



*Garcia River Watershed*

Area	Hydrologic Units	Calwater Subbasins ---	(Planning Watersheds)
72,875 Acres	18010108	1113700101	Lamour Creek (6550 Acres)
29,491 Hectares	4th Field HUC	1113700102	Little Penney (3972 Acres)
114 Square Miles		1113700103	Victoria Fork (4929 Acres)
	1113	1113700104	Inman Creek (5481 Acres)
<b>Location</b>	4th Field Calwater	1113700105	Pardaloe Creek (10473 Acres)
Mendocino County		1113700201	East of Eureka Hill (3425 Acres)
		1113700202	North of Gualala Mtn. (2626 Acres)
		1113700203	South Fork Garcia River (5595 Acres)
		1113700204	Rolling Brook (8000 Acres)
		1113700205	North Fork Garcia River (10373 Acres)
		1113700206	Hathaway Creek (7498 Acres)
		1113700207	Signal Creek (3954 Acres)

Species Potential	Miles of Streams with Species Present
Northern California <b>Steelhead</b> Central Coastal Diversity Stratum - Independent Population	<u>Steelhead</u> 70 NOAA Fisheries, Critical Habitat Redesignation, 2005
Central California Coast <b>Coho</b> Navarro Point-Gualala Point Diversity Stratum - Independent Population	<u>Coho</u> 33 CDFG, Coho Distribution, May 2007
California Coastal <b>Chinook</b> Central Coastal Diversity Stratum - Potentially Independent	<u>Chinook</u> 25 NOAA Fisheries, Critical Habitat Redesignation, 2005

Critical Habitat	Miles of Stream
Northern California Steelhead	70 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)
California Coastal Chinook	25 Miles of Stream

Miles of Waterway <sup>A</sup>	Miles	Number of Dams <sup>C</sup>
Naturally Occurring Waterways		0
Intermittent Stream	126	
Perennial Stream	102	
Artificial Path	14	

<sup>C</sup>Passage Assessment Database,  
Pacific States Marine Fisheries Commission, 2008

<sup>A</sup>USGS National Hydrography Dataset, High Resolution, 2004. 1:24,000

USGS Gaging Stations <sup>B</sup>	Number of Barriers <sup>C</sup>
11467600	34
Garcia River near Point Arena	14 Diversions 15 Road Crossings (3 Temp. &/or Partially Impassable) 5 Natural Barriers (Chutes, Falls, Log Jams, etc. (2 Impassable))

<sup>C</sup>Passage Assessment Database,  
Pacific States Marine Fisheries Commission, 2008



EPA Total Maximum Daily Load Classification (**TMDL**)<sup>1</sup>

High Priority - Temperature

Sources: Habitat Modification, Removal of Riparian Vegetation, Streambank Modification/Destabilization, Nonpoint Source

<sup>1</sup>State Water Resources Control Board, 2003

Average Annual **Precipitation**<sup>E</sup>

60.3"

Average Annual **Precipitation Range**<sup>E</sup>

45 - 75"

<sup>E</sup>California Mean Annual Precipitation Zones, 1900-1960, CA Department of Forestry, 1990

<b>Roads</b> <sup>A</sup>	<b>(US Census Bureau (TIGER))</b>	Miles
Roads in Watershed		
Primary Road / Highway		
Secondary and connecting road, state highways		3
Local, neighborhood, and rural road, city street, unseparated		220
Vehicular trail, 4WD		2
Driveway or service road		21
Total Miles		

<b>Road Density</b>	<b>(US Census Bureau (TIGER))</b>	
Miles of Roads per SqMi of Watershed		2.2
Miles of Roads per SqMi of 100m Riparian Buffer*		2.8

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

<sup>A</sup>U.S. Census Bureau - Tiger 2000, 2002. 1:24,000

<b>Roads</b> <sup>A1</sup>	<b>(Timber Harvest Plans)</b>	Miles
Roads in Watershed		
Abandoned Seasonal		1
Bridge		0
Existing Permanent (rocked)		118
Existing Seasonal		484
Existing Temporary & 4WD		52
Proposed Permanent (rocked)		
Proposed Seasonal		2
Proposed Temporary & 4WD		0
Reconstructed Seasonal		
Secondary Road (2-3 lanes)		20

<b>Road Density</b>	<b>(Timber Harvest Plans)</b>	
Miles of Roads per SqMi of Watershed		5.9
Miles of Roads per SqMi of 100m Riparian Buffer*		6.2

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

<sup>A1</sup>California Department of Forestry, Timber Harvest Plans for Garcia Watershed, 2006

<b>Slope</b> <sup>D</sup>	Acres	Percent of watershed
Lands of 0-2 percent slope	2,092	3%
Lands of 2-4 percent slope	1,428	2%
Lands of 4-10 percent slope	3,551	5%
Lands of 10-15 percent slope	2,885	4%
Lands of 15-30 percent slope	11,482	16%
Lands of 30-60 percent slope	35,009	48%
Lands of 60-100 percent slope	16,205	22%
Lands of > 100 percent slope	537	1%

<b>Elevation Range</b>	0 - 2703 ft.	0 - 824 m
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<sup>D</sup>Slope derived from USGS 10 meter Digital Elevation Models (DEM's)

