



Navarro River Watershed

Area	Hydrologic Units	Calwater Subbasins ---	(Planning Watersheds)
201,468 Acres	18010108	1113500101	Diamond D Ranch (2556 Acres)
81,531 Hectares	4th Field HUC	1113500102	Adams Creek (3906 Acres)
315 Square Miles		1113500103	Maple Creek (6980 Acres)
	1113	1113500104	Beebe Creek (3940 Acres)
Location	4th Field Calwater	1113500105	German Creek (6802 Acres)
Mendocino County		1113500106	Middle Rancheria Creek (9310 Acres)
		1113500107	Upper Rancheria Creek (6488 Acres)
		1113500201	Horse Creek (8348 Acres)
		1113500202	Ham Canyon (4672 Acres)
		1113500203	Lower Rancheria Creek (6262 Acres)
		1113500301	Soda Creek (8216 Acres)
		1113500302	Robinson Creek (8953 Acres)
		1113500303	Con Creek (7456 Acres)
		1113500304	Anderson Creek (4863 Acres)
		1113500401	North Fork Indian Creek (8903 Acres)
		1113500402	Lower Indian Creek (6941 Acres)
		1113500403	Hendy Woods (7769 Acres)
		1113500404	Upper Indian Creek (9393 Acres)
		1113500501	Middle S. Branch Navarro R. (6467 Acres)
		1113500502	Lower S. Branch Navarro R. (4451 Acres)
		1113500503	Upper S. Branch Navarro R. (7899 Acres)
		1113500601	John Smith Creek (3671 Acres)
		1113500602	Dutch Henry Creek (7315 Acres)
		1113500603	Little N. Fork Navarro River (7082 Acres)
		1113500701	Upper Navarro River (3756 Acres)
		1113500702	Floodgate Creek (3833 Acres)
		1113500703	Middle Navarro River (5729 Acres)
		1113500704	North Fork Navarro River (5710 Acres)
		1113500705	Fly Creek (4862 Acres)
		1113500706	Ray Gulch (3907 Acres)
		1113500707	Mouth of Navarro River (7293 Acres)
		1113500708	Mill Creek (7734 Acres)

Species Potential	Miles of Streams with Species Present
Northern California Steelhead Central Coastal Diversity Stratum - Independent Population	<u>Steelhead</u> 184 NOAA Fisheries, Critical Habitat Redesignation, 2005
Central California Coast Coho Coastal Gualala Diversity Stratum - Independent Population	<u>Coho</u> 110 CDFG, Coho Distribution, May 2007
California Coastal Chinook Central Coastal Diversity Stratum - Independent Population	<u>Chinook</u> 42 NOAA Fisheries, Critical Habitat Redesignation, 2005

Critical Habitat	
Northern California Steelhead	184 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	0 Miles of Stream



Miles of Waterway^A	Miles	Number of Dams^C
Naturally Occurring Waterways		6
Intermittent Stream	578	2 - Temporal Barriers
Perennial Stream	182	4 - Unknow Barrier Status
Artificial Path	27	

^CPassage Assessment Database,
Pacific States Marine Fisheries Commission, 2008

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

USGS Gaging Stations^B	Number of Barriers^C
11467800	342
Rancheria Creek near Boonville	6 Dams
11467850	203 Diversions
Soda Creek Tributary near Boonville	117 Road Crossings (31 Impassable, 20 Partially Impassable)
11467880	16 Natural Barriers (Falls, Log Jams, etc. (9 Impassable))
Navarro River trib	
11468000	
Navarro River near Navarro, CA	

^CPassage Assessment Database,
Pacific States Marine Fisheries Commission, 2008

EPA Total Maximum Daily Load Classification (TMDL)¹

High Priority - Sediment/Siltation, Temperature

Sources: Agriculture, Ag Return Flows, Ag-grazing, Channel Erosion, Construction/Land Development, Disturbed Sites, Drainage/Filling of Wetlands, Erosion/Siltation, Flow Regulation/Modification, Habitat Modification, Harvesting-Restoration-Residue Management, Highway/Road/Bridge Construction, Irrigated Crop Production, Land Development, Logging Road Construction-Maintenance, Nonirrigated Crop Production, Nonpoint Source, Range Grazing-Riparian and/or Upland, Removal of Riparian Vegetation, Resource Extraction, Silviculture, Specialty Crop Production, Streambank Modification/Destabilization, Water Diversion

¹State Water Resources Control Board, 2003

Appropriated Waterways²

Anderson Creek (From confluence with Clow Canyon upstream) is Fully appropriated (8/1 to 9/30)

Unnamed Trib (14N, 15W, Sec. 12) from confluence with Navarro River upstream (4/1 to 10/31)

²California State Water Resources Control Board, 1998.

Average Annual Precipitation^E	Average Annual Precipitation Range^E
53.5"	40 - 65"

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



Roads^A	(US Census Bureau (TIGER))	Miles
Roads in Watershed		
Primary Road / Highway		5
Secondary and connecting road, state highways		45
Local, neighborhood, and rural road, city street, unseparated		606
Vehicular trail, 4WD		46
Driveway or service road		21
Total Miles		723

Road Density	(US Census Bureau (TIGER))	
Miles of Roads per SqMi of Watershed		2.3
Miles of Roads per SqMi of 100m Riparian Buffer*		3.0

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

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

Roads^{A1}	(Timber Harvest Plans)	Miles
Roads in Watershed		
Abandoned Seasonal		1
Bridge		
Existing Permanent (rocked)		122
Existing Seasonal		1318
Existing Temporary & 4WD		161
Proposed Permanent (rocked)		
Proposed Seasonal		45
Proposed Temporary & 4WD		0
Reconstructed Seasonal		0
Secondary Road (2-3 lanes)		88

Road Density	(Timber Harvest Plans)	
Miles of Roads per SqMi of Watershed		5.5
Miles of Roads per SqMi of 100m Riparian Buffer*		5.3

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

^{A1}California Department of Forestry, Timber Harvest Plans for Ten Mile Watershed, 2006

Slope^D	Acres	Percent of watershed
Lands of 0-2 percent slope	2,001	1%
Lands of 2-4 percent slope	3,550	2%
Lands of 4-10 percent slope	9,944	5%
Lands of 10-15 percent slope	9,355	5%
Lands of 15-30 percent slope	42,622	21%
Lands of 30-60 percent slope	102,187	51%
Lands of 60-100 percent slope	31,273	15%
Lands of > 100 percent slope	996	0%

Elevation Range	0 - 3412 ft.	0 - 1040 m
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^DSlope derived from USGS 10 meter Digital Elevation Models (DEM's)



Vegetation^G	Acres	Percent of watershed
Agriculture	3754	2%
Annual grassland	30,498	15%
Barren	190	0%
Conifer Forest		
Closed Cone-Pine-Cypress	22	0%
Douglas Fir	18,382	9%
Klamath Mixed Conifer	173	0%
Montane Hardwood-Conifer	6,444	3%
Redwood	83,368	41%
Hardwood Forest		
Montane Hardwood	51,969	26%
Montane Riparian	185	0%
Hardwood Woodland		
Blue Oak Woodland	52	0%
Coastal Oak Woodland	964	0%
Shrub	4,984	2%
Urban	348	0%
Water	306	0%

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

Erodability of Watershed^F	Acres	Percent of watershed
Erosion Potential 6	85,343	42%
Erosion Potential 7	97,131	48%
Erosion Potential 8	18,818	9%

^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	197,534	98%
State (Fish & Game)	230	0%
State (Parks & Recreation)	868	0%
Federal (BLM)	3,316	2%

^HManagement Landscape, CA Department of Forestry, 2002

Area Under a Timber Harvest Plan^A past 10 years	Area Under a Timber Harvest Plan^A past 15 years (1991-2006)
30,283 15% of watershed	49,052 24% of watershed

^ACalifornia Department of Forestry, Timber Harvest Plans for Navarro Watershed, 2006

Population^I	Housing^I
Total Population within the watershed -- 3,009 People	Total Housing Units within the watershed -- 1280 Houses
	Housing Density
	0 to Less than 1 Housing Unit / 160 Acres 77%
	1 Unit / 160 Acres to 1 Unit / 20 Acres 21%
	1 Unit / 20 Acres to 1 Unit / 5 Acres 1%
	1 Unit / 5 Acres to 2 Units / Acre
	2 Units / Acres to Greater than or Equal to 5 Units / Acre

