

Watershed Characterization

Salmon Creek Watershed

Area	Hydrologic Units	Calwater Subbasins ---	(Planning Watersheds)
22,482 Acres	18010111	1115100001	Nolan Creek (4892 Acres)
9,098 Hectares	4th Field HUC	1115100002	Fay Creek (8333 Acres)
35 Square Miles		1115100003	Lower Salmon Creek (1733 Acres)
	1115	1115100004	Upper Salmon Creek (7275 Acres)
Location	4th Field Calwater	1115210000	Bodega Head (249 Acres)
Sonoma County			

Species Potential	Miles of Streams with Species Present
Central California Coast Steelhead North Coastal Diversity Stratum - Potentially Independent	<u>Steelhead</u> 20 NOAA Fisheries, Critical Habitat Redesignation, 2005
Central California Coast Coho Coastal Diversity Stratum - Dependent Population	<u>Coho</u> 22 CDFG, Coho Distribution, May 2007

Critical Habitat	
Central California Coast Steelhead	20 Miles of Stream
Central California Coast Coho	All accessible river reaches between Punta Gorda & San Lorenzo River including 2 San Francisco Bay streams: Arroyo Corte Madera del Presidio and Corte Madera Creek (64 FR 24049)

Coho Intrinsic Potential	
Km of Historical Coho IP (21.5 C mask)	48
% of IP (21.5 C Mask) with Current Coho Distribution	62%
<small>Spence, B. C., et al., 2008. A framework for assessing the viability of threatened and endangered salmon and steelhead in the North-Central California Coast Recovery Domain. NOAA Tech Memo NMFS-SWFSC-423.</small>	

Miles of Waterway ^A	Miles	Number of Dams ^C
Naturally Occurring Waterways		0
Intermittent Stream	32	
Perennial Stream	31	
Artificial Path	2	
<small>^CPassage Assessment Database, Pacific States Marine Fisheries Commission, 2005</small>		

^AUSGS National Hydrography Dataset, High Resolution, 2004. 1:24,000

USGS Gaging Stations ^B	Number of Barriers ^C
11460920 Salmon Creek at Bodega	42
	0 Dams 41 Diversions 1 Natural Barriers (Chutes, Falls, Log Jams, etc. (5 Impassable))
<small>^CPassage Assessment Database, Pacific States Marine Fisheries Commission, 2006</small>	

EPA Total Maximum Daily Load Classification (TMDL) ^I
Indicator Bacteria
Sources: Unknown
<small>^IState Water Resources Control Board, 2006</small>

Average Annual Precipitation ^E	Average Annual Precipitation Range ^E
45"	35 - 55"

^ECalifornia Mean Annual Precipitation Zones, 1900-1960, CA Department of Forestry, 1990



Roads^A		Miles
Roads in Watershed		
Primary Road / Highway		0
Secondary and connecting road, state highways		1
Local, neighborhood, and rural road, city street, unseparated		85
Vehicular trail, 4WD		1
Driveway or service road		14

Road Density		
Miles of Roads per SqMi of Watershed		2.9
Miles of Roads per SqMi of 100m Riparian Buffer*		4.0

*Buffer is 100 meters on either side of the stream centerline

^AU.S. Census Bureau - Tiger 2000, 2002. 1:24,000

Slope^D	Acres	Percent of watershed
Lands of 0-2 percent slope	449	2%
Lands of 2-4 percent slope	772	3%
Lands of 4-10 percent slope	2,862	13%
Lands of 10-15 percent slope	2,807	12%
Lands of 15-30 percent slope	8,734	39%
Lands of 30-60 percent slope	6,247	28%
Lands of 60-100 percent slope	607	3%
Lands of 100-117 percent slope	3	0%

Elevation Range	0 - 1325 ft.	0 - 404 m
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^DSlope derived from USGS 10 meter Digital Elevation Models (DEM's)

Vegetation^G	Acres	Percent of watershed
Agriculture	1,297	6%
Annual grassland	9,392	42%
Barren	17	0%
Conifer Forest		
Closed Cone-Pine-Cypress	106	0%
Douglas Fir	1,124	5%
Montane Hardwood-Conifer	319	1%
Redwood	6,373	28%
Hardwood Forest		
Montane Hardwood	2,590	12%
Montane Riparian	40	0%
Hardwood Woodland		
Coastal Oak Woodland	185	1%
Eucalytus	17	0%
Valley Foothill Riparian	64	0%
Shrub	697	3%
Urban	185	1%
Water	37	0%
Wetland	37	0%

^GMulti-source Land Cover Data (2002 v2), CA Department of Forestry, 2002. 100 meter Grid



Erodability of Watershed^F	Acres	Percent of watershed
All of watershed is ranked as 4	22,482	100%

^FDepartment of Conservation, Division of Mines and Geology; minimum mapping unit: approx. 8000 acres
Watersheds were rated based on slope, precipitation, and lithologic susceptibility to failure. Total erosion potential is based on a combination of the landslide potential, debris slide potential, and the surface erosion potential. Rating 0-10 [0 = Low slide potential, 10 = High slide potential]

Land Ownership^H	Acres	Percent of watershed
Private	22,383	100%
State (Parks & Recreation)	98	0%

^HManagement Landscape, CA Department of Forestry, 2002

Population^I	Housing^I
Total Population within the watershed -- 2,210 People	Total Housing Units within the watershed -- 1,069 Houses
	Housing Density
	0 to Less than 1 Housing Unit / 160 Acres 12%
	1 Unit / 160 Acres to 1 Unit / 20 Acres 66%
	1 Unit / 20 Acres to 1 Unit / 5 Acres 21%
	1 Unit / 5 Acres to 2 Units / Acre 2%
	2 Units / Acres to Greater than or Equal to 5 Units / Acre

^ICensus 2000 Block Data (Migrated), CA Department of Forestry, 2003



Salmon Creek

Vegetation density and age class in the entire watershed

California Department of Forestry and Fire Protection; fveg02_2. Vector digital dataset. 100m Grid, 2002.

Acres

Size	Density	Agriculture	Barren	Conifer Forest	Conifer Woodland	Hardwood Forest	Hardwood Woodland	Herbaceous	Shrub	Urban	Water	Wetland	Grand Total by Size class
Not Determined	Not Determined	1310	17			2	7	9331	188	37	37		
	S			2									
	P												
	M												
Seedling	D			10		5	27						
	Total	1310	17	12		7	34	9331	188	37	37		10973
	S												
	P												
Sapling	M												
	D												
	Total			383		264							647
	S			7		15							
Pole	P			44		44							
	M			208		99							
	D			124		106							
	Total			667		528	27						1222
Small Tree	S						2						
	P						37						
	M						42						
	D						67	10					
Medium/Large Tree	Total			1462		1070	193		694				3419
	S			49									
	P			171									
	M			586		37	10						
Multi Layered	D			2908		722	2						
	Total			3714		759	12						4485
	D			1735									
	Total			1735									1735
Grand Total by Species Type		1310	17	7973		2628	266	9331	694	188	37	37	22481

SIZE	Description	Diameter at Breast Height (DBH)
Not Determined		N/A
Seedling		Less Than 1 inch
Sapling		1 to 6 inches
Pole		6 to 11 inches
Small Tree		11 to 24 inches
Medium/Large Tree		Greater Than 24 inches
Multi Layered		Size 5 Over Size 4 Or 3; Total Tree Crown Closure Greater Than 60%

Percent

Size	Density	Agriculture	Barren	Conifer Forest	Conifer Woodland	Hardwood Forest	Hardwood Woodland	Herbaceous	Shrub	Urban	Water	Wetland	Grand Total by Size class
Not Determined	Not Determined	6%	0%			0%	0%	42%	1%	0%	0%		
	S			0%									
	P												
	M												
Seedling	D			0%		0%							
	Total	6%	0%	0%		0%	0%	42%	1%	0%	0%		49%
	S												
	P												
Sapling	M			0%		0%							
	D			0%		0%							
	Total			2%		1%							3%
	S												
Pole	P			0%		0%							
	M			0%		0%							
	D			1%		0%	0%						
	Total			2%		2%	0%						5%
Small Tree	S			3%		2%	0%						
	P			0%		0%							
	M			0%		0%							
	D			1%		0%	0%						
Medium/Large Tree	Total			7%		5%	1%		3%				15%
	S												
	P			0%		0%							
	M			1%		0%	0%						
Multi Layered	D			13%		3%	0%						
	Total			17%		3%	0%						20%
	D			8%									
	Total			8%									8%
Grand Total by Species Type		6%	0%	35%		12%	1%	42%	3%	1%	0%	0%	100%

SIZE (SHRUB)	Desc.	Crown Decadence	DENSITY	Description
Not Determined		N/A		None
Seedling Shrub		Seedlings or sprouts < 3 years	S	10 to 24%
Young Shrub		None	P	25 to 39%
Mature Shrub		1 - 25%	M	40 to 59%
Decadent Shrub		> 25%	D	60 to 100%

Salmon Creek

Vegetation within Riparian Buffer (100 meter on either side of stream)

California Department of Forestry and Fire Protection; fveg02_2. Vector digital dataset. 100m Grid, 2002.

