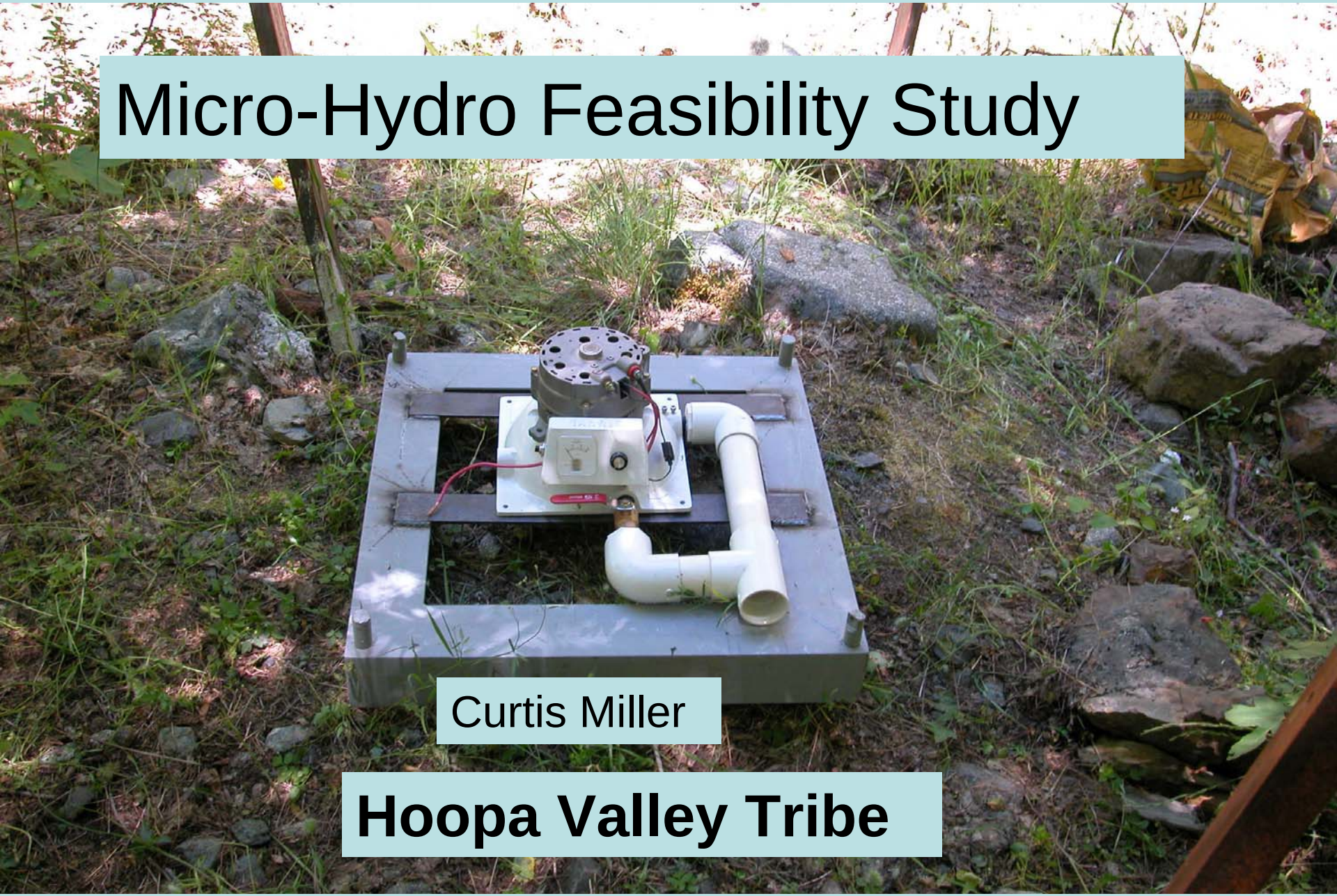
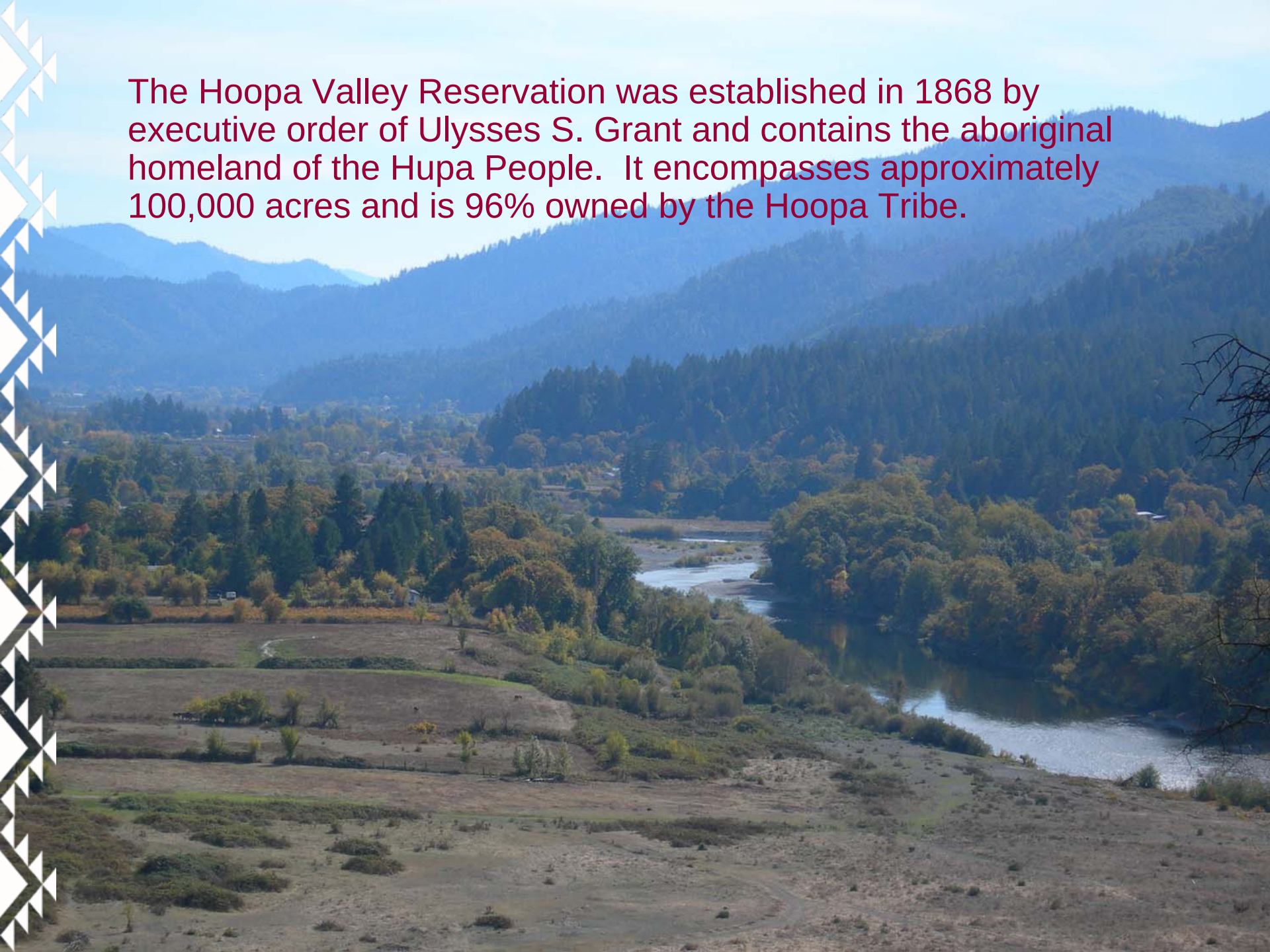
Micro-Hydro Feasibility Study



Curtis Miller

Hoopa Valley Tribe



The Hoopa Valley Reservation was established in 1868 by executive order of Ulysses S. Grant and contains the aboriginal homeland of the Hupa People. It encompasses approximately 100,000 acres and is 96% owned by the Hoopa Tribe.

