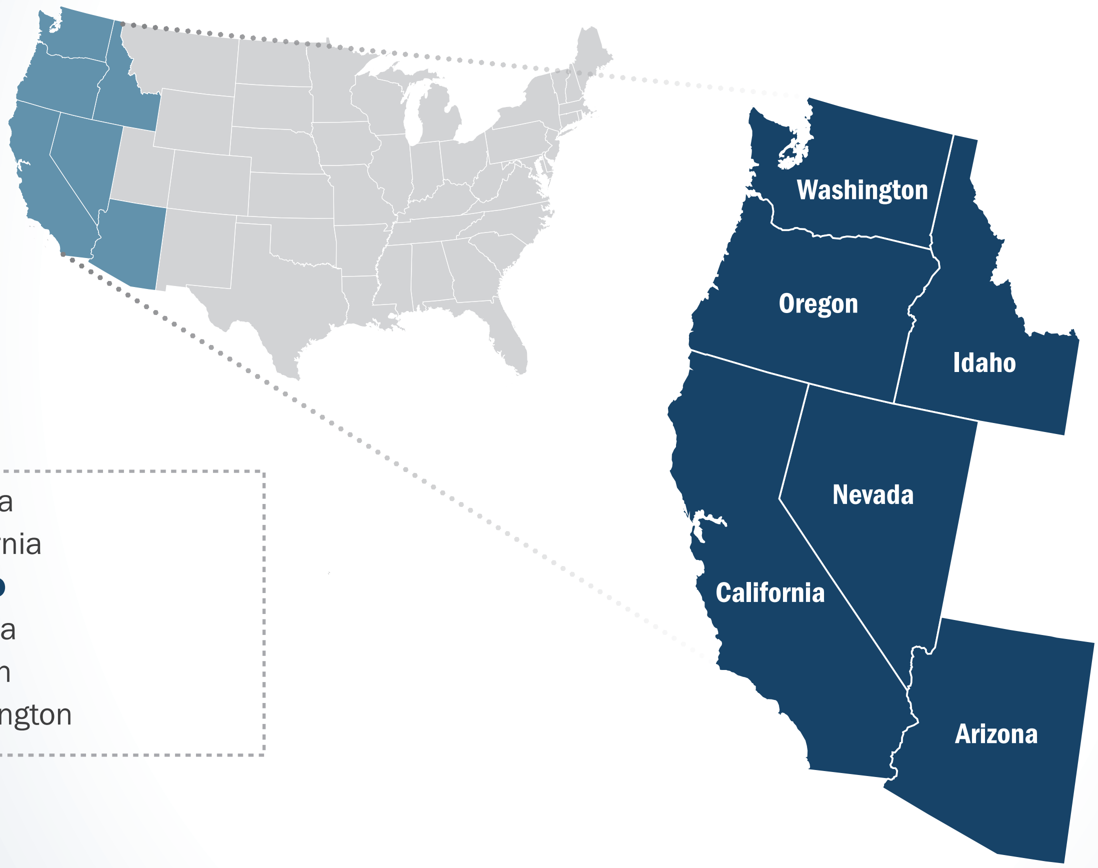
Nationwide Public Safety Broadband Network
Draft Programmatic Environmental Impact Statement for the Western United States

VOLUME 3 - CHAPTER 5



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First Responder Network Authority

FirstNet®

Nationwide Public Safety Broadband Network

Draft Programmatic Environmental Impact Statement for the Western United States

VOLUME 3 - CHAPTER 5

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Cooperating Agencies
Federal Communications Commission
General Services Administration
U.S. Department of Agriculture—Rural Utilities Service
U.S. Department of Agriculture—U.S. Forest Service
U.S. Department of Agriculture—Natural Resource Conservation Service
U.S. Department of Defense—Department of the Air Force
U.S. Department of Energy
U.S. Department of Homeland Security

September 2016

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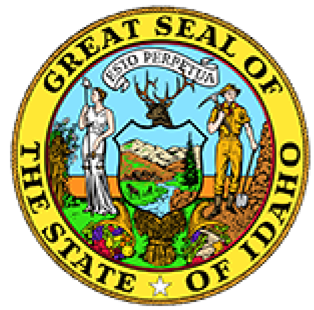
5. IDAHO



Idaho was populated for centuries by American Indian tribes with a rich cultural history. The first Europeans to visit the region were among those on the Lewis and Clark Expedition, which crossed the region in 1804 on their way to the Pacific Ocean. Idaho became a U.S. territory in 1863 and entered the Union as the 43rd state in 1890 (Idaho State Historical Society, 2015a). Idaho is bordered by Canada and Montana to the north, Washington and Oregon to the west, Nevada and Utah to the south, and Montana and Wyoming to the east. This chapter provides details about the existing environment of Idaho as it relates to the Proposed Action.

General facts about Idaho are provided below:

- **State Nickname:** The Gem State
- **Land Area:** 82,643 square miles; **U.S. Rank:** 11 (U.S. Census Bureau, 2012a)
- **Capital:** Boise
- **Counties:** 44 (State of Idaho, 2016a)
- **2014 Estimated Population:** Over 1.6 million people; **U.S. Rank:** 39 (U.S. Census Bureau, 2015a)
- **Most Populated Cites:** Boise City, Nampa, Pocatello, Idaho Meridian, Idaho Falls, and Pocatello (U.S. Census Bureau, 2015b)
- **Main Rivers:** Kootenai, Pend Oreille, Coeur d'Alene, Spokane, Clearwater, Salmon, Western Snake, Upper Snake, Deep Creek, and Bear (IDWR, 2010)
- **Mountain Ranges:** Coeur d' Alene Mountains, Clearwater Mountains, Seven Devils Mountains, Beaverhead Mountains, Lemhi Range, Lost River Range, Smokey Mountains, Pioneer Mountains, Albion Mountains, Bannock Range, Portneuf Range, Caribou Range, and Bear River Range (Idaho State University, 2016)
- **Highest Point:** Borah Peak (12,662 ft.) (USGS, 2016a)

5.1. AFFECTED ENVIRONMENT

5.1.1. Infrastructure

5.1.1.1. Definition of the Resource

This section provides information on key Idaho infrastructure resources that could potentially be affected by FirstNet projects. Infrastructure consists of the systems and physical structures that enable a population in a specified area to function. Infrastructure is entirely manmade with a high correlation between the type and extent of infrastructure and the degree to which an area is characterized as "developed" Infrastructure includes a broad array of facilities such as utility systems, streets and highways, railroads, airports, buildings and structures, ports, harbors, and other manmade facilities. Individuals, businesses, government entities, and virtually all relationships between these groups depend on infrastructure for their most basic needs, as well as for critical and advanced needs (e.g., emergency response, health care, and telecommunications).

Section 5.1.1.3 provides an overview of the traffic and transportation infrastructure in Idaho, including road and rail networks and airport facilities. Idaho public safety infrastructure could include any infrastructure utilized by a public safety entity[1] as defined in Title VI of the Middle Class Tax Relief and Job Creation Act of 2012 (Public Law [Pub. L.] No. 112-96, Title VI Stat. 156 (codified at 47 United States Code [U.S.C.] 1401 et seq.) (the Act), including infrastructure associated with police, fire, and emergency medical services (EMS). However, other organizations can qualify as public safety services as defined by the Act. Public safety services in Idaho are presented in more detail in Section 5.1.1.4. Section 5.1.1.5 describes specific public safety communications infrastructure and commercial telecommunications infrastructure in Idaho. An overview of utilities in Idaho, such as power, water, and sewer, is presented in Section 5.1.1.6.

5.1.1.2. Specific Regulatory Considerations

Multiple Idaho laws and regulations pertain to the state's public utility and transportation infrastructure and its public safety community. Table 5.1.1-1 identifies the relevant laws and regulations, the regulatory agencies, and their jurisdiction as derived from the state's applicable statutes and administrative rules. Appendix C, Environmental Laws and Regulations, identifies applicable federal laws and regulations.

[1] The term "public safety entity" means an entity that provides public safety services (7 U.S. Code [U.S.C.] § 1401(26)).

Table 5.1.1-1: Relevant Idaho Infrastructure Laws and Regulations

State Law/Regulation	Regulatory Agency	Applicability
Idaho Statutes (IS): Title 61 Public Utility Regulation; Title 62 Railroads and Other Public Utilities: Idaho Administrative Code (IAC): Chapter 31, Public Utilities Commission	Idaho Public Utilities Commission	Supervises and regulates all railroad, common carrier, pipeline, gas, electric, telephone, and water public utility companies within the state
IS: Title 36 Fish and Game; Title 39 Health and Safety: IAC: Chapter 13 Department of Fish and Game; Chapter 58 Department of Environmental Quality (DEQ)	Idaho Department of Fish and Game; Idaho DEQ	Obtains and manages lands and waters or rights to lands and waters for wildlife protection and environmental conservation purposes; provides for the protection of environmental values, including clean air, water, and soil
IS: Title 46 Militia and Military Affairs: IAC: Chapter 15.13 Emergency Response Commission	Bureau of Homeland Security, under the Military Division of the Office of the Governor	Plans and prepares for disasters and emergencies and coordinates the implementation of the state's public safety wireless radio interoperable communications systems
IS: Title 21 Aeronautics; Title 40 Highways and Bridges: IAC Chapter 39 Department of Transportation	Idaho Department of Transportation	Regulates and oversees the development and operation of the state's aviation and highway facilities and services
IS: Title 67 State Government and State Affairs	Idaho State Historical Society	Assists and encourages the recognition and preservation of the state's cultural, historic, archeological, and architectural resources

5.1.1.3. Transportation

This section describes the traffic and transportation infrastructure in Idaho, including specific information related to the road networks, airport facilities, and rail networks. The movement of vehicles is commonly referred to as traffic, as well as the circulation along roads. Roadways in the state can range from multilane road networks with asphalt surfaces, to unpaved gravel or private roads. The information regarding existing transportation systems in Idaho are based on a review of maps, aerial photography, and federal and state data sources.

The Idaho Transportation Department (ITD) has jurisdiction over freeways and major roads, airports, and railroads in the state; local counties have jurisdiction for smaller streets and roads. The mission of the ITD is "Your Safety. Your Mobility. Your Economic Opportunity" (ITD, 2015a).

Idaho has an extensive and complex transportation system across the entire state. The state's transportation network consists of:

- 48,082 miles of public roads (FHWA, 2014a) and 4,431 bridges (FHWA, 2015a);
- 1,709.5 miles of rail network that includes passenger rail and freight (ITD, 2013);

- 282 aviation facilities, including airstrips and heliports (FAA, 2015a); and
- Idaho has one small river port (Port of Lewiston 2016).

Road Networks

As identified in Figure 5.1.1-1, the metropolitan areas of the state from north to south are Coeur d'Alene, Lewiston, Boise City, Pocatello, and Idaho Falls (U.S. Census Bureau, 2015d). Idaho's four major interstates connect its metropolitan areas to one another, as well as to other states. Travel outside the major metropolitan areas is conducted on Interstates, state and county roads. Table 5.1.1-2 lists the interstates and their start/end points in Idaho. Per the national standard, even numbered interstates run from west to east with the lowest numbers beginning in the south; odd numbered interstates run from north to south with the lowest numbers beginning in the west (FHWA, 2015b).

Table 5.1.1-2: Idaho Interstates

Interstate	Southern or Western Terminus in Idaho	Northern or Eastern Terminus in Idaho
I-15	UT line near Malad City	MT line near Humphrey
I-84	OR line near Fruitland	UT line near Stone
I-86	I-84 in Heyburn	I-15 in Pocatello
I-90	WA line near Post Falls	MT line near Mullan

Source: (FHWA, 2015b)

In addition to the Interstate System, Idaho has both National Scenic Byways and State Scenic Byways. National and State Scenic Byways are roads that are recognized for one or more archaeological, cultural, historic, natural, recreational, and scenic qualities (FHWA 2013). Figure 5.1.1-1 illustrates the major transportation networks, including roadways, in Idaho. Section 5.1.8, Visual Resources, describes the National and State Scenic Byways found in Idaho from an aesthetic perspective.

National Scenic Byways are roads with nationwide interest; the byways are designated and managed by the U.S. Department of Transportation's Federal Highway Administration (FHWA). Idaho has six National Scenic Byways (FHWA, 2015c):

- International Selkirk Loop,
- Northwest Passage Scenic Byway,
- Payette River Scenic Byway,
- Pend Oreille Scenic Byway,
- Pioneer Historic Byway, and
- Western Heritage Historic Byway.

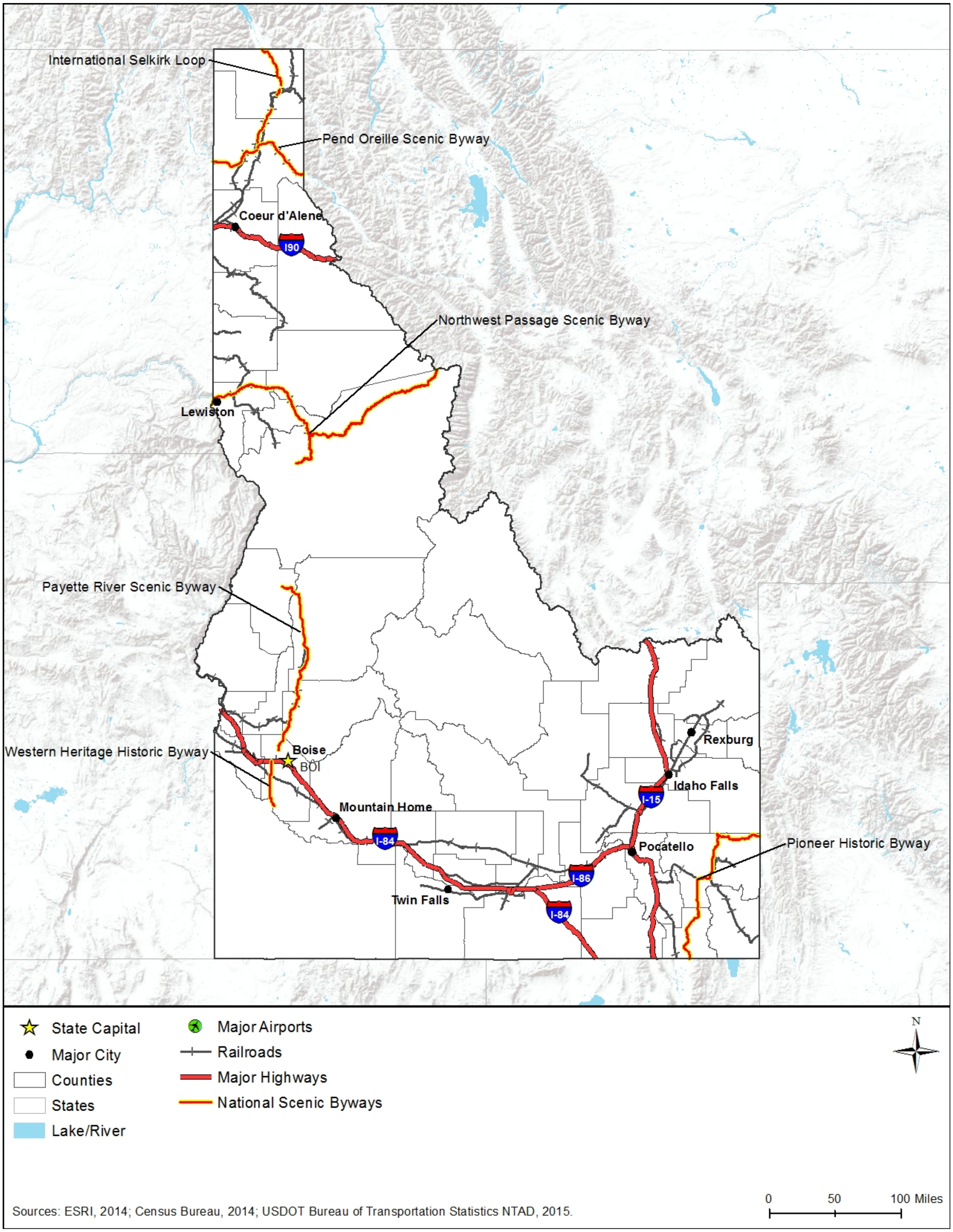


Figure 5.1.1-1: Idaho Transportation Networks

State Scenic Byways are roads with statewide interest; State Scenic Byways are designated and managed by ITD. Some State Scenic Byways may be designated on portions of National Scenic Byways. Idaho has 25 State Scenic Byways that crisscross the entire state (ITD, 2009):[2]

- City of Rocks Back Country Byway
- Elk River Back Country Byway
- Fort Henry Historic Byway
- Gold Rush Historic Byway
- Hells Canyon Scenic Byway
- Lake Coeur d'Alene Scenic Byway
- Lewis and Clark Back Country Byway
- Lost Gold Trails Loop
- Main Oregon Trail Back Country Byway
- Mesa Falls Scenic Byway
- Oregon Trail-Bear Lake Scenic Byway
- Owyhee Uplands Back Country Byway
- Panhandle Historic Rivers Passage
- Peaks to Craters Scenic Byway
- Ponderosa Pine Scenic Byway
- Sacajawea Historic Byway
- Salmon River Scenic Byway
- Sawtooth Scenic Byway
- Snake River Canyon Scenic Byway
- St. Joe River Scenic Byway
- Teton Scenic Byway
- Thousand Springs Scenic Byway
- White Pine Scenic Byway
- Wild Horse Trail Scenic Byway
- Wildlife Canyon Scenic Byway

Airports

Passenger air service in Idaho is provided primarily by six public commercial airports (FAA, 2015b); the largest airport is Boise Air Terminal/Gowen Field (BOI), which is owned and operated by the City of Boise (BOI, 2015). BOI is the 75th busiest airport in the nation, as measured by number of passengers served (FAA, 2015b). In 2014, BOI served 2,692,093 passengers, facilitated 127,552 aircraft operations, and moved 89,361,082 pounds of freight (FAA, 2015b) (BOI, 2014). Figure 5.1.1-1 illustrates the major transportation networks, including airports, in the state. Section 5.1.7, Land Use, Recreation, and Airspace, provides greater detail on airports and airspace in Idaho.

Rail Networks

Idaho is connected to a network of passenger rail (Amtrak) and freight rail. Figure 5.1.1-1 illustrates the major transportation networks, including rail lines, in Idaho.

Amtrak runs one line through Idaho: the Empire Builder. The Empire Builder runs every day between Chicago and either Portland or Seattle, with the only stop in Idaho occurring in Sandpoint (ITD, 2013). In fiscal year 2011, Amtrak served 5,296 passengers in Idaho (ITD, 2013). Table 5.1.1-3 provides a complete list of Amtrak lines that run through Idaho.

Table 5.1.1-3: Amtrak Train Routes Serving Idaho

Route	Starting Point	Ending Point	Length of Trip	Cities Served in Idaho
Empire Builder	Chicago, IL	Portland, OR/Seattle, WA	46 hours	Sandpoint

Source: (Amtrak, 2015)

[2] The total number of State Scenic Byways may not include those segments of National Scenic Byways that are also designated as State Scenic.

Almost all of the 1,709.5 miles of railroad track in Idaho are owned by freight railroad companies (ITD, 2013). Two Class I freight rail companies operate in the state, BNSF Railway and Union Pacific Railroad, which own 995.8 miles of all track in Idaho (ITD, 2013). One Class II railroad owns 33.5 miles of track and nine Class III railroads own 680.2 miles of track in the state (ITD, 2013). Of all the freight rail movement in Idaho, 87 percent is pass through traffic that neither originates nor terminates in the state (ITD, 2013). Originating and terminating freight rail in Idaho totals approximately five percent of traffic in the state, with only two percent of the movement traveling entirely within Idaho (ITD, 2013). Of the freight rail traffic originating in Idaho, 60 percent carries agricultural or food products (ITD, 2013).

Harbors and Ports

Idaho has one small river port at on the Columbia-Snake River system, approximately 465 river miles from the Pacific Ocean. The port serves primarily barge traffic for break bulk and oversize cargos and agriculture commodities morning between points wests along the waterway and inland to Canada, Wyoming, Montana, and North Dakota. The port also handles containerized cargo. (Port of Lewiston 2016)

“There are four dams on each of the rivers, totaling eight dams and locks that help vessels move upstream and downstream between the Port of Lewiston and Portland/Vancouver. These locks move vessels some 222 meters (730 vertical feet) from the coastline to the Port of Lewiston. The 4.3-meter (14-foot) river channel can accommodate loaded barges with an average 3 meters (10 feet) of draft and tugs with from 3.4 to 3.7 meters (11 to 12 feet) of draft.” (World Port Source 2016)

Port of Lewiston infrastructure includes 3 docks, 6.2 million bushel capacity grain elevators, 150,000 square foot warehouse facility, 10 truck bays, and 5 rail bays (served by Burlington Northern/Santa Fe and Union Pacific). Cargos handled by the port include paper and forest products, coal, agricultural products, and manufactured goods. Over-sized cargo shipped through the port include refinery equipment destined for the Kearl Oil Sands in Alberta Canada and wind-powered generators for the U.S. Midwest region (World Port Source 2016).

5.1.1.4. Public Safety Services

Idaho public safety services consist of public safety infrastructure and first responder personnel. The general abundance and distribution of public safety services may roughly follow key state demographic indicators. Table 5.1.1-4 presents Idaho’s key demographics including population (estimated); land area; population density; and number of municipal governments. More information about these demographics is presented in Section 5.1.9, Socioeconomics.

Table 5.1.1-4: Key Idaho Indicators

Idaho Indicators	
Estimated Population (2014)	1,634,464
Land Area (square miles) (2010)	82,643
Population Density (persons per sq. mile) (2014)	20
Municipal Governments (2012)	200

Sources: (U.S. Census Bureau, 2015a) (U.S. Census Bureau, 2012a) (U.S. Census Bureau, 2013)

Table 5.1.1-5 presents Idaho's public safety infrastructure, including fire and police stations. Table 5.1.1-6 identifies first responder personnel including dispatch, fire and rescue, law enforcement, and emergency medical personnel in the state.

Table 5.1.1-5: Public Safety Infrastructure in Idaho by Type

Infrastructure Type	Number
Fire and Rescue Stations [a]	466
Law Enforcement Agencies [b]	117
Fire Departments [c]	194

[a] Data collected by the U.S. Fire Administration in 2015.
[b] Number of state and local law enforcement agencies, which include: local police departments, sheriffs' offices, primary state law enforcement agencies, special jurisdictional agencies, and other miscellaneous agencies, collected by the U.S. Bureau of Justice Statistics in 2008.
[c] Data collected by the U.S. Fire Administration in 2015.

Sources: (U.S. Fire Administration, 2015) (U.S. Bureau of Justice Statistics, 2011)

Table 5.1.1-6: First Responder Personnel in Idaho by Type

First Responder Personnel	Number
Police, Fire and Ambulance Dispatchers [a]	470
Fire and Rescue Personnel [b]	5,463
Law Enforcement Personnel [c]	5,290
Emergency Medical Technicians and Paramedics [d e]	1,090

[a] BLS Occupation Code: 43-5031.
[b] BLS Occupation Codes: 33-2011 (Firefighters), 33-2021 (Fire Inspectors and Investigators), 33-1021 (First-Line Supervisors of Fire Fighting and Prevention Workers), and 53-3011 (Ambulance Drivers and Attendants, Except Emergency Medical Technicians). Volunteer firefighters reported by the U.S. Fire Administration.
[c] Full-time employees from state and local law enforcement agencies which include: local police departments, sheriffs' offices, primary state law enforcement agencies, special jurisdictional agencies, and other miscellaneous agencies, collected by the U.S. Bureau of Justice Statistics in 2008.
[d] BLS Occupation Code: 29-2041.
[e] All BLS data collected in 2015.

Sources: (U.S. Fire Administration, 2015) (U.S. Bureau of Justice Statistics, 2011) (BLS, 2015a)

5.1.1.5. Telecommunications Resources

There is no central repository of information for public safety communications infrastructure and commercials telecommunications infrastructure in Idaho; therefore, the following information and data are combined from a variety of sources, as referenced.

Communications throughout the state are based on a variety of publicly and commercially owned technologies, including coaxial cable (traditional copper cable), fiber optics, hybrid fiber optics/coaxial cable, microwave, wireless, and satellite systems providing voice, data, and video services (BLS, 2016). Figure 5.1.1-2 presents a typical wireless configuration including both a narrowband public safety land mobile radio network (traditional radio network) and a commercial broadband access network (wireless technology); backhaul (long-distance wired or wireless connections), core, and commercial networks including a long term evolution (LTE) evolved packet core (modern broadband cellular networks); and network applications (software) delivering voice, data, and video communications (FCC, 2016a).

Public Safety Communications

In order to protect and best serve the public interest, first responder and law enforcement communities must be able to communicate effectively. The evolution of the communications networks used by public safety stakeholders toward a broadband wireless technology, such as LTE (see Section 2.1.1), has the potential to provide users with better coverage, while offering additional capacity and enabling the use of new applications that would likely make their work safer and more efficient. Designing such a network presents several challenges due to the uniqueness of the deployment, the requirements, and the nationwide scale (NIST, 2015). Historically, there have been many challenges and impediments to timely and effective sharing of information. Chief among these factors impacting information sharing are: network coverage gaps, land mobile radio system infrastructure diversity, insufficient budgets, and diverse radio frequencies. Communication interoperability has also been a persistent challenge, along with issues concerning spectrum availability, embedded infrastructure, and differing standards among stakeholders (NTFI, 2005). This has caused a fragmented approach to communications implementation across the United States and at a state level, including in Idaho.

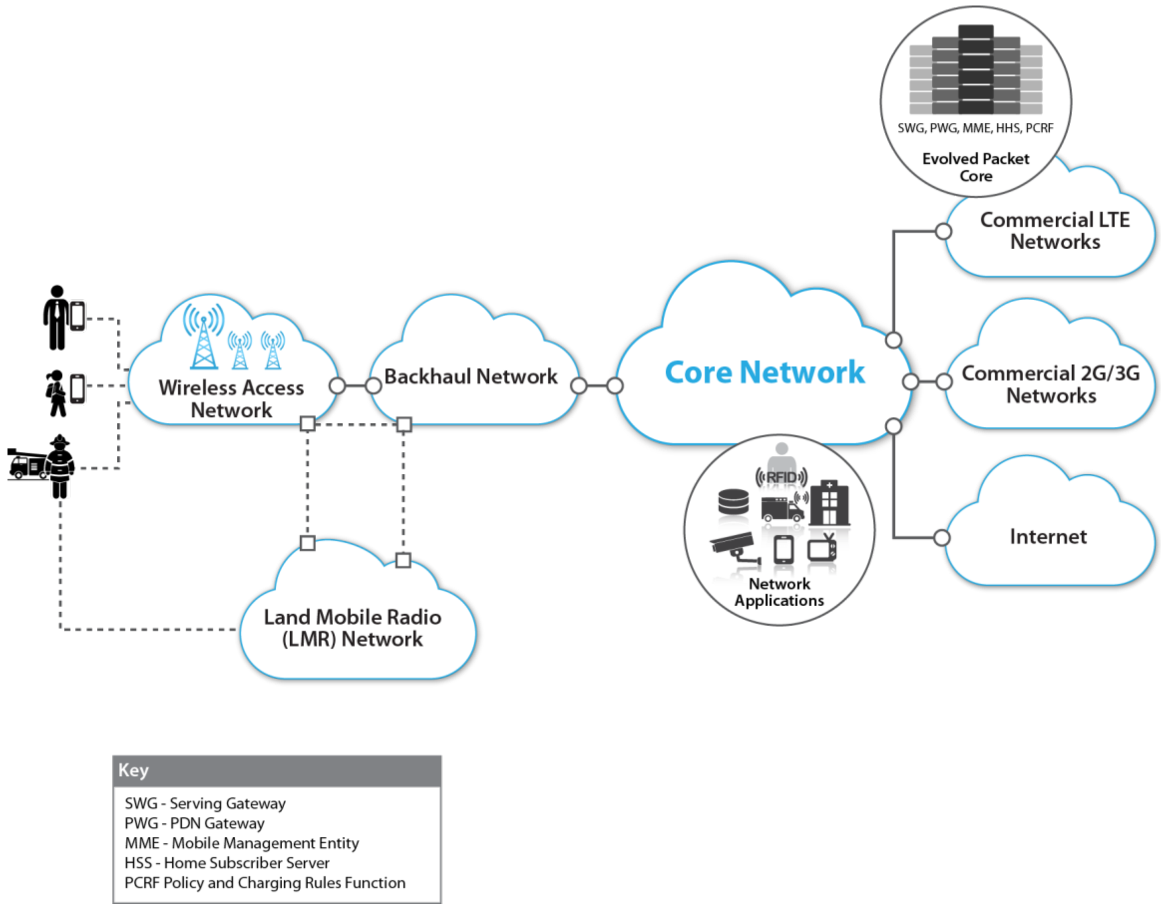


Figure 5.1.1-2: Typical Wireless Network Configuration

Prepared by: Booz Allen Hamilton

There are five key reasons why public safety agencies often cannot connect through existing communications (NTFI, 2005):

- Incompatible and aging communications equipment,
- Limited and fragmented funding,
- Limited and fragmented planning,
- A lack of coordination and cooperation, and
- Limited and fragmented radio spectrum.

To help enable the public safety community to incorporate disparate Land Mobile Radio networks with a nationwide public safety LTE broadband network, the U.S. Department of Commerce Public Safety Communications Research Program (PSCR) – Boulder Laboratories, in 2015, prepared a locations-based services (LBS) research and development roadmap to examine the current state of location-based technologies, forecast the evolution of LBS capabilities and gaps, and identify potential research and development opportunities that would improve the public safety community's use of LBS within operational settings. This is the first of several technology roadmaps that PSCR plans to develop over the next few years to better inform investment decisions (PSCR, 2015).

Like most states, Idaho's public safety LMR network environment is facing transition and reflects the challenges of the need for greater system capabilities, particularly in continuing to enhance and expand the state's adoption of digital P25 systems. The modernization of legacy Very High Frequency (VHF)[3] and Ultra High Frequency (UHF)[4] analog systems in the state will require parallel investments in system maintenance and increased overall network and radio upgrades, in order to improve public safety LMR interoperability.

Based on a commissioned third-party assessment conducted in 2008 regarding the best alternative for modernization of Idaho's public safety networks, the state elected the digital 700 MHz technology and has standardized on this platform to achieve improved interoperability, coverage, and narrowband voice/data capabilities. Idaho's Bureau of Homeland Security (BHS) summarized this approach and its key elements as follows: "The system shall consist of the state of Idaho microwave backbone, Ada County master site, and other systems, gateways and bridges for state and local governmental agencies. The proposed system will be called the Idaho Cooperative Agencies Wireless Interoperable Network (ICAWIN)" (Idaho Bureau of Homeland Security, 2011). The ICAWIN system operates on 700 MHz and allows for interoperability with legacy public safety VHF systems used by police, fire, and EMS in the state (RadioReference.com, 2015a). The system is also interoperable with the standalone five county 700 MHz Eastern Idaho system, the Eastern ICAWIN. Idaho's BHS is the state agency which has responsibility for the ICAWIN system planning, oversight, and operations.

Statewide/Multi-County Public Safety Networks

Emergency response and public safety services are organized and delivered in Idaho on a Regional and District basis which map to the state's county structure. Figure 5.1.1-3 depicts this structure, with the state divided into six districts and three regions (which also correspond to the Idaho State Police radio coverage territories) (SIEC, 2009).

Idaho's statewide public safety network operates on 700 MHz and is a digital Project 25 (P25) system, providing multi-agency communications across the state. Figure 5.1.1-4 depicts the state's digital tower locations, as well as its digital microwave backbone network which supports the statewide LMR system (State of Idaho, 2008).

The Eastern ICAWIN is a digital P25 network operating at 700 MHz covering five eastern Idaho counties (Bonneville, Jefferson, Madison, Fremont, and Clark). It is interoperable with the legacy fire and EMS VHF systems, and with ICAWIN (RadioReference.com, 2015b).

WyoLink, Wyoming's statewide VHF digital P25 network, also covers two counties in Idaho: Bear Lake and Bonneville Counties.

[3] VHF band covers frequencies ranging from 30 MHz to 300 MHz (NTIA, 2005).
[4] UHF band covers frequencies ranging from 300 MHz to 3000 MHz (NTIA, 2005).

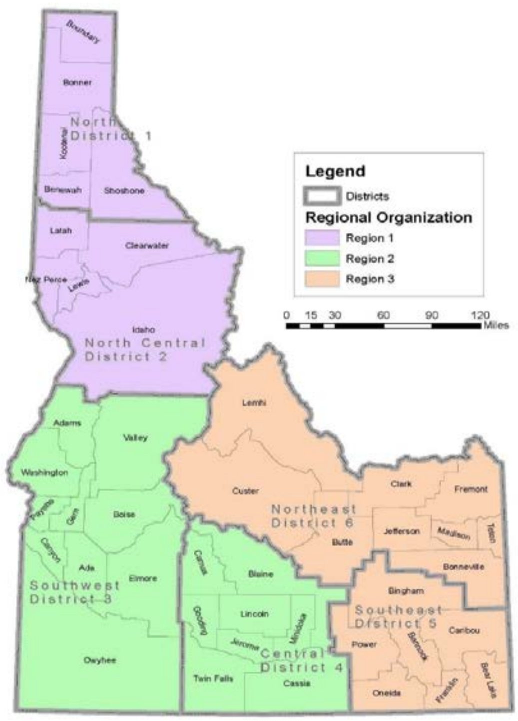


Figure 5.1.1-3: Idaho Emergency Response Regional/District County Structure

Source: (State of Idaho, 2008)

County/City Public Safety Networks

Like most states, Idaho's public safety agencies have adopted a mix of LMR technologies, systems, and frequencies at the state, county, and local levels. Although Idaho has recommended standardization on digital P25 technology, support for VHF and UHF systems remains an explicit part of the state's LMR strategy given the need to provide ongoing support for legacy LMR systems. As the Statewide Interoperability Executive Council (SIEC) report states, "It should be clearly understood that while 700 MHz appears to provide the most capacity and options for the system as a whole, this concept clearly recognizes that some areas of the state and some agencies will likely continue to operate in the VHF (130-170MHz) or the UHF (400-500MHz) bands and that will be accommodated in the final statewide system as necessary" (SIEC, 2009).

With the availability of the statewide ICAWIN digital P25 network in the state, many county and city public safety agencies in Idaho now have adopted this 700 MHz system as their primary system.

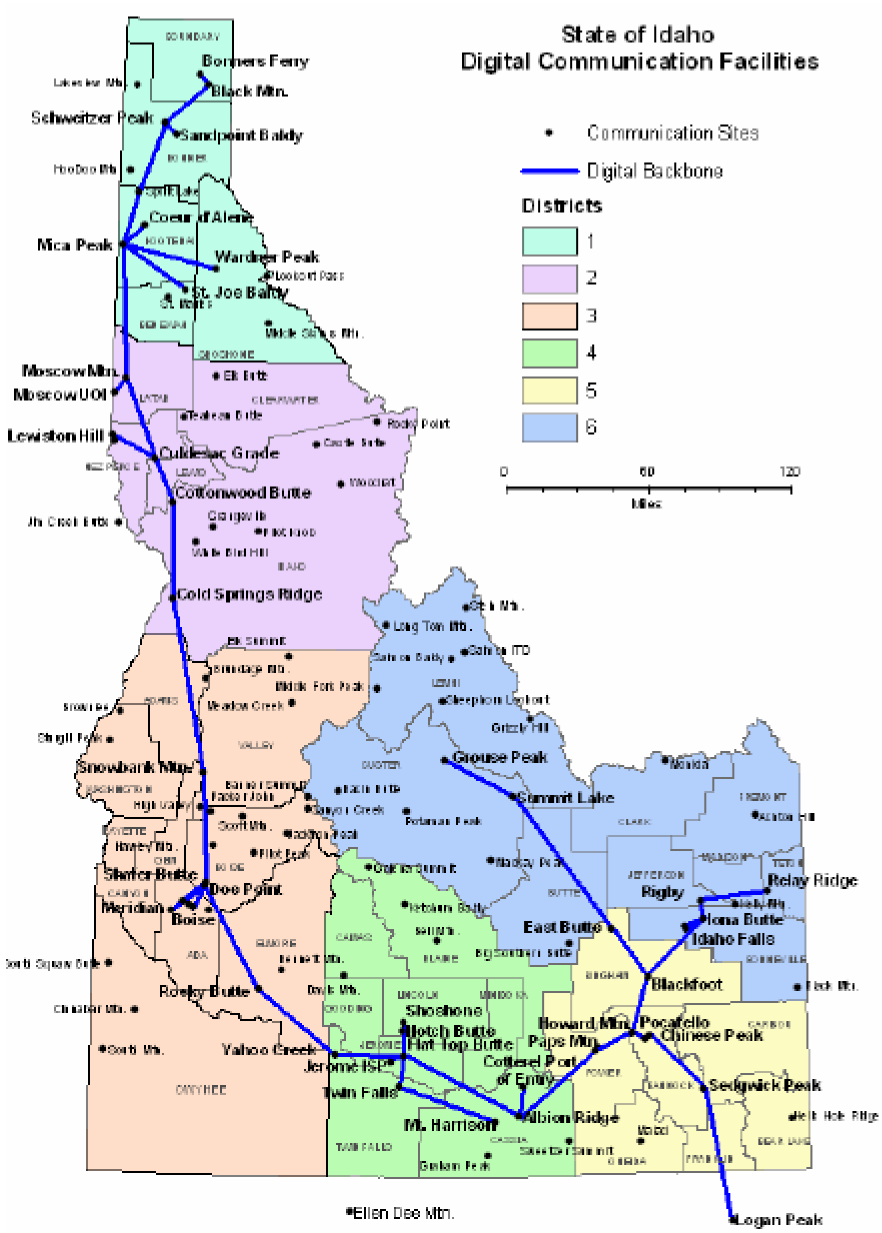


Figure 5.1.1-4: Idaho Digital Microwave Backbone and Wireless Tower Site Locations

Source: (State of Idaho, 2008)

Ada County in southwestern Idaho illustrates this situation, as Ada County law and fire agencies have adopted the statewide ICAWIN system and the legacy VHF and UHF frequencies have been relegated in general for back-up and redundancy purposes. In Boise, which is in Ada County and the state's capital, the police department has already discontinued use of its legacy UHF system in favor of the ICAWIN system for ongoing communications requirements (RadioReference.com, 2015c).

Madison County in eastern Idaho is another county which reflects both the diversity of frequencies in use in Idaho's counties, as well as the adoption of digital P25 technology. In Madison County, the Easter ICAWIN digital P25 700 MHz network is used by the sheriff's department for law dispatch, with law dispatch communications simulcast on both 700 MHz and UHF (RadioReference.com, 2015d). In Rexburg and Sugar City, fire dispatch and tactical communications operate on VHF (RadioReference.com, 2015e). The standalone Madison County ID system is a multi-location system providing coverage to not only Madison County law, fire, and EMS users, but also to two additional counties in the state: Fremont and Teton (RadioReference.com, 2015f).

Public Safety Answering Points

According to the Federal Communication Commission's (FCC) Master PSAP registry, there are 71 primary and secondary PSAPs in Idaho serving Idaho's 44 counties (FCC, 2015).

Commercial Telecommunications Infrastructure

Idaho's commercial telecommunications industry and infrastructure is robust with multiple service providers, offering products and services via the full spectrum of telecommunications technologies (FCC, 2014a) (FCC, 2014b). The following sub-sections present information on Idaho's commercial telecommunications infrastructure, including information on the number of carriers and technologies deployed; geographic coverage; voice, Internet access, and wireless subscribers; and the quantity and location of telecommunications towers, fiber optic plant, and data centers.

Carriers, Coverage, and Subscribers

Idaho's commercial telecommunications industry provides the full spectrum of telecommunications technologies and networks, including coaxial cable (traditional copper cable), fiber optics, hybrid fiber optics/coaxial cable, microwave, wireless, and satellite systems.

Table 5.1.1-7 presents the number of providers of switched access[5] lines, Internet access[6], and mobile wireless services including coverage.

Table 5.1.1-7: Telecommunications Access Providers and Coverage in Idaho as of December 2013

Commercial Telecommunications Access Providers	Number of Service Providers	Coverage of Households
Switched access lines [a]	114	97.1% of households [b]
Internet access [c]	55	48% of households
Mobile wireless [d]	25	86% of population

[a] Switched access lines are a service connection between an end user and the local telephone company's switch (the basis of older telephone services); this number of service providers was reported by the FCC as of December 31, 2013 in Table 17 as the total of ILEC and non-ILEC providers (FCC, 2014b).
[b] Household coverage data provided by the FCC in "Universal Service Monitoring Report" as a Voice Penetration percentage (percentage of household with a telephone in the unit) and is current as of 2013.
[c] Internet access providers are presented in Table 21 by technology provided; the number of service providers is calculated by subtracting the reported Mobile Wireless number from the total reported number of providers. Household coverage is provided in Table 13 (FCC, 2014a).
[d] Mobile wireless provider data was retrieved from the FCC National Broadband Map website (www.broadbandmap.gov/data-download). The process of the data collection is explained in the broadband footnote.

Sources: (FCC, 2013) (FCC, 2014a) (FCC, 2014b) (NTIA, 2014)

Table 5.1.1-8 shows the wireless providers in Idaho along with their geographic coverage. The following four maps,

Figure 5.1.1-5 to Figure 5.1.1-8 show the combined coverage for the top two providers; Sprint and T-Mobile's coverage; DIGIS, SafeLink Internet, and Speed Connects coverage; and the coverage of all other providers with less than five percent coverage area, respectively.[7]

[5] "A service connection between an end user and the local telephone company's switch; the basis of plain old telephone services (POTS)." (FCC, 2013)
[6] Internet access includes Digital Subscriber Line (DSL), cable modem, fiber, satellite, and fixed wireless providers.
[7] The broadband map utilized data collected as part of the broadband American Recovery and Reinvestment Act initiative. The data was retrieved from the FCC National Broadband Map website (www.broadbandmap.gov/data-download). Each state's broadband data was downloaded accordingly. The data pertaining to broadband data/coverage for census blocks, streets, addresses, and wireless were used. Census blocks, roads, and addresses were merged into one file and dissolved by similar business and provider names. Square miles were calculated for each provider. The maps show all providers over 5% on separate maps; providers with areas under 5% percent were merged and mapped as "Idaho Other Fiber Providers." All Wireless providers were mapped as well; those with areas under 5% were merged and mapped as "Idaho Other Wireless Providers." Providers under 5% were denoted in their respective tables.

Table 5.1.1-8: Wireless Telecommunications Coverage by Providers in Idaho

Wireless Telecommunications Providers	Coverage
AT&T Mobility LLC	51.46%
Verizon Wireless	50.99%
Sprint	13.37%
DIGIS	11.77%
T-Mobile	9.16%
SafeLink Internet	8.85%
Speed Connect	6.90%
Other[a]	15.01%

Source: (NTIA, 2014)

[a] Other: Provider with less than 5 percent coverage area. Providers include: OneWave Networks; Inland Cellular; Cricket Wireless; AIR-PIPE; Filer Mutual Telephone Company; First Step Internet; Intermax Networks; Clearwire; Nez Perce Tribe; Farmers Mutual Telephone Company; Silver Star Communications; Leader Communications, LCC; Ptera; Red Spectrum Communication; QRO High-Speed Internet of Idaho; Custer Telephone Broadband Services; Project Mutual Telephone Cooperative Association, Inc.; IdahoWiFi; BitSmart; Palousetronics; Craner Technology Services; St. Maries Gazette Record; CTC Internet; Wilderness Wireless; MTE Communications.

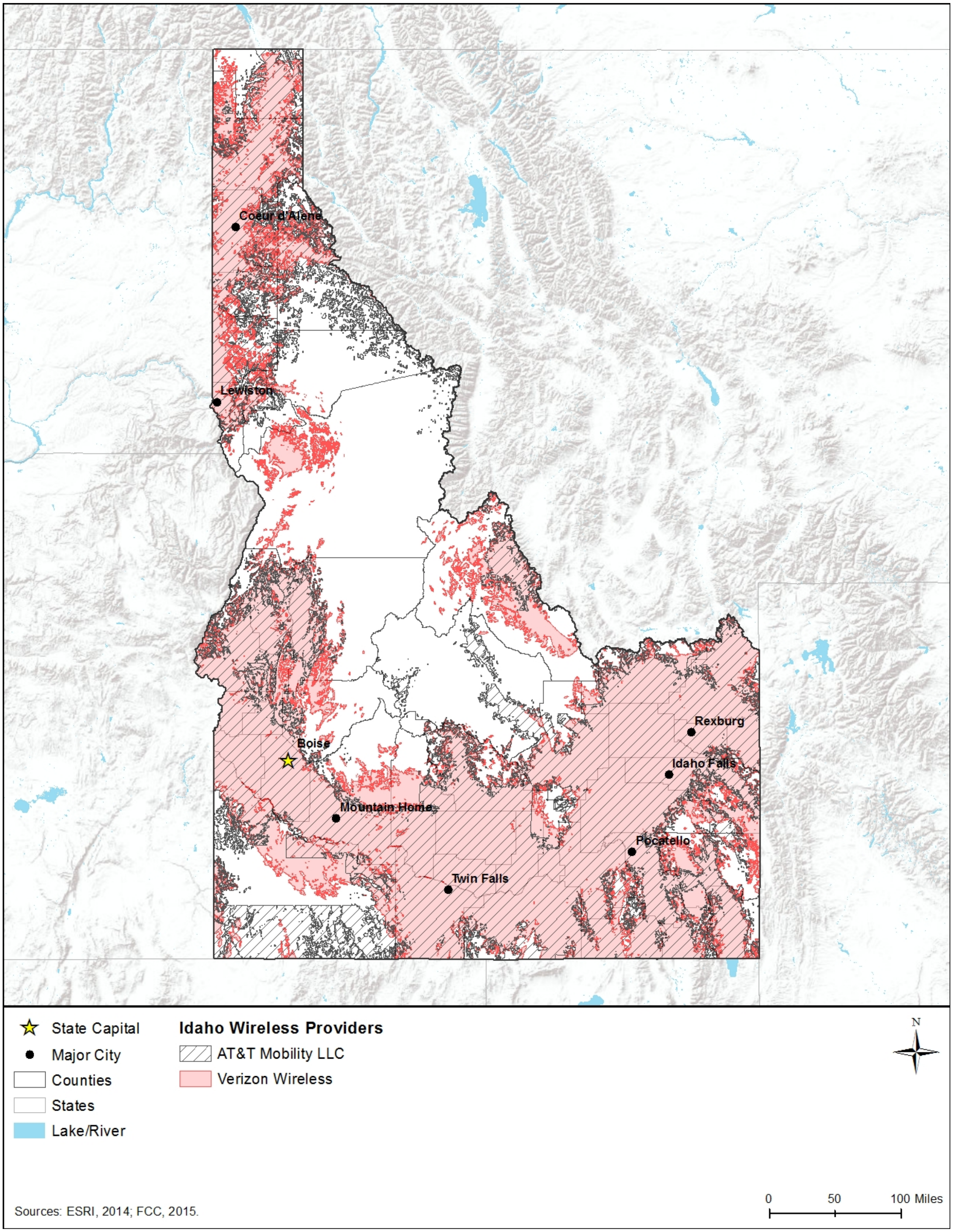


Figure 5.1.1-5: Top Wireless Providers Availability in Idaho

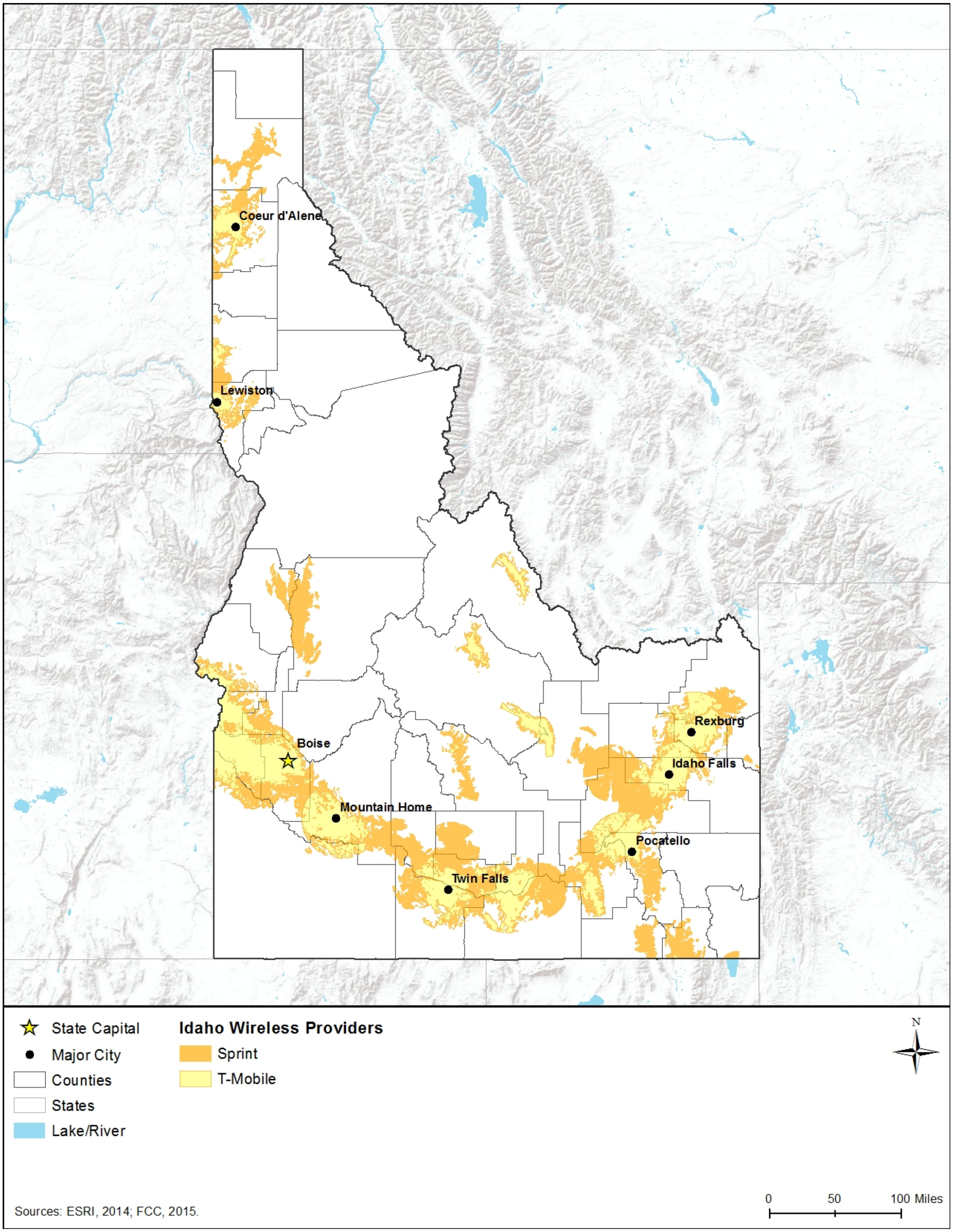


Figure 5.1.1-6: Sprint and T-Mobile Wireless Availability in Idaho

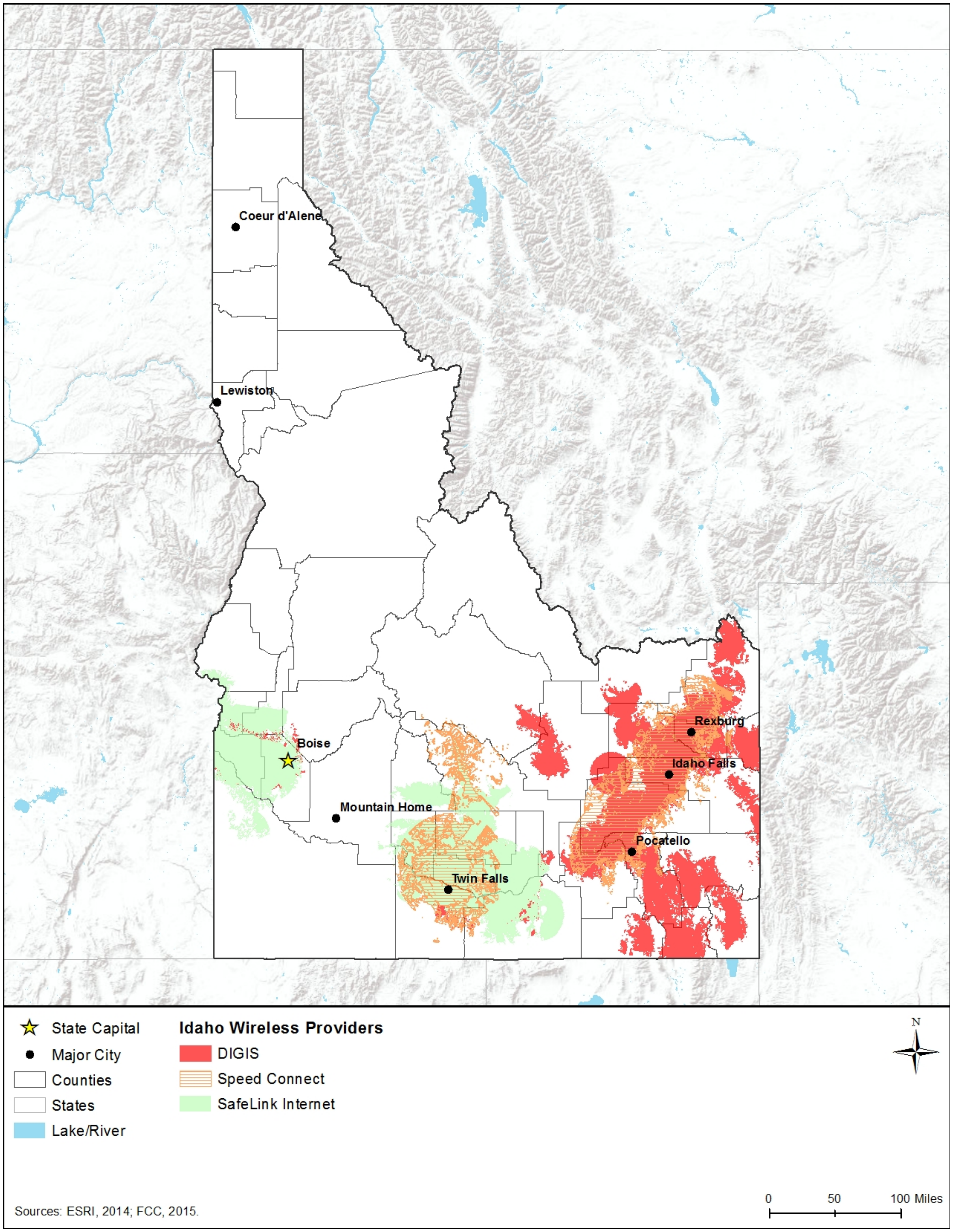


Figure 5.1.1-7: DIGIS, SafeLink Internet, and Speed Connect Wireless Availability in Idaho

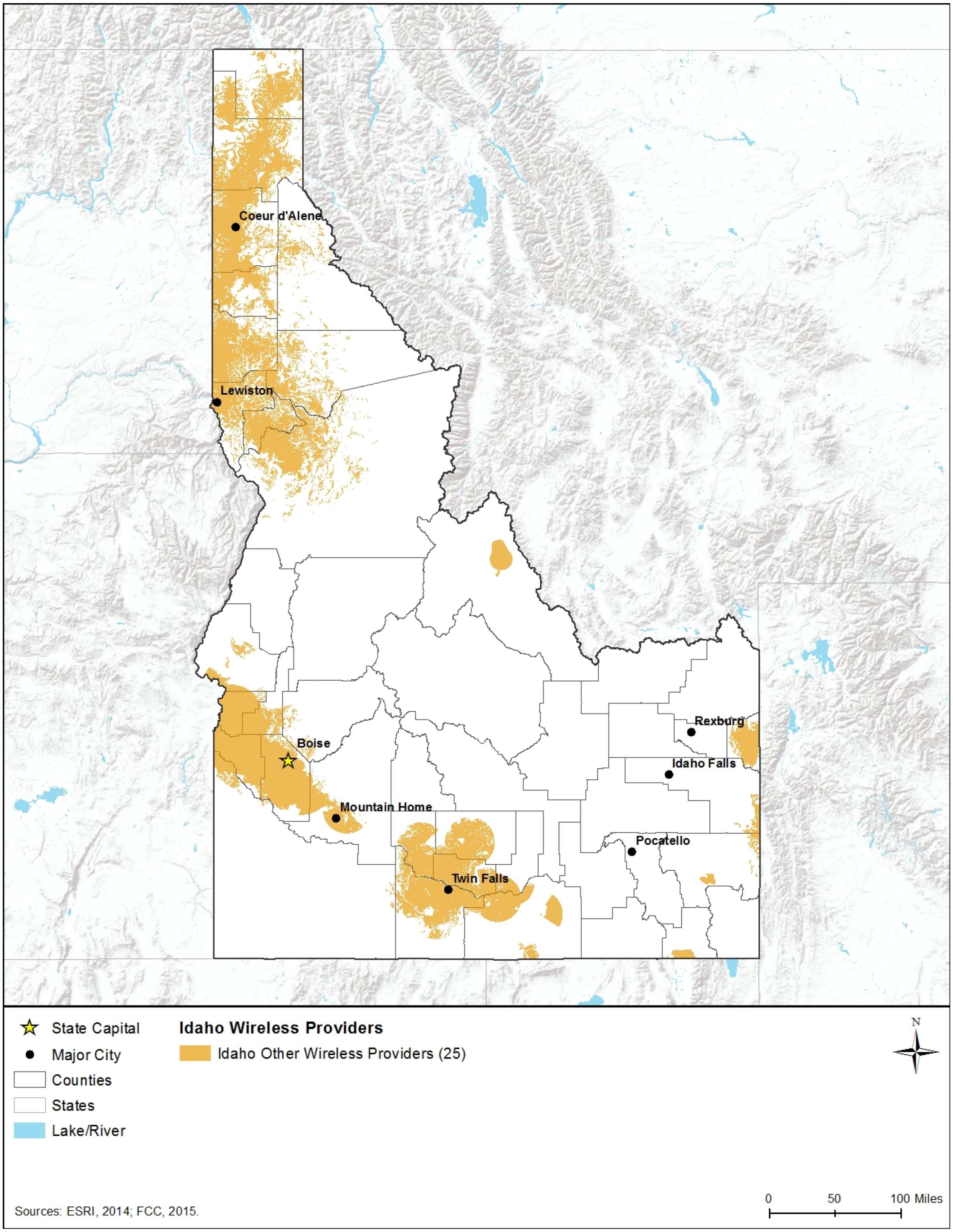


Figure 5.1.1-8: Other Provider Wireless Availability in Idaho

Towers

There are many types of domestic towers employed today by the telecommunications industry, government agencies, and other owners. Towers are designed and used for a variety of purposes, and the height, location, and supporting structures and equipment are all designed, constructed, and operated according to the technical specifications of the spectrum used, the type of equipment mounted on the tower, geographic terrain, need for line-of-sight transmissions to other towers, radio frequency needs, and other technical specifications. There are three general categories of stand-alone towers: monopole, lattice, and guyed. Typically, monopole towers are the smallest, followed by lattice towers at a moderate height, and guyed towers at taller heights (with the guyed wires providing tension support for the taller heights) (CSC, 2007). In general, taller towers can provide communications coverage over larger geographic areas, but require more land for the actual tower site, whereas shorter towers provide less geographic coverage and require less land for the tower site (USFS, 2009a). Figure 5.1.1-9 presents representative examples of each of these categories or types of towers.

Monopole
100 – 200 feet
Source: *http://laps.noaa.gov/birk/laps_intranet/site_photos/Monarch/tower.jpg*

Lattice
200 – 400 feet
Source: Personal Picture

Guyed
200 – 2,000 feet
Source: *http://www.esrl.noaa.gov/gmd/ccgg/insitu/*

Figure 5.1.1-9: Types of Towers

Telecommunications tower infrastructure proliferates throughout Idaho, although tower infrastructure is concentrated in the higher and more densely populated areas of Idaho. Owners of towers and some types of antennas are required to register those infrastructure assets with the FCC (FCC 2016).[8] Table 5.1.1-9 presents the number of towers (including broadcast towers) registered with the FCC in Idaho, by tower types, and Figure 5.1.1-10 presents the location of those structures, as of June 2016.

[8] An antenna structure must be registered with the FCC if the antenna structure is taller than 200 feet above ground level or may interfere with the flight path of a nearby airport. (FCC, 2016d)

Table 5.1.1-9: Number of Commercial Towers in Idaho by Type

Constructed[a] Towers[b]		**Constructed Monopole Towers**	
100ft and over	16	100ft and over	0
75ft – 100ft	105	75ft – 100ft	0
50ft – 75ft	104	50ft – 75ft	2
25ft – 50ft	187	25ft – 50ft	23
25ft and below	73	25ft and below	11
Subtotal	**485**	**Subtotal**	**46**
Constructed Guyed Towers		**Buildings with Constructed Towers**	
100ft and over	2	100ft and over	0
75ft – 100ft	7	75ft – 100ft	0
50ft – 75ft	3	50ft – 75ft	0
25ft – 50ft	2	25ft – 50ft	0
25ft and below	1	25ft and below	0
Subtotal	**15**	**Subtotal**	**0**
Constructed Lattice Towers		**Multiple Constructed Structures[c]**	
100ft and over	0	100ft and over	0
75ft – 100ft	7	75ft – 100ft	0
50ft – 75ft	18	50ft – 75ft	0
25ft – 50ft	19	25ft – 50ft	0
25ft and below	9	25ft and below	0
Subtotal	**53**	**Subtotal**	**0**
Constructed Tanks[d]			
Tanks	3		
Subtotal	**3**		
Total All Tower Structures		**602**	

Source: (FCC, 2016b)

[a] Planned construction or modification has been completed. Results will return only those antenna structures that the FCC has been notified are physically built or planned modifications/alterations to a structure have been completed. (FCC, 2016b)

[b] Self standing or guyed (anchored) structure used for communication purposes. (FCC, 2012)

[c] Multiple constructed structures per antenna registration. (FCC, 2016c)

[d] Any type of tank – water, gas, etc. with a constructed antenna. (FCC, 2016c)

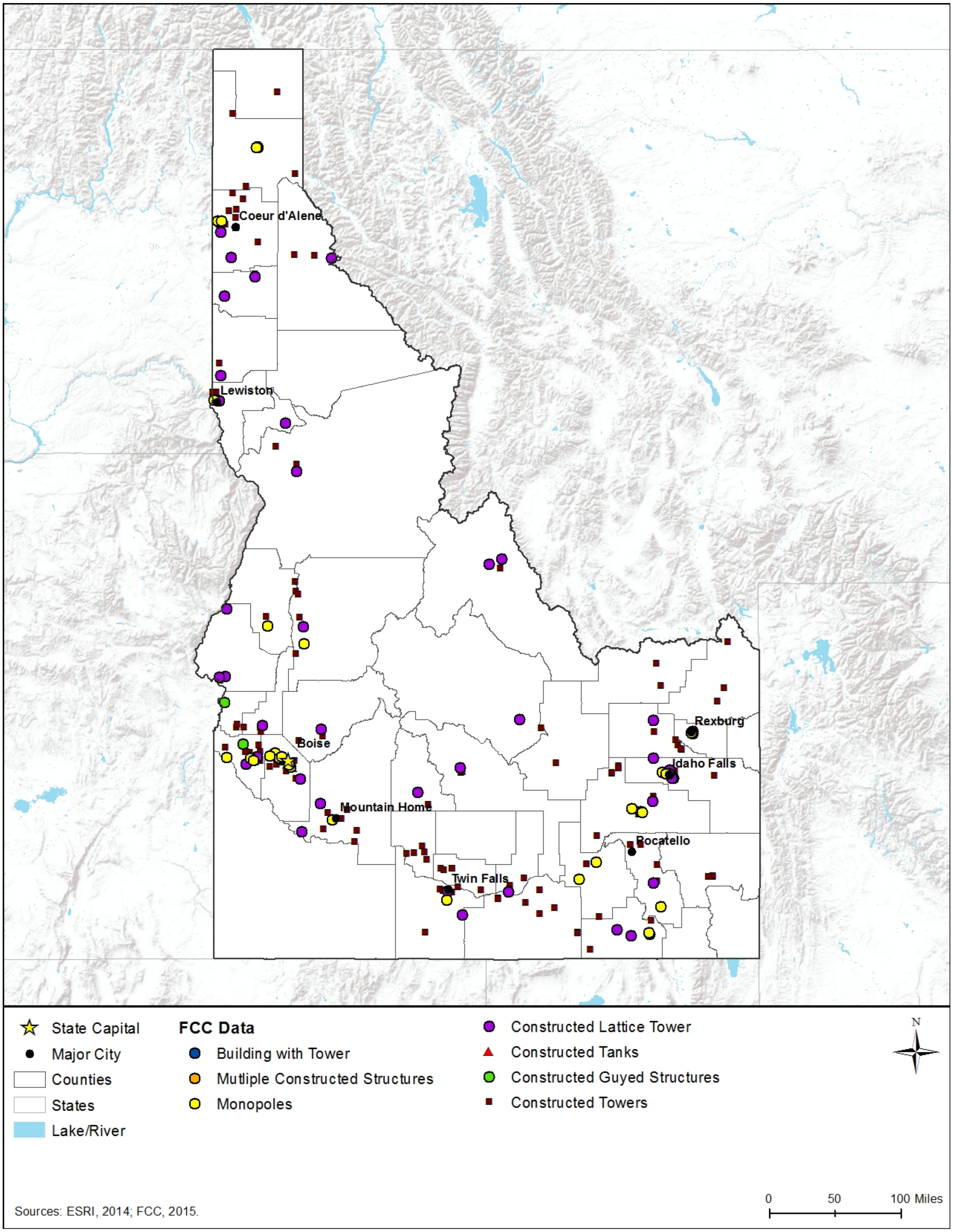


Figure 5.1.1-10: FCC Tower Structure Locations in Idaho

Fiber Optic Plant (Cables)

Fiber optic plant, or cables, can be buried directly in the ground; pulled, blown, or floated into ducts, conduits, or innerduct (flexible plastic protective sleeves or tubes); placed under water; or installed aerially between poles, typically on utility rights-of-way. A fiber optic network includes an access network consisting of a central office, distribution and feeder plant (cables of various sizes directly leaving a central office and splitting to connect users to the network), and a user location, as shown in Figure 5.1.1-11. The network also may include a middle mile component (shorter distance cables linking the core network between central offices or network nodes across a region) and a long haul network component (longer distance cables linking central offices across regions) (FCC, 2000).

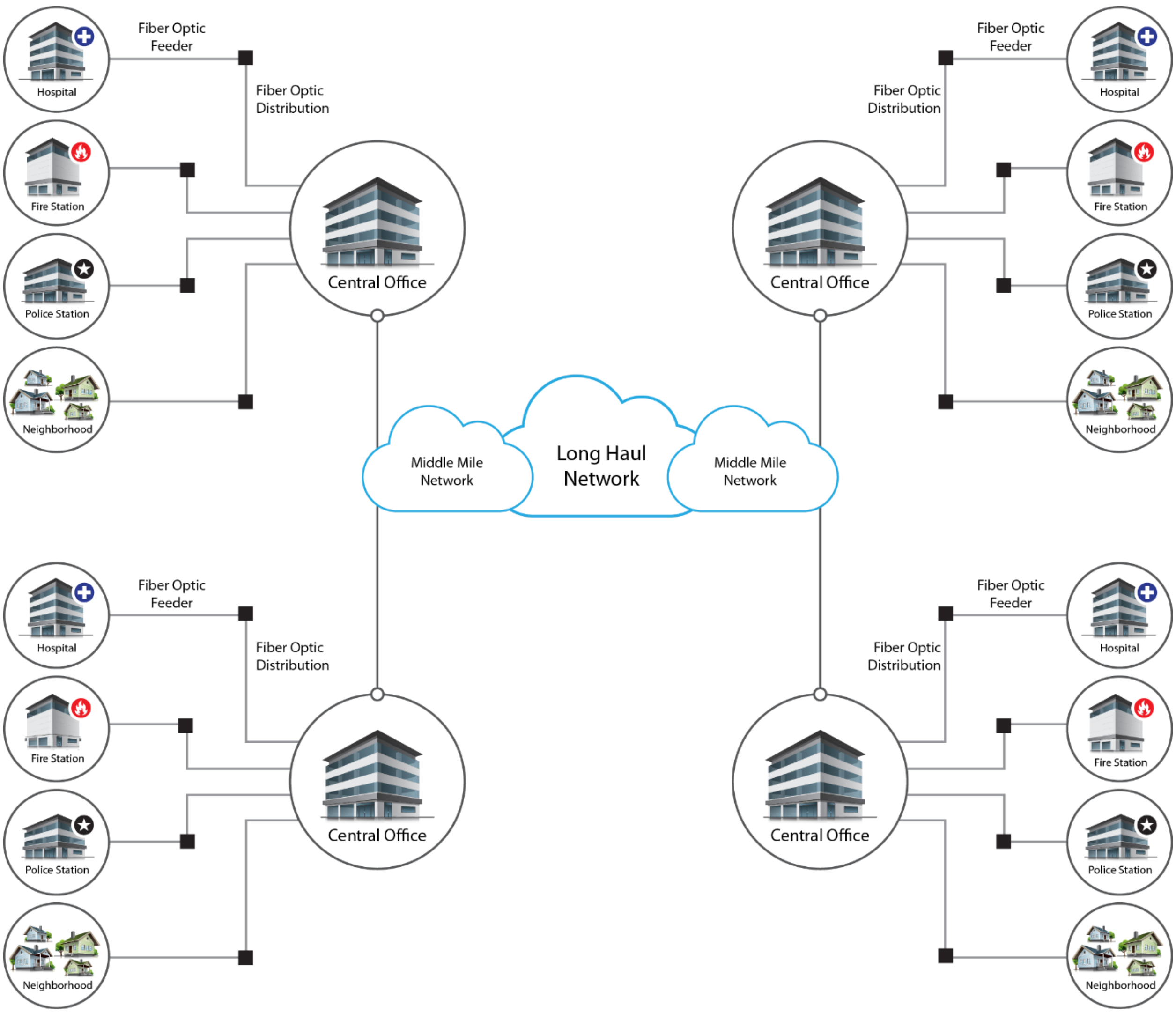


Figure 5.1.1-11: Typical Fiber Optic Network in Idaho

Source: (ITU-T, 2012)

Prepared by: Booz Allen Hamilton

Last Mile Fiber Assets

In Idaho, fiber access networks are concentrated in the highest population centers as shown in the figures below. In Idaho, there are 35 fiber providers that offer service in the state, as listed in Table 5.1.1-10. Figure 5.1.1-12 shows coverage for CenturyLink and Frontier Communications, Figure 5.1.1-13 shows coverage for Albion Telephone Company and Cable ONE, and Figure 5.1.1-14 shows coverage for providers with less than five percent coverage area, respectively.

Table 5.1.1-10: Fiber Provider Coverage

Fiber Provider	Coverage
CenturyLink	2.5673%
Frontier Communications	2.0340%
Albion Telephone Company	1.3372%
Cable ONE	1.2575%
Other[a]	4.76%

Source: (NTIA, 2014)

[a] Other: Provider with less than 5 percent coverage area. Providers include: Project Mutual Telephone Cooperative Association, Inc.; Rural Telephone Company; Fremont Communications; Silver Star Communications; MTE Communications; Custer Telephone Cooperative, Inc.; Direct Communications; Cambridge Telephone; Time Warner Cable; Filer Mutual Telephone Company; Integra Telecom; Oregon-Idaho Utilities, Inc.; Mud Lake Telephone Cooperative Association, Inc.; Farmers Mutual Telephone Company; Inland Telephone Company; Suddenlink Communications; Zito Media; TW Telecom; Cox Communications; Syringa Networks, LLC; TDS; Level 3 Communications, LLC; Northland Cable Television; Concept Communication Corp.; First Step Internet; CTC Internet; AIR-PIPE; Comcast; Westel Fiber; Mullan Cable; Cogent Communications

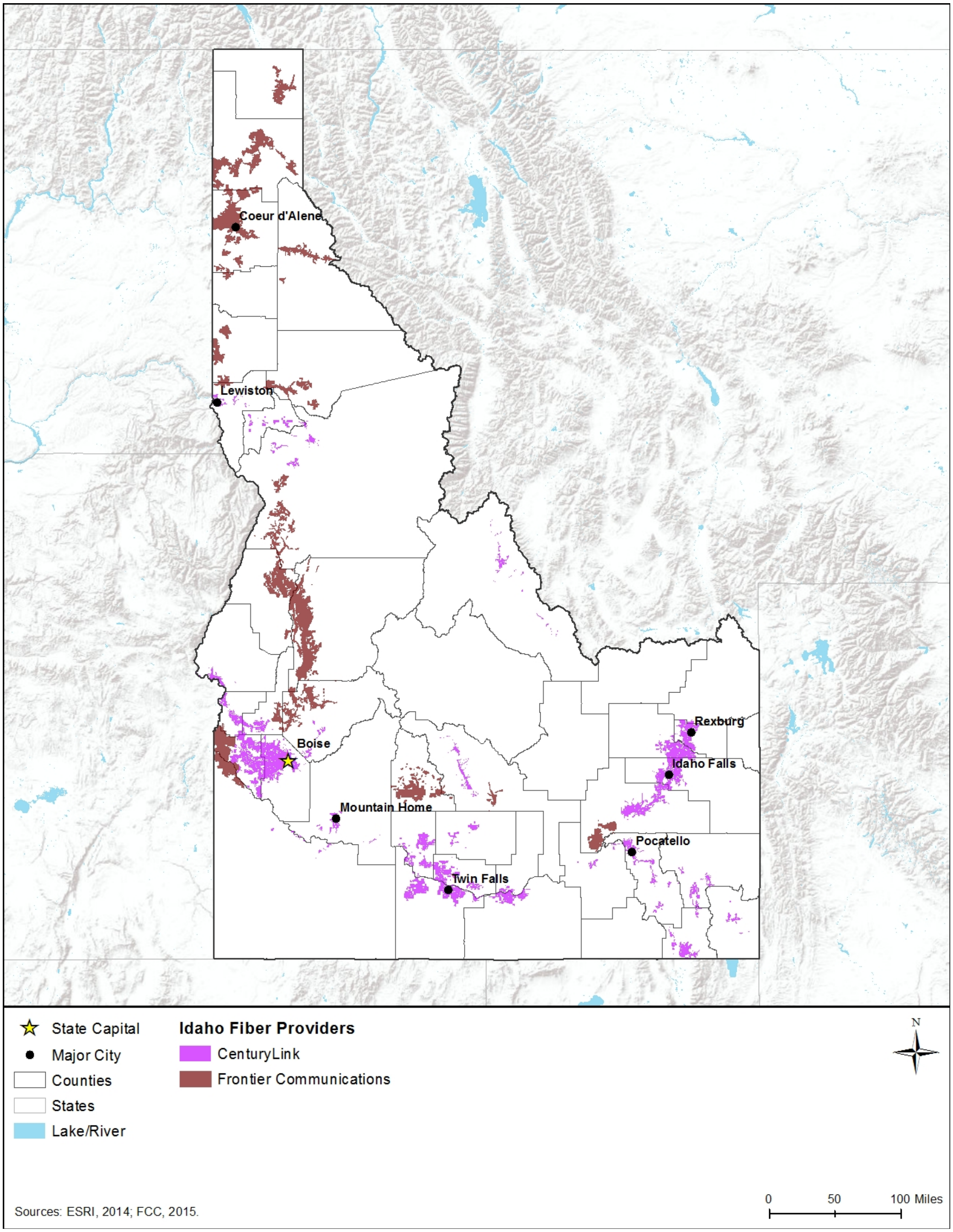


Figure 5.1.1-12: Fiber Availability in Idaho for CenturyLink and Frontier Communications

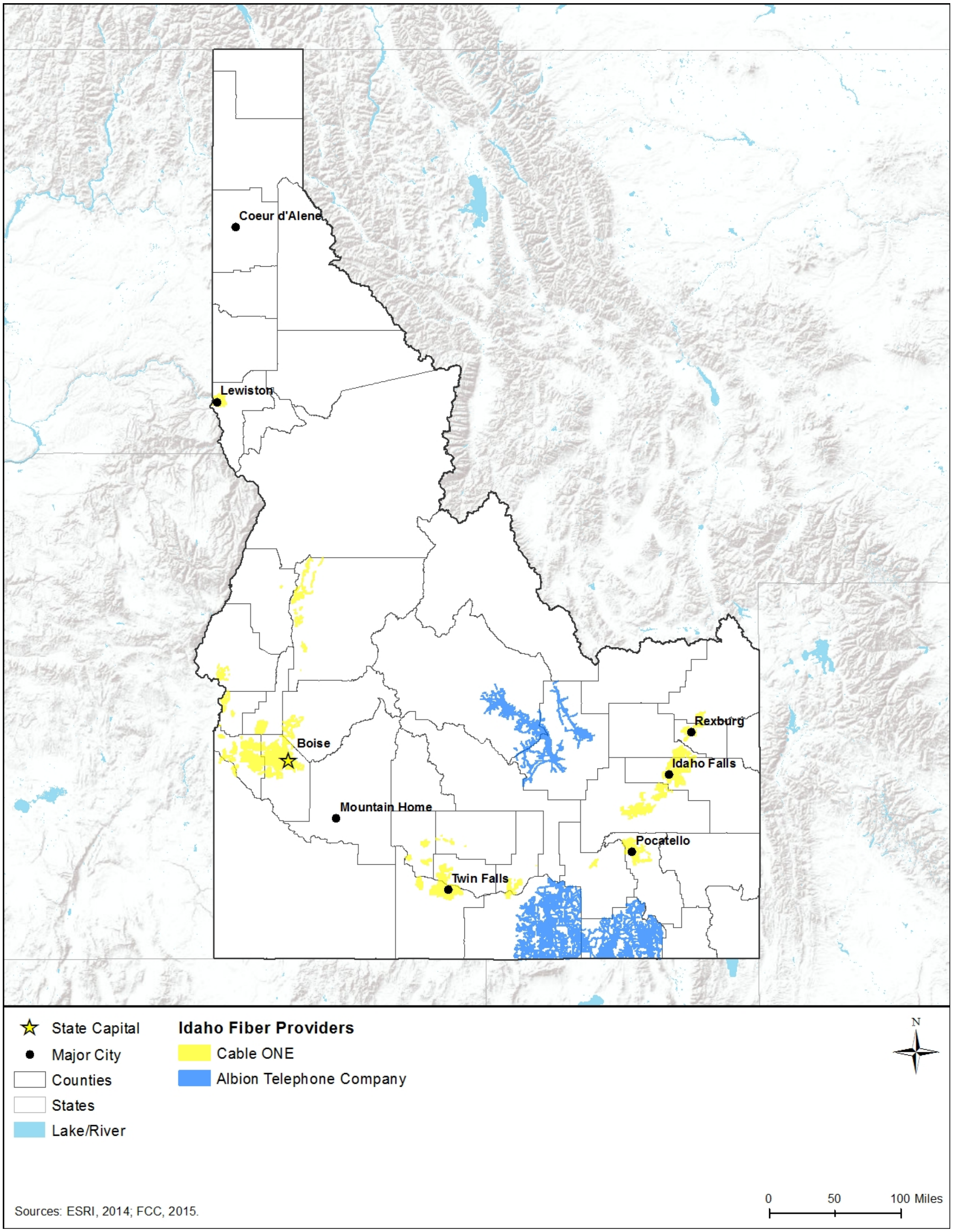


Figure 5.1.1-13: Albion Telephone Company and Cable ONE's Fiber Availability in Idaho

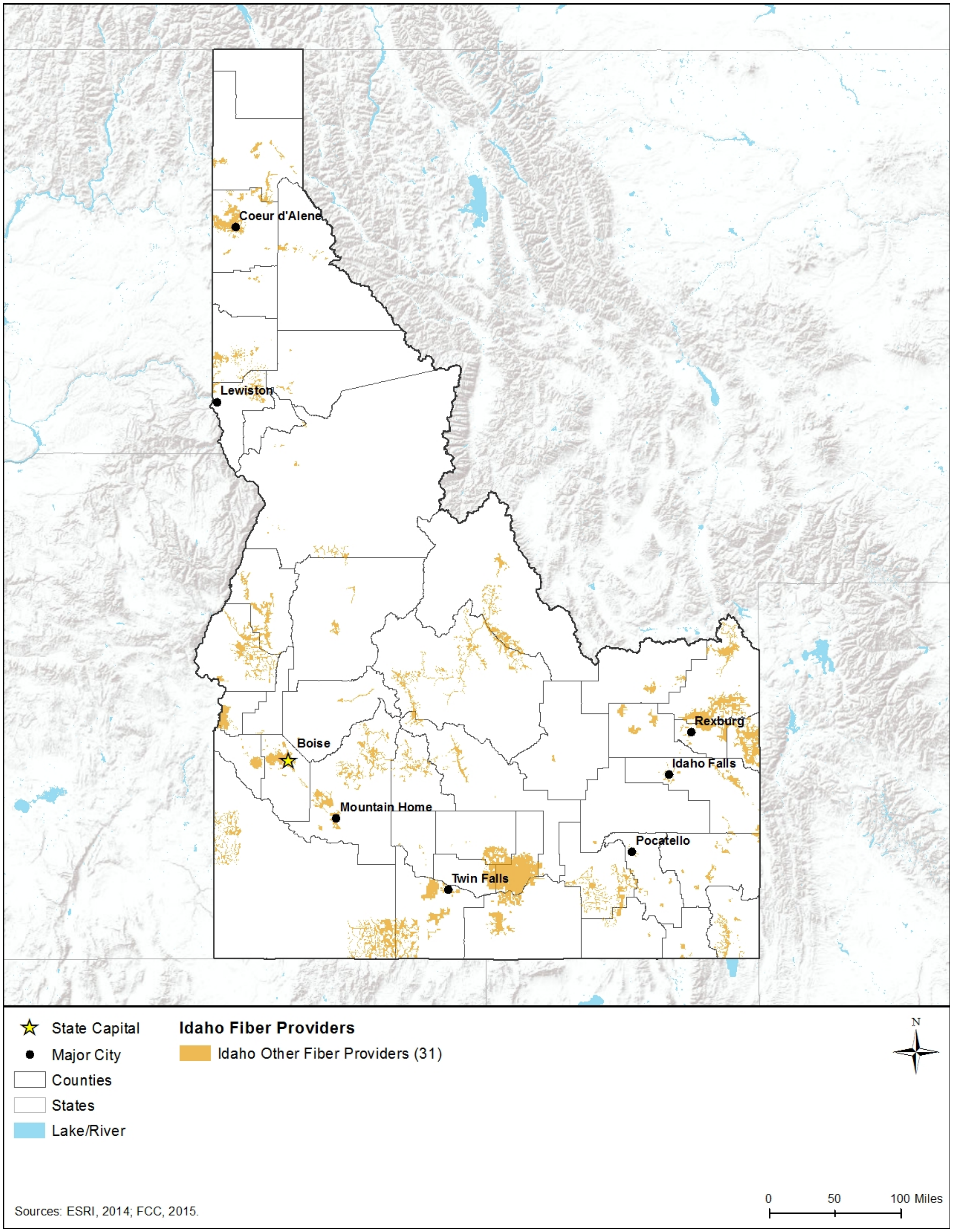


Figure 5.1.1-14: Other Providers Fiber Availability in Idaho

Data Centers

Data centers (also known as network access points, collocation facilities, hosting centers, carrier hotels, and Internet exchanges) are large telecommunications facilities that house routers, switches, servers, storage, and other telecommunications equipment. These data centers facilitate efficient network connectivity among and between telecommunications carriers and between carriers and their largest customers. These facilities also provide racks and cages for equipment, power and cooling, cabling, physical security, and 24x7 monitoring (CIO Council, 2015; GAO, 2013). Ownership of data centers may be public or private; comprehensive information regarding data centers may not be publicly available as some are related to secure facilities.

5.1.1.6. Utilities

Utilities are the essential systems that support daily operations in a community and cover a broad array of public services, such as electricity, water, wastewater, and solid waste. Section 5.1.4, Water Resources, describes the potable water sources in the state.

Electricity

Electric utilities owned by investors or private companies have some aspects of their operation regulated by the Idaho Public Utilities Commission (PUC). This regulation involves setting the utility rates and ensuring quality service for customers regarding issues related to billing or customer service. Their jurisdiction does not extend to customer-owned cooperatives of municipal electric utilities (PUC, 2015a). There are three electric utilities that are regulated by the PUC: Avista, Idaho Power, and Rocky Mountain Power (PUC, 2015b). Most of the electricity generated in Idaho comes from hydroelectric plants and, in 2014, 9,002,000 megawatthours[9] of electricity was produced by these plants (EIA, 2015a). This accounted for 60 percent of the total 15,184,000 megawatthours generated in the state. Other sources of energy production included wind power and natural gas, which accounted for 18 and 17 percent, respectively. Aside from these sources, biomass, geothermal (the result of Idaho’s natural volcanic formations), and coal based facilities all produced negligible amounts of electricity (EIA, 2015a). “82 percent of Idaho’s net electricity generation came from renewable energy resources, and Idaho had the fifth lowest average electricity prices in the United States” in 2014 (EIA, 2015b). During the same year, in-state generated electricity only accounted for 65 percent of total retail sales in Idaho, with the other 35 percent coming from out-of-state and international sources. In 2014, the largest portion of the energy used was used by the industrial sector, at 34.2 percent of the total. The transportation sector used 26.0 percent, while the residential and commercial sectors used just 23.1 and 16.7 percent, respectively (EIA, 2016a).

[9] One megawatthour is defined as one thousand kilowatthours or 1 million watthours; where one watthour is “the electrical energy unit of measure equal to one watt of power supplied to, or taken from, an electric circuit steadily for one hour.” (EIA, 2016b).

Water

Regulation of the quality of Idaho's drinking water is the responsibility of the DEQ. The rules that the DEQ enforces regarding drinking water apply to public drinking water systems, as a means of protecting public health (DEQ, 2015a). The "DEQ is authorized to administer Idaho's Drinking Water Program through the federal Safe Drinking Water Act [SDWA] and the Idaho Rules for Public Drinking Water Systems," and regulates "the design, construction, operation, maintenance, and quality control of public drinking water systems" in furtherance of this goal (DEQ, 2015a) (DEQ, 2015b). The public water systems referenced are defined as "systems for the provision of public water for human consumption… if such system has at least fifteen (15) service connections, regardless of the number of water sources or configuration of the distribution system, or regularly serves an average of at least twenty-five (25) individuals daily at least sixty (60) days out of the year" (DEQ, 2015b). The state has 1,960 public drinking water systems and 95 percent of its population relies on groundwater as a source of their drinking water (DEQ, 2015a). The 1,960 systems are broken into three categories: community water systems (CWS), non-transient non-community water systems (NTNCWS) and transient non-community water systems (TNCWS). CWSs serve primary residences (like apartments) and NTNCWSs serve the same people regularly, but away from home (including schools and hospitals). TNCWSs serve different people on a regular basis, and would include water systems at a highway rest stop. CWS make up 38 percent of the systems in Idaho, while NTNCWSs make up 12 percent, and TNCWSs take up the remainder (DEQ, 2015c). All public water systems are required by the SDWA to monitor their water for any of a number of contaminants. They must also report their findings back to the state and their consumers. In the interests of public health, the DEQ contracts with the Idaho Bureau of Laboratories to ensure that water testing laboratories meet state standards (DEQ, 2015d). Consumer Confidence Reports are used to communicate the information about drinking water to consumers. The SDWA requires that the community water systems inform customers annually of the sources of their water and the results of contaminant testing (DEQ, 2015e).

There are 15 major reservoirs, with a total capacity 5,804,046 acre feet, in Idaho maintained by the Bureau of Reclamation (Bureau of Reclamation Pacific Northwest Region, 2016), and 3 major reservoirs managed by USACE (USACE -- Walla Walla District, 2016). The reservoirs in Idaho are:

- Jackson Lake
- Palisades
- Grassy Lake
- Island Park
- Ririe
- American Falls
- Lake Walcott
- Anderson Ranch
- Arrowrock
- Lucky Peak
- Cascade
- Deadwood
- Reservoir A
- Lake Waha
- Soldiers Meadows Reservoir
- Lake Pend Oreille
- Dworshak Reservoir
- Lucky Peak Lake

These reservoirs are maintained by a network of dams, which are throughout the state. There are 20 major dams in Idaho maintained by the Bureau of Reclamation (Bureau of Reclamation, 2015) and 3 major dams managed by the U.S. Army Corps of Engineers (USACE) (USACE -- Walla Walla District, 2016). Dams in California are:

- American Falls Dam
- Anderson Ranch Dam
- Arrowrock Dam
- Black Canyon Diversion Dam
- Boise River Diversion Dam
- Cascade Dam
- Deadwood Dam
- Deer Flat East Dike Dam
- Deer Flat Lower Embankment
- Deer Flat Middle Embankment
- Deer Flat Upper Embankment
- Hubbard Dam
- Island Park Dam
- Little Wood River Dam
- Mann Creek Dam
- Minidoka Dam
- Palisades Dam
- Reservoir A Dam
- Ririe Dam
- Soldiers Meadow Dam
- Albeni Falls Dam
- Dworshak Dam
- Lucky Peak Lake Day

Wastewater

Idaho's wastewater is managed through permits that allow wastewater discharge, and the certification of wastewater facility operators. The National Pollutant Discharge Elimination System (NPDES) requires that any facility that discharges pollutants from a point source (like a pipe) into U.S. waters require permits. These permits set limitations on both what and how much of waste can be discharged in an effort to protect the public (DEQ, 2015f). In 47 states and the U.S. Virgin Islands, these permits are issued by the state/territory; Idaho is 1 of 4 states that do not operate such a program (USEPA, 2016a).

In Idaho, NPDES permits are issued by the U.S. Environmental Protection Agency (USEPA). The state has submitted an application to gain authority to distribute permits through a proposed state-level entity: the Idaho Pollutant Discharge System. These permits are used for a range of pollutant-producing operations including concentrated animal feeding operations, aquaculture facilities, and domestic wastewater plants (DEQ, 2015f). NPDES permits are issued as one of two types: general permits and individual permits. General permits are used to allow operations at a number of separate facilities that have similar discharge needs. This could be used for "multiple facilities within one industry, such as aquaculture, or may cover multiple facilities from different industries but that have a similar discharge, such as stormwater." Individual permits are used to meet more specific needs on a singular basis (DEQ, 2015f).

Along with the Idaho Bureau of Occupational Licenses (IBOL), the DEQ helps to ensure that these facilities are operated by those with the proper experience and education. The IBOL partners with the Idaho Board of Drinking Water and Wastewater Professionals to set these educational and experience related requirements, as well as issuing licenses to those qualified. The DEQ sets classifications on dischargers that handle more than 2,500 gallons each day. They also ensure that the operator of a wastewater facility has the appropriate certifications to operate the particular class of discharger (DEQ, 2015g).

Solid Waste Management

Idaho's solid waste is managed by the DEQ, under authority given by the Idaho Solid Waste Facilities Act, which mandates the regulation of "landfills, incinerators, transfer stations, processing facilities, and wood or mill yard debris facilities" (DEQ, 2015h). This responsibility is shared with seven health districts. The DEQ has the responsibility of approving the location and designs of new solid waste facilities, as well as approving the technical and engineering plans for them. The actual monitoring of "operational, closure, and post closure requirements" by these facilities is the responsibility of the health district in which the facility belongs. In addition the health districts perform compliance inspections (DEQ, 2015i). The use of seven health districts; Panhandle, North Central, Southwest, Central, South Central, Southeastern, and Eastern; as the state's primary method of monitoring and inspecting solid waste facilities ensures that the management of Idaho's solid waste is decentralized. These seven districts operate as the "primary outlets for public health services," allowing them to address public health issues on a community level. Waste collection efforts are organized and operated on a district or local government level (DEQ, 2015j). Recycling efforts in the state are also decentralized, and municipal recycling operates at the discretion of local authorities; with other options provided by private companies. "Recycling in Idaho is limited by its geographic isolation from reprocessing facilities and markets. Recyclable materials must be shipped long distances, which can be costly, especially for heavy materials like glass. Collection and transportation costs can outweigh the value of the recyclable materials" (DEQ, 2015k). Another standing issue is that "traditionally, Idaho has benefited from ample landfill space, which has kept disposal costs low. As a result, it is often cheaper to dispose of products than to recycle them" (DEQ, 2015k). There is currently no statewide waste diversion goal for Idaho.

5.1.2. Soils

5.1.2.1. Definition of the Resource

The Soil Science Society of America defines soil as:

(i) "The unconsolidated mineral or organic material on the immediate surface of the Earth that serves as a natural medium for the growth of land plants." (NRCS, 2015a)

(ii) "The unconsolidated mineral or organic matter on the surface of the Earth that has been subjected to and shows effects of genetic and environmental factors of: climate (including water and temperature effects), and macro- and microorganisms, conditioned by relief, acting on parent material over a period of time. A product-soil differs from the material from which it is derived in many physical, chemical, biological, and morphological properties and characteristics." (NRCS, 2015a)

Five primary factors account for soil development patterns. A combination of the following variables contributes to the soil type in a particular area (University of Minnesota, 2001):

- *Parent Material*: The original geologic source material from the soil formed affects soil aspects, including color, texture, and ability to hold water.
- *Climate*: Chemical changes in parent material occur slowly in low temperatures. However, hot temperatures evaporate moisture, which also facilitates chemical reactions within soils. The highest degree of reaction within soils occurs in temperate, moist climates.
- *Topography*: Steeper slopes produce increased runoff, and, therefore, downslope movement of soils. Slope orientation also dictates the microclimate to which soils are exposed, because different slope faces receive more sunlight than others do.
- *Biology*: The presence/absence of vegetation in soils affects the quantity of organic content of the soil.
- *Time*: Soil properties are dependent on the period over which other processes act on them.

5.1.2.2. Specific Regulatory Considerations

The Proposed Action must meet the requirements of the National Environmental Policy Act (NEPA) and other applicable laws and regulations. Applicable federal laws and regulations that apply for Soils, such as the Farmland Protection Policy Act of 1981, are in Appendix C, Environmental Laws and Regulations. A list of applicable state laws and regulations is included in Table 5.1.2-1 below.

Table 5.1.2-1: Relevant Idaho Soil Laws and Regulations

State Law/Regulation	Regulatory Agency	Applicability
Catalog of Stormwater Best Management Practices for Idaho Cities and Counties	DEQ	Technical guidance for construction site design, including best management practices (BMPs) to control sediment and prevent erosion.

5.1.2.3. Environmental Setting

Idaho is composed of three Land Resource Region (LRR),[10] as defined by the Natural Resources Conservation Service (NRCS) (NRCS, 2006):

- Northwestern Wheat and Range Region,
- Rocky Mountain Range and Forest Region, and
- Western Range and Irrigated Region.

Within and among Idaho's 3 LRRs are 13 Major Land Resource Areas (MLRA),[11] which are characterized by patterns of soils, climate, water resources, land uses, and type of farming (NRCS, 2006). The locations and characteristics of Idaho's MLRAs are presented in Figure 5.1.2-1 and Table 5.1.2-2.

Soil characteristics are an important consideration for FirstNet insomuch as soil properties could influence the suitability of sites for network deployment. Soil characteristics can differ over relatively short distances, reflecting differences in parent material, elevation, and position on the landscape, biota[12] such as bacteria, fungi, biological crusts, vegetation, animals, and climatic variables such as precipitation and temperature. For example, expansive soils[13] with wet and dry seasons alternately swell and shrink, which presents integrity risks to structural foundations (Rogers, Olshansky, & Rogers, 2004). Soils can also be affected by a variety of surface uses that loosen topsoil and damage or remove vegetation or other groundcover, which may result in accelerated erosion, compaction, and rutting[14] (discussed further in the subsections below).

[10] Land Resource Region: "A geographical area made up of an aggregation of Major Land Resource Areas (MLRA) with similar characteristics" (NRCS, 2006).
[11] Major Land Resource Area: "A geographic area, usually several thousand acres in extent, that is characterized by a particular pattern of soils, climate, water resources, land uses, and type of farming" (NRCS, 2006).
[12] The flora and fauna of a region.
[13] Expansive soils are characterized by "the presence of swelling clay minerals" that absorb water molecules when wet and expand in size or shrink when dry leaving "voids in the soil" (Rogers, Olshansky, & Rogers, 2004).
[14] Rutting is indentations in soil from operating equipment in moist conditions or soils with lower bearing strength (USFS, 2009b).

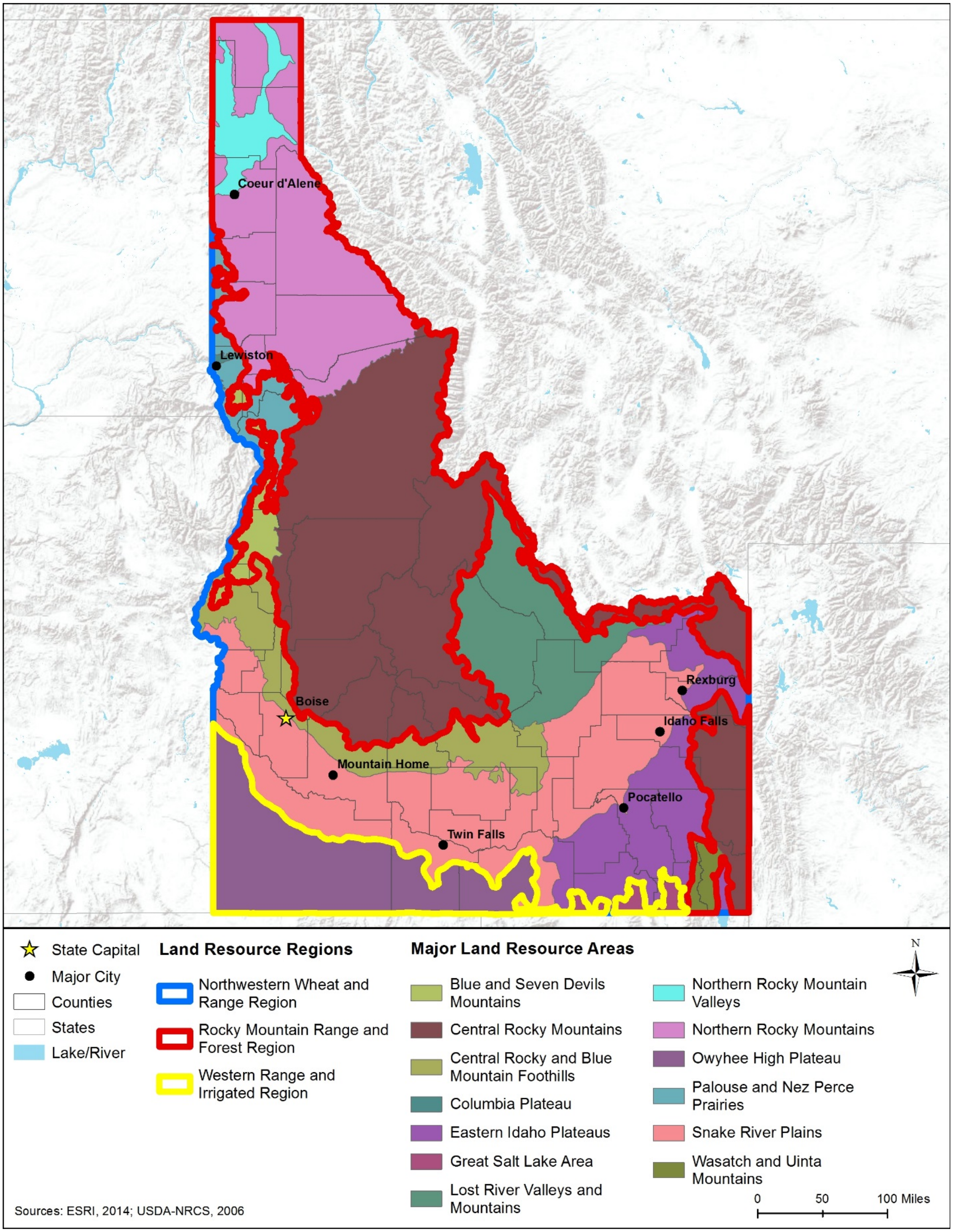


Figure 5.1.2-1: Locations of Major Land Resource Areas in Idaho

Table 5.1.2-2: Characteristics of Major Land Resource Areas in Idaho

MLRA Name	Region of State	Soil Characteristics
Blue and Seven Devils Mountains	Western Idaho	Andisols[a] and Mollisols[b] are the dominant soil orders. These soils of varying texture range from very poorly drained to well drained, and range from shallow to very deep.
Central Rocky Mountains	Central Idaho	Alfisols,[c] Inceptisols,[d] and Mollisols are the dominant soil orders. These soils are medium to coarse textured, and are typically skeletal.
Central Rocky and Blue Mountain Foothills	Southern Idaho	Mollisols is the dominant soil order, with Aridisols[e] less so. These well drained soils are loamy[f] or clayey, and range from very shallow to very deep.
Columbia Plateau	Western Idaho	Mollisols is the dominant soil order. These loamy and well drained soils are typically moderately deep to very deep.
Eastern Idaho Plateaus	Eastern Idaho	Mollisols is the dominant order. These loamy and well drained soils are typically very deep or deep.
Great Salt Lake Area	Southeastern Idaho	Aridisols, Entisols,[g] and Mollisols are the dominant soil orders. These very deep soils are well drained to somewhat excessively drained, and are loamy or loamy skeletal.
Lost River Valleys and Mountains	Central Idaho	Aridisols and Mollisols are the dominant soil orders. These well drained and very deep soils are typically loamy-skeletal, loamy, or sandy-skeletal.
Northern Rocky Mountain Valleys	Northern Idaho	Andisols, Mollisols, and Inceptisols are the dominant soil orders. These well drained soils are typically very deep, and are loamy or loamy skeletal.
Northern Rocky Mountains	Northern Idaho	Alfisols, Andisols, and Inceptisols are the dominant soil orders. These soils range from very poorly drained to well drained, and range from shallow to very deep.
Owyhee High Plateau	Southwestern Idaho	Aridisols and Mollisols are the dominant soil orders. These well drained soils range from shallow to moderately deep, and are loamy or clayey.
Palouse and Nez Perce Prairies	Southern Idaho	Mollisols is the dominant soil order. These loamy soils are moderately well drained to well drained, and are typically deep or very deep.
Snake River Plains	Southern Idaho	Aridisols is the dominant soil order. These typically well drained soils are loamy, silty, or clayey, and range from shallow to very deep.
Wasatch and Uinta Mountains	Southeastern Idaho	Aridisols, Entisols, Inceptisols, and Mollisols are the dominant soil orders. These typically well drained soils range from very shallow to very deep and are loamy or loamy-skeletal.

[a] Andisols: "Highly productive soils. They are common in cool areas with moderate to high precipitation, especially those areas associated with volcanic materials." (NRCS, 2015b)
[b] Mollisols: "Soils that have a dark colored surface horizon relatively high in content of organic matter. They are base rich throughout and quite fertile. Mollisols form under grass in climates that have a moderate to pronounced seasonal moisture deficit." (NRCS, 2015b)
[c] Alfisols: "Soils found in semiarid to moist areas that are formed from weathering processes that leach clay minerals and other constituents out of the surface layer and into the subsoil. They are productive for most crop, are primarily formed under forest or mixed vegetative cover, and make up nearly 10 percent of the world's ice-free land surface." (NRCS, 2015b)
[d] Inceptisols: "Soils found in semiarid to humid environments that exhibit only moderate degrees of soil weathering and development. They have a wide range of characteristics, can occur in a wide variety of climates, and make up nearly 17 percent of the world's ice-free land surface." (NRCS, 2015b)

[e] Aridisols: “Soils that are too dry for the growth of mesophytic plants. Lack of moisture greatly restricts the intensity of the weathering process and limits most soil development processes to the upper part of the soils. They make up about 12 percent of the world’s ice-free land surface.” (NRCS, 2015b)
[f] Loamy Soil: “[A soil] that combines [sand, silt, and clay] in relatively equal amounts.” (Purdue University Consumer Horticulture, 2006)
[g] Entisols: “Soils that show little to no pedogenic horizon development. They occur in areas of recently deposited parent materials or in dunes, steep slopes, or flood plains where erosion or deposition rates are faster than rate of soil development. They make up nearly 16 percent of the world’s ice-free land surface.” (NRCS, 2015b)
Source: (NRCS, 2006)

5.1.2.4. Soil Suborders

Soil suborders are part of the soil taxonomy (a system of classification used to make and interpret soil surveys). Soil orders are the highest level in the taxonomy;[15] there are 12 soil orders in the world and they are characterized by both observed and inferred[16] properties, such as texture, color, temperature, and moisture regime. Soil suborders are the next level down, and are differentiated within an order by soil moisture and temperature regimes, as well as dominant physical and chemical properties (NRCS, 2015c). The STATSGO2[17] soil database identifies 31 different soil suborders in Idaho (NRCS, 2015d). Figure 5.1.2-2 depicts the distribution of the soil suborders, and Table 5.1.2-3 provides a summary of the major physical-chemical characteristics of the various soil suborders found.

[15] Taxonomy: “A formal representation of relationships between items in a hierarchical structure.” (USEPA, 2015o)
[16] “Soil properties inferred from the combined data of soil science and other disciplines (e.g., soil temperature and moisture regimes inferred from soil science and meteorology)” (NRCS, 2015g).
[17] STATSGO2 is the Digital General Soil Map of the United States that shows general soil association units across the landscape of the nation. Developed by the National Cooperative Soil Survey, STATSGO2 supersedes the State Soil Geographic (STATSGO) dataset.

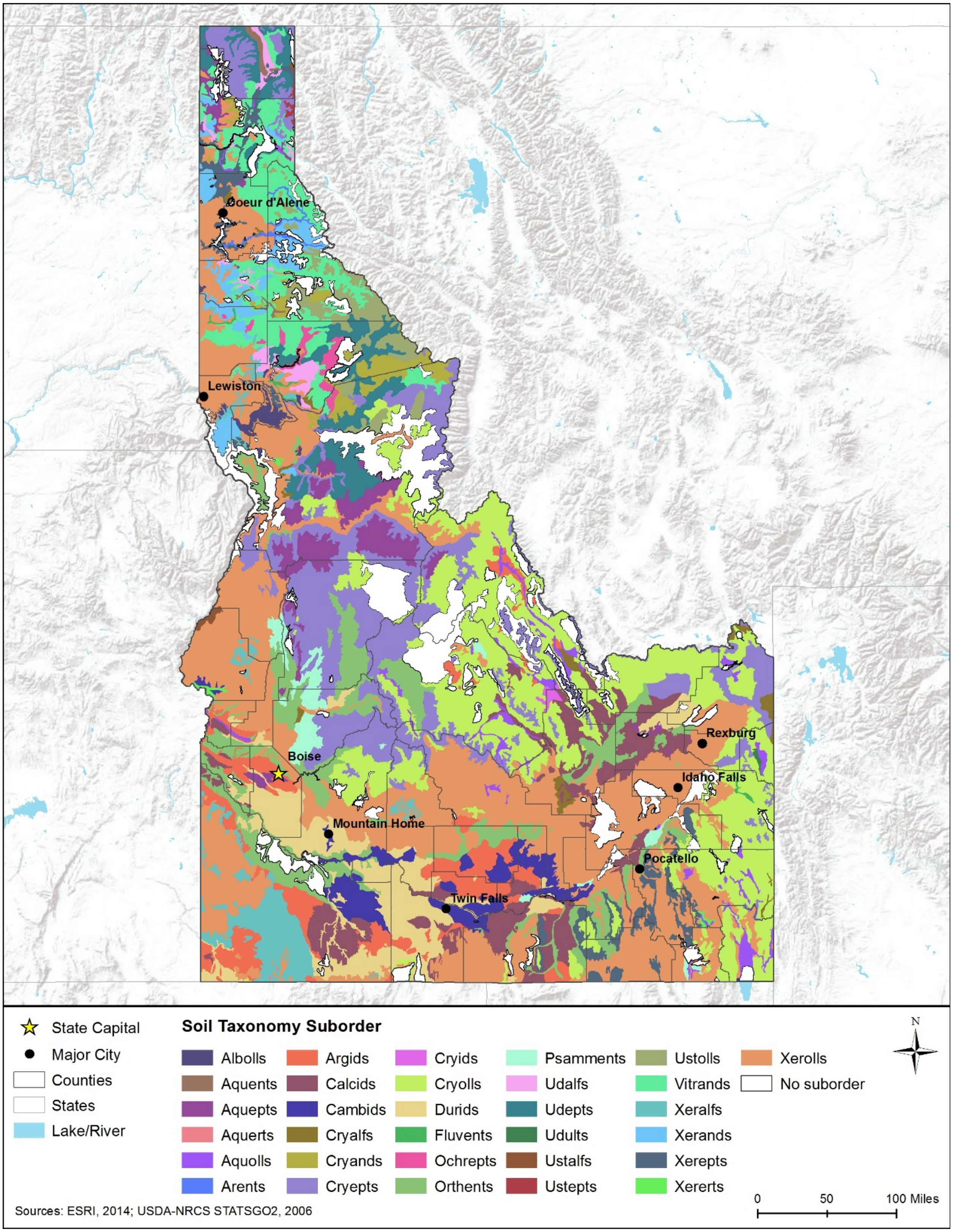


Figure 5.1.2-2: Idaho Soil Taxonomy Suborders

Table 5.1.2-3: Major Characteristics of Soil Suborders[18] Found in Idaho, as depicted in Figure 5.1.2-2

Soil Order	Soil Suborder	Ecological Site Description	Soil Texture	Slope (%)	Drainage Class	Hydric Soil[a]	Hydrologic Group	Runoff Potential	Permeability[b]	Erosion Potential	Compaction and Rutting Potential
Mollisols	Albolls	Albolls have a fluctuating groundwater table, with gentle slopes. They supported grasses and shrubs, and are typically used as cropland.	Clay loam, Silt loam, Silty clay loam	0-40	Somewhat poorly drained to moderately well drained	No	C, D	Medium, High	Low, Very Low	Medium to High, depending on slope	Low
Entisols	Aquents	Widely distributed, with some forming in sandy deposits, and most forming in recent sediments. Aquents support vegetation that tolerates either permanent or periodic wetness, and are mostly used for pasture, cropland, forest, or wildlife habitat.	Silt loam, Stratified gravelly coarse sand to extremely gravelly coarse sand	0-2	Very poorly drained to poorly drained	No	C, D	Medium, High	Low, Very Low	Medium to High, depending on slope	Low
Inceptisols	Aquepts	Aquepts have poor or very poor natural drainage. If these soils have not been artificially drained, groundwater is at or near the soil surface at some time during normal years (although not usually in all seasons). They are used primarily for pasture, cropland, forest, or wildlife habitat. Many Aquepts have formed under forest vegetation, but they can have almost any kind of vegetation.	Clay loam, Coarse sandy loam, Loam, Sand and gravel, Silt loam, Stratified mucky peat to extremely cobbly sand, Variable, Very fine sandy loam	0-20	Very poorly drained to somewhat poorly drained	No, Yes	C, D	Medium, High	Low, Very Low	Medium to High, depending on slope	High, due to hydric soil and poor drainage conditions
Vertisols	Aquerts	Aquerts are wet soils, with prolonged moisture at or near the soil surface. Their natural vegetation includes savanna, grass, and forest. They are used as forest, rangeland, and cropland, although drainage for cropland can be difficult due to poor drainage.	Clay	0-1	Very poorly drained	Yes	D	High	Very Low	High	High, due to hydric soil and poor drainage conditions
Mollisols	Aquolls	Aquolls support grass, sedge, and forb vegetation, as well as some forest vegetation. However, most have been artificially drained and utilized as cropland.	Fine sandy loam, Gravelly loam, Loam, Sand, Silt loam, Silty clay, Silty clay loam, Very cobbly sandy loam, Very fine sandy loam, Very stony loam	0-4	Very poorly drained to somewhat poorly drained	No, Yes	C, D	Medium, High	Low, Very Low	Medium to High, depending on slope	High, due to hydric soil and poor drainage conditions
Entisols	Arents	Arents are predominantly used for pasture, crops, wildlife habitat, and urban land. Since they have been subject to various means of mixing, they lack diagnostic horizons.	Silt	0-4	Somewhat poorly drained	No	C	Medium	Low	Medium	Low
Aridisols	Argids	Argids are found in the western United States. They are primarily used as wildlife habitat or rangeland, although some can also be used as cropland, if irrigated.	Extremely gravelly loam, Gravelly loam, Loam, Sandy clay loam, Sandy loam, Silt loam, Silty clay loam, Unweathered bedrock, Very gravelly clay loam, Very gravelly sandy clay	0-60	Well drained	No	B, C, D	Medium, High	Moderate, Low, Very Low	Medium to High, depending on slope	Low
Aridisols	Calcids	Calcids are found in the western United States, and used primarily as wildlife habitat or rangeland, although some have been utilized as irrigated cropland. They have high levels calcium carbonates that persist due to insufficient precipitation.	Extremely gravelly sand, Extremely gravelly sandy loam, Fine sand, Fine sandy loam, Loam, Loamy sand, Sand, Sandy loam, Silt loam, Stratified sand to fine sand, Stratified very gravelly coarse sand to sand, Unweathered bedrock, Very gravelly loam, Very gravelly sandy loam	0-30	Somewhat poorly drained to somewhat excessively drained	No	A, B, C	Low, Medium	High, Moderate, Low	Low to Medium, depending on slope	Low
Aridisols	Cambids	Cambids are found in the western United States, with little soil development. They are primarily used as wildlife habitat or rangeland, although some can also be used as cropland, if irrigated.	Bedrock, Clay loam, Cobbly fine sandy loam, Fine sandy loam, Loamy fine sand, Silt loam, Unweathered bedrock	0-20	Well drained to somewhat excessively drained	No	A, B, C, D	Low, Medium, High	High, Moderate, Low, Very Low	Low to High, depending on slope	Low

[18] Soil suborders constitute a broad range of soil types. Within each suborder, the range of soil types may have a range of properties across the state, which result in multiple values being displayed in the table for that suborder.