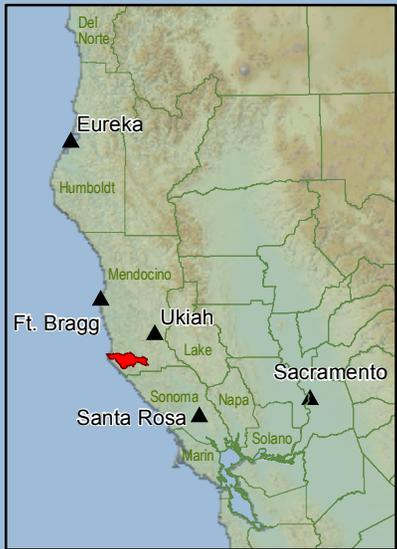






NMFS-SWR-HCD  
July 2008

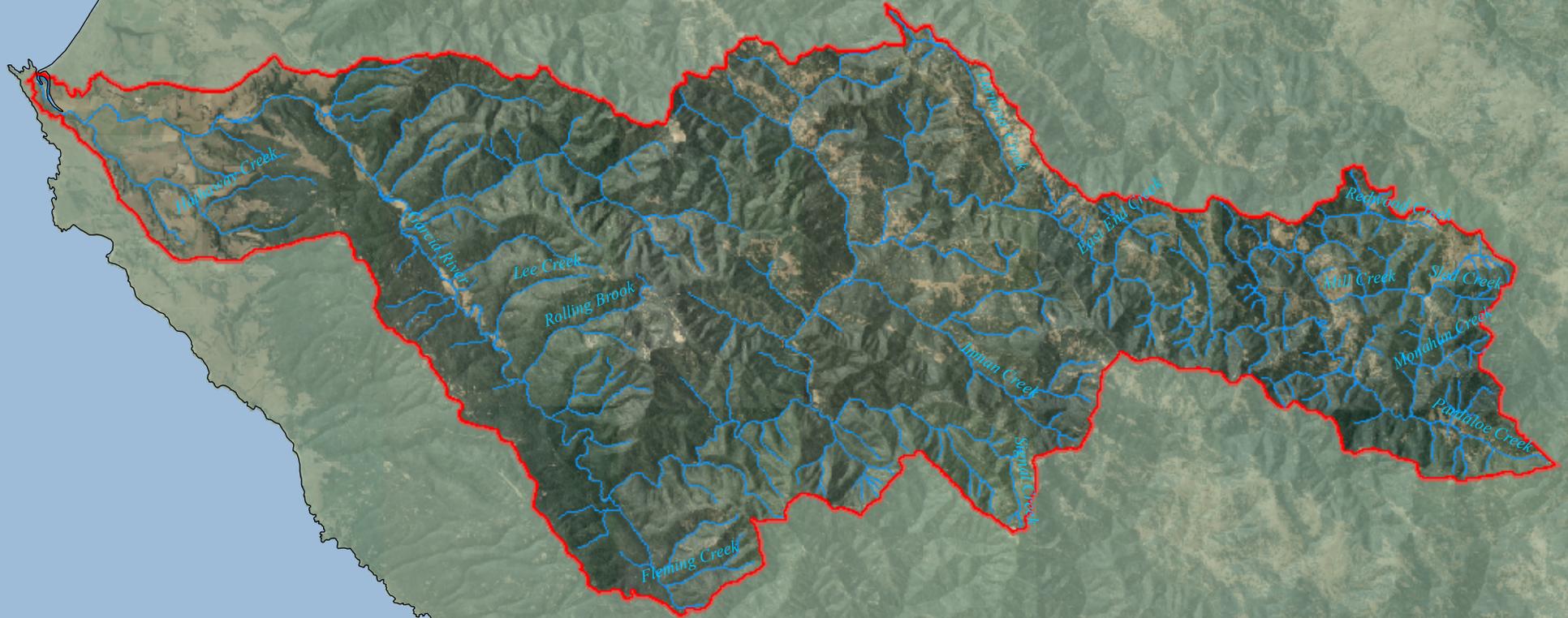
# Garcia River Watershed





NMFS-SWR-HCD  
July 2008

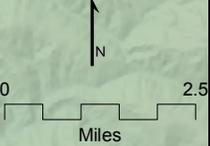
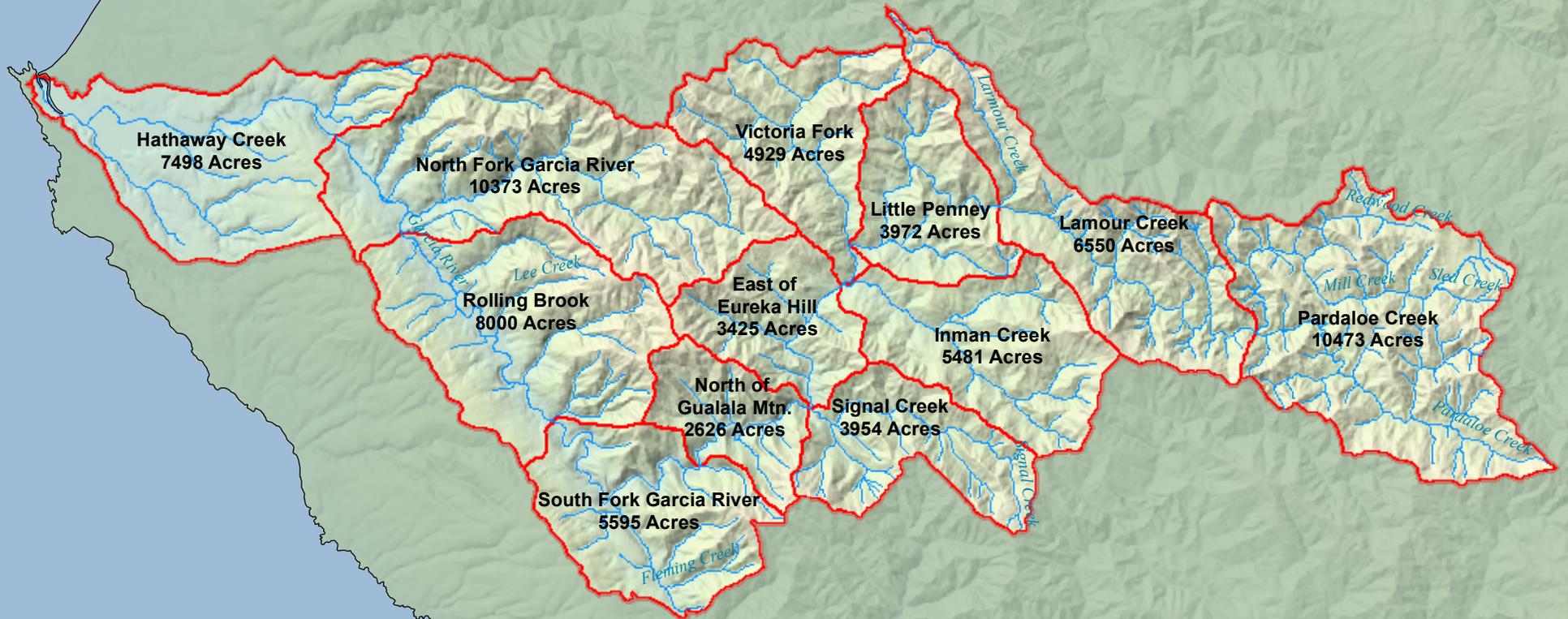
# Garcia River Watershed





NMFS-SWR-HCD  
July 2008

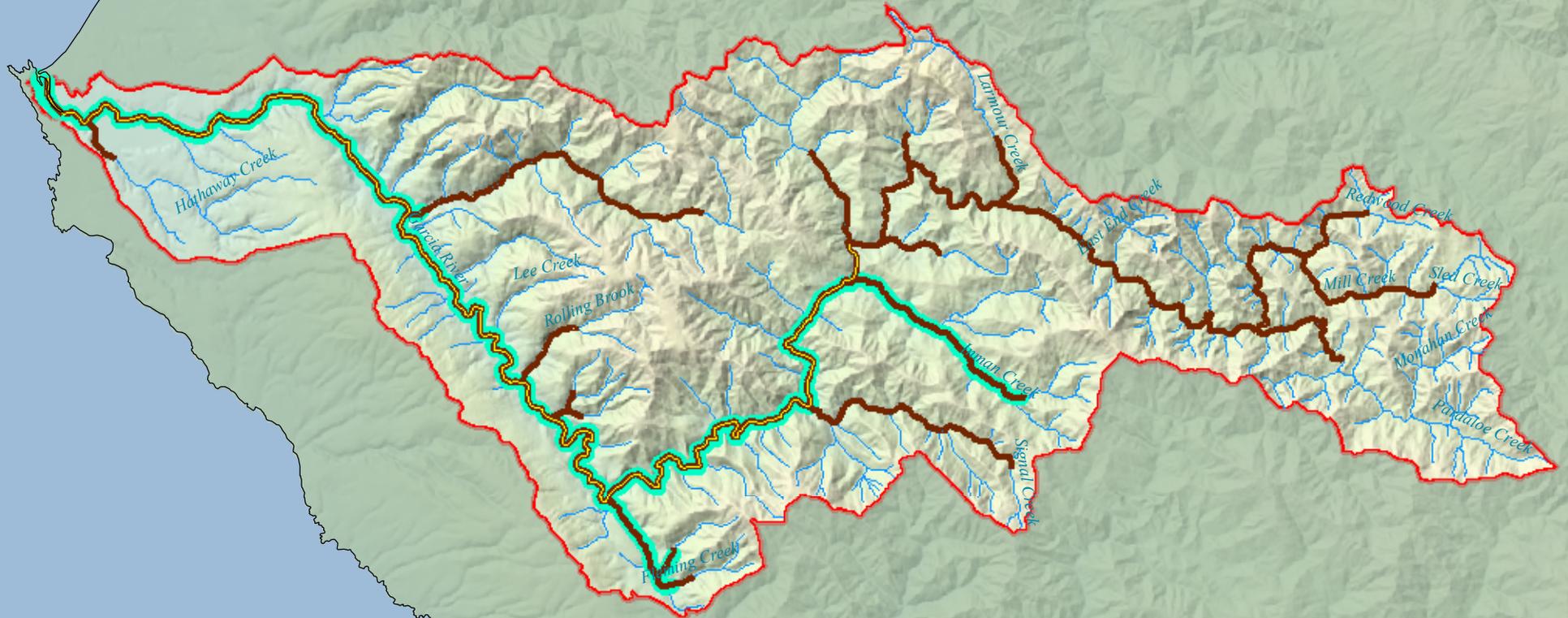
# Garcia River Watershed CalWater Planning Watersheds





NMFS-SWR-HCD  
July 2008

# Garcia River Watershed Fish Distribution and Critical Habitat



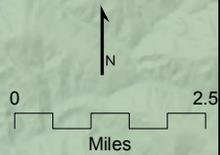
 CC Chinook Distribution and Critical Habitat  
National Marine Fisheries Service, August 2005. 1:100,000.

 NC Steelhead Distribution and Critical Habitat  
National Marine Fisheries Service, August 2005. 1:100,000.

 Coho Distribution  
CDFG - NCNCR-ISB, 2007. 1:100,000.

 1:24,000 Streams  
USGS National Hydrography Dataset, 2004. 1:24,000

 Garcia River Watershed





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## Garcia River Watershed Steelhead Current vs. Historical

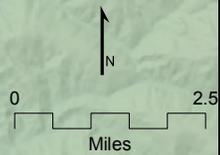


 Current Steelhead Distribution  
National Marine Fisheries Service,  
August 2005. 1:100,000.