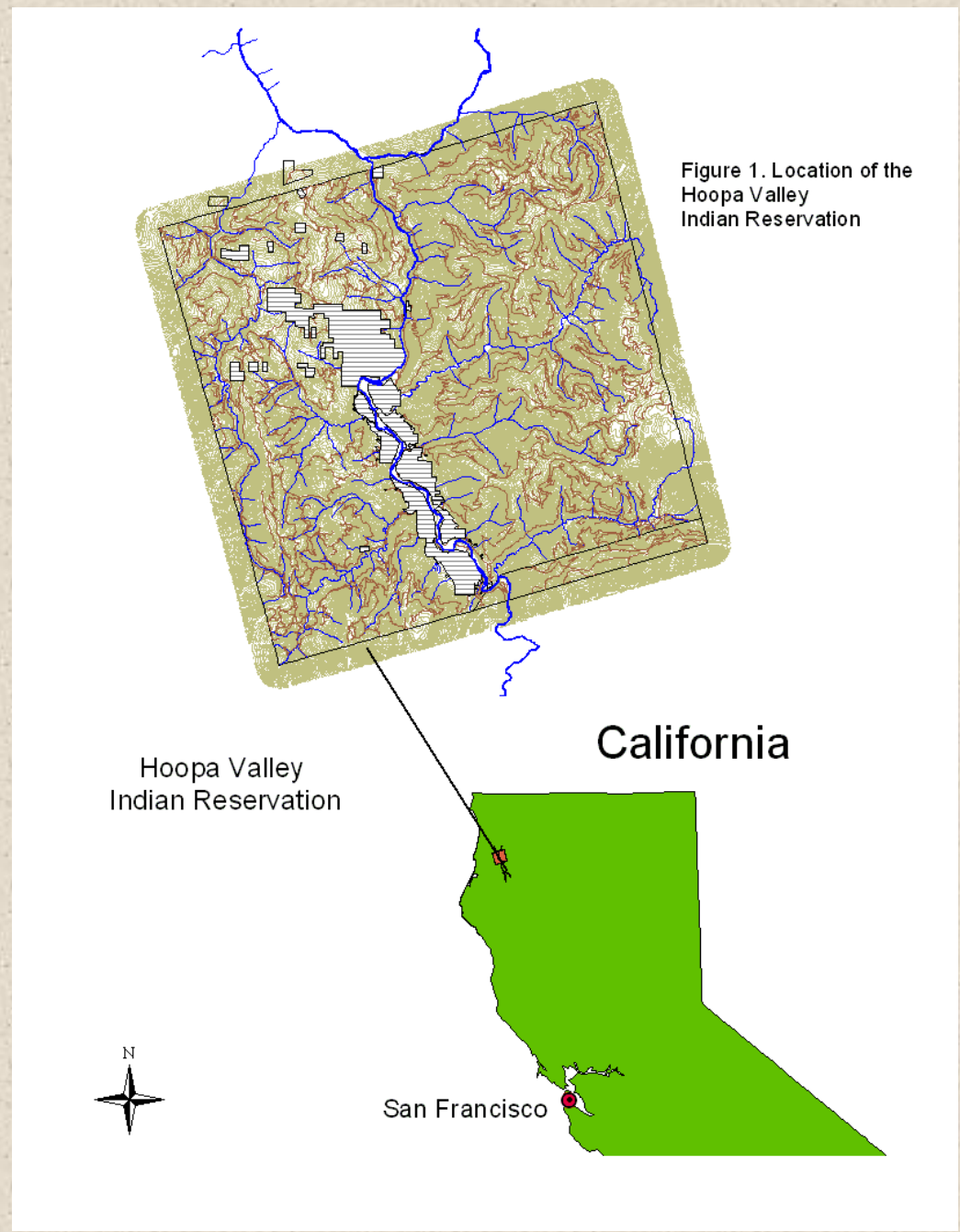
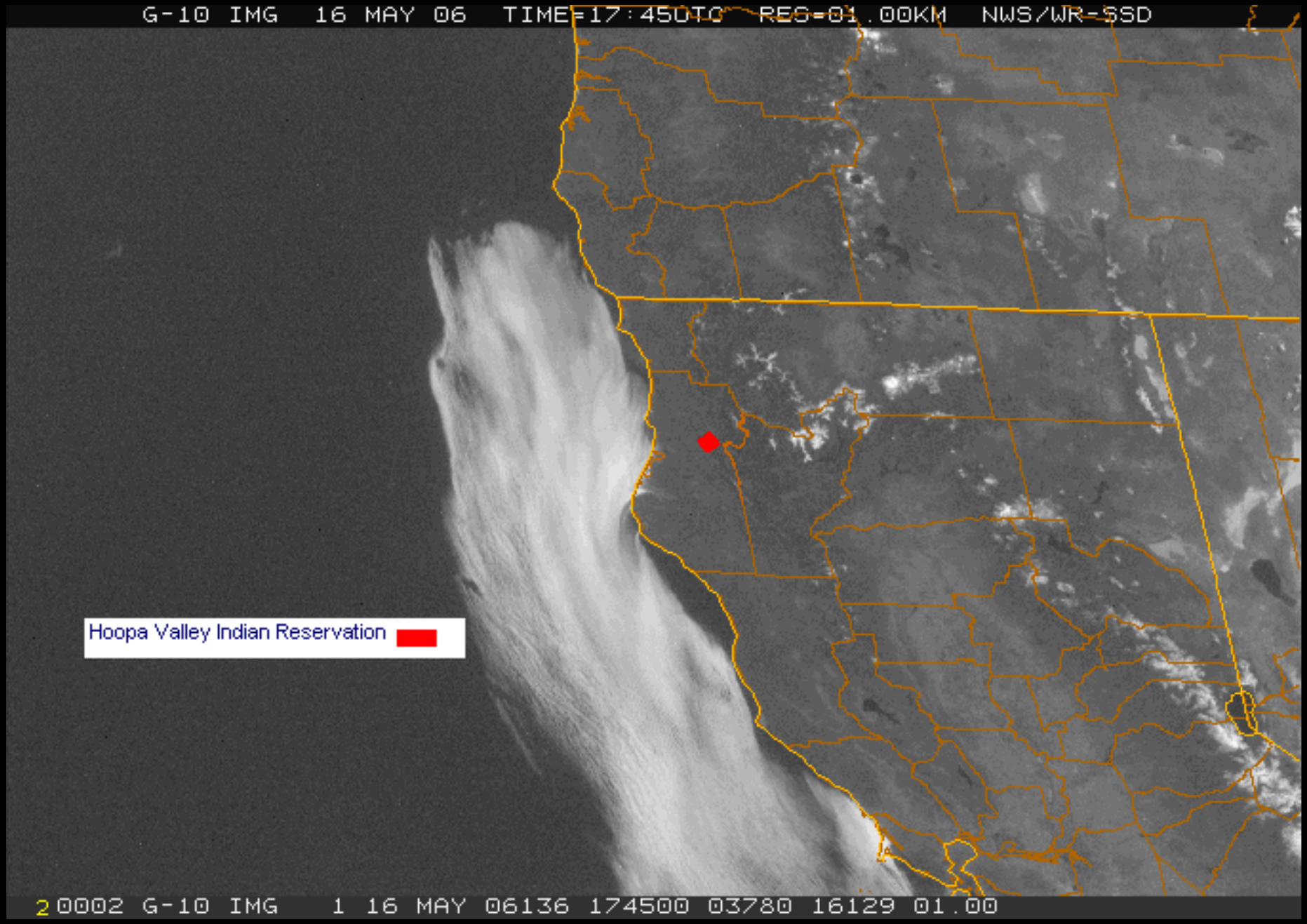
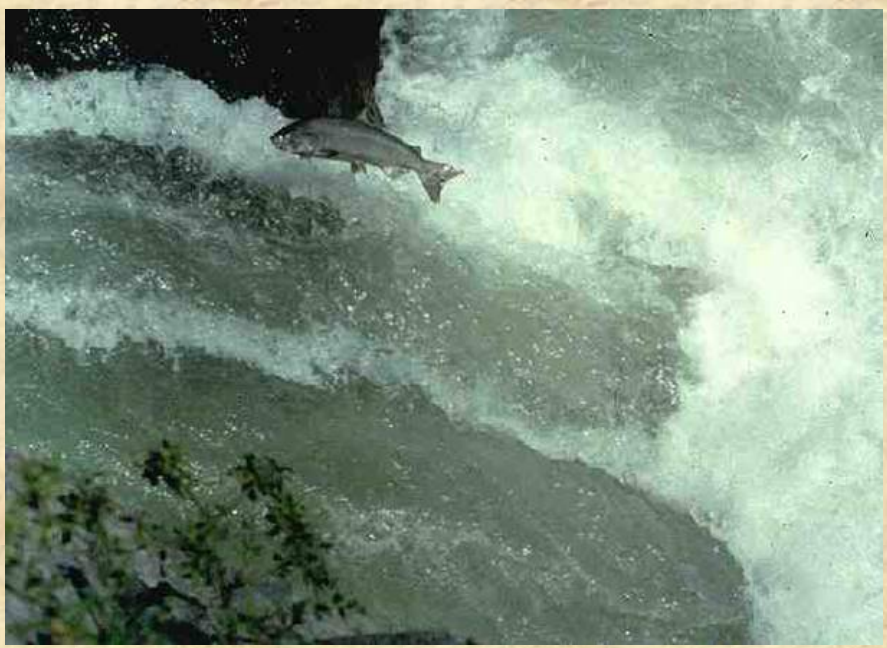
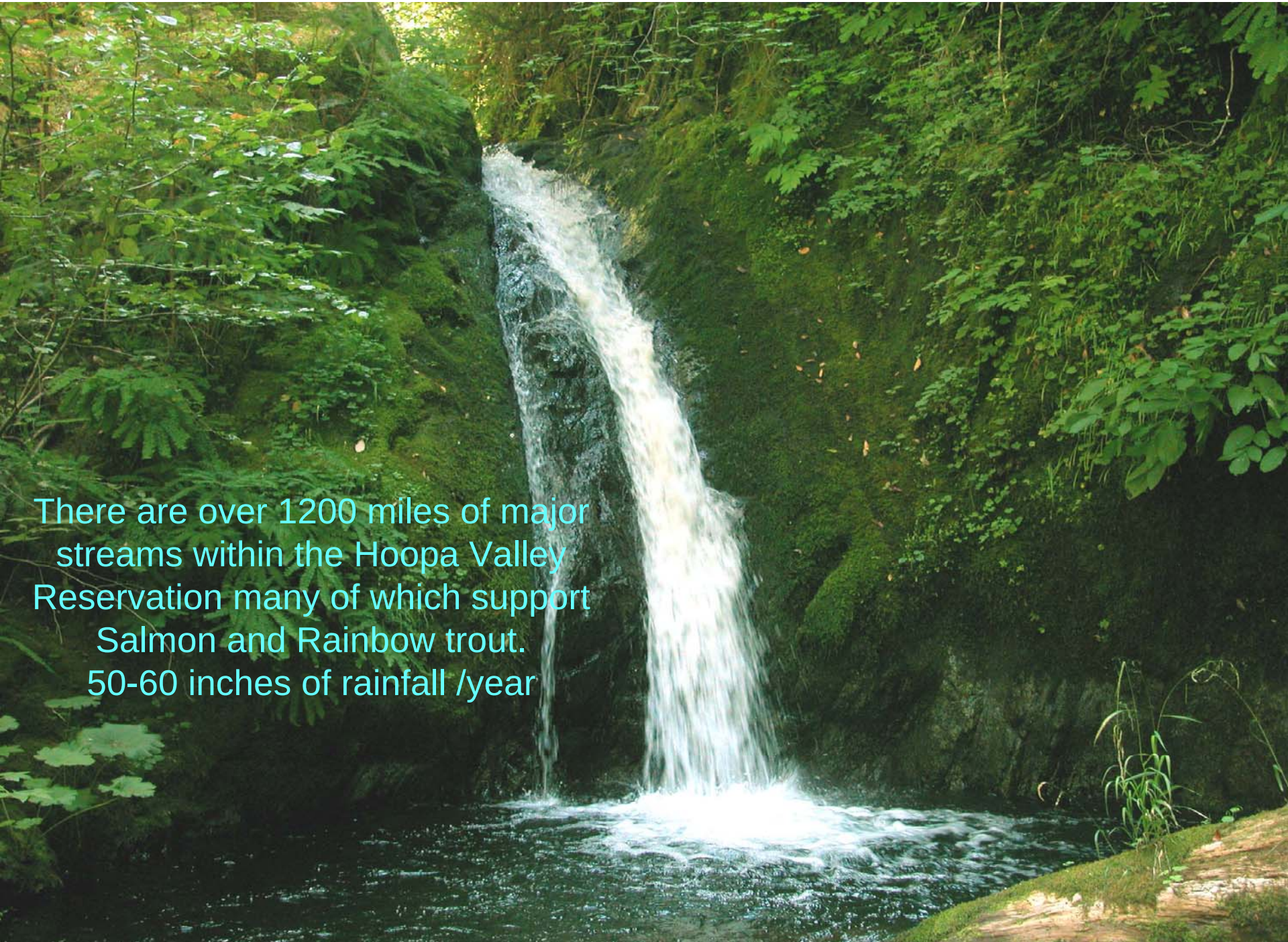


Figure 1. Location of the Hoopa Valley Indian Reservation


G-10 IMG 16 MAY 06 TIME=17:45UTC RES=01.00KM NWS/WR-SSD
Hoopa Valley Indian Reservation
20002 G-10 IMG 1 16 MAY 06136 174500 03780 16129 01.00

Salmon are the life blood of the Hupa and Yurok and Karuk people




There are over 1200 miles of major streams within the Hoopa Valley Reservation many of which support Salmon and Rainbow trout.
50-60 inches of rainfall /year

Why Hydro?