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





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Navarro River Watershed CalWater Planning Watersheds

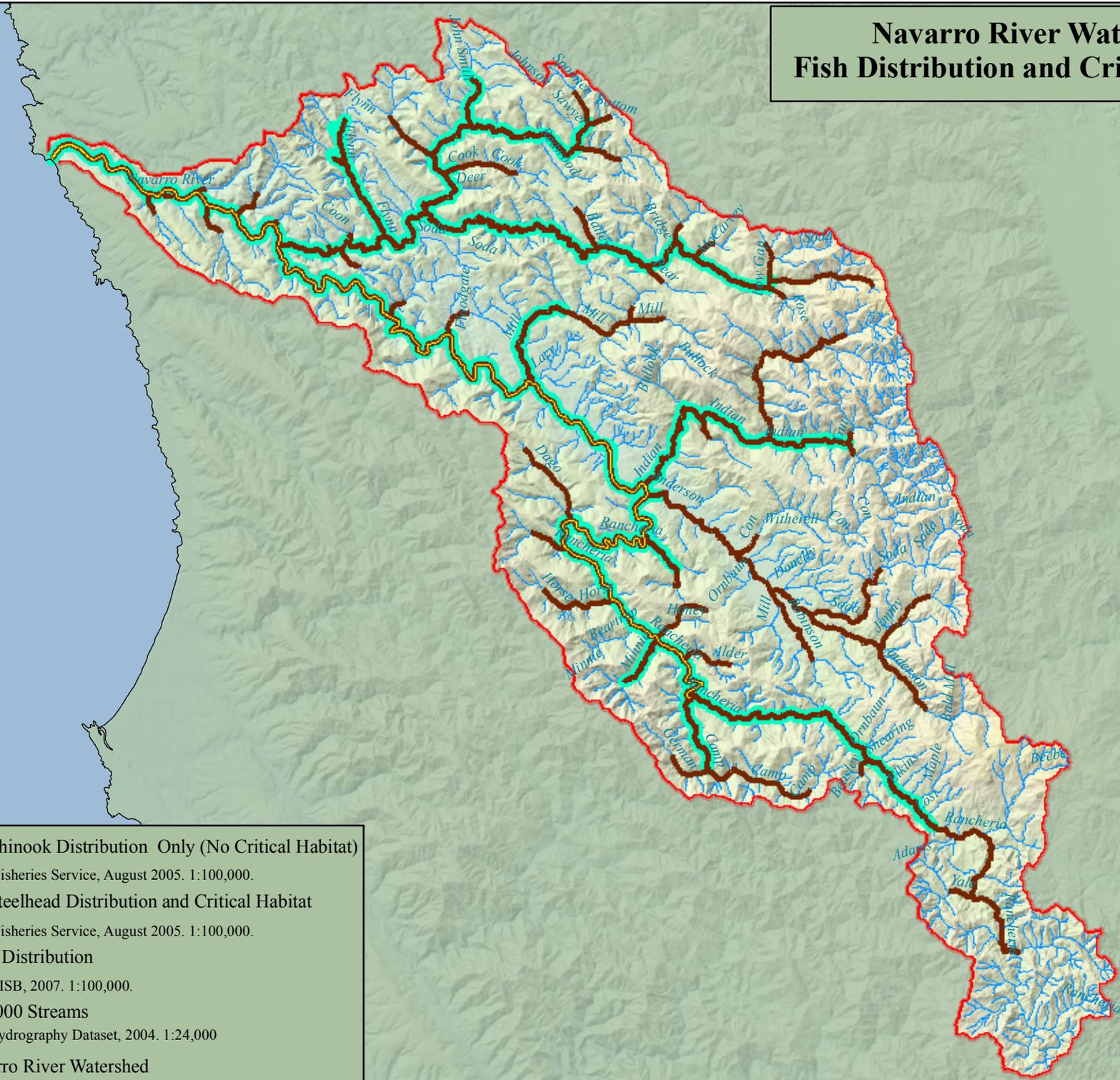




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Navarro River Watershed Fish Distribution and Critical Habitat



-  CC Chinook Distribution Only (No 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
-  Navarro River Watershed





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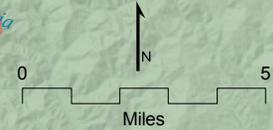
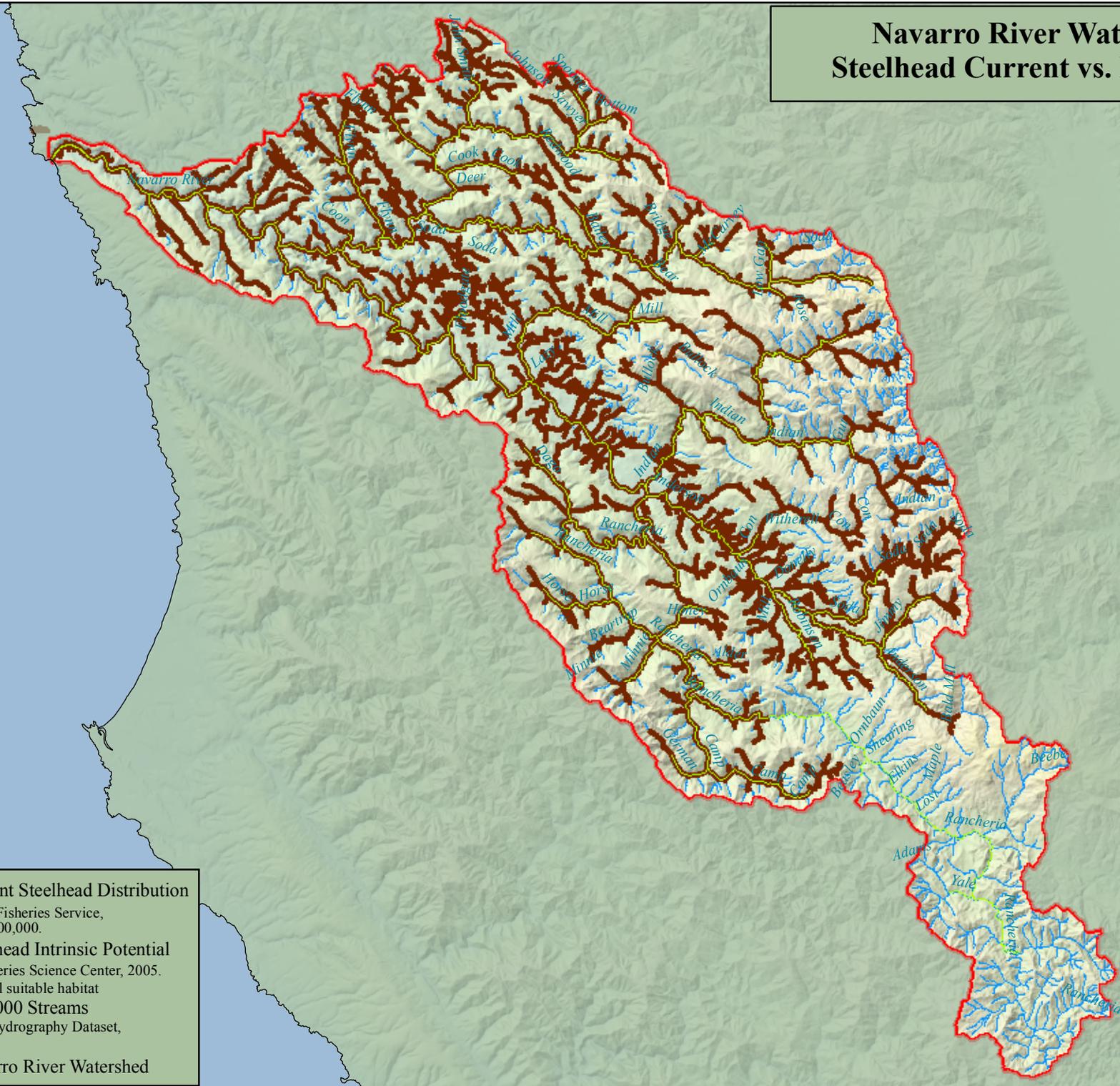
Navarro River Watershed Steelhead Current vs. Historical