Acres													Grand Total by Size class
Size	Density	Agriculture	Barren	Conifer Forest	Conifer Woodland	Hardwood Forest	Hardwood Woodland	Herbaceous	Shrub	Urban	Water	Wetland	
Not Determined	Not Determined	148.0	10.0				7.0	1599.0		82.0	20.0	20.0	
	S P M D Total						27.0						
Seedling	S												
	P M D Total												
Sapling	S				5.0								
	P M D Total			10.0	15.0	22.0	5.0	30.0					
Pole	S			12.0	7.0								
	P M D Total			15.0	30.0	40.0	49.0	12.0	69.0	190.0	15.0		
Small Tree	S				15.0								
	P M D Total			72.0	20.0	114.0	15.0	5.0	250.0	339.0	96.0	371.0	
Medium/Large Tree	S			25.0									
	P M D Total			35.0	166.0	10.0	10.0	546.0	200.0	2.0			
Multi Layered	D			361.0									
	Total			361.0									
Grand Total by Species Type		148	10	1742	0	937	174	1599	371	82	20	20	5103

SIZE	Description	Diameter at Breast Height (DBH)
Seedling		Less Than 1 inch
Sapling		1 to 6 inches
Pole		6 to 11 inches
Small Tree		11 to 24 inches
Medium/Large Tree		Greater Than 24 inches
Multi Layered		Size 5 Over Size 4 Or 3; Total Tree Crown Closure Greater Than 60%

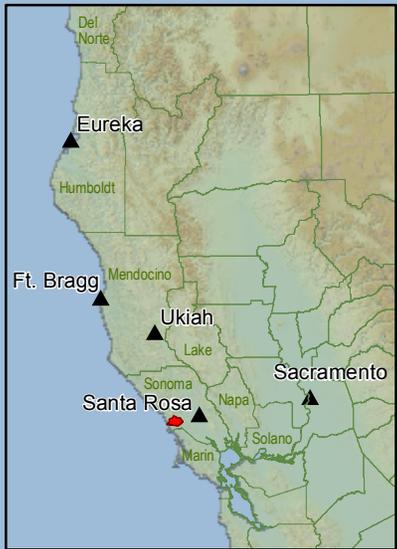
Percent													Grand Total by Size class
Size	Density	Agriculture	Barren	Conifer Forest	Conifer Woodland	Hardwood Forest	Hardwood Woodland	Herbaceous	Shrub	Urban	Water	Wetland	
Not Determined	Not Determined	3%	0%				0%	31%		2%	0%	0%	
	S P M D Total						1%						
Seedling	S												
	P M D Total												
Sapling	S				0%	0%							
	P M D Total				0%	0%	0%	1%					
Pole	S				0%	0%							
	P M D Total				0%	1%	0%	1%	4%	0%			
Small Tree	S				0%	0%							
	P M D Total				1%	0%	2%	0%	0%	5%	7%	2%	
Medium/Large Tree	S				0%	0%							
	P M D Total				2%	0%	0%	0%	5%	7%	2%	7%	
Multi Layered	D				1%								
	Total				3%	5%	1%		3%	5%	1%		
Grand Total by Species Type		3%	0%	34%	0%	18%	3%	31%	7%	2%	0%	0%	100%

SIZE (SHRUB)	Desc.	Crown Decadence	DENSITY	Description
Not Determined		N/A	S	10 to 24%
Seedling Shrub		Seedlings or sprouts < 3 years	P	25 to 39%
Young Shrub		None	M	40 to 59%
Mature Shrub		1 - 25%	D	60 to 100%
Decadent Shrub		> 25%		



November 2008

Salmon Creek Watershed

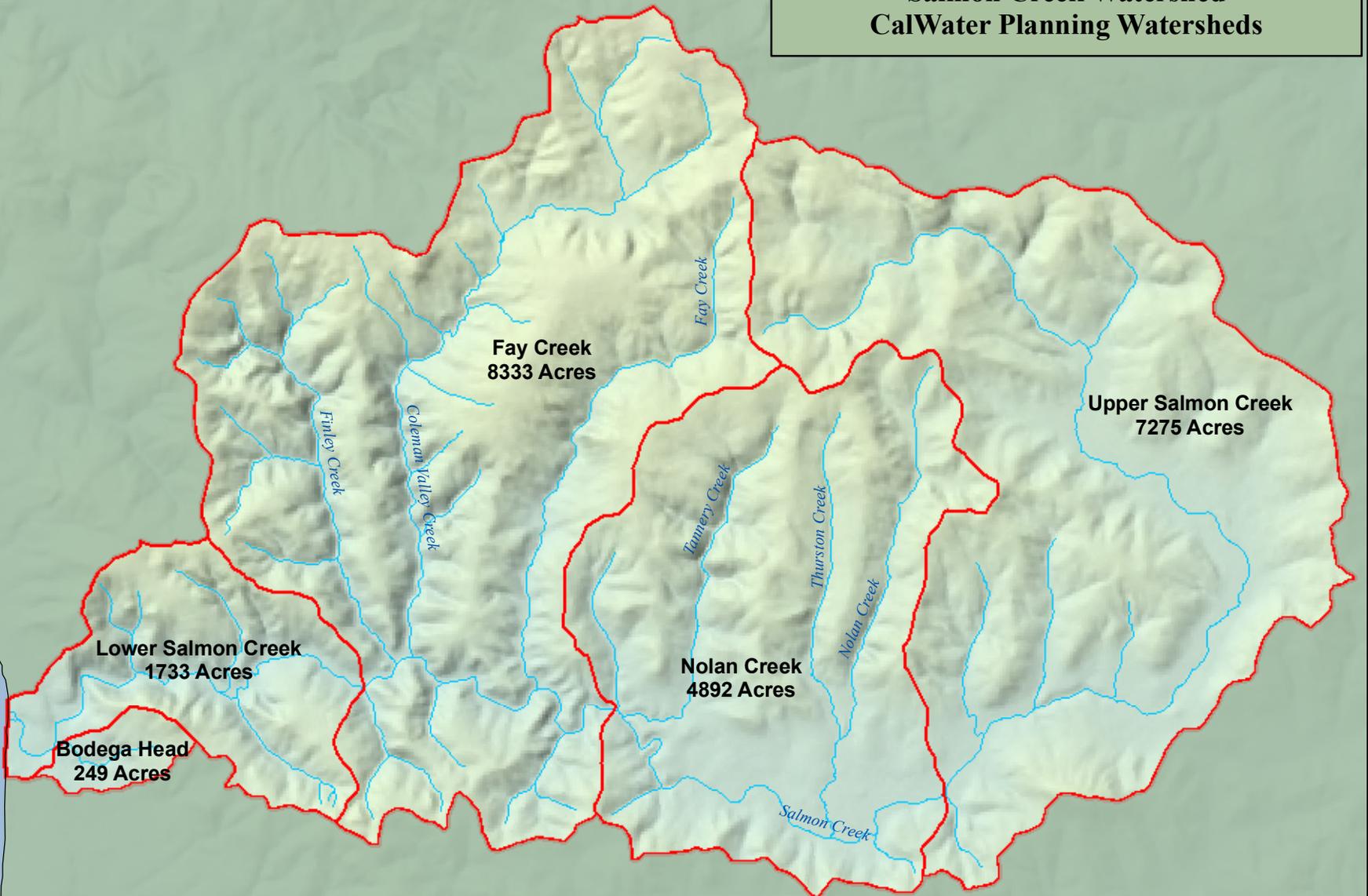




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Salmon Creek Watershed CalWater Planning Watersheds