- Most common renewable energy
- Well developed technology
- Most efficient means of producing electricity
- Multiple uses of water resource
- Ideal for distributed generation
- Least expensive power in US

Hydro Efficiency

- Generates between 205-267 times the amount of energy to build and maintain the facility
- Windpower is 37x
- Nuclear is 16x
- Coal is 11x

In FY06 the Hoopa Valley Tribe received a grant from the DOE to conduct a hydro-power feasibility study on 7 major streams of the Reservation

Concept of Approach

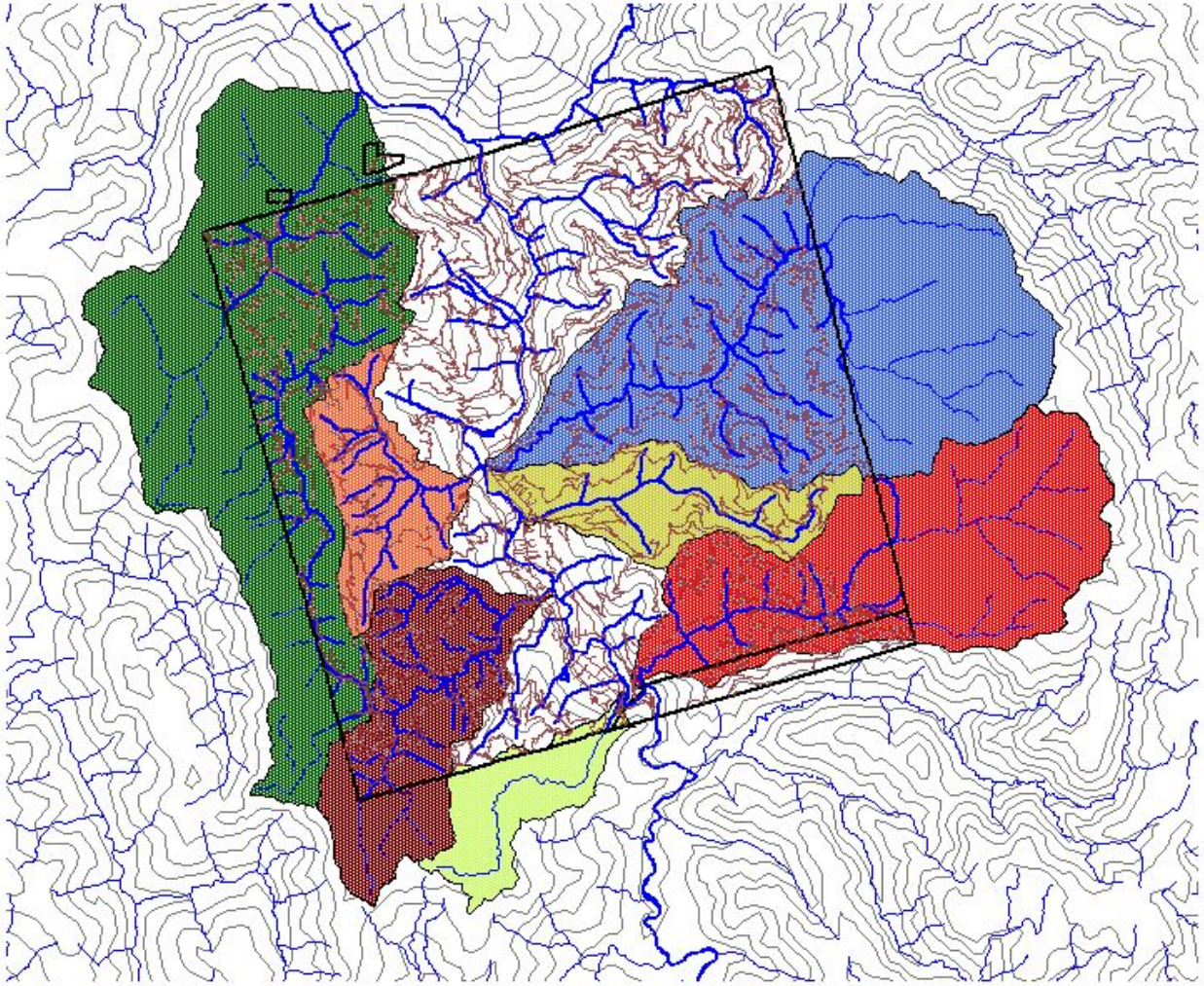
- Road access to streams
  - Intake sites, pipeline construction and turbine sites
- Distance to Valley
  - produce enough power to get down to the valley and still have plenty for the community to use
- Proximity to power lines – connectivity
- Location for turbine
  - relatively flat, close to power lines
- Adequate head and majority of stream flows at intake site

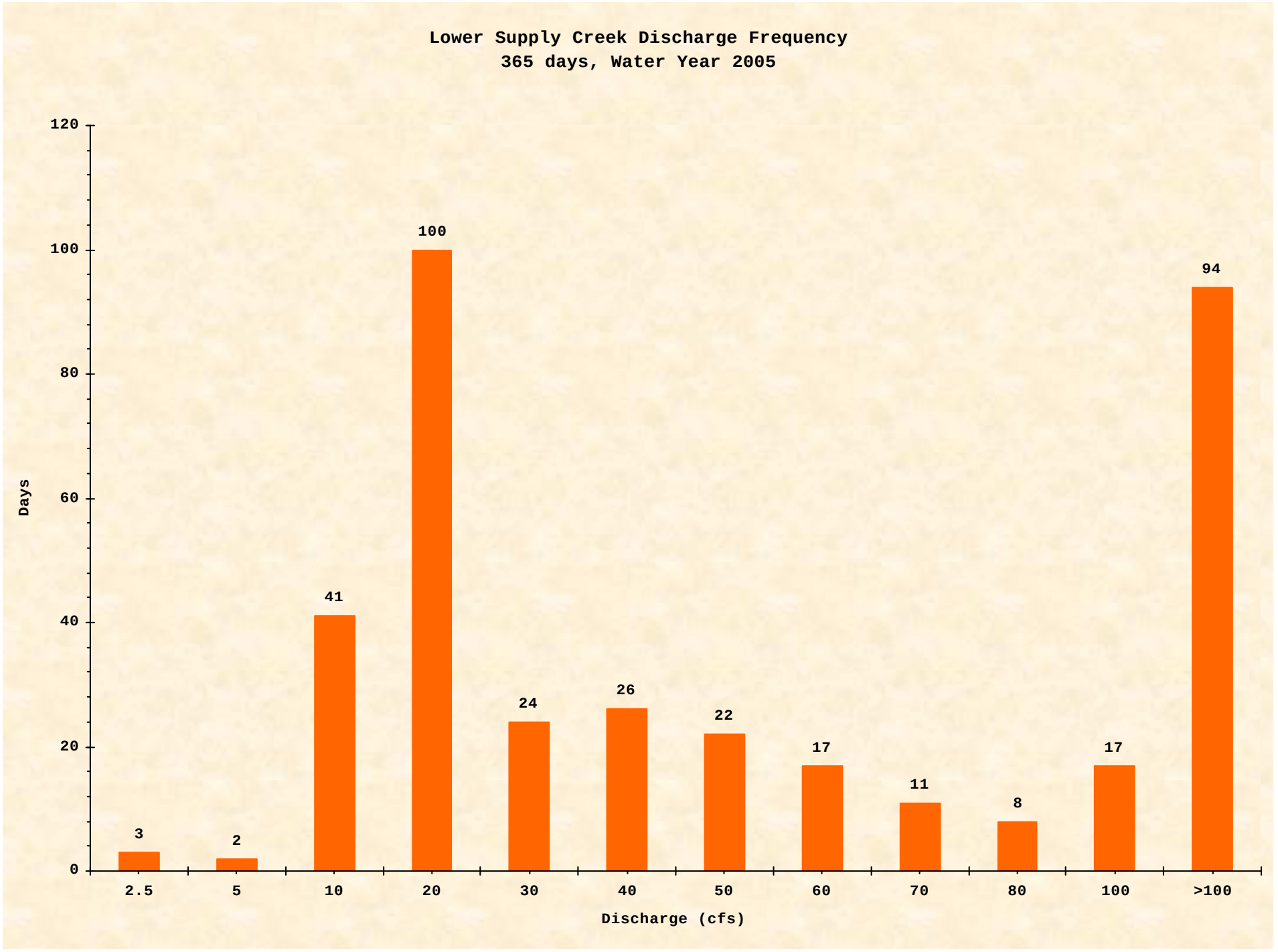
Issue(s)

- The Hoopa Valley Tribe has been involved in legal battles with upstream dams for over 10 years
- In 2003 the Tribe won it's case for 30%more water from the Lewiston dam to support Salmon fisheries in the Trinity and Klamath Rivers

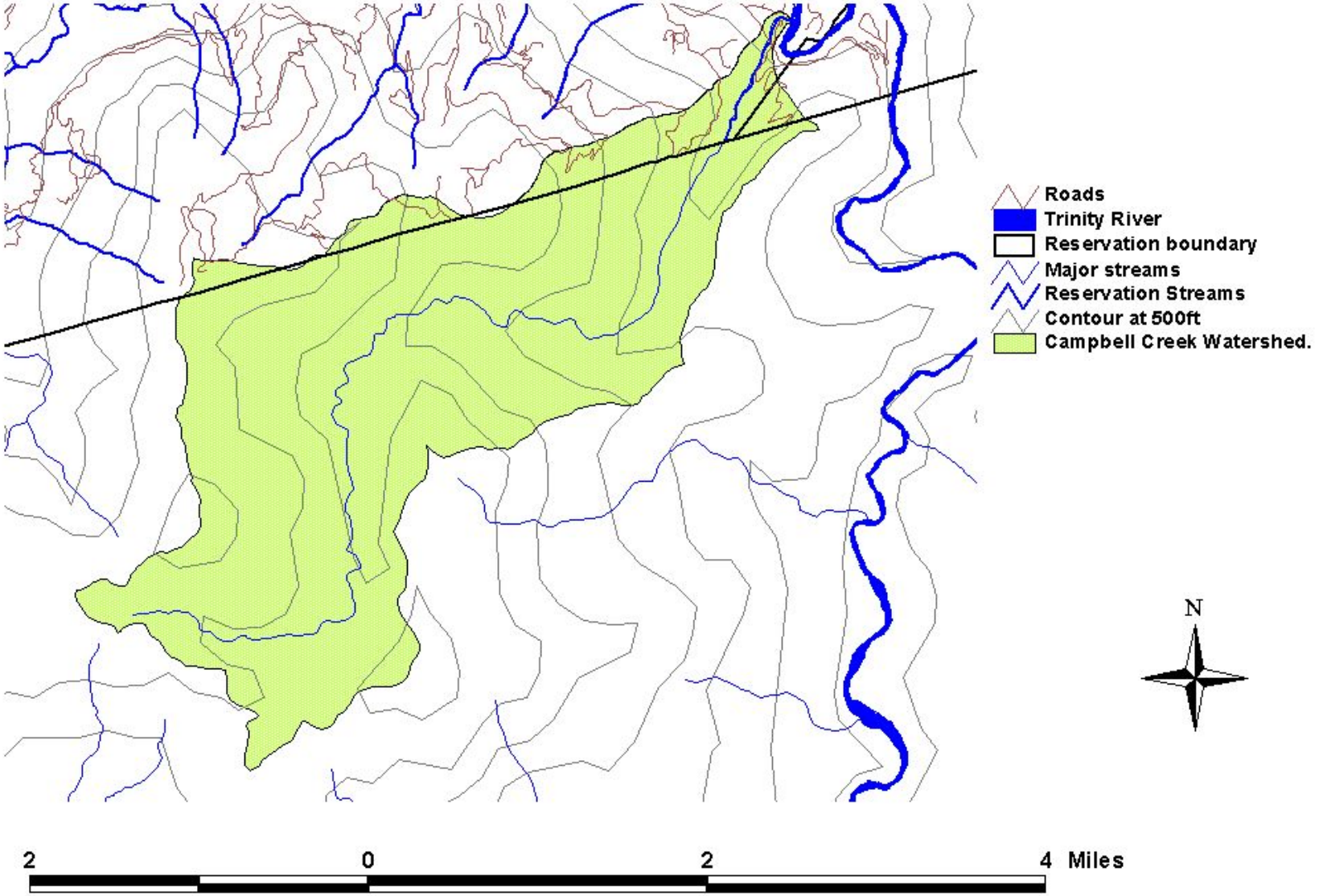
Lewiston Dam – Trinity River

Hoopa Valley Hydrosheds




Lower Supply Creek Discharge Frequency
365 days, Water Year 2005
Days
120
100
80
60
40
20
0
3
2
41
100
24
26
22
17
11
8
17
94
2.5
5
10
20
30
40
50
60
70
80
100
>100
Discharge (cfs)

