DOE/EIS-0232- Figures and Table 2.1

Figure S.1

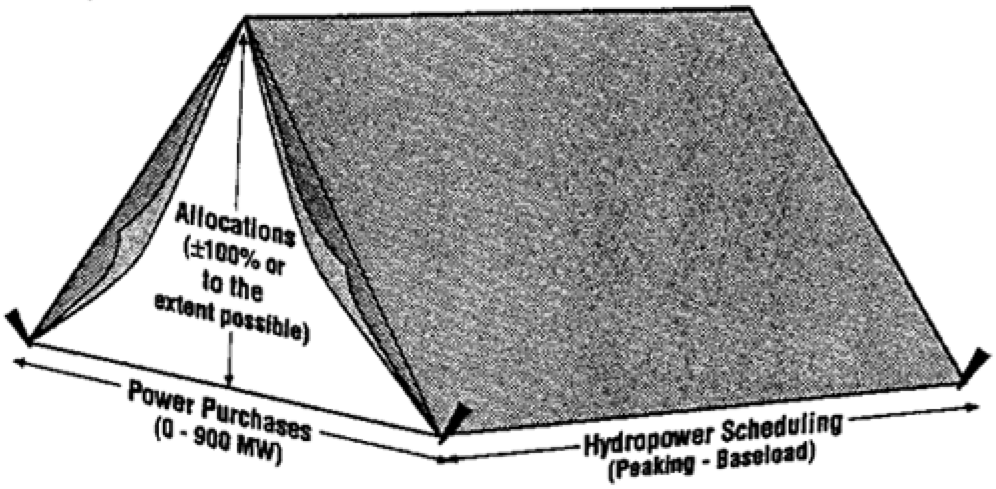


Figure S.1. The Tent Stakes Approach for Examining the Limits of the Alternatives

Figure 1.1

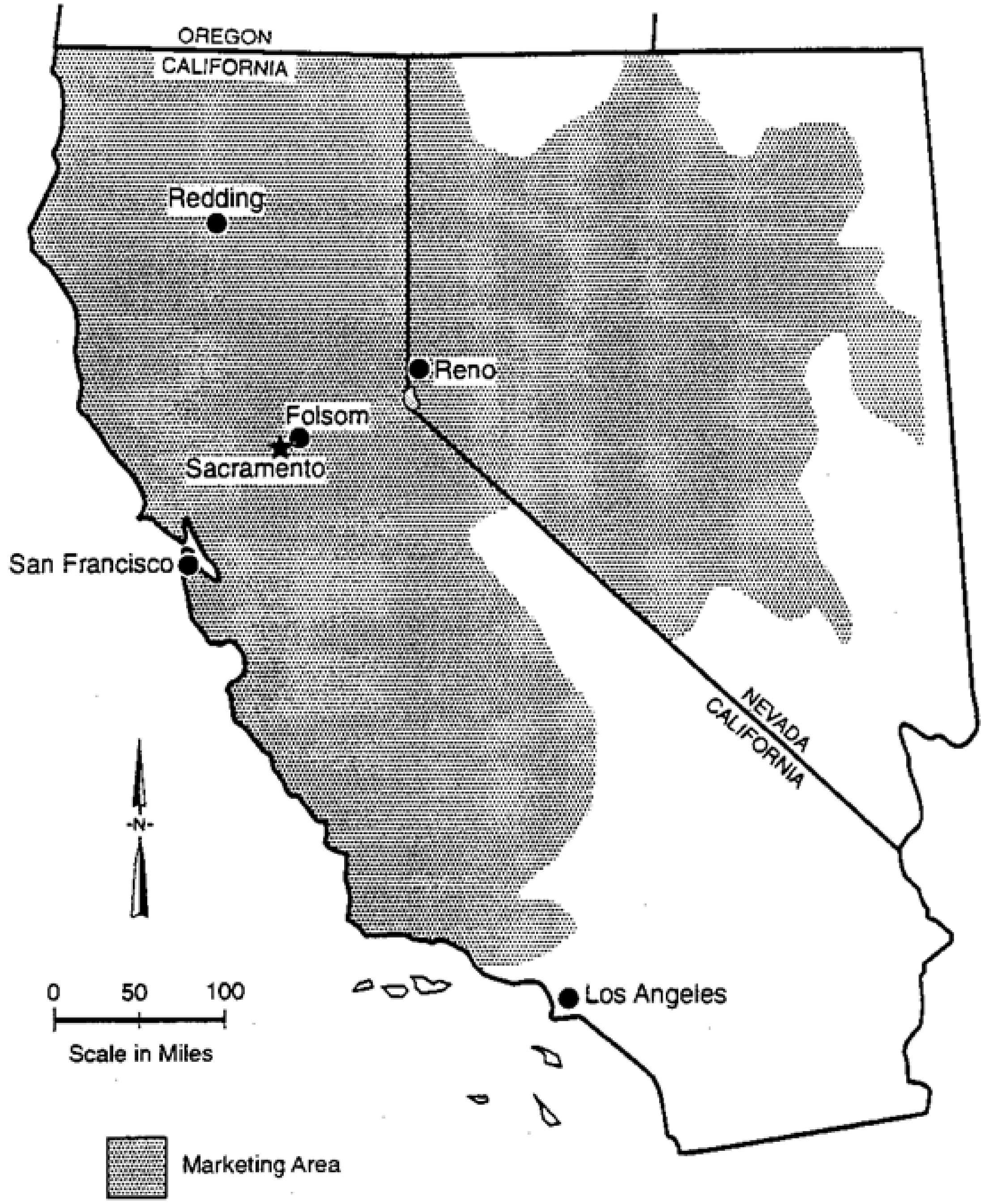
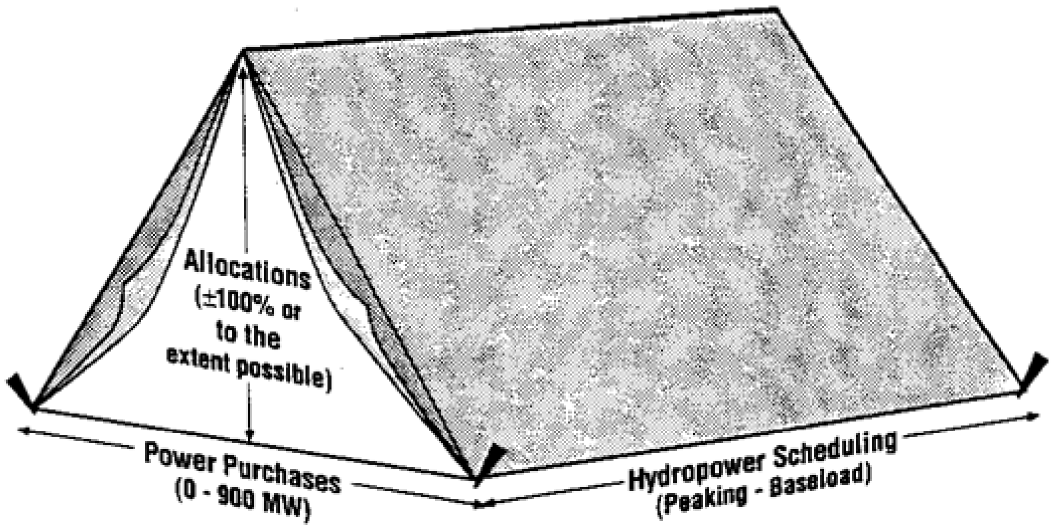

OREGON
CALIFORNIA
Redding
Reno
Folsom
Sacramento
San Francisco
NEVADA
CALIFORNIA
-N-
0
50
100
Scale in Miles
Los Angeles
Marketing Area

Figure 1.2



Allocations
(±100% or
to the
extent possible)
Power Purchases
(0 - 900 MW)
Hydropower Scheduling
(Peaking - Baseload)

Figure 1.3

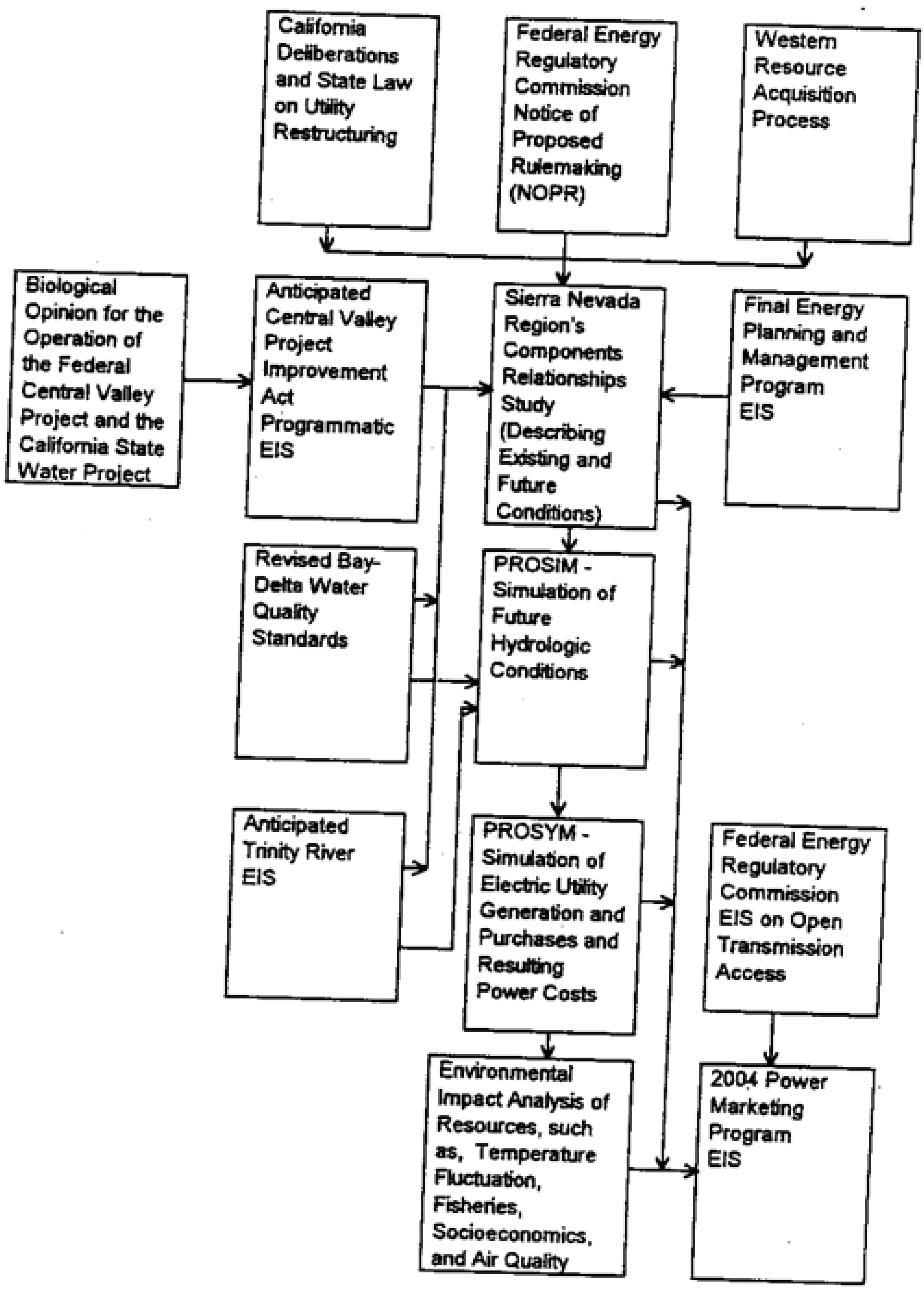

California Deliberations and State Law on Utility Restructuring
Federal Energy Regulatory Commission Notice of Proposed Rulemaking (NOPR)
Western Resource Acquisition Process
Biological Opinion for the Operation of the Federal Central Valley Project and the California State Water Project
Anticipated Central Valley Project Improvement Act Programmatic EIS
Sierra Nevada Region's Components Relationships Study (Describing Existing and Future Conditions)
Final Energy Planning and Management Program EIS
Revised Bay-Delta Water Quality Standards
PROSIM - Simulation of Future Hydrologic Conditions
Anticipated Trinity River EIS
PROSYM - Simulation of Electric Utility Generation and Purchases and Resulting Power Costs
Federal Energy Regulatory Commission EIS on Open Transmission Access
Environmental Impact Analysis of Resources, such as, Temperature Fluctuation, Fisheries, Socioeconomics, and Air Quality
2004 Power Marketing Program EIS

Figure 2.1

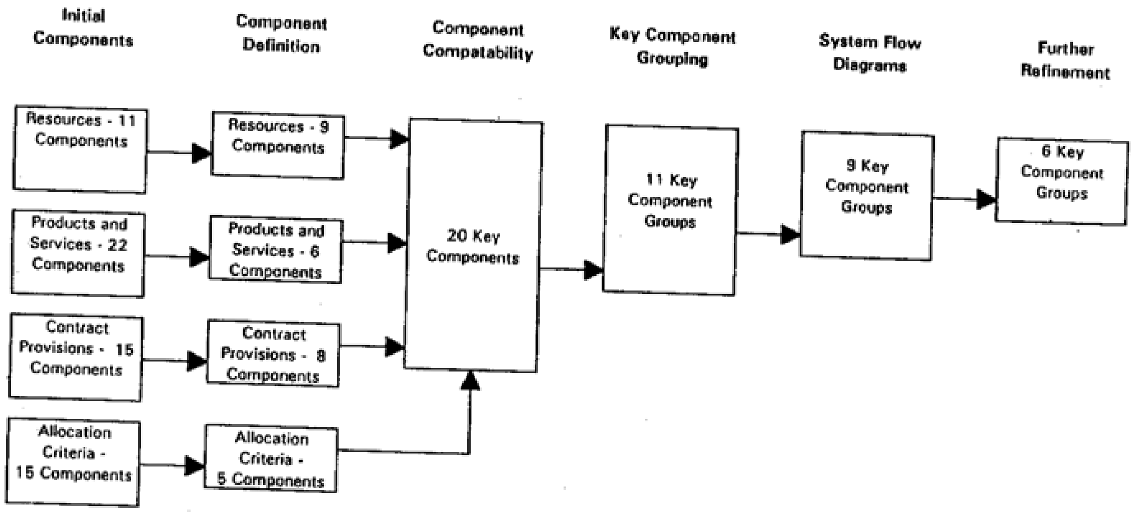


Figure 2.2

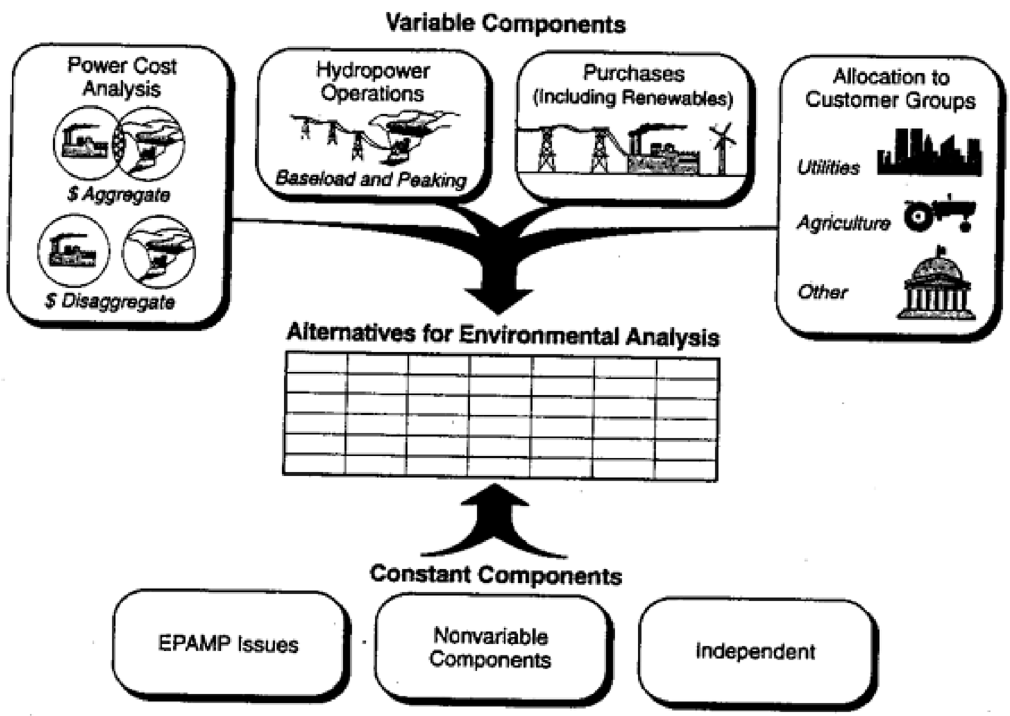
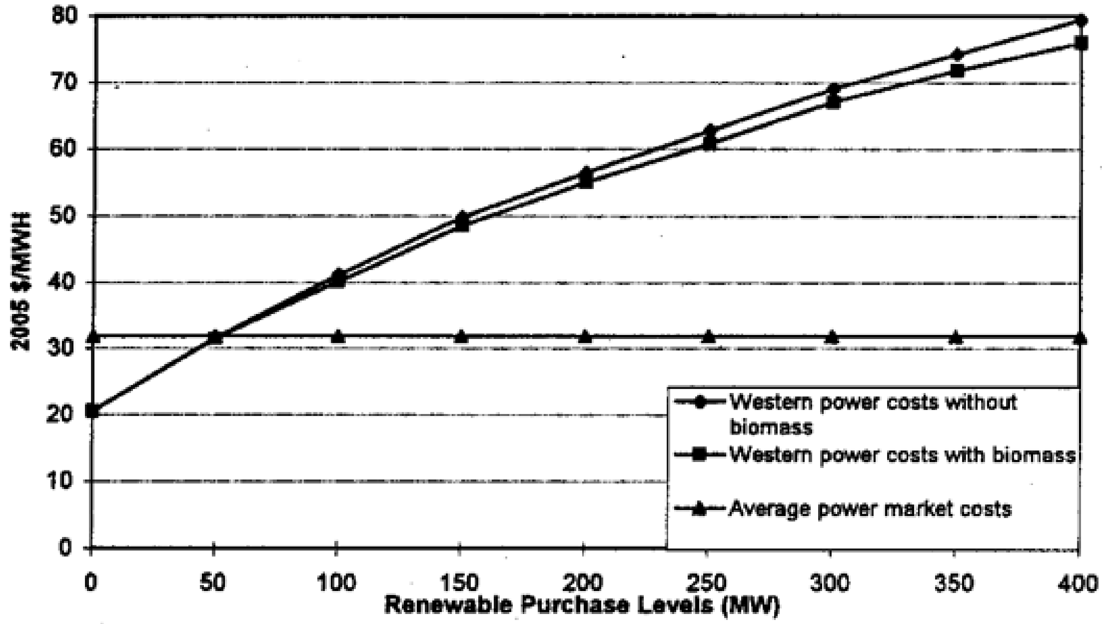
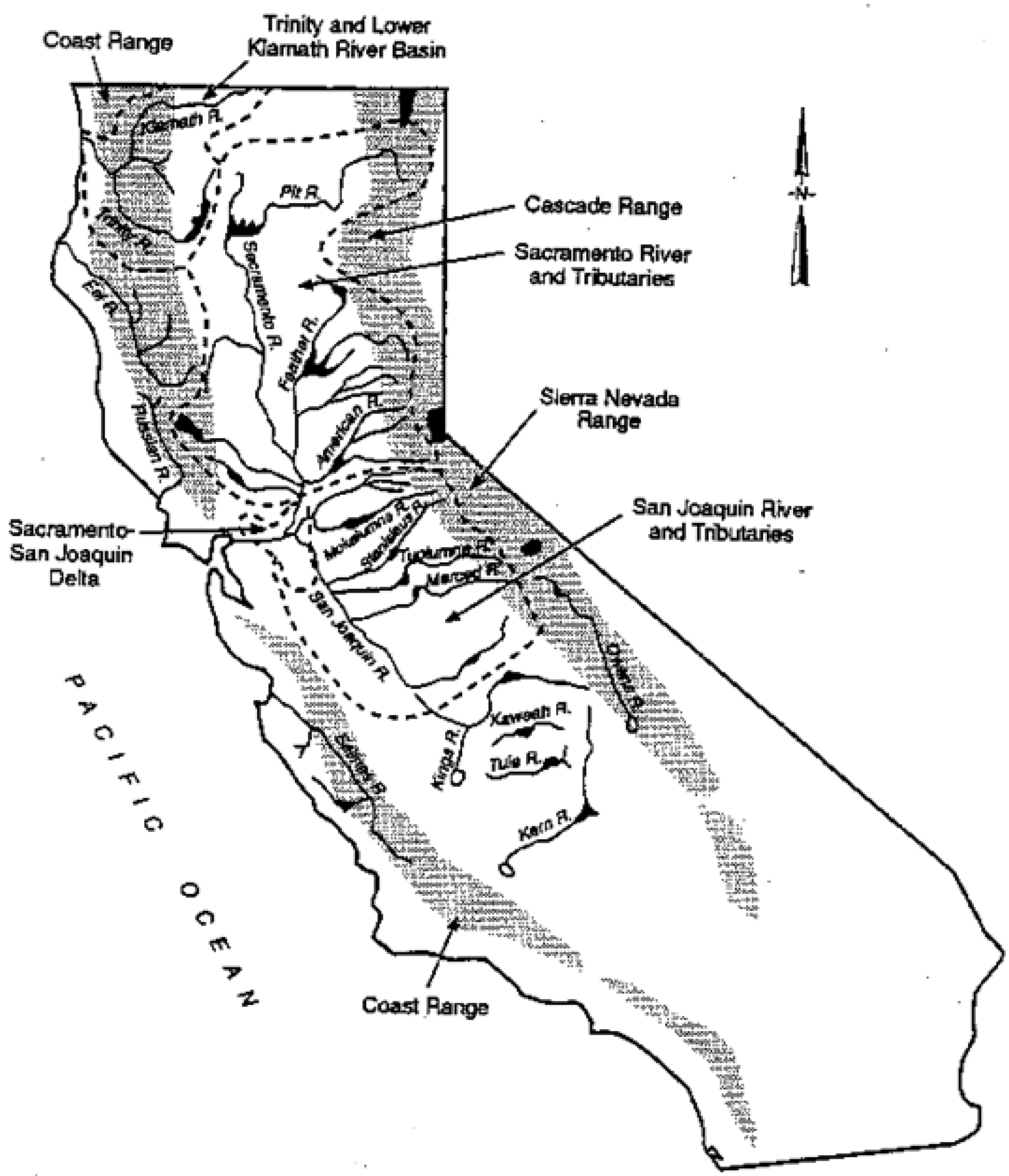