Soil Order	Soil Suborder	Ecological Site Description	Soil Texture	Slope (%)	Drainage Class	Hydric Soil[a]	Hydrologic Group	Runoff Potential	Permeability[b]	Erosion Potential	Compaction and Rutting Potential
Alfisols	Cryalfs	Cryalfs are cold weather soils found primarily at high elevations. Due to the cold, short growing season, the majority of these soils are utilized as forest.	Clay loam, Gravelly loam, Gravelly silt loam, Silt loam, Silty clay loam, Very gravelly loam, Very gravelly sandy clay loam, Very gravelly very fine sandy loam	0-60	Poorly drained to well drained	No, Yes	B, C, D	Medium, High	Moderate, Low, Very Low	Medium to High, depending on slope	High, due to hydric soil and poor drainage conditions
Andisols	Cryands	Cryands are typically used as forest, and are primarily formed under vegetation in coniferous forests.	Cobbly loam, Gravelly silt loam, Medial silt loam, Silt loam, Very cobbly loam, Very cobbly silt loam, Very gravelly sandy loam	15-65	Moderately well drained to well drained	No	B, C	Medium	Moderate, Low	Medium	Low
Inceptisols	Cryepts	Cryepts are soils of high latitudes or high elevations, and support cold weather vegetation such as conifers and hardwoods. They are mostly used as forest or wildlife habitat, although some are also used as cropland.	Coarse sandy loam, Extremely cobbly sandy loam, Extremely flaggy loam, Extremely flaggy sandy loam, Extremely stony loamy coarse sand, Extremely stony sandy loam, Fragmental material, Gravelly fine sandy loam, Gravelly loamy coarse sand, Gravelly silt loam, Loam, Sandy loam, Variable, Very channery sandy loam, Very cobbly loamy sand, Very cobbly sandy loam, Very gravelly coarse sandy loam, Very gravelly loam, Very gravelly loamy coarse sand, Very gravelly sandy loam, Weathered bedrock	0-90	Moderately well drained to excessively drained	No	A, B, C, D	Low, Medium, High	High, Moderate, Low, Very Low	Low to High, depending on slope	Low
Aridisols	Cryids	Cryids are cold weather soils in areas of high elevation with short growing seasons that restrict soil use. They are mostly used as wildlife habitat or rangeland.	Gravelly loam	2-10	Well drained	No	D	High	Very Low	High	Low
Mollisols	Cryolls	Cryolls are generally freely drained, cold weather soils. They are primarily used as rangeland, along with some forest and pasture. Forest, grass, or grass/shrub vegetation are supported with these soils.	Clay loam, Cobbly loam, Extremely cobbly sandy loam, Extremely gravelly loam, Gravelly clay loam, Gravelly loam, Gravelly loamy coarse sand, Gravelly sandy loam, Gravelly silt loam, Loam, Silt loam, Silty clay loam, Stony loam, Unweathered bedrock, Very cobbly silty clay loam, Very gravelly clay loam, Very gravelly fine sandy loam, Very gravelly loam, Very gravelly loamy coarse sand, Very gravelly sandy clay loam, Very gravelly sandy loam, Very gravelly silt loam, Very stony loam, Weathered bedrock	0-70	Moderately well drained to somewhat excessively drained	No	B, C, D	Medium, High	Moderate, Low, Very Low	Medium to High, depending on slope	Low
Aridisols	Durids	Durids are found in the western United States, with the majority found in Nevada and Idaho. A few areas are used as irrigated cropland, but most are utilized as wildlife habitat or rangeland. They are characterized by a soil subsurface horizon cemented by silica (duripan).	Bedrock, Cemented, Clay, Cobbly very fine sandy loam, Duripan, Gravelly loam, Gravelly silt loam, Indurated, Loam, Loamy sand, Sand, Sandy loam, Silt loam, Unweathered bedrock, Very stony loam, Weathered bedrock	0-20	Well drained to somewhat excessively drained	No	B, C, D	Medium, High	Moderate, Low, Very Low	Medium to High, depending on slope	Low

Soil Order	Soil Suborder	Ecological Site Description	Soil Texture	Slope (%)	Drainage Class	Hydric Soil[a]	Hydrologic Group	Runoff Potential	Permeability[b]	Erosion Potential	Compaction and Rutting Potential
Entisols	Fluvents	Fluvents are mostly freely drained soils that form in recently deposited sediments on flood plains, fans, and deltas located along rivers and small streams. Unless protected by dams or levees, these soils frequently flood. Fluvents are normally utilized as rangeland, forest, pasture, or wildlife habitat, with some also used for cropland.	Stratified gravelly sandy loam to loam, Stratified very gravelly sand to silt loam, Stratified very gravelly sandy loam to gravelly loam, Variable	0-4	Somewhat poorly drained to well drained	No	B, C	Medium	Moderate, Low	Medium	Low
Inceptisols	Ochrepts	The Ochrepts suborder has been removed from the Soil Taxonomy; most of these soils were moved to the Udept suborder.[c]	Loam, Silt loam	35-75	Well drained	No	B	Medium	Moderate	Medium	Low
Entisols	Orthents	Orthents are commonly found on recent erosional surfaces and are used primarily as rangeland, pasture, or wildlife habitat.	Coarse sand, Coarse sandy loam, Extremely gravelly loam, Fine gravelly loamy coarse sand, Fine sandy loam, Gravelly coarse sand, Gravelly loamy coarse sand, Gravelly loamy sand, Loam, Loamy coarse sand, Sandy loam, Silt loam, Silty clay loam, Unweathered bedrock, Variable, Very cobbly loam, Very cobbly silt loam, Very gravelly loamy coarse sand	0-90	Moderately well drained to excessively drained	No	A, B, C, D	Low, Medium, High	High, Moderate, Low, Very Low	Low to High, depending on slope	Low
Entisols	Psamments	Psamments are sandy in all layers. In some arid and semi-arid climates, they are among the most productive rangeland soils, and are primarily used as rangeland, pasture, or wildlife habitat. Those Psamments that are nearly bare are subject to wind erosion and drifting, and do provide good support for wheeled vehicles.	Gravelly loamy coarse sand, Loamy fine sand, Loamy sand, Sand, Stratified sand to loamy sand to loamy fine sand, Weathered bedrock	0-60	Somewhat excessively drained to excessively drained	No	A, B, C, D	Low, Medium, High	High, Moderate, Low, Very Low	Low to High, depending on slope	Low
Alfisols	Udalfs	Udalfs have an udic (humid or subhumid climate) moisture regime, and are believed to have supported forest vegetation at some time during development.	Clay loam, Silt loam	0-75	Somewhat poorly drained to moderately well drained	No	B, C, D	Medium, High	Moderate, Low, Very Low	Medium to High, depending on slope	Low
Inceptisols	Udepts	Udepts have an udic or perudic (saturated with water long enough to cause oxygen depletion) moisture regime, and are mainly freely drained. Most of these soils currently support or formerly supported forest vegetation, with mostly coniferous forest in the Northwest and mixed or hardwood forest in the East. Some also support shrub or grass vegetation, and in addition to being used as forest, some have been cleared and are used as cropland or pasture.	Extremely cobbly sandy loam, Extremely gravelly loam, Loam, Sandy loam, Stratified extremely gravelly coarse sandy loam to fine sandy loam, Very gravelly sandy loam	0-90	Well drained to somewhat excessively drained	No	B, C	Medium	Moderate, Low	Medium	Low
Ultisols	Udults	Udults are more or less freely drained, relatively humus poor, and have an udic moisture regime. Most of these soils currently support or formerly supported mixed forest vegetation, and many have been cleared and used as cropland (mostly with the use of soil amendments).	Silt loam	2-4	Well drained	No	B	Medium	Moderate	Medium	Low
Alfisols	Ustalfs	Ustalfs are primarily used for grazing or cropland, and they also support savanna and grassland vegetation. They are found in areas with a marked dry season.	Very gravelly clay loam	8-30	Well drained	No	B	Medium	Moderate	Medium	Low
Inceptisols	Ustepts	Ustepts are freely drained soils, typically used as pasture or cropland, although some support forest, rangeland, and wildlife habitat.	Unweathered bedrock	15-60	Well drained	No	D	High	Very Low	High	Low

Soil Order	Soil Suborder	Ecological Site Description	Soil Texture	Slope (%)	Drainage Class	Hydric Soil[a]	Hydrologic Group	Runoff Potential	Permeability[b]	Erosion Potential	Compaction and Rutting Potential
Mollisols	Ustolls	Ustolls typically supported grass and forest vegetation, and are now primarily used as cropland or rangeland. They are generally freely drained, and found in subhumid to semiarid climates. Areas with drought are common, and blowing soil can be an issue.	Variable, Very cobbly silt loam	35-60	Well drained	No	A	Low	High	Low	Low
Andisols	Vitrands	Vitrands are mostly utilized as forest, although some can be used for rangeland, or cleared and used for pasture or cropland. They are generally well drained, with a coarse texture and low water content. These soils typically form under coniferous forest vegetation.	Cobbly loamy coarse sand, Extremely cobbly loam, Extremely cobbly sandy loam, Extremely stony sandy loam, Gravelly sandy loam, Gravelly silt loam, Sandy loam, Silt loam, Silty clay loam, Very cobbly silt loam	3-90	Moderately well drained to well drained	No	B, C, D	Medium, High	Moderate, Low	Medium to High, depending on slope	Low
Alfisols	Xeralfs	Xeralfs support warmer weather, drier vegetation such as annual grasses, forbs, and woody shrubs, along with cooler, wetter vegetation such as coniferous forest. They are typically used for forest, grazing, and croplands.	Clay, Clay loam, Cobbly clay loam, Fine gravelly sandy clay loam, Indurated, Silt loam, Stony loam, Very cobbly clay	0-75	Somewhat poorly drained to well drained	No	B, C, D	Medium, High	Moderate, Low, Very Low	Medium to High, depending on slope	Low
Andisols	Xerands	Xerands are used as forest, pasture, or cropland. They form under grass and shrub vegetation or under coniferous forest vegetation.	Gravelly silt loam, Silty clay loam	0-75	Well drained	No	B	Medium	Moderate	Medium	Low
Inceptisols	Xerepts	Xerepts support coniferous forest, shrubs, grasses, and trees, are typically used for forest, pasture, or croplands, and sometimes as wildlife habitat or rangeland. They are generally freely drained and found in the western United States.	Extremely gravelly loamy sand, Fine sand, Loam, Silt, Silt loam, Silty clay loam, Stony loam, Very cobbly sandy loam, Very fine sandy loam, Very gravelly sandy loam, Very stony loam, Weathered bedrock	0-75	Somewhat poorly drained to well drained	No	B, C, D	Medium, High	Moderate, Low, Very Low	Medium to High, depending on slope	Low
Vertisols	Xererts	Xererts are found in Mediterranean climates. The soils become very dry in the summer, and most in the winter, which can cause significant damage to roads and structures. They are mostly used for cropland or rangeland, and native vegetation is mainly forbs and grasses.	Clay, Silty clay, Silty clay loam	0-60	Somewhat poorly drained to well drained	No	C, D	Medium, High	Low, Very Low	Medium to High, depending on slope	Low

Soil Order	Soil Suborder	Ecological Site Description	Soil Texture	Slope (%)	Drainage Class	Hydric Soil[a]	Hydrologic Group	Runoff Potential	Permeability[b]	Erosion Potential	Compaction and Rutting Potential
Mollisols	Xerolls	Xerolls are found on sloping lands that Mediterranean climates. They are generally freely drained, although typically dry for extended periods in summer. These soils are used for irrigated croplands, and those on very steep slopes are used for rangeland and forest.	Clay loam, Coarse sandy loam, Cobbly loam, Extremely channery loam, Extremely cobbly clay, Extremely cobbly silt loam, Extremely gravelly loamy sand, Extremely stony clay loam, Extremely stony loam, Extremely stony silt loam, Fine gravelly clay loam, Fine sandy loam, Gravelly coarse sandy loam, Gravelly loam, Gravelly loamy sand, Gravelly silt loam, Gravelly silty clay, Indurated, Loam, Loamy fine sand, Loamy sand, Sand and gravel, Sandy clay loam, Sandy loam, Silt loam, Silty clay loam, Stony loam, Stony sandy loam, Stratified coarse sandy loam to clay loam, Stratified extremely cobbly loamy coarse sand to extremely cobbly sandy loam, Unweathered bedrock, Variable, Very cobbly clay, Very cobbly clay loam, Very cobbly loam, Very cobbly sandy clay loam, Very cobbly silt loam, Very gravelly clay loam, Very gravelly coarse sand, Very gravelly loam, Very gravelly sandy loam, Very gravelly silt loam, Very gravelly silty clay loam, Very stony loam, Very stony sandy loam, Very stony silty clay loam, Weathered bedrock	0-99	Somewhat poorly drained to excessively drained	No, Yes	B, C, D	Medium, High	Moderate, Low, Very Low	Medium to High, depending on slope	High, due to hydric soil and poor drainage conditions

[a] Hydric Soil: "A soil that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part" (NRCS, 2015e). Soil suborders constitute a broad range of soil types. Within each soil suborder, some specific soil types are hydric while others are not.
[b] Based on Runoff Potential, described in Section 5.1.2.5, Runoff Potential
[c] (NRCS, 2003a)
Source: (NRCS, 2015d) (NRCS, 1999)

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5.1.2.5. Runoff Potential

The NRCS uses four Hydrologic Soil Groups (A, B, C, and D) that are based on a soil's runoff potential[19]. Group A generally has the smaller runoff potential, whereas Group D generally has the greatest (Purdue University, 2015). Table 5.1.2-3 (above) provides a summary of the runoff potential for each soil suborder in Idaho.

Group A. Sand, loamy sand or sandy loam soils. This group of soils has "low runoff potential and high infiltration rates[20] even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sands or gravels and have a high rate of water transmission" (Purdue University, 2015). Calcids, Cambids, Cryepts, Orthents, Psamments, and Ustolls fall into this category in Idaho.

Group B. Silt loam or loam soils. This group of soils has a "moderate infiltration rate when thoroughly wetted and consists chiefly or moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures" (Purdue University, 2015). This group has medium runoff potential. Argids, Calcids, Cambids, Cryalfs, Cryands, Cryepts, Cryolls, Durids, Fluvents, Ochrepts, Orthents, Psamments, Udalfs, Udepts, Udults, Ustalfs, Vitrands, Xeralfs, Xerands, Xerepts, and Xerolls fall into this category in Idaho.

Group C. Sandy clay loam soils. This group of soils has "low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine to fine structure" (Purdue University, 2015). This group has medium runoff potential. Albolls, Aquents, Aquepts, Aquolls, Arents, Argids, Calcids, Cambids, Cryalfs, Cryands, Cryepts, Cryolls, Durids, Fluvents, Orthents, Psamments, Udalfs, Udepts, Vitrands, Xeralfs, Xerepts, Xererts, and Xerolls fall into this category in Idaho.

Group D. Clay loam, silty clay loam, sandy clay, silty clay, or clay soils. This group of soils "has the highest runoff potential. They have very low infiltration rates when thoroughly wetted and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface and shallow soils over nearly impervious material" (Purdue University, 2015). Albolls, Aquents, Aquepts, Aquerts, Aquolls, Argids, Cambids, Cryalfs, Cryepts, Cryids, Cryolls, Durids, Orthents, Psamments, Udalfs, Ustepts, Vitrands, Xeralfs, Xerepts, Xererts, and Xerolls fall into this category in Idaho.

[19] Classifying soils is highly generalized and it is challenging to differentiate orders as soil properties can change with distance or physical properties. The soil suborders are at a high level, therefore soil groups may be found in multiple hydrologic groups within a state, as composition, topography, etc. varies in different areas.

[20] Infiltration Rate: "The rate at which a soil under specified conditions absorbs falling rain, melting snow, or surface water expressed in depth of water per unit time" (FEMA, 2010).

5.1.2.6. Soil Erosion

"Soil erosion involves the breakdown, detachment, transport, and redistribution of soil particles by forces of water, wind, or gravity" (NRCS, 2015f). Water-induced erosion can transport soil into streams, rivers, and lakes, degrading water quality and aquatic habitat. When topsoil is eroded, organic material is depleted, creating loss of nutrients available for plant growth. Soil particles displaced by wind can cause human health problems and reduced visibility, creating a public safety hazard (NRCS, 1996a). Table 5.1.2-3 (above) provides a summary of the erosion potential for each soil suborder in Idaho. Soils with medium to high erosion potential in Idaho include those in the Albolls, Aquents, Aquepts, Aquerts, Aquolls, Arents, Argids, Calcids, Cambids, Cryalfs, Cryands, Cryepts, Cryids, Cryolls, Durids, Fluvents, Ochrepts, Orthents, Psamments, Udalfs, Udepts, Udults, Ustalfs, Ustepts, Vitrands, Xeralfs, Xerands, Xerepts, Xererts, and Xerolls suborders, which are found throughout most of the state (Figure 5.1.2-2).

5.1.2.7. Soil Compaction and Rutting

Soil compaction and rutting occurs when soil layers are compressed by machinery or animals, which decreases both open spaces in the soil, as well as water infiltration rates (NRCS, 1996b). Moist soils with high soil water content are most susceptible to compaction and rutting, as they lack the strength to resist deformation caused by pressure. When rutting occurs, channels form and result in downslope erosion (USFS, 2009b). Other characteristics that factor into compaction and rutting risk include soil composition (i.e. low organic soil is at increased risk of compaction), amount of pressure exerted on the soil, and repeatability (i.e., the number of times the pressure is exerted on the soil). Machinery and vehicles that have axle loads greater than ten tons can cause soil compaction of greater than 12 inches depth (NRCS, 1996b), (NRCS, 2003b).

Loam, sandy loam, and sandy clay loam soils are most susceptible to compaction and rutting; silt, silty clay, silt loam, silty clay loam, and clay soils are more resistant to compaction and rutting (NRCS, 1996b). Table 5.1.2-3 (above) provides a summary of the compaction and rutting potential for each soil suborder in Idaho.

Soils with the highest potential for compaction and rutting in Idaho include those in the Aquepts, Aquerts, Aquolls, Cryalfs, and Xerolls suborders, which are found throughout the state (Figure 5.1.2-2).

5.1.3. Geology

5.1.3.1. Definition of the Resource

The U.S. Geological Survey (USGS) is the primary government organization responsible for the nation's geological resources. USGS defines geology as an interdisciplinary science with a focus on the following aspects of earth sciences: geologic hazards and disasters, climate variability and change, energy and mineral resources, ecosystem and human health, and ground-water availability. Several of these elements are discussed in other sections of this PEIS, including Water Resources (Section 5.1.4), Human Health and Safety (Section 5.1.15), and Climate Change (Section 5.1.14).

This section covers the six aspects of geology most relevant to the Proposed Action and Alternatives:

- Section 5.1.3.3, Environmental Setting: Physiographic Regions and Provinces,[21, 22]
- Section 5.1.3.4, Surface Geology,
- Section 5.1.3.5, Bedrock Geology,[23]
- Section 5.1.3.6, Paleontological Resources,[24]
- Section 5.1.3.7, Fossil Fuel and Mineral Resources, and
- Section 5.1.3.8, Geologic Hazards.[25]

5.1.3.2. Specific Regulatory Considerations

The Proposed Action must meet the requirements of NEPA and other applicable laws and regulations. A list of applicable state laws and regulations is included in Table 5.1.3-1 below.

Table 5.1.3-1: Relevant Idaho Geology Laws and Regulations

State Law/Regulation	Regulatory Agency	Applicability
Idaho Building Codes	Local Agencies	Check county, city, and other local agencies for seismic guidelines in building codes
Idaho Code Chapter 30, 33-3013 through 33-3016	Idaho Museum of Natural History	An excavation permit is required from the Idaho Museum of Natural History to excavate any vertebrate fossil on public lands.

Sources: (City of Boise, 2015) (City of Hailey, 2015) (Adams County, 2015) (State of Idaho, 2010)

5.1.3.3. Environmental Setting: Physiographic Regions and Provinces

The concept of physiographic regions was created in 1916 by geologist Nevin Fenneman as a way to describe areas of the United States based on common landforms (i.e., not climate or vegetation). Physiographic regions are areas of distinctive topography, geography, and geology. Important physiographic differences between adjacent areas are generally due to differences in the nature or structure of the underlying rocks. There are eight distinct physiographic regions in the continental United States: 1) Atlantic Plain, 2) Appalachian Highlands, 3) Interior Plains, 4) Interior Highlands, 5) Laurentian Upland, 6) Rocky Mountain System, 7) Intermontane Plateaus, and 8) Pacific Mountain System. Regions are further sub-divided into physiographic provinces based on differences observed on a more local scale (Fenneman, 1916).

Idaho has two major physiographic regions: Rocky Mountain System (Middle Rocky Mountains and Northern Rocky Mountains Provinces) and Intermontane Plateaus (Basin and Range and Columbia Plateau Provinces) (USGS, 2003b) (Figure 5.1.3-1). The locations of these regions

[21] Physiographic regions: Areas of the United States that share commonalities based on topography, geography, and geology (Fenneman, 1916).
[22] Physiographic provinces: Subsets within physiographic regions (Fenneman, 1916).
[23] Bedrock: Solid rock beneath the soil and superficial rock (USGS, 2015d).
[24] Paleontology: "Study of life in past geologic time based on fossil plants and animals" (USGS, 2015e).
[25] Geologic Hazards: Any geological or hydrological process that poses a threat to people and/or their property, which includes but is not limited to volcanic eruptions, earthquakes, landslides, sinkholes, mudflows, flooding, and shoreline movements (NPS, 2013).

and provinces are shown in Figure 5.1.3-1 and their general characteristics summarized in the following subsections.

Rocky Mountain System

The Rocky Mountains form a line from the northern border with Canada south into central New Mexico. The Rocky Mountains were created during the Laramide orogeny,[26] which occurred between 70 and 40 million years ago (MYA).[27] They formed due to the collision of the Pacific Ocean oceanic crust[28] with the North American continental crust. In most cases, convergence of oceanic crust with continental crust results in mountain formation 200 to 400 miles from the coastline; however, given the low angle of subduction by which the oceanic crust passed under the less dense continental crust during the Laramide orogeny, this resulted in formation of the Rocky Mountains several hundred miles further inland than is normally observed (USGS, 2014a).

Middle Rocky Mountains Province – The Middle Rocky Mountains include part of southeastern Idaho along the state's eastern border with Wyoming. Folded sedimentary[29] (e.g., limestones,[30] siltstone,[31] cherts,[32] sandstones,[33] and shales[34]) and volcanic mountains are characteristic of this province (NPS, 2014a) (USFS, 1994). The Overthrust Mountain section is within southeastern Idaho, and includes the Snake River, Caribou, Webster, Aspen, Portneuf, Bannock, and Bear River Ranges. These areas are characterized by "steep, rugged mountains with narrow to broad valleys… Elevation ranges from 5,000 to 13,000 [feet, and] local relief ranges from 3,000 to 7,000 [feet]" (USFS, 1994).

[26] Orogeny: "An episode of mountain building and/or intense rock deformation." (USGS, 2015f)
[27] For consistency, this PEIS uses the University of California Berkeley Geologic Time Scale for all of the FirstNet PEIS state documents. Time scales differ among universities and researchers; FirstNet utilized a consistent time scale throughout, which may differ slightly from other sources.
[28] Crust: "The rocky, relatively low density, outermost layer of the Earth." (USGS, 2015f)
[29] Sedimentary Rock: "Rocks that formed from pre-existing rocks or pieces of once-living organisms. They form from deposits that accumulate on the Earth's surface. Sedimentary rocks often have distinctive layering or bedding." (USGS, 2014h)
[30] Limestone: "A sedimentary rock made mostly of the mineral calcite (calcium carbonate). Limestone is usually formed from shells of once-living organisms or other organic processes, but may also form by inorganic precipitation." (USGS, 2015f)
[31] Siltstone: "A sedimentary rock made mostly of silt-sized grains." (USGS, 2015f)
[32] Chert: "A very fine-grained sedimentary rock made of quartz. Usually made of millions of globular siliceous skeletons of tiny marine plankton called radiolarians. Black chert is called flint." (USGS, 2015f)
[33] Sandstone: "Sedimentary rock made mostly of sand-sized grains." (USGS, 2015f)
[34] Shale: "Sedimentary rock derived from mud. Commonly finely laminated (bedded). Particles in shale are commonly clay minerals mixed with tiny grains of quartz eroded from pre-existing rocks." (USGS, 2015f)

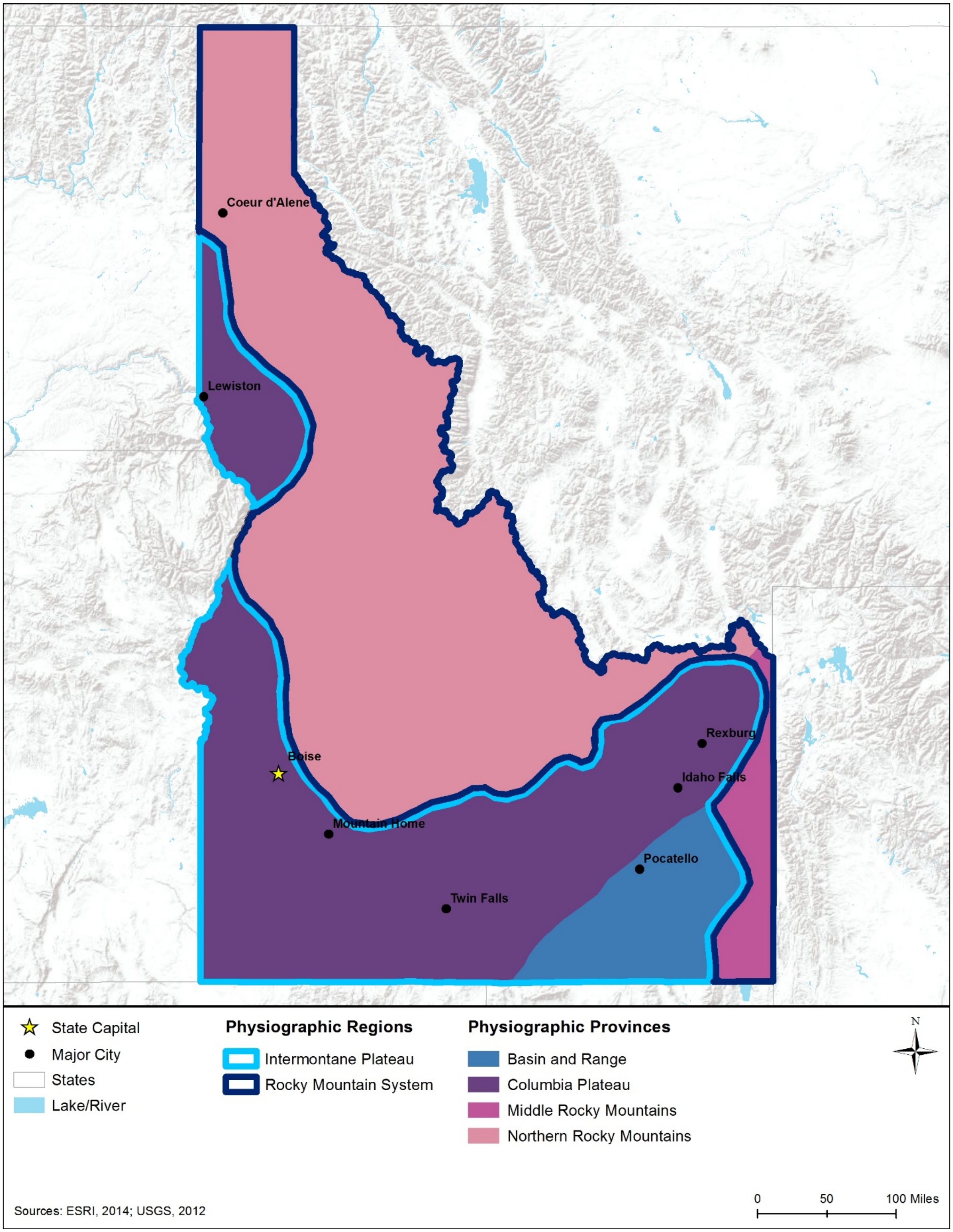


Figure 5.1.3-1: Physiographic Regions and Provinces of Idaho

<u>Northern Rocky Mountains Province</u> – The Northern Rocky Mountains include much of northern and central Idaho along the state's borders with Washington to the west and Montana to the east. In general, the Northern Rocky Mountains Province is lower in elevation than the Middle Rocky Mountains Province to the south and east (NPS, 2014b). Within Idaho, the Northern Rocky Mountains Province includes the Idaho Batholith,[35] Bitterroot Valley, Rocky Mountain Front, Belt Mountains, and Beaverhead Mountains.

- The Idaho Batholith, in central and northern Idaho, ranges from 3,000 to 10,000 feet above sea level (ASL) with local relief that can reach up to 5,000 feet. This area is characterized by "large U-shaped valleys with broad bottoms [that] indicate that the area has been strongly glaciated."
- The Bitterroot Valley, in northern Idaho along the state's eastern border with Montana, ranges from 2,500 to 6,000 feet ASL in the basin areas. The Bitterroot Mountains are between 3,000 and 8,000 feet ASL and are characterized by "steep slopes, sharp crests, and narrow valleys."
- The Rocky Mountain Front in northern Idaho is between 5,500 and 8,500 feet ASL and is characterized as "glaciated mountains with limestone scarps and ridges interspersed with glacial and lacustrine intermontane basins."
- The Belt Mountains are in northern Idaho and are between 4,000 and 8,500 feet ASL. "Plains and rolling hills [(at 2,500 to 5,000 feet ASL)] surround the isolated mountain ranges."
- The Beaverhead Mountains, also along the state's eastern border with Montana, span between 4,000 and 10,000 feet ASL in the valleys and 2,500 to 6,500 feet ASL in the interceding valleys. The Beaverhead Mountains are noted for their "high, steep mountains with sharp alpine ridges and cirques[36] at higher elevations, glacial and fluvial valleys, and alluvial terraces[37] and [floodplains]." (USFS, 2015a)

Intermontane Plateaus

The Intermontane Plateau Region describes the area between the Rocky Mountains and the Sierra Nevada and Cascade Ranges. The Intermontane Plateau Region dates to 80 MYA and predates the younger Rocky Mountain System to the east which was created roughly 60 MYA. The region is characterized by interspersed high-elevation plateaus, mountains, and low-lying basins. The Colorado Plateaus Province is one of the major elevated areas in this region. (Lew, 2004)

<u>Basin and Range Province</u> – The Basin and Range Province is characterized by north-south trending mountains and valleys that were created as the landscape in the region underwent

[35] Batholith: "Very large mass of intrusive (plutonic) igneous rock that forms when magma solidifies at depth. A batholith must have greater than 100 square kilometers (40 square miles) of exposed area." (USGS, 2015f)
[36] Cirque: "A bowl-shaped, amphitheater-like depression eroded into the head or the side of a glacier valley. Typically, a cirque has a lip at its lower end." (USGS, 2004)
[37] Terrace: "Level or near-level area of land, generally above a river or ocean and separated from it by a steeper slope. A river terrace is made by the river at some time in the past when the river flowed at a higher level. A terrace may be made of river deposits such as gravel or sand, or it could be cut by the river on bedrock." (USGS, 2015f)

extension[38] over the past 30 million years (NPS, 2014c). This tectonic activity has thinned the Earth's crust and created large faults that have resulted in the "distinctive alternating pattern of linear mountain ranges and valleys" (USGS, 2014b). Within Idaho, the Basin and Range Province includes eastern portions of the state, including the City of Pocatello. "[The Province] is characterized by north–south trending mountain ranges and volcanic plateaus interspersed with broad, nearly level basins and valleys. The elevational range is [4,000 to 7,200 feet ASL]. Large alluvial fans[39] have developed at the mouths of most canyons, and playas[40] and marshes occur in valleys and basins" (Idaho Fish and Game, 2015a).

Columbia Plateau – The Columbia Plateau Province includes portions of southern and western Idaho. The Columbia Plateau is noted for containing widespread Miocene basalt[41] fields that date to within the last 17 million years. The portion of the Columbia Plateau that passes through Idaho is referred to as the Snake River Plain. This area is a flat, low-lying landscape with basalt flows infused with rhyolite[42] (NPS, 2014c). The line of basalt that passes through southern Idaho is an indicator of the movement of the North American tectonic plate[43] over the Yellowstone Hot Spot[44] over the last 15 million years. "Craters of the Moon [National Monument] contains effects of the most recent volcanic eruptions in the Snake River Plain, namely 4.5 cubic miles of lava covering approximately 643 square miles" (USFS, 2015b).

5.1.3.4. Surface Geology

Surficial geology is characterized by materials such as till,[45] sand and gravel, or clays that overlie bedrock. The surface terrain, which can include bedrock outcrops, provides information on the rock compositions and structural characteristics of the underlying geology. Because surface materials are exposed, they are subject to physical and chemical changes due to weathering from precipitation (rain and snow), wind and other weather events, and human-caused interference. Depending on the structural characteristics and chemical compositions of the surface materials, heavy precipitation can cause slope failures,[46] subsidence,[47] and erosion (Thompson, 2015).

[38] Extension: "In geology, the process of stretching the Earth's crust. Usually cracks (faults) form, and some blocks sink, forming sedimentary basins." (USGS, 2015f)
[39] Alluvial Fan: "A fan-shaped pile of sediment that forms where a rapidly flowing mountain stream enters a relatively flat valley. As water slows down, it deposits sediment (alluvium) that gradually builds a fan." (USGS, 2015f)
[40] Playa: "Playas are shallow, short-lived lakes that form where water drains into basins with no outlet to the sea and quickly evaporates. Playas are common features in arid (desert) regions and are among the flattest landforms in the world." (USGS, 2015f)
[41] Basalt: "A dark, fine-grained, extrusive (volcanic) igneous rock with a low silica content (40 percent to 50 percent), but rich in iron, magnesium, and calcium." (USGS, 2015f)
[42] Rhyolite: "A volcanic rock chemically equivalent to granite; usually light colored, very fine-grained or glassy-looking. May have tiny visible crystals of quartz and/or feldspar dispersed in a glassy white, green, or pink groundmass." (USGS, 2015f)
[43] Tectonic Plate: "A slab of rigid lithosphere (crust and uppermost mantle) that moves over the asthenosphere." (USGS, 2015f)
[44] Hot Spot: "An area of concentrated heat in the mantle that produces magma that rises to the Earth's surface to form volcanic islands." (USGS, 2015f)
[45] Till: "An unsorted and unstratified accumulation of glacial sediment, deposited directly by glacier ice. Till is a heterogeneous mixture of different sized material deposited by moving ice (lodgement till) or by the melting in-place of stagnant ice (ablation till). After deposition, some tills are reworked by water." (USGS, 2013b)
[46] Slope failure, also referred to as mass wasting, is the downslope movement of rock debris and soil in response to gravitational stresses. (Idaho State University 2000)
[47] Subsidence: Gradual settling or sudden sinking of the Earth's surface owing to subsurface movement of earth materials." (USGS, 2000)

Surface materials in Idaho mostly consist of unconsolidated deposits and rocks. They range greatly in age, from pre-Oligocene (34 to 23 MYA) to Pleistocene (2.6 MYA to 11,700 years ago). Sediment sizes range from fine-grained deposits that come from older volcanic, wind-blown, and lake origins, to younger coarse-grained deposits that originated from streams and glaciers. Many older unconsolidated deposits also have thin flows of silicic or basaltic volcanic rocks, while others have thicker beds of ash from volcanoes. In some areas, such as the Snake River Plain, mixing of volcanic rocks and unconsolidated deposits occurs. Volcanic rocks are found throughout the state; as noted in section 5.1.8.6, Visual Resources – Natural Areas, parts of Idaho include the "largest area of volcanic rocks of young age (Quaternary) in the U.S… [as well as] the world's richest deposits of Upper Pliocene [(5.3 to 2.6 MYA)] age terrestrial fossils" (NPS, 2012c). Basaltic volcanic rocks are found on the Snake River Plain and are typically dark colored, composed of iron and manganese, and are fine-grained and dense. Silicic volcanic rocks are found predominantly in southwest Idaho. They contain high amounts of silica and are light colored and coarse grained. Undifferentiated sedimentary, metamorphic, and igneous rocks are found throughout the state. They are typically dense, and few fracturing occurs (USGS, 1994).

Figure 5.1.3-2 depicts a generalized illustration of the surface geology for Idaho.

5.1.3.5. Bedrock Geology

Bedrock geology analysis, and "the study of distribution, position, shape, and internal structure of rocks" (USGS, 2015a) reveals important information about a region's surface and subsurface characteristics (i.e., three dimensional geometry), including dip (slope of the formation),[48] rock composition, and regional tectonism.[49] These structural aspects of bedrock geology are often indicative of regional stability, as it relates to geologic hazards such as landslides, subsidence, earthquakes, and erosion (New Hampshire Department of Environmental Services, 2014).

Folding and faulting in Idaho during the Precambrian Era (4,600 to 542 MYA) first established areas of structurally strong and weak bedrock, and generally controlled the framework for later tectonic activity. The most intense deformation of Idaho's subsurface occurred during three orogenies: Nevadan (Jurassic [200 to 146 MYA] through Cretaceous [146 to 66 MYA] Periods); Laramide (Cretaceous through Paleogene [66 to 23 MYA] Periods); and Cascadian (Paleogene through Neogene [23 to 2.6 MYA] Periods). Southeastern and east-central Idaho bedrock is dominated by faulted and folded rock from the Paleozoic Era (542 to 251 MYA). In southern Idaho, extrusion of volcanic rock, block faulting, and Paleogene and Neogene downfolding are characteristic of bedrock geology. Central Idaho is dominated by the Cretaceous Period batholith,[50] and northern Idaho bedrock geology is heavily influenced by Precambrian Era (4,600 to 542 MYA) structural geology (Ross & Savage, 1967). Figure 5.1.3-3 shows the general bedrock geology for Idaho.

[48] Dip: "A measure of the angle between the flat horizon and the slope of a sedimentary layer, fault plane, metamorphic foliation, or other geologic structure." (NPS, 2000)
[49] Tectonism: "Structure forces affecting the deformation, uplift, and movement of the earth's crust." (USGS, 2015f)
[50] Batholith: "A large mass of rock formed by magmatic processes that has more than 100 km^2 (40 mi^2) of surface exposure and no known floor." (USGS, 2011b)

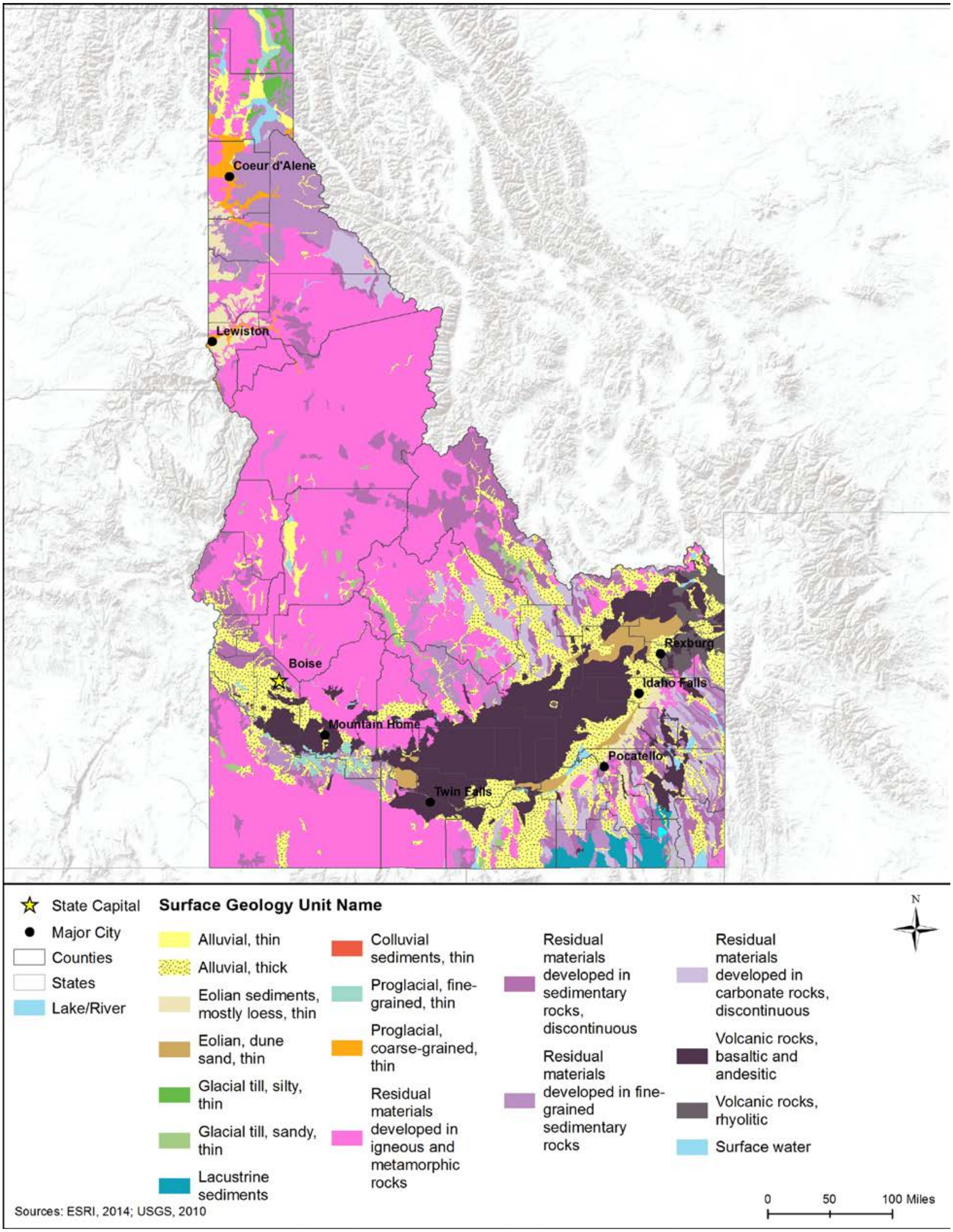


Figure 5.1.3-2**: Generalized Surface Geology for Idaho**

5.1.3.6. Paleontological Resources

Idaho State Fossil
Equus simplicidens

Source: (The Paleontology Portal, 2015)

Stromatolite fossils have been recorded in Precambrian (4,600 to 542 MYA) Era sediments in northern Idaho. During the Paleozoic Era (542 to 251 MYA), a shallow sea covered most of Idaho. Marine fossils from the Cambrian (542 to 488 MYA) through Carboniferous (359 to 299 MYA) Periods have been recorded in metamorphosed marine sediments, and include trilobites,[51] brachiopods,[52] gastropods,[53] corals, crinoids,[54] and sponges. The Phosphoria Formation in eastern Idaho has rich Permian (299 to 251 MYA) Period fossils including spiral-toothed sharks, fishes, corals, brachiopods, gastropods, bryozoan,[55] cephalopods,[56] pelecypods,[57] and ostracods.[58] Idaho's deepwater marine environments during the Mesozoic (251 to 66 MYA) Era produced fossils of mollusks, echinoids,[59] corals, bryozoans, brachiopods, shark teeth, and an early ichthyosaur. Jurassic (200 to 146 MYA) Period rocks in southeastern Idaho have yielded oyster, scallop, crinoid,[60] sea urchin spine, ammonite,[61]

[51] Trilobite: "Any member of Trilobita, an extinct class of marine arthropods. Trilobites are known from the Cambrian to the Permian. They had segmented, oval-shaped bodies and were the first animals to have complex eyes (similar to the compound eyes in modern insects)." (Smithsonian Institution, 2016a)

[52] Brachiopods: "Any member of a phylum of marine invertebrate animals called Brachiopoda. Brachiopods are sessile, bivalved organisms, but are more closely related to the colonial Bryozoa than the bivalved mollusks. Brachiopod diversity peaked in the Paleozoic, but some species survive." (Smithsonian Institution, 2016a)

[53] Gastropods: "Any member of a large class of mollusks (Gastropoda), commonly called snails. Gastropods live in marine, freshwater, and terrestrial habitats. They have a univalve, often spiral shell (or none at all), a muscular foot for locomotion, and distinctive sensory organs." (Smithsonian Institution, 2016a)

[54] Crinoids: "The common name for any echinoderm of the class Crinoidea, including sea lilies, feather stars, etc. Crinoids are common fossils in the Paleozoic and persist to the present. Many species have stalks and radiating arms and feed on particles in the water column." (Smithsonian Institution, 2016a)

[55] Bryozoan: "Common name for any member of the phylum Bryozoa. Bryozoans are invertebrate aquatic organisms most commonly found in large colonies." (Smithsonian Institution, 2016a)

[56] Cephalopods: "Any mollusk of the class Cephalopoda, which includes squids, octopus, and ammonites. They are characterized by the tentacles attached to their heads." (Smithsonian Institution, 2016a)

[57] Pelecypods: Bivalves that constitute "a very diverse and abundant group of molluscs which inhabit a variety of marine and non-marine environments." (SUNY Cortland, 2016)

[58] Ostracod: "Any member of the crustacean class Ostracoda, which have a shrimp-like body in a bivalved shell. Ostracodes are very small and are common fossils in marine and freshwater environments through much of the Phanerozoic." (Smithsonian Institution, 2016a)

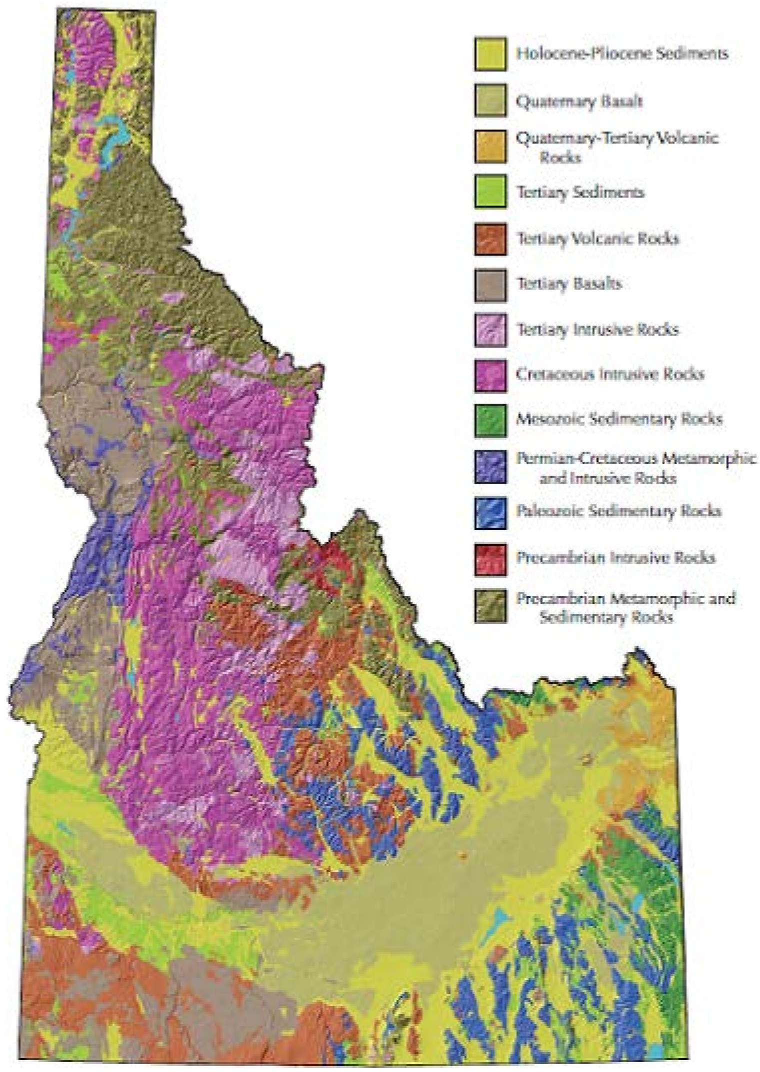
[59] Echinoids: "Common name for any member of the class Echinoidea, typified by sea urchins. Echinoids are a major component of Mesozoic and Cenozoic benthic marine faunas, and most have a rounded form with five-fold radial symmetry." (Smithsonian Institution, 2016a)

[60] Crinoid: "The common name for any echinoderm of the class Crinoidea, including sea lilies, feather stars, etc. Crinoids are common fossils in the Paleozoic and persist to the present. Many species have stalks and radiating arms and feed on particles in the water column." (Smithsonian Institution, 2016a)

[61] Ammonite: "Any member of an extinct suborder of cephalopod mollusks (Ammonoidea) with chambered, spiral shells that thrived in the Mesozoic and Paleozoic oceans." (Smithsonian Institution, 2016a)

belemnite,[62] and coral fossils, while fossils from terrestrial and freshwater sediments such as fish, turtles, crocodilians, freshwater gastropods, ostracods, bivalves[63] and plants have been recorded in eastern Idaho. Terrestrial Cretaceous (146 to 66 MYA) Period dinosaur fossils have also been found in Idaho, and include bones, teeth, eggshell fragments, and gastroliths.[64] Early Cenozoic (66 MYA to present) Era sedimentary rocks and fossil yields indicate a cooler climate, with fossils of plants, fish, rodents, rabbits, and camels recorded (The Paleontology Portal, 2015). *Equus simplicidens*, Idaho's state fossil, is an ancestor of the modern horse, and lived about 3.5 MYA (Idaho State Historical Society, 2007). Quaternary (2.6 MYA to present) Period lava flows, glacial deposits, and deposits of lake and river sediments have yielded mammoths, horses, camels, lizards, and fish (The Paleontology Portal, 2015).

[62] Belemnite: "Any member of an order of squid-like cephalopods (Belemnoida) that evolved in the Carboniferous and lived though the Mesozoic. Belemnites had soft bodies surrounding an internal shell and were probably fast-swimming carnivores, like modern squid." (Smithsonian Institution, 2016a)
[63] Bivalve: "A mollusk with a soft body enclosed by two distinct shells that are hinged and capable of opening and closing." (Smithsonian Institution, 2016b)
[64] Gastrolith: "Rocks that have been in the digestive system of an animal." (University of California Museum of Paleontology, 2007)



Source: (Digital Atlas of Idaho, 2016)

Figure 5.1.3-3 Generalized Bedrock Geology for Idaho

5.1.3.7. Fossil Fuel and Mineral Resources

Oil and Gas

Crude oil production does not occur in Idaho. No commercial oil reserves have been discovered in the state, and all crude oil is transported into the state via pipelines. There is a very small amount of natural gas production in southwestern Idaho, but the majority of natural gas is supplied via pipeline from Canada and western states (EIA, 2015c).

Minerals

As of 2015, Idaho's nonfuel mineral production values was $713M, ranking 9th in the nation (in terms of dollar value). Idaho's leading nonfuel minerals were Phosphate rock, stone (crushed), cement (Portland and masonry), and sand and gravel (construction). Other minerals produced in the state are crushed stone, cement, copper, dimension stone,[65] feldspar, garnet, gemstones, gold, perlite, pumice, zeolites, zinc, industrial sand, and lime (USGS, 2015b).

5.1.3.8. Geologic Hazards

The four major geologic hazards of concern in Idaho are volcanoes, earthquakes, landslides, and subsidence. The subsections below summarize current geologic hazards in Idaho.

Volcanoes

Volcanic hazards in Idaho include three active and potentially active areas that could impact the state. The first is the Yellowstone Caldera[66] in northwest Wyoming that overlaps into Montana and southeastern Idaho. Three significant eruptions in have occurred in Yellowstone within the last 2.1 million years, along with other smaller events. During each volcanic eruption, "enormous volumes of magma[67] erupted at the surface and into the atmosphere as mixtures of red-hot pumice,[68] volcanic ash[69] (small, jagged fragments of volcanic glass and rock), and gas spread as pyroclastic ("fire-broken") flows[70] in all directions." Though it is likely that a future pyroclastic eruption will occur at Yellowstone, it is far more likely that events in the immediate future will take the form of a lava[71] flow. "Since Yellowstone's last caldera forming eruption 640,000 years ago, about 30 eruptions of rhyolitic[72] lava flows have nearly filled the Yellowstone Caldera (USGS, 2005).

The second volcanic area that poses a threat to Idaho is in the Cascade Mountain Range in Washington and Oregon (Washington Section 8.1.3.8 and Oregon Section 7.1.3.8 include additional information on the volcanoes in the Cascade Mountain Range.). Eruptions from more than 12 active composite[73] volcanoes, including Mount Saint Helens, in the Cascades would produce ashfall that could impact Idaho. The third area of volcanic activity is the Snake River Plain, especially the area in south-central Idaho known as the "Craters of the Moon." This area contains linear cracks in the earth's crust that have produced lava[74] flows approximately every 2,000 years (Idaho Bureau of Homeland Security, 2013a). Figure 5.1.3-4 displays the location of active volcanoes within Idaho.

[65] Dimension stone: "Natural rock material quarried for the purpose of obtaining blocks or slabs that meet specifications as to size (width, length, and thickness) and shape." (USGS, 2016d)
[66] Caldera: "Large, generally circular, fault-bounded depression caused by the withdrawal of magma from below a volcano or volcanoes." (USGS, 2015f)
[67] Magma: "Molten rock. Magma may be completely liquid or a mixture of liquid rock, dissolved gases and crystals. Molten rock that flows out onto the Earth's surface is called lava." (USGS, 2015f)
[68] Pumice: "A light-colored, frothy, glassy volcanic rock." (USGS, 2015f)
[69] Ash: "Fine particles of volcanic rock and glass blown into the atmosphere by a volcanic eruption." (USGS, 2015f)
[70] Pyroclastic Flow: "A volcanic eruption that produces a large volume of solid volcanic fragments (pyroclastics) rather than fluid lava. This type of eruption is typical of volcanoes with high silica, viscous, gas-rich magma. (USGS, 2015f)
[71] Lava: "Magma that reaches the Earth's surface through a volcanic eruption. When cooled and solidified, forms extrusive (volcanic) igneous rock. (USGS, 2015f)
[72] Rhyolite: "A volcanic rock chemically equivalent to granite. Usually light colored, very fine-grained or glassy-looking. May have tiny visible crystals of quartz and/or feldspar dispersed in a glassy white, green, or pink groundmass." (USGS, 2015f)
[73] Composite Volcano: "A relatively long-lived volcano built up of both lava flows and pyroclastic material." (USGS, 2015f)
[74] Lava: "Magma that reaches the Earth's surface through a volcanic eruption. When cooled and solidified, forms extrusive (volcanic) igneous rock. (USGS, 2015f)

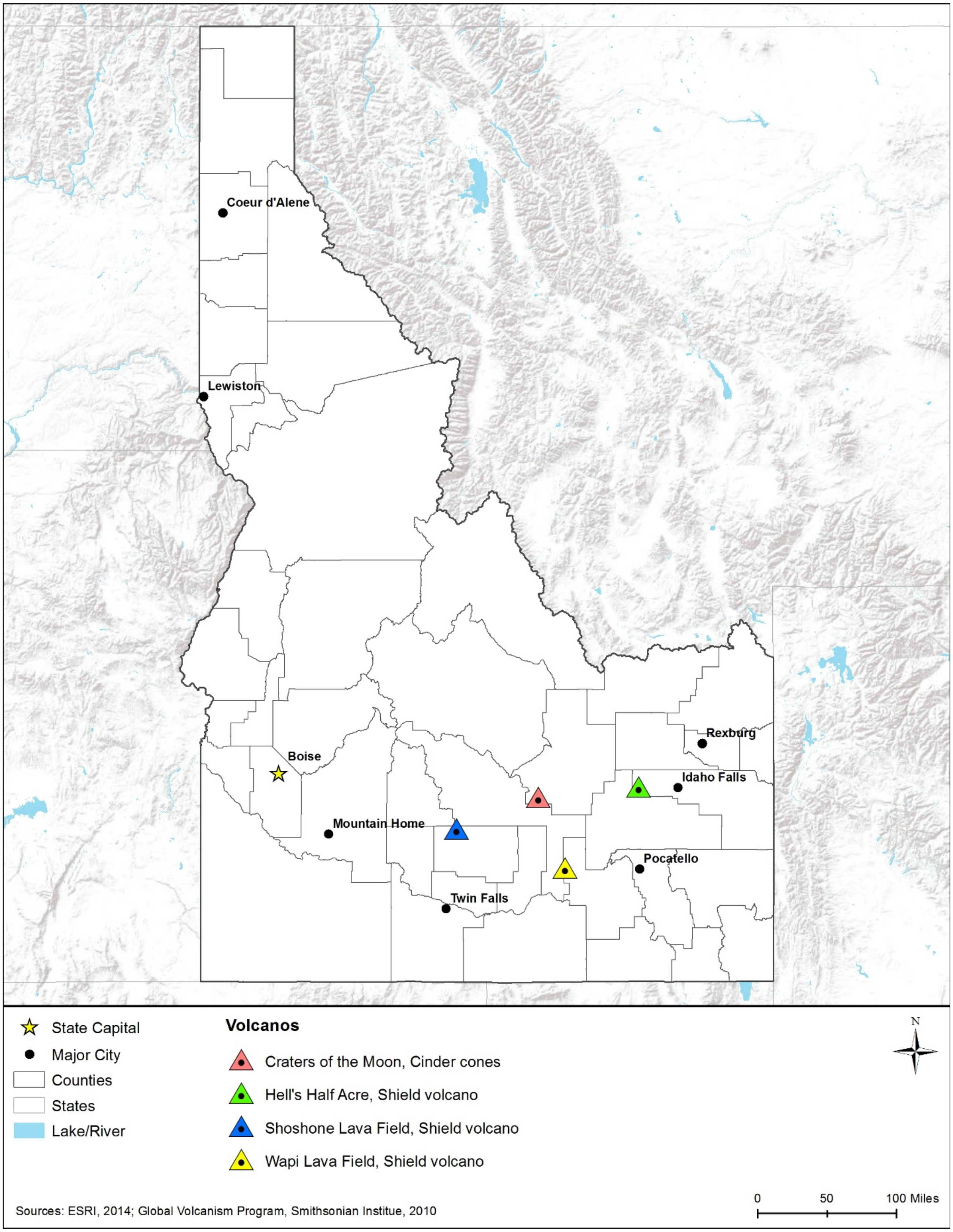


Figure 5.1.3-4: Active Volcanoes within Idaho

Earthquakes

Between 1973 and March 2012, there were over 35 earthquakes of a magnitude 4.5 (on the Richter scale) or greater in Idaho (USGS, 2014c). Earthquakes are the result of large masses of rock moving against each other along fractures called faults. Earthquakes occur when landmasses on opposite sides of a fault suddenly slip past each other; the grinding motion of each landmass sends out shock waves. The vibrations travel through the Earth and, if they are strong enough, they can damage manmade structures on the surface. Earthquakes can produce secondary flooding impacts resulting from dam failure (USGS, 2012a).

The shaking due to earthquakes can be significant many miles from its point of origin depending on the type of earthquake and the type of rock and soils beneath a given location. Crustal earthquakes, the most common, typically occur at depths of 6 to 12 miles; these earthquakes typically do not reach magnitudes higher than 6.0 on the Richter scale.[75] Subduction zone earthquakes occur where Earth's tectonic plates collide. "When these plates collide, one plate slides (subducts) beneath the other, where it is reabsorbed into the mantle of the earth" (OSHA, 2015). Subduction zones are found off the coast of Washington, Oregon, and Alaska (USGS, 2014j). Convergence boundaries between two tectonic plates can result in earthquakes with magnitudes that exceed 8.0 on the Richter scale (Oregon Department of Geology, 2015).

Figure 5.1.3-5 depicts the seismic risk throughout Idaho; the box surrounding the range of colors shows the seismic hazards in the state. The map indicates levels of horizontal shaking (measured in Peak Ground Acceleration [PGA]) that have a 2 percent chance of being exceeded in a 50-year period. Units on the map are measured in terms of acceleration due to gravity (% g). Most pre-1965 buildings are likely to experience damage with exceedances of 10% g. Post-1985 buildings (in California) have experienced only minor damage with shaking of 60% g. (USGS, 2010).

Areas of greatest seismicity in Idaho are concentrated in the central, eastern, and southeastern portions of the state. Seismic activity in eastern Idaho is related to seismic hotspots in the Yellowstone region. Each month, dozens of smaller earthquakes (less than 3.0 in magnitude) occur in this area. Seismic activity in central and southeast Idaho is related to faults in the central mountains. Earthquakes ranging from magnitude 2.0 to 3.8 have been felt yearly in southeast Idaho. The largest earthquake recorded in Idaho (in magnitude and property damage) occurred on October 28, 1983. The magnitude 6.9 Borah Peak earthquake was centered approximately 30 miles southeast of Challis, in central Idaho. (Idaho Bureau of Homeland Security, 2013b)

Many of Idaho's most populous areas, including Boise, Pocatello, and Idaho Falls, are in high seismic risk areas. Seismic hazard assessments are difficult in Idaho, as most of the state's earthquakes that occur are not associated with any known faults. (Idaho Bureau of Homeland Security, 2013b)

[75] The Richter scale is a numerical scale for expressing the magnitude of an earthquake on the basis of seismograph oscillations. The more destructive earthquakes typically have magnitudes between about 5.5 and 8.9; the scale is logarithmic and a difference of one represents an approximate thirtyfold difference in magnitude. (USGS, 2014i)

Landslides

"The term 'landslide' describes many types of downhill earth movements, ranging from rapidly moving catastrophic rock avalanches and debris flows in mountainous regions to more slowly moving earth slides and other ground failures" (USGS, 2003a). Geologists use the term "mass movement" to describe a great variety of processes such as rock fall, creep, slump, mudflow, earth flow, debris flow, and debris avalanche regardless of the time scale (USGS, 2003a).

Landslides can be triggered by a single severe storm or earthquake, causing widespread damage in a short period. Most landslide events are triggered by water infiltration that decomposes and loosens rock and soil, lubricates frictional surfaces, adds weight to an incipient landslide, and imparts buoyancy to the individual particles. Intense rainfall, rapid snowmelt, freeze/thaw cycles, earthquakes, volcanic eruptions, and human alterations to the natural landscape can trigger mass land movements. Large landslides can dam rivers or streams, and cause both upstream and downstream flooding (USGS, 2003a).

The potential for landslide activity in Idaho is localized. The state's climate, soils, geology, and landscape are all conducive to this localized landslide activity. Landslides occur throughout the year, although many are small events without documented impacts. Landslide events resulting in disasters are rare. Since 1976, three federal disasters have been declared that included landslides in central and northern Idaho: 1996, 1997, and 2011. According to the Idaho Bureau of Homeland Security, the potential of landslides is elevated in northern Idaho, relative to the rest of the state, due to its increased topography, and the relatively higher amount of precipitation this portion of the state receives. "[Landslide] occurrences may be found throughout the state. Even in the relatively flat Snake River Plain {(in central Idaho)] and Owyhee County [(in southern Idaho)] regions, numerous landslides occur along the near-vertical walls of deeply incised river canyons" (Idaho Bureau of Homeland Security, 2013c). Figure 5.1.3-6 shows landslide incidence and susceptibility throughout Idaho.

Subsidence

Land subsidence is a "gradual settling or sudden sinking of the Earth's surface owing to subsurface movement of earth materials." The primary causes of land subsidence are attributed to aquifer system compaction, drainage of organic soils, underground mining, sinkholes, and thawing permafrost. More than 80 percent of subsidence in the United States is a consequence of over-withdrawal of groundwater. In many aquifers, which are subsurface soil layers through which groundwater moves, water is pumped from pore spaces between sand and gravel grains. If an aquifer is confined by layers of silt or clay, which do not transport groundwater, the lowered water pressure in the sand and gravel causes slow drainage of water from the clay and silt beds. The reduced water pressure compromises support for the clay and silt beds, causing them to collapse on one another. The effects of this compression are seen in the permanent lowering of the land surface elevation (USGS, 2000).

Land subsidence can result in altered stream elevations and slopes; detrimental effects to infrastructure and buildings; and collapse of wells due to compaction of aquifer sediments.

Subsided areas can become more susceptible to inundation, both during storm events and non-events. Additionally, land subsidence can affect vegetation and land use (USGS, 2013a).

In Idaho, land subsidence is of particular concern in the Snake River plain. This area contains regions of late Cenozoic Era (66 million years ago to present) basalt lava fields that produce volcanic pseudokarst[76] areas. These areas are characterized by fissures, open sinkholes, lava tubes, and caves that are created from extrusion of still-liquid portions of lava. These lava tubes and fissures can produce sinkholes mostly less than 100 feet wide, but in the Snake River, these can extend for more than one mile at depths that exceed 150 feet. These pseudokarst areas cause problems to foundations, abutments, and reservoirs, and the permeable lava can hold large quantities of water that can lead to flooding and slope stability issues during excavations and cuts (Davies, 1984). Figure 5.1.3-7 shows the location of areas in Idaho that are susceptible to land subsidence due to karst topography.

[76] Pseudokarst: “Karstlike terrain produced by processes other than the dissolution of rocks. (Davies, 1984)

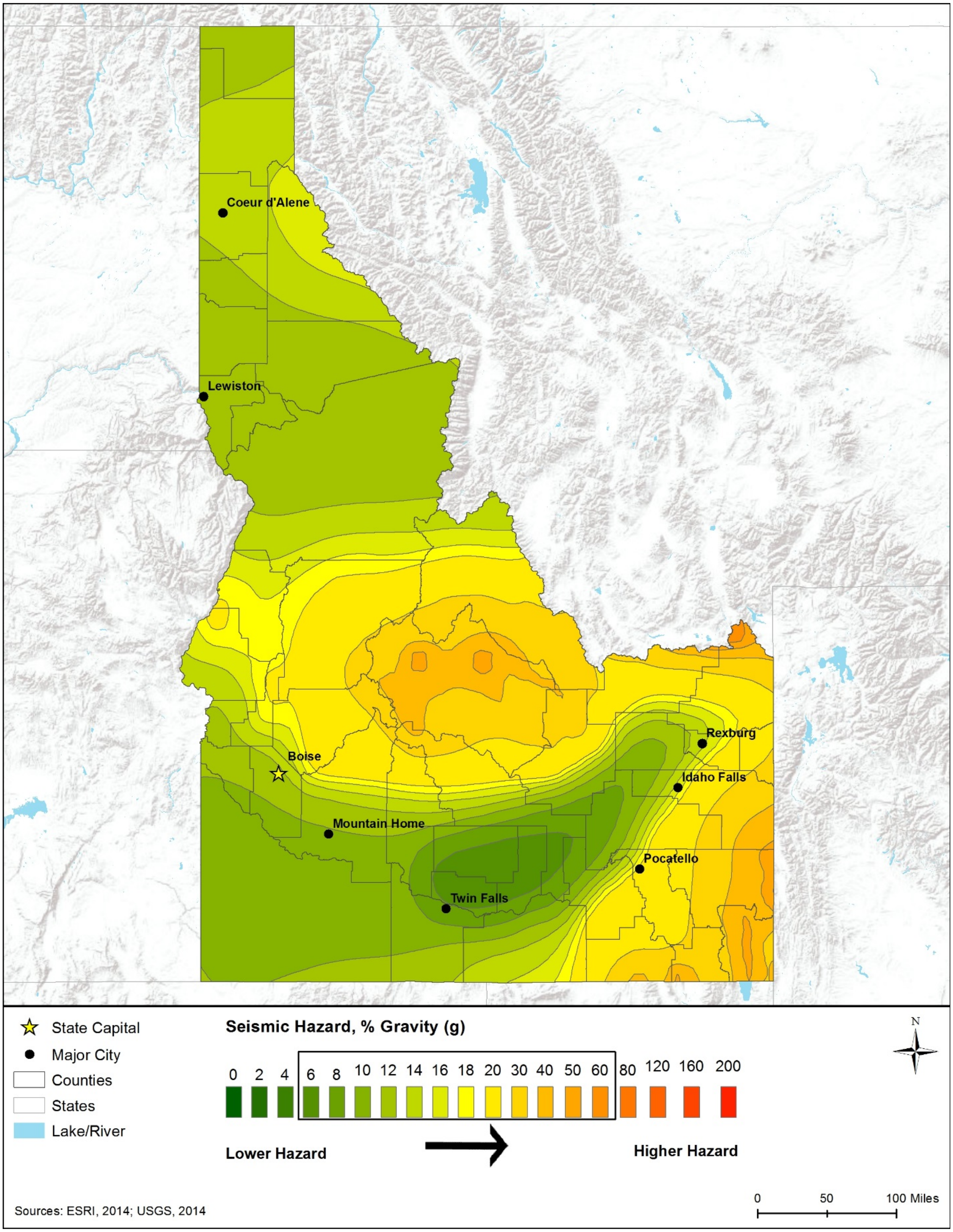


Figure 5.1.3-5: Idaho 2014 Seismic Hazard Map

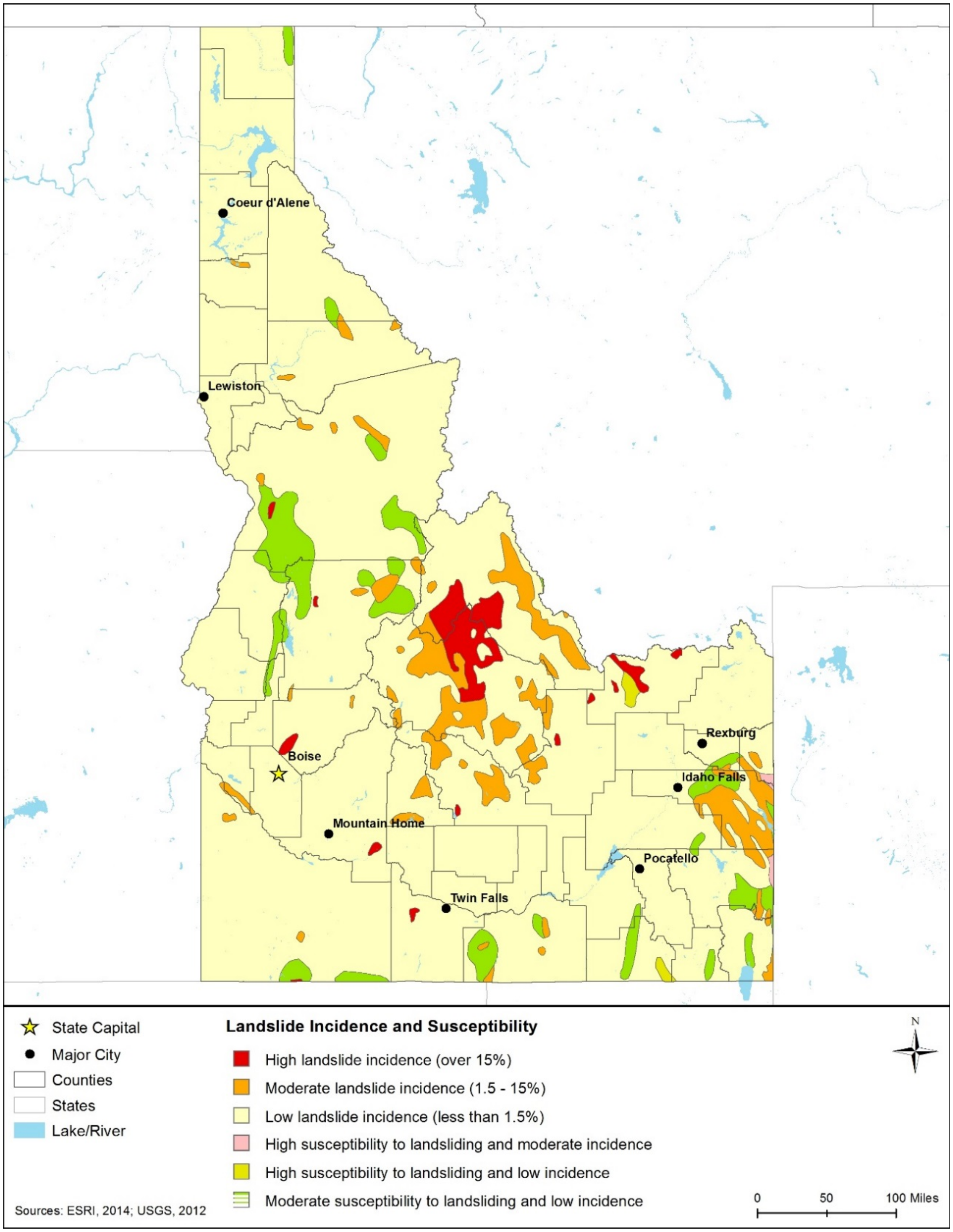


Figure 5.1.3-6: Idaho Landslide Incidence and Susceptibility Hazard Map[77]

[77] Susceptibility hazards not indicated in Figure 5.1.3-6 where same or lower than incidence. Susceptibility to landslides is defined as the probable degree of response of areal rocks and soils to natural or artificial cutting or loading of slopes, or to anomalously high precipitation. High, moderate, and low susceptibility are delimited by the same percentages used in classifying the incidence of landslides. Some generalization was necessary at this scale, and several small areas of high incidence and susceptibility were slightly exaggerated. (USGS, 2014d)

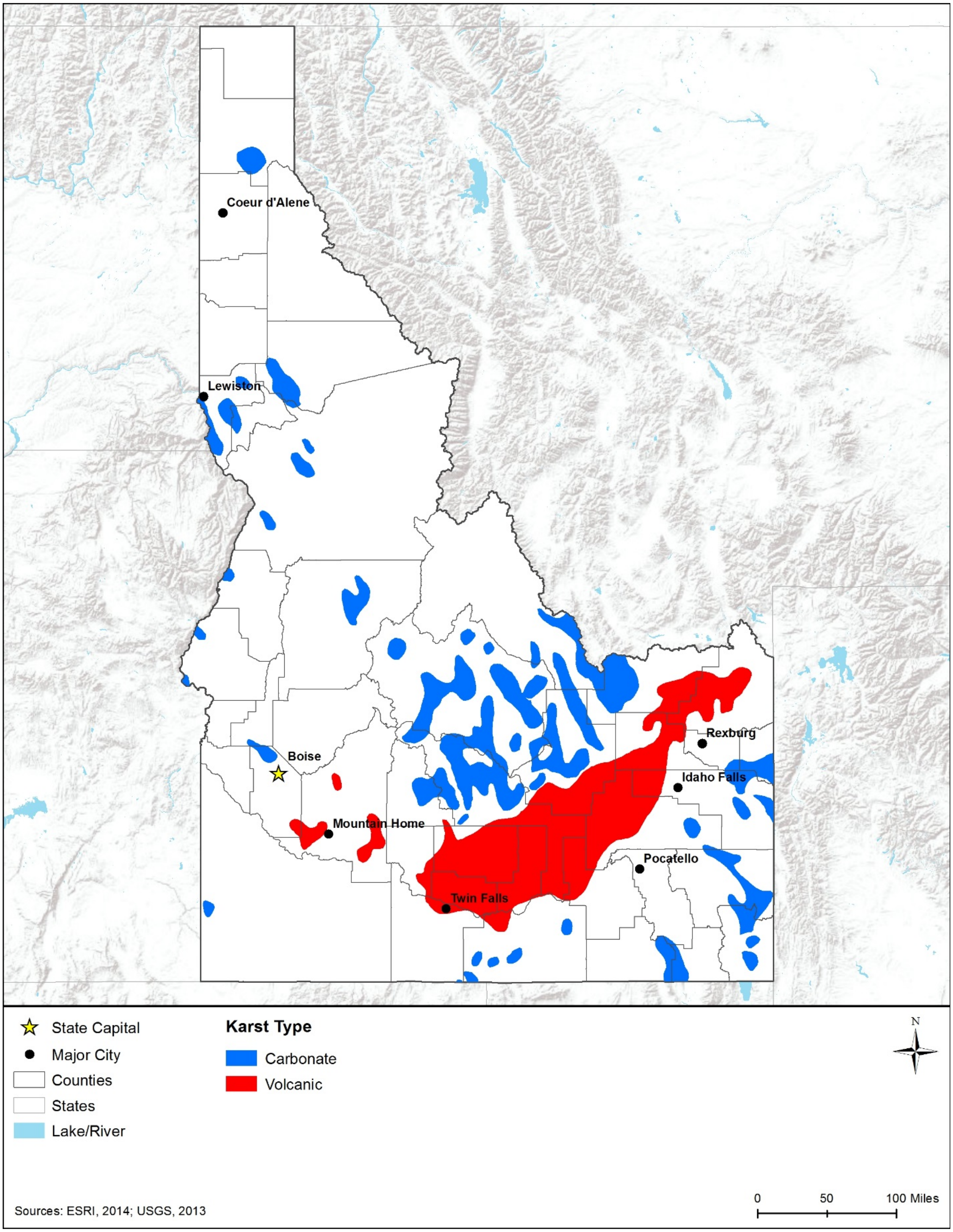


Figure 5.1.3-7: Areas Susceptible to Subsidence due to Karst Topography in Idaho

5.1.4. Water Resources

5.1.4.1. Definition of the Resource

Water resources are defined as all surface water bodies and groundwater systems including streams, rivers, lakes, floodplains, aquifers, and other aquatic habitats (wetlands are discussed separately in Section 5.1.5). These resources can be grouped into watersheds which are defined as areas of land whose flowing water resources (including runoff from rainfall) drain to a common outlet such as a river or ocean. The value and use of water resources are influenced by the quantity and quality of water available for use and the demand for available water. Water resources are used for drinking, irrigation, industry, recreation, and as habitat for wildlife. Some water resources that are particularly pristine, sensitive, or of great economic value enjoy special protections under federal and state laws. An adequate supply of water is essential for human health, economic wellbeing, and ecological health (USGS, 2014e).

5.1.4.2. Specific Regulatory Considerations

Federal laws relevant to protecting the quality and use of water resources are summarized in Appendix C, Environmental Laws and Regulations, and Section 1.8, Overview of Relevant Federal Laws and Executive Order. Table 5.1.4-1 summarizes the major Idaho laws and permitting requirements relevant to the state's water resources.

Table 5.1.4-1: Relevant Idaho Water Laws and Regulations

State Law/Regulation	Regulatory Agency	Applicability
Clean Water Act (CWA) Section 401 Water Quality Certification	DEQ	DEQ issues Section 401 certifications that the actions authorized by the permits do not violate Idaho water quality standards, and not covered by Nationwide Permit (NWP).
Idaho Stream Channel Protection Act	Idaho Department of Water Resources (IDWR)	IDWR must approve in advance any work being done within the beds and banks of a continuously flowing stream.
CWA Section 404 permit, NWP, Regional Conditions for Idaho	USACE Walla Walla District	USACE shall coordinate with Idaho Department of Fish and Game for activities in the following waters that require pre notification: Henry's Fork of the Snake River; Teton River upstream of State Highway 33; South Fork Snake River; Big Lost River upstream of the U.S. 93 crossing south of Leslie; East Fork Big Lost River; Boise River upstream of Arrow Rock Reservoir; Salmon River and its tributaries, St Joe River; Priest River; Falls River; Big Wood River; closed Basins of Beaver-Camas Creeks; Medicine Lodge Creek and Crooked Creek Mud Lake Basin; Kootenai River Basin; Big Sand Creek; Potlatch River, Hog Meadow Creek and East Fork Palouse River; Lolo Creek; Musselshell Creek and Eldorado Creek; Camas Prairie (northern Idaho); Middle and South Fork Clearwater River Basins; Weiser River Basin in Adams and Washington Counties.
Tribal Water Quality Standards	Coeur D'Alene Tribe and Shoshone-Bannock Tribes	Two tribes in Idaho administer their water quality standards (WQS) program. According to the USEPA, "a tribe may administer a WQS program if it applies and USEPA finds that it qualifies under Section 518(e) of the Clean Water Act to be treated in a manner similar to a state."

State Law/Regulation	Regulatory Agency	Applicability
State Water Rights	IDWR	"Water law in Idaho is based on the appropriation doctrine, because water rights in Idaho are based upon diversion and beneficial use of water…The priority date determines who gets water when there is not enough to go around…The amount of the water right is the amount of water put to beneficial use. Due to the beneficial use requirement, a water right (or a portion of a water right) may be lost if it is not used for a continuous five-year period."

Sources: (DEQ, 2015l) (IDWR, 2015a) (USACE - Walla Walla, 2012) (USEPA, 2016b) (IDWR, 2015d)

5.1.4.3. Environmental Setting: Surface Water

Surface water resources are lakes, ponds, rivers, and streams. According to the IDWR, the state has approximately 93,000 miles of streams and rivers, more than 2,000 lakes, and approximately 880 square miles of water surface area (IDWR, 2015b). These surface waters supply drinking water; provide flood control and aquatic habitat; and support recreation, tourism, agriculture, fishing, power generation, and manufacturing across the state.

Watersheds

Watersheds, or drainage areas, consist of surface water and all underlying groundwater, and encompass an area of land that drains streams and rainfall to a common outlet (e.g., reservoir, bay). Idaho's waters (lakes, rivers, and streams) are divided into 6 major watersheds, or drainage basins (Figure 5.1.4-1): Panhandle, Clearwater, Southwest, Salmon, Bear River, and Upper Snake (DEQ, 2013). Visit www.deq.idaho.gov/media/430278-huc_regions_map.pdf for information and additional maps about each DEQ watershed's location, size, and water quality.

The Clearwater and Salmon Basins are in central Idaho, while the Southwest, Upper Snake, and Bear River Basins are in southern Idaho. The Panhandle Basin is in the northern part of the state. Ninety-five percent of runoff drains to the Columbia River Basin, and ultimately discharges to the Pacific Ocean. The Great Basin in Idaho receives the remaining five percent from the Bear River Basin (IDWR, 2010).

Idaho's Panhandle Basin has tributaries that include the Flathead, Bitterroot, Blackfoot and the St. Regis rivers in Montana, and Clark Fork/Kootenai, Pend Oreille, Spokane, Pack, and Priest Rivers in Idaho. The Clearwater Basin in north central Idaho covers roughly 9,600 square miles, or 12 percent of the state. There are over 11,000 miles of streams, including the major tributaries of the North Fork Clearwater, Lochsa, and Selway rivers, which are west of the Continental Divide. The Clearwater system includes the largest capacity storage facility in Idaho (IDWR, 2010).

The Southwest Basin is in the southwest corner of Idaho, including areas around the city of Boise. This area is part of the larger regional Snake River Basin and is located downgradient from Idaho's Upper Snake Basin. Within the Southwest Basin, major tributaries to the Snake River include the Bruneau, Boise, Payette, and Weiser Rivers. The Snake River exits the Southwest Basin as it enters into Hells Canyon along the Washington state border. "The Salmon

River basin drains more than 14,000 square miles of central Idaho with more than 16,000 miles of streams." (IDWR, 2010)

The Bear River Basin encompasses 7,474 square miles in three states, including 3,255 square miles in Utah; 1,515 square miles in Wyoming; and 2,704 square miles in southeastern Idaho. Bear River in the southeast corner of the state drains to the Great Basin. The Great Basin is a closed basin because it has no natural outlet to the sea. All of the water that drains into the region either evaporates, or seeps into the ground. The water that leaves this small southeastern portion of Idaho drains into the Great Salt Lake in Utah. The Deep Creek drainage in the Curlew Valley, east of the Bear River Basin, also drains into the Great Basin. (IDWR, 2010)

The Upper Snake Basin encompasses areas around Idaho Falls and Twin Falls. This area is part of the larger regional Snake River Basin, which encompasses 108,000 square miles in 5 states (Idaho, Wyoming, Utah, Oregon, and Washington). The Snake River enters Idaho at the Wyoming border with an annual inflow of more than five million acre-feet. Approximately 57 percent of the surface area of the state of Idaho is within the Snake River Basin. Although the Snake River Basin represents 50 percent of the water resources of the state, it is the water supply for 76 percent of Idaho's population. (IDWR, 2010)

Freshwater

As shown in Figure 5.1.4-1, there are 14 major rivers in Idaho: Snake, Salmon, Bear, Clearwater, Coeur d'Alene, Kootenai, Pend Oreille/Clark Fork, Spokane, St. Joe, Rapid, Owyhee, Bruneau, Jarbride, and Priest Rivers. "Few of Idaho's rivers systems are free flowing. Early dam construction (1905 through 1930) created storage primarily for irrigation and/or generation of power. Later, during the 1950s and 1960s, larger capacity dams functioned as flood control and additional irrigation storage" (IDWR, 2010). Attributes of some of the major rivers are described below.

- The 111-mile Spokane River originates from Lake Coeur d'Alene in the Idaho Panhandle. "Major tributary [sic] include the Coeur d'Alene, the St. Joe and the St. Maries Rivers." (IDWR, 2010)
- The 420-mile Salmon River begins in Central Idaho's Sawtooth Range, and is "among the longest undammed river systems in the continental United States… Major tributaries include the Pahsimeroi, Lemhi, South, Middle and North Forks and the Little Salmon River." (IDWR, 2010)
- The more than 1,000-mile Snake River (779 miles in Idaho) flows through southern Idaho across the Snake River Plain. "The Snake River leaves Idaho at Lewiston, a city with the distinction of being Idaho's only seaport, [and] joins the Columbia River near Pasco, Washington." (IDWR, 2010)

Idaho also contains more than 2,000 natural lakes and ponds (IDWR, 2015b). Lake Pend Oreille in the Idaho's panhandle is the largest natural lake in the state, with a surface area of 134 square miles acres, 111 miles of shoreline, and maximum depth of 1,152 feet. Bear Lake in the southwest corner of the state on the border of Utah is the second largest lake in Idaho; it is 109 square miles (about one-half of which is in Utah), 20 miles long, and just over 200 feet deep.

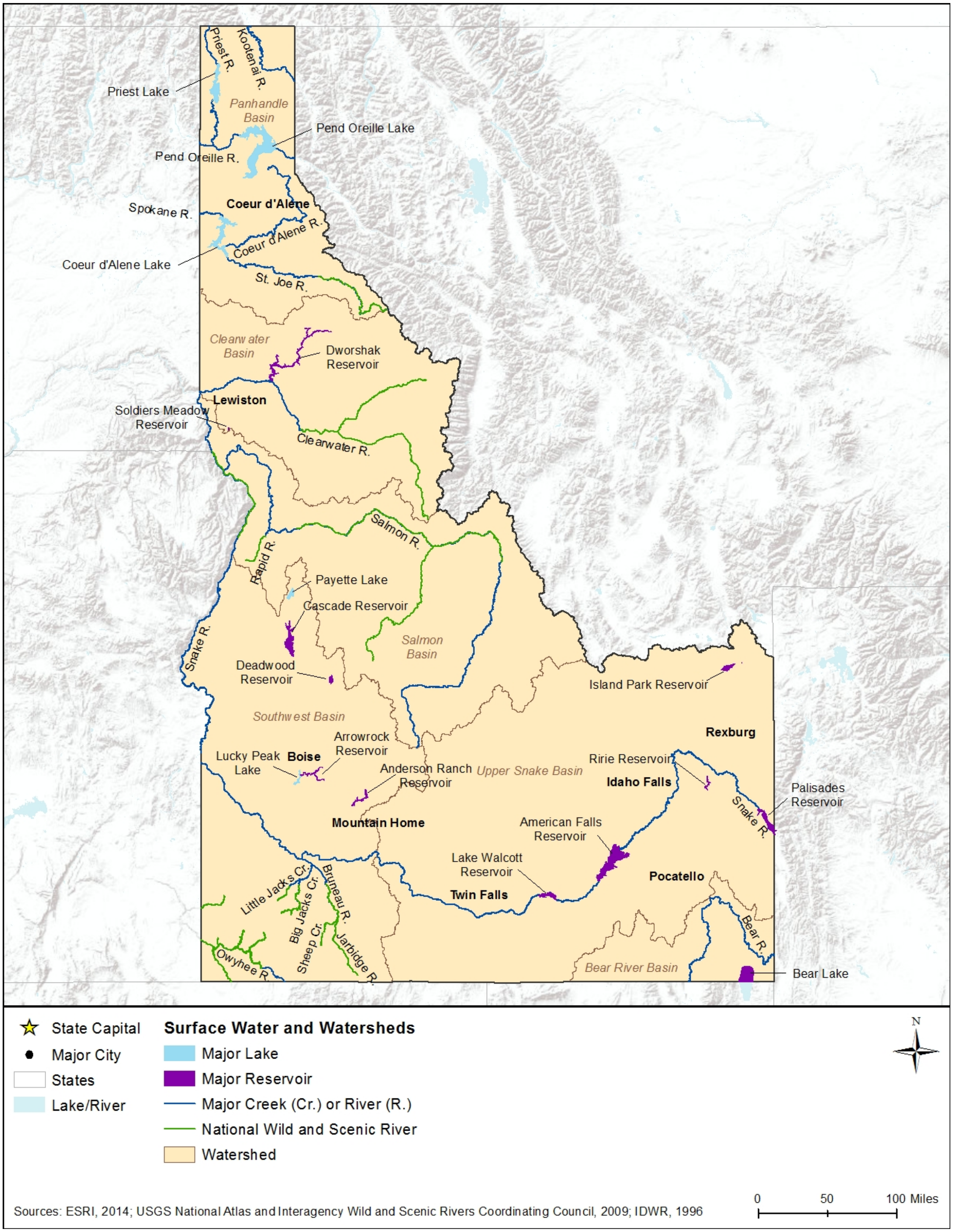


Figure 5.1.4-1: Major Idaho Watersheds and Surface Waterbodies

About 25 miles southeast of Lake Pen Oreille, is the 50-square-mile Lake Coeur d'Alene, with a maximum depth of 220 feet. Priest Lake, also in the panhandle, is the fourth largest Idaho lake, 20 miles northwest of Lake Pend Oreille. Priest Lake is a tributary to the Pend Oreille River, and is 37 square miles and 128-feet deep. A small dam originally constructed in 1950 and rebuilt in 1978, the dam allows Priest Lake to have a storage capacity of 71,300 acre-feet (IDWR, 2010).

5.1.4.4. Sensitive or Protected Waterbodies

Wild and Scenic Rivers

In Idaho, there are 891 river miles designated as Wild and Scenic (refer to Appendix C, Environmental Laws and Regulations, for more information regarding the Wild and Scenic Rivers Act). This includes the following 22 rivers (National Wild and Scenic Rivers System, 2015):

- Battle Creek
- Big Jacks Creek
- Bruneau River
- Bruneau River (West Fork)
- Clearwater River (Middle Fork)
- Cottonwood Creek
- Deep Creek
- Dickshooter Creek
- Duncan Creek
- Jarbidge River
- Little Jacks Creek
- Owyhee River
- Owyhee River (North Fork)
- Owyhee River (South Fork)
- Rapid River
- Red Canyon
- St. Joe River
- Salmon River
- Salmon River (Middle Fork)
- Sheep Creek
- Snake River
- Wickahoney Creek

State Protected Rivers

The Idaho Legislature authorized the Idaho Water Resource Board to preserve highly valued waterways as state protected rivers in 1988. River segments with "outstanding fish and wildlife, recreational, aesthetic, or geologic value," as identified in components of the Comprehensive State Water Plan, may be designated for state protection. Through this program, over 2,745 miles of Idaho's rivers are protected. (IDWR, 2015c)

5.1.4.5. Impaired Waterbodies

Water quality is evaluated by several constituents and attributes, including temperature, dissolved oxygen, suspended sediment, nutrients, metals, oils, pesticides water color, condition of stream banks and lake shores; observations of aquatic wildlife communities; and sampling of fish tissue or sediment (USEPA, 2016c). Under Section 303(d) of the Clean Water Act, states are required to assess water quality and report a listing of impaired waters,[78] the causes of

[78] Impaired waters: waterways that do not meet state water quality standards. Under the CWA, Section 303(d), states, territories, and authorized tribes are required to develop prioritized lists of impaired waters. (USEPA, 2015p)

impairment, and probable sources (USEPA, 2016d). Table 5.1.4-2 summarizes the water quality of Idaho's assessed major waterbodies by category, percent impaired, designated use,[79] cause, and probable sources. Figure 5.1.4-2 shows the Section 303(d) waters in Idaho as of 2014.

As shown in Table 5.1.4-2, various sources affect Idaho's waterbodies, causing impairments. As of 2012, approximately 55 percent of Idaho's assessed streams and 90 percent of assessed lakes were impaired from temperature, sediment, nutrients, or stream/flow modification, which equates to just over a third of the streams and just over half of the lakes being known to have impairment in the state. (USEPA, 2015a)

Table 5.1.4-2: Section 303(d) Impaired Waters of Idaho, 2012

Water Type[a]	Amount of Waters Assessed[b] (Percent)	Amount Impaired (Percent)	Designated Uses of Impaired Waters	Top Causes of Impairment	Top Probable Sources for Impairment
Rivers and Streams	66%	55%	(coldwater and warmwater) aquatic life, undesignated surface waters, and salmonid spawning	temperature (water), sediment, total phosphorus	agriculture (animal grazing), hydromodification (changes to water flow), and loss of habitat
Lakes, Reservoirs, and Ponds	61%	90%	aquatic life, primary and secondary contact recreation, and salmonid spawning	total phosphorus, mercury, and flow alteration	new construction (roads, bridges, infrastructure), hydromodification, and agriculture

[a] Some waters may be considered for more than one water type.

[b] Idaho has not assessed all waterbodies within the state.

Source: (USEPA, 2015a)

According to the DEQ 2012 Integrated Report, "water quality, temperature, combined biota/habitat bioassessments, sedimentation/siltation, *Escherichia coli* (*E. coli*), and cause unknown" are the main causes of causes of impairment in Idaho streams and rivers. Most of the causes have declined since the last reporting cycle (2010) due to improved data management and total maximum daily loads (TMDL) development. (DEQ, 2014)

[79] Designated Use: an appropriate intended use by humans and/or aquatic life for a waterbody. Designated uses may include recreation, shellfishing, or drinking water supply. (USEPA, 2015p)

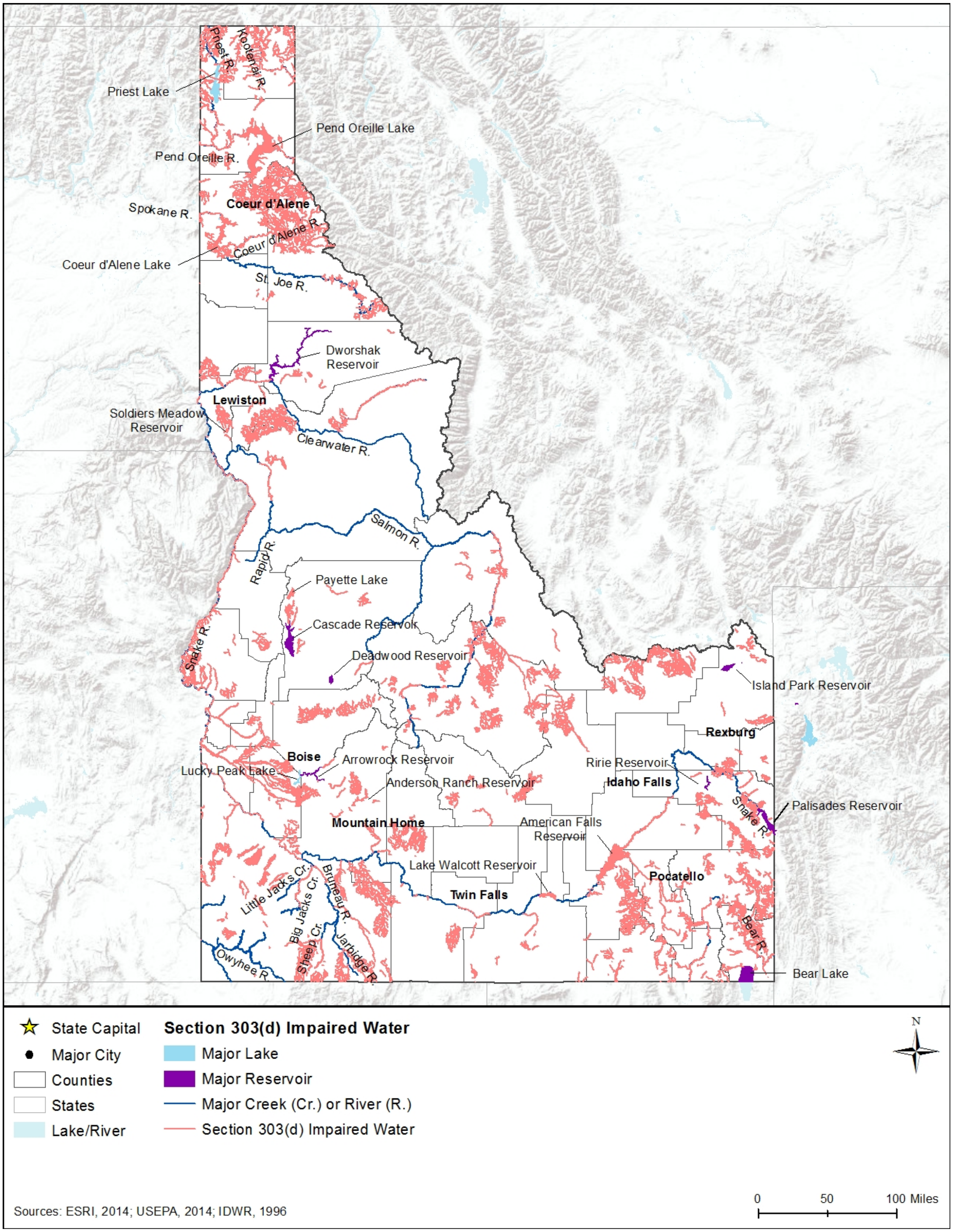


Figure 5.1.4-2: Section 303(d) Impaired Waters of Idaho, 2014

5.1.4.6. Floodplains

The Federal Emergency Management Agency (FEMA) defines a floodplain or flood-prone area as "any land area susceptible to being inundated by water from any source" (44 Code of Regulations [CFR] 59.1) (FEMA, 2000).[80] Through FEMA's flood hazard mapping program, the agency identifies flood hazards and risks associated with the 100-year flood, which is defined as "a flood that has a 1 percent chance of occurring in any given year," to allow communities to prepare and protect against flood events (FEMA, 2013).

Floodplains provide suitable and sometimes unique habitat for a wide variety of plants and animals, and are typically more biologically diverse than upland areas due to the combination of both terrestrial and aquatic ecosystems. Vegetation along stream banks provides shade, which helps to regulate water temperature for aquatic species. During flood events, sediment and debris settle out and collect on the floodplain, enriching the soil with additional nutrients. Pollutants from floodwater runoff are also filtered by floodplain vegetation and soils; thereby improving water quality. Furthermore, floodplains protect natural and built infrastructure by providing floodwater storage, erosion control, water quality maintenance, and groundwater recharge. Historically, floodplains have been favorable locations for agriculture, aquaculture, and forest production due to the relatively flat topography and nearby water supply. Floodplains can also offer recreational activities, such as boating, swimming, and fishing, as well as hiking and camping (FEMA, 2014a).

Riverine and lake floodplains occur along rivers, streams, or lakes where overbank flooding may occur, inundating adjacent land areas. In mountainous areas floodwaters can build and recede quickly, with fast moving and deep water. Flooding in these areas can cause greater damage than typical riverine flooding due to the high velocity of water flow, the amount of debris carried, and the broad area affected by floodwaters. Whereas, flatter floodplains may remain inundated for days or weeks, covered by slow-moving and shallow water (FEMA, 2014b).

Flooding is the leading cause for disaster declaration by the President in the United States and results in significant damage throughout the state annually (NOAA, 2015a). There are several causes of flooding in Idaho, often resulting in loss of life and damage to property, infrastructure, agriculture, and the environment. Although some areas, such as floodplains, are more prone to flooding than others, no area in the state is exempt from flood hazards. A few areas in the state are flooded or threatened by flood waters nearly every year. The Kootenai River Valley, near Bonners Ferry, is one such area, and another is the Snake River upstream from Idaho Falls near Roberts and Menan. Reservoirs and other flood-control facilities have minimized the damage from such seasonal floods. Of the 23 major disasters in Idaho declared by the federal government, 18 involved flooding (IDWR, 2012).

Local communities often have floodplain management or zoning ordinances that restrict development within the floodplain. FEMA provides floodplain management assistance, including mapping of 100-year floodplain limits, to approximately 175 communities in Idaho through the National Flood Insurance Program (NFIP) (FEMA, 2015a). Established to reduce

[80] To search for and locate CFR records, see the Electronic Code of Federal Regulations (e-CFR): www.ecfr.gov.

the economic and social cost of flood damage by subsidizing insurance payments, the NFIP encourages communities "to adopt and enforce floodplain management regulations and to implement broader floodplain management programs" and allows property owners in participating communities to purchase insurance protection against losses from flooding (FEMA, 2015b). As an incentive, communities can voluntarily participate in the NFIP Community Rating System (CRS), which is a program that rewards communities by reducing flood insurance premiums in exchange for doing more than the minimum NFIP requirements for floodplain management. As of May 2014, Idaho had 21 communities participating in the CRS (FEMA, 2014c).[81]

5.1.4.7. Groundwater

Groundwater systems are sources of water that result from precipitation infiltrating the ground surface, and includes underground water that occupies pore spaces between sand, clay, or rock particles. An aquifer is a permeable geological formation that stores or transmits water to wells and springs. Groundwater is contained in either confined (bound by clays or nonporous bedrock) or unconfined (no layer to restrict the vertical movement of groundwater) aquifers (USGS, 1999). When the water table reaches the ground surface, groundwater will reappear as either streams, surface bodies of water, or wetlands. This exchange between surface water and groundwater is an important feature of the hydrologic (water) cycle. Table 5.1.4-3 provides details on aquifer characteristics in the state; Figure 5.1.4-3 shows Idaho's principal and sole source aquifers.

Idaho's principal aquifers consist of valley-fill, fractured basalt, and sedimentary and volcanic rock. Approximately 95 percent of Idaho residents draw drinking water from groundwater resources. Groundwater is an important resource in Idaho, providing water for public and private drinking water systems, irrigation and other agricultural practices, and industrial use. Although the quality of groundwater in Idaho is generally good, groundwater has been degraded in the southern part of the state, which has the highest population density. Nitrate is one of the most widespread groundwater contaminants in Idaho. (DEQ, 2015m)

"In 1953, Idaho's Ground Water Act gave the IDWR the authority to designate critical ground water areas and groundwater management areas. These areas are established when the ground water resources are insufficient or approaching insufficiency to meet current or future water needs. There are eight Critical Ground Water Areas (CGWA) including all or part of ground water basins that do not have a sufficient supply of ground water for irrigation or other uses…" (IDWR, 2010). There are 11 Ground Water Management Areas (GWMA) in Idaho in which the groundwater supply basins are approaching critical groundwater area conditions. (IDWR, 2010)

[81] A list of the 21 CRS communities can be found in the most recent FEMA CRS report dated May 1, 2014 (FEMA, 2014c) and additional program information is available from FEMA's NFIP CRS website (www.fema.gov/national-flood-insurance-program-community-rating-system).

Table 5.1.4-3: Description of Idaho's Principal Aquifers

Aquifer Type and Name	Location in State	Groundwater Quality
Basin and Range basin-fill aquifers Unconsolidated sand and gravel	Southeastern corner of state, directly south of Pocatello	Water is suitable for all uses. Most water is obtained from unconsolidated-deposit aquifers. Development for freshwater supply has been extensive. Principal water use is for public supply, domestic and commercial, irrigation and livestock watering and industry.
Basin and Range carbonate –rock aquifers	Southeastern corner of state, southeast of Pocatello	Water is suitable for most uses. Concentration of dissolved-solids is low. Principal water use is for public supply, domestic and commercial, irrigation and livestock watering and industry.
Columbia Plateau basaltic-rock aquifers	Northern Idaho, around Lewiston	Water from this aquifer is generally suitable for most purposes. Water from this aquifer is of medium hardness due to a median dissolved-solids concentration. Contains higher levels of nitrate concentrations. Water use provides for public-supply, domestic and commercial, agricultural (primarily irrigation), and industrial purposes
Pacific Northwest basaltic-rock aquifers	Spread throughout southern half of the state	Water is suitable for most uses though primality used for agriculture. These aquifers generally yield freshwater but can yield saltwater as well. Most of the fresh groundwater withdrawals are used for irrigation purposes.
Snake River Plain basaltic-rock aquifers	Spread throughout southern central part of the state, stretching from Mountain Home to Rexburg	Water from this aquifer is of medium hardness due to a median dissolved-solids concentration. Contains higher levels of nitrate concentrations. Yields significantly more water than basin-fill aquifers. Large volumes of water are primarily used for agricultural and irrigation purposes. Other uses provide for public-supply, domestic and commercial and industrial purposes.
Columbia Plateau basin-fill aquifers Unconsolidated deposits of coarse sand and gravel	West central part of the state stretching from northwest of Boise to the southeast towards Twin Falls	Generally, water is suitable for most purposes. Water from this aquifer is of medium hardness due to a median dissolved-solids concentration. Contains median levels of nitrate concentrations. Uses provide for public-supply, domestic and commercial, and agricultural (primarily irrigation) purposes.
Northern Rocky Mountains Intermontane Basins aquifer system Clay, fine and coarse sand, and gravel	Spread throughout eastern part of the state	Aquifer consists of unconsolidated sediments where the chemical concentration varies widely due to diverse composition of aquifers. Large part of each intermontane basin is rugged, uninhabited public land where demand for groundwater is minimal. Primary water use is related to the lumber and mining industries, recreational activities, irrigated agriculture, and livestock raising.
Pacific Northwest basin-fill aquifers Sand and gravel	Throughout southwest part of state around Boise and very northern tip north of Coeur d'Alene	Most productive aquifer in the region. Provides freshwater for most public-supply, domestic, commercial, agricultural, irrigation, and industrial purposes.
Snake River Plain basin-fill aquifers Coarse sand and gravel	Crescent shaped area stretching from Rexburg to Boise	Generally, water is suitable for most purposes. Water from this aquifer is of medium hardness due to a median dissolved-solids concentration. Contains median levels of nitrate concentrations. Large volumes of water is primarily used for agricultural and irrigation purposes. Other uses provide for public-supply, domestic and commercial and industrial purposes.

Sources: (Moody, Carr, Chase, & Paulson, 1986) (USGS, 1994)

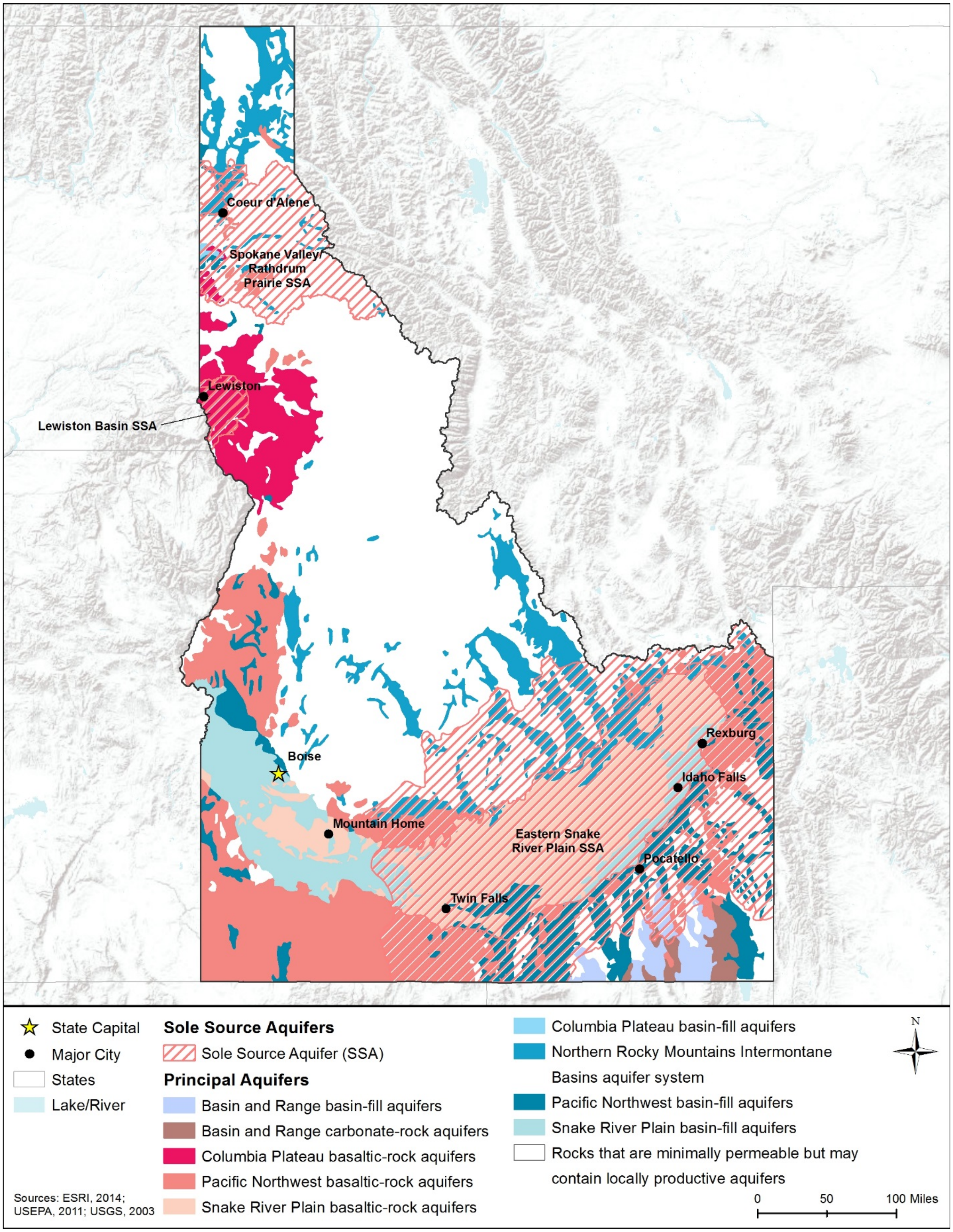


Figure 5.1.4-3: Principal and Sole Source Aquifers of Idaho

Sole Source Aquifers

The USEPA defines sole source aquifers (SSAs) as "an aquifer that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer" and are areas with no other drinking water sources (USEPA, 2015b). Idaho has three designated SSAs within the state, the Rathdrum Prairie, Lewiston Basin, and the Eastern Snake Plain aquifers (Figure 5.1.4-3). Because the Spokane/Rathdrum Prairie Valley serves over 400,000 people, Idaho also categorizes it as a sensitive resource aquifer, which means that stricter standards are enforced and "it may not be degraded without demonstration that it is necessary for social or economic development" (DEQ, 2015n). Designating a groundwater resource as an SSA helps to protect the drinking water supply in that area and requires reviews for all federally funded proposed projects to ensure that the water source is not jeopardized (USEPA, 2015b).

5.1.5. Wetlands

5.1.5.1. Definition of the Resource

The CWA defines wetlands as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas" (40 CFR 230.3(t), 1993).

The USEPA estimates that "more than one-third of the United States' threatened and endangered species live only in wetlands, and nearly half of such species use wetlands at some point in their lives" (USEPA, 1995). In addition to providing habitat for many plants and animals, wetlands also provide benefits to human communities. Wetlands store water during flood events, improve water quality by filtering polluted runoff, help control erosion by slowing water velocity and filtering sediments, serve as points of groundwater recharge, and help maintain base flow in streams and rivers. Additionally, wetlands provide recreation opportunities for people, such as hiking, bird watching, and photography (USEPA, 1995).

5.1.5.2. Specific Regulatory Considerations

Appendix C, Environmental Laws and Regulations, describes the pertinent federal laws protecting wetlands in detail. Table 5.1.5-1 summarizes the major Idaho state laws and permitting requirements relevant to the state's wetlands.

Table 5.1.5-1: Relevant Idaho Wetlands Laws and Regulations

State Law/Regulation	Regulatory Authority	Applicability
CWA Section 404 permit, Idaho regional requirements	USACE, Walla Walla	USACE shall coordinate with Idaho Department of Fish and Game for activities in the following wetlands require pre notification: These include forested wetlands, peatlands, vernal pools, kettles or wetlands identified in Idaho Department of Fish and Game Wetland Conservation Strategy[82] as Class I, Class II and Reference Habitat Sites.
Stream Channel Protection Act	IDWR	IDWR must approve in advance any work being done within the beds and banks of a continuously flowing stream, assists in the protection of wetlands and riparian areas.
CWA Section 401 Water Quality Certification	DEQ	DEQ issues Section 401 certifications that the actions authorized by the permits do not violate Idaho water quality standards, and not covered by NWP.
Tribal Water Quality Standards	Coeur D'Alene Tribe and Shoshone-Bannock Tribes	Two tribes in Idaho administer their water quality standards (WQS) program. According to the USEPA, "a tribe may administer a WQS program if it applies and USEPA finds that it qualifies under Section 518(e) of the Clean Water Act to be treated in a manner similar to a state."

Sources: (USACE - Walla Walla, 2012) (IDWR, 2015a) (DEQ, 2015l) (IDWR, 2015d)

5.1.5.3. Environmental Setting: Wetland Types and Functions

The U.S. Fish and Wildlife Service's (USFWS) National Wetlands Inventory (NWI) mapping adopted a national Wetlands Classification Standard (WCS) that classifies wetlands according to shared environmental factors, such as vegetation, soils, and hydrology, as defined in Cowardin et al. (1979). The WCS includes five major wetland systems: Marine, Estuarine, Riverine, Lacustrine, and Palustrine (as detailed in Table 5.1.5-2).[83] The first four of these include both wetlands and deepwater habitats but the Palustrine includes only wetland habitats. (USFWS, 2015w)

- "The Marine System consists of the open ocean overlying the continental shelf and its associated high-energy coastline. Marine habitats are exposed to the waves and currents of the open ocean and the Water Regimes are determined primarily by the ebb and flow of oceanic tides. Salinities exceed 30 parts per thousand (ppt), with little or no dilution except

[82] Idaho Department of Fish and Game's Wetland Conservation-Strategies have been developed for the Henrys Fork Basin, Northern Idaho, Big Wood River, Southeast Idaho, East-Central Idaho and Spokane River Basin, Middle and Western Snake River and tributaries, and the Upper Snake River and adjacent wetlands. Closed basins of Beaver-Camas Creeks, Medicine Lodge Creek, Palouse River, and lower Clearwater River sub-basins, Middle Fork and South Fork Clearwater Basins and Camas Prairie in northern Idaho. Refer to the internet Site at: http://fishandgame.idaho.gov/content/page/wetlands-publications-idaho-natural-heritage-program#reports.

[83] The wetland acreages were obtained from the USFWS (2014) National Wetlands Inventory. Data from this inventory was downloaded by state at https://www.fws.gov/wetlands/. The wetlands data contains a wetlands classification code, which are a series of letter and number codes, adapted to the national wetland classification system in order to map from (e.g., PFO). Each of these codes corresponds to a larger wetland type; those wetland areas are rolled up under that wetlands type. The codes and associated acres that correspond to the deepwater habitats (e.g., those beginning with M1, E1, L1) were removed. The wetlands acres were derived from the geospatial datafile, by creating a pivot table to capture the sum of all acres under a particular wetland type. The maps reflect/show the wetland types/classifications and overarching codes; the symbolization used in the map is standard to these wetland types/codes, per the USFWS and Federal Geographic Data Committee.

outside the mouths of estuaries." Where wave energy is low, mangroves or mudflats may be present.

- "The Estuarine System consists of deepwater tidal habitats and adjacent tidal habitats that are usually semi enclosed by land but have open, partly obstructed, or sporadic access to the open ocean and the ocean water is at least occasionally diluted by freshwater runoff from the land."
- "Riverine System includes all wetlands and deepwater habitats contained within a channel with two exceptions (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and (2) habitats with water containing ocean-derived salts in excess of 0.5 ppt."
- Lacustrine System includes inland water bodies that are situated in topographic depressions, lack emergent trees and shrubs, have less than 30 percent vegetation cover, and occupy greater than 20 acres. Includes lakes, larger ponds, sloughs, lochs, bayous, etc.
- Palustrine includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, or emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 percent." The System is characterized based on the type and duration of flooding, water chemistry, vegetation, or substrate characteristics (soil types). (Cowardin et al., 1979) (FGDC, 2013)

Table 5.1.5-2: Idaho Wetland Types, Descriptions, Location, and Amount, 2014

Wetland Type	Map Code and Color	Description[a]	Occurrence	Amount (acres)[b]
Palustrine forested wetland	PFO	PFO wetlands contain woody vegetation that are at least 20 feet tall. Floodplain forests and hardwood swamps are examples of PFO wetlands.	Forested lowlands within the state	184,862
Palustrine scrub-shrub wetland	PSS	Woody vegetation less than 20 feet tall dominates PSS wetlands. Thickets and shrub swamps are examples of PSS wetlands.	Throughout the state, often on stream floodplains	
Palustrine emergent wetlands	PEM	PEM wetlands have erect, rooted, green-stemmed, annual, water-loving plants, present for most of the growing season in most years. PEM wetlands include freshwater marshes, wet meadows, fens[84], prairie potholes, and sloughs.	On river and lake floodplains	558,108
Palustrine unconsolidated bottom	PUB	PUB and PAB wetlands are commonly known as freshwater ponds, and includes all wetlands with at least 25 percent cover of particles smaller than stones and a vegetative cover less than 30 percent.	Throughout the state	30,848
Palustrine aquatic bed	PAB	PAB wetlands include wetlands vegetated by plants growing mainly on or below the water surface line.		

[84] Fens are nutrient-rich, grass- and sedge-dominated emergent wetlands that are recharged from groundwater and have continuous running water. (Edinger, et al., 2014)

Wetland Type	Map Code and Color	Description[a]	Occurrence	Amount (acres)[b]
Other Palustrine wetland	Misc. Types	Farmed wetland, saline seep[85], and other miscellaneous wetlands are included in this group.	Abandoned fields, depressions (seeps), along hillsides and highways	6,136
Riverine wetland	R	Riverine systems include rivers, creeks, and streams. They are contained in natural or artificial channels periodically or continuously containing flowing water.	Throughout the state	18,894
Lacustrine wetland	L2	Lacustrine systems are lakes or shallow reservoir basins generally consisting of ponded waters in depressions or dammed river channels, with sparse or lacking persistent emergent vegetation, but including any areas with abundant submerged or floating-leaved aquatic vegetation. These wetlands are less than 8.2 feet deep.	Distributed throughout Idaho	46,917
			TOTAL	**845,765**

Sources: (Cowardin et al., 1979) (USFWS, 2015a) (FGDC, 2013)

[a] The wetlands descriptions are based on information from the Federal Geographic Data Committee (FGDC)'s Classification of Wetland and Deepwater Habitats of the United States. Based on Cowardin et.al, 1979, some data has been revised based on the latest scientific advances. The USFWS uses these standards as the minimum guidelines for wetlands mapping efforts. (FGDC, 2013)

[b] All acreages are rounded to the nearest whole number. The maps are prepared from the analysis of high altitude imagery. A margin of error is inherent in the use of imagery. The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. (USFWS, 2015b)

Palustrine Wetlands

In Idaho, palustrine wetlands include the majority of vegetated freshwater wetlands (freshwater marshes, swamps, bogs, and ponds). Palustrine forested (PFO) wetlands are rare in Idaho. Common vegetation in PFO wetlands include quaking aspen (*Populus tremuloides*), with narrow-leaf cottonwood (*Populus angustifolia*) in eastern Idaho. Broad-leaved deciduous forests are most extensive on the Big Lost River, East Fork Salmon River, and mainstem Salmon River. (Jankovsky-Jones, M., 1999) (Idaho Fish and Game, 2000) Palustrine scrub-shrub (PSS) wetlands vegetation (willows [*Salix spp.*], water birch [*Betula occidentalis*], and mountain alder [*Alnus incana*]) occurs in association with somewhat poorly drained soils along channels. At higher elevations, PSS vegetation is dominated by low shrubs including bog birch (*Betula glandulosa*), shrubby cinquefoil (*Potentilla fruticose*), and greasewood (*Sarcobatus vermiculatus*) (Jankovsky-Jones, M., 1999).