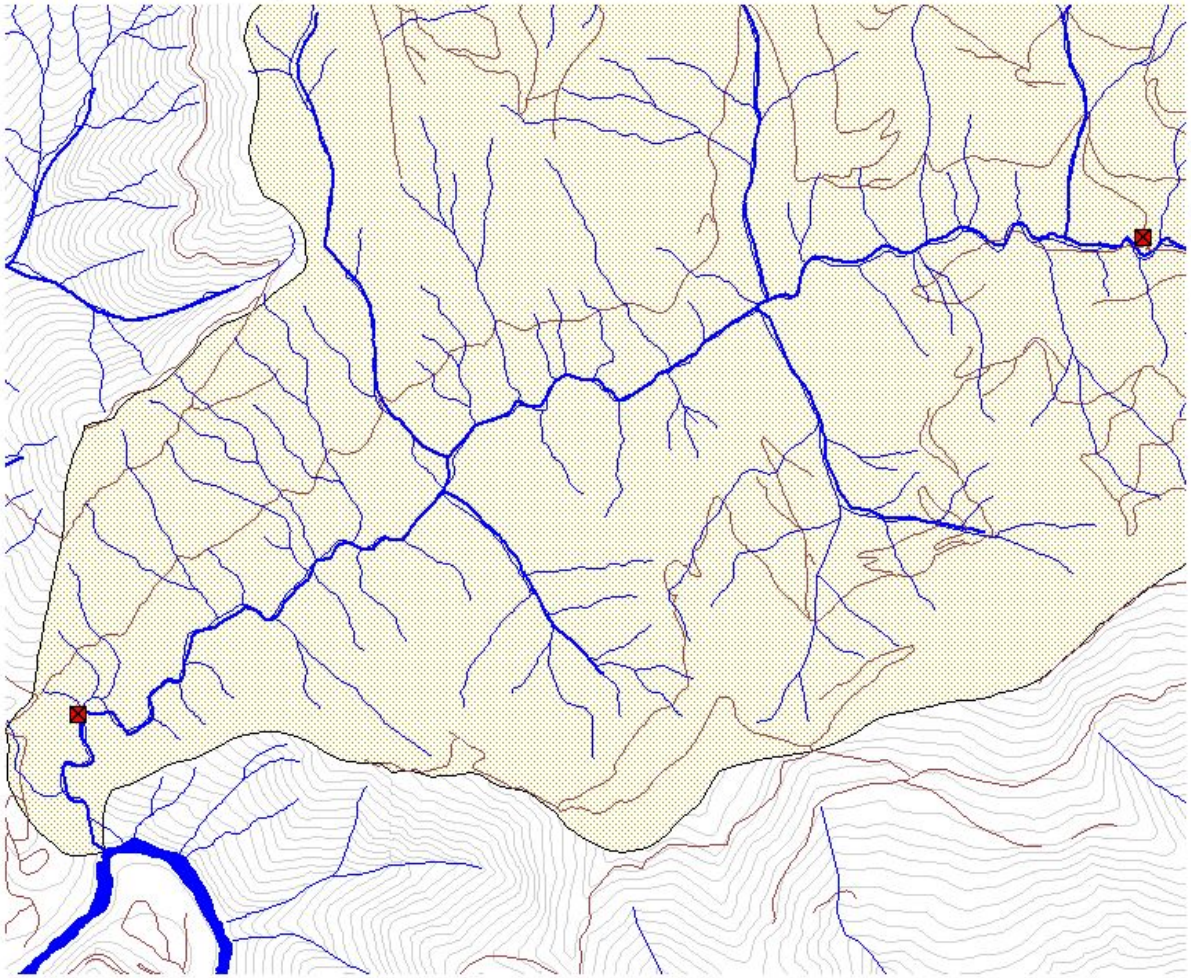
Campbell Creek Watershed



Upper Campbell Creek Landslide
Off Reservation Impacts


Campbell Creek Sediments

Lower Tish Tang Creek
Hoopa Valley



Hydro intake sites
Creeks.shp
Trinity River
Roads
Reservation Streams
Tish Tang Watershed
Contour at 80 ft.

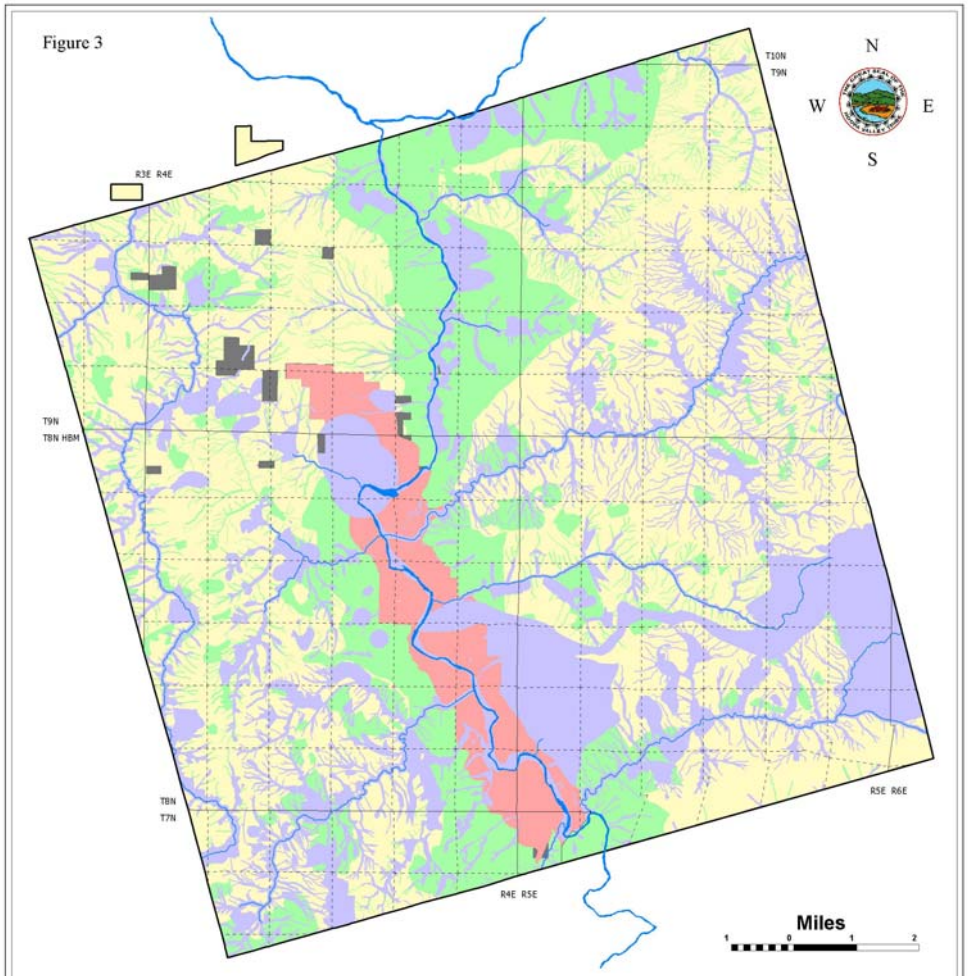
N

0.8 0 0.8 1.6 2.4 Miles

Problems with Tish Tang

- Very gradual gradient 5-10%
- Unstable slopes
- Timber set asides
- Cultural sites
- Lack of low elevation site for turbine

Figure 3



HOOPA VALLEY INDIAN RESERVATION
Harvest Restrictions

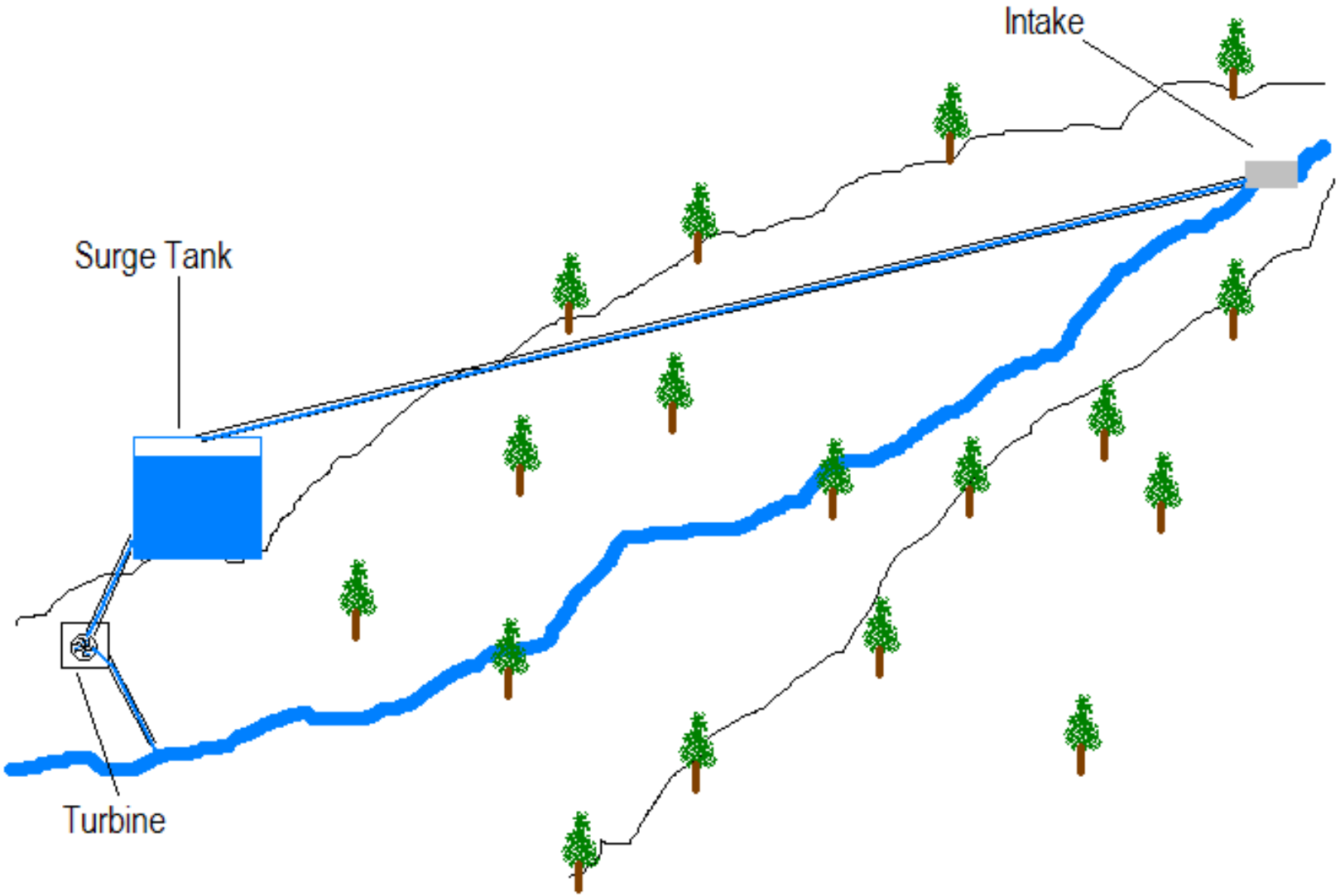
Harvest Restrictions

- *Non-Urban Fee and Alloted*
- *Intensive No Cut*
- *Partial Cut Urban*
- *Section Township*
- *Streams River*