Figure 2.3



2005 $/MWH
80
70
60
50
40
30
20
10
0
0
50
100
150
200
250
300
350
400
Renewable Purchase Levels (MW)
Western power costs without biomass
Western power costs with biomass
Average power market costs

Figure 3.1



Coast Range
Trinity and Lower Klamath River Basin
Klamath R.
Pit R.
Cascade Range
Sacramento River and Tributaries
Sacramento R.
Feather R.
American R.
Eel R.
Russian R.
Sierra Nevada Range
San Joaquin River and Tributaries
Sacramento-San Joaquin Delta
Mokelumne R.
Stanislaus R.
Tuolumne R.
Merced R.
San Joaquin R.
Owens R.
Kaweah R.
Kings R.
Tule R.
Kern R.
PACIFIC OCEAN
Coast Range
-N-

Figure 3.2

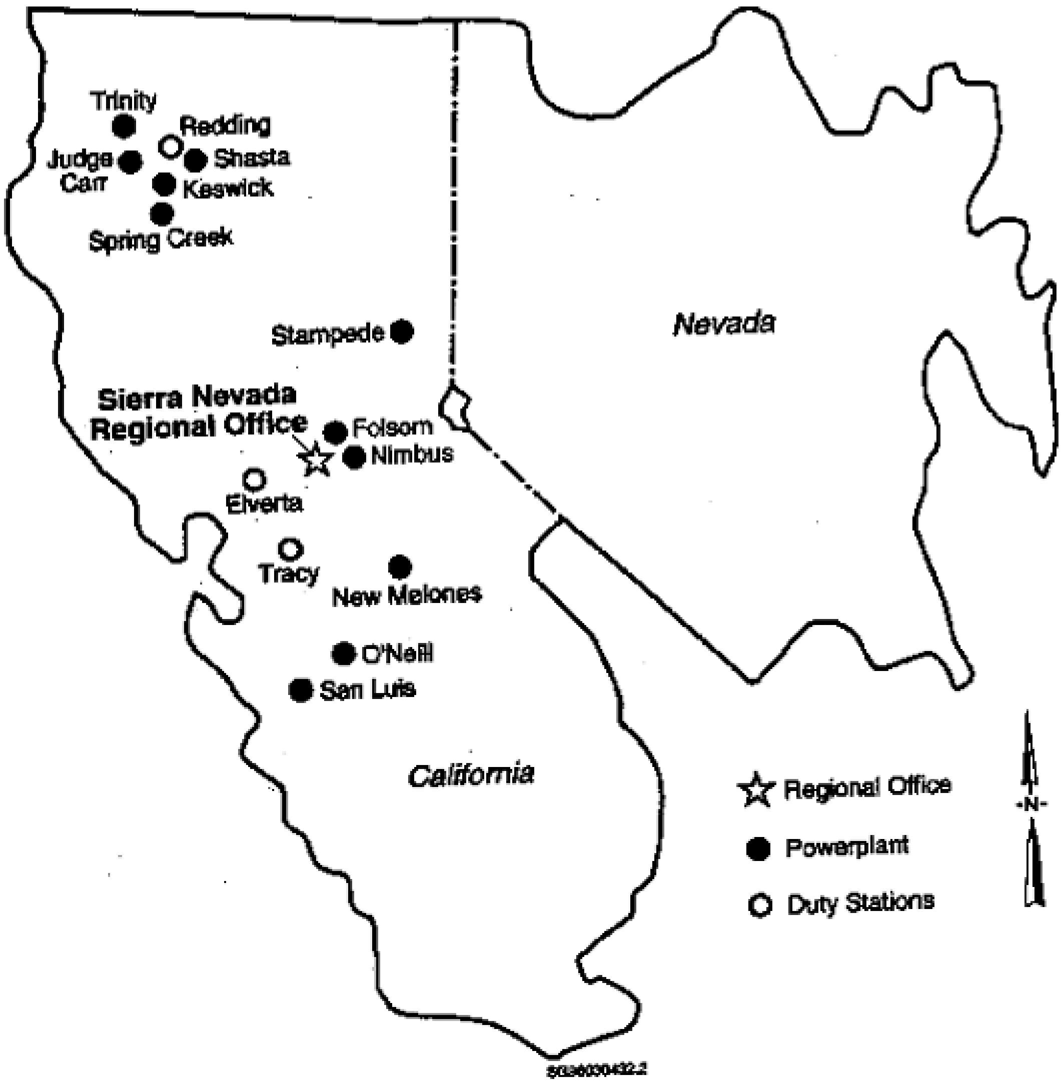


Figure 3.2. Federal Powerplants of the Sierra Nevada Region

Figure 3.3

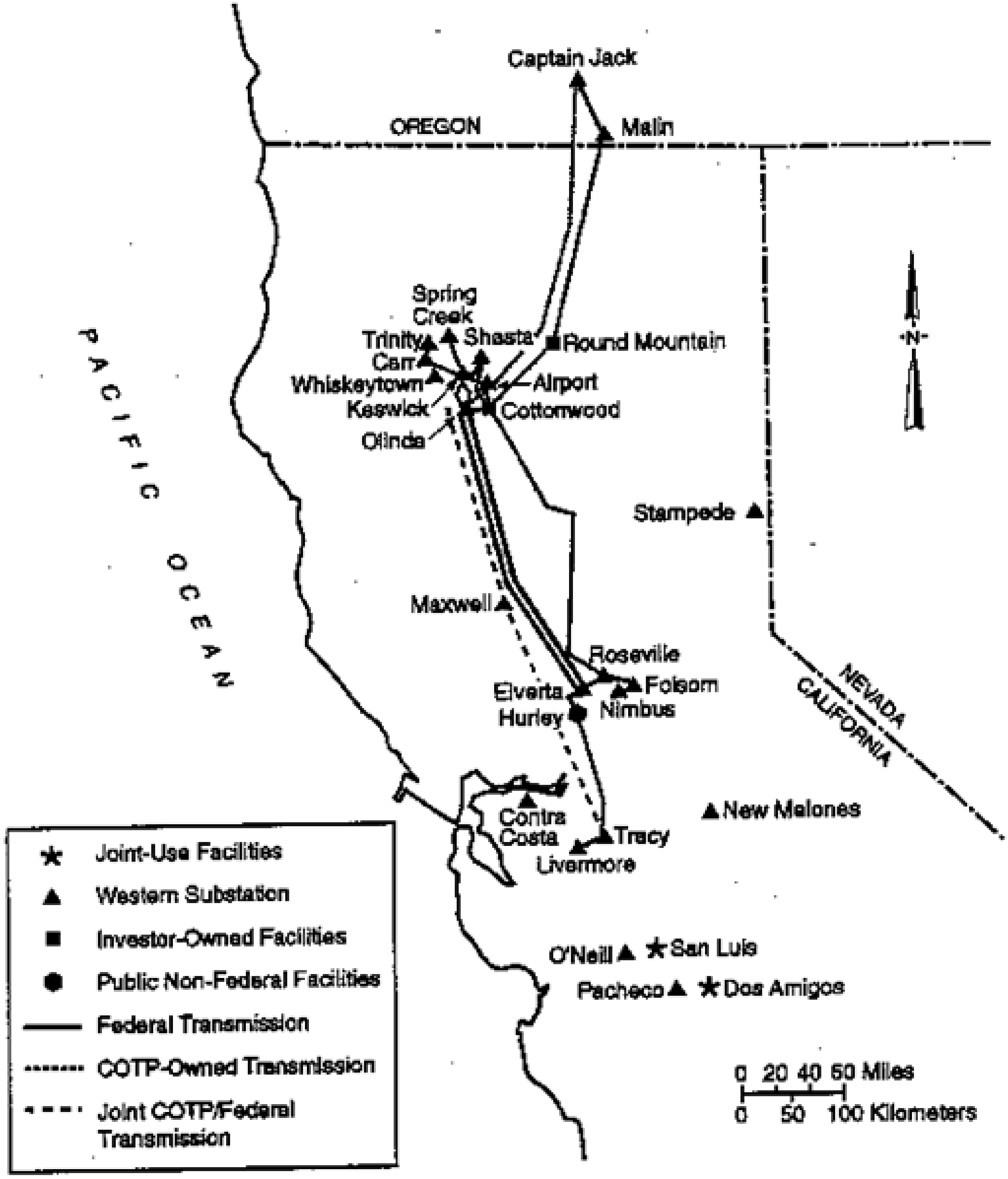
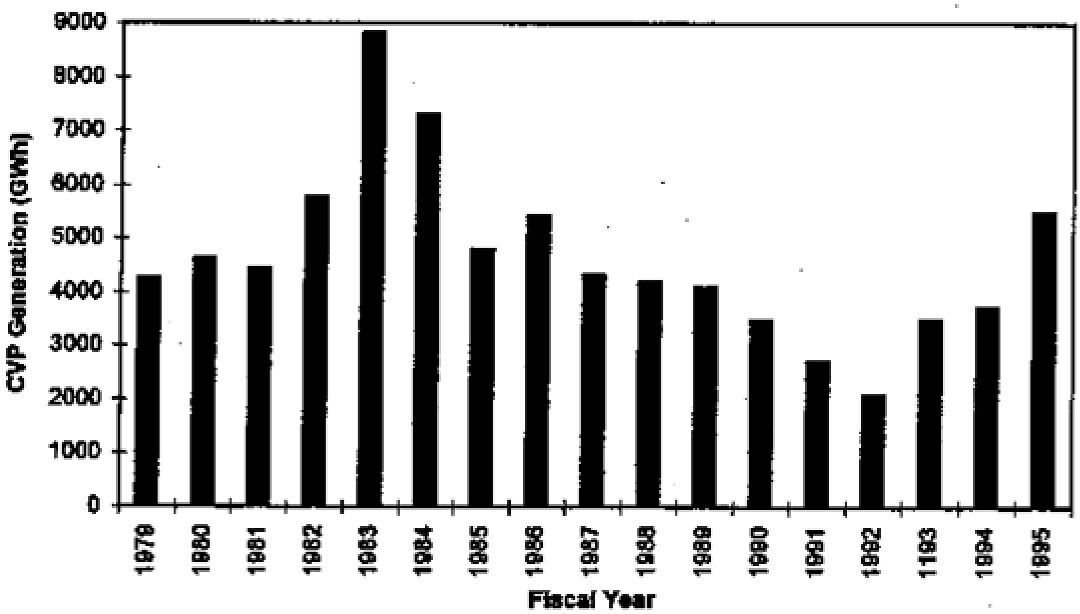


Figure 3.3. Sierra Nevada Region's Principal Transmission Facilities

Figure 3.4



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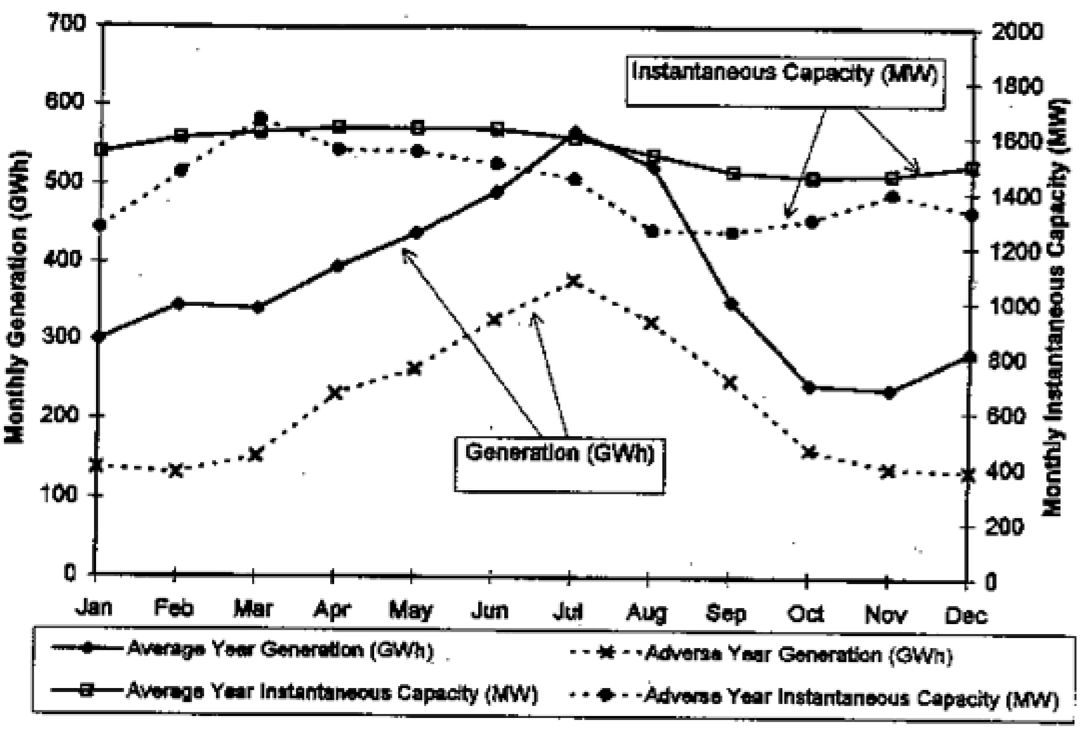


Figure 3.6

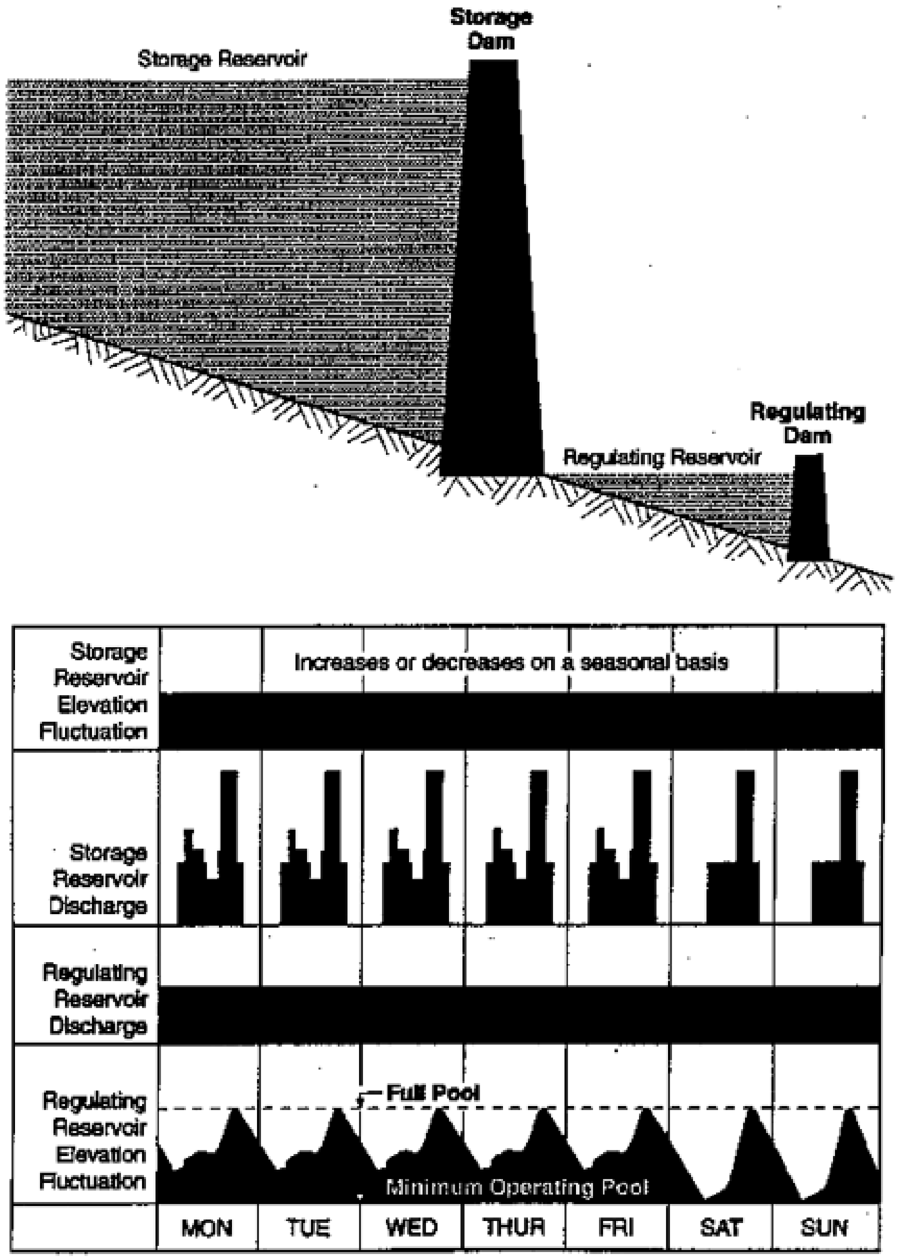
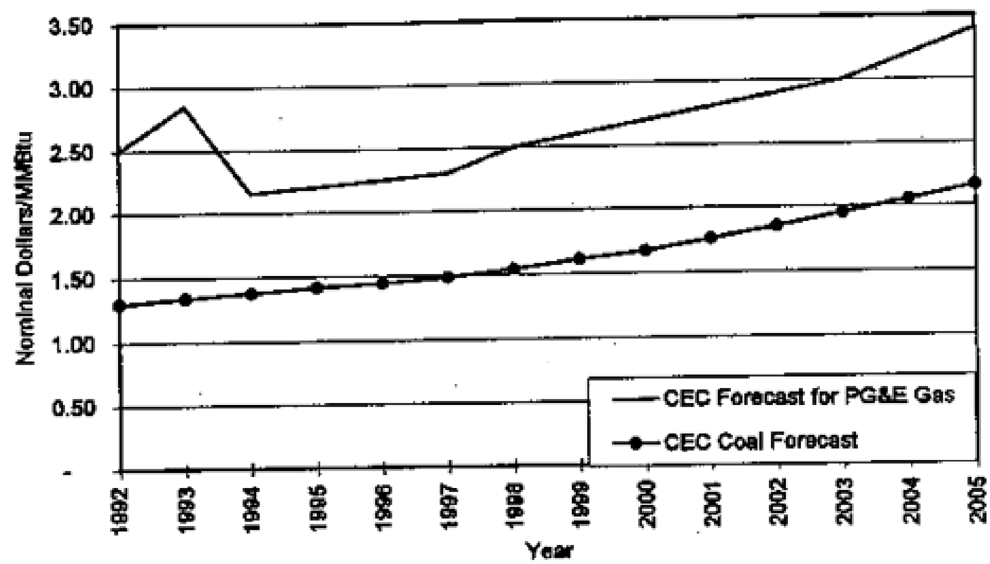