 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

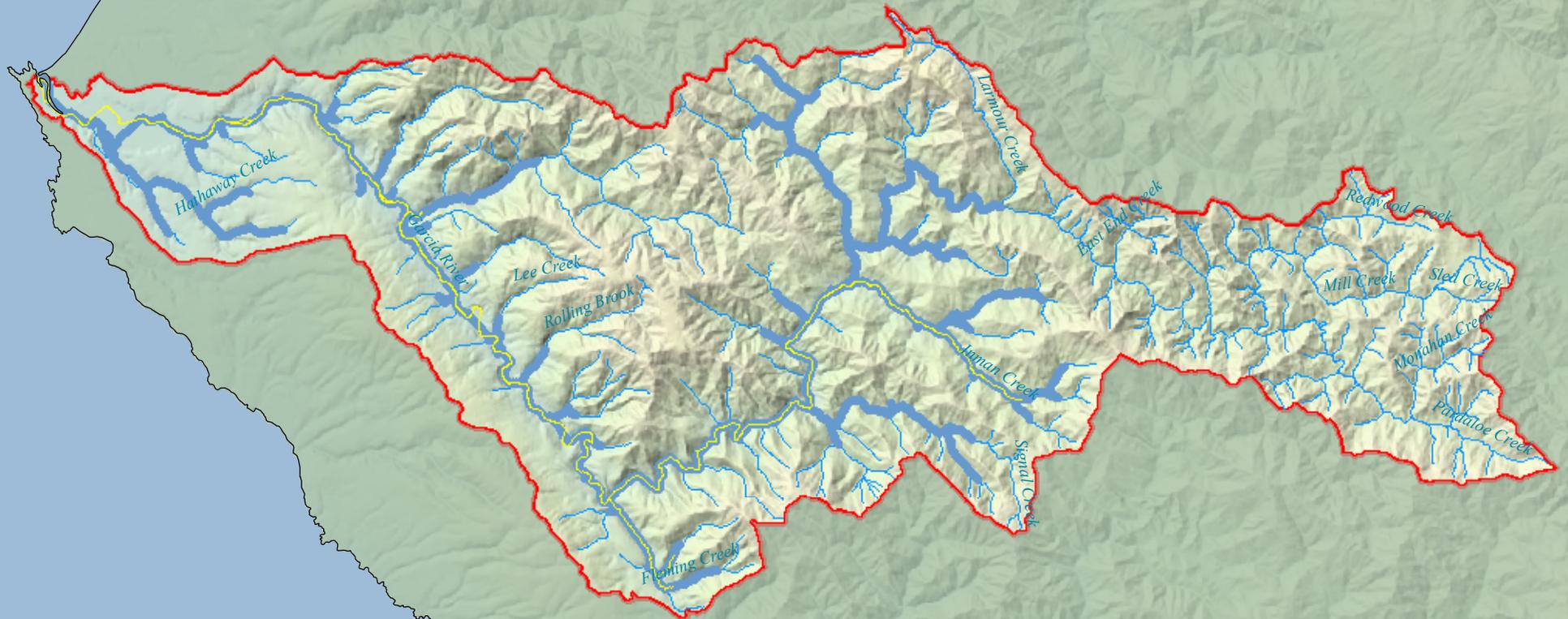
 Garcia River Watershed





NMFS-SWR-HCD  
July 2008

# Garcia River Watershed Coho Current vs. Historical

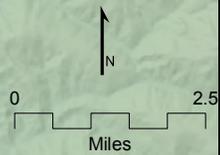


 Current Coho Distribution  
CDFG - NCNCR-ISB, 2007. 1:100,000.

 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

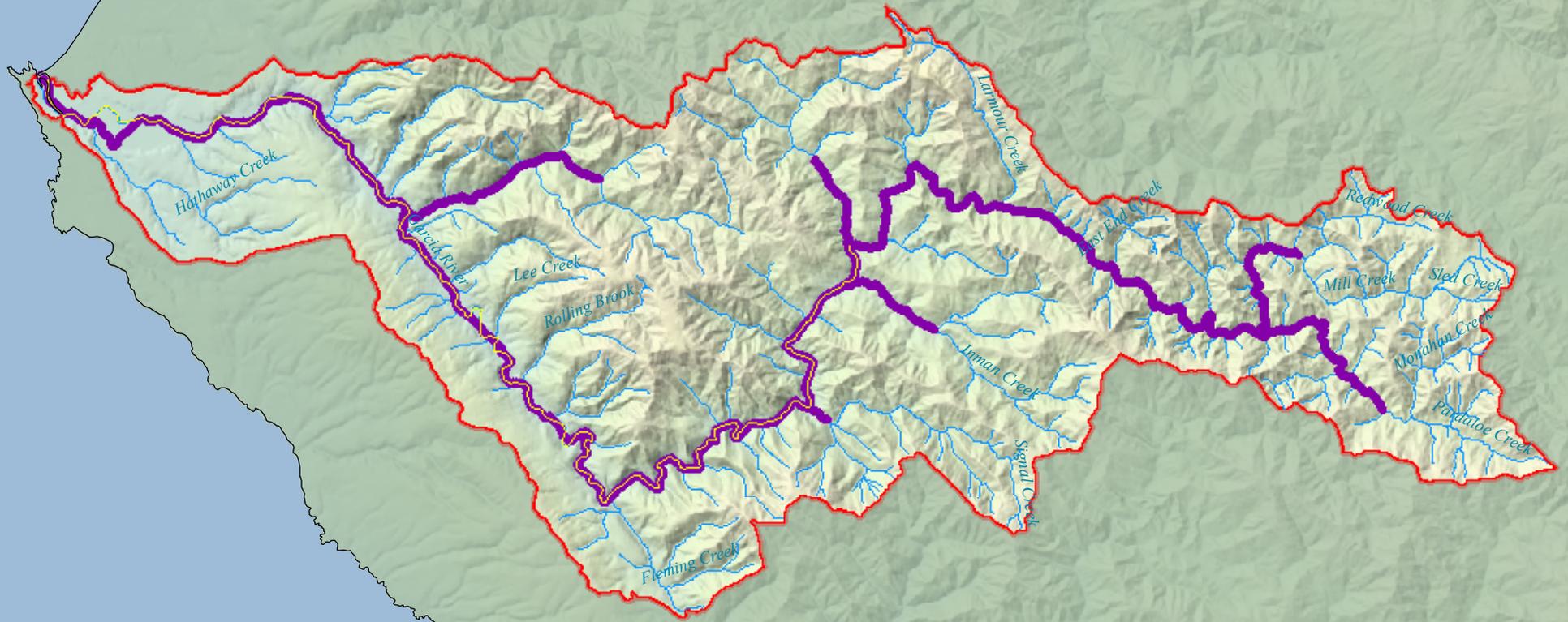
 Garcia River Watershed





NMFS-SWR-HCD  
July 2008

# Garcia River Watershed Chinook Current vs. Historical

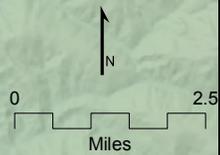


 Current Chinook Distribution  
National Marine Fisheries Service,  
August 2005. 1:100,000.

 Chinook Intrinsic Potential  
NMFS SWR Fisheries Science Center, 2005.  
Potential historical suitable habitat

 1:24,000 Streams  
USGS National Hydrography Dataset,  
2004. 1:24,000

 Garcia River Watershed

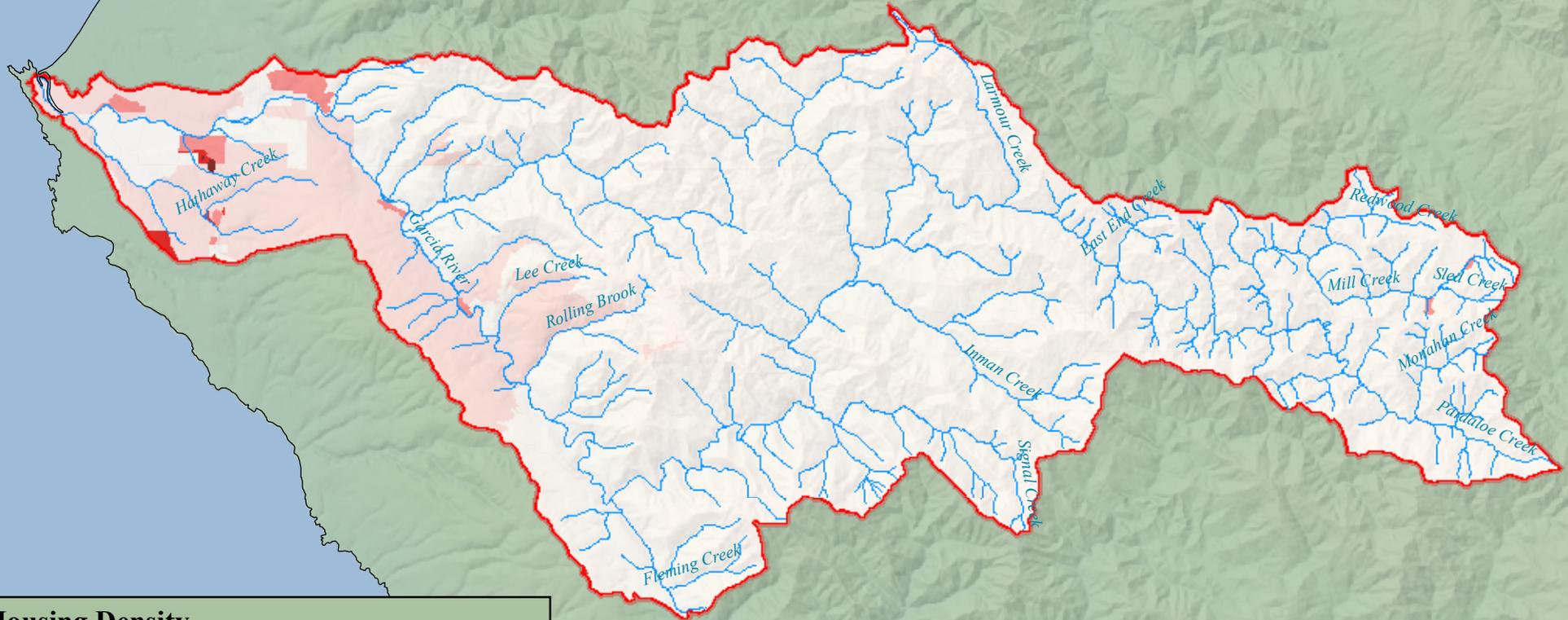






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July 2008

# Garcia River Watershed Development

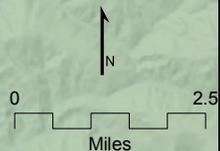


## Housing Density

- 0 to Less than 1 Housing Unit / 160 Acres (86%)
- 1 Unit / 160 Acres to 1 Unit / 20 Acres (13%)
- 1 Unit / 20 Acres to 1 Unit / 5 Acres (1%)
- 1 Unit / 5 Acres to 2 Units / Acre
- 2 Units / Acre to Greater than or Equal to 5 Units / Acre