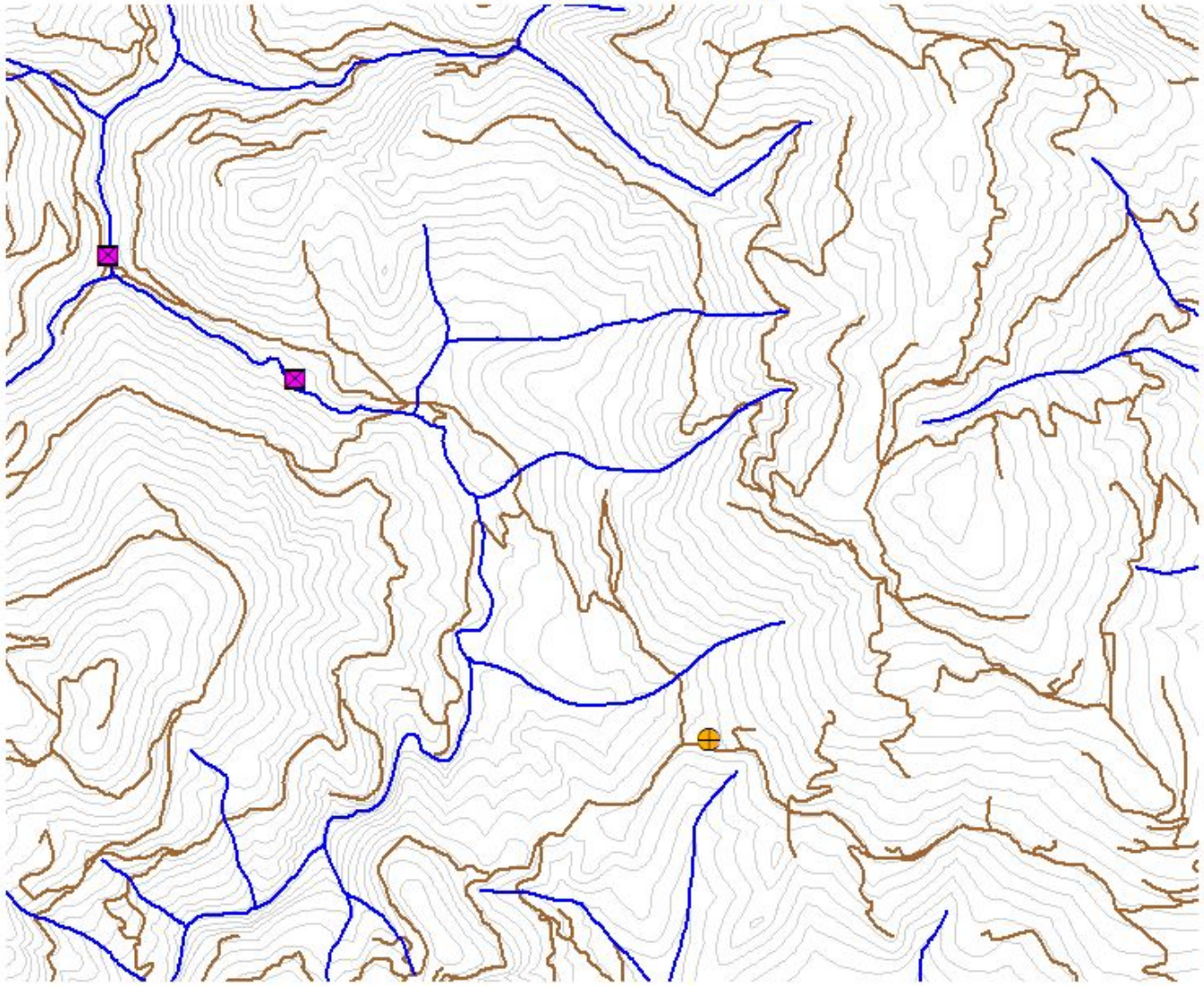

Instability


TRADITIONAL HUPA
VILLAGE SITE
ONE OF MANY XHONTAS LOCATED AMONG
THE SCENIC TRINITY RIVER
XHONTA
(HOUSE)

Alternative Concept



Pine Creek Hydro Sites
Hoopa Valley



Pine creek hydro sites
PG&E_connect
Streams
River
Roads
Contour

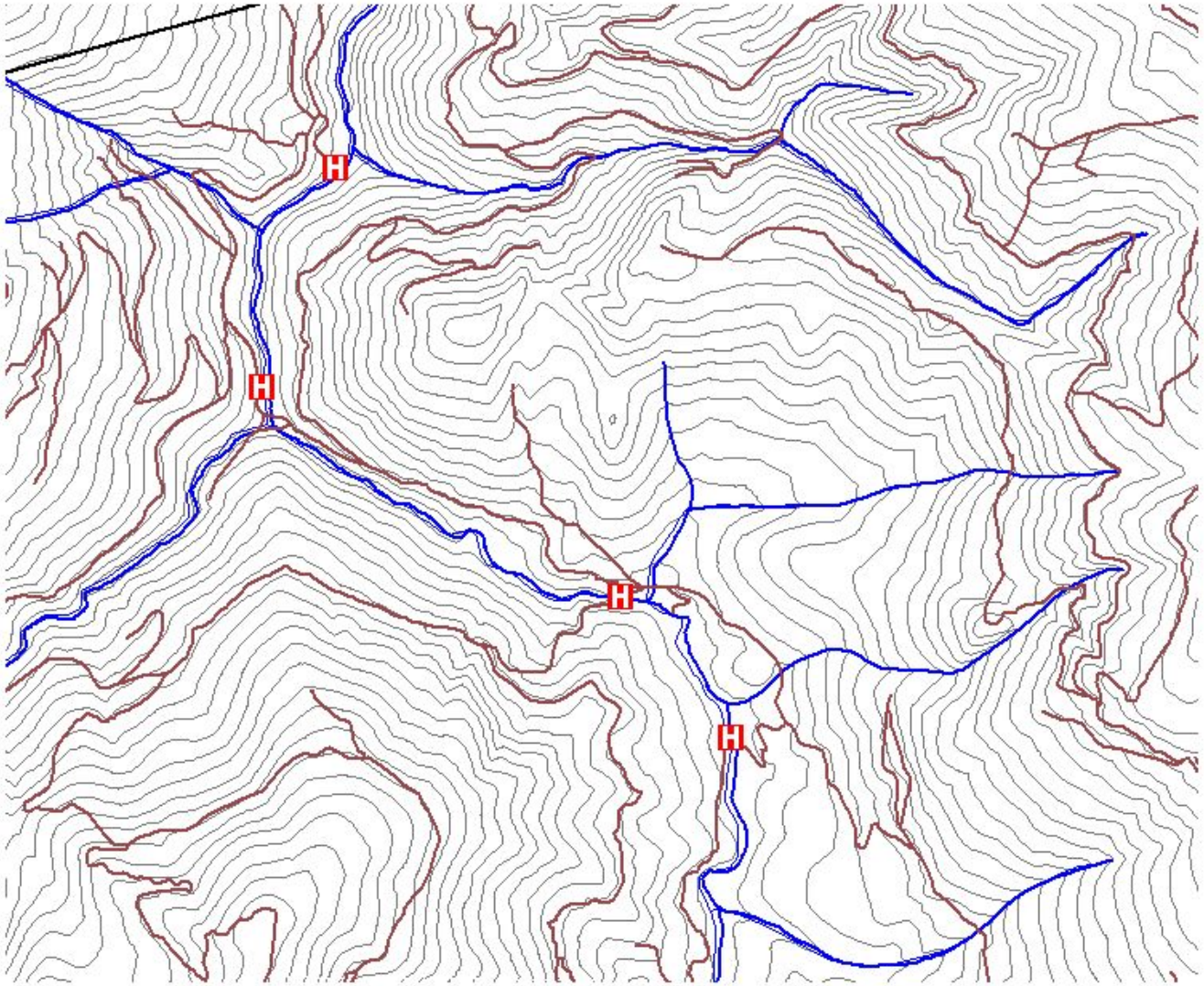
N

1 0 1 2 3 Miles

Pine Creek

- Gross head, 66 feet
- Length of pipe, 4500 feet
- Flow range, 50 cfs
- Duration 50cfs for 141 days
- Recommended pipe diameter, 48"
- Calculated net head, 62 feet
- Expected power, 220KW

Pine Creek Hydro Sites

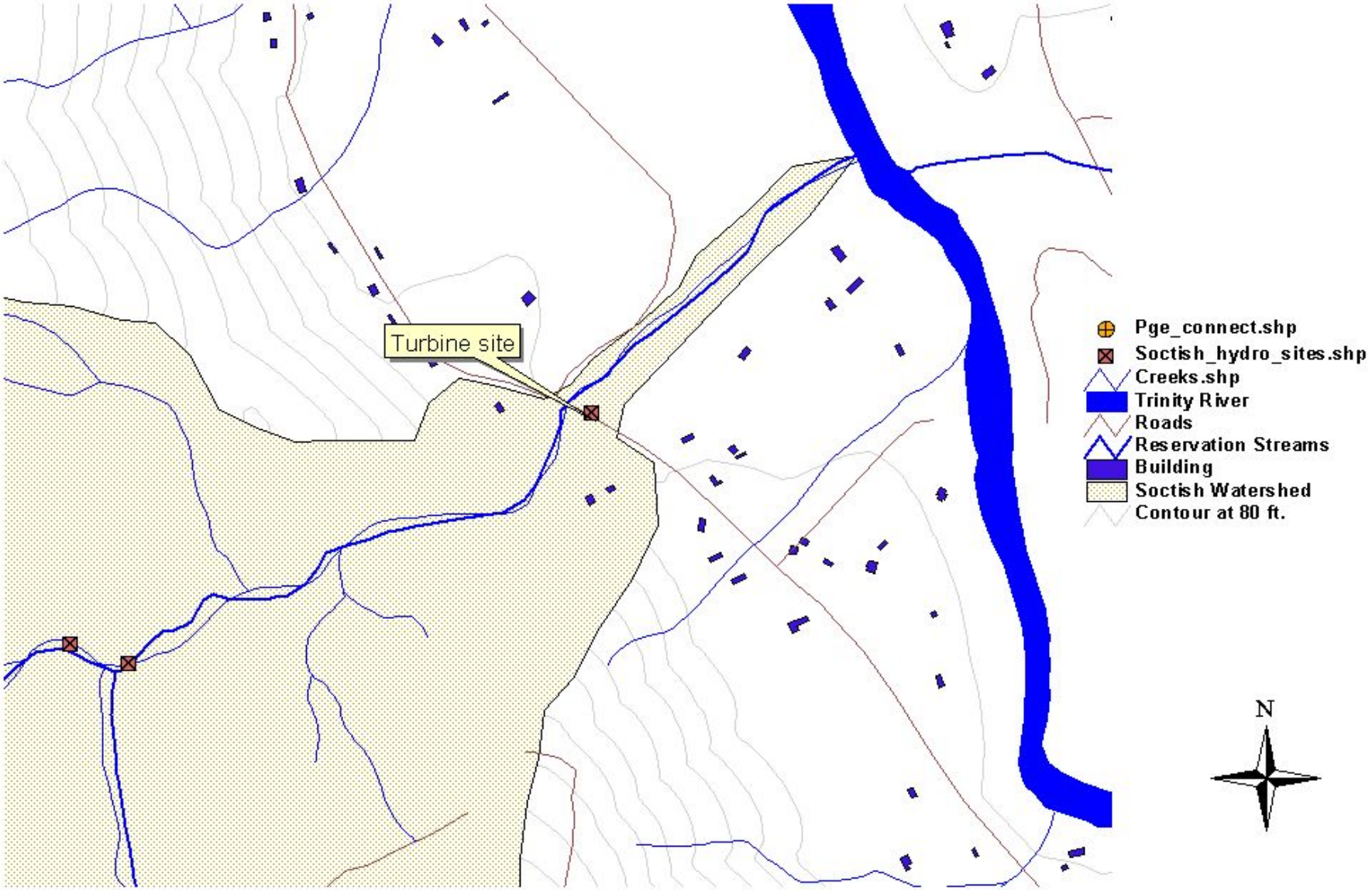


H Hydro sites
Reservation boundary
Roads
Reservation Streams
Major streams
Trinity River
Contour at 80 ft.