Figure 3.6. Example of Daily Flow Fluctuations for CVP Reservoirs

Figure 3.7



3.50
3.00
2.50
2.00
1.50
1.00
0.50
Nominal Dollars/MMBtu
CEC Forecast for PG&E Gas
CEC Coal Forecast
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
Year

Figure 3.8

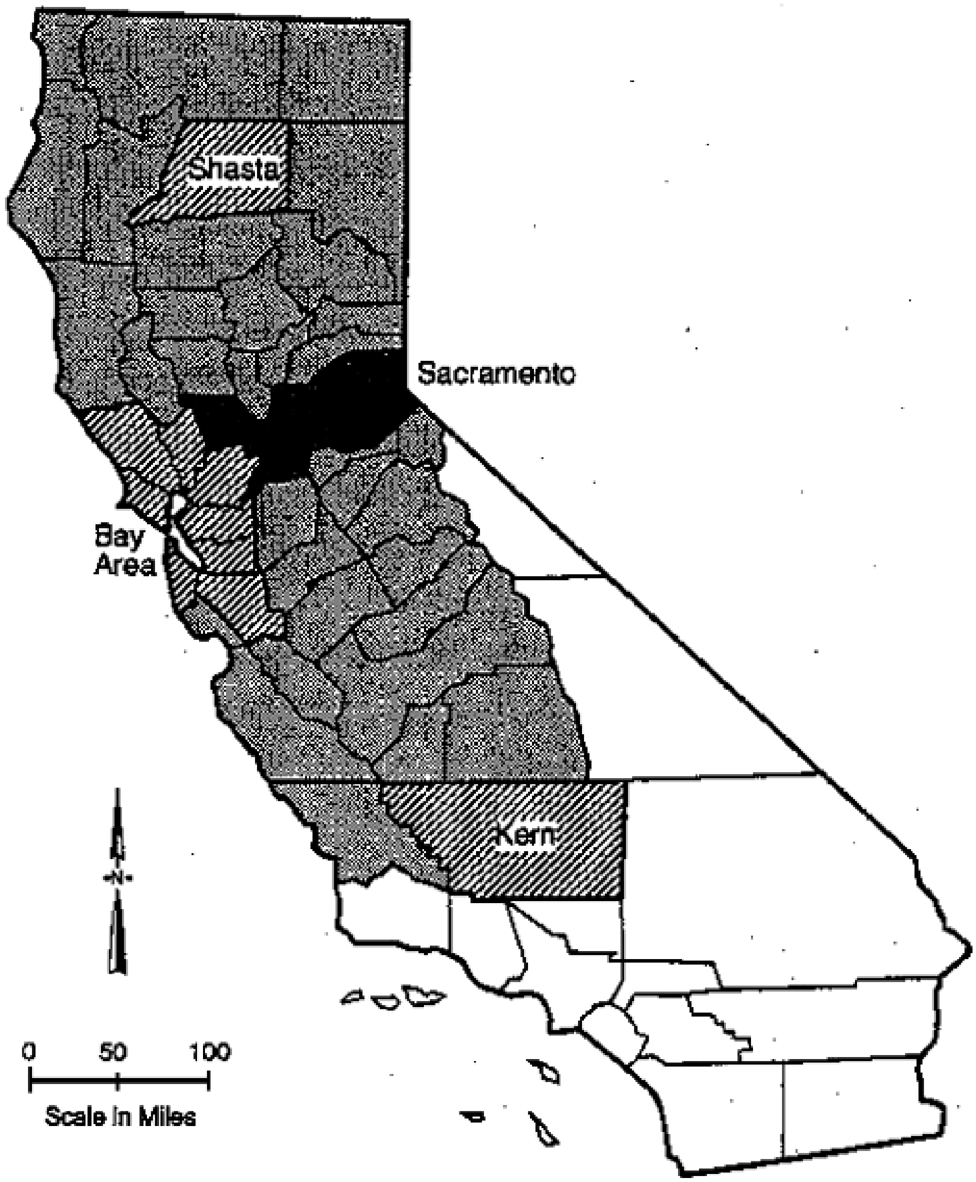


Figure 3.8. Northern and Central California Subregions and Counties Used in Economic Impact Analysis

Figure 3.9

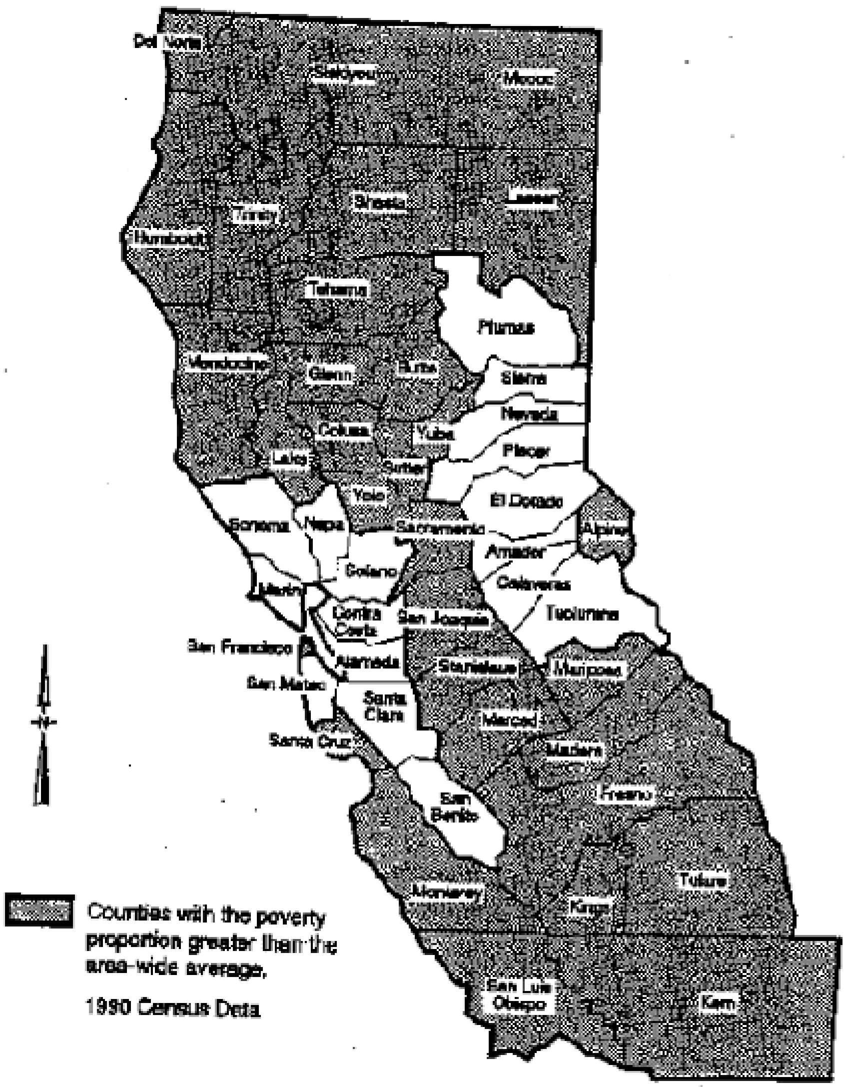
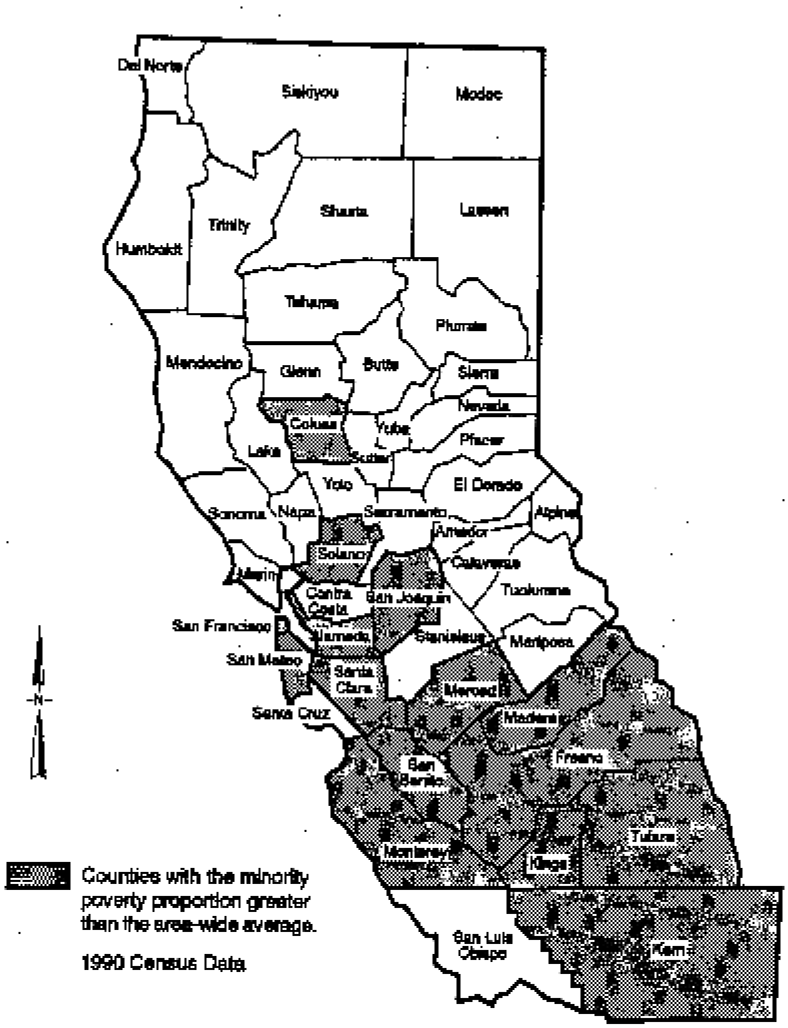


Figure 3.9. Distribution of Low-Income Population in Northern and Central California, 1990 (Lester and Anderson 1995)

Figure 3.10



Del Norte
Siskiyou
Modoc
Humboldt
Trinity
Shasta
Lassen
Tehama
Plumas
Mendocino
Glenn
Butte
Sierra
Nevada
Colusa
Yuba
Placer
Lake
Sutter
Yolo
El Dorado
Sonoma
Napa
Sacramento
Alpine
Amador
Solano
Calaveras
Marin
Tuolumne
Contra Costa
San Joaquin
San Francisco
Alameda
Stanislaus
Mariposa
San Mateo
Santa Clara
Merced
Santa Cruz
Madera
San Benito
Fresno
Tulare
Monterey
Kings
San Luis Obispo
Kern
-N-
Counties with the minority poverty proportion greater than the area-wide average.
1990 Census Data

Figure 3.11

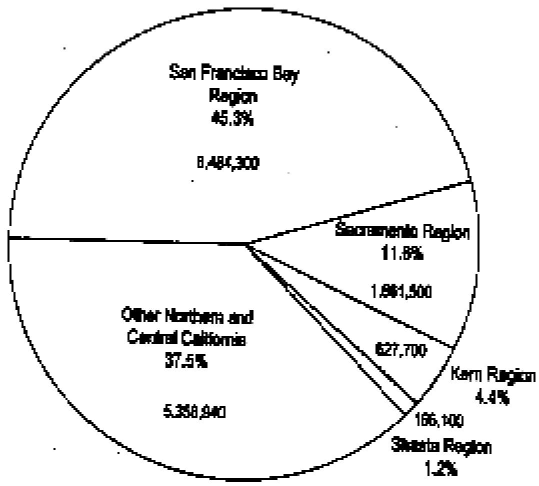


Figure 3.11. 1995 Regional Population Distribution in Northern and Central California (CDOF 1995).

Figure 3.12

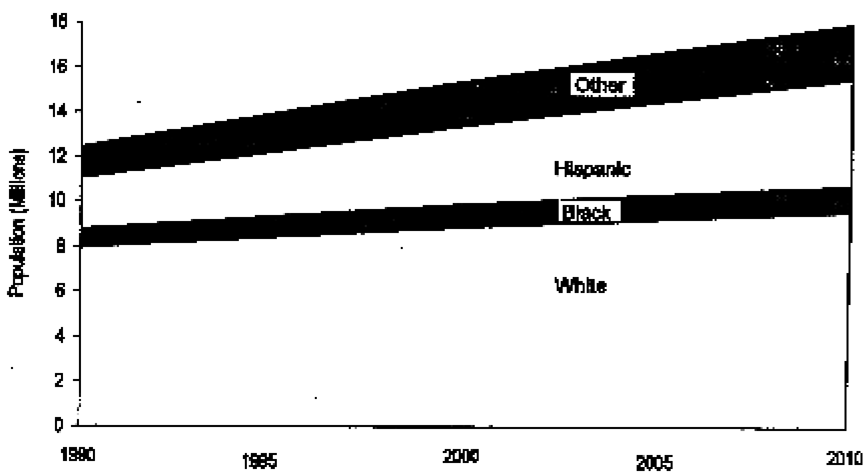


Figure 3.12. Northern and Central California Population Trend Projections, 1990-2010 Employment and Industry (CDOF 1994)

Figure 3.13

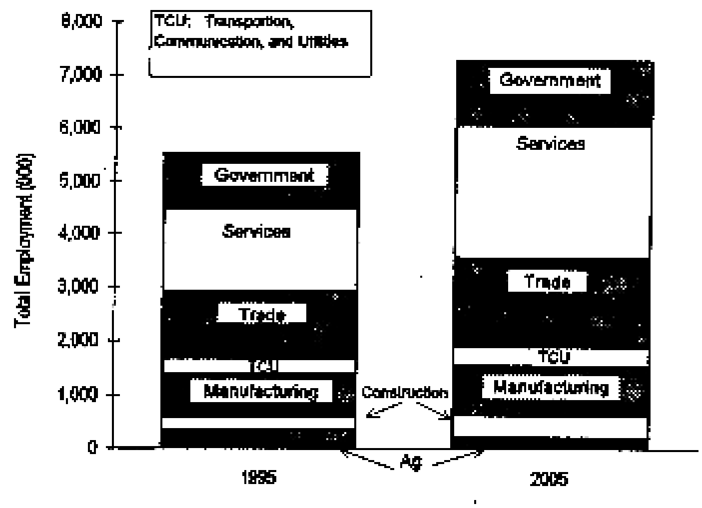


Figure 3.13. 1995 and 2005 Total Employment in Northern and Central California

Figure 3.14

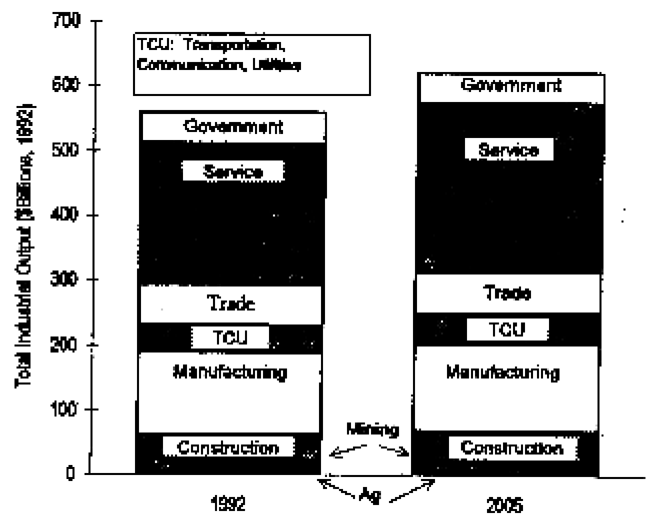
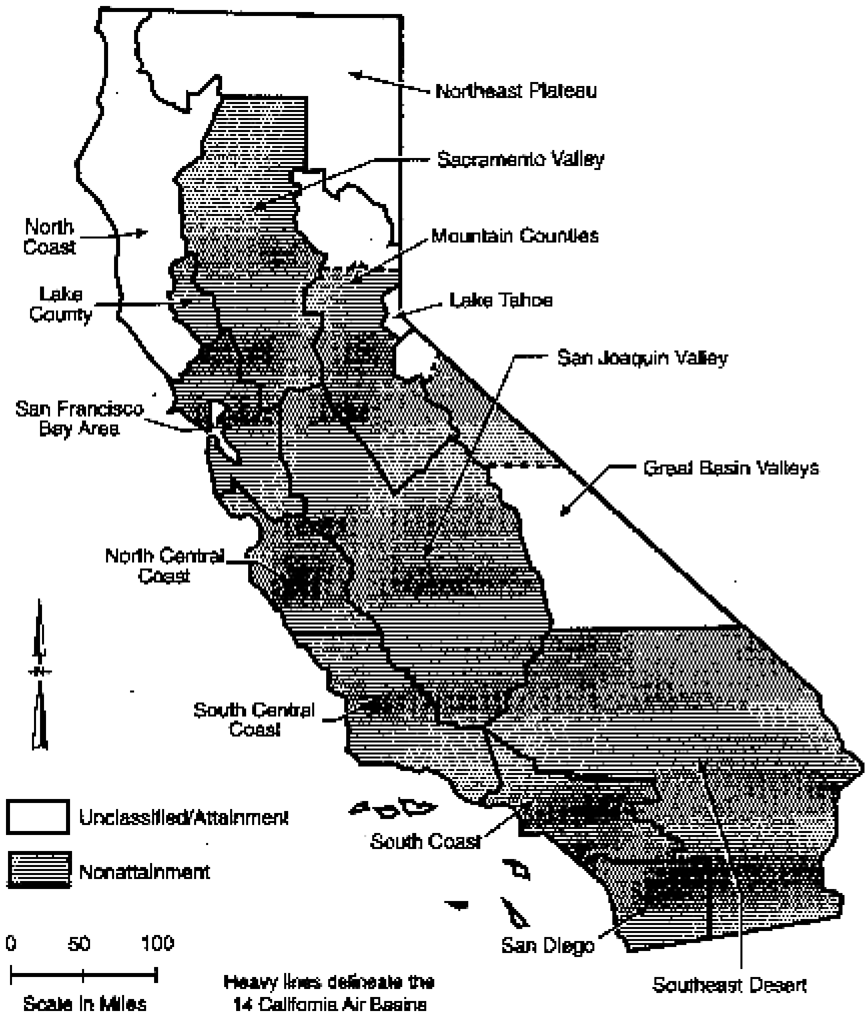


Figure 3.14. 1992 and 2005 Northern and Central California Total Industrial Output by Major Industry

Figure 3.15


Northeast Plateau
Sacramento Valley
North Coast
Mountain Counties
Lake County
Lake Tahoe
San Francisco Bay Area
San Joaquin Valley
Great Basin Valleys
North Central Coast
South Central Coast
South Coast
San Diego
Southeast Desert
0 50 100
Scale in Miles
Heavy lines delineate the
14 California Air Basins

Figure 3.16



Northeast Plateau
Sacramento Valley
North Coast
Mountain Counties
Lake County
Lake Tahoe
San Joaquin Valley
San Francisco Bay Area
Great Basin Valleys
North Central Coast
South Central Coast
Unclassified/Attainment
Nonattainment
South Coast
0 50 100
Scale in Miles
Heavy lines delineate the 14 California Air Basins
San Diego
Southeast Desert