 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

 Navarro River Watershed

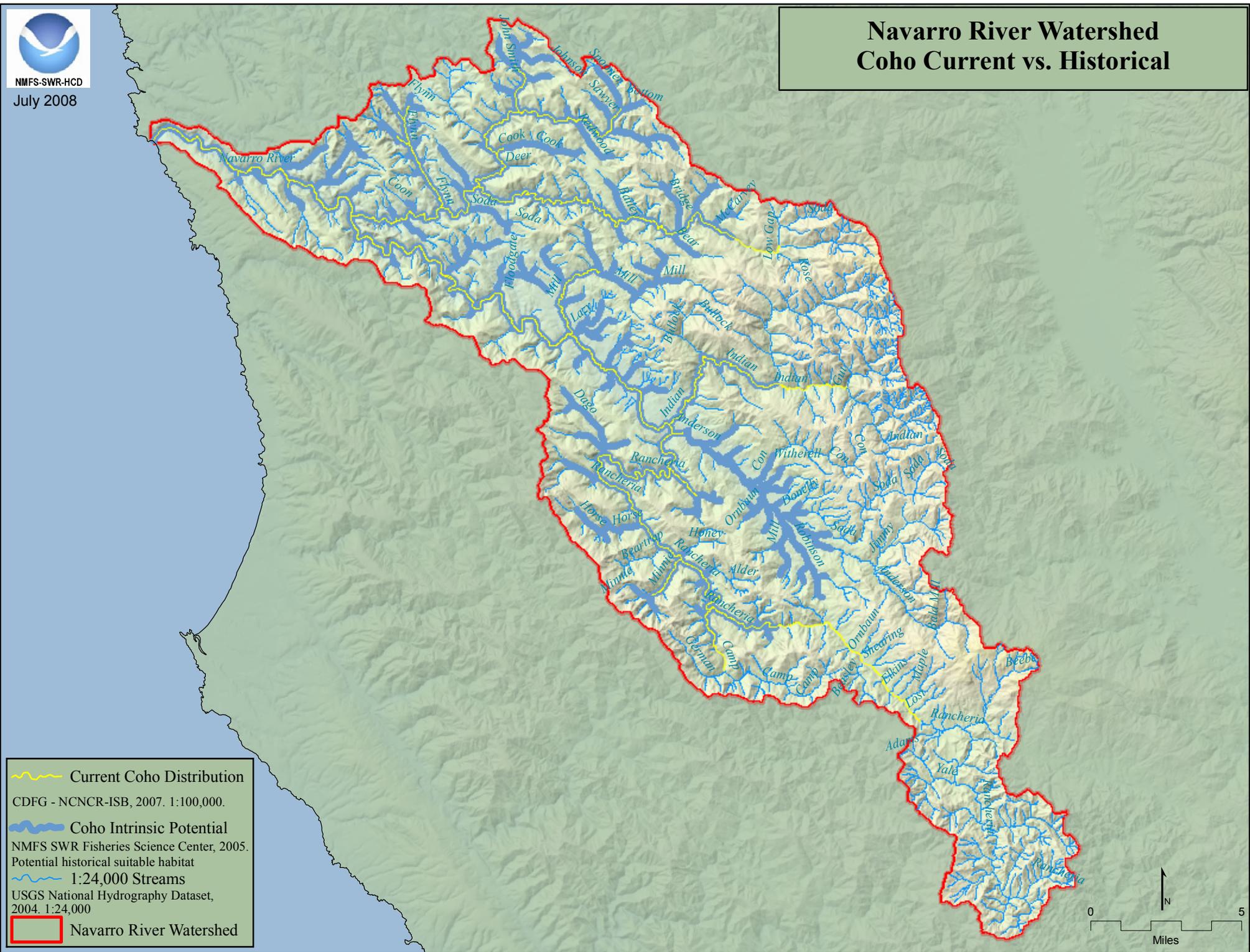




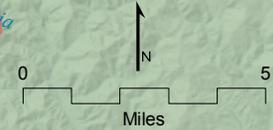
NMFS-SWR-HCD

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Navarro 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
- Navarro River Watershed

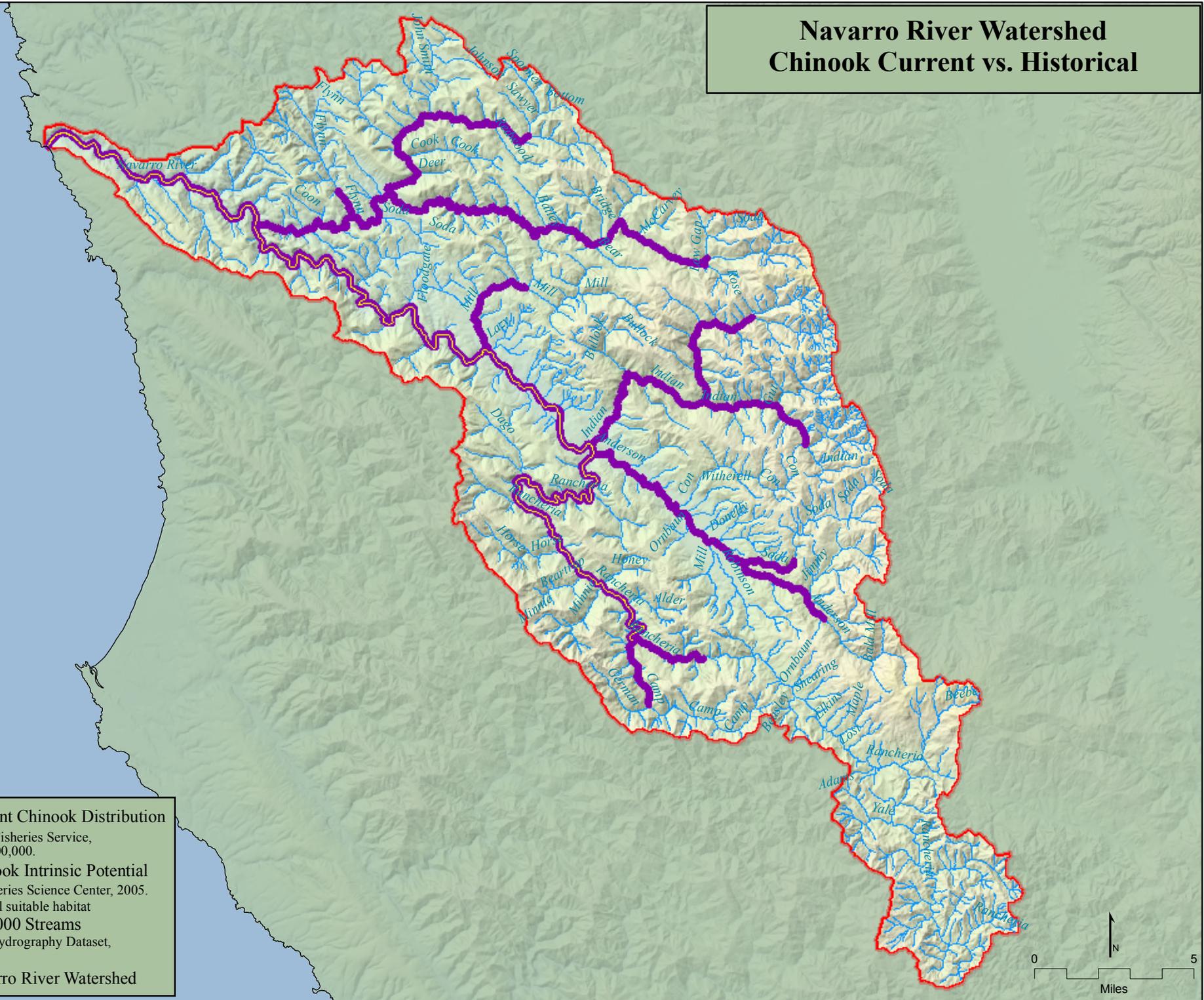




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Navarro River Watershed Chinook Current vs. Historical

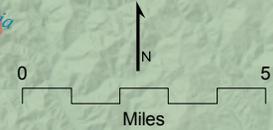


 Current Chinook Distribution
 National Marine Fisheries Service,
 August 2005. 1:100,000.