N

1 0 1 2 Miles

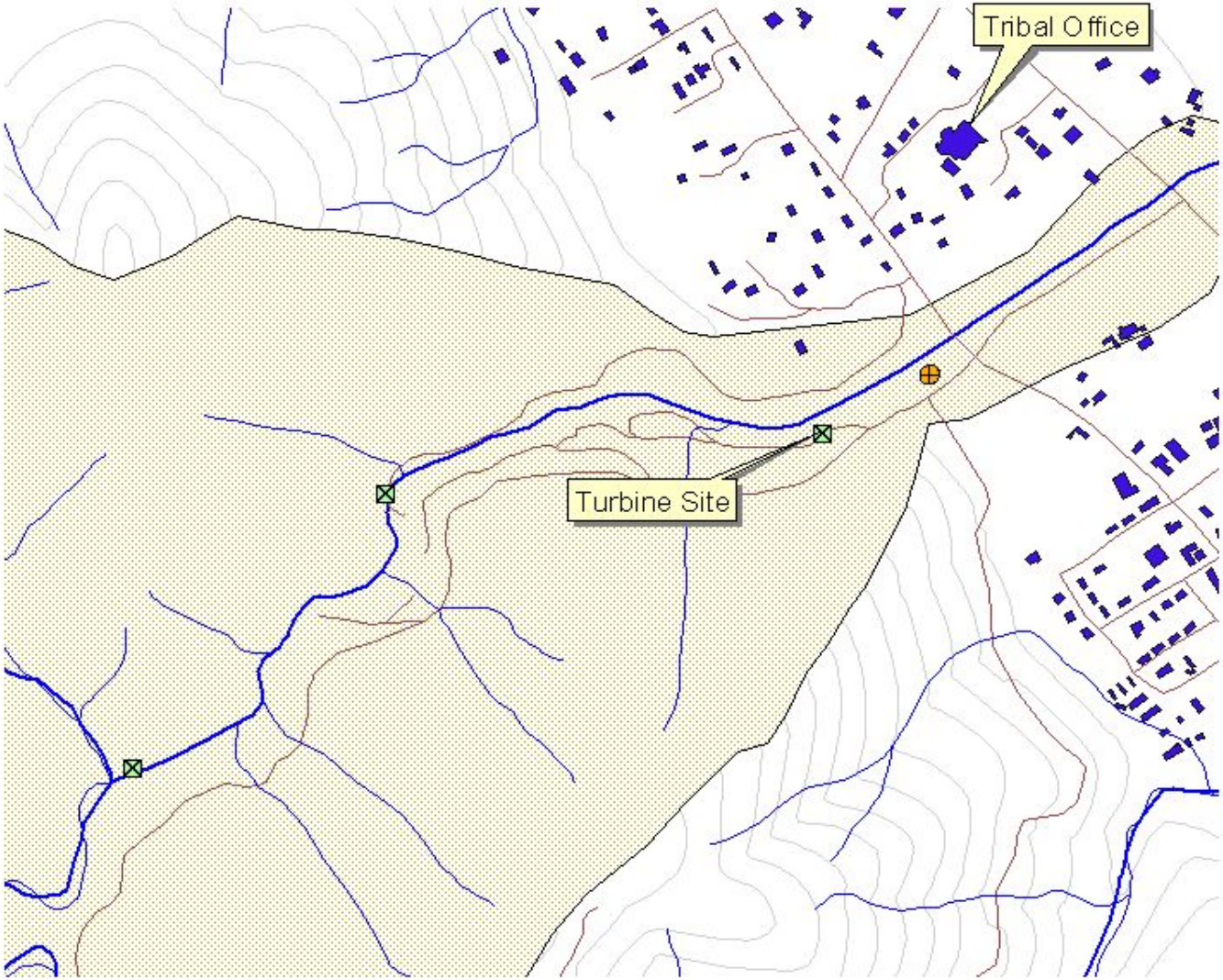
Soctish Creek Hydro Sites



Soctish Creek

- Gross head, 118 feet
- Length of pipe, 2716 feet
- Flow range, 100 cfs
- Flow duration 217 days
- Recommended pipe diameter, 48"
- Calculated net head, 109 feet
- Expected power, 790KW

Supply creek hydro sites



Pge_connect.shp
Supply_hydro.shp
Creeks.shp
Trinity River
Roads
Reservation Streams
Building
Supply Creek Watershed
Contour at 80 ft.

N

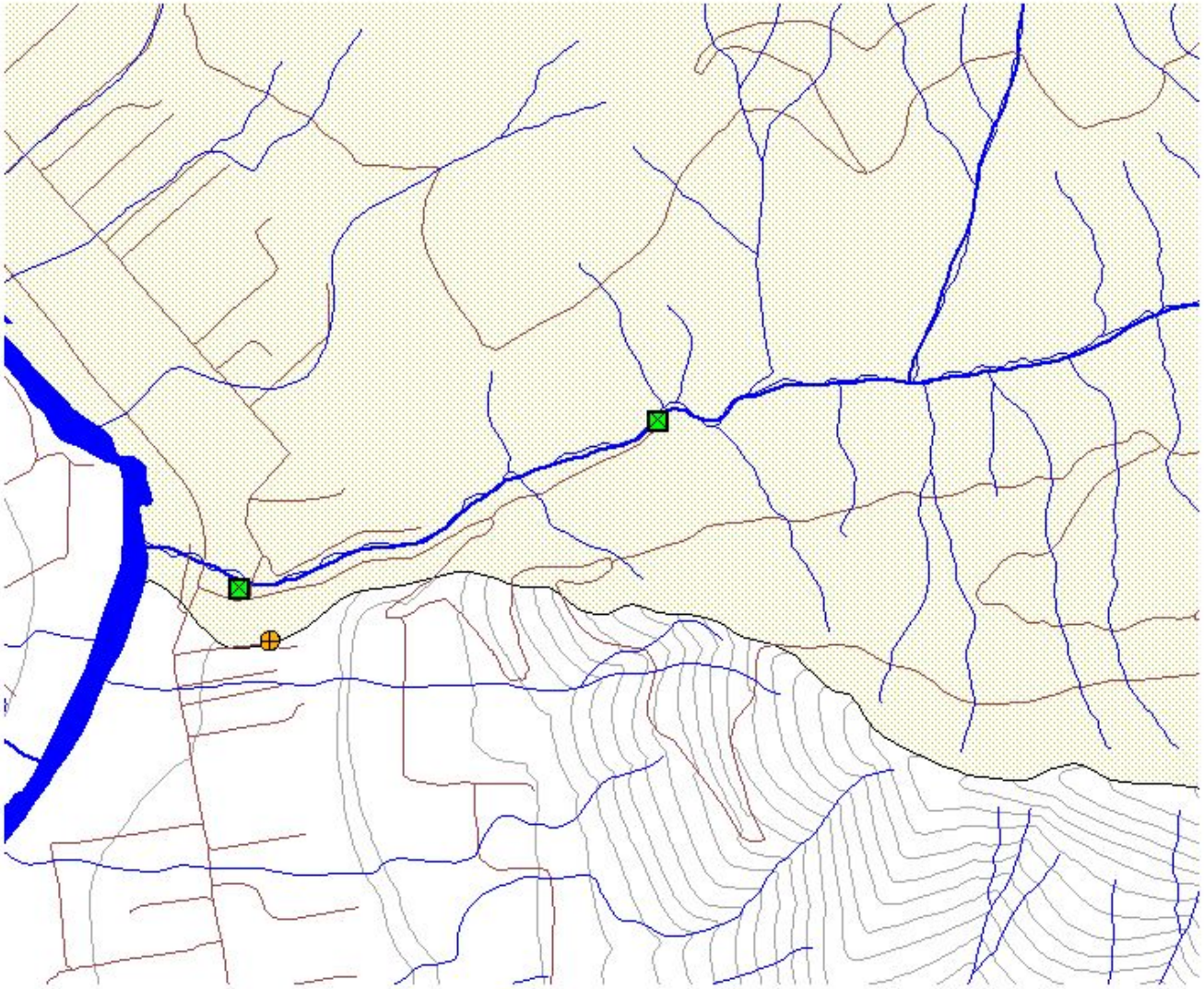
0.4 0 0.4 0.8 Miles

SCALE

Supply Creek

- Gross head, 233 feet
- Length of pipe, 4169 feet
- Flow range, 50 cfs
- Flow duration of 170 days
- Recommended pipe diameter, 40"
- Calculated net head, 223 feet
- Expected power, 800KW

Hostler Creek Hydro Sites



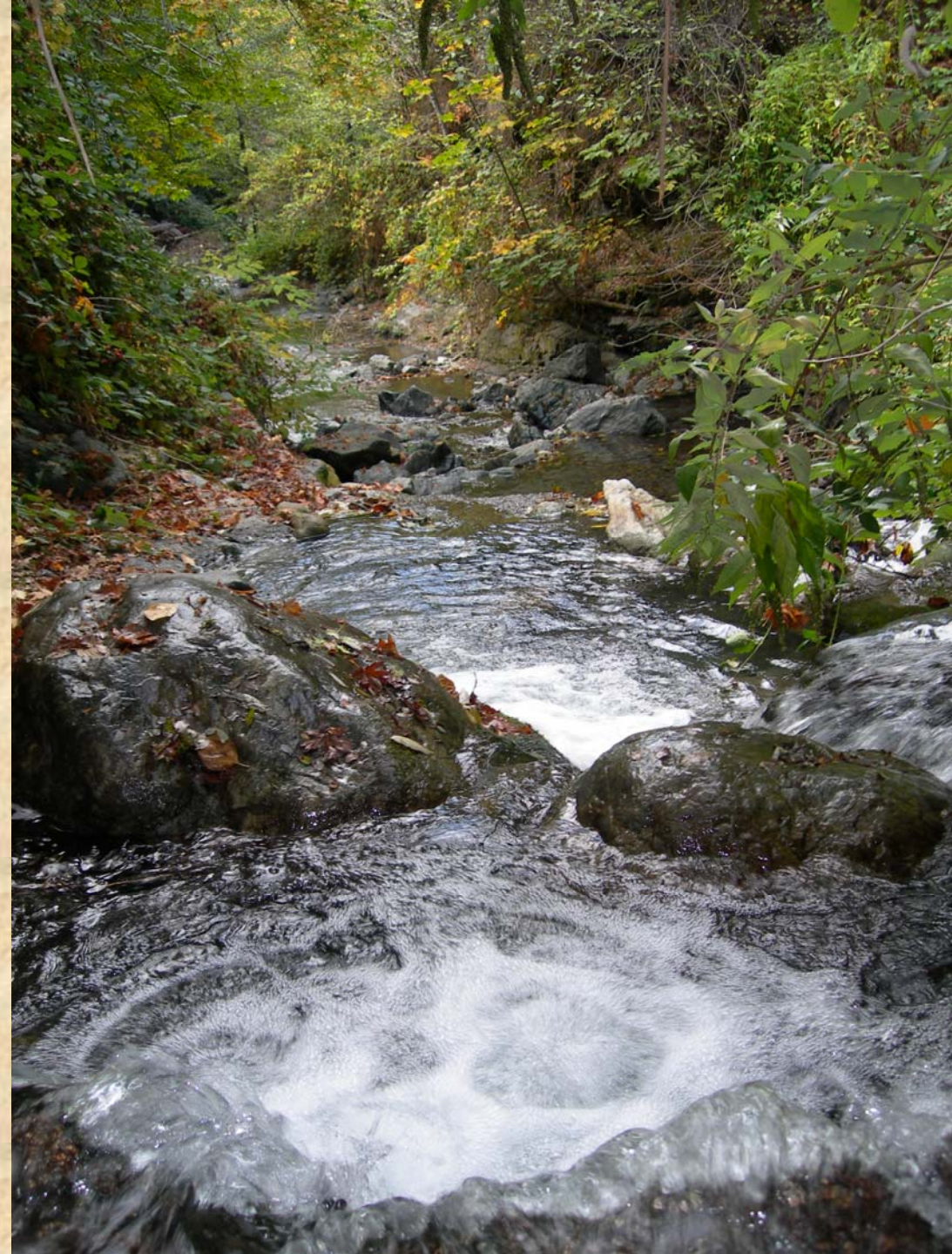
Pge_connect.shp
Hostler Creek Hydro Sites
Creeks.shp
Trinity River
Roads
Reservation Streams
Hostler Watershed
Mill Creek Watershed
Contour at 80 ft.