Population within the Watershed = 852 People  
Houses within the Watershed = 376

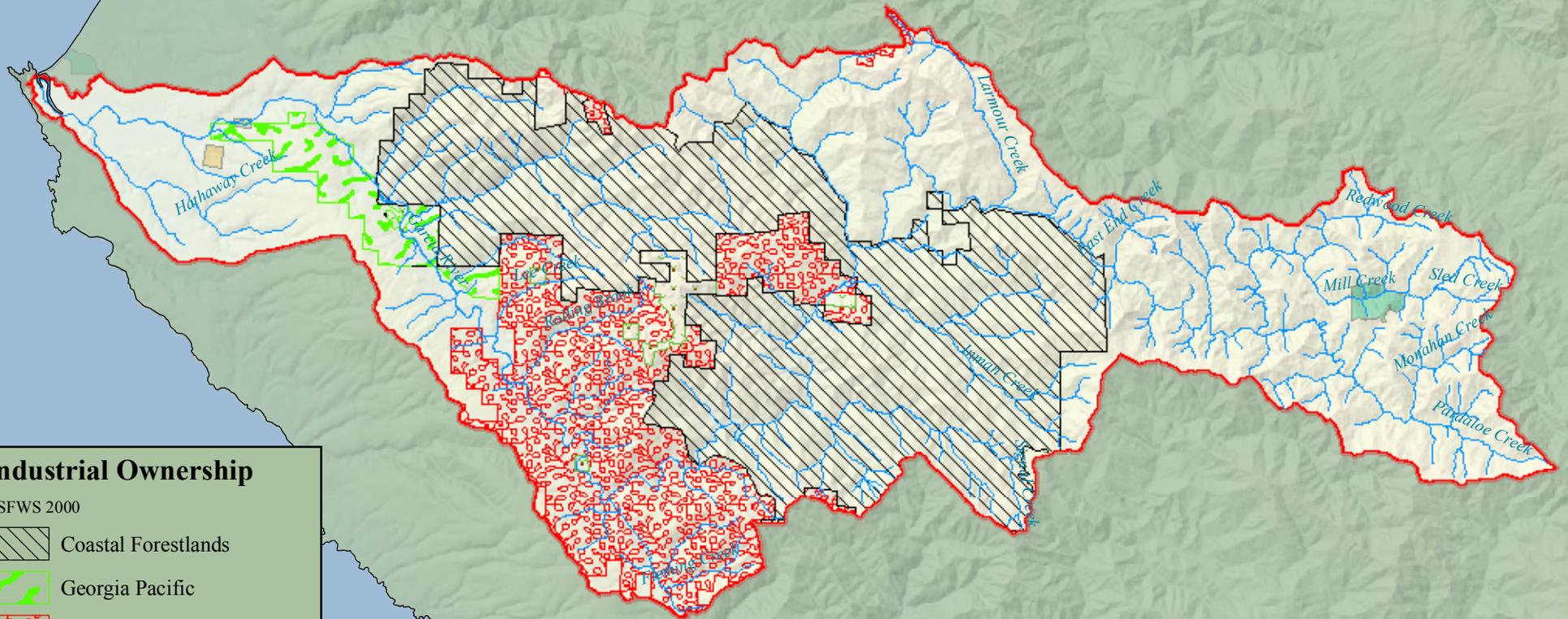
California Department of Forestry, 2003. 1:100,000.





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# Garcia River Watershed Ownership



## Industrial Ownership

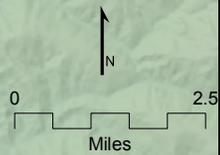
USFWS 2000

-  Coastal Forestlands
-  Georgia Pacific
-  Mendocino Redwoods
-  Other

## Ownership

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

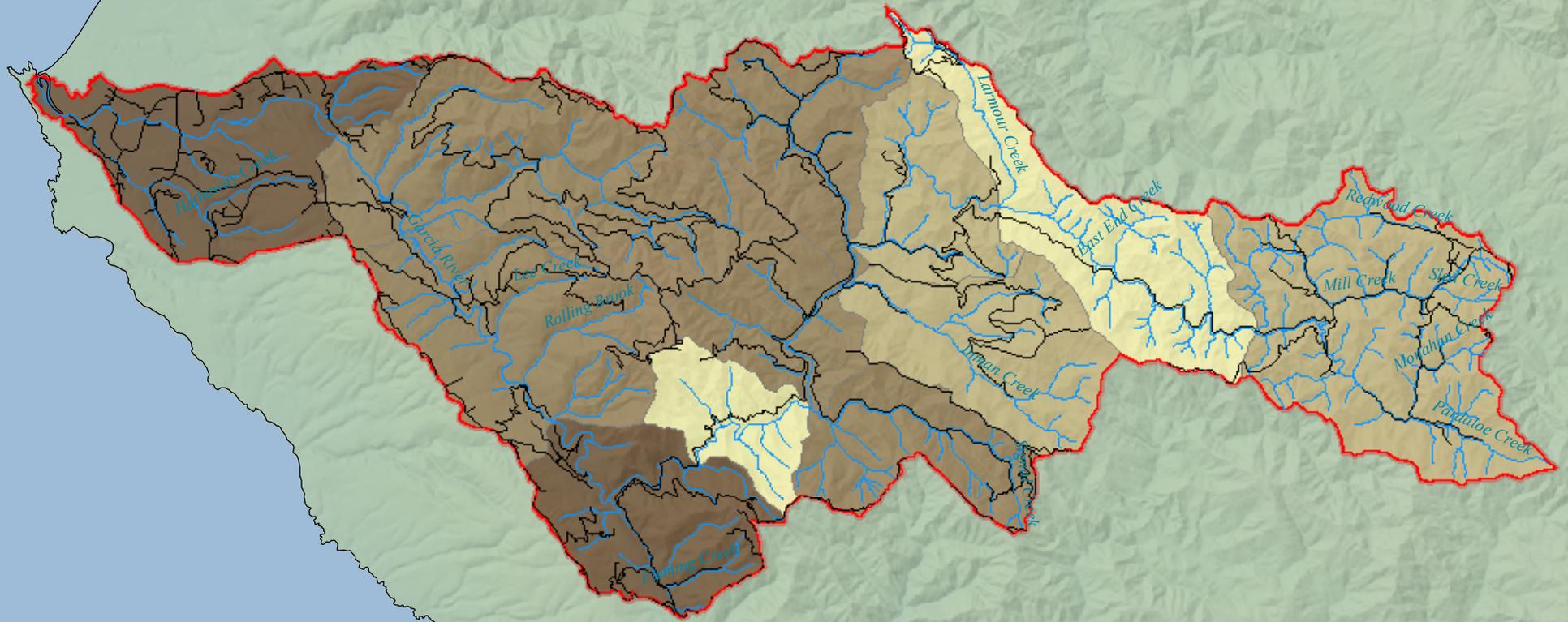
-  Private
-  State, Parks & Recreation
-  Federal, BIA
-  Federal, Military





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# Garcia River Watershed Road Density



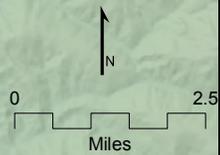
 Road  
U.S. Census Bureau - Tiger 2000, 2002. 1:24,000