Common palustrine emergent (PEM) wetlands in Idaho are dominated by the sedges and sedge-like species, such as, water sedge (*Carex aquatilis*), bladder sedge (*C utriculata*), Nebraska sedge (*C. nebrascensis*), common spikerush (*Eleocharis palustris*), Baltic rush (*Juncus balticus*),

[85] Saline seep is an area where saline groundwater discharges at the soil surface. These wetland types are characterized by saline soils and salt tolerant plants. (City of Lincoln, 2015)

and common cattail (*Typha latifolia*). Temporarily flooded emergent vegetation is dominated by grasses and sedges including tufted hairgrass (*Deschampsia cespitosa*), basin wildrye (*Elymus cinereus*), mat muhly (*Muhlenbergia richardsonis*), and western wheatgrass (*Agropyron smithii*). Downstream of Palisades Reservoir on the South Fork Snake River is an example of PEM wetlands in Idaho. (Jankovsky-Jones, M., 1999) Palustrine wetlands also include the shallow water zones of lakes, rivers, and ponds and aquatic beds (PAB/PUB) formed by water lilies and other floating-leaved or free-floating plants. Cattails are often found growing in or around PAB/PUB wetlands in Idaho, and they offer important breeding grounds for waterfowl and other wildlife. These are the easiest wetlands to recognize and occur throughout the state. Common emergent and floating vegetation includes species of bulrush, cattail, rush, pondweed (*Potamogeton natans*), knotweed, pond–lily (*Nuphar polysepalum*), watermilfoil (*Myriophyllum spicatum*), and canarygrass. (Jankovsky-Jones, Conservation Strategy for Southeastern Idaho Wetlands, 1997) (Idaho Fish and Game, 2004)

Palustrine Wetland Status

In Idaho an estimated 386,000 acres of wetland habitat (56 percent) were lost from 1780 to 1980 (Murphy, 2014). Based on the USFWS NWI 2014 analysis of palustrine wetlands, PEM (includes prairie potholes) is the dominant wetland type (66 percent), followed by, PFO/PSS (22 percent), PUB/PAB (ponds) (4 percent), and other palustrine wetlands (1 percent) (USFWS, 2014a). There are approximately 780,000 acres of palustrine (freshwater) wetlands in the state (USFWS, 2014a). Conversion to agriculture, drainage, and flooding by reservoirs are the main causes of wetland losses. Also, human disturbance has allowed non-native species, such as leafy spurge (*Euphorbia esula*) and spotted knapweed (*Centaurea maculosa*), to eliminate woody tree and shrub cover, and compact wetland soils (Murphy, 2014).

Lacustrine Wetlands

In northern Idaho, the wetlands are associated with both large lakes and with glaciated kettle lakes. In central Idaho, this habitat most frequently occurs in high mountain lakes left behind by alpine glaciation. In the southern part of the state, examples of this habitat include Henry’s Lake and Bear Lake. There are approximately 47,000 acres of lacustrine wetlands in the state, or 6 percent of the total wetlands (USFWS, 2014a). Typical plant species include pondweeds, milfoils (*Myriophyllum spp.*), bladderworts (*Utricularia spp.*), coontails (*Ceratophyllum*), muskgrass (*Chara spp.*), and other submergent plants. The nonnative species wild rice (*Zizania aquatic*) is well established and widespread in the extensive wetlands in the Coeur d’Alene system (Idaho Fish and Game, 2000).

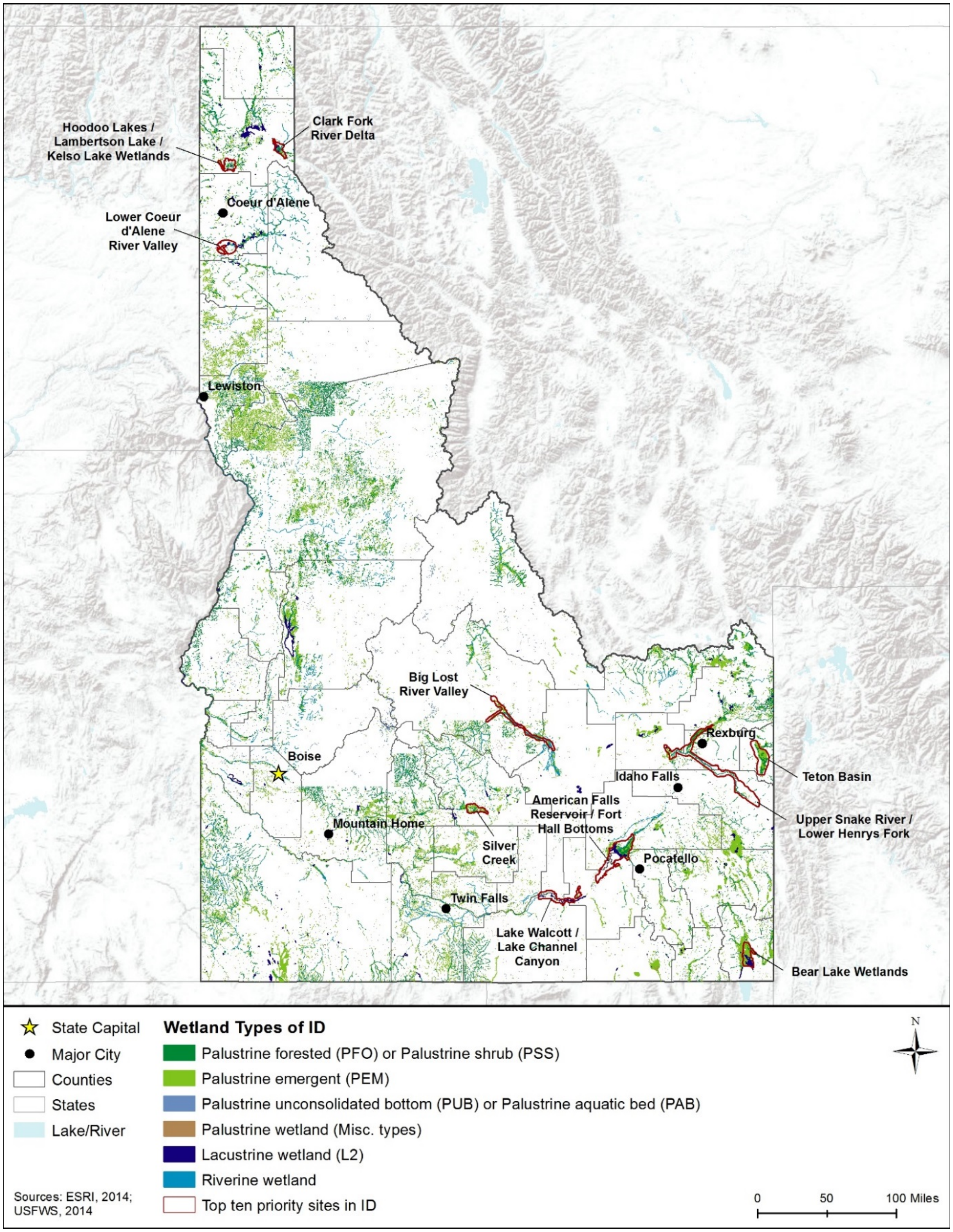


Figure 5.1.5-1: Wetlands by Type, Idaho, 2014

Riverine Wetlands

The wetlands occur in broad valleys and have fine textured sediments deposited by peak flows in the spring. Examples of this subclass are found along tributaries to Camas Creek in south-central Idaho, the broad valleys of southwest Idaho occupied by streams such as Diamond Creek, Thomas Fork, and Lanes Creek, and low gradient tributaries emptying into Cascade Reservoir in west central Idaho. There are approximately 19,000 acres of riverine wetlands in the state, or 2 percent of the total wetlands (USFWS, 2014a).

5.1.5.4. Wetlands of Special Concern or Value

In addition to protections under the state's wetland regulations and national CWA, Idaho considers certain wetland communities as areas of high quality and special value due to their global or regional scarcity, "unusual local importance," or habitat they support. These include forested wetlands, peatlands, vernal pools, playas, kettles, and wetlands identified in Idaho Department of Fish and Game Wetland Conservation Strategy[86] as Class I, Class II, and Reference Habitat Sites.

Forested Wetlands

Forested wetlands in Idaho are discussed in Section 5.1.5.3.

Peatlands

Peatlands are "waterlogged areas with a surface accumulation of peat (organic matter) 30 centimeters (12 inches) or more thick." In northern Idaho, peatlands may form on the margins of lakes with soft (acidic) water and often create floating or quaking mats. Rich fens are found in broad valleys including the Birch Creek Valley in the east-central mountains and the Teton Valley in eastern Idaho. Vegetation corresponds to moisture and nutrient gradients. Peatlands are very stable with organic soils forming at the rate of one inch in 100 years. Peatlands are irreplaceable within our lifetime, and no mitigation has been developed to compensate for their loss. (Idaho Fish and Game, 2004) (Jankovsky-Jones, M., 1999) (Idaho Fish and Game, 2000)

Peatlands are considered rich fens where peats are comprised of sedges, rushes, and brown mosses. Rich fens are typically characterized by sedge species (*Carex spp.)*, common cattail, and hardstem bulrush (*Scirpus acutus*). Among the rarest wetlands in the state are rich calcareous fens, which occur in association with springs have large amounts of calcium carbonate in their soils. Brown moss is often present, as well as beaked spikerush (*Eleocharis rostellata*), shrubby cinquefoil, hoary willow (*Salix candida*), and green muhly (*Muhlenbergia racemosa*) (Jankovsky-Jones, 1997). Birch Creek Fen in east central Idaho and portions of the Teton Basin in eastern Idaho are examples of Idaho fens (Idaho Fish and Game, 2000).

[86] Idaho Department of Fish and Game's Wetland Conservation-Strategies have been developed for the Henrys Fork Basin, Northern Idaho, Big Wood River, Southeast Idaho, East-Central Idaho and Spokane River Basin, Middle and Western Snake River and tributaries, and the Upper Snake River and adjacent wetlands. Closed basins of Beaver-Camas Creeks, Medicine Lodge Creek, Palouse River, and lower Clearwater River sub-basins, Middle Fork and South Fork Clearwater Basins and Camas Prairie in northern Idaho. Refer to the internet Site at: http://fishandgame.idaho.gov/content/page/wetlands-publications-idaho-natural-heritage-program#reports

Depressional Wetlands (Vernal Pools, Playas, and Kettles)

The depressional class of wetlands includes vernal pools, playas, and kettles. Depressional wetlands occur in topographic depressions (i.e., closed elevation contours) that allow the accumulation of surface water. Depressional wetlands may have any combination of inlets and outlets or lack them completely. Potential water sources are precipitation, overland flow, streams, or groundwater and interflow from adjacent uplands. Depressional wetlands may lose water through evapotranspiration, intermittent or perennial outlets, or recharge to groundwater. Prairie potholes, playa lakes, and vernal pools are common examples of depression wetlands. Depression wetlands are distributed throughout Idaho. (Idaho Fish and Game, 2004) (Jankovsky-Jones, M., 1999)

Vernal Pools

Vernal pools are shallow depression, and occur in southern Idaho in association with volcanic plains and plateaus. They are a type of small, temporary wetland present in forested areas, though the pools themselves lack trees. The pools fill from spring or fall precipitation, and are usually dry by late summer or during droughts since they are not connected to a permanent water source. Vernal pools fill from rain, snowmelt, or groundwater. These small wetlands contribute to storage and filtration of surface water and help recharge aquifers. (Idaho Fish and Game, 2004) (Jankovsky-Jones, M., 1999)

Playas

Playa lakes are small circular depressions with a clay layer at the bottom that prevents water from soaking into the ground. Historically the Big Lost River, the Little Lost River, and Birch Creek flowed into playas on the edge of the Snake River Plain. Water diversions have eliminated flows which supported the Little Lost River and Birch Creek playas, and wetlands are limited to periodically flooded wetlands in the vicinity of the Big Lost River sinks. Playas are dominated by stands of common spikerush and Western wheatgrass (*Agropyron smithii*). (Jankovsky-Jones, M., 1999)

Kettles

In northern Idaho, depressional wetlands include small lakes and kettle holes left behind by retreating glaciers. Kettle ponds in northern Idaho may be small depressions dominated by emergent and scrub-shrub vegetation with no open water, or larger ponds and pools with open water surrounded by emergent wetlands. These wetlands are dominated by northern mannagrass (*Glyceria borealis*), inflated sedge (*Carex vesicaria*), bladder sedge, common spikerush, and floating-leaved pondweed. The drier perimeter of wetlands is frequently surrounded by stands of Douglas spiraea (*Spiraea douglasii*) with occasional quaking aspen. Open water is sometimes present and supports pond lily and pondweeds. (Jankovsky-Jones, M., 1999)

Class I, Class II and Reference Habitat Sites

There are 10 Class I, II, and Reference Habitat Sites, as shown in Figure 5.1.5-1 (Hahn, Murphy, Schmidt, & Fields, 2005):

- **Upper Snake River/Lower Henrys Fork** wetland includes tributary stream riparian areas, springs (including travertine and hot springs), PSS wetlands on the lower Henrys Fork, marsh, and alkaline wetlands (at Market Lake) on the Plains. The wetland is valuable habitat for waterfowl and songbirds.
- **Big Lost River Valley** wetland includes spring-fed cattail marshes and sedge, Baltic rush, and alkaline wet meadows at Thousand Springs-Chilly Slough wetlands. The river corridor includes sloughs with emergent and aquatic vegetation, along with dense stands of willows and cottonwoods.
- **Bear Lake Wetlands** supports extensive bulrush and cattail marshes surrounded by meadows of sedge, Baltic rush, tufted hairgrass, and alkaline communities. Much of the wetland occurs within the Bear Lake National Wildlife Refuge. Downstream of Bear Lake, the wetland includes a narrowleaf cottonwood bottomland forest within the wide floodplain of the Bear River.
- **Lake Walcott/Lake Channel Canyon** consists of freshwater and alkaline wetlands, which support several rare plant communities.
- **American Falls Reservoir/Fort Hall Bottoms** encompasses the reservoir and surrounding marshes and alkaline wetlands. The alkaline wetlands support the only known occurrence in Idaho of the iodine bush community at the very northern edge of its range.
- **Teton Basin** complex of wetlands contain a mosaic of sedge, rush, and mesic grass meadows, shrubby cinquefoil and willow scrub-shrub wetlands, and black cottonwood and aspen forested wetlands.
- **Clark Fork River Delta** support mature western red cedar and grand fir forest, black cottonwood bottomland forest, willow and red-osier dogwood scrub-shrub wetlands, and mesic grasslands. Wetter portions of the meadows are dominated by emergent marsh, while reed canarygrass (a non-native) dominates drier meadows (especially where water levels have been manipulated).
- **Silver Creek** PEM wetland consists bulrush, cattail, and sedges alternate along stream channels with willows and water birch.
- **Lower Coeur d'Alene River Valley** supports emergent marsh, peatlands, black cottonwood gallery forest, moist conifer forest, and willow and birch riparian habitats occur in and adjacent to the floodplain.
- **Hoodoo Lakes/Lambertson Lake/Kelso Lake Wetlands** is a chain of wetlands associated with glacial kettles, including at least six lakes, broad sedge and rush meadows (some of which are hayed), and streamside riparian areas. Despite being altered by drainage, forested swamps and extensive peatlands are still present.

Other Important Wetland Sites in Idaho

- Idaho Fish and Game's has developed a network of 34 Wildlife Management Areas and 1 Conservation Easement across the state which focuses on the conservation of game species and their habitats. Up to 89 percent of the 60,000 acres managed by Idaho Fish and Game as Wildlife Management Areas is wetland and riparian habitat. (Murphy, 2014)

- Other wetlands protected under easements or agreements through voluntary government programs and resource conservation groups are found across the state. These include NRCS Agricultural Conservation Easement Program and easements managed by natural resource conservation groups such as state land trusts, The Nature Conservancy, Bureau of Land Management, and Wood River Land Trust. According to the National Conservation Easement Database, a national electronic repository of government and privately held conservation easements (http://conservationeasement.us/), NRCS holds more than 63,700 acres in conservation easements in Idaho. (NCED, 2015)

5.1.6 Biological Resources

5.1.6.1 Introduction

This chapter describes the biological resources of Idaho. Biological resources include terrestrial vegetation, wildlife, fisheries and aquatic habitats, and threatened and endangered species as well as species of conservation concern. Because of the significant topographic variation within the state, Idaho supports a wide diversity of biological resources ranging from lower river plains, hills, arid basins, and rangeland settings in the southern portion of the state, to montane forests and alpine meadows in the rugged mountainous areas of central, northern, and western Idaho. Federal land management agencies maintain lists of species of concern for their landholdings; these lists are not discussed below as they are maintained independently from the ESA. For future site-specific analysis on those lands, consultation with the appropriate land management agency would be required.

5.1.6.2 Specific Regulatory Considerations

The federal laws relevant to the protection and management of biological resources in Idaho are summarized in detail in Appendix C, Environmental Laws and Regulations, and Section 1.8, Overview of Relevant Federal Laws and Executive Order. Table 5.1.6-1 summarizes major state laws relevant to Idaho's biological resources.

Table 5.1.6-1: Major Idaho Laws Relevant to Biological Resources

State Law/Regulation	Regulatory Agency	Applicability
Idaho Noxious Weed Law (Idaho Statute [IS] Title 22 Agriculture and Horticulture Chapter 24 Sections 22-2401 through 2413)	Idaho State Department of Agriculture (ISDA)	Defines noxious weeds and the responsibilities of landowners to control noxious weeds on their property. The ISDA is responsible for the administration of the law; determines, compiles, updates, and publishes a current list of noxious weeds or groups of noxious weeds. A state coordinator maintains the noxious weed list and consults with other weed management agencies on the designation and development of Cooperative Weed Management Areas, or CWMAs, as well as the development and implementation of Integrated Weed Management Plans, or IWMPs. Also stipulates that assistance shall be provided to landowners, managers, and lessees in the state, including natural resource management agencies, and public and private landowners.

State Law/Regulation	Regulatory Agency	Applicability
Idaho Invasive Species Act of 2008 (IS Title 22 Agriculture and Horticulture Chapter 19 Sections 22-1901 through 1917) and Title 6 Chapter 0, Section 02.06.09 – Rules Governing Invasive Species	ISDA	Addresses the threat of invasive species by providing policy direction and planning to combat invasive species infestations, as well as preventing the introduction of new species. Establishes a program that includes the current invasive species list and strategies to prioritize risks, prevent new invasions, employ early detection and rapid response, and apply control and management techniques to control invasive species in Idaho.

5.1.6.3 Terrestrial Vegetation

The distribution of flora within the state is a function of the characteristic geology, soils, climate, and water of a given geographic area and correlates with distinct areas identified as ecoregions. Ecoregions are broadly defined areas that share similar characteristics, such as climate, geology, soils, and other environmental conditions and represent ecosystems contained within a region. The boundaries of an ecoregion are not fixed, but rather depict a general area with similar ecosystem types, functions, and qualities (National Wildlife Federation, 2015) (USDA, 2015a) (World Wildlife Fund, 2015). The ecoregions mapped by the USEPA are the most commonly referenced, although individual states and organizations have also developed ecoregions that may differ slightly from those designated by the USEPA. The USEPA divides North America into 15 broad Level I ecoregions. These Level I ecoregions are further divided into 50 Level II ecoregions. These Level II ecoregions are further divided into 182 smaller Level III ecoregions. This section provides an overview of the terrestrial vegetation resources for Idaho at USEPA Level III (USEPA, 2016e).

As shown in Figure 5.1.6-1, the USEPA divides Idaho into ten Level III ecoregions. The ten ecoregions support a variety of different plant communities, all predicated on their general location within the state. Communities range from coniferous forest and alpine communities in the Northern Rockies and Idaho Batholith region in central and northern Idaho, to river plains, rangeland, and agricultural cropland communities in the Snake River Plain regions within the south central portion of the state. Areas in the Northern and Central Basin and Range regions are influenced further by the dry climates found in these regions. Table 5.1.6-2 provides a summary of the general abiotic[87] characteristics, vegetative communities, and the typical vegetation found within each of Idaho's 10 ecoregions.

[87] Abiotic: "Characterized by absence of life; abiotic materials include non-living environmental media (e.g., water, soils, sediments); abiotic characteristics include such factors as light, temperature, pH, humidity, and other physical and chemical influences." (USEPA, 2016j)

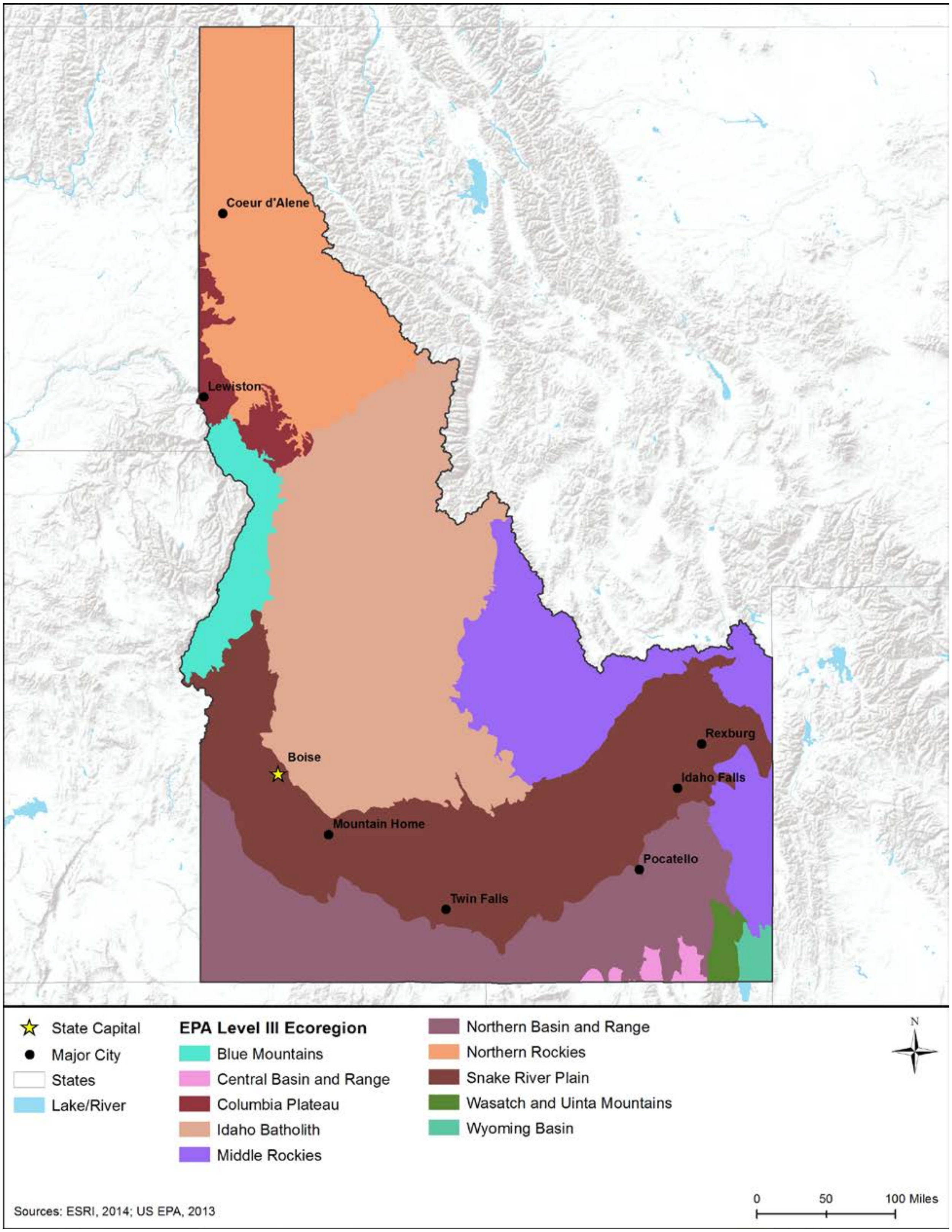


Figure 5.1.6-1: USEPA Level III Ecoregions in Idaho

Table 5.1.6-2: USEPA Level III Ecoregions of Idaho

EPA Ecoregion Number	Ecoregion Name	Abiotic Characterization	Plant Zone Ecosystem	Typical Dominant Vegetation
Geographic Region: Rocky Mountains				
15	Northern Rockies	A rugged mountainous region composed mostly of maritime influenced coniferous forest ,on extensive thick volcanic ash deposits with alpine characteristics at the highest elevations and numerous glacial[a] lakes	Douglas-fir Forest, Lodgepole Pine Forest, Fir-Spruce Forest, Hemlock Forest	**Conifer Trees –** subalpine fir (*Abies lasiocarpa*), douglas fir (*Pseudotsuga menziesii*), grand fir (*Abies grandis*), ponderosa pine (*Pinus ponderosa*), white bark pine (*Pinus albicaulis*), mountain hemlock (*Tsuga mertensiana*), Engelmann spruce (*Picea engelmannii*), and lodgepole pine (*Pinus contorta*)
16	Idaho Batholith[b]	A partially glaciated mountainous plateau.[c] Coniferous forests experience less maritime influence compared to the Northern Rockies. The mountain basins are the origin for a large number of perennial streams.[d]	Douglas-fir Forest, Lodgepole Pine Forest, and Fir-Spruce Forest	**Conifer Trees –** subalpine fir (*Abies lasiocarpa*), douglas fir (*Pseudotsuga menziesii*), grand fir (*Abies grandis*), ponderosa pine (*Pinus ponderosa*), englemann spruce (*Picea engelmannii*), and lodgepole pine (*Pinus contorta*), Alpine larch (*Larix lyallii*) **Shrubs –** Mountain sagebrush (*Artemisia tridentate)*
17	Middle Rockies	Composed of a mix of montane forest types, alpine areas, and grass and shrub covered intermontane valleys and foothills.	Englemann Spruce Forest, Douglas-fir Forest, and Subalpine-fir Forest.	**Conifer Trees –**Douglas fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), and western white pine (*Pinus monticola*)
18	Wyoming Basin	An intermontane basin composed of arid grasslands and shrublands.	Grasslands/Semi-desert Shrublands	**Hardwood Trees -** Douglas-fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), western white pine (*Pinus monticola*)
19	Wasatch and Uinta Mountains	Composed of high, glaciated mountains, dissected plateaus, foothills, and intervening valleys, including extensively glaciated Uinta Mountains, the Wasatch Range, and the Wasatch Plateau.	Subalpine Forests, Douglas Fir Forest, Juniper-Pinyon Woodland, Mountain Mahogany Oak Scrub	**Conifer Trees** - Lodgepole pine (*Pinus contorta*), ponderosa pine (*Pinus ponderosa*), Douglas fir (*Pseudotsuga menziesii*)

EPA Ecoregion Number	Ecoregion Name	Abiotic Characterization	Plant Zone Ecosystem	Typical Dominant Vegetation
Geographic Region: Columbia Plateau				
10	Columbia Plateau	An arid sagebrush steppe and grassland region underlain by lava rock and covered by loess soils. The region is surrounded by moister, forested, and mountainous regions.	Ponderosa pine, western juniper, shrub steppe, grasslands	**Hardwoods** – Water birch (*Betula occidentalis*), mountain alder (*Alcana incana*), black hawthorn (*Crataegus douglasii*), black cottonwood (*Populus trichocarpa*) **Conifer Trees** – lodgepole pine (*Pinus contorta*), western juniper (*Juniperus occidentalis*), ponderosa pine (*Pinus ponderosa*) **Shrubs** – Douglas spirea (*Spiraea douglasii*), red dosier dogwood (*Cornus sericea*), willows (*Salix spp.*), snowberry (*Symphoricarpos albus*), big sagebrush (*Artemisia tridentata*)
11	Blue Mountains	Consists of a diverse complex of mountain ranges, valleys, steep river canyons, and plateaus, with habitats ranging from dry sagebrush steppe to high alpine peaks.	Habitats range from dry sagebrush steppe to high alpine peaks	**Hardwoods –** Cottonwood (*Populus deltoids*), white alder (*Alnus rhombifolia*) **Conifer Trees –** western juniper (*Juniperus occidentalis*), Engelmann spruce (*Picea engelmannii*), Douglas fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), white fir (*Abies concolor*), and infrequent ponderosa pine (*Pinus ponderosa*), and true fir (*Abies*) **Shrubs** – Pacific ninebark (*Physocarpus capitatus*), willows (*Salix spp.*), redosier dogwood (*Cornus sericea*), snowberry (*Symphoricarpos albus*)
12	Snake River Plain	Many alluvial valleys bordering the Snake River. This ecoregion is considerably lower and more gently sloping than surrounding ecoregions with agriculture, cattle feedlots, and sagebrush steppe.	Sagebrush steppe	**Hardwoods** – Cottonwood (*Populus deltoids*), aspen (*Populus tremuloides*), mountain alder (*Alnus incana*), black hawthorn (*Crataegus douglasii*), chokecherry (*Prunus virginiana*) **Conifer Trees –** western juniper (*Juniperus occidentalis*), Engelmann spruce (*Picea engelmannii*), Douglas fir(*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*) **Shrubs** – Wyoming big sagebrush (*Artemisia tridentate*), bitterbrush (*Purshia tridentata*)

EPA Ecoregion Number	Ecoregion Name	Abiotic Characterization	Plant Zone Ecosystem	Typical Dominant Vegetation
Geographic Region: Basin and Range				
13	Central Basin Range	Composed of northerly trending, fault-block ranges and intervening, drier basins where valleys, slopes, and alluvial fans are either shrub and grass-covered, shrub-covered, or barren.	Saltbrush-Greasewood, Great Basin Sagebrush, Juniper-Pinyon Woodland Spruce Fir Forest	**Shrub** - Wyoming big sagebrush (*Artemisia tridentate*), black sagebrush (*Artemisia nova*), mountain big sagebrush (*Artemisia tridentata*)
80	Northern Basin Range	Consists of dissected lava plains, rolling hills, alluvial fans, valleys, and scattered mountains.	Sagebush Steepe, Juniper Woodlands Grasses	**Shrub -** Wyoming big sagebrush (*Artemisia tridentate*), black sagebrush (*Artemisia nova*) **Forbs/Grasses -** Bluebunch wheatgrass (*Pseudoroegneria spicata*), and Idaho fescue (*Festuca idahoensis*)

[a] Glacial: "Of or pertaining to distinctive processes and features produced by or derived from glaciers and ice sheets." (USEPA, 2015q)

[b] A batholith is a very lager mass of intrusive igneous rock that forms when magma solidifies at depth. A batholith must have greater than 100 square kilometers (40 square miles) of exposed area. (USEPA, 2015q)

[c] Plateau: "An elevated plain, tableland, or flat-topped region of considerable extent." (USEPA, 2015q)

[d] Perennial stream: "A stream that runs continuously throughout the year." (USEPA, 2015q)

Sources: (McGrath, et al., 2002) (CEC, 2011)

Communities of Concern

Idaho does not track vegetative communities of concern; however, the Idaho Natural Heritage Program (INHP) does track sensitive and at-risk species and threatened ecosystems (Idaho Fish and Game, 2015b). The INHP maintains a statewide inventory and database known as the Idaho Fish and Wildlife Information System (IFWIS). The IFWIS is a comprehensive repository for site-specific data on Idaho's fish, wildlife and plant diversity (Idaho Fish and Game, 2015b). As a member of NatureServe, the IFWIS stores and updates Idaho's Natural Heritage data. In addition to more common species, IFWIS also tracks species that are identified as having special conservation status based on the following sensitive species lists (Idaho Fish and Game, 2015c).

- Species of Greatest Conservation Need (SGCN) identified in Idaho's Comprehensive Wildlife Conservation Strategy (described in more detail below);
- Species listed under the Endangered Species Act (ESA) as endangered, threatened, candidate or proposed;
- U.S. Bureau of Land Management Species of Special Concern;
- USFS Intermountain Region Sensitive Species;
- USFS Northern Region Sensitive Species; and
- Idaho Native Plant Society rare plant species.

Using the sensitive species lists, the IFWIS can compile all potential at-risk species known to occur within the state. Each at-risk species is then assigned a rank based on its rarity and vulnerability (Idaho Fish and Game, 2015d).

Invasive insects pose a large threat to Idaho's forest and agricultural resources. Species such as the gypsy moth (*Lymantria dispar dispar*), hemlock woolly adelgid (*Adelges tsugae*), Asian longhorn beetle (*Anoplophora glabripennis*), and emerald ash borer (*Agrilus planipennis*) are of particular concern in Idaho and can cause irreversible damage to native forests. (USDA, 2015c).

Nuisance and Invasive Plants

There are a large number of undesirable plant species that are considered nuisance and invasive. Noxious weeds are typically non-native species that have been introduced into an ecosystem inadvertently; however, on occasion native species can be considered a noxious weed. Noxious weeds greatly affect agricultural areas, forest management, natural, and other open areas (U.S. GPO, 2011). The U.S. government has designated certain plant species as noxious weeds in accordance with the Plant Protection Act of 2000 (7 U.S.C. 7701 et seq.). As of September 2014, 112 federally recognized noxious weed species have been catalogued in the United States (88 terrestrial, 19 aquatic, and 5 parasitic) (USDA, 2014a).

The Idaho Noxious Weed Law (Idaho Statue Title 22 Agriculture and Horticulture Chapter 24 Noxious Weeds) stipulates that the ISDA be responsible for the establishment of the statewide noxious weed list and updates to that list, as necessary (State of Idaho, 2015). In addition, the Law further stipulates the establishment of Cooperative Weed Management Areas (CWMAs) to manage weeds. CWMAs are distinguishable, hydrologic, vegetative, or geographic zones based on geography, weed infestations, climate conditions, and land use patterns (ISDA, 2015a). There are over 30 SWMAs in Idaho, covering approximately 87 percent of the state; these CWMAs participate in the ISDA's cost-share program, which assists local agencies in managing noxious weed prevention programs (ISDA, 2015a). A total of 67 state-listed noxious weeds are regulated in Idaho, each designated into three levels of concern (ISDA, 2015b). Thirty-six of these species occur on the Federal Noxious Weed List (USDA, 2014a). Of the 67 state-listed species, 51 are terrestrial and 16 are aquatic. The following species by vegetation type are regulated in Idaho.

- **Aquatic –** Brazilian elodea (*Egeria densa*), Common European frogbit (*Hydrocharis morsus-ranae*), Fanwort (*Cobomba caroliniana*), Feathered mosquito fern (*Azolla pinnata*), Giant hogweed (*Heracleum mantegazzianum*), giant salvinia (*Salvinia molesta*), Iberian starthistle (*Centaurea iberica*), Hydrilla (*Hydrilla verticillata*), Variable-leaf milfoil (*Myriophyllum heterophyllum*), water chestnut (*Trapa natans*), water hyacinth (*Eichhornia crassipes*), Yellow floating heart (*Nymphoides pelata*), Common reed (*Phragmites australis*), Eurasian watermilfoil (*Myriophyllum spicatum*), Parrotfeather milfoil (*Myriophyllum aquaticum*), and Curlyleaf pondweed (*Potamogeton crispus*).
- **Shrubs –** Policeman's helmet (*Impatiens glandulifera*), Purple starthistle (*Centaurea calcitrapa*), Squarerose knapweed (*Centaurea triumfetti*), Syrian beancaper (*Zygophyllum fabago*), Tall hawkweed (*Hieracium piloselloides*), black henbane (*Hyoscyamus niger*), bohemian knotweed (*Polygonum bohemicum*), giant knotweed (*Polygonum sachalinense*), Japanese knotweed (*Polygonum cuspidatum*), Small bugloss (*Anchusa arvensis*), and Poison hemlock (*Conium maculatum*).
- **Terrestrial Forbs and Grasses –** Yellow devil hawkweed (*Hieracium glomeratum*), Buffalobur (*Solanum rostratum*), Common crupina (*Crupina vulgaris*), Dyers Woad (*Isatis Tinctoria*), Johnson grass (*Sorghum halepense*), Matgrass (*Nardus stricta*), Meadow knapweed (*Centaurea debeauxii*), Mediterranean sage (*Salvia aethiopis*), Musk thistle (*Carduus nutans*), Orange hawkweed (*Hieracium aurantiacum*), Perrenial sowthistle (*Sonchus arvensis*), Russian knapweed (*Acroptilon repens*), Scotch broom (*Cytisus scoparius*), Viper's bugloss (*Echium vulgare*), Yellow hawkweed (*Hieracium caespitosum*), Canada thistle (*Cirsium arvense*), Dalmatian toadflax (*Linaria dalmatica ssp. Dalmatica*), Diffuse knapweed (*Centaurea diffusa*), Field bindweed (*Convolvulus arvensis*), Flowering rush (*Butomus umbelltus*), Hoary alyssum (*Berteroa incana*), Houndstongue (*Cynoglossum officinale*), Jointed goatgrass (*Aegilpos cylindrical*), Leafy spurge (*Euphorbia esula*), Milium (*Milium vernal*), Oxeye daisy (*Leucanthemum vulgare*), Perennial pepperweed (*Lepidium latifolium*), Plumeless thistle (*Carduus acanthoides*), Puncture vine (*Tribulus terrestris*), Purple loosestrife (*Lythrum salicaria*), Rush skeleton weed (*Chondrilla juncea*), Saltcedar (*Tamarix spp.*), Scotch thistle (*Onopordum acanthium*), Spotted knapweed (*Centaurea stoebe*), Tansy ragwort (*Senecio jacobaea*), White byrony (*Bryonia alba*), Whitetop (*Cardaria draba*), Yellow flag iris (*Iris psudocorus*), Yellow starthistle (*Centaurea solstitialis*), and Yellow toadflax (*Linaria vulgaris*).

5.1.6.4 Terrestrial Wildlife

This section discusses the terrestrial wildlife species in Idaho, divided among mammals,[88] birds,[89] reptiles[90] and amphibians,[91] and invertebrates.[92] Terrestrial wildlife consists of those species that live predominantly on land. Terrestrial wildlife includes common big game species, small game animals, furbearers, nongame animals, game birds, waterfowl, and migratory birds as well as their habitats within Idaho. A discussion of non-native and/or invasive terrestrial wildlife species is also included within this section. Information regarding the types and location of native and non-native/invasive wildlife is useful for assessing the importance of any impacts to these resources or the habitats they occupy.

The Idaho Comprehensive Wildlife Conservation Strategy (Idaho CWCS) addresses 619 vertebrate and 572 invertebrate wildlife species, of which 229 species are tracked as Species of Greatest Conservation Need (SGCN). Ninety-four Idaho wildlife species are non-native to the state. (Idaho Fish and Game, 2005a).

Mammals

There are 105 known mammal species that occur in the state (Idaho Fish and Game, 2005a). Common and widespread mammalian species in Idaho range from the masked shrew (*Sorex cinereus*)**,** American pika (*Ochonta princeps*), elk (*Cervus elaphus*), and mule deer (*Odocoileus hemionus*), to the red fox (*Vulpes vulpes*), raccoon (*Vulpes vulpes*), and least chipmunk (*Tamias minimus*). Most mammals are widely distributed throughout the state; however, there are some species, such as the big horn sheep (*Ovis canadensis*) and mountain goat (*Oreamnos americanus*), that are found primarily in the mountainous areas in the northern and western portion of the state. A number of threatened and endangered mammals are located in Idaho. Section 5.1.6.6, Threatened and Endangered Species and Species of Conservation Concern, identifies these protected species.

In Idaho, white-tailed deer (*Odocoileus virginianus*), mule deer, elk, pronghorn (*Antilocapra americana*), gray wolf (*Canus lupus*), mountain lion (*Puma concolor*), and black bear (*Ursus americanus*) are classified as big game species; moose (*Alces alces*), big horn sheep, and mountain goats are classified as trophy species. Small game species include small mammals (e.g., squirrels and rabbits), furbearers, and upland and migratory game birds (Idaho Fish and Game, 2015f). The following species of furbearers may be legally hunted or trapped in Idaho: river otter (*Lutra canadensis*), badger (*Taxidea taxus*), beaver (*Castor canadensis*), bobcat (*Lynx rufus*), mink (*Neovison vison*), marten (*Martes spp.*), grey fox (*Urocyon cinereoargenteus*), red

[88] Mammals: "Warm-blooded vertebrates that give birth to and nurse live young; have highly evolved skeletal structures; are covered with hair, either at maturity or at some stage of their embryonic development; and generally have two pairs of limbs, although some aquatic mammals have evolved without hind limbs." (USEPA, 2015q)
[89] Birds: "Warm-blooded vertebrates possessing feathers and belonging to the class Aves." (USEPA, 2015q)
[90] Reptile: "Cold-blooded, air-breathing vertebrates belonging to the class Reptilia, usually covered with external scales or bony plates." (USEPA, 2015q)
[91] Amphibian: "A cold-blooded vertebrate that lives in water and on land. Amphibians' aquatic, gill-breathing larval stage is typically followed by a terrestrial, lung-breathing adult stage." (USEPA, 2015q)
[92] Invertebrates: "Animals without backbones: e.g. insects, spiders, crayfish, worms, snails, mussels, clams, etc." (USEPA, 2015q)

fox (*Vulpes vulpes*), swift fox (*Vulpes velox*), raccoon (*Procyon lotor*), and muskrat (*Ondatra zibethicus*) (Idaho Fish and Game, 2015f).

Idaho has identified 21 mammals as Species of Greatest Conservation Need (SGCN). The SGCN list consists of at-risk species that are in need of most attention for conservation. Proposed species for the SGCN list were evaluated by analyzing several inclusion and exclusion criterion. Although these species have been targeted for conservation, they are not currently under legal protection because of the SGCN listing. The SGCN list is updated periodically and is used by the state of Idaho to focus their conservation efforts and as a basis for implementing their ICWS. Every five years, Idaho Fish and Game intends to conduct an in-depth review of the Idaho CWCS. The review includes an assessment of the results of the adequacy of monitoring programs for species and habitats; an inventory and review of conservation plans and actions implemented in the previous five years; analysis of information collected in the inventory, monitoring and research efforts; and an evaluation of the questions and suggestions received from users of the Idaho CWCS (Idaho Fish and Game, 2005a).

Birds

The number of native bird species documented in Idaho varies according to the timing of the data collection effort, changes in bird taxonomy,[93] and the reporting organization's method for categorizing occurrence and determining native versus non-native status. Further, the diverse ecological communities (i.e., mountains, large rivers and lakes, plains, etc.) found in Idaho support a large variety of bird species.

A total of 284 species of resident and migratory birds have been documented in Idaho (Idaho Fish and Game, 2005a). Among the 284 extant[94] species in Idaho, 53 SGCN have been identified (Idaho Fish and Game, 2005a).

Idaho is within the Pacific Flyway. The Pacific Flyway covers the entire state of Idaho and spans from the west coast of Mexico to the Arctic. Large numbers of migratory birds utilize this flyway and other migration corridors and pathways throughout the state each year during their annual migrations northward in the spring and southward in the fall. "The Migratory Bird Treaty Act (MBTA) makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to Federal regulations" (USFWS, 2013a). The USFWS is responsible for enforcing the MBTA and maintaining the list of protected species. The migratory bird species protected under the MBTA are listed in 50 CFR 10.13 (USFWS, 2013a).

Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are protected under the Bald and Golden Eagle Protection Act. Bald eagles are generally found near large rivers and lakes in the entire state all year (eBird, 2015a). Golden eagles are generally found

[93] Taxonomy: "A formal representation of relationships between items in a hierarchical structure." (USEPA, 2015q)
[94] Extant: "A species that is currently in existence (the opposite of extinct)." (USEPA, 2015q)

anywhere within their known range, but they generally nest in mountains and cliffs. Golden eagles are found throughout the state all year round (eBird, 2015b).

A number of Important Bird Areas (IBAs) have also been identified in Idaho, as can be seen in Figure 5.1.6-2. The IBA program is an international bird conservation initiative with a goal of identifying the most important places for birds, and to conserve these areas. These IBAs are identified according to standardized, scientific criteria through a collaborative effort among state, national, and international conservation-oriented non-governmental organizations (NGOs), state and federal government agencies, local conservation groups, academics, grassroots environmentalists, and birders. These IBAs link global and continental bird conservation priorities to local sites that provide critical habitat for native bird populations. IBA priority areas are based on a number of specific criteria. Generally, global IBAs are sites determined important for globally rare species or support bird populations at a global scale. Continental IBAs are sites determined important for continentally rare species or support bird populations at a continental scale, but do not meet the criteria for a global IBA. State IBAs are sites determined important for state rare species or support local populations of birds. (National Audubon Society, 2015a)

According to the Audubon Society, a total of 62 IBAs have been identified in Idaho, including breeding range,[95] migratory stop-over, feeding, and over-wintering areas, and a variety of habitats such as native grasslands, grasslands, sage brush, and wetland/riparian areas (National Audubon Society, 2015a). These IBAs are widely distributed throughout the state, and comprise over 4,458,368 acres of land in areas such as Craters of the Moon National Monument and Preserve, Owyhee Uplands, Deer Flat National Wildlife Refuge, Raft River and Curlew Valley IBA, and South Hills IBA (National Audubon Society, 2015a). The IBA habitats vary greatly in the state and range from grasslands, to sage steppe shrublands and montane forests. The largest IBA in the state is the Owyhee Uplands, located in the southwest corner of Idaho, which is an important area for the Brewer's sparrow (*Spizella breweri*), green-tailed towhee (*Pipilo chlorurus*), Ferruginous hawk (*Buteo regalis*), black-throated gray warbler (*Setophaga nigrescens*), and Greater sage-grouse (*Centrocercus urophasianus*). Owyhee Hills consists of a rugged landscape of sagebrush plateaus incised by deep river canyons and it is considered an ecologically significant area with the Columbia River Basin for California big horn sheep, in addition to numerous bird species (National Audubon Society, 2015a).

One threatened bird is located in Idaho - the Yellow-billed cuckoo (*Coccyzus americanus*). Section 5.1.6.6, Threatened and Endangered Species and Species of Conservation Concern, discusses this protected species.

[95] Breeding range: "The area utilized by an organism during the reproductive phase of its lifecycle and during the time that young are reared." (USEPA, 2015q)

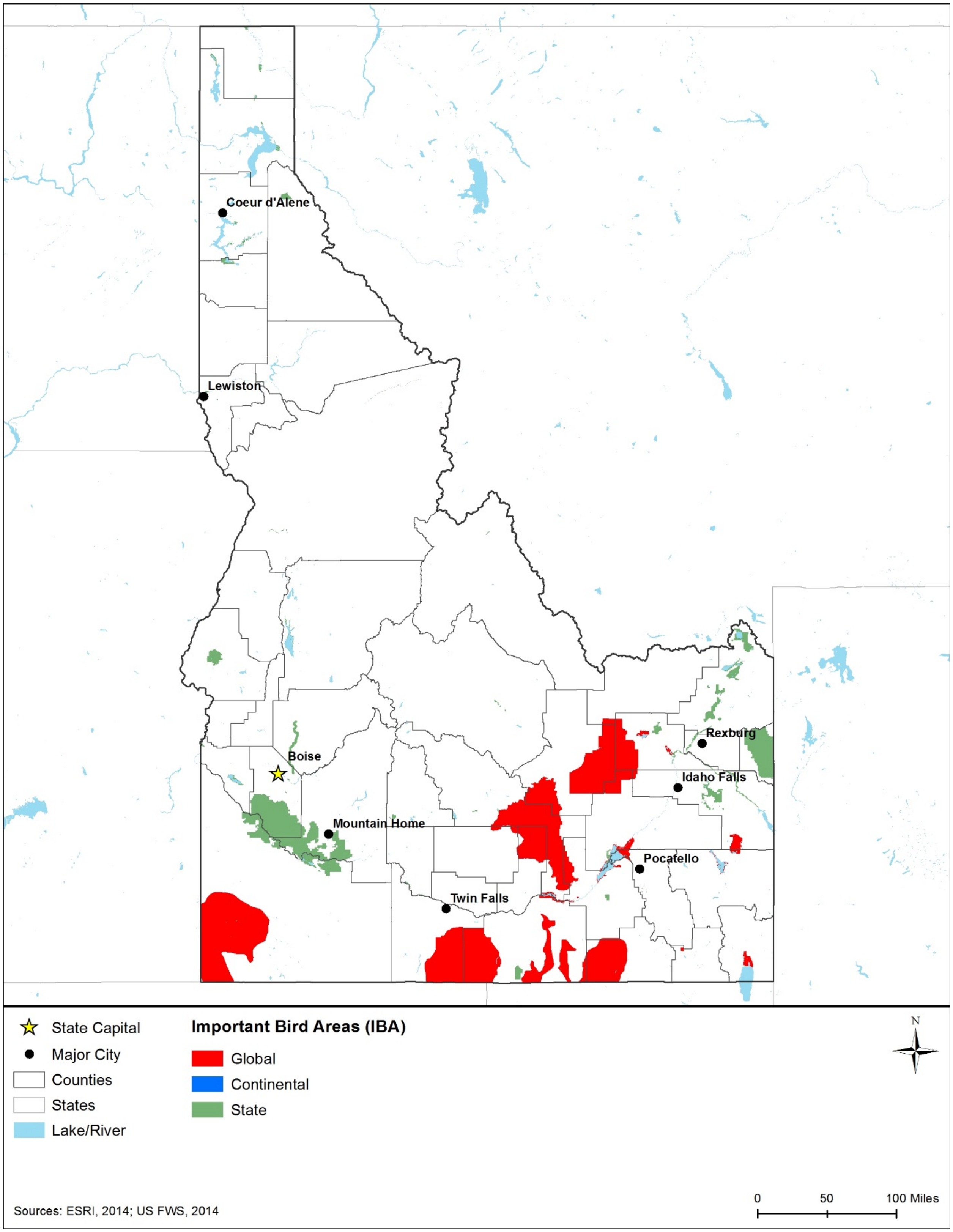


Figure 5.1.6-2: Important Bird Areas (IBA) of Idaho

Reptiles and Amphibians

A total of 39 native reptile and amphibian species occur in the state of Idaho, including 10 frogs and toads, five salamanders and newts, 11 lizards, 12 snakes, and one turtle. These species occur in a wide variety of habitats from the Snake River plains in the central and southern portion of the state to coniferous forests in the Blue Mountains and the Bitteroot Mountains in the northern portion of the state. Very few species are widespread throughout the state, and are instead more commonly found in either the plains region in the south or the mountainous region in the north. Of the 39 native reptile and amphibian species, 10 SGCN have been identified. (Idaho Fish and Game, 2005a).

A valid Idaho hunting license is required by residents and nonresidents for taking, capturing or possessing any live or dead Idaho amphibians and reptiles, except bullfrogs. Other species that are non-native to Idaho and used for pet and hobby purposes are unregulated if established in the wild. All other species are considered non-game, and take of these species is only allowed under special circumstances. (Idaho Fish and Game, 2012)

Invertebrates

Idaho is home to thousands of species of invertebrates, including a wide variety of bees, hornets, wasps, butterflies, moths, beetles, flies, dragonflies, damselflies, spiders, mites, and nematodes. These invertebrates provide an abundant food source for mammals, birds, reptiles, amphibians, and other invertebrates. In the U.S., one third of all agricultural output depends on pollinators.[96] In natural systems, the size and health of the pollinator population is linked to ecosystem health, with a direct relationship between pollinator diversity and plant diversity. “As a group, native pollinators are threatened by habitat loss, pesticides, disease, and parasites” (NRCS, 2009). It is estimated that approximately 557 butterfly, gastropod, moth, and insect species occur in Idaho (Idaho Fish and Game, 2005a).

A total of 101 invertebrate SGCN have been identified in Idaho (Idaho Fish and Game, 2005a). Several federally listed invertebrates are located in Idaho. Section 5.1.6.6, Threatened and Endangered Species and Species of Conservation Concern, discusses these protected species.

Invasive Wildlife Species

Idaho has adopted regulations that prohibit or regulate the possession, importation, shipping, or transportation of invasive species. The prohibited species list includes terrestrial wildlife such as 2 amphibians (e.g., bull frog [*Xenopus laevis*]), 6 reptiles (e.g., red-eared slider [*Trachemys scripta elegans*]), 1 bird, 1 mammal, 43 insects, 36 plant pathogens (parasitic nematodes), and 16 mollusks (terrestrial snails and slugs) (ISDA, 2006a). Invasive wildlife species are important to consider when proposing a project, since project activities may result in conditions that favor the growth and spread of invasive wildlife populations. These situations may result from directly altering the landscape or habitat to a condition that is more favorable for an invasive species, or by altering the landscape or habitat to a condition that is less favorable for a native species.

[96] Pollinators: “Animals or insects that transfer pollen from plant to plant.” (USEPA, 2015q)

5.1.6.5 Fisheries and Aquatic Habitat

This section discusses the aquatic wildlife species in Idaho, including freshwater fish and invertebrates. A summary of non-native and/or invasive aquatic species is also presented. A distinctive feature of the Idaho landscape with regard to aquatic wildlife is the cold-water trout streams and rivers located in the Blue Mountains, Bitterroot Mountains, and Sawtooth Mountains in the north and in the Snake River system in the south. These water bodies, often fed by snowmelt, provide habitat for a variety of aquatic wildlife that require a high dissolved oxygen content and low sediment load. No essential fish habitat (EFH) identified by the Magnuson-Stevens Fishery Conservation and Management Act exists in the state of Idaho. Critical habitat for threatened and endangered fish species, such as bull trout (*Salvelinus confluentus*), steelhead (*Oncorhynchus mykiss*), and white sturgeon (*Acipenser transmontanus*), as defined by the ESA, does exist within Idaho and is discussed in Section 5.1.6.6, Threatened and Endangered Species and Species of Conservation Concern. (USFWS, 2015c)

Freshwater Fish

Idaho is known for its freshwater fishing and is home to breeding populations of many species. Idaho's Comprehensive Wildlife Conservation Strategy, Appendix A, Common and Scientific Names for Fish and Wildlife Species Found in Idaho, lists 100 fish species in the state, 44 of which were introduced to the state or are non-native (Idaho Fish and Game, 2005a). Fish species range from small species like the fathead minnow (*Pimephales promelas*) and the redside shiner (*Richardsonius balteatus*) to large fish, such as the Northern pike (*Esox lucius*) and the Chinook salmon (*Oncorhynchus tshawytscha*). Of the 105 species recorded, 21 are considered SGCN (Idaho Fish and Game, 2005a). These species are grouped into 17 families, as follows: lampreys, sturgeons, herrings, carps and minnows, suckers, loaches, catfishes, pikes, smelt, trout and salmon, trout and perches, cods, livebearers, sculpin, sunfishes, perches, and cichlids. A brief description of those families that contain common species, notable sport fish species, or species of concern is listed below.

The lamprey family includes one species, the Pacific lamprey (*Lampetra tridentate*), which is both a SGCN and an endangered species by the state of Idaho due to declining populations (Idaho Fish and Game, 2005a). Historically, the Pacific lamprey was distributed in all drainages of the Snake River below Shoshone Falls, except the Palouse River. The species is now restricted to the Clearwater and Salmon River drainages and tributaries to the Snake River below Hells Canyon dam (Idaho Fish and Game, 2015g).

The sturgeon family also consists of one species, the White sturgeon (*Acipenser transmontanus*). At one time, biologists classified the species into two different population segments: one occurring in the Snake River and the other occurring in the Kootenai River system. The state identifies white sturgeon as a SGCN and an endangered species (Idaho Fish and Game, 2005a). The species reside in the Snake, lower Salmon, and Kootenai Rivers in Idaho. As the construction of dams on the Snake River isolated many of the sturgeon populations in the early 1900s through the 1970's, the once healthy numbers of the species were reduced. Today, the healthiest populations remain in a stretch of the Snake River between Bliss Dam and the upper end of C.J. Strike Reservoir in southern Idaho, and a stretch of the Snake River from Lewiston upstream to Hell's Canyon Dam. (Idaho Fish and Game, 2015h)

The herring family consists of one species, the American Shad (*Alosa sapidissima*). The American shad is known as a game fish in Idaho. The carp and minnow family consists of 18 species, including the Chiselmouth (*Acrocheilus alutaceus*), Lake chub (*Couesius plumbeus*), Tui Chub (*Gila bicolor*), and the Longnose dace (*Rhinichthys catharactae*). The northern leatherside chub (*Lepidomeda copei*) is listed as a SGCN, and a protected non-game species. (Idaho Fish and Game, 2005a)

The sucker family consists of six species, including the Utah sucker (*Catostomus ardens*), Longnose sucker (*Catostomus catostomus*), and mountain sucker (*Catostomus platyrhynchus*). The mountain sucker occurs throughout the mountainous regions of the west, and it is widespread throughout the Snake and Bear River systems in Idaho (American Fisheries Society, 2015a). The species prefer cool, clear streams with sandy bottoms. None of the species in the sucker family are listed as SGCN.

The loach family only contains one species, the Oriental weatherfish (*Misgurnus anguillicaudatus*). This species was introduced to Idaho; occurrences were recorded in an irrigation ditch at Eagle State Park in the Boise River System near Boise, in Ada County, Idaho. (Nico, et al., 2015)

The catfish family consists of seven fish species, most of which are common game fish in Idaho. Common catfish species include black bullhead (*Ameiurus melas*), yellow bullhead (*Ameiurus natalis*), blue catfish (*Ictalurus furcatus*), and Tadpole madtom (*Noturus gyrinus*) (Idaho Fish and Game, 2005a). None of the species are listed as SGCN.

The pike family consists of two species: the Northern pike (*Esox lucius*) and the Tiger muskellunge (*Esox lucius x E. masquinongy*) (Idaho Fish and Game, 2005a). Neither species is a SGCN. The smelt family consists of only the rainbow smelt (*Osmerus mordax*). As an introduced species, it is known to occur in the Sawtooth Mountains of Idaho.

The trout and salmon family consists of 31 species (Idaho Fish and Game, 2005a). Common and notable species include Lake Whitefish (*Coregonus clupeaformis*), Cutthroat trout (*Oncorhynchus clarkia*), Coho salmon (*Oncorthynchus kisutch*), Rainbow trout (*Oncorhynchus mykiss*), Sockeye salmon (*Oncorhynchus nerka*), Chinook salmon (*Oncorthynchus tshawytscha*), Bear Lake Whitefish (*Prosopium coulterii*), and Arctic char (*Salvelinus alpines*). Of the 31 trout and salmon species, 13 are identified by the state as SGCN (Idaho Fish and Game, 2005a). These species include Bonneville cutthroat trout (*Oncorhynchus clarkii utah*), Yellowstone cutthroat trout (*Oncorhynchus clarkia bouvieri*), westslope cutthroat trout (*Oncorhynchus clarkia lewisi*), inland redband trout (*Oncorhynchus mykiss gairdneri*), steelhead (*Oncorhynchus mykiss gairdneri*), Sockeye salmon (*Oncorhynchus nerka*), Kokanee (*Oncorhynchus nerka),* both the fall and spring/summer funs of the Chinook salmon (*Oncorhynchus tshawytscha*), Bear Lake whitefish (*Prosopium abyssicola*), Bonneville cisco (*Prosopium gemmifer*), Bonneville whitefish (*Prosopium spilonotus*), and bull trout (*Salvelinus confluentus*) (Idaho Fish and Game, 2005a). A popular species, the cutthroat trout require cold water and a clean gravel substrate. The four subspecies occur throughout the state in reservoirs, large lakes, and streams and large rivers (USFWS, 1982).

The trout and perch family consists of only the sand roller (*Percopsis transmontana*). Historically, the sand roller was found in the Columbia River. In Idaho, it was documented in the 1950s in the Clearwater River above Lewiston, near Hatwai Creek; however, since then there have been no observations of the species and biologists now suspect the species has been extirpated. (Idaho Fish and Game, 2005b)

The cod family includes one species, the burbot (*Lota lota*). Burbot are identified by their eel-like appearance and round tail. In Idaho, burbot are native only to the Kootenai River, where the population has declined since the construction of the Libby Dam. While most fish spawn in the spring, summer, and fall, burbot spawn in the winter. (American Fisheries Society, 2015b)

The livebearer family consists of four species, including the Western mosquitofish (*Gambusia affnis*), Shortfin molly (*Poecilia mexicana*), guppy (*Poecilia reticulata*), and green swordtail (*Xiphophorus hellerii*) (Idaho Fish and Game, 2005a). None of these fish species are SGCN.

The sculpin family consists of eight species. Three of the eight species are identified by the state as SGCN, including the Bear Lake sculpin (*Cottus extensus*), Shoshone sculpin (*Cottus greenei*), and the Wood River sculpin (*Cottus leiopomus*) (Idaho Fish and Game, 2005a). Sculpins prefer clear, fast-flowing streams and rivers. The Bear Lake sculpin is endemic to Bear Lake in southeast Idaho near the Utah border (American Fisheries Society, 2015c). The Shoshone sculpin is endemic to the springs and creeks in the Hagerman Valley and the Blue Hearts springs in the Snake River valley in southern Idaho (American Fisheries Society, 2015d). They are most common in the slower moving waters of stream systems and are typically found in areas with a significant amount of aquatic vegetation (American Fisheries Society, 2015d). Wood River sculpin are endemic to the upper Little Wood River and tributaries, as well as the Big Wood River and tributaries upstream from Magic Reservoir in Blaine County, Idaho. They occur in mainly small to medium-sized stream with cool, clear waters and swift current (American Fisheries Society, 2015e).

The sunfish family is composed of 8 species: green sunfish (*Lepomis cyanellus*), pumpkinseed (*Lepomis gibbosus*), warmouth (*Lepomis gulosus*) bluegill (*Lepomis gulosus*), smallmouth bass (*Micropterus dolomeiu*), largemouth bass (*Micropterus salmoides*), white crappie (*Pomoxis annularis*), and black crappie (*Pomoxis nigromaculatus*) (Idaho Fish and Game, 2005a). None of these fish species are SGCN.

The perch family includes yellow perch (*Perca flavescens*), Sauger (*Sander Canadensis*), and Walleye (*Sander viteus*) (Idaho Fish and Game, 2005a). None of these fish species are SGCN.

The cichlid family consists of four species: convict cichlid (*Cichlasoma nigrofasciatum*), blue tilapia (*Oreochromis aureus*), Mozambique tilapia (*Oreochromis mossambicus*), and redbelly tilapia (*Tilapia zillii*) (Idaho Fish and Game, 2005a). None of these fish species are SGCN.

Shellfish and Other Invertebrates

Idaho is home to approximately 185 aquatic mollusk, pearlshell, clam, and fingerclam species, which includes 29 gastropod families and four bivalve[97] families. Of these 185 aquatic mollusk, pearlshell, claim, and fingerclam species, approximately 28 of the mollusk species have been introduced or are non-native to Idaho. Three mollusk species are considered SGCN, including the California Floater (*Anodonta californiensis*), Western Ridged Mussel (*Gonidea angulata*), and Western Pearlshell (*Margaritifera falcata*). Forty-one gastropod species are considered SGCN, including the Bliss Rapids Snail (*Taylorconcha serpenticola*), Selway Forestsnail (*Allogona lombardii*), and Whorled Mountainsnail (*Oreohelix vortex*). (Idaho Fish and Game, 2005a).

Invasive Aquatic Species

Idaho has adopted regulations that prohibit or regulate the possession, importation, shipping, or transportation of invasive species. The list of prohibited aquatic species includes 12 invertebrates (mussels, snails, crayfish, and clams) and 14 fish (ISDA, 2006a). Zebra (*Dreissena polymorpha*) and quagga (*Dreissena bugensis*) mussels, two aquatic invasive species that were introduced to North America's Great Lakes in the late 1980's have not been detected in Idaho waters (ISDA, 2015c). To protect Idaho's waters from these invasive aquatic species, the ISDA established a watercraft inspection station program that focuses on boat inspections at the state borders (ISDA, 2015d). Since the launch of the program in 2009, more than 300,000 inspections have been conducted in Idaho. Through these inspections, 145 mussel-fouled boats have been intercepted (ISDA, 2015d).

[97] Bivalve: "An aquatic mollusk whose compressed body is enclosed within a hinged shell. For example, clams, oysters and mussels are bivalves." (USEPA, 2015q)

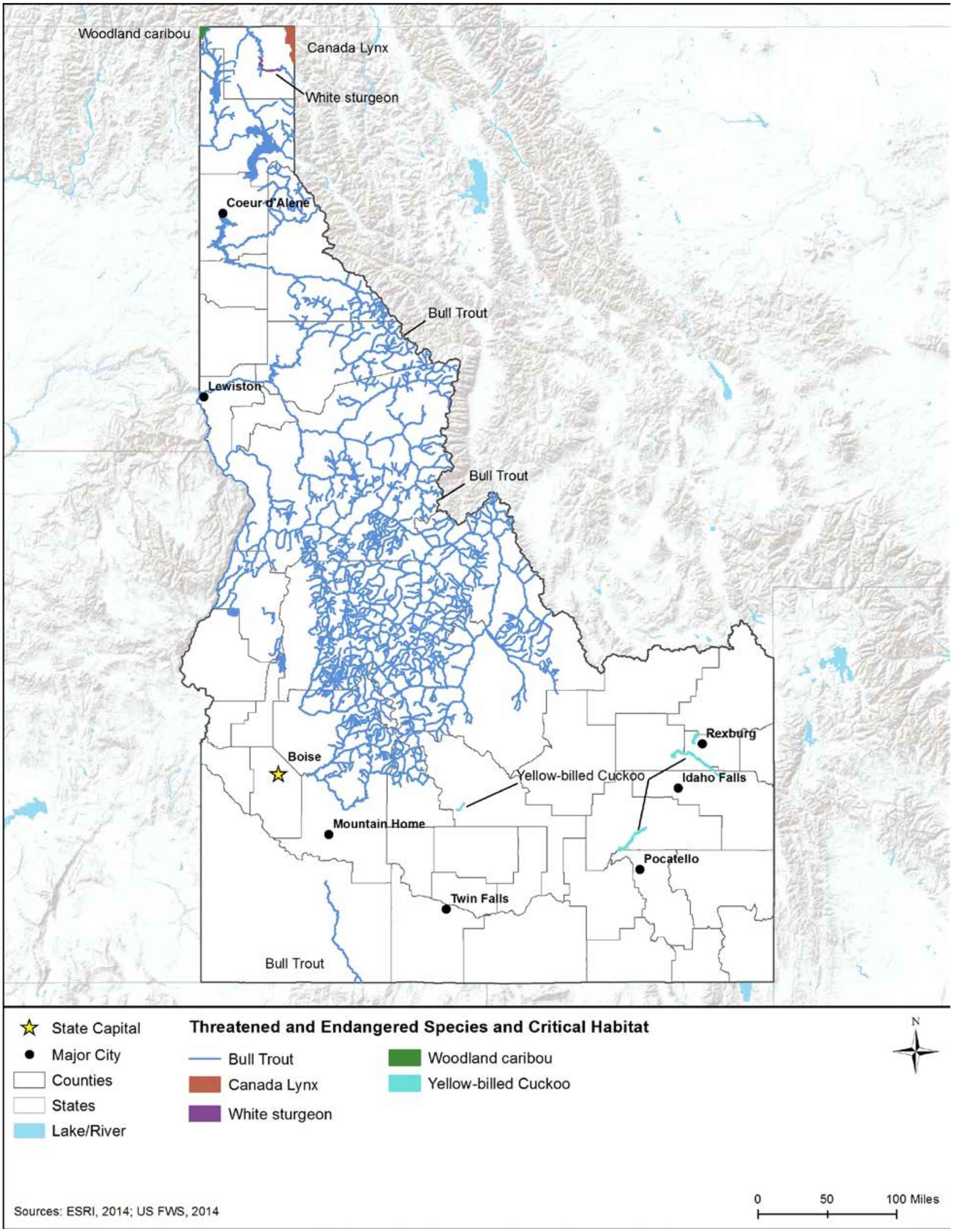


Figure 5.1.6-3: Critical Habitat for Federally Listed Species in Idaho

5.1.6.6 Threatened and Endangered Species and Species of Conservation Concern

The USFWS is responsible for administering the ESA (16 U.S.C §1531 et seq.) in state of Idaho. The USFWS Office has identified five federally endangered and ten federally threatened species known to occur in Idaho (USFWS, 2015d). Of these 15 federally listed species, five of them have designated critical habitat[98] (USFWS, 2015e). One candidate species,[99] Whitebark pine (*Pinus albicaulis*), is identified by USFWS as occurring within the state (USFWS, 2015f). Federal land management agencies maintain lists of species of concern for their landholdings; these lists are not discussed below as they are maintained independently from the ESA. For future site-specific analysis on those lands, consultation with the appropriate land management agency would be required. Candidate species are not afforded statutory protection under the ESA. However, the USFWS recommends taking these species into consideration during environmental planning because they could be listed in the future (USFWS, 2014b). The 15 federally listed species include four mammals, one bird, two fish, four invertebrates, and four plants (USFWS, 2015d), and are discussed in detail under the following sections.

Mammals

One endangered and three threatened mammals are federally listed for Idaho as summarized in Table 5.1.6-3 (USFWS, 2015d). Information on the habitat, distribution, and threats to the survival and recovery of each of these species in Idaho is provided below.

Table 5.1.6-3: Federally Listed Mammal Species of Idaho

Common Name	Scientific Name	Federal Status [a]	Critical Habitat in Idaho	Habitat Description
Canada Lynx	*Lynx canadensis*	T	Yes	Alpine boreal forests of the Rocky Mountains
Grizzly Bear	*Ursus arctos horribilis*	T/XN	No	Alpine forests to mixed shrub fields to grasslands
Northern Idaho Ground Squirrel	*Spermophilus brunneus*	T	No	Meadows and grasslands surrounded by Ponderosa pine and Douglass-fir trees
Woodland Caribou	*Rangifer tarandus caribou*	E	Yes	Subalpine fir and red cedar/ hemlock forest types

[a] E = Endangered, T = Threatened, XN = Non-Essential Experimental Population

Source: (USFWS, 2015f) (USFWS, 2015d)

Canada Lynx. The Canada lynx is an average-sized cat (ranging from 30 to 35 inches long and 14 to 31 pounds) with "large, well-furred paws, long, black ear tufts, and a short, black-tipped

[98] Critical habitat includes "the specific areas (i) within the geographic area occupied by a species, at the time it is listed, on which are found those physical or biological features (I) essential to conserve the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographic area occupied by the species at the time it is listed upon determination that such areas are essential to conserve the species" (16 U.S.C §1532(5)(A)).
[99] Candidate species are plants and animals that the USFWS has "sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities (USFWS, 2014d).

tail" that separates it from a bobcat (USFWS, 2013b). This cat inhabits boreal forests dominated by spruce and fir, and is skilled at hunting in deep snow. Their primary prey is the snowshoe hare (*Lepus americanus*) and as a result the abundance and survival of the Canada lynx is directly related to the density and health of regional snowshoe hare populations. The species was listed as endangered in 2000 (65 FR 16053 16086, January 24, 2000). Only a few places in the lower 48 states regularly support the Canada lynx populations. Northern and Central Idaho is one of these areas, with the majority of lynx habitat occurring on public lands in the Rocky Mountains (USFWS, 2015d).

The Canada lynx was listed in 2000 primarily concerning habitat destruction, the need for more regulatory control, and consistent guidance for forest management activities. Given the lynx travels back and forth between the United States and Canada, contiguous habitat is important for this species. In addition, snowshoe hare habitat is also important because of the direct link between snowshoe hare abundance and lynx abundance and survival. While incidental take of lynx from hunting or trapping is possible, available data does not show this to be substantial threat (USFWS, 2005) (USFWS, 2013b).

Grizzly Bear. The grizzly's fur ranges in color from light brown to nearly black. A male grizzly bear "stands at approximately 7 feet tall and weighs from 300 to 600 pounds (and occasionally more than 800 pounds)," while females weigh between 200 to 400 pounds (USFWS, 2007a). Grizzly bears were federally listed as threatened in 1975 (40 FR 31734 31736, July 25, 1975). This species is found in northern and eastern reaches of Idaho in the following counties: Bonner, Bonnerville, Boundary, Clark, Freemont, and Teton (USFWS, 2015g).

Grizzly bear Photo credit: USFWS

Suitable habitat ranges from alpine forests to mixed shrub fields to grasslands. Grizzlies tend to be at lower elevations in the spring and higher elevations during hibernation. Hibernation usually begins in October or November and lasts until March, sometimes extending to May (USFWS, 2007a). The primary threats to this species include conflicts with humans, such as livestock depredation or unregulated hunting, and habitat loss or fragmentation[100] from various types of development ranging from new roads, logging, energy and mineral exploration, and recreation (USFWS, 2007a; Servheen, 1993).

Northern Idaho Ground Squirrel. The Northern ground squirrel (*Spermophilus brunneus brunneus*) is a reddish gray animal with reddish brown spots and is about 9 inches in length. The species has a short, narrow tail and a white ring of fur around its eye. It relies on abundance of grassland seeds in order to store fats for an eight-month hibernation period from August to April. The species was listed as threatened in 2000 (65 FR 17780 17786, April 5, 2000).

[100] Fragmentation: "The breaking up of large and continuous ecosystems, communities, and habitats into smaller areas that are surrounded by altered or disturbed land or aquatic substrate." (USEPA, 2015q)

The northern Idaho ground squirrel occurs in dry meadows, grasslands and in areas where Ponderosa and Douglas-fir trees are present. Populations are located in western Idaho in Valley and Apple Counties. Threats to the Northern Idaho Ground Squirrel include loss of native meadow habitat and the fragmentation of important travel corridors that have impacts on spatial connectivity (USFWS, 2015h).

Woodland Caribou. The Woodland Caribou (*Rangifer tarandus caribou*) is clove-brown in color with a white neck, rump, and feet. It is the only species in the deer family where both males and females grow antlers. Woodland Caribou can weigh from 350-400 pounds and have been recorded weighing up to 700 pounds. The species was listed as Endangered in 1983 (48 FR 28500 28504, January 14, 1983) and has designated critical habitat in northwestern Idaho and northeastern Washington in the southern Selkirk Mountain range (77 FR 71041 7108, October 25, 1983) (USFWS, 2015i). Historical ranges include northwestern, northcentral, northeastern conterminous United States as well as southern reaches of Canada (USFWS, 2015i).

Woodland caribou Photo credit: USFWS

The Woodland Caribou migrates in accordance with distinct seasonal weather and food distribution patterns. Early winter is the most critical season as soft new snow pack can make mobilization hard and ground foraging difficult. As late winter comes, the species moves higher in elevation and uses the hardened snow pack to forage lichens in the tree canopies 5 meters off the ground. As spring returns, woodland Caribou will return to lower elevations to forage greening areas and will reside in lower elevations until the return of early winter. Threats to the Woodland Caribou include illegal harvest via poachers, habitat fragmentation via road construction and habitat alteration from timber harvesting (USFWS, 2015i).

Birds

One threatened bird is federally listed for Idaho as summarized in Table 5.1.6-4 (USFWS, 2015d). Information on the habitat, distribution, and threats to the survival and recovery of the yellow-billed cuckoo in Idaho is provided below.

Table 5.1.6-4: Federally Listed Bird Species of Idaho

Common Name	Scientific Name	Federal Status [a]	Critical Habitat in Idaho	Habitat Description
Yellow-billed Cuckoo	*Coccyzus americanus*	T	Yes	Riparian corridors, woodlands with reliable water sources

[a] T = Threatened

Source: (USFWS, 2015d)

Yellow-billed Cuckoo. The western yellow-billed cuckoo (*Coccyzus americanus*) is a large, slim bird with a down curved bill. This shy, migrant bird winters in South America and breeds in the western United States. The western yellow-billed cuckoo is considered a separate population from its eastern counterpart. Currently, the western yellow-billed cuckoo is only known to breed in Arizona, California, Colorado, Idaho, New Mexico, and Utah (Johnson, 2009). The species was listed as threatened in 2014 (79 FR 59991 60038, October 11, 2014) (USFWS, 2015j).

Yellow-billed cuckoo Photo credit: USFWS

Suitable habitat for the species includes densely wooded areas with reliable water sources nearby. Especially in the west, nesting occurs in willow tree near drainages and foraging occurs in cottonwoods. There is critical habitat designated in 2014 along the southeastern part of Idaho along the Snake River (79 FR 48547 48652, August 18, 2014). Threats to the species include habitat alteration and conversion to riparian corridors for agricultural and housing (USFWS, 2015j).

Fish

Federally listed fish species in Idaho consist of one threatened and one endangered species, as summarized in Table 5.1.6-5 (USFWS, 2015d). Information on the habitat, distribution, and threats to the survival and recovery of these species in Idaho is provided below.

Table 5.1.6-5. Federally Listed Fish Species of Idaho

Common Name	Scientific Name	Federal Status [a]	Critical Habitat in Idaho	Habitat Description
Bull Trout	*Salvelinus confluentus*	T	Yes	Coldwater, clean gravel substrate, headwaters and lake bodies
White Sturgeon	*Acipenser transmontanus*	E	Yes	Libby Dam, Montana downstream to Corra Linn Dam at Kootenay Lake is British Colombia

[a] E = Endangered, T = Threatened

Source: (USFWS, 2015d)

Bull Trout. Bull Trout (*Salvelinus confluentus*) are a part of the taxonomic family Salmonidae and can range from 10 inches as resident form trout and 32 inches as migratory/anadromous form trout. They are olive green to bronze and possess pale yellow, orange or salmon colored spots their back. Compared to other Salmonids, bull trout require more specific habitats; they are very sensitive to temperature changes and require clean spawning gravel. Bull trout were listed as threatened in 1998 (63 FR 31647 31674, July 10, 1998) (USFWS, 2015k).

As of 2010, bull trout have been designated 19,729 miles of stream and 488,251 acres of reservoirs and lakes as critical habitat in Idaho, Washington, Oregon, Montana and Nevada (75 FR 63898 64070, October 18, 2010) (USFWS, 2015k). The greatest threats to this species includes fish passage restrictions that lead to habitat fragmentation, impacts to water quality due to land management activities, overfishing, hybridization with other trout species, and the potential for increased water temperatures due to climate change (USFWS, 2014b).

Bull trout Photo credit: USFWS

White Sturgeon. The white sturgeon (*Acipenser transmontanus*) is a large fish with a cartilaginous skeleton; the largest specimen on record weighed approximately 1,500 pounds. Ocean populations of white sturgeon tend to be much larger than the Kootenai River population that occurs in Idaho, Montana, and British Columbia, Canada. The White Sturgeon was listed as endangered in 1994 (59 FR 45989 46002, September 6, 1994) (USFWS, 2015l).

The Kootenai River population has designated critical habitat (73 FR 39506 39523, July 9, 2008) (USFWS, 2015l), which consists of the 167 miles of river, encompassing their entire range. Suitable habitat for this species consists of rivers with cold water temperatures, good water quality, and unaltered flow. Alterations to the natural flow regime within the Kootenai River from the construction of Libby Dam and other human-induced land use alterations has contributed to the decline of this population (USFWS, 1999).

Invertebrates

One threatened and three endangered invertebrates are federally listed for Idaho, as summarized in Table 5.1.6-6 (USFWS, 2015d). These species all have specific habitat requirements that limit their distribution in Idaho. Information on the habitat, distribution, and threats to the survival and recovery of these invertebrate species in Idaho is provided below.

Table 5.1.6-6. Federally Listed Invertebrate Species of Idaho

Common Name	Scientific Name	Federal Status [a]	Critical Habitat in Idaho	Habitat Description
Banbury Springs Limpet	*Lanx sp.*	E	No	Boulders, cobble and basalt rocks in four isolated springs
Bliss Rapids Snail	*Taylorconcha serpenticola*	T	No	Cobbles located next to cool spring-fed waters
Bruneau Hot Springsnail	*Pyrgulopsis bruneauensis*	E	No	Large boulders next to geothermal springs and seeps along the Bruneau River
Snake River Snail	*Physa natricina*	E	No	Swift moving water, sandy-boulder substrate

[a] E = Endangered, T = Threatened

Source: (USFWS, 2015d)

Banbury Springs Limpet. The Banbury Springs limpet (*Lanx sp.*) is a conical shelled lanx and is colored red-cinnamon. This small species can range in size from 0.09 to 0.28 inch long, and is only 0.03 to 0.17 inch tall. The species does not possess specialized respiratory organs, making it sensitive to dissolved oxygen levels. The species was listed as endangered in 1992 (57 FR 59244 59257, December 14, 1992).

The Banbury Springs limpet is found in four isolated cold-spring locations: Briggs Springs, Thousand Springs, Box Canyon Springs, and Banbury Springs, all located within Idaho's southern central region. Threats to this species include habitat alterations, low spring flows, groundwater quality, low dissolved oxygen levels, and invasive species (USFWS, 2015m).

Bliss Rapids Snail. The Bliss Rapids snail (*Taylorconcha serpenticola*) is a tiny ovoid shelled snail that ranges from 0.08 to 0.16 inches in length with a clear, white-colored shell. The species was listed as threatened in 1992 (57 FR 59244 59257, December 14, 1992). This snail prefers cobble-boulder surfaces with cool spring fed waters (USFWS, 2015n).

The species is primarily found in the upper reaches and tributaries of the Snake River in the southern central region of Idaho. Threats to the snail include water quality issues caused by hydroelectric operations, pollution, and invasive species, such as the New Zealand Mudsnail (USFWS, 2015n).

Bruneau Hot Springsnail. The Bruneau hot springsnail (*Pyrgulopsis bruneauensis*) is 2 mm in length and is endemic to geothermal springs and seeps within approximately 5 miles of the Bruneau River is the southwestern region of Idaho. It was listed as endangered in 1992 (58 FR 5938 5946, January 25, 2015) (USFWS, 2015o).

The snail prefers large cobbles and boulders near the springs and moving water. Threats to the species include groundwater depletion and instability mainly caused by agricultural uses. Moreover, temperature of the springs is the most specific factor that affects the springsnail's population and spatial distribution (USFWS, 2015o).

Snake River Snail. The Snake River Snail (*Physa natricina*) is an ovoid shelled mollusk that reaches 6.5 millimeters in size. It is amber brown in color and it shell will typically have 3 to 3.5 whorls. The species was listed as endangered in 1992 (57 FR 59244 59257, December 14, 1992) (USFWS, 2015p).

The species is believed to exist solely in the Snake River drainage and occurs in areas with swift moving water and sandy, boulder substrates. Current threats to the species are the water quality issues posed by redirection of water, warm-water discharge into the Snake River, and non-point source pollution (USFWS, 1995).

Plants

Four threatened plants are federally listed for Idaho as summarized in Table 5.1.6-7 (USFWS, 2015d). Information on the habitat, distribution, and threats to the survival and recovery of each of these species in Idaho is provided below.

Table 5.1.6-7. Federally Listed Plant Species of Idaho

Common Name	Scientific Name	Federal Status [a]	Critical Habitat in Idaho	Habitat Description
MacFarlane's Four-o'clock	*Mirabilis macfarlanei*	T	No	Steep river canyon grasslands
Spalding's Catchfly	*Silene spaldingii*	T	No	Open mesic grasslands along valleys and drainages
Ute Ladies'-tresses	*Spiranthes diluvialis*	T	No	Wetlands and Meadows along Snake river in southeastern Idaho
Water Howellia	*Howellia aquatilis*	T	No	Depressional wetlands formed by glacial potholes

[a] T = Threatened

Source: (USFWS, 2015d) (USFWS, 2015e)

MacFarlane's Four-o'clock. The MacFarlane's four-o'clock (*Mirabilis macfarlanei*) is a perennial plant that with magenta colored flowers that form in clumps of four to seven. Flowering season is from May-June and individuals are known to live up to 20 years in age. The species was listed as threatened in 1979 (44 FR 61912 61913, November 29, 1979). MacFarlane's four-o'clock has thirteen known populations, nine of which are in Idaho County in the southwestern part of the state. In Idaho County, these populations are in the Snake River Canyon and Salmon River areas (USFWS, 2015q).

Suitable habitat for the species include river canyon grasslands with less than 12 inches of annual rainfall. Threats the MacFarlane's four-o'clock include invasive species, floods and landslides, herbicides and pesticides, and livestock grazing (USFWS, 2000).

Spalding's Catchfly. The Spaulding's catchfly is a perennial[101] herbaceous plant of the carnation family that can grow up to 30 inches in height and flowers from July to August. The species was listed as threatened in 2001 (66 FR 51597 51606, October 10, 2001). This plant gets its name because it is "covered in dense sticky hairs that frequently trap dust or insects" (USFWS, 2007b). Its range includes Idaho, Montana, Oregon, and Washington. In Idaho, the species is found in the Palouse Grasslands in west-central Idaho (USFWS, 2015r).

Suitable habitat for this species includes "open, mesic[102] grasslands or sagebrush-steppe communities" within valleys and along drainages, and occasionally open pine forests (USFWS, 2007b). Typically, this species is associated with rough and Idaho fescues, Nelson's and Richard's needlegrasses, and bluebunch wheatgrass. Threats to this species include competition with nonnative invasive plants, fire suppression, small population sizes, livestock grazing and trampling, and land conversion, climate change, insect damage and disease, and off-road vehicle use (USFWS, 2007b).

[101] Perennial plants: "Plants that live for more than two growing seasons. Perennial plants either die back after each season (herbaceous plants) or grow continuously (shrubs)." (USEPA, 2015q)
[102] Mesic: "Soil condition that is medium-wet." (USEPA, 2015q)

Ute Ladies'-tresses. The Ute ladies'-tresses is a perennial orchid that grows up to 24 inches in height and that typically flowers from early August to early September. The Ute ladies' tresses was federally listed as threatened in 1992 (57 FR 2048 2053, January 17, 1992) and was proposed for delisting in 2004. Though the species is recovering, its threatened status is current.

The species occurs throughout Colorado, Idaho, Montana, Nebraska, Nevada, Utah, Washington, and Wyoming. Within Idaho, the species is believed to exist in wetlands and meadows along certain parts of the Snake River in the southeastern regions of the state. Threats to this species include urbanization, agriculture, recreation, grazing, and invasive non-native species (USFWS, 2015s).

Water Howellia. The water howellia (*Howellia aquatilis*) is an aquatic, winter annual ranging from 4 to 24 inches in height that flowers in July to August (USFWS, 2015t). It was listed as threatened in 1994 (59 FR 35860 35864, July 19, 1994) (USFWS, 2015t). This plant is typically submerged or floating in water (USFWS, 1996). This species is also known to occur in California, Montana, Oregon, and Washington in the United States (USFWS, 1996). Only one occurrence of the species is known in Idaho, which occurred at Spirit Lake in 1892.

Suitable habitat for this species consists of wetlands formed by glacial potholes with a varied hydrologic regime,[103] consisting of wet conditions during winter snowmelt and spring rains, and dry conditions by late summer (USFWS, 2015t). Important wetland habitat is often surrounded by deciduous[104] forest. The primary threats to this species and its habitat include timber harvesting, livestock grazing, invasion of nonnative invasive plants, and human-induced habitat conversion from increased urbanization, agriculture, and flood control measures (USFWS, 1996).

5.1.7. Land Use, Recreation, and Airspace

5.1.7.1 Definition of the Resources

The following summarizes major land uses, recreational venues, and airspace considerations in Idaho, characterizing existing, baseline conditions for use in evaluating the potential environmental consequences resulting from implementing the Proposed Action or Alternatives.

Land Use and Recreation

Land use is defined as "the arrangements, activities, and inputs people undertake in a certain land cover type to produce, change, or maintain it" (Di Gregorio & Jansen, 1998). A land use designation can include one or more pieces of land, and multiple land uses may occur on the same piece of land. Land use also includes the physical cover, observed on the ground or remote sensing and mapping, on the earth's surface; land cover includes vegetation and manmade development (USGS, 2012b).

[103] Hydrologic regime: "The system that describes the occurrence, distribution, and circulation of water on the earth and between the atmosphere." (USEPA, 2015q)
[104] Deciduous: "Plants having structures that are shed at regular intervals or at a given stage in development, such as trees that shed their leaves seasonally." (USEPA, 2015q)

Recreational uses are activities in which residents and visitors participate. They include outdoor activities, such as hiking, fishing, boating, athletic events (e.g., golf), and other attractions (e.g., historic monuments and cultural sites) or indoor activities, such as museums and historic sites. Recreational resources can include trails, lakes, forests, beaches, recreational facilities, museums, historic sites, and other areas/facilities. Recreational resources are typically managed by federal, state, county, or local governments. (State of Idaho, 2016b)

Descriptions of land uses are presented in five primary categories in Idaho: Forest and Woodland, Semi-Desert, Agricultural Vegetation, Shrubland and Grassland, and Developed and Other Human Use. Descriptions of land ownership are presented in four main categories: private, federal, state, and tribal. Descriptions of recreational opportunities are presented in a regional fashion.

Airspace

Airspace is generally defined as the space lying above the earth, above a certain area of land or water, or above a nation and the territories that it controls, including territorial waters (Merriam Webster Dictionary, 2015a). Airspace is a finite resource that can be defined vertically and horizontally, as well as temporally, when discussing it in relation to aircraft activities. Airspace management addresses how and in what airspace aircraft fly. Air flight safety considers aircraft flight risks, such as aircraft mishaps and bird/animal-aircraft strikes. The Federal Aviation Administration (FAA) is charged with the safe and efficient use of the nation’s airspace and has established criteria and limits to its use (FAA, 2014a).

The FAA operates a network of airport towers, air route traffic control centers, and flight service stations. The FAA also develops air traffic rules, assigns use of airspace, and controls air traffic in U.S. airspace. “The Air Traffic Organization (ATO) is the operational arm of the FAA responsible for providing safe and efficient air navigation services to approximately 30.2 million square miles of airspace. This represents more than 17 percent of the world’s airspace and includes all of the U.S. and large portions of the Atlantic and Pacific Oceans and the Gulf of Mexico” (FAA, 2014b). The ATO is comprised of Service Units (organizations) that support the operational requirements (FAA, 2016a).

The FAA Air Traffic Services Unit (the Unit) manages the National Airspace System (NAS) and international airspace assigned to U.S. control and is responsible for ensuring efficient use, security, and safety of the nation’s airspace. FAA field and regional offices (e.g., Aircraft Certification Offices, Airports Regional Offices, Flight Standards District Offices (FSDO), Regional Offices & Aeronautical Center, etc.) assist in regulating civil aviation to promote safety, and develop and carry out programs that control aircraft noise and other environmental effects (e.g., air pollutants) attributed from civil aviation (FAA, 2015c). The FAA works with state aviation officials and airport planners, military airspace managers, and other organizations in deciding how best to use airspace (FAA, 2014a).

5.1.7.2 Specific Regulatory Considerations

Appendix C, Environmental Laws and Regulations, summarizes numerous federal environmental laws and regulations that, to one degree or another, may affect land use in Idaho. However, most site-specific land use controls and requirements are governed by local county, city, and village laws and regulations. Furthermore, many land use controls and requirements are implemented and enforced under the umbrella of land use planning, often with the help and support of state authorities. Local land use planning requirements are outlined in Idaho Code Title 67, Chapter 65 (State of Idaho, 2014).

Because the Nation's airspace is governed by federal laws, there are no specific Idaho state laws that would alter the existing conditions relating to airspace for this PEIS. Aviation is addressed in the Idaho Statutes, Title 21 – Aeronautics (Idaho Legislature, 2014b).

5.1.7.3 Land Use and Ownership

For the purposes of this analysis, Idaho has been classified into primary land use groups based on coverage type as Forest and Woodland, Semi-Desert, Agricultural Vegetation, Shrubland and Grassland, and Developed and Other Human Use. Land ownership within Idaho has been classified into four main categories: private, federal, state, and tribal.

Land Use

Table 5.1.7-1 identifies the major land uses by coverage type in Idaho. Forest and woodlands comprise the largest portion of land use with 36 percent of Idaho's total land occupied by this category (Table 5.1.7-1 and Figure 5.1.7-1). Agriculture is the second largest area of land use with 11 percent of the total land area. Developed areas account for one percent of the total land area. The remaining percentage of land includes public land, surface water, and other land covers, shown in Figure 5.1.7-1, that are not associated with specific land uses (USGS, 2011a).

Table 5.1.7-1: Major Land Use in Idaho by Coverage Type

Land Use	Square Miles	Percent of Land
Forest and Woodland	30,109	36%
Semi-Desert	25,996	31%
Agricultural Vegetation	9,446	11%
Shrubland and Grassland	8,331	10%
Developed and Other Human Use	1,358	2%
Other	7,403	10%

Source: (USGS, 2011a)

Forest and Woodland

Forest and woodland areas are primarily located in central and northern Idaho. Forest and woodlands are also found in higher elevations in southwestern and southeastern Idaho (Figure 5.1.7-1). The USFS owns and manages approximately 76 percent of the forest and woodlands across 12 national forests. Private ownership comprises about 13 percent. (USFS, 2012). Section 5.1.6, Biological Resources, presents additional information about terrestrial vegetation.

National Forests

Idaho has 12 National Forests, which are managed for a mix of uses, including recreation, water resources, livestock grazing, wildlife habitat, fishing, hunting, timber, minerals, and environmental restoration. (USFS, 2016a)

- Bitteroot National Forest
- Boise National Forest
- Caribou-Targhee National Forest
- Clearwater National Forest
- Coeur d'Alene National Forest
- Curlew National Grassland
- Kaniksu National Forest
- Nez Perce National Forest
- Payette National Forest
- St. Joe National Forest
- Salmon-Challis National Forest
- Sawtooth National Forest

State Forests

Forest and woodland areas are part of lands managed by the Idaho Department of Lands (IDL), Idaho Department of Fish and Game, and Idaho Parks and Recreation. The IDL manages the Floodwood State Forest in the northern portion of the state. The IDL prepared the Idaho Forest Action Plan to analyze forest condition, identify forest trends, and develop actions to address priority issues and areas. The 2012 Idaho Forest Action Plan states that the purpose of the plan is to establish "a long-term, coordinated strategy for reducing threats to Idaho's forests while increasing the social, economic, and environmental benefits they provide." (IDL, 2012)

Private Forest and Woodland

Private landowners collectively own approximately 13 percent of Idaho's total forestland. All of the private forest and woodland areas are unreserved or available for harvest activities. About 91 percent of the land is classified as timberland or forests able to produce 20 cubic feet of wood per acre per year (USFS, 2012). For additional information regarding forest and woodland areas, see Section 5.1.6, Biological Resources, and Section 5.1.8, Visual Resources.

Semi-Desert

Land use within the semi-desert category in Idaho includes wildlife management areas, wilderness and wilderness study areas, recreation, minerals development, wild horse management areas, and livestock grazing (BLM 2016). The majority of semi-desert areas occur in the central and southern parts of the state (Figure 5.1.7-1) and are managed by private land owners, the state, DOD, DOE, tribes, or the BLM (Figure 5.1.7-2).

Agricultural Land

Agricultural land exists in every region of the state. The largest concentrations of agricultural land are in the southern third of the state and in northwestern Idaho along the western border with Washington (Figure 5.1.7-1). Approximately 11 percent of Idaho's total land area is classified as agricultural land (9,446 square miles). In 2012, there were 224,816 farms in Idaho and 83 percent were owned and operated by small, family businesses, with the average farm size of 474 acres (USDA, 2014b). Some of the state's largest agricultural uses include dairy, beef,

hay, potatoes, wheat, barley, beans, corn, and onions. Other agricultural uses include cattle, calves, and sheep (USDA, 2014c). For more information by county, access the USDA Census of Agriculture website:
http://www.agcensus.usda.gov/Publications/2012/Full_Report/Census_by_State/Idaho/.

Shrubland and Grassland

The largest concentrations of shrubland and grassland are located in mountain valleys, edges of forest and woodlands, and the transition between high and low elevations (Figure 5.1.7-1). Land use in these areas varies by location and includes both private and public land ownership (Figure 5.1.7-2. Some of the uses within this category include ranching, recreation, and wildlife preservation.

Developed Land

Developed land tends to be concentrated within metropolitan (urban) areas and surrounding cities, towns, and suburbs (NRCS, 2000a) (Figure 5.1.7-1). Although only one percent of Idaho land is developed, these areas are highly utilized for residential, commercial, industrial, recreational, and government purposes. Table 5.1.7-2 lists the top five developed metropolitan areas within the state and their associated population estimates, and Figure 5.1.7-1 shows where these areas are located within the Developed land use category.

Table 5.1.7-2: Top Five Developed Metropolitan Areas

Metropolitan Area	Population Estimate (2014)
Boise City	664,707
Coeur d'Alene	147,245
Idaho Falls	138,126
Pocatello	83, 471
Lewiston, ID-WA Metropolitan Area	62,120
Total Population of Top Five Metropolitan Areas	**1,075,557**
Total State Population	**1,634,464**

Sources: (U.S. Census Bureau, 2015d) (U.S. Census Bureau, 2015a)

Land Ownership

Land ownership within Idaho has been classified into four main categories: private, federal, state, and tribal.

Private Land

About 30 percent of the land in Idaho is privately owned (Idaho Association of Counties, 2010). Private land falls under the land use categories of agricultural, forest and woodland, and developed (Figure 5.1.7-1). Highly developed, urban, metropolitan areas transition into suburban, agriculture, shrub, and woodland areas, which then transition into more wild and remote areas (U.S. Census Bureau, 2010) (USDA Economic Research Service 2016). Private land exists in all regions of the state and is concentrated in the southern third of Idaho and the northwest region (USGS, 2011a).[105]

Federal Land

Seven federal agencies manage the majority of federal lands throughout the state (Table 5.1.7-3 and Figure 5.1.7-2). There may be other federal lands, but they are not shown on the map due to their small size relative to the entire state. The agencies listed in Table 5.1.7-3 manage 52,872 square miles (63 percent) of Idaho land with a variety of land types and uses, including national laboratory, military bases, national wildlife refuges, national forests, national parks, national monuments, national historic sites, water and hydropower projects, wilderness, and national conservation areas. (USGS, 2012c) (USGS, 2014f)

Seven federal agencies manage the majority of federal lands throughout the state (Table 5.1.7-3 and Figure 5.1.7-2).[106] There may be other federal lands, but they are not shown on the map due to their small size relative to the entire state.

Table 5.1.7-3: Federal Land in Idaho

Agency	Square Miles	Representative Type
Department of Energy	888	National Laboratory
Department of Defense	373	Military Bases, Range
USFWS	134	National Wildlife Refuges
USFS	31,835	National Forests and Wilderness
NPS[a]	205	Park, Reserve, Monuments, Historic Site
Bureau of Reclamation	125	Water and Irrigation Projects, Hydropower Projects, and Dams
Bureau of Land Management	19,312	Wilderness, National Monument, National Conservation Area
Total	**52,872**	**NA**

[a] Additional trails and corridors pass through Idaho that are part of the NPS.

Sources: (USGS, 2012c) (USGS, 2014g)

- The Department of Energy owns and manages 888 square miles consisting of the Idaho National Laboratory (DOE, 2016);
- The Department of Defense owns and manages 373 square miles used for military bases, military facilities, and a range (DoD, 2014);
- The USFWS owns and manages 134 square miles consisting of six National Wildlife Refuges in Idaho (USFWS, 2014c);
- The USFS owns and manages 31,835 square miles set aside as the Bitterroot National Forest, Boise National Forest, Caribou-Targhee National Forest, Clearwater National Forest, Curlew National Grassland, Idaho Panhandle National Forests, Nez Perce National Forest, Payette

[105] Total acreage of private land could not be obtained for the state.

[106] Land ownership data were retrieved from the Protected Areas Database of the United States (PAD-US), produced by USGS (http://gapanalysis.usgs.gov/padus/). This dataset categorizes lands across the U.S. by conservation, land management, planning, recreation, and ownership, as well as other uses. It is an extensive dataset that contains large quantities of information relevant to the Proposed Action. The data was queried to show Owner and used USGS' PAD-US ownership symbolization for consistency. The PADUS 1.3 geodatabase was downloaded in the summer of 2015, and used consistently throughout all these maps for each state and D.C.

National Forest, Salmon-Challis National Forest, and Sawtooth National Forest (USFS, 2016a);

- The NPS manages 205 square miles consisting of Yellowstone National Park, one National Reserve, two National Monuments, and one National Historic Park (NPS, 2014d);
- The Bureau of Reclamation manages 125 square miles consisting of water and irrigation projects, hydropower plants, and dams (Bureau of Reclamation, 2007); and
- The Bureau of Land Management manages 19,312 square miles consisting of forestland, rangeland, Wilderness areas, Craters of the Moon National Monument, and Birds of Prey National Conservation Area (BLM, 2015a). (USGS, 2012c) (USGS, 2014g)

State Land[107]

The Idaho state government owns approximately 4,326 square miles of land comprised of trust lands, wildlife management areas, and state parks. Three state agencies, the IDL, Idaho Fish and Game, and Idaho Parks and Recreation manage the majority of state lands (Table 5.1.7-4). (USGS, 2012c) (USGS, 2014g)

Table 5.1.7-4: State Land in Idaho

Agency	Square Miles [a]	Representative Type
IDL	3,926	Trust lands
Idaho Fish and Game	327	Wildlife Management Areas
Idaho Parks and Recreation	65	State Parks
Other	8	Miscellaneous

[a] Acres are not additive due to overlapping boundaries of the State Forests, State Parks and Recreation Areas, and Wildlife Management Areas.

Sources: (USGS, 2012c) (USGS, 2014g)

- The Idaho Department of Land manages 3,926 square miles set aside as state endowment trust land and public trust lands (IDL, 2015a);
- Idaho Fish and Game manages 327 square miles consisting of 32 Wildlife Management Areas to provide wildlife habitat for hunting, fishing and recreation opportunities (Idaho Fish and Game, 2015e); and
- Idaho Parks and Recreation manages 65 square miles consisting of 27 state parks that provide a variety of recreation facilities and opportunities (Idaho Parks and Recreation, 2015a). (USGS, 2012c) (USGS, 2014g)

[107] State land use data for tables and narrative text were derived from specific state sources and may not correspond directly with USGS data that was used for developing maps and figures.

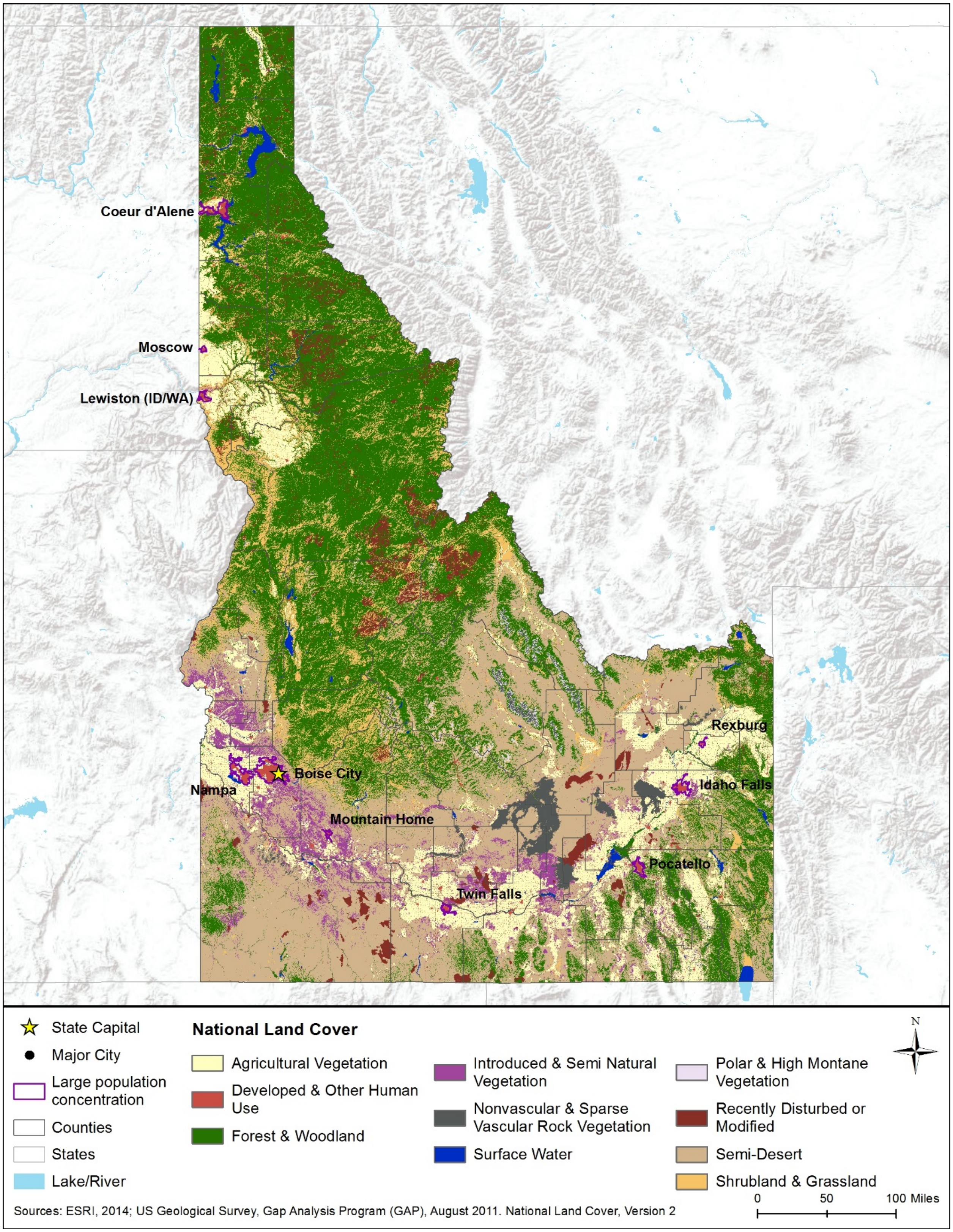


Figure 5.1.7-1: Major Land Use Distribution by Coverage Type

Tribal Land

The Bureau of Indian Affairs, along with individual tribes, manages 2,956 square miles, or 3.5 percent of the total land within Idaho.[108] These lands are composed of five Indian Reservations currently located in the state (Table 5.1.7-5). For additional information regarding tribal land, see Section 5.1.11, Cultural Resources.

Table 5.1.7-5: Indian Reservations of Idaho

Reservation Name	Square Miles
Coeur D'Alene Reservation	611
Duck Valley Reservation	282
Fort Hall Reservation	850
Kootenai Reservation	9
Nez Perce Reservation	1,204
Total	**2,956**

Sources: (USGS, 2012c) (USGS, 2014g)

5.1.7.4 Recreation

Idaho is known for its rugged geography in the Rocky Mountains. The state consists of high, snow-capped peaks, mountain rivers with rapids and waterfalls, and steep canyons; important recreation within the state depend on these geographic features. The state is a destination for alpine skiing and snowboarding, with a number of peaks at heights over 10,000 feet (Idaho Department of Commerce, 2015). The state is also ranked among outdoor magazines for whitewater rafting, often paired with backcountry camping for multi-day trips (Idaho Department of Commerce, 2015). On the community level, towns, cities, and counties provide an assortment of indoor and outdoor recreational facilities, including athletic fields and courts, playgrounds, picnicking areas, and lake, river, or beach access points. Availability of community-level facilities is typically commensurate to the population's needs.

This section discusses recreational opportunities available at various locations throughout Idaho. For information on visual resources, see Section 5.1.8, Visual Resources, and for information on the historical significance of locations, see Section 5.1.11, Cultural Resources.

[108] Although the Bureau of Indian Affairs "manages" American Indian lands, the Bureau of Indian Affairs is different than other land management agencies as the lands are held in trust and are sovereign nations.

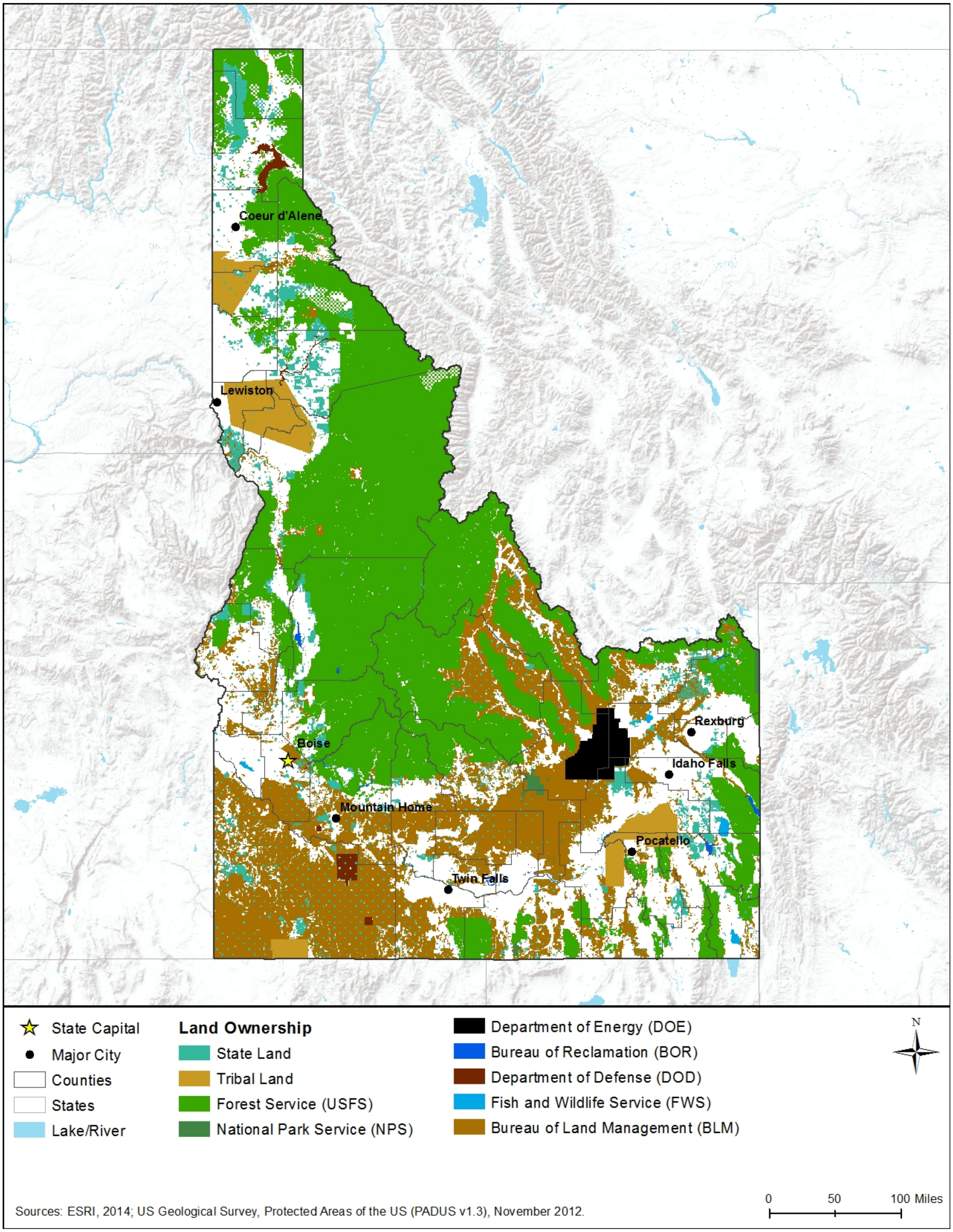


Figure 5.1.7-2: Major Land Ownership Distribution

Northern Region

The Northern Region consists of the state's northern panhandle, bordered by Washington to the west, Canada to the north, and Montana to the east (see Figure 5.1.7-3).[109] The Bitterroot Mountain Range of the Rocky Mountains are the defining feature of the region, with the Kootenai, St. Joe, and Clearwater Rivers cutting across the region. (StateParks.com, 2015)

The Idaho Panhandle National Forest is known for the Pulaski Tunnel Trail, which passes through areas of historic significance associated with the 1910 wildfires, the Emerald Creek Garnet Area, and the Route of the Hiawatha Rail-Trail. In addition, the Idaho Panhandle contains five recreation areas, where amenities for water-based activities, winter sports, and locations available for hunting and fishing are located. Recreational activities within the forests include hiking, bicycling, horseback riding, and other trail use; camping, fossil collecting, rock-hounding, and picnicking; fishing, boating, rafting, swimming, tubing, and other water activities; ice skating, downhill skiing and snowboarding, snowmobiling, cross-country skiing, and other winter sports; and licensed, seasonal big game, small game, and game bird hunting. (USFS, 2015c) (Idaho Parks and Recreation, 2016)

The Nez Perce-Clearwater National Forests contain three rivers popular for floating and rafting: the Selway, the Lochsa, and the Salmon. The forest organizes recreation through nine corridors: activities include hiking, bicycling, horseback riding, and other trail use; camping and picnicking; fishing, boating, rafting, swimming, tubing, and other water activities; ice skating, downhill skiing and snowboarding, snowmobiling, cross-country skiing, and other winter sports; and licensed, seasonal big game hunting. (USFS, 2015d)

Western Region

The Western Region is located south of the panhandle, bordered to the west by Oregon and to the south by Nevada and Utah (see Figure 5.1.7-3). Mountain ranges in the region include the Seven Devils, Owyhee Mountains, Sawtooth Range, and Salmon River Mountains; rivers within the region include the Snake River, the Salmon River, and the Boise River. The City of Rocks National Reserve is visited by rock climbers and backcountry hikers; other activities at the reserve include hiking, horseback riding, mountain biking, camping, and seasonal, licensed hunting (NPS, 2015a).

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[109] Recreational area data was retrieved from the Protected Areas Database of the United States (PAD-US), produced by USGS (http://gapanalysis.usgs.gov/padus/). This dataset categorizes lands across the U.S. by conservation, land management, planning, recreation, and ownership, as well as other uses. It is an extensive dataset that contains large quantities of information relevant to the Proposed Action. The data was queried to show the Primary Designation Type of area. To show these in the map, recognizable symbols (e.g., varying shades of green for National Parks and Forests) were used as PAD-US does not have a standard symbolization for recreational resources. The PADUS 1.3 geodatabase was downloaded in the summer of 2015, and used consistently throughout all these maps for each state and D.C.

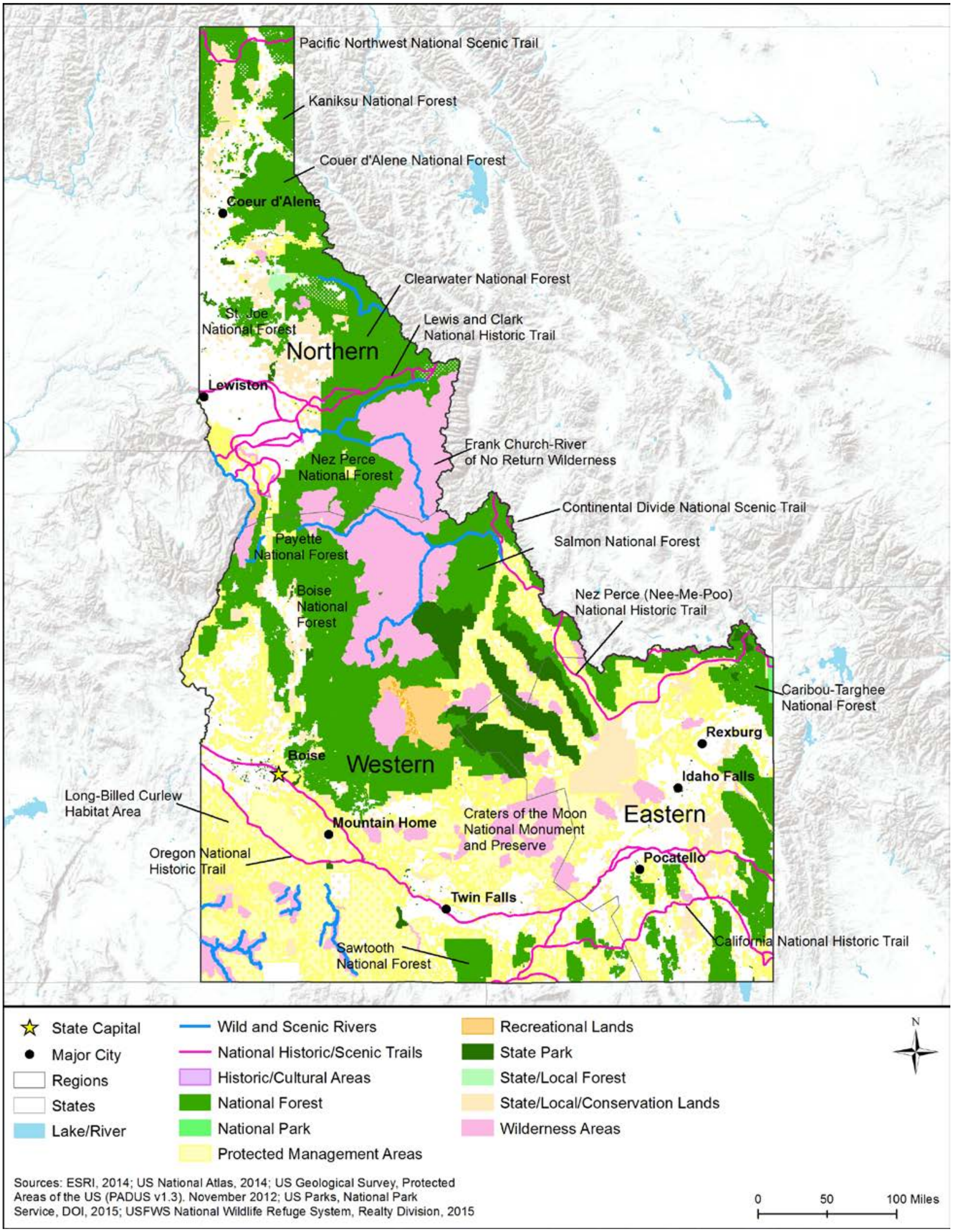


Figure 5.1.7-3: Idaho Recreation Resources

Idaho's Western Region contains four national forests, each unique with its own set of special areas. The Payette National Forest is popular for extreme winter sports; the Salmon-Challis National Forest contains areas including the Frank Church – River of No Return Wilderness Area and the Wild and Scenic River Salmon River; the Boise National Forest contains the North Fork Payette River Canyon and the 10,000-foot peak of Trinity Mountain; and the Sawtooth National Forest, a working forest, is known for its seven Research Natural Areas. Activities within the forest include hiking, bicycling, horseback riding, and other trail use; camping and picnicking; fishing, boating, rafting, swimming, tubing, and other water activities; downhill skiing and snowboarding, snowmobiling, cross-country skiing, and other winter sports; and licensed, seasonal big game, small game, and game bird hunting. (USFS, 2015e) (USFS, 2015f) (USFS, 2015g) (USFS, 2015h) (Idaho Parks and Recreation, 2016)

Eastern Region

The Eastern Region lies to the south of Montana, with Wyoming to the east and Utah to the south (see Figure 5.1.7-3). The Bitterroot Mountains continue from the northwest, the Snake River Plain makes up the center of the region, and the Caribou Range is found in the southeast part of the region. The region includes the Craters of the Moon National Monument and Preserve, and ocean of lava flows in an otherworldly landscape. Hiking and caving is available in both the lava tube caves and in the wilderness, camping, and cross-country skiing and snowshoeing (NPS, 2015o).