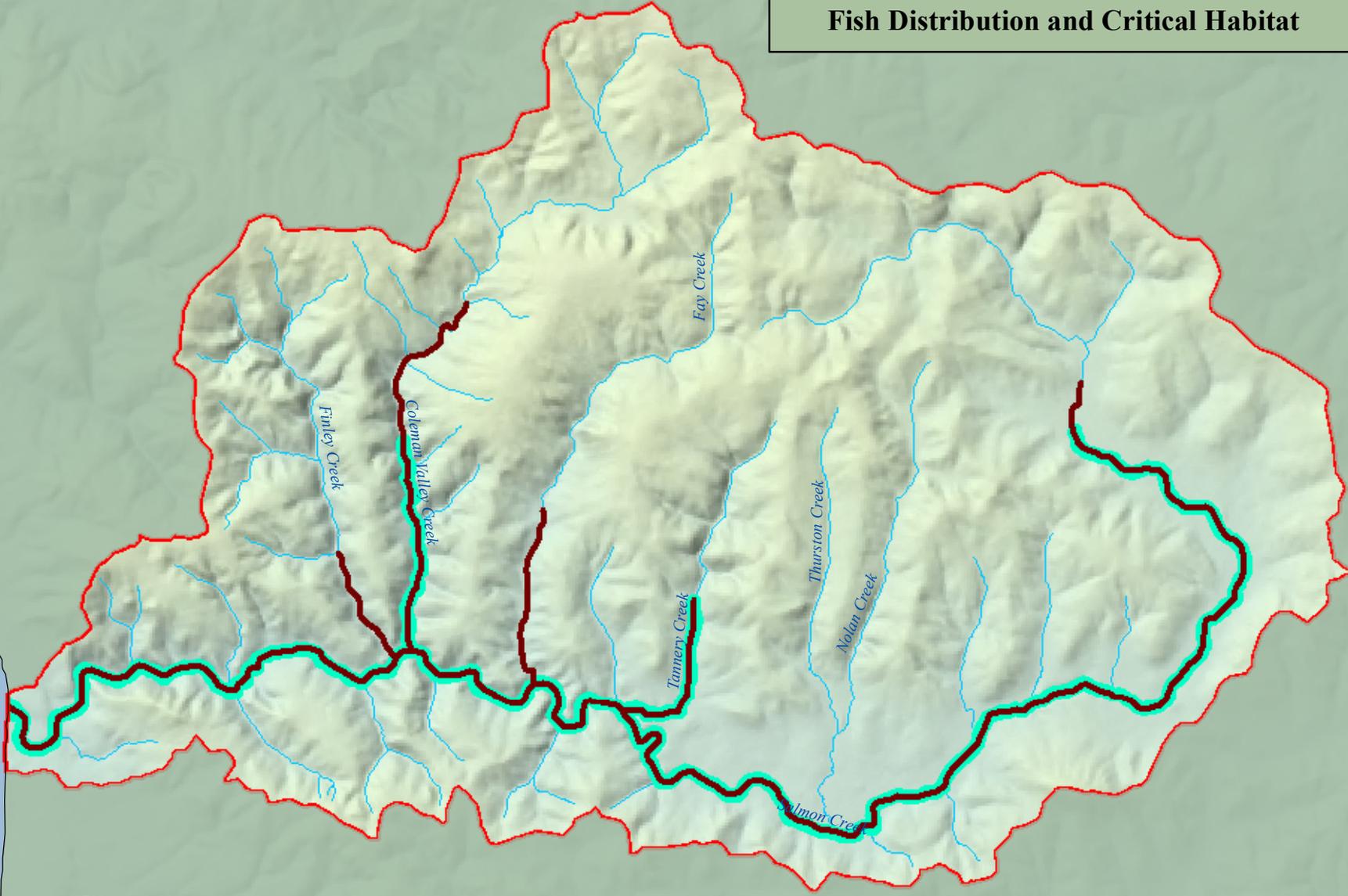




NMFS-SWR-HCD

September
2009

Salmon Creek Watershed Fish Distribution and Critical Habitat



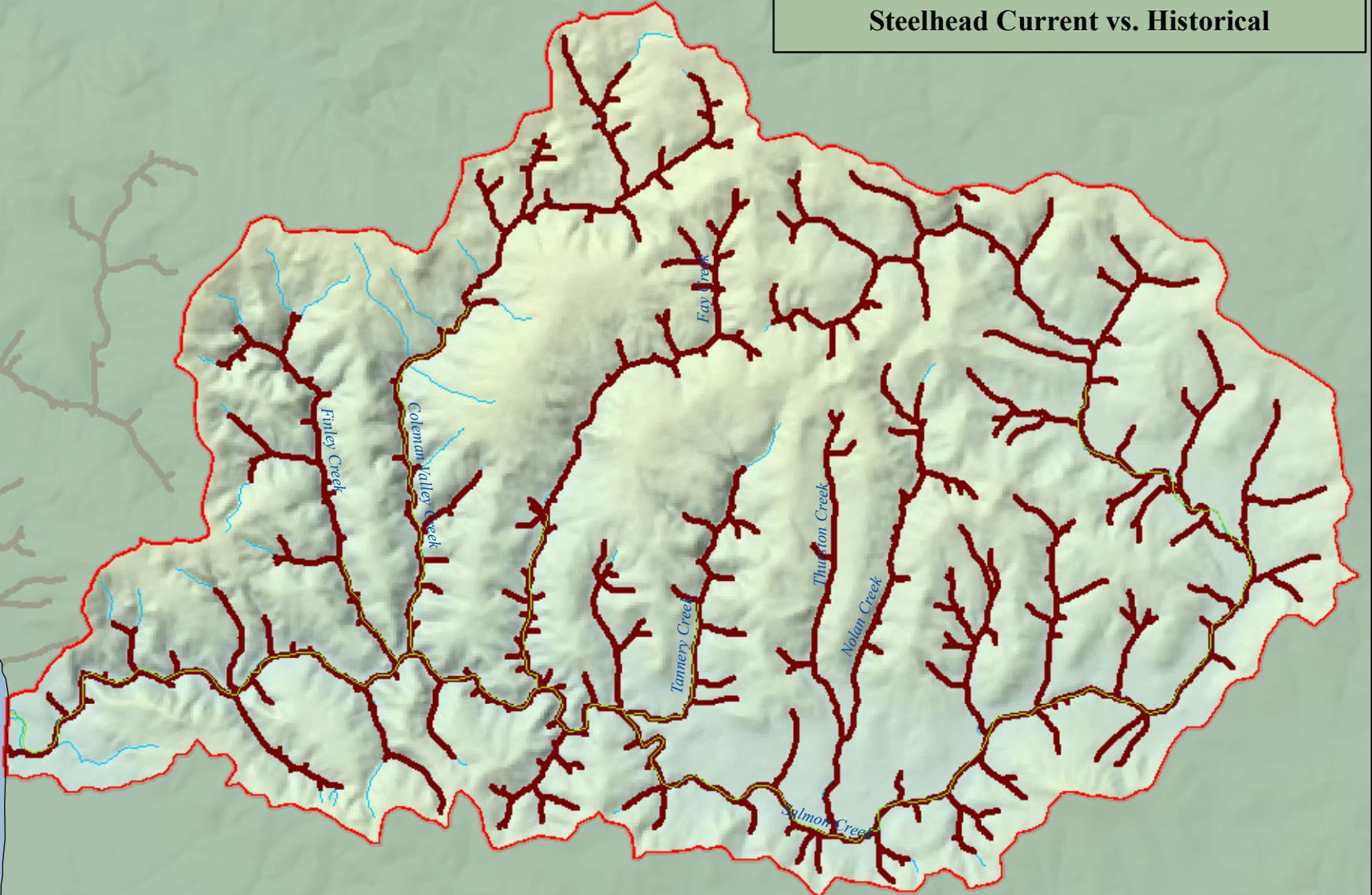
-  CCC Steelhead Distribution and Critical Habitat
National Marine Fisheries Service, August 2005. 1:100,000.
-  Coho Distribution
CDFG - NCNCR-ISB, 2009. 1:100,000.
-  1:24,000 Streams
USGS National Hydrography Dataset, 2004. 1:24,000
-  Salmon Creek Watershed



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November
2008

Salmon Creek Watershed Steelhead Current vs. Historical



-  Current Steelhead Distribution
National Marine Fisheries Service, August 2005.
1:100,000.
-  Steelhead Intrinsic Potential
NMFS SWR Fisheries Science Center, 2005.
Potential historical suitable habitat
-  1:24,000 Streams
USGS National Hydrography Dataset, 2004.
1:24,000
-  Salmon Creek Watershed

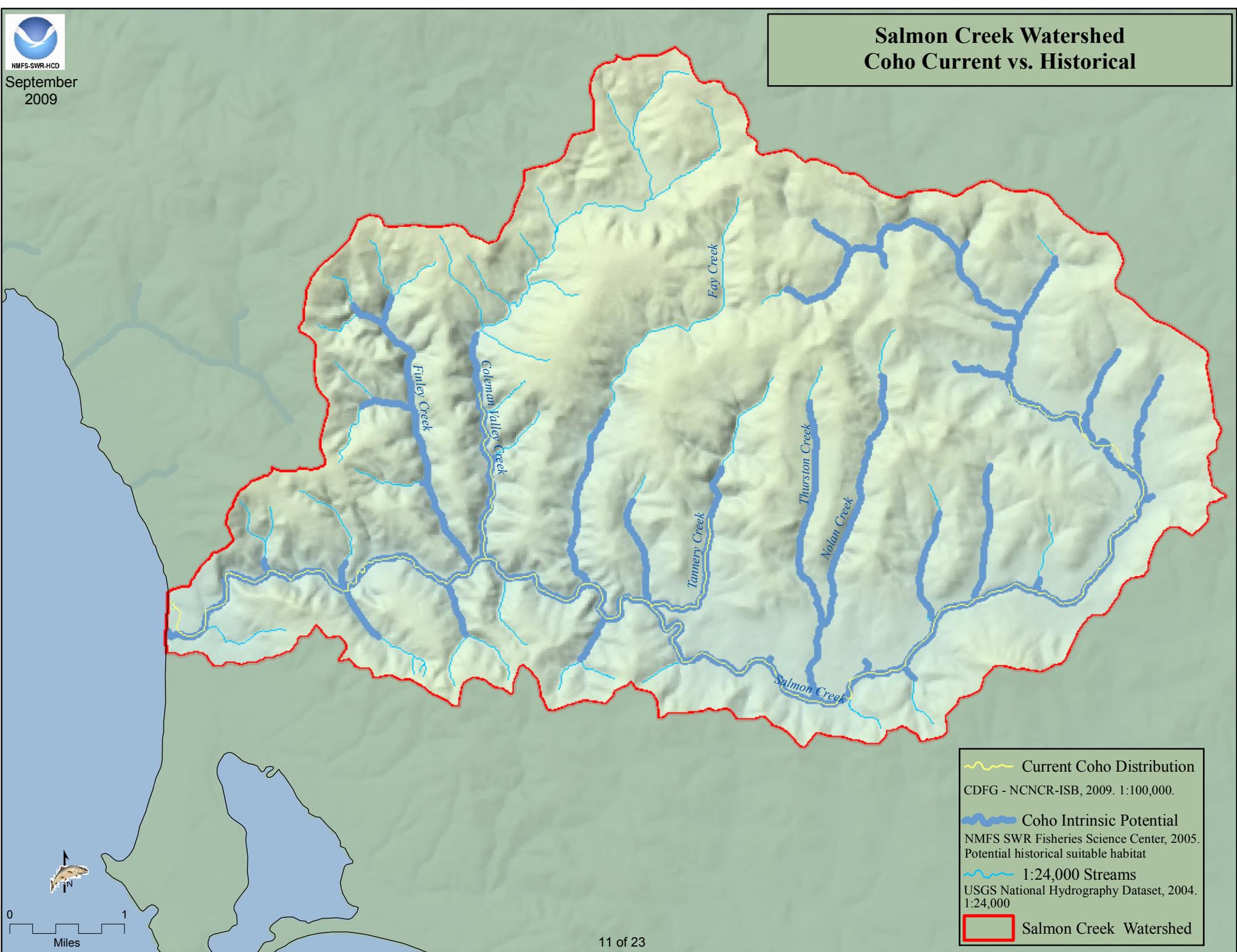




NMFS-SWR-HCD

September 2009

Salmon Creek Watershed Coho Current vs. Historical



-  Current Coho Distribution
CDFG - NCNCR-ISB, 2009. 1:100,000.
-  Coho Intrinsic Potential
NMFS SWR Fisheries Science Center, 2005.
Potential historical suitable habitat
-  1:24,000 Streams
USGS National Hydrography Dataset, 2004.
1:24,000
-  Salmon Creek Watershed