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

RdDensity

	1.19 - 1.50
	1.51 - 2.00
	2.01 - 2.50
	2.51 - 3.10

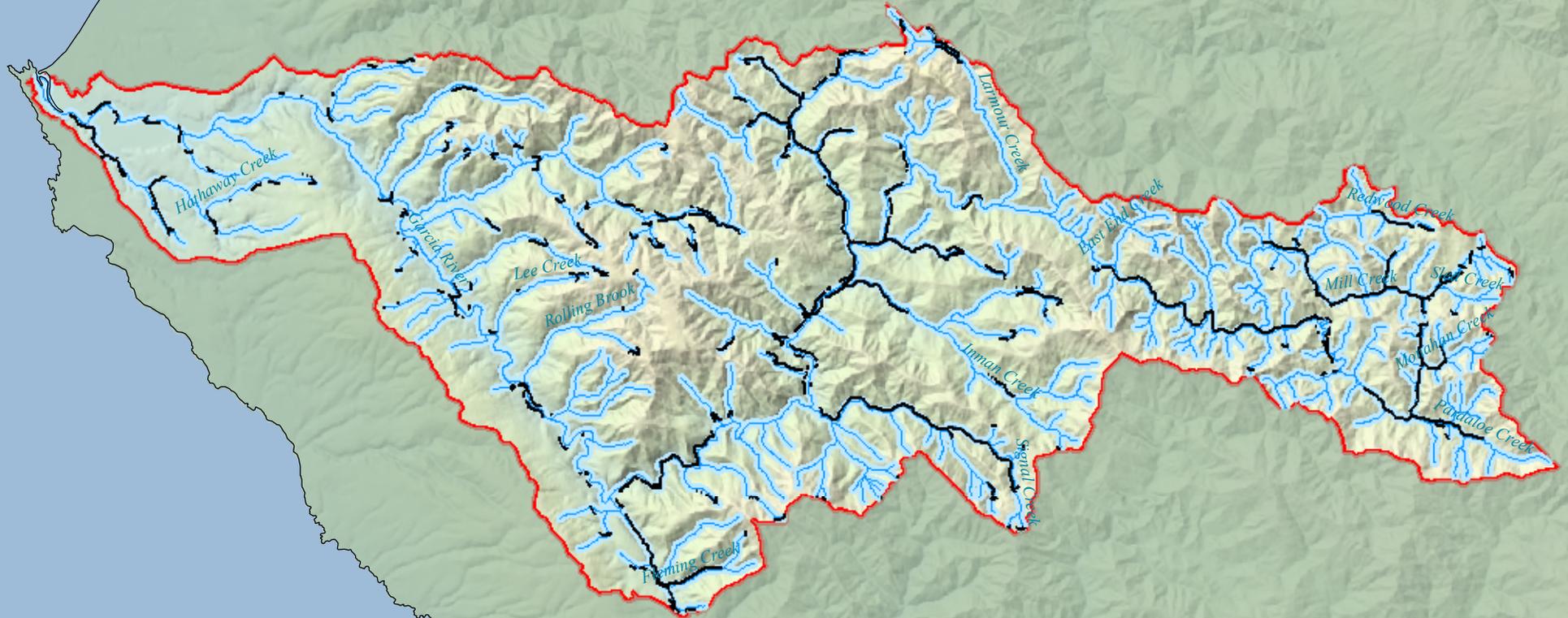
Overall Watershed  
Density = 2.2 Miles / SqMi





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## Garcia River Watershed Road Density in the Riparian Corridor



 Road Segments within the 200 meter Riparian Corridor

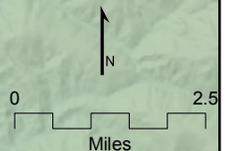
U.S. Census Bureau - Tiger 2000, 2002. 1:24,000

 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 = 2.8 Miles / SqMi of Corridor





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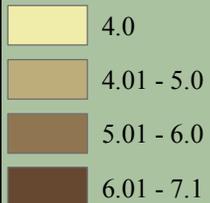
# Garcia River Watershed Road Density per Timber Harvest Plan Roads



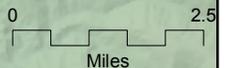
Road

California Department of Forestry, Timber Harvest Plans 2006

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



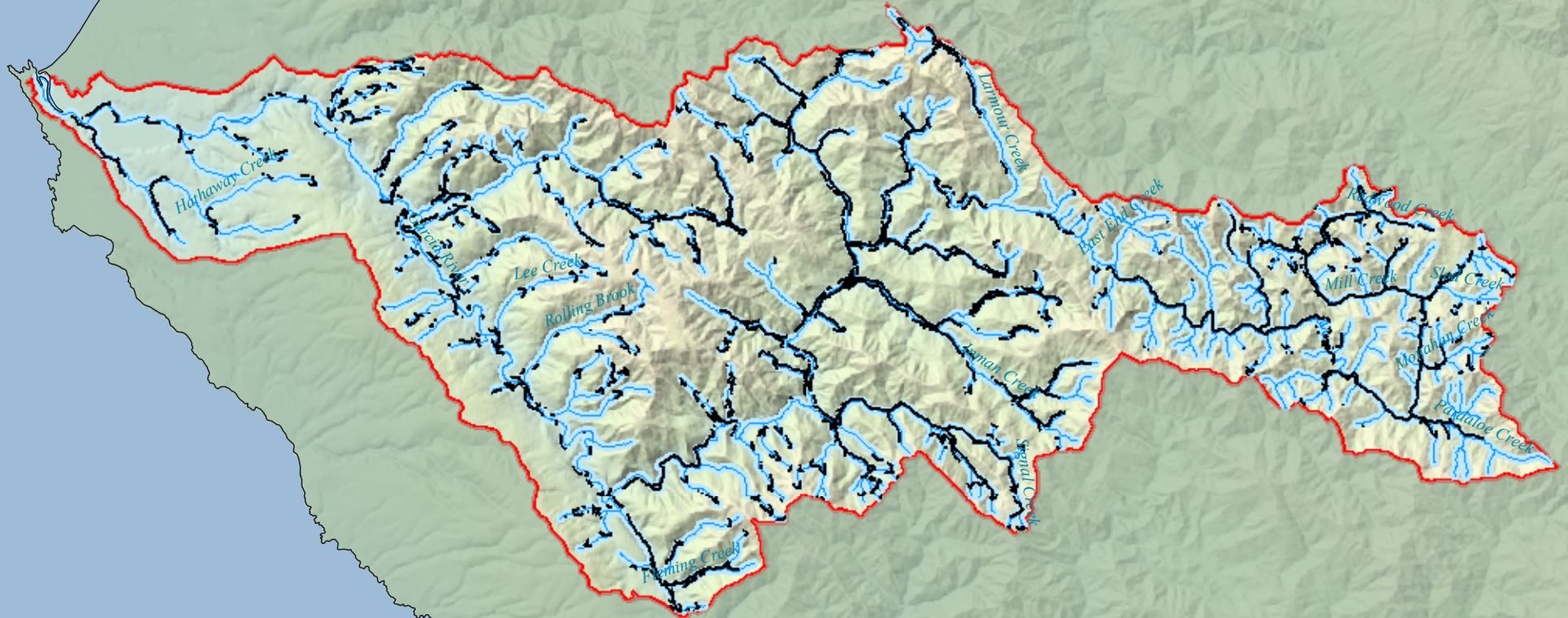
Overall Watershed  
Density = 5.9 Miles / SqMi





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## Garcia River Watershed Road Density in the Riparian Corridor per Timber Harvest Plan Roads



 Road Segments within the 200 meter Riparian Corridor

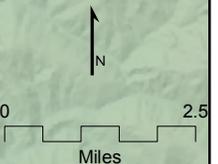
California Department of Forestry, Timber Harvest Plans 2006

 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 = 6.2 Miles / SqMi of Corridor





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# Garcia River Watershed Vegetation