Part of Yellowstone National Park extends into Idaho, including the Island Park, Henry's Fork, and the Big Springs National Recreation Water Trail: hiking, fishing, and canoeing are popular activities in these areas (Recreation.gov, 2015). The park abuts the Caribou-Targhee National Forest overlooks the Teton Range, is known for waterfalls, and is a popular location for tubing, white water rafting, and windsurfing. Other activities within the forest include hiking, bicycling, horseback riding, spelunking, and other trail use; camping, mineral prospecting, and picnicking; sand beaches, fishing, boating, swimming, and other water activities; skijoring, downhill skiing and snowboarding, snowmobiling, cross-country skiing, and other winter sports; and licensed, seasonal big game, small game, and game bird hunting. (USFS, 2015i) (Idaho Parks and Recreation, 2016)

5.1.7.5 Airspace

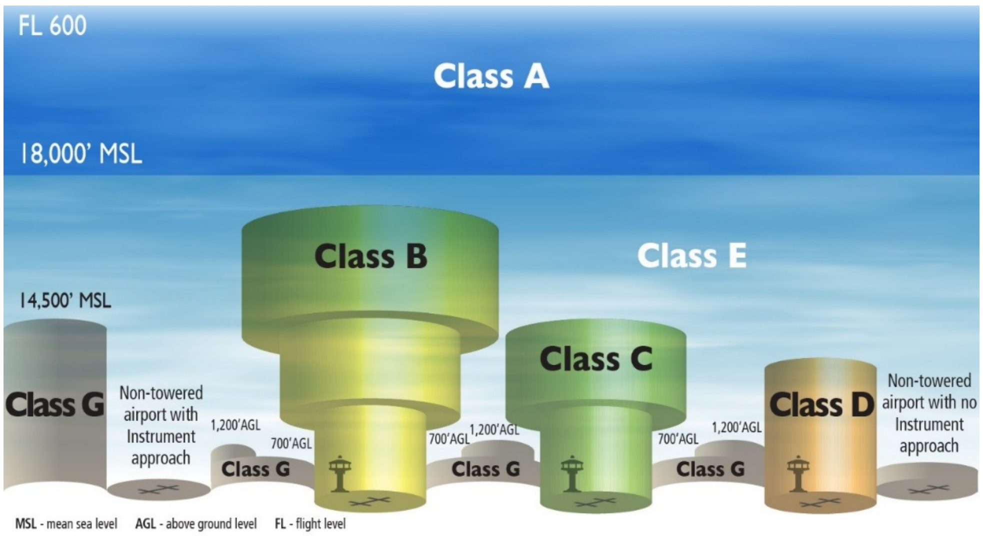
The FAA uses the NAS to provide for aviation safety. The NAS includes Special Use Airspace (SUA) consisting of Restricted Areas, Warning Areas, and Military Operation Areas (MOAs). The FAA controls the use of the NAS with various procedures and practices (such as established flight rules and regulations, airspace management actions, and air traffic control procedures) to ensure the safety of aircraft and protection of the public.

Airspace Categories

There are two categories of airspace or airspace areas:

1) **Regulatory airspace** consists of controlled airspace (Class A, B, C, D, and E airspace areas in descending order of restrictive operating rules), and restricted and prohibited areas.
2) **Non-regulatory airspace** consists of MOAs, warning areas, alert areas, and controlled firing areas.

Within each of these two categories, there are four types of airspace: controlled, uncontrolled, special use, and other airspace. The categories and types of airspace are dictated by the complexity or density of aircraft movements, the nature of the operations conducted within the airspace, the level of safety required, and the national and public interest. Figure 5.1.7-4 depicts the different classifications and dimensions for controlled airspace. Air Traffic Control (ATC)[110] service is based on the airspace classification (FAA, 2008).



Source: Derived from (FAA, 2008)

Figure 5.1.7-4: National Air Space Classification Profile

Controlled Airspace

- **Class A:** Airspace from 18,000 feet to 60,000 feet Mean Sea Level (MSL)[111]. Includes the airspace over waters off the U.S. coastlines (48 contiguous states and Alaska) within 12 Nautical Miles (NM). All operations must be conducted under Instrument Flight Rules (IFR).[112]
- **Class B:** Airspace from the surface up to 10,000 feet MSL near the busiest airports with heavy traffic operations. The airspace is tailored to the specific airport in several layers. An ATC clearance is required for all aircraft to operate in this area.
- **Class C:** Airspace from the surface to 4,000 feet above the airport elevation surrounding the airport. Applies to airports with an operational control tower, serviced by a radar approach

[110] ATC – Approved authority service to provide safe, orderly and expeditious flow of air traffic operations (FAA, 2015d).
[111] MSL – The average level of for the surface of the ocean; "The height of the surface of the sea midway between the average high and low tides." (Merriam Webster Dictionary, 2015b)
[112] IFR – Rules for the conduct of flights under instrument meteorological conditions (FAA, 2015i).

control, and certain number of IFR operations or total number of passengers boarding aircrafts. Airspace is tailored in layers, but usually extends out to 10 NM from 1,200 feet to 4,000 feet above the airport elevation. Entering Class C airspace requires radio contact with the controlling ATC authority, and an ATC clearance is ultimately required for landing.

- **Class D:** Airspace from the surface to 2,500 feet above the airport elevation surrounding airports with an operational control tower. Airspace area is tailored. Aircraft entering the airspace must establish and maintain radio contact with the controlling ATC.
- **Class E:** Controlled airspace not designated as Class A, B, C, or D. Class E airspace extends upward from the surface or a designated altitude to the overlying or adjacent controlled airspace (FAA, 2008).

Uncontrolled Airspace

Class G: No specific definition. Refers generally to airspace not designated as Class A, B, C, D, or E. Class G airspace is from the surface to the base of Class E airspace.

Special Use Airspace

SUA designates specific airspace that confines or imposes limitations on aircraft activities (See Table 5.1.7-6).

Table 5.1.7-6: SUA Designations

SUA Type	Definition
Prohibited Areas	"Airspace of defined dimensions identified by an area on the surface of the earth within which the flight of aircraft is prohibited. Such areas are established for security or other reasons associated with the national welfare. These areas are published in the Federal Register and are depicted on aeronautical charts."
Restricted Areas	"Airspace identified by an area on the surface of the earth within which the flight of aircraft, while not wholly prohibited, is subject to restrictions. Activities within these areas must be confined because of their nature or limitations imposed upon aircraft operations that are not a part of those activities or both. Restricted areas denote the existence of unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. Penetration of restricted areas without authorization from the using or controlling agency may be extremely hazardous to the aircraft and its occupants. Restricted areas are published in the Federal Register and constitute 14 CFR Part 73."
Warning Areas	"Airspace of defined dimensions, extending from three NM from the U.S. coast, which contains activity that may be hazardous to nonparticipating aircraft. The purpose of such warning areas is to warn non-participating pilots of the potential danger. A warning area may be located over domestic or international waters or both."
MOAs	"Airspace of defined vertical and lateral limits established for separating certain military activities (e.g., air combat maneuvers, air intercepts, testing, etc.) from IFR traffic. Whenever an MOA is in use, non-participating IFR traffic may be cleared through a MOA if IFR separation can be provided by ATC. Otherwise, ATC will reroute or restrict nonparticipating IFR traffic."
Alert Areas	"Depicted on aeronautical charts to inform non-participating pilots of areas that may contain a high volume of pilot training or an unusual type of aerial activity. Pilots should be particularly alert when flying in these areas. All activity within an alert area must be conducted in accordance with CFRs, without waiver, and pilots of participating aircraft and pilots transiting the area are responsible for collision avoidance."

SUA Type	Definition
Controlled Firing Areas (CFAs)	"Activities that, if not conducted in a controlled environment, could be hazardous to nonparticipating aircraft. The distinguishing feature of the CFA, as compared to other special use airspace, is that its activities are suspended immediately when spotter aircraft, radar, or ground lookout positions indicate an aircraft might be approaching the area. There is no need to chart CFAs since they do not cause a nonparticipating aircraft to change its flight path."
National Security Areas (NSA)	"Airspace of defined vertical and lateral dimensions established at locations where there is a requirement for increased security and safety of ground facilities. Pilots are requested to voluntarily avoid flying through the depicted NSA. When it is necessary to provide a greater level of security and safety, flight in NSAs may be temporarily prohibited by regulation under the provisions of 14 CFR Section 99.7. Regulatory prohibitions are issued by System Operations, System Operations Airspace and Aeronautical Information Manual (AIM) Office, Airspace and Rules, and disseminated via Notices to Airmen (NOTAM). Inquiries about NSAs should be directed to Airspace and Rules."

Sources: (FAA, 2015d) (FAA, 2008)

Other Airspace Areas

Other airspace areas, explained in Table 5.1.7-7, include Airport Advisory, Military Training Routes (MTRs), Temporary Flight Restrictions (TFRs), Parachute Jump Aircraft Operations, published Visual Flight Rules (VFR) and IFRs, and Terminal Radar Service Areas.

Table 5.1.7-7: Other Airspace Designations

Type	Definition
Airport Advisory	There are three types: • Local Airport Advisory – Operated within 10 statute miles of an airport where there is a Flight Service Station (FSS) located on an airport, but no operational control tower. The FSS advises the arriving and departing aircraft on particular conditions. • Remote Airport Advisory – Operated within 10 statute miles for specific high activity airports with no operational control tower. • Remote Airport Information Service – Used for short-term special events.
MTRs	MTRs are for use by the military for training, specifically low level combat tactics where low altitudes and high speed are needed.
TFRs	TFRs are established to: • Protect people and property from a hazard; • Provide safety for disaster relief aircraft during operations; • Avoid unsafe aircraft congestion associated with an incident or public interest event; • Protect the U.S. President, Vice President, and other public figures; • Provide safety for space operations; and • Protect in the state of Hawaii declared national disasters for humanitarian reasons. Only those TFRs annotated with an ending date and time of "permanent" are included in this Draft PEIS, since it indicates a longer, standing condition of the airspace. Other TFRs are typically a shorter duration of for a one-time specific event.
Parachute Jump Aircraft Operations	Parachute jump area procedures are in 14 CFR Part 105, while the U.S. parachute jump areas are contained in the regional Airport/Facility Directory.
Published VFRs and IRs	These are established routes for moving around and through complex airspace, like Class B airspace. VFRs are procedures used to conduct flights under visual conditions. IFRs are procedures used to conduct flights with instruments and meteorological conditions.
Terminal Radar Service Areas	Airspace areas that are not one of the established U.S. airspace classes. These areas provide additional radar services to pilots.

Sources: (FAA, 2015d) (FAA, 2008)

Aerial System Considerations

Unmanned Aerial Systems

Unmanned Aerial Systems (UASs) are widely used by the military, private entities, public service, educational institutions, federal/state/local governments, and other agencies. The FAA's Unmanned Aircraft Systems Integration Office integrates UAS into the NAS. The *Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap of 2013* addresses the actions and considerations needed to integrate UAS into the NAS "without reducing existing capacity, decreasing safety, negatively impacting current operators, or increasing the risk to airspace users or persons and property on the ground any more than the integration of comparable new and novel technologies" (FAA, 2013).

UAS at airports is a complex operational challenge with the need to separate UAS flight operations from mainstream air traffic. Separation can be achieved with specific UAS launch windows, special airports, or off-airport locations that allow the UAS to easily launch and recover. Special aviation procedures are applied to UAS flights. There must be the capability of Sense and Avoid (SAA) and Control and Communication (C2) during UAS operations. An Unmanned Aircraft (UA) must be able to see (or sense) other aircraft in the area and avoid the aircraft through corrected flight path changes. General equipment and operational requirements can include aircraft anti-collision lights, an altitude encoding transponder, cameras, sensors, and collision avoidance maneuvers. The C2 of the UA occurs with the pilot/operator, the UAS control station, and ATC. Research efforts, a component of the FAA's UAS roadmap, continue to mature the technology for both SAA and C2 capabilities.

Balloons

Moored balloons and unmanned free balloons cannot be operated in a prohibited or restricted area unless approval is obtained from the controlling agency. Balloons also cannot be operated if they pose a hazard to people and their property.

Obstructions to Airspace Considerations

The Airports Division of the FAA is responsible for the evaluation and analysis of proposed construction or alterations on airports. The FAA Air Traffic Office is responsible for determining obstructions to air navigation as a result of construction off airports that may affect the safe and efficient use of navigable airspace and the operation of planned or existing air navigation and communication facilities. Such facilities include air navigation aids, communication equipment, airports, federal airways, instrument approach or departure procedures, and approved off-airway routes. An Obstruction Evaluation and Airport Airspace Analysis (OE/AAA) is required when there is the potential for airport construction/alteration of a facility that may impinge upon the NAS. Per 14 CFR Part 77.9, the FAA is to be notified about construction or alterations when:

- "Any construction or alteration exceeding 200 ft. aboveground level
- Any construction or alteration:

    - within 20,000 ft. of a public use or military airport which exceeds a 100:1 surface from any point on the runway of each airport with its longest runway more than 3,200 ft.
    - within 10,000 ft. of a public use or military airport which exceeds a 50:1 surface from any point on the runway of each airport with its longest runway no more than 3,200 ft.
    - within 5,000 ft. of a public use heliport which exceeds a 25:1 surface
- Any highway, railroad, or other traverse way whose prescribed adjusted height would exceed the above noted standards
- When requested by the FAA
- Any construction or alteration located on a public use airport or heliport regardless of height or location" (FAA, 2015e).

Construction or alternative facilities (such as towers) that are subject to FCC licensing requirements are also required to have an OE/AAA performed by the FAA Airport Division.

Idaho Airspace

Idaho Aeronautics is a division with the ITD. The Aeronautics Division operates and maintains state owned aircraft, as well as providing airport planning and development services, airport inspections, and evaluation of airspace obstructions and compliance. The Division's mission is "to provide the highest quality, most effective, efficient, and safest airport system for all users of aviation services. To this end, the Division of Aeronautics plans and implements essential programs, services and projects to develop, encourage, and foster an exemplary system of airports that meet the current and future requirements of a growing and diverse Idaho aviation community" (ITD, 2015b). There is one FAA FSDO located in Boise, ID (FAA, 2015c).

Idaho airports are classified as those included in the State Aviation System Plan (SASP) and those that are not part of the SASP. The SASP addresses the strategic planning and future development for the state's airport system, as well as addressing key associated with their airports. (National Association of State Aviation Officials (NASAO), 2015) Figure 5.1.7-5 presents the different aviation airports/facilities residing in Idaho, while Figure 5.1.7-6 and Figure 5.1.7-7 presents the breakout by public and private airports/facilities. There are approximately 282 airports/facilities within Idaho as presented in Table 5.1.7-8 and Figure 5.1.7-5 through Figure 5.1.7-7 (FAA, 2016b).

Table 5.1.7-8: Type and Number of Idaho Airports/Facilities

Type of Airport or Facility	Public	Private
Airport	119	109
Heliport	0	51
Seaplane	4	1
Ultralight	0	1
Balloonport	0	1
Gliderport	0	0
Total	**123**	**159**

Source: (FAA, 2016b)

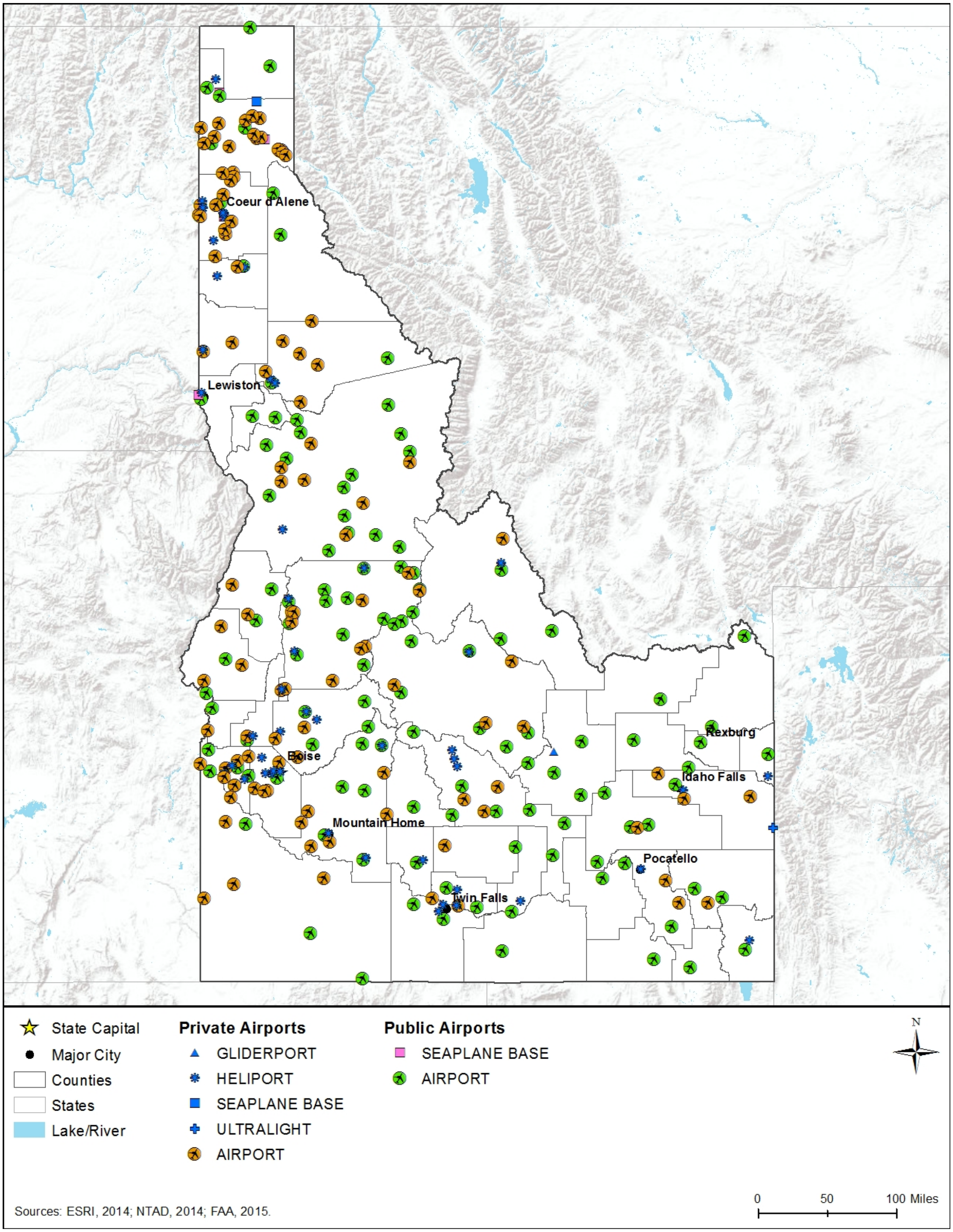


Figure 5.1.7-5: Composite of Idaho Airports/Facilities

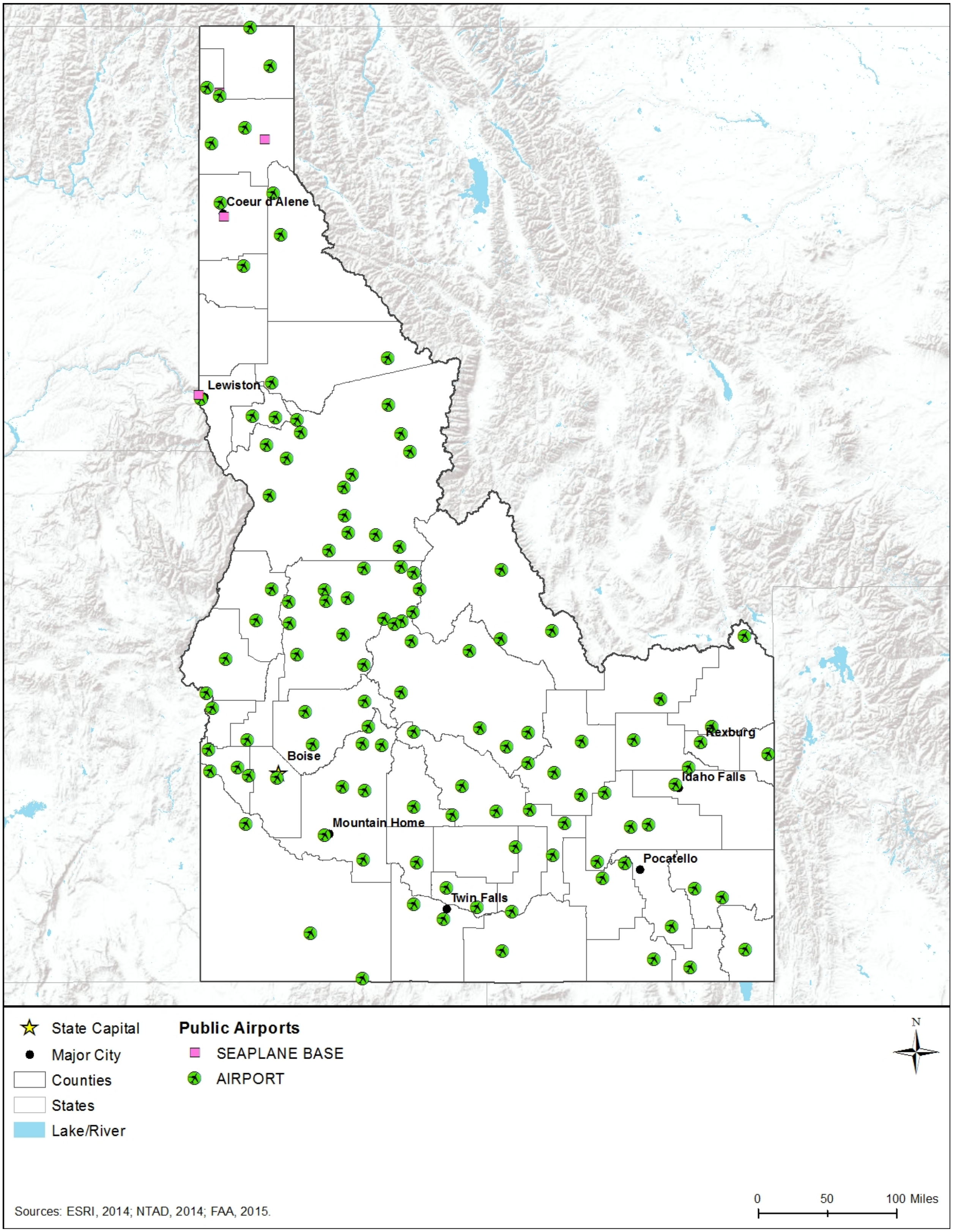


Figure 5.1.7-6: Public Idaho Airports/Facilities

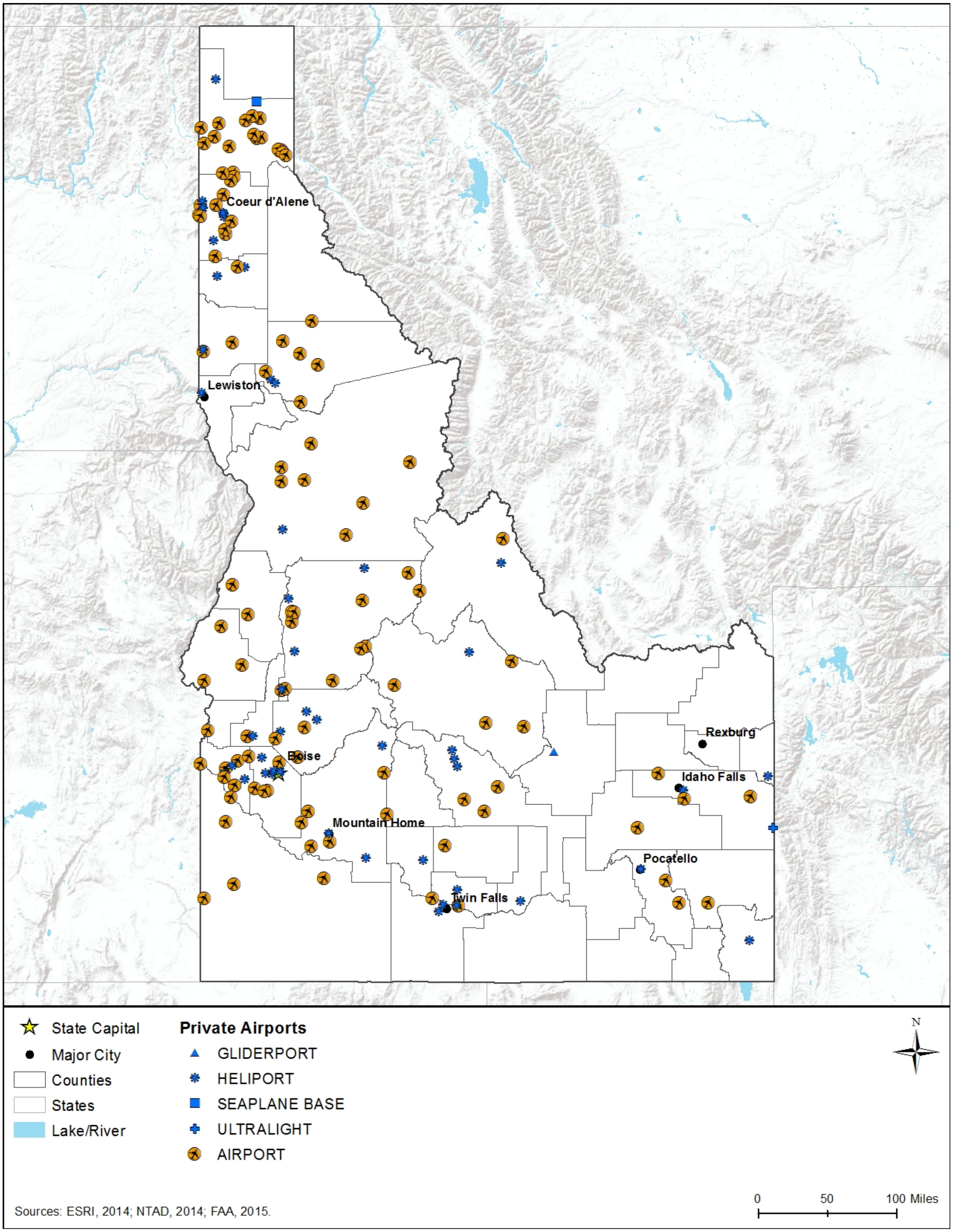


Figure 5.1.7-7: Private Idaho Airports/Facilities

There are Class C and Class D controlled airports in Idaho as follows:

- One Class C –
  - Boise Air Terminal
- Six Class D –
  - Friedman Memorial, Hailey
  - Idaho Falls Regional
  - Lewiston-Nez Perce County, Lewiston
  - Mountain Home Air Force Base
  - Pocatello Regional
  - Twin Falls Joslin Field-Magic Valley Regional, Twin Falls (FAA Airport Safety and Operations, 2004).

SUAs (i.e., nine restricted areas, two MOAs, and one NSA) located in Idaho are as follows:

- Saylor Creek (Restricted)
  - R-3202, High – FL 180 to FL 290
  - R-3202, Low – Surface to, but not including, FL 180
- Boise (Restricted)
  - R-3203A – Surface to 15,000 feet MSL
  - R-3203B – 15,000 feet MSL to and including 22,000 feet MSL
  - R-3203C – Surface to and including 6,000 feet MSL
  - R-3203D – Surface to and including 22,000 feet MSL
- Juniper Buttes (Restricted)
  - R-3204A – Surface to 100 feet AGL
  - R-3204B – 100 feet AGL to, but not including, FL 180
  - R-3204C – FL 180 to FL 290

The two MOAs for Idaho are as follows:

- Jarbridge –
  - North – 100 feet AGL to 17,999 feet MSL
- Owyhee –
  - North – 100 feet AGL to 17,999 feet MSL (FAA, 2015f).

The MOA of Paradise North in Oregon, associated with the Commander, 366th Fighter Wing of Mountain Home Air Force Base, extends into the lower western corner of the state. Altitude restrictions for the Paradise North MOA are 3,000 feet AGL or 10,000 feet MSL whichever is higher to 17,999 feet MSL. The Roosevelt A MOA in Washington state, associated with the Commander Officer, Naval Air Station Whidbey Island, Oak Harbor, extends into the upper western corner of the state. Altitude restrictions for the Roosevelt A MOA are 9,000 feet MLS to, but not including, FL 180. (FAA, 2015f)

The SUAs for Idaho are presented in Figure 5.1.7-8. There are no TFRs (see Figure 5.1.7-8) (FAA, 2015h). There is a National Security Area (NSA 0008 Sector A and B – Surface to 6,000 feet MSL)[113] located around Idaho Falls (See Figure 5.1.7-8) (FAA, 2015f). The restrictions associated with this NSA, when active, may impact the airspace in the area. MTRs in Idaho, presented in Figure 5.1.7-9, consist of six Visual Routes and eight Instrument Routes.

UAS Considerations

The National Park Service (NPS) signed a policy memorandum on June 20, 2014 that "directs superintendents nationwide to prohibit launching, landing, or operating unmanned aircraft on lands or waters administered by the National Park Service" (NPS, 2014f). There are 10 NPS units in Idaho that must comply with this agency directive. (NPS, 2015c).

Obstructions to Airspace Considerations

Several references in the Idaho Code of Laws address airspace hazards. Idaho Statutes Title 21, Chapter 5, Airport Zoning Act 21-501 defines an aviation hazard as "any new or existing structure, object of natural growth, use of land, or modification thereto, which endangers the lives and property of users of an airport, or of occupants of land in its vicinity, and that reduces the size of the area available for landing, taking off and maneuvering of aircraft, or extends up into the airspace between airports to cause disastrous and needless loss of life and property" (Idaho Legislature, 2014c). Aviation hazards contrary to public interest, as defined by Chapter 5, Airport Zoning Action 21-502 in Title 21, states "…if of the obstruction type, in effect reduces the size of the area available for the landing, taking off and maneuvering of aircraft thus tending to destroy or impair the utility of the airport and the public investment therein" (Idaho Legislature, 2014d). Section 21-516 addresses the determination of air hazards based on the neighborhood surrounding the structures, land features, uses of the structure and property, and the type of flying operations conducted in the area (Idaho Legislature, 2014a).

[113] National Security Area (NSA) consists of defined vertical and lateral dimensions in the airspace where there is increased security of ground facilities. Pilots are expected to voluntarily avoid flying through the NSA. Additional security levels may result in further restrictions of the NSA, which FAA Headquarters would issue and disseminate with a NOTAM. (FHWA, 2014b)

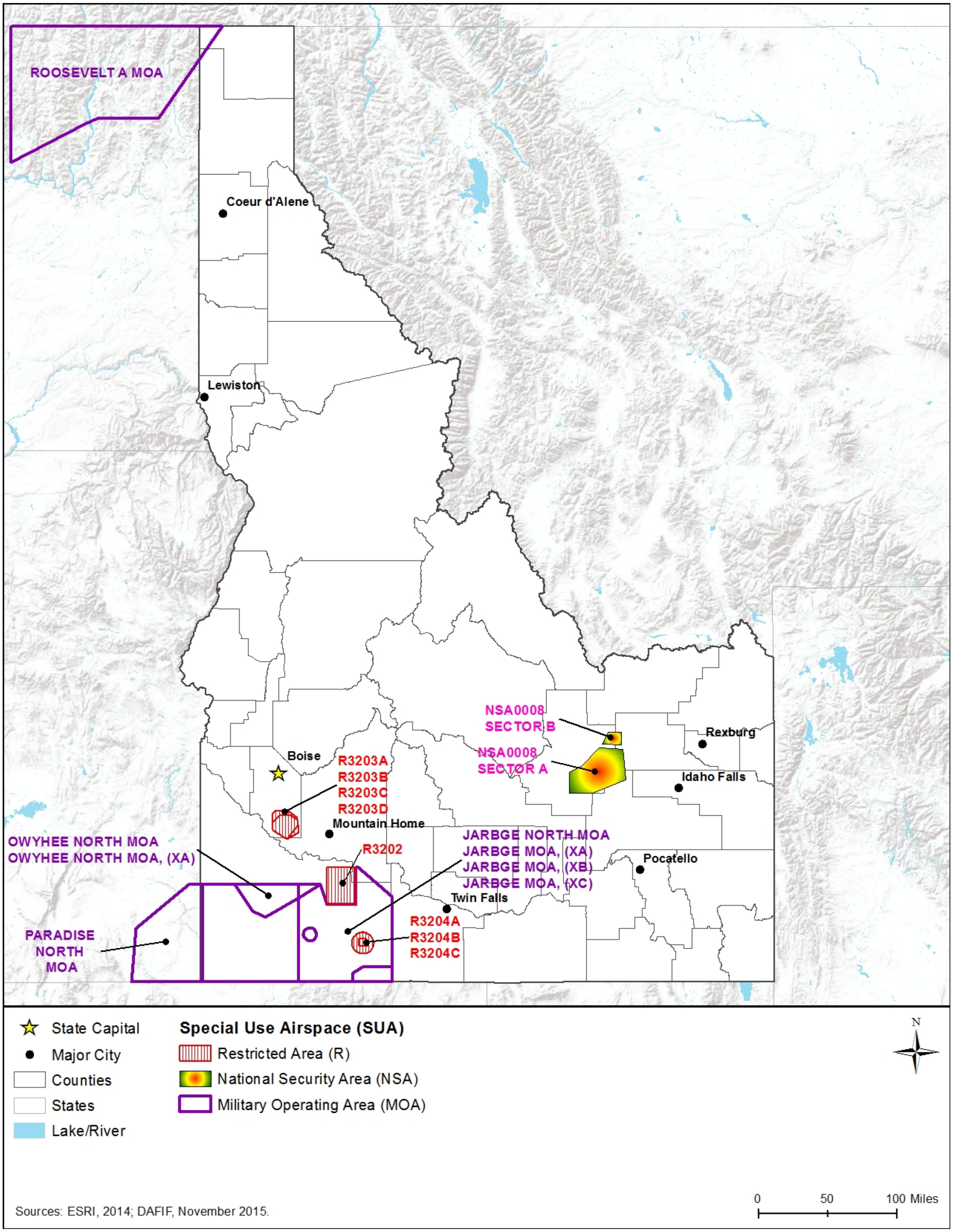


Figure 5.1.7-8: SUAs in Idaho

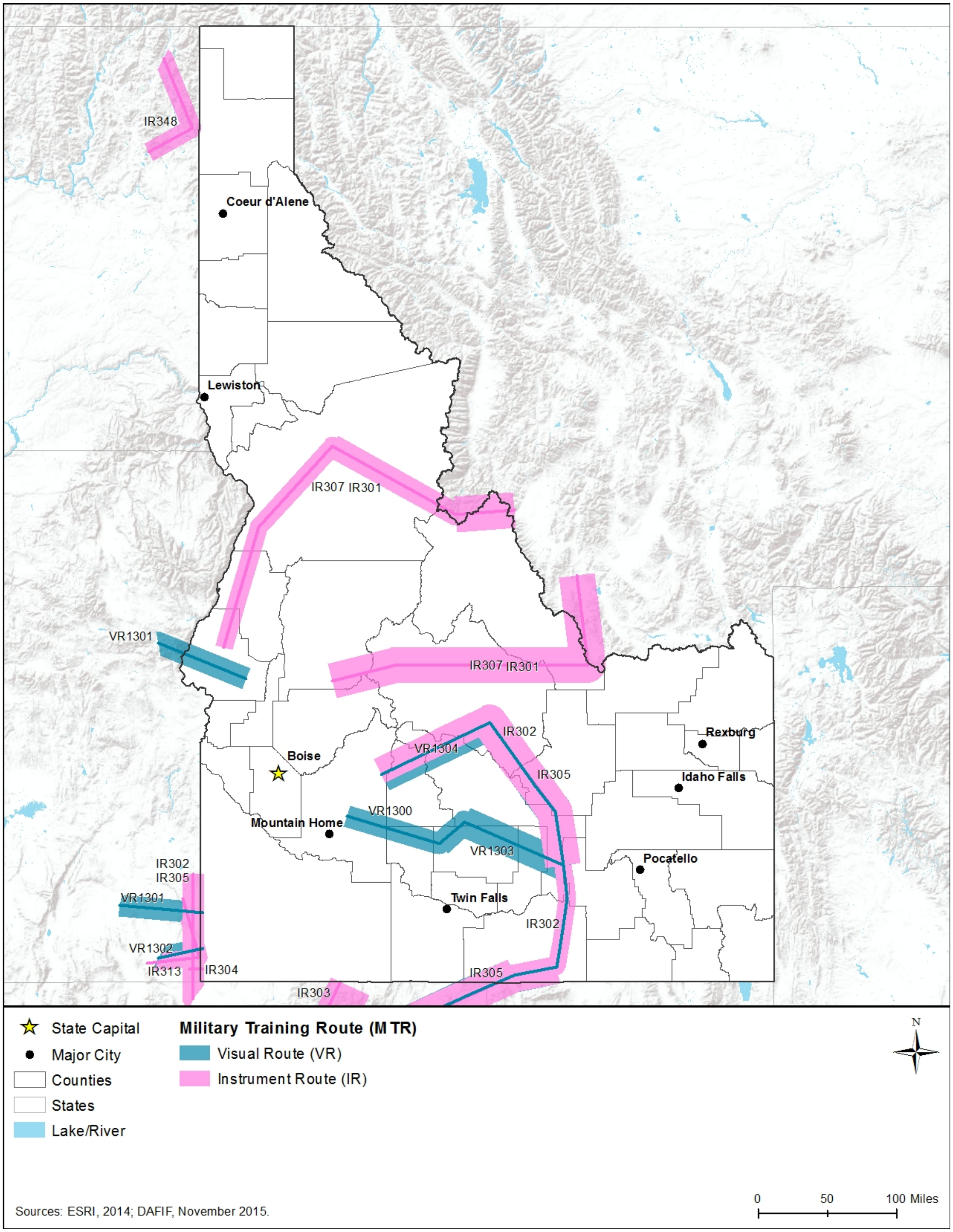


Figure 5.1.7-9: MTRs in Idaho

5.1.8 Visual Resources

5.1.8.1 Definition of the Resource

Visual resources influence the human experience of a landscape. Various aspects combine to create visual resources, such as color, contrast, texture, line, and form. Features such as mountain ranges, city skylines, unique geological formations, rivers and constructed landmarks such as bridges, memorials, cultural resources, or statues are considered visual resources. For some, cityscapes are valued visual resources; for others, views of natural areas are valued visual resources. While many aspects of visual resources are subjective, evaluating potential impacts on the character and continuity of the landscape is a consideration when evaluating proposed actions for NEPA and National Historic Preservation Act (NHPA) compliance. The federal government does not have a single definition of what constitutes a visual resource; therefore, this PEIS will use the general definition of visual resources used by the BLM, "the visible physical features on a landscape (e.g., land, water, vegetation, animals, structures, and other features)" (BLM, 1984).

5.1.8.2 Specific Regulatory Considerations

Table 5.1.8-1 presents state and local laws and regulations regarding scenic and visual resources for Idaho.

Table 5.1.8-1: Relevant Idaho Visual Resources Laws and Regulations

State Law/Regulation	Regulatory Agency	Applicability
IS: Title 42, Chapters 15, 17, 38, Water Resources	Division of Water Resources	When issuing permits for water flow…"is necessary for the preservation of fish and wildlife habitat, aquatic life, recreation, aesthetic beauty, navigation, transportation, or water quality of the stream."
IS: Title 55, Chapter 29, Emergency Communications Preservation	Various Agencies	"Any rule or ordinance of a local unit of government involving the placement, screening, or height of antennas and towers based on health, safety or aesthetic considerations must be crafted to reasonably accommodate amateur radio communications and to represent the minimum practicable regulation to accomplish a legitimate purpose of the local unit of government."
IS: Title 36, Chapter 23, Wildlife Violator Compact	Division of Fish and Game	"The preservation, protection, management and restoration of wildlife contributes immeasurably to the aesthetic, recreational and economic aspects of these natural resources"
IS: Title 61, Chapter 17, Siting of Transmission Facilities	Idaho Public Utilities Commission	Application for transmission facilities "by a tribe, the state or federal government including, but not limited to, monuments, wilderness areas, wildlife refuges, scenic waterways and similar areas."

In addition to the state laws and regulations, local zoning laws may apply related to visual resources. Viewsheds and scenic vistas are increasingly important to the state's towns and cities as they look at the future planning of their municipalities.

5.1.8.3 Character and Visual Quality of the Existing Landscape

Idaho has a wide range of visual resources. Forested areas are the most prevalent visual resource within the state. Visual resources within forested areas are generally comprised of continuous, natural looking cover with gradual transitions of line and color. They are typically characterized by the lack of disturbance or disruption of the landscape. Agricultural lands are the second most dominant landscape in the state. These areas have distinct color changes between croplands and pasturelands, few tall structures, and aesthetic or culturally pleasing structures (e.g., barns). Lakes, rivers, wetlands, and waterfront lands in Idaho vary from vegetated riparian areas (areas located on the bank of a watercourse, or a lake) to wide, open lakeside vistas. The consistency, continuity, and lack of view obstructions from major constructed features characterizes the visual attributes of these areas.

While the state and many municipalities have some regulation of scenic and visual resources, not all scenic areas within the state have been identified or have policy or regulations for management or protection by the state. The areas listed below have some measure of management, significance, or protection through state or federal policy, as well as being identified as a visually significant area.

5.1.8.4 Visually Important Historic Properties and Cultural Resources

Visual and aesthetic qualities of historic properties can contribute to the overall importance of a particular site. Such qualities relate to the integrity of the appearance and setting of these properties or resources. Viewsheds (the natural and manmade environment visible from one or more viewing points) can also contribute to the significance of historic properties or cultural resources. Viewsheds containing historic properties and cultural resources may be considered important because of their presence in the landscape. Figure 5.1.8-1 shows areas that are included in the National Register of Historic Places (NRHP) that may be considered visually sensitive. In Idaho, there are 1,031 NRHP listed sites, which include ten National Historic Landmarks, one National Historical Park, and six State Historic Sites. Some State Historic Sites, State Heritage Areas, and State Historic Districts may also be included in the NRHP, whereas others are not designated at this time. (NPS, 2014h)

The *Secretary of the Interior's Standards for the Treatment of Historic Properties* addresses four aspects: preservation, rehabilitation, restoration, and reconstruction, whereas *The Guidelines for the Treatment of Cultural Landscapes*, both authored by the NPS, provides guidance for applying protections to all aspects of the historic and cultural landscape, such as forests, gardens, trails, structures, ponds, and farming areas, to meet the Standards (NPS, 1995). The Standards "require retention of the greatest amount of historic fabric, including the landscape's historic form, features, and details as they have evolved over time," which directly protects historic properties and the visual resources therein (NPS, 1995).

National Heritage Areas

National Heritage Areas (NHAs) are “places where natural, cultural, and historic resources combine to form a cohesive, nationally important landscape” (NPS, 2011). There are no NHAs in Idaho (NPS, 2012a).

National Historic Landmarks

National Historic Landmarks (NHLs) are defined as “nationally significant historic places designated by the U.S. Secretary of the Interior because they possess exceptional value or quality in illustrating or interpreting the heritage of the United States” (NPS, 2015d). NHLs may include “historic buildings, sites, structures, objects, and districts” (NPS, 2016). The importance of NHL-designated properties can be attributed to scenic or aesthetic qualities, among other attributes that may be considered visual resources or visually sensitive at these sites. There are 11 NHLs in Idaho (NPS, 2015e) (NPS, 2015n):

- Assay Office,
- Bear River Massacre Site,
- Camas Meadows Battle Sites,
- Cataldo Mission,
- City of Rocks,
- Experimental Breeder Reactor No. 1,
- Fort Hall,
- Fort Yellowstone,
- Lemhi Pass,
- Lolo Trail, and
- Weippe Prairie.

By comparison, there are over 2,500 NHLs in the United States (NPS 2015b). Figure 5.1.8-1 provides a representative sample of some historic and cultural resources that may be visually sensitive.

State Heritage Sites

State heritage sites are likely to contain scenic or aesthetic components that may be considered visual resources or visually sensitive. There are six designated state heritage sites within the state (Idaho State Historical Society, 2016):

- Historic Franklin Properties,
- Pierce Courthouse,
- Rock Creek Station and Stricker Homesite,
- Old U.S. Assay Office,
- Bureau of Reclamation Building, and
- Table Rock.

State heritage sites contain many of the same visual attributes and resources as national historic sites and landmarks for additional information regarding these properties and resources, see Section 5.1.11, Cultural Resources.

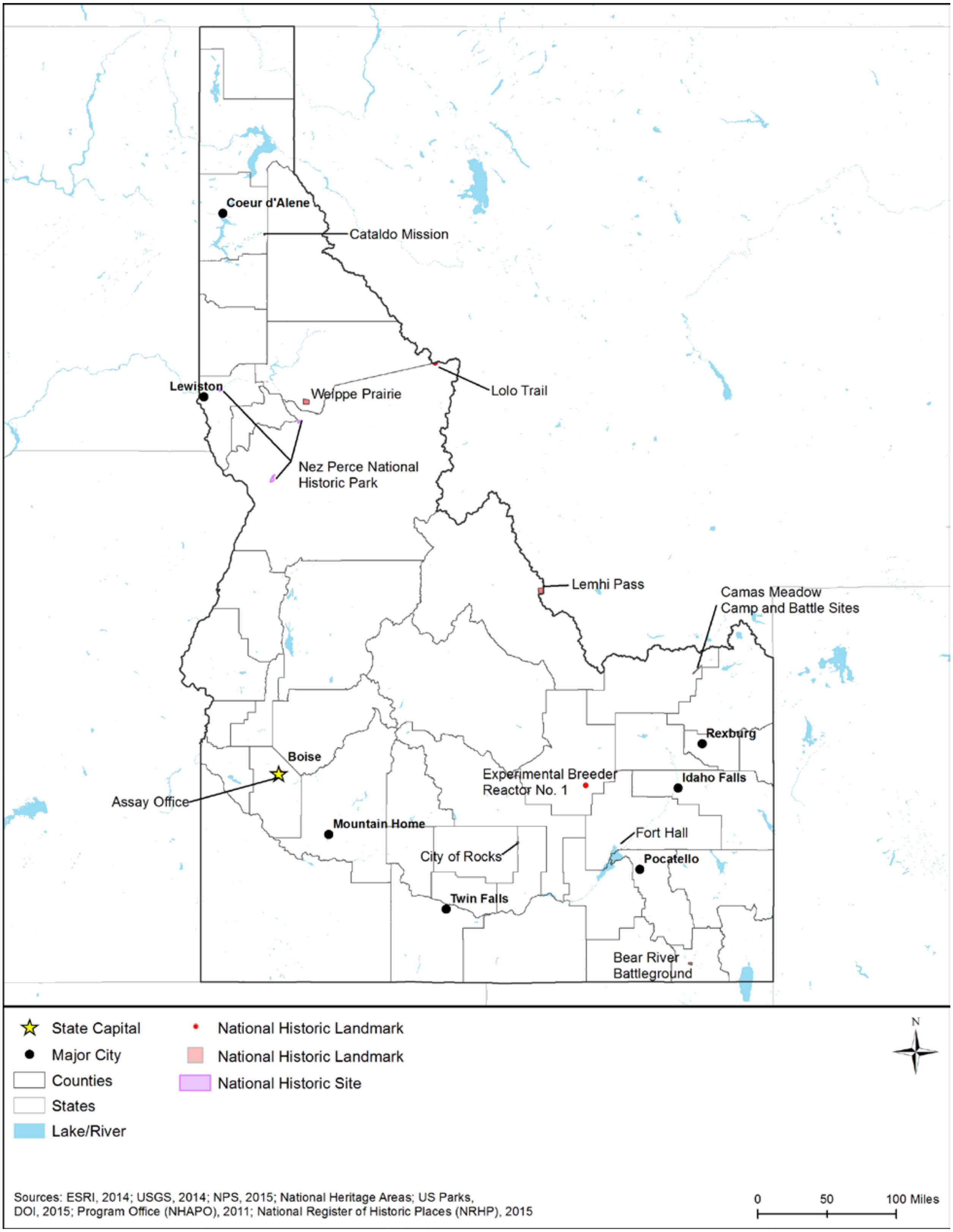


Figure 5.1.8-1: Representative Sample of Some Historic and Cultural Resources that May be Visually Sensitive

5.1.8.5 Parks and Recreation Areas

Parks and recreation areas include state parks, National Recreation Areas, National Forests, and National and State Trails. Parks and recreation areas often contain scenic resources and tend to be visited partly because of their associated visual or aesthetic qualities. Figure 5.1.7-3 in Section 5.1.7, Land Use, Recreation, and Airspace identifies parks and recreational resources that may be visually sensitive in Idaho. Figure 5.1.8-2 displays natural areas that may be visually sensitive, including park and recreation areas.[114]

State Parks

State parks contain natural, historic, cultural, and/or recreational resources of significance to Idaho residents and visitors. There are 27 state parks throughout Idaho (Table 5.1.8-2 and Figure 5.1.8-2), most of which contain scenic or aesthetic areas considered to be visual resources or visually sensitive (Idaho Parks and Recreation, 2015b). Examples of visual resources within state parks include scenic rivers, valleys, mountains, forested areas, wildlife, cliffs, and rocky outcroppings.

Table 5.1.8-2: Idaho State Parks

Ashton-Tetonia Trail	Coeur d’ Alene Parkway	Harriman
Bear Lake	Coeur d’ Alene’s Old Mission	Hells Gate
Bruneau Dunes	Dworshak	Henrys Lake
Castle Rocks	Eagle Island	Heyburn
City Of Rocks	Farragut	Lake Cascade
Lake Walcott	Ponderosa	Massacre Rocks
Land of Yankee Fork	Priest Lake	McCroskey
Lucky Peak	Round Lake	Three Island Crossing
Trail of the Coeur d’ Alene’s	Thousand Springs	Winchester Lake

Source: (Idaho Parks and Recreation, 2015b)

[114] The natural areas data were retrieved from the Protected Areas Database of the United States (PAD-US), produced by USGS (http://gapanalysis.usgs.gov/padus/). This dataset categorizes lands across the U.S. by conservation, land management, planning, recreation, and ownership, as well as other uses. It is an extensive dataset that contains large quantities of information relevant to the Proposed Action. The data was queried and further combined by the Primary Designation Type into classifications that fit the multiple types of land applicable for Natural Areas. For this map, recognizable symbols (e.g., varying shades of green for National Parks and Forests) were used as PAD-US does not have a standard symbolization for natural areas. The PADUS 1.3 geodatabase was downloaded in the summer of 2015, and used consistently throughout all these maps for each state and D.C.

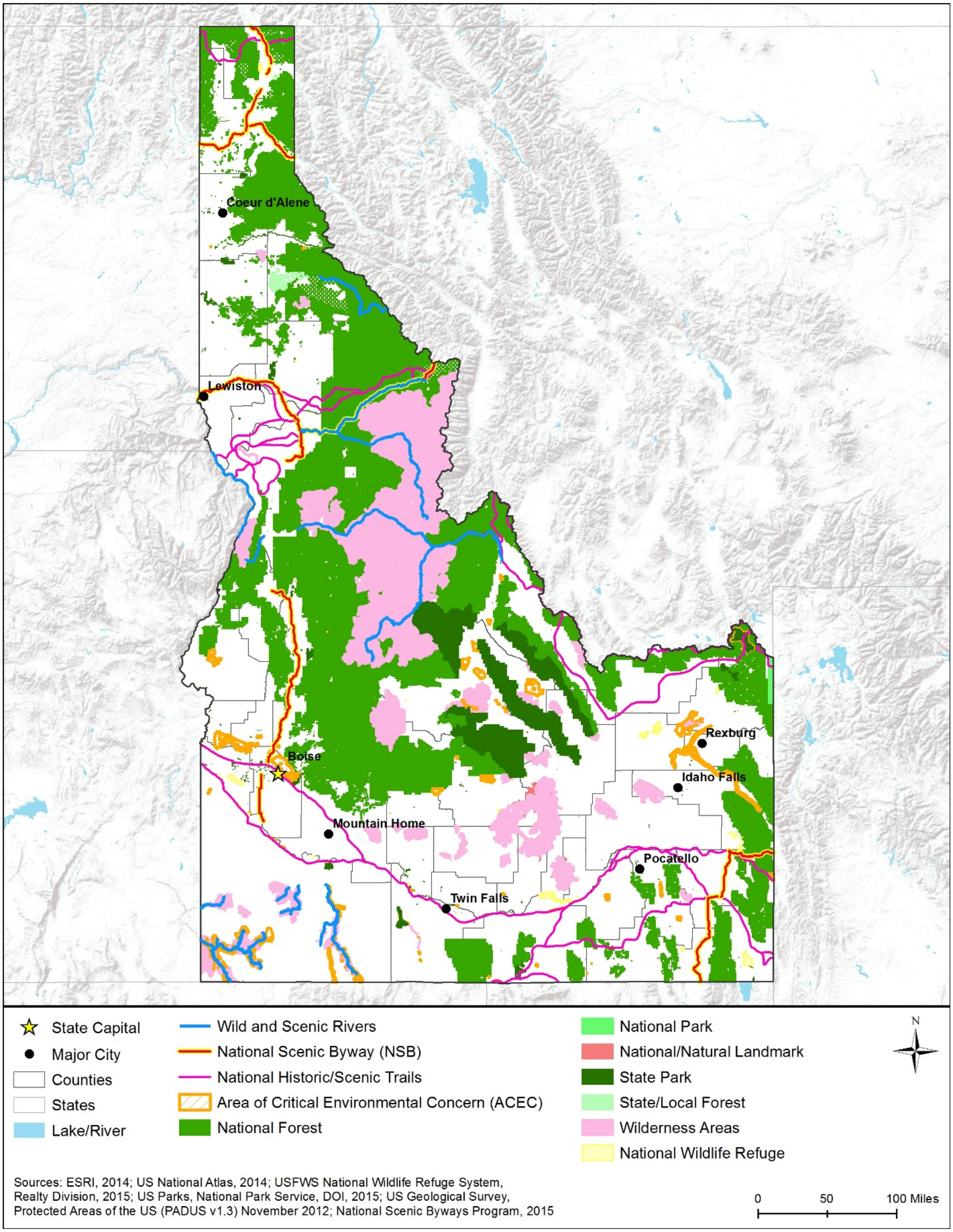


Figure 5.1.8-2: Natural Areas that May be Visually Sensitive in Idaho

National Park Service

National Parks are managed by the National Park Service (NPS) and contain natural, historic, cultural, visual, ecological, and recreational resources of significance to the nation and are maintained for the public's use. In Idaho, there are 10[115] officially designated National Parks and other NPS affiliated areas, such as National Heritage Areas; there are 3 National Historic Trails, 1 National Reserve, 2 National Monuments, 1 National Geologic Trail, 1 National Historic Site, 1 National Historical Park, and 1 National Park (NPS, 2014h) (see Figure 5.1.8-1 and Figure 5.1.8-2). Table 5.1.8-3 identifies the National Parks and affiliated areas located in Idaho. For additional information regarding parks and recreation areas, see Section 5.1.7, Land Use, Recreation, and Airspace.

Figure 5.1.8-3: Sawtooth National Forest

Source: (NPS, 2015f)

Table 5.1.8-3: Idaho National Parks and Affiliated Areas

Area Name	
California National Historic Trail	Ice Age Floods National Geologic Trail
City of Rocks National Reserve	Craters of the Moon National Monument and Preserve
Hagerman Fossil Beds National Monument	Minidoka National Historic Site
Nez Perce National Historical Park	Yellowstone National Park
Lewis and Clark National Historic Trail	Oregon National Historic Trail

Source: (NPS, 2015g)

115 This count is based on the NPS website "by the numbers" current as of 9/30/2014 (NPS, 2015m). Actual lists of parks and NPS affiliated areas may vary here depending on when areas are designated by Congress.

U.S. Forest Service

National Forests contain natural, historic, cultural, visual, ecological, and recreational resources of significance to the nation. Owned by the U.S. government, these areas are maintained for multiple uses (USFS, 2016b). In Idaho, there are nine National Forests, two National Recreation Areas, and one National Grassland (Table 5.1.8-4).

Table 5.1.8-4: USFS Areas

Boise National Forest	Nez Perce National Forest
Caribou-Targhee National Forest	Payette National Forest
Clearwater National Forest	Salmon-Challis National Forest
Curlew National Grassland	Sawtooth National Forest
Idaho Panhandle National Forests: Coeur d'Alene, Kaniksu, and St. Joe National Forests	

Source: (USFS, 2015j)

National Scenic Trails

Designated under Section 5 of the National Trails System Act (16 U.S.C. 1241-1251, as amended), National Scenic Trails (NSTs) are defined as extended trails that "provide for maximum outdoor recreation potential and for the conservation and enjoyment of the nationally significant scenic, historic, natural, or cultural qualities of the areas though which they pass" (NPS, 2012b). There are two National Scenic Trails within or along the border of Idaho: the Pacific Northwest NST and the Continental Divide NST (CDNST), both administered by the NPS. The Pacific Northwest Trail begins near the Continental Divide in Glacier National Park and travels more than 1,200 miles through Montana, Idaho, and Washington before reaching its western terminus at the Pacific Ocean near Cape Alava. "The Pacific Northwest Trail is a unique pathway that travels through some of the most spectacular and scenic terrain in the United States and connects people and communities of the Pacific Northwest." (USDA, 2015b) The route for the CDNST crosses 25 National Forests, 3 National Parks, and 4 BLM Districts, as well as various private lands in the states of Montana, Idaho, Wyoming, Colorado, and New Mexico. The total distance from the Canada-United States border on the north and the United States-Mexico border on the south is approximately 3,100 miles.

The National Trails System Act authorized the designation of National Recreational Trails near urban areas (American Trails 2015). There are over 1,100 National Recreation Trails across the nation administered by the USFS, USACE, USFWS, local or state governments, and non-profit organizations (National Recreation Trails, 2015).

5.1.8.6 Natural Areas

National Wilderness Areas

In 1964, Congress enacted the Wilderness Act of 1964 as "an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." A designation as a National Wilderness Area is the highest level of conservation protection given by Congress to federal lands. This Act defined wilderness as land untouched by man and primarily affected only by the "forces of nature" and as that which "may also contain ecological, geological, or other features of scientific, education, scenic, or historical value." Over 106 million acres of federal public lands have been designated as wilderness areas. Twenty-five percent of these federal lands are in 47 national parks (44 million acres) and part of National Park System. These designated wilderness areas are managed by the USFS, Bureau of Land Management, USFWS, and NPS. (NPS, 2015h).

Idaho is home to 15 federally managed Wilderness Areas:

- Big Jacks Creek Wilderness,
- Bruneau-Jarbidge Rivers Wilderness,
- Craters of the Moon National Wilderness Area,
- Frank Church-River of No Return Wilderness,
- Gospel-Hump Wilderness,
- Hells Canyon Wilderness,
- Hemingway-Boulders Wilderness,
- Jim McClure-Jerry Peak Wilderness,
- Little Jacks Creek Wilderness,
- North Fork Owyhee Wilderness,
- Owyhee River Wilderness,
- Pole Creek Wilderness,
- Sawtooth Wilderness,
- Selway-Bitterroot Wilderness, and
- White Clouds Wilderness (Figure 5.1.8-2) (NPS, 2015h).

State Forest Preserves

As discussed in section 5.1.7.3, Land Use and Ownership, the IDL manages the Floodwood State Forest in the northern portion of the state. (IDL, 2012)

Rivers Designated as National or State Wild, Scenic or Recreational

National Wild, Scenic, or Recreational Rivers are those rivers designated by Congress or the Secretary of the Interior in accordance with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. 1271-1287). These rivers have outstanding natural, cultural, and recreational values, including potential visual resources. Idaho has approximately 107,651 miles of river, of which 891 miles are designated as wild & scenic (Figure 5.1.8-2) (National Wild and Scenic Rivers System, 2015).

Figure 5.1.8-4: Bruneau River Wild and Scenic River

Source: (National Wild and Scenic Rivers System, 2015)

National Wildlife Refuges (NWR) and State Wildlife Management Areas (WMA)

NWRs are a network of lands and waters managed by the USFWS. These lands and waters are "set aside for the conservation, management and, where appropriate, restoration of fish, wildlife, and plant resources and their habitats" (USFWS, 2015u). Idaho has seven NWRs managed by the USFWS, including:

- Kootenai NWR,
- Camas NWR,
- Deer Flat NWR,
- Minidoka NWR,
- Grays Lake NWR,
- Oxford Slough NWR, and
- Bear Lake NWR. (USFWS, 2013c)

Visual resources within the NWRs include views and sites of lakes, rivers, wildlife, and naturally vegetated areas.

State Wildlife Management Areas (WMA)

State WMAs are lands owned by Idaho and managed by Idaho Fish and Game. These areas include 327 square miles consisting of 32 Wildlife Management Areas. WMAs provide wildlife habitat for hunting, fishing, and recreation opportunities (Idaho Fish and Game, 2015e). For additional information on wildlife refuges and management areas, see Section 5.1.6.4., Terrestrial Wildlife.

National Natural Landmarks

National Natural Landmarks (NNL) are sites designated by the U.S. Secretary of the Interior that "contain outstanding biological and/or geological resources, regardless of land ownership, and are selected for their outstanding condition, illustrative value, rarity, diversity, and value to science and education" (NPS, 2014e). These landmarks may be considered visual resources or visually sensitive. In Idaho, 11 NNLs exist entirely or partially within the state (Table 5.1.8-5). Some of the natural features located within these areas include the "largest area of volcanic rocks of young age (Quaternary) in the U.S., the best example of bornhardts in the country, and the world's richest deposits of Upper Pliocene age terrestrial fossils" (NPS, 2012c). One example, Crater Rings NNL, contains wide scenic vistas of volcanic craters (Figure 5.1.8-5).

Figure 5.1.8-5: Crater Rings NNL

Source: (NPS, 2012d)

Table 5.1.8-5: Idaho National Natural Landmarks

NNL Name	
Big Southern Butte	Big Springs
Cassia Silent City of Rocks	Crater Rings
Great Rift System	Hagerman Fauna Sites
Hell's Half Acre Lava Field	Hobo Cedar Grove Botanical Area
Niagara Springs	North Menan Butte
Sheep Rock	

Source: (NPS, 2012e)

5.1.8.7 Additional Areas

State and National Scenic Byways

National Scenic Byways are resources designated specifically for scenic or aesthetic areas or qualities which would be considered visual resources or visually sensitive. Idaho has six designated National Scenic Byways (See Figure 5.1.7-3 in Section 5.1.7, Land Use, Recreation, and Airspace):

- International Selkirk Loop,
- Northwest Passage Scenic Byway,
- Payette River Scenic Byway,
- Pend Oreille Scenic Byway,
- Pioneer Historic Byway, and
- Western Heritage Historic Byway.

The National Scenic Byways Program is managed by the U.S. Department of Transportation, FHWA. Similar to National Scenic Byways, Idaho Scenic Byways are transportation corridors that are of particular statewide interest. There are 25 State Scenic Byways (Section 5.1.1.3, Road Networks). (ITD, 2009)

5.1.9 Socioeconomics

5.1.9.1 Definition of the Resource

NEPA requires consideration of socioeconomics; specifically, Section 102(A) of NEPA requires federal agencies to "insure the integrated use of the natural and social sciences…in planning and in decision making" (42 U.S.C. § 4332(A)). Socioeconomics refers to a broad, social science-based approach to understanding a region's social and economic conditions. It typically includes population, demographic descriptors, economic activity indicators, housing characteristics, property values, and public revenues and expenditures (BLM, 2005). When applicable, it includes qualitative factors such as community cohesion. Socioeconomics provides important context for analysis of FirstNet projects, and in addition, FirstNet projects may affect the socioeconomic conditions of a region.

The choice of socioeconomic topics and depth of their treatment depends on the relevance of potential topics to the types of federal actions under consideration. FirstNet's mission is to provide public safety broadband and interoperable emergency communications coverage throughout the nation. Relevant socioeconomic topics include population density and growth, economic activity, housing, property values, and state and local taxes.

The financial arrangements for deployment and operation of the FirstNet network may have socioeconomic implications. Section 1.1 frames some of the public expenditure and public revenue considerations specific to FirstNet; however, this is not intended to be either descriptive or prescriptive of FirstNet's financial model or anticipated total expenditures and revenues associated with the deployment of the Nationwide Public Safety Broadband Network (NPSBN). This socioeconomics section provides some additional, broad context, including data and discussion of state and local government revenue sources that FirstNet may affect.

Environmental justice is a related topic that specifically addresses the presence of minority populations (defined by race and Hispanic ethnicity) and low-income populations, in order to give special attention to potential impacts on those populations, per Executive Order 12898. This PEIS addresses environmental justice in a separate section (Section 5.1.10). This PEIS also addresses the following topics, sometimes included within socioeconomics, in separate sections: Land Use, Recreation, and Airspace (Section 5.1.7, Land Use, Recreation, and Airspace), infrastructure (Section 5.1.1, Infrastructure), and Visual Resources (Section 5.1.8).

Wherever possible, this section draws on nationwide datasets from federal sources such as the U.S. Census Bureau (Census Bureau)[116] and U.S. Bureau of Labor Statistics (BLS). This ensures

[116] For U.S. Census Bureau sources, a URL (see references section) that begins with "http://factfinder.census.gov" indicates that the American FactFinder (AFF) interactive tool can be used to retrieve the original source data via the following procedure. If

consistency of data and analyses across the states examined in this PEIS. In all cases, this section uses the most recent data available for each geography at the time of writing. At the county, state, region, and national levels, the data is typically for 2013 or 2014. For smaller geographic areas, this section uses data from the Census Bureau's American Community Survey (ACS). The ACS is the Census Bureau's flagship demographic estimates program for years other than the decennial census years. This PEIS uses the 2009-2013 ACS, which is based on surveys (population samples) taken across that five-year period; thus, it is not appropriate to attribute its data values to a specific year. It is a valuable source because it provides the most accurate and consistent socioeconomic data across the nation at the sub-county level (U.S. Census Bureau, 2016).

The remainder of this section addresses the following subjects: regulatory considerations specific to socioeconomics in the state, communities and populations, economic activity, housing, property values, and taxes.

5.1.9.2 Specific Regulatory Considerations

Research for this section did not identify any specific state, local, or tribal laws or regulations that are directly relevant to socioeconomics for this PEIS.

5.1.9.3 Communities and Populations

This section discusses the population and major communities of Idaho (ID) and includes the following topics:

- Recent and projected statewide population growth,
- Current distribution of the population across the state, and
- Identification of the largest population concentrations in the state.

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the reference's URL begins with "http://dataferrett.census.gov," significant socioeconomic expertise is required to navigate this interactive tool to the specific data. However, the data can usually be found using AFF. As of May 24, 2016, the AFF procedure is as follows: 1) Go to http://factfinder.census.gov. 2) Select "Advanced Search," then "Show Me All." 3) Select from "Topics" choices, select "Dataset," then select the dataset indicated in the reference; e.g. "American Community Survey, 2013 1-Year Estimates" or "2012 Census of Governments". Click "Close." Note: ACS is the abbreviation in the AFF for the American Community Survey. SF is the abbreviation used with the 2000 and 2010 "Summary Files." For references to the "2009-2013 5-Year Summary File," choose "2013 ACS 5-year estimates" in the AFF. 4) Click the "Geographies" box. Under "Select a geographic type," choose the appropriate type; e.g. "United States – 010 or "State – 040" or "..... County – 050" then select the desired area or areas of interest. Click "Add to Your Selections" then "Close." For Population Concentration data, select "Urban Area – 400" as the geographic type, then select 2010 under "Select a version" and then choose the desired area or areas. Alternatively, do not choose a version, and select "All Urban Areas within United States." Regional values cannot be viewed in the AFF because the regions for this PEIS do not match Census Bureau regions. All regional values were developed by downloading state data and using the most mathematically appropriate calculations (e.g., sums of state values, weighted averages, etc.) for the specific data. 5) In "Refine your search results," type the table number indicated in the reference; e.g. "DP04" or "LGF001." The dialogue box should auto-populate with the name of the table(s) to allow the user to select the table number/name. Click "Go." 6) In the resulting window, click the desired table under "Table, File, or Document Title" to view the results. If multiple geographies were selected, it is often easiest to view the data by clicking the "Download" button above the on-screen data table. Choose the desired comma-delimited format or presentation-ready format (includes a Microsoft Excel option). In some cases, the structure of the resulting file may be easier to work with under one format or another. Note that in most cases, the on-screen or downloaded data contains additional parameters besides those used in the FirstNet PEIS report table. Readers must locate the FirstNet PEIS-specific data within the Census Bureau tables. Additionally, the data contained in the FirstNet tables may incorporate data from multiple sources and may not be readily available in one table on the Census site.

Statewide Population and Population Growth

Table 5.1.9-1 presents the 2014 population and population density of Idaho in comparison to the West Region[117] and the nation. The estimated population of Idaho in 2014 was 1,634,464 (U.S. Census Bureau, 2015a). The population density was 20 persons per square mile (sq. mi.), which is substantially lower than the population density of both the region (98 persons/sq. mi.) and the nation (90 persons/sq. mi.). In 2014, Idaho was the 39th largest state by population among the 50 states and the District of Columbia, 11th largest by land area, and had the 45th greatest population density (U.S. Census Bureau, 2015e; U.S. Census Bureau, 2015f).

Table 5.1.9-1: Land Area, Population, and Population Density of Idaho

Geography	Land Area (sq. mi.)	Estimated Population 2014	Population Density 2014 (persons/sq. mi.)
Idaho	82,643	1,634,464	20
West Region	624,241	61,039,316	98
United States	3,531,905	318,857,056	90

Sources: (U.S. Census Bureau, 2015e; U.S. Census Bureau, 2015f)

Population growth is an important subject for this PEIS given FirstNet's mission. Table 5.1.9-2 presents the population growth trends of Idaho from 2000 to 2014 in comparison to the West Region and the nation. The state's annual growth rate decreased considerably in the 2010 to 2014 period compared to 2000 to 2010, from 1.94 percent to 1.05 percent. The growth rate of Idaho in the latter period was similar to the growth rate of the region, at 1.08 percent. Both the state and the region showed higher growth rates in both periods compared to the nation's growth rate. (U.S. Census Bureau, 2015g; U.S. Census Bureau, 2015e)

Table 5.1.9-2: Recent Population Growth of Idaho

Geography	Population			Numerical Population Change		Rate of Population Change (AARC)[a]	
	2000	2010	2014 (estimated)	2000 to 2010	2010 to 2014	2000 to 2010	2010 to 2014
Idaho	1,293,953	1,567,582	1,634,464	273,629	66,882	1.94%	1.05%
West Region	51,610,010	58,469,720	61,039,316	6,859,710	2,569,596	1.26%	1.08%
United States	281,421,906	308,745,538	318,857,056	27,323,632	10,111,518	0.93%	0.81%

Sources: (U.S. Census Bureau, 2015g; U.S. Census Bureau, 2015e)

[a] AARC = Average Annual Rate of Change (compound growth rate)

Demographers prepare future population projections using various population growth modeling methodologies. For this nationwide PEIS, it is important to use population projections that apply the same methodology across the nation. It is also useful to consider projections that use different methodologies, since no methodology is a perfect predictor of the future. The Census

[117] The West Region is comprised of the states of Arizona, California, Idaho, Nevada, Oregon, and Washington. Throughout the socioeconomics section, figures for the West Region represent the sum of the values for all states in the region, or an average for the region based on summing the component parameters. For instance, the population density of the West Region is the sum of the populations of all its states, divided by the sum of the land areas of all its states.

Bureau does not prepare population projections for the states. Therefore, Table 5.1.9-3 presents projections of the 2030 population from two sources that are national in scope and use different methodologies: the University of Virginia's Weldon Cooper Center for Public Service and ProximityOne, a private sector demographic and economic data and analysis service. The table provides figures for numerical change, percentage change, and annual growth rate based on averaging the projections from the two sources. The average projection indicates Idaho's population will increase by approximately 300,000 people, or 18.3 percent, from 2014 to 2030. This reflects an average annual projected growth rate of 1.06 percent, which is very similar to the historical growth rate from 2010 to 2014 of 1.05 percent. The projected annual growth rate of the state is similar to that of the region (1.03 percent) and greater than the projected growth rate of the nation (0.80 percent). (U.S. Census Bureau, 2015e; ProximityOne, 2015; UVA Weldon Cooper Center, 2015)

Table 5.1.9-3: Projected Population Growth of Idaho

Geography	Population 2014 (estimated)	Projected 2030 Population			Change Based on Average Projection		
		UVA Weldon Cooper Center Projection	Proximity One Projection	Average Projection	Numerical Change 2014 to 2030	Percent Change 2014 to 2030	Rate of Change (AARC)[a] 2014 to 2030
Idaho	1,634,464	1,969,343	1,898,594	1,933,969	299,505	18.3%	1.06%
West Region	61,039,316	73,661,854	70,107,981	71,884,918	10,845,602	17.8%	1.03%
United States	318,857,056	360,978,449	363,686,916	362,332,683	43,475,627	13.6%	0.80%

Sources: (U.S. Census Bureau, 2015e; ProximityOne, 2015; UVA Weldon Cooper Center, 2015)

[a] AARC = Average Annual Rate of Change (compound growth rate)

Population Distribution and Communities

Figure 5.1.9-1 presents the distribution and relative density of the population of Idaho. Each brown dot represents 500 people, and massing of dots indicates areas of higher population density – therefore, areas that are solid in color are particularly high in population density. The map uses ACS estimates based on samples taken from 2009 to 2013 (U.S. Census Bureau, 2015h).

This map also presents the 10 largest population concentrations in the state, outlined in purple. These population concentrations reflect contiguous, densely developed areas as defined by the Census Bureau based on the 2010 census (U.S. Census Bureau, 2012b; U.S. Census Bureau, 2015r). These population concentrations often include multiple incorporated areas as well as some unincorporated areas.

Other groupings of brown dots on the map represent additional, but smaller, population concentrations. Dispersed dots indicate dispersed population across the less densely settled areas of the state. Figure 5.1.9-1 shows the largest population concentration in the Boise City area, which is consistent with Table 5.1.9-4 below.

Table 5.1.9-4 provides the populations of the 10 largest population concentrations in Idaho, based on the 2010 census. It also shows the changes in population for these areas between the 2000 and 2010 censuses.[118] In 2010, the largest population concentration was the Boise City area, which had 349,684 people. The state had one other population concentration over 100,000 people (the Nampa area). All other population concentrations had fewer than 100,000 people. The smallest of these 10 population concentrations was the Mountain Home area, with a 2010 population of 16,531. The fastest growing area, by average annual rate of change from 2000 to 2010, was the Nampa area, with an annual growth rate of 4.68 percent. This area had a large increase in its area definition that may have taken in some existing populations; thus, the growth rate may reflect this factor as well as organic growth (net in-migration and/or births exceeding deaths). All but one of the 10 areas had growth rates over 1.00 percent. The area with the slowest growth was the Idaho portion of the Lewiston area, with a growth rate of 0.25 percent. (U.S. Census Bureau, 2012b; U.S. Census Bureau, 2015j; U.S. Census Bureau, 2015k)

Table 5.1.9-4 also shows that the top 10 population concentrations in Idaho accounted for 57.9 percent of the state's population in 2010. Further, population growth in the 10 areas from 2000 to 2010 amounted to 78.4 percent of the entire state's growth. These figures indicate that the populations within these 10 areas are growing at a faster rate than the population in the remainder of the state. (U.S. Census Bureau, 2012b; U.S. Census Bureau, 2015j; U.S. Census Bureau, 2015k)

[118] Census Bureau boundaries for these areas are not fixed. Area changes from 2000 to 2010 may include accretion of newly developed areas into the population concentration, Census Bureau classification of a subarea as no longer qualifying as a concentrated population due to population losses, and reclassification by the Census Bureau of a subarea into a different population concentration. Thus, population change from 2000 to 2010 reflects change within the constant area and change as the overall area boundary changes. Differences in boundaries in some cases introduce anomalies in comparing the 2000 and 2010 populations and in calculation of the growth rate presented in the table.

Table 5.1.9-4: Population of the 10 Largest Population Concentrations in Idaho

Area	Population				Population Change 2000 to 2010	
	2000	2010	2009–2013	Rank in 2010	Numerical Change	Rate (AARC)
Boise City	272,625	349,684	358,755	1	77,059	2.52%
Coeur d'Alene	74,800	98,378	98,198	3	23,578	2.78%
Idaho Falls	66,973	90,733	92,010	4	23,760	3.08%
Lewiston	30,946	31,740	32,135	7	794	0.25%
Moscow	21,791	24,212	24,222	9	2,421	1.06%
Mountain Home	13,380	16,531	16,313	10	3,151	2.14%
Nampa*	95,909	151,499	153,784	2	55,590	4.68%
Pocatello	62,498	69,809	70,048	5	7,311	1.11%
Rexburg	19,110	26,852	27,190	8	7,742	3.46%
Twin Falls	35,603	48,836	49,522	6	13,233	3.21%
Total for Top 10 Population Concentrations	**693,635**	**908,274**	**922,177**	**NA**	**214,639**	**2.73%**
Idaho (statewide)	**1,293,953**	**1,567,582**	**1,583,364**	**NA**	**273,629**	**1.94%**
Top 10 Total as Percentage of State	**53.6%**	**57.9%**	**58.2%**	**NA**	**78.4%**	**NA**

Sources: (U.S. Census Bureau, 2012b; U.S. Census Bureau, 2015j; U.S. Census Bureau, 2015k)

AARC = Average Annual Rate of Change (compound growth rate)

*The large population increase from 2000 to 2010 for the Nampa urbanized area reflects a large increase in the area definition, from 46 sq. mi. in 2000 to 69 sq. mi. in 2010.

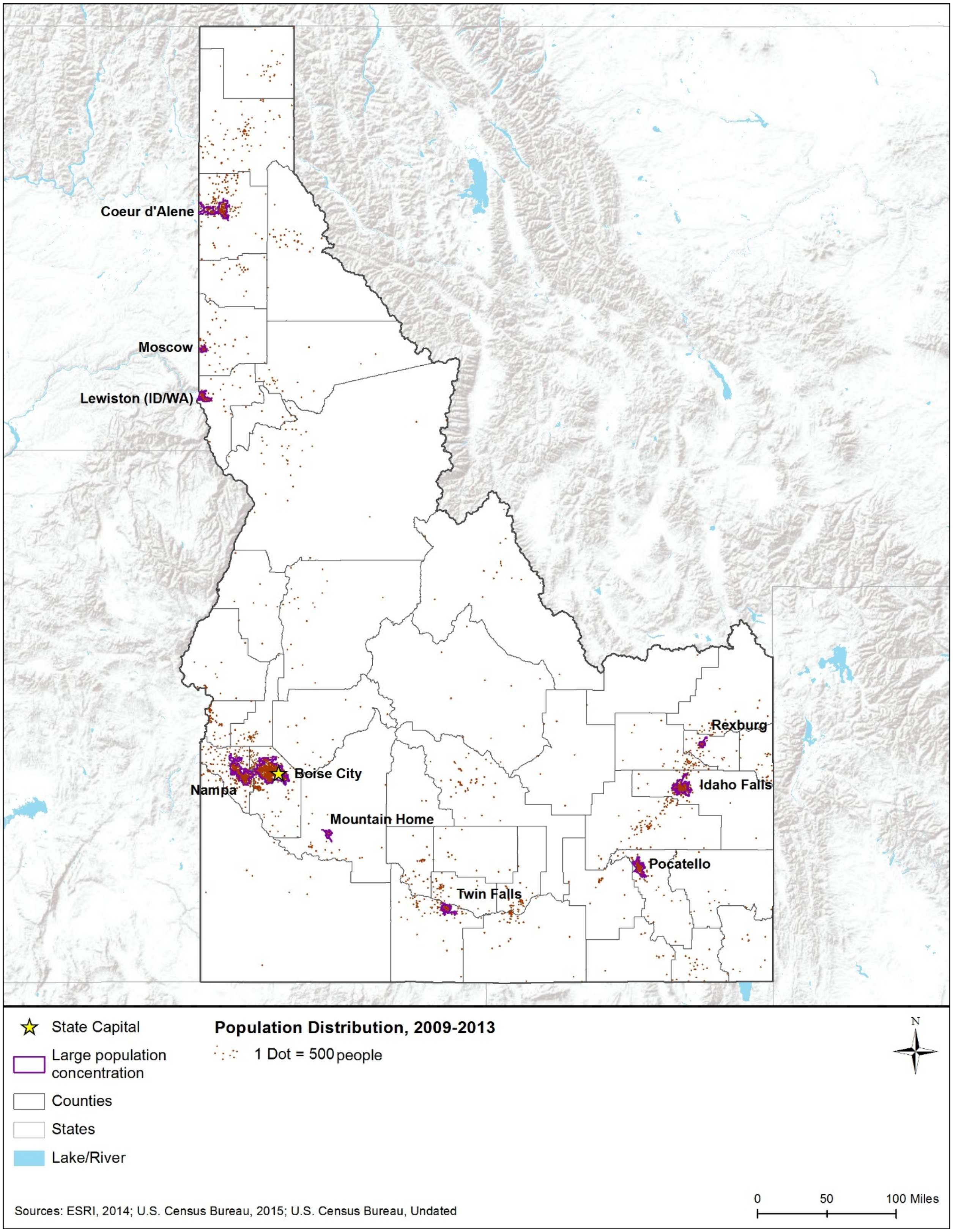


Figure 5.1.9-1: Population Distribution in Idaho, 2009–2013

5.1.9.4 Economic Activity, Housing, Property Values, and Government Revenues

This section addresses other socioeconomic topics that are potentially relevant to FirstNet. These topics include:

- Economic activity,
- Housing,
- Property values, and
- Government revenues.

Social institutions – educational, family, political, public service, military, and religious – are present throughout the state. The institutions most relevant to FirstNet projects are public services such as medical and emergency medical services and facilities. This PEIS addresses public services in Section 5.1.1, Infrastructure. Project-level NEPA analyses may need to examine other institutions, depending on specific locations and specific types of actions.

Economic Activity

Table 5.1.9-5 compares several economic indicators for Idaho to the West Region and the nation. The table presents two indicators of income[119] – per capita and median household – as income is a good measure of general economic health of a region.

Per capita income is total income divided by the total population. As a mathematical average, the very high incomes of a relatively small number of people tend to bias per capita income figures upwards. Nonetheless, per capita income is useful as an indicator of the relative income level across two or more areas. As shown in Table 5.1.9-5, the per capita income in Idaho in 2013 ($22,652) was $6,006 lower than that of the region ($28,658), and $5,532 lower than that of the nation ($28,184) (BLS, 2015b; U.S. Census Bureau, 2015l; U.S. Census Bureau, 2015m; U.S. Census Bureau, 2015n).

Household income is a useful measure, and often used instead of family income, because in modern society there are many single-person households and households composed of non-related individuals. Median household income (MHI) is the income at which half of all households have higher income, and half have lower income. Table 5.1.9-5 shows that in 2013, the MHI in Idaho ($46,621) was $10,450 lower than that of the region ($57,071), and $5,629 lower than that of the nation ($52,250) (BLS, 2015b; U.S. Census Bureau, 2015l; U.S. Census Bureau, 2015m; U.S. Census Bureau, 2015n).

Employment status is a key socioeconomic parameter because employment is essential to the income of a large portion of the adult population. The federal government calculates the

[119] The Census Bureau defines income as follows: "'Total income' is the sum of the amounts reported separately for wage or salary income; net self-employment income; interest, dividends, or net rental or royalty income or income from estates and trusts; Social Security or Railroad Retirement income; Supplemental Security Income (SSI); public assistance or welfare payments; retirement, survivor, or disability pensions; and all other income. Receipts from the following sources are not included as income: capital gains, money received from the sale of property (unless the recipient was engaged in the business of selling such property); the value of income "in kind" from food stamps, public housing subsidies, medical care, employer contributions for individuals, etc.; withdrawal of bank deposits; money borrowed; tax refunds; exchange of money between relatives living in the same household; gifts and lump-sum inheritances, insurance payments, and other types of lump-sum receipts." (USEPA, 2006)

unemployment rate as the number of unemployed individuals who are looking for work divided by the total number of individuals in the labor force. Table 5.1.9-5 compares the unemployment rate in Idaho to the West Region and the nation. In 2014, Idaho's statewide unemployment rate of 4.8 percent was considerably lower than the rates for the region (7.2 percent) and the nation (6.2 percent)[120] (BLS, 2015b; U.S. Census Bureau, 2015l; U.S. Census Bureau, 2015m; U.S. Census Bureau, 2015n).

Table 5.1.9-5: Selected Economic Indicators for Idaho

Geography	Per Capita Income 2013	Median Household Income 2013	Average Annual Unemployment Rate 2014
Idaho	$22,652	$46,621	4.8%
West Region	$28,658	$57,071	7.2%
United States	$28,184	$52,250	6.2%

Sources: (BLS, 2015c; U.S. Census Bureau, 2015o; U.S. Census Bureau, 2015p; U.S. Census Bureau, 2015q)

Figure 5.1.9-2 and Figure 5.1.9-3 show how MHI in 2013 (U.S. Census Bureau, 2015o) and unemployment in 2014 (BLS, 2015c) varied by county across the state. These maps also incorporate the same population concentration data as Figure 5.1.9-1 (U.S. Census Bureau, 2012b; U.S. Census Bureau, 2015r). Following these two maps, Table 5.1.9-6 presents MHI and unemployment for the 10 largest population concentrations in the state. The table reflects survey data taken from 2009 to 2013. Thus, its figures are not directly comparable to those on the maps. Nonetheless, both the maps and the table help portray differences in income and unemployment across Idaho.

Figure 5.1.9-2 shows that only five Idaho counties, located in the southern portion of the state, had a MHI above the national median. The remainder of the state had MHI levels below the national average. Table 5.1.9-6 shows that MHI in the Boise City and Idaho Falls areas was above the state average. MHI in all other population concentrations was below the state average. MHI was lowest in the Rexburg and Moscow areas, which are two of the three smallest areas shown in the table. (U.S. Census Bureau, 2015t)

Figure 5.1.9-3 presents variations in the 2014 unemployment rate across the state, by county. It shows that counties with unemployment rates below the national average (that is, better employment performance) were distributed throughout the southern portion of the state. Five counties in the northern part of the state, mostly along the Washington state border, also had unemployment rates below the national average. All of the counties with large population concentrations had unemployment rates below the national average. Counties in the more sparsely populated central portion of the state had unemployment rates above the national average. When comparing unemployment in the population concentrations to the state average (Table 5.1.9-6), five areas had 2009-2013 unemployment rates that were higher than the state average. In particular, the Nampa and Rexburg areas had unemployment rates that were

[120] The timeframe for unemployment rates can change quarterly.

considerably higher than the state average. The Lewiston area had an unemployment rate that was considerably lower than the state average. (U.S. Census Bureau, 2015t)

Detailed employment data provide useful insights into the nature of a local, state, or national economy. Table 5.1.9-7 provides figures on employment percentages by type of worker and by industry based on surveys conducted in 2013 by the Census Bureau. By class of worker (type of worker: private industry, government, self-employed, etc.), the percentage of private wage and salary workers was somewhat lower in Idaho than in the West Region and the nation. The percentage of government workers was somewhat higher in the state than in the region and nation. Self-employed workers in the state were a similar percentage as the region, and were a somewhat higher percentage than the nation.

By industry, Idaho has a mixed economic base and some notable figures in the table are as follows. Idaho in 2013 had a similar percentage (within two percentage points) of workers in most industries compared to the West Region and nation. It had a considerably higher percentage of persons working in "agriculture, forestry, fishing and hunting, and mining" than did the region or the nation. Idaho had a considerably lower percentage of workers in the "professional, scientific, management, administrative, and waste management services" and the "arts, entertainment, and recreation, and accommodation and food services" industries than the West Region. (U.S. Census Bureau, 2015t)

Table 5.1.9-6: Selected Economic Indicators for the 10 Largest Population Concentrations in Idaho, 2009–2013

Area	Median Household Income	Average Annual Unemployment Rate
Boise City	$54,280	8.5%
Coeur d'Alene	$46,198	9.5%
Idaho Falls	$49,363	6.9%
Lewiston	$45,251	5.4%
Moscow	$33,208	9.2%
Mountain Home	$43,281	9.2%
Nampa	$40,847	12.5%
Pocatello	$41,333	8.5%
Rexburg	$26,307	12.4%
Twin Falls	$42,320	7.7%
Idaho (statewide)	$46,767	8.8%

Source: (U.S. Census Bureau, 2015t)

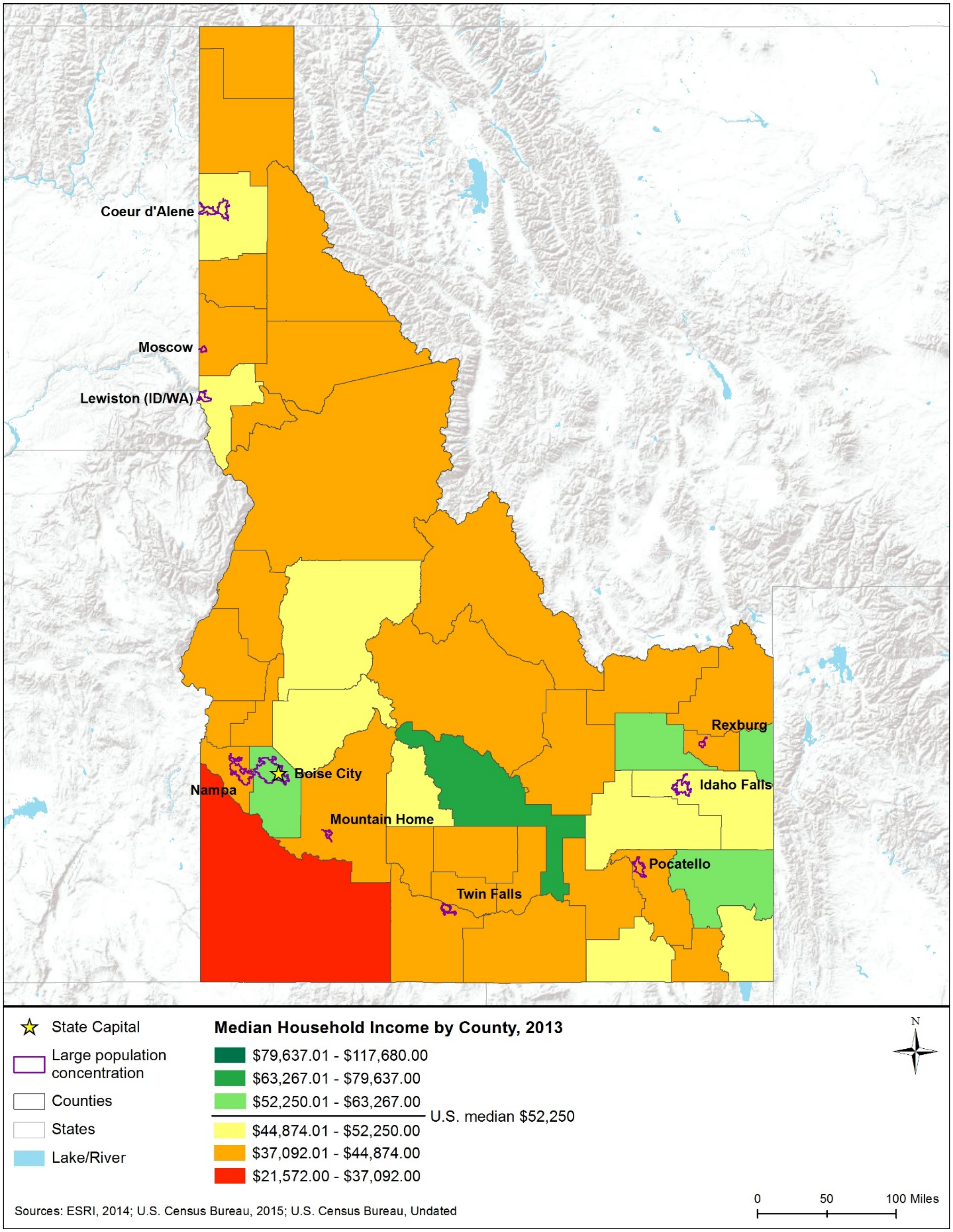


Figure 5.1.9-2: Median Household Income in Idaho, by County, 2013

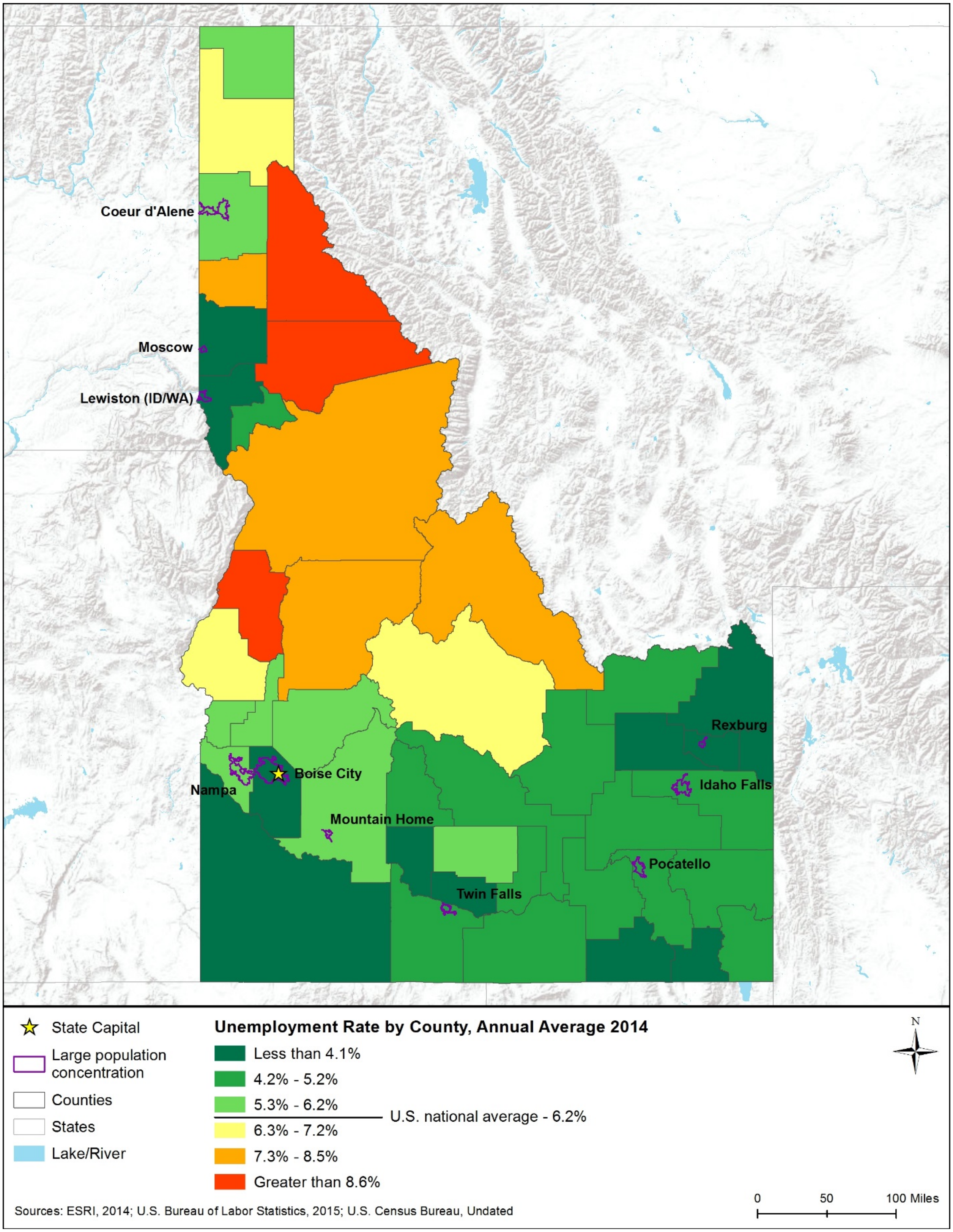


Figure 5.1.9-3: Unemployment Rates in Idaho, by County, 2014

Table 5.1.9-7: Employment by Class of Worker and by Industry, 2013

Class of Worker and Industry	Idaho	West Region	United States
Civilian Employed Population 16 Years and Over	710,293	26,912,315	145,128,676
Percentage by Class of Worker			
Private wage and salary workers	76.5%	78.4%	79.7%
Government workers	15.8%	13.9%	14.1%
Self-employed in own not incorporated business workers	7.4%	7.5%	6.0%
Unpaid family workers	0.3%	0.2%	0.2%
Percentage by Industry			
Agriculture, forestry, fishing and hunting, and mining	5.8%	2.5%	2.0%
Construction	7.3%	6.1%	6.2%
Manufacturing	10.3%	9.5%	10.5%
Wholesale trade	2.7%	2.9%	2.7%
Retail trade	12.3%	11.6%	11.6%
Transportation and warehousing, and utilities	4.5%	4.7%	4.9%
Information	1.7%	2.6%	2.1%
Finance and insurance, and real estate and rental and leasing	5.5%	6.3%	6.6%
Professional, scientific, management, administrative, and waste management services	9.6%	12.3%	11.1%
Educational services, and health care and social assistance	21.8%	20.9%	23.0%
Arts, entertainment, and recreation, and accommodation and food services	8.8%	10.9%	9.7%
Other services, except public administration	4.4%	5.2%	5.0%
Public administration	5.2%	4.6%	4.7%

Source: (U.S. Census Bureau, 2015u)

Table 5.1.9-8 presents employment shares for selected industries for the 10 largest population concentrations in the state. The table reflects survey data taken by the Census Bureau from 2009 to 2013. Thus, its figures for the state are slightly different from those in Table 5.1.9-7 for 2013.

Table 5.1.9-8: Employment by Selected Industries for the 10 Largest Population Concentrations in Idaho, 2009–2013

Area	Construction	Transportation and Warehousing, and Utilities	Information	Professional, Scientific, Management, Administrative and Waste Management Services
Boise City	5.4%	4.1%	2.7%	12.6%
Coeur d’Alene	10.5%	3.2%	1.4%	10.4%
Idaho Falls	6.4%	3.1%	2.8%	13.8%
Lewiston (ID/WA) (ID Portion)	7.0%	3.1%	1.3%	5.4%
Moscow	2.7%	1.1%	0.9%	6.7%
Mountain Home	4.5%	6.2%	1.2%	5.6%

Area	Construction	Transportation and Warehousing, and Utilities	Information	Professional, Scientific, Management, Administrative and Waste Management Services
Nampa	9.2%	4.9%	1.9%	8.4%
Pocatello	5.5%	5.5%	1.7%	8.6%
Rexburg	3.4%	2.2%	1.2%	10.8%
Twin Falls	6.4%	6.2%	1.5%	7.7%
Idaho (statewide)	7.3%	4.6%	1.9%	9.6%

Source: (U.S. Census Bureau, 2015t)

Housing

The housing stock is an important socioeconomic component of communities. The type, availability, and cost of housing in an area reflect economic conditions and affect quality of life. Table 5.1.9-9 compares Idaho to the West Region and nation on several common housing indicators.

As shown in Table 5.1.9-9, in 2013, Idaho had a lower percentage of housing units that were occupied (87.0 percent) than the region (89.9 percent) or nation (87.6 percent). Of the occupied units, Idaho had a considerably higher percentage of owner-occupied units (69.4 percent) than the region (56.8 percent) or nation (63.5 percent). This is reflected in the higher percentage of detached single-unit housing (also known as single-family homes) in Idaho in 2013 (74.0 percent) compared to the region (60.3 percent) and nation (61.5 percent). The homeowner vacancy rate in Idaho (2.0 percent) was higher than the rate for the region (1.6 percent) and was similar to the rate for the nation (1.9 percent). This rate reflects "vacant units that are 'for sale only'" (U.S. Census Bureau, 2015u). The vacancy rate among rental units in Idaho (5.1 percent) matched the rate for the region and was lower than the rate for the nation (6.5 percent) (U.S. Census Bureau, 2015v).

Table 5.1.9-9: Selected Housing Indicators for Idaho, 2013

Geography	Total Housing Units	Housing Occupancy & Tenure				Units in Structure
		Occupied Housing	Owner-Occupied	Homeowner Vacancy Rate	Rental Vacancy Rate	1-Unit, Detached
Idaho	676,192	87.0%	69.4%	2.0%	5.1%	74.0%
West Region	23,159,156	89.9%	56.8%	1.6%	5.1%	60.3%
United States	132,808,137	87.6%	63.5%	1.9%	6.5%	61.5%

Source: (U.S. Census Bureau, 2015v)

Table 5.1.9-10 provides housing indicators for the largest population concentrations in the state by survey data taken from 2009 to 2013. Thus, its figures are not directly comparable to the more recent data in the previous table. However, it does present variation in these indicators for population concentrations across the state and compared to the state average for the 2009 to 2013 period. Table 5.1.9-10 shows that during this period the percentage of occupied housing units exceeded the state average of 86.5 percent in all areas except Mountain Home, ranging between 84.2 percent in the Mountain Home area to 94.2 percent in the Boise City area (U.S. Census Bureau, 2015w).

Table 5.1.9-10: Selected Housing Indicators for the 10 Largest Population Concentrations in Idaho, 2009–2013

Area	Total Housing Units	Housing Occupancy & Tenure				Units in Structure
		Occupied Housing	Owner-Occupied	Homeowner Vacancy Rate	Rental Vacancy Rate	1-Unit, Detached
Boise City	147,585	94.2%	66.8%	2.0%	5.2%	73.0%
Coeur d'Alene	42,940	92.6%	65.5%	1.9%	6.0%	68.8%
Idaho Falls	34,491	91.2%	70.8%	3.1%	9.2%	68.9%
Lewiston (ID/WA) (ID Portion)	14,113	94.0%	67.1%	1.6%	5.0%	67.1%
Moscow	10,188	94.0%	42.7%	2.0%	1.9%	37.1%
Mountain Home	7,391	84.2%	64.8%	2.9%	19.0%	67.5%
Nampa	55,686	91.4%	66.8%	3.7%	7.9%	76.0%
Pocatello	27,933	92.6%	65.1%	1.3%	7.1%	62.9%
Rexburg	8,602	87.5%	36.1%	1.5%	3.9%	33.1%
Twin Falls	19,462	91.0%	61.7%	1.9%	9.7%	70.5%
Idaho (statewide)	670,084	86.5%	69.8%	2.4%	6.6%	73.0%

Source: (U.S. Census Bureau, 2015w)

Property Values

Property values have important relationships to both the wealth and affordability of communities. Table 5.1.9-11 provides indicators of residential property values for Idaho and compares these values to values for the West Region and nation. The figures on median value of owner-occupied units are from the Census Bureau's ACS, based on owner estimates of how much their property (housing unit and land) would sell for if it were for sale (U.S. Census Bureau, 2015u). The table shows that the median value of owner-occupied units in Idaho in 2013 ($159,000) was substantially lower than the corresponding value for the West Region ($301,787) and somewhat lower than that for the nation ($173,900) (U.S. Census Bureau, 2015v).

Table 5.1.9-11: Residential Property Values in Idaho, 2013

Geography	Median Value of Owner-Occupied Units
Idaho	$159,000
West Region	$301,787
United States	$173,900

Source: (U.S. Census Bureau, 2015v)

Table 5.1.9-12 presents residential property values for the largest population concentrations in the state. The table reflects survey data taken from 2009 to 2013. Thus, its figures are not directly comparable to the more recent data in the previous table. However, it does show variation in property values for population concentrations across the state and compared to the state average for the 2009 to 2013 period. The median property values for five of the 10 areas were higher than the state median value ($162,100). The median values for the Moscow ($198,900) and Boise City ($184,000) areas were considerably higher than the state value. Five population concentrations had property values below the state value. The lowest median property value was in the Nampa area ($114,700), which had the third lowest median household income (Table 5.1.9-6). (U.S. Census Bureau, 2015w)

Table 5.1.9-12: Residential Property Values for the 10 Largest Population Concentrations in Idaho, 2009–2013

Area	Median Value of Owner-Occupied Units
Boise City	$184,500
Coeur d’Alene	$176,800
Idaho Falls	$148,800
Lewiston (ID/WA) (ID Portion)	$165,600
Moscow	$198,900
Mountain Home	$131,100
Nampa	$114,700
Pocatello	$138,600
Rexburg	$164,700
Twin Falls	$143,900
Idaho (statewide)	$162,100

Source: (U.S. Census Bureau, 2015w)

Government Revenues

State and local governments obtain revenues from many sources. FirstNet projects may affect flows of revenue sources between different levels of government due to program financing and intergovernmental agreements for system development and operation. Public utility taxes are a subcategory of selective sales taxes that includes taxes on providers of land and mobile telephone, telegraph, cable, and internet services (U.S. Census Bureau, 2006a). These service providers may obtain new taxable revenues from operation of components of the public safety broadband network. These revenue streams are typically highly localized and therefore are best considered in the deployment phase of FirstNet.

Table 5.1.9-13 presents total and selected state and local government revenue sources as reported by the Census Bureau's 2012 Census of Governments. It provides both total dollar figures (in millions of dollars) and figures per capita (in dollars), based on total population for each geography. The per capita figures are particularly useful in comparing the importance of certain revenue sources in the state relative to other states in the region and the nation. State and local governments may obtain some additional revenues related to telecommunications infrastructure.

General and selective sales taxes may change, reflecting expenditures during system development and maintenance. Public utility taxes are a subcategory of selective sales taxes that includes taxes on providers of land and mobile telephone, telegraph, cable, and internet services (U.S. Census Bureau, 2006a).

Table 5.1.9-13 shows that state and local governments in Idaho received less total revenue in 2012 on a per capita basis than their counterpart governments in the region and nation. The Idaho state government had per capita levels of intergovernmental revenues[121] from the federal government that were considerably higher than counterparts in the region, but lower than counterparts in the nation. Idaho local governments had lower levels of per capita intergovernmental revenues from the federal government than local governments in both the region and the nation. The Idaho state government obtained no revenue from property taxes, while Idaho local governments received lower per capita property tax revenues than local governments in the region and nation. For most other types of tax revenues, Idaho state and local governments obtained lower per capita revenues than counterpart governments in the region and nation. However, Idaho state government obtained higher per capita revenues than did counterparts in the region for general and selective sales taxes, individual income taxes, and corporate income taxes. It is also noteworthy that local governments in Idaho obtained no revenue from general sales taxes and individual and corporate income taxes. (U.S. Census Bureau, 2015x; U.S. Census Bureau, 2015y)

Table 5.1.9-13: State and Local Government Revenues, Selected Sources, 2012

Type of Revenue		Idaho		Region		United States	
		State Govt. Amount	Local Govt. Amount	State Govt. Amount	Local Govt. Amount	State Govt. Amount	Local Govt. Amount
Total Revenue	($M)	$8,308	$5,261	$372,535	$354,200	$1,907,027	$1,615,194
	Per capita	$5,206	$3,297	$6,235	$5,928	$6,075	$5,145
Intergovernmental from Federal	($M)	$2,479	$187	$44,368	$15,822	$514,139	$70,360
	Per capita	$1,554	$117	$743	$265	$1,638	$224
Intergovernmental from State	($M)	$0	$1,961	$87,966	$117,358	$0	$469,147
	Per capita	$0	$1,229	$1,472	$1,964	$0	$1,495

[121] Intergovernmental revenues are those revenues received by one level of government from another level of government, such as shared taxes, grants, or loans and advances (U.S. Census Bureau, 2006b).

Type of Revenue		Idaho		Region		United States	
		State Govt. Amount	**Local Govt. Amount**	**State Govt. Amount**	**Local Govt. Amount**	**State Govt. Amount**	**Local Govt. Amount**
Intergovernmental from Local	($M)	$18	$0	$880	$0	$19,518	$0
	Per capita	$12	$0	$15	$0	$62	$0
Property Taxes	($M)	$0	$1,393	$52,387	$71,927	$13,111	$432,989
	Per capita	$0	$873	$877	$1,204	$42	$1,379
General Sales Taxes	($M)	$1,225	$0	$31,184	$14,896	$245,446	$69,350
	Per capita	$767	$0	$522	$249	$782	$221
Selective Sales Taxes	($M)	$440	$24	$13,934	$7,418	$133,098	$28,553
	Per capita	$276	$15	$233	$124	$424	$91
Public Utilities Taxes	($M)	$3	$23	$3,644	$4,323	$14,564	$14,105
	Per capita	$2	$14	$61	$72	$46	$45
Individual Income Taxes	($M)	$1,213	$0	$10,133	$0	$280,693	$26,642
	Per capita	$760	$0	$170	$0	$894	$85
Corporate Income Taxes	($M)	$189	$0	$1,270	$52	$41,821	$7,210
	Per capita	$118	$0	$21	$1	$133	$23

Sources: (U.S. Census Bureau, 2015x; U.S. Census Bureau, 2015y)

Note: This table does not include all sources of government revenue. Summation of the specific source rows does not equal total revenue.

5.1.10 Environmental Justice

5.1.10.1 Definition of the Resource

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, issued in 1994, sets out principles of environmental justice and requirements that federal agencies should follow to comply with the EO (See Section 1.8.12, Executive Order 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations).[122] The fundamental principle of environmental justice is, "fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (USEPA, 2016f). Under the EO, each federal agency must "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations" (Executive Office of the President, 1994). In response to the EO, the Department of Commerce developed an Environmental Justice Strategy in 1995, and published an updated strategy in 2013 (U.S. Department of Commerce, 2013).

In 1997, the Council on Environmental Quality (CEQ) issued *Environmental Justice: Guidance under the National Environmental Policy Act (NEPA)* to assist federal agencies in meeting the

[122] See https://www.epa.gov/laws-regulations/summary-executive-order-12898-federal-actions-address-environmental-justice.

requirements of the EO (CEQ, 1997a). Additionally, the USEPA's Office of Environmental Justice (USEPA, 2015c) offers guidance on Environmental Justice issues and provides an "environmental justice screening and mapping tool," EJSCREEN (USEPA, 2015d).

The CEQ guidance provides several important definitions and clarifications that this PEIS utilizes:

- Minority populations consist of "Individual(s) who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic."
- Low-income populations consist of individuals living in poverty, as defined by the U.S. Census Bureau (Census Bureau).
- Environmental effects include social and economic effects. Specifically, "Such effects may include ecological, cultural, human health, economic, or social impacts on minority communities, low-income communities, or Indian tribes when those impacts are interrelated to impacts on the natural or physical environment" (CEQ, 1997a).

5.1.10.2 Specific Regulatory Considerations

Based on correspondence with an official with the Idaho DEQ, the Idaho DEQ "does not currently have any environmental justice policies, programs, or guidance. [DEQ does] participate in environmental justice coordination efforts led by Region 10 of the USEPA. [DEQ] also follow[s] environmental justice requirements associated with federal pass-through grant and loan money." (Kostka, 2015)

5.1.10.3 Environmental Setting: Minority and Low-Income Populations

Table 5.1.10-1 presents 2013 data on the composition of Idaho's population by race and by Hispanic origin. The state's population has considerably lower percentages of individuals who identify as Black/African American (0.6 percent), Asian (1.5 percent), or Some Other Race (2.6 percent) than the populations of the West Region and the nation. (Those percentages are, for Black/African American, 5.2 percent for the West Region and 12.6 percent for the nation; for Asian, 10.5 percent and 5.1 percent respectively; and for Some Other Race, 10.0 percent and 4.7 percent respectively.) The state's population of persons identifying as White (91.5 percent) is considerably larger than that of the West Region (68.3 percent) and the nation (73.7 percent).

The percentage of the population in Idaho that identifies as Hispanic (11.8 percent) is considerably lower than in the West Region (31.5 percent), and lower than in the nation (17.1 percent). Hispanic origin is a different category than race; persons of any race may identify as also being of Hispanic origin.

The category All Minorities consists of all persons who consider themselves Hispanic or of any race other than White. Idaho's All Minorities population percentage (16.8 percent) is considerably lower than that of the West Region (51.2 percent) or the nation (37.6 percent).

Table 5.1.10-2 presents the percentage of the population living in poverty in 2013, for the state, region, and nation. The figure for Idaho (15.6 percent) is lower than that for the West Region (16.6 percent) and slightly lower than the figure for the nation (15.8 percent).

Table 5.1.10-1: Population by Race and Hispanic Status, 2013

Geography	Total Population	Race							Hispanic	All Minorities
		White	Black/ African Am	Am. Indian/ Alaska Native	Asian	Native Hawaiian /Pacific Islander	Some Other Race	Two or More Races		
Idaho	1,634,464	91.5%	0.6%	1.2%	1.5%	0.1%	2.6%	2.4%	11.8%	16.8%
West Region	60,262,888	68.3%	5.2%	1.3%	10.5%	0.4%	10.0%	4.3%	31.5%	51.2%
United States	316,128,839	73.7%	12.6%	0.8%	5.1%	0.2%	4.7%	3.0%	17.1%	37.6%

Source: (U.S. Census Bureau, 2015z)

"All Minorities" is defined as all persons who consider themselves Hispanic or of any race other than White. Because some Hispanics identify as both Hispanic and of a non-White race, "All Minorities" is less than the sum of Hispanics and non-White races.

Table 5.1.10-2: Percentage of Population (Individuals) in Poverty, 2013

Geography	Percent Below Poverty Level
Idaho	15.6%
West Region	16.6%
United States	15.8%

Source: (U.S. Census Bureau, 2015aa)

5.1.10.4 Environmental Justice Screening Results

Analysis of environmental justice in a NEPA document typically begins by identifying potential environmental justice populations in the project area. Appendix D, Environmental Justice Methodology, presents the methodology used in this PEIS to screen each state for the presence of potential environmental justice populations. The methodology builds on CEQ guidance and best practices used for environmental justice analysis. It uses data at the census-block group level; block groups are the smallest geographic units for which regularly updated socioeconomic data is readily available at the time of writing.

Figure 5.1.10-1 visually portrays the results of the environmental justice population screening analysis for Idaho. The analysis used block group data from the Census Bureau's American Community Survey 2009-2013 5-Year Estimates (U.S. Census Bureau, 2015h; U.S. Census Bureau, 2015c; U.S. Census Bureau, 2015i; U.S. Census Bureau, 2015s) and Census Bureau urban classification data (U.S. Census Bureau, 2012b; U.S. Census Bureau, 2015r).

Figure 5.1.10-1 shows that Idaho has many areas with high potential for environmental justice populations. The distribution of these high potential areas is fairly even across the state, but high potential areas are somewhat more prevalent in the southwest portion of the state. High potential areas occur both within and outside of the 10 largest population concentrations. The distribution of areas with moderate potential for environmental justice populations is also fairly even across the state.

It is important to understand how the data behind Figure 5.1.10-1 affect the visual impact of this map. Block groups have similar populations (hundreds to a few thousand individuals) regardless of population density. In sparsely populated areas, a single block group may cover tens or even hundreds of square miles, while in densely populated areas, block groups each cover much less than a single square mile. Thus, while large portions of the state outside the areas defined as large population concentrations show moderate or high potential for environmental justice populations, these low density areas reflect modest numbers of minority or low-income individuals compared to the potential environmental justice populations within densely populated areas. The overall effect of this relative density phenomenon is that the map visually shows large areas of the state having environmental justice potential, but this over-represents the presence of environmental justice populations.