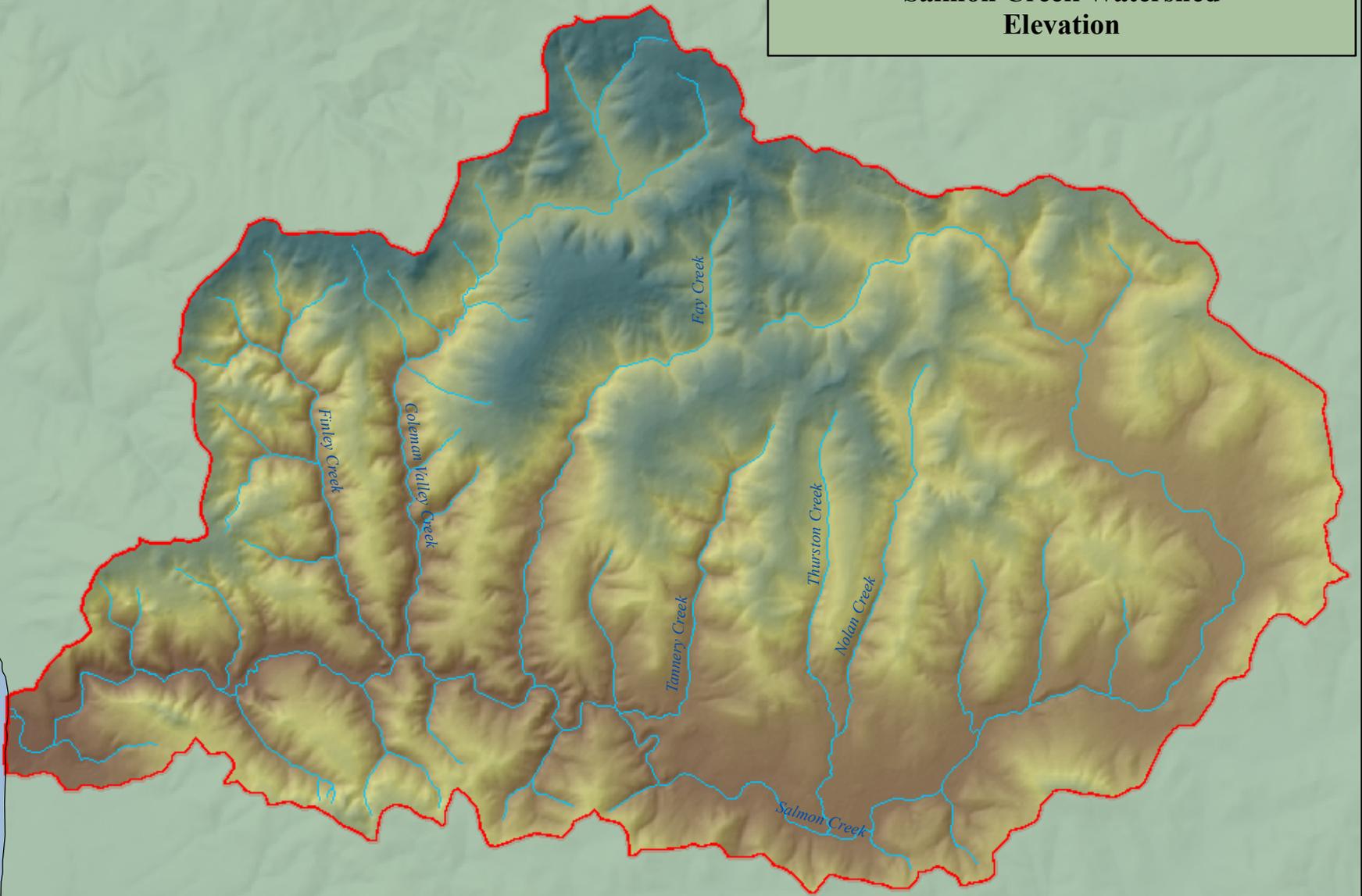




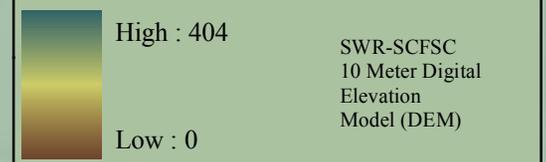
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Salmon Creek Watershed Elevation



Salmon Creek Elevation (Meters)

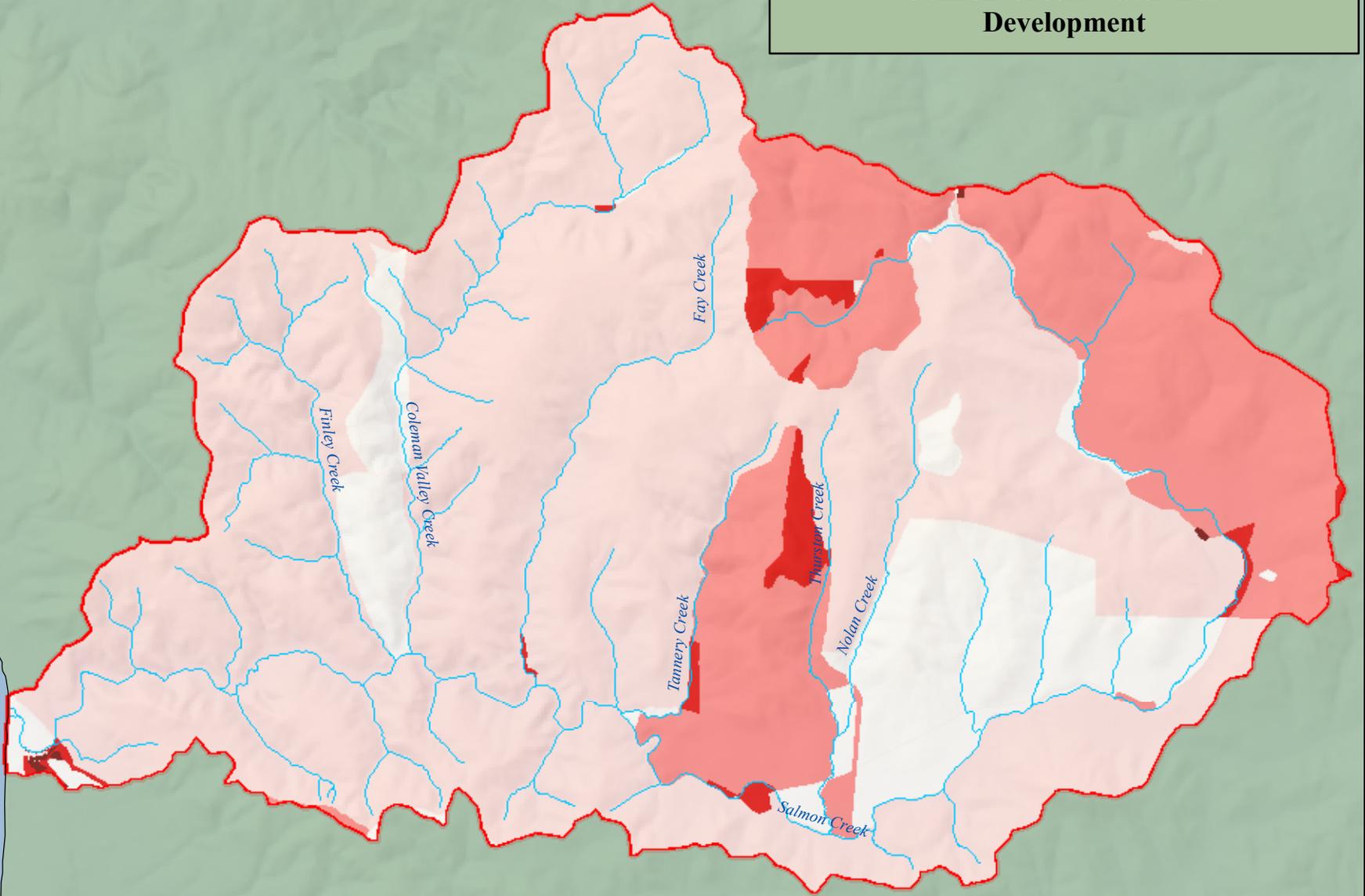




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Salmon Creek Watershed Development



Population within the Watershed = 2,210 People
 Houses within the Watershed = 1,069

California Department of Forestry, 2003. 1:100,000.