Figure 3.17

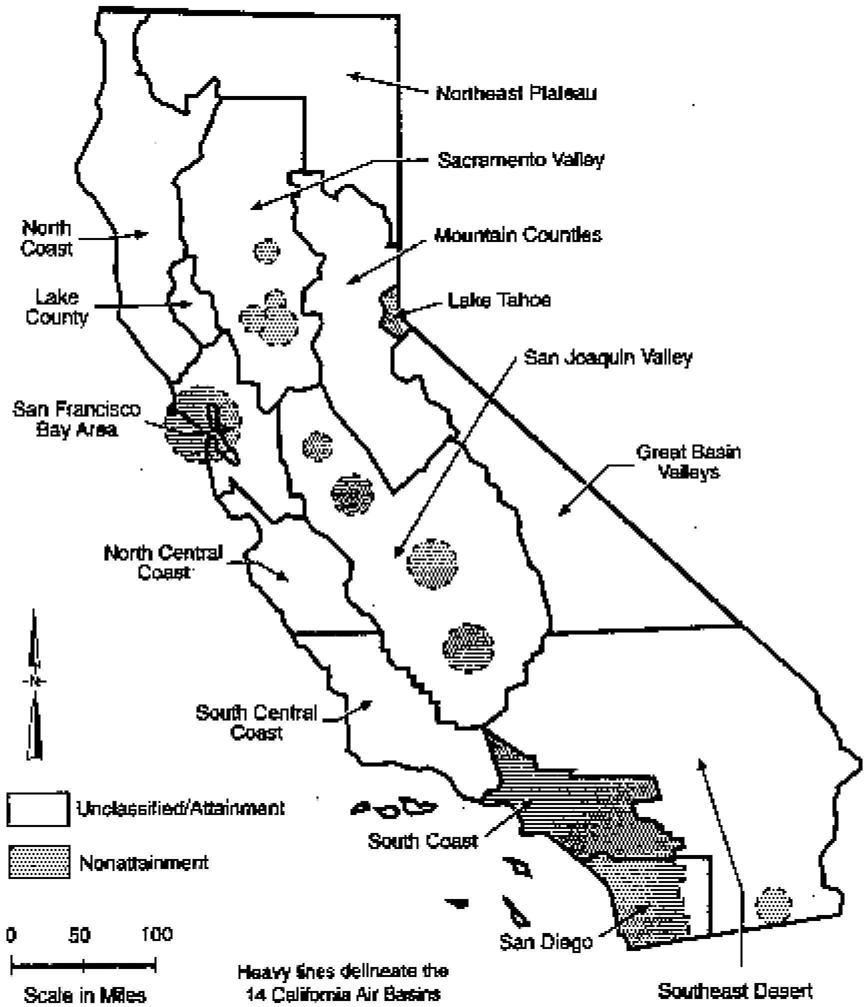
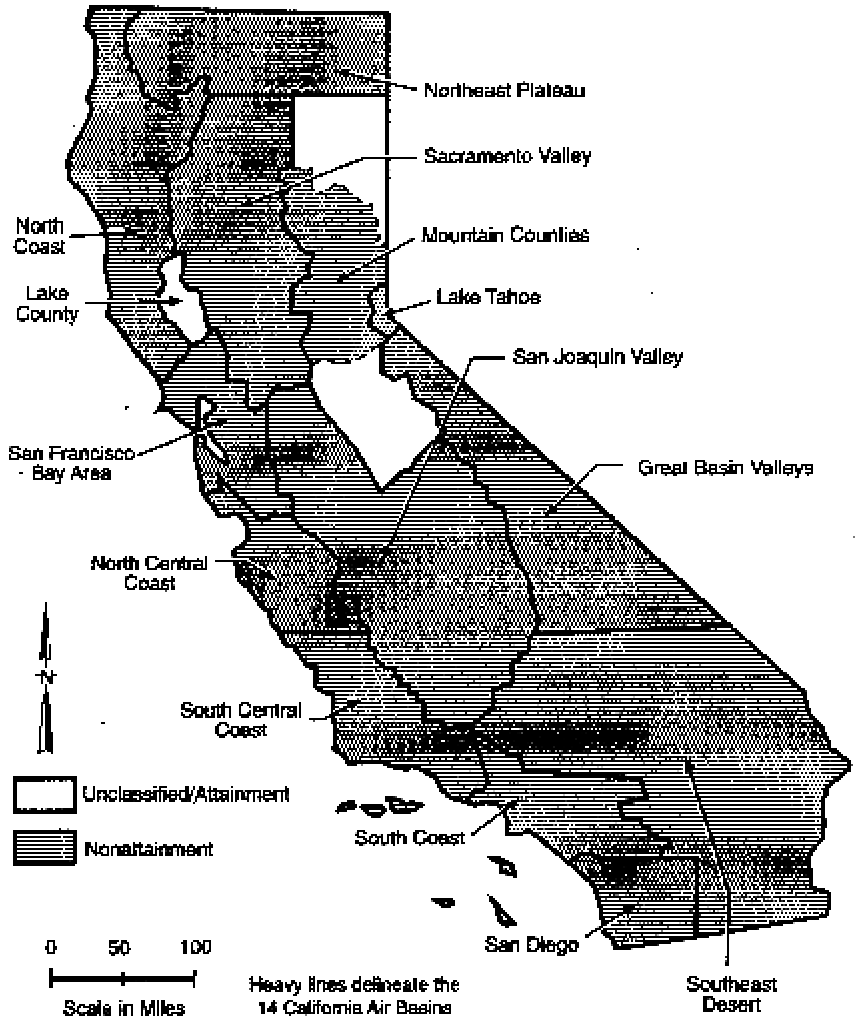

Northeast Plateau
Sacramento Valley
Mountain Counties
North Coast
Lake County
Lake Tahoe
San Joaquin Valley
San Francisco Bay Area
Great Basin Valleys
North Central Coast
N
South Central Coast
Unclassified/Attainment
Nonattainment
South Coast
0 50 100
Scale in Miles
San Diego
Heavy lines delineate the 14 California Air Basins
Southeast Desert

Figure 3.18



Northeast Plateau
Sacramento Valley
North Coast
Mountain Counties
Lake County
Lake Tahoe
San Joaquin Valley
San Francisco - Bay Area
Great Basin Valleys
North Central Coast
N
South Central Coast
Unclassified/Attainment
Nonattainment
South Coast
San Diego
0 50 100
Scale in Miles
Heavy lines delineate the 14 California Air Basins
Southeast Desert

Figure 3.19

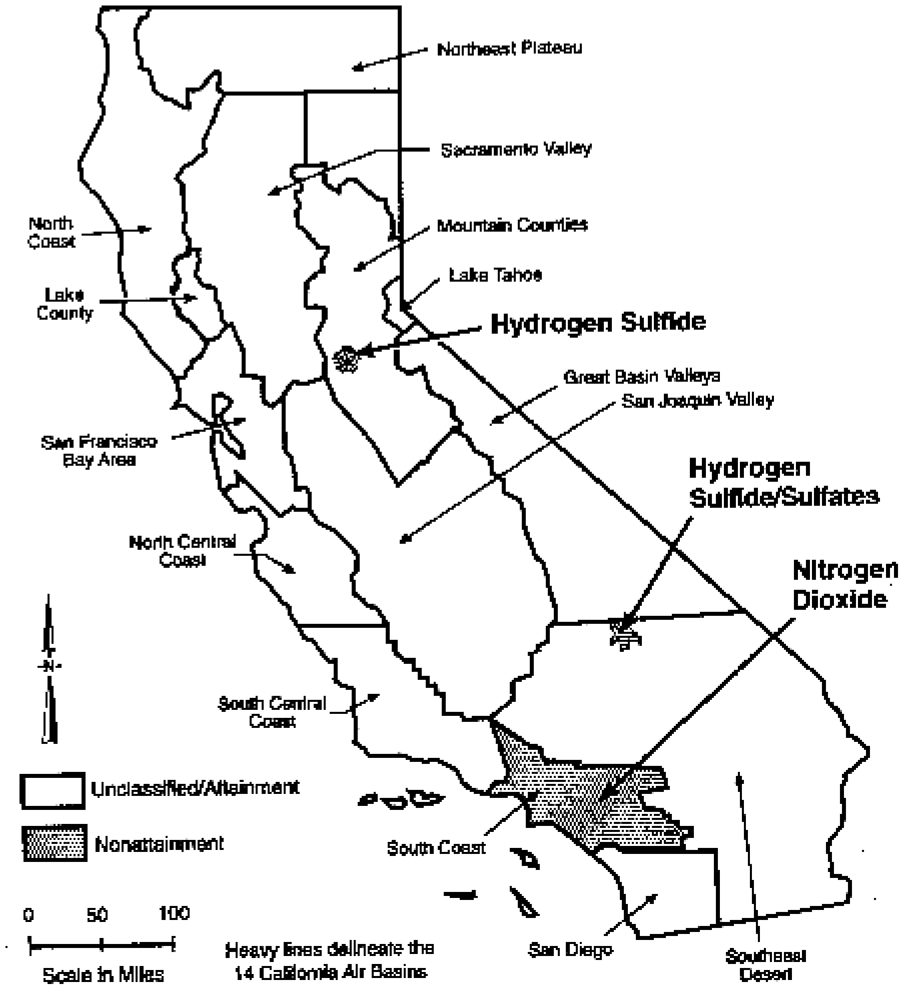

Northeast Plateau
Sacramento Valley
North Coast
Mountain Counties
Lake Tahoe
Lake County
Hydrogen Sulfide
Great Basin Valleys
San Joaquin Valley
San Francisco Bay Area
Hydrogen Sulfide/Sulfates
North Central Coast
Nitrogen Dioxide
N
South Central Coast
Unclassified/Attainment
Nonattainment
South Coast
0 50 100
Scale in Miles
Heavy lines delineate the 14 California Air Basins
San Diego
Southeast Desert

Figure 4.1

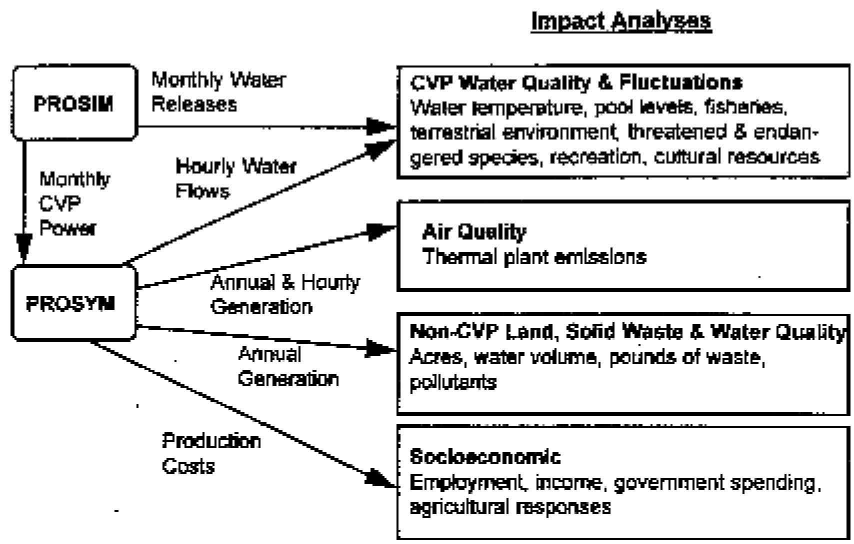


Figure 4.2

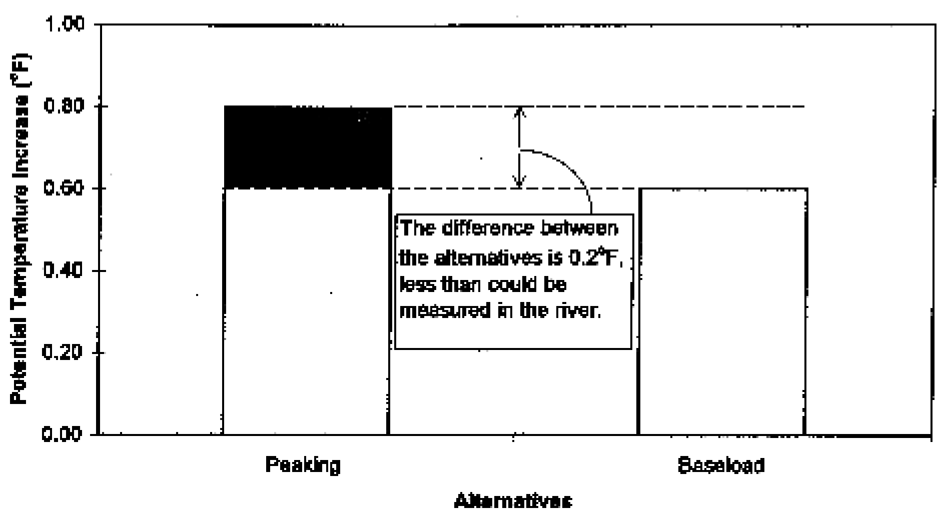


Figure 4.3

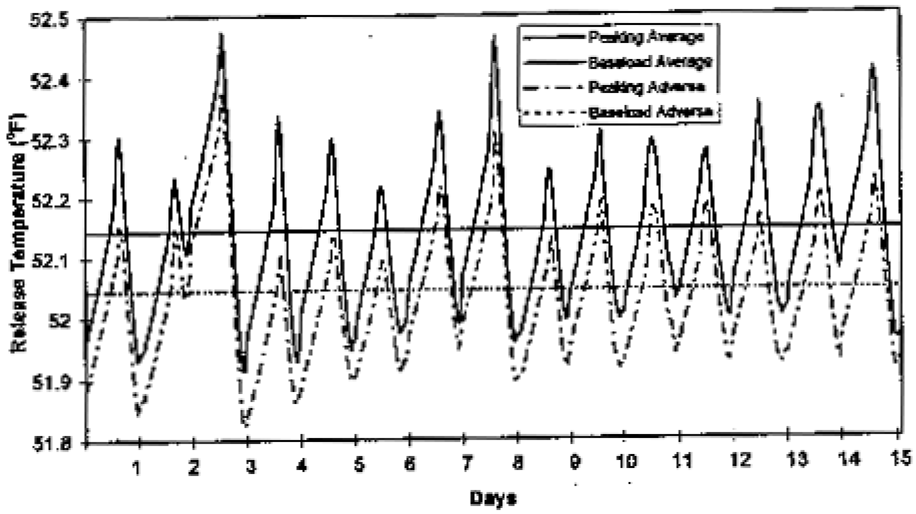


Figure 4.4

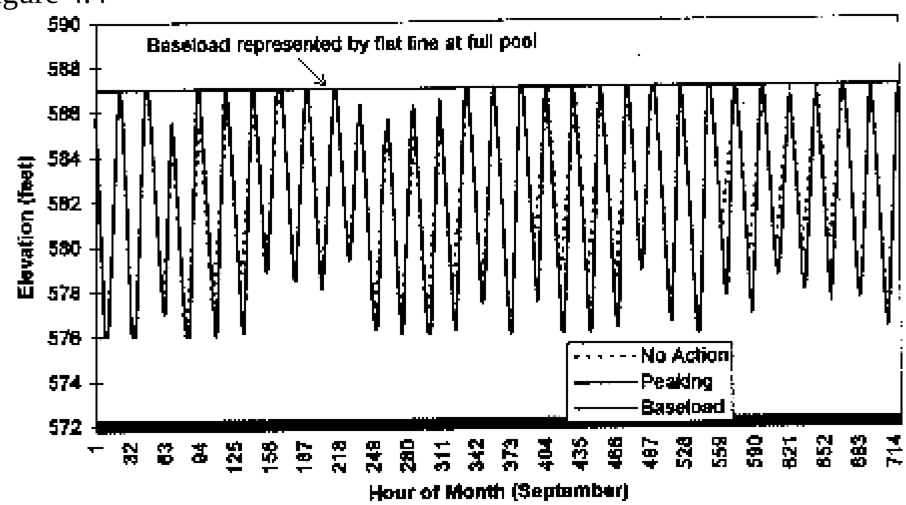


Figure 4.4. Keswick Pool Elevation for September in an Average Year

Figure 4.5

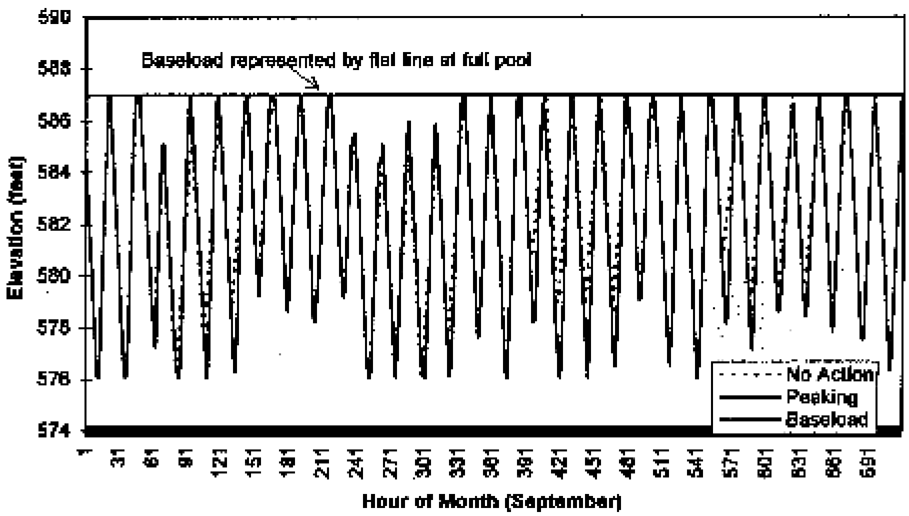


Figure 4.5. Keswick Pool Elevation for September in an Adverse Year

Figure 4.6

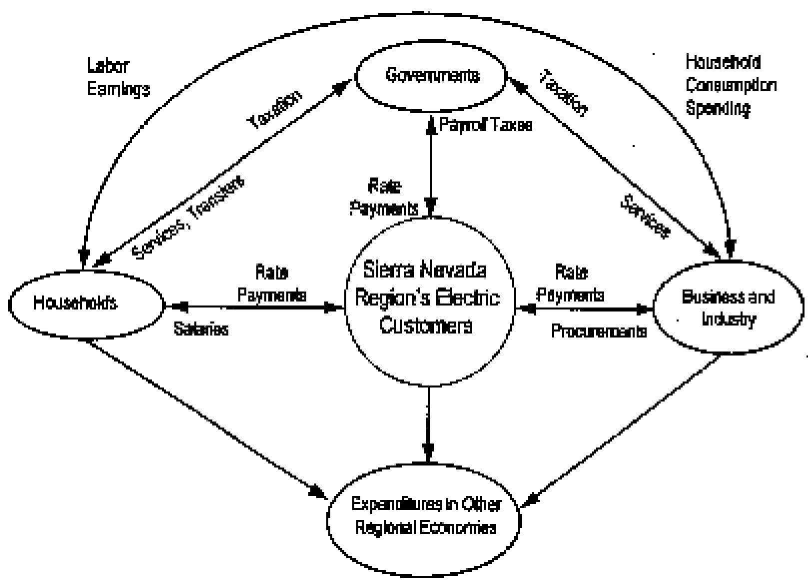


Figure 4.6. Financial Flows Within a Regional Economy

Figure 4.7

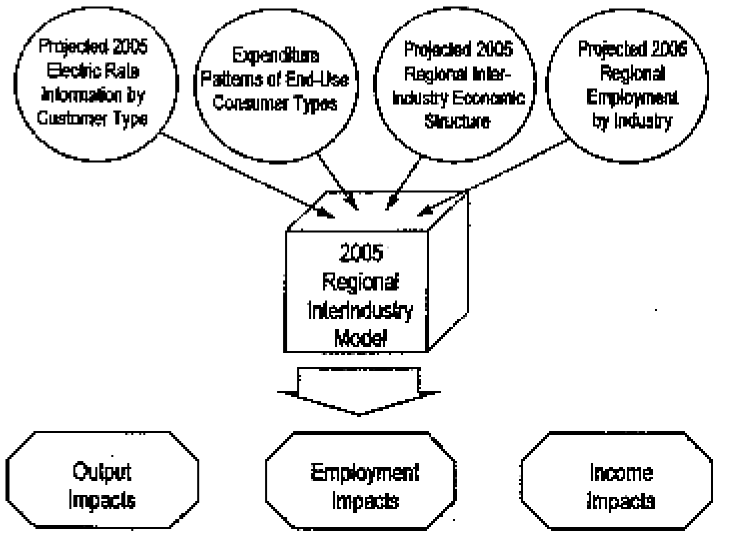


Figure 4.7. Economic Impact Modeling Process Used to Estimate 2005 Impacts

Figure 4.8

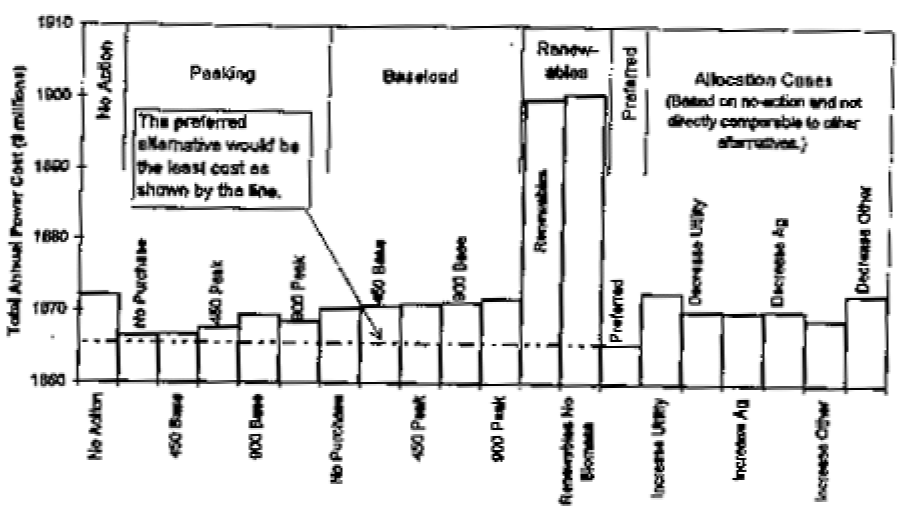


Figure 4.8. Aggregated Power Costs for Alternatives and Allocation Cases

Figure 4.9

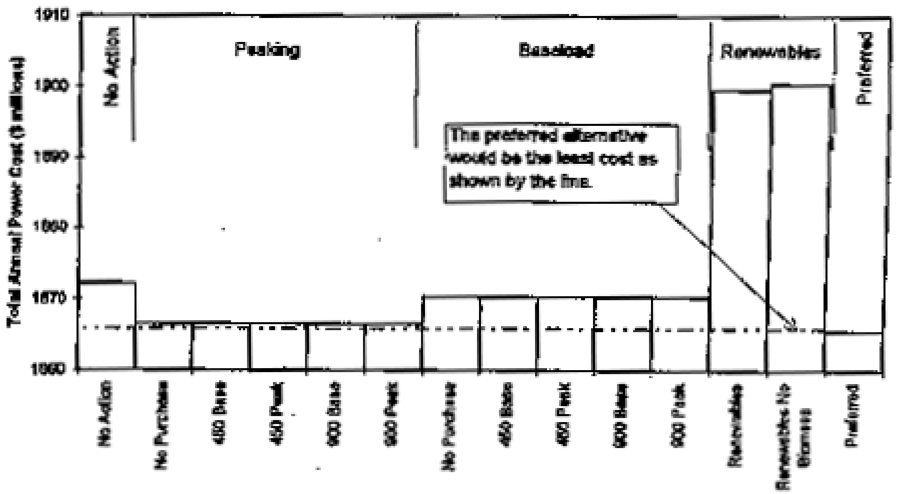


Figure 4.9. Example of Disaggregated Cases (aggregated renewables cases included for comparison)