It is also very important to note that Figure 5.1.10-1 does not definitively identify environmental justice populations. It indicates *degrees of likelihood of the presence* of populations of potential concern from an environmental justice perspective. Two caveats are important. First, environmental justice communities are often highly localized. Block group data may under- or over-represent the presence of these localized communities. For instance, in the large block groups in sparsely populated regions of the state, the data may represent dispersed individuals of minority or low-income status rather than discrete, place-based communities. Second, the definition of the high potential category draws a wide net for potential environmental justice populations. As discussed in Appendix D, the definition includes some commonly used thresholds for environmental justice screening that tend to over-identify environmental justice potential. Before FirstNet deploys projects, additional site-specific analyses to identify specific, localized environmental justice populations may be warranted. Such analyses could tier-off the methodology of this PEIS.

This map also does not indicate whether FirstNet projects would have actual impacts on environmental justice populations. An environmental justice effect on minority or low-income populations only occurs if the effect is harmful, significant (according to significance criteria), and “appreciably exceeds or is likely to appreciably exceed the risk or rate to the general population or other appropriate comparison group” (CEQ, 1997a). The Environmental Consequences section (Section 5.2) addresses the potential for disproportionately high and adverse environmental or human health impacts on environmental justice populations.

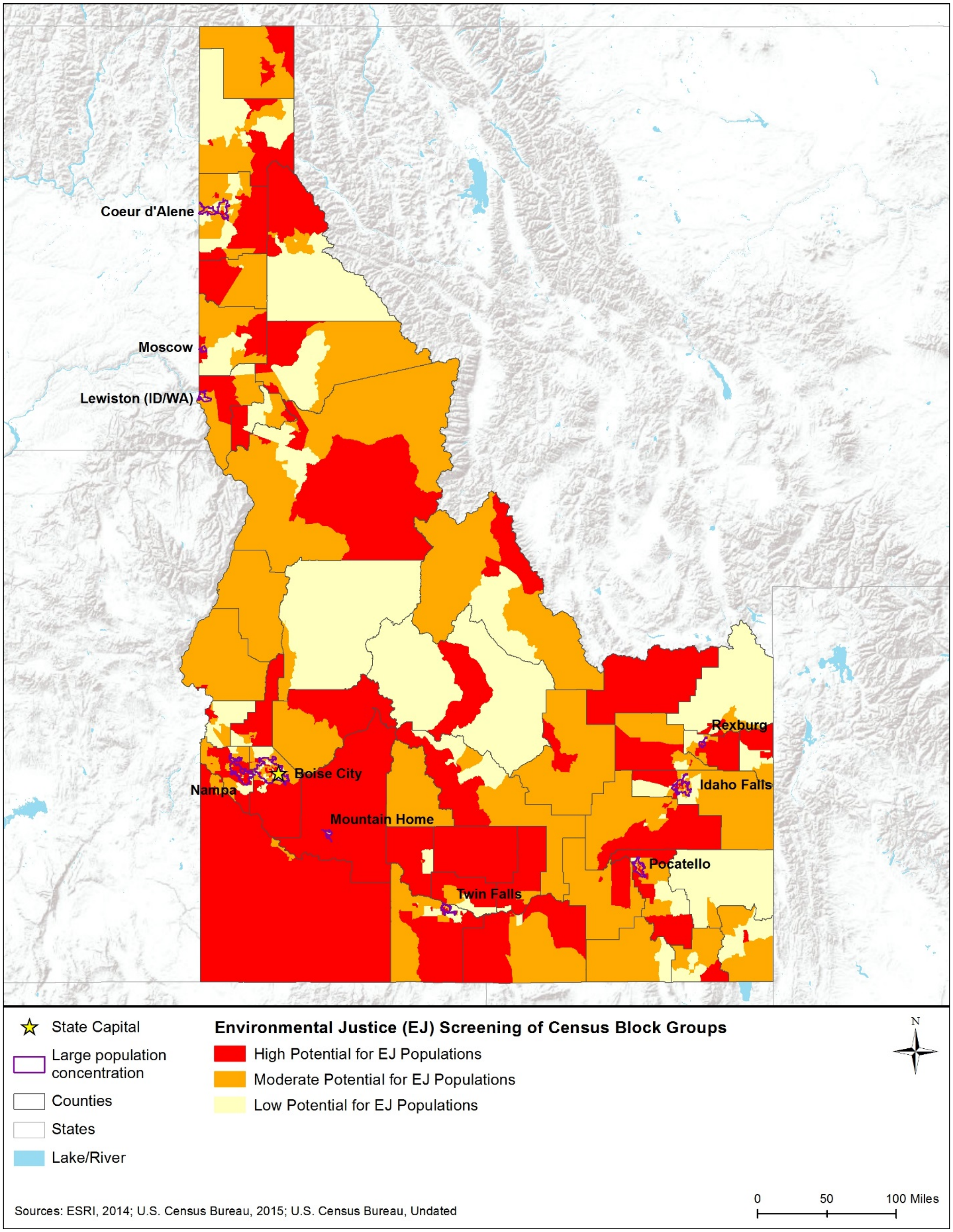


Figure 5.1.10-1: Potential for Environmental Justice Populations in Idaho, 2009–2013

5.1.11 Cultural Resources

5.1.11.1 Definition of Resource

For the purposes of this PEIS, cultural resources are defined as:

> Natural or manmade structures, objects, features, locations with scientific, historic, and cultural value, including those with traditional religious or cultural importance and any prehistoric or historic district, site, or building included in, or eligible for inclusion in, the NRHP.

This definition is consistent with the how cultural resources are defined in the:

- Statutory language and implementing regulations for Section 106 of the NHPA, as amended, formerly 16 U.S.C. 470a(d)(6)(A) (now 54 U.S.C. 306131(b)) and 36 CFR 800.16(l)(1);
- Statutory language and Implementing regulations for the Archaeological Resources Protection Act of 1979 (ARPA), 16 U.S.C. 470cc(c) and 43 CFR 7.3(a);
- Statutory language and implementing regulations for the Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3001(3)(D) and 43 CFR 10.2(d);
- NPS's program support of public and private efforts to identify, evaluate, and protect America's historic and archeological resources (NPS, 2015i); and
- Advisory Council on Historic Preservation's (ACHP) guidance for protection and preservation of sites and artifacts with traditional religious and cultural importance to Indian tribes or Native Hawaiian organizations (Advisory Council on Historic Preservation, 2004).

5.1.11.2 Specific Regulatory Considerations

The Proposed Action must meet the requirements of NEPA and other applicable laws and regulations. Applicable federal laws and regulations that apply to Cultural Resources include the NHPA (detailed in Section 1.8, Overview of Relevant Federal Laws and Executive Orders), the American Indian Religious Freedom Act (AIRFA), ARPA, and NAGPRA. Appendix C, Environmental Laws and Regulations summarizes these pertinent federal laws.

Idaho does not have state laws and regulations that are similar to those of NHPA or NEPA (refer to Table 5.1.11-1). While federal agencies may take into account compatible state laws and regulations, their actions that are subject to federal environmental review under NEPA and NHPA are not subject to compliance with such state laws and regulations.

Table 5.1.11-1: Relevant Idaho Cultural Resources Laws and Regulations

State Law/Regulation	Regulatory Agency	Applicability
Preservation of Historic Sites (Idaho Code Title 67, Chapter 46)	Idaho State Historic Preservation Office (SHPO)	This act authorizes local governments to engage in historic preservation programs.

5.1.11.3 Cultural and Natural Setting

Through the examination of cultural materials, archaeologists have determined that human beings have occupied Idaho for at least 12,000 years, beginning in the Pleistocene Epoch. These aboriginal people are believed to have crossed the Bering Land Bridge during the last ice age as they followed migrations of mammoth, bison, and other large game. Various state parks within Idaho assist in the preservation of over 35,000 archaeological sites, with 30 listed on the NRHP (NPS, 2015j).

The people of the region during the late Pleistocene are presumed to have lived in nomadic bands, exploiting seasonal resources, including large game of the plateau and mountain areas of the state. As the Pleistocene ended, giving way to more temperate conditions, resources and prehistoric ways of life shifted, as marked by an advancement in technologies and economies. The diversity of plants and animals in the region increased as the climate warmed. Larger game species, which are now extinct in North America (e.g., mammoth, ground sloth and camel), became absent as the Idaho area became warmer and dryer. In response to this climate change, inhabitants transition from large to small game for subsistence. This can be seen in the archaeological record where large atlatl and spear points, such as Clovis points, are replaced with small projectile points suitable for bow hunting of smaller, faster game. The archaeological record also shows that edible plants and fish became more preferred resources for exploitation.

Several aboriginal groups and bands originally occupied the Idaho area, which is convergence of two physiographic regions: the Intermodal Plateau and Rocky Mountain System (refer to Figure 5.1.3-1**)**. The residents lived in the varying terrains, including the arid western portion of the state, the Snake and Salmon River plains, and the mountainous regions spanning the Sawtooth National Forest to the south, through the Panhandle and into Canada to the north (Rosillon, M., 1980) (Idaho State University, 2015).

The following sections examine Idaho's prehistory (10000 B.C. to A.D. 1900), with some particular elements of the historic period since European-American exploration and settlement in the 1800s. Even after contact with white explorers, fur trappers and settlers, many American Indians sustained their traditional way of life, and some continue to do so today.

The warming at the end of the last glacial period that marked the end of the Pleistocene and the beginning of the Holocene Period (approximately 7000 B.C.) persisted with fluctuations of the mean annual temperature. This warming period marked the end of the Paleoindian Period and the beginning of what is called the Archaic Period. Figure 5.1.11-1 shows a timeline representing the periods that represent the evolving culture that existed within this region.

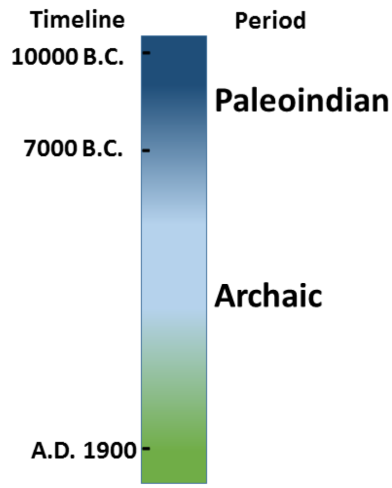


Figure 5.1.11-1: Timeline of Prehistoric Human Occupation

Source: (Institute of Maritime History, 2015)

Paleoindian Period (10000 - 7000 B.C.)

The Paleoindian Period of the Idahoan natives has been well documented in the archaeological record. Spanning approximately 3,000 years during the end of the Pleistocene, the culture period is marked by large game hunting and limited flora exploitation. Examples of early documented sites in Idaho include the Haskett Site in Power County, the Hetrick Site in Washington County and the Simon Clovis Cache in Camas County. All three sites show evidence of large-game hunting technologies and a way of life more focused on exploiting a smaller range of resources than is seen in later periods (BLM, 2015d).

Idaho's Paleoindian Period is subdivided into three sub-periods based on archaeological evidence. The Clovis and Folsom Sub-Periods were limited to the Paleoindian Period, while the latter, the Plano Sub-Period, seems to extend into the Early Archaic Period. It is important to note that the three Paleoindian sub-periods in Idaho are poorly delineated due to relatively few research studies that include radiocarbon dating (BLM, 2015d).

The Clovis Sub-Period (10000-9000 B.C.) is named for fluted projectile points first found at Clovis, New Mexico in 1936. Clovis points are believed to be the earliest biface point types identified in the continental United States. The Folsom Sub-Period, which began around 9000 B.C. and lasted for about four hundred years, is named for the projectile point type first found in Folsom, New Mexico in 1927. The Plano Sub-Period, which overlaps with the early Archaic Period, is thought to have occurred between 9000 and 7000 B.C. Sites from this sub-period feature large lanceolate points and the faunal remains of large game, such as bison (Lohse, E.S., 1993).

The Paleoindian people of Idaho and surrounding regions relied heavily on large game hunting, as evidenced by the abundance of cultural material recovered (i.e., large stemmed and lanceolate projectile points) and paucity of small game-hunting implements. It is believed that bison and mountain sheep were a substantial portion of the Paleoindian diet during the earlier periods (Mauser, L.; Miss, C., 2003). Excavations of the Redfish Overhang Paleoindian lithic site in south-central Idaho, yielded a cache of large lanceolate projectile points, dated to approximately 8000 B.C. (Mauser, L.; Miss, C., 2003).

Archaic Period (7000 – 3,000 B.C.)

Around 7000 B.C., the climate of the Idaho region became warmer and more arid, creating a larger biodiversity of plant and animal species and created sub-climates in which various living resources adapted and thrived. While large game hunting continued, Idaho area inhabitants developed niche procurement techniques as various plants, fish, and small game became more abundant as reliable, seasonal food sources. Technologies also improved to process and store food goods, such as salmon, steelhead trout, and camas (a plant in the asparagus family), for the winter months. (Boyd, R. (Ed.), 1999)

Also during the Archaic Period, aboriginal Idahoans learned how to burn forests and grasslands to influence game animal behavior for easier hunting and to create forest clearings that provided habitat for game. During "deer drives," peripheral fires were set to funnel herds of game animals into areas where they could be easily ambushed. Burns in the late fall and early winter forests were conducted to create clearings with nutrient-rich soils where new vegetation would grow during the spring and summer. The cleared areas attracted game species (e.g., deer) that foraged on the new understory and improved the habitat of edible plants that could be harvested in abundance. In the Northern Rockies Ecoregion, grasses, camas, sunflower, Oregon boxwood, pinegrass, wild huckleberry, grouseberry, bear grass, and wild rose were important food sources for human beings and wildlife alike. In the Columbia Basin Ecoregion, yarrow, lilies, camas and balsamroot and sunflower were highly sought as important sources of nutrition. (Boyd, R. (Ed.), 1999)

Cascade Sub-Period (7000 - 3000 B.C.)

The Cascade Sub-Period is best understood in an archaeological context as a sub-period of change in projectile point types and forms. Prior to the eruption of Mount Mazama (in nearby Oregon, and a well-documented archaeological marker from around 5000 B.C.) the record indicates that large, lanceolate points were still favored indicating the continued Paleoindian practices of large game hunting. Soon after the eruption, smaller dart points appear in the archeological record indicating a shift to small game hunting, which likely coincided with the diversification of resources and diets (Ferguson, D., 2009) (Lohse, E.S., 1993).

Tucannon Sub-Period (3000 B.C. - A.D. 500)

This sub-period marks a shift from mobile, nomadic subsistence lifeways to more permanent habitation sites, which could support a larger population. The remnants of early pit houses are associated with this sub-period. A shift from large game hunting is also present in the archaeological record, as the remains of small mammals and fish are found in abundance alongside smaller dart points and milling implements, such as mortars and pestles (a technology used for processing plant material) (Ferguson, D., 2009) (Lohse, E.S., 1993). Idahoans wintered in pit houses surviving largely on food materials collected and processed during the spring, summer, and fall (Lohse, E.S., 1993).

Harder Sub-Period (A.D. 500 - 1300)

Villages including pit-house camps are associated with this sub-period indicating a continued increase in a more sedentary, village-oriented lifeway. While tools for hunting and processing large game are found to be associated with this sub-period, so too are smaller projectile points used to hunt smaller game species with bow technology. Fishing became a lasting and integral part of resource procurement during this sub-period (Ferguson, D., 2009) (Lohse, E.S., 1993).

Piqunin Sub-Period (A.D. 1300 - 1700)

This sub-period is marked by continued development of permanent settlements, and diversification of resource procurement and diet. Long houses began to replace the less elaborate pit houses during this sub-period. There is a proliferation of large villages along permanent water sources, as well as temporary habitation sites, which would have been used seasonally in different ecological settings as camps to support the hunting, fishing, and gathering. The prevalence of small, thinner projectile points indicate small and medium game hunting predominated (Ferguson, D., 2009) (Lohse, E.S., 1993).

Numipu Sub-Period (A.D. 1700 - 1900)

The Numipu Sub-Period interfaced with the historic period when Idaho natives first met European-American explorers and settlers. Drastic changes in technologies occurred during this time, as did the adaptation of lifeways. It was during the beginning of this sub-period that the domesticated horse was introduced to the native people of the Idaho region, which substantially increased trade with distant native groups and whites alike (Ferguson, D., 2009) (Lohse, E.S., 1993).

5.1.11.4 Federally Recognized Tribes of Idaho

According to the Bureau of Indian Affairs and the National Conference of State Legislators, there are four federally recognized tribes in Idaho: the Kootenai Tribe of Idaho, the Coeur d' Alene Tribe, The Nez Perce Tribe of Idaho, and the Shoshone-Bannock Tribes of the Fort Hall Reservation of Idaho (National Conference of State Legislatures, 2016). The location of federally recognized tribes are highlighted in bold in Figure 5.1.11-2. The other tribes depicted on the figure are general locations of tribes that were known to exist in this region of the United States, but are not officially federally recognized.

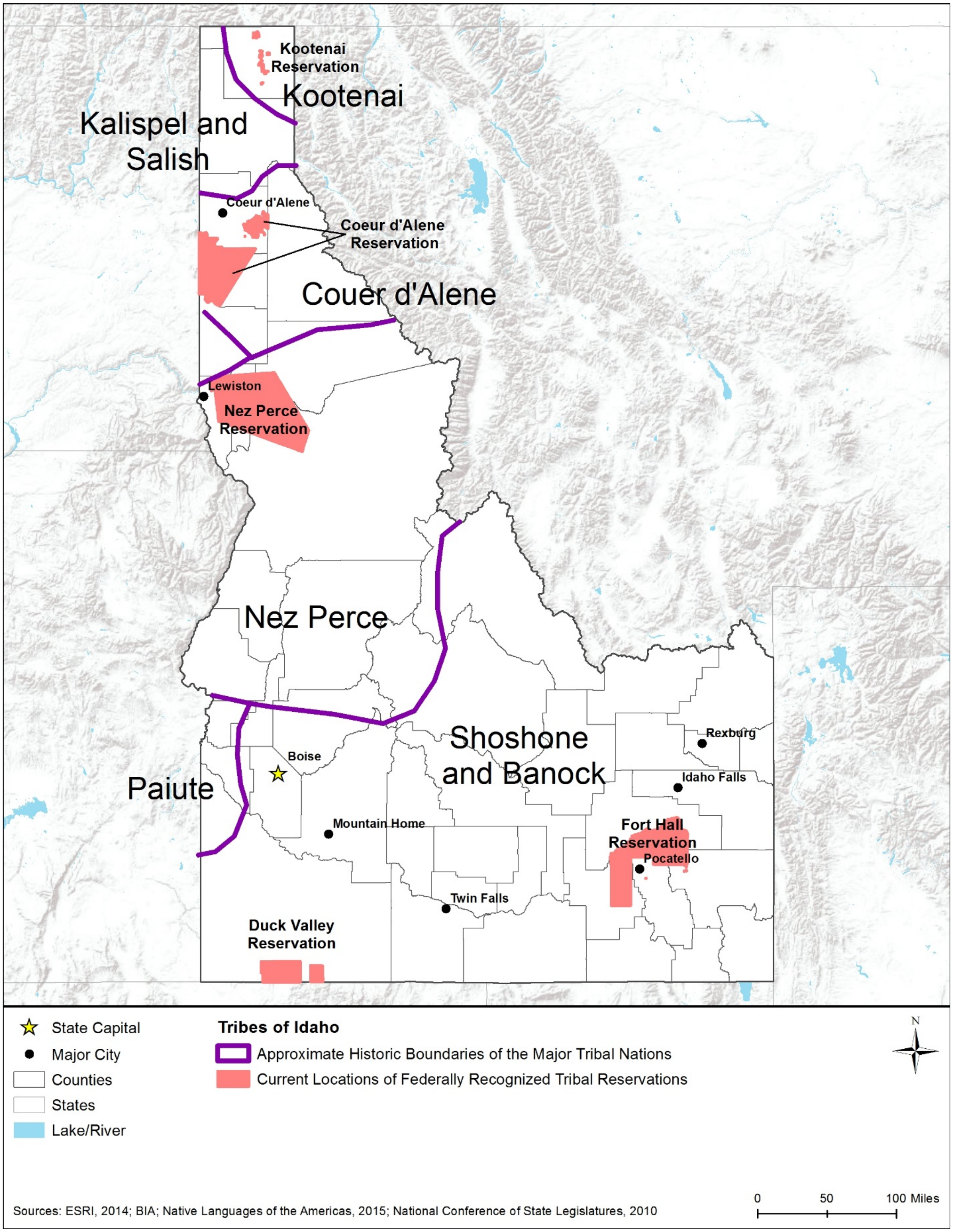


Figure 5.1.11-2: Federally Recognized Tribes in Idaho

5.1.11.5 Significant Archaeological Sites of Idaho

As previously mentioned in Section 5.1.11.3 there are 30 archaeological sites in Idaho listed on the NRHP. Table 5.1.11-2 lists the names of the sites, the city they are closest to, and type of site. The list includes both prehistoric and historic archaeological sites. The number of archaeological sites may increase with the discovery of new sites.[123] (NPS, 2015j).

Idaho State Cultural Resources Database and Tools

Idaho State Historic Preservation Office (SHPO)

The Idaho State Historic Preservation Office, which is part of the Idaho Historical Society, works to preserve the cultural resources of Idaho. The office is responsible for regulatory oversight of archaeological activities, overseeing preservation programs, and maintaining archaeological and historical resources. A list of Idaho NRHP nominations is posted on the SHPO website (http://history.idaho.gov/state-historic-preservation-office) for public review, as well as nomination forms and documents for future nominations.

University of Idaho, Department of Sociology and Anthropology

The Department of Sociology and Anthropology at the University of Idaho includes the Alfred W. Bowers Laboratory of Anthropology and the Northern Repository of the Archaeological Survey of Idaho. The Archaeological Survey of Idaho preserves and curated documents and collections from archaeological studies for present and future academic research projects (University of Idaho, 2016).

Idaho Professional Archaeological Council

The Idaho Professional Archaeological Council is a statewide organization that promotes collaboration and communication among professional archaeological communities of Idaho. The council is composed of federal, state, and tribal archaeologists, as well as academic archaeologists and private cultural resource management consultants. Information on becoming an affiliate of the Idaho Professional Archaeological Council is available at http://www.idarchaeology.com/.

[123] A current list of NRHP sites are listed on the NPS NRHP website: http://www.nps.gov/nr/ (NPS, 2015j).

Table 5.1.11-2: Archaeological Sites on the National Register of Historic Places in Idaho

Closest City	Site Name	Type of Site
American Falls	American Falls Archeological District	Historic, Historic - Aboriginal, Prehistoric
Arco	Aviator's Cave	Prehistoric
Blue Dome	Birch Creek Rock Shelters	Prehistoric
Boise	Dry Creek Rockshelter	Prehistoric
Bonners Ferry	Harvey Mountain Quarry	Historic - Aboriginal, Prehistoric
Challis	Challis Archeological Spring District	Prehistoric
Challis	Challis Bison Jump Site	Historic - Aboriginal, Prehistoric
Clayton	East Fork Lookout	Prehistoric
Cobalt	Shoup Rock Shelters	Prehistoric
Cottonwood	Lower Salmon River Archeological District	Historic, Prehistoric
Cuprum	Hells Canyon Archeological District	Historic - Aboriginal, Prehistoric
Driggs	Pierre's Hole 1832 Battle Area Site	Historic
Fort Hall	Fort Hall Site	Military
Givens Springs	Map Rock Petroglyphs Historic District	Prehistoric
Grandview	Guffey Butte--Black Butte Archeological District	Historic, Historic - Aboriginal, Prehistoric
Hunt	Wilson Butte Cave	Prehistoric
Idaho Falls	Wasden Site (Owl Cave)	Prehistoric
Kilgore	Camas Meadow Camp and Battle Sites	Military
Lenore	Lenore Site	Prehistoric
Lewiston	Hasotino	Historic - Aboriginal, Prehistoric
Lewiston	Hatwai Village Site	Prehistoric
Lewiston	Nez Perce Snake River Archeological District	Historic - Aboriginal, Prehistoric
Pierce	Moore Gulch Chinese Mining Site (10-CW-159)	Historic
Reynolds	Camp Lyon Site	Military
Salmon	Fort Lemhi	Historic
Stanley	Redfish Archeological District	Historic - Aboriginal, Prehistoric
Sun Valley	Sawtooth City	Historic
Wagon Box Basin	Camas and Pole Creeks Archeological District	Prehistoric
Warren	Chinese Mining Camp Archeological Site	Historic
Weston	Weston Canyon Rock Shelter	Prehistoric

Source: (NPS, 2014g)

5.1.11.6 Historic Context

European-Americans first explored present-day Idaho shortly after the 1803 Louisiana Purchase. While Idaho was not included in the Louisiana Purchase, Louis and Clark's Corps of Discovery expedition spent time in Idaho in 1805 before continuing on to the Pacific Ocean. Idaho was one of the last states to undergo non-indigenous exploration, despite nearby states being explored earlier. English and American fur traders began to arrive during the early 19th century, and in

1818, the United States and England agreed to occupy the territory jointly. In 1819, the United States and Spain established the southern border of Idaho, which at the time bordered Spanish territory (Idaho State Historical Society, 2015b).

During the second quarter of the 19th century, trader and settler traffic through Idaho increased, relating to both the expansion of the fur industry and the increasing Pacific coast settlement. This would result in conflict with American Indians throughout much of the 19th century. In 1841, a wagon party traveling through Idaho split into separate groups, one of which pioneered portions of the Oregon Trail, while another pioneered what would become the California Trail. In 1848, the Oregon Territory was formed, which at the time included all of Idaho. In 1849, as a part of the California gold rush, traffic through southern Idaho increased on the California Trail (Idaho State Historical Society, 2015b).

In 1860, gold was discovered in Idaho, and while the claims were on Nez Perce land, settlers continued to develop the city of Pierce, which led to conflict with American Indians. While the Civil War did not directly affect Idaho, the state was split politically over the conflict, as it contained an equal mix of northers and southerners. The Idaho Territory was created in 1863, and initially contained all of Montana and most of Wyoming as well. In 1866, the capital was moved from Lewiston, in the north, to Boise, in the south, resulting in internal political strife and nearly causing a split in the state. In 1869, the first transcontinental railroad was completed, and while the railroad did not pass through Idaho, it passed just to the south in Utah and Nevada and made transportation to Idaho much easier (Idaho State Historical Society, 2015b).

In 1877, the Nez Perce fought back against increasing settlement, rather than being forced onto a reservation, but were defeated and forcibly removed to a reservation in Oklahoma. They were finally allowed to return several years later. In 1879, the Utah Northern Railroad was completed, and in 1882, the Northern Pacific Railroad was completed, both of which opened the state to increased settlement. In 1898, the University of Idaho was established in Moscow, a location that was chosen to help subdue the northern secession movement. On July 3, 1890, Idaho became the 43rd state to join the Union. During the late 19th century, unrest among gold and silver miners was common and resulted in labor strikes and at times violence. During the early 20th century, irrigation projects were undertaken, with the Minidoka and Arrowrock Dams being prominent examples. Projects such as these continued into the middle of the 20th century in order to harness waterpower and alleviate flooding issues. Military installations were built during World War II (WWII), including Minidoka Camp in Hunt, which served as an internment camp for Japanese Americans. (Idaho State Historical Society, 2015b).

Idaho has 1,031 NRHP listed sites, as well as 11 NHLs (NPS, 2014h) (NPS, 2015e) (NPS, 2015n). Idaho contains no National Heritage Areas (NPS, 2015k). Figure 5.1.11-3 shows the location of NRHP sites within the state of Idaho.[124]

[124] See Section 5.1.7 for a more in-depth discussion of additional historic resources as they relate to recreational resources.

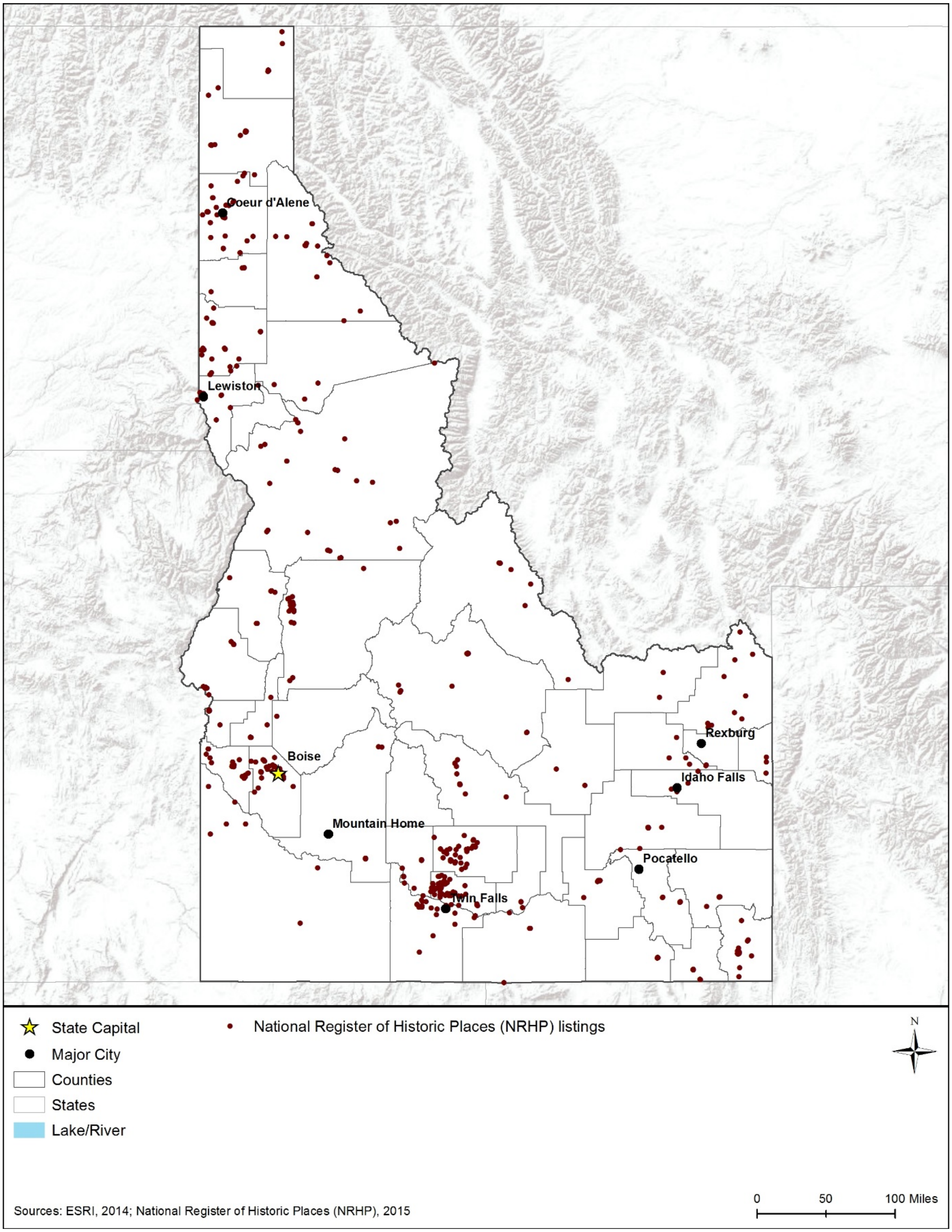


Figure 5.1.11-3: NRHP Sites in Idaho

5.1.11.7 Architectural Context

Early evidence of Euro-American activity in Idaho includes the remnants of roads and trails that were frequented by early pioneers and fur trappers. Remnants of the Oregon Trail, California Trail, and other lesser-known paths can be seen in the region today. These trails did not reach their height until the end of the second quarter of the 19th century when mining and homesteading activities pulled a great number of settlers west. Early structures were built out of locally obtained logs, earth, or stone, as processed building materials would not have been available. These early structures were utilitarian in nature and were located strategically to facilitate trade and commerce. Military fortifications were also common, as conflict with American Indian populations continued for much of the 19th century (Idaho State Historical Society, 2015b).

As movement into and through the region increased during the 19th century, additional types of structures began to appear. Jesuit priests constructed the first Catholic church, the Mission of the Sacred Heart, near Lake Coeur d'Alene in 1842. Later in the decade, it was moved to a new location due to flooding, and a new building was completed in 1853. This building is now Idaho's oldest surviving building and has been designated as a NHL. After gold was discovered in 1860, Pierce City was founded, which now contains the state's oldest civic building, the Shoshone County Courthouse. The courthouse is now open to the public and interpreted as a historic site (Idaho State Historical Society, 2015b).

Typical western architecture would have been built as settlements evolved during the mid-19th century. In towns associated with the gold rush, "false-front" buildings were common throughout the region. These were hastily constructed buildings of logs or simple framing, with flat, wood-framed façades meant to give the appearance of an urban dwelling and provide room for large signage. Depending on the settlement, the building would potentially be upgraded or replaced. If the settlement failed, buildings were simply abandoned (Heath, 1989).

After Idaho became a territory, government and civic buildings were built in greater numbers. These included jails, court houses, post offices, and educational facilities. The U.S. Assay Office in Boise is an important example that has been designated as a NHL and now functions as the Idaho State Historic Preservation Office (Idaho State Historical Society, 2015b). With regard to schools, they often evolved in function and form "from pure utility to increased comfort and embellishment" (National Register of Historic Places, 1991a). During the latter part of the 19th century, the arrival of the railroad dramatically changed the landscape. The Utah Northern Railroad and the Northern Pacific Railroad allowed for modern buildings materials and styles to be imported (Idaho State Historical Society, 2015b). During the late 19th century, popular building styles included Victorian Era styles such as Italianate, Second Empire, Queen Anne, and others, with revival architecture picking after the turn of the century (McAlester, 2013).

Idaho also contains a collection of agricultural properties dating to the late 19th and early 20th centuries that are associated with European immigration, with the Swedes, Finns, and Germans comprising many of the groups that participated in this migration (National Register of Historic Places, 1983) (National Register of Historic Places, 1991b). Starting in the early 20th century, land reclamation and irrigation projects were undertaken by the government, including the

Minidoka and Arrowrock Dams (Idaho State Historical Society, 2015b). Additional forms of government buildings were built for much of the 20th century, including a collection of New Deal Era post offices that were built during the Great Depression (National Register of Historic Places, 1989).

Figure 5.1.11-4: Representative Architectural Styles of Idaho

- Top Left – Grain Elevator (Unknown, ID) – (Highsmith, 2005)
- Top Middle – Union Block (Boise, ID) – (Historic American Buildings Survey, 1933a)
- Top Right – Congregation Beth Israel Synagogue (Boise, ID) – (Historic American Buildings Survey, 1933b)
- Bottom Left – Log House (Salmon, ID) – (Historic American Buildings Survey, 1933c)
- Bottom Right – Sawmill (Boundary County, ID) – (Historic American Buildings Survey, 1941)

5.1.12 Air Quality

5.1.12.1 Definition of the Resource

Air Quality in a geographic area is determined by the type and amount of pollutants emitted into the atmosphere, the size and topography[125] of the area, and the prevailing weather and climate conditions. The levels of pollutants and pollutant concentrations in the atmosphere are typically

[125] Topography: The unique features and shapes of the land (e.g., valleys and mountains).

expressed in units of parts per million (ppm)[126] or micrograms per cubic meter (μg/m^3) determined over various periods of time (averaging time).[127] This section discusses the existing air quality in Idaho. The USEPA designates areas within the United States as attainment,[128] nonattainment,[129] maintenance,[130] or unclassifiable[131] depending on the concentration of air pollution relative to ambient air quality standards. Information is presented regarding national and state ambient air quality standards and nonattainment areas that would be potentially more sensitive to impacts from implementation of the Proposed Action or alternatives.

5.1.12.2 Specific Regulatory Considerations

National and State Ambient Air Quality Standards

The Clean Air Act (CAA) establishes National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: Carbon monoxide (CO), lead, oxides of nitrogen (NO_X), particulate matter ($PM_{2.5}$ and PM_{10}), ozone (O_3), and oxides of sulfur (SO_X). The NAAQS establish various standards, either primary[132] or secondary,[133] for each pollutant with varying averaging times. Standards with short averaging times (e.g., 1-hour, 8-hour, and 24-hour) were developed to prevent the acute health effects from short-term exposure at high concentrations. Longer averaging periods (e.g., 3 months or annual) are intended to prevent chronic health effects from long-term exposure. A description of the NAAQS is presented in Appendix E.

In addition to the NAAQS, there are standards for Hazardous Air pollutants (HAP), which are those typically associated with specific industrial processes such as chromium electroplating (hexavalent chromium), dry cleaning (perchloroethylene), and solvent degreasing (halogenated solvents)(USEPA, 2016g). HAPs can have severe adverse impacts on human health and the environment, including increased risk of cancer, reproductive issues, or birth defects. HAPs are federally regulated under the CAA via the National Emission Standards for Hazardous Air Pollutants (NESHAPs). USEPA developed the NESHAPs for sources and source categories emitting HAPs that pose a risk to human health. Appendix C, Environmental Laws and Regulations presents a list of federally regulated HAPs.

In conjunction with adopting the federal NAAQS in Idaho Administrative Procedures Act (IDAPA) 58.01.01.576.05 (General Provisions for Ambient Air Quality Standards), Idaho

[126] Equivalent to 1 milligram per liter (mg/L).
[127] Averaging Time: "The period over which data are averaged and used to verify proper operation of the pollution control approach or compliance with the emissions limitation or standard." (USEPA, 2015r)
[128] Attainment areas: Any area that meets the national primary or secondary ambient air quality standard for the pollutant. (USEPA, 2015s)
[129] Nonattainment areas: Any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant. (USEPA, 2015s)
[130] Maintenance areas: An area that was previously nonattainment, but has met the national primary or secondary ambient air quality standards for the pollutant, and has been designated as attainment. (USEPA, 2015s)
[131] Unclassifiable areas: Any area that cannot be classified on the basis of available information as meeting the national primary or secondary air quality standard for a pollutant. (USEPA, 2015s)
[132] Primary standard: The primary standard is set to provide public health protection, including protecting the health of sensitive populations such as asthmatics, children, and the elderly. (USEPA, 2014b)
[133] Secondary standards: The secondary standard is set to provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. (USEPA, 2014b)

maintains its own ambient air quality standards for total fluoride content in vegetation used for feed and forage (Idaho Office of the Administrative Rules Coordinator, 2015). Table 5.1.12-1 presents an overview of the fluoride standards as defined by the DEQ.

Table 5.1.12-1: Idaho Ambient Air Quality Standards for Fluorides

Pollutant	Averaging Time	Standard		Notes
		μg/m³	ppm	
Fluorides (Gaseous)	Annual	-	40	Annual arithmetic mean.
	Bimonthly	-	60	Monthly concentration for two consecutive months.
	Monthly	-	80	Monthly concentration never to be exceeded.

Source: (Idaho Office of the Administrative Rules Coordinator, 2015)

Title V Operating Permits/State Operating Permits

Idaho has authorization to issue CAA Title V operating permits on behalf of the USEPA, as outlined in 40 CFR 70. The Title V program refers to Title V of the CAA that governs permitting requirements for major industrial air pollution sources and consolidates all CAA requirements for the facility into one permit (USEPA, 2015e). The overall goal of the Title V program is to "reduce violations of air pollution laws and improve enforcement of those laws" (USEPA, 2015e). The permit issued to a facility contains both state and federal portions and incorporates a reporting schedule (USEPA, 2014a).

Under the Idaho Administrative Code, known as the IDAPA, the state refers to the federal Title V operating permit program as their Tier I (major sources) Air Quality operating permit program. IDAPA 58.01.01.300 (Procedures and Requirements for Tier I Operating Permits) describes the applicability of Tier I (major sources) operating permits. The Idaho DEQ requires Tier I operating permits for a major source if it emits or has the potential to emit pollutants in excess of the major source thresholds (see Table 5.1.12-2). Idaho requires Tier II operating permits under IDAPA 58.01.01.400 [Procedures and Requirements for Tier II Operating Permit] for sources with the potential to emit below the major source criteria, sources which accept production or hours of operation limits, and those that meet General Permit requirements (Idaho Office of the Administrative Rules Coordinator, 2015).

Table 5.1.12-2: Major Air Pollutant Source Thresholds

Pollutant	TPY
Any Criteria Pollutant[a]	100
Single Hazardous Air Pollutant (HAP)	10
Total/Cumulative HAPs	**25**

Source: (USEPA, 2014a)

[a] Sources in nonattainment areas will have lower thresholds for some criteria pollutants depending on the classification of the nonattainment area.

Exempt Activities

Idaho DEQ allows the following exemptions for Tier I Air Quality operating permits under IDAPA 58.01.01.317.1 (Insignificant Activities):

- "Internal combustion engines for propelling or powering a vehicle…;
- Portable electrical generators that can be moved by hand from one location to another. Moved by hand means that it can be moved without the assistance of any motorized or non-motorized vehicle, conveyance, or device…;
- Insignificant activities on the basis of size or production rate including:
  - …Combustion sources, less than five million (5,000,000) British thermal units (Btu)/hr, exclusively using natural gas, butane, propane, and/or liquefied petroleum gas;
  - Combustion sources, less than five hundred thousand (500,000) Btu/hr, using any commercial fuel containing less than four-tenths percent (.4%) by weight sulfur for coal or less than one percent (1%) by weight sulfur for other fuels;
  - Combustion sources, of less than one million (1,000,000) Btu/hr, if using kerosene, No. 1 or No. 2 fuel oil…;
  - Combustion turbines, of less than five hundred (500) HP…;
  - An emission unit or activity with potential emissions less than or equal to the significant emission rate as defined in [the general definitions] and actual emissions less than or equal to ten percent (10%) of the levels contained in [the general definition] of significant and no more than one (1) ton per year of any hazardous air pollutant." (Idaho Office of the Administrative Rules Coordinator, 2015)

Temporary Emissions Sources Permits

Idaho DEQ can issue Tier I Air Quality operating permits for emissions from similar operations by the same source owner or operator at multiple temporary locations. IDAPA 58.01.01.336 (Tier I Operating Permits for Tier I Portable Sources) states, "…the operation must be temporary and involve at least one change of location during the term of the permit." (Idaho Office of the Administrative Rules Coordinator, 2015)

State Preconstruction Permits

The Idaho DEQ requires construction permits under IDAPA 58.01.01.201 (Permit to Construct Required) before any owner or operator may "commence construction or modification of any stationary source, facility, major facility, or major modification." (Idaho Office of the Administrative Rules Coordinator, 2015).

The Idaho DEQ allows preconstruction permits under IDAPA 58.01.01.213.01 (Pre-Permit Construction Eligibility) for "non-major sources, non-major modifications and new sources or modifications that have the potential to emit below major source levels [see Table 5.1.12-2]" (Idaho Office of the Administrative Rules Coordinator, 2015).

General Conformity

Established under Section 176(c)(4) of the CAA, "the General Conformity Rule ensures that the actions taken by federal agencies in nonattainment and maintenance areas do not interfere with a state's plans to meet national standards for air quality" outlined in the state implementation plan (SIP) (USEPA, 2013). An action in designated nonattainment and maintenance areas would be evaluated for the emission of those particular pollutants under the General Conformity Rule through an applicability analysis. Pursuant to Title 40 CFR 93.153(d)(2) and (e), Federal actions "in response to emergencies which are typically commenced on the order of hours or days after the emergency" and actions "which are part of part of a continuing response to emergency or disaster" that are taken up to 6 months after beginning response activities, will be exempt from any conformity determinations (U.S. GPO, 2010).

The estimated pollutant emissions are compared to *de minimis*[134] levels. These values are the minimum thresholds for which a conformity determination must be performed (see Table 5.1.12-3). As a result, lower *de minimis* thresholds for VOCs and NO_X could apply depending on the attainment status of a county.

Table 5.1.12-3: *De Minimis* Levels

Pollutant	Area Type	TPY
Ozone (VOC or NO_X)	Serious Nonattainment	50
	Severe Nonattainment	25
	Extreme Nonattainment	10
	Other areas outside an OTR	100
Ozone (NO_X)	Maintenance	100
Ozone (VOC)	Maintenance outside an OTR	100
CO, SO_2, NO_2	All Nonattainment and Maintenance	100
PM_{10}	Serious Nonattainment	70
	Moderate Nonattainment and Maintenance	100
$PM_{2.5}$ (Direct Emissions) (SO_2) (NO_X (unless determined not to be a significant precursor)) (VOC or ammonia (if determined to be significant precursors))	All Nonattainment and Maintenance	100
Lead	All Nonattainment and Maintenance	25

Source: (U.S. GPO, 2010)

If an action does not result in an emissions increase above the *de minimis* levels in Table 5.1.12-3, then a conformity determination is not required. If the applicability analysis shows that the total direct and indirect emissions are above the *de minimis* levels in Table 5.1.12-3, then the action must undergo a conformity determination. The federal agency must first show that the action would meet all SIP control requirements and that any new emissions would not cause a

[134] de minimis: "40 CFR 93 § 153 defines de minimis levels, that is, the minimum threshold for which a conformity determination must be performed, for various criteria pollutants in various areas." (USEPA, 2016k)

new violation of the NAAQS. To demonstrate conformity,[135] the agency would have to fulfill one or more of the following:

- Show any emissions increase is specifically identified and accounted for in the respective state's SIP;
- Receive acknowledgement from the state that any increase in emissions would not exceed the SIP emission budget;
- Receive acknowledgement from the state to revise the SIP and include emissions from the action;
- Show the emissions would be fully offset by implementing reductions from another source in the same area; and
- Conduct air quality modeling that demonstrates the emissions would not cause or contribute to new violations of the NAAQS, or increase the frequency or severity of any existing violations of the NAAQS (USEPA 2010).

State Implementation Plan Requirements

The Idaho SIP is composed of many related actions to ensure ambient air concentrations of the six criteria pollutants comply with the NAAQS. Idaho's SIP is a conglomeration of separate actions taken for each of the pollutants. All of Idaho's SIP actions are codified under 40 CFR Part 52 Subpart N. A list of all SIP actions for all six criteria pollutants can be found on the Idaho DEQ website.[136] (DEQ, 2015o)

5.1.12.3 Environmental Setting: Ambient Air Quality

Nonattainment Areas

The USEPA classifies areas as attainment, nonattainment, maintenance, or unclassifiable for six criteria pollutants. When evaluating an area's air quality against regulatory thresholds (i.e., permitting and general conformity), maintenance areas are often combined with nonattainment, while unclassifiable areas are combined with attainment areas. Figure 5.1.12-1 and Table 5.1.12-4, below, present the current nonattainment areas in Idaho as of January 30, 2015. The year(s) listed in the table for each pollutant indicate when USEPA promulgated the standard for that pollutant; note that, for $PM_{2.5}$ and PM_{10} these standards listed are in effect." Table 5.1.12-4 contains a list of the counties and their respective current nonattainment status for each criteria pollutant. The year(s) listed in the table for each pollutant indicate the date(s) when USEPA promulgated an ambient air quality standard for that pollutant. Note certain pollutants have more than one standard in effect (e.g., $PM_{2.5}$, O_3, and SO_2). Unlike Table 5.1.12-4, Figure 5.1.12-1 does not differentiate between standards for the same pollutant. Additionally, given that particulate matter is the criteria pollutant of concern, PM_{10} and $PM_{2.5}$ merge in the figure to count as a single pollutant.

[135] Conformity: Compliance with the State Implementation Plan.
[136] Idaho DEQ Air Quality Monitoring website: http://www.deq.idaho.gov/air-quality/planning/

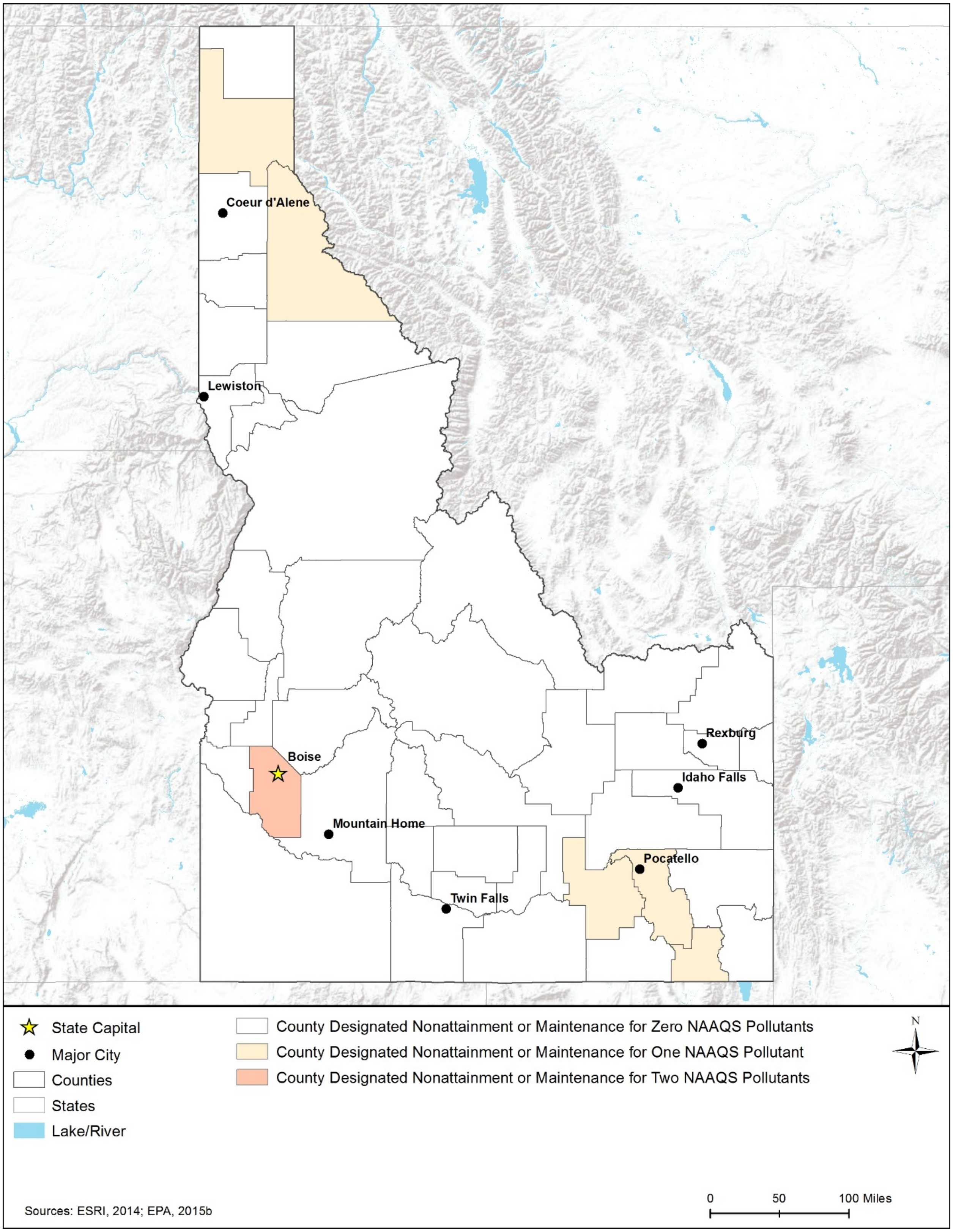


Figure 5.1.12-1: Nonattainment and Maintenance Counties in Idaho

Table 5.1.12-4: Idaho Nonattainment and Maintenance Areas by Pollutant and County

County	Pollutant and Year USEPA Implanted Standard											
	CO	Lead		NO_2	PM_{10}	$PM_{2.5}$			O_3		SO_2	
	1971	1978	2008	1971	1987	1997	2006	2012	1997	2008	1971	2010
Ada	M				M							
Bannock (Portneuf Valley, ID)					M							
Bannock (Fort Hall Indian Reservation)					X-4							
Bonner					M							
Franklin							X-4					
Power (Portneuf Valley, ID)					M							
Power (Fort Hall Indian Reservation)					X-4							
Shoshone					X-4			X-4				

Source: (USEPA, 2015f)

X-1 = Nonattainment Area (Extreme)
X-2 = Nonattainment Area (Severe)
X-3 = Nonattainment Area (Serious)
X-4 = Nonattainment Area (Moderate)
X-5 = Nonattainment Area (Marginal)
X-6 = Nonattainment Area (Unclassified)
M = Maintenance Area

Air Quality Monitoring and Reporting

The Idaho DEQ measures air pollutants at 28 sites across the state as part of the National Air Monitoring Stations Network and the State and Local Air Monitoring Stations Network (DEQ, 2015p). Annual Idaho State Ambient Air Quality Reports are prepared, containing pollutant data summarized by region (DEQ, 2015q). The Idaho DEQ reports real-time pollution levels of NO_2, O_3, SO_2, PM_{10}, $PM_{2.5}$, CO, and Pb on their website (DEQ, 2016a).

Throughout 2013, O_3 measurements exceeded the federal standard of 0.075 ppm two times at Boise-White Pine (Ada County). PM_{10} measurements exceeded the federal 24-hour standard of 150 $\mu g/m^3$ one time at Pinehurst (Shoshone County). $PM_{2.5}$ measurements violated the federal 24-hour standard of 35 $\mu g/m^3$ over ten times at Pinehurst (Shoshone County) and Salmon (Lemhi County), and nine times at Meridian-St. Luke's (Ada County). No exceedances were measured for CO, SO_2, and NO_x. (DEQ, 2015r)

Air Quality Control Regions

USEPA classified all land in the United States as a Class I, Class II, or Class III Federal Air Quality Control Region (AQCR) (42 U.S.C. § 7470). Class I areas include international parks, national wilderness areas which exceed 5,000 acres in size, national memorial parks which exceed 5,000 acres in size, and national parks which exceed 6,000 acres in size. Class I areas cannot be re-designated as Class II or Class III and are intended to maintain pristine air quality. Although USEPA developed the standards for a Class III AQCR, to date they have not actually classified any area as Class III. Therefore, any area that is not classified as a Class I area is, by default, automatically designated as a Class II AQCR (42 U.S.C. § 7472).

In a 1979 USEPA memorandum, the Assistant Administrator for Air, Noise, and Radiation (USEPA 1979) advised USEPA Regional Offices to provide notice to the Federal Land Manager (FLM) of any facility subject to the Prevention of Significant Deterioration (PSD) permit requirements and within 100 kilometers[137] of a Class I area. "The [US]EPA's policy is that FLMs should be notified by the Regional Office about any project that is within 100 kilometers of a Class I area. For sources having the capability to affect air quality at greater distances, notification should also be considered for Class I areas beyond 100 kilometers" (Page, 2012). The 2005 USEPA guidelines for air quality modeling do not provide a precise modeling range for Class I areas.

PSD applies to new major sources or major modifications at existing sources for pollutants where the source is in an attainment or unclassifiable area. An air quality analysis is required for sources subject to PSD requirements and generally consists of using a dispersion model to evaluate emission impacts to the area. "Historically, the [US]EPA guidance for modeling air quality impacts under the PSD program has tended to focus more on the requirements for a Class II modeling analysis. If an action is considered major source and consequently subject to PSD requirements, the air quality impact analysis need only to analyze the impacts to air quality within 100 kilometers from the source (the normal useful range of [US]EPA-approved Gaussian plume models" (USEPA, 1992).

Idaho has four Class I areas: the Craters of the Moon Wilderness, Sawtooth Wilderness, Hells Canyon Wilderness, and Selway-Bitterroot Wilderness. Several adjacent states contain Class 1 areas where the 100-kilometer buffer intersects Idaho counties: Oregon has two, Montana and Wyoming both contain four (including Yellowstone National Park in Wyoming), and Nevada has one Class I area. Any PSD-applicable action within these counties would require FLMs notification from the appropriate Regional Office (USEPA, 2012d).

Figure 5.1.12-2 is a map of Idaho highlighting all relevant Class I areas and all areas within a 100 kilometer radius. The numbers next to each of the highlighted Class I areas in Figure 5.1.12-2 correspond to the numbers and Class I areas listed in Table 5.1.12-5.

[137] The memorandum and associated guidance use kilometers. 100 kilometers is equal to about 62 miles.

Table 5.1.12-5: Relevant Federal Class I Areas

#[a]	Area	Acreage	State
1	Craters of the Moon Wilderness	43,243	ID
2	Sawtooth Wilderness	216,383	ID
3	Hells Canyon Wilderness	192,700	ID-OR
4	Selway-Bitterroot Wilderness	1,240,700	ID-MT
5	Eagle Cap Wilderness	293,476	OR
6	Cabinet Mountains Wilderness	94,272	MT
7	Anaconda Pintler Wilderness	157,803	MT
8	Red Rock Lakes Wilderness	32,350	MT
9	Yellowstone NP	2,020,625	ID-WY
10	Grand Teton NP	305,504	WY
11	Teton Wilderness	557,311	WY
12	North Absaroka Wilderness	351,104	WY
13	Jarbridge Wilderness	64,667	NV

Source: (USEPA, 2012d)

[a] The numbers correspond to the shaded regions in Figure 5.1.12-2.

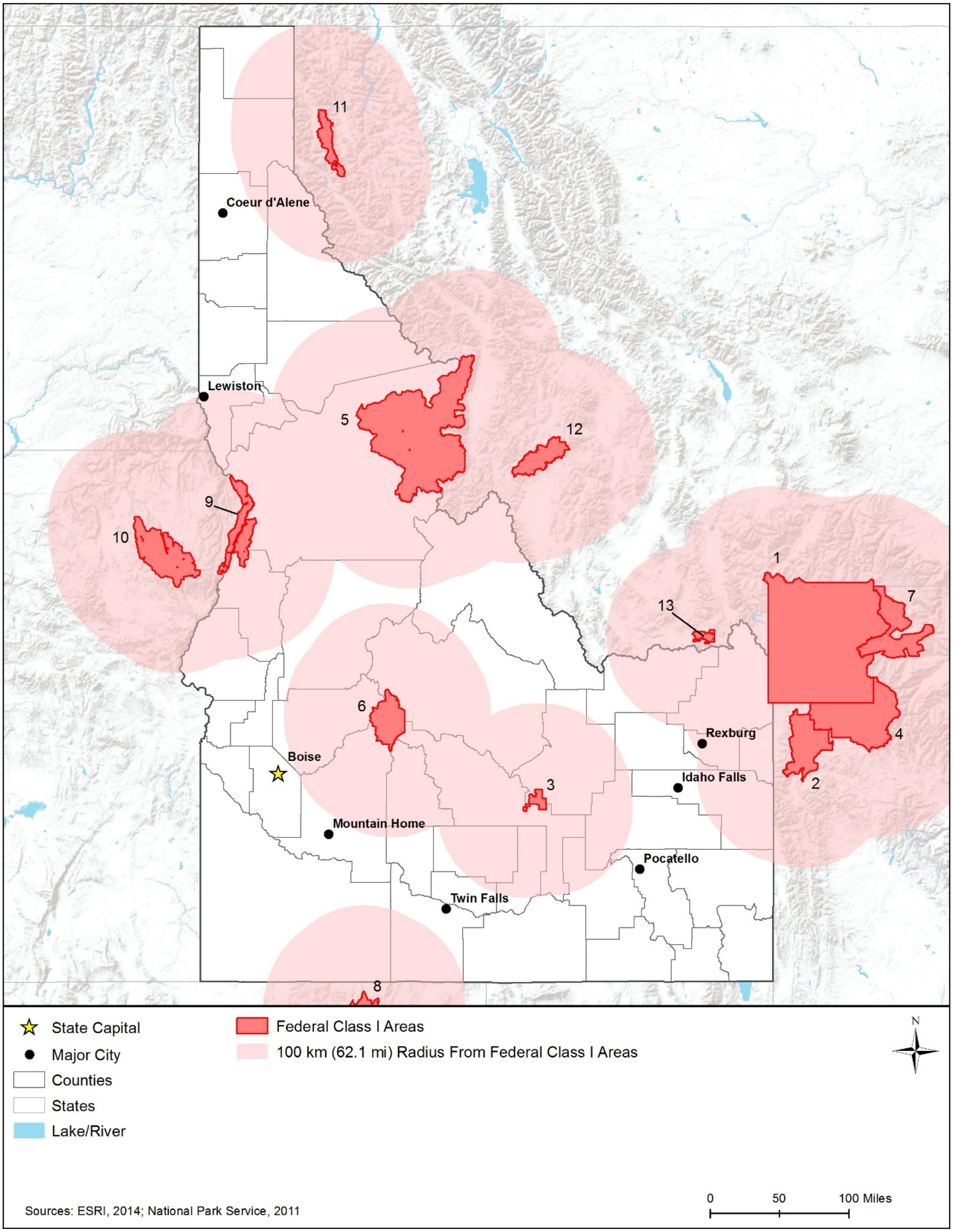


Figure 5.1.12-2: Federal Class I Areas with Implications for Idaho

5.1.13 Noise

This section presents a discussion of a basic understanding of environmental noise, background/ambient noise levels, noise standards, and guidelines.

5.1.13.1 Definition of the Resource

Noise is caused by pressure variations that the human ear can detect and is often defined as unwanted sound (USEPA, 2012a). Noise is one of the most common environmental issues that interferes with normal human activities and otherwise diminishes the quality of the human environment. Typical sources of noise that result in this type of interference in urban and suburban surroundings includes interstate and local roadway traffic, rail traffic, industrial activities, aircraft, and neighborhood sources like lawn mowers, leaf blowers, etc.

The effects of noise can be classified into three categories:

- Noise events that result in annoyance and nuisance;
- Interference with speech, sleep, and learning; and
- Physiological effects such as hearing loss and anxiety.

Fundamentals of Noise

For environmental noise analyses, a noise metric refers to the unit that quantitatively measures the effect of noise on the environment. The unit used to describe the intensity of sound is the decibel (dB). Audible sounds range from 0 dB ("threshold of hearing") to about 140 dB ("threshold of pain") (OSHA, 2016a). The vibration frequency characteristics of the sound, measured as sound wave cycles per second [Hertz (Hz)], determines the pitch of the sound (Federal Transit Authority, 2006). The normal audible frequency range is approximately 20 Hz to 20 kHz (FAA, 2015g). The A-weighted scale, denoted as dBA, approximates the range of human hearing by filtering out lower frequency noises, which are not as damaging as the higher frequencies. The dBA scale is used in most noise ordinances and standards (OSHA, 2016a).

Measurements and descriptions of noise (i.e., sounds) are based on various combinations of the following factors (Federal Transit Authority, 2006):

- The total sound energy radiated by a source, usually reported as a sound power level.
- The actual air pressure changes experienced at a particular location, usually measured as a sound pressure level (SPL) (the frequency characteristics and SPL combine to determine the loudness of a sound at a particular location).
- The duration of a sound.
- The changes in frequency characteristics or pressure levels through time.

Figure 5.1.13-1 presents the sound levels of typical events that occur on a daily basis in the environment. For example, conversational speech is measured at about 55 to 60 dBA, whereas a band playing loud music may be as high as 120 dBA.

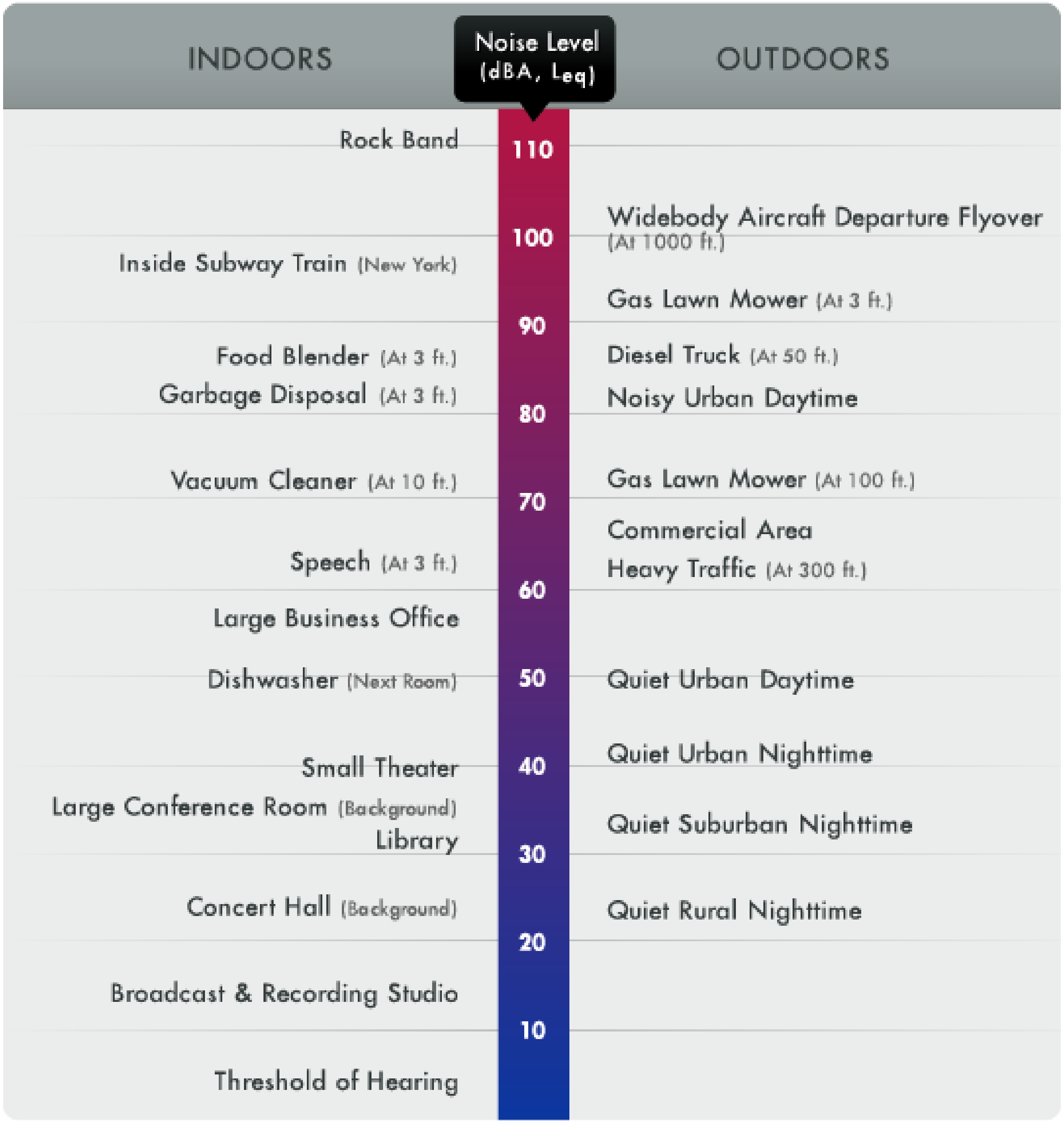


Figure 5.1.13-1: Sound Levels of Typical Sounds

Leq: Equivalent Continuous Sound Level
Source: (Sacramento County Airport System, 2015)
Prepared by: Booz Allen Hamilton

Because of the logarithmic unit of measurement, sound levels cannot be added or subtracted linearly. However, several methods of estimating sound levels can be useful in determining approximate sound levels. First, if two sounds of the same level are added, the sound level increases by approximately three dB (for example: 60 dB + 60 dB = 63 dB). Secondly, the sum of two sounds of a different level is slightly higher than the louder level (for example: 60 dB + 70 dB = 70.4 dB).

The changes in human response to changes in dB levels is categorized as follows (Federal Transit Authority, 2006):

- A 3-dB change in sound level is considered a barely noticeable difference;
- A 5-dB change in sound level will typically result in a noticeable community response; and
- A 10-dB change, which is generally considered a doubling of the sound level, almost certainly causes an adverse community response.

In general, ambient noise levels are higher during the day than at night and typically this difference is about 10 dB (USEPA, 1973). Ambient noise levels can differ considerably depending on whether the environment is urban, suburban, or rural.

5.1.13.2 Specific Regulatory Considerations

As identified in Appendix C, Environmental Laws and Regulations, the Noise Control Act of 1972, along with its subsequent amendments (e.g., Quiet Communities Act of 1978 [42 U.S.C. Parts 4901−4918]), delegates authority to the states to regulate environmental noise and directs government agencies to comply with local community noise statutes and regulations. Although no federal noise regulations exist, the USEPA has promulgated noise guidelines (USEPA, 1974). Similarly, most states have no quantitative noise-limit regulations.

Idaho does not have any statewide noise laws that would apply to the activities covered under the Proposed Action. Statewide noise laws that do exist cover mainly motor vehicles, including emergency vehicles, and ATVs and snowmobiles. Title 75-4523 and Title 75-4535 would apply to motor vehicles used as deployable technologies, but these restrictions would likely already be implemented into these vehicles before the Proposed Action even occurred.

Many cities and towns may have additional, local noise ordinances to further manage community noise levels. The noise limits specified in such ordinances are typically applied to define noise sources and specify a maximum permissible noise level. Large cities and towns, such as Boise are likely to have different regulations than rural or suburban communities largely due to the population density and difference in ambient noise levels (FHWA, 2011). Table 5.1.13-1 provides an overview of Idaho's state laws relating to noise.

Table 5.1.13-1: Relevant Idaho Noise Laws and Regulations

State Law/ Regulation	Regulatory Agency	Applicability
Chapter 49-937	Idaho General Assembly (IGA)	Statewide regulation of noise from motor vehicle exhaust systems

5.1.13.3 Environmental Setting: Ambient Noise

The range and level of ambient noise in Idaho varies widely based on the area and environment of the area. The population of Idaho can choose to live and interact in areas that are large cities, rural communities, and national and state parks. Table 5.1.13-1 illustrates noise values for typical community settings and events that are representative of what the population of Idaho may experience on a day-to-day basis. These noise levels represent a wide range and are not specific to Idaho. As such, this section describes the areas where the population of Idaho can potentially be exposed to higher than average noise levels.

- **Urban Environments:** Urban areas have higher noise levels due to the higher prevalence of vehicle traffic (70 to 90 dBA), construction noise (90 to 120 dBA), and outdoor conversations (e.g., small/large groups of people) (60 to 90 dBA) (U.S. Department of Interior, 2008). Urban areas in Idaho are Coeur d'Alene, Lewiston, Boise City, Pocatello, and Idaho Falls (U.S. Census Bureau, 2015d).
- **Airports:** Areas surrounding airports tend to be more sensitive to noise due to aircraft operations that occur throughout the day. A jet engine aircraft can produce between 130 to 160 dBA in its direct proximity (FAA, 2007). However, commercial aircraft are most likely to emit noise levels between 70 to 100 dBA depending of the type of aircraft and associated engine (FAA, 2012). This noise will be perceived differently based on the altitude of the aircraft and its distance to the point of measurement. Airport operations are primarily arrivals and departures of commercial aircraft but based on the type of airport, can include touch-and-go operations that are typical of general aviation airports and military airfields. The location of most commercial airports are in the proximity of urban communities; therefore, aircraft operations (arrivals/departures) can result in noise exposure in the surrounding areas to be at higher levels with the potential for increased noise levels during peak operation times (early morning and evenings), when there is an increase in air traffic. The noise levels in areas surrounding commercial airports can have significantly higher ambient noise levels than in other areas. In Idaho, Boise Airport (BOI) and Idaho Falls Regional Airport (IDA) have combined annual operations of more than 161,000 flights (FAA, 2015j). These operations result in increased ambient noise levels in the surrounding communities. See Section 5.1.1, Infrastructure, and Figure 5.1.7-5 for more information about airports in the state.
- **Highways:** Communities near major highways also experience higher than average noise levels when compared to areas that are not in close proximity to a highway (FHWA, 2015d). There are a number of major highways within the state that may contribute to higher ambient noise levels for residents living in those areas. The major highways in the state tend to have higher than average ambient noise levels on nearby receptors, ranging from 52 to 75 dBA (FHWA, 2015d). See Section 5.1.1, Public Safety Infrastructure, and Figure 5.1.1-1 for more information about the major highways in the state.
- **Railways:** Like highways, railways tend to have higher than average ambient noise levels for residents living in close proximity (Federal Transit Authority, 2006). Railroad operations can produce noise ranging from 70 dBA for an idling locomotive to 115 dBA when the locomotive engineer rings the horn while approaching a crossing (DOT, 2015). Idaho has multiple rail corridors with high levels of commercial and commuter rail traffic. These major rail corridors are the Burlington Northern rail line and the Union Pacific rail line. There are also a number of other rail corridors that join these major rail lines and connect with other cities (ITD, 1996). See Section 5.1.1, Public Safety Infrastructure, and Figure 5.1.1-1 for more information about rail corridors in the state.
- **National and State Parks:** The majority of national and state parks are likely to have lower than average ambient noise levels given their size and location in wilderness areas. National and state parks, historic areas, and monuments are protected areas. These areas typically

have lower noise levels, as low as 30 to 40 dBA (NPS, 2014i). Idaho has 10 NPS units and 11 National Natural Landmarks (NPS, 2015l). Visitors to these areas expect lower ambient noise conditions than the surrounding urban areas. See Section 5.1.8, Visual Resources, for more information about national and state parks for Idaho.

5.1.13.4 Sensitive Noise Receptors

Noise-sensitive receptors include residences, schools, medical facilities, places of worship, libraries, churches, nursing homes, concert halls, playgrounds, and parks. Sensitive noise receptors are typically areas where the intrusion of noise can disrupt the use of the environment. A quiet urban area usually has a typical noise level in the daytime of 50 dBA, and 40 dBA during the evening. Noise levels in remote wilderness and rural nighttime areas are usually 30 dBA (BLM, 2014). Most cities and towns in Idaho have at least one school, church, or park, in addition to likely having other noise-sensitive receptors. There are most likely thousands of sensitive receptors in Idaho.

5.1.14 Climate Change

5.1.14.1 Definition of the Resource

Climate change, according to the Intergovernmental Panel on Climate Change (IPCC), is defined as "…a change in the state of the climate that can be identified (e.g., using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or human activity." (IPCC, 2007)

Accelerated rates of climate change are linked to an increase in atmospheric concentrations of greenhouse gas (GHG) caused by emissions from human activities such as burning fossil fuels to generate electricity (USEPA, 2012b). The IPCC is now 95 percent certain that humans are the main cause of current global warming (IPCC, 2013). Human activities result in emissions of four main GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and halocarbons (a group of gases containing fluorine, chlorine, or bromine) (IPCC, 2007). The common unit of measurement for GHGs is metric tons of CO_2-equivalent (MT CO_2e[138]), which equalizes for the different global warming potential of each type of GHG. Where this document references emissions of CO_2 only, the units will be in million metric tons (MMT) CO_2. Where the document references emissions of multiple GHGs, the units are in MMT CO_2e.

"Global concentrations of these four GHGs have increased significantly since 1750" (IPCC, 2007). "Atmospheric concentrations of CO_2 increased from 280 parts per million (ppm) of carbon in 1750 to 379 ppm of carbon in 2005" (IPCC, 2007). The atmospheric concentration of CH_4 has increased from a pre-industrial value of about 715 parts per billion (ppb) to 1,774 ppb in 2005 (IPCC, 2007). "Atmospheric concentrations of N_2O increased from a pre-industrial value

[138] CO_2e refers to Carbon Dioxide Equivalent, "A metric measure used to compare the emissions from various greenhouse gases based upon their global warming potential (GWP). Carbon dioxide equivalents are commonly expressed as million metric tons of carbon dioxide equivalents ($MMTCO_2e$). The carbon dioxide equivalent for a gas is derived by multiplying the tons of the gas by the associated GWP. $MMTCO_2e$ = (million metric tons of a gas) * (GWP of the gas)" (USEPA, 2016l)

of about 270 ppb to 319 ppb in 2005" (IPCC, 2007). "Many halocarbons have increased from a near-zero pre-industrial concentrations, primarily due to human activities" (IPCC, 2007).

Both the GHG emissions effects of the Proposed Action and Alternatives, and the relationships of climate change effects to the Proposed Action and Alternatives, will be considered in this PEIS (see Chapter Four, Environmental Consequences). Therefore, to form the baseline against which to assess possible impacts from the Proposed Action, the existing climate conditions in the project area will be described first by state and sub-region, where appropriate, and then future projected climate scenarios will be described by state and sub-region. The discussion will focus on the following climate change impacts: 1) temperature; 2) precipitation; and 3) severe weather events (including tropical storms, tropical cyclones, and hurricanes).

5.1.14.2 Specific Regulatory Considerations

The pertinent federal laws relevant to the protection and management of climate change are summarized in Appendix C, Environmental Laws and Regulations. Idaho has not established goals and regulations to reduce GHG emissions to combat climate change. However, as shown in Table 5.1.14-1, the city of Boise, Idaho has established a policy for climate change preparedness and GHG emissions.

Table 5.1.14-1: Relevant Idaho Climate Change Laws and Regulations

State Laws/Regulations	Regulatory Agency	Applicability
Climate Protection Program	City of Boise, Idaho	On August 16, 2006, Mayor Bieter signed the U.S. Mayors Climate Protection Agreement making Boise the 1st city in Idaho to endorse the agreement. The agreement requires cities to take steps to reduce GHG emissions associated with global climate change through such measures as energy-efficient building practices, alternative fuels, and improved transportation and land-use planning. A resolution approving Boise's participation in U.S. Mayors Climate Protection Agreement was passed by City Council on September 19, 2006. The resolution indicates City leader's agreement that the city of Boise will strive to meet or exceed the Kyoto Protocol GHG emission reduction target of 7 percent reduction from 1990 greenhouse gas emissions level by 2012

5.1.14.3 Idaho Greenhouse Gas Emissions

Estimates of Idaho's total GHG emissions vary. The Department of Energy's (DOE) Energy Information Agency (EIA) collects and disseminates national-level emissions data on other GHGs such as methane (CH_4) and nitrous oxide (NO_x), but not at the state level (EIA, 2011). The USEPA also collects and disseminates national-level GHG emissions data, but by economic sector, not by state (USEPA, 2015g). Individual states have developed their own GHG inventories, which are updated with different frequencies and trace GHG in a variety of ways.

For the purposes of this PEIS, the EIA data on CO_2 emissions are used as the baseline metric to ensure consistency and comparability across the 50 states. However, if additional data sources on GHG emissions are available for a given state, including other GHGs such as CH_4, they are described and cited.

According to the EIA, Idaho emitted a total of 16.7 million metric tons (MMT) of CO_2 in 2013 (Table 5.1.14-2) (EIA, 2015d). Idaho's carbon emissions are very low due to its small population and because 78 percent of its net electricity generation comes from renewable resources, especially hydroelectricity and wind (EIA, 2014). Annual emissions between 1980 and 1986 declined, and then increased with occasional declines (1992, 2003) before stabilizing at their current levels. Increases came largely from petroleum products and natural gas. Emissions from coal have been declining slightly for the last decade, but increased in 2013 as a result of modest increases from all sources (Figure 5.1.14 1) (EIA, 2015d). Sixty-four percent of Idaho's CO_2 emissions come from petroleum products from the transportation sector. Natural gas accounts for another 32 percent, almost entirely emitted by the electric power sector. Idaho burns very little coal and only three percent of its emissions come from that fuel. Idaho is ranked 44th among the states for total CO_2 emissions (EIA, 2014), and 42nd for per-capita CO_2 emissions (EIA, 2015e).

Table 5.1.14-2: Idaho CO_2 Emissions from Fossil Fuels by Fuel Type and Sector, 2012

Fuel Type (MMT)		Source (MMT)	
Coal	0.7	Residential	1.6
Petroleum Products	10.7	Commercial	1.3
Natural Gas	5.7	Industrial	3.5
		Transportation	8.8
		Electric Power	1.3
TOTAL	**16.7**	**TOTAL**	**16.7**

Source: (EIA, 2015f)

The majority of Idaho's GHG emissions is CO_2. These emissions are the result of fossil fuel combustion for producing energy, mostly petroleum products from electric power generating facilities and coal-fired power plants. Other major GHGs emitted in Idaho are CH_4, hydrofluorocarbons, NO_x, sulfur hexafluoride (SF_6) and perfluorocarbons (DEQ, 2016b).

The DEQ commissioned The Center for Climate Change Strategies to prepare a 1990 – 2020 greenhouse gas emission inventory for the state of Idaho. Total U.S. GHG emissions were 6,673 million metric tons (14.7 trillion pounds) in 2013 (USEPA, 2015u). In 2013, Idaho emitted 16.7 million metric tons of CO_2. In 2013, Idaho had 10.4 metric tons of CO_2 per capita, compared to 16.7 metric tons nationwide, per capita (EIA, 2015g). Emissions came from energy related activities across all sectors such residential (11.4 percent) commercial (7.8 percent) industrial (21.0 percent) and transportation (52.7 percent) (EIA, 2015g).

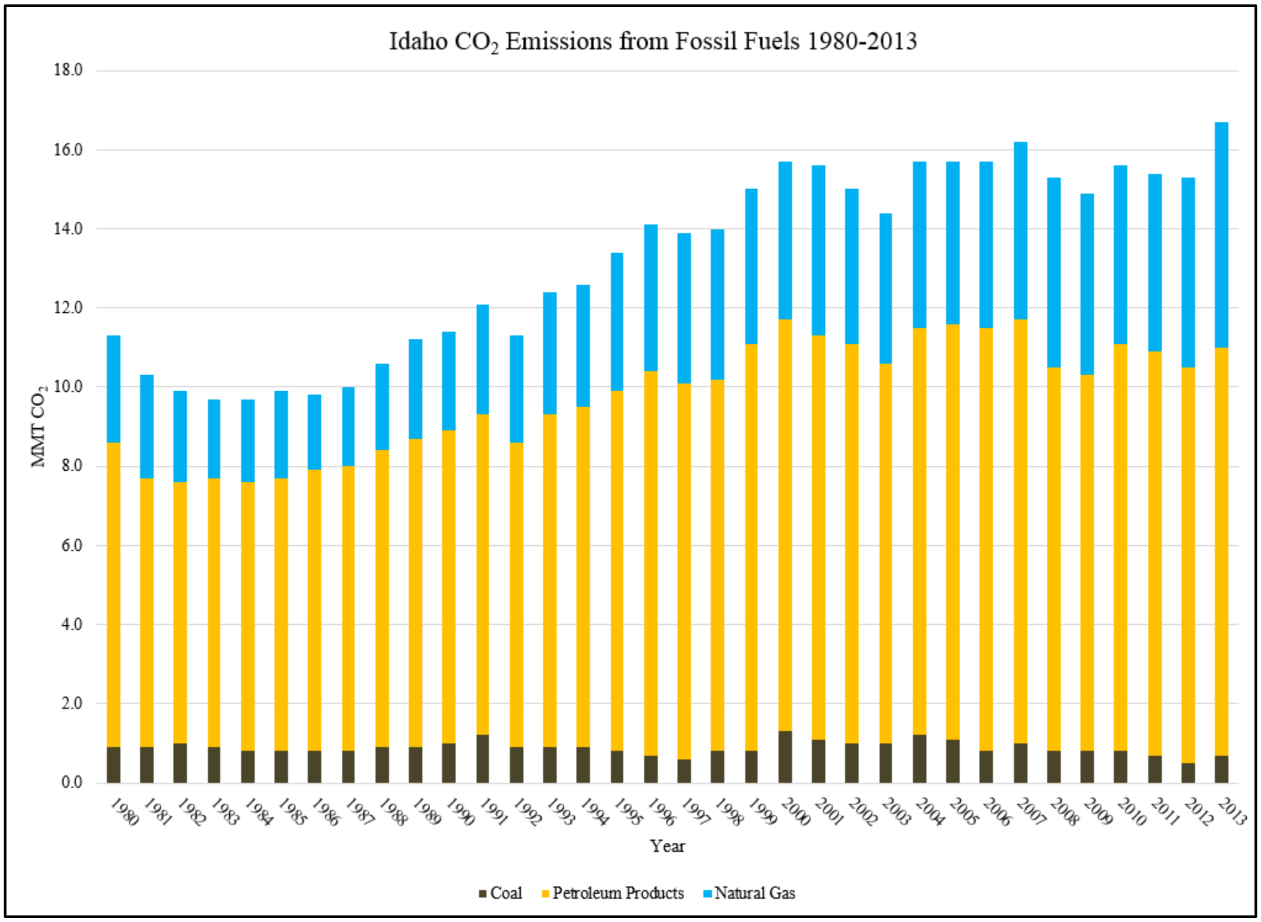


Figure 5.1.14-1: Idaho CO_2 Emissions from Fossil Fuels by Fuel Type 1980-2013

Source: (EIA, 2015f)

Although, petroleum is the main energy resource used in Idaho, the state does not produce or refine petroleum. Instead, the resources enter the state through pipelines. Idaho only produces small amounts of natural gas but is looking to expand production. Because the majority of residents use natural gas for home heating, the residential and industrial sectors are the largest consumers of natural gas (CCS, 2008) (EIA, 2016b).

In 2000, agriculture emissions accounted for 24 percent, much higher than the national average. Emissions have continued to grow 0.2 percent annually primarily due to a growing dairy cattle and beef cattle population. Emissions from the industrial sector will continue to rise from, “enteric fermentation, manure management, and agricultural soils” (CCS, 2008) (EIA, 2016b).

The transportation sector continues to have a significant impact on statewide GHG emissions. Between 1990 and 2002 transportation fuel use increased by 2.6 percent annually. In 2002, on road vehicle emissions accounted for 70 percent while diesel vehicles increased by 72 percent. GHG emissions are likely to continue to rise in Idaho at a rate of 1.7 percent annually; however, new emission regulations and vehicle energy standards will help slow down GHG emissions from this sector (CCS, 2008).

Idaho has very low electricity rates because hydroelectric power plants provide most of the state's electricity generation. "Idaho typically gets nearly 85 percent of its net electricity generation from renewable resources, a larger share than any other state" (EIA, 2016b). Since 2004, new and proposed power plants are a combination of natural gas, wind, and geothermal. Future greenhouse gas emissions are difficult to predict because emissions depend on the production of new power plants and emission levels from current plants. (CCS, 2008)

5.1.14.4 Environmental Setting: Existing Climate

The National Weather Service defines climate as the "reoccurring average weather found in any particular place" (NWS, 2011a). The widely accepted division of the world into major climate categories is referred to as the Köppen-Geiger climate classification system. Climates within this system are classified based "upon general temperature profiles related to latitude" (NWS, 2011a). The first letter in each climate classification details the climate group. The Köppen-Geiger system further divides climates into smaller sub-categories based on precipitation and temperature patterns. The secondary level of classification details the seasonal precipitation, degree of aridity, and presence or absence of ice. The tertiary levels distinguish different monthly temperature characteristics (NWS, 2011b).

The majority of Idaho falls into climate group (D). Climates classified as (D) are "moist continental mid-latitudinal climates," with "warm to cool summers and cold winters" (NWS, 2011a). In (D) climates, the "average temperature of the warmest month is greater than 50 degrees Fahrenheit (°F), while the coldest month is less than negative 22 °F" (NWS, 2011a). Winter months in (D) climate zones are cold and severe with "snowstorms, strong winds, and bitter cold from Continental Polar or Arctic air masses" (NWS, 2011a) (NWS, 2011b). Although the majority of Idaho is classified as climate group (D), potions of southern, southeastern, and southwestern Idaho are within climate group (B). Climates classified as (B) are dry climates, "in large continental regions of the mid-latitudes often surrounded by mountains" (NWS, 2011a). "The most obvious climatic feature of this climate is that potential evaporation and transpiration exceed precipitation" (NWS, 2011a). In addition, small regions of western and northwestern Idaho are within climate group (C). Climates classified as (C) are warm, with humid summers and mild winters. During winter months, "the main weather feature is the mid-latitude cyclone" (NWS, 2011a). During summer months, thunderstorms are frequent. Idaho has six sub-climate categories, which are described below in the following paragraphs (NWS, 2011a) (NWS, 2011b).

Bsk – The Köppen-Geiger climate classification system classifies northwestern, western, and southwestern regions such as Liberal, as Bsk. Climates classified as Bsk, are mid-latitude and dry. "Evaporation exceed precipitation on average but is less than potential evaporation" (NWS, 2011b). Average temperatures in Bsk climate zones are less than 64 °F (NWS, 2011a) (NWS, 2011b).

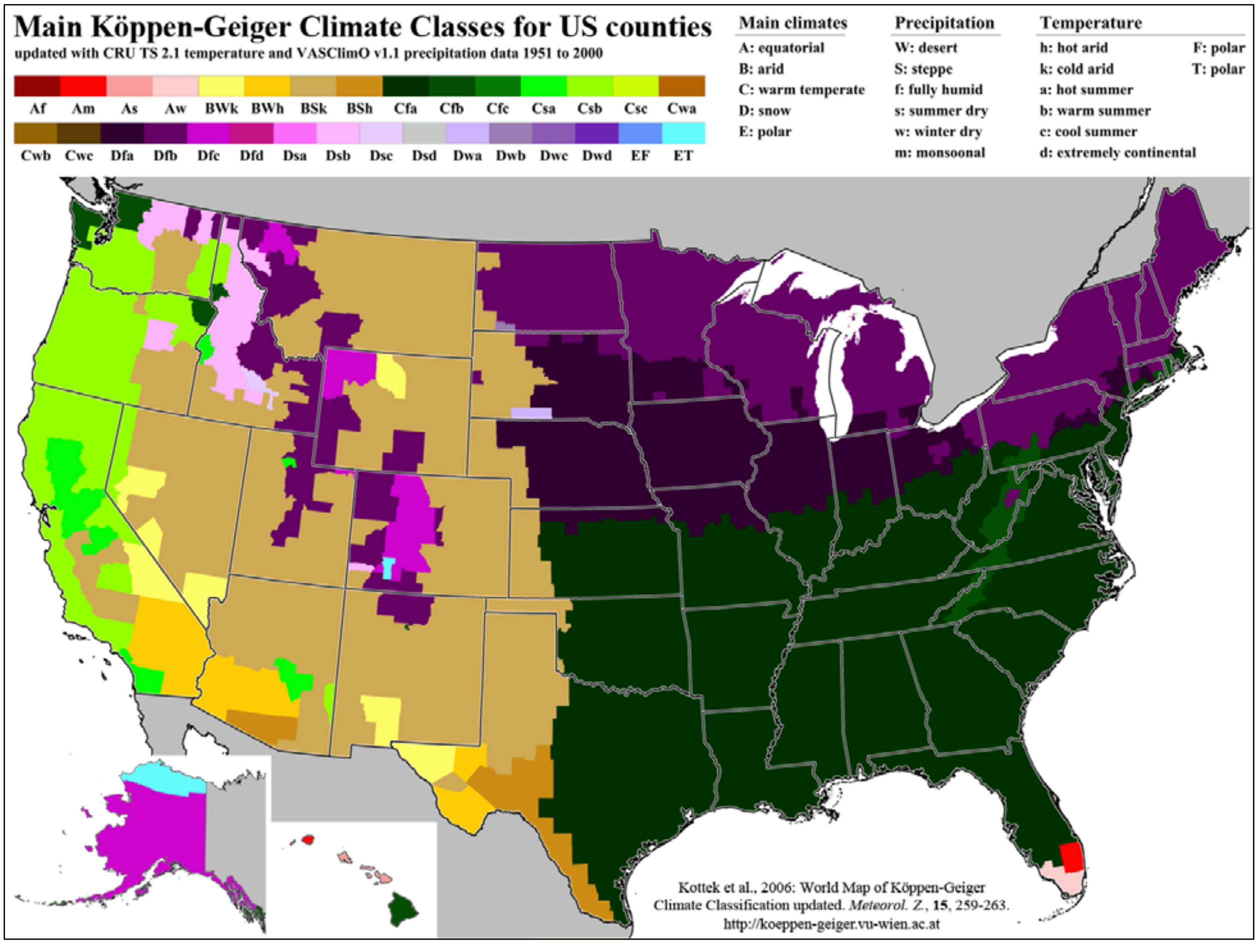


Figure 5.1.14-2: Köppen-Geiger Climate Classes for U.S. Counties

Source: (Kottek, World Map of the Köppen-Geiger Climate Classification, 2006)

Cfa – The Köppen-Geiger climate classification system classifies the majority of Kansas, including the capital Topeka, as Cfa. Cfa climates are generally warm, with humid summers and mild winters. In this climate classification zone, the secondary classification indicates year-round rainfall, but it is highly variable; thunderstorms are dominant during summer months. In this climate classification zone, the tertiary classification indicates mild, hot summers with average temperature of warm months over 72 °F. Average temperatures of the coldest months are under 64 °F. (NWS, 2011a) (NWS, 2011b)

Csa – The Köppen-Geiger climate classification system classifies portions of central and east central Arizona as Csa. Climates classified as Csa are Mediterranean climates, with mild temperatures and dry, hot summers. The warmest months in Csa climates are greater than 72 °F. A minimum of four months out of the year experience average temperatures that are greater than 50 °F. Csa climates experience frost during winter months and "at least three times as much precipitation during [the] wettest winter months as in the driest summer month" (NWS, 2011b). The coldest month in Csa climates is warmer than 26 °F but cooler than 64 °F. Summers in Csa climates are dry and mild (GLOBE SCRC, 2015) (NWS, 2011a) (NWS, 2011b).

Csb – The Köppen-Geiger climate classification system classifies areas of western Nevada as Csb. Climates classified as Csb are Mediterranean climates, with mild temperatures and cool, dry summers. In (Csb climates, the coldest months are warmer than 26 °F but cooler than 64 °F, with at least four months averaging temperatures greater than 50 °F (GLOBE SCRC, 2015) (NWS, 2011b). Summers in Csb climates are dry and mild (GLOBE SCRC, 2015). Winters in Csb climates typically have high levels of frost, with "at least three times as much precipitation during [the] wettest winter months as in the driest summer month" (NWS, 2011b). Csb climates are typically found on western sides of continents and near the coast (GLOBE SCRC, 2015) (NWS, 2011a) (NWS, 2011b).

Dfb – The Köppen-Geiger climate classification system classifies the majority of North Dakota, including northern, eastern, southern, and central regions, as Dfb. Climates classified as Dfb are characterized as humid, with warm summers and snowy winters. In this climate classification zone, the secondary classification indicates substantial precipitation during all seasons. In this climate classification zone, the tertiary classification indicates that at least four months out of the year averaging above 50 °F. (NWS, 2011a) (NWS, 2011b)

Dsb – The Köppen-Geiger climate classification system classifies a large area of north, central, and southern Idaho as Dsb. Climates classified as Dsb are experience dry conditions, with warm summers, and ample snow. Dsb climates experience at least one month that is colder than 26 °F. This climate is generally found in high elevations. (GLOBE SCRC, 2015) (NWS, 2011a) (NWS, 2011b)

This section discusses the current state of Idaho's climate with regard to air temperature, precipitation, and extreme weather events (e.g., flooding, severe blizzards, high winds, and tornadoes) in the state's six climate regions: Bsk, Cfa, Csa, Csb, Dfb, and Dsb.

Air Temperature

The topography of Idaho with "its mountains, canyons, and plains, produces a paradise of extremes" (Qualls, 2015). During winter months, the mountains, influenced by the Pacific Ocean, experience cool temperatures, and abundant snowfall. "Moist winters give way to dry, continental summers with hot daytime temperatures, but cool nights" (Qualls, 2015).

The state of Idaho is unique in that it "is among the states with the widest range between record maximum and minimum temperatures, having experienced 178 °F between the two" (Qualls, 2015). Average temperatures during July, Idaho's hottest month, range between 85 and 90 °F throughout most of the low-lying areas of the state. Low humidity in these areas results in average summertime lows between 40 and 50 °F. The greatest temperature to occur in Idaho was on July 28, 1934 with a record high of 118 °F in Orofino (SCEC, 2015). The lowest temperature to occur was on January 18, 1943 with a record low of negative 60 °F in Island Park (SCEC, 2015) (Qualls, 2015).

Precipitation

The mountainous regions as well as central and northern parts of Idaho receive the greatest accumulations of snowfall. "The maximum recorded winter snowfall of 441.8 inches occurred at Roland West Portal during the winter of 1949-50, and the highest annual average of 283.5 inches occurs at Mullan Pass" (Qualls, 2015). The greatest 24-hour precipitation accumulation occurred along Rattlesnake Creek on November 23, 1909 with a total of 7.17 inches (Qualls, 2015). The greatest 24-hour snowfall accumulation occurred near Anderson Dam on December 18, 1967 with a total of 31 inches (SCEC, 2015).

Severe Weather Events

Widespread flooding is one of Idaho's most destructive severe weather events, occurring mostly due to high intensity thunderstorms and rapid snowmelt. One of the state's most costly flooding events occurred in May 1948 within the Clearwater River Basin and was caused by a combination of rapid snowmelt and heavy rainfall. Throughout the basin, approximately 50 people were killed and over $102 million in damages was reported. In June 1976, the Teton Dam Failure also caused widespread flooding and damages in Sugar City and surrounding areas. When the dam failed on June 5, 1976, water was released at 2.3 million cubic-feet per second. In total, the flooding event caused 11 deaths and nearly $2 billion in damages. More recently, in June 2010, widespread flooding throughout the Payette River Basin destroyed homes, businesses, and roads, causing an estimated $2.4 million in damages in Payette County. Flood damages also extended into Valley County, where monetary losses totaled at least $1.3 million. Total public assistance for affected counties totaled approximately $5.3 million. (NOAA, 2015b)

Winter storms in Idaho are highly variable and range in size, intensity, and duration. Depending on the storm's intensity, they can last for hours or days, ranging from a "small amount of dry snow to a large blanketed area of wet snow and ice" (State of Idaho Hazard Mitigation Plan, 2013). Generally, winter storms in Idaho are "characterized by low temperatures and blowing snow" (State of Idaho Hazard Mitigation Plan, 2013). Approximately 31 counties in Idaho (out of 43 total counties) are classified as high-risk for winter storms. High-risk counties are "situated in winter storms patterns, severity, and duration of storms, and proximity to higher elevations" (State of Idaho Hazard Mitigation Plan, 2013). One of Idaho's most costly winter storms occurred in northern Idaho during the winter of 1996. In the last months of 1996, "mountain snow packs were holding more than 150 percent of their normal water content," leading to severe landslides and flooding throughout northern Idaho. Strong winds during the storm lead to downed numerous trees and powerlines, leading to extensive power outages, while heavy snowfall collapsed roofs of businesses, homes, and schools. As a result, 18 counties were declared federal disaster areas. (State of Idaho Hazard Mitigation Plan, 2013)

Tornadoes are uncommon to Idaho, especially in comparison to other parts of the country. On average, five tornadoes occur year, with the majority of storms occurring between May and September. (Livingston, 2013) (State of Idaho Hazard Mitigation Plan, 2013)

Thunderstorms and hailstorms are also common to Idaho, with storms occurring throughout the state each year. Thunderstorms and hailstorms are most common during summer months. One of the largest hailstones was recorded in Bonneville County in June 1996, with golf-ball sized stones. During two of Idaho's most damaging hail events, storms caused approximately $1 million in property damage in August 1997 and another $5 million in crop and other agricultural damage in July 1998. (State of Idaho Hazard Mitigation Plan, 2013)

5.1.15 Human Health and Safety

5.1.15.1 Definition of the Resource

The existing environment for health and safety is defined by occupational and environmental hazards likely to be encountered during the deployment, operation, and maintenance of towers, antennas, cables, utilities, and other equipment and infrastructure at existing and potential FirstNet telecommunication sites. There are two human populations of interest within the existing environment of health and safety, (1) telecommunication occupational workers and (2) the general public near telecommunication sites. Each of these populations could experience different degrees of exposure to hazards as a result of their relative access to FirstNet telecommunication sites and their function throughout the deployment of the FirstNet telecommunication network infrastructure.

The health and safety issues reviewed in this section include occupational safety for telecommunications workers, contaminated sites, and manmade or natural disaster sites. This section does not evaluate the health and safety risks associated with radio frequency (RF) radiation or vehicular traffic, or the transportation of hazardous materials and wastes. Vehicle traffic and the transportation of hazardous materials and wastes are evaluated in Section 5.1.1, Infrastructure.

5.1.15.2 Specific Regulatory Considerations

Federal organizations, such as OSHA, USEPA, the U.S. Department of Health and Human Services, and others protect human health and the environment. In Idaho, this resource area is regulated by the Idaho Department of Labor, and the DEQ regulates waste and environmental pollution. Health and safety of the general public is regulated by the Idaho Department of Health and Welfare (IDHW). Federal OSH regulations apply to workers through either OSHA, or stricter state-specific plans that must be approved by OSHA. Idaho does not have an OSHA-approved "State Plan." Therefore, public and private sector occupational safety and health programs in the state of Idaho are enforced by OSHA.

Federal laws relevant to protecting occupational and public health and safety are summarized in Appendix C, Environmental Laws and Regulations, and Section 1.8, Overview of Relevant Federal Laws and Executive Order. Table 5.1.15-1 below summarizes the major Idaho laws relevant to the state's occupational health and safety, hazardous materials, and hazardous waste management programs.

Table 5.1.15-1: Relevant Idaho Human Health and Safety Laws and Regulations

State Law/Regulation	Regulatory Agency	Applicability
Idaho Administrative Code: Chapter 58.01.11	DEQ	Establishes minimum requirements for the protection of groundwater.
Idaho Administrative Code: Chapter 58.01.18	DEQ	Details requirements for the remediation or redevelopment of sites, and creates a voluntary remediation program to encourage economic revitalization.
Idaho Administrative Code: Chapter 20.03.02	IDL	Provides for the protection of public health and safety by ensuring that lands disturbed by exploration or mining operations are reclaimed.

5.1.15.3 Environmental Setting: Existing Telecommunication Sites

There are many inherent health and safety hazards at telecommunication sites. Telecommunication site work is performed indoors, below ground level, on building roofs, over water bodies, and on communication towers. Tasks may also be performed at dangerous heights or confined spaces while operating heavy equipment, on energized equipment near underground and overhead utilities, and while using hazardous materials, such as flammable gases and liquids. Because telecommunication workers are often required to perform work outside, heat and cold exposure, precipitation, and lightning strikes also present hazard and risks depending on the task, occupational competency, and work-site monitoring (OSHA, 2016b). A summary description of the health and safety hazards present in the telecommunication occupational work environment is listed below.

Working from height, overhead work, and slips, trips, or falls – At tower and building-mount sites, workers regularly climb structures using fixed ladders or step bolts to heights up to 2,000 feet above the ground's surface (OSHA, 2015). In addition to tower climbing hazards, telecommunication workers have restricted workspace on rooftops or work from bucket trucks parked on uneven ground. Cumulatively, these conditions present fall and injury hazards to telecommunication workers, and the general public who may be observing the work or transiting the area. (International Finance Corporation, 2007a).

Trenches and confined spaces – Installation of underground utilities, building foundations, and work in utility manholes[139] are examples of when confined space work is necessary. Installation of telecommunication activities involves laying conduit and limited trenching (generally 6 to 12 inches in width). Confined space work can involve poor atmospheric conditions, requiring ventilation and rescue equipment. Additionally, when inside a confined space, worker movement is restricted and may prevent a rapid escape or interfere with proper work posture and ergonomics. (OSHA, 2016c)

Heavy equipment and machinery – New and replacement facility deployment and maintenance can involve the use of heavy equipment and machinery. During the lifecycle of a telecommunication site, heavy equipment such as bulldozers, backhoes, dump trucks, cement

[139] Manholes may be used for telecommunications activities, especially in cities and urban areas, depending on the location of other utilities. In cities, power, water, and telecommunication lines are often co-located; if access is through a manhole in the street, that access will be used.

trucks, and cranes are used to prepare the ground, transport materials and soil, and raise large sections of towers and antennas. Telecommunication workers may be exposed to the additional site traffic and often work near heavy equipment to direct the equipment drivers and to accomplish work objectives. Accessory machinery such as motorized pulley systems, hydraulic metal shears, and air driven tools present additional health and safety risks as telecommunication work sites. These pieces of machinery can potentially sever skin and bone, or cause other significant musculoskeletal injuries to the operator. (OSHA, 2016c)

Energized equipment and existing utilities – Electrical shock from energized equipment and utilities is an elevated risk at telecommunication sites due to the amount of electrical energy required for powering communication equipment and broadcasting towers. Telecommunication cables are often co-located with underground and overhead utilities, which can further increase occupational risk during earth-breaking and aerial work (International Finance Corporation, 2007a).

Optical fiber safety – Optical fiber cable installation and repair presents additional risks to telecommunications workers, including potential eye or tissue damage, through ingestion, inhalation, or other contact with glass fiber shards. The shards are generated during termination and splicing activities, and can penetrate exposed skin (International Finance Corporation, 2007b). Additionally, fusion splicing (to join optical fibers) in confined spaces or other environments with the potential for flammable gas accumulation presents risk of fire or explosion (Fiber Optic Association, 2010).

Noise – Sources of excess noise at telecommunication sites include heavy equipment operation, electrical power generators and other small engine equipment, air compressors, electrical and pneumatic power tools, and road vehicles, such a diesel engine work trucks. The cumulative noise environment has the potential to exceed the OSHA acceptable level of 85 decibels (dB) per 8-hour time weighted average (TWA) (see Section 10.1.13, Noise) (OSHA, 2002). Fugitive noise may emanate beyond the telecommunication work site and impact the public living in the vicinity, observing the work, or transiting through the area (OSHA, 2016c).

Hazardous materials and hazardous waste – Work at telecommunication sites may require the storage and use of hazardous materials such as fuel sources for backup power generators and compressed gases used for welding and metal cutting (new towers only). In some cases, telecommunication sites require use of potentially hazardous products (e.g., herbicides). Secondary hazardous materials (e.g., exhaust fumes) may present greater health risks than the primary hazardous material (e.g., diesel fuel). Furthermore, the use of hazardous materials creates down-stream potential to generate hazardous waste. While it is unlikely that any FirstNet activities would involve the generation or storage of hazardous waste, older existing telecommunication structures and sites could have hazardous materials present, such as lead-based paint on outdoor structures or asbestos tiles and insulation in equipment sheds. The general public, unless a telecommunication work site allows unrestricted access, are typically shielded from hazardous materials and hazardous wastes that are components of telecommunication site work. (OSHA, 2016c)

Aquatic environments – Installation of telecommunication lines may include laying, burying, or boring lines under wetlands and waterways, including lakes, rivers, ponds, and streams. Workers responsible for these activities operate heavy equipment from soft shorelines, boats, barges, and other unstable surfaces. There is potential for equipment and personnel falls, as well as drowning in waterbodies. Wet work conditions also increase risks of electric shock and hypothermia. (OSHA, 2016c)

Outdoor elements – Weather conditions have the potential to quickly and drastically reduce safety, and increase hazards at telecommunication work sites. Excessive heat and cold conditions impact judgement, motor skills, hydration, and in extreme cases may lead to hyper- or hypothermia. Precipitation, such as rain, ice, and snow, create slippery climbing conditions and wet or muddy ground conditions. Lightning strikes are risks to telecommunication workers climbing towers or working on top of buildings. (OSHA, 2016c)

Telecommunication Worker Occupational Health and Safety

The BLS uses established industry and occupational codes to classify telecommunications workers. For industry classifications, BLS uses the North American Industry Classification System (NAICS) codes, which identify the telecommunications industry (NAICS code 517XX) as being within the information industry (NAICS code 51). For occupational classifications, BLS uses the Standard Occupational Classification (SOC) system to identify workers as belonging to one of 840 occupations. Telecommunications occupations are identified as either telecommunication equipment installers and repairers, except line installers (SOC code 49-2022), or telecommunication line installers and repairers (SOC code 49-9052). Both occupations are reported under the installation, maintenance and repair occupations (SOC code 49-0000).

As of May 2014, there were 780 telecommunication equipment installers and repairers and, 150 telecommunication line installers and repairers (Figure 5.1.15-1) working in Idaho (BLS, 2015d). Idaho has not reported nonfatal injuries rates in the telecommunications industry since 2003, when data is first available (BLS, 2015e). Nationwide, there were 2.2 nonfatal occupational injury cases in 2014 per 100 full-time workers in the telecommunications industry (BLS, 2015f).

Nationwide in 2013, there were 18 fatalities reported across the telecommunications industry (5 due to violence and other injuries by persons or animals; 3 due to transportation incidents; and 7 due to slips, trips, or falls), with an hours-based fatal injury rate of 7.9 per 100,000 full-time equivalent workers (BLS, 2013). This represents 45 percent of the broader information industry fatalities (40 total), and less than 1 percent of total occupational fatalities (4,585 total). Idaho has not had any fatalities in the telecommunications industry or telecommunications occupations since 2003, when data is first available. By comparison, Idaho had 16 fatalities within the broader installation, maintenance, and repair occupations (SOC code 49-0000), with the highest fatality year being 2004, with 7 fatalities (BLS, 2015i).

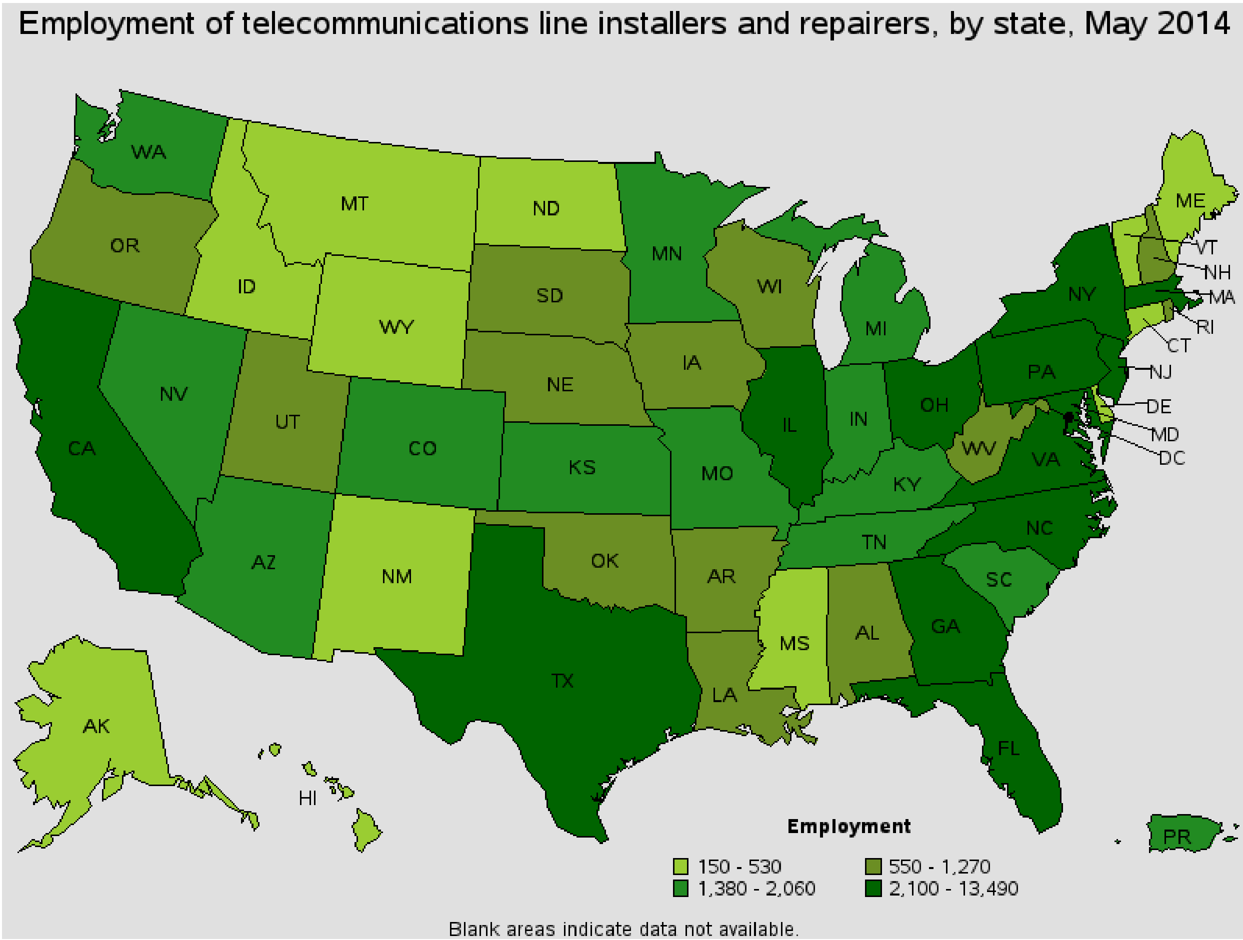


Figure 5.1.15-1: Number of Telecommunication Line Installers and Repairers Employed per State, May 2014

Source: (BLS, 2015g)

Public Health and Safety

The general public is unlikely to encounter occupational hazards at telecommunication sites, due to limited access. Among the general public, trespassers entering telecommunication sites would be at the greatest risk for exposure to health and safety hazards. Idaho does not have a state-supported public health tracking system. Public health data is reported at the federal level through the Centers for Disease Control and Prevention Wide-ranging Online Data for Epidemiologic Research (WONDER). While the WONDER database cannot be searched for cases specific to telecommunication sites, many available injury categories are consistent with risks present at telecommunication sites. For example, between 1999 and 2013, there were 32 fatalities due to a fall from, out of, or through a building or structure, and 10 fatalities due to being caught, crushed, jammed or pinched in or between objects in Idaho (Centers for Disease Control and Prevention, 2015).

5.1.15.4 Environmental Setting: Contaminated Properties at or near Telecommunication Sites

Existing and surrounding land uses, including landfills or redeveloped brownfields, near telecommunication sites have the potential to impact human health and safety. Furthermore, undocumented environmental practices of telecommunication site occupants, including practices before current environmental laws, could result in environmental contamination, affecting the quality of soil, sediments, groundwater, surface water, and air.

Contaminated property is typically classified by the federal environmental remediation or cleanup programs that govern them, such as sites administered through the Superfund Program[140] or listed on the National Priorities List (NPL), as well as the Resource Conservation and Recovery Act (RCRA) Corrective Action sites and Brownfields. These regulated cleanup sites are known to contain environmental contaminants at concentrations exceeding acceptable human health exposure thresholds. Contact with high concentrations of contaminated media can result in adverse health effects, such as dermatitis, pulmonary and cardiovascular events, organ disease, central nervous system disruption, birth defects, and cancer. It generally requires extended periods of exposure over a lifetime for the most severe health effects to occur.

As of September 2015, Idaho had 11 RCRA Corrective Action sites,[141] 177 brownfields, and 9 proposed or final Superfund/NPL sites (USEPA, 2015h). Based on a November 2015 search of USEPA's Cleanups in My Community (CIMC) database, there are three Superfund sites in Idaho where human exposures are not under control (St. Maries Creosote Site near St. Maries, ID; the Blackbird Mine near Lemhi, ID; and the Bunker Hill Mining Company site near Kellogg, ID) (USEPA, 2015i).

DEQ's Brownfield Revitalization Program oversees brownfield cleanup and allows the redevelopment of a property to bring it back to economic productivity (DEQ, 2015s). The Idaho Voluntary Cleanup Program (VCP) allows parties to cleanup contaminated sites under DEQ oversight, and following specific standards and guidance to avoid enforcement action (DEQ, 2015t). One example of a brownfield site is the Boise Cascade Mill site, along the North Fork Payette River in Cascade, ID. In 2001, a former mill closed at the site closed, raising concerns about environmental impacts from previous wood processing activities. DEQ assessed the 40-acre log yard south of the former mill, and the site was redeveloped into a recreation center, whitewater park, and walking and biking trails. (DEQ, 2015u)

In addition to contaminated properties, certain industrial facilities are permitted to release toxic chemicals into the air, water, or land. One such program is the Toxics Release Inventory (TRI), administered by the USEPA under the Emergency Planning and Community Right to Know Act (EPCRA) of 1986. The Toxic Release Inventory database is a measure of the industrial nature of

[140] The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) enacted in 1980, commonly referred to as the Superfund Program, governs abandoned hazardous waste sites, and collects a tax on chemical and petroleum industries. CERCLA was amended by the Superfund Amendments and Reauthorization Act (SARA) in 1986; see Appendix C, Environmental Laws and Regulations (USEPA, 2011).

[141] Data gathered using the USEPA's Cleanups in My Community (CIMC) search on November 16, 2015, for all sites in the state of Idaho, where cleanup type equals 'RCRA Hazardous Waste – Corrective Action,' and excludes sites where cleanup phase equals 'Construction Complete' (i.e., no longer active).

an area and the over-all chemical use, and can be used to track trends in releases over time. The "releases" do not necessarily equate to chemical exposure by humans or necessarily constitute to quantifiable health risks because the releases include all wastes generated by a facility – the majority of which are disposed of via managed, regulated processes that minimize human exposure and related health risks (e.g., in properly permitted landfills or through recycling facilities). As of September 2015, Idaho had 112 TRI reporting facilities. The identification of a TRI facility does not necessarily indicate that the facility is actively releasing to the environment; the majority of TRI reports involve permitted disposal facilities. According to the USEPA, in 2013, the most recent data available, Idaho released 48.8 million pounds of toxic chemicals through onsite and offsite disposal, transfer, or other releases, largely from the metal mining and chemicals industries. This accounted for 1.19 percent of nationwide TRI releases, ranking Idaho 32 of 56 U.S. states and territories based on total releases per square mile (USEPA, 2015j).

Another USEPA program is the National Pollutant Discharge Elimination System (NPDES), which regulates the quality of stormwater and sewer discharge from industrial and manufacturing facilities. Permitted discharge facilities are potential sources of toxic constituents that are harmful to human health or the environment. As of November 12, 2015, Idaho had 55 permitted major discharge facilities registered with the USEPA Integrated Compliance Information System (USEPA, 2015k).