 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

 Navarro River Watershed

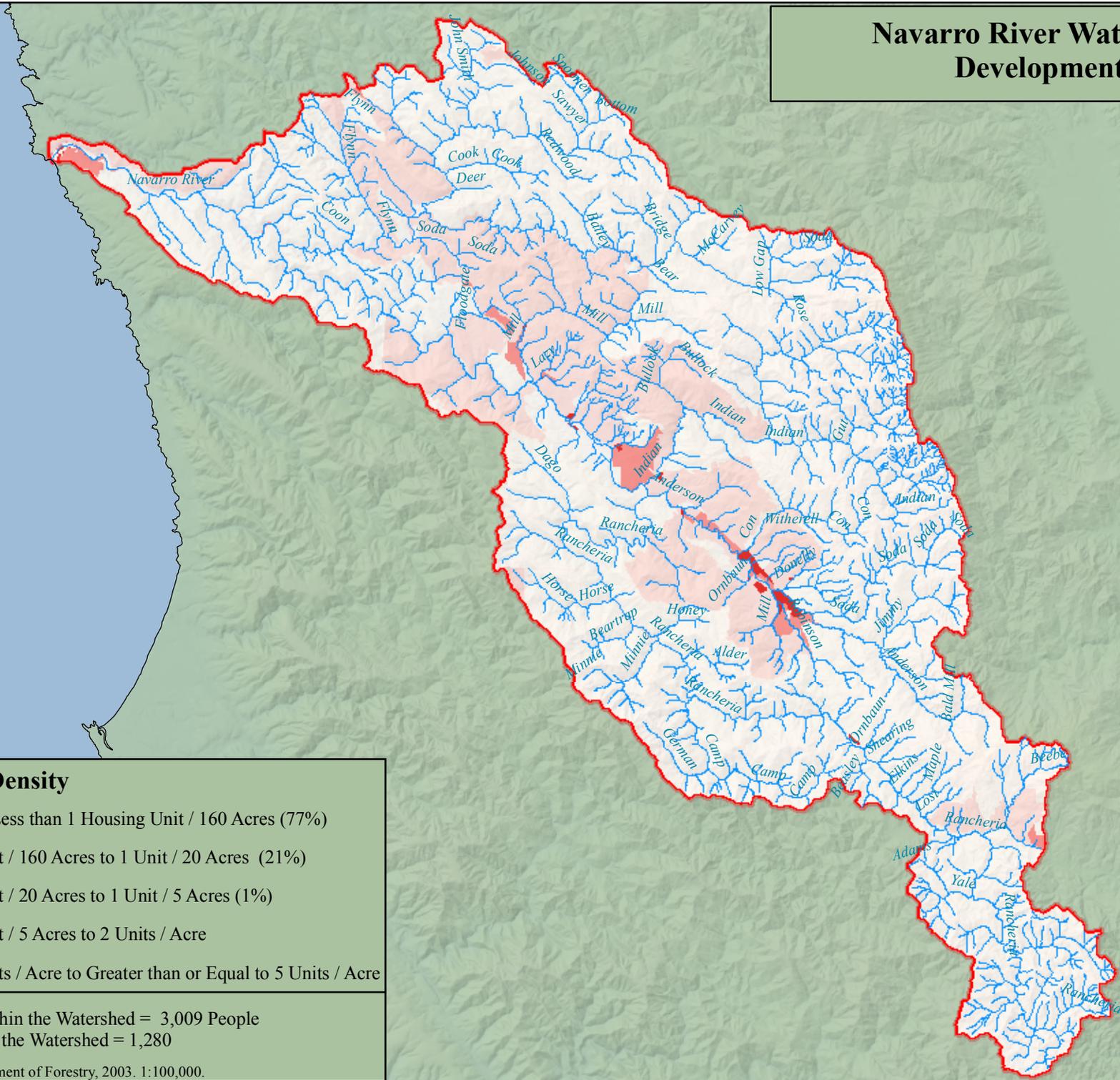




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Navarro River Watershed Development

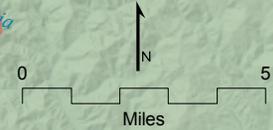


Housing Density

- 0 to Less than 1 Housing Unit / 160 Acres (77%)
- 1 Unit / 160 Acres to 1 Unit / 20 Acres (21%)
- 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 = 3,009 People
 Houses within the Watershed = 1,280

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

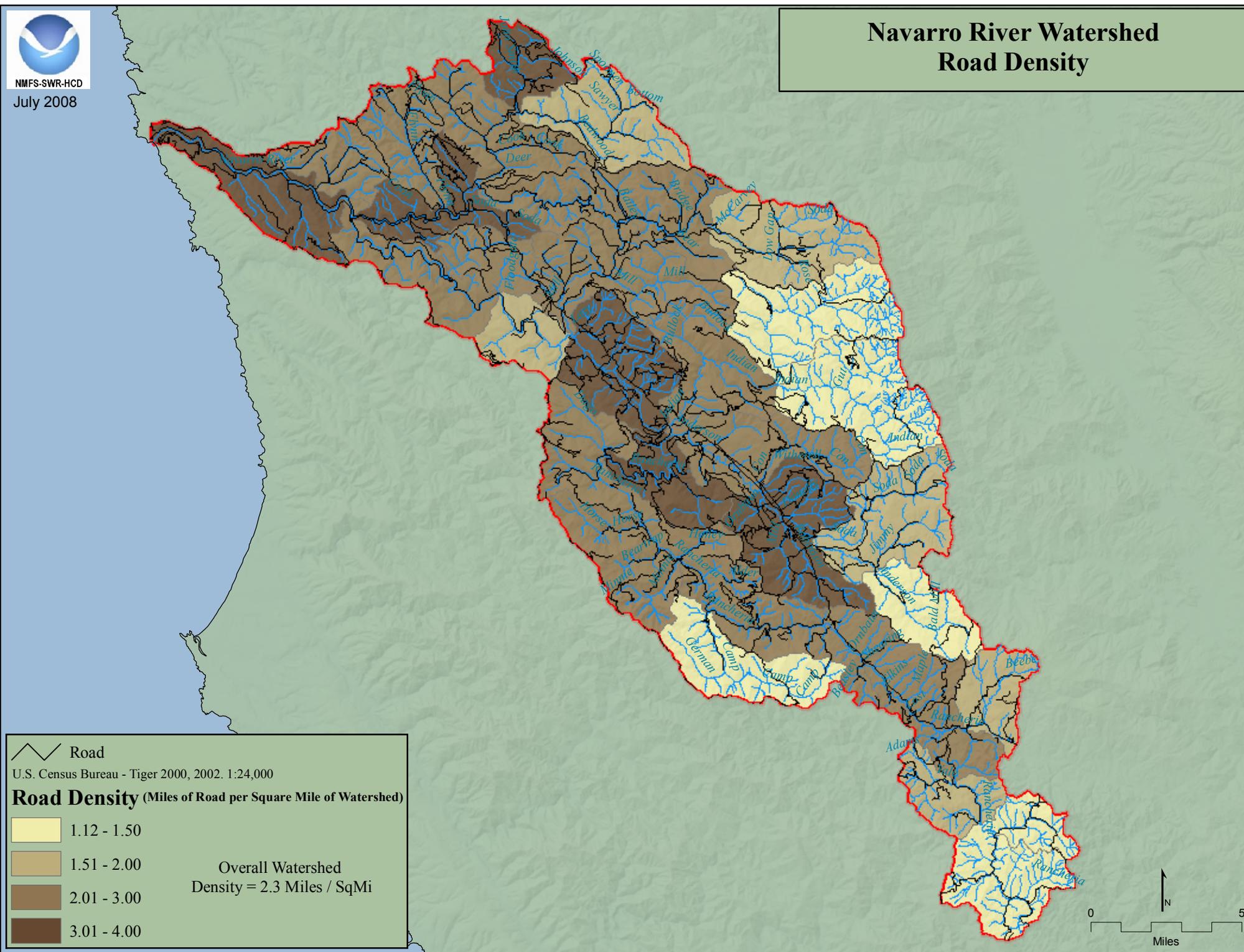




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Navarro River Watershed Road Density