## WHR13 Vegetation Classification

California Department of Forestry, 2002.100 meter Grid

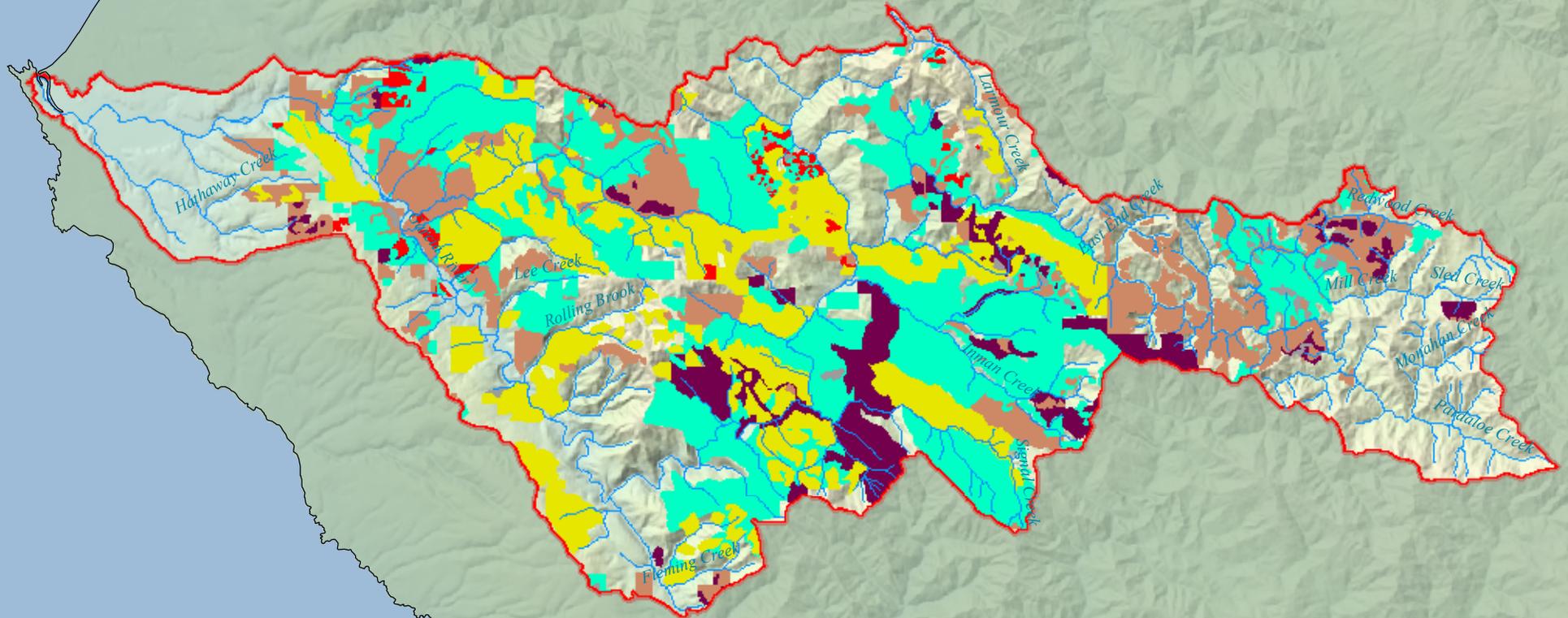
-  Agriculture - 1%
-  Barren/Other
-  Conifer Forest 70%
-  Hardwood Forest - 19%
-  Hardwood Woodland
-  Herbaceous - 9%
-  Shrub - 1%
-  Urban
-  Water





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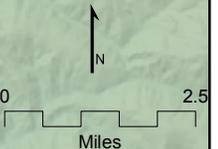
# Garcia River Watershed Timber Harvesting 1987-2006



## Timber Harvest Plans 1987-2006

California Department of Forestry, 2006.

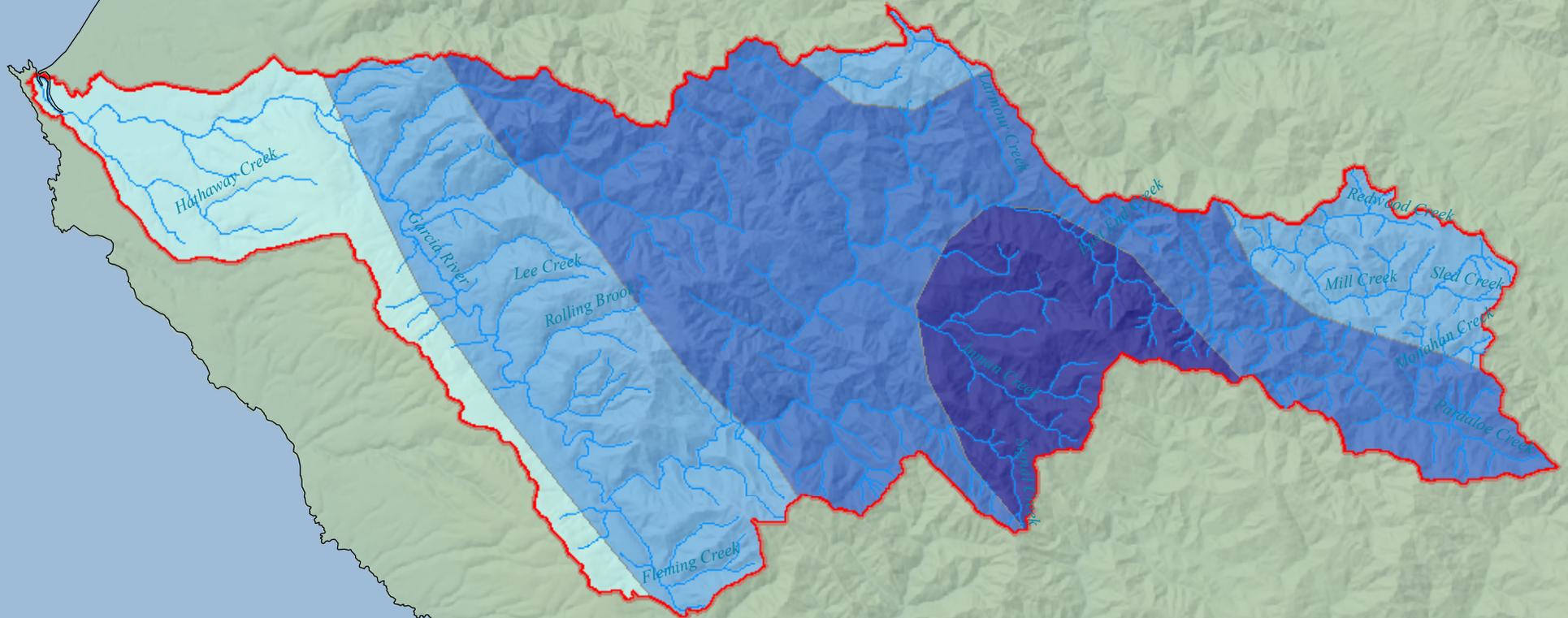
- Clearcut
- Uneven Age Removal
- Even age Removal
- Alternative Prescription
- Transition
- Outside THP



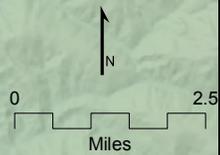
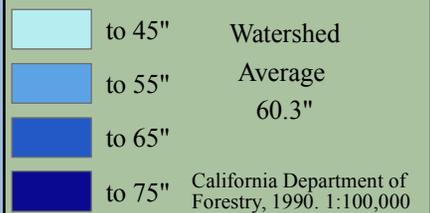