The National Institutes of Health, U.S. National Library of Medicine, provides an online mapping tool called TOXMAP, which allows users to "visually explore data from the USEPA's TRI and Superfund Program" (NIH, 2015). Figure 5.1.15-2 provides an overview of potentially hazardous sites in Idaho.

Telecommunication Worker Occupational Health and Safety

Telecommunications sites may be on or near contaminated land, industrial discharge facilities, or sites presenting additional hazards. Occupational exposure to contaminated environmental media can occur during activities like soil excavating, trenching, other earthwork, and working over water bodies. Indoor air quality may also be impacted from vapor intrusion infiltrating indoors from contaminated soil or groundwater that are present beneath a building's foundation. As of October 2015, there are seven USEPA-regulated telecommunications site in Idaho (USEPA, 2015l). Sites such as this are regulated under one or more environmental programs including NPDES compliance, Superfund/NPL status, and TRI releases.

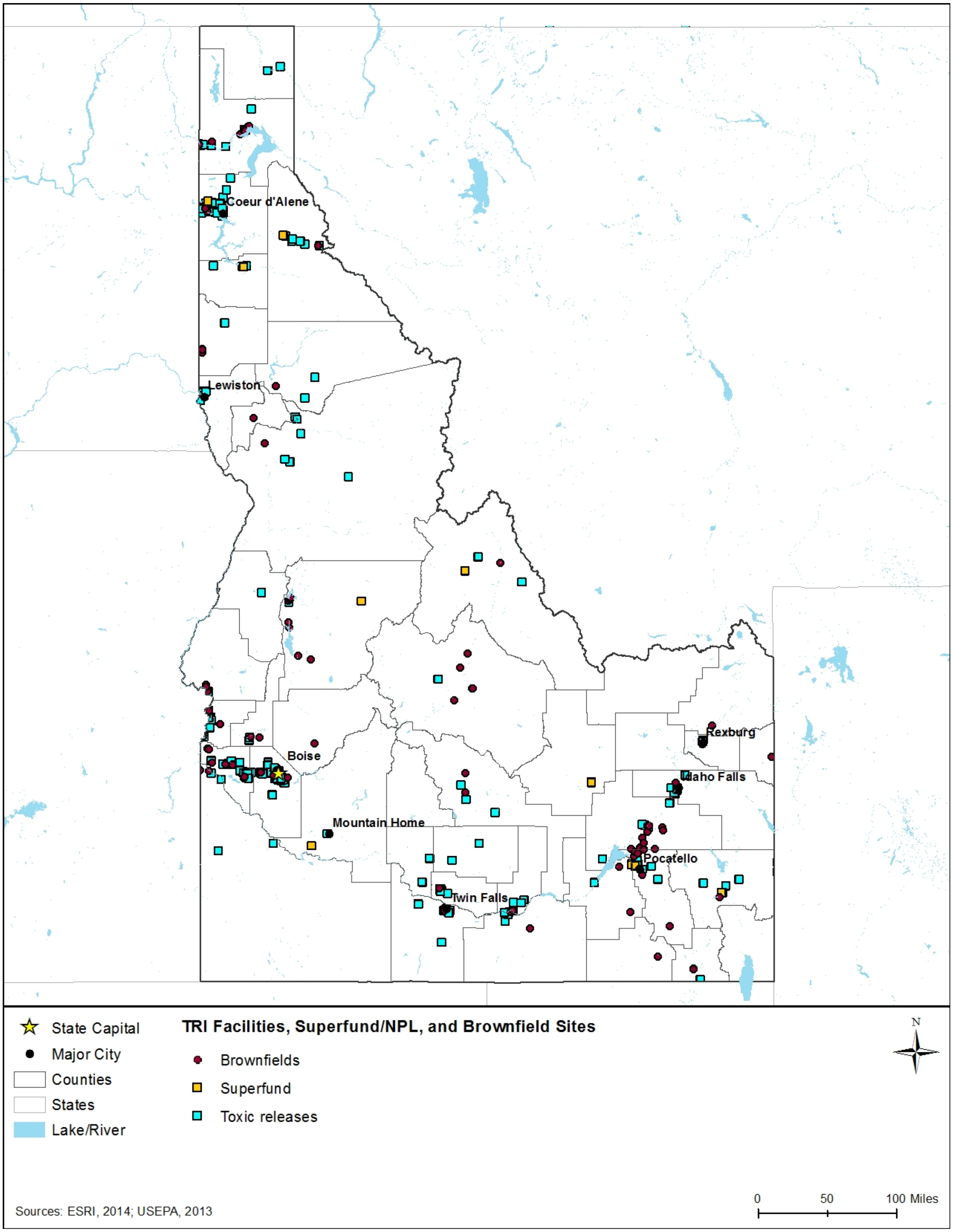


Figure 5.1.15-2: TOXMAP Superfund/NPL and TRI Facilities in Idaho (2013)

According to BLS data, Idaho had four occupational fatalities in 2010 and three in 2013 across all sectors from exposure to "harmful substances or environments," although these were not specific to telecommunications (BLS, 2015i). By comparison, the BLS reported three fatalities in 2011 and three fatalities[142] in 2014 nationwide within the telecommunications industry (NAICS code 517), due to exposure to harmful substances or environments (BLS, 2015h). In 2014, BLS also reported four fatalities within the telecommunications line installers and repairers occupation (SOC code 49-9052), and no fatalities within the telecommunications equipment installers and repairers occupation (SOC code 49-2022) due to exposure to harmful substances or environments (BLS, 2014).

Public Health and Safety

As described earlier, access to telecommunication sites is nearly always restricted to occupational workers. Although site access control is one of the major reasons telecommunication sites present an inherent low risk to non-occupational workers, the general public could be potentially exposed to contaminants and other hazards in a variety of ways. One example would be if occupational workers disturb contaminated soil while digging, causing hazardous chemicals to mix with an underlying groundwater drinking water sources. If a contaminant enters a drinking water source, the surrounding community could inadvertently ingest or absorb the contaminant when using that source of water for drinking, cooking, bathing, and swimming. By trespassing on a restricted property, a trespasser may come in contact with contaminated soil or surface water, or by inhaling harmful vapors.

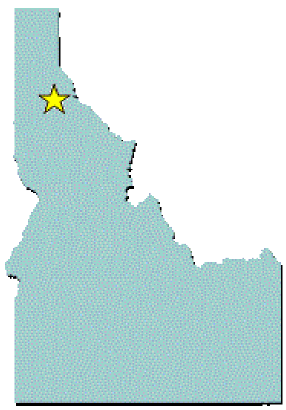
The IDHW partners with the Centers for Disease Control and Prevention, Agency for Toxic Substances and Disease Registry, to provide health assessments and consultations that identify and assess human exposure risks at contaminated sites. Public health assessments, consultations, and advisories for documented hazardous waste sites are publicly available through the IDHW Environmental Health Assessments/Consultations website (IDHW, 2015).

[142] BLS Census of Fatal Occupational Injuries data for 2014 is for preliminary reporting only. Final data is expected to be released in spring 2016 (BLS, 2015j).

Spotlight on Idaho Superfund Sites: Bunker Hill Mining & Metallurgical Complex

The Bunker Hill Mining & Metallurgical Complex (Coeur d'Alene Basin Cleanup) Superfund site is in the northern panhandle region of Idaho, and is one of the largest historical mining districts. As early as 1883, tailings from the mining and milling process were dumped in rivers and streams. Contaminants spread throughout the Coeur d'Alene River and were deposited in downstream floodplains and sediments. Waste piles and air emissions from metal smelting also contributed to the lead contamination of soil, sediment, groundwater, and surface water in the area. (USEPA, 2015t)

Currently, the USEPA and DEQ are conducting cleanup activities at the site, including the removal of lead-contaminated soil from residential properties, containing mine tailings, removing source materials, constructing caps over materials, and implementing institutional controls and health programs (USEPA, 2015t). To date, 6,500 residences and public places have been remediated through soil removal, with DEQ providing oversight. The DEQ is also responsible for the Roadway Surface Remediation Strategy, which repairs deteriorated public roads to prevent the exposure of contaminants from beneath the road surface. (DEQ, 2015v)



Source: (DEQ, 2015w)

Figure 5.1.15-3: Historic Photo of a Tailings Plank Dam in the South Fork Coeur d'Alene River

5.1.15.5 Environmental Setting: Abandoned Mine Lands at or near Telecommunications Sites

Another health and safety hazard in Idaho includes surface and subterranean mines. In 2015, the Idaho mining industry ranked 9th for non-fuel minerals (primarily phosphate rock, crushed stone, Portland cement and masonry, and construction sand and gravel), generating a value of $713M (USGS, 2016b). Health and safety hazards at active mines and abandoned mine lands (AML) include falling into open shafts, cave-ins from unstable rock and decayed support, deadly gases and lack of oxygen inside the mine, unused explosives and toxic chemicals, horizontal and vertical openings, high walls, and open pits (BLM, 2015b).

The IDL administers the state AML Program and is responsible for managing AML health and safety hazards (IDL, 2015b). Based on USEPA research, there are between 8,000 and 16,000 AML sites in Idaho (BLM, 2015c). Priority 1 and 2 AML sites pose a significant risk to human health and safety, and Priority 3 sites pose a risk to the environment. As of November 2015, Idaho had one Priority 2 AML, in Teton County, ID, and shown in Figure 5.1.15-4 (U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement, 2015a).

Figure 5.1.15-4: High Priority Abandoned Mine Lands in Idaho (2015)

Source: (U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement, 2015b)

Telecommunication Worker Occupational Health and Safety

Telecommunications sites may be on or near AMLs or mine fires, presenting occupational exposure risks from fire, toxic gases, and subsidence during FirstNet deployment, operation, and maintenance activities. Because the locations of many abandoned mines are unknown or hidden, these mines pose a risk to telecommunications workers because they may be encountered during deployment and maintenance operations.

Public Health and Safety

Subterranean mines present additional health and safety risks to the general public, by generating toxic combustible gases, which can penetrate the surface through ground fractures, potentially seeping into residential structures. Additionally, mine fires can consume enough sub-surface material, that risk of subsidence increases. As a result, AMLs and mine fires in particular, can result in evacuations of entire communities (U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement, 2015c).

5.1.15.6 Environmental Setting: Natural & Manmade Disaster Sites

Natural and manmade disaster events can create health and safety risks, as well as present unique hazards, to telecommunication workers and the general public. Telecommunications, including public safety communications, can be unavailable (temporarily or permanently) during disaster events. Examples of manmade disasters are train derailments, refinery fires, or other incident involving the release of hazardous constituents. A common example of a natural disaster is flooding. Floodwaters damage transportation infrastructure (roads, railways, etc.) and utility lines (sewer, water, electric power, broadband, natural gas lines, etc.). Floodwaters are often contaminated by hazardous chemicals and sanitary wastes, which can cause headaches, skin rashes, dizziness, nausea, excitability, weakness, fatigue, and disease to exposed workers (OSHA, 2003).

Physical hazards may also be present at disaster sites, such as downed utility lines, debris blockage or road washout conditions, which increases exposure risks to telecommunication workers. Climbing and working from tower structures damaged by wind increases the risk of slips, trips, or falls. During natural and manmade disasters, access to the telecommunication sites can be obstructed by debris.

Telecommunication Worker Occupational Health and Safety

Telecommunication workers are often called upon to provide support to natural and manmade disaster response efforts because of the critical need to restore and maintain telecommunication capabilities. The need to enter disaster areas as part of the recovery effort exposes telecommunication workers to elevated risks because chemical, biological, and physical hazards might not have not been fully identified or assessed. Transportation infrastructure and utilities in the affected areas are often compromised and present unknown chemical and biologic hazards. Correspondingly, if telecommunication workers are injured during response and repair operations, their rescue and treatment might over-extend first responder staff and medical facilities that are delivering care to victims of the initial incident.

Currently, Idaho Department of Labor and BLS do not report data specific to injuries or fatalities among telecommunication workers responding to natural or manmade disasters. However, the National Response Center (NRC), managed by the U.S. Coast Guard, compiles reports for oil spills, chemical releases, or other maritime security incidents and contains incident reports related to occupational health and safety. Of the 24 NRC-reported incidents for Idaho in 2015 with known causes, 43 incidents were attributed to natural disaster (e.g., earthquake, flood, hurricane, tornado, or other natural phenomenon), while 42 incidents were attributed to manmade disasters (e.g., derailment, dumping, equipment failure, operator error, over pressuring, suicide, transport accident, or trespasser) or other indeterminate causes (U.S. Coast Guard 2015). According to the National Response Center (NRC), several incidents occurred due to flooding in June 2010 (Figure 5.1.15-5), which involved a discharge of hazardous materials. Another incident near Idaho City, ID, involved a release of transformer oil when a utility pole broke in a storm and rupturing the pole-mounted transformer (U.S. Coast Guard, 2013). Such incidents present unique, hazardous challenges to telecommunication workers during natural or manmade disasters.

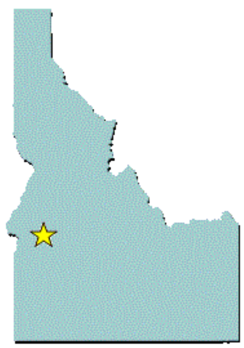
Public Health and Safety

Natural and manmade disasters can cause hazards that affect large geographic areas and present public health and safety risks to populations in those areas. Similar to telecommunication workers, the general public faces risks during these types of disasters, such as compromised transportation infrastructure and utilities, potential for exposure to unknown chemical and biologic hazards, and inadequate medical support.

In 2014, Idaho experienced 7 fatalities (5 due to winter storms and 2 due to unknown causes) and 12 weather-related injuries. By comparison, 384 weather-related fatalities and 2,203 injuries were reported nationwide the same year. (NWS, 2015b)

Spotlight on Idaho Natural Disaster Sites: 2010 Idaho Flooding

In the spring of 2010, extensive flooding and landslides occurred throughout Idaho. Unusually cold temperatures maintained the high-elevation snowpack until late in the season. When 2-6 inches of rain fell in June and added to the rapidly melting snow, creeks, streams, and reservoirs quickly overflowed their banks. Counties throughout the Payette River Basin experienced significant flooding (Figure 5.1.15-5). Levees were breached and numerous roads and bridges were damaged or washed out. Railroads and agricultural lands were also flooded along the banks of the Payette River. (NOAA, 2015b)



Source: (NOAA, 2010)

Figure 5.1.15-5: Floodwaters along the Payette River in Emmett, ID

5.2. ENVIRONMENTAL CONSEQUENCES

This section describes the potential environmental impacts, beneficial, or adverse, resulting from the Proposed Action and Alternatives. The specific deployment activity and where the deployment will take place will be determined based on location-specific conditions and the results of site-specific environmental reviews. At the programmatic level, the categories of impacts have been defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Each resource area identifies the range of possible impacts on resources for the Proposed Action and Alternatives, include the No Action Alternative. The No Action Alternative provides a comparison to describe the effects of environmental resources of the existing conditions to the proposed Alternatives.

NEPA requires agencies to assess the potential direct and indirect impacts each alternative could have on the existing environment (as characterized earlier in this section). Direct impacts are those impacts that are caused by the Proposed Action and occur at the same time and place, such as soil disturbance. Indirect impacts are those impacts related to the Proposed Action but result from an intermediate step or process, such as changes in surface water quality because of soil erosion.

For each resource, the potential impact is assessed in terms of context of the action and the intensity of the potential impact, per CEQ regulations (40 CFR §1508.27). *Context* refers to the timing, duration, and where the impact could potentially occur (i.e., local vs. national; pristine vs. disturbed; common species vs. protected species). In terms of duration of potential impact, context is described as short or long term. *Intensity* refers to the magnitude or severity of the effect as either beneficial or adverse. Resource-specific significance rating criteria are provided at the beginning of each resource area section.

5.2.1. Infrastructure

5.2.1.1. Introduction

This section describes potential impacts to infrastructure in Idaho associated with construction, deployment, and operation of the Proposed Action and alternatives. Chapter 9, Best Management Practices (BMPs) and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.1.2. Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on infrastructure were evaluated using the significance criteria presented in Table 5.2.1-1. As described in Section 5.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to infrastructure addressed in this section are presented as a range of possible impacts.

Table 5.2.1-1: Impact Significance Rating Criteria for Infrastructure

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than significant with BMPs and mitigation measures incorporated**	**Less than significant**	**No impact**
Transportation system capacity and safety	Magnitude or Intensity	Creation of substantial traffic congestion/delay and/or a substantial increase in transportation incidents (e.g., crashes, derailments).	Effect that is potentially significant, but with mitigation is less than significant.	Minimal change in traffic congestion/delay and/or transportation incidents (e.g., crashes, derailments).	No effect on traffic congestion or delay, or transportation incidents.
	Geographic Extent	Regional impacts observed throughout the state/territory.		Effects realized at one or multiple isolated locations.	NA
	Duration or Frequency	Permanent: Persisting indefinitely.		Short-term effects will be noticeable for up to the entire construction phase or a portion of the operational phase.	NA
Capacity of local health, public safety, and emergency response services	Magnitude or Intensity	Impacted individuals or communities cannot access health care and/or emergency services, or access is delayed, due to the project activities.	Effect is potentially significant, but with mitigation is less than significant.	Minor delays to access to care and emergency services that do not impact health outcomes.	No impacts on access to care or emergency services.
	Geographic Extent	Regional impacts observed (“regional” assumed to be at least a county or county-equivalent geographical extent, could extend to state).		Impacts only at a local/neighborhood level.	NA
	Duration or Frequency	Duration is constant during construction and deployment phase.		Rare event during construction and deployment phase.	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than significant with BMPs and mitigation measures incorporated**	**Less than significant**	**No impact**
Modifies existing public safety response, physical infrastructure, telecommunication practices, or level of service in a manner that directly affects public safety communication capabilities and response times	Magnitude or Intensity	Substantial adverse changes in public safety response times and the ability to communicate effectively with and between public safety entities.	Effect that is potentially significant, but with mitigation is less than significant.	Minimal change in the ability to communicate with and between public safety entities.	No perceptible change in existing response times or the ability to communicate with and between public safety entities.
	Geographic Extent	Local/City, County/Region, or State/Territory.		Local/City, County/Region, or State/Territory.	Local/City, County/Region, or State/Territory.
	Duration or Frequency	Permanent or perpetual change in emergency response times and level of service.		Change in communication and/or the level of service is perceptible but reasonable to maintaining effectiveness and quality of service.	NA
Effects to commercial telecommunication systems, communications, or level of service	Magnitude or Intensity	Substantial adverse changes in level service and communications capabilities.	Effect that is potentially significant, but with mitigation is less than significant.	Minor changes in level of service and communications while transitioning to the new system	No perceptible effect to level of service or communications while transitioning to the new system.
	Geographic Extent	Local/City, County/Region, or State/Territory.		Local/City, County/Region, or State/Territory.	Local/City, County/Region, or State/Territory.
	Duration or Frequency	Persistent, long-term, or permanent effects to communications and level of service.		Minimal effects to level of service or communications lasting no more than a short period (minutes to hours) during the construction and deployment phase.	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than significant with BMPs and mitigation measures incorporated**	**Less than significant**	**No impact**
Effects to utilities, including electric power transmission facilities and water and sewer facilities	Magnitude or Intensity	Substantial disruptions in the delivery of electric power or to physical infrastructure that results in disruptions, including frequent power outages or drops in voltage in the electrical power supply system ("brownouts"). Disruption in water delivery or sewer capacity, or damage to or interference with physical plant facilities that impact delivery of water or sewer systems.	Effect that is potentially significant, but with mitigation is less than significant.	Minor disruptions to the delivery of electric power, water, and sewer services, or minor modifications to physical infrastructure that result in minor disruptions to delivery of power, water, and sewer services.	There would be no perceptible impacts to delivery of other utilities and no service disruptions.
	Geographic Extent	Local/City, County/Region, or State/Territory.		Local/City, County/Region, or State/Territory.	Local/City, County/Region, or State/Territory.
	Duration or Frequency	Effects to other utilities would be seen throughout the entire construction phase.		Effects to other utilities would be of short duration (minutes to hours) and would occur sporadically during the entire construction phase.	NA

NA = Not Applicable

5.2.1.1. Description of Environmental Concerns

Transportation System Capacity and Safety

The primary concerns for transportation system capacity and safety related to FirstNet activities would primarily occur during the construction phases of deployment. Depending on the exact site locations and placement of new assets in the field, temporary impacts on traffic congestion, railway use, airport or harbor operations, or use of other transportation corridors could occur if site locations were near or adjacent to roadways and other transportation corridors, requiring temporary closures (lane closures on roadways, for example). Coordination would be necessary with the relevant transportation authority (i.e., departments of transportation, airport authorities, railway companies, and harbormasters) to ensure proper coordination during deployment. Based on the impact significance criteria presented in Table 5.2.1-1, such impacts would be less than significant due to the temporary nature of the deployment activities, even if impacts would be realized at one or more isolated locations. These impacts would be noticeable during the deployment phase, but would be short-term, with no anticipated impacts continuing into the operational phase, unless any large-scale maintenance would become necessary during operations.

Capacity of Local Health, Public Safety, and Emergency Response Services

The capacity of local health, public safety, and emergency response services would experience less than significant impacts during deployment or operation phases. During deployment and system optimization, existing services would likely remain operational in a redundant manner ensuring continued operations and availability of services to the public. The only potential impact would be extremely rare, if emergency response services were using transportation infrastructure to respond to an emergency at the exact time that deployment activities were taking place. This type of impact would be isolated at the local or neighborhood level, and the likelihood of such an impact would be extremely low. Once operational, the new network would provide beneficial impacts to the capacity of local health, public safety, and emergency response services through enhanced communications infrastructure, thereby increasing capacity for and enhancing the ability of first responders to communicate during emergency response situations. Based on the impact significance criteria presented in Table 5.2.1-1, potential negative impacts would be less than significant. Substantial beneficial impacts are likely to result from implementation.

Modifies Existing Public Safety Response Telecommunication Practices, Physical Infrastructure, or Level of Service in a Manner that Directly Affects Public Safety Communication Capabilities and Response Times

The Proposed Action and alternatives contemplated by FirstNet would not cause negative impacts to existing public safety response telecommunication practices, physical infrastructure, or level of service in a manner that directly affects public safety communication capabilities and response times. Based on the impact significance criteria presented in Table 5.2.1-1, any potential impacts would be less than significant during deployment. As described above, during deployment and system optimization, existing services would likely remain operational in a redundant manner ensuring continued operations and availability of services to the public. Once operational, state, and local public safety organizations would need to evaluate telecommunication practices and standard operating procedures (SOPs). FirstNet's mission is to complement such practices and SOPs in a positive manner; therefore, only beneficial or complementary impacts would be anticipated. Public safety communication capabilities and response times would be expected to also experience beneficial impacts through enhanced communications abilities. It is possible that FirstNet would be upgrading physical telecommunications infrastructure, thus the infrastructure would also experience a positive and beneficial impact. Disposal or reuse of old public safety communications infrastructure would also likely need to be considered once the specifics are known. Any negative impacts would be expected to be less than significant given the short-term nature of the deployment activities.

Effects to Commercial Telecommunication Systems, Communications, or Level of Service

Commercial telecommunication systems, communications, or level of service would experience no impacts, as such commercial assets would likely be using a different spectrum for communications. FirstNet has exclusive rights to use of the assigned spectrum, and only designated public safety organizations would be authorized to connect to FirstNet's network. Depending on the use patterns of FirstNet's spectrum, such spectrum use may be over-built or under-utilized.[143] Such leases would then have less than significant positive impacts on commercial telecommunication systems, communications, or level of service, per the impact significance criteria presented in Table 5.2.1-1. Anticipated impacts would be less than significant due to the limited extent and temporary nature of the deployment.

Effects to Utilities, including Electric Power Transmission Facilities, and Water and Sewer Facilities

The activities proposed by FirstNet would have less than significant impacts on utilities, including electric power transmission facilities, and water and sewer facilities. Depending on the specific project contemplated, installation of new equipment could require connection with local electric sources, and use of site-specific local generators, on a temporary or permanent basis. Also, depending on the specific project contemplated, the draw or use of power from the transmission facilities may need to be examined; however, it is not anticipated that such use of power would have negative impacts, due to the local nature of the proposed activities and the widespread availability and use of the power grid in the United States.

5.2.1.2. Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment, and operation activities.

[143] Telecommunications equipment for specific spectrum use can be built where other equipment for other spectrum use already exists. If the new equipment and spectrum is not fully utilized, the geographic region may experience "over-build," where an abundance of under-utilized equipment may exist in that geographic location. This situation can be caused by a variety of factors including changes in current and future use patterns, changes in spectrum allocation, changes in laws and regulations, and other factors.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to infrastructure and others would not. In addition, and as explained in this section, the same type of Proposed Action Infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no impacts to infrastructure under the conditions described below:

- Wired Projects
    - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. It is anticipated that there would be no impacts to infrastructure resources since the activities that would be conducted at these small entry and exit points are not likely to produce perceptible changes or disruption of transportation, telecommunications, or utility services.
    - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting of dark fiber would have no impacts to infrastructure resources because there would be no ground disturbance and no interference with existing utility, transportation, or communication systems.
- Satellites and Other Technologies
    - Satellite-Enabled Devices and Equipment: It is anticipated that the use of portable devices that use satellite technology would not impact infrastructure resources because there would be no change to the built or natural environment from the use of portable equipment. Installation of satellite-enabled equipment would not be expected to have any impacts to infrastructure resources, given that construction activities would occur on existing structures, would not be expected to interfere with existing equipment, and transportation capacity and safety, and access to emergency services would not be impacted.
    - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the Nationwide Public Safety Broadband Network (NPSBN), however it may include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact infrastructure resources, it is anticipated that this activity would have no impact on infrastructure resources.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to infrastructure as a result of implementation of the Preferred Alternative would encompass a range of impacts that could occur as a result of direct interface with existing infrastructure, most notably existing telecommunication infrastructure. The types of infrastructure deployment activities that could be part of the Preferred Alternative and result in potential impacts to infrastructure include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: Plowing (including vibratory plowing), trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber could result in potential impacts to infrastructure resources, depending on the specific assets connected on either end of the buried fiber. If a fiber optic plant is being used to tie into existing telecommunications assets, then localized impacts to telecommunications sites could occur during the deployment phase, however, it is anticipated that this tie-in would cause less than significant impacts as the activity would be temporary and minor.
  - New Build – Aerial Fiber Optic Plant: Installation of a new aerial fiber optic plant could impact new telecommunications infrastructure through the installation of new, or use of existing, telecommunications poles.
  - Collocation on Existing Aerial Fiber Optic Plant: Similar to new build activities (above), collocation on existing aerial fiber optic plant could include installation of new or replacement towers requiring ground disturbance.
  - New Build – Submarine Fiber Optic Plant: The installation of cables in or near bodies of water would not impact infrastructure resources because there would be no local infrastructure to impact. However, impacts to infrastructure resources could potentially occur as result of the construction of landings and/or facilities on shores or the banks of water bodies that accept the submarine cable, depending on the exact site location and proximity to existing infrastructure.
  - Installation of Optical Transmission or Centralized Transmission Equipment: Installation of transmission equipment such as small boxes or huts, or access roads, could potentially impact infrastructure. Impacts could include disruption of service in transportation corridors, disruption of service to telecommunications infrastructure, or other temporary impacts.
- Wireless Projects
  - New Wireless Communication Towers: Installation of new wireless towers and associated structures (generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads might result in temporary or unintended impacts to current utility services during installation or interconnection activities. Generally, however, these deployment activities would be independent and would not be expected to interfere with other existing towers and structures. In addition, installation activities would have beneficial impacts due to expansion of infrastructure at a local level. Such activities could enhance public safety

infrastructure, and other telecommunications as the site could potentially be available for subsequent collocation.

- Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower, which would result in localized impacts to that tower such as minor disruptions in services. As a result of collocation of equipment, the potential addition of power units, structural hardening, and physical security measures could potentially have beneficial impacts on existing infrastructure assets, depending on the site specific plans.
- Deployable Technologies: Implementation of deployable technologies could result in potential impacts to infrastructure resources in terms of infrastructure expansion, if deployment requires paving of previously unpaved surfaces or other new infrastructure build to accommodate the deployable technology. Also, beneficial impacts could be realized, as deployable technologies are used when other infrastructure is impaired in some way; so deployable technologies could provide continuity of service during emergency events. Where deployable technologies would be implemented on existing paved surfaces and the acceptable load on those paved surfaces is not exceeded, or where aerial deployable technologies may utilized but launched from existing paved surfaces, it is anticipated that there would be no impacts to infrastructure resources because there would be no disturbance of the natural or built environment.

In general, the abovementioned activities could potentially impact infrastructure resources in different ways, resulting in both potentially negative and potentially positive impacts. Potential negative impacts to infrastructure associated with deployment could include temporary disruption of various types of transportation corridors, temporary impacts on existing or new telecommunications sites, and more permanent impacts on utilities, if new infrastructure required tie-in to the electric grid. These impacts are expected to be less than significant as the deployment activities will likely be of short duration (generally a few hours to a few months depending on the activity), would be regionally based around the on-going phase of deployment, and minor. See Chapter 9, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts. Positive impacts to infrastructure resources may result from the expansion of public safety and commercial telecommunications capacity and an improvement in public safety telecommunications coverage, system resiliency, response times, and system redundancy.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in potential impacts similar to the abovementioned deployment impacts. It is anticipated that there would be no impacts to infrastructure associated with routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for inspections. If usage of heavy equipment as part of routine maintenance or inspections occurs off of established access roads or corridors, or if further construction related activities are required along public road and utility ROWs, increased traffic congestion, current telecommunication system interruption, and utility interruptions could occur. These potential impacts would be expected to be minor and temporary as explained above, and therefore less than significant. See Chapter 9, BMPS and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Numerous beneficial impacts would be associated with operation of the NPSBN. The new system is intended to result in substantial improvements in public safety response times and the ability to communicate effectively with and between public safety entities, and would also likely result in substantial improvements in level of service and communications capabilities. Operation of the NPSBN is intended to improve high-speed data capabilities, location information, images, and eventually streaming video, which would enhance communications and the ability of the public safety community to effectively engage and respond. The NPSBN is also intended to have a higher level of redundancy and resiliency than current commercial networks to support the public safety community effectively, even in events of extreme demand. This improvement in the level of resiliency and redundancy is intended to increase the reliability of systems, communications, and level of service, and also minimize disruptions and misinformation resulting from limited or disrupted service. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.1.3. Alternatives Impact Assessment

The following section assesses potential impacts to infrastructure associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to infrastructure as a result of implementation of this alternative could be as described below.

Deployment Impacts

As explained above, implementation of deployable technologies could result in less than significant impacts to infrastructure even if deployment requires expansion of infrastructure, such as paving of previously unpaved surfaces or other new infrastructure built to support deployment. This is primarily due to the small amount of paving or new infrastructure that might have to be constructed to accommodate the deployables. The site-specific location of deployment would need to be considered, and any local infrastructure assets (transportation, telecommunications, or utilities) would need to be considered, planned for, and managed accordingly to try and avoid any negative impacts to such resources. Beneficial impacts could be realized, as deployable technologies are used when other infrastructure is impaired in some way; so deployable technologies could provide continuity of service during emergency events. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As explained above, operation activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the Preferred Alternative, it is anticipated that there would be no impacts to infrastructure resources associated with routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for inspections. If usage of heavy equipment, as part of routine maintenance or inspection occurs off an established access roads or utility ROWs, or if additional maintenance-related construction activities occur within public road and utility ROWs, less than significant impacts would likely still occur to transportation systems or utility services due to the limited amount of new infrastructure needed to accommodate the deployables. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed; therefore, there would be no associated deployment or installation of wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to infrastructure as a result of deployment and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 5.1.1, Infrastructure. The state also would not realize positive, beneficial impacts to infrastructure resources described above.

5.2.2. Soils

5.2.2.1. Introduction

This section describes potential impacts to soil resources in Idaho associated with deployment and operation of the Proposed Action and alternatives. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.2.2. Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on soil resources were evaluated using the significance criteria presented in Table 5.2.2-1. The categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to soil resources addressed in this section are presented as a range of possible impacts.

Table 5.2.2-1: Impact Significance Rating Criteria for Soils

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	Less than significant with BMPs and mitigation measures incorporated	Less than significant	No impact
Soil erosion	Magnitude or Intensity	Severe, widespread, and observable erosion in comparison to baseline, high likelihood of encountering erosion-prone soils.	Effect that is potentially significant, but with mitigation is less than significant.	Perceptible erosion in comparison to baseline conditions; low likelihood of encountering erosion-prone soil types.	No perceptible change in baseline conditions.
	Geographic Extent	State or territory.		Region or county.	NA
	Duration or Frequency	Chronic or long-term erosion not likely to be reversed over several years.		Isolated, temporary, or short-term erosion that that is reversed over few months or less.	NA
Topsoil mixing	Magnitude or Intensity	Clear and widespread mixing of the topsoil and subsoil layers.	Effect that is potentially significant, but with mitigation is less than significant.	Minimal mixing of the topsoil and subsoil layers has occurred.	No perceptible evidence that the topsoil and subsoil layers have been mixed.
	Geographic Extent	State or territory.		Region or county.	NA
	Duration or Frequency	NA		NA	NA
Soil compaction and rutting	Magnitude or Intensity	Severe and widespread, observable compaction and rutting in comparison to baseline.	Effect that is potentially significant, but with mitigation is less than significant.	Perceptible compaction and rutting in comparison to baseline conditions.	No perceptible change in baseline conditions.
	Geographic Extent	State or territory.		Region or county.	NA
	Duration or Frequency	Chronic or long-term compaction and rutting not likely to be reversed over several years.		Isolated, temporary, or short term compaction and rutting that is reversed over a few months or less.	No perceptible change in baseline conditions.

NA = Not Applicable

5.2.2.1. Description of Environmental Concerns

Soil Erosion

Soil erosion is an environmental concern for nearly every construction activity that involves ground disturbance. Construction erosion typically only occurs in a small area of land with the actual removal of vegetative cover from construction equipment or by wind and water erosion. Of concern in Idaho and other states with similar geography and weather patterns is the erosion of construction site soils to natural waterways, where the sediment could impair water and habitat quality, and potentially affect aquatic plants and animals (NRCS, 2000b). Areas exist in Idaho that have steep slopes (i.e., greater than 20 percent) or where the erosion potential is medium to high, including locations with Albolls, Aquents, Aquepts, Aquerts, Aquolls, Arents, Argids, Calcids, Cambids, Cryalfs, Cryands, Cryepts, Cryids, Cryolls, Durids, Fluvents, Ochrepts, Orthents, Psamments, Udalfs, Udepts, Udults, Ustalfs, Ustepts, Ustolls, Vitrands, Xeralfs, Xerands, Xerepts, Xererts, and Xerolls (see Section 5.1.2.4, Soil Suborders, and Figure 5.1.2-2).

Based on the impact significance criteria presented in Table 5.2.2-1, building of some of FirstNet's network deployment sites could cause potentially significant erosion at locations with highly erodible soil and steep grades. For the majority of projects, impacts to soils would be expected to be less than significant given the short-term and temporary duration of the activities.

To the extent practicable, FirstNet would attempt to minimize ground disturbing construction in areas with high erosion potential due to steep slopes or soil type. Where construction is required in areas with a high erosion potential, FirstNet could implement BMPs and mitigation measures, where practicable and feasible, to avoid or minimize impacts, and minimize the periods when exposed soil is open to precipitation and wind (see Chapter 9).

Topsoil Mixing

The loss of topsoil (i.e., organic and mineral topsoil layers) by mixing is a potential impact at all ground disturbing construction sites, including actions requiring clearing, excavation, grading, trenching, backfilling, or site restoration/remediation work.

Based on impact significance criteria presented in Table 5.2.2-1, and due to the relatively small-scale (less than 1 acre) of most FirstNet project sites, as well as the implementation of BMPs and mitigation measures (Chapter 9), minimal topsoil mixing is anticipated.

Soil Compaction and Rutting

Soil compaction and rutting at construction sites could involve heavy land clearing equipment such as bulldozers and backhoes, trenchers and directional drill rigs to install buried fiber, and cranes to install towers and aerial infrastructure. Heavy equipment could cause perceptible compaction and rutting of susceptible soils, particularly if BMPs and mitigation measures are not implemented.

Soils with the highest potential for compaction or rutting were identified by using the STATSGO2 database (see Section 5.1.2.4, Soil Suborders). The most compaction susceptible soils in Idaho are hydric soils with poor drainage conditions, which include Aquepts, Aquerts, Aquolls, Cryalfs, and Xerolls hydric soils and with poor drainage conditions. These suborders constitute approximately 31 percent of Idaho's land area, [144] and are found throughout the state (see Figure 5.1.2-2). The potential for compaction or rutting impact would be generally low at FirstNet network deployment sites where other soil types predominate.

Based on impact significance criteria presented in Table 5.2.2-1, the risk of soil compaction and rutting resulting from FirstNet deployment activities would be less than significant due to the extent of susceptible soils in the state.

5.2.2.2. Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment and operation activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could deploy various types of facilities or infrastructure. Depending on the physical nature and location of FirstNet facilities or infrastructure and the specific action, some activities would result in potential impacts to soil resources and others would not. In addition, and as explained in this section, the same type of proposed action infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no impacts to soil resources under the conditions described below:

- Wired Projects
  - Use of Existing Conduit – New Buried Fiber Optic Plant: Installation of fiber optic cable in existing conduit through existing hand-holes, pulling vaults, junction boxes, huts, and POP structures and would not impact soil resources because it would not produce perceptible changes to soil resources.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting of dark fiber would be conducted electronically through existing infrastructure, with no impacts to soil resources. If physical access is required to light dark fiber, it would be through existing hand holes, pulling vaults, junction boxes, huts, and similar existing structures.

[144] This percentage was calculated by dividing the acres of soils that fall within the suborders listed above by the total soil land cover for the state.

- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: Deployment of temporary or portable equipment that use satellite technology, including COWs, COLTs, SOWs, satellite phones, and video cameras would not impact soil resources because those activities would not require ground disturbance.
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it could include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact soil resources, it is anticipated that this activity would have no impact on soil resources.

Activities with the Potential to Have Impacts

Implementation of the Preferred Alternatives could include potential deployment-related impacts to soil resources resulting from ground disturbance activities, including soil erosion, topsoil mixing, and soil compaction and rutting. The types of deployment activities that could be part of the Preferred Alternative and result in potential impacts to soil resources include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: New fiber optic cable installation usually requires trenching, plowing (including vibratory plowing), or directional boring, as well as construction of hand holes, pulling vaults, junction boxes, huts, and POP structures that require ground disturbance. Impacts from fiber optic plant installation and structure construction, as well as associated grading and restoration of the disturbed ground when construction is completed, could result in soil erosion, topsoil mixing, or soil compaction and rutting.
  - New Build – Aerial Fiber Optic Plant: Installation of new utility poles, and replacement/upgrading of existing poles and structures could potentially impact soil resources resulting from ground disturbance for pole/structure installation (soil erosion and topsoil mixing), and heavy equipment use from bucket trucks operating on existing paved, gravel, or dirt roads (soil compaction and rutting). Potential impacts to soils are anticipated to be small-scale and short-term.
  - Collocation on Existing Aerial Fiber Optic Plant: Topsoil removal, soil excavation, and excavated material placement during the replacement of poles and structural hardening could result in soil erosion and topsoil mixing. Heavy equipment use associated with these activities as well as with installing new fiber on existing poles could result in soil compaction and rutting.
  - New Build – Submarine Fiber Optic Plant*:* The installation of cables in or near bodies of water would not impact soil resources because there would be no local infrastructure to impact. However, impacts to soil resources could potentially occur as result of the construction of landings and/or facilities on shores or the banks of water bodies that accept the submarine cable, depending on the exact site location and proximity to existing soils.

  - Installation of Optical Transmission or Centralized Transmission Equipment: Installation of optical transmission equipment or centralized transmission equipment, including associated new utility poles, hand holes, pulling vault, junction box, hut, and POP structure installation, would require ground disturbance that could potentially impact soil resources. Potential impacts to soils resulting from soil erosion, topsoil mixing, soil compaction, and rutting are anticipated to be small-scale and short-term.

- Wireless Projects
  - New Wireless Communication Towers: Installation of new wireless towers and associated structures, such as generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads, or access roads could result in impacts to soil resources. Land/vegetation clearing, excavation activities, landscape grading, and other ground disturbance activities during the installation of new wireless towers and associated structures or access roads could result in soil erosion or topsoil mixing, and heavy equipment use during these activities could result in soil compaction and rutting.
  - Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower, which would not result in impacts to soils. However, if additional power units, structural hardening, and physical security measures required ground disturbance, such as grading, or excavation activities, impacts to soil resources could occur, including soil erosion and topsoil mixing, as well as soil compaction and rutting associated with heavy equipment use.
  - Deployable Technologies: Implementation of deployable technologies could result in potential impacts to soil resources depending on the technology and location for deployment. Potential impacts may result if deployment of vehicles (i.e., SOWs, COWs, COLTs, or UAVs) occurs in unpaved areas, or if the implementation results in paving of previously unpaved surfaces. Some staging or landing areas (depending on the type of technology) may require land/vegetation clearing, excavation, and paving. These activities could result in soil erosion and topsoil mixing. Heavy equipment use associated with these activities may result in soil compaction and rutting. In addition, implementation of deployable technologies themselves could result in soil compaction and rutting if deployed in unpaved areas. Where technologies such as COWs, COLTs, and SOWs are deployed on existing paved surfaces, there would be no impacts to soil resources because there would be no ground disturbance.

In general, the abovementioned activities could potentially involve land/vegetation clearing, topsoil removal, excavation, excavated material placement, trenching or directional boring, construction of access roads and other impervious surfaces, landscape grading, and heavy equipment movement. Potential impacts to soil resources associated with deployment of this infrastructure could include soil erosion, topsoil mixing, or soil compaction and rutting. These impacts are expected to be less than significant as the activity would likely be short term, localized to the deployment locations, and would return to normal conditions as soon as revegetation occurs, often by the next growing season. It is expected that heavy equipment would utilize existing roadways and utility rights-of-way for deployment activities. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As described earlier, operation activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned construction impacts. It is anticipated that there would be no impacts to soil resources associated with routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for inspections because there would be no ground disturbance. If usage of heavy equipment as part of routine maintenance or inspections occurs off of established access roads or corridors, or if the acceptable load of the surface is exceeded, soil compaction and rutting impacts could result as explained above. These impacts are expected to be less than significant due to the temporary nature and small scale of operations activities with the potential to create impacts. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.2.3. Alternatives Impact Assessment

The following section assesses potential impacts to soils associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to soil resources as a result of implementation of this alternative could be as described below.

Deployment Impacts

As explained above, implementation of deployable technologies could result in less than significant impacts to soil resources if deployment occurs in unpaved areas, or if the implementation results in paving of previously unpaved surfaces. Impacts would likely be less than significant due to the limited extent and temporary nature of the deployment. In addition, impacts to soils could occur on paved surfaces if the acceptable load of the surface is exceeded.

Some staging or landing areas (depending on the type of technology) may require land/vegetation clearing, excavation, and paving. These activities could result in soil erosion and topsoil mixing. Heavy equipment use associated with these activities may result in soil compaction and rutting. In addition, implementation of deployable technologies themselves could also result in soil compaction and rutting if deployed in unpaved areas. However, these potential impacts are expected to be less than significant due to the small scale and short term nature of the deployment. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As explained above, operation activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the Preferred Alternative, it is anticipated that there would be no impacts to soil resources associated with routine inspections of the deployable assets, assuming that the same access roads used for deployment are also used for inspections because there would be no ground disturbance. If usage of heavy equipment as part of routine maintenance or inspections occurs off of established access roads or corridors, or if the acceptable load of the surface is exceeded, less than significant soil compaction and rutting impacts could result as previously explained above. Finally, if deployable technologies are parked and operated with air conditioning for extended periods, the condensation water from the air conditioner could result in minimal soil erosion. However, it is anticipated that the potential soil erosion would result in less than significant impacts as described above due to the limited extent and temporary nature of the deployment. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed. Therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to soil resources as a result of construction and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 5.1.2, Soils.

5.2.3. Geology

5.2.3.1. Introduction

This section describes potential impacts to Idaho geology resources associated with deployment and operation of the Proposed Action and alternatives. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.3.2. Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on geology resources were evaluated using the significance criteria presented in Table 5.2.3-1. The categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to geology addressed in this section are presented as a range of possible impacts.

Table 5.2.3-1: Impact Significance Rating Criteria for Geology

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	Less than significant with BMP and mitigation measures incorporated	Less than significant	No impact
Seismic Hazard	Magnitude or Intensity	High likelihood that a project activity could be located within a high-risk earthquake hazard zone or active fault.	Effect that is potentially significant, but with mitigation is less than significant.	Low likelihood that a project activity could be located within an earthquake hazard zone or active fault.	No likelihood of a project activity being located in an earthquake hazard zone or active fault.
	Geographic Extent	Hazard zones or active faults are highly prevalent within the state/territory.		Earthquake hazard zones or active faults occur within the state/territory, but may be avoidable.	Earthquake hazard zones or active faults do not occur within the state/territory.
	Duration or Frequency	NA		NA	NA
Volcanic Activity	Magnitude or Intensity	High likelihood that a project activity could be located near a volcano lava or mud flow area of influence.	Effect that is potentially significant, but with mitigation is less than significant.	Low likelihood that a project activity could be located near a volcanic ash area of influence.	No likelihood of a project activity located within a volcano hazard zone.
	Geographic Extent	Volcano lava flow areas of influence are highly prevalent within the state/territory.		Volcano ash areas of influence occur within the state/territory, but may be avoidable.	Volcano hazard zones do not occur within the state/territory.
	Duration or Frequency	NA		NA	NA
Landslide	Magnitude or Intensity	High likelihood that a project activity could be located within a landslide area.	Effect that is potentially significant, but with mitigation is less than significant.	Low likelihood that a project activity could be located within a landslide area.	No likelihood of a project activity located within a landslide hazard area.
	Geographic Extent	Landslide areas are highly prevalent within the state/territory.		Landslide areas occur within the state/territory, but may be avoidable.	Landslide hazard areas do not occur within the state/territory.
	Duration or Frequency	NA		NA	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than significant with BMP and mitigation measures incorporated**	**Less than significant**	**No impact**
Land Subsidence	Magnitude or Intensity	High likelihood that a project activity could be located within an area with a hazard for subsidence (e.g., karst terrain).	Effect that is potentially significant, but with mitigation is less than significant.	Low likelihood that a project activity could be located within an area with a hazard for subsidence.	Project activity located outside an area with a hazard for subsidence.
	Geographic Extent	Areas with a high hazard for subsidence (e.g., karst terrain) are highly prevalent within the state/territory.		Areas with a high hazard for subsidence occur within the state/territory, but may be avoidable.	Areas with a high hazard for subsidence do not occur within the state/territory.
	Duration or Frequency	NA		NA	NA
Potential Mineral and Fossil Fuel Resource impacts	Magnitude or Intensity	Severe, widespread, observable impacts to mineral and/or fossil fuel resources.	Effect that is potentially significant, but with mitigation is less than significant.	Limited impacts to mineral and/or fossil resources.	No perceptible change in mineral and/or fossil fuel resources.
	Geographic Extent	Regions of mineral or fossil fuel extraction areas are highly prevalent within the state/territory.		Mineral or fossil fuel extraction areas occur within the state/territory, but may be avoidable.	Mineral or fossil fuel extraction areas do not occur within the state/territory.
	Duration or Frequency	Long-term or permanent degradation or depletion of mineral and fossil fuel resources.		Temporary degradation or depletion of mineral and fossil fuel resources.	NA
Potential Paleontological Resources impacts	Magnitude or Intensity	Severe, widespread, observable impacts to paleontological resources.	Effect that is potentially significant, but with mitigation is less than significant.	Limited impacts to paleontological and/or fossil resources.	No perceptible change in paleontological resources.

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than significant with BMP and mitigation measures incorporated**	**Less than significant**	**No impact**
	Geographic Extent	Areas with known paleontological resources are highly prevalent within the state/territory.		Areas with known paleontological resources occur within the state/territory, but may be avoidable.	Areas with known paleontological resources do not occur within the state/territory.
	Duration or Frequency	NA		NA	NA
Surface Geology, Bedrock, Topography, Physiography, and Geomorphology	Magnitude or Intensity	Substantial and measurable degradation or alteration of surface geology, bedrock, topography, physiographic characteristics, or geomorphological processes.	Effect that is potentially significant, but with mitigation is less than significant.	Minor degradation or alteration of surface geology, bedrock, topography that do not result in measurable changes in physiographic characteristics or geomorphological processes.	No degradation or alteration of surface geology, bedrock, topography, physiographic characteristics, or geomorphologic processes.
	Geographic Extent	State/territory.		State/territory.	NA
	Duration or Frequency	Permanent or long-term changes to characteristics and processes.		Temporary degradation or alteration of resources that is limited to the construction and deployment phase.	NA

NA = Not Applicable

5.2.3.3. Description of Environmental Concerns

Environmental concerns regarding geology can be viewed as two distinct types, those that would potentially provide impacts to the project, such as seismic hazards, landslides, and volcanic activity, and those that would be impacts from the project, such as land subsidence and effects on mineral and fossil fuel resources, paleontological resources, surface geology, bedrock, topography, physiography, and geomorphology. These concerns and their impacts on geology are discussed below.

Seismic Hazard

As discussed in Section 5.1.3.8, areas of greatest seismicity in Idaho are concentrated in the central, eastern, and southeastern portions of the state. Seismic activity in eastern Idaho is related to seismic hotspots in the Yellowstone region. Each month, dozens of smaller earthquakes (less than 3.0 in magnitude) occur in this area. Seismic activity in central and southeast Idaho is related to faults in the central mountains. Earthquakes ranging from magnitude 2.0 to 3.8 have been felt yearly in southeast Idaho. As shown in Figure 5.1.3-5, many of Idaho's most populous areas, including Boise, Pocatello, and Idaho Falls, are in high seismic risk areas. Given the potential for minor to moderate earthquakes in parts of Idaho, some amount of infrastructure be subject to earthquake hazards. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Volcanic Activity

Volcanic hazards in Idaho include three active and potentially active areas that could impact the state. The first is the Yellowstone Caldera[145] in northwest Wyoming that overlaps into Montana and southeastern Idaho (Wyoming Section 18.1.3.8 includes a detailed discussion of the Yellowstone Caldera). The second area is in the Cascade Mountain Range in Washington and Oregon (Washington Section 8.1.3.8 and Oregon Section 7.1.3.8 include additional information on the volcanoes in the Cascade Mountain Range.). Eruptions from more than 12 active composite[146] volcanoes, including Mount Saint Helens, in the Cascades could produce ashfall that could impact Idaho. The third area of volcanic activity is the Snake River Plain, particularly an area in south-central Idaho known as the "Craters of the Moon" (Idaho Bureau of Homeland Security, 2013a). Based on the impact significance criteria presented in Table 5.2.3-1, impacts from volcanic activity would could only be potentially significant if there is a high likelihood that a project activity could be located near a volcano lava or mud flow area of influence. Given the potential for volcanic activity to affect parts of Idaho, some amount of infrastructure be subject to volcanic hazards. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

[145] Caldera: "Large, generally circular, fault-bounded depression caused by the withdrawal of magma from below a volcano or volcanoes." (USGS, 2015f)
[146] Composite Volcano: "A relatively long-lived volcano built up of both lava flows and pyroclastic material." (USGS, 2015f)

Landslides

Similar to seismic hazards, another concern would be placement of equipment in areas that are highly susceptible to landslides. Equipment that is exposed to landslides is subject to misalignment, alteration, or, in extreme cases, destruction; all of these activities could result in connectivity loss.

As discussed in Section 5.1.3, and shown in Figure 5.1.3-6, localized areas of Idaho are vulnerable to land subsidence. Based on the impact significance criteria presented in Table 5.2.3-1, potential impacts to landslides from deployment or operation of the Proposed Action would have less than significant impacts, as it is likely that the project would attempt to avoid areas that are prone to landslides; however, landslide impacts to the Proposed Action could be potentially significant if FirstNet's deployment locations were within areas in which landslides are highly prevalent. The potential of landslides is increased in northern Idaho. To the extent practicable, FirstNet would avoid deployment in areas that are susceptible to landslide events. However, given that karst topography exists in many counties throughout the state, some amount of infrastructure may subject to landslide hazards. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Land Subsidence

Equipment that is exposed to land subsidence, such as sinkholes created by karst topography or mine collapse, is subject to misalignment, alteration, or, in extreme cases, destruction. Significant long-term land subsidence, due to factors such as aquifer compaction, in coastal areas could lead to relative sea level rise[147] and inundation of equipment. All of these activities could result in connectivity loss.

Land subsidence is of particular concern in the Snake River plain in the southeastern portion of the state. This area contains basalt lava fields that produce volcanic pseudokarst[148] areas. These areas are characterized by fissures, open sinkholes, lava tubes, and caves that are created from extrusion of still-liquid portions of lava. These lava tubes and fissures could produce sinkholes that exceed 150 feet (Davies, 1984). Figure 5.1.3-7 shows the location of areas in Idaho that are susceptible to land subsidence due to karst topography. Based on the impact significance criteria presented in Table 5.2.3-1, potential impacts to soil subsidence from deployment or operation of the Proposed Action would have less than significant impacts; however, subsidence impacts to the Proposed Action could be potentially significant if FirstNet's deployment locations were within areas at high risk to karst topography areas. However, given that karst topography exists in many counties throughout the state, some amount of infrastructure may subject to landslide hazards, in which case BMPs and mitigation measures could help avoid or minimize the potential impacts. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs

[147] Relative Sea Level Rise: "[Sea level rise that] includes the combined movement of both water and land. Even if sea level was constant, there could be changes in relative sea level. For example, a rising land surface would produce a relative fall in sea level, whereas a sinking land surface would produce a relative rise in sea level." (U.S. Geological Survey, 2015)
[148] Pseudokarst: "Karstlike terrain produced by processes other than the dissolution of rocks" (Davies, 1984)

and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Potential Mineral and Fossil Fuel Resource Impacts

Equipment deployment near mineral and fossil fuel resources is not likely to affect these resources. Rather the new construction is only likely to limit access to extraction of these resources. Based on the impact significance criteria presented in Table 5.2.3-1, impacts to mineral and fossil fuel resources are unlikely as the Proposed Action could only be potentially significant if FirstNet's deployment locations were to cause severe, widespread, observable impacts to mineral and/or fossil fuel resources. The Proposed Action is likely to have less than significant impacts due to the expected small scale of likely FirstNet projects. To the extent practicable, FirstNet would avoid construction in areas where these resources exist. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Potential Paleontological Resource Impacts

Equipment installation and construction activities that require ground disturbance could damage existing paleontological resources, which are both fragile and irreplaceable. Based on the impact significance criteria presented in Table 5.2.3-1, impacts to paleontological resources could be potentially significant if FirstNet's buildout/deployment locations uncovered paleontological resources during construction activities. As discussed in Section 5.1.3.6, fossils are found throughout parts of Idaho. It is anticipated that potential impacts to specific areas known to contain paleontological resources would be avoided, minimized, or mitigated, and any potential impacts would be limited and localized. Potential impacts to paleontological resources should be considered on a site-by-site basis, and BMPs and mitigation measures could further help avoid or minimize the potential impacts. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Surface Geology, Bedrock, Topography, Physiography, and Geomorphology

Equipment installation and construction activities that require modification or removal of the surrounding terrain could cause irreparable damage to that area's geology, topography, physiography, or geomorphology. Based on the impact significance criteria presented in Table 5.2.3-1, impacts would be less than significant if FirstNet's deployment is unlikely to cause substantial and measurable degradation or alteration of surface geology, bedrock, topography, physiographic characteristics, or geomorphological processes. Construction activities related to the Proposed Action and Alternatives are likely to be minor and less than significant as the proposed activities are not likely to require removal of significant volumes of terrain and any rock ripping would likely occur in discrete locations and would be unlikely to result in large-scale changes to the geologic, topographic, or physiographic characteristics. When ground disturbance is required, BMPs and mitigation measures could be implemented to help avoid or minimize the potential impacts. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.3.4. Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment and operation activities.

Deployment Impacts

Implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities have the potential to be impacted by geologic hazards, some activities could result in potential impacts to geology, and other activities would have no impacts. In addition, and as explained in this section, the same type of Proposed Action Infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no impacts to geology under the conditions described below:

- Wired Projects
    - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. In most cases, there would be no impacts to geologic resources since the activities that would be conducted at these small entry and exit points are not likely to produce perceptible changes.
    - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up of dark fiber would have no impacts to geologic resources because there would be no ground disturbance.
- Satellites and Other Technologies
    - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN, however it may include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact geologic resources, it is anticipated that this activity would have no impact on geologic resources.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to geologic resources, or resulting from geologic hazards due to implementation of the Preferred Alternative, would encompass a range of impacts that could occur as a result of ground disturbance activities, including loss of mineral and fuel resources and paleontological resources. The types of infrastructure development scenarios or deployment activities that could be part of the Preferred Alternative and result in potential impacts to geologic resources, or impacts from geologic hazards, include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: Plowing (including vibratory plowing), trenching, or directional boring and the construction of POP, huts, or other associated facilities or hand-holes to access fiber could result in potential impacts to geologic resources due to associated ground disturbance, such as impacts to fuel and mineral resources or paleontological resources. Where equipment is installed in locations that are susceptible to landslides, earthquakes, and other geologic hazards, it is possible that equipment could be affected by that hazard.
  - New Build – Aerial Fiber Optic Plant: Installation of new utility poles, and associated use of heavy equipment during construction, could result in potential impacts to geologic resources due to associated ground disturbance. Where equipment is installed in locations that are susceptible to landslides, earthquakes, and other geologic hazards, it is possible that equipment could be affected by that hazard.
  - Collocation on Existing Aerial Fiber Optic Plant: Replacement of utility poles and structural hardening, and associated use of heavy equipment during construction, could result in potential impacts to geologic resources due to associated ground disturbance. Where equipment is installed in locations that are susceptible to landslides, earthquakes, and other geologic hazards, it is possible that equipment could be affected by that hazard.
  - New Build – Submarine Fiber Optic Plant: The installation of cables in or near bodies of water would not impact geology resources because there would be no local geology resources to impact. However, impacts to geology resources could potentially occur as result of the construction of landings and/or facilities on shores or the banks of water bodies that accept the submarine cable, depending on the exact site location and proximity to existing geology resources.
  - Installation of Optical Transmission or Centralized Transmission Equipment: If installation of transmission equipment would occur in existing boxes or huts and require ground disturbance in locations that are susceptible to geologic hazards (e.g., land subsidence, landslides, or earthquakes), it is possible that they could be affected by that hazard.
- Wireless Projects
  - New Wireless Communication Towers*:* Installation of new wireless towers and associated structures (generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads could result in impacts to geologic resources. Land/vegetation clearing, excavation activities, landscape grading, and other ground disturbance activities during the installation of new wireless towers and associated structures or access roads could result in erosion or disturbance of geologic resources. Where equipment is installed in locations that are susceptible to landslides, earthquakes, and other geologic hazards, it is possible that equipment could be affected by that hazard.

  - Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower, which would not result in ground disturbance. However, if additional power units are needed, structural hardening, and physical security measures required ground disturbance, such as grading, or excavation activities, impacts to geologic resources could occur due to ground disturbance. Where equipment is installed in locations that are susceptible to landslides, earthquakes, and other geologic hazards, it is possible that equipment could be affected by that hazard.
  - Deployable Technologies: Implementation of deployable technologies could result in potential impacts to geologic resources depending on the technology and location proposed for deployment. Potential impacts may result if deployment of vehicles (i.e., SOWs, COWs, COLTs, or UAVs) occurs in unpaved areas, or if the implementation results in paving of previously unpaved surfaces. Some staging or landing areas (depending on the type of technology) may require land/vegetation clearing, excavation, and paving. Where deployable technologies would be implemented on existing paved surfaces, there would be no impacts to/from geologic resources because there would be no ground disturbance and mobile technologies could be moved to avoid geologic hazards.
- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: In most cases, the installation of permanent equipment on existing structures, adding equipment to satellites launched for other purposes, or the use of portable devices that use satellite technology would not impact geologic resources because those activities would not require ground disturbance. However, where equipment is permanently installed in locations that are susceptible to landslides, earthquakes, and other geologic hazards, it is possible that they could be affected by that hazard. The use of portable satellite-enabled devices would not impact geologic resources nor would it be affected by geologic hazards because there would be no ground disturbance nor any impact to the built or natural environment.

In general, the abovementioned activities could potentially involve ground disturbance resulting from land/vegetation clearing, topsoil removal, excavation, excavated material placement, trenching or directional boring, construction of access roads and other impervious surfaces, landscape grading, and heavy equipment movement. Potential impacts to geological resources associated with deployment could result in incidental removal of bedrock or mineral and fuel resources, or adverse impacts to installed equipment resulting from geologic hazards (e.g., seismic hazards, landslides, and land subsidence). Specific FirstNet projects are likely to be small-scale; correspondingly, disturbance to geologic resources for those types of projects with the potential to impact geologic resources is also expected to be small-scale. As a result, these potential impacts are expected to be less than significant. For the same reason, impacts to deployment from geologic hazards are likely to be less than significant as well. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to further avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned deployment impacts. It is anticipated that there would be no impacts to geology associated with routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for inspections because there would be no ground disturbance.

The operation of the Preferred Alternative could be affected by to geologic hazards including seismic activity, volcanic activity, landslides, and land subsidence. However, potential impacts would be anticipated to be less than significant as it is anticipated that deployment locations would avoid, as practicable and feasible, locations that are more likely to be affected by potential seismic activity, landslides, or land subsidence. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.3.5. Alternatives Impact Assessment

The following section assesses potential impacts to geology associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to geology as a result of implementation of this alternative could be as described below.

Deployment Impacts

Implementation of deployable technologies on existing paved surfaces would not result in impacts to geologic resources (or from geologic hazards) as there would be no ground disturbance and mobile technologies could be moved to avoid geologic hazards. Potential impacts may result if deployment of vehicles (i.e., SOWs, COWs, COLTs, or UAVs) occurs in unpaved areas, or if the implementation results in paving of previously unpaved surfaces. Some staging or landing areas (depending on the type of technology) may require land/vegetation clearing, excavation, and paving. These impacts are expected to be less than significant due to the minor amount of paving or new infrastructure needed to accommodate the deployables.

Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As explained above, operation activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the Preferred Alternative, it is anticipated that there would be no impacts to geologic resources (or from geologic hazards) associated with routine inspections of the Preferred Alternative because there would be no ground disturbance.

The operation of the Deployable Technologies Alternative could be affected by to geologic hazards including seismic activity, volcanic activity, landslides, and land subsidence. However, potential impacts would be anticipated to be less than significant as the deployment would be temporary and likely would attempt to avoid locations that was subject to increased seismic activity, landslides, and land subsidence. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed; therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure, or satellites and other technologies. As a result, there would be no impacts to geologic resources (or from geologic hazards) as a result of construction and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 5.1.3, Geology.

5.2.4. Water Resources

5.2.4.1. Introduction

This section describes potential impacts to water resources in Idaho associated with deployment and operation of the Proposed Action and alternatives. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.4.2. Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on water resources were evaluated using the significance criteria presented in Table 5.2.4-1. The categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to water resources addressed in this section are presented as a range of possible impacts.

Table 5.2.4-1: Impact Significance Rating Criteria for Water Resources

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than significant with BMPs and mitigation measures incorporated**	**Less than significant**	**No impact**
Water Quality (groundwater and surface water) - sedimentation, pollutants, nutrients, water temperature	Magnitude or Intensity	Groundwater contamination creating a drinking quality violation, or otherwise substantially degrade groundwater quality or aquifer; local construction sediment water quality violation, or otherwise substantially degrade water quality; water degradation poses a threat to the human environment, biodiversity, or ecological integrity. Violation of various regulations including: CWA, SDWA.	Effect that is potentially significant, but with mitigation is less than significant.	Potential impacts to water quality, but potential effects to water quality would be below regulatory limits and would naturally balance back to baseline conditions.	No changes to water quality; no change in sedimentation or water temperature, or the presence of water pollutants or nutrients.
	Geographic Extent/Context	Watershed level, and/or within multiple watersheds.		Watershed or subwatershed level.	NA
	Duration or Frequency	Chronic and long term changes not likely to be reversed over several years or seasons.		Impact is temporary, lasting no more than six months.	NA
Floodplain degradation*	Magnitude or Intensity	The use of floodplain fill, substantial increases in impervious surfaces, or placement of structures within a 500-year flood area that will impede or redirect flood flows or impact floodplain hydrology. High likelihood of encountering a 500-year floodplain within a state or territory.	Effect that is potentially significant, but with mitigation is less than significant.	Activities occur inside the 500-year floodplain, but do not use fill, do not substantially increase impervious surfaces, or place structures that will impede or redirect flood flows or impact floodplain hydrology, and do not occur during flood events. Low likelihood of encountering a 500-year floodplain within a state or territory.	Activities occur outside of floodplains and therefore do not increase fill or impervious surfaces, nor do they impact flood flows or hydrology within a floodplain.

Type of Effect	**Effect Characteristics**	**Impact Level**			
		Potentially Significant	**Less than significant with BMPs and mitigation measures incorporated**	**Less than significant**	**No impact**
	Geographic Extent	Watershed level, and/or within multiple watersheds.		Watershed or subwatershed level.	NA
	Duration or Frequency	Chronic and long term changes not likely to be reversed over several years or seasons.		Impact is temporary, lasting no more than one season or water year, or occurring only during an emergency.	NA
Drainage pattern alteration	Magnitude or Intensity	Alteration of the course of a stream of a river, including stream geomorphological conditions, or a substantial and measurable increase in the rate or amount of surface water or changes to the hydrologic regime.	Effect that is potentially significant, but with mitigation is less than significant.	Any alterations to the drainage pattern are minor and mimic natural processes or variations.	Activities do not impact drainage patterns.
	Geographic Extent	Watershed level, and/or within multiple watersheds.		Watershed or subwatershed level.	NA
	Duration or Frequency	Impact occurs in perennial streams, and is ongoing and permanent.		Impact is temporary, lasting no more than six months.	NA
Flow alteration	Magnitude or Intensity	Consumptive use of surface water flows or diversion of surface water flows such that there is a measurable reduction in discharge.	Effect that is potentially significant, but with mitigation is less than significant.	Minor or no consumptive use with negligible impact on discharge.	Activities do not impact discharge or stage of waterbody (stream height).
	Geographic Extent	Watershed level, and/or within multiple watersheds.		Watershed or subwatershed level.	NA
	Duration or Frequency	Impact occurs in perennial streams, and is ongoing and permanent.		Impact is temporary, not lasting more than six months.	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than significant with BMPs and mitigation measures incorporated**	**Less than significant**	**No impact**
Changes in groundwater or aquifer characteristics	Magnitude or Intensity	Substantial and measurable changes in groundwater or aquifer characteristics, including volume, timing, duration, and frequency of groundwater flow, and other changes to the groundwater hydrologic regime.	Effect that is potentially significant, but with mitigation is less than significant.	Any potential impacts to groundwater or aquifers are temporary, lasting no more than a few days, with no residual impacts.	Activities do not impact groundwater or aquifers.
	Geographic Extent	Watershed level, and/or within multiple watersheds.		Watershed or subwatershed level.	NA
	Duration or Frequency	Impact is ongoing and permanent.		Impact is temporary, not lasting more than six months.	NA

* - Since public safety infrastructure is considered a critical facility, project activities should avoid the 500-year floodplain wherever practicable, per the Executive Orders on Floodplain Management (EO 11988 and EO 13690). (See http://www.archives.gov/federal-register/codification/executive-order/11988.html and https://www.federalregister.gov/articles/2015/02/04/2015-02379/establishing-a-federal-flood-risk-management-standard-and-a-process-for-further-soliciting-and).

NA = Not Applicable

5.2.4.1. Description of Environmental Concerns

Potential Water Quality Impacts

Water quality impaired waterbodies are those waters that have been identified as not supporting their appropriate uses. Projects in watersheds of impaired waters may be subject to heightened permitting requirements. For example, the CWA requires states to assess and report on the quality of waters in their state. Section 503(d) of the CWA requires states to identify impaired waters. For these impaired waters, states must consider the development of a Total Maximum Daily Load (TMDL) or other strategy to reduce the input of the specific pollutant(s) restricting waterbody uses, in order to restore and protect such uses.

Various sources affect Idaho's waterbodies, causing impairments. As of 2012, approximately 55 percent of Idaho's streams and 90 percent of lakes were impaired from temperature, sediment, nutrients, and/or stream/flow modification (USEPA, 2015a) (see Figure 5.1.4-2). Although the quality of groundwater in Idaho is generally good, groundwater has been degraded in the southern part of the state, which has the highest population density. Nitrate is one of the most widespread groundwater contaminants in Idaho. (DEQ, 2015m)

Deployment activities could contribute pollutants in a number of ways but the primary likely manner is increased sediment in surface waters. Vegetation removal on site exposes soils to rain and wind that could increase erosion. Impacts to water quality may occur from post construction vegetation management, such as herbicides, that may leach into groundwater or move to surface waters through soil erosion or runoff, spray drift, or inadvertent direct overspray. Fuel, oil, and other lubricants from equipment could contaminate groundwater and surface waters if carried in runoff. Other water quality impacts could include changes in temperature, pH or dissolved oxygen levels, water odor, color, or taste, or addition of suspended solids.

Soil erosion or the introduction of suspended solids into waterways from implementation of the Preferred Alternative could contribute to degradation of water quality. If the Proposed Action and Alternatives would disturb more than 1 acre of soil, a state or USEPA NPDED Construction General Permit (CGP) would be required. As part of the permit application for the CGP, a stormwater pollution prevention plan (SWPPP) would need to be prepared containing BMPs that would be implemented to prevent, or minimize the potential for, sedimentation and erosion. Adherence to the CGP and the BMPs would help prevent sediment and suspended solids from entering the waterways and ensure that effects on water quality during construction would not be adverse.

Deployment activities associated with the Proposed Action have the potential to increase erosion and sedimentation around construction and staging areas. Grading activities associated with construction would potentially result in a temporary increase in the amount of suspended solids running off construction sites. If a storm event were to occur, construction site runoff could result in sheet erosion of exposed soil. If not adequately controlled, water runoff from these areas would have the potential to degrade surface water quality. Implementing BMPs could reduce potential impacts to surface water quality.

Expected deployment activities would not violate applicable state, federal (e.g., CWA, and Safe Drinking Water Act), and local regulations, cause a threat to the human environment, biodiversity, or ecological integrity through water degradation, or cause a sediment water quality violation from local construction, or otherwise substantially degrade water quality.

Therefore, based on the impact significance criteria presented in Table 5.2.4-1, water quality impacts would likely be less than significant due to the limited extent and temporary nature of the deployment, and could be further reduced if BMPs and mitigation measures were to be incorporated where practicable and feasible.

During implementation of the Proposed Action and Alternatives, there is the potential to encounter shallow groundwater due to clearing and grading activities, shallow excavation, or relocation of utility lines. This is unlikely, as trenching is not expected to exceed a 48-inch depth. However, groundwater contamination may exist in areas directly within or near the project area. If trenching[149] or tower construction were to occur near or below the existing water table (depth to water), then dewatering would be anticipated at the location. Residual contaminated groundwater could be encountered during dewatering activities. Construction activities would need to comply with Idaho dewatering requirements. Any groundwater extracted during dewatering activities, or subject to the terms of a dewatering permit, may be required to be treated prior to discharge or disposed of at a wastewater treatment facility.

Based on the impact significance criteria presented in Table 5.2.4-1, groundwater quality impacts could be potentially significant if the majority of FirstNet's deployment locations resulted in a drinking quality violation, or otherwise substantially degrade groundwater quality or aquifer. There is little potential for groundwater contamination within a watershed or multiple watersheds. Thus, there would likely be less than significant impacts on groundwater quality within most of the state. In areas where groundwater is close to the surface, then site-specific analysis, BMPs, and mitigation measures could be implemented to further reduce potential impacts.

Floodplain Degradation

Floodplains are low-lying lands next to rivers and streams. When left in a natural state, floodplain systems store and dissipate floods without adverse impacts on human beings, buildings, roads and other infrastructure. The 500-year floodplain is the area of minimal flood hazard, where there is a 0.2-percent-annual-chance flood. Some projects may be outside of a floodplain, but still be in an area with known flooding history.

Based on the impact significance criteria presented in Table 5.2.4-1, floodplain degradation impacts would be potentially less than significant since the majority of FirstNet's likely deployment activities, on the watershed or subwatershed level, would use minimal fill, would not substantially increase impervious surfaces, structures would not impede or redirect flood flows or impact floodplain hydrology, and would not occur during flood events with the exception of

[149] Telecommunications activities involve laying conduit, with minimal trenching. Trenching activities would likely be at a minimal depth (less than 36 inches) and width (6 to 12 inches).

deployable technologies which may be deployed in response to an emergency. Additionally, any effects would be temporary, lasting no more than one season or water year,[150] or occur only during an emergency.

Examples of activities that would have less than significant impacts include:

- Construction of any structure in the 500-year floodplain but is built above base flood elevation pursuant to floodplain management regulations.
- Land uses that include pervious surfaces such as gravel parking lots.
- Land uses that do not change the flow of water or drainage patterns.
- Limited clearing or grading activities.

Implementation of BMPs and mitigation measures could reduce the risk of additional impacts to floodplain degradation (see Chapter 9).

Drainage Pattern Alteration

Flooding and erosion from land disturbance could changes drainage patterns. Storm water runoff causes erosion while construction activities and land clearing could change drainage patterns. Clearing or grading activities, or the creation of walls or berms could alter water flow in an area or cause changes to drainage patterns. Drainage could be directed to stormwater drains, storage, and retention areas designed to slow water and allow sediments to settle out. Improperly handled drainage could cause increased erosion, changes in stormwater runoff, flooding, and damage to water quality. Existing drainage patterns could be modified by channeling (straightening or restructuring natural watercourses); creation of impoundments (detention basins, retention basins, and dams); stormwater increases; or altered flow patterns.

According to the significance criteria in Table 5.2.4-1, any temporary (lasting less than six months) alterations to drainage patterns that are minor and mimic natural processes or variations within the watershed or subwatershed level would be considered less than significant.

Examples of projects that could have minor changes to the drainage patterns include:

- Land uses with pervious surfaces that create limited stormwater runoff.
- Where stormwater is contained on site and does not flow to or impact surface waterbodies offsite on other properties.
- Activities designed so that the amount of stormwater generated before construction is the same as afterwards.
- Activities designed using low impact development techniques for stormwater.

Since the proposed activities would not substantially alter drainage patterns ways that alter the course of a stream or river; create a substantial and measurable increase in the rate and amount of surface water; or change the hydrologic regime; and any effects would be short-term; impacts to

[150] A water year is defined as "the 12-month period October 1, for any given year through September 30, of the following year. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months." (USGS, 2016c)

drainage patterns would be less than significant. BMPs and mitigation measures could be implemented to further reduce any potentially significant impacts.

Flow Alteration

Flow alteration refers to the modification of flow characteristics, relative to natural conditions. Human activities may change the amount of water reaching a stream, divert flow through artificial channels, or alter the shape and location of streams. Surface water and groundwater withdrawals could alter flow by reducing water volumes in streams. Withdrawals may return to the surface/groundwater system at a point further downstream, be removed from the watershed through transpiration by crops, lawns or pastures, or be transferred to another watershed altogether (e.g., water transferred to a different watershed for drinking supply). Altered flow could increase flooding and introduce more erosion and potential for pollution. Alternatively, if water is diverted from its normal flow, the opposite may occur; wetlands and streams may not receive as much water as necessary to maintain the ecology and previous functions.

Activities that do not impact discharge or stage of waterbody (stream height) are not anticipated to have an impact on flow, according to Table 5.2.4-1. Projects that include minor consumptive use of surface water with less than significant impacts on discharge (do not direct large volumes of water into different locations) on a temporary (no more than six months) are likely to have less than significant impacts on flow alteration, on a watershed or subwatershed level. Examples of projects likely to have less than significant impacts include:

- Construction of any structure in a 100-year or 500-year floodplain that is built above base flood elevation pursuant to floodplain management regulations.
- Land uses that are maintaining or increasing pervious surfaces.
- Land uses that do not change the flow of water or drainage patterns off site or into surface water bodies that have not received that volume of stormwater previously.
- Minor clearing or grading activities.

Since the proposed activities would not likely alter flow characteristics or change the hydrologic regime, impacts would be less than significant impacts to flow alteration. BMPs, mitigation measures, and avoidance could be implemented to further reduce any impacts.

Changes in Groundwater or Aquifer Characteristics

As described in Section 5.1.4.7, approximately 95 percent of Idaho residents draw drinking water from groundwater resources. Groundwater is an important resource in Idaho, providing water for public and private drinking water systems, irrigation and other agricultural practices, and industrial use. Although the quality of groundwater in Idaho is generally good, groundwater has been degraded in the southern part of the state, which has the highest population density (DEQ, 2015m). Once a groundwater supply is exhausted or contaminated, it is very expensive, and sometimes impossible, to replace. Water supply demand from the deployment activities is unlikely to exceed safe and sustainable withdrawal capacity rate of the local supply or aquifer.

Storage of generator fuel over groundwater or an aquifer would be unlikely to cause significant impacts to water quality due to the expected small volume of these materials. Activities that may cause changes is groundwater or aquifer characteristics include:

- Excavation or dredging during or after construction.
- Any liquid waste, including but not limited to wastewater, generation.
- Storage of petroleum or chemical products.

Private and public water supplies often use groundwater as a water source. To maintain a sustainable system, the amount of water withdrawn from these groundwater sources must be balanced with the amount of water returned to the groundwater source (groundwater recharge).

Deployment activities should be less than significant since they would not substantially deplete supplies of potable groundwater, as any construction dewatering would be short-term. The siting of deployment activities should be considered to avoid areas that would extract groundwater from potable groundwater sources in the area. According to Table 5.2.4-1, potentially significant impacts to groundwater or aquifer characteristics would only occur if actions resulted in substantial and measurable changes in groundwater or aquifer characteristics, including volume, timing, duration, and frequency of groundwater flow, and other changes to the groundwater hydrologic regime on a watershed or within multiple watersheds that is ongoing and permanent. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.4.2. Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment and operation activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to water resources and others would not. In addition, and as explained in this section, the same type of Proposed Action Infrastructure could result in a range of no impacts to potentially significant impacts depending on the deployment scenario or site-specific conditions. The impact on the water resources that could be affected would depend on the watershed, duration (chronic or short-term) and frequency (many years or a few months) the resource would be used, and the water resource’s current use (sole source for drinking water, considered exceptional value for recreation, or provides critical habitat for a species).

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Infrastructure, the following are likely to have no impacts to water resources under the conditions described below:

- Wired Projects
  - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. It is anticipated that there would be no impacts to water resources since the activities that would be conducted at these small entry and exit points are not likely to produce perceptible changes.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up of dark fiber would have no impacts to water resources because there would be no ground disturbance.
- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: It is anticipated that the installation of permanent equipment on existing structures and the use of portable devices that use satellite technology would not impact water resources because those activities would not require ground disturbance.
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it could include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact water resources, it is anticipated that this activity would have no impact on water resources.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to water resources because of implementation of the Preferred Alternative would encompass a range of impacts that could occur, including impaired water quality. The types of deployment activities that could be part of the Preferred Alternative and result in potential impacts to water resources include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: Plowing (including vibratory plowing), trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber could result in potential impacts to water resources. Land/vegetation clearing and excavation activities, associated with construction of POPs, huts, or other associated facilities could result in direct and indirect impacts to water quality from a temporary increase in the amount of suspended solids running off construction sites. The amount of impact depends on the land area affected, installation technique, and location. Trenching would not be expected to occur near or below the existing water table (depth to water). Implementing BMPs and mitigation measures could reduce impact intensity.

- New Build – Submarine Fiber Optic Plant: The installation of cables in or near bodies of water would not impact water resources because there would be no local water resources to impact. However, impacts to water resources could potentially occur as result of the construction of landings and/or facilities on shores or the banks of water bodies that accept the submarine cable, depending on the exact site location and proximity to existing water resources.
- New Build – Aerial Fiber Optic Plant: Potential impacts would be similar to Buried Fiber Optic Plant. Ground disturbance activities could cause impacts to water quality from increased suspended solids; groundwater impacts from trenching activities are not expected. If a new roadway were built, additional impervious surface would not be expected to impact water resources or the overall amount of runoff and nonpoint pollution.
- Collocation on Existing Aerial Fiber Optic Plant: Replacement of poles or structural hardening could result in ground disturbance that could cause impacts to water quality from increased suspended solids.
- Installation of Optical Transmission or Centralized Transmission Equipment: If installation of transmission equipment required grading or other ground disturbance to install small boxes or huts, or access roads, there could potentially be direct and indirect impacts to water quality from a temporary increase in the amount of suspended solids running off construction sites. The amount of impact depends on the land area affected, installation technique, and location. Trenching would not be expected to occur near or below the existing water table (depth to water). If installation of transmission equipment would occur in existing boxes or huts and require no ground disturbance, there would be no impacts to water resources.

- Wireless Projects
  - New Wireless Communication Towers: Installation of new wireless towers and associated structures (generators, equipment sheds, fencing, security, lighting, electrical feeds, and concrete foundations and pads) or access roads could result in potential direct and indirect impacts to water quality from a temporary increase in the amount of suspended solids running off construction sites. The amount of impact depends on the land area affected, installation technique, and location. Trenching would not be expected to occur near or below the existing water table (depth to water). Implementing BMPs and mitigation measures could reduce impact intensity. If a new roadway were built, any additional impervious surface could impact water resources or the overall amount of runoff and nonpoint pollution.
  - Deployable Technologies: Implementation of land-based deployable technologies could result in potential impacts to water resources if deployment involves movement of equipment through streams, occurs in riparian or floodplain areas, occurs in unpaved areas, or if the implementation results in paving of previously unpaved surfaces. Some staging or landing areas (depending on the type of technology) may require land/vegetation clearing, excavation, and paving. These activities could result in direct and indirect impacts to water quality from a temporary increase in the amount of suspended solids running off construction sites or deployment in unpaved areas. The amount of impact depends on the land area affected, installation technique, and location.

Implementing BMPs and mitigation measures could reduce impact intensity. The activities could also result in indirect impacts on water quality if fuels leak into surface or groundwater. Where deployable technologies would be implemented on existing paved surfaces, or where aerial and vehicular deployable technologies may be used on existing paved surfaces, it is anticipated that there would be no impacts to water resources because there would be no ground disturbance.

Deployment of drones, balloons, blimps, or piloted aircraft could have indirect impacts on water quality if fuels spill or other chemicals seep into ground or surface waters. In general, the abovementioned activities could potentially involve land/vegetation clearing; excavation and trenching; installation of security/safety lighting and fencing; and deployment of aerial platforms. Potential impacts to water resources associated with deployment of this infrastructure could include water quality impacts, but are expected to be less than significant due to the small scale of individual activities. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

In general, the abovementioned activities could potentially involve land/vegetation clearing; excavation and trenching; construction of access roads; installation or restructuring of towers or poles, installation of security/safety lighting and fencing; and deployment of aerial platforms. Potential impacts to water resources associated with deployment of this infrastructure would likely be less than significant due to the limited geographic scale of individual activities and would likely return to baseline conditions once revegetation of disturbed areas is complete. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities, and are expected to have no impacts as there would be no ground disturbing activity and it is likely routine maintenance activities would be conducted along exiting roads and utility rights-of way. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned construction impacts. Impacts to surface and groundwater quality from routine operations and maintenance, such as herbicide application to control vegetation, are not expected. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.4.3. Alternatives Impact Assessment

The following section assesses potential impacts to water resources associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to water resources as a result of implementation of this alternative could be as described below.

Deployment Impacts

As explained above, implementation of deployable technologies could result in less than significant impacts to water resources if those activities occurred on paved surfaces. Some staging or launching/landing areas (depending on the type of technology) may require land/vegetation clearing, excavation, and paving, however, these activities would be isolated and short term, and would likely return to baseline conditions once revegetation was complete. Additionally, project activities could result in direct and indirect impacts to water quality from a temporary increase in the amount of suspended solids running off construction sites and from fuels leaking into surface or groundwater. However, spills from vehicles or machinery used during deployment tend to be associated with re-fueling operations, and as such, would likely be a few gallons or less in volume and would likely be easily contained or cleaned up, and therefore would have less than significant impacts. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Deployable Technologies Alternative would consist of routine maintenance and inspection of the deployable technologies. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned deployment impacts. The water resources impacts would depend on the watershed, duration (chronic or short-term) and frequency (many years or a few months) the resource would be used, and the water resource’s current use (sole source for drinking water, considered exceptional value for recreation, or provides critical habitat for a species).

It is anticipated that there would be no impacts to water resources associated with routine inspections of the Deployable Technologies Alternative, assuming that the same access roads used for deployment are also used for inspections. If usage of heavy equipment as part of routine maintenance or inspections occurs off of established access roads or corridors and near waterbodies, the resulting ground disturbance could increase sedimentation in waterbodies, potentially impacting water quality. It is assumed that routine maintenance would not include operation of vehicles or equipment in waterbodies. Finally, if ground-based deployable technologies are parked and operated with air conditioning for extended periods of time, the condensation water from the air conditioner could result in soil erosion that could potentially impact waterbodies if the deployables are located adjacent to waterbodies, however, due to the limited and temporary nature of the deployable activities, it is anticipated that these potential impacts would be less than significant. Site maintenance, including mowing or herbicides, is anticipated to result in less than significant effects to water quality, due to the small-scale of expected FirstNet activities in any particular location. In addition, the presence of new access roads could increase the overall amount of impervious surface in the area, and increase runoff effects on water resources, as explained above. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed; therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to water resources as a result of construction and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 5.1.4, Water Resources.

5.2.5. Wetlands

5.2.5.1. Introduction

This section describes potential impacts to wetlands in Idaho associated with deployment and operation of the Proposed Action and alternatives. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.5.2. Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on wetlands were evaluated using the significance criteria presented in Table 5.2.4-1. The categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to wetlands addressed in this section are presented as a range of possible impacts.

Table 5.2.5-1: Impact Significance Rating Criteria for Wetlands

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	Less than significant with BMPs and mitigation measures incorporated	Less than significant	No impact
Direct wetland loss (fill or conversion to non-wetland)	Magnitude[a] or Intensity	Substantial loss of high-quality wetlands (e.g., those that provide critical habitat for sensitive or listed species, are rare or a high-quality example of a wetland type, are not fragmented, support a wide variety of species, etc.); violations of Section 504 of the CWA.	Effect that is potentially significant, but with mitigation is less than significant.	Impacts to lower quality wetlands (e.g., not rare or unique, that have low productivity and species diversity, and those that are already impaired or impacted by human activity).	No direct loss of wetlands.
	Geographic Extent/Context	Watershed level, and/or within multiple watersheds.		Watershed or subwatershed level.	NA
	Duration or Frequency	Chronic and long term changes not likely to be reversed over several years or seasons.		Periodic and/or temporary loss reversed over 1-2 growing seasons with or without active restoration.	NA
Other direct effects: vegetation clearing; ground disturbance; direct hydrologic changes (flooding or draining); direct soil changes; water quality degradation (spills or sedimentation)	Magnitude or Intensity	Substantial and measurable changes to hydrological regime of the wetland impacting salinity, pollutants, nutrients, biodiversity, ecological integrity, or water quality; introduction and establishment of invasive species to high quality wetlands.	Effect that is potentially significant, but with mitigation is less than significant.	Impacts to lower quality wetlands affecting the hydrological regime including salinity, pollutants, nutrients, biodiversity, ecological integrity, or water quality; introduction and establishment of invasive species to high quality wetlands.	No direct impacts to wetlands affecting vegetation, hydrology, soils, or water quality.
	Geographic Extent	Watershed level, and/or within multiple watersheds.		Watershed or subwatershed level.	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than significant with BMPs and mitigation measures incorporated**	**Less than significant**	**No impact**
	Duration or Frequency	Long-term or permanent alteration that is not restored within 2 growing seasons, or ever.		Periodic and/or temporary loss reversed over 1-2 growing seasons with or without active restoration.	NA
Indirect effects:[b] change in function(s)[c] change in wetland type	Magnitude or Intensity	Changes to the functions or type of high quality wetlands (e.g., those that provide critical habitat for sensitive or listed species, are rare or a high-quality example of a wetland type, are not fragmented, support a wide variety of species, etc.).	Effect that is potentially significant, but with mitigation is less than significant.	Impacts to lower quality wetlands (e.g., not rare or unique, that have low productivity and species diversity, and those that are already impaired or impacted by human activity).	No changes in wetland function or type.
	Geographic Extent	Watershed level, and/or within multiple watersheds.		Watershed or subwatershed level.	NA
	Duration or Frequency	Long-term or permanent.		Periodic and/or temporary loss reversed over 1-2 growing seasons with or without active restoration.	NA

[a] "Magnitude" is defined based on the type of wetland impacted, using USACE wetland categories (USACE 2014). Category 1 are the highest quality, highest functioning wetlands

[b] Indirect effects are those resulting from direct effects, but they occur elsewhere in space and/or time. Includes indirect hydrologic effects (wetting or drying) that in turn alters wetland function or type

[c] Wetland functions include hydrologic, ecological, geomorphic, and social functions typically assessed for wetlands as part of USACE compensatory mitigation planning. Typical functions assessed may include flood attenuation, bank stabilization, water quality, organic matter input/transport, nutrient processing, wildlife habitat, T/E species habitat, biodiversity, recreational/social value.

NA = Not Applicable

5.2.5.3. Description of Environmental Concerns

Potential Direct Wetland Loss (Fill or Conversion to Non-Wetland)

Construction-related impacts from several of the deployment activities have the potential for direct wetland impacts such as filling, draining, or conversion to a non-wetland. Examples include placement of fill in a wetland to construct a new tower, trenching through a wetland or directly connected waterway to install a cable, and placement of a structure (tower, building) within the wetland.

Wetlands regulate the quality and quantity of surface and groundwater supplies, reduce flood hazards by serving as retention basins for surface runoff, and maintain water supplies after floodwaters subside. If wetlands were filled, the entire area may be at risk for increased flooding. There could be a loss of open space to be enjoyed by the community, and decreased wildlife populations may be observed due to displacement and increased noise, light, and other human disturbance. To the extent practicable or feasible, FirstNet and/or their partners would avoid filling wetlands or altering the hydrologic regime so that wetlands would not be lost or converted to non-wetlands. Loss of high and low-quality wetlands would be less than significant given the small amount of land disturbance associated with likely proposed individual sites (generally less than an acre). Additionally, all site-specific locations will be subject to an environmental review to help ensure environmental concerns are addressed. To minimize any potential impacts to wetlands, BMPs and mitigation measures would be implemented in compliance with any issued federal, state, and local permits. Potential wetlands impacts could be further reduced by implementing BMPs and mitigation measures (see Chapter 9).

There are approximately 845,765 acres of wetlands throughout Idaho. The main type of wetlands are palustrine (freshwater) wetlands found on river and lake floodplains across the state (USFWS, 2015a).

Based on the impact significance criteria presented in Table 5.2.5-1, the deployment activities would most likely have less than significant direct impacts on wetlands. Additionally, the deployment activities would not violate applicable federal, state, and local regulations.

In Idaho, as discussed in Wetlands, Section 5.1.5.4, regulated high quality wetlands include forested wetlands, peatlands, vernal pools, playas, kettles, and wetlands identified in Idaho Department of Fish and Game Wetland Conservation Strategy[151] as Class I, Class II, and Reference Habitat Sites.

If any of the proposed deployment activities were to occur in these high quality wetlands, potentially significant impacts could occur. Although high quality wetlands are regionally scarce, they occur throughout the state, and are not always included on state maps; therefore,

[151] Idaho Department of Fish and Game's Wetland Conservation-Strategies have been developed for the Henrys Fork Basin, Northern Idaho, Big Wood River, Southeast Idaho, East-Central Idaho and Spokane River Basin, Middle and Western Snake River and tributaries, and the Upper Snake River and adjacent wetlands. Closed basins of Beaver-Camas Creeks, Medicine Lodge Creek, Palouse River, and lower Clearwater River sub-basins, Middle Fork and South Fork Clearwater Basins and Camas Prairie in northern Idaho. Refer to the internet Site at: http://fishandgame.idaho.gov/content/page/wetlands-publications-idaho-natural-heritage-program#reports.

site-specific analysis would be required, in addition to BMPs and mitigation measures to avoid potentially significant impacts to wetlands. To minimize any potential impacts to wetlands, BMPs and mitigation measures would be implemented in compliance with any issued federal, state, and local permits. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Potential Other Direct Effects

Other direct impacts consist of altering the chemical, physical, or biological components of a wetland to the extent that changes to the wetland functions occur. However, other direct impacts would not result in a loss of total wetland acreage. Changes, for example, could include conversion of a forested wetland system to a non-forested state through chemical, mechanical, or hydrologic manipulation; altered hydrologic conditions (increases or decreases) such as stormwater discharges or water withdrawals that alter the functions of the wetlands.

Based on the impact significance criteria presented in Table 5.2.5-1, construction-related deployment activities that result in long-term or permanent, substantial, and measurable changes to hydrological regime of the wetland (i.e., changes in salinity, pollutants, nutrients, biodiversity, ecological integrity, or water quality) may cause potentially significant impacts. In addition, introduction and establishment of invasive species to high quality wetlands within a watershed or multiple watersheds are potentially significant. Other direct effects to high- and low-quality wetlands would be less than significant given the amount of land disturbance associated with the project locations (generally less than an acre) and the short time-frame of deployment activities and the application of federal, state, and local wetlands regulations. Additionally, all site-specific locations will be subject to an environmental review to help ensure environmental concerns are addressed. To minimize any potential impacts to wetlands, BMPs and mitigation measures would be implemented in compliance with any issued federal, state, and local permits. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Examples of activities that could have other direct effects to wetlands in Idaho include:

- *Vegetation Clearing*: removing existing vegetation by clearing forest and herbaceous vegetation during construction activities, grading, seeding, and mulching. Clearing and grading may include increased soil erosion and a decrease in the available habitat for wildlife.
- *Ground Disturbance*: Increased amounts of stormwater runoff in wetlands could alter water level response times, depths, and duration of water detention. Reduction of watershed infiltration capacity could cause wetland water depths to rise more rapidly following storm events.
- *Direct Hydrologic Changes (flooding or draining)*: Greater frequency and duration of flooding could destroy native plant communities, as could depriving them of their water supply. Hydrologic changes could make a wetland more vulnerable to pollution. Increased water depths or flooding frequency could distribute pollutants more widely through a

wetland. Sediment retention in wetlands is directly related to flow characteristics, including degree and pattern of channelization, flow velocities, and storm surges.

- *Direct Soil Changes*: Changes in soil chemistry could lead to degradation of wetlands that have a specific pH range and/or other parameter, such as the acidic conditions of peatlands (which are high quality wetlands in Idaho).
- *Water Quality Degradation (spills or sedimentation)*: The loss of wetlands results in a depletion of water quality both in the wetland and downstream. Filtering of pollutants by wetlands is an important function and benefit. High levels of suspended solids (sedimentation) could reduce light penetration, dissolved oxygen, and overall wetland productivity. Toxic materials in runoff could interfere with the biological processes of wetland plants, resulting in impaired growth, mortality, and changes in plant communities.

Indirect Effects:[152] Changes in Function(s)[153] or Change in Wetland Type

Indirect effects to wetlands could include change in wetland function or conversion of a resource to another type (i.e., wetland to an open body of water). The construction of curb and gutter systems diverts surface runoff and could cause flooding or wetlands to dry out, depending on the direction of diversion. Indirect effects to wetlands would be less than significant given the amount of land disturbance associated with the project locations (generally less than an acre) and the application of federal, state, and local wetlands regulations. Additionally, all site-specific locations will be subject to an environmental review to help ensure environmental concerns are addressed. To minimize any potential impacts to wetlands, BMPs and mitigation measures would be implemented in compliance with any issued federal, state, and local permits. Potential wetlands impacts could be further reduced by implementing BMPs and mitigation measures, as practicable and feasible (see Chapter 9).

Examples of functions related to wetlands in Idaho that could potentially be impacted from construction-related deployment activities include:

- *Flood Attenuation*: Wetlands provide flood protection by holding excess runoff after storms, before slowly releasing it to surface waters. While wetlands may not prevent flooding, they could lower flood peaks by providing detention of storm flows.
- *Bank Stabilization:* By reducing the velocity and volume of flow, wetlands provide erosion control, floodwater retention, and reduce stream sedimentation.
- *Water Quality:* Water quality impacts on wetland soils could eventually threaten a wetland's existence. Where sediment inputs exceed rates of sediment export and soil consolidation, a wetland would gradually become filled.
- *Nutrient Processing:* Wetland forests retain ammonia during seasonal flooding. Wetlands absorb metals in the soils and by plant uptake via the roots. They also allow metabolism of

[152] Indirect effects are those resulting from direct effects, but they occur elsewhere in space and/or time. Includes indirect hydrologic effects (wetting or drying) that in turn alters wetland function or type.
[153] Wetland functions include hydrologic, ecological, geomorphic, and social functions typically assessed for wetlands as part of USACE compensatory mitigation planning. Typical functions assessed may include flood attenuation, bank stabilization, water quality, organic matter input/transport, nutrient processing, wildlife habitat, T/E species habitat, biodiversity, recreational/social value.

oxygen-demanding materials and reduce fecal coliform populations. These pollutants are often then buried by newer plant material, isolating them in the sediments.

- *Wildlife Habitat*: Impacts on wetland hydrology and water quality affect wetland vegetation. While flooding could harm some wetland plant species, it promotes others. Shifts in plant communities because of hydrologic changes could have impacts on the preferred food supply and animal cover.
- *Recreational Value*: Wetlands provide recreation opportunities for people, such as hiking, bird watching, and photography.
- *Groundwater Recharge:* Wetlands retain water, allowing time for surface waters to infiltrate into soils and replenish groundwater.

According to the significance criteria defined in Table 5.2.5-1, impacts to lower quality wetlands (e.g., not rare or unique, that have low productivity and species diversity, and those that are already impaired or impacted by human activity), would be considered potentially less than significant. Deployment activities would have less than significant indirect impacts on wetlands in the state because forested wetlands, peatlands, vernal pools, playas, kettles, and other high quality wetlands are regionally scarce, proposed deployment activities would be evaluated for impact at the site level, and BMPs and mitigation measures could be implemented, as feasible and practicable, to reduce potential impacts to all wetlands.

In areas of the state with high quality wetlands, there could be potentially significant impacts at the project level that would be analyzed on a case-by-case basis. If avoidance were not possible, BMPs and mitigation measures would help to mitigate impacts. To minimize any potential impacts to wetlands, BMPs and mitigation measures would be implemented in compliance with any issued federal, state, and local permits. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.5.4. Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment and operation activities. To determine the magnitude of potential impacts of site-specific activities, wetland delineations would be required to determine the exact location of all wetlands, including high quality wetlands, as well as a functional assessment by an experienced wetland delineator.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to wetlands and others would not. In addition, and as explained in this section, the same type of Proposed Action Infrastructure could result in a range of no impacts to potentially significant impacts depending on the deployment scenario or site-specific conditions.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no impacts to wetlands under the conditions described below:

- Wired Projects
  - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. It is anticipated that there would be no impacts to wetlands since the activities that would be conducted at these small entry and exit points are not likely to produce perceptible changes.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up of dark fiber would have no impacts to wetlands because there would be no ground disturbance.
- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: It is anticipated that the installation of permanent equipment on existing structures, adding equipment to satellites being launches for other purposes, and the use of portable devices that use satellite technology is not likely to impact wetlands since there would be no ground disturbance.
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it may include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact wetlands, it is anticipated that this activity would have no impact on wetlands.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to wetlands because of implementation of the Preferred Alternative would encompass a range of impacts that could occur, including direct effects, other direct effects, and indirect effects on wetlands.

The types of deployment activities that could be part of the Preferred Alternative and result in potential impacts to wetlands include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant*:* Plowing (including vibratory plowing), trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber could result in potential impacts to wetlands. Land/vegetation clearing and excavation activities, associated with construction of POPs, huts, or other associated facilities could result in direct and indirect impacts to wetlands. The amount of impact depends on the land area affected, installation technique, proximity to wetlands, and type of wetland that could be affected (e.g., high quality). Any ground disturbance could cause direct and indirect impacts wetlands, depending on the proximity to wetlands and type of wetlands that could be affected. Implementing BMPs and mitigation measures could reduce impact intensity.

- New Build – Submarine Fiber Optic Plant: The installation of cables in or near bodies of water would not impact wetland resources because there would be no local wetlands to impact. However, impacts to wetland resources could potentially occur as result of the construction of landings and/or facilities on shores or the banks of water bodies that accept the submarine cable, depending on the exact site location and proximity to existing wetland resources.
- New Build – Aerial Fiber Optic Plant*:* Potential impacts would be similar to Buried Fiber Optic Plant. Any ground disturbance could cause direct and indirect impacts wetlands, depending on the proximity to wetlands and type of wetlands that could be affected.
- Collocation on Existing Aerial Fiber Optic Plant: Any ground disturbance could cause direct and indirect impacts to wetlands from increased suspended solids and runoff from activities, depending on the proximity to wetlands and type of wetlands that could be affected.
- Installation of Optical Transmission or Centralized Transmission Equipment: If installation of transmission equipment required grading or other ground disturbance to install small boxes or hunts, or access roads, there could potentially be direct and indirect impacts to wetlands. The amount of impact from a temporary increase in the amount of suspended solids running off construction sites and into wetlands, depends on the land area affected, installation technique, and location. If trenching were to occur near wetlands, it could cause impacts on wetlands. Implementing BMPs and mitigation measures could reduce impact intensity.

- Wireless Projects
  - New Wireless Communication Towers: Installation of new wireless towers and associated structures (generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads could potentially cause direct and indirect impacts to wetlands. The activities could cause a temporary increase in the amount of suspended solids running off construction sites and into wetlands, depending on their proximity. The amount of impact depends on the land area affected, installation technique, and proximity to wetlands, and wetland type. If trenching were to occur near wetlands, it could cause impacts on wetlands. Implementing BMPs and mitigation measures could reduce impact intensity.
  - Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower, which would not result in impacts to wetlands. However, if additional power units are needed, structural hardening, and physical security measures required ground disturbance, such as grading, or excavation activities, impacts to wetlands could occur near wetlands, it could cause impacts on wetlands. Implementing BMPs and mitigation measures could reduce impact intensity.
  - Deployable Technologies: Implementation of deployable technologies could result in potential impacts to wetlands if deployment occurs in unpaved areas, or if the implementation results in paving of previously unpaved surfaces. Some staging or landing areas (depending on the type of technology) may require land/vegetation clearing, excavation, and paving. The amount of impact depends on the land area

affected, installation technique, and location. Implementing BMPs and mitigation measures could reduce impact intensity. The activities could also result in other direct impacts on wetlands if fuels leak into nearby waterbodies or wetlands. Deployment of drones, balloons, blimps, or piloted aircrafts could have other direct impacts on wetlands if fuels spill or other chemicals seep into nearby waterbodies or wetlands.

In general, the abovementioned activities could potentially involve land/vegetation clearing; excavation and trenching; construction of access roads; installation or restructuring of towers, poles, or underwater cables; installation of security/safety lighting and fencing; and deployment of aerial platforms. Depending on the deployment activity for this infrastructure, potential impacts to wetlands may occur. The amount of impact depends on the land area affected, installation technique, proximity to wetlands, and type of wetland that could be affected (e.g., high quality). Any ground disturbance could cause direct and indirect impacts wetlands, depending on the proximity to wetlands and type of wetlands that could be affected. These impacts are expected to be less than significant due to the small about of land discturbance (generally less than one acre) and the short timeframe of deployment activities. To minimize any potential impacts to wetlands, BMPs and mitigation measures would be implemented in compliance with any issued federal, state, and local permits. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to further avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned construction impacts. It is anticipated that there could be ongoing potential other direct impacts to wetlands if heavy equipment is used for routine operations and maintenance application of herbicides occurs to control vegetation along all ROWs and near structures, depending on the proximity to wetlands. The intensity of the impact depends on the amount of herbicides used, frequency, and location of nearby sensitive wetlands. These impacts are expected to be less than significant due to the limited nature of deployment activities. It is also anticipated that routine maintenance activities would be conducted on existing roads and utility ROW. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to further avoid or minimize potential impacts.

5.2.5.5. Alternatives Impact Assessment

The following section assesses potential impacts to water resources associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to wetlands as a result of implementation of this alternative could be as described below.

Deployment Impacts

As explained above, implementation of deployable technologies could result in less than significant impacts to wetlands. Some staging or launching/landing areas (depending on the type of technology) may require land/vegetation clearing, excavation, and paving. These activities could result in direct and indirect impacts to wetlands from a temporary increase in the amount of suspended solids running off construction sites to nearby surface waters. The amount of impact depends on the land area affected, installation technique, and proximity to wetlands, and wetland type; however, impacts are expected to be less than significant due to the small-scale and temporary duration of expected FirstNet deployment activities in any one location. To minimize any potential impacts to wetlands, BMPs and mitigation measures would be implemented in compliance with any issued federal, state, and local permits. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to further avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Deployable Technologies Alternative would consist of routine maintenance and inspection of the deployable technologies. Any major infrastructure replacement as part of ongoing system maintenance could result in impacts similar to the abovementioned deployment impacts. The wetlands impacts would depend on the watershed, duration (chronic or short-term) and frequency (many years or a few months) the resource would be used, and the wetland’s quality and function.

It is anticipated that there would be less than significant impacts to wetlands associated with routine inspections of the Deployable Technologies Alternative, as it is likely existing roads and utility rights-of-way would be utilized for maintenance and inspection activities. Site maintenance, including mowing or herbicides, is anticipated to result in less than significant effects to wetlands due to the limited nature of site maintenance activities, including mowing and application of herbicides. To minimize any potential impacts to wetlands, BMPs and mitigation measures would be implemented in compliance with any issued federal, state, and local permits. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed; therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to wetlands from construction and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 5.1.5, Wetlands.

5.2.6. Biological Resources

5.2.6.1. Introduction

This section describes potential impacts to terrestrial vegetation, wildlife, fisheries and aquatic habitat, and threatened and endangered species in Idaho associated with deployment and operation of the Proposed Action and its alternatives. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.6.2. Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on terrestrial vegetation, wildlife, fisheries, and aquatic habitats were evaluated using the significance criteria presented in Table 5.2.6-1. The categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to terrestrial vegetation, wildlife, and fisheries and aquatic habitat addressed in Sections 5.2.6.3, 5.2.6.4, and 5.2.6.5, respectively, are presented as a range of possible impacts.

Refer to Section 5.2.6.6 for impact assessment methodology and significance criterial associated with threatened and endangered species in Idaho.

Table 5.2.6-1: Impact Significance Rating Criteria for Terrestrial Vegetation, Wildlife, Fisheries, and Aquatic Habitats

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than significant with mitigation incorporated**	**Less than significant**	**No impact**
Direct Injury/Mortality	Magnitude or Intensity	Population-level or sub-population injury /mortality effects observed for at least one species depending on the distribution and the management of said species. Events that may impact endemics, or concentrations during breeding or migratory periods. Violation of various regulations including: Magnuson Stevens Fishery Conservation And Management Act (MSFCMA), MBTA, and Bald and Golden Eagle Protection Act (BGEPA).	Effect that is potentially significant, but with BMPs and mitigation measures is less than significant.	Individual mortality observed but not sufficient to affect population or sub-population survival.	No direct individual injury or mortality would be observed.
	Geographic Extent	Regional effects observed within Idaho for at least one species. Anthropogenic[a] disturbances that lead to exclusion from nutritional or habitat resources, or direct injury or mortality of endemics or a significant portion of the population or sub-population located in a small area during a specific season.		Effects realized at one location when population is widely distributed, and not concentrated in affected area.	NA
	Duration or Frequency	Chronic and long-term effects not likely to be reversed over several years for at least one species.		Temporary, isolated, or short-term effects that are reversed within one to three years.	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than significant with mitigation incorporated**	**Less than significant**	**No impact**
Vegetation and Habitat Loss, Alteration, or Fragmentation	Magnitude or Intensity	Population-level or sub-population effects observed for at least one species or vegetation cover type, depending on the distribution and the management of the subject species. Impacts to terrestrial, aquatic, or riparian habitat or other sensitive natural community vital for feeding, spawning/breeding, foraging, migratory rest stops, refugia, or cover from weather or predators. Violation of various regulations including: MMPA, MBTA, and BGEPA.	Effect that is potentially significant, but with BMPs and mitigation measures is less than significant.	Habitat alteration in locations not designated as vital or critical for any period. Temporary losses to individual plants within cover types, or small habitat alterations take place in important habitat that is widely distributed and there are no cover type losses or cumulative effects from additional projects.	Sufficient habitat would remain functional to maintain viability of all species. No damage or loss of terrestrial, aquatic, or riparian habitat from project would occur.
	Geographic Extent	Regional effects observed within Idaho for at least one species. Anthropogenic disturbances that lead to the loss or alteration of nutritional or habitat resources for endemics or a significant portion of the population or sub-population located in a small area during a specific season.		Effects realized at one location.	NA
	Duration or Frequency	Chronic and long-term effects not likely to be reversed over several years for at least one species.		Temporary, isolated, or short-term effects that are reversed within one to three years.	NA

Type of Effect	**Effect Characteristics**	**Impact Level**			
		Potentially Significant	**Less than significant with mitigation incorporated**	**Less than significant**	**No impact**
Indirect Injury/Mortality	Magnitude or Intensity	Population-level or sub-population effects observed for at least one species depending on the distribution and the management of said species. Exclusion from resources necessary for the survival of one or more species and one or more life stages. Anthropogenic disturbances that lead to mortality, disorientation, the avoidance or exclusion from nutritional or habitat resources for endemics or a significant portion of the population or sub-population located in a small area during a specific season. Violation of various regulations including: MMPA, MBTA, and BGEPA.	Effect that is potentially significant, but with BMPs and mitigation measures is less than significant.	Individual injury/mortality observed but not sufficient to affect population or sub-population survival. Partial exclusion from resources in locations not designated as vital or critical for any given species or life stage, or exclusion from resources that takes place in important habitat that is widely distributed. Anthropogenic disturbances are measurable but minimal as determined by individual behavior and propagation, and the potential for habituation or adaptability is high given time.	No stress or avoidance of feeding or important habitat areas. No reduced population resulting from habitat abandonment.
	Geographic Extent	Regional or site specific effects observed within Idaho for at least one species. Behavioral reactions to anthropogenic disturbances depend on the context, the time of year age, previous experience and activity. Anthropogenic disturbances that lead to startle responses of large groupings of individuals during haul outs, resulting in injury or mortality.		Effects realized at one location.	NA
	Duration or Frequency	Chronic and long-term effects not likely to be reversed over several years for at least one species.		Temporary, isolated, or short-term effects that are reversed within one to three years.	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	Less than significant with mitigation incorporated	Less than significant	No impact
Effects to Migration or Migratory Patterns	Magnitude or Intensity	Population-level or sub-population effects observed for at least one species depending on the distribution and the management of said species. Temporary or long-term loss of migratory pattern/path or rest stops due to anthropogenic activities. Violation of various regulations including: MMPA, MBTA, and BGEPA.	Effect that is potentially significant, but with BMPs and mitigation measures is less than significant.	Temporary loss of migratory rest stops due to anthropogenic activities take place in important habitat that is widely distributed and there are no cumulative effects from additional projects.	No alteration of migratory pathways, no stress or avoidance of migratory paths/patterns due to project.
	Geographic Extent	Regional effects observed within Idaho for at least one species. Anthropogenic disturbances that lead to exclusion from nutritional or habitat resources during migration, or lead to changes of migratory routes for endemics or a significant portion of the population or sub-population located in a small area during a specific season.		Effects realized at one location when population is widely distributed, and not concentrated in affected area.	NA
	Duration or Frequency	Chronic and long-term effects not likely to be reversed over several years for at least one species.		Temporary, isolated, or short-term effects that are reversed within one to three years.	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	Less than significant with mitigation incorporated	Less than significant	No impact
Reproductive Effects	Magnitude or Intensity	Population or sub-population level effects in reproduction and productivity over several breeding/spawning seasons for at least one species depending on the distribution and the management of said species. Violation of various regulations including: MMPA, MBTA, and BGEPA.	Effect that is potentially significant, but with BMPs and mitigation measures is less than significant.	Effects to productivity are at the individual rather than population level. Effects are within annual variances and not sufficient to affect population or sub-population survival.	No reduced breeding or spawning success.
	Geographic Extent	Regional effects observed within Idaho for at least one species. Anthropogenic disturbances that lead to exclusion from prey or habitat resources required for breeding/spawning or stress, abandonment and loss of productivity for endemics or a significant portion of the population or sub-population located in a small area during the breeding/spawning season.		Effects realized at one location.	NA
	Duration or Frequency	Chronic and long-term effects not likely to be reversed over several breeding/spawning seasons for at least one species.		Temporary, isolated, or short-term effects that are reversed within one breeding season.	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than significant with mitigation incorporated**	**Less than significant**	**No impact**
Invasive Species Effects	Magnitude or Intensity	Extensive increase in invasive species populations over several seasons.	Effect that is potentially significant, but with BMPs and mitigation measures is less than significant.	Mortality observed in individual native species with no measurable increase in invasive species populations.	No loss of forage and cover due to the invasion of exotic or invasive plants introduced to project sites from machinery or human activity.
	Geographic Extent	Regional impacts observed throughout Idaho.		Effects realized at one location.	NA
	Duration or Frequency	Chronic and long-term changes not likely to be reversed over several years or seasons.		Periodic, temporary, or short-term changes that are reversed over one or two seasons.	NA

[a] Anthropogenic: "Made by people or resulting from human activities. Usually used in the context of emissions that are produced as a result of human activities" (USEPA, 2016h).
NA = Not Applicable

5.2.6.3. Terrestrial Vegetation

Impacts to terrestrial vegetation occurring in Idaho are discussed in this section.

Description of Environmental Concerns

Direct Injury/Mortality

Direct injury/mortality effects are physical injuries, extreme physiological stress, or death of an individual organism from interactions associated with the Proposed Action. The most common direct injuries are permanent or temporary loss or disturbance of individual plants. Based on the impact significance criteria presented in Table 5.2.6-1, direct injury or mortality impacts could be significant if population-level or sub-population effects were observed for at least one species depending on the distribution and the management of the subject species. Although unlikely, direct mortality/injury to plants could occur in construction zones from land clearing, excavation activities, or vehicle traffic; however, FirstNet deployment events are expected to be relatively small in scale and therefore would have less than significant impacts. The implementation of BMPs and mitigation measures and avoidance measures would help to minimize or altogether avoid potential impacts to plant population survival. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Vegetation and Habitat Loss, Alteration, or Fragmentation

Habitat impacts are primarily physical disturbances that result in alterations in the amount or quality of a habitat. As with all of the effects categories, the magnitude of the potential impact depends on the duration, location, and spatial scale of the system and associated activities. Habitat fragmentation is the loss or breaking down of continuous and connected habitat. The sagebrush steppe habitat in central Idaho has become fragmented and altered due to introduction of invasive annual grasses and occurrence of wildfires (USFWS, 2015v). However, a large portion of the state is mountainous and remains relatively unfragmented, particularly in Northern Idaho.

Construction of new infrastructure and long-term facility maintenance could result in the alteration of the type of vegetative communities in these localized areas, and in some instances the permanent loss of vegetation. In general, these impacts are expected to be less than significant due to the short-term, localized nature of the deployment activities. Further, some limited amount of infrastructure may be built in sensitive or rare regional vegetative communities, in which case BMPs and mitigation measures would be recommended and consultation with appropriate resource agencies, if required, would be undertaken to minimize or avoid potential impacts. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Indirect Injury/Mortality

Indirect effects are effects that are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (40 CFR 1508.8[b]). Indirect injury/mortality could include stress related to disturbance. The alteration of soils or hydrology within a localized area could result in stress or mortality of plants. Construction activities that remove large quantities of soil in the immediate vicinity of trees could cause undue stress to trees from root exposure, although this is unlikely to occur due to the small size of expected FirstNet activities. Indirect injury/mortality impacts vary depending on the species, time of year and duration of construction or deployment. Overall, these impacts are expected to be less than significant due to the short-term and small-scale nature of deployment activities. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Effects to Migration or Migratory Patterns

No effects to the long-term migration or migratory patterns for terrestrial vegetation (e.g., forest migration) are expected as a result of the Proposed Action, given the small-scale of deployment activities.

Reproductive Effects

No reproductive effects to terrestrial vegetation are expected as a result of the Proposed Action, given the small-scale of deployment activities.