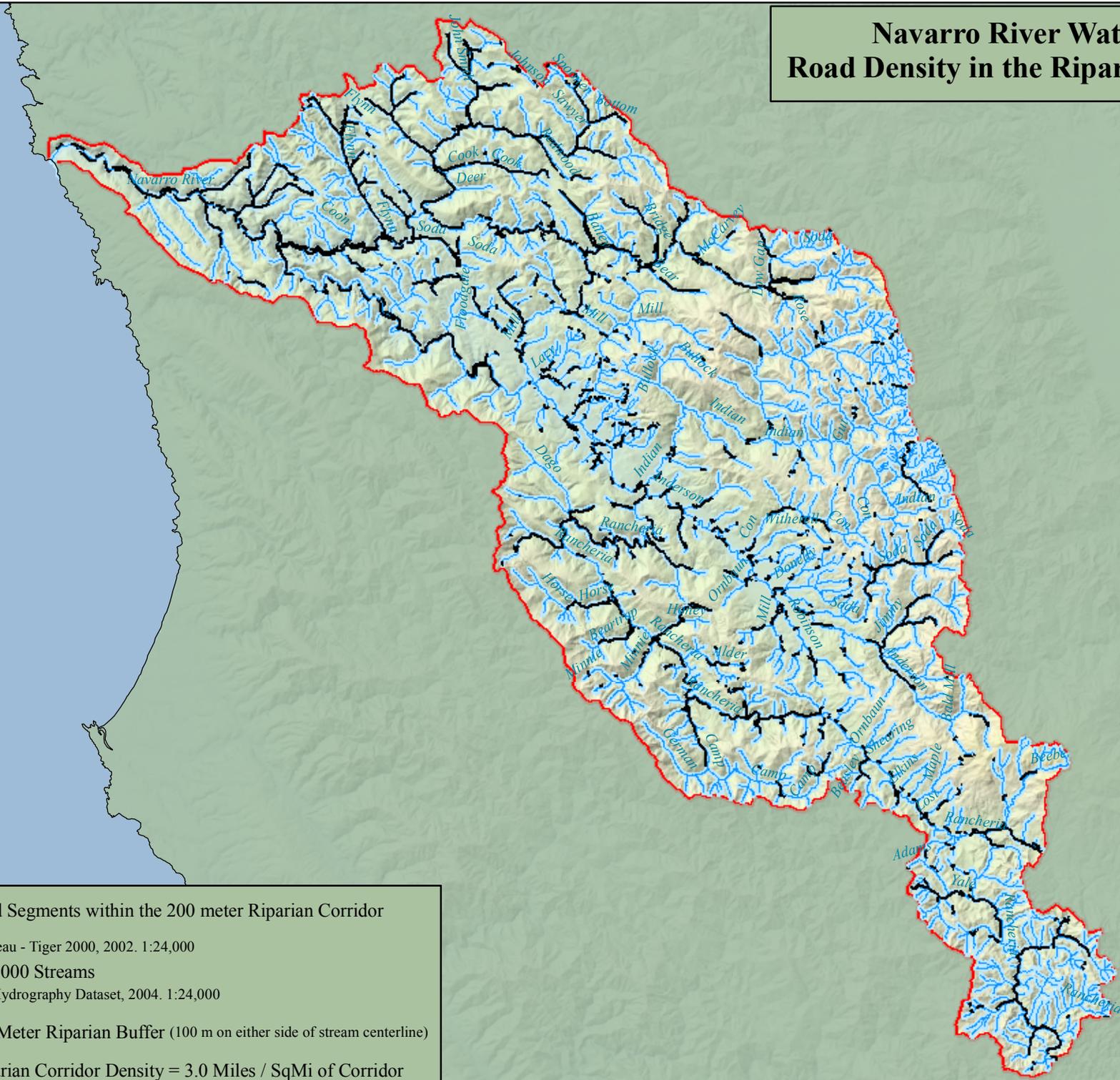




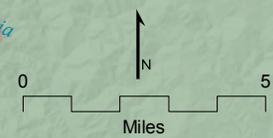
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Navarro River Watershed Road Density in the Riparian Corridor



 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 = 3.0 Miles / SqMi of Corridor





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Navarro 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)

2.66 - 4.0

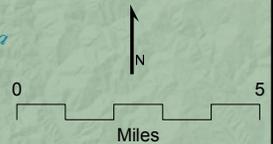
4.001 - 5.0

5.01 - 6.0

6.01 - 7.0

7.01 - 8.5

Overall Watershed
Density = 5.5 Miles / SqMi

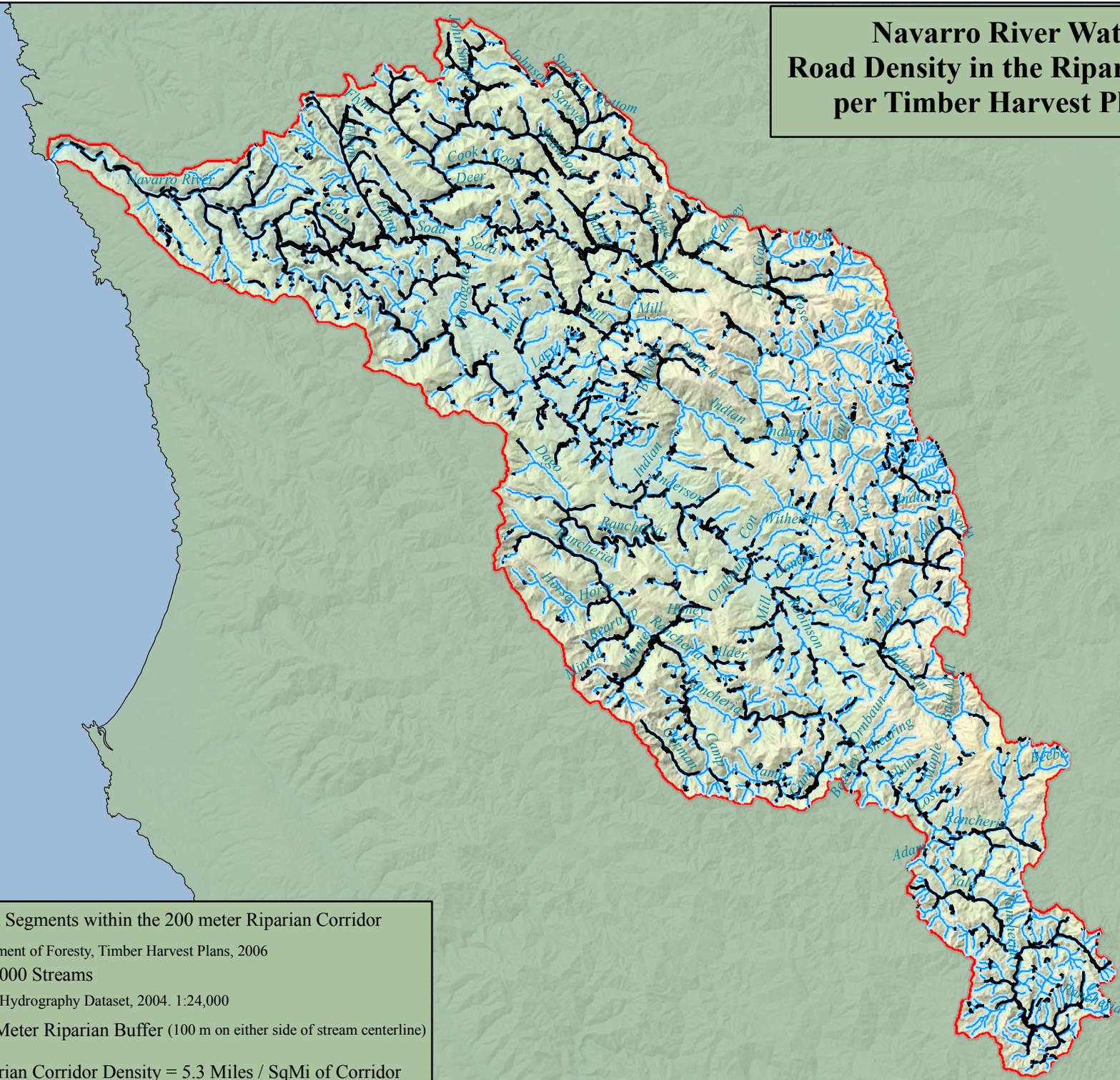




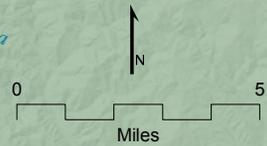
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Navarro River Watershed Road Density in the Riparian Corridor per Timber Harvest Plan Roads



-  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 = 5.3 Miles / SqMi of Corridor