NMFS-SWR-HCD  
July 2008

# Garcia River Watershed Precipitation



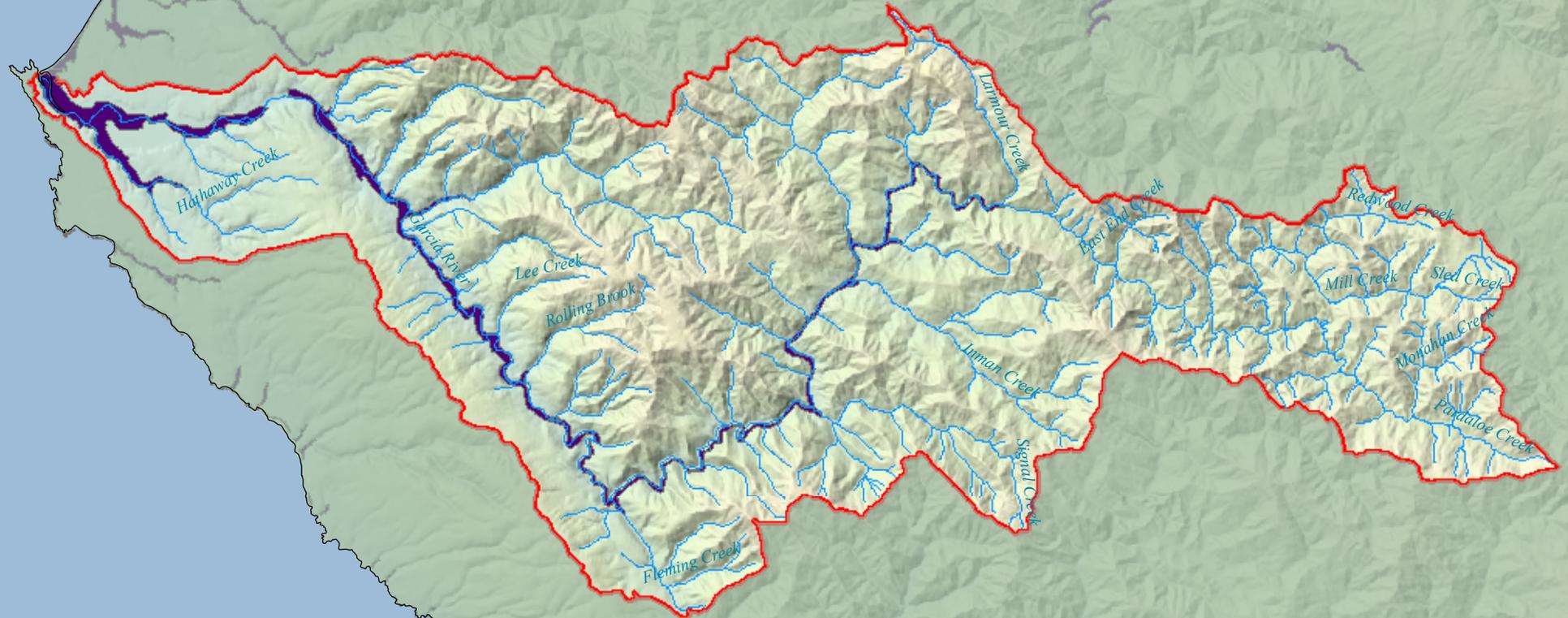
## 1900-1960 Annual Precipitation





NMFS-SWR-HCD  
July 2008

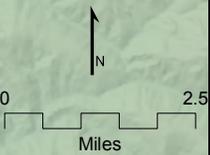
# Garcia River Watershed Flood Zone



## FEMA Flood Zones

FEMA, 1996. 1:24,000

-  100 Year Flood Zone
-  500 Year Flood Zone





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July 2008

# Garcia River Watershed Erosion Potential / Geologic Features

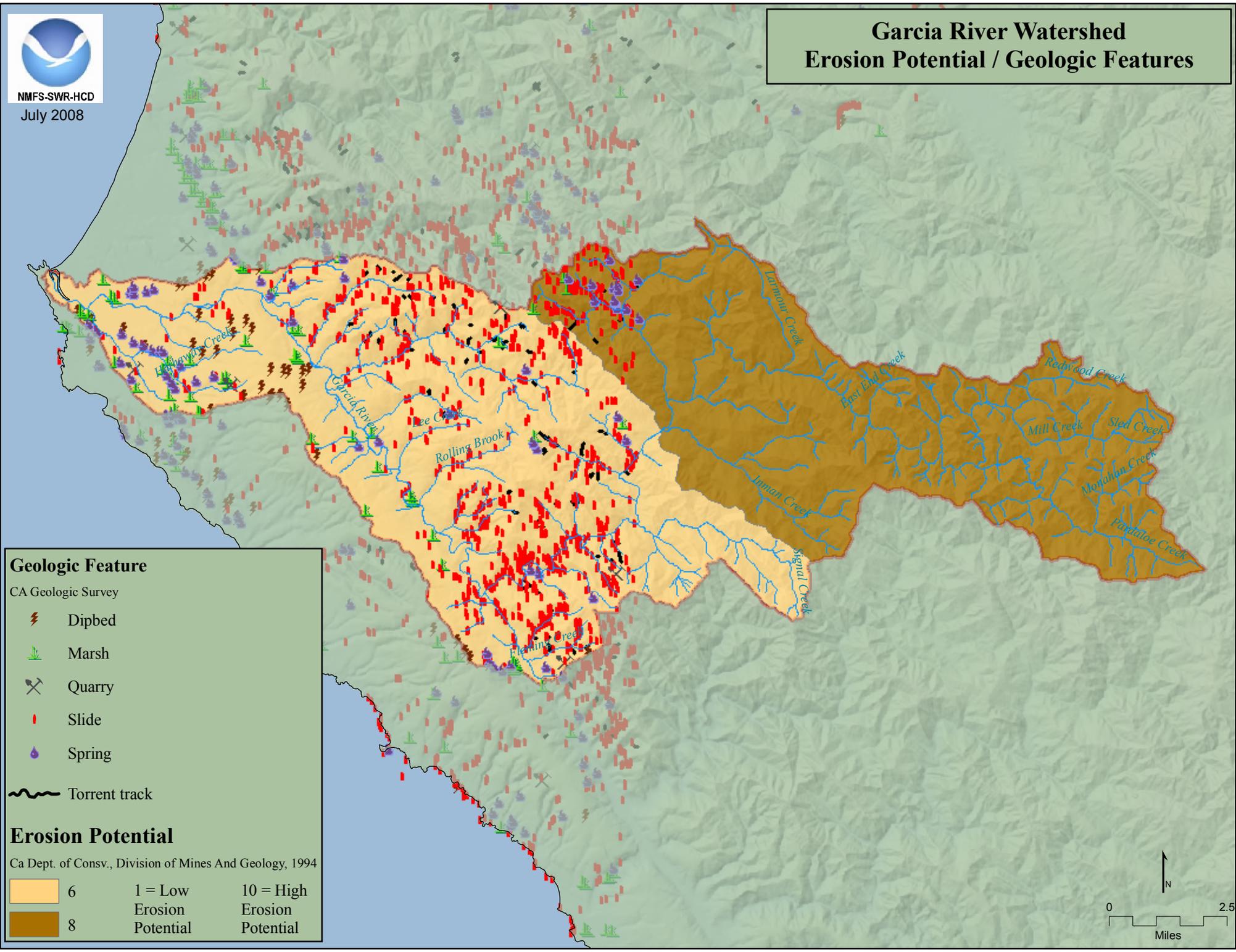
**Geologic Feature**

- CA Geologic Survey Dipbed
- Marsh
- Quarry
- Slide
- Spring
- Torrent track

**Erosion Potential**

Ca Dept. of Consv., Division of Mines And Geology, 1994

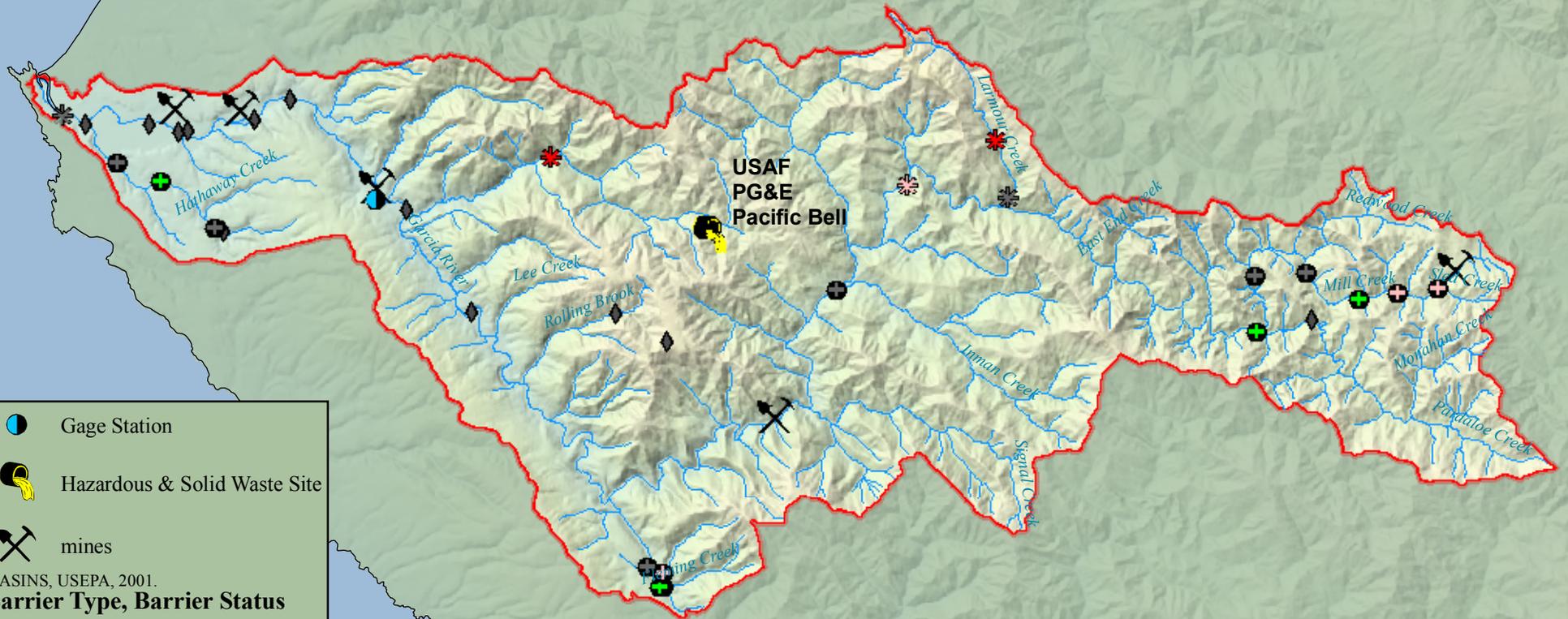
	6	1 = Low	10 = High
	8	Erosion	Erosion
		Potential	Potential