N

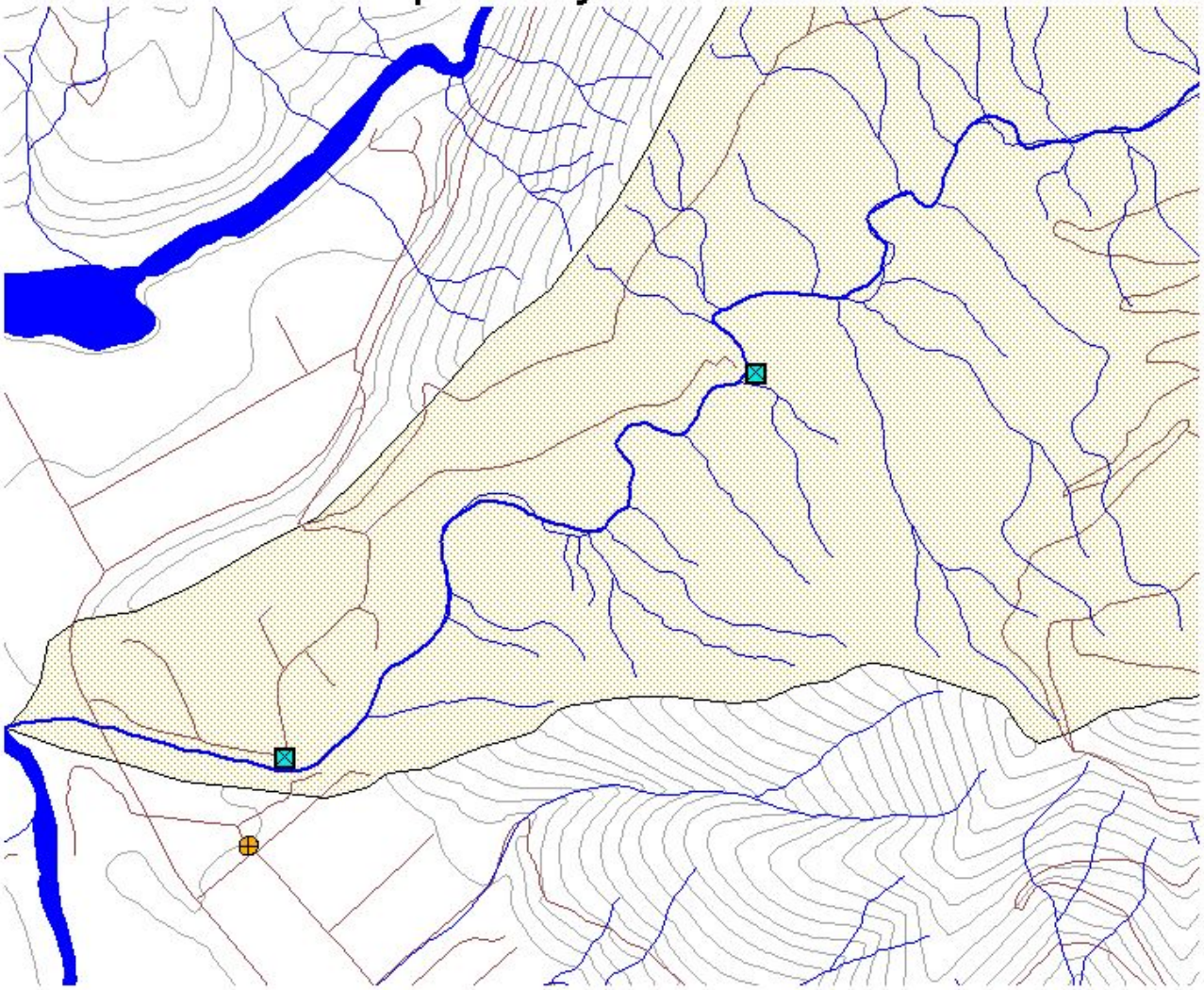
1 0 1 Miles

Hostler Creek

- Gross head, 39 feet
- Length of pipe, 375 feet
- Flow range, 10 cfs
- Flow duration 317 days
- Recommended pipe diameter, 16"
- Calculated net head, 35 feet
- Expected power, 19KW



Mill Creek Hydro Power Sites
Hoopa Valley



Pge_connect.shp
Mill Creek hydro sites
Creeks.shp
Trinity River
Roads
Reservation Streams
Mill Creek Watershed
Contour at 80 ft