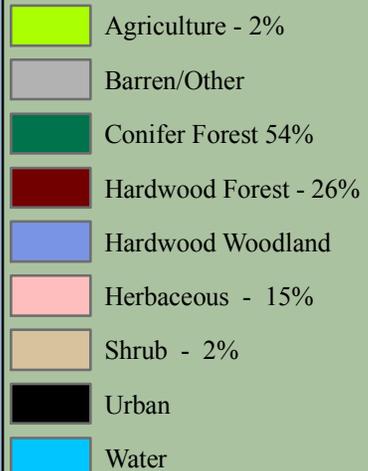
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Navarro River Watershed Vegetation

WHR13 Vegetation Classification

California Department of Forestry, 2002.100 meter Grid





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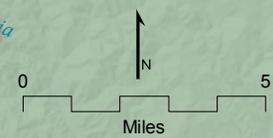
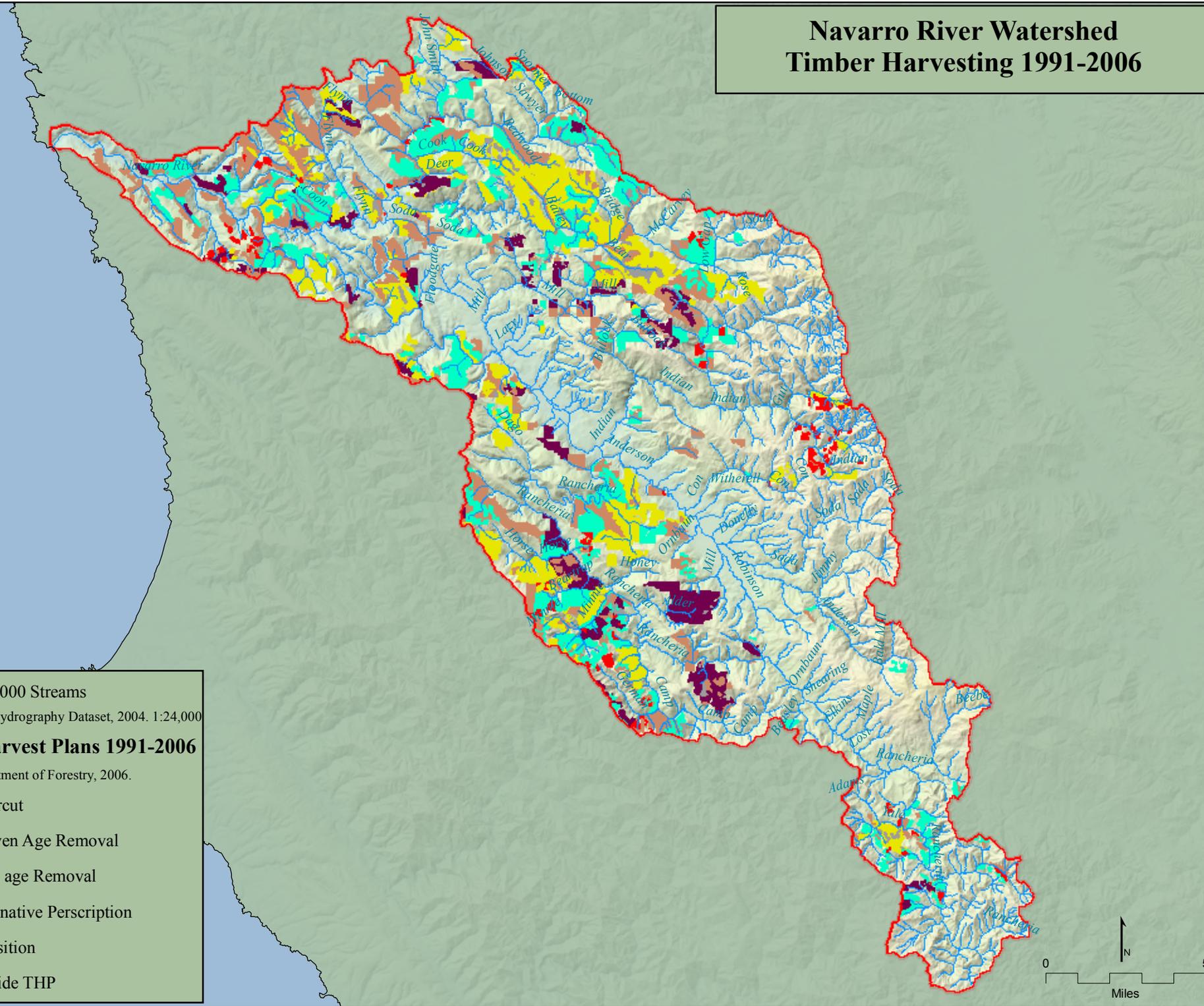
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Navarro River Watershed Timber Harvesting 1991-2006

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

Timber Harvest Plans 1991-2006
California Department of Forestry, 2006.

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

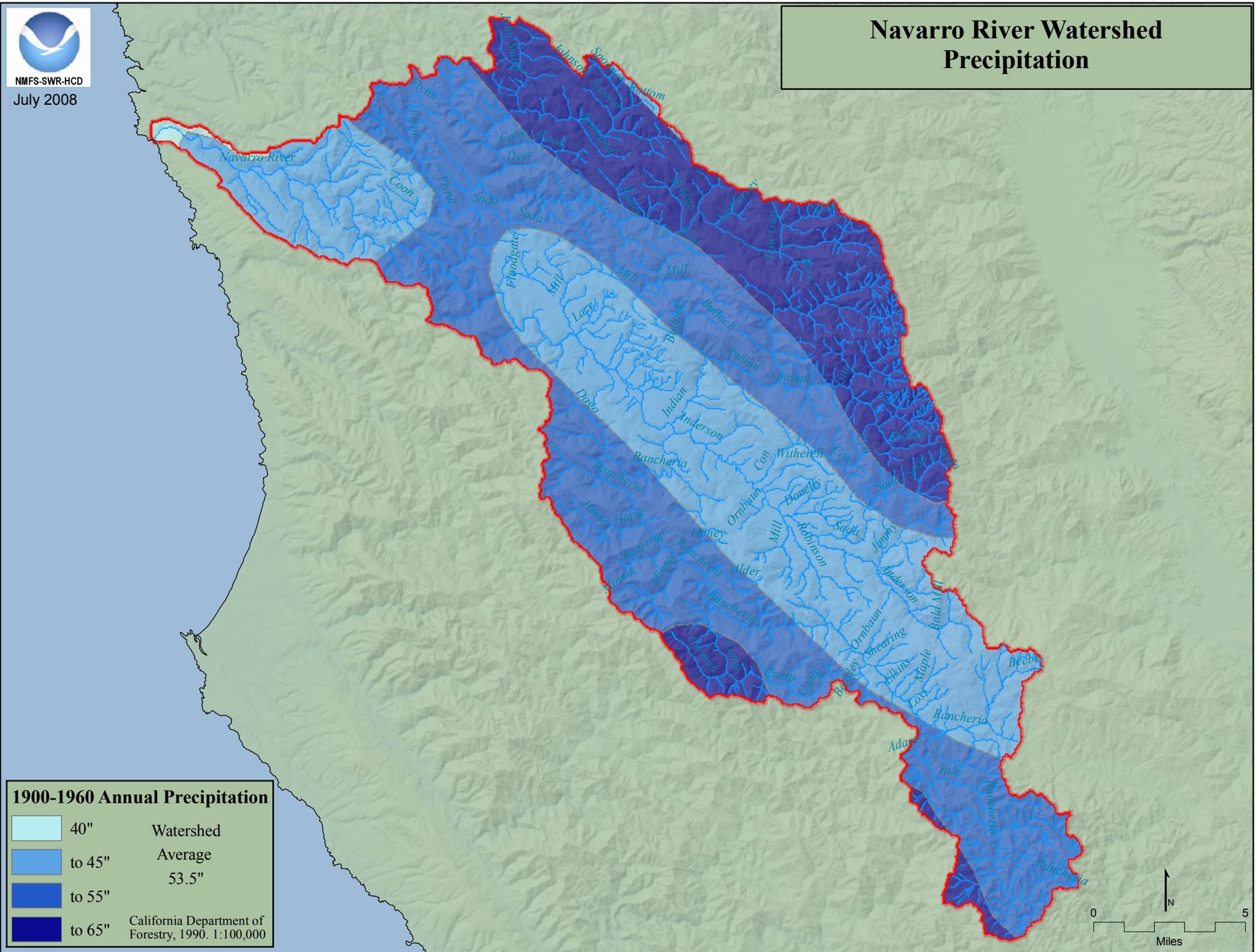




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Navarro River Watershed Precipitation