Figure 4.10

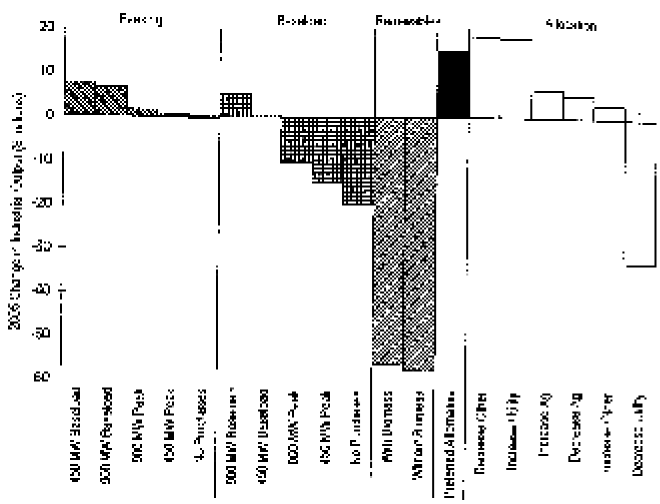


Figure 4.10. 2005 Impacts on Industrial Output by Alternative in the Northern and Central California Economic Region

Figure 4.11

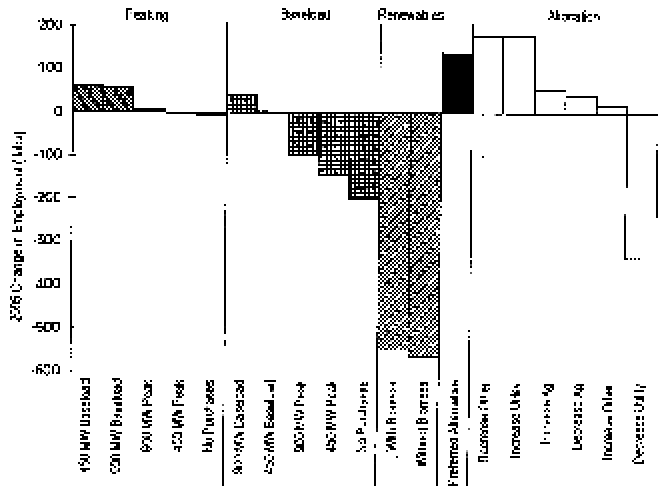


Figure 4.11. 2005 Employment Impacts by Alternative in the Northern and Central California Economic Region

Figure 4.12

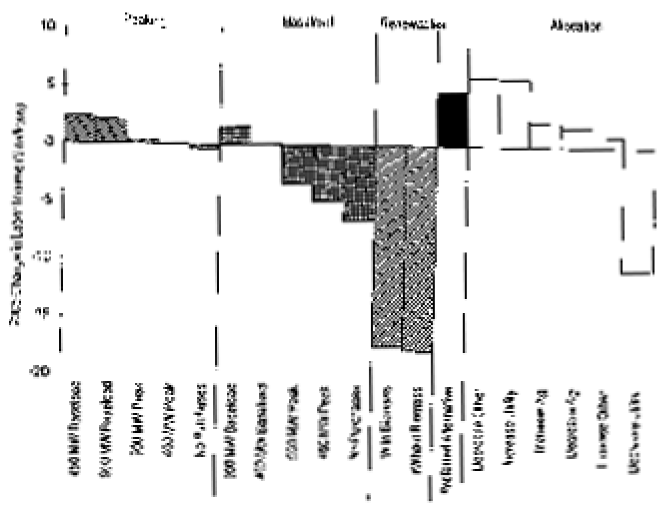


Figure 4.12. 2005 Regional Labor Income Impacts by Alternative in the Northern and Central California Economic Region

Figure 4.13

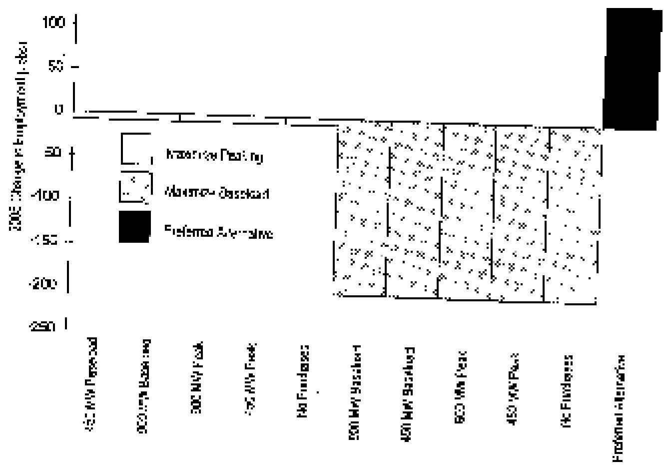


Figure 4.13. Example of How Disaggregated Cases Would Affect Socioeconomic Outcomes

Figure 4.14

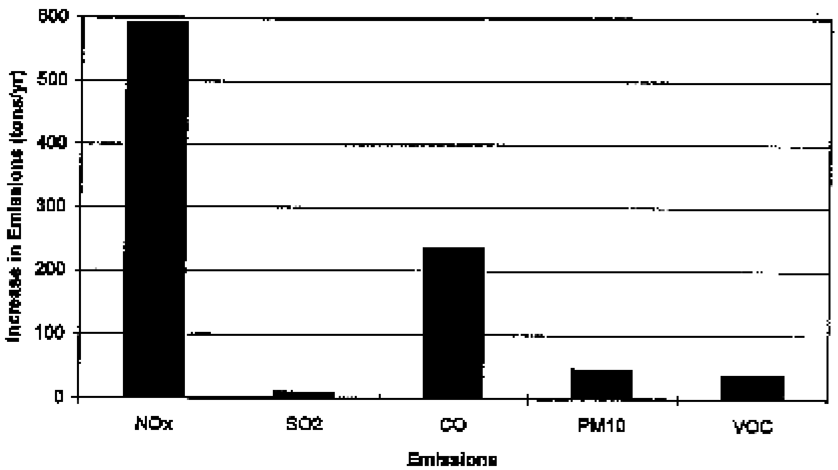


Figure 4.14. Increase in the No-Action Alternative Air Pollutant Emissions for an Adverse Water Year Compared to an Average Year

Figure 4.15

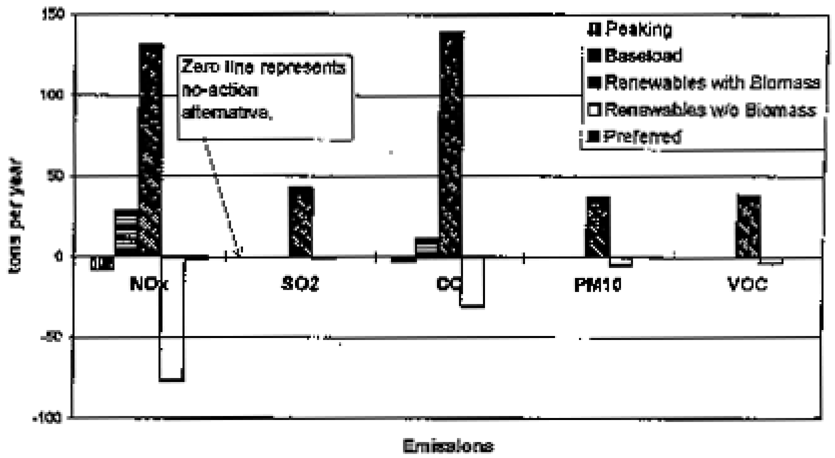


Figure 4.15. Change in Pollutant Emissions from No-Action Alternative Levels for an Average Water Year

Figure 4.16

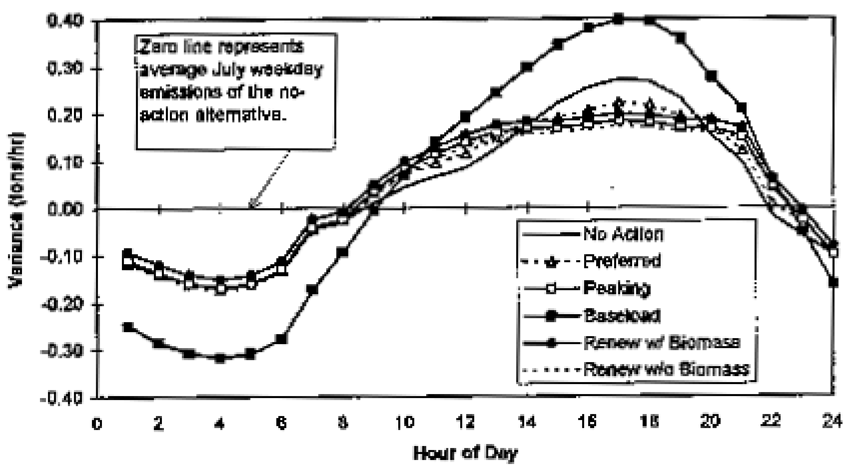


Figure 4.16. Hourly Difference in No, Emissions During July for Each Alternative

Figure 4.17

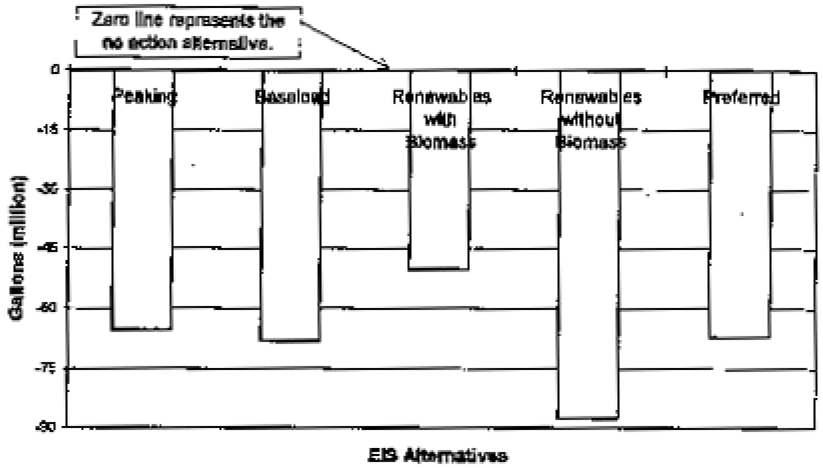


Figure 4.18

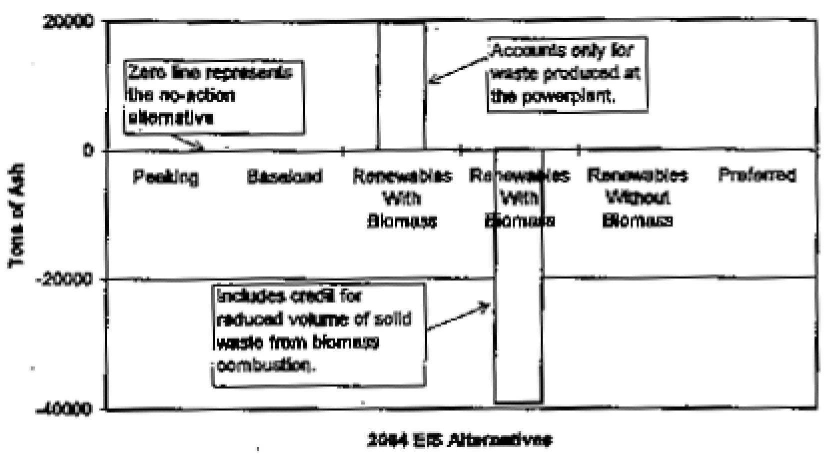
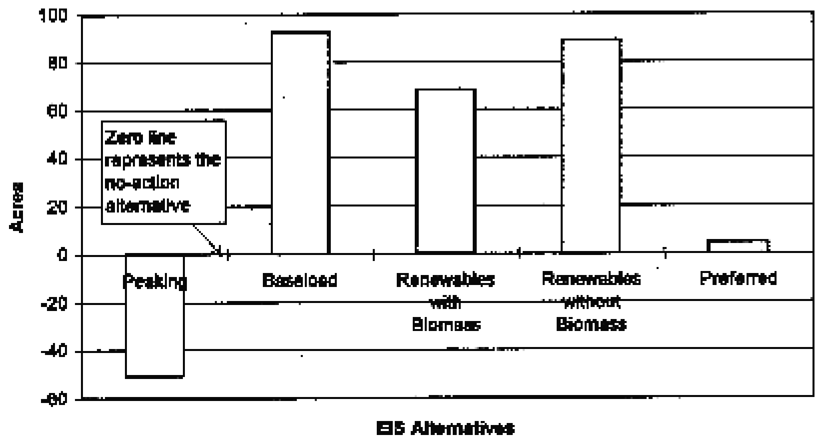


Figure 4.18. Estimates of Solid Waste Production

Figure 4.19



J.1 Lewiston Stage Contents Relationship *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

J.2 Keswick Stage Contents Relationship *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

J.3 Natoma Stage Contents Relationship *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

J.4 Tulloch Stage Contents Relationship *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

K.1 Power Costs for Agriculture Customers *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

K.2 Power Costs for Other Customers *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

K.3 Power Costs for Utility Customers *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

K.4 Power Costs for Total Customers *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

L.1 2005 Regional Output Impacts by Alternative in the Bay Area Economic Region *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

L.2 2005 Regional Employment Impacts by Alternative in the Bay Area Economic Region *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

L.3 2005 Regional Labor Income Impacts by Alternative in the Bay Area Economic Region *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

L.4 2005 Regional Output Impacts by Alternative in the Sacramento Region *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

L.5 2005 Regional Employment Impacts by Alternative in the Sacramento Region *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

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Summary

The Western Area Power Administration (Western), created in 1977 under the Department of Energy (DOE) Organization Act, markets and transmits electric power throughout 15 western states. Western's Sierra Nevada Customer Service Region (Sierra Nevada Region) markets approximately 1,480 megawatts (MW) of power from the Central Valley Project (CVP) and other sources and markets nonfirm energy from the Washoe Project.[(1)]

Western's mission is to market and transmit electricity that is in excess of Project Use (power required for project operations), which for the Sierra Nevada Region is generated from CVP and Washoe Project powerplants. Western's power marketing responsibility includes managing the Federal transmission system. The hydroelectric generation facilities of the CVP are operated by the Bureau of Reclamation (Reclamation). Reclamation manages and releases water in accordance with the various acts authorizing specific projects and with other laws, permits, and enabling legislation. Western's capacity and energy sales must be in conformance with the laws that govern its sale of electrical power. Hydropower operations at each facility comply with water flows and other constraints set by Reclamation, the U.S. Fish and Wildlife Service, or other regulatory agencies, acting in accordance with laws, regulations, and policies.

Proposed Action

Existing contracts for the sale of Sierra Nevada Region power resources expire on December 31, 2004. The Sierra Nevada Region proposes to develop a marketing plan that defines the products and services to be offered and the eligibility and allocation criteria that will lead to allocations of CVP and Washoe Project electric power resources beyond the year 2004. Because determining levels of long-term firm power resources to be marketed and subsequently entering into contracts for the delivery of related products and services could have been a major Federal action with potentially significant impacts to the human environment, this 2004 Power Marketing Program Final Environmental Impact Statement (2004 EIS) has been prepared in compliance with the National Environmental Policy Act of 1969 (NEPA), as amended, and associated implementing regulations, particularly Council on Environmental Quality regulations (40 CFR Parts 1500-1508) and DOE regulations (10 CFR Part 1021). This 2004 EIS describes the environmental consequences of the range of reasonable marketing plan alternatives.

The 2004 EIS contains an analysis of decisions related to the development and adoption of the Sierra Nevada Region's 2004 Power Marketing Program. Five levels of decisions are related to the program, although not all of them are directly addressed in the 2004 EIS. The five levels of decisions are as follows:

- How to schedule Federal CVP hydroelectric generation within constraints established by Reclamation. These issues are analyzed within the 2004 EIS.
- How much and what kinds of power purchases are needed to firm and maximize the value of Federal hydroelectric power. These issues are analyzed within the 2004 EIS.
- The type and kinds of specific products and services that will be offered to customers. These will be shaped from Federal hydropower and power purchases and are being designed as part of a separate public process under the Administrative Procedure Act. This process will be completed following completion of the 2004 EIS process.
- How much Federal hydropower to allocate to specific Sierra Nevada Region customers. Allocations to specific customers will be made in the separate public process which adheres to the guidelines of the Administrative Procedure Act. The 2004 EIS evaluates regional effects of extreme changes in allocation levels to the following three customer groups; utility, agricultural, and other. Smaller reductions in allocation levels for purposes of establishing resource pools were analyzed in Western's Energy Planning and Management Program (EPAMP) EIS (Western 1995).
- Rates and rate structures establishing the amounts customers will be charged are set through a separate public rate-making process. Rates and rate structures are changed periodically to reflect Western's changing costs and resource availability.

Because of the complexity of power marketing, utility industry changes (restructuring) now under way, and the need to remain economically viable in an increasingly competitive and rapidly changing marketplace, the Sierra Nevada Region's 2004 Plan will establish the framework for power marketing decisions. The 2004 Plan will give Western an ongoing ability to adapt its marketing decisions to changing economic conditions and the changing demands and needs of its customers.

The 2004 EIS supports a flexible and adaptive marketing program with ongoing decisions. Some of these, such as contract renewals, will be made infrequently. Others will be made hourly, such as decisions about supplemental power purchases. To provide this flexibility, the 2004 EIS analyzes the extreme ranges of decisions to assess possible environmental effects. Because no significant environmental impacts were found within these extremes, decision makers have latitude within the examined bounds to establish the power marketing program and carry out day-to-day operations.