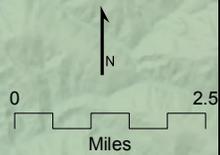


NMFS-SWR-HCD  
July 2008

# Garcia River Watershed Barriers / Industrial Discharge / Gages



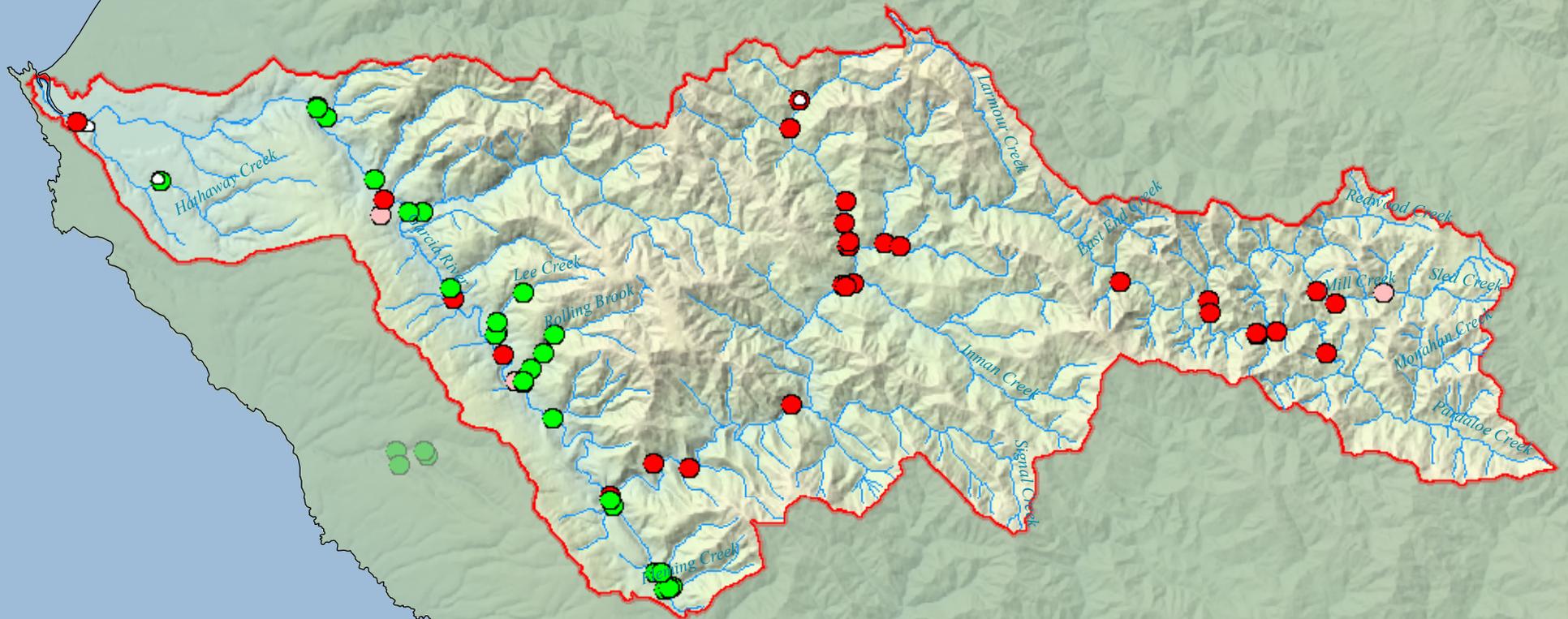
Gage Station  
 Hazardous & Solid Waste Site  
 mines  
 BASINS, USEPA, 2001.  
**Barrier Type, Barrier Status**  
 CA Fish Passage Assessment, PSMFC, 2008  
 Diversion, Unknown  
 Log jam/Falls, Partial  
 Log jam/Falls, Total  
 Log jam/Falls, Unknown  
 Road crossing, Not a barrier  
 Road crossing, Partial  
 Road crossing, Unknown





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July 2008

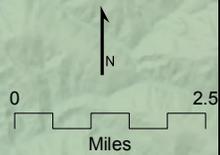
## Garcia River Watershed Temperature



### MWAT 1994-2001

KRIS Garcia 2003

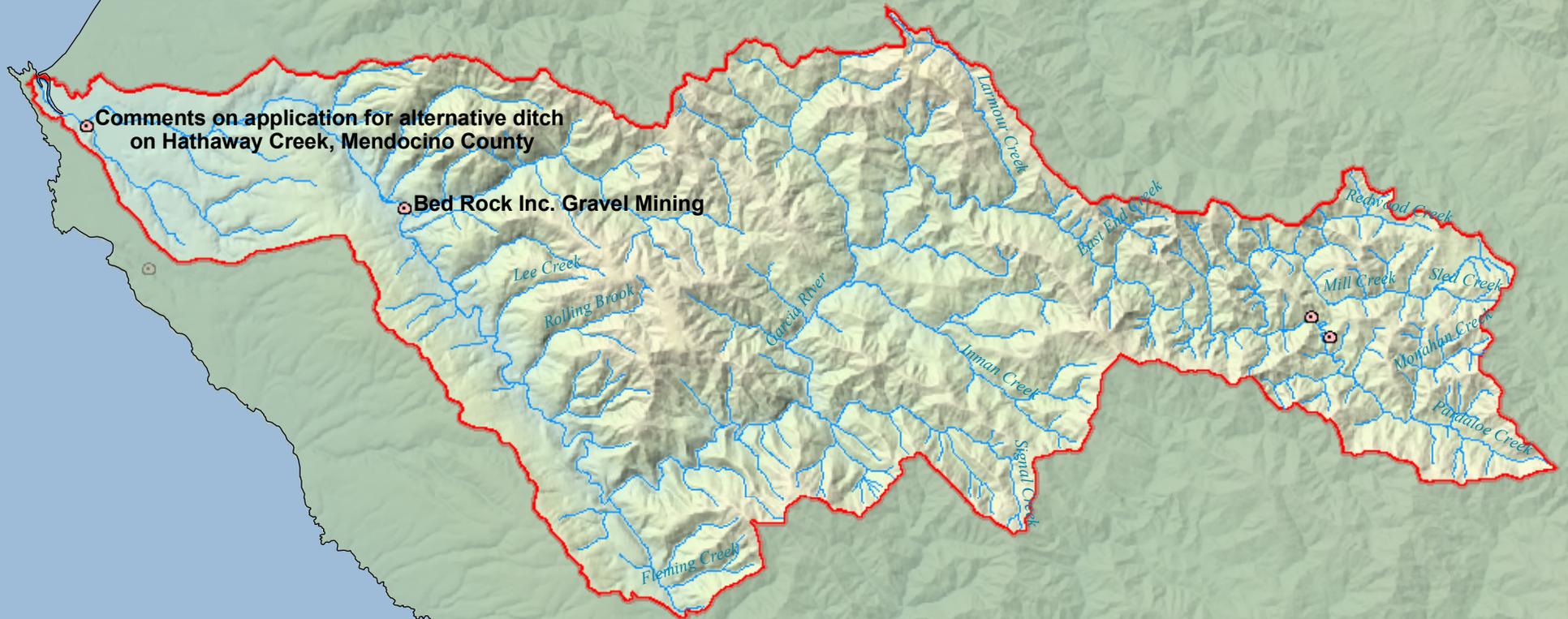
- never  $> 16.8^{\circ}\text{C}$
- some years  $> 16.8^{\circ}\text{C}$
- all years  $> 16.8^{\circ}\text{C}$
- no data





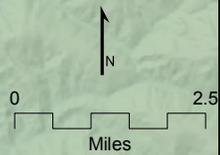
NMFS-SWR-HCD  
July 2008

# Garcia River Watershed Public Consultation Tracking System



- 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/>

NC\_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>

CC\_Chinook\_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**

CC\_Chinook\_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>

NC\_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\_september2008  
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)**

R1\_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/>

roads

vector digital data

Timber Harvest Plans

California Department of Forestry and Fire Protection

1:24,000

2006

### **Elevation**

USGS DEM

10 Meter Digital Elevation Model (DEM)

Earth Resources and Science (EROS)

United States Geological Survey

<http://edc.usgs.gov/products/elevation/dem.html>

### **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

Department of Conservation, Division of Mines and 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/>

### **Timber Harvesting**

thp\_(year)

Annual Timber Harvest Plans

vector digital data

California Department of Forestry and Fire Protection

Santa Rosa, CA

1987-2006

### **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>

### **Imagery**

naip\_1-1\_2n\_s\_ca045\_2004\_1 (Mendocino)

remote-sensing image

raster digital data

National Agriculture Imagery Program (NAIP)

USDA-FSA Aerial Photography Field Office

Salt Lake City, Utah

2004

<http://datagateway.nrcs.usda.gov/GatewayHome.html>

### **Historic Suitable Habitat (Coho, Chinook, Steelhead)**

Intrinsic Potential Model

vector digital data

NOAA Fisheries

Santa Cruz Laboratory, Santa Cruz, CA

2005

<http://swfsc.noaa.gov/>

### **Forest Industrial Ownership**

nwca\_own  
vector digital data  
United States Fish and Wildlife Service  
Arcata, CA  
2000

### **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/>

### **Temperature**

regional\_monitor\_pts  
vector digital data  
KRIS Garcia  
Institute for Fisheries Resources  
Arcata, CA  
2003  
<http://www.krisweb.com/krisgarcia/krisdb/html/krisweb/index.htm>

### **Geologic Features**

Geopoint  
vector digital data  
Department of Conservation, Division of Mines and  
Geology  
Minimum Mapping Unit: Approximately 8000  
Acres (20,000 Hectares)  
1994

Gorge  
vector digital data  
Department of Conservation, Division of Mines and  
Geology  
Minimum Mapping Unit: Approximately 8000  
Acres (20,000 Hectares)  
1994

### **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/>