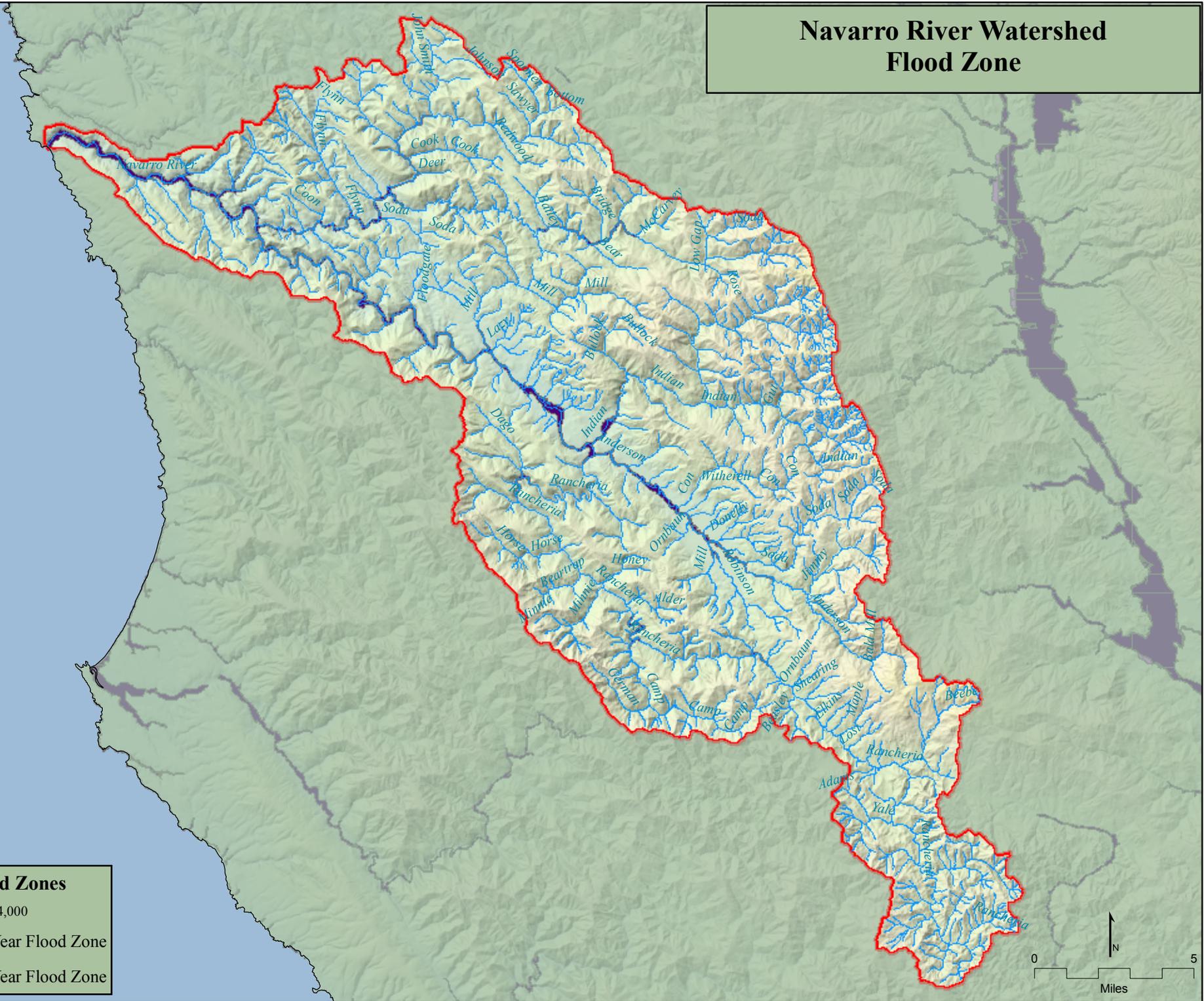




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Navarro River Watershed Flood Zone



FEMA Flood Zones

FEMA, 1996. 1:24,000

- 100 Year Flood Zone
- 500 Year Flood Zone





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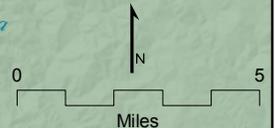
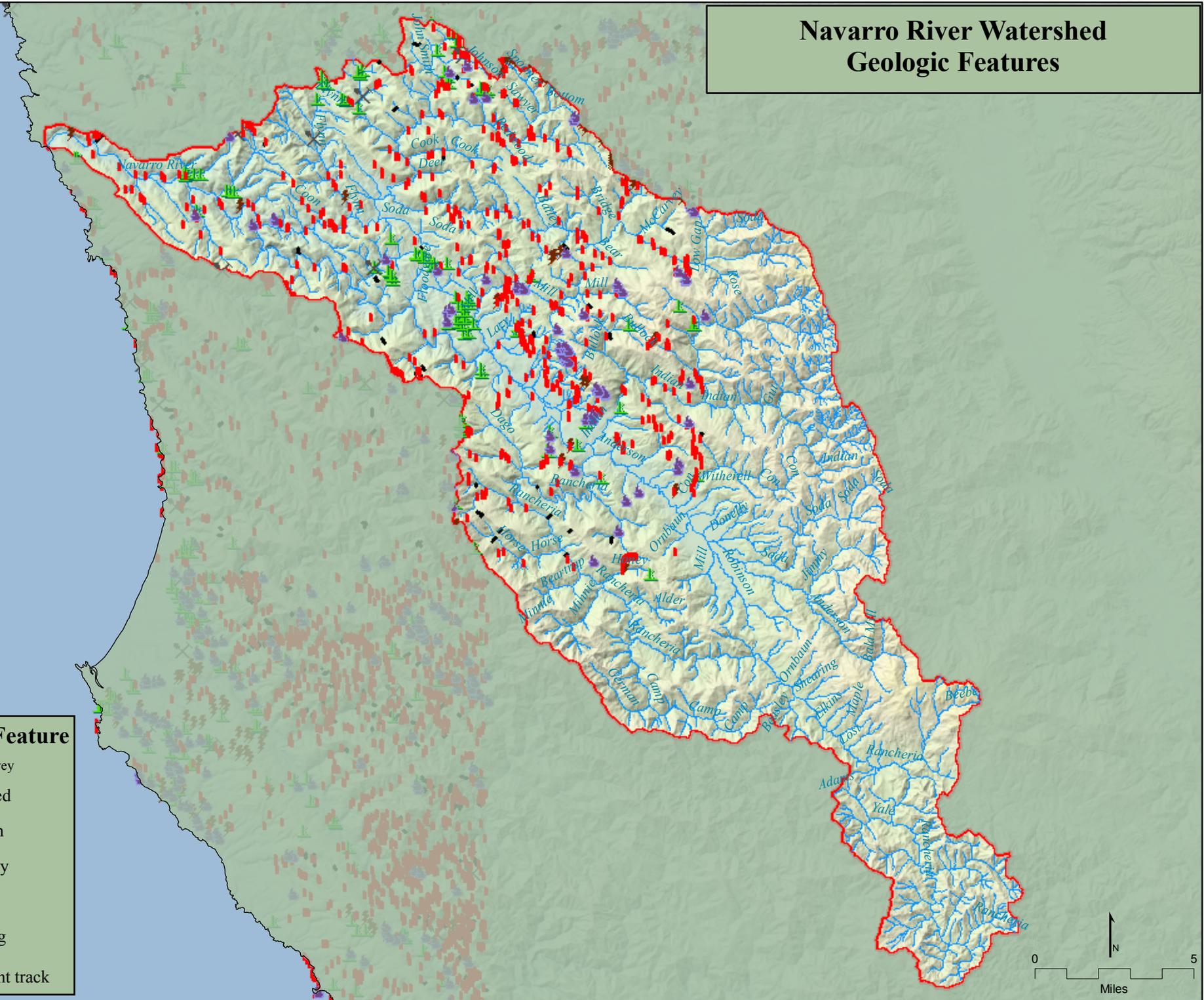
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Navarro River Watershed Geologic Features