Invasive Species Effects

When human activity results in a species entering an ecosystem new to it, the species is classified as introduced or, depending on its ability to spread rapidly and outcompete native species, invasive. The introduction of invasive species could have a dramatic effect on natural resources and biodiversity. Idaho has adopted regulations to regulate and prohibit "the possession, importation, shipping, or transportation of select invasive species." The prohibited species list includes plants, animals, insects, and plant pathogens, to help control invasive species with the greatest potential to impact the state's biodiversity. (ISDA, 2006b)

As described in Section 7.1.6.4, when non-native species are introduced into an ecosystem in which they did not evolve, their populations sometimes increase rapidly.

The potential to introduce invasive plants within construction zones and during long-term site maintenance could occur from vehicles and equipment being transported from one region to another, or when conducting revegetation of a site after deployment activities are complete. Overall, these impacts are expected to be less than significant due to the small-scale, localized nature of deployment activities. BMPs could help to minimize or avoid the potential for introducing invasive plant species during implementation of the Proposed Action. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that

FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment and operational activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to terrestrial vegetation resources and others would not. In addition, and as explained in this section, the same type of Proposed Action infrastructure could result in a range impacts, from no impacts to less than significant impacts, depending on the deployment scenario or site-specific conditions. The terrestrial vegetation that would be affected would depend on the ecoregion, the species' phenology,[154] and the nature as well as the extent of the habitats affected. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are expected to have no impacts to terrestrial vegetation under the conditions described below:

- Wired Projects
    - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. Although terrestrial vegetation could be impacted, it is anticipated that effects to vegetation would be minimal since the activities that would be conducted at these small entry and exit points are not likely to produce perceptible changes.
    - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up of dark fiber would have no impacts to terrestrial vegetation because there would be no ground disturbance.
- Satellites and Other Technologies
    - Satellite-Enabled Devices and Equipment: It is anticipated that the installation of permanent equipment on existing structures, attaching equipment to satellite launches for other purposes, and the use of portable devices that use satellite technology would not

[154] Phenology is the seasonal changes in plant and animal lifecycles, such as emergence of insects or migration of birds.

impact terrestrial vegetation because those activities would not require ground disturbance.

- Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it could include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact biological resources, it is anticipated that this activity would have no impact on terrestrial vegetation.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to terrestrial vegetation as a result of implementation of the Preferred Alternative would encompass a range of impacts that could occur, including direct injury/mortality; vegetation and habitat loss, alteration, or fragmentation; indirect injury/mortality; and invasive species effects. The types of infrastructure deployment activities that could be part of the Preferred Alternative and result in potential impacts to terrestrial vegetation include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: Plowing, trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber could result in potential impacts to terrestrial vegetation. Land/vegetation clearing and excavation activities, associated with construction of POPs, huts, or other associated facilities could result in direct or indirect injury to plants; the loss, alteration, or fragmentation of vegetative communities; and invasive species effects if BMPs and mitigation measures are not implemented.
  - New Build – Aerial Fiber Optic Plant: The installation of new poles and hanging cable and associated security, safety, or public lighting components on public ROWs or private easements as well as the construction of access roads, POPs, huts, or facilities to house outside plant equipment could result in potential impacts to terrestrial vegetation. Impacts may vary depending on the number or individual poles installed, but could include direct or indirect injury to plants; the loss, alteration, or fragmentation of vegetative communities; and invasive species effects if BMPs and mitigation measures are not implemented.
  - Collocation on Existing Aerial Fiber Optic Plant: Land clearing and excavation during replacement of poles and structural hardening could result in direct or indirect injury to plants; the loss, alteration, or fragmentation of vegetative communities; and invasive species effects.
  - New Build – Submarine Fiber Optic Plant: The installation of cables in or near bodies of water would not impact biological resources because there would be no local biological resources to impact. However, impacts to biological resources could potentially occur as result of the construction of landings and/or facilities on shores or the banks of water bodies that accept the submarine cable, depending on the exact site location and proximity to existing biological resources.
  - Installation of Optical Transmission or Centralized Transmission Equipment: If installation of transmission equipment required construction of access roads, trenching,

and/or land clearing, such disturbance could result in direct or indirect injury to plants, vegetation loss, and invasive species effects.

- Wireless Projects
  - New Wireless Communication Towers: Installation of new wireless towers and associated structures (generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads), microwave facilities, or access roads could result in impacts to terrestrial vegetation. Land/vegetation clearing, excavation activities, landscape grading, and other disturbance activities during the installation of new wireless towers and associated structures or access roads could result in direct or indirect injury to plants; the loss, alteration, or fragmentation of vegetative communities; and invasive species effects.
  - Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower which would not result in impacts to terrestrial vegetation. However, if additional power units, structural hardening, and physical security measures require land clearing or excavation activities, impacts would be similar to new wireless construction.
  - Deployable Technologies: Implementation of deployable technologies including COWs, COLTs, or SOWs could result in direct impacts to terrestrial vegetation if deployment occurs on vegetated areas, or the implementation results in paving of previously unpaved surfaces. Some staging or landing areas (depending on the type of technology) may require land/vegetation clearing, excavation, and paving. These activities could result in direct or indirect injury to plants; the loss, alteration, or fragmentation of vegetative communities; and invasive species effects. Deployment of drones, balloons, blimps, or piloted aircrafts could potentially impact terrestrial vegetation if launching or recovery occurs on vegetated areas. Impacts would be similar to deployment of COWs, COLTs, and SOWs.

In general, the abovementioned activities could potentially involve land/vegetation clearing; topsoil removal; excavation and trenching; construction of access roads; installation or restructuring of towers, poles, or cables; heavy equipment movement; installation of security/safety lighting and fencing; and deployment of aerial platforms. Potential impacts to terrestrial vegetation associated with deployment of this infrastructure, depending on their scale, could include direct or indirect injury/mortality to plants; the loss, alteration, or fragmentation of vegetative communities; and invasive species depending on the ecoregion, the species' phenology, and the nature and extent of the vegetation affected. These impacts are expected to be less than significant due to the small-scale of expected deployment activities. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operational activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned deployment impacts. The terrestrial vegetation that would be affected would depend on the ecoregion, the species' phenology, and the nature and extent of the habitats affected.

It is anticipated that there would be no impacts to terrestrial vegetation associated with routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for inspections. Site maintenance, including mowing or herbicides, is anticipated to result in less than significant effects due to the small-scale of expected activities. These potential impacts could result from accidental spills from maintenance equipment or release of herbicides and because these areas would not be allowed to revert to a more natural state. If usage of heavy equipment or land clearing activities occurs off established roads or corridors as part of routine maintenance or inspections, direct or indirect injury/mortality to plants; the loss, alteration, or fragmentation of vegetative communities; and invasive species could occur to terrestrial vegetation, however impacts are expected to be less than significant due to the small-scale of expected activities. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Alternatives Impact Assessment

The following section assesses potential impacts to terrestrial vegetation associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to terrestrial vegetation as a result of implementation of this alternative could be as described below.

Deployment Impacts

As described above, implementation of deployable technologies could result in less than significant impacts from land/vegetation clearing, excavation, and paving activities. These activities could result in direct or indirect injury to plants; the loss, alteration, or fragmentation of vegetative communities; and invasive species effects. Greater frequency and duration of deployments could change the magnitude of impacts. However, impacts are expected to remain less than significant due to the relatively small-scale of FirstNet activities at individual locations. See Chapter 9, BMPs and Mitigation Measures, for a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

Operational Impacts

As described above, operational activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. The impacts could vary greatly among species, vegetative community, and geographic region, but are expected to remain less than significant. As with the Preferred Alternative, it is anticipated that there would be less than significant impacts to terrestrial vegetation associated with routine operations and maintenance due to the relatively small scale of likely FirstNet project sites. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed; therefore there would be no associated construction or installation of wired, wireless, deployable infrastructure or satellites and other technologies. There would be no impacts to terrestrial vegetation as a result of construction and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 5.1.6.3, Terrestrial Vegetation.

5.2.6.4. Wildlife

Impacts to amphibians and reptiles, terrestrial mammals, birds, and terrestrial invertebrates occurring in Idaho are discussed in this section. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Description of Environmental Concerns

Direct Injury/Mortality

Direct injury/mortality effects are physical injuries, extreme physiological stress, or death of an individual organism from interactions associated with the Proposed Action. The most common direct injuries are entanglement, vehicle or vessel strike, problems associated with accidental ingestion, and injuries incurred by sensitive animals from disturbance events.

Based on the impact significance criteria presented in Table 5.2.6-1, less than significant impacts would be anticipated given the anticipated small size and nature of the majority of the proposed deployment activities. Although anthropogenic disturbances may be measurable (although minimal) for some FirstNet Proposed Actions, impacts to individual behavior of animals would be short-term and direct injury or mortality impacts at the population-level or sub-population effects would not likely be observed; therefore, impacts are generally expected to be less than significant, as discussed further below. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Terrestrial Mammals

Vehicle strikes are common sources of direct mortality or injury to both small and large mammals in Idaho. Mammals are attracted to roads for a variety of reasons including use as a source of minerals, foraging, and migration (FHWA, 2009). Individual injury or mortality as a result of vehicle strikes associated with the Proposed Action could occur.

Entanglement in fences or other barriers could be a source of mortality or injury to terrestrial mammals, though entanglements would likely be isolated, individual events.

For example, if tree-roosting bats, and particularly maternity colonies are present at a site location, removal of trees during land clearing activities could result in direct injury/mortality if bats are utilizing them as roost trees or for rearing young. The scale of this impact would be expected to be small-scale and would be dependent on the location and type of deployment activity, and the amount of tree removal. Site avoidance measures could be implemented to avoid disturbance to bats.

Birds

Mortalities from collisions or electrocutions with manmade cables and wires are environmental concerns for avian species and violate MBTA and BGEPA. Generally, collision events occur to “poor” fliers (e.g., ducks), night-migrating birds, heavy birds (e.g., swans and cranes), and birds that fly in flocks; while species susceptible to electrocution are birds of prey, ravens, and thermal soarers, typically having large wing spans (Gehring, Kerlinger, & and Manville, 2011).

Avian mortalities or injuries could also result from vehicle strikes, although typically occur as isolated events.

Direct injury and mortality of birds could occur to ground-nesting birds when nests are either disturbed or destroyed during land clearing, excavation and trenching, and other ground disturbing activities. Removal of trees during land clearing activities, could also result in direct injury/mortality to forest dwelling birds if they are utilizing them as roost trees for resting or shelter from predators and inclement weather, or as nest trees for rearing young. The scale of this impact would be associated with the amount of tree removal and the abundance of forest-dwelling birds roosting/nesting in the area. These impacts could be particularly pronounced in IBAs within the state if birds temporarily avoid those areas, since they provide essential habitat for various life stages (Hill, D. et al., 1997).

Direct mortality and injury to birds of Idaho are not likely to be widespread or affect populations of species as a whole; impacts to individual birds may be realized depending on the nature of the deployment activity. Direct injury/mortality are not anticipated to be widespread or affect bird populations due to the small scale of likely FirstNet actions. If siting considerations, BMPs, and mitigation measures are implemented (Chapter 9), potential impacts could be minimized. Additionally, potential impacts under MBTA and BGEPA could be addressed through BMPs and mitigation measures developed in consultation with USFWS.

Reptiles and Amphibians

Very few of Idaho's amphibian and reptile species are widely distributed throughout the state. Instead most species are found in the plains region in the southern portion of the state or the mountainous region in the northern portion of the state. Direct mortality to amphibians or reptiles could occur in construction zones either by excavation activities or by vehicle strikes; however, these events are expected to be temporary and isolated, affecting only individual animals.

Terrestrial Invertebrates

The terrestrial invertebrate populations of Idaho are so widely distributed that injury/mortality events are not expected to affect populations of species as a whole.

Vegetation and Habitat Loss, Alteration, or Fragmentation

Habitat impacts are primarily physical disturbances that result in alterations in the amount or quality of a habitat. As with all of the effects categories, the magnitude of the impact depends on the duration, location, and spatial scale of the system and associated activities. Habitat fragmentation is the loss or breaking down of continuous and connected habitat, and impeding access to resources and mates. The sagebrush steppe habitat in central Idaho has become fragmented and altered due to introduction of invasive annual grasses and occurrence of wildfires. However, a large portion of the state is mountainous and remains relatively unfragmented, particularly in Northern Idaho.

Additionally, habitat loss could occur through exclusion, directly or indirectly, preventing an animal from accessing an optimal habitat (e.g., breeding, forage, or refuge), either by physically preventing use of a habitat or by causing an animal to avoid a habitat, either temporarily or long-term. It is expected that activities associated with the Proposed Action would cause exclusion effects only in very special circumstances, as in most cases an animal could fly, swim, or walk to a nearby area that would provide refuge.

In general, potential effects of vegetation and habitat loss, alteration, or fragmentation are expected to be less than significant because of the small-scale nature of expected deployment activities. These potential impacts are described for Idaho's wildlife species below. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Terrestrial Mammals

Mammals occupy a wide range of habitats throughout Idaho and may experience localized effects of habitat loss or fragmentation. Removal or loss of vegetation may impact large mammals (e.g., black bear, moose, or elk) by decreasing the availability of forest for cover from predators or foraging. Loss of cover may increase predation on both breeding adults as well as their young. The loss, alteration, or fragmentation of forested habitat would also impact some small mammals (e.g., bats, fisher, American marten) that utilize these areas for roosting, foraging, sheltering, and for rearing their young. Loss of habitat or exclusions from these areas could be avoided or minimized by BMPs and mitigation measures (see Chapter 9).

Birds

The direct removal of migratory bird nests is prohibited under the MBTA. The USFWS and Idaho Fish and Game provide regional guidance on the most critical time periods (e.g., breeding season) to avoid vegetation clearing. The removal and loss of vegetation could affect avian species directly by loss of nesting, foraging, stopover, and cover habitats.

Noise disturbance and human activity, as discussed previously, could directly restrict birds from using their preferred resources. Greater human activity of longer duration would increase the likelihood that birds would avoid the area, possibly being excluded from essential resources. These impacts could be particularly pronounced in IBAs within the state as birds may temporarily avoid these areas (Hill, D. et al., 1997).

The degree to which habitat exclusion affects birds depends on many factors. The impact to passerine[155] species from disturbance or displacement from construction activities is likely to be short-term with minor effects from exclusion. Exclusion from resources concentrated in a small migratory stop area during peak migration could have major impacts to species that migrate in large flocks and concentrate at stop overs (e.g., shorebirds). BMPs and mitigation measures, including nest avoidance during construction-related activities, would help to avoid or minimize the potential impacts to birds from exclusion of resources, as appropriate.

Reptiles and Amphibians

Important habitats for Idaho’s amphibians and reptiles typically consist of wetlands and, in some cases as with the timber rattlesnake, the surrounding upland forest. Impacts are expected to be less than significant given the short-term nature and limited geographic scope of individual activities. If proposed project sites were unable to avoid sensitive areas, BMPs and mitigation measures (see Chapter 9) would be implemented to avoid or minimize the potential impacts.

Filling or draining of wetland breeding habitat (see Section 5.2.4, Water Resources) and alterations to ground or surface water flow from development associated with the Proposed Action may also have effects to Idaho’s amphibian and reptile populations, though BMPs and mitigation measures would help to avoid or minimize the potential impacts.

Terrestrial Invertebrates

Habitat loss and degradation are the most common causes of invertebrate species’ declines; however, habitat for many common terrestrial invertebrates is generally assumed to be abundant and widely distributed across the state, therefore no significant effects to terrestrial invertebrates are expected. Impacts to sensitive invertebrate species are discussed below in Section 5.2.6.6, Threatened and Endangered Species and Species of Concern.

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[155] Passerines are an order of “perching” birds that have four toes, three facing forward and one backward, which allows the bird to easily cling to both horizontal and nearly vertical perches.

Indirect Injury/Mortality

Indirect injury/mortality impacts vary depending on the species, time of year and duration of deployment. Overall, impacts are expected to remain less than significant due to the short-term nature and limited geographic scope of expected activities, though BMPs and mitigation measures could further help to avoid or minimize the potential impacts. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

<u>Terrestrial Mammals</u>

Stress from repeated disturbances during critical time periods (e.g., roosting and mating) could reduce the overall fitness and productivity of young and adult terrestrial mammals. Indirect effects could occur to roosting bats from noise, light, or human disturbance causing them to leave their roosting locations or excluding them from their summer roosting/maternity colony roosts. For example, some bat species establish summer roosting or maternity colonies in the same general area that they return to year and after year. The majority of FirstNet deployment activities would be short-term in nature, and repeated disturbances would not occur. Depending on the project type and location, individual species may be disturbed resulting in less than significant impacts.

<u>Birds</u>

Repeated disturbance, especially during the breeding and nesting season, could cause stress to individuals lowering fitness and productivity. These impacts could be particularly pronounced in IBAs within the state if birds temporarily avoid those areas, since they provide essential habitat for various life stages (Hill, D. et al., 1997). The majority of FirstNet deployment activities would be short-term in nature, and repeated disturbances would not occur. Depending on the project type and location, individual species may be disturbed resulting in less than significant impacts.

<u>Reptiles and Amphibians</u>

Changes in water quality and quantity, especially during the breeding seasons, could cause stress resulting in lower productivity. The majority of FirstNet deployment activities would be short-term in nature, and repeated disturbances would not occur. Depending on the project type and location, individual species may be disturbed resulting in less than significant impacts.

<u>Terrestrial Invertebrates</u>

Terrestrial invertebrates could experience chronic stress, either by changes in habitat composition or competition for resources, resulting in lower productivity. Due to the large number of invertebrates distributed throughout the state, and given the short-term nature of most of the deployment activities, this impact would likely be less than significant.

Effects to Migration or Migratory Patterns

Migration is the regular movement of animals from one region to another and back again. Migratory patterns vary by species and sometimes within the same species. Overall, potential impacts are anticipated to be less than significant due to the small-scale and localized nature of expected activities. Potential effects to migration patterns of Idaho's amphibians and reptiles, terrestrial mammals, birds, and terrestrial invertebrates are described below. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Terrestrial Mammals

Large game animals (e.g., moose, elk, and woodland caribou) have well-defined migratory routes. Route knowledge is passed on from one generation to the next and includes important feeding and calving areas. Small mammals (e.g., bats) also have migratory routes that include spring and fall roosting areas between their summer maternity roosts and hibernacula.[156]

Any clearance, drilling, and construction activities needed for network deployment, including noise associated with these activities, has the potential to divert mammals from these migratory routes. Impacts could vary depending on the species, time of year of construction/operation, and duration, but are generally expected to be less than significant because they would be unlikely to result in long-term avoidance. BMPs and mitigation measures could help to further avoid or minimize the potential impacts.

Birds

Because many birds have extremely long migrations, protection efforts for critical sites along migratory routes must be coordinated over distances often involving many different countries. For example, as a group, shorebirds migrating through Idaho undertake some of the longest-distance migrations of all animals. Idaho is within the Pacific Flyway, which spans more than 4,000 miles from the Arctic tundra to the west coast of Mexico. Idaho has 62 IBAs containing a variety of habitats, including grasslands, to sage steppe shrublands and montane forests, that are ecologically important to migratory bird species such as the sage grouse (National Audubon Society, 2015b). Many migratory routes are passed from one generation to the next. Impacts could vary (e.g., mortality of individuals or abandonment of stopover sites by whole flocks) depending on the species, time of year of construction/operation, and duration, and impacts are expected to be less than significant given the short-term nature and limited geographic scope for individual activities. BMPs and mitigation measures could help to further avoid or minimize effects to migratory pathways.

Reptiles and Amphibians

Several species of snakes and salamanders are known to seasonally migrate in Idaho. In Idaho many salamanders cross roadways as they migrate seasonally between upland areas and wetland

[156] A location chosen by an animal for hibernation

areas to breed. “Several species of snakes are also known to migrate seasonally in a loop pattern as they move from a winter hibernaculum to summer foraging habitat” (Jochimsen, Peterson, Andrews, & Whitfield, 2004). Mortality and barriers to movement could occur as result of the Proposed Action (Jochimsen, Peterson, Andrews, & Whitfield, 2004).

Species that use streams as dispersal or migratory corridors may be impacted if these waterways are restricted or altered, but impacts are expected to be less than significant given the short-team nature and limited geographic scope for individual activities. BMPs and mitigation measures could help to further avoid or minimize the potential impacts.

Terrestrial Invertebrates

The proposed deployment activities would be expected to be short-term or temporary in nature. No effects to migratory patterns of Idaho’s terrestrial invertebrates are expected as a result of the Proposed Action.

Reproductive Effects

Reproductive effects are considered those that either directly or indirectly reduce an animal’s ability to produce offspring or reduce the rates of growth, maturation, and survival of offspring, which could affect the overall population of individuals. Overall, potential impacts are anticipated to be less than significant due to the short-term and limited nature of expected activities. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Terrestrial Mammals

Restricted access to important winter hibernacula or summer maternity roosts for bats and calving grounds for large mammals, such as the moose, has the potential to negatively affect body condition and reproductive success of mammals in Idaho. For example, moose use certain types of habitats that allow for more effective defense of their calves from predators.

Disturbance from deployment and operations could also result in the abandonment of offspring leading to reduced survival, although these activities are expected to be small-scale and impacts are expected to be less than significant. Reproductive effects as a result of displacement and disturbance could be minimized through the use of BMPs and mitigation measures.

Birds

Impacts due to Proposed Action deployment and operations could include abandonment of the area and nests due to disturbance. Disturbance (visual and noise) may displace birds into less suitable habitat and thus reduce survival and reproduction. These impacts could be particularly pronounced in IBAs within the state if birds temporarily avoid those areas, since they provide essential habitat for various life stages (Hill, D. et al., 1997). Impacts would be less than significant due to the limited extent and temporary nature of the deployment. BMPs and mitigation measures, as defined through consultation with USFWS or another appropriate regulatory agency, could be required to avoid or minimize impacts under the MBTA or BGEPA.

Applicable BMPs and mitigation measures, as defined through consultation with USFWS for MBTA or BGEPA, if required, could help to avoid or minimize any potential impacts. Environmental consequences pertaining to federally listed species will be discussed in Section 5.2.6.6, Threatened and Endangered Species.

Reptiles and Amphibians

Reproductive effects to reptile nests may occur through direct loss or disturbance of nests. Reproductive effects to sub-populations of amphibians and reptiles may occur through the direct loss of vernal pools as breeding habitat if deployment activities occur near breeding pools, or alter water quality through sediment infiltration, or obstruction of natural water flow to pools, though BMPs would help to avoid or minimize the potential impacts.

Terrestrial Invertebrates

The majority of FirstNet deployment or operation activities are likely to be short-term in nature; therefore, no reproductive effects to terrestrial invertebrates are expected as a result of the Proposed Action.

Invasive Species Effects

When human activity results in a species entering an ecosystem new to it, the species is classified as introduced or invasive. The introduction of invasive species could have a dramatic effect on natural resources. Idaho has adopted regulations to regulate and prohibit "the possession, importation, shipping, or transportation of select invasive species." The prohibited species list includes plants, animals, insects, and plant pathogens to help control invasive species with the greatest potential to impact the state's biodiversity (ISDA, 2006a).

FirstNet deployment or operation activities could result in short-term or temporary changes to specific project sites, although these sites are expected to return to their natural state in a year or two. Invasive species are not expected to be introduced to project sites as part of the deployment activities from machinery or construction workers. Therefore, potential impacts are expected to be less than significant.

Potential invasive species effects to Idaho's wildlife are described below.

Terrestrial Mammals

FirstNet deployment activities are not expected to introduce terrestrial mammal species to project sites as these activities are temporary and would not provide a mechanism for transport of invasive terrestrial mammals to project sites from other locations.

Birds

Invasive plant and pest species directly alter the landscape or habitat to a condition that is more favorable for an invasive species, and less favorable for native species and their habitats. FirstNet deployment activities could result in short-term or temporary changes to specific project sites, although these sites are expected to return to their natural state in a year or two. Invasive bird species are not expected to be introduced at project sites as part of the deployment activities from machinery or construction workers.

Reptiles and Amphibians

The red-eared slider (a turtle species) and bull frog (*Xenopus laevis*) are regulated under the Idaho Invasive Species Act. Both of these species are highly adaptable and could threaten native wildlife by competing with them for food sources and also spread disease (USGS, 2015c) Although FirstNet deployment activities could result in short-term or temporary changes to specific project sites, these sites are expected to return to their natural state in a year or two. Invasive reptile or amphibian species are not expected to be introduced at project sites as part of the deployment activities. Invasive terrestrial reptile or amphibian species are not expected to be introduced at project sites from machinery or laborers.

Terrestrial Invertebrates

Terrestrial invertebrate populations are susceptible to invasive plant species that may change or alter the community composition of specific plants on which they depend. Effects from invasive plant species to terrestrial invertebrates would be similar to those described for habitat loss and degradation.

Invasive insects pose a large threat to Idaho's forest and agricultural resources (USDA, 2015c). Species such as the gypsy moth, hemlock woolly adelgid, Asian longhorn beetle, and emerald ash borer are of particular concern in Idaho and are known to cause irreversible damage to native forests. The potential to introduce invasive invertebrates within construction zones and during long-term site maintenance could occur from vehicles and equipment being transported from one region to another, or when conducting revegetation of a site after deployment activities are complete. BMPs and mitigation measures could help to avoid or minimize the potential for introducing invasive terrestrial invertebrate species during implementation of the Proposed Action. Invasive species effects related to terrestrial invertebrates could be minimized with the implementation of BMPs and mitigation measures. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment and operational activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to wildlife resources and others would not. In addition, and as described in this section, infrastructure developed under the Preferred Alternative could result in a range of impacts, from no impacts to less than significant impacts, depending on the deployment scenario or site-specific conditions. The wildlife that would be affected would depend on the ecoregion, the species' phenology, and the nature and extent of the habitats affected. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are expected to have no impacts to wildlife resources under the conditions described below:

- Wired Projects
  - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. Noise generated by equipment required to install fiber would be infrequent and of short duration, and unlikely to produce measurable changes in wildlife behavior. It is anticipated that effects to wildlife would be temporary and would not result in any perceptible change.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up of dark fiber would have no impacts to wildlife resources because there would be no ground disturbance.
- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: It is anticipated that the installation of permanent equipment on existing structures, attaching equipment to satellites launched for other purposes, and the use of portable devices that use satellite technology would not impact wildlife because those activities would not require ground disturbance.
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it may include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact wildlife resources, it is anticipated that this activity would have no impact on wildlife resources.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to wildlife resources as a result of implementation of the Preferred Alternative would encompass a range of impacts that could occur, including direct injury/mortality; vegetation and habitat loss, alteration, or fragmentation; effects to migratory patterns; indirect injury/mortality; reproductive effects; and invasive species effects. The types of infrastructure deployment activities are anticipated to be less than significant to wildlife resources include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: Plowing, trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber

could result in potential impacts to wildlife resources. Land/vegetation clearing and excavation activities, associated with construction of POPs, huts, or other associated facilities could result in direct injury/mortalities of wildlife that are not mobile enough to avoid construction activities (e.g., reptiles, small mammals, and young individuals), that utilize burrows (e.g., ground squirrels), or that are defending nest sites (such as ground-nesting birds). Disturbance, including noise, associated with the above activities involving heavy equipment or land clearing could result in habitat loss, effects to migration patterns, indirect injury/mortality, reproductive effects, and invasive species effects. Implementation of BMPs and mitigation measures could help to avoid or minimize potential impacts.

- New Build – Aerial Fiber Optic Plant: The installation of new poles and hanging cable and associated security, safety, or public lighting components on public ROWs or private easements as well as the construction of access roads, POPs, huts, or facilitates to house outside plant equipment could result in potential impacts to wildlife resources. Impacts may vary depending on the number or individual poles installed, and the extent of ground disturbance, but could include direct injury/mortality of individuals, but could include direct injury/mortality as described above; habitat loss, alteration, or fragmentation; effects to migratory patterns; indirect injury/mortality; and invasive species effects.
- Collocation on Existing Aerial Fiber Optic Plant: Land clearing and excavation during replacement of poles and structural hardening could result in direct injury/mortality, habitat loss or alteration, effects to migratory patterns, indirect injury/mortality, and invasive species effects. Noise disturbance from heavy equipment use associated with these activities as well as with installing new fiber on existing poles could result in migratory effects and indirect injury/mortality.
- New Build – Submarine Fiber Optic Plant: The installation of cables in or near bodies of water would not impact biological resources because there would be no local biological resources to impact. However, impacts to biological resources could potentially occur as result of the construction of landings and/or facilities on shores or the banks of water bodies that accept the submarine cable, depending on the exact site location and proximity to existing biological resources.
- Installation of Optical Transmission or Centralized Transmission Equipment: If installation of transmission equipment required construction of access roads, trenching, and/or land clearing, such disturbance could result in direct injury/mortality of wildlife as described for other New Build activities. Habitat loss, alteration and fragmentation; effects to migration or migratory patterns, indirect injury/mortality, and invasive species effects could occur as a result of construction and resulting disturbance.

- Wireless Projects
  - New Wireless Communication Towers: Installation of new wireless towers and associated structures (e.g., generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads could result in impacts to wildlife resources. Land/vegetation clearing, excavation activities, landscape grading, and other disturbance activities during the installation of new wireless towers and associated structures or access roads could result in direct injury/mortality, habitat loss, alteration or fragmentation, and effects to migratory patterns. Security

lighting and fencing could result in direct and indirect injury or mortality, effects to migratory patterns, as well as reproductive effects. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions.

- Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower, which would not result in impacts to wildlife. However, if additional power units, replacement towers, or structural hardening are required, impacts would be similar to new wireless construction. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions.
- *Deployable Technologies*: Implementation of deployable technologies including COWs, COLTs, and SOWs could result in direct injury/mortalities to wildlife on roadways. If external generators are used, noise disturbance could potentially impact migratory patterns of wildlife. RF hazards could result in indirect injury or mortality as well as reproductive effects depending on duration and magnitude of operations. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions. Deployment of drones, balloons, blimps, or piloted aircrafts could potentially impact wildlife by direct or indirect injury/mortality from collision, entanglement, or ingestion and effects to migratory patterns and reproductive effects from disturbance and/or displacement due to noise. The magnitude of these effects depends on the timing and frequency of deployments. However, deployment activities are expected to be temporary and isolated, and likely affecting only a small number of wildlife.

In general, the abovementioned activities could potentially involve land/vegetation clearing; excavation and trenching; construction of access roads; installation or restructuring of towers or poles; installation of security/safety lighting and fencing; and deployment of aerial platforms. Potential impacts to wildlife resources associated with deployment of this infrastructure are anticipated to be less than significant given the small-scale of likely individual FirstNet projects; however, some deployment activities could include direct injury/mortality, habitat loss, indirect injury/mortality, effects to migration, reproductive effects, and effects of invasive species depending on the project type, location, ecoregion, the species' phenology, and the nature and extent of the habitats affected. As stated above, these impacts would likely be limited to individual wildlife species and unlikely to cause population-level impacts. The specific deployment activity and where the deployment will take place will be determined based on location-specific conditions and the results of site-specific environmental reviews. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operational activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned deployment impacts. The wildlife that would be affected would depend on the ecoregion, the species' phenology, and the nature and extent of the habitats affected.

It is anticipated that there would be less than significant impacts to wildlife resources associated with routine inspections of the Preferred Alternative. Site maintenance would be infrequent, including mowing or limited application of herbicides, may result in less than significant effects to wildlife including direct injury/mortality to less mobile wildlife, or exposure to contaminants from accidental spills from maintenance equipment or release of pesticides. Potential spills of these materials would be expected to be in small quantities.

During operations, direct injury/mortality of wildlife could occur from collisions and/or entanglements with transmission lines, towers, and aerial platforms.

Wildlife resources could still be affected by the reduction in habitat quality associated with habitat fragmentation from the presence of access roads, transmission corridors, and support facilities. These features could also continue to disrupt movements of terrestrial wildlife, particularly during migrations between winter and summer ranges or in calving areas.

In addition, the presence of new access roads and transmission line ROWs may increase human use of the surrounding areas, which could increase disturbance to wildlife resulting in effects to migratory pathways, indirect injury/mortalities, reproductive effects, as well as the potential introduction and spread of invasive species as explained above. As stated above, these impacts would likely be limited to individual wildlife species and unlikely to cause population-level impacts, and therefore would likely be less than significant given the short-term nature and limited geographic scope for individual activities. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Alternatives Impact Assessment

The following section assesses potential impacts to wildlife resources associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to wildlife resources as a result of implementation of this alternative could be as described below.

Deployment Impacts

As described above, implementation of deployable technologies could result in less than significant impacts from direct and indirect injury or mortality events, changes in migratory patterns, disturbance, or displacement. Greater frequency and duration of deployments could change the magnitude of impacts depending on species, life history, and region of the state. However, impacts are expected to remain less than significant because deployment activities are expected to be temporary, likely affecting only a small number of wildlife. Impacts are expected to be less than significant. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operational Impacts

As described above, operational activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the Preferred Alternative, it is anticipated that there would be less than significant impacts because deployable activities are expected to be temporary and likely affecting only a small number of wildlife. The impacts could vary greatly among species and geographic region. The impacts could vary greatly among species and geographic region. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the nationwide, interoperable, public safety broadband network would not be deployed; therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to wildlife resources as a result of construction and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 5.1.6.4, Terrestrial Wildlife.

5.2.6.5. Fisheries and Aquatic Habitats

Impacts to fisheries and aquatic habitats occurring in Idaho are discussed in this section. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Description of Environmental Concerns

Direct Injury/Mortality

Direct injury/mortality effects are physical injuries, extreme physiological stress, or death of an individual organism from interactions associated with the Proposed Action. The most common direct injuries are entanglement, vessel strike, problems associated with accidental ingestion, and injuries incurred by sensitive animals from disturbance events (USEPA, 2012c).

Based on the impact significance criteria presented in Table 5.2.6-1, less than significant impacts would be anticipated given the size and nature of the majority of proposed deployment activities. Although anthropogenic disturbances may be measurable (although minimal) for some FirstNet projects, direct injury or mortality impacts at the population-level or sub-population-level would not likely be observed.

BMPs and mitigation measures could help to avoid or minimize potential impacts to fisheries and aquatic invertebrate population survival.

Vegetation and Habitat Loss, Alteration, or Fragmentation

Habitat impacts are primarily physical disturbances that result in alterations in the amount or quality of a habitat. As with all of the effects categories, the magnitude of the impact depends on the duration, location, and spatial scale of the system and associated activities. Habitat fragmentation is the breaking down of continuous and connected habitat, and impeding access to resources and mates.

Depending on the location, construction of new infrastructure and long-term facility maintenance could result in the shoreline habitat alteration in localized areas; in some instances, the permanent loss of riparian vegetation could occur, which could lead to water quality impacts and in turn aquatic habitat alteration. Habitat loss is not likely to be widespread or affect populations of species as a whole; fish species would be expected to swim to a nearby location, depending on the nature of the deployment activity. Additionally, deployment activities with the potential for impacts to sensitive aquatic habitats could be addressed through BMPs and mitigation measures as defined through consultation with the appropriate resource agency.

Indirect Injury/Mortality

Water quality impacts from exposure to contaminants from accidental spills from vehicles and equipment, and erosion or sedimentation from land clearing and excavation activities near or within riparian areas, floodplains, wetlands, streams, and other aquatic habitats could result in changes to habitat, food sources, or prey resulting in indirect mortality/ injury to fish and aquatic invertebrates. Indirect injury/mortality impacts vary depending on the species, time of year, and duration of deployment. These impacts are expected to be less than significant due the short-term nature and limited geographic scope of deployment activities. BMPs and mitigation measures to protect water resources (see Section 5.2.4, Water Resources) could help to minimize or avoid potential impacts.

Effects to Migration or Migratory Patterns

Migration is the regular movement of animals from one region to another and back again. Migratory patterns vary by species and sometimes within the same species. For example, restrictions or alterations to waterways could alter migration patterns, limit fish passage, or affect foraging and spawning site access. Impacts would vary depending on the species, time of year, and duration of deployment, but would be localized and small-scale, and therefore are expected to be less than significant. BMPs and mitigation measures could help to further avoid or minimize the potential impacts.

Reproductive Effects

Reproductive effects are considered those that either directly or indirectly reduce an animal's ability to produce offspring or reduce the rates of growth, maturation, and survival of offspring, which could affect the overall population of individuals. Restrictions to spawning/breeding areas for fish and aquatic invertebrates and the alteration of water quality through sediment infiltration, obstruction of natural water flow, or loss of submerged vegetation resulting from the deployment of various types of infrastructure, are not anticipated, and therefore impacts are expected to be less than significant. BMPs and mitigation measures could help to further avoid or minimize the potential impacts.

Invasive Species Effects

FirstNet deployment activities could result in less than significant impacts to aquatic populations due to introduction of invasive species. The potential to introduce invasive plant (and plant seeds) and pest species (e.g., invasive insects) within construction zones could occur from vessels and equipment being transported from one region to another, or when conducting revegetation of a site after deployment activities are complete. FirstNet deployment activities could result in short-term or temporary changes to specific project sites and these sites are expected to return to their natural state in a year or two. Invasive species are not expected to be introduced to project sites as part of the deployment activities from machinery or construction workers. Therefore, impacts are expected to be less than significant due to the limited extent and temporary nature of the deployment. Should invasive species be found on a site, BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented to minimize invasive species effects to fisheries and aquatic species. Additional BMPs and mitigation measures, as defined in Chapter 9, BMPs and Mitigation Measures, may be implemented as appropriate to further minimize potential impacts.

Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment and operational activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to fisheries and aquatic habitats and others would not. In addition, and as explained in this section, the same type of Proposed Action infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions. The fisheries and aquatic habitats that would be affected would depend on the ecoregion, the species' phenology, and the nature and extent of the habitats affected. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are expected to have no impacts to fisheries and aquatic habitats under the conditions described below:

- Wired Projects
  - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance, including noise, associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. It is anticipated that effects to wildlife would be temporary and would not result in any perceptible change.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up of dark fiber would have no impacts to fisheries and aquatic habitats because there would be no ground disturbance.
- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: It is anticipated that the installation of permanent equipment on existing structures and the use of portable devices that use satellite technology would not impact fisheries and aquatic habitats because those activities would not require ground disturbance.
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it could include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact fisheries, it is anticipated that this activity would have no impact on the aquatic environment.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to fisheries and aquatic habitats as a result of implementation of the Preferred Alternative would encompass a range of impacts that could occur, including direct injury/mortality; vegetation and habitat loss, alteration, or fragmentation; effects to migratory patterns; indirect injury/mortality; reproductive effects; and invasive species effects. The types of infrastructure deployment activities that could be part of the Preferred Alternative and result in potential impacts to fisheries and aquatic habitats include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: Plowing, trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber could result in potential impacts to fisheries and aquatic habitats. Land/vegetation clearing and excavation activities, associated with construction of POPs, huts, or other associated facilities, particularly if they occur adjacent to water resources that support fish, could result in habitat loss, alteration and fragmentation; indirect injury/mortality; and invasive species effects if BMPs and mitigation measures are not implemented.
  - New Build – Aerial Fiber Optic Plant: The installation of new poles and hanging cable and associated security, safety, or public lighting components on public ROWs or private

easements as well as the construction of access roads, POPs, huts, or facilitates to house outside plant equipment could result in potential impacts to fisheries and aquatic habitats if activities occur near water resources that support fish. Impacts may vary depending on the number or individual poles installed or if access roads or stream crossings are needed, but could include habitat loss, alteration and fragmentation; indirect injury/mortality; and invasive species effects.

- Collocation on Existing Aerial Fiber Optic Plant: Land clearing and excavation during replacement of poles and structural hardening, if conducted near water resources that support fish, could result in habitat loss, alteration and fragmentation; indirect injury/mortality; and invasive species effects.
- New Build – Submarine Fiber Optic Plant: The installation of cables in or near bodies of water would not impact biological resources because there would be no local biological resources to impact. However, impacts to biological resources could potentially occur as result of the construction of landings and/or facilities on shores or the banks of water bodies that accept the submarine cable, depending on the exact site location and proximity to existing biological resources.
- Installation of Optical Transmission or Centralized Transmission Equipment: If installation of transmission equipment required construction of access roads, trenching, and/or land clearing, particularly near water resources that support fish, such disturbance could result in habitat loss, alteration and fragmentation; indirect injury/mortality, and invasive species effects.

- Wireless Projects
  - New Wireless Communication Towers: Installation of new wireless towers and associated structures (generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads could result in impacts to fisheries and aquatic habitats, if such actions were deployed near water resources. Land/vegetation clearing, excavation activities, landscape grading, and other disturbance activities during the installation of new wireless towers and associated structures or access roads, particularly if they occur near waterbodies, could result in habitat loss or indirect injury/mortality, and invasive species effects, although highly unlikely. Refer to Section 2.4, Radio Frequency Emissions, for more information on RF emissions.
  - Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower which would not result in impacts to fisheries and aquatic habitats. However, if new power units, replacement towers, structural hardening, or physical security measures required ground disturbance, impacts would be similar to new wireless construction. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions.
  - Deployable Technologies: Implementation of deployable technologies including COWs, COLTs, or SOWs could result in habitat loss, alteration and fragmentation; indirect injury/mortality, and invasive species effects if new access roads or other ground disturbing activities are necessary that generate erosion, sedimentation, or water quality

impacts. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions. Deployment of drones, balloons, blimps, or piloted aircraft could potentially impact fisheries and aquatic habitat if deployment occurs within or adjacent to water resources. The magnitude of these effects depends on the timing and frequency of deployments, and could result in result in habitat loss, alteration and fragmentation; indirect injury/mortality, and invasive species effects.

In general, the abovementioned activities could potentially involve land/vegetation clearing; excavation and trenching; construction of access roads; installation or restructuring of towers, poles, or underwater cables; installation of security/safety lighting and fencing; and deployment of aerial platforms. Potential impacts to fisheries and aquatic habitats associated with deployment of this infrastructure could include direct injury/mortality, habitat loss, indirect injury/mortality, effects to migration, reproductive effects, and effects of invasive species depending on the ecoregion, the species' phenology, and the nature and extent of the habitats affected. These impacts are anticipated to be less than significant due to the small scale and localized nature of deployment activities that have the potential to impact aquatic habitats. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operational activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned deployment impacts. The fisheries and aquatic habitats that would be affected would depend on the ecoregion, the species' phenology, and the nature and extent of the habitats affected.

It is anticipated that there would be less than significant impacts to fisheries and aquatic habitats associated with routine inspections of the Preferred Alternative. Site maintenance that might include accidental spills from maintenance equipment or pesticide runoff near fish habitat are anticipated to result in less than significant effects to fisheries and aquatic habitats due to the limited nature of such activities and the likely small quantities of potentially harmful liquids used.

Fisheries and aquatic habitat could still be affected by the reduction in habitat quality associated with habitat fragmentation from the presence of access roads, transmission corridors, and support facilities. These features could also continue to disrupt movements of fish passage. In addition, the presence of new access roads and transmission line ROWs near water resources that support fish may increase human use of the surrounding areas, which could increase disturbance to fisheries and aquatic habitats resulting in effects to migratory pathways, indirect injury/mortalities, reproductive effects, as well as the potential introduction and spread of invasive species as explained above. Fisheries and aquatic habitat may also be impacted if increased access leads to an increase in the legal or illegal take of biota. However, impacts are expected to be less than significant due to the small scale of expected activities with the potential to affect fisheries and aquatic habitat. As a result of the small scale, only a limited number of individuals are anticipated to be impacted, furthermore, habitat impacts would also be minimal in scale. Chapter 9, BMPs and Mitigation Measures, provides a listing of the BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Alternatives Impact Assessment

The following section assesses potential impacts to fisheries and aquatic habitats associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to fisheries and aquatic habitats as a result of implementation of this alternative could be as described below.

Deployment Impacts

As explained above, implementation of deployable technologies could result in less than significant impacts from habitat loss, alteration, and fragmentation; indirect injury/mortality, and invasive species effects. Greater frequency and duration of deployments could change the magnitude of impacts depending on species, life history, and region of the state. However, impacts are expected to remain less than significant due to the limited nature of expected deployment activities. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operational Impacts

Operational activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the Preferred Alternative, it is anticipated that there would be less than significant impacts to fisheries and aquatic habitats associated with routine operations and maintenance due to the limited nature of expected deployment activities. The impacts could vary greatly among species and geographic region. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the nationwide, interoperable, public safety broadband network would not be deployed; therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to fisheries and aquatic habitats as a result of construction and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 5.1.6.5, Fisheries and Aquatic Habitats.

5.2.6.6. Threatened and Endangered Species and Species of Conservation Concern

This section describes potential impacts to threatened and endangered species in Idaho associated with deployment and operation of the Proposed Action and alternatives. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on threatened and endangered species and their habitat were evaluated using the significance criteria presented in Table 5.2.6-2. The categories of impacts for threatened and endangered species and their habitats are defined as may affect, likely to adversely affect; may affect, not likely to adversely affect; and no effect. Characteristics of each effect type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes across the state, the potential impacts to threatened and endangered species addressed below are presented as a range of possible impacts.

Table 5.2.6-2: Impact Significance Rating Criteria for Threatened and Endangered Species

Type of Effect	Effect Characteristics	Impact Level		
		May Affect, Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect	No Effect
Injury/Mortality of a Listed Species	Magnitude or Intensity	As per the ESA, this impact threshold applies at the individual level so applies to any mortality of a listed species and any impact that has more than a negligible potential to result in unpermitted take of an individual of a listed species. Excludes permitted take.	Does not apply in the case of mortality (any mortality unless related to authorized take falls under likely to adversely affect category). Applies to a negligible injury that does not meet the threshold of take due to its low level of effect and/or ability to fully mitigate the effect. Includes permitted take.	No measurable effects on listed species.
	Geographic Extent	Any geographic extent of mortality or any extent of injury that could result in take of a listed species.	Any geographic extent that does not meet the threshold of take due to its low level of effect and/or ability to fully mitigate the effect. Typically applies to one or very few locations.	
	Duration or Frequency	Any duration or frequency that could result in take of a listed species.	Any duration or frequency that does not meet the threshold of take due to its low level of effect and/or ability to fully mitigate the effect. Typically applies to infrequent, temporary, and short-term effects.	
Reproductive Effects	Magnitude or Intensity	Any reduction in breeding success of a listed species.	Changes in breeding behavior (e.g., minor change in breeding timing or location) that are not expected to result in reduced reproductive success.	No measurable effects on listed species.
	Geographic Extent	Reduced breeding success of a listed species at any geographic extent.	Changes in breeding behavior at any geographic extent that are not expected to result in reduced reproductive success of listed species. Typically applies to one or very few locations.	
	Duration or Frequency	Any duration or frequency that could result in reduced breeding success of a listed species.	Infrequent, temporary, or short-term changes in breeding behavior that do not reduce breeding success of a listed species within a breeding season.	
Behavioral Changes	Magnitude or Intensity	Disruption of normal behavior patterns (e.g., breeding, feeding, or sheltering) that could result in take of a listed species.	Minor behavioral changes that would not result in take of a listed species.	No measurable effects on listed species.

Type of Effect	Effect Characteristics	Impact Level		
		May Affect, Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect	No Effect
	Geographic Extent	Any geographic extent that could result in take of a listed species.	Changes in behavior at any geographic scale that are not expected to result in take of a listed species. Typically applies to one or very few locations.	
	Duration or Frequency	Any duration or frequency that could result in take of a listed species.	Infrequent, temporary, or short-term changes that are not expected to result in take of a listed species.	
Loss or Degradation of Designated Critical Habitat	Magnitude or Intensity	Effects to any of the essential features of designated critical habitat that would diminish the value of the habitat for the survival and recovery of the listed species for which the habitat was designated.	Effects to designated critical habitat that would not diminish the functions or values of the habitat for the species for which the habitat was designated.	No measurable effects on designated critical habitat.
	Geographic Extent	Effects to designated critical habitat at any geographic extent that would diminish the value of the habitat for listed species. Note that the likely to adversely affect threshold for geographic extent depends on the nature of the effect. Some effects could occur at a large-scale but still not appreciably diminish the habitat function or value for a listed species. Other effects could occur at a very small geographic scale but have a large adverse effect on habitat value for a listed species.	Effects realized at any geographic extent that would not diminish the functions and values of the habitat for which the habitat was designated. Typically applies to one or few locations within a designated critical habitat.	
	Duration or Frequency	Any duration or frequency that could result in reduction in critical habitat function or value for a listed species.	Any duration or frequency that would not diminish the functions and values of the habitat for which the habitat was designated. Typically applies to Infrequent, temporary, or short-term changes.	

Description of Environmental Concerns

Injury/Mortality of a Listed Species

Direct injury/mortality effects are physical injuries, extreme physiological stress, or death of an individual organism from interactions associated with the Proposed Action. The most common direct injuries are entanglement, vehicle strike, problems associated with accidental ingestion, and injuries incurred by sensitive animals from disturbance events.

Based on the impact significance criteria presented in Table 5.2.6-2, any direct injury or mortality of a listed species at the individual-level, as well as any impact that has the potential to result in unpermitted take of an individual species at any geographic extent, duration, or frequency, may affect and likely adversely affect a listed species. Direct injury/mortality environmental concerns pertaining to federally listed terrestrial mammals, birds, fish, invertebrates, and plants with known occurrence in Idaho are described below. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

<u>Terrestrial Mammals</u>

The Canada lynx (*Lynx canadensis*), grizzly bear, woodland caribou (*Rangifer tarandus caribou*), and northern Idaho ground squirrel are federally listed species protected under the ESA. Direct mortality or injury to these species is unlikely. However, isolated vehicle strikes could occur. Impacts would likely be isolated, individual events and therefore may affect but are not likely to adversely affect a listed species.

BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

<u>Birds</u>

One federally listed bird is known to occur within the state of Idaho; the yellow-billed cuckoo (*Coccyzus americanus*). Depending on the project type and location, direct mortality or injury to these birds could occur from collisions or electrocutions with manmade cables and wires, vehicle strikes, or by disturbance or destruction of nests during ground disturbing activities. However, these potential impacts may affect, but are not likely to adversely affect, listed species as FirstNet would attempt to avoid deployment activities in these areas. If proposed project sites were unable to avoid sensitive areas, BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

Fish

The white sturgeon (*Acipenser transmontanus*) and bull trout (*Salvelinus confluentus*) are found in the Pacific Ocean waterways of Idaho, with the white sturgeon being found only in the Kootenai River. Direct mortality or injury to the endangered white sturgeon and bull trout species could occur from entanglements resulting from the Proposed Action but are unlikely as the majority of FirstNet deployment projects would not occur in the aquatic environment. Therefore, potential impacts may affect, but are not likely to adversely affect, listed species. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

Invertebrates

Four federally listed invertebrates, three snails and one limpet, occur in Idaho; they include the Banbury Springs Limpet., Bliss Rapids Snail, Bruneau Hot Springsnail, and Snake River Snail. Direct mortality or injury could occur to these species if land clearing or excavation activities associated with the Proposed Action occur in an area inhabited by one of these species. Distribution of these species is very limited throughout the state. For example, the Snake River snail is found only in the Snake River drainage. FirstNet would attempt to avoid areas where these species may occur. Potential impacts may affect, but are not likely to adversely affect, the listed species. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

Plants

Four federally listed plants occur in Idaho; they include MacFarlane’s four-o’clock, Spalding’s catchfly, ute ladies’-tresses, and water howellia. Direct mortality to federally listed plants could occur if land clearing or excavation activities associated with the Proposed Action occur in an area inhabited by one of these species. FirstNet would attempt to avoid areas where these species may occur; therefore, potential impacts may affect, but are not likely to adversely affect, listed species. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

Reproductive Effects

Reproductive effects are considered those that either directly or indirectly reduce the breeding success of a listed species either by altering its breeding timing or location, or reducing the rates of growth, maturation, and survival of offspring, which could affect the breeding success. Potential effects to federally listed terrestrial mammals, birds, amphibians, fish, invertebrates, and plants with known occurrence in Idaho are described below.

Terrestrial Mammals

Noise, light, and other human disturbances associated with the Proposed Action could adversely affect federally listed terrestrial mammals, such as the Canada Lynx or Northern Idaho Ground Squirrel, within or in the vicinity of Project activities. Impacts would be directly related to the frequency, intensity, and duration of these activities; however, they are anticipated to be small-scale and localized. FirstNet would attempt to avoid these areas. Therefore, potential impacts may affect, but are not likely to adversely affect, listed species. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

Birds

The yellow-billed cuckoo is the only federally listed bird species that is known to nest in Idaho. Nesting occurs in willow trees next to drainages. Noise, light, or human disturbance within nesting areas could cause yellow-billed cuckoos to abandon their nests, relocate to less desirable locations, or cause stress to individuals reducing survival and reproduction. FirstNet would attempt to avoid these areas. Therefore, potential impacts may affect, but are not likely to adversely affect, listed species. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

Fish

Deployment activities in the upstream portions of the Kootenai River and other Pacific watersheds resulting in increased disturbance (e.g., humans, noise), especially during spawning activity, and changes in water quality could cause stress resulting in lower productivity (see Section 5.2.4, Water Resources, for a discussion of potential impacts to water resources). Impacts to reproduction for the endangered white sturgeon and bull trout species are unlikely as the majority of FirstNet deployment projects would not occur in an aquatic environment and FirstNet would attempt to avoid these areas. Therefore, potential impacts may affect, but are not likely to adversely affect, listed species. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

Invertebrates

Changes in water quality from ground disturbing activities could cause stress resulting in lower productivity for federally listed mollusks known to occur in Idaho. Potential impacts to federally listed invertebrate species may affect, but are not likely to adversely affect, those species, as FirstNet would attempt to avoid these areas. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

<u>Plants</u>

Potential impacts could occur from ground-disturbing activities to listed plant species as a result of the Proposed Action. However, FirstNet would attempt to avoid these areas. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

Behavioral Changes

Effects to normal behavior patterns that could lead to disruptions in breeding, feeding, or sheltering, resulting in take of a listed species would be considered potentially significant. Potential effects to federally listed terrestrial mammals, birds, fish, invertebrates, and plants with known occurrence in Idaho are described below.

<u>Terrestrial Mammals</u>

Noise associated with the installation of cables could affect mammal migration patterns, such as for the Canada Lynx or Woodland Caribou, though impacts are likely to be short-term. Terrestrial mammals have the capacity to divert from sound sources during feeding and migration. FirstNet would attempt to avoid areas where these species are known to occur; therefore, potential impacts may affect, but would likely not adversely affect, these species. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

<u>Birds</u>

Because many birds have extremely long migrations, protection efforts for critical sites along migratory routes must be coordinated over distances often involving many different countries. For example, the Yellow-billed Cuckoo migrates many miles from their breeding grounds in the western United States to their wintering sites in South America. Disturbance in stopover, foraging, or breeding areas (visual or noise) or habitat loss/fragmentation could cause stress to individuals causing them to abandon areas for less desirable habitat and potentially reduce over fitness and productivity. Activities related to the Proposed Action, such as aerial deployment or construction activities, could result in effects to federally listed birds. FirstNet would attempt to avoid areas where these species are known to occur; therefore, potential impacts may affect, but would likely not adversely affect, these species. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

Fish

Changes in water quality as a result of ground disturbing activities could impact food sources for the white sturgeon and bull trout. Further, increased human disturbance, noise, and vessel traffic could cause stress to these fish species causing them to abandon spawning locations or altering migration patterns. Behavioral changes to these listed species are unlikely as the majority of FirstNet deployment projects would not occur in aquatic environment. Therefore, potential impacts may affect, but are not likely to adversely affect, these species. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

Invertebrates

Changes in water quality, habitat loss or alternation, and introduction of aquatic invasive species could impact food sources for federally listed mollusks, such as the Bliss Rapids Snail or Banbury Springs Limpet resulting in lower productivity. Disturbances to food sources utilized by the federally listed terrestrial species, especially during the breeding season, could impact foraging behavior. FirstNet would attempt to avoid areas where these species are known to occur; therefore, potential impacts may affect, but would likely not adversely affect, these species. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

Plants

No behavioral effects to federally listed plants are expected as a result of the Proposed Action.

Loss or Degradation of Designated Critical Habitat

Effects to designated critical habitat and any of its essential features that could diminish the value of the habitat for the listed species or its survival and recovery would be considered an adverse effect and could be potentially significant. Depending on the species or habitat, the adverse effect threshold would vary for geographic extent. In some cases, large-scale impacts could occur that would not diminish the functions and values of the habitat, while in other cases, small-scale changes could lead to potentially significant adverse effects, such as impacts to designated critical habitat for a listed species that is only known to occur in one specific location geographically. Potential effects to federally listed birds, reptiles and amphibians, fish, invertebrates, and plants with designated critical habitat in Idaho are described below.

Terrestrial Mammals

Designated critical habitat for the Woodland Caribou occurs in northwestern Idaho in the southern Selkirk Mountain range. Critical habitat for the Canada Lynx has been designated in the Idaho Panhandle National Forest. Land clearing, excavation activities, and other ground disturbing activities in this region of Idaho could lead to habitat loss or degradation, which could lead to adverse effects to the woodland caribou depending on the duration, location, and spatial scale of the associated activities. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

Birds

Critical habitat for the Yellow-billed Cuckoo has been designated in southeastern Idaho along the Snake River. Land clearing, excavation activities, and other ground disturbing activities in this region of Idaho could lead to habitat loss or degradation, which could lead to adverse effects to the yellow-billed cuckoo depending on the duration, location, and spatial scale of the associated activities. FirstNet would attempt to avoid areas where these species are known to occur; therefore, potential impacts may affect, but would likely not adversely affect, designated critical habitat. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

Fish

Thousands of miles of streams and lakes in northern and central Idaho has been dedicated as critical habitat for the Bull Trout. In addition, 167 miles of the Kootenai River in northern Idaho has been designated as critical habitat for the White Sturgeon. Proposed FirstNet deployment activities near water would likely occur onshore with limited activities in the water and therefore would not likely disturb critical habitat. FirstNet would attempt to avoid areas where these species are known to occur; therefore, potential impacts may affect, but would likely not adversely affect, designated critical habitat. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

Invertebrates

No designated critical habitat occurs for terrestrial or aquatic invertebrates in Idaho. Therefore, no effect to threatened and endangered species from the loss or degradation of designated critical habitat is expected as a result of the Proposed Action.

Plants

No designated critical habitat occurs for plants in Idaho. Therefore, no effect to threatened and endangered species from the loss or degradation of designated critical habitat is expected as a result of the Proposed Action.

Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment and operational activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to threatened and endangered species and others would not. In addition, and as explained in this section, the same type of Proposed Action infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions. The threatened and endangered species that would be affected would depend on the ecoregion, the species' phenology, and the nature and extent of the habitats affected. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Activities Likely to Have No Effect

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are expected to have no effect to threatened and endangered species or their habitat under the conditions described below:

- Wired Projects
  - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance, including noise, associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. Although threatened and endangered species and their habitat could be impacted, it is anticipated that effects to threatened and endangered species would be temporary, infrequent, and likely not conducted in locations designated as vital or critical for any period.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up of dark fiber would have no impacts to threatened and endangered species or their habitat because there would be no ground disturbance and very limited human activity.
- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: It is anticipated that the installation of permanent equipment on existing structures and the use of portable devices that use satellite technology would not impact threatened and endangered because those activities would not require ground disturbance.
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it could include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact protected species, it is anticipated that this activity would have no impact on protected species.

Activities with the Potential to Listed Species

Potential deployment-related effects to threatened and endangered species and their habitats as a result of implementation of the Preferred Alternative would encompass a range of impacts that could occur, including direct injury/mortality, reproductive effects, behavioral changes, and loss/degradation of designated critical habitat. The types of infrastructure deployment activities that could be part of the Preferred Alternative and result in potential effects to threatened and endangered species include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: Plowing, trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber could result in potential impacts to threatened and endangered species. Land/vegetation clearing and excavation activities, associated with construction of POPs, huts, or other associated facilities could result in direct injury/mortalities of threatened and endangered species that are not mobile enough to avoid construction activities (e.g., reptiles, mollusks, small mammals, and young), that utilize burrows (e.g., ground squirrels), or that are defending nest sites (e.g., ground-nesting birds). Disturbance, including noise, associated with the above activities could result in direct injury/mortality, reproductive effects, behavioral changes, and loss/degradation of designated critical habitat if BMPs and mitigation measures are not implemented.
  - New Build – Aerial Fiber Optic Plant: The installation of new poles and hanging cable and associated security, safety, or public lighting components on public ROWs or private easements as well as the construction of access roads, POPs, huts, or facilitates to house outside plant equipment could result in potential impacts to threatened and endangered species and their habitat. Impacts may vary depending on the number or individual poles installed, but could include direct injury/mortality, reproductive effects, behavioral changes, and loss/degradation of designated critical habitat.
  - Collocation on Existing Aerial Fiber Optic Plant: Land clearing and excavation during replacement of poles and structural hardening could result in direct injury/mortality, reproductive effects, behavioral changes, and loss/degradation of designated critical habitat to threatened and endangered species. Noise disturbance from heavy equipment use associated with these activities as well as with installing new fiber on existing poles could result in reproductive effects or behavior changes.
  - New Build – Submarine Fiber Optic Plant: The installation of cables in or near bodies of water would not impact biological resources because there would be no local biological resources to impact. However, impacts to biological resources could potentially occur as result of the construction of landings and/or facilities on shores or the banks of water bodies that accept the submarine cable, depending on the exact site location and proximity to existing biological resources.
  - Installation of Optical Transmission or Centralized Transmission Equipment: If installation of transmission equipment would occur in existing boxes or huts, there would be no impacts to threatened and endangered species or their habitats. If installation of transmission equipment required construction of access roads, trenching, and/or land clearing, such disturbance could result in direct injury/mortality of threatened and endangered species as described for other New Build activities. Reproductive effects, behavioral changes, and loss/degradation of designated critical habitat could also occur as a result of construction and resulting disturbance.

- Wireless Projects
  - New Wireless Communication Towers: Installation of new wireless towers and associated structures (generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads could result in impacts to threatened and endangered species and their habitat. Land/vegetation clearing, excavation activities, landscape grading, and other disturbance activities during the installation of new wireless towers and associated structures or access roads could result in direct injury/mortality, reproductive effects, behavioral changes, and loss/degradation of designated critical habitat. Security lighting and fencing could result in direct injury/mortality, disruption of normal behavior patterns, as well as reproductive effects. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions.
  - Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower; FirstNet activities would be infrequent, temporary, or short-term in nature and are unlikely to which would not result in impacts to threatened and endangered species. However, if replacement towers, or structural hardening are required, impacts could be similar to new wireless construction. Hazards related to RF and security/safety lighting and fencing may produce direct injury/mortality, reproductive effects, and behavioral changes. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions.
  - Deployable Technologies: Implementation of land-based deployable technologies including COWs, COLTs, or SOWs could result in direct injury/mortalities to threatened and endangered species on roadways. If external generators are used, noise disturbance could potentially result in reproductive effects or behavioral changes to threatened and endangered species. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions. Deployment of drones, balloons, piloted aircraft, or blimps could potentially impact threatened and endangered species by direct injury/mortality, reproductive effects, behavioral changes, and loss/degradation of designated critical habitat. The magnitude of these effects depends on the timing and frequency of deployments.

In general, the abovementioned activities could potentially involve land/vegetation clearing; excavation and trenching; construction of access roads; installation or restructuring of towers, poles, or underwater cables; installation of security/safety lighting and fencing; and deployment of aerial platforms. Potential impacts to threatened and endangered species associated with deployment of this infrastructure could include direct injury/mortality, reproductive effects, behavioral changes, and loss/degradation of designated critical habitat depending on the species' phenology and the nature and extent of the habitats affected. FirstNet would attempt to avoid areas where these species are known to occur; therefore, potential impacts may affect, but are not likely adversely affect protected species. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operational activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned deployment impacts.

It is anticipated that operational impacts may affect, but are not likely to adversely affect threatened and endangered species due to routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for inspections. Site maintenance, including mowing or application of herbicides, may affect, but are not likely to adversely affect threatened and endangered species, as they would be conducted infrequently, and BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

During operations, direct injury/mortality of threatened and endangered species could occur from collisions and/or entanglements with transmission lines, towers, and aerial platforms. FirstNet would attempt to avoid areas where these species are known to occur. Therefore, listed species may be affected, but are not likely to be adversely affected. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

Threatened and endangered species may be affected, but are not likely to be adversely affected, by the reduction in habitat quality associated with habitat fragmentation from the presence of access roads, transmission corridors, and support facilities. These features could also continue to disrupt movements of some species, particularly during migrations between winter and summer ranges. FirstNet would attempt to avoid areas where these species are known to occur. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

Alternatives Impact Assessment

The following section assesses potential impacts to threatened and endangered species associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to threatened and endangered species as a result of implementation of this alternative could be as described below.

<u>Deployment Impacts</u>

As explained above, implementation of deployable technologies may affect, but is not likely to adversely affect, threatened and endangered species as a result of direct injury/mortality, reproductive effects, behavioral changes, and loss/degradation of designated critical habitat. Greater frequency and duration of deployments could change the magnitude of impacts depending on species, life history, and region of the state. FirstNet would attempt to avoid areas where these species are known to occur. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

<u>Operational Impacts</u>

As explained above, operational activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the Preferred Alternative, it is anticipated that activities may affect, but are not likely to adversely affect, threatened and endangered species and their habitats as a result of routine operations, management, and monitoring. FirstNet would attempt to avoid areas where these species are known to occur. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented. Additional BMPs and mitigation measures, as defined in Chapter 9, may be implemented as appropriate to further minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed; therefore there would be no associated construction or installation of wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no effects to threatened and endangered species as a result of construction and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 5.1.6.6, Threatened and Endangered Species and Species of Conservation Concern.

5.2.7. Land Use, Recreation, and Airspace

5.2.7.1. Introduction

This section describes potential impacts to land use, recreation, and airspace resources in Idaho associated with deployment and operation of the Proposed Action and alternatives. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.7.2. Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on land use, recreation, and airspace resources were evaluated using the significance criteria presented in Table 5.2.7-1. The categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to land use, recreation, and airspace resources addressed in this section are presented as a range of possible impacts.

Table 5.2.7-1: Impact Significance Rating Criteria for Land Use, Recreation, and Airspace

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant**	**No Impact**
Direct land use change	Magnitude or Intensity	Change in designated/permitted land use that conflicts with existing permitted uses, and/or would require a change in zoning. Conversion of prime or unique agricultural lands.	Effect that is potentially significant, but with mitigation is less than significant.	Minimal changes in existing land use, or change that is permitted by-right, through variance, or through special exception.	No changes to existing development, land use, land use plans, or policies. No conversion of prime or unique agricultural lands.
	Geographic Extent	Regional impacts observed throughout the state or territory.		Effects realized at one or multiple isolated locations.	NA
	Duration or Frequency	Permanent: Land use altered indefinitely.		Short-Term: Land use altered for as long as the entire construction phase or a portion of the operations phase.	NA
Indirect land use change	Magnitude or Intensity	New land use directly conflicts with surrounding land use pattern, and/or causes substantial restriction of land use options for surrounding land uses.	Effect that is potentially significant, but with mitigation is less than significant.	New land use differs from, but is not inconsistent with, surrounding land use pattern; minimal restriction of land use options for surrounding land uses.	No conflicts with adjacent existing or planned land uses.
	Geographic Extent	Regional impacts observed throughout the state or territory.		Effects realized at one or multiple isolated locations.	NA
	Duration or Frequency	Permanent: Land use altered indefinitely.		Short-Term: Land use altered for as long as the entire construction phase or a portion of the operations phase.	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant**	**No Impact**
Loss of access to public or private recreation land or activities	Magnitude or Intensity	Total loss of access to recreation land or activities.	Effect that is potentially significant, but with mitigation is less than significant.	Restricted access to recreation land or activities.	No disruption or loss of access to recreational lands or activities.
	Geographic Extent	Most or all recreational land/sites in a state or territory; recreational lands/sites that are of national significance.		Effects realized at one or multiple isolated locations; recreational lands that are not nationally significant, but that are significant within the state/territory.	NA
	Duration or Frequency	Persists during the life of the project.		Persists for as long as the entire construction phase or a portion of the operations phase.	NA
Loss of enjoyment of public or private recreation land (due to visual, noise, or other impacts that make recreational activity less desirable)	Magnitude or Intensity	Total loss of enjoyment of recreational activities; substantial reduction in the factors that contribute to the value of the recreational resource, resulting in avoidance of activity at one or more sites.	Effect that is potentially significant, but with mitigation is less than significant.	Small reductions in visitation or duration of recreational activity.	No loss of enjoyment of recreational activities or areas; no change to factors that contribute to the value of the resource.
	Geographic Extent	Most or all recreational land/sites in a state or territory; recreational lands/sites that are of national significance.		Effects realized at one or multiple isolated locations; recreational lands that are not nationally significant, but that are significant within the state/territory.	NA
	Duration or Frequency	Persists during or beyond the life of the project.		Persists for as long as the entire construction phase or a portion of the operations phase.	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	Less Than Significant with Mitigation Incorporated	Less Than Significant	No Impact
Use of airspace	Magnitude or Intensity	Measurable, substantial change in flight patterns and/or use of airspace.	Effect that is potentially significant, but with mitigation is less than significant.	Alteration to airspace usage is minimal.	No alterations in airspace usage or flight patterns.
	Geographic Extent	Regional impacts observed throughout the state or territory.		Effects realized at one or multiple isolated locations.	NA
	Duration or Frequency	Permanent: Airspace altered indefinitely.		Short-Term: Airspace altered for as long as the entire construction phase or a portion of the operations phase.	NA

NA = Not Applicable

5.2.7.3. Description of Environmental Concerns

Direct Land Use Change

Changes in land use could be influenced by the deployment, operation, and maintenance of facilities or other infrastructure, and the acquisition of rights-of-way or easement. The deployment, operation, and maintenance of structures, towers, roads, and other permanent features could conflict with exiting development or land use. The installation of poles, towers, structures, or other above-ground facilities or assets could have short- or long-term effects to existing development or land use based on the characteristics of the structures or facilities, such as the location, type, or height. In addition, the acquisition of ROWs or easements and the construction of roads to access facilities and locations could influence changes in land use. The effects from these actions would depend on the geographic location; compatibility with existing land uses; and characteristics of the right-of-way, easement, or access road. These characteristics, such as the length, width, and location could change the existing land use to another category or result in the short- or long-term loss of the existing land use.

Based on the impact significance criteria presented in Table 5.2.7-1, less than significant impacts would be anticipated given the size and nature of the majority of the proposed deployment activities. Direct land use changes would be minimized and isolated at specific locations and all required permits would be obtained; only short-term impacts during the construction phase would be expected.

Indirect Land Use Change

Changes in surrounding land use patterns and options for surrounding land uses could be influenced by the deployment, operation, and maintenance of facilities and the acquisition of rights-of-way or easement. The deployment, operation, and maintenance of structures, towers, roads, and other permanent features could conflict with surrounding land use patterns and options for surrounding land uses. The installation of poles, towers, structures, or other above-ground facilities or assets could have short- or long-term effects to surrounding land use patterns or options for surrounding land uses based on the characteristics of the structures or facilities, such as the location, type, or height. In addition, the acquisition of ROWs or easements and the construction of roads to access facilities and locations could influence changes in surrounding land uses. The effects from these actions would depend on the geographic location; compatibility with surrounding land uses; and characteristics of the ROW, easement, or access road. These characteristics, such as the length, width, and location could conflict with surrounding land use patterns or restrict options for surrounding land uses.

Based on the impact significance criteria presented in Table 5.2.7-1, less than significant impacts would be anticipated as any new land use would be small-scale; only short-term impacts during the construction phase would be expected.

Loss of Access to Public or Private Recreation Land or Activities

Access to public or private recreation land or activities could be influenced by the deployment, operation, and maintenance of facilities and the acquisition of ROW or easement. Localized, short-term accessibility to recreation land or activities could be impacted by the deployment and maintenance of structures, towers, roads, and other permanent features. In the long-term, the deployment and installation of poles, towers, structures, or other aboveground facilities could alter the types and locations of recreation activities.

Based on the impact significance criteria presented in Table 5.2.7-1, less than significant impacts would be anticipated as restricted access or a loss of access to recreation areas would not occur; only short-term impacts or small-scale limitations during the construction phase would be expected.

Loss of Enjoyment of Public or Private Recreation Land

The deployment of new towers, and the resulting built tower, could influence the enjoyment of public or private recreation land. Enjoyment of recreation land could be temporarily impacted by crews accessing the site during the deployment and maintenance of structures, towers, roads, and other permanent features. The deployment of poles, towers, structures, or other aboveground facilities could affect the enjoyment of recreational land based on the characteristics of the structures or facilities, including permanent impacts to scenery, short-term noise impacts, and the presence of deployment or maintenance crews.

Based on the impact significance criteria presented in Table 5.2.7-1, less than significant impacts would be anticipated as only small reductions, if any, in recreational visits or durations would occur due to the relatively small-scale nature of likely FirstNet activities. Only short-term impacts during the construction phase would be expected.

Use of Airspace

Primary concerns to airspace include the following: if aspects of the Proposed Action would result in violation of FAA regulations; undermine the safety of civilian, military, or commercial aviation; or infringe on flight activity and flight corridors. Potential impacts could include air routes or flight paths, available flight altitudes, disruption of normal flight patterns, and restrictions to flight activities. Construction of new towers or alternations to existing towers could obstruct navigable airspace depending on the tower location. Use of aerial technologies could result in SUA considerations.

Based on impact significance criteria presented in Table 5.2.7-1, airspace impacts are not likely to change or alter flight patterns or airspace usage. As drones, balloons, and piloted aircraft would likely only be deployed in an emergency and for a short period of time, FirstNet would not have a significant impact on airspace resources.

5.2.7.4. Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment and operation activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure, and the specific deployment requirements, some activities would result in potential impacts to land use, recreation, and airspace resources and others would not. In addition, and as explained in this section, the same type of Proposed Action infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no impacts to land use, recreation, and airspace resources under the conditions described below:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: Plowing (including vibratory plowing), trenching, or directional boring alongside the road in utility corridors or within public road rights-of-way.
    - Land Use: See *Activities with the Potential to Have Impacts* below.
    - Recreation: See *Activities with the Potential to Have Impacts* below.
    - Airspace: No impacts to airspace would be anticipated since the activities would not affect flight patterns or cause obstructions that would require FAA and/or state review based on FAR 14 CFR, Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace* (See Section 5.1.7.5, Obstructions to Airspace Considerations).
  - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas.
    - Land Use: It is anticipated that there would be no impacts to land use since the activities that would be conducted would not directly or indirectly result in changes to existing and surrounding land uses.
    - Recreation: See *Activities with the Potential to Have Impacts* below.
    - Airspace: It is anticipated that there would be no impacts to airspace since the activities would not affect flight patterns or cause obstructions that would require FAA and/or state review based on FAR 14 CFR, Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace* (see Section 5.1.7.5, Obstructions to Airspace Considerations).

- New Build – Aerial Fiber Optic Plant: Installing new poles and hanging cables on previously disturbed or new (undisturbed) ROWs or easements and the potential construction of access roads.
    - Land Use: See *Activities with the Potential to Have Impacts* below.
    - Recreation: See *Activities with the Potential to Have Impacts* below.
    - Airspace: Installation of new poles would not have an effect on airspace because utility poles are an average of 40 feet in height and do not intrude into useable airspace.
- Collocation on Existing Aerial Fiber Optic Plant: Installation of new fiber on existing poles would be limited to previously disturbed areas.
    - Land Use: It is anticipated that there would be no impacts to land use since the activities that would be conducted would not directly or indirectly result in changes to existing and surrounding land uses.
    - Recreation: No impacts to recreation would be anticipated since the activities that would be conducted would not cause disruption or loss of access to recreational lands or activities or the enjoyment of those lands or activities.
    - Airspace: No impacts are anticipated to airspace from collocations.
- Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting of dark fiber and installation of new equipment in existing huts.
    - Land Use: It is anticipated that there would be no impacts to land use since the activities would not directly or indirectly result in changes to existing and surrounding land uses.
    - Recreation: Use of existing dark fiber would not impact recreation because it would not impede access to recreational resources.
    - Airspace: Lighting of dark fiber would have no impacts to airspace.
- New Build – Submarine Fiber Optic Plant: Installing cables in or near bodies of water and the constructing landings and/or facilities on shore to accept submarine cable.
    - Land Use: See *Activities with the Potential to Have Impacts* below.
    - Recreation: See *Activities with the Potential to Have Impacts* below.
    - Airspace: The installation of cables in limited nearshore and inland bodies of water and construction of landings/facilities would not impact flight patterns or cause obstructions that would require FAA and/or state review based on FAR 14 CFR, Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace* (See Section 5.1.7.5, Obstructions to Airspace Considerations).
- Installation of Optical Transmission or Centralized Transmission Equipment: Installation of transmission equipment would occur in existing boxes or huts. The section below addresses potential impacts to land use, recreation resources, and airspace if deployment of new boxes, huts, or access roads is required.
    - Land Use: See *Activities with the Potential to Have Impacts* below.

        - Recreation: See *Activities with the Potential to Have Impacts* below.
        - Airspace: No impacts to airspace would be anticipated since the activities would not affect flight patterns or cause obstructions that would require FAA and/or state review based on FAR 14 CFR, Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace* (See Section 5.1.7.5, Obstructions to Airspace Considerations).

- Wireless Projects
    - Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower, structure, or building.
        - Land Use: There would be no impacts to existing and surrounding land uses. The potential addition of power units, structural hardening, and physical security measures would not impact existing or surrounding land uses.
        - Recreation: See *Activities with the Potential to Have Impacts* below.
        - Airspace: See *Activities with the Potential to Have Impacts* below.
- Deployable Technologies
    - Deployable Technologies: These technologies would be used where permanent, fixed infrastructure cannot be deployed due to a variety of factors such as the need to supplement coverage or to avoid or mitigate permanent impacts to sensitive resources or receptors.
        - Land Use: It is anticipated that there would be no impacts to existing or surrounding land uses because these technologies would be temporarily located in areas compatible with other land uses.
        - Recreation: No impacts to recreation are anticipated as deployable technologies would not affect the use or enjoyment of recreational lands.
        - Airspace: Use of land-based deployable technologies (COW, COLT, and SOW) is not expected to result in impacts to airspace, provided antenna masts do not exceed 200 feet Above Ground Level (AGL) or do not trigger any of the other FAA obstruction to airspace criteria listed in Section 5.1.7.5, Obstructions to Airspace Considerations.
- Satellites and Other Technologies
    - Satellite-Enabled Devices and Equipment: Installation of permanent equipment on existing structures and the use of portable devices that use satellite technology.
        - Land Use: It is anticipated that there would be no impacts to existing or surrounding land uses because these technologies would be temporarily located in areas compatible with other land uses.
        - Recreation: It is anticipated that there would be no impacts to recreational uses because these technologies would be temporarily deployed but would not restrict access to, or enjoyment of, recreational lands.
        - Airspace: It is anticipated that the installation of permanent equipment on existing structures and the use of portable devices that use satellite technology would not

impact airspace because those activities would not result in changes to flight patterns and airspace usage or result in obstructions to airspace.

- Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it could include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact to land use, recreation, or airspace, it is anticipated that this activity would have no impact on land use, recreation, or airspace.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to land use, recreation resources, or airspace as a result of implementation of the Preferred Alternative would encompass a range of impacts that could occur, including changes to existing and surrounding land uses. The types of infrastructure deployment activities that could be part of the Preferred Alternative and result in potential impacts to land use resources include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: Plowing (including vibratory plowing), trenching, or directional boring alongside the road in utility corridors or within public road rights-of-way.
    - Land Use: Construction activities could temporarily restrict existing and surrounding land uses at isolated locations.
    - Recreation: It is anticipated that plowing, trenching, or directional boring may cause temporary, localized restrictions to recreational land or activities, which may persist during the deployment phase. It is reasonable to anticipate that small reductions in visitation to localized areas may occur during the deployment phase.
    - Airspace: No impacts are anticipated – see previous section.
  - New Build – Aerial Fiber Optic Plant: Installing new poles and hanging cables on previously disturbed or new (undisturbed) rights-of-way or easements and the potential construction of access roads.
    - Land Use: These activities could result in term potential impacts to land uses. Construction activities could temporarily restrict existing and surrounding land uses at isolated locations. New structures, poles, or access roads on previously undisturbed rights-of-way or easements could have long-term impacts to existing and surrounding land uses. The magnitude of the impact would depend on the specific location and the compatibility of the new structures with existing and surrounding land uses.
    - Recreation: Deployment activities may cause temporary, localized restricted access to recreation land or activities, which may persist for the duration of the deployment phase. Small reductions to visitation during the deployment phase may be anticipated.
    - Airspace: No impacts are anticipated – see previous section.

- New Build – Submarine Fiber Optic Plant: Installing cables in or near bodies of water and the constructing landings and/or facilities on shore to accept submarine cable.
  - Land Use: Construction activities could temporarily restrict existing and surrounding land uses at isolated locations. New landings and/or facilities on shore could have long-term impacts to existing and surrounding land uses. The magnitude of the impact would depend on the specific location and the compatibility of the new facilities with existing and surrounding land uses.
  - Recreation: Deployment may temporarily restrict recreation on or within limited nearshore and inland bodies of water and the surrounding area during the deployment phase. Reductions in visitation may result during deployment.
  - Airspace: No impacts are anticipated – see previous section.
- Installation of Optical Transmission or Centralized Transmission Equipment: Installation of equipment including construction of new boxes, huts, or access roads.
  - Land Use: Construction activities could temporarily restrict existing and surrounding land uses at isolated locations. New boxes, huts, or access roads could have long-term impacts to existing and surrounding land uses. The magnitude of the impact would depend on the specific location and the compatibility of the new facilities with existing and surrounding land uses.
  - Recreation: Deployment of installation equipment and the construction of boxes, huts, or access roads may restrict access to recreation land or activities. Reductions in visitation during deployment may occur.
  - Airspace: No impacts are anticipated – see previous section.

- Wireless Projects
  - New Wireless Communication Towers: Installing new wireless towers, associated structures (generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads.
    - Land Use: Construction activities could temporarily restrict existing and surrounding land uses at isolated locations. New wireless towers, associated structures, or access roads could have long-term impacts to existing and surrounding land uses. The magnitude of the impact would depend on the specific location and the compatibility of the new facilities with existing and surrounding land uses.
    - Recreation: Deployment of new towers and associated structures could result in temporary, localized restricted access for recreation land or activities for the duration of the deployment phase. Reductions in visitation or duration of recreational activity may result from restricted access.
    - Airspace: Installation of new wireless towers could result in impacts to airspace if towers exceed 200 feet AGL or meets the other criteria listed in Section 5.1.7.5, Obstructions to Airspace Considerations. An OE/AAA could be required for the FAA to determine if the proposed construction does affect navigable airways or flight patterns of an airport if the aerial fiber optic plant is located in proximity to one of Idaho's airports.

- Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower.
  - Land Use: No impacts are anticipated – see previous section.
  - Recreation: Installation of antennas or microwaves to existing towers may cause temporary, localized restricted access to recreation lands or activities during installation, which may cause small reductions in visitation for the duration of installation.
  - Airspace: Collocation of mounting or installing equipment (such as antennas or microwave dishes) on an existing tower, addition of power units, structural hardening, and physical security measures could result in impacts if located near airports or air navigation facilities.

- Deployable Technologies
  - Deployable Technologies: These technologies would be used where permanent, fixed infrastructure cannot be deployed due to a variety of factors such as the need to supplement coverage or to avoid or mitigate permanent impacts to sensitive resources or receptors.
    - Land Use: No impacts are anticipated – see previous section.
    - Recreation: No impacts are anticipated – see previous section.
    - Airspace: Implementation of deployable aerial communications architecture could result in temporary or intermittent impacts to airspace. Deployment of tethered systems (such as balloons or blimps) could pose an obstruction hazard if deployed above 200 feet and near Idaho airports (See obstruction criteria in Section 5.1.7.5, Obstructions to Airspace Considerations). Potential impacts to airspace (such as SUAs and MTRs) may be possible depending on the planned use of drones, piloted aircraft, untethered balloons, and blimps (e.g., frequency of deployment, altitudes, proximity to airports and airspaces classes/types, length of deployment, etc.). Coordination with the FAA would be required to determine the actual impact and the required certifications. It is expected that FirstNet would attempt to avoid changes to airspace and the flight profiles (boundaries, flight altitudes, operating hours, etc.).

- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: The installation of permanent equipment on existing structures and the use of portable devices that use satellite technology.
    - Land Use: No impacts are anticipated – see previous section
    - Recreation: It is anticipated the installation of equipment on existing structures may cause temporary, localized restricted access to recreation lands or activities during installation, which may cause small reductions in visitation for the duration of installation.
    - Airspace: It is anticipated that the installation of permanent equipment on existing structures and the use of portable devices that use satellite technology may impact airspace if equipment creates an obstruction.

In general, the abovementioned activities could potentially involve construction activities. Potential impacts to land uses associated with deployment of this infrastructure could include temporary restrictions to existing and surrounding land uses in isolated locations. Potential impacts to recreation land and activities could include temporary, localized restricted access and reductions in visitation or duration of recreational activities. Potential impacts to airspace could include obstructions. These potential impacts are expected to be less than significant due to the temporary and small-scale nature of deployment activities. Additionally FirstNet (or its network partners), would prepare an OE/AAA for any proposed tower that might affect navigable airways or flight patterns of an airport. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned deployment impacts. It is anticipated that there would be no impacts to land use, recreation resources, or airspace associated with routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for temporary, short-term inspections because there would be no ground disturbance, no airspace activity, and no access restrictions to recreational lands. If routine maintenance or inspection activities would conflict with existing or surrounding land uses, impact recreation resources, or conflict with airspace, impacts could result as explained above.

Operation of the Deployable Technologies options of the Preferred Alternative could result in the temporary presence of deployable vehicles and equipment (including airborne equipment), potentially for up to two years in some cases. Operation activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. It is anticipated that there would be no impacts to land use, recreation resources, or airspace associated with routine inspections, assuming that the same access roads used for deployment are also used for inspections.

The degree of change in the visual environment (see Section 5.2.8, Visual Resources)—and therefore the potential indirect impact on a landowner’s ability to use or sell of their land as desired—would be highly dependent on the specific deployment location and length of deployment. Once deployment locations are known, the location would be subject to an environmental review to help ensure environmental concerns are identified. The use of deployable aerial communications architecture could temporarily add new air traffic or aerial navigation hazards. The magnitude of these effects would depend on the specific location of airborne resources along with the duration of their use; however, impacts are anticipated to be less than significant due to the short-term natures of the deployment activities. FirstNet would coordinate with the FAA to review required certifications. Chapter 9, BMPs and Mitigation

Measures, provided a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.7.5. Alternatives Impact Assessment

The following section assesses potential impacts to land use, recreation resources, and airspace associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to land use, recreation, and airspace resources as a result of implementation of this alternative could be as described below.

Deployment Impacts

As explained above, implementation of deployable technologies could result in less than significant impacts to land use. While a single deployable technology may have imperceptible impact, multiple technologies operating in close proximity for longer periods could impact existing and surrounding land uses. There could be impacts to recreation activities during the deployment of technologies if such deployment were to occur within or near designated recreation areas. Enjoyment of activities dependent upon the visibility of wildlife or scenic vistas may be affected; however, impacts would be less than significant due to the temporary nature of likely deployment activities. If deployment triggers any obstruction criterion or result in changes to flight patterns and airspace restrictions, FirstNet (or its partners) would consult with the FAA to determine how to proceed. Also, implementation of deployable technologies could result in less than significant impacts to airspace if deployment does trigger any obstruction criterion or result in changes to flight patterns and airspace restrictions. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As explained above, operation activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the Preferred Alternative, it is anticipated that there would be no impacts to land use, recreation resources, or airspace associated with routine inspections of the Deployable Technologies Alternative, assuming that the same access roads used for deployment are also used for inspections and that activities would not trigger any obstruction criterion or result in changes to flight patterns and airspace restrictions. Operation of deployable technologies would result in land use, land ownership, airspace, and recreation (access and enjoyment) similar in type to those described for the Preferred Alternative. The frequency and extent of those potential impacts would be greater than for the Proposed Action because under this Alternative, deployable technologies would be the only options available. As a result, this alternative would require a larger number of terrestrial and airborne deployable vehicles and a larger number of deployment locations in—all of which would potentially affect a larger number of properties and/or areas of airspace. Overall, these potential impacts would be less than significant due to the temporary nature of deployment activities. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed; therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure, or satellites and other technologies. As a result, there would be no impacts to land use, recreation resources, or airspace. Environmental conditions would therefore be the same as those described in Section 5.1.7, Land Use, Recreation, and Airspace.

5.2.8. Visual Resources

5.2.8.1. Introduction

This section describes potential impacts to visual resources in Idaho associated with deployment and operation of the Proposed Action and alternatives. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.8.2. Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on visual resources were evaluated using the significance criteria presented in Table 5.2.8-1. As described in Section 5.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to visual resources addressed in this section are presented as a range of possible impacts.

Table 5.2.8-1: Impact Significance Rating Criteria for Visual Resources

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than significant with BMPs and mitigation measures incorporated**	**Less than significant**	**No impact**
Adverse change in aesthetic character of scenic resources or viewsheds	Magnitude or Intensity	Fundamental and irreversibly negative change in aesthetic character.	Effect that is potentially significant, but with mitigation is less than significant.	Intermittently noticeable change in aesthetic character that is marginally negative.	No visible effects.
	Geographic Extent	Regional impacts observed throughout the state/territory.		Effects realized at one or multiple isolated locations.	No visible effects.
	Duration or Frequency	Permanent or persistent changes to aesthetic character lasting throughout or beyond the construction or deployment phase.		Persisting through the construction and deployment phase, but aesthetics of the area would be returned to original state following the construction and deployment phase.	Transient or no visible effects.
Nighttime lighting	Magnitude or Intensity	Lighting dramatically alters night-sky conditions.	Effect that is potentially significant, but with mitigation is less than significant.	Lighting alters night-sky conditions to a degree that is only intermittently noticeable.	Lighting does not noticeably alter night-sky conditions.
	Geographic Extent	Regional impacts observed throughout the state/territory.		Effects realized at one or multiple isolated locations.	No visible effects.
	Duration or Frequency	Permanent or persistent changes to night-sky conditions lasting throughout or beyond the construction or deployment phase.		Persisting through the construction and deployment phase, but lighting would be removed and night-sky conditions would be returned to original state following the construction and deployment phase.	Transient or no visible effects.

5.2.8.3. Description of Environmental Concerns

Adverse Change in Aesthetic Character of Scenic Resources or Viewsheds

A primary concern during and following construction of structures, towers, roads or other permanent features is the long-term disruption of scenery and viewsheds. In Idaho, residents and visitors travel to many national parks and forests, historic sites, and state parks, such as Yellowstone National Park and Boise National Forest. If lands considered visually significant or scenic were subject to vegetation loss or removal, short- or long-term effects to viewsheds or scenic resources could occur. Bare ground or interruption of a landscape due to vegetation removal could be considered an adverse change in the aesthetic character of scenic resources or viewsheds. New towers or structures constructed within scenic areas could disrupt the perceived aesthetic character or scenery of an area. If new towers were constructed to a height that required lighting, nighttime vistas could be affected in areas where the night skies do not have light disruptions or are within unpopulated areas.

Based on the impact significance criteria presented in Table 5.2.8-1, impacts to the aesthetic character of scenic resources or viewsheds would be considered potentially significant if landscapes were permanently removed or fragmented, or if damage to historic or cultural resources occurred. Given the small-scale of likely FirstNet activities, impacts are expected to be less than significant.

Nighttime Lighting

If new towers or facilities were constructed to a height that required lighting, nighttime vistas could be affected in areas where the night skies do not have light disruptions or are within unpopulated areas. If nighttime lighting were necessary for the operation or function of a facility that caused regional impacts or permanent changes to night sky conditions, those effects would be considered potentially significant.

Based on the impact significance criteria presented in Table 5.2.8 1, lighting that illuminates the night sky, diminishes night sky viewing over long distances, and persists over the long-term would be considered potentially significant. Although likely FirstNet actions are expected to be small-scale, certain discrete locations may experience potentially significant impacts to night skies, although potentially minimized to less than significant with implementation of BMPs and mitigation measures, as defined in Chapter 9, BMPs and Mitigation Measures. BMPs and mitigation measures, as defined through consultation with the appropriate resource agency, would be implemented.

5.2.8.4. Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment and operation activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to visual resources and others would not. In addition, and as explained in this section, the same type of Proposed Action Infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no impacts to visual resources under the conditions described below:

- Wired Projects
  - Collocation on Existing Aerial Fiber Optic Plant: While the addition of new aerial fiber optic plant to an existing aerial fiber optic transmission system would likely be visible, the change associated with this option is so small as to be essentially imperceptible. This option would involve no new nighttime lighting and pole replacement would be limited.
  - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. It is anticipated that there would be no impacts to visual resources since the activities would be conducted at small entry and exit points and are not likely to produce perceptible changes, and would not require nighttime lighting.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up of dark fiber would have no impacts to visual resources because there would be no ground disturbance, would not require nighttime lighting, and would not produce any perceptible changes.
- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: It is anticipated that the installation of permanent equipment on existing structures and the use of portable devices that use satellite technology would not impact visual resources since those activities would not require ground disturbance or vegetation removal.
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it may include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact visual resources, it is anticipated that this activity would have no impact on visual resources.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to visual resources as a result of implementation of the Preferred Alternative would encompass a range of impacts that could occur as a result of ground disturbance, vegetation removal, or installation of permanent structures if development occurs in scenic areas. The types of deployment activities that could be part of the Preferred Alternative and result in potential impacts to visual resources include the following:

- Wired Projects
    - New Build – Buried Fiber Optic Plant: Plowing (including vibratory plowing), trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber could result in potential impacts to visual resources. The degree of impact would depend on the timing, location, and type of project; installation of a hut or POP would be permanent, whereas ground disturbing activities would be short-term. In most cases, development located next to existing roadways would not affect visual resources unless vegetation were removed or excavation occurred in scenic areas.
    - New Build – Aerial Fiber Optic Plant: Construction and installation of new or replacement poles and hanging cables could result in impacts to the aesthetic character of scenic resources or viewsheds depending on the location of the installation. In most cases, development in public rights-of-ways would not affect visual resources unless vegetation were removed or construction occurred in scenic areas. If new lighting were necessary, impacts to night skies could occur. Construction of new roadways could result in linear disruptions to the landscape, surface disturbance, and vegetation removal; all of which could impact the aesthetic character of scenic resources or viewsheds, depending on the location of the installation.
    - New Build – Submarine Fiber Optic Plant: The installation of cables in or near bodies of water would not impact visual resources because there would be no local visual resources to impact. However, impacts to visual resources could potentially occur as result of the construction of landings and/or facilities on shores or the banks of water bodies that accept the submarine cable, depending on the exact site location and proximity to existing visual resources.
    - Installation of Optical Transmission or Centralized Transmission Equipment: If installation of transmission equipment required grading, vegetation removal, or other ground disturbance to install small boxes or huts, or access roads, potential impacts to visual resources could occur but effects would be temporary and localized.
- Wireless Projects
    - New Wireless Communication Towers: Installation of new wireless towers and associated structures (generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads could result in impacts to visual resources. Land/vegetation clearing, excavation activities, landscape grading, and other surface disturbing activities during the installation of new wireless towers and associated structures or access roads could result in the degradation of the aesthetic character of scenic resources or viewsheds. Impacts may be experienced by viewers if new towers were located in or near a national park unit or other sensitive area. If new towers were constructed to a height that required aviation lighting, nighttime

vistas could be impacted in areas where the night skies do not have light disruptions or are within unpopulated areas. If nighttime lighting were necessary for the operation or function of a facility, impacts to night sky conditions could occur.

- Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower and would not likely result in additional impacts to visual resources. However, if additional power units are needed, structural hardening or physical security measures required ground disturbance or removal of vegetation, impacts to the aesthetic character of scenic resources or viewsheds could occur.
- Deployable Technologies: Implementation of deployable technologies could result in potential impacts to visual resources if long-term deployment occurs in scenic areas, or if the implementation requires minor construction of staging or landing areas, results in vegetation removal, areas of surface disturbance, or additional nighttime lightning.

In general, the abovementioned activities could potentially involve land/vegetation clearing, and potential scenic intrusion of towers, poles, roads, infrastructure, and other structures. Potential impacts to visual resources associated with deployment could include interruptions of landscapes, degradation of the aesthetic character of scenic resources or viewsheds, and overall changes in valued scenic resources, particularly for permanent fixtures such as towers or facilities. These impacts are expected to be less than significant, due to the temporary and small-scale nature of deployment activities. As discussed above, potential impacts to night skies from lighting are expected to be less than significant with BMPs and mitigation measures incorporated. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned construction impacts. It is anticipated that there would be no impacts to visual resources associated with routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for inspections. Nighttime lighting in isolated rural areas or if sited near a national park would be less than significant with BMPs and mitigation measures incorporated during operations. Additionally, FirstNet would work closely with the NPS to address any concerns they might have if a tower needed to be placed in an area that might affect the nighttime sky at a NPS unit. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.8.5. Alternatives Impact Assessment

The following section assesses potential impacts to visual resources associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to infrastructure as a result of implementation of this alternative could be as described below.

Deployment Impacts

As explained above, implementation of deployable technologies could result in potential impacts to visual resources if long-term deployment occurs in scenic areas. If staging or landing areas (depending on the type of technology) require surface disturbance or vegetation clearing, or if these areas were within scenic landscapes or required new nighttime lighting, impacts could occur to the aesthetic character of scenic resources or viewsheds. These impacts are expected to be less than significant as generally they would be limited to the deployment location and could often be screened or otherwise blocked from view. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As explained above, operation activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the Preferred Alternative, it is anticipated that there would be no impacts to visual resources associated with routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for inspections. The potential visual impacts—including aesthetic conditions and nighttime lighting—of the operation of deployable technologies would be less than significant given the limited geographic scope for individual activities. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed; therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to visual resources as a result of construction and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 5.1.8, Visual Resources.

5.2.9. Socioeconomics

5.2.9.1. Introduction

This section describes potential impacts to socioeconomics in Idaho associated with deployment and operation of the Proposed Action and alternatives. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.9.2. Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on socioeconomics were evaluated using the significance criteria presented in Table 5.2.9-1. As described in Section 5.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to socioeconomics addressed in this section are presented as a range of possible impacts.

Table 5.2.9-1: Impact Significance Rating Criteria for Socioeconomics

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than significant with mitigation incorporated**	**Less than significant**	**No impact**
Impacts to real estate (could be positive or negative)	Magnitude or Intensity	Changes in property values and/or rental fees, constituting a significant market shift.	Effect that is potentially significant, but with mitigation is less than significant.	Indiscernible impact to property values and/or rental fees.	No impacts to real estate in the form of changes to property values or rental fees.
	Geographic Extent	Regional impacts observed throughout the state/territory.		Effects realized at one or multiple isolated locations.	NA
	Duration or Frequency	Persists during the life of the project.		Persists for as long as the entire construction phase or a portion of the operations phase.	NA
Changes to spending, income, industries, and public revenues	Magnitude or Intensity	Economic change that constitutes a market shift.	Effect that is potentially significant, but with mitigation is less than significant.	Indiscernible economic change.	No change to tax revenues, wages, major industries, or direct spending.
	Geographic Extent	Regional impacts observed throughout the state/ territory.		Effects realized at one or multiple isolated cities/towns.	NA
	Duration or Frequency	Persists during or beyond the life of the project.		Persists for as long as the entire construction phase or a portion of the operations phase.	NA
Impacts to employment	Magnitude or Intensity	High level of job creation at the state or territory level.	Effect that is potentially significant, but with mitigation is less than significant.	Low level of job creation at the state/territory level.	No job creation due to project activities at the state/territory level.
	Geographic Extent	Regional impacts observed throughout the state/territory.		Effects realized at one or multiple isolated cities/towns.	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	Less than significant with mitigation incorporated	Less than significant	No impact
	Duration or Frequency	Persists during the life of the project.		Persists for as long as the entire construction phase or a portion of the operations phase.	NA
Changes in population number or composition	Magnitude or Intensity	Substantial increases in population, or changes in population composition (age, race, gender).	Effect that is potentially significant, but with mitigation is less than significant.	Minor increases in population or population composition.	No changes in population or population composition.
	Geographic Extent	Regional impacts observed throughout the state or territory.		Effects realized at one or multiple isolated locations.	NA
	Duration or Frequency	Persists during the life of the project.		Persists for as long as the entire construction phase or a portion of the operations phase.	NA

NA = Not Applicable

5.2.9.3. Description of Environmental Concerns

This section discusses at a high level the types of socioeconomic impacts that could result from deployment of the NPSBN. Socioeconomic impacts could be negative or positive. Subsections below address socioeconomic impacts in four general areas, following the breakdown of the significance rating criteria in the table above:

- Impacts to Real Estate;
- Economic Benefits or Adverse Impacts related to changes in Spending, Income, Industries, and Public Revenues;
- Impacts to Employment; and
- Changes in Population Number or Composition.

In addition to the specific impacts noted below, the Proposed Action would likely have broad, beneficial impacts to all four areas in times of disaster, by improving the response of public safety personnel. Reduced damages and faster recovery would result. This would support property values; maintain corporate income, personal income, and government revenues; preserve jobs; and reduce disruptions to populations.

Impacts to Real Estate

Deployment of the NPSBN has the potential to improve property values in areas that have property values below typical market values due to below average public safety communication services. Improved services would reduce response times and improve responses (provide a better fit of the response to the need). These effects would reduce the potential for economic losses and thus support investments in property and greater market value for property. Any increases in property values are most likely in areas that have low property values and below average public safety communication services. Increases are less likely in areas that already have higher property value. As discussed in Affected Environment, property values vary across Idaho. Median values of owner-occupied housing units in the 2009–2013 period ranged from approximately $199,000 in the greater Moscow area, to just under $115,000 in the Nampa area. These figures are general indicators only. Property values are probably both higher and lower in specific localities. Any property value effects of deployment of the NPSBN would occur at a localized level.

Some telecommunications infrastructure, such as wireless communications towers, may adversely affect property values, depending on infrastructure location and other characteristics. Researchers believe these negative impacts relate to perceptions of the aesthetics of towers, or fears over electromagnetic radiation. Economists and appraisers have studied this issue and use a statistical analysis methodology known as hedonic pricing, or hedonic modelling, to assess how different attributes of properties such as distance from a tower affect property value (Bond, Sims, & Dent, 2013). Essentially, analysts compare the value of multiple properties while statistically controlling for differences in property attributes, in order to isolate the effect of a specific attribute such as proximity of a communications tower. A recent literature review examined such studies in the United States, Germany, and New Zealand (Bond, Sims, & Dent, 2013). These studies all focused on residential properties. One study identified a positive effect on price in one neighborhood due to the presence of a wireless communications tower. Most studies identified negative effects on price. Generally, these negative effects were small: an approximately two percent decrease in property price. In one case, the average reduction in price was 15 percent. In all cases, the effects declined rapidly with distance, with some cases showing no effect beyond 100 meters (328 feet) and one case showing effects up to about 300 meters (984 feet).

Based on review of the particulars of each study, the literature review authors hypothesize that many additional factors regarding communications towers, besides distance, may affect property value. These include the type, height, size, and appearance of communication towers; grouping of towers; the level of activity in the property market at the time properties are listed or sold; and the level of negative local media focus on potential health effects of communication towers at the time properties are listed or sold.

Economic Benefits or Adverse Impacts related to changes in Spending, Income, Industries, and Public Revenues

Developing the NPSBN may increase economic activity as governments and contractors make expenditures to deploy, operate, and maintain telecommunications and broadband infrastructure. Funds for such expenditures would come primarily from federal, state, and local government sources or through private entities under a written agreement with such governmental entities. FirstNet has three primary sources of funding to carry out its mission: (1) up to $7 billion in cash funded by proceeds of incentive auctions authorized by the Act; (2) network user or subscriber fees; and (3) fees from covered leasing agreements that allow FirstNet to permit a secondary users to access network capacity on a secondary basis for non-public safety services only. The use of NPSBN capacity on a secondary basis for non-public safety services, including commercial services, by parties entering into a covered leasing agreement with FirstNet may also increase economic activity and generation of income for such party.

Direct spending of federal, state, and private sector funds to deploy and operate the NPSBN would likely represent new income to businesses that provide goods and services for the network, resulting in a positive impact. This direct impact would lead to indirect impacts (as directly impacted businesses purchase supporting goods and services) and induced impacts (as the employees of all affected businesses spend the wages they have earned). Because most FirstNet infrastructure investments would be dispersed across the nation, the business income and wages generated in any particular state or community would generally be small relative to the overall state or community economy, but measurable. Based on the significance criteria above, the business income and wage impacts would be considered positive and less than significant. It is also highly unlikely that these impacts would lead to significant market shifts or other significant changes to local/regional economic structure.

Spending and income generation related to developing the NPSBN would also result in changes to public revenues. Property taxes may change as property values increase or decrease due to the installation of new infrastructure. General and selective sales taxes may change (most likely increase), reflecting expenditures during system development and maintenance. Public utility tax revenues may change. These taxes are a subcategory of selective sales taxes that includes taxes on providers of land and mobile telephone, telegraph, cable, and internet services (U.S. Census Bureau, 2006a). These service providers may obtain new taxable revenues from operation of components of the public safety broadband network. In such cases, public utility tax revenues may increase, but they could also remain the same or decrease if providers are granted tax breaks in return for operating portions of the network. Individual and corporate income taxes may change as FirstNet infrastructure development and operation creates new taxable income for involved companies and workers.

FirstNet's partner(s) be given the right to use excess NPSBN capacity commercially. This would result in additional economic activity and generation of income. In turn, this could have revenue implications for federal and state governments, through taxes on sales and on corporate income generated by commercial use of the network.

FirstNet may have an additional, non-revenue benefit to the public sector. The network is likely to create operational cost savings and increased productivity for public safety personnel.

Impacts to Employment

Private companies and government organizations that receive income from deploying and operating the NPSBN would use portions of that income to hire the employees they need to provide their support to the network. This generation of new employment could be a minor, direct, beneficial impact of expenditures on FirstNet. Additional, indirect employment increases would occur as additional businesses hire workers to provide supporting goods and services. For instance, FirstNet partner(s) and their subcontractors and vendors would need engineers and information technology professionals, project managers, construction workers, manufacturing workers, maintenance workers, and other technical and administrative staff. Further employment gains would occur as businesses throughout the economy benefit from consumer spending by wage-earners in direct and indirectly affected businesses.

For the most part, employment gains in any particular state or community would generally be measurable, but small relative to the overall state or community economy. This is because FirstNet infrastructure investments would be dispersed across the nation. Based on the significance criteria above, the employment impacts would be considered positive and less than significant. However, even small employment gains are beneficial, and would be especially welcomed in areas that have high unemployment. As discussed in Affected Environment, unemployment rates (as shown by the unemployment rate map and selected economic indicators table) vary considerably across Idaho. The average unemployment rate in 2014 was 4.8 percent, considerably lower than the national rate of 6.2 percent. Counties with unemployment rates below the national average (that is, better employment performance) were distributed throughout the southern portion of the state. Five counties in the northern part of the state, mostly along the Washington state border, also had unemployment rates below the national average. All of the counties with large population concentrations had unemployment rates below the national average. Counties in the more sparsely populated central portion of the state had unemployment rates above the national average.

Large companies that win major contracts for deploying and operating the NPSBN may have concentrations of employees in some specific locations; for instance, engineers and other system designers may be located in one or a few specific offices. While such employment concentrations could be important to specific communities, these and other employment impacts would still not be significant based on the criteria in Table 5.2.9-1 because they would not constitute a "high level of job creation at the state or territory level."

Changes in Population Number or Composition

In general, changes in population numbers occur when employment increases or decreases to a degree that affects the decisions of workers on where they can find employment; that is, when workers and their families move to or leave an area because of employment opportunities or the lack thereof. As noted above, deployment and operation of the NPSBN is likely to generate new employment opportunities (directly and indirectly), but employment changes would not be large enough in any state to be considered significant. Therefore, it is highly unlikely that the NPSBN would lead to significant changes in population numbers according to the significance criteria table above. Further, it is unlikely that the NPSBN would lead to any measurable changes in population numbers in any geographic areas, with the possible exception of cities where companies that win major NPSBN contracts establish centers for NPSBN deployment and operation activities. Smaller numbers of employees in any area would not produce measurable population changes because population is always in flux due to births, deaths, and in-migration and out-migration for other reasons.

Population composition refers to age, gender, race, ethnicity, and other characteristics of the individuals making up a population. Given the low potential for changes to population numbers, it is highly unlikely that the NPSBN would lead to any changes in population composition.

5.2.9.4. Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment and operation activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could deploy various types of facilities or infrastructure. Almost all deployment activities would have socioeconomic impacts, because they represent economic activity that would result, for instance, in expenditures and generation of income. These effects are measurable by economists, even if very small, but their significance is determined by application of the criteria in Table 5.2.9-1. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Activities Likely to Have No Impacts

- Satellites and Other Technologies
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it could include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact socioeconomics, it is anticipated that this activity would have no impact on socioeconomic resources.

Activities with the Potential to Have Impacts

Potential impacts to socioeconomics for the Preferred Alternative would encompass a range of impacts that could result from deployment activities. The discussion below summarizes how the four types of socioeconomic impacts discussed above and listed again here apply to each type of deployment activity. For greater detail on the nature of these impacts, see the Description of Environmental Concerns section above.

- Impacts to Real Estate;
- Changes to Spending, Income, Industries, and Public Revenues;
- Impacts to Employment; and
- Changes in Population Number or Composition.

Positive impacts on property values would generally not result from one or a few particular activities, but instead would result from the totality of the new NPSBN infrastructure and operational systems that enable improved public safety services to currently underserved areas. Similarly, any change to population numbers in a few locations as discussed above would result from large contract awards and contractor decisions about employee locations, not from specific deployment activities. Therefore, these types of impacts are not included in the activity-focused discussions below.

- Wired Projects
  - Use of Existing Conduit – New Buried Fiber Optic Plant: Installation of fiber optic cable in existing conduit would have the following types of socioeconomic impacts:
    - Changes to Spending, Income, Industries, and Public Revenues – Materials and labor for these projects would represent new expenditures that would generate income, help support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.
    - Impacts to Employment – Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.
  - Collocation on Existing Aerial Fiber Optic Plant: Collocation of new aerial fiber optic plant on existing utility poles and other structures would have the following types of socioeconomic impacts:

    - Changes to Spending, Income, Industries, and Public Revenues – Materials and labor for these projects would represent new expenditures that would generate income, help support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.
    - Impacts to Employment – Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.
- Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting of dark fiber would be conducted electronically through existing infrastructure, and would have the following types of socioeconomic impacts:
    - Changes to Spending, Income, Industries, and Public Revenues – Labor for these projects would represent new expenditures that would generate income, help support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.
    - Impacts to Employment – Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.
- New Build – Submarine Fiber Optic Plant: The installation of cables in or near bodies of water , and associated onshore activities at existing or new facilities would have the following types of socioeconomic impacts:
    - Changes to Spending, Income, Industries, and Public Revenues – Materials and labor for these projects would represent new expenditures that would generate income, help support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.
    - Impacts to Employment – Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.
- Installation of Optical Transmission or Centralized Transmission Equipment: Installation of transmission equipment through existing or new boxes or huts would have the following types of socioeconomic impacts:
    - Changes to Spending, Income, Industries, and Public Revenues – Materials and labor for these projects would represent new expenditures that would generate income, help support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.
    - Impacts to Employment – Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.
- New Build – Buried Fiber Optic Plant: New fiber optic cable installation usually requires construction activities and would have the following types of socioeconomic impacts:
    - Changes to Spending, Income, Industries, and Public Revenues – Materials and labor for these projects would represent new expenditures that would generate income, help

support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.

    - Impacts to Employment – Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.

  - New Build – Aerial Fiber Optic Plant: Pole/structure installation would have the following types of socioeconomic impacts:

    - Changes to Spending, Income, Industries, and Public Revenues – Materials and labor for these projects would represent new expenditures that would generate income, help support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.

    - Impacts to Employment – Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.

- Wireless Projects

  - New Wireless Communication Towers: Installation of new wireless towers and associated structures, such as generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads, or access roads would have the following types of socioeconomic impacts:

    - Impacts to Real Estate – As discussed above, communication towers sometimes have adverse impacts on nearby property values (Bond, Sims, & Dent, 2013). Such impacts, if they occur, would be limited to a small area around each project and would generally be a small percentage reduction in property value; thus the impacts would be less than significant.

    - Changes to Spending, Income, Industries, and Public Revenues- Materials and labor for these projects would represent new expenditures that would generate income, help support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.

    - Impacts to Employment - Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.

  - Collocation on Existing Wireless Tower, Structure, or Building: Collocation would include mounting or installing equipment (such as antennas) on an existing facility would have the following types of socioeconomic impacts. While communication towers sometimes have adverse impacts on nearby property values (Bond, Sims, & Dent, 2013), the impacts of existing wireless towers are presumably already factored into property values and would not be affected by the addition of new equipment.

  - Changes to Spending, Income, Industries, and Public Revenues – Materials and labor for these projects would represent new expenditures that would generate income, help support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.

- Impacts to Employment – Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.
- Deployable Technologies: COWs, COLTs, and SOWs and aerial deployable technologies require storage, staging, and (for aerial deployables) launch/landing areas. Development of such areas, or enlargement of existing areas to accommodate FirstNet equipment, would have the following types of socioeconomic impacts:
- Impacts to Real Estate – It is possible that development or enlargement of storage, staging, and launch/landing areas could have adverse impacts on nearby property values. This is because such facilities may have adverse aesthetic aspects (e.g., large areas of pavement and large numbers of parked vehicles), equipment maintenance activities at such facilities may generate noise, and operational activities may generate traffic. Such factors could affect nearby property values. These impacts, if they occur, would occur within a limited distance of each site, and would be limited to a relatively small number of sites within the region and state. Therefore, these impacts would be less than significant.
- Changes to Spending, Income, Industries, and Public Revenues – Materials and labor for these projects would represent new expenditures that would generate income, help support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.
- Impacts to Employment – Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.

- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: It is anticipated that the deployment of such devices and equipment would be similar to collocation of wireless equipment on existing wireless towers, structures, or buildings, and would have the following types of socioeconomic impacts.
  - Changes to Spending, Income, Industries, and Public Revenues – Materials and labor for these projects would represent new expenditures that would generate income, help support industries, and may generate public revenues. All such effects would be small in scale relative to the regional and state economy and of limited duration; their impacts would be less than significant.
  - Impacts to Employment – Similarly, expenditures for these projects would generate temporarily a less than significant number of jobs regionally and statewide.

In general, the abovementioned activities would have less than significant beneficial socioeconomic impacts. The discussion above characterized the impacts of each type of activity. The socioeconomic impacts of all activities considered together would also be less than significant. Even when considered together, the impacts would be very small relative to the total economic activity and property value of any region or the state. In addition, with the possible exception of property values, all deployment impacts would be limited to the construction phase. To the extent that certain activities could have adverse impacts to property values, those impacts are also expected to be less than significant, as described above. Chapter 9, BMPs and

Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

Activities with the Potential to Have Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Preferred Alternative would consist of primarily of routine maintenance and inspection of fixed infrastructure. As with deployment activities, all operational activities would have socioeconomic impacts, because all represent economic activity. All operational activities would be conducted by public or private sector employees, and therefore support employment and involve payment of wages. Even if these economic effects are a very small for each operational activity, and not significant across the entire state, they are measurable socioeconomic impacts.

Potential socioeconomic impacts would primarily be beneficial, and generally of these types:

- Changes to Spending, Income, Industries, and Public Revenues – Operational activities would require expenditures, which then generate business income and employee wages, and may result in new public sector revenues such as taxes on sales and income. All such effects would be small in scale relative to the regional and state economy; their impacts would be less than significant.
- Impacts to Employment – Public and private sector organizations responsible for operating the NPSBN would sustain existing employees and/or hire new employees to carry out operational activities. They would generate a less than significant number of jobs regionally and statewide.

The potential negative impacts on property values mentioned above for deployment of new wireless communication towers and deployable technology storage, staging, and launch/landing areas may also apply in the operations phase. The ongoing presence of such facilities has aesthetic and other effects that may reduce nearby property values, relative to values in the absence of such facilities. These impacts, if they occur, would be less than significant as they would occur within a limited distance of each site, and would be limited to a relatively small number of sites within the region and state. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.9.5. Alternatives Impact Assessment

The following section assesses potential impacts to socioeconomics associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred

Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to socioeconomics resulting from implementation of this alternative could be as described below.

Deployment Impacts

As explained above, all deployment activities represent economic activity and thus have socioeconomic impacts. These impacts would primarily be beneficial, such as generation of business income and employee wages, and creation or sustainment of jobs. The impacts would be small for each activity, although less than significant based on the significance criteria table. Impacts are anticipated to be less than significant due to the limited extent and temporary nature of the deployment.