Housing Density

- 0 to Less than 1 Housing Unit / 160 Acres (12%)
- 1 Unit / 160 Acres to 1 Unit / 20 Acres (66%)
- 1 Unit / 20 Acres to 1 Unit / 5 Acres (21%)
- 1 Unit / 5 Acres to 2 Units / Acre (2%)
- 2 Units / Acre to Greater than or Equal to 5 Units / Acre

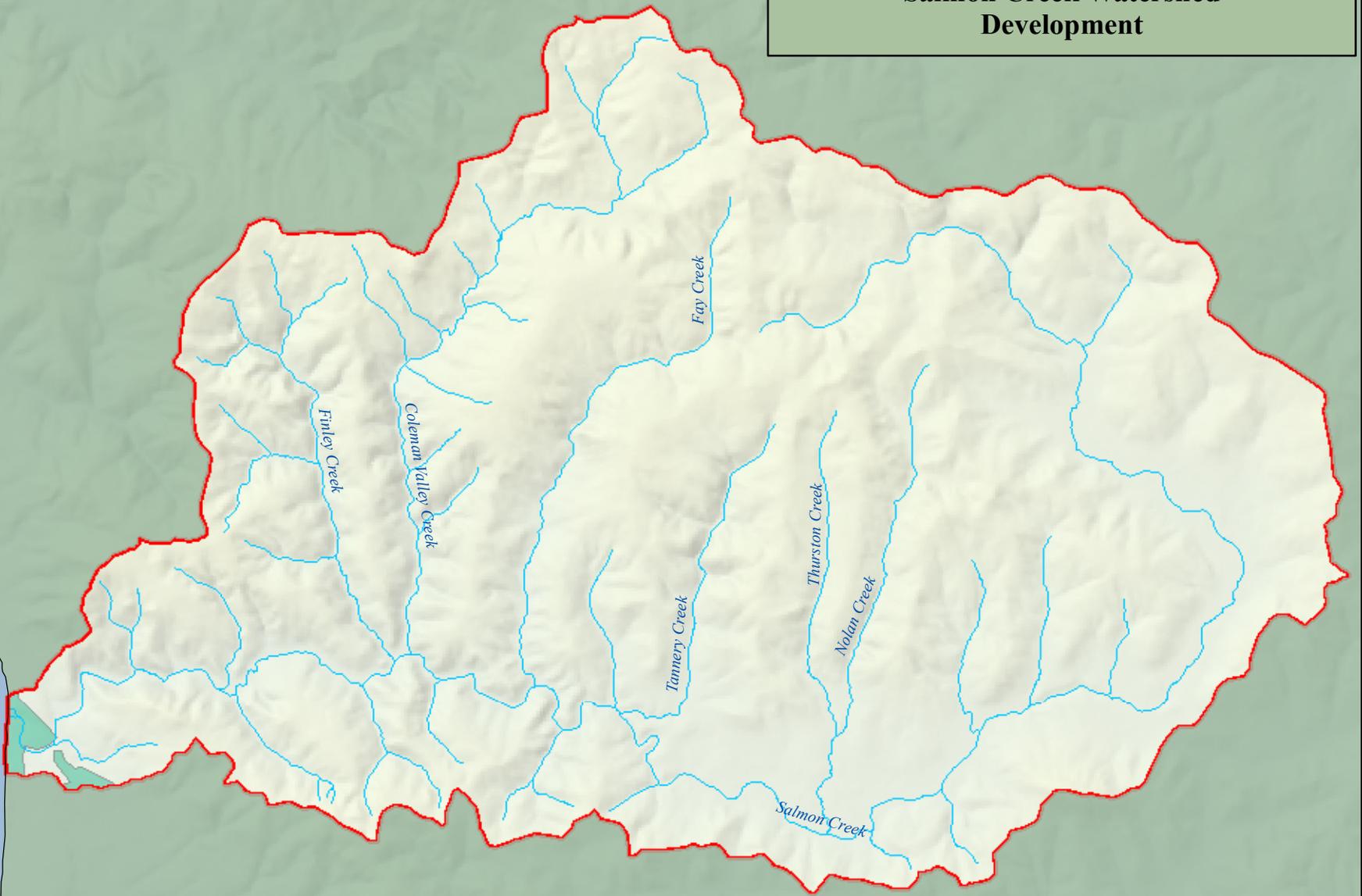




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Salmon Creek Watershed Development



Ownership

California Dept. of Forestry, 1999. 1:100,000.

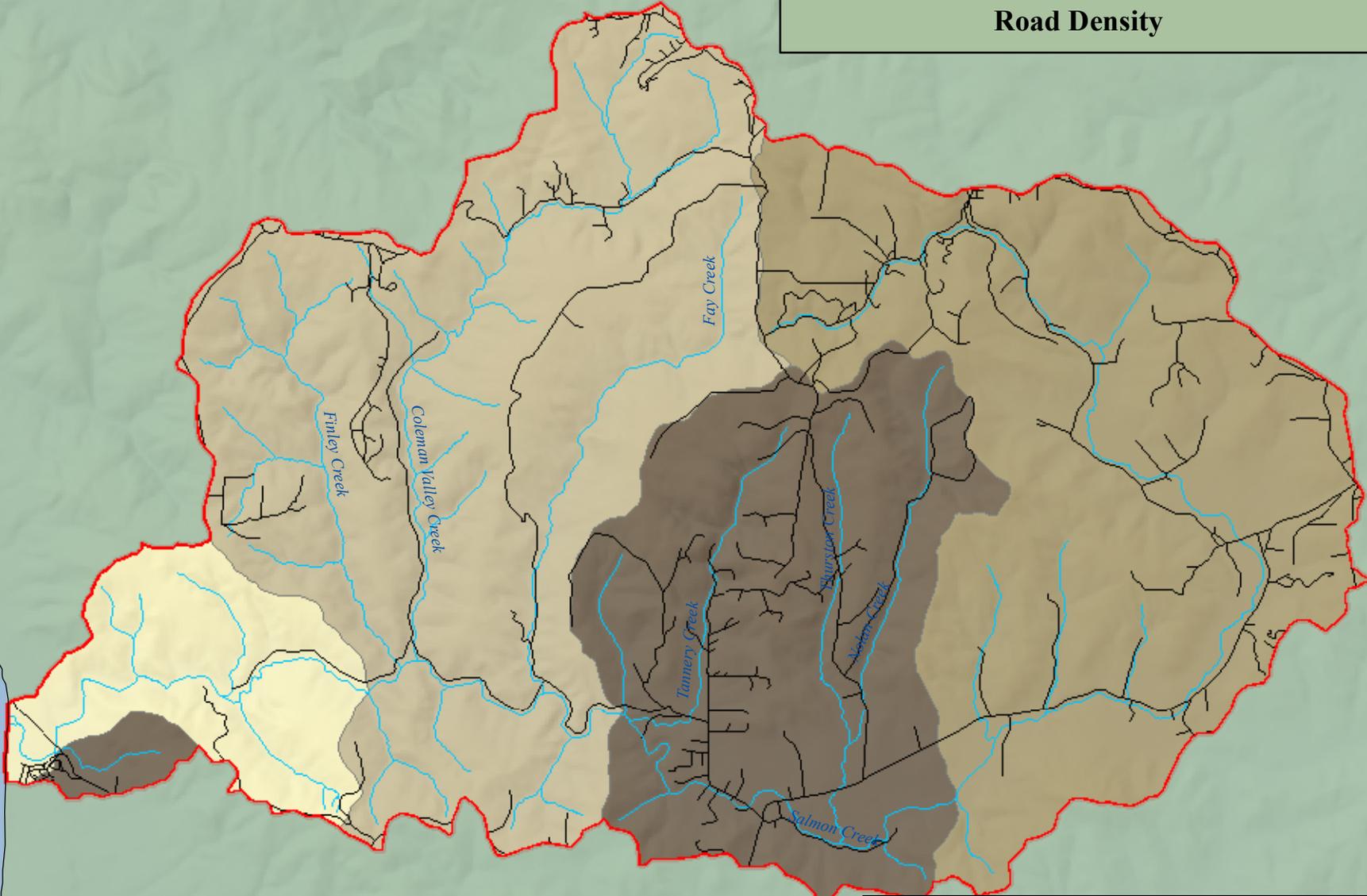
-  Private
-  State, Parks & Recreation



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Salmon Creek Watershed Road Density



Roads

U.S. Census Bureau - Tiger 2000, 2002. 1:24,000

Road Density (Miles of Road per Square Mile of Watershed)