Need for the Proposed Action

The Sierra Nevada Region needs to determine the level and character of capacity, energy, and other services that will be marketed beyond 2004. The Sierra Nevada Region also needs to establish eligibility and allocation criteria for the allocations of electric power resources to be marketed under contracts that will replace those expiring December 31, 2004.

Purpose of the Proposed Action

In implementing the proposed action, the Sierra Nevada Region plans to achieve a balanced mix of purposes. The purposes of the 2004 Power Marketing Plan (2004 Plan) are listed below (in no particular order):

- to be consistent with Sierra Nevada Region's statutory and other legal constraints
- to provide long-term resource and contractual stability for the Sierra Nevada Region and for customers contracting with the Sierra Nevada Region
- to provide the greatest practical value of the power resource to the Sierra Nevada Region and to customers contracting with the Sierra Nevada Region
- to protect the human and natural environment
- to be responsive to future changes in the CVP, the Washoe Project, and the utility industry.

Public Involvement

The Sierra Nevada Region developed and followed a Public Involvement Plan early in the 2004 EIS process. The Public Involvement Plan was designed to guide the Sierra Nevada Region through a collaborative and systematic decision-making process and facilitate input from the public and interested parties and agencies. The primary purposes of public involvement, as set out in the Public Involvement Plan, were to

- inform the public
- gather information from the public to identify public concerns and values

- responsibly address stakeholder input regarding environmental and allocation concerns and consider such input in decision making.

Public comments and opinions from interested groups, Federal and State agencies, customers, and the general public are an integral part of the decision-making process. Through public meetings, workshops, mailings, and comments on the draft 2004 EIS, the Sierra Nevada Region has received input on the scope of the 2004 EIS and on the alternatives. This 2004 EIS reflects comments received. Comments and responses are presented in Appendix O.

Through the Sierra Nevada Region's public involvement process, an extensive effort was made to notify all potentially interested parties about the 2004 EIS and opportunities for involvement. Approximately 25 pre-scoping stakeholder meetings (involving customers, agencies, interested groups, and individuals) were informally held during the summer of 1993 to discuss issues and concerns related to the project. An interested parties mailing list was used to keep track of those showing an interest in the project. The list was expanded to include any new interested parties as they were identified. The *Federal Register* notice of the scoping period was published on August 10 and 13, 1993. In conjunction with the notice, a news release was sent to local newspapers, and scoping invitation letters were mailed to those on the interested parties mailing list. Three public scoping meetings were held in August and September 1993 to receive written and verbal comments on environmental and marketing-related issues. The Sierra Nevada Region held two more public meetings to facilitate information sharing and to obtain further public comment: an Issues and Alternatives Public Workshop on May 18, 1994, and an EIS Alternatives Workshop on January 18, 1995. A public hearing concerning the draft 2004 EIS was held on June 13, 1996. The public comment period for the draft 2004 EIS closed on July 31, 1996. Additionally, public involvement opportunities were supplemented by 12 separate mailings of the project bulletin, the *2004 EIS Update*, designed to keep all interested groups and individuals apprised of the project details and scheduled events.

Alternatives

In developing alternatives for the 2004 EIS, the Sierra Nevada Region focused on six key component groups--key elements of the marketing program--that vary across the alternatives. The Sierra Nevada Region's intent in establishing the ranges for the variable components was to use a "tent stakes" approach to constructing alternatives. Using this approach, the alternatives were designed to cover the range of reasonable options and thus the analyses of their environmental effects would bracket the range of potential impacts. Although the final marketing plan may not be identical to any one of the 2004 EIS alternatives, the values for any alternative selected and its components will be within the range considered and its impacts will fall within the range of impacts assessed.

The six key component groups that are varied in the analysis of alternatives include the following:

1) Baseload Operations - Within the operational constraints established by the U.S. Department of the Interior (Interior), this refers to releasing water from hydroelectric facilities to generate electricity at a relatively constant rate. This approach would emphasize a steady water release rate from dams above regulating reservoirs.

2) *Peaking Operations* - Within the operational constraints established by Interior, this refers to storing and releasing water from hydroelectric facilities to generate electricity during the relatively short period of maximum demand. This approach would emphasize periodic water releases from dams above regulating reservoirs timed to produce electricity when it is most needed.

3) Power Purchases - These refer to Sierra Nevada Region power purchases used to supplement the Federal hydroelectric resource. Purchases may come from various power markets in California, the Pacific Northwest, and the Desert Southwest. For purposes of modeling and analysis in this 2004 EIS, purchase levels of 0 MW, 450 MW, and 900 MW, each at capacity factors up to 15 percent and 85 percent, are assumed. The no-action alternative has an approximate average monthly purchase level of about 478 MW assuming average hydrologic conditions and no contractual interchanges or exchanges.

4) Renewable Resources - These resource types will be emphasized in one alternative and could be acquired through either selective purchases or allocations of Federal resources to Sierra Nevada Region customers active in developing renewable resources.

5) Power Cost Analysis - This refers to analyzing cost impacts to Sierra Nevada Region's customers from combining the costs for purchases and Sierra Nevada Region's hydropower resources (aggregated) or treating these resources individually, each with its own cost (disaggregated).

6) Allocation to Customer Groups - This refers to assessing the impacts of changing the quantities of power that customer groups currently receive from the Sierra Nevada Region. Customers are divided into the following three groups, with the customers in each group having similar load characteristics: utilities, agriculture, and other (such as State and Federal agencies).

Nonvariable and independent components do not vary across alternatives; therefore, the environmental effects attributable to these components are constant. Nonvariable and independent components include eligibility criteria, first preference, preference, marketing area, delivery conditions, transmission requirements, minimum load requirements, executed contract requirements, alternative financing arrangements, termination provisions, and standard provisions. Such components may be included in the 2004 Plan. Because they are already included in Sierra Nevada Region's present activities, they represent no change from the no-action alternative. Environmental impact analyses in this 2004 EIS focus on those components that vary across the alternatives. Constant effects associated with nonvariable and independent components are included in this 2004 EIS.

Components that were analyzed in the EPAMP EIS (Western 1995a) were not analyzed in this 2004 EIS. These components include contract length, power planning requirements (such as integrated resource planning for customers), withdrawal provisions, and contract adjustment provisions.

An analysis of allocations to customer groups was done to characterize the impacts that may result from changing the quantity of resources available to different customer groups. Such changes may result if the Sierra Nevada Region emphasizes sales to a particular group or encourages special actions, such as acquiring renewable resources, or customer allocations change due to resource availability or marketing options. In this study, customer allocations are both increased and decreased for each customer group. This approach captures the range of beneficial and negative impacts that may result from changes affecting a particular customer group.

Four alternatives were developed for analysis in the draft 2004 EIS that are structured around operations of the CVP hydroelectric system. A preferred alternative has been added to the final 2004 EIS. The other alternatives also have been refined. The key change affecting alternative structure is the treatment of the energy market assumed for 2005. In the draft 2004 EIS, each of the alternatives incorporated varying levels of firm capacity purchases at different capacity factors. In these types of contracts, Western would be required to purchase the energy and capacity even if it was not needed or if it was not the most economic purchase available at any given time.

In the final 2004 EIS, the energy market is assumed to operate with open access for both wholesale and retail customers. Further, power could be purchased on an hourly basis, as needed. Because of this flexibility, when Western makes purchases, it is unlikely that customers would make a similar purchase to meet the same need. In addition, because both Western and its customers would have equal access to the market, purchases would be under similar terms and conditions. Thus, a purchase by Western would be offset by purchases foregone by Western's customers and vice versa. The results of these assumptions about equal access and hourly pricing include the following:

- Purchase levels described in the alternatives would be the maximum purchased in any 1 hour by the Sierra Nevada Region.
- The Sierra Nevada Region could purchase up to the maximum purchase level but need not purchase more than it requires.
- The power cost analysis shown in the draft 2004 EIS is not applicable under open access conditions. All purchases in the final 2004 EIS are assumed to be made from power markets. The Sierra Nevada Region's market costs would be passed on to its customers, meaning there would be no difference between a Sierra Nevada Region purchase and a customer's direct market purchase. The no purchase option represents the effects of the Sierra Nevada Region disaggregating costs associated with any purchases. Purchase options were also analyzed on an aggregated basis.

Another change is the assumed cost of renewable resources. In the draft 2004 EIS, it was assumed that all renewables available to Western would be priced at levels incorporating technological improvements that may be forthcoming by the year 2005. The final 2004 EIS assumes that prices incorporating technological advancements will be available in 20 percent of the renewable resources that would be available in 2005. This revision raised the cost of renewables in comparison with the assumptions used in the draft EIS and, along with lower market prices, reduced the amount of renewable resources that could be economically supported to 50 MW.

The four original alternatives include the following:

- The no-action alternative refers to a continuation of Sierra Nevada Region's present approach to marketing power, meeting 2005 loads that are comparable to today's (1996) load patterns. Within operating constraints, hydropower facilities are scheduled close to maximum peaking. For modeling purposes, the no-action alternative includes an average monthly purchase of about 478 MW, assuming average hydrologic conditions and no contractual interchanges or exchanges.
- Maximize hydropower peaking (the peaking alternative) refers to scheduling the CVP hydropower facilities to maximize power generation during peak load periods within operating constraints. Five purchase cases are considered including no power purchases, 450 MW up to a 15-percent capacity factor, 450 MW up to an 85-percent capacity factor, 900 MW up to a 15-percent capacity factor, and 900 MW up to an 85-percent capacity factor.
- The baseload alternative refers to scheduling the CVP hydropower facilities for relatively constant power output within operating constraints. The same five purchase cases are examined as with the peaking alternative described above.
- Renewable resource acquisition (the renewables alternative) refers to scheduling the CVP hydropower facilities to maximize power generation during peak load periods within operating constraints, and power purchases are set at 50 MW of capacity to support the use of renewable resources. Capacity was assumed to be equally distributed among biomass, wind, solar and geothermal facilities.[(2)]

As indicated previously, the Sierra Nevada Region used a "tent stakes" approach to constructing alternatives, which captures the greatest possible range of impacts likely to occur. Figure S.1 illustrates the tent stakes approach.

Preferred Alternative

The preferred alternative is similar to the maximum peaking alternative. Additional power would be purchased if requested by customers to meet their load requirements. Purchases are transparent to the analysis because costs would be passed directly through to customers. This alternative falls within the tent stakes established in the draft 2004 EIS.

Environmentally Preferred Alternative

The peaking alternative was selected as the environmentally preferred alternative. This alternative was selected because it would provide the greatest load-carrying capacity and best offset the need for additional powerplants. This alternative generally results in the greatest benefits or least impacts to the environmental resources when impacts are quantified. Peaking with no purchases results in the greatest benefits.

Figure S.1. The Tent Stakes Approach for Examining the Limits of the Alternatives

The alternatives are summarized in Table S.1. The baseload and peaking alternatives incorporate several purchase levels; but the no-action, renewables, and preferred alternatives were each analyzed at only one purchase level.

Affected Environment

The affected environment includes those environmental resources that may be changed by the Sierra Nevada Region's proposed actions. The affected environment includes some CVP facilities as well as related utility systems and economics. The alternatives under consideration would be implemented in the year 2005, after existing power marketing contracts expire. Where it is important to the analysis, there is a description of assumptions and projections of how the affected environment may appear in the year 2005.

The CVP is a large water control and delivery system. It includes 18 dams and reservoirs and 11 powerplants. Sierra Nevada Region's actions are limited to scheduling power from specific hydropower generators and the regulating reservoirs that maintain nonfluctuating flows downstream from those facilities. These regulating reservoirs include Lewiston, Keswick, Lake Natoma, and Tulloch. The Sierra Nevada Region has no discretion over how water is released from the regulating reservoirs. At the generating facilities upstream of the regulating reservoirs, the Sierra Nevada Region has discretion in the hourly scheduling of generation but cannot schedule generation in a manner that would impact regulating reservoir releases. Therefore, within the CVP, the environment that may be affected by the alternatives described

Table S.1 Summary of 2004 EIS Alternatives

	ALTERNATIVES				
	No-Action	**Maximize Hydropower Peaking** [a]	**Baseload**	**Renewables**	**Preferred**
Power Resources (MW)					
CVP Load-Carrying Capacity [b]	1,089	1,377	508	1,377[c]	1,326
Minimum and Maximum Monthly	1,255 and 1,665				

CVP Capacity [d]													
Power Purchases	478[e]	0	450[f]	450[g]	900[f]	900[g]	0	450[f]	450[g]	900[f]	900[g]	50	[h]
Allocation to Customer Groups	Historic	100% increase (or to the extent possible) and 100% decrease in existing allocations to each of three customer groups: utilities, agriculture, and other.											
Constant Components													
Nonvariable	These components include eligibility criteria, first preference, preference, marketing area, delivery conditions, and transmission requirements.												
Independent	Components in this category include minimum load requirements, executed contract requirement, alternative financing arrangements, termination provisions, withdrawal provisions, and standard provisions.												
EPAMP EIS	These components include contract length, power planning requirements such as IRP for customers and contract adjustment provisions.												

[a] Maximized peaking with no purchases has been identified as the environmentally preferred alternative.
[b] Determined assuming a 90% exceedance - shown for the peak month.
[c] Assumes hydropower peaking operations are maximized.
[d] Based on projected hydroplant capabilities assuming 90% exceedance.
[e] Approximate average monthly purchase assuming average hydrologic conditions and no contractual interchanges or exchanges.
[f] Up to a 15% capacity factor.
[g] Up to an 85% capacity factor.
[h] Purchases may be made to support customers but market costs would be passed through to customers making them equivalent to customer purchases.

in this 2004 EIS is limited to the regulating reservoirs. The main reservoirs are substantially larger than the regulating reservoirs, and changes in power operations do not create noticeable fluctuations in reservoir surface elevations on a daily basis.

Interior is assessing environmental effects related to broader operating issues in separate NEPA processes which address various sections of the CVP Improvement Act and the Trinity River Basin Fish and Wildlife Restoration Act. These other processes should be referenced as additional sources of information about CVP operations and environmental conditions. Other related NEPA and environmental processes include new water quality standards for the San Francisco Bay-San Joaquin/Sacramento River Delta Estuary (Bay/Delta), the Federal Energy Regulatory Commission's (FERC's) EIS on transmission services, Western's EPAMP EIS, recent California State legislation on electric utility industry restructuring, and the Public Utility Commission's proposed environmental impact report on that legislation.

Washoe Project marketing will also be considered in Sierra Nevada Region's 2004 Plan and is briefly described in this 2004 EIS. However, the Sierra Nevada Region has no operating discretion at this facility, and thus conditions will not change as a result of Sierra Nevada Region's 2004 Plan.

Environmental resources outside the CVP that may be influenced by CVP operations, Sierra Nevada Region's power marketing activities, and responses to those activities include air quality, water quality, wastes, and land use. The potential affected environment for these resources is large. The Pacific Northwest, northern and central California, and the Desert Southwest are regions that may interact with the Sierra Nevada Region in supplying power and are potentially part of the affected environment. The power generation and transmission facilities and markets of these areas are interconnected.

Sierra Nevada Region's customers and the economies in which they operate and serve are also part of the affected environment.

Environmental Consequences

The impact analyses follow three basic steps. Historic hydrological conditions were analyzed using the PROSIM (CVP simulation model) model. The PROSIM outputs (in the form of monthly water flows and available hydropower capacity and energy) were input to the PROSYM model, a production cost simulation model of electric utility operations. PROSYM outputs (in the form of estimated levels of electric generation, production costs, and hourly water flows in the CVP) were used to assess the environmental impacts. Table S.2 summarizes the environmental impacts of each alternative.

Table S.2 Summary of Environmental Impacts[a]

Environmental Resources	Impact Summary
Utility Systems	The alternatives result in offsets in generation between the CVP hydrosystem and combustion turbines (CTs) and combined-cycle combustion turbines (CCCTs). Baseload alternative reduces marketable capacity of the CVP. Peaking increases marketable CVP capacity.
CVP Water Resources - Temperature Fluctuation	No change from existing conditions.
CVP Water Resources - Pool-Level Fluctuation	Affects regulating reservoirs only. Peaking, no-action, renewables, and preferred alternatives very similar with a daily peak and trough. The baseload alternative results in a more constant reservoir level. The Sierra Nevada Region does not propose to schedule powerplant releases into Keswick Reservoir that would cause scouring of toxic-metal laden

	sediments.
Fisheries	No impact to anadromous fish. Peaking, renewables, no-action, and preferred alternatives similar to existing conditions. Fish in the regulating reservoirs may benefit slightly from baseload alternative.
Terrestrial Environment	No change from existing conditions.
Threatened and Endangered Species	No change from existing conditions.
Recreation	Peaking, no-action, renewables, and preferred alternatives similar to existing conditions. Recreation on regulating reservoirs may benefit slightly from baseload alternative.
Cultural Resources	Peaking, no-action, renewables, and preferred alternatives similar to existing conditions. Baseload alternative would reduce or minimize the impacts of erosion from pool fluctuation.
Socioeconomic Resources	Impacts are less than a fraction of 1 percent on a regional basis and are nearly indistinguishable across alternatives. The largest effect would be with the renewables alternative, which results in slightly negative effects. All alternatives would have neutral or slightly negative impacts on agricultural profit and no impacts on production.
Air Resources	The baseload and renewables (with a biomass component) alternatives slightly increase pollutant emissions; other alternatives produce slight decreases or no change in pollutant emissions. The baseload alternative results in greater emissions during the day when pollutant emissions from other sources are also high. Other alternatives are similar to the no-action alternative or shift additional emissions to the night.
Water Consumption Associated with Non-CVP Powerplants	All alternatives reduce water consumption in comparison to the no-action alternative. The slight changes found are due to shifts among the use of CTs and CCCTs.
Wastes Associated with Non-CVP Powerplants	Annual waste production is relatively constant across the no-action, peaking, baseload, and preferred alternatives. The renewables alternative results in the greatest annual waste production, mostly coming from biomass fuel powerplants. However, biomass-fired powerplants may consume forest or agricultural byproducts or urban wastes and result in a reduced waste volume. A test case without biomass results in waste production similar to the no-action alternative.
Land Use Associated	In comparison to the no-action alternative, the peaking

with Non-CVP Powerplants	alternative results in more available capacity that reduces acreage by about 50 acres needed for generation facilities. The baseload alternative requires an additional 90 acres, and the renewables alternative results in about 70 to 90 additional acres. The preferred alternative may result in up to about 5 additional acres.
Irreversible and Irretrievable Commitments of Resources	Land-use impacts may be irreversible. Substantial shifts in powerplant fuel type are not expected.
Unavoidable Adverse Impacts	Of the impacts identified, the only major effect stems from lost load-carrying capacity in the baseload alternative.
Relationship Between Short-Term Uses and Long-Term Productivity	No alternatives result in substantial land being taken out of production or a loss of river-system long-term productivity. Adding new capacity to make up for lost CVP load-carrying capacity could result in small regional impacts.
Direct and Indirect Effects	Direct effects are limited to those related to possible changes in electric power production at some CVP facilities. All others are indirect.
Cumulative Effects	2004 EIS analyses incorporate cumulative effects to the extent they can be identified, such as the effects on the operation of power resources in the areas where power purchases may be made. In large part, any cumulative impacts have already been felt, as CVP power has been marketed in the past. Most analyses describe potential shifts in impacts, rather than new or additional impacts.

[a] The analysis indicates that potential impacts to fisheries, terrestrial environment, threatened and endangered species, recreation, and cultural resources are restricted to regulating reservoirs (see Section 3.4).

The manner in which hydropower generating plants are scheduled is one of the fundamental differences across the alternatives. The PROSYM analyses show that, when operated to provide electricity at peak times (the peaking alternative), the hydropower system can offset up to 317 MW[(3)] of electric generating capacity from other sources when compared to the no-action alternative. The replacement capacity needed to offset the difference between the baseload and no-action alternatives is 581 MW of load-carrying capacity. Building new capacity results in land-use impacts and the use of the natural and financial resources needed to build the powerplant and connect it with the interconnected transmission grid. Western is not currently planning to build such a powerplant.

The CVP hydropower system does not require additional facilities or modifications to change from baseload to peaking operations or vice versa. Thus, the lost load-carrying capacity from baseload operations would be retrievable for CVP operations if a decision to subsequently implement peaking operations was made. However, if the baseload alternative is implemented and replacement capacity is built, replacement capacity is expected to remain in place. If this occurs, a potential shift from baseload back to peaking CVP operations would likely result in temporary surplus capacity in the region.

Impacts resulting from CVP water releases within Sierra Nevada Region's power scheduling discretion are limited. The Sierra Nevada Region's discretion is described in the introduction to Chapter 3. In comparison to the no-action alternative, the peaking alternative results in only slightly greater pool-level fluctuation in regulating reservoirs. Impacts are restricted to the regulating reservoirs at Lewiston, Keswick, Lake Natoma, and Tulloch because the regulating dams are operated to control releases downstream. As discussed in Section 3.4.2, the Sierra Nevada Region has assumed for purposes of this 2004 EIS that Keswick Reservoir can fluctuate up to 11 ft with the removal of contaminated sediment in the Spring Creek arm of Keswick Reservoir. If this problem is not resolved by 2005, the Sierra Nevada Region will schedule powerplant operations within the then current normal operating level, which would reduce the potential effects on water temperature and pool fluctuation.

The baseload alternative would result in relatively constant water releases from the main dams that would avoid pool-level fluctuation and potentially improve recreation and resident fisheries slightly in the regulating reservoirs. The hourly water releases from the main dams, whether operating for peaking or baseload, affect temperature fluctuation a very minor amount. The temperature differences are so small that, although they can be calculated, they could not be measured in the regulating reservoirs or the rivers downstream.

Given these findings about pool-level and temperature fluctuations, in comparison with the no-action alternative, no alternative would result in adverse impacts to fisheries, threatened and endangered species, recreation, the terrestrial environment, or cultural resources.

The more constant flows of the baseload alternative may result in minor beneficial effects to fisheries, recreation, and cultural resources associated with the regulating reservoirs. A reduction in pool-level fluctuation may improve habitat for resident fish and improve boating conditions. Stable pool elevations would also reduce erosion at shoreline cultural resource sites by minimizing the zone of impact due to pool fluctuations. Erosion due to wave action would be confined to this zone.

Impacts to air quality, solid waste, and wastewater would be related to the generation of electricity at powerplants apart from the CVP. The variation across the alternatives comes from changes in operation of combustion turbines (CTs) and combined-cycle combustion turbines (CCCTs) that may be located throughout northern and central California, the Pacific Northwest, or the Desert Southwest. The most substantial air quality impacts would come from changes in hourly operations of other non-hydropower plants in response to the manner in which the CVP hydroelectric facilities are scheduled (peaking or baseload). Generally, compared to the no-action alternative, scheduling the hydropower system as a baseload system would result in an increase of emissions from other powerplants during the day when ambient levels are high because thermal generation would be needed for peaking. Peaking the hydropower system offsets daytime thermal production and reduces daytime emissions but increases nighttime thermal production and emissions, when ambient levels are less. This can be important for areas having problems meeting air quality standards during summer afternoons when industrial, utility, and transportation emissions are at their peak. During summer afternoons, the difference in oxides of nitrogen (NO_x) emissions between the peaking and baseload alternatives would reach over 400 pounds per hour (lb/h). These emissions are equivalent to those from a 400-MW combustion turbine plant.

Without biomass, the renewables alternative results in the most beneficial effects on annual air emissions. Including biomass in the renewables alternatives would produce the greatest levels of annual air emissions.

In comparison with the no-action alternative, all of the other alternatives would result in beneficial effects on wastewater production. As with annual air emissions, the renewables alternative without biomass would result in the greatest benefit in reducing wastewater production. Renewables with biomass would produce the least benefit but would still result in a reduction in wastewater production in comparison with the no-action alternative.

Solid waste production also would be most changed by the renewables alternative. Biomass-fueled plants that burn municipal solid waste produce a great deal of ash as solid waste but also reduce the quantity of solid waste, requiring disposal in a landfill. For every pound of ash produced by biomass combustion, municipal solid waste is reduced by about 5 pounds. When this reduction is taken into account, solid waste would be reduced by nearly 40,000 tons with the renewables alternative. In comparison, the other alternatives (including renewables without biomass) are very similar to the no-action alternative.

The baseload alternative results in about 90 acres of land needed for replacement capacity. The renewables alternative would result in land-use impacts. Renewables, such as solar photovoltaic and wind, may require up to about 30 times the land area per megawatt of capacity of thermal resources such as CTs. In comparison to the no-action alternative, the renewables alternative would require 70 to 90 acres of land for powerplants.

The Sierra Nevada Region's 2004 Plan would influence the overall power costs of its customers. The alternatives are structured to determine the maximum range of impacts to gauge socioeconomic effects in the areas of output, employment, and labor income. When compared to the economy of northern and central California, or of any one of four economic regions analyzed within northern and central California, the estimated impacts are very small. The impacts are typically less than a fraction of 1 percent of the economic sectors being measured, which are large and relatively stable. None of the EIS alternatives are estimated to impact agricultural productivity and employment. The economic effects of the alternatives are reported for the regional economies studied. Based on results from the power production cost analysis described in Section 4.2, the associated economic impacts of the alternatives are nearly indistinguishable in all cases and in all regions.

All of these socioeconomic results reflect averaging across regions and customer groups and do not capture the effects on individual customers. Economic effects on Sierra Nevada Region customers who lose or gain allocations may be substantial in individual cases but cannot be determined because specific allocations have not been made. In general, however, customers who lose allocations would be balanced by other customers who gain equivalent allocations. Specific allocations will be made in a separate process under the APA.

Across the alternatives and the affected economic regions, economic impacts are minimal. The impacts are not disproportional across income or race groupings of the population. In the case of agriculture customers, low-income and minority groups make up a larger proportion of the employment in that sector. The impacts identified do not affect agricultural gross revenues or production levels. Thus, employment levels are not affected, and the impacts of alternatives do not disproportionally affect low-income or minority groups.

The effects of emphasizing the use of renewable resources (assuming some technological improvements) in the generation mix have a negative economic impact compared to the same quantity of thermal purchases. Improvements in technology should occur prior to 2005 that reduce the cost of the renewable resources. The amount of renewables to be included in the renewables alternative was determined by melding the anticipated cost of renewables in 2004 together with the anticipated CVP hydropower cost. The renewables share of the mix was increased until the combined rate for Sierra Nevada Region energy equaled the anticipated market rate for energy in 2004. This resulted in melding the CVP hydropower operated to maximize peaking with 50 MW of renewable resource purchases.

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1. The Sierra Nevada Region is not proposing to change operations at the Washoe Project.

2. A sensitivity test was run without biomass in the resource mix for purposes of analyzing air quality and effects on land use, water quality, and wastes.

3. August data (see Table 4.2). August was selected because loads are high at that time of year in relation to available capacity.

Summary

The Western Area Power Administration (Western), created in 1977 under the Department of Energy (DOE) Organization Act, markets and transmits electric power throughout 15 western states. Western's Sierra Nevada Customer Service Region (Sierra Nevada Region) markets approximately 1,480 megawatts (MW) of power from the Central Valley Project (CVP) and other sources and markets nonfirm energy from the Washoe Project.[1]

Western's mission is to market and transmit electricity that is in excess of Project Use (power required for project operations), which for the Sierra Nevada Region is generated from CVP and Washoe Project powerplants. Western's power marketing responsibility includes managing the Federal transmission system. The hydroelectric generation facilities of the CVP are operated by the Bureau of Reclamation (Reclamation). Reclamation manages and releases water in accordance with the various acts authorizing specific projects and with other laws, permits, and enabling legislation. Western's capacity and energy sales must be in conformance with the laws that govern its sale of electrical power. Hydropower operations at each facility comply with water flows and other constraints set by Reclamation, the U.S. Fish and Wildlife Service, or other regulatory agencies, acting in accordance with laws, regulations, and policies.

Proposed Action

Existing contracts for the sale of Sierra Nevada Region power resources expire on December 31, 2004. The Sierra Nevada Region proposes to develop a marketing plan that defines the products and services to be offered and the eligibility and allocation criteria that will lead to allocations of CVP and Washoe Project electric power resources beyond the year 2004. Because determining levels of long-term firm power resources to be marketed and subsequently entering into contracts for the delivery of related products and services could have been a major Federal action with potentially significant impacts to the human environment, this 2004 Power Marketing Program Final Environmental Impact Statement (2004 EIS) has been prepared in compliance with the National Environmental Policy Act of 1969 (NEPA), as amended, and associated implementing regulations, particularly Council on Environmental Quality regulations (40 CFR Parts 1500-1508) and DOE regulations (10 CFR Part 1021). This 2004 EIS describes the environmental consequences of the range of reasonable marketing plan alternatives.

The 2004 EIS contains an analysis of decisions related to the development and adoption of the Sierra Nevada Region's 2004 Power Marketing Program. Five levels of decisions are related to the program, although not all of them are directly addressed in the 2004 EIS. The five levels of decisions are as follows:

- How to schedule Federal CVP hydroelectric generation within constraints established by Reclamation. These issues are analyzed within the 2004 EIS.
- How much and what kinds of power purchases are needed to firm and maximize the value of Federal hydroelectric power. These issues are analyzed within the 2004 EIS.
- The type and kinds of specific products and services that will be offered to customers. These will be shaped from Federal hydropower and power purchases and are being designed as part of a separate public process under the Administrative Procedure Act. This process will be completed following completion of the 2004 EIS process.
- How much Federal hydropower to allocate to specific Sierra Nevada Region customers. Allocations to specific customers will be made in the separate public process which adheres to the guidelines of the Administrative Procedure Act. The 2004 EIS evaluates regional effects of extreme changes in allocation levels to the following three customer groups; utility, agricultural, and other. Smaller reductions in allocation levels for purposes of establishing resource pools were analyzed in Western's Energy Planning and Management Program (EPAMP) EIS (Western 1995).
- Rates and rate structures establishing the amounts customers will be charged are set through a separate public rate-making process. Rates and rate structures are changed periodically to reflect Western's changing costs and resource availability.

Because of the complexity of power marketing, utility industry changes (restructuring) now under way, and the need to remain economically viable in an increasingly competitive and rapidly changing marketplace, the Sierra Nevada Region's 2004 Plan will establish the framework for power marketing decisions. The 2004 Plan will give Western an ongoing ability to adapt its marketing decisions to changing economic conditions and the changing demands and needs of its customers.

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In implementing the proposed action, the Sierra Nevada Region plans to achieve a balanced mix of purposes. The purposes of the 2004 Power Marketing Plan (2004 Plan) are listed below (in no particular order):

- to be consistent with Sierra Nevada Region's statutory and other legal constraints
- to provide long-term resource and contractual stability for the Sierra Nevada Region and for customers contracting with the Sierra Nevada Region
- to provide the greatest practical value of the power resource to the Sierra Nevada Region and to customers contracting with the Sierra Nevada Region
- to protect the human and natural environment
- to be responsive to future changes in the CVP, the Washoe Project, and the utility industry.

Public Involvement

The Sierra Nevada Region developed and followed a Public Involvement Plan early in the 2004 EIS process. The Public Involvement Plan was designed to guide the Sierra Nevada Region through a collaborative and systematic decision-making process and facilitate input from the public and interested parties and agencies. The primary purposes of public involvement, as set out in the Public Involvement Plan, were to

- inform the public
- gather information from the public to identify public concerns and values
- responsibly address stakeholder input regarding environmental and allocation concerns and consider such input in decision making.

Public comments and opinions from interested groups, Federal and State agencies, customers, and the general public are an integral part of the decision-making process. Through public meetings, workshops, mailings, and comments on the draft 2004 EIS, the Sierra Nevada Region has received input on the scope of the 2004 EIS and on the alternatives. This 2004 EIS reflects comments received. Comments and responses are presented in Appendix O.

Through the Sierra Nevada Region's public involvement process, an extensive effort was made to notify all potentially interested parties about the 2004 EIS and opportunities for involvement. Approximately 25 pre-scoping stakeholder meetings (involving customers, agencies, interested groups, and individuals) were informally held during the summer of 1993 to discuss issues and concerns related to the project. An interested parties mailing list was used to keep track of those showing an interest in the project. The list was expanded to include any new interested parties as they were identified. The *Federal Register* notice of the scoping period was published on August 10 and 13, 1993. In conjunction with the notice, a news release was sent to local newspapers, and scoping invitation letters were mailed to those on the interested parties mailing list. Three public scoping meetings were held in August and September 1993 to receive written and verbal comments on environmental and marketing-related issues. The Sierra Nevada Region held two more public meetings to facilitate information sharing and to obtain further public comment: an Issues and Alternatives Public Workshop on May 18, 1994, and an EIS Alternatives Workshop on January 18, 1995. A public hearing concerning the draft 2004 EIS was held on June 13, 1996. The public comment period for the draft 2004 EIS closed on July 31, 1996. Additionally, public involvement opportunities were supplemented by 12 separate mailings of the project bulletin, the *2004 EIS Update*, designed to keep all interested groups and individuals apprised of the project details and scheduled events.

Alternatives

In developing alternatives for the 2004 EIS, the Sierra Nevada Region focused on six key component groups--key elements of the marketing program--that vary across the alternatives. The Sierra Nevada Region's intent in establishing the ranges for the variable components was to use a "tent stakes" approach to constructing alternatives. Using this approach, the alternatives were designed to cover the range of reasonable options and thus the analyses of their environmental effects would bracket the range of potential impacts. Although the final marketing plan may not be identical to any one of the 2004 EIS alternatives, the values for any alternative selected and its components will be within the range considered and its impacts will fall within the range of impacts assessed.

The six key component groups that are varied in the analysis of alternatives include the following:

1) Baseload Operations - Within the operational constraints established by the U.S. Department of the Interior (Interior), this refers to releasing water from hydroelectric facilities to generate electricity at a relatively constant rate. This approach would emphasize a steady water release rate from dams above regulating reservoirs.

2) *Peaking Operations* - Within the operational constraints established by Interior, this refers to storing and releasing water from hydroelectric facilities to generate electricity during the relatively short period of maximum demand. This approach would emphasize periodic water releases from dams above regulating reservoirs timed to produce electricity when it is most needed.

3) Power Purchases - These refer to Sierra Nevada Region power purchases used to supplement the Federal hydroelectric resource. Purchases may come from various power markets in California, the Pacific Northwest, and the Desert Southwest. For purposes of modeling and analysis in this 2004 EIS, purchase levels of 0 MW, 450 MW, and 900 MW, each at capacity factors up to 15 percent and 85 percent, are assumed. The no-action alternative has an approximate average monthly purchase level of about 478 MW assuming average hydrologic conditions and no contractual interchanges or exchanges.

4) Renewable Resources - These resource types will be emphasized in one alternative and could be acquired through either selective purchases or allocations of Federal resources to Sierra Nevada Region customers active in developing renewable resources.

5) Power Cost Analysis - This refers to analyzing cost impacts to Sierra Nevada Region's customers from combining the costs for purchases and Sierra Nevada Region's hydropower resources (aggregated) or treating these resources individually, each with its own cost (disaggregated).

6) Allocation to Customer Groups - This refers to assessing the impacts of changing the quantities of power that customer groups currently receive from the Sierra Nevada Region. Customers are divided into the following three groups, with the customers in each group having similar load characteristics: utilities, agriculture, and other (such as State and Federal agencies).

Nonvariable and independent components do not vary across alternatives; therefore, the environmental effects attributable to these components are constant. Nonvariable and independent components include eligibility criteria, first preference, preference, marketing area, delivery conditions, transmission requirements, minimum load requirements, executed contract requirements, alternative financing arrangements, termination provisions, and standard provisions. Such components may be included in the 2004 Plan. Because they are already included in Sierra Nevada Region's present activities, they represent no change from the no-action alternative. Environmental impact analyses in this 2004 EIS focus on those components that vary across the alternatives. Constant effects associated with nonvariable and independent components are included in this 2004 EIS.

Components that were analyzed in the EPAMP EIS (Western 1995a) were not analyzed in this 2004 EIS. These components include contract length, power planning requirements (such as integrated resource planning for customers), withdrawal provisions, and contract adjustment provisions.

An analysis of allocations to customer groups was done to characterize the impacts that may result from changing the quantity of resources available to different customer groups. Such changes may result if the Sierra Nevada Region emphasizes sales to a particular group or encourages special actions, such as acquiring renewable resources, or customer allocations change due to resource availability or marketing options. In this study, customer allocations are both increased and decreased for each customer group. This approach captures the range of beneficial and negative impacts that may result from changes affecting a particular customer group.

Four alternatives were developed for analysis in the draft 2004 EIS that are structured around operations of the CVP hydroelectric system. A preferred alternative has been added to the final 2004 EIS. The other alternatives also have been refined. The key change affecting alternative structure is the treatment of the energy market assumed for 2005. In the draft 2004 EIS, each of the alternatives incorporated varying levels of firm capacity purchases at different capacity factors. In these types of contracts, Western would be required to purchase the energy and capacity even if it was not needed or if it was not the most economic purchase available at any given time.

In the final 2004 EIS, the energy market is assumed to operate with open access for both wholesale and retail customers. Further, power could be purchased on an hourly basis, as needed. Because of this flexibility, when Western makes purchases, it is unlikely that customers would make a similar purchase to meet the same need. In addition, because both Western and its customers would have equal access to the market, purchases would be under similar terms and conditions. Thus, a purchase by Western would be offset by purchases foregone by Western's customers and vice versa. The results of these assumptions about equal access and hourly pricing include the following:

- Purchase levels described in the alternatives would be the maximum purchased in any 1 hour by the Sierra Nevada Region.
- The Sierra Nevada Region could purchase up to the maximum purchase level but need not purchase more than it requires.
- The power cost analysis shown in the draft 2004 EIS is not applicable under open access conditions. All purchases in the final 2004 EIS are assumed to be made from power markets. The Sierra Nevada Region's market costs would be passed on to its customers, meaning there would be no difference between a Sierra Nevada Region purchase and a customer's direct market purchase. The no purchase option represents the effects of the Sierra Nevada Region disaggregating costs associated with any purchases. Purchase options were also analyzed on an aggregated basis.

Another change is the assumed cost of renewable resources. In the draft 2004 EIS, it was assumed that all renewables available to Western would be priced at levels incorporating technological improvements that may be forthcoming by the year 2005. The final 2004 EIS assumes that prices incorporating technological advancements will be available in 20 percent of the renewable resources that would be available in 2005. This revision raised the cost of renewables in comparison with the assumptions used in the draft EIS and, along with lower market prices, reduced the amount of renewable resources that could be economically supported to 50 MW.

The four original alternatives include the following:

- The no-action alternative refers to a continuation of Sierra Nevada Region's present approach to marketing power, meeting 2005 loads that are comparable to today's (1996) load patterns. Within operating constraints, hydropower facilities are scheduled close to maximum peaking. For modeling purposes, the no-action alternative includes an average monthly purchase of about 478 MW, assuming average hydrologic conditions and no contractual interchanges or exchanges.
- Maximize hydropower peaking (the peaking alternative) refers to scheduling the CVP hydropower facilities to maximize power generation during peak load periods within operating constraints. Five purchase cases are considered including no power purchases, 450 MW up to a 15-percent capacity factor, 450 MW up to an 85-percent capacity factor, 900 MW up to a 15-percent capacity factor, and 900 MW up to an 85-percent capacity factor.

- The baseload alternative refers to scheduling the CVP hydropower facilities for relatively constant power output within operating constraints. The same five purchase cases are examined as with the peaking alternative described above.
- Renewable resource acquisition (the renewables alternative) refers to scheduling the CVP hydropower facilities to maximize power generation during peak load periods within operating constraints, and power purchases are set at 50 MW of capacity to support the use of renewable resources. Capacity was assumed to be equally distributed among biomass, wind, solar and geothermal facilities.[2]

As indicated previously, the Sierra Nevada Region used a "tent stakes" approach to constructing alternatives, which captures the greatest possible range of impacts likely to occur. Figure S.1 illustrates the tent stakes approach.

Preferred Alternative

The preferred alternative is similar to the maximum peaking alternative. Additional power would be purchased if requested by customers to meet their load requirements. Purchases are transparent to the analysis because costs would be passed directly through to customers. This alternative falls within the tent stakes established in the draft 2004 EIS.

Environmentally Preferred Alternative

The peaking alternative was selected as the environmentally preferred alternative. This alternative was selected because it would provide the greatest load-carrying capacity and best offset the need for additional powerplants. This alternative generally results in the greatest benefits or least impacts to the environmental resources when impacts are quantified. Peaking with no purchases results in the greatest benefits.

Figure S.1. The Tent Stakes Approach for Examining the Limits of the Alternatives

The alternatives are summarized in Table S.1. The baseload and peaking alternatives incorporate several purchase levels; but the no-action, renewables, and preferred alternatives were each analyzed at only one purchase level.

Affected Environment

The affected environment includes those environmental resources that may be changed by the Sierra Nevada Region's proposed actions. The affected environment includes some CVP facilities as well as related utility systems and economics. The alternatives under consideration would be implemented in the year 2005, after existing power marketing contracts expire. Where it is important to the analysis, there is a description of assumptions and projections of how the affected environment may appear in the year 2005.

The CVP is a large water control and delivery system. It includes 18 dams and reservoirs and 11 powerplants. Sierra Nevada Region's actions are limited to scheduling power from specific hydropower generators and the regulating reservoirs that maintain nonfluctuating flows downstream from those facilities. These regulating reservoirs include Lewiston, Keswick, Lake Natoma, and Tulloch. The Sierra Nevada Region has no discretion over how water is released from the regulating reservoirs. At the generating facilities upstream of the regulating reservoirs, the Sierra Nevada Region has discretion in the hourly scheduling of generation but cannot schedule generation in a manner that would impact regulating reservoir releases. Therefore, within the CVP, the environment that may be affected by the alternatives described

Table S.1 Summary of 2004 EIS Alternatives

	ALTERNATIVES												
	No-Action	**Maximize Hydropower Peaking** [a]					**Baseload**					**Renewables**	**Preferred**
Power Resources (MW)													
CVP Load-Carrying Capacity [b]	1,089	1,377					508					1,377[c]	1,326
Minimum and Maximum Monthly CVP Capacity [d]	1,255 and 1,665												
Power Purchases	478[e]	0	450[f]	450[g]	900[f]	900[g]	0	450[f]	450[g]	900[f]	900[g]	50	[h]
Allocation to Customer Groups	Historic	100% increase (or to the extent possible) and 100% decrease in existing allocations to each of three customer groups: utilities, agriculture, and other.											
Constant Components													
Nonvariable	These components include eligibility criteria, first preference, preference, marketing area, delivery conditions, and transmission requirements.												
Independent	Components in this category include minimum load requirements, executed contract requirement, alternative financing arrangements, termination provisions, withdrawal provisions, and standard provisions.												
EPAMP EIS	These components include contract length, power planning requirements such as IRP for customers and contract adjustment provisions.												

[a] Maximized peaking with no purchases has been identified as the environmentally preferred alternative.
[b] Determined assuming a 90% exceedance - shown for the peak month.
[c] Assumes hydropower peaking operations are maximized.
[d] Based on projected hydroplant capabilities assuming 90% exceedance.
[e] Approximate average monthly purchase assuming average hydrologic conditions and no contractual interchanges or exchanges.
[f] Up to a 15% capacity factor.

[g] Up to an 85% capacity factor.
[h] Purchases may be made to support customers but market costs would be passed through to customers making them equivalent to customer purchases.

in this 2004 EIS is limited to the regulating reservoirs. The main reservoirs are substantially larger than the regulating reservoirs, and changes in power operations do not create noticeable fluctuations in reservoir surface elevations on a daily basis.

Interior is assessing environmental effects related to broader operating issues in separate NEPA processes which address various sections of the CVP Improvement Act and the Trinity River Basin Fish and Wildlife Restoration Act. These other processes should be referenced as additional sources of information about CVP operations and environmental conditions. Other related NEPA and environmental processes include new water quality standards for the San Francisco Bay-San Joaquin/Sacramento River Delta Estuary (Bay/Delta), the Federal Energy Regulatory Commission's (FERC's) EIS on transmission services, Western's EPAMP EIS, recent California State legislation on electric utility industry restructuring, and the Public Utility Commission's proposed environmental impact report on that legislation.

Washoe Project marketing will also be considered in Sierra Nevada Region's 2004 Plan and is briefly described in this 2004 EIS. However, the Sierra Nevada Region has no operating discretion at this facility, and thus conditions will not change as a result of Sierra Nevada Region's 2004 Plan.

Environmental resources outside the CVP that may be influenced by CVP operations, Sierra Nevada Region's power marketing activities, and responses to those activities include air quality, water quality, wastes, and land use. The potential affected environment for these resources is large. The Pacific Northwest, northern and central California, and the Desert Southwest are regions that may interact with the Sierra Nevada Region in supplying power and are potentially part of the affected environment. The power generation and transmission facilities and markets of these areas are interconnected.

Sierra Nevada Region's customers and the economies in which they operate and serve are also part of the affected environment.

Environmental Consequences

The impact analyses follow three basic steps. Historic hydrological conditions were analyzed using the PROSIM (CVP simulation model) model. The PROSIM outputs (in the form of monthly water flows and available hydropower capacity and energy) were input to the PROSYM model, a production cost simulation model of electric utility operations. PROSYM outputs (in the form of estimated levels of electric generation, production costs, and hourly water flows in the CVP) were used to assess the environmental impacts. Table S.2 summarizes the environmental impacts of each alternative.

Table S.2 Summary of Environmental Impacts[(a)]

Environmental Resources	Impact Summary
Utility Systems	The alternatives result in offsets in generation between the CVP hydrosystem and combustion turbines (CTs) and combined-cycle combustion turbines (CCCTs). Baseload alternative reduces marketable capacity of the CVP. Peaking increases marketable CVP capacity.
CVP Water Resources - Temperature Fluctuation	No change from existing conditions.
CVP Water Resources - Pool-Level Fluctuation	Affects regulating reservoirs only. Peaking, no-action, renewables, and preferred alternatives very similar with a daily peak and trough. The baseload alternative results in a more constant reservoir level. The Sierra Nevada Region does not propose to schedule powerplant releases into Keswick Reservoir that would cause scouring of toxic-metal laden sediments.
Fisheries	No impact to anadromous fish. Peaking, renewables, no-action, and preferred alternatives similar to existing conditions. Fish in the regulating reservoirs may benefit slightly from baseload alternative.
Terrestrial Environment	No change from existing conditions.
Threatened and Endangered Species	No change from existing conditions.
Recreation	Peaking, no-action, renewables, and preferred alternatives similar to existing conditions. Recreation on regulating reservoirs may benefit slightly from baseload alternative.
Cultural Resources	Peaking, no-action, renewables, and preferred alternatives similar to existing conditions. Baseload alternative would reduce or minimize the impacts of erosion from pool fluctuation.
Socioeconomic Resources	Impacts are less than a fraction of 1 percent on a regional basis and are nearly indistinguishable across alternatives. The largest effect would be with the renewables alternative, which results in slightly negative effects. All alternatives would have neutral or slightly negative impacts on agricultural profit and no

	impacts on production.
Air Resources	The baseload and renewables (with a biomass component) alternatives slightly increase pollutant emissions; other alternatives produce slight decreases or no change in pollutant emissions. The baseload alternative results in greater emissions during the day when pollutant emissions from other sources are also high. Other alternatives are similar to the no-action alternative or shift additional emissions to the night.
Water Consumption Associated with Non-CVP Powerplants	All alternatives reduce water consumption in comparison to the no-action alternative. The slight changes found are due to shifts among the use of CTs and CCCTs.
Wastes Associated with Non-CVP Powerplants	Annual waste production is relatively constant across the no-action, peaking, baseload, and preferred alternatives. The renewables alternative results in the greatest annual waste production, mostly coming from biomass fuel powerplants. However, biomass-fired powerplants may consume forest or agricultural byproducts or urban wastes and result in a reduced waste volume. A test case without biomass results in waste production similar to the no-action alternative.
Land Use Associated with Non-CVP Powerplants	In comparison to the no-action alternative, the peaking alternative results in more available capacity that reduces acreage by about 50 acres needed for generation facilities. The baseload alternative requires an additional 90 acres, and the renewables alternative results in about 70 to 90 additional acres. The preferred alternative may result in up to about 5 additional acres.
Irreversible and Irretrievable Commitments of Resources	Land-use impacts may be irreversible. Substantial shifts in powerplant fuel type are not expected.
Unavoidable Adverse Impacts	Of the impacts identified, the only major effect stems from lost load-carrying capacity in the baseload alternative.
Relationship Between Short-Term Uses and Long-Term Productivity	No alternatives result in substantial land being taken out of production or a loss of river-system long-term productivity. Adding new capacity to make up for lost CVP load-carrying capacity could result in small regional impacts.
Direct and Indirect Effects	Direct effects are limited to those related to possible changes in electric power production at some CVP facilities. All others are indirect.
Cumulative Effects	2004 EIS analyses incorporate cumulative effects to the extent they can be identified, such as the effects on the operation of

	power resources in the areas where power purchases may be made. In large part, any cumulative impacts have already been felt, as CVP power has been marketed in the past. Most analyses describe potential shifts in impacts, rather than new or additional impacts.

[a] The analysis indicates that potential impacts to fisheries, terrestrial environment, threatened and endangered species, recreation, and cultural resources are restricted to regulating reservoirs (see Section 3.4).

The manner in which hydropower generating plants are scheduled is one of the fundamental differences across the alternatives. The PROSYM analyses show that, when operated to provide electricity at peak times (the peaking alternative), the hydropower system can offset up to 317 MW(3) of electric generating capacity from other sources when compared to the no-action alternative. The replacement capacity needed to offset the difference between the baseload and no-action alternatives is 581 MW of load-carrying capacity. Building new capacity results in land-use impacts and the use of the natural and financial resources needed to build the powerplant and connect it with the interconnected transmission grid. Western is not currently planning to build such a powerplant.

The CVP hydropower system does not require additional facilities or modifications to change from baseload to peaking operations or vice versa. Thus, the lost load-carrying capacity from baseload operations would be retrievable for CVP operations if a decision to subsequently implement peaking operations was made. However, if the baseload alternative is implemented and replacement capacity is built, replacement capacity is expected to remain in place. If this occurs, a potential shift from baseload back to peaking CVP operations would likely result in temporary surplus capacity in the region.

Impacts resulting from CVP water releases within Sierra Nevada Region's power scheduling discretion are limited. The Sierra Nevada Region's discretion is described in the introduction to Chapter 3. In comparison to the no-action alternative, the peaking alternative results in only slightly greater pool-level fluctuation in regulating reservoirs. Impacts are restricted to the regulating reservoirs at Lewiston, Keswick, Lake Natoma, and Tulloch because the regulating dams are operated to control releases downstream. As discussed in Section 3.4.2, the Sierra Nevada Region has assumed for purposes of this 2004 EIS that Keswick Reservoir can fluctuate up to 11 ft with the removal of contaminated sediment in the Spring Creek arm of Keswick Reservoir. If this problem is not resolved by 2005, the Sierra Nevada Region will schedule powerplant operations within the then current normal operating level, which would reduce the potential effects on water temperature and pool fluctuation.

The baseload alternative would result in relatively constant water releases from the main dams that would avoid pool-level fluctuation and potentially improve recreation and resident fisheries slightly in the regulating reservoirs. The hourly water releases from the main dams, whether operating for peaking or baseload, affect temperature fluctuation a very minor amount. The temperature differences are so small that, although they can be calculated, they could not be measured in the regulating reservoirs or the rivers downstream.

Given these findings about pool-level and temperature fluctuations, in comparison with the no-action alternative, no alternative would result in adverse impacts to fisheries, threatened and endangered species, recreation, the terrestrial environment, or cultural resources.

The more constant flows of the baseload alternative may result in minor beneficial effects to fisheries, recreation, and cultural resources associated with the regulating reservoirs. A reduction in pool-level fluctuation may improve habitat for resident fish and improve boating conditions. Stable pool elevations would also reduce erosion at shoreline cultural resource sites by minimizing the zone of impact due to pool fluctuations. Erosion due to wave action would be confined to this zone.

Impacts to air quality, solid waste, and wastewater would be related to the generation of electricity at powerplants apart from the CVP. The variation across the alternatives comes from changes in operation of combustion turbines (CTs) and combined-cycle combustion turbines (CCCTs) that may be located throughout northern and central California, the Pacific Northwest, or the Desert Southwest. The most substantial air quality impacts would come from changes in hourly operations of other non-hydropower plants in response to the manner in which the CVP hydroelectric facilities are scheduled (peaking or baseload). Generally, compared to the no-action alternative, scheduling the hydropower system as a baseload system would result in an increase of emissions from other powerplants during the day when ambient levels are high because thermal generation would be needed for peaking. Peaking the hydropower system offsets daytime thermal production and reduces daytime emissions but increases nighttime thermal production and emissions, when ambient levels are less. This can be important for areas having problems meeting air quality standards during summer afternoons when industrial, utility, and transportation emissions are at their peak. During summer afternoons, the difference in oxides of nitrogen (NO_x) emissions between the peaking and baseload alternatives would reach over 400 pounds per hour (lb/h). These emissions are equivalent to those from a 400-MW combustion turbine plant.

Without biomass, the renewables alternative results in the most beneficial effects on annual air emissions. Including biomass in the renewables alternatives would produce the greatest levels of annual air emissions.

In comparison with the no-action alternative, all of the other alternatives would result in beneficial effects on wastewater production. As with annual air emissions, the renewables alternative without biomass would result in the greatest benefit in reducing wastewater production. Renewables with biomass would produce the least benefit but would still result in a reduction in wastewater production in comparison with the no-action alternative.

Solid waste production also would be most changed by the renewables alternative. Biomass-fueled plants that burn municipal solid waste produce a great deal of ash as solid waste but also reduce the quantity of solid waste, requiring disposal in a landfill. For every pound of ash produced by biomass combustion, municipal solid waste is reduced by about 5 pounds. When this reduction is taken into account, solid waste would be reduced by nearly 40,000 tons with the renewables alternative. In comparison, the other alternatives (including renewables without biomass) are very similar to the no-action alternative.

The baseload alternative results in about 90 acres of land needed for replacement capacity. The renewables alternative would result in land-use impacts. Renewables, such as solar photovoltaic and wind, may require up to about 30 times the land area per megawatt of capacity of thermal resources such as CTs. In comparison to the no-action alternative, the renewables alternative would require 70 to 90 acres of land for powerplants.

The Sierra Nevada Region's 2004 Plan would influence the overall power costs of its customers. The alternatives are structured to determine the maximum range of impacts to gauge socioeconomic effects in the areas of output, employment, and labor income. When compared to the economy of northern and central California, or of any one of four economic regions analyzed within northern and central California, the estimated impacts are very small. The impacts are typically less than a fraction of 1 percent of the economic sectors being measured, which are large and relatively stable. None of the EIS alternatives are estimated to impact agricultural productivity and employment. The economic effects of the alternatives are reported for the regional economies studied. Based on results from the power production cost analysis described in Section 4.2, the associated economic impacts of the alternatives are nearly indistinguishable in all cases and in all regions.

All of these socioeconomic results reflect averaging across regions and customer groups and do not capture the effects on individual customers. Economic effects on Sierra Nevada Region customers who lose or gain allocations may be substantial in individual cases but cannot be determined because specific allocations have not been made. In general, however, customers who lose allocations would be balanced by other customers who gain equivalent allocations. Specific allocations will be made in a separate process under the APA.

Across the alternatives and the affected economic regions, economic impacts are minimal. The impacts are not disproportional across income or race groupings of the population. In the case of agriculture customers, low-income and minority groups make up a larger proportion of the employment in that sector. The impacts identified do not affect agricultural gross revenues or production levels. Thus, employment levels are not affected, and the impacts of alternatives do not disproportionally affect low-income or minority groups.

The effects of emphasizing the use of renewable resources (assuming some technological improvements) in the generation mix have a negative economic impact compared to the same quantity of thermal purchases. Improvements in technology should occur prior to 2005 that reduce the cost of the renewable resources. The amount of renewables to be included in the renewables alternative was determined by melding the anticipated cost of renewables in 2004 together with the anticipated CVP hydropower cost. The renewables share of the mix was increased until the combined rate for Sierra Nevada Region energy equaled the anticipated market rate for energy in 2004. This resulted in melding the CVP hydropower operated to maximize peaking with 50 MW of renewable resource purchases.

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1. The Sierra Nevada Region is not proposing to change operations at the Washoe Project.

2. A sensitivity test was run without biomass in the resource mix for purposes of analyzing air quality and effects on land use, water quality, and wastes.

3. August data (see Table 4.2). August was selected because loads are high at that time of year in relation to available capacity.

Table 2.1

Table 2.1. Initial 63 Components

		Terms and Conditions	
Resources	Products and Services	Contract Provisions	Allocation and Eligibility Criteria
1. CVP Baseload 2. CVP Peaking 3. COTP and the Pacific Intertie 4. Northwest Purchases 5. Southwest Transmission 6. Southwest Purchases 7. Northern California Purchases 8. Customer Purchases 9. Green Resources 10. Customer Generation 11. Demand-Side Management	12. Capacity Reserve 13. Contingent Power 14. Economy/Nonfirm Energy 15. Emergency Power 16. Exchange Capacity and Energy 17. Firm Capacity with Energy 18. Firm Capacity with Energy - Baseload 19. Firm Capacity with Energy - Intermediate 20. Firm Capacity with Energy - Peaking 21. Firm Capacity with Energy - Load Factor Power 22. Maintenance Power 23. Spinning Reserve 24. Nonspinning Reserve 25. Selected Generation Technology Firming 26. Ramping Service 27. Regulation Service 28. Seasonal Power 29. Surplus Power 30. Transmission Service 31. Nonpower Services/Technical Assistance 32. Nonfirm Energy 33. Packaging of Unbundled Services	34. Long-term Sales Contract 35. Short-term Sales Contract 36. Medium-term Sales Contract 37. Executed Contract Requirement 38. Delivery Conditions/ Transmission/Location 39. Alternative Financing Arrangements 40. Termination Provisions 41. Withdrawal Provisions 42. Adjustment Provisions 43. Minimum Load Requirements 44. Scheduling/Operations Provisions 45. Standard Provisions 46. Energy Management 47. Cost Allocation 48. Rates	49. Eligibility Criteria 50. First Preference Allocation 51. Preference Allocation 52. Maximum/Minimum Allocation 53. Percentage of Marketable Resource 54. Percentage of Customer Load 55. Percentage of Existing Allocation 56. Greater Consideration to Existing Customers 57. Greater Consideration to Customers to Maximize Diversity 58. Greater Consideration to Customers Who Can Exchange Energy with the Sierra Nevada Region 59. Greater Consideration to Preferred Technologies or Renewable/Cogeneration Support 60. Greater Consideration to New Customers 61. Greater Consideration to DOD Legislation Allottees 62. Greater Consideration to Customers Assisting in Transmission Access or Efficient and Reliable Service 63. Reallocation of Unaccepted or Terminated Contracts

F.1 Cultural Properties Surrounding Lewiston Reservoir *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

F.2 Cultural Properties Surrounding Keswick Reservoir *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

F.3 Cultural Properties Surrounding Lake Natoma *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

F.4 Cultural Properties Surrounding Tulloch Reservoir *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

G.1 Marginal Heat Rates and Incremental Market Resources *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

H.1 National Ambient Air Quality Standards *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

H.2 Emission Levels for Designation as a Major Source *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

H.3 California Ambient Air Quality Standards *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

I.1 Energy Production *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

K.1 Power Cost Calculations *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

N.1 Impact Factors Selected for Use in the Analysis *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

N.2 Reported Impact Factors for Pulverized Coal Powerplants *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

N.3 Reported Impact Factors for Atmospheric Fluidized Bed Coal Powerplants *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

N.4 Reported Impact Factors for Coal Gasification, Combined-Cycle Powerplants *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

N.5 Reported Impact Factors for Hydroelectric Powerplants *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

N.6 Reported Impact Factors for Simple-Cycle Combustion Turbine Powerplants *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

N.7 Reported Impact Factors for Gas-Fired Combined-Cycle Combustion Turbine Powerplants *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

N.8 Reported Impact Factors for Agricultural Residue Burning Powerplants *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

N.9 Reported Impact Factors for Municipal Solid Waste Burning Powerplants *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

N.10 Reported Impact Factors for Wood Waste and Forest Products-Fired Powerplants *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

N.11 Reported Impact Factors for Geothermal Powerplants *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

N.12 Reported Impact Factors for Solar Generation *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

N.13 Reported Impact Factors for Wind Generation *(NOT AVAILABLE IN ELECTRONIC FORMAT)*

N.14 Reported Impact Factors for Nuclear Powerplants *(NOT AVAILABLE IN ELECTRONIC FORMAT)*