Geologic Feature

CA Geologic Survey

-  Dipbed
-  Marsh
-  Quarry
-  Slide
-  Spring
-  Torrent track

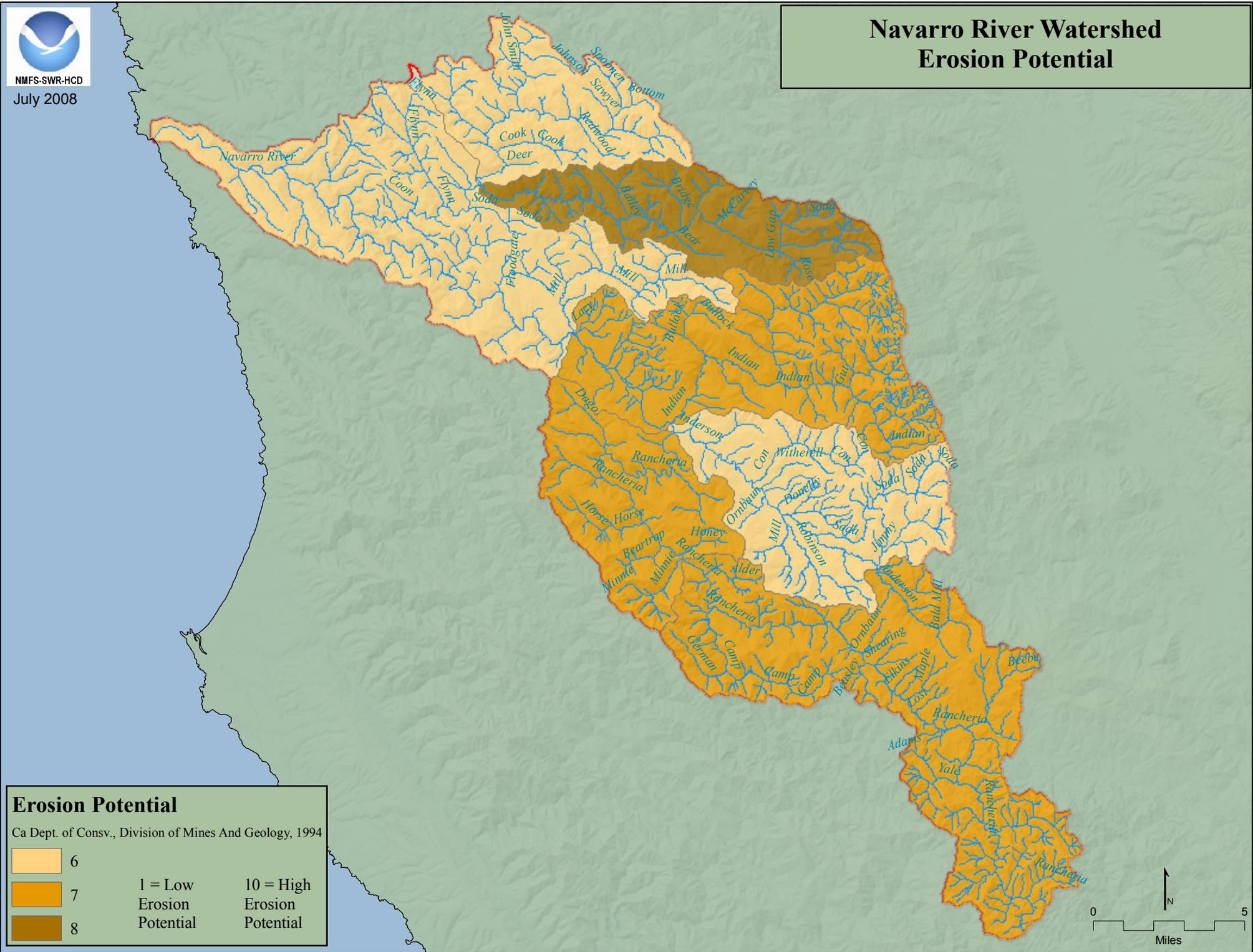




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Navarro River Watershed Erosion Potential



Erosion Potential

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

	6		
	7	1 = Low	10 = High
	8	Erosion	Erosion
		Potential	Potential





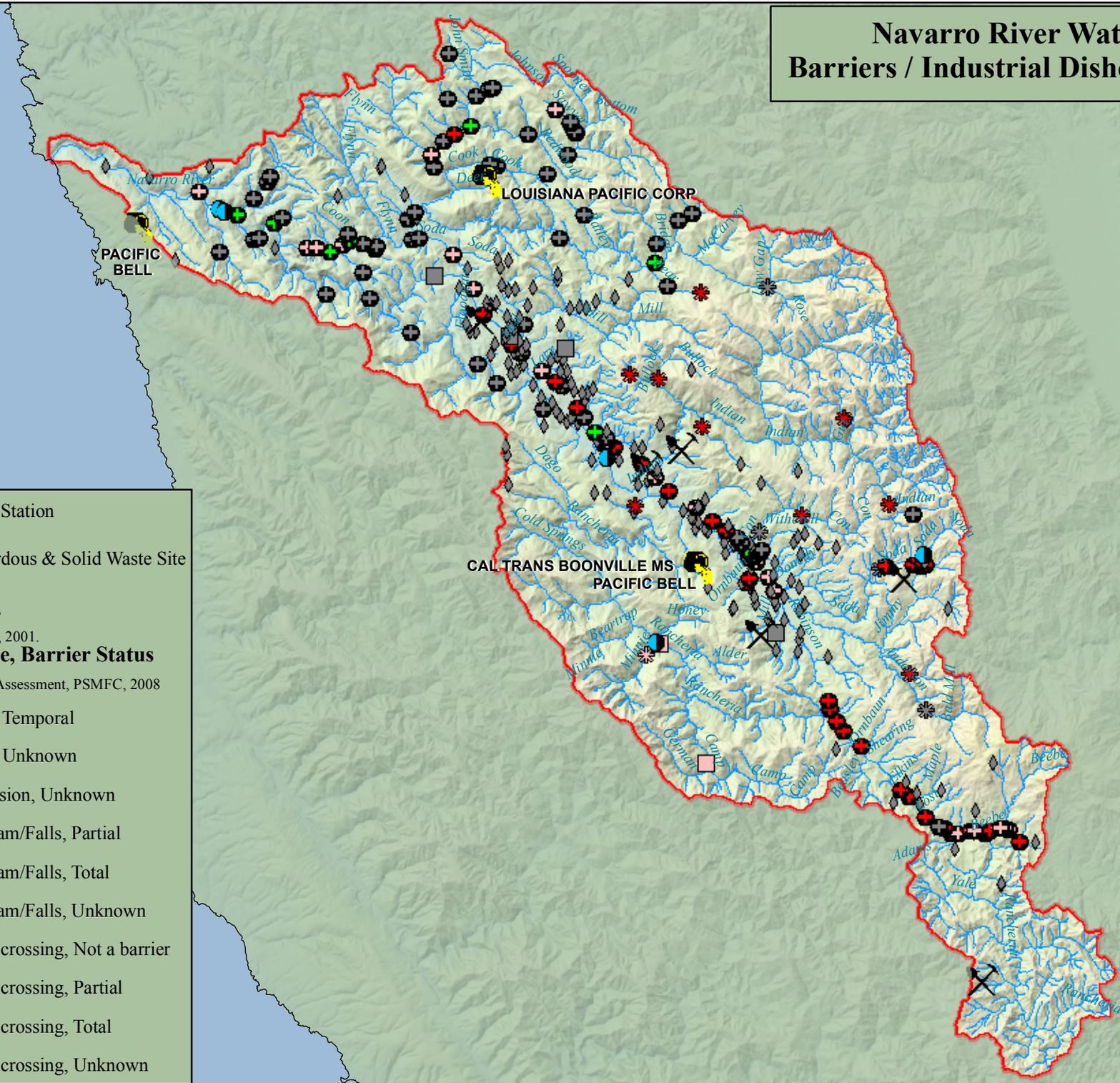
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Navarro River Watershed Barriers / Industrial Discharge / Gages

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

- Dam, Temporal
- Dam, Unknown
- Diversion, Unknown
- Log jam/Falls, Partial
- Log jam/Falls, Total
- Log jam/Falls, Unknown
- Road crossing, Not a barrier
- Road crossing, Partial
- Road crossing, Total
- Road crossing, Unknown





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