- < 2
- 2 - 2.5
- 2.5 - 3.5
- > 3.5

Overall Watershed
Density = 2.9 Miles / SqMi

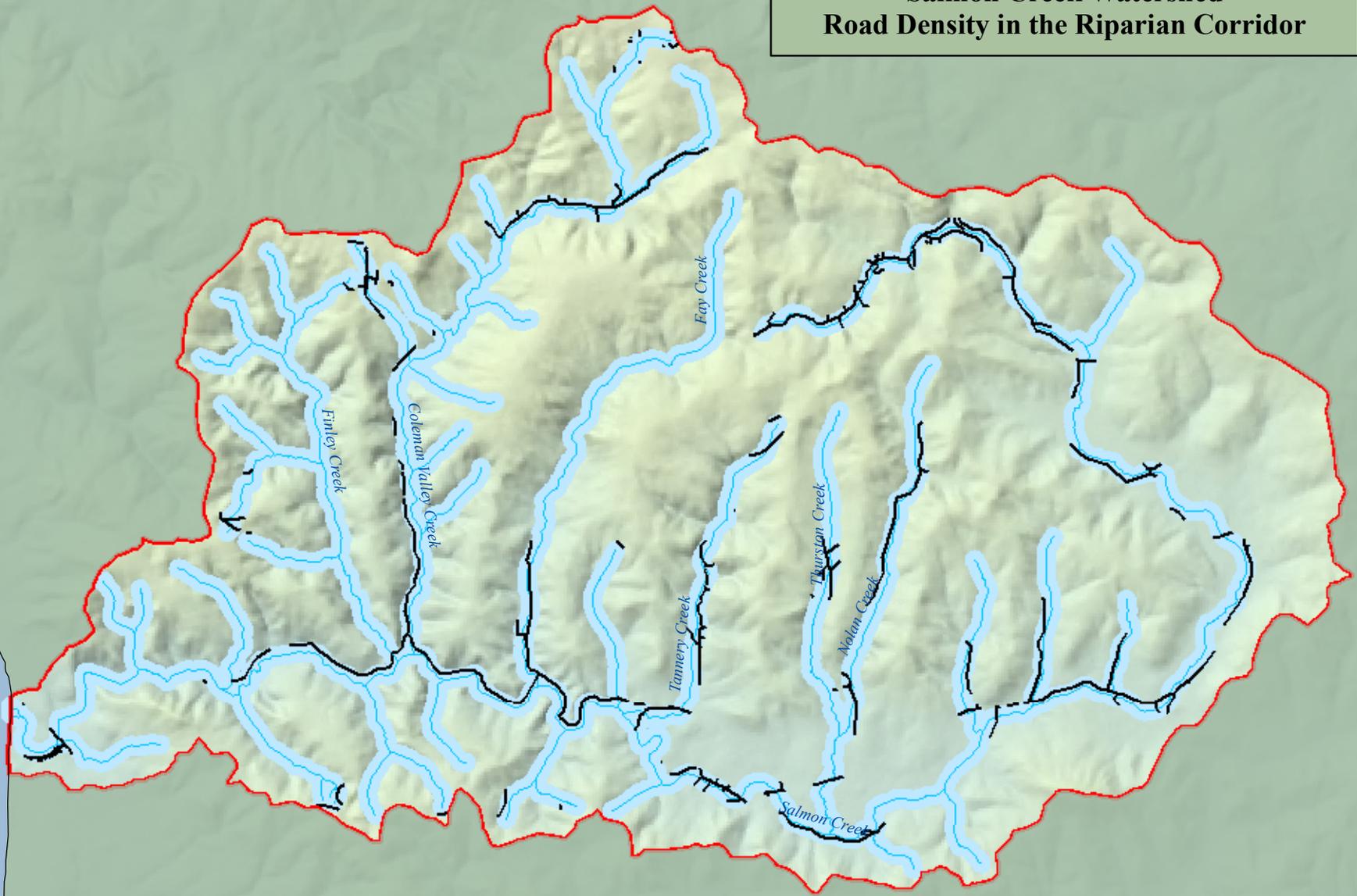




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Salmon Creek Watershed Road Density in the Riparian Corridor



-  Road Segments within the 200 meter Riparian Corridor
U.S. Census Bureau - Tiger 2000, 2002. 1:24,000
 -  1:24,000 Streams
USGS National Hydrography Dataset, 2004. 1:24,000
 -  200 Meter Riparian Buffer (100 m on either side of stream centerline)
- Overall Riparian Corridor Density = 4.0 Miles / SqMi of Corridor

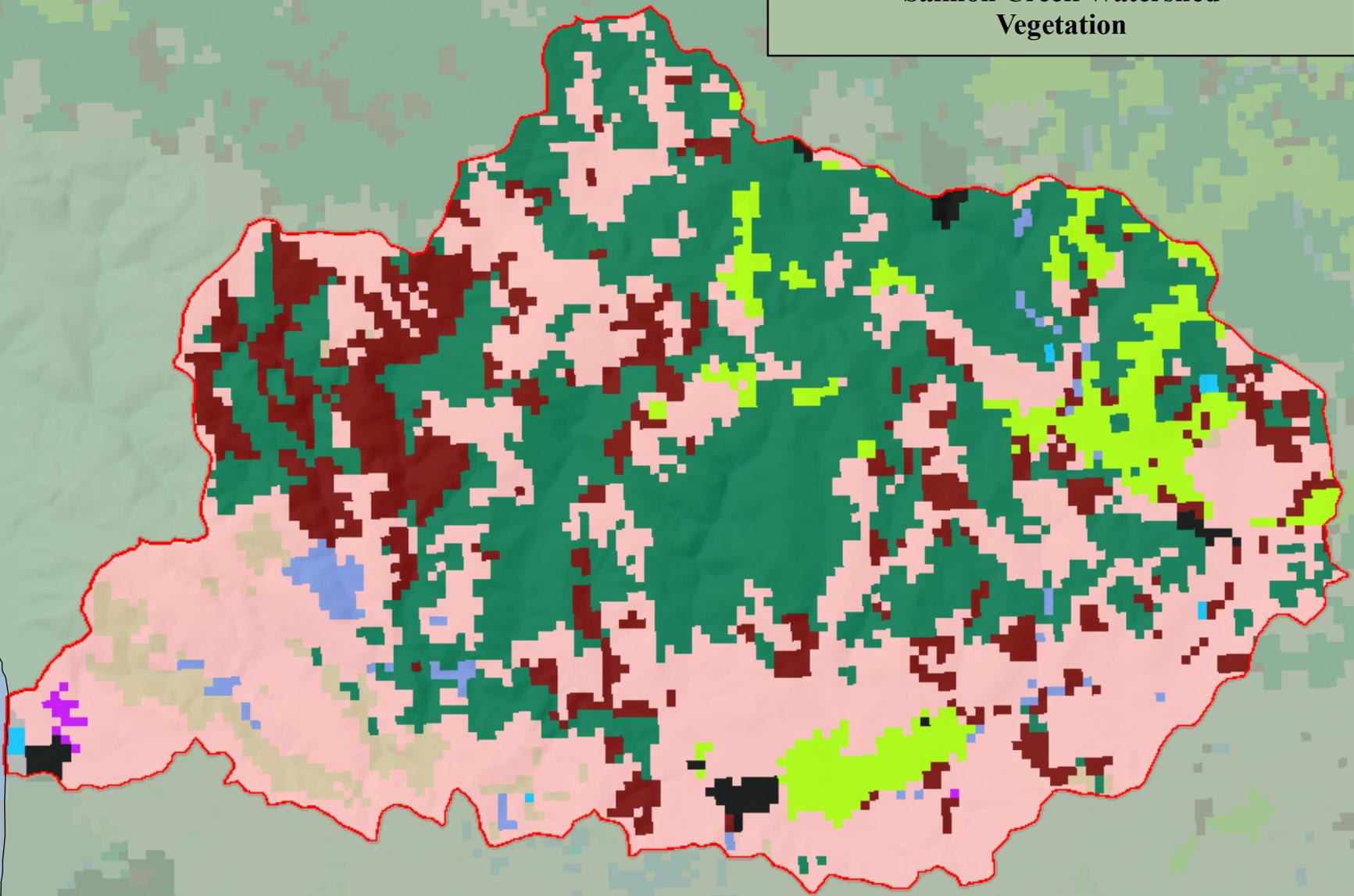




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Salmon Creek Watershed Vegetation



WHR13 Vegetation Classification

California Department of Forestry, 2002.100 meter Grid

-  Agriculture - 6%
-  Barren/Other
-  Conifer Forest 35%

-  Hardwood Forest - 12%
-  Hardwood Woodland - 1%
-  Herbaceous - 42%
-  Shrub - 3%

-  Urban - 1%
-  Water
-  Wetland

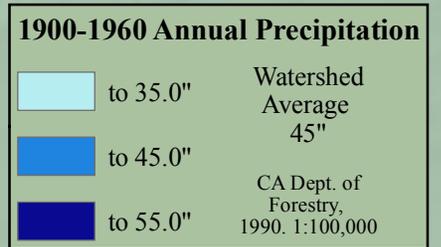
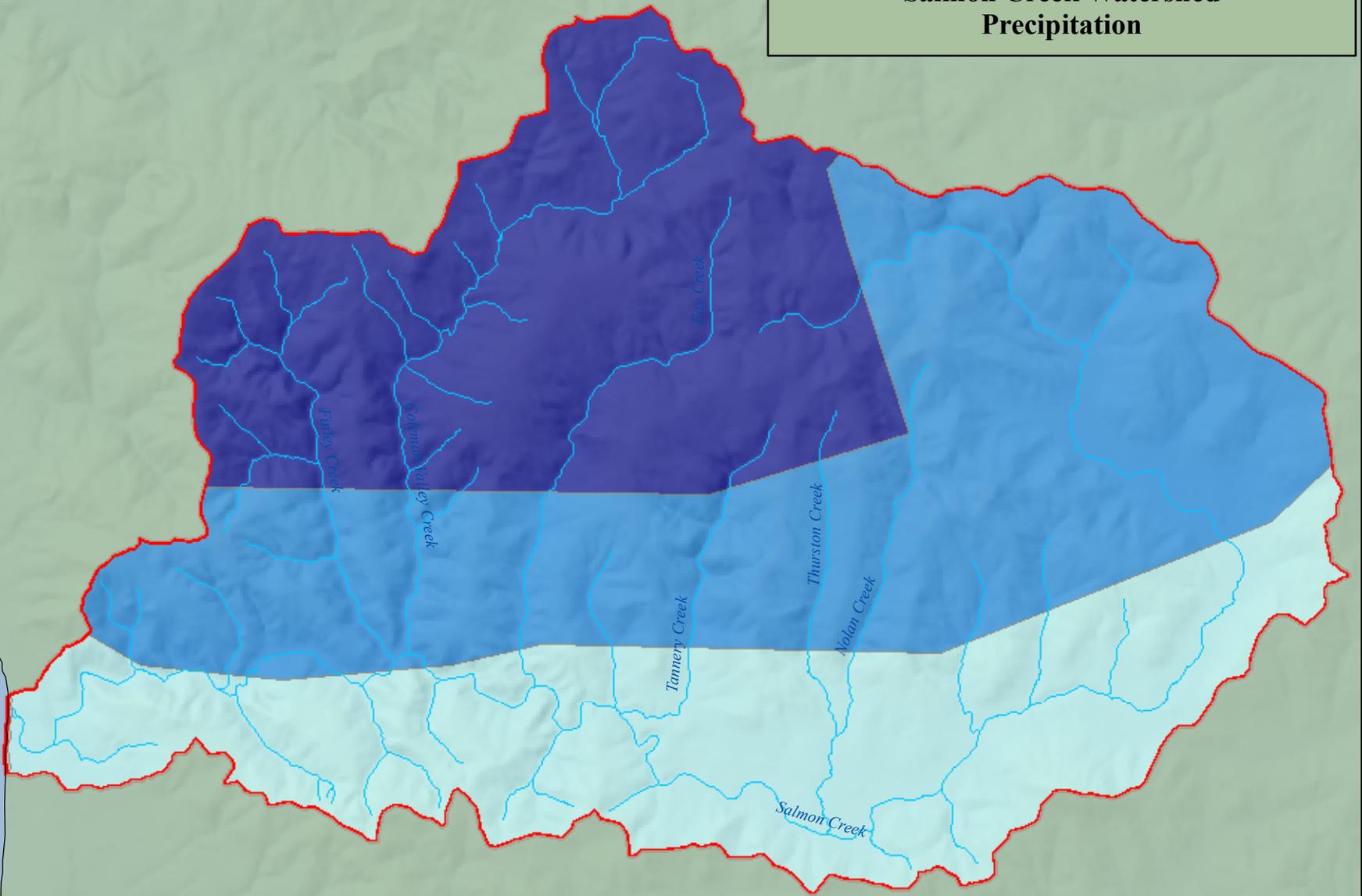