Deployable technologies such as COWs, COLTs, and SOWs, along with aerial deployable technologies, would require storage, staging, and launch/landing areas. Development or enlargement of these facilities could have adverse impacts on nearby property values. The potential for such impacts is higher under this alternative than the Preferred Alternative because it is likely that these facilities would be implemented in greater numbers and over a larger geographic extent. The potential adverse impacts of new wireless communication towers on property values would be avoided under the Deployable Technologies Alternative. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

All operational activities represent economic activity and thus have socioeconomic impacts. These impacts would primarily be beneficial, and because they are small individually, overall impacts would be less than significant at the programmatic level. Impacts are anticipated to be less than significant due to the limited extent and temporary nature of the deployment.

The ongoing presence of facilities for housing and maintaining deployable technologies may have adverse aesthetic aspects (e.g., large areas of pavement and large numbers of parked vehicles) or other aspects (e.g., noise and traffic) that could negatively affect the value of surrounding properties. The potential for such impacts is higher under this alternative than the Preferred Alternative because it is likely that these facilities would be more numerous, present over a larger geographic extent, and used with greater frequency and duration. These impacts, if they occur, would be less than significant as they would be limited to a relatively small number of sites within the region and state. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed. Therefore, there would be no associated deployment or installation activities to deploy wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to socioeconomics from deployment and operation of the No Action Alternative. Socioeconomic conditions would therefore be the same as those described in Section 5.1.9, Socioeconomics.

5.2.10. Environmental Justice

5.2.10.1. Introduction

This section describes potential impacts to environmental justice in Idaho associated with deployment and operation of the Proposed Action and alternatives. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.10.2. Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on environmental justice were evaluated using the significance criteria presented in Table 5.2.10-1. As described in Section 5.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to environmental justice addressed in this section are presented as a range of possible impacts.

Table 5.2.10-1: Impact Significance Rating Criteria for Environmental Justice

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than significant with BMPs and mitigation measures incorporated**	**Less than significant**	**No impact**
Effects associated with other resource areas (e. g., human health and safety, cultural resources, socioeconomics) that have a disproportionately high and adverse impact on low-income populations and minority populations	Magnitude or Intensity	Direct and disproportionately high and adverse effects on environmental justice communities (as defined by EO 12898) that cannot be fully mitigated.	Effect that is potentially significant, but with mitigation is less than significant.	Direct effects on environmental justice communities (as defined by EO 12898) that are not disproportionately high and adverse, and therefore do not require mitigation.	No direct effects on environmental justice communities, as defined by EO 12898.
	Geographic Extent	Effects realized within counties at the Census Block Group level.		Effects realized within counties at the Census Block Group level.	Effects realized within counties at the Census Block Group level.
	Duration or Frequency	Persists during the life of the project.		Persists for as long as the entire construction phase or a portion of the operations phase.	NA

NA = Not Applicable

5.2.10.3. Description of Environmental Concerns

Effects associated with other Resource Areas that have a Disproportionately High and Adverse Impact on Low-Income Populations and Minority Populations

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (Executive Office of the President, 1994), and guidance from CEQ, require federal agencies to evaluate potential human health and environmental effects on environmental justice populations. Specifically, "Such effects may include ecological, cultural, human health, economic, or social impacts on minority communities, low-income communities, or Indian tribes when those impacts are interrelated to impacts on the natural or physical environment" (CEQ, 1997b). Thus, effects associated with other resource areas are of interest from an environmental justice perspective. This includes Human Health and Safety, Cultural Resources, Socioeconomics, Noise, Aesthetics and Visual Resources, and other resources.

Potential concerns noted in the impact analyses for these resources include dust, noise, traffic, and other adverse impacts of construction activities. New wireless communication towers sometimes have adverse impacts on nearby property values (Bond, Sims, & Dent, 2013). See Socioeconomics Environmental Consequences for additional discussion. The presence and operation of large storage, staging, and launch/landing areas for deployable technologies could raise environmental justice concerns as described below. American Indian tribes are considered environmental justice populations (CEQ, 1997b); thus, impacts on tribal cultural resources (for instance, due to construction) could be a concern from an environmental justice perspective.

Impacts are considered environmental justice impacts only if they are *both* "adverse" and "disproportionately high" in their incidence on environmental justice populations relative to the general population (CEQ, 1997b). The focus in environmental justice impact assessments is always, by definition, on adverse effects. However, telecommunications projects, such as those proposed by FirstNet, could have beneficial effects. These effects may include better provision of police, fire, and emergency medical services; improvements in property values; and the generation of jobs and income. These impacts are considered in the Socioeconomics Environmental Consequences (Section 5.2.9).

Construction impacts are localized, and property value impacts of wireless telecommunications projects rarely extend beyond 300 meters (984 feet) of a communications tower (Bond, Sims, & Dent, 2013). In addition, impacts related to deployment are of short duration. The potential for significant environmental justice impacts from the FirstNet deployment activities would be limited. Most, but not all, of the FirstNet operational activities have very limited potential for impacts as these activities are limited in scale and short in their duration.

Before FirstNet deploys projects, additional site-specific analyses to identify specific environmental justice populations and assess specific impacts on those populations may be necessary. Such analyses could tier-off the methodology and results of this PEIS. The areas shown in the environmental justice screening map of Affected Environment (Section 5.1.10.4) as having moderate potential or high potential for environmental justice populations would particularly warrant further screening. As discussed in Section 5.1.10.3, Environmental Setting:

Minority and Low-Income Populations, Idaho's population has low percentages of all minority groups. The state has a poverty rate lower than the region's rate and similar to the nation's rate. Idaho has many areas with high potential for environmental justice populations. The distribution of these high potential areas is fairly even across the state, but high potential areas are somewhat more prevalent in the southwest portion of the state. High potential areas occur both within and outside of the 10 largest population concentrations. The distribution of areas with moderate potential for environmental justice populations is also fairly even across the state. Further analysis using the data developed for the screening analysis in Section 5.1.10.4, Environmental Justice Screening Results, may be useful. In addition, USEPA's EJSCREEN tool and USEPA's lists of environmental justice grant and cooperative agreement recipients may help identify local environmental justice populations (USEPA, 2015d; USEPA, 2016i).

A site-specific analysis would also evaluate whether an actual environmental justice impact on those populations would be likely to occur. Analysts could use the evaluation presented below under "Activities with the Potential to Have Impacts" as a starting point. Analysts should bear in mind that any such activities that are problematic based on the adverse impact criterion of environmental justice might also have beneficial impacts on those same environmental justice communities.

5.2.10.4. Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment and operation activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could deploy various types of facilities or infrastructure. Depending on the physical nature and location of FirstNet facilities or infrastructure and the specific action, some activities would result in potential impacts to environmental justice communities and others would not. In addition, and as explained in this section, the same type of proposed action infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no impacts to environmental justice under the conditions described below:

- Wired Projects
    - Use of Existing Conduit – New Buried Fiber Optic Plant: Installation of fiber optic cable in existing conduit would be through existing hand holes, pulling vaults, junction boxes, huts, and POP structures. Activities at these small entry points would be limited and temporary and thus are not likely to produce perceptible changes affecting any

surrounding communities. Therefore, they would not affect environmental justice communities.

- Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting of dark fiber would be conducted electronically through existing infrastructure, and therefore would have no impacts to environmental justice. If physical access is required to light dark fiber, it would likely be through existing hand holes, pulling vaults, junction boxes, huts, and similar existing structures, with no resulting impacts on environmental justice communities.

- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: It is anticipated that the deployment of such devices and equipment not involve new ground disturbance, impacts to environmental justice communities would not occur. Impacts associated with satellite-enabled devices requiring construction activities are addressed below.
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it could include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact environmental justice, it is anticipated that this activity would have no impact on environmental justice.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to environmental justice for the Preferred Alternative would encompass a range of impacts that could occur as a result of disturbance to communities from construction activities, such as noise, dust, and traffic. The types of infrastructure deployment activities that could be part of the Preferred Alternative and result in potential impacts to environmental justice communities include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: New fiber optic cable installation usually requires construction activities such as trenching, plowing (including vibratory plowing), or directional boring, as well as construction of hand holes, pulling vaults, junction boxes, huts, and POP structures. These activities could temporarily generate noise and dust, or disrupt traffic. If such impacts occur disproportionately to environmental justice communities, they would be considered environmental justice impacts.
  - New Build – Aerial Fiber Optic Plant: Pole/structure installation could temporarily generate noise and dust, or disrupt traffic. If these effects occur disproportionately in environmental justice communities, they would be considered environmental justice impacts.
  - New Build – Submarine Fiber Optic Plant: The installation of cables in or near bodies of water would not impact environmental justice resources because there would be no local environmental justice resources to impact. However, impacts to environmental justice resources could potentially occur as result of the construction of landings and/or facilities on shores or the banks of water bodies that accept the submarine cable, depending on the exact site location and proximity to existing environmental justice resources.

- Installation of Optical Transmission or Centralized Transmission Equipment: If installation of transmission equipment would occur in existing boxes or huts, there would be no adverse impacts on surrounding communities, and thus no potential for environmental justice impacts. Installation of optical transmission equipment or centralized transmission equipment requiring construction of new utility poles, hand holes, pulling vaults, junction boxes, huts, and POP structures could temporarily generate noise and dust, or disrupt traffic. If these effects occur disproportionately in environmental justice communities, they would be considered environmental justice impacts.

- Wireless Projects
  - New Wireless Communication Towers: Installation of new wireless towers and associated structures, such as generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads, or access roads requires construction activities that could temporarily generate noise and dust, or disrupt traffic. New communication towers sometimes have adverse impacts on nearby property values (Bond, Sims, & Dent, 2013) (See Socioeconomics Environmental Consequences for additional discussion.). If these effects occur disproportionately in environmental justice communities, they would be considered environmental justice impacts.
  - Collocation on Existing Wireless Tower, Structure, or Building: Collocation would include mounting or installing equipment (such as antennas) on an existing facility. This activity would be small in scale, temporary, and highly unlikely to produce adverse human health or environmental impacts on the surrounding community. Thus, it would not impact environmental justice communities. If collocation requires construction for additional power units, structural hardening, and physical security measures, the construction activity could temporarily generate noise and dust and disrupt traffic. If these effects occur disproportionately in environmental justice communities, they would be considered environmental justice impacts.
  - Deployable Technologies: COWs, COLTs, and SOWs and aerial deployable technologies require storage, staging, and (for aerial deployables) launch and landing areas. To the extent such areas require new construction, noise and dust could be temporarily generated, and traffic could be disrupted. If these effects occur disproportionately in environmental justice communities, they would be considered environmental justice impacts.

In general, the impacts from the above-mentioned activities would be short-term and could potentially involve objectionable dust, noise, traffic, or other localized impacts due to construction activities. In some cases, these effects and aesthetic effects could potentially impact property values, particularly from new towers. These impacts are expected to be less than significant, but are problematic from an environmental justice perspective if they occur disproportionately in environmental justice communities. Since environmental justice impacts occur at the site-specific level, analyses of individual proposed projects would help determine potential impacts to specific environmental justice communities. BMPs and mitigation measures may be required to address potential impacts to environmental justice communities at the site-specific level. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

Activities Likely to Have No Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Preferred Alternative would consist of primarily of routine maintenance and inspection of fixed infrastructure. It is anticipated that such activities would not result in environmental justice impacts, as the intensity of these activities would be low (low potential for objectionable effects such as noise and dust) and their duration would be very short. Routine maintenance and inspection would not adversely affect property values, for the same reasons.

Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned deployment activities that involve construction.

Impacts are expected to be less than significant given the short-term nature and limited geographic scope for individual activities. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.10.5. Alternatives Impact Assessment

The following section assesses potential impacts to environmental justice associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to environmental justice communities resulting from implementation of this alternative could be as described below.

Deployment Impacts

As explained above, deployable technologies such as COWs, COLTs, and SOWs, along with aerial deployable technologies, could require storage, staging, and launch/landing areas. To the extent such areas require new construction, noise and dust could be generated temporarily, and traffic could be disrupted. If these effects occur disproportionately in environmental justice communities, they would be considered environmental justice impacts. Impacts are expected to be less than significant because they would be temporary in nature. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

The ongoing presence of facilities for housing and maintaining deployable technologies may have adverse aesthetic aspects (e.g., large areas of pavement and large numbers of parked vehicles) that could negatively affect the value of surrounding properties. In addition, equipment maintenance activities at such facilities may temporarily generate noise, and operational activities may generate traffic. These effects may be adverse in themselves, and may impact property values. If these effects occur disproportionately in environmental justice communities, they would be considered environmental justice impacts. Impacts are expected to be less than significant as operations are expected to be temporary in nature. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed. Therefore, there would be no associated construction or installation activities to deploy wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to environmental justice as a result of deployment and operation of the No Action Alternative. Environmental conditions would therefore be the same as those described in Section 5.1.10, Environmental Justice.

5.2.11. Cultural Resources

5.2.11.1. Introduction

This section describes potential impacts to cultural resources in Idaho associated with deployment and operation of the Proposed Action and alternatives. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.11.2. Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on cultural resources were evaluated using the significance criteria presented in Table 5.2.11-1. As described in Section 5.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to cultural resources addressed in this section are presented as a range of possible impacts.

Table 5.2.11-1: Impact Significance Rating Criteria for Cultural Resources

Type of Effect	Effect Characteristics	Impact Level			
		Adverse effect	**Mitigated adverse effect[a]**	**Effect, but not adverse**	**No effect**
Physical damage to and/or destruction of historic properties[b]	Magnitude or Intensity	Effects to a contributing portion of a single or many historic properties.	Adverse effect that has been procedurally mitigated through Section 106 process.	Effects to a non-contributing portion of a single or many historic properties.	No direct effects to historic properties.
	Geographic Extent	Direct effects APE.		Direct effects APE.	Direct effects APE.
	Duration or Frequency	Permanent direct effects to a contributing portion of a single or many historic properties.		Permanent direct effects to a non-contributing portion of a single or many historic properties.	No direct effects to historic properties.
Indirect effects to historic properties (i.e., visual, noise, vibration, atmospheric)	Magnitude or Intensity	Effects to a contributing portion of a single or many historic properties.	Adverse effect that has been procedurally mitigated through Section 106 process.	Effects to a contributing or non-contributing portion of a single or many historic properties.	No indirect effects to historic properties.
	Geographic Extent	Indirect effects APE.		Indirect effects APE.	Indirect effects APE.
	Duration or Frequency	Long-term or permanent indirect effects to a single or many historic properties.		Infrequent, temporary, or short- or long-term or permanent indirect effects to a single or many historic properties.	No indirect effects to historic properties.
Loss of character defining attributes of historic properties	Magnitude or Intensity	Effects to a contributing portion of a single or many historic properties.	Adverse effect that has been procedurally mitigated through Section 106 process.	Effects to a non-contributing portion of a single or many historic properties.	No direct or indirect effects to historic properties.
	Geographic Extent	Direct and/or indirect effects APE.		Direct and/or indirect effects APE.	Direct and/or indirect effects APE.

Type of Effect	Effect Characteristics	Impact Level			
		Adverse effect	**Mitigated adverse effect[a]**	**Effect, but not adverse**	**No effect**
	Duration or Frequency	Long-term or permanent loss of character defining attributes of a single or many historic properties.		Infrequent, temporary, or short-term changes to character defining attributes of a single or many historic properties.	No direct or indirect effects to historic properties.
Loss of access to historic properties	Magnitude or Intensity	Effects to a contributing portion of a single or many historic properties.	Adverse effect that has been procedurally mitigated through Section 106 process.	Effects to a non-contributing portion of a single or many historic properties.	No segregation or loss of access to historic properties.
	Geographic Extent	Any area surrounding historic properties that would cause segregation or loss of access to a single or many historic properties.		Any area surrounding historic properties that could cause segregation or loss of access to a single or many historic properties.	No segregation or loss of access to historic properties.
	Duration or Frequency	Long-term or permanent segregation or loss of access to a single or many historic properties.		Infrequent, temporary, or short-term changes in access to a single or many historic properties.	No segregation or loss of access to historic properties.

[a] Whereas mitigation measures for other resources discussed in this PEIS may be developed to achieve an impact that is "Less than Significant with Mitigation Incorporated," historic properties are considered to be "non-renewable resources," given their very nature. As such, any and all unavoidable adverse effects to historic properties, per Section 106 of the NHPA (as codified in 36 CFR Part 800.6), would require FirstNet to consult with the SHPO/THPO and other consulting parties, including American Indian tribes and Native Hawaiian Organizations, to develop appropriate mitigation.

[b] Per NHPA, a "historic property" is defined as any district, archaeological site, building, structure, or object that is either listed or eligible for listing in the NRHP. Cultural resources present within a project's APE are not historic properties if they do not meet the eligibility requirements for listing in the NRHP. Sites of religious and/or cultural significance refer to areas of concern to Indian tribes and other consulting parties that, in consultation with the respective party(ies), may or may not be eligible for listing in the NRHP. These sites may also be considered TCPs. Therefore, by definition, these significance criteria only apply to cultural resources that are historic properties, significant sites of religious and/or cultural significance, or TCPs. For the purposes of brevity, the term historic property is used here to refer to either historic properties, significant sites of religious and/or cultural significance, or TCPs.

5.2.11.3. Description of Environmental Concerns

Physical Damage to and/or Destruction of Historic Properties

One of the primary environmental concerns during deployment activities is damage to or destruction of historic and cultural resources. Deployment involving ground disturbance has the potential to damage or destroy archaeological sites, and the attachment of communications equipment to historic building and structures has the potential to cause damage to features that are historically significant.

Based on the impact significance criteria presented in Table 5.2.11-1, direct deployment impacts could be potentially significant if FirstNet's deployment locations were in areas with moderate to high probabilities for archaeological deposits, within historic districts, or at historic properties. To the extent practicable, FirstNet would attempt to minimize activities in areas with archaeological deposits or within historic districts. However, given archaeological sites and historic properties are present throughout Idaho, some deployment activities may be in these areas, in which case BMPs (see Chapter 9) would help avoid or minimize the potential impacts.

Indirect Effects to Historic Properties (i.e., visual, noise, vibration, atmospheric)

The potential for indirect effects to historic properties would be present during deployment of the proposed facilities/infrastructure and during trenching, grading, and/or foundation excavation activities. Indirect effects include the introduction of visual, noise, atmospheric, and/or vibration effects that diminish a property's historic integrity. The greatest likelihood of potentially significant impacts from indirect effects would be from the deployment of equipment in areas that would cause adverse visual effects to historic properties. To the extent practicable, FirstNet would attempt to minimize activities in areas within or adjacent to historic districts or properties.

Loss of Character Defining Attributes of Historic Properties

Deployment of FirstNet equipment has the potential to cause the loss of character defining attributes of historic properties; such attributes are the features of historic properties that define their NRHP eligibility. Examples of such impacts would be the loss of integrity of archaeological sites through ground disturbing activities, and direct impacts to historic buildings from equipment deployment that adversely alter historic architectural features. Significant impacts such as these could be avoided or minimized through BMPs (see Chapter 9).

Loss of Access to Historic Properties

The deployment of equipment requiring a secure area has the potential to cause the loss of access to historic properties. The highest potential for this type of significant impact would be from the deployment of equipment in secure areas that impact the access to sites of cultural importance to American Indians. It is anticipated that FirstNet would identify potential impacts to such areas through the NHPA consultation process, and would minimize deployment activities that would cause such loss of access.

5.2.11.4. Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment and operation activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to cultural resources, while others would not. In addition, and as explained in this section, the same type of Proposed Action Infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no impacts to cultural resources under the conditions described below:

- Wired Projects
    - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. It is anticipated that there would be no impacts to cultural resources since the activities that would be conducted at these small entry and exit points are not likely to produce impacts.
    - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up of dark fiber would have no impacts to cultural. If required, and if done in existing huts with no ground disturbance, installation of new associated equipment would also have no impacts to cultural resources because there would be no ground disturbance and no perceptible visual changes.
- Satellites and Other Technologies
    - Satellite-Enabled Devices and Equipment: It is anticipated that the installation of permanent equipment on existing structures and the use of portable devices that use satellite technology would not impact cultural resources because those activities would not require ground disturbance or create perceptible visual effects.
    - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it could include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact cultural resources, it is anticipated that this activity would have no impact on cultural resources.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to cultural resources as a result of implementation of the Preferred Alternative would encompass a range of impacts that could occur as a result of ground disturbance activities, including destruction of cultural or historic artifacts. The types of infrastructure deployment activities that could be part of the Preferred Alternative and result in potential impacts to cultural resources include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: Plowing (including vibratory plowing), trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber could result in potential impacts to cultural resources. Soil disturbance and heavy equipment use associated with plowing, trenching, or directional boring as well as land/vegetation clearing, excavation activities, and landscape grading associated with construction of POPs, huts, or other associated facilities or hand-holes to access fiber could result in the disturbance of archaeological sites, and the associated structures could have visual effects on historic properties.
  - New Build – Aerial Fiber Optic Plant: Ground disturbance during the installation of new utility poles and the use of heavy equipment during the installation of new utility poles and hanging of cables could result in the disturbance of archaeological sites, and the associated structures could have visual effects on historic properties.
  - New Build – Submarine Fiber Optic Plant: The installation of cables in or near bodies of water would not impact cultural resources because there would be no local cultural resources to impact. However, impacts to cultural resources could potentially occur as result of the construction of landings and/or facilities on shores or the banks of water bodies that accept the submarine cable, which could result in the disturbance of archaeological sites (archaeological deposits are frequently associated with bodies of water), depending on the exact site location and proximity to existing cultural resources.
  - Installation of Optical Transmission or Centralized Transmission Equipment: If installation of transmission equipment would occur in existing boxes or huts and require no ground disturbance, there would be no impacts to cultural resources. If installation of transmission equipment required grading or other ground disturbance to install small boxes or huts, or access roads, there could potentially be impacts to cultural resources. Ground disturbance could impact archaeological sites, and the associated structures could have visual effects on historic properties.
  - Collocation on Existing Aerial Fiber Optic Plant: Soil excavation and excavated material placement during the replacement of poles and structural hardening could result in direct and indirect effects to cultural resources, although any effects to access would be short-term. Heavy equipment use associated with these activities as well as with installing new fiber on existing poles could result in direct and indirect effects to cultural resources.
- Wireless Projects
  - New Wireless Communication Towers: Deployment of new wireless towers and associated structures (generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads could result

in impacts to historic properties. Land/vegetation clearing, excavation activities, landscape grading, and other ground disturbance activities during the deployment of new wireless towers and associated structures or access roads, could result in the disturbance of archaeological sites. The deployment of new wireless communication towers and their associated structures could result in visual impacts to historic properties or the loss of access to historic properties.

- Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower could result in impacts to historic properties. Ground disturbance activities could result in the disturbance of archaeological sites, and the deployment of collocated equipment could result in visual impacts or physical damage to historic properties, especially in urban areas such as Boise that have larger numbers of historic public buildings.
- Deployable Technologies: Implementation of deployable technologies could result in potential impacts to cultural resources if deployment occurs in unpaved areas, or if the implementation results in paving of previously unpaved surfaces. In addition, impacts to historic properties could occur if the deployment is long-term, or if the deployment involves aerial technologies with the potential for visual or other indirect impacts.

In general, the abovementioned activities could potentially involve ground disturbance, construction of access roads and other impervious surfaces, landscape grading, and heavy equipment movement. Potential impacts to cultural resources associated with deployment could include physical damage to or destruction of historic properties, indirect impacts including visual effects, the loss of access to historic properties, or the loss of character-defining features of historic properties. These activities could affect, but not adversely affect, cultural resources as the potential adverse effects would be temporary and limited to the area near individual Proposed Action deployment site. Additionally, some equipment proposed to be installed on or near properties that are listed or eligible for listing on the NRHP could potentially be removed. Additionally as appropriate, FirstNet would engage in consultation as required under Section 106 of the NHPA. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major communications infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned deployment impacts. It is anticipated that there would be no effect to cultural resources associated with routine inspections of the Preferred Alternative. If usage of heavy equipment as part of routine maintenance or inspections occurs off established access roads or corridors, or if the acceptable load of the surface is exceeded, ground disturbance impacts on archaeological sites could result as explained above. These potential impacts would be associated with ground disturbance or modifications of properties, however, due to the small scale of expected activities, these actions could affect but would not likely adversely affect, cultural resources. In the event that maintenance and inspection activities occur off existing roads, FirstNet would engage in consultation as required under Section 106 of the NHPA. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.11.5. Alternatives Impact Assessment

The following section assesses potential impacts to cultural resources associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to cultural resources as a result of implementation of this alternative could be as described below.

Deployment Impacts

As explained above, implementation of deployable technologies could result in impacts to cultural resources if deployment occurs in unpaved areas, or if the implementation results in paving of previously unpaved surfaces. Some staging or landing areas (depending on the type of technology) may require land/vegetation clearing, excavation, and paving. These activities could result in impacts to archaeological sites. These activities could affect, but not adversely affect, cultural resources due to the limited amount of expected ground disturbing activities and the short-term nature of deployment activities. However, in the event that land/vegetation clearing is required, FirstNet would engage in consultation as required under Section 106 of the NHPA. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As explained above, operation activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the deployment impacts, it is anticipated that there would be effects, but no adverse effects to historic properties associated with implementation/running of the deployable technology. No adverse effects would be expected to either site access or viewsheds due to the temporary nature of expected activities.

As with the Preferred Alternative, it is anticipated that there would be no effects to cultural resources associated with routine inspections of the Preferred Alternative, assuming that the same access roads used for deployment are also used for inspections. If usage of heavy equipment as part of routine maintenance or inspections occurs off established access roads or corridors, impacts to archaeological sites could occur, however, in the event that this is required, FirstNet would engage in consultation as required under Section 106 of the NHPA. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed; therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to cultural resources as a result of deployment and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 5.1.11, Cultural Resources.

5.2.12. Air Quality

5.2.12.1. Introduction

This section describes potential impacts to Idaho's air quality from deployment and operation of the Proposed Action and alternatives. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.12.2. Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on Idaho's air quality were evaluated using the significance criteria presented in Table 5.2.12-1. As described in Section 5.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to Idaho's air quality addressed in this section are presented as a range of possible impacts.

Table 5.2.12-1: Impact Significance Rating Criteria for Air Quality

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than significant with mitigation incorporated**	**Less than significant**	**No impact**
Increased air emissions	Magnitude or Intensity	Pollutant concentrations would exceed one or more NAAQS in nonattainment and maintenance areas. Emissions in attainment areas would cause an area to be out of attainment for any NAAQS. Projects do not conform to the SIP covering nonattainment and maintenance areas.	Effect that is potentially significant, but with mitigation is less than significant.	Negligible emissions would occur for any criteria pollutants within an attainment area but would not cause a NAAQS exceedance.	Action would not cause pollutant concentrations to exceed the NAAQS in nonattainment and maintenance areas. Emissions in attainment areas would not cause air quality to go out of attainment for any NAAQS. Projects are *de minimis* or conform to the SIP covering nonattainment and maintenance areas.
	Geographic Extent/Context	NA		NA	NA
	Duration or Frequency	Permanent or long-term.		Short term.	Temporary.

NA = Not Applicable

5.2.12.3. Description of Environmental Concerns

Increased Air Emissions

The Proposed Action has the potential to generate air pollutant emissions. These emissions could be above and beyond what is typically generated in a given area and may alter ambient air quality. Deployment activities may involve the use of vehicles, heavy equipment, and other equipment that could emit exhaust and create fugitive dust in localized areas. During operations, routine maintenance and other use of generators at tower facilities may emit exhaust for specific durations (maintenance) or unpredictable timeframes (if power is lost to a site, for example). Impacts are likely to be less than significant due to the mobile nature of the sources and the temporary and short-term duration of deployment activities. Although unlikely, the emissions of criteria pollutants could impair the air quality of the region and potentially affect human health. Potential impacts to air quality from emissions may occur in areas where the current air quality exceeds, or has a history of exceeding, one or more NAAQS. Areas exist in Idaho that are in maintenance or nonattainment for one or more criteria pollutants (see Section 5.1.12, Air Quality and Figure 5.1.12-1). The majority of the counties in Idaho are designated as maintenance areas for one or more of the following pollutants: CO and PM (Table 5.1.12-4); one county in southwest Idaho is designated nonattainment or maintenance for two NAAQS pollutants (and Figure 5.1.12-1).

Based on the significance criteria presented in Table 5.2.12-1, air emissions impacts would likely be less than significant given the size and nature of the majority of the proposed deployment activities. The majority of FirstNet's deployment activities would not be located in sensitive areas nor would a large number of emission sources be deployed/operated long-term in the same area from fixed or mobile sources or construction activities. Less than significant emissions could occur for any of the criteria pollutants within attainment areas in Idaho; however, NAAQS exceedances are not anticipated. Given that nonattainment areas are present throughout Idaho (Figure 5.1.12-1)), FirstNet would try to minimize potential emissions where possible and would recommend the implementation of BMPs, where feasible and practicable, to avoid or minimize potential impacts.

5.2.12.4. Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including construction, deployment, and operation activities.

Deployment and Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementing the Preferred Alternative could result in deploying various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to air quality and others would not. The potential impacts could range from no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions. Chapter 9, BMPs and

Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no impacts to air quality under the conditions described below:

- Wired Projects
  - Use of Existing Conduit – New Buried Fiber Optic Plant: Activities associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit. Gaining access to the conduit and installing the cable may result in minor disturbance at entry and exit points, however this activity would be temporary and infrequent, and is not expected to produce any perceptible changes in air emissions.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up dark fiber would require no construction and have no short- or long-term emissions to air quality because it would create no new sources of emissions.
- Satellites and Other Technologies
  - Satellite Enabled Devices and Equipment: The duration of construction activities associated with installing permanent equipment on existing structures would most likely be short-term. It is anticipated that insignificant concentrations of criteria pollutants would be emitted during installment of this equipment from the use of machinery. Deployment and operation of satellite-enabled devices and portable equipment are expected to have minimal to no impact on ambient air quality concentrations.
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it may include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact air quality resources, it is anticipated that this activity would have no impact on those resources.

Activities with Potential Impacts to Air Quality

Construction, deployment, and operation activities related to the Preferred Alternative could impact air quality by generating various quantities of criteria pollutant emissions. It is expected that such impacts would be less than significant due to the shorter duration and localized nature of the activities. The types of infrastructure deployment scenarios or deployment activities that could be part of the Preferred Alternative and result in potential impacts to air quality include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: Plowing (including vibratory plowing), trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber as well as land/vegetation clearing, excavation activities, and

landscape grading could result in fugitive dust and products of combustion from the use of vehicles and heavy equipment.

- New Build – Aerial Fiber Optic Plant: The use of heavy equipment during the installation of new poles and hanging cables, as well as constructing access roads, POP huts, or other associated facilities to house plant equipment could result in products of combustion from the use of vehicles and machinery, as well as fugitive dust emissions from site preparation.
- Collocation on Existing Aerial Fiber Optic Plant: Excavation equipment used during pole replacement, and other heavy equipment used for structural hardening or reinforcement, could result in products of combustion from the use of vehicles and heavy equipment, as well as fugitive dust from site preparation.
- New Build – Submarine Fiber Optic Plant: The installation of cables in or near bodies of water would not impact air quality resources because there would be no local air quality resources to impact. However, impacts to air quality resources could potentially occur as result of the construction of landings and/or facilities on shores or the banks of water bodies that accept the submarine cable, depending on the exact site location and proximity to existing air quality resources.
- Installation of Optical Transmission or Centralized Transmission Equipment: Emissions associated with the installation of optical transmission or centralized transmission equipment would be limited to the short-term, temporary use of vehicle and construction equipment. Long-term impacts are unlikely, as the power requirements for optical networks are relatively low.

- Wireless Projects
  - New Wireless Communication Towers: Activities associated with installing new wireless towers and associated structures (e.g., generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads could result in products of combustion. Operating vehicles and other heavy equipment, running generators while conducing excavation activities, and landscape grading to install new wireless towers and associated structures or access roads could result in products of combustion and fugitive dust.
  - Collocation on Existing Wireless Tower, Structure, or Building: Vehicles and equipment used to mount or install equipment, such as antennas or microwave dishes, on an existing tower could impact air quality. If additional power units are needed, structural hardening, and physical security measures required grading or excavation, then exhaust and fugitive dust from heavy equipment used for these activities could also result in increased air emissions.
  - Deployable Technologies: The type of deployable technology used would dictate the types of air pollutants generated. For example, mobile equipment deployed via heavy trucks could generate products of combustion from the internal combustion engines associated with the vehicles and onboard generators. These units may also generate fugitive dust depending on the type of road traveled during deployment (i.e., paved versus unpaved roads). Aerial platforms (e.g., UASs or other aircraft) would generate pollutants during all phases of flight.

In general, the pollutants of concern from the abovementioned activities would be products of combustion from burning fossil fuels in internal combustion engines and fugitive dust from site preparation activities and vehicles traveling on unpaved road surfaces. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the construction impacts. These impacts are anticipated to be less than significant due to the limited nature of the deployment. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major communications infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned deployment impacts. It is anticipated that there would be less than significant impacts to air quality associated with routine inspections of the Preferred Alternative due to the limited nature of the activity. If usage of heavy equipment as part of routine maintenance or inspections occurs off established access roads or corridors additional air quality impacts may occur, however, they would be less than significant as they would still be limited in nature. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.12.5. Alternatives Impact Assessment

The following section assesses potential impacts to air quality associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific equipment associated with the Deployable Technologies Alternative could include heavy trucks with onboard generators, aerial vehicles (e.g., UASs or other aircraft), and ground support vehicles and other equipment for aerial deployment. The stand-alone Deployable Technologies Alternative differs from the Preferred Alterative in the number of mobile and aerial vehicles likely to deploy, the distances traveled from storage locations, and the duration of deployment. The potential impacts to air quality are as follows:

Deployment and Operation Impacts to Air Quality

Implementing deployable technologies could result in products of combustion from mobile equipment deployed via heavy trucks using internal combustion engines associated with the vehicles and onboard generators. While a single deployable vehicle may have an insignificant impact, multiple vehicles operating for longer periods, in close proximity, may have a greater cumulative impact, although this is expected to be less than significant based on the defined significance criteria, since activities would be temporary and short-term. These vehicles may also produce fugitive dust if traveling on unpaved roads. Some staging or landing areas (depending on the type of technology) may require excavation, site preparation, and paving. Heavy equipment used for these activities could emit products of combustion as a result of burning fossil fuels in internal combustion engines. The deployment and operation of aerial technology is anticipated to generate pollutants during all phases of flight, except for balloons. The products of combustion from ground support vehicles, as well as the duration of ground support operations and travel between storage and deployment locations, would dictate the concentrations and associated impacts. Additionally, routine maintenance and inspections of the deployable technologies are anticipated to be less than significant, given that these activities are of low-intensity and short duration. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, FirstNet would not deploy the NPSBN and there would be no impact to ambient air quality. By not deploying NPSBN, FirstNet would avoid generating emissions from construction, installation, or operation of wired, wireless, or deployable infrastructure or technologies; satellites; and other technologies.

5.2.13. Noise

5.2.13.1. Introduction

This section describes potential noise impacts from construction, deployment, and operation of the Proposed Action and alternatives. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.13.2. Impact Assessment Methodology and Significance Criteria

The noise impacts of the Proposed Action were evaluated using the significance criteria presented in Table 5.2.13-1. As described in Section 9.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential noise impacts to Idaho addressed in this section are presented as a range of possible impacts.

Table 5.2.13-1: Impact Significance Rating Criteria for Noise

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than significant with BMPs and mitigation measures incorporated**	**Less than significant**	**No impact**
Increased noise levels	Magnitude or Intensity	Noise levels would exceed typical noise levels from construction equipment and generators. Noise levels at noise sensitive receptors (such as residences, hotels/motels/inns, hospitals, and recreational areas) would exceed 55 dBA or specific state noise limits. Noise levels plus baseline noise levels would exceeds 10 dBA increase from baseline noise levels (i.e., louder). Project noise levels near noise receptors at National Parks would exceed 65 dBA.	Effect that is potentially significant, but with mitigation is less than significant.	Noise levels resulting from project activities would exceed natural sounds, but would not exceed typical noise levels from construction equipment or generators.	Natural sounds would prevail. Noise generated by the action (whether it be construction or operation) would be infrequent or absent, mostly immeasurable.
	Geographic Extent/Context	County or local.		County or local.	County or local.
	Duration or Frequency	Permanent or long-term.		Short term.	Temporary.

NA = Not Applicable

5.2.13.3. Description of Environmental Concerns

Increased Noise Levels

The Proposed Action has the potential to generate noise during construction and operation of various equipment used for deployment. These noise levels could be above what is typically generated in a given area and may alter the ambient acoustical environment. If significant, the noise could cause impacts on residential areas, or other facilities that are sensitive to noise, such as churches, hospitals, or schools. The construction activities for deploying some of the various equipment evaluated under the Proposed Action could cause short-term impacts to nearby populations. However, it is likely that there would be less long-term effects from operational use of the proposed equipment (See Section 5.1.13, Noise).

Based on the significance criteria presented in Table 5.2.13-1, noise impacts would likely be less than significant given the size and nature of the majority of the proposed deployment activities. The majority of FirstNet's deployment activities would not be located in sensitive areas nor would a large number of noise sources be deployed/operated long-term in the same area. Noise levels from deployment activities are not expected to exceed typical noise levels for short-term/temporary construction equipment or generators.

To the extent practicable, FirstNet would attempt to mitigate or minimize noise effects during construction or operation. BMPs and mitigation measures could help to limit impacts on nearby noise-sensitive receptors. However, given that much of the concentration and setup of equipment would often occur in populated areas, FirstNet operations would not be able to completely avoid noise impacts due to construction and operations at various receptors.

5.2.13.4. Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including construction, deployment, and operation activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementing the Preferred Alternative could result in deploying various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential noise impacts and while others would not. In addition, the same type of Proposed Action Infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no noise impacts under the conditions described below:

- Wired Projects
    - Use of Existing Conduit – New Buried Fiber Optic Plant: Disturbance associated with the installation of fiber optic cable in existing conduit would be limited to entry and exit points of the existing conduit in previously disturbed areas. Noise generated by equipment required to install fiber would be infrequent and of short duration, and is not expected to create perceptible impacts.
    - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up dark fiber would require no construction or installation activities, and therefore would have no noise impacts.
- Satellites and Other Technologies
    - Satellite Enabled Devices and Equipment: The duration of construction activities associated with installing permanent equipment on existing structures would most likely be short-term. It is anticipated that insignificant levels of noise would be emitted during installment of this equipment. Noise caused by these construction and installation activities would be similar to other construction activities in the area, such as the installation of cell phone towers or other communication equipment. Deployment and operation of satellite-enabled devices and equipment are expected to have minimal to no impact on the noise environment.
    - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it may include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact noise resources, it is anticipated that this activity would have no impact on the resources.

Activities with the Potential for Noise Impacts

Construction, deployment, and operation activities related to the Preferred Alternative could create noise impacts from either the construction or operation of the infrastructure. The types of infrastructure deployment scenarios or deployment activities that could be part of the Preferred Alternative and result in potential impacts to air quality include the following:

- Wired Projects
    - New Build – Buried Fiber Optic Plant: Plowing (including vibratory plowing), trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber as well as land/vegetation clearing, excavation activities, and landscape grading could result in high noise levels from the use of heavy equipment and machinery.
    - New Build – Aerial Fiber Optic Plant: The use of heavy equipment during the installation of new poles and hanging cables, as well as constructing access roads, POP huts, or other

associated facilities to house plant equipment would be short-term and could result in increased levels from the use of vehicles and machinery.

- Collocation on Existing Aerial Fiber Optic Plant: Excavation equipment used during potential pole replacement, and other heavy equipment used for structural hardening or reinforcement, could result in temporary increased noise levels from the use of heavy equipment and machinery.
- Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Installation of new associated huts or equipment, if required, could result in higher noise levels if the activity required the use of heavy equipment for grading or other purposes.
- New Build – Submarine Fiber Optic Plant: The installation of cables in or near bodies of water would not impact noise resources because there would be no local noise resources to impact. However, impacts to noise resources could potentially occur as result of the construction of landings and/or facilities on shores or the banks of water bodies that accept the submarine cable, depending on the exact site location and proximity to existing noise resources.
- Installation of Optical Transmission or Centralized Transmission Equipment: Noise associated with the installation of optical transmission or centralized transmission equipment would be limited to the short-term, temporary use of vehicle and construction equipment. Long-term impacts are unlikely, as the noise emissions from optical networks are relatively low. Heavy equipment used to grade and construct access roads could generate increased levels of noise over baseline levels temporarily.

- Wireless Projects
  - New Wireless Communication Towers: Activities associated with installing new wireless towers and associated structures (e.g., generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads could result in localized construction noise. Operating vehicles, other heavy equipment, and generators would be used on a short-term basis and could increase noise levels.
  - Collocation on Existing Wireless Tower, Structure, or Building: Vehicles and equipment used to mount or install equipment, or to grade or excavate additional land on sites for installation of equipment, such as antennas or microwave dishes on an existing tower, could impact the local noise environment temporarily.
  - Deployable Technologies: The type of deployable technology used would dictate the types of noise generated. For example, mobile equipment deployed via heavy trucks could generate noise from the internal combustion engines associated with the vehicles and onboard generators. With the exception of balloons, aerial platforms (e.g., UASs or other aircraft, except balloons) generate noise during all phases of flight, including takeoff, landing, and flight operations over necessary areas that could impact the local noise environment.

In general, noise from the abovementioned activities would be products of site preparation, installation, and construction activities, as well as additional construction vehicles traveling on nearby roads and localized generator use. These impacts are expected to be less than significant due to the temporary duration of deployment activities. Additionally, pre-existing noise levels achieved after some months (typically less than a year but could be a few hours for linear activities such as pole construction). Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

Operation activities associated with the Preferred Alternative would be less than significant for routine maintenance and inspection of the facilities because of the temporary nature of the activities which would not create new permanent sources of noise. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned construction impacts. It is anticipated that potential noise impacts would be similar to or less than those described for the deployment activities. If usage of vehicles or heavy equipment as part of routine maintenance or inspections or onsite generator use occurs, potential noise impacts could result as explained above. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.13.5. Alternatives Impact Assessment

The following section assesses potential noise impacts associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific equipment associated with the Deployable Technologies Alternative would be heavy trucks with onboard generators, aerial vehicles (e.g., UASs or other aircraft), and ground support vehicles and equipment for aerial deployment. The stand-alone Deployable Technologies Alternative differs from the Preferred Alterative in the number of mobile and aerial vehicles likely to deploy, the distances traveled from storage locations and the duration of deployment. The potential noise impacts are as follows:

Deployment Impacts

Implementing deployable technologies could result in noise from mobile equipment deployed via heavy trucks, including not only onboard generators, but also the vehicles themselves. While a single deployable vehicle may have an insignificant impact, multiple vehicles operating for longer periods, in close proximity, may increase localized noise levels. Several vehicles traveling together could also create short-term noise impacts on residences or other noise-sensitive receptors as they pass by. With the exception of balloons, the deployment of aerial technology is anticipated to generate noise during all phases of flight. Aerial technologies would have the highest level of noise impact if they are required to fly above residential areas, areas with a high concentration of noise-sensitive receptors (i.e., schools or churches), or over national parks or other areas where there is an expectation of quiet and serenity on their way to their final destinations. Residences near deployment areas for aerial technologies (i.e., airports or smaller airfields) could also be affected during takeoff and landing operations. Additionally, routine maintenance and inspections of the deployable technologies are anticipated to be less than significant, given that these activities are of low-intensity and short duration. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

Operation activities associated with the Deployable Technologies Alternative would be similar to several of the deployment activities related to routine maintenance and inspection of the facilities. Operation of generators could also generate noise in the area. However, deployable technologies could be deployed to areas with few existing facilities, so noise impacts could be minimal in those areas. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned construction impacts. It is anticipated that potential noise impacts would be the same as those described for the deployment activities. If usage of vehicles or heavy equipment as part of routine maintenance or inspections occurs, potential noise impacts could result as explained above.

Operational impacts from aerial technologies would include repeated flyovers by UAS vehicles while they are needed in the area. This could generate less than significant, short-term impacts on any residential areas or other noise-sensitive receptors under the flight path of these vehicles. However, once these operations cease, noise levels would quickly return to baseline levels. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, FirstNet would not deploy the NPSBN and there would be no impact to ambient noise. By not deploying the NPSBN, FirstNet would avoid generating noise from construction, installation, or operation of wired, wireless, deployable infrastructure or satellites and other technologies.

5.2.14. Climate Change

5.2.14.1. Introduction

This section describes potential impacts to climate and climate change-vulnerable resources in Idaho associated with deployment and operation of the Proposed Action and alternatives. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.14.2. Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on climate and potential climate change impacts on the Proposed Action’s installations and infrastructure were evaluated using the significance criteria presented in Table 5.2.14-1. As described in Section 5.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to climate and climate change-vulnerable resources addressed in this section are presented as a range of possible impacts.

CEQ requires the consideration of climate change from two perspectives. The first is the potential for impacts on climate change through GHG emissions resulting from the Proposed Action or alternatives. The second is related to the implications and possible effects of climate change on the environmental consequences of the Proposed Action or alternatives. This extends to the impacts of climate change on facilities and infrastructure that would be part of the Proposed Action or alternatives (CEQ, 2014).

CEQ has established the significance criteria for GHG emissions at 25,000 MT CO_2e on an annual basis, with the requirement that if projected emissions exceed this threshold, a GHG emissions quantitative analysis is warranted (CEQ, 2014). Although 25,000 MT is a very small fraction (one 266,920th) of the total U.S. emissions of 6,673 MMT CO_2e in 2013 (USEPA, 2015m), the sum of additional emissions as a consequence of the deployment of FirstNet, combined with multiple new sources of CO_2 and other GHGs from other projects and human activities, could be significant.

CEQ guidance for the consideration of effects of climate change on the environmental consequences of the proposed action is more general. In addition to the consideration of climate change’s effects on environmental consequences, it also includes the impact that climate change may have on the projects themselves (CEQ, 2014). Projects located in areas that are vulnerable to the effects of climate change may be at risk. Analysis of these risks through the NEPA process could provide useful information to the project planning to ensure these projects are resilient to the impacts of climate change.

Table 5.2.14-1: Impact Significance Rating Criteria for Climate Change

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less Than Significant with Mitigation Measures Incorporated**	**Less Than Significant**	**No Impact**
Contribution to climate change through GHG emissions	Magnitude or Intensity	Exceedance of 25,000 metric tons of CO_2e/year, and global level effects observed.	Effect that is potentially significant, but with mitigation is less than significant.	Only slight change observed.	No increase in greenhouse gas emissions or related changes to the climate as a result of project activities.
	Geographic Extent	Global impacts observed.		Global impacts observed.	NA
	Duration or Frequency	Long-term changes. Changes cannot be reversed in a short term.		Changes occur on a longer time scale. Changes cannot be reversed in the short term.	NA
Effect of climate change on FirstNet installations and infrastructure	Magnitude or Intensity	Climate change effects (such as temperature change) negatively impact FirstNet infrastructure.	Effect that is potentially significant, but with mitigation is less than significant.	Only slight change observed.	No measurable impact of climate change on FirstNet installations or infrastructure.
	Geographic Extent	Local and regional impacts observed.		Local and regional impacts observed.	NA
	Duration or Frequency	Long-term changes. Changes cannot be reversed in a short term.		Changes occur on a longer time scale. Changes cannot be reversed in the short term.	NA

5.2.14.3. Projected Future Climate

Climate model forecasts of future temperatures are highly dependent on emissions scenarios (low versus high), particularly in projections beyond 2050. An increase in average annual temperature of 3.3 °F to 9.7 °F is projected by 2070 to 2099 (compared to the period 1970 to 1999), depending largely on a low or high emissions scenario. The increases are projected to be largest in summer. (USGCRP, 2014a)

Additionally, the Northwest is projected to observe a longer frost-free season by mid-century as compared to a 1971 – 2000 baseline, where a frost-free season is defined as the period between the last occurrence of 32 °F in the spring and the first occurrence of 32 °F in the fall. In Idaho, the frost-free season under a high emissions scenario is expected to extend greater than 80 days longer than the baseline years in much of the state. (USGCRP, 2014b)

Air Temperature

Figure 5.2.14-1 and Figure 5.2.14-2 illustrate the anticipated temperature changes for low and high GHG emission scenarios for Idaho from a 1969 to 1971 baseline.

Bsk – Figure 5.2.14-1 shows that by mid-century (2040 to 2059), temperatures in the entire state of Idaho under a low emissions scenario would increase by approximately 4 °F, and by the end of the century (2080 to 2099) under a low emissions scenario temperature in the Bsk region of Idaho would increase by approximately 6 °F. (USGCRP, 2009a)

Figure 5.2.14-2 shows that under a high emissions scenario for the period (2040 to 2059), temperatures would increase by approximately 5 °F. Under a high emissions scenario for the period (2080 to 2099) in the Bsk region of Idaho, temperatures would increase by approximately 9 °F. (USGCRP, 2009a)

Cfa – Temperatures in this region are expected to increase by mid-century (2040 to 2059) under a low emissions scenario at the same rate as the Bsk region. By the end of the century (2080 to 2099) under a low emissions scenario temperatures are expected to increase by 5 °F. (USGCRP, 2009a)

Under a high emissions scenario temperatures would increase by approximately 5 °F by mid-century. By the end of the century, temperatures are projected to increase by 8 °F in the Cfa region. (USGCRP, 2009a)

Csa – Temperatures in this region are expected to increase by mid-century (2040 to 2059) and by the end of the century (2080 to 2099) at the same rate as the Bsk and Cfa region under a low emissions scenario. (USGCRP, 2009a)

Under a high emissions scenario, temperatures in this region would increase by approximately 4 °F by mid-century, and by the end of the century temperatures would increase by approximately 8 °F. (USGCRP, 2009a)

Csb – Under a low emissions scenario temperatures in the Csb region are expected to increase by approximately 4 °F by mid-century and by 6 °F by the end of the century. (USGCRP, 2009a)

Temperatures are expected to increase by 5 °F under a high emissions scenario in this region. By the end of the century, temperatures are expected to increase by 9 °F. (USGCRP, 2009a)

Dfb – Under a low emissions scenario, temperatures are expected to increase by 4 °F in this region by mid-century, and by the end of the century temperatures are anticipated to increase by 6 °F in the southern portion of the region and by 5 °F in the remainder of the Dfb region. (USGCRP, 2009a)

Temperatures are expected to increase by 4 °F in the northern portion of the Dfb region and by 5 °F in the southern portion of the region under a high emissions scenario. (USGCRP, 2009a)

Dsb – Temperatures in this region under a low emissions scenario are expected to increase at the same rate as the Dfb region by mid and end-of-the century. (USGCRP, 2009a)

Under a high emissions scenario, temperatures are expected to increase by 4 °F in the northern portion of the region and by 5 °F in the southern portion of the region by mid-century. By the end of the century, temperatures are expected to increase 8 °F in the northern portion of the region and by 9 °F in the southern portion of the region. (USGCRP, 2009a)

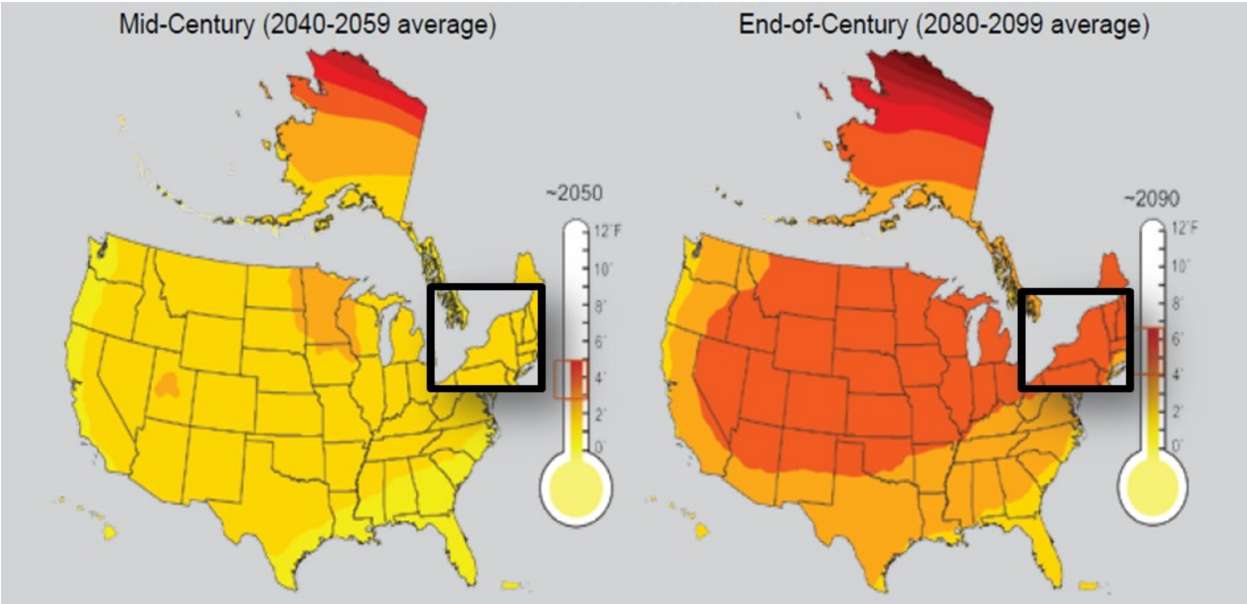

Figure 5.2.14-1: Idaho Low Emission Scenario Projected Temperature Change

Source: (USGCRP, 2009b)

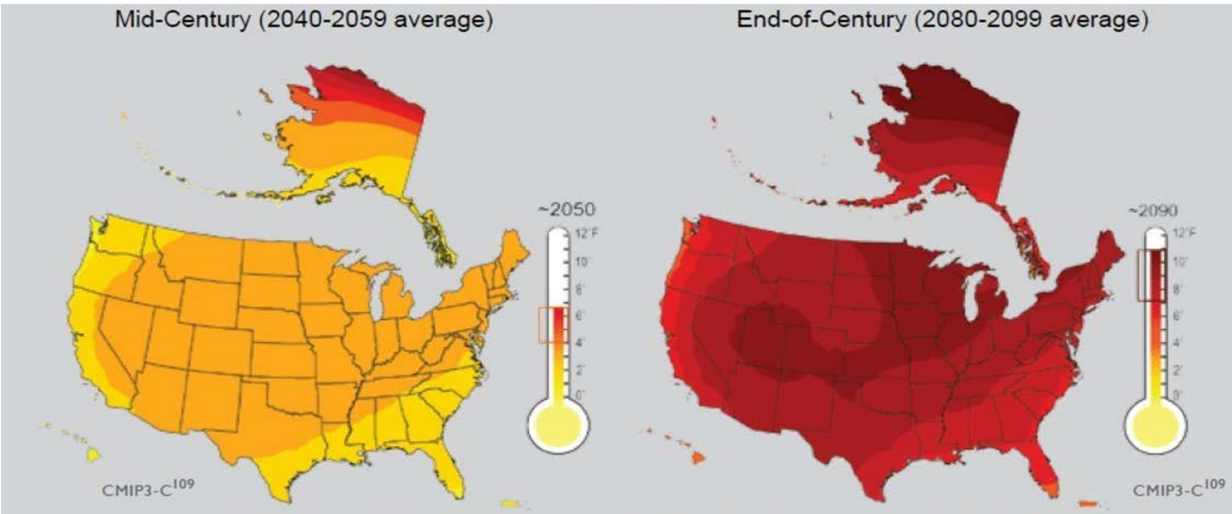

Figure 5.2.14-2: Idaho High Emission Scenario Projected Temperature Change

Source: (USGCRP, 2009b)

Precipitation

Under a high emissions scenario, summer precipitation is projected to decrease by as much as 30 percent by the end of the century in the Northwest (USGCRP, 2014a). "Northwest summers are already dry and although a 10 percent reduction (the average projected change for summer) is a small amount of precipitation, unusually dry summers have many noticeable consequences, including low streamflow west of the Cascades and greater extent of wildfires throughout the region" (USGCRP, 2014a).

In Idaho, there is an expected increase of about 10 percent in the number of consecutive dry days under a low emissions scenarios by mid-century (2041 to 2070) as compared to the period (1971 – 2000). Under a high emissions scenario in the majority of the state there is a projected increase of about 10 percent in the number of consecutive dry days in the southern portion of the state, a 20 percent increase in the central portion, and an increase of 30 percent in the northern portion of the state. An increase in consecutive dry days could lead to drought.

Figure 5.2.14-3 and Figure 5.2.14-4 show predicted seasonal precipitation change for an approximate 30-year period of 2071 to 2099 compared to a 1970 to 1999 approximate 30-year baseline. Figure 5.2.14-3 show seasonal changes in a low emissions scenario, which assumes rapid reductions in emissions where rapid reductions means more than 70 percent cuts from current levels by 2050. (USGCRP, 2014c)

Figure 5.2.14-4 shows a high emissions scenario, which assumes continued increases in emissions, with associated large increases in warming and major precipitation changes. (Note: white areas in the figures indicate that the changes are not projected to be larger than could be expected from natural variability.) (USGCRP, 2014c)

Bsk – Figure 5.2.14-3 shows that in a low emissions scenario in the 30-year period for 2071 to 2099, precipitation would increase by 10 percent in winter and spring for the entire state of

Idaho. However, there are no expected changes in precipitation in summer or fall other than fluctuations due to natural variability. (USGCRP, 2014c)

Figure 5.2.14-4shows that if emissions continue to increase, winter precipitation could increase as much as 30 percent over the period 2071 to 2099 in a small portion of the region while the remainder of the region is expected to have a 20 percent increase. In spring, precipitation in this scenario is expected to increase 10 or 20 percent depending on the portion of the region. Summer precipitation is expected to decrease 10 percent. In fall, precipitation is expected to increase 10 percent or remain constant depending on the portion of the region. (USGCRP, 2014c)

Cfa – Precipitation changes for the Cfa region are consistent with projected changes for the Bsk region of Idaho under a low GHG emissions scenario. (USGCRP, 2014c)

In winter and spring, precipitation is expected to increase 20 percent in the Cfa region under a high emissions scenario. Summer precipitation is expected to decrease 20 percent. Fall precipitation is anticipated to increase 10 percent in this scenario. (USGCRP, 2014c)

Csa – Precipitation changes for the Csa region are consistent with projected changes for the Bsk and Cfa regions of Idaho under a low GHG emissions scenario. (USGCRP, 2014c)

Precipitation changes for the Csa region are consistent with projected changes for the Cfa region under a high emissions scenario. (USGCRP, 2014c)

Csb – Precipitation changes for the Csb region are consistent with projected changes for the Bsk, Cfa and Csa regions of Idaho under a low GHG emissions scenario. (USGCRP, 2014c)

In winter under a high emissions scenario in the Csb region, precipitation is expected to increase 20 percent. Spring and fall precipitation is expected to increase 10 percent. Precipitation in summer is anticipated to decrease 10 or 20 percent depending on the portion of the region. (USGCRP, 2014c)

Dfb – Precipitation changes for the Dfb region are consistent with projected changes for the Bsk, Cfa, Csa, and Csb regions of Idaho under a low GHG emissions scenario. (USGCRP, 2014c)

Winter precipitation under a high emissions scenario in the Dfb region is expected to increase 20 percent. In spring, precipitation is expected to increase 10 or 20 percent depending on the portion of the region. Summer precipitation is expected to decrease 10 percent in the southern portion of the region while precipitation is expected to decrease 20 percent in the northern portion of the region. Fall precipitation is expected to increase 10 percent or remain constant depending on the portion of the region. (USGCRP, 2014c)

Dsb – Precipitation changes for the Dsb region are consistent with projected changes for the Bsk, Cfa, Csa, and Dfb regions of Idaho under a low GHG emissions scenario. (USGCRP, 2014c)

Under a high emissions scenario, precipitation in winter and spring in the Dsb region is projected to increase 20 percent. In summer, precipitation is expected to decrease 10 or 20 percent depending on the portion of the region. Fall precipitation is expected to increase 10 percent or remain constant depending on the portion of the region. (USGCRP, 2014c)

Severe Weather Events

It is difficult to forecast the impact of climate change on severe weather events such as winter storms and thunderstorms. Trends in thunderstorms are subject to greater uncertainties than trends in temperature and associated variables directly related to temperature. Climate scientists are studying the influences of climate change on severe storms. Recent research has yielded insights into the connections between warming and factors that cause severe storms. For example, atmospheric instability and increases in wind speed with altitude link warming with tornadoes and thunderstorms. Additionally, research has found a link between warming and conditions favorable for severe thunderstorms. However, more research is required to make definitive links between severe weather events and climate change. (USGCRP, 2014d).

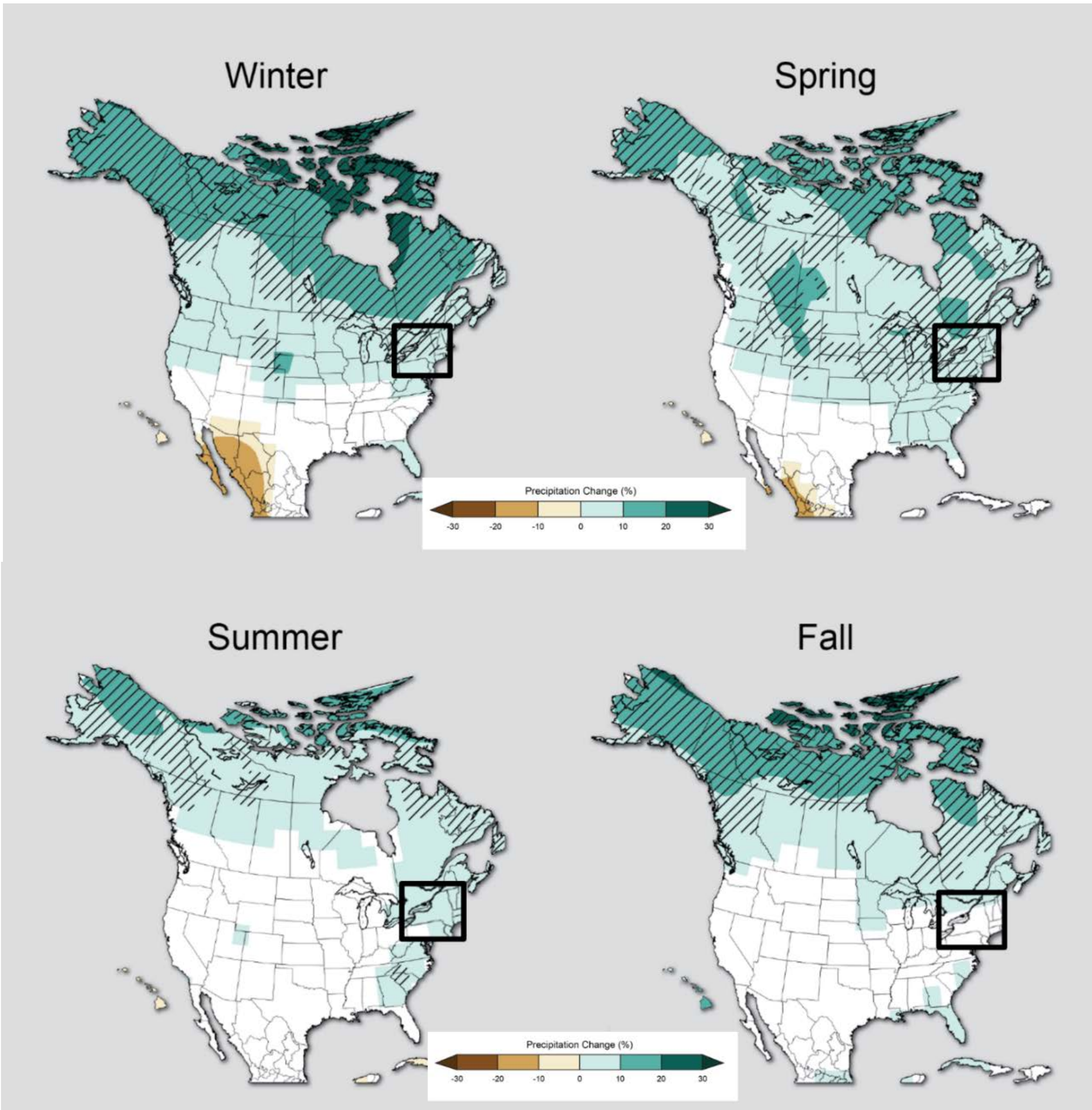

Figure 5.2.14-3: Predicted Seasonal Precipitation Change for 2071 to 2099 Compared to 1970 to 1999 Baseline in a Low Emissions Scenario

Source: (USGCRP, 2014c)

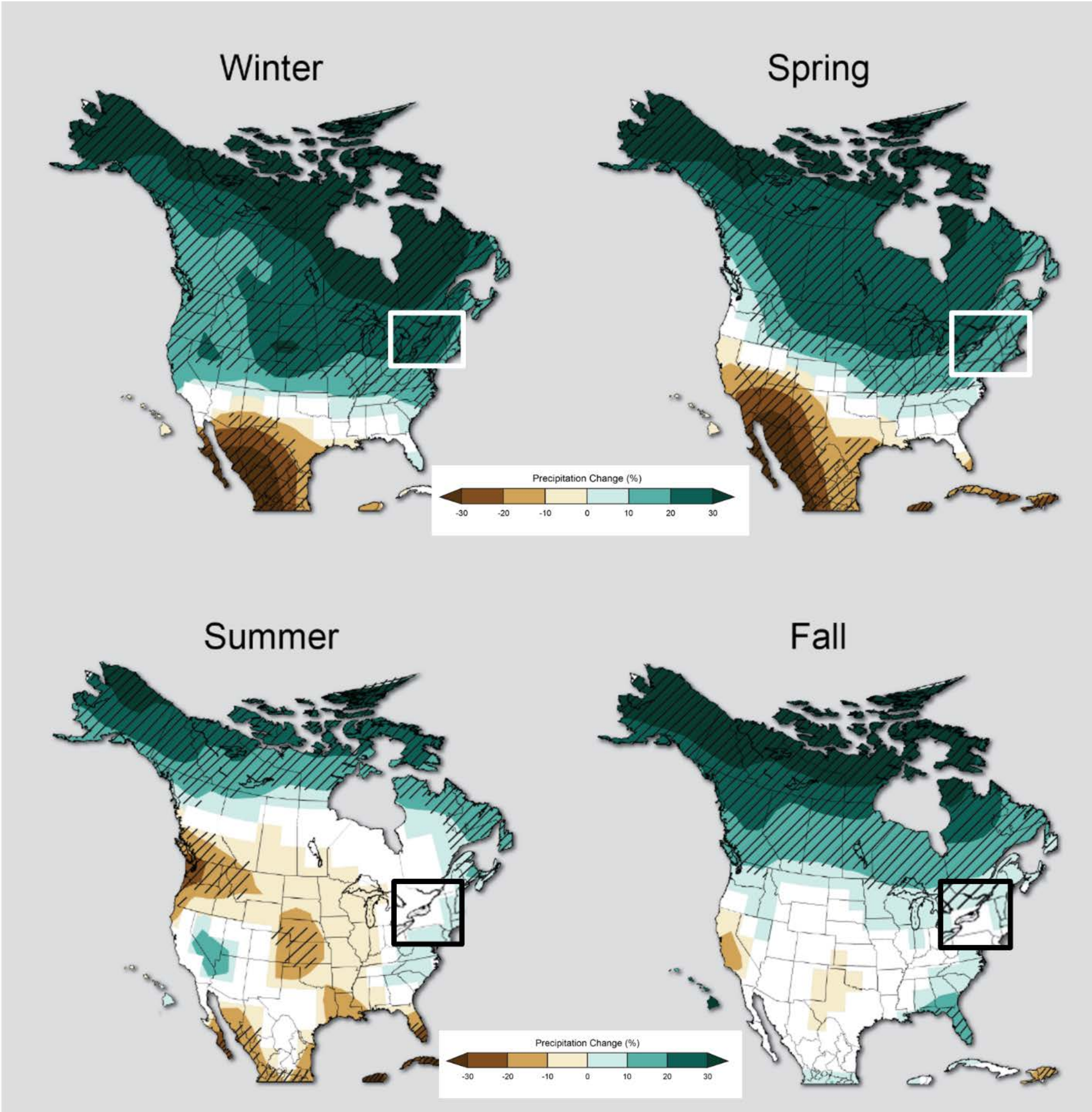

Figure 5.2.14-4: Predicted Seasonal Precipitation Change for 2071 to 2099 Compared to 1970 to 1999 Baseline in a High Emissions Scenario

Source: (USGCRP, 2014c)

5.2.14.4. Description of Environmental Concerns

Greenhouse Gas Emissions

Increases in GHG emissions have altered the global climate, leading to generalized temperature increases, weather disruption, increased droughts and heatwaves, and may have potentially catastrophic long-term consequences for the environment. Although GHGs are not yet regulated by the federal government, many states have set various objectives related to reducing GHG emissions, particularly CO_2 emissions from fossil fuels.

Based on the impact significance criteria presented in Table 5.2.14-1, climate change impacts as a result of GHG emissions could be significant and require a quantitative analysis if FirstNet's deployment of technology was responsible for increased emissions of 25,000 MT/year or more. The GHG emissions resulting from FirstNet activities fall into two categories: short-term and long-term. Short-term emissions could be associated with deployment activities (vehicles and other motorized construction equipment) and would have no long-term or permanent impact on GHG emissions or climate change. Long-term (both temporary and permanent) emission increases could result from operations, including the use of grid-provided electricity by FirstNet equipment such as transmitters and optical fiber, and from the temporary use of portable or onsite electric generators (a less efficient, more carbon-intensive source of electricity), during emergency situations when the electric grid was down, for example after a hurricane.

A single large cell tower would typically require 20-60kW of power to operate (Balshe, 2011). The CO_2 emissions associated with the operation of the tower would depend on whether it was supplied by a stand-alone power source, such as a generator, or from the grid, and whether it was operating at full power on a continuous basis. A standard 60kW 3-phase diesel generator running full-loaded consumes approximately 4.0 to 5.0 gallons of diesel per hour (Diesel Service & Supply, 2016). Diesel fuel combustion emits 22.38 lbs of CO_2 per gallon (EIA, 2015h). A 60kW transmitter running on a generator would therefore be responsible for 1,221 kg of CO_2/day. Running continuously, the tower would cause the emission of 446 MT of CO_2 per year.

However, grid-provided electricity would result in less CO_2 emissions than on-site provided energy. Using the average carbon intensity of grid-provided electricity of 1,136.53 lbs/MWh (USEPA, 2015n), the same transmitter would be responsible for approximately 271 MT of CO_2 per year running continuously. Actual emissions would depend on the fuel mix and efficiency of the systems from which electricity was generated. Some may even run on low/no-emissions renewable energy. Therefore, this scenario is a "worst-case" for GHG emissions. If the system deployment resulted in the operation of more than 50 60 kW towers operating at maximum power in remote locations on diesel generators on a continuous basis, the 25,000 MT/year threshold may be exceeded and a quantitative analysis required. By comparison optical fiber is considerably more energy efficient and consumes considerably less power than transmitters (Vereecken, et al., 2011), and would not impact GHG emissions in such a way as to require a quantitative analysis.

Effects of Climate Change on Project-Related Impacts

Climate change may increase project-related impacts by magnifying or otherwise altering impacts in other resources areas. For example climate change may impact air quality, water resource availability, and recreation. These effects would vary from state to state depending on the resources in question and their relationship to climate change. The increased severity and length of droughts is expected to increase in Idaho as less water is stored in winter snow pack and rising temperatures increase evapotranspiration rates, and less rain falls. This in turn may contribute to multiple ecological effects including reduced or eliminated stream flow in environmentally sensitive areas, more frequent and larger wildland fires (USGCRP, 2014e) as well as increased fuel load in the form of dead trees caused by invasive bark beetles (USFS, 2015k).

Impact of Climate Change on FirstNet Installations and Infrastructure

For areas of Idaho already at risk of flooding, climate change is projected to increase the frequency and severity of torrential downpours which in turn may increase the potential for flash floods (USGCRP, 2014f). Climate change may expose areas of Idaho increased intensity and duration of heat waves (USGCRP, 2014f) although Idaho does not have large population centers with significant urban heat islands that would greatly magnify these effects. Extended periods of extreme heat may increase general demand on the electric grid, impede the operation of the grid, (DOE, 2015) and overwhelm the capacity on-site equipment needed to keep microwave and other transmitters cool. Increasing frequency and extent of wildland fires as a result of climate change and other factors (USFS, 2015k) may present a risk to both permanent and mobile installations as well as to first responders themselves. Based on the impact significance criteria presented in Table 5.2.14-1, climate change effects on FirstNet installations and infrastructure would be significant if they negatively affected the operation of these facilities.

5.2.14.5. Potential Impacts of the Preferred Alternative

Greenhouse Gas Emissions

The following section assesses potential GHG emission impacts associated with implementation of the Preferred Alternative in Idaho, including deployment and operation activities.

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could result in the deployment and operation of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to GHG emissions, climate impacts in other resource areas, and FirstNet infrastructure and operations, and others would not. In addition, and as explained in this section, the same type of Proposed Action Infrastructure could result in a range of no impacts to less than significant impacts depending on the deployment scenario or site-specific conditions.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no impacts to climate change under the conditions described below:

- Wired Projects
    - Use of Existing Conduit – New Buried Fiber Optic Plant: There would be no short-term emissions associated with construction, as construction would not take place. The

equipment required to blow or pull fiber through existing conduit would be used temporarily and infrequently, resulting in no perceptible generation of GHG emissions.

- Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up dark fiber would require no construction and have no short- or long-term emissions. This would create no perceptible change in GHG emissions.

- Satellites and Other Technologies
  - Distribution of Satellite Enabled Devices and Equipment: The installation of satellite-enabled equipment on existing structures, or the use of portable satellite-enabled devices would not create any perceptible changes in GHG emissions because they would not create any new emissions sources.
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the NPSBN; however, it could include equipment on satellites that are already being launched for other purposes. Therefore it is anticipated that there would be no GHG emissions or any climate change effects on the project because these activities.

Activities with the Potential to Have Impacts

The deployment and use of energy-consuming equipment as a result of the implementation of the Preferred Alternative would result in GHG emissions whose significance would vary depending on their power requirements, duration and intensity of use, and number. The types of infrastructure deployment scenarios that could be part of the Preferred Alternative and result in potential impacts to GHG emissions and climate change include the following:

- Wired Projects
  - New Build - Buried Fiber Optic Plant: This activity would include plowing (including vibratory plowing), trenching, and directional boring, and could involve construction of POPs, huts, or other facilities to house outside plant equipment or hand holes to access fiber. These activities could generate GHG emissions.
  - New Build Aerial Fiber Optic Plant: These projects would require construction equipment for installing or replacing new poles and hanging cables as well as excavation and grading for new or modified right-of-ways or easements. It could also include construction of POPs, huts, or other facilities to house outside plant equipment. These activities could generate GHG emissions.
  - Collocation on Existing Aerial Fiber Optic Plant: These projects would require equipment for replacement of existing wiring and poles. GHG emissions associated with these projects would arise from use of machinery and vehicles to complete these activities.
  - New Build – Submarine Fiber Optic Plant: The installation of cables in or near bodies of water would not impact climate change resources because there would be no local climate change resources to impact. However, impacts to climate change resources could potentially occur as result of the construction of landings and/or facilities on shores or the banks of water bodies that accept the submarine cable, depending on the exact site location and proximity to existing climate change resources.

  - Installation of Optical Transmission or Centralized Transmission Equipment: The construction of small boxes or huts or other structures would require construction equipment, which could generate GHG emissions.
- Wireless Projects
  - New Wireless Tower Construction: Installation of new wireless towers and associated structures (generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads could result in short-term, temporary GHG emissions from vehicles and construction equipment. Long-term, permanent or temporary increases in GHG emissions would result from the electricity requirements of the towers (both grid-provided and back-up), and would depend on their size, number, and the frequency and duration of their use.
  - Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on existing towers. There would be no short-term GHG emissions associated with construction as it would not occur. Minor, short-term, temporary GHG emissions may result from any associated equipment used for installation, such as cranes or other equipment. Long-term, permanent or temporary increases in GHG emissions would result from the electricity requirements of the towers (both grid-provided and back-up), and would depend on their size, number, and the frequency and duration of their use.
- Deployable Technologies
  - COWs, COLTs, SOWs: The long-term operations of these mobile systems have the potential to have GHG emission impacts in excess of 25,000 MT if operated in large numbers over the long-term. However this would be highly dependent on their size, number, and the frequency and duration of their use. Emissions associated with the deployment and maintenance of a complete network solution of this type may be significant if large numbers of manned or unmanned aircraft were used for a sustained period of time (i.e., months to years). Emissions would depend on the type of platforms used, their energy consumption, and the duration of the network's operation.

Potential climate change impacts associated with deployment activities as a result of implementation of the Preferred Alternative include increased GHG emissions. GHG emissions would arise from the combustion of fuel used by equipment during construction and changes in land use. Emissions occurring as a result of soil disturbance and loss of vegetation are expected to be less than significant due to the limited and localized nature of deployment activities. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Climate Change Impacts on FirstNet Infrastructure or Operations

Climate change effects on the Preferred Alternative could be potentially significant to less than significant with BMPs and mitigation measures incorporated because climate change may potentially impact FirstNet installations or infrastructure during periods of extreme heat, severe storms, and other weather events. FirstNet installations should be evaluated in the design and planning phase through tiering to this analysis, in the context of their local geography and anticipated climate hazards to ensure they are properly hardened or there is sufficient redundancy to continue operations in a climate-affected environment. Mitigation measures could minimize or reduce the severity or magnitude of a potential impact resulting to the project, including adaptation, which refers to anticipating adverse effects of climate change and taking appropriate action to prevent and minimize the damage climate change effects could cause.

Climate change's anticipated impact on extreme weather events such as hurricanes or heat waves may increase the severity of the emergencies to which first responders are responding in vulnerable areas, and thus the extent and duration of their dependence on FirstNet resources. FirstNet would likely prepare to sustain these operations in areas experiencing climate and weather extremes through the design and planning process for individual locations and operations.

5.2.14.6. Alternatives Impact Assessment

The following section assesses potential impacts to climate associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration.

Potential Deployment Impacts

As explained above, implementation of deployable technologies could involve use of fossil-fuel-powered vehicles, powered generators, and/or aerial platforms. There could be some emissions and soil and vegetation loss as a result of excavation and grading for staging and/or landing areas depending on the type of technology. GHG emissions are expected to be less than significant based on the defined significance criteria, since activities would be temporary and short-term. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operations Impacts

Implementing land-based deployable technologies (COW, COLT, SOW) could result in emissions from mobile equipment on heavy trucks using internal combustion engines associated with the vehicles and onboard generators. While a single deployable vehicle may have an insignificant impact, multiple vehicles operating for longer periods, in close proximity, may have a cumulative impact, although this impact is expected to be less than significant due to the limited extent and temporary nature of the deployment. Some staging or landing areas (depending on the type of technology) may require excavation, site preparation, and paving. Heavy equipment used for these activities could produce emissions as a result of burning fossil fuels in internal combustion engines. The operation of aerial technology is anticipated to generate pollutants during all phases of flight, except for balloons. The concentrations and associated impacts would be dictated by the products of combustion from ground support vehicles, as well as the duration of ground support operations and travel between storage and deployment locations. These activities are expected to be less than significant due to the limited duration of deployment activities. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Additionally, routine maintenance and inspections of the deployable technologies are anticipated to be less than significant, given that these activities are of low-intensity and short duration.

Climate Change Impacts on FirstNet Deployables Infrastructure or Operations

Climate change effects have the most noticeable impacts over a long period of time. Climate change effects such as temperature, precipitation changes, and extreme weather during operations would be expected but could have little to no impact on the deployed technology due to the temporary nature of deployment. If there are no permanent structures, there would be little to no impacts as a result of sea-level rise. However, if these technologies are deployed continuously (at the required location) for an extended climate change effects on deployables could be similar to the Proposed Action, as explained above. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed; therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure, or satellites and other technologies. As a result, there would be no impacts to GHG emissions or climate as a result of deployment and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 5.1.14, Climate Change.

5.2.15. Human Health and Safety

5.2.15.1. Introduction

This section describes potential impacts to human health and safety in Idaho associated with deployment of the Proposed Action and alternatives. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.15.2. Impact Assessment Methodology and Significance Criteria

The impacts of the Proposed Action on human health and safety were evaluated using the significance criteria presented in Table 5.2.15-1. As described in Section 5.2, Environmental Consequences, the categories of impacts are defined as potentially significant, less than significant with mitigation incorporated, less than significant, or no impact. Characteristics of each impact type, including magnitude or intensity, geographic extent, and duration or frequency, were used to determine the impact significance rating associated with each potential impact.

Given the nature of this programmatic evaluation, and because the Proposed Action could potentially cover a wide variety of actions that would take place in various landscapes, the potential impacts to human health and safety addressed in this section are presented as a range of possible impacts.

Table 5.2.15-1: Impact Significance Rating Criteria for Human Health and Safety

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	Less than significant with mitigation incorporated	Less than significant	No impact
Exposure to Worksite Occupational Hazards as a Result of Activities at Existing or New FirstNet Sites	Magnitude or Intensity	Exposure to concentrations of chemicals above occupational regulatory limits and time weighted averages (TWAs). A net increase in the amount of hazardous or toxic materials or wastes generated, handled, stored, used, or disposed of, resulting in unacceptable risk, exceedance of available waste disposal capacity and probable regulatory violations. Exposure to recognized workplace safety hazards (physical and chemical). Violations of various regulations including: OSHA, RCRA, CERCLA, TSCA, EPCRA.	Effect is potentially significant, but with mitigation is less than significant.	No exposure to chemicals above health-protective screening levels. Hazardous or toxic materials or wastes could be safely and adequately managed in accordance with all applicable regulations and policies, with limited exposures or risks. No exposure to unsafe working conditions or other workplace safety hazards.	No exposure to chemicals, unsafe working conditions, or other workplace safety hazards.
	Geographic Extent	Regional impacts observed ("regional" assumed to be at least a county or county-equivalent geographical extent, could extend to state/territory).		Impacts only at a local/neighborhood level.	NA
	Duration or Frequency	Occasional frequency during the life of the project.		Rare event.	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	Less than significant with mitigation incorporated	Less than significant	No impact
Exposure to Hazardous Materials, Hazardous Waste, and Mine Lands as a Result of FirstNet Site Selection and Site-Specific Land Disturbance Activities	Magnitude or Intensity	Exposure to concentrations of chemicals above regulatory limits, or USEPA chemical screening levels protective of the general public. A net increase in the amount of hazardous or toxic materials or wastes generated, handled, stored, used, or disposed of, resulting in unacceptable risk, exceedance of available waste disposal capacity and probable regulatory violations. Site contamination conditions could preclude development of sites for the proposed use. Violations of various regulations including: OSHA, RCRA, CERCLA, TSCA, EPCRA. Unstable ground and seismic shifting.	Effect is potentially significant, but with mitigation is less than significant.	No exposure to chemicals above health-protective screening levels. Hazardous or toxic materials or wastes could be safely and adequately managed in accordance with all applicable regulations and policies, with limited exposures or risks. No exposure to unstable ground conditions or other workplace safety hazards.	No exposure to chemicals, unstable ground conditions, or other workplace safety hazards.
	Geographic Extent	Regional impacts observed ("regional" assumed to be at least a county or county-equivalent geographical extent, could extend to state/territory).		Impacts only at a local/neighborhood level.	NA
	Duration or Frequency	Occasional frequency during the life of the project.		Rare event.	NA

Type of Effect	Effect Characteristics	Impact Level			
		Potentially Significant	**Less than significant with mitigation incorporated**	**Less than significant**	**No impact**
Exposure to Hazardous Materials, Hazardous Waste, and Occupational Hazards as a Result of Natural And Manmade Disasters	Magnitude or Intensity	Exposure to concentrations of chemicals above regulatory limits, or USEPA chemical screening levels protective of the general public. Site contamination conditions could preclude development of sites for the proposed use. Physical and biologic hazards. Loss of medical, travel, and utility infrastructure.	Effect is potentially significant, but with mitigation is less than significant.	No exposure to chemicals above health-protective screening levels. Hazardous or toxic materials or wastes could be safely and adequately managed in accordance with all applicable regulations and policies, with limited exposures or risks. No exposure to unsafe conditions. No loss of medical, travel, or utility infrastructure.	No exposure to chemicals, unsafe conditions, or other safety and exposure hazards.
	Geographic Extent	Regional impacts observed ("regional" assumed to be at least a county or county-equivalent geographical extent, could extend to state/territory).		Impacts only at a local/neighborhood level.	NA
	Duration or Frequency	Occasional frequency during the life of the project.		Rare event.	NA

NA = Not Applicable

5.2.15.3. Description of Environmental Concerns

Worksite Physical Hazards, Hazardous Materials, and Hazardous Waste

The human health and safety concern having the greatest likelihood to occur during FirstNet deployment activities is occupational injury to telecommunication workers. The nature of telecommunication work requires workers to execute job responsibilities that are inherently dangerous. Telecommunication work activities present physical and chemical hazards to workers. The physical hazards have the potential to cause acute injury, long-term disabilities, or in the most extreme incidents, death. Other occupational activities such as handling hazardous materials and hazardous waste often do not result in acute injuries, but may compound over multiple exposures, resulting in increased morbidity. Based on the impact significance criteria presented in Table 5.2.15-1, occupational injury impacts could be potentially significant if the FirstNet deployment locations require performing occupational activities that have the highest relative potential for physical injury and/or chemical exposure. Examples of activities that may present increased risk and higher potential for injury include working from heights (i.e., from towers and roof tops), ground-disturbing activities like trenching and excavating, confined space entry, operating heavy equipment, and the direct handling of hazardous materials and hazardous waste. Predominately, these hazards are limited to occupational workers, but may impact the general public if there are trespassers or if any physical of chemical hazard extends beyond the restricted access of FirstNet work sites.

To protect occupational workers, the OSHA mandates that employers be required to protect their employees from occupational hazards that could result in injury. Depending on the source of the hazard and the site-specific work conditions, OSHA generally recommends the following hierarchy for protecting onsite workers.

1.) Engineering controls,

2.) Work practice controls,

3.) Administrative controls, and then

4.) Personal protective equipment (PPE).

Engineering controls are often physical barriers that prevent access to a worksite, areas of a worksite, or from idle and operating equipment. Physical barriers take many forms like perimeter fences, trench boxes,[157] chain locks, bollards, storage containers (for storing equipment and chemicals), or signage and caution tape. Other forms of engineering controls could include machinery designed to manipulate the quality of the work environment, such as ventilation blowers. Whenever practical, engineering controls may result in the complete removal of the hazard from the work site, an example of which would be the transport and offsite disposal of hazardous waste or asbestos containing materials.

[157]Trench boxes are framed metal structures inserted into open trenches to support trench faces, to protect workers from cave-ins and similar incidents. (OSHA, 2016e)

Work practice controls could be implemented as abiding by specific OSHA industry standards, such as the Confined Space Entry standard (29 CFR 1910.146) or thru the development of employer specific workplace rules and operational practices (OSHA, 2016d). To the extent practicable, FirstNet contractors would implement and abide by work practice controls through employee safety training and by developing site-specific health and safety plans (HASP). The HASPs would identify all potential hazardous materials and hazardous wastes, potential physical hazards, and applicable mitigation steps. Other components of a HASP identifying appropriate PPE for each task and the location of nearby medical facilities. Safety Data Sheets (SDS) describing the physical and chemical properties of hazardous materials used during FirstNet deployment and maintenance activities, as well as the physical and health hazards, routes of exposure, and precautions for safe handling and use would be kept and maintained at all FirstNet project sites. In addition to HASPs and SDSs, standard operating procedures (SOP) would be developed and implemented by FirstNet contractors for critical and/or repetitive tasks that require attention to detail, specialized knowledge, or clear step-wise directions to prevent worker injury and to ensure proper execution.

Administrative controls are employer-initiated methods to reduce the potential for injury and physical fatigue (OSHA, 2016d). Administrative controls may take the form of limiting the number of hours an employee is allowed to work per day, requiring daily safety meetings before starting work, utilizing the buddy system for dangerous tasks, and any other similar activity or process that is designed to identify and mitigate unnecessary exposure to hazards. When engineering controls, work practice controls, and administrative controls are not feasible or do not provide sufficient protection, employers must also provide appropriate PPE to their employees and ensure its proper use. PPE is the common term used to refer to the equipment worn by employees to minimize exposure to chemical and physical hazards. Examples of PPE include gloves, protective footwear, eye protection, protective hearing devices (earplugs, muffs), hard hats, fall protection, respirators, and full body suits. PPE is the last line of defense to prevent occupational injuries and exposure.

The Idaho Department of Labor is not authorized by OSHA to administer a state program for public or private sector employers. Therefore, the Idaho Department of Labor defers all regulatory authority and enforcement for occupational safety relating to FirstNet site work to the leadership and interpretation of OSHA. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Hazardous Materials, Hazardous Waste, and Mine Lands

The presence of environmental contamination at FirstNet deployment sites has the potential to negatively impact health and safety of workers and the general public. Past or present contaminated media, such as soil and groundwater, may be present and become disturbed as a result of site activities. Mines may cause unstable surface and subsurface conditions because of underground shaft collapses or seismic shifting. Based on the impact significance criteria presented in Table 5.2.15-1, human health impacts could be significant if FirstNet deployment sites are near contaminated properties or abandoned mine lands. Prior to the start of any FirstNet deployment project, potential site locations should be screened for known environmental contamination and/or mining activities using federal resources such as the USEPA Cleanups in My Community database and U.S. Department of Interior's Abandoned Mine Lands inventory, through the DEQ, or through an equivalent commercial resource.

By screening sites for environmental contamination, mining activities, and reported environmental liabilities, the presence of historic contamination and unsafe ground conditions could be evaluated and may influence the site selection process. In general, the lower the density of environmental contamination or mining activities, the more favorable the site will be for FirstNet deployment projects. If sites containing known environmental contamination (or mine lands) are selected for proposed FirstNet deployment activities it may be necessary to implement additional controls (e.g., engineering, work practice, administrative, and/or PPE) to ensure workers, and the general public, are not unnecessarily exposed to the associated hazards. Additionally, for any proposed FirstNet deployment site, it is possible undocumented environmental contamination is present.

During FirstNet deployment activities, if any soil or groundwater is observed to be stained or emitting an unnatural odor, it may be an indication of environmental contamination. When such instances are encountered, it may be necessary to stop work until the anomaly is further assessed through record reviews or environmental sampling. Proposed FirstNet deployment would attempt to avoid known contaminated sites. However, in the event that FirstNet is unable to avoid a contaminated site, then site analysis and remediation would be required under RCRA, CERCLA, and applicable Idaho state laws in order to protect workers and the general public from direct exposure or fugitive contamination.

Exposure assessments identify relevant site characteristics, temporal exposure parameters, and toxicity data to determine the likelihood of adverse health effects. More formally known as a human health risk assessment (HHRA), these studies provide mathematical justification for implementing controls at the site to protect human health. If the HHRA determines the potential for adverse health effects is too great DEQ may require FirstNet to perform environmental clean-up actions at the site to lower the existing levels of contamination. HHRAs help determine which level of PPE (i.e., Level D, Level C, Level B, or Level A) is necessary for a work activity. HHRAs take into account all exposure pathways: absorption, ingestion, inhalation, and injection. Therefore, specific protective measures (e.g., controls and PPE) that disrupt the exposure pathways could be identified, prioritized, and implemented. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Natural and Manmade Disasters

The impacts of natural and manmade disasters are likely to present unique health and safety hazards, as well as exacerbate pre-existing hazards, such as degrading occupational work conditions and disturbing existing environmental contamination. The unique hazards presented by natural and manmade disasters may include, fire, weather incidents (e.g., floods, tornadoes, hurricanes, etc.), earthquakes, vandalism, large- or small-scale chemical releases, utility disruption, community evacuations, or any other event that abruptly and drastically denudes the availability or quality of transportation infrastructure, utility infrastructure, medical infrastructure, and sanitation infrastructure. Additionally, such natural and manmade disasters could directly impact public safety communication infrastructure assets through damage or destruction.

Based on the impact significance criteria presented in Table 5.2.15-1, human health impacts could be significant if FirstNet deployment sites are located in areas that are directly impacted by natural and manmade disasters that could lead to exposure to hazardous wastes, hazardous materials, and occupational hazards. FirstNet's emphasis on public safety-grade communications infrastructure may result in a less than significant beneficial impact, as new infrastructure could be deployed with additional structural hardening, and existing infrastructure may also be hardened as appropriate and feasible, in an effort to reduce the possibility of infrastructure damage or destruction to some degree.

Potential mitigation measures for natural disasters is to be aware of current weather forecasts, forest fire activities, seismic activities, and other news worthy events that may indicate upcoming disaster conditions. Awareness provides time and opportunity to plan evacuation routes, to relocate critical equipment and parts, and to schedule appropriate work activities preceding and after the natural disaster. These mitigation steps reduce the presence of workers and dangerous work activities to reduce the potential for injury or death. Manmade disasters could be more difficult to anticipate due to the unexpected or accidental nature of the disaster. Though some manmade disasters are due to malicious intentions, many manmade disasters result from human error or equipment failure. The incidence of manmade disasters affecting FirstNet deployment sites would be difficult to predict and diminish because the source of such disasters is most likely to originate from sources independent of FirstNet activities. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partners would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.15.4. Potential Impacts of the Preferred Alternative

The following section assesses potential impacts associated with implementation of the Preferred Alternative, including deployment and maintenance activities.

Deployment Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, implementation of the Preferred Alternative could result in the deployment of various types of facilities or infrastructure. Depending on the physical nature and location of the facility/infrastructure and the specific deployment requirements, some activities would result in potential impacts to human health and safety and others would not. In addition, and as explained in this section, the same type of Proposed Action Infrastructure could result in a range of no impacts to less than significant with mitigation, depending on the deployment scenario or site-specific activities. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Activities Likely to Have No Impacts

Of the types of facilities or infrastructure deployment scenarios described in Section 2.1.2, Proposed Action Infrastructure, the following are likely to have no impacts to human health and safety under the conditions described below:

- Wired Projects
  - Use of Existing Conduit – New Buried Fiber Optic Plant: the pulling or blowing of fiber optic cable would be performed through existing conduit. Use of mechanical equipment would be limited to pulley systems and blowers. Some locations with no existing power supply may require the use of electrical generators. Hazardous materials needed for this work would include fiber optical cable lubricants, mechanical oil/grease, and fuel for electrical generators although these materials are expected to be used infrequently and in small quantities. These activities are not likely to result in serious injury or chemical exposure, or surface disturbances since work would be limited to existing entry and exit points, would be temporary, and intermittent. It is anticipated that there would be no impacts to human health and safety since these activities would be conducted with the use of OSHA and industry recognized controls.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable: Lighting up of dark fiber would have no impacts to human health and safety because there would be no ground disturbance or heavy equipment used.
- Satellites and Other Technologies
  - Deployment of Satellites: FirstNet does not anticipate launching satellites as part of the deployment of the NPSBN; however, it could include equipment on satellites that are already being launched for other purposes. As adding equipment to an existing launch vehicle would be very unlikely to impact human health and safety resources, it is anticipated that this activity would have no impact on those resources.

Activities with the Potential to Have Impacts

Potential deployment-related impacts to human health and safety as a result of implementation of the Preferred Alternative would encompass a range of impacts that occur as a result of ground disturbance activities, construction activities, equipment upgrade activities, management of hazardous materials and/or hazardous waste, and site selection. The types of infrastructure development scenarios or deployment activities that could be part of the Preferred Alternative and result in potential impacts to human health and safety include the following:

- Wired Projects
  - New Build – Buried Fiber Optic Plant: Plowing (including vibratory plowing), trenching, or directional boring and the construction of POPs, huts, or other associated facilities or hand-holes to access fiber could require the use of heavy equipment and hazardous materials. The additional noise and activity at the site would require workers to demonstrate a high level of situational awareness. Failure to follow OSHA and industry controls could result in injuries. Excavation of soil at proposed sites known to contain environmental contamination has the potential to expose workers to harmful chemicals or releases that could impact the general public in the immediate vicinity. Additionally,

some of this work would likely be performed along road right-of-ways, increasing the potential for vehicle traffic to collide with site workers or equipment. If a proposed deployment activity involves the operation of heavy equipment, managing hazardous materials and hazardous waste management, or other site location challenges, there could be potential human health and safety impacts to consider.

- New Build – Aerial Fiber Optic Plant: Installation of new poles and fiber optic lines could require excavation activities, working from heights, use of hazardous materials, and site locations in ROWs. Hazards associated with the site work include injury from heavy equipment, fall hazards, chemical hazards, and the potential for vehicle traffic to collide with site workers or equipment. Excavation of soil at proposed sites known to contain environmental contamination has the potential to expose workers to harmful chemicals or releases that could impact the general public in the immediate vicinity. If a proposed deployment activity involves the operation of heavy equipment, hazardous materials and hazardous waste management, or other site location challenges, there could be potential human health and safety impacts to consider.
- Collocation on Existing Aerial Fiber Optic Plant: Installation of overhead fiber optic lines would require work from height. In some instances, new poles would be installed requiring excavation activities with heavy equipment. Hazards associated with the site work include injury from heavy equipment, fall hazards, chemical hazards, and the potential for vehicle traffic to collide with site workers or equipment. Excavation of soil at proposed sites known to contain environmental contamination has the potential to expose workers to harmful chemicals or releases that could impact the general public in the immediate vicinity. If a proposed deployment activity involves the operation of heavy equipment, hazardous materials and hazardous waste management, or other site location challenges, there could be potential human health and safety impacts to consider.
- New Build – Submarine Fiber Optic Plant: The installation of cables in or near bodies of water would not impact human health and safety resources because there would be no local human health and safety resources to impact. However, impacts to human health and safety resources could potentially occur as result of the construction of landings and/or facilities on shores or the banks of water bodies that accept the submarine cable, depending on the exact site location and proximity to existing human health and safety resources.
- Installation of Optical Transmission or Centralized Transmission Equipment: Installation of transmission equipment would require site preparation, construction activities, and management of hazardous materials and hazardous waste. Excavation of soils at proposed sites known to contain environmental contamination may result in workers being exposed to harmful chemicals or releases that could impact the general public in the immediate vicinity. If a proposed deployment activity involves the operation of heavy equipment, hazardous materials and hazardous waste management, or other site location challenges, there could be potential human health and safety impacts to consider.

- Wireless Projects
  - New Wireless Communication Towers: Installation of new wireless towers and associated structures (generators, equipment sheds, fencing, security and aviation lighting, electrical feeds, and concrete foundations and pads) or access roads would

require site preparation, construction activities, and management of hazardous materials and hazardous waste. Communication towers would be erected, requiring workers to perform their duties from heights sufficient to result in serious injury or death in the event of falling. Working from heights may also result in additional overhead hazards and falling objects. Excavation of soils at proposed sites known to contain environmental contamination may result in workers being exposed to harmful chemicals or releases that could impact the general public in the immediate vicinity. If a proposed deployment activity involves the operation of heavy equipment, hazardous materials and hazardous waste management, or other site location challenges, there could be potential human health and safety impacts to consider. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions.

  - Collocation on Existing Wireless Tower, Structure, or Building: Collocation would involve mounting or installing equipment (such as antennas or microwave dishes) on an existing tower. This would require workers to perform their duties from heights sufficient to result in serious injury or death in the event of falling not result in impacts to soils. Working from heights may also result in additional overhead hazards and falling objects. Excavation of soils at proposed sites known to contain environmental contamination may result in workers being exposed to harmful chemicals or releases that could impact the general public in the immediate vicinity. If a proposed deployment activity involves the operation of heavy equipment, hazardous materials and hazardous waste management, or other site location challenges, there could be potential human health and safety impacts to consider. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions.

- Deployable Technologies
  - The use of deployable technologies could result in soil disturbance if land-based deployables are deployed on unpaved areas or if the implementation results in paving of previously unpaved surfaces. The use of heavy machinery presents the possibility for spills and soil and water contamination, and noise emissions could potentially impact human health; and vehicles and heavy equipment present the risk of workplace and road traffic accidents that could result in injury. Set-up of a cellular base station contained in a trailer with a large expandable antenna mast is not expected to result in impacts to human health and safety. However, due to the larger size of the deployable technology, site preparation or trailer stabilization may be required to ensure the self-contained unit is situated safely at the site. Additionally, the presence of a dedicated electrical generator would produce fumes and noise. The possibility of site work and the operation of a dedicated electrical generator have the potential for impacts to human health and safety. For a discussion of radio frequency emissions, refer to Section 2.4, Radio Frequency Emissions. Use of aerial vehicles would not involve telecommunication site work. Prior to deployment and when not in use, the aerial vehicles would likely require preventive maintenance. Workers responsible for these activities may handle hazardous materials, not limited to fuel, solvents, and adhesives.

- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment: The use of portable devices that utilize satellite technology would not impact human health and safety because there is no

construction activities or use of hazardous materials. The installation of permanent equipment on existing structures may require workers to operate from heights or in sensitive environments. As a result, the potential for falling, overhead hazards, and falling objects is greater and there is a potential to impact human health and safety.

In general, the abovementioned FirstNet activities could potentially involve site preparation work, construction activities, work in potentially harmful environments (road ROW, work over water, and environmental contamination), management of hazardous materials and hazardous waste, and weather exposure. Potential impacts to human health and safety associated with deployment of the Proposed Project could include injury from site preparation and operating heavy equipment, construction activities, falling/overhead hazards/falling objects, exposure and release of hazardous chemicals and hazardous waste, and release of historic contamination to the surrounding environment. It is anticipated that potential health impacts associated with human exposure to environmental hazardous materials in air, water, or soil, the risk of road traffic, workplace accidents and injuries, noise exposure, and risk of infectious disease transmission would be less than significant due to the small-scale of likely FirstNet activities that would be temporary and of short duration. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As described in Section 2.1.2, Proposed Action Infrastructure, operation activities associated with the Preferred Alternative would consist of routine maintenance and inspection of the facilities. Any major infrastructure replacement as part of ongoing system maintenance would result in impacts similar to the abovementioned construction impacts. It is anticipated that there would be less than significant impacts to human health and safety associated with routine inspections of the Preferred Alternative. Use of PPE or other mitigation measures could be necessary to adequately protect workers. If usage of heavy equipment is part of routine maintenance, the potential for impacts to human health and safety would also increase. It is anticipated that potential health impacts associated with human exposure to environmental hazardous materials in air, water, or soil, the risk of road traffic, workplace accidents and injuries, noise exposure, and risk of infectious disease transmission would be less than significant due to the small-scale of likely FirstNet activities that would be temporary and of short duration. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

5.2.15.5. Alternatives Impact Assessment

The following section assesses potential impacts to human health and safety associated with the Deployable Technologies Alternative and the No Action Alternative.

Deployable Technologies Alternative

Under the Deployable Technologies Alternative option, a nationwide fleet of mobile communications systems would provide temporary coverage in areas not covered by the existing, usable land-based infrastructure. There would be no collocation of equipment and minimal new construction associated with wired or wireless projects discussed above under the Preferred Alternative. Some limited construction could be associated with implementation such as land clearing or paving for parking or staging areas. The specific infrastructure associated with the Deployable Technologies Alternative would be the same as the deployable technologies implemented as part of the Preferred Alternative but would likely be implemented in greater numbers, over a larger geographic extent, and used with greater frequency and duration. Therefore, potential impacts to human health and safety as a result of implementation of this alternative could be as described below.

Deployment Impacts

As explained above, implementation of deployable technologies could result in less than significant impacts to human health and safety. The largest of the land-based deployable technologies may require site preparation work or stabilization work to ensure the self-contained trailers are stable. Heavy equipment may be necessary to complete the site preparation work. However, in general, the deployable technologies are small mobile units that could be transported as needed. While in operation, the units are parked and operate off electrical generators or existing electrical power sources. Connecting deployable technology to a power supply may present increased electrocution risk during the process of connecting power. If the power source is an electrical generator, then there would also likely be a need to manage hazardous materials (fuel) onsite. These activities could result in less than significant impacts to human health and safety. It is anticipated that potential health impacts associated with human exposure to environmental hazardous materials in air, water, or soil, the risk of road traffic, workplace accidents and injuries, noise exposure, and risk of infectious disease transmission would be less than significant due to the small-scale of likely FirstNet activities that would be temporary and of short duration. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

Operation Impacts

As explained above, operation activities would consist of implementation/running of the deployable technology and routine maintenance and inspections. As with the Preferred Alternative, it is anticipated that there would be no impacts to human health and safety associated with routine inspections of the Preferred Alternative. Use of PPE or other mitigation measures may be necessary to adequately protect workers. If usage of heavy equipment is part of routine maintenance, the potential for impacts to human health and safety would also increase. These impacts would be less than significant because of the small-scale of likely FirstNet activities; activities associated would routine maintenance, inspection, and deployment of deployable technologies would be temporary and often of limited duration. Chapter 9, BMPs and Mitigation Measures, provides a listing of BMPs and mitigation measures that FirstNet and/or its partner(s) would require, as practicable or feasible, to avoid or minimize potential impacts.

No Action Alternative

Under the No Action Alternative, the NPSBN would not be deployed; therefore, there would be no associated construction or installation of wired, wireless, deployable infrastructure or satellites and other technologies. As a result, there would be no impacts to human health and safety as a result of construction and operation of the Proposed Action. Environmental conditions would therefore be the same as those described in Section 5.1.15, Human Health and Safety.

ID Appendix A – Water Resources

Table A-1: Idaho Federal Wild, Scenic, and Recreational Rivers

River Name	River Description	Designation
Battle Creek	March 30, 2009. Battle Creek from its confluence with the Owyhee River to the upstream boundary of the Owyhee River Wilderness.	Wild — 23.4 miles
Big Jacks Creek	March 30, 2009. Big Jacks Creek from the downstream border of the Big Jacks Creek Wilderness in Section 8, Township 8 South, Range 4 East, to the point at which it enters the Northwest 1/4 of Section 26, Township 10 South, Range 2 East, Boise Meridian.	Wild — 35.0 miles
Bruneau River	March 30, 2009. The Bruneau River from the downstream boundary of the Bruneau-Jarbidge Wilderness to its upstream confluence with the West Fork of the Bruneau River.	Wild — 38.7 miles; Recreational — 0.6 miles
Bruneau River (West Fork)	March 30, 2009. The West Fork of the Bruneau River from its confluence with the Jarbidge River to the downstream boundary of the Bruneau Canyon Grazing Allotment in the Southeast/Northeast quadrants of Section 5, Township 13 South, Range 7 East, Boise Meridian	Wild — 0.4 miles
Clearwater River (Middle Fork)	October 2, 1968. The Middle Fork from the town of Kooskia upstream to the town of Lowell. The Lochsa River from its confluence with the Selway River at Lowell (forming the Middle Fork) upstream to the Powell Ranger Station. The Selway River from Lowell upstream to its origin.	Wild — 54.0 miles; Recreational — 131.0 miles
Cottonwood Creek	March 30, 2009. Cottonwood Creek from its confluence with Big Jacks Creek to the upstream boundary of the Big Jacks Creek Wilderness.	Wild — 2.6 miles
Deep Creek	March 30, 2009. Deep Creek from its confluence with the Owyhee River to the upstream boundary of the Owyhee River Wilderness in Section 30, Township 12 South, Range 2 West, Boise Meridian.	Wild — 13.1 miles
Dickshooter Creek	March 30, 2009. Dickshooter Creek from its confluence with Deep Creek to a point on the stream 1/4 mile due west of the east boundary of Section 16, Township 12 South, Range 2 West, Boise Meridian.	Wild — 9.3 miles
Duncan Creek	March 30, 2009. Duncan Creek from its confluence with Big Jacks Creek upstream to the east boundary of Section 18, Township 10 South, Range 4 East, Boise Meridian	Wild — 0.9 miles
Jarbidge River	March 30, 2009. The Jarbidge River from its confluence with the West Fork of the Bruneau River to the upstream boundary of the Bruneau-Jarbidge Rivers Wilderness	Wild — 28.8 miles
Little Jacks Creek	March 30, 2009. Little Jacks Creek from the downstream boundary of the Little Jacks Creek Wilderness upstream to the mouth of OX Prong Creek.	Wild — 12.4 miles
Owyhee River	March 30, 2009. The Owyhee River from the Idaho-Oregon state border to the upstream boundary of the Owyhee River Wilderness	Wild — 67.3 miles
Owyhee River (North Fork)	March 30, 2009. The North Fork of the Owyhee River from the Idaho-Oregon state border upstream to the upstream boundary of the North Fork Owyhee River Wilderness	Wild — 15.1 miles; Recreational — 5.7 miles

Owyhee River (South Fork)	March 30, 2009. The South Fork of the Owyhee River upstream from its confluence with the Owyhee River to the upstream boundary of the Owyhee River Wilderness at the Idaho Nevada state border	Wild — 30.2 miles; Recreational — 1.2 miles
Rapid River	December 31, 1975. The segment from the headwaters of the main stem to the national forest boundary. The segment of the West Fork from the wilderness boundary downstream to the confluence with the main stem.	Wild — 26.8 miles
Red Canyon River	March 30, 2009. Red Canyon from its confluence with the Owyhee River to the upstream boundary of the Owyhee River Wilderness	Wild — 4.6 miles
St. Joe River	November 10, 1978. The segment above the confluence of the North Fork of the St. Joe River to St. Joe Lake	Wild — 26.6 miles; Recreational — 39.7 miles
Salmon River	July 23, 1980. The segment of the main stem from the mouth of the North Fork of the Salmon River downstream to Long Tom Bar.	Wild — 79.0 miles; Recreational — 46.0 miles
Salmon River (Middle Fork)	October 2, 1968. From its origin to its confluence with the Main Salmon River.	Wild — 103.0 miles; Scenic — 1.0 mile
Sheep Creek	March 30, 2009. Sheep Creek from its confluence with the Bruneau River to the upstream boundary of the Bruneau-Jarbidge Rivers Wilderness	Wild — 25.6 miles
Snake River, Idaho, Oregon	December 1, 1975. The segment from Hells Canyon Dam downstream to an eastward extension of the north boundary of section 1, T5N, R47E, Willamette meridian.	Wild — 32.5 miles; Scenic — 34.4 miles
Wickahoney Creek	March 30, 2009. Wickahoney Creek from its confluence with Big Jacks Creek to the upstream boundary of the Big Jacks Creek Wilderness	Wild — 1.5 miles

Source: (National Wild and Scenic Rivers System, 2015)

ACRONYMS

Acronym	Definition
AARC	Average Annual Rate of Change
ACHP	Advisory Council On Historic Preservation
ACS	American Community Survey
AGL	Above Ground Level
AIM	Aeronautical Information Manual
AIRFA	American Indian Religious Freedom Act
AML	Abandoned Mine Lands
ANR	Agency of Natural Resources
AQCR	Air Quality Control Region
ARPA	Archaeological Resources Protection Act of 1979
ASL	Above Sea Level
ASPM	Aviation System Performance Metrics
ATC	Air Traffic Control
ATO	Air Traffic Organization
ATSDR	Agency For Toxic Substances and Disease Registry
BGEPA	Bald and Golden Eagle Protection Act
BHS	Idaho Bureau of Homeland Security
BLS	Bureau of Labor Statistics
BOI	Idaho, Boise Airport
BTOP	Broadband Technology Opportunity Program
BTV	Burlington International Airport
CAA	Clean Air Act
CDC	Centers for Disease Control and Prevention
CEQ	Council On Environmental Quality
CFR	Code of Federal Regulations
CGP	Construction General Permit
CH_4	Methane
CIMC	Cleanups In My Community
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CPG	Certificates of Public Good
CRS	Community Rating System
CWA	Clean Water Act
CWMA	Cooperative Weed Management Areas
CWS	Community Water Systems
DEQ	Idaho Department of Environmental Quality
DOD	Department of Defense

Acronym	Definition
DOE	Department of Energy
EIA	Energy Information Administration
EICAWIN	Eastern Idaho Cooperative Agencies Wireless Interoperable Network
EMS	Emergency Medical Services
EO	Executive Order
EPCRA	Emergency Planning and Community Right To Know Act
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FGDC	Federal Geographic Data Committee
FHWA	Federal Highway Administration
FLM	Federal Land Manager
FSDO	Flight Standards District Office
FSS	Flight Service Station
GAP	Gap Analysis Program
GHG	Greenhouse Gas
GRANK	Global Rank
HAP	Hazardous Air Pollutant
HASP	Health and Safety Plans
HHRA	Human Health Risk Assessment
IAC	Idaho Administrative Code
IBA	Important Birding Areas
IBOL	Idaho Bureau of Occupational Licenses
ICAWIN	Idaho Cooperative Agencies Wireless Interoperable Network
IDA	Idaho Falls Regional Airport
IDAPA	Idaho Administrative Procedures Act
IDHW	Idaho Department of Health and Welfare
IDL	Idaho Department of Lands
IDWR	Idaho Department of Water Resources
IFR	Instrument Flight Rules
IFWIS	Idaho Fish and Wildlife Information Service
IGA	Idaho General Assembly
INHP	Idaho National Heritage Program
IPCC	Intergovernmental Panel On Climate Change
ISDA	Idaho State Department of Agriculture
ITD	Idaho Transportation Department
IWIN	Integrated Wireless Network

Acronym	Definition
LBS	Locations-Based Services
LCCS	Land Cover Classification System
LMR	Land Mobile Radio
LRR	Land Resource Region
LTE	Long-Term Evolution
MBTA	Migratory Bird Treaty Act
MHI	Median Household Income
MLRA	Major Land Resource Areas
MMPA	Marine Mammal Protection Act
MMT	Million Metric Tons
MSFCMA	Magnuson Stevens Fishery Conservation And Management Act
MSL	Mean Sea Level
MYA	Million Years Ago
N_2O	Nitrous Oxide
NA	Not Applicable
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NAICS	North American Industry Classification System
NAS	National Airspace System
NASAO	National Association of State Aviation Officials
NCR	National Capital Region
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHA	National Heritage Area
NHL	National Historic Landmarks
NHPA	National Historic Preservation Act
NIST	National Institute of Standards and Technology
NM	Nautical Miles
NNL	National Natural Landmarks
NOAA	National Oceanic Atmospheric Administration
NOTAM	Notices To Airmen
NO_X	Oxides of Nitrogen
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
NPSBN	Nationwide Public Safety Broadband Network
NRB	Natural Resources Board
NRC	National Response Center

Acronym	Definition
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSA	National Security Areas
NTFI	National Task Force On Interoperability
NTIA	National Telecommunications and Information Authority
NTNCWS	Non-Transient Non-Community Water Systems
NWI	National Wetlands Inventory
NWP	Nationwide Permit
NWR	National Wildlife Refuge
NWS	National Weather Service
OE/AAA	Obstruction Evaluation and Airport Airspace Analysis
OSHA	Occupational Safety and Health Administration
OTR	Ozone Transport Region
PADUS	Protected Area Database of the U.S.
PEIS	Programmatic Environmental Impact Study
PEM	Palustrine Emergent
PFO	Palustrine Forested
PGA	Peak Ground Acceleration
PPE	Personal Protective Equipment
PSCR	Public Safety Communications Research
PSD	Prevention of Significant Deterioration
PSS	Palustrine Scrub-Shrub
PUC	Idaho Public Utilities Commission
RCRA	Resource Conservation and Recovery Act
RF	Radio Frequency
SAA	Sense and Avoid
SAIPE	Small Area Income and Poverty Estimates
SASP	State Aviation System Plan
SDS	Safety Data Sheets
SEIC	Statewide Interoperability Executive Council
SF_6	Sulfur Hexafluoride
SGCN	Species of Greatest Conservation Need
SIP	State Implementation Plan
SOC	Standard Occupational Classification
SOP	Standard Operating Procedure
SO_X	Oxides of Sulfur
SPDES	State Pollutant Discharge Elimination System
SPL	Sound Pressure Level

Acronym	Definition
SRANK	State Rank
SUA	Special Use Airspace
SWPPP	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
TNCWS	Transient Non-Community Water Systems
TRI	Toxics Release Inventory
TWA	Time Weighted Average
UA	Unmanned Aircraft
UAS	Unmanned Aircraft Systems
UHF	Ultra High Frequency
USACE	U.S. Army Corp of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Change Research Program
USGS	U.S. Geological Survey
VCP	Voluntary Cleanup Program
VFR	Visual Flight Rules
VHF	Very High Frequency
VOC	Ozone
WCS	Wetland Classification System
WMA	Wildlife Management Areas
WONDER	Wide-ranging Online Data for Epidemiologic Research
WWII	World War II

REFERENCES

The citations in this Draft PEIS reflect the most recent information on the referenced site at the time the document was being written. If the site was updated after that point, the more recent information will be incorporated, as feasible, into the final document.

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