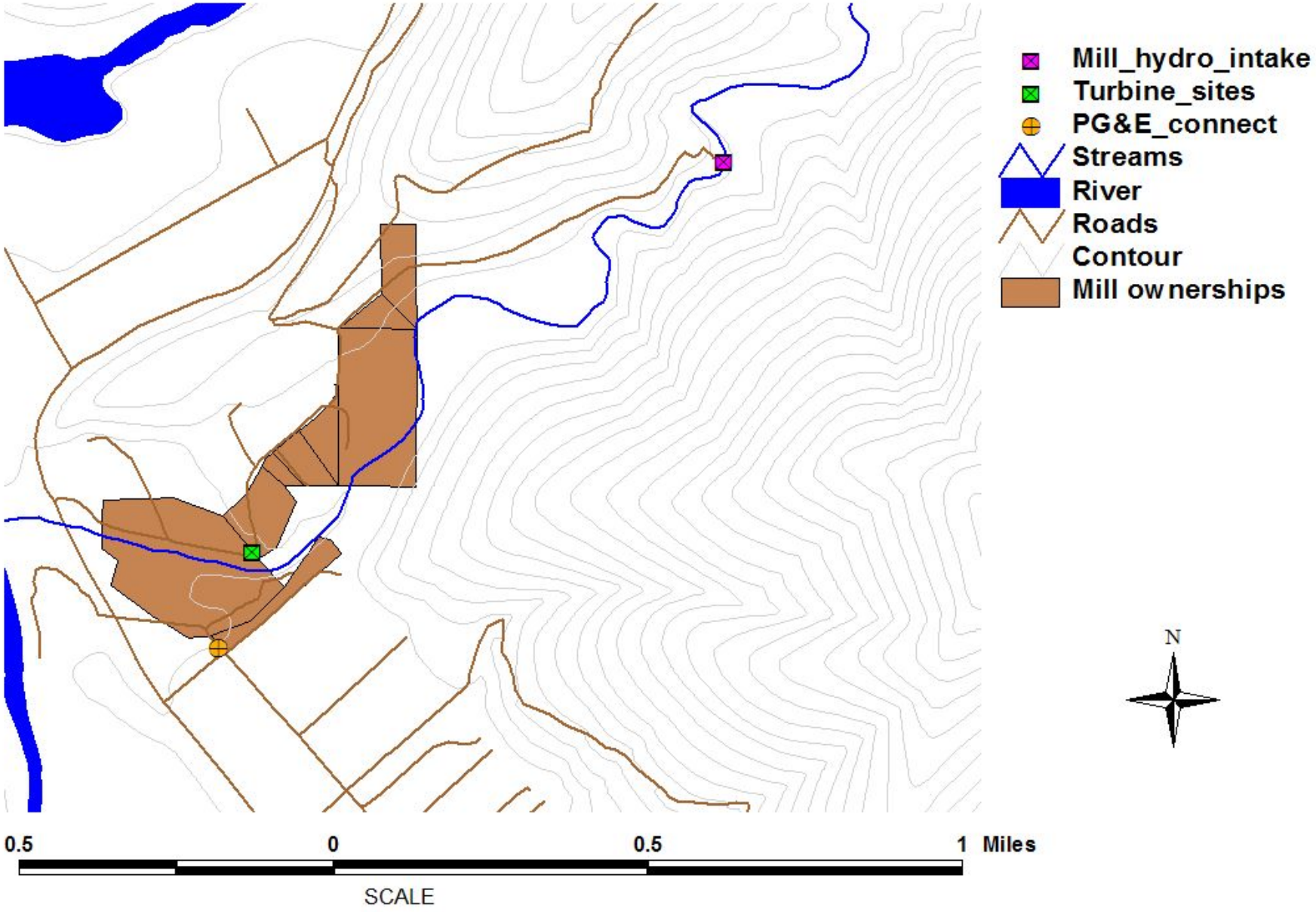
N

1 0 1 Miles

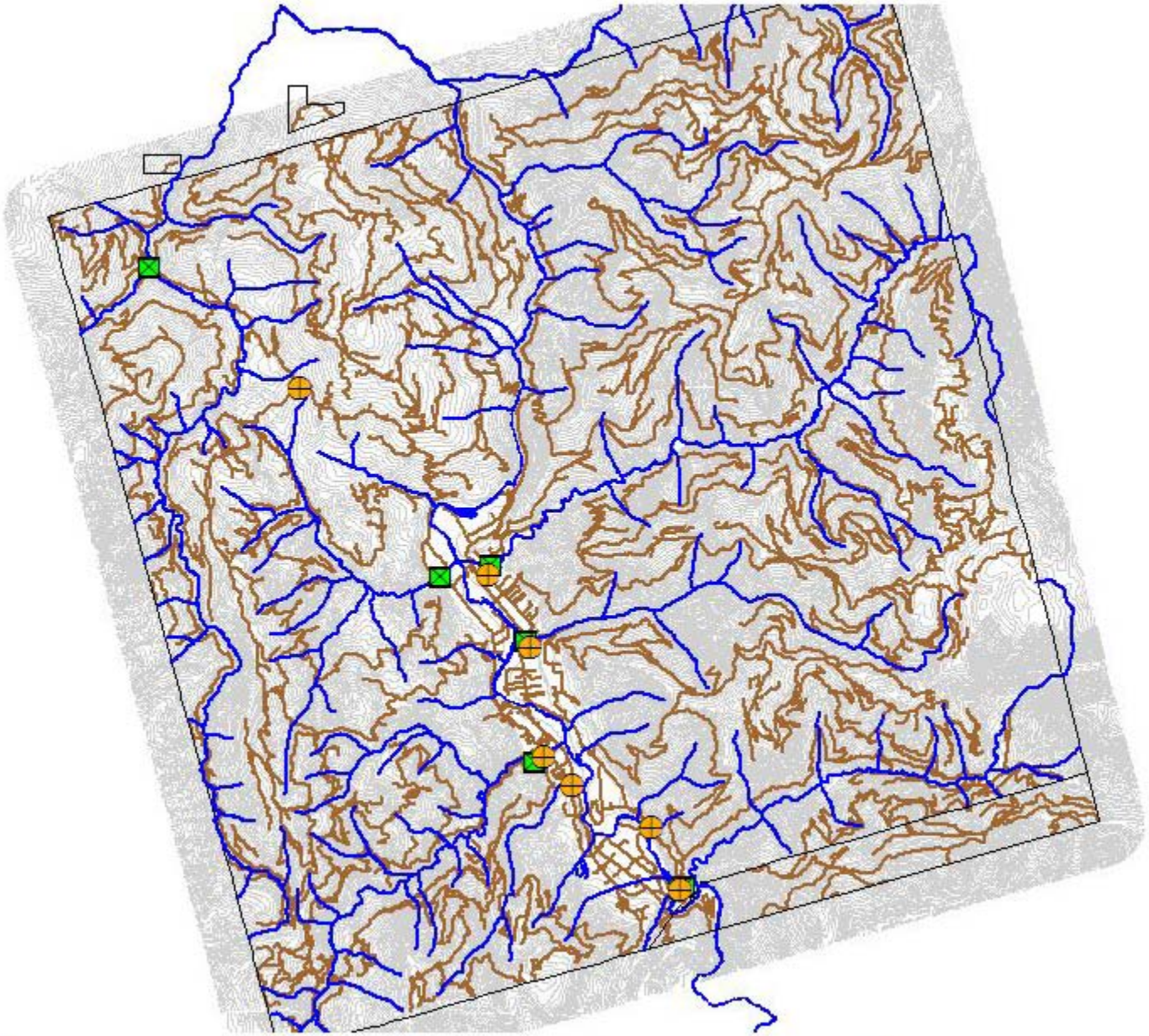
Mill Creek

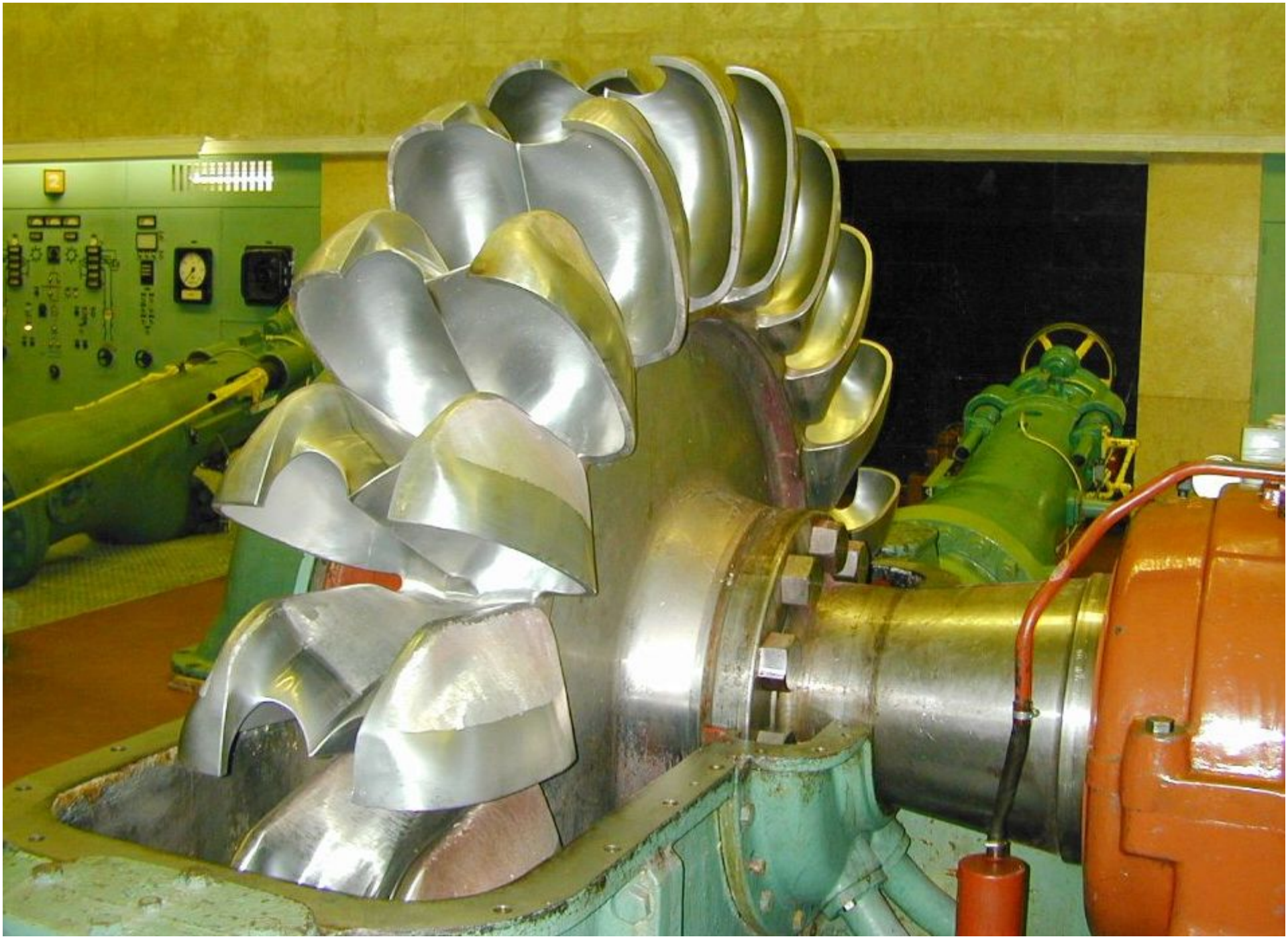
- Gross head, 72 feet
- Length of pipe, 6350 feet
- Flow range, 100 cfs
- Flow duration 182 days
- Recommended pipe diameter, 60"
- Calculated net head, 65 feet
- Expected power, 470KW

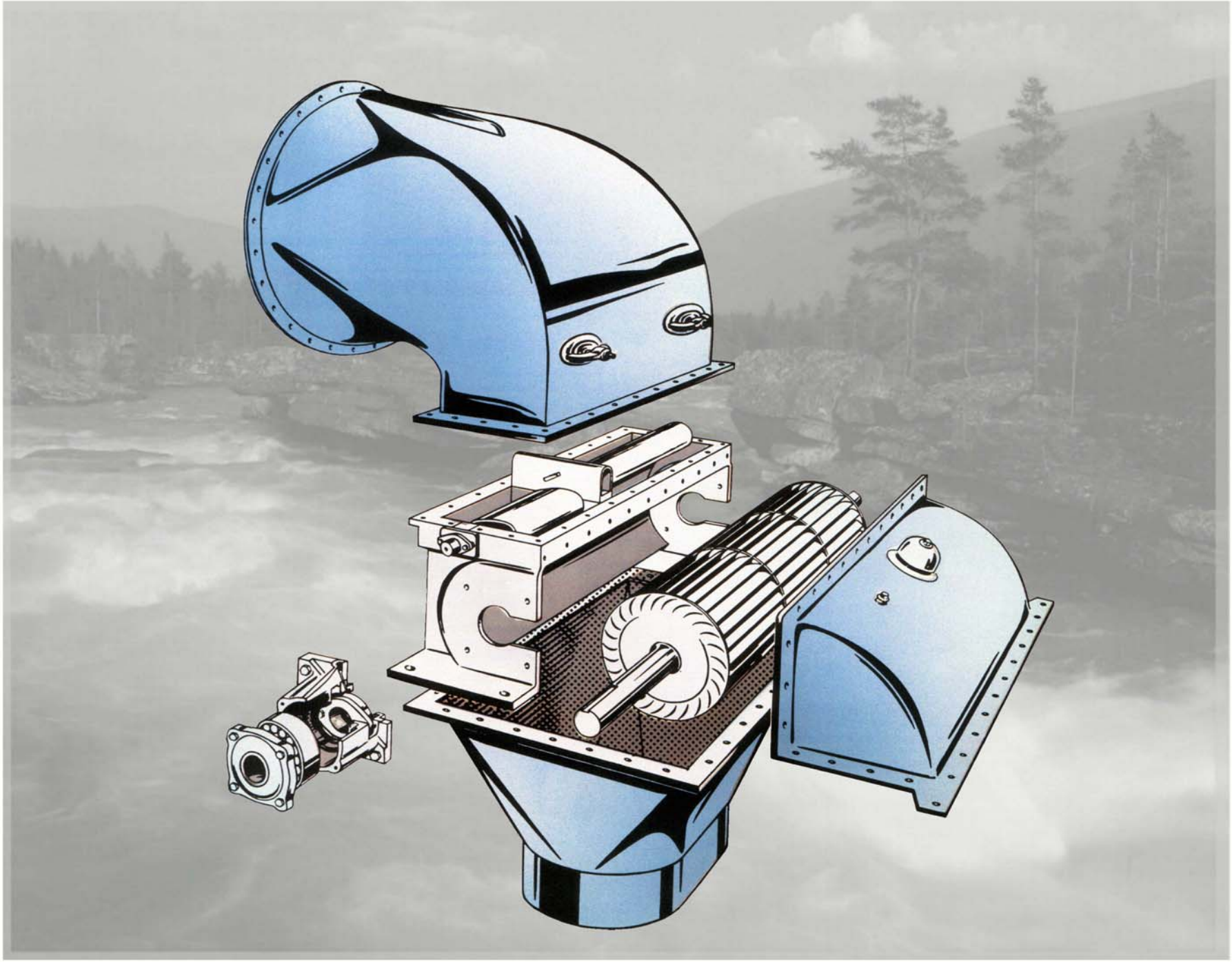
Lower Mill Creek Ownerships



PG&E Connections







Hoopa Tribe Detail

	KW Size of Turbine	Power Purchase / KWH	Annual Revenue	Total Cost of Installation	25% Down Payment	Loan Amt (Total Cost less down payment)	9% Note, amortized over 10 yr., annual payments	Revenue - Cost
Lower Pine Creek	220	0.092	68,492	1,864,800	$466,200	**1,398,600**	**212,602**	**-144,110**
Soctish Creek	790	0.092	378,517	1,608,000	$402,000	**1,206,000**	**183,325**	**195,192**
Supply Creek Option 1	335	0.092	125,746	1,364,900	$341,225	**1,023,675**	**155,610**	**-29,864**
Supply Creek Option 2	800	0.092	300,288	1,712,020	$428,005	**1,284,015**	**195,184**	**105,104**
Hostler Creek	19	0.092	13,299	251,500	$62,875	**188,625**	**28,673**	**-15,374**
Mill Creek	470	0.092	188,872	2,690,220	$672,555	**2,017,665**	**306,707**	**-117,835**

Questions