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Salmon Creek Watershed Precipitation

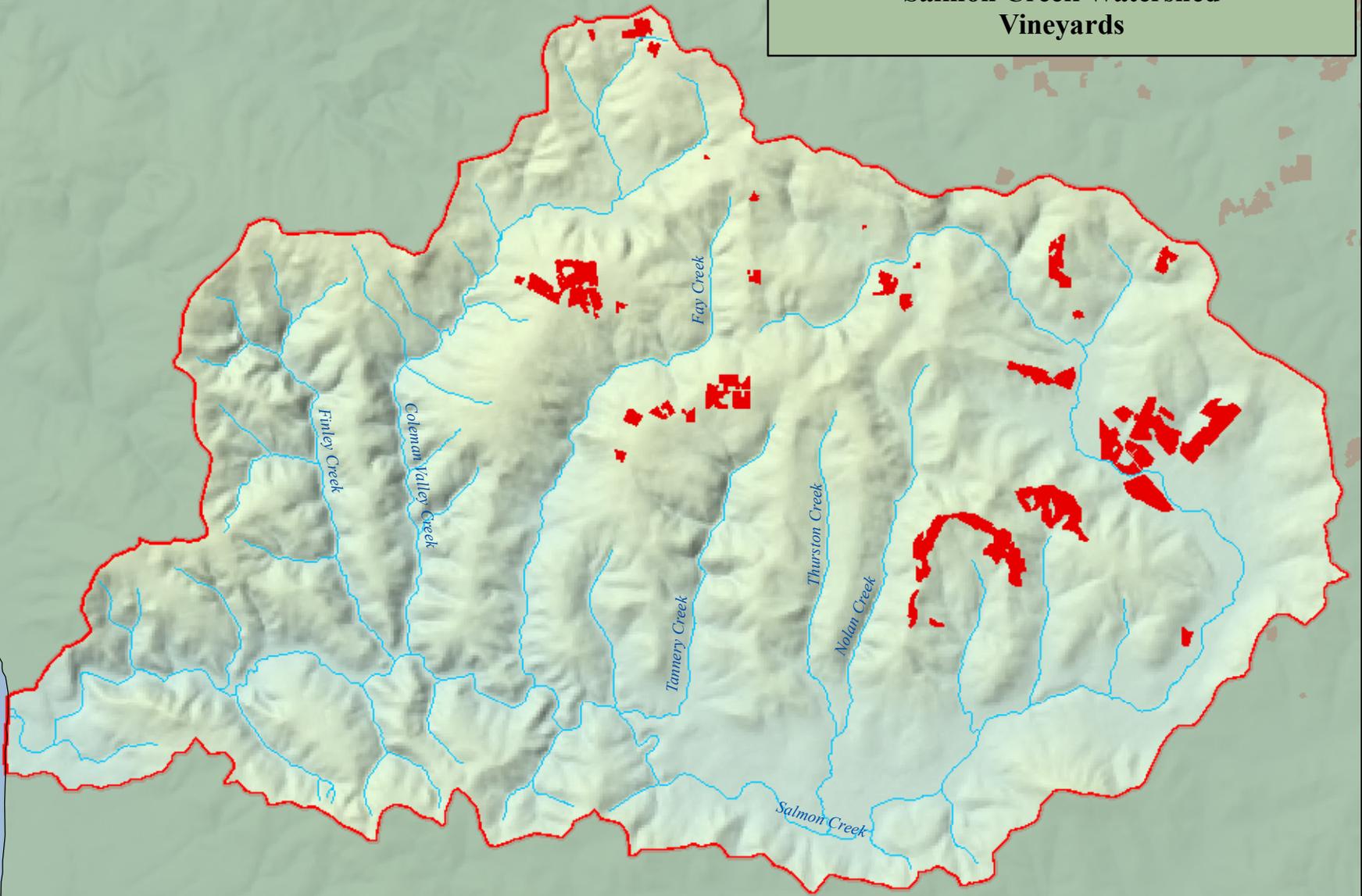




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Salmon Creek Watershed Vineyards



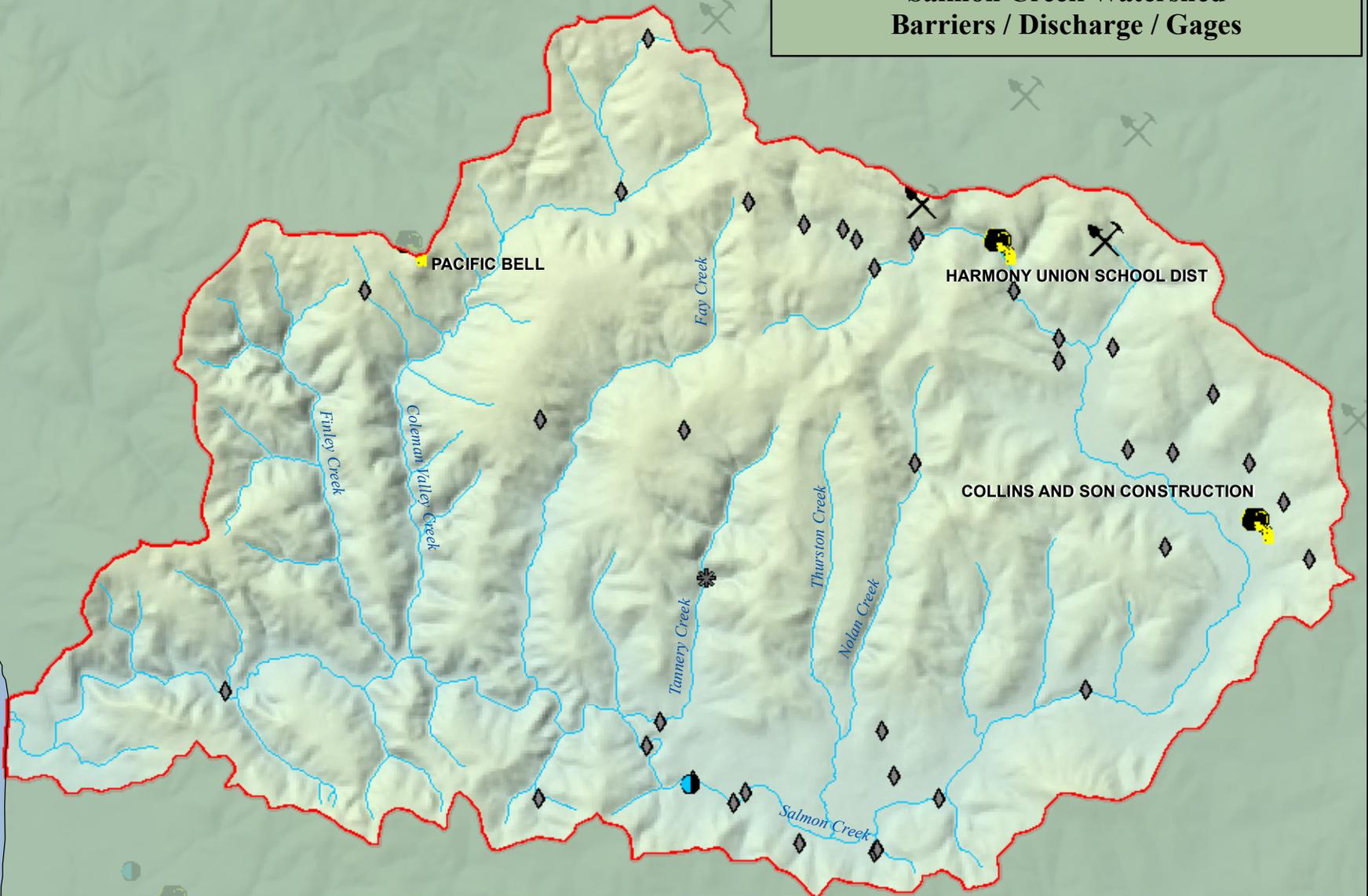
Vineyards
UC Berkeley/IHRMP North coast GIS Lab, 2008
 Vineyard



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Salmon Creek Watershed Barriers / Discharge / Gages



Barrier Type, Barrier Status		Gage Station
CA Fish Passage Assessment, PSMFC, 2008		Hazardous & Solid Waste Site USEPA BASINS 2001
Diversion, Unknown	Log jam, Unknown	mines

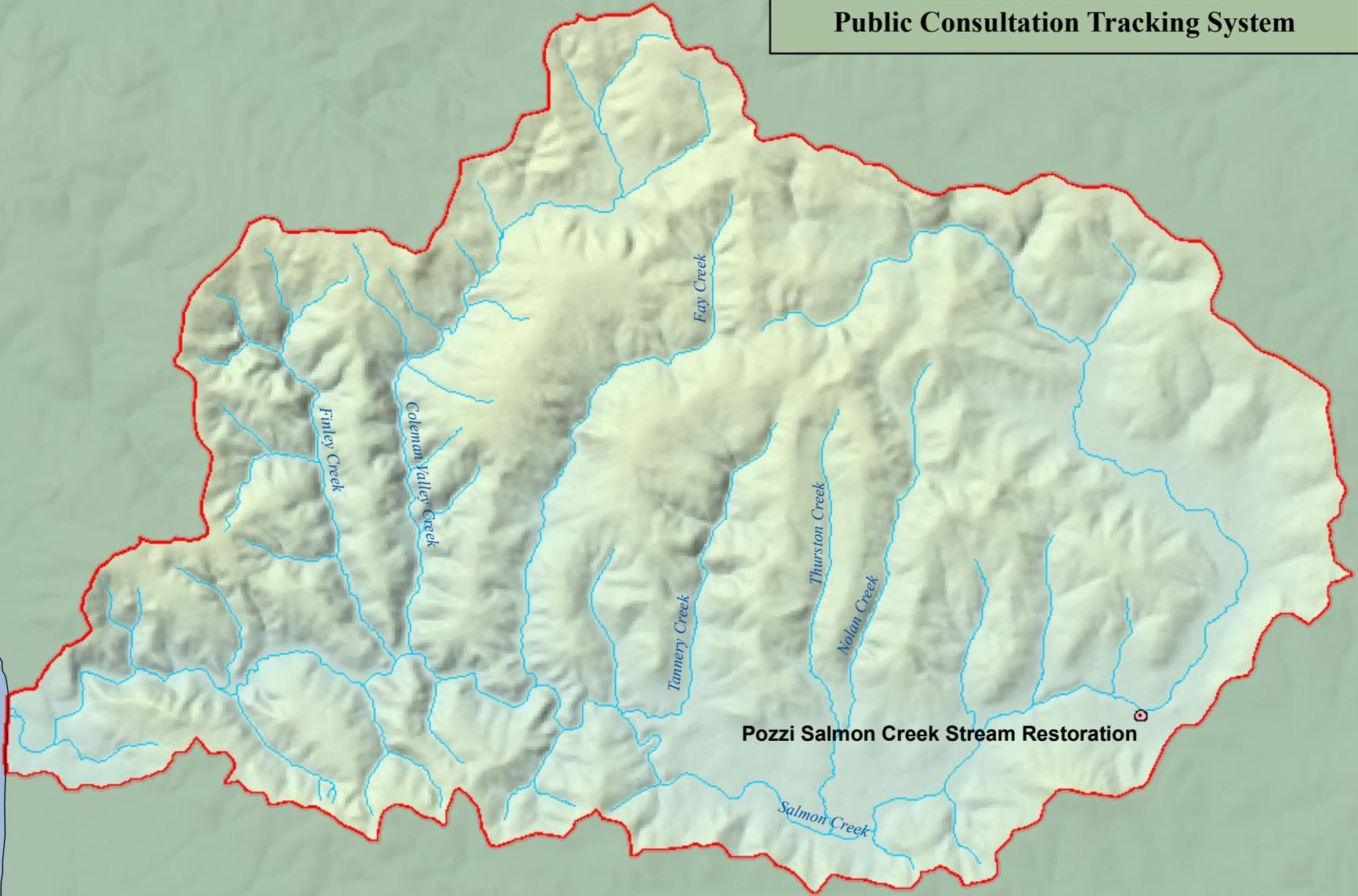




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Salmon Creek Watershed Public Consultation Tracking System



Pozzi Salmon Creek Stream Restoration

● PCTS Record

○ RMS Record

Current as of May 9, 2008 (PCTS) and Jan. 25, 2008 (RMS). Only those records with a Latitude and Longitude entered appear here



References

Watersheds

calwater_ver2_2
vector digital data
California Watersheds (CALWATER 2.2)
California Department of Forestry and Fire
Protection
1:24,000
1999
<http://www.ca.nrcs.usda.gov/features/calwater/>

Distribution

Coho_Distribution
vector digital data
Eric Haney - CDFG - NCNCR-ISB
1:100,000
2006
Draft
<http://www.calfish.org/>

CCC_Steelhead_Distribution_06_2005
vector digital data
National Marine Fisheries Service (NOAA
Fisheries)
1:100,000
August 2005
<http://swr.nmfs.noaa.gov/salmon/layers/finalgis.htm>

Critical Habitat

CCC_Steelhead_ch_06_2005
vector digital data
National Marine Fisheries Service (NOAA
Fisheries)
1:100,000
August 2005
<http://swr.nmfs.noaa.gov/salmon/layers/finalgis.htm>

Hydrology

1801 NHD Flowline
vector digital data
National Hydrography Dataset High Resolution
United States Geological Survey
1:24,000
2004

Dams

Dams_2005
vector digital data

Goslin, M.,
Santa Cruz Fishery Science Center
National Marine Fisheries Service
2005
<http://swfsc.noaa.gov/>

Barriers and Diversions

pad_september2006
vector digital data
California Fish Passage Assessment Database
Pacific States Marine Fisheries Commission
September 2006
<http://www.calfish.org/>

Gaging Stations

gages
vector digital data
Better Assessment Science Integrating point and
Nonpoint Sources (BASINS)
United States Environmental Protection Agency
2001
<http://www.epa.gov/waterscience/basins/>

Total Maximum Daily Load (TMDL)

R2_rivers_2002 303d
vector digital data
State Water Resources Control Board (SWRCB)
California Environmental Protection Agency
2002

Precipitation

California Mean Annual Precipitation Zones, 1900-
1960
Vector digital data
California Department of Forestry and Fire
Protection 1990
1:100,000
<http://frap.cdf.ca.gov/data/frapgisdata/select.asp>

Roads

TGRR00
vector digital data
Roads
United States Census Bureau
1:100000
2000
<http://www.census.gov/geo/www/tiger/>

Elevation

Spln_mos_02

10 Meter Digital Elevation Model (DEM)
NOAA Fisheries, Santa Cruz Laboratory
2003

Vegetation

fveg02_2

raster digital data
Multi-source Land Cover Data
California Department of Forestry and Fire
Protection
100 meter Grid
2002

<http://frap.cdf.ca.gov/data/frapgisdata/select.asp>

Erodability

Highly Erodible Watersheds

vector digital data
Depart. of Conservation, Division of Mines &
Geology
Minimum Mapping Unit: Approximately 8000
Acres (20,000 Hectares)
1994

<http://gis.ca.gov/catalog/BrowseRecord.epl?id=380>

Land Ownership

GOVTOWNA

vector digital data
California Department of Forestry Forest and
Rangeland Resources Assessment Program
Bureau of Land Management Surface Management
1:100,000
September 1999
<http://old.casil.ucdavis.edu/casil/gis.ca.gov/teale/govtowna/>

Developed Area and Population

Census 2000 Block Data (Migrated)
vector digital data
California and the Department of Forestry and Fire
Protection, FRAP
2003
1:100,000
<http://frap.cdf.ca.gov/data/frapgisdata/select.asp>

Vineyards

Master layer of vineyards that have been digitized
from orthorectified photos for Sonoma County
vector digital data
Adina Merenlender's lab, UC Berkeley
UC Berkeley/IHRMP North Coast GIS lab
2008

Imagery

naip_1-1_1_n_s_ca097_2006_2 (Sonoma)
remote-sensing image
raster digital data
National Agriculture Imagery Program (NAIP)
USDA-FSA Aerial Photography Field Office
Salt Lake City, Utah
2006
<http://datagateway.nrcs.usda.gov/GatewayHome.html>

Historic Suitable Habitat (Coho, Steelhead)

Intrinsic Potential Model
vector digital data
NOAA Fisheries
Santa Cruz Laboratory, Santa Cruz, CA
2005
<http://swfsc.noaa.gov/>

Toxins

Hazardous_&_solid_waste_sites
Better Assessment Science Integrating point and
Nonpoint Sources (BASINS)
vector digital data
United States Environmental Protection Agency
2001
<http://www.epa.gov/waterscience/basins/>

mines
vector digital data
Better Assessment Science Integrating point and
Nonpoint Sources (BASINS)
United States Environmental Protection Agency
2001
<http://www.epa.gov/waterscience/basins/>

Records Management System (RMS)

Public Consultation Tracking System (PCTS)
National Marine Fisheries Service
Oracle Databases
2008

Flood Zones

FEMA Flood Insurance Maps 1996
Vector digital data
Federal Emergency Management Agency
Q3 Flood Data Program
1996
<http://www.fema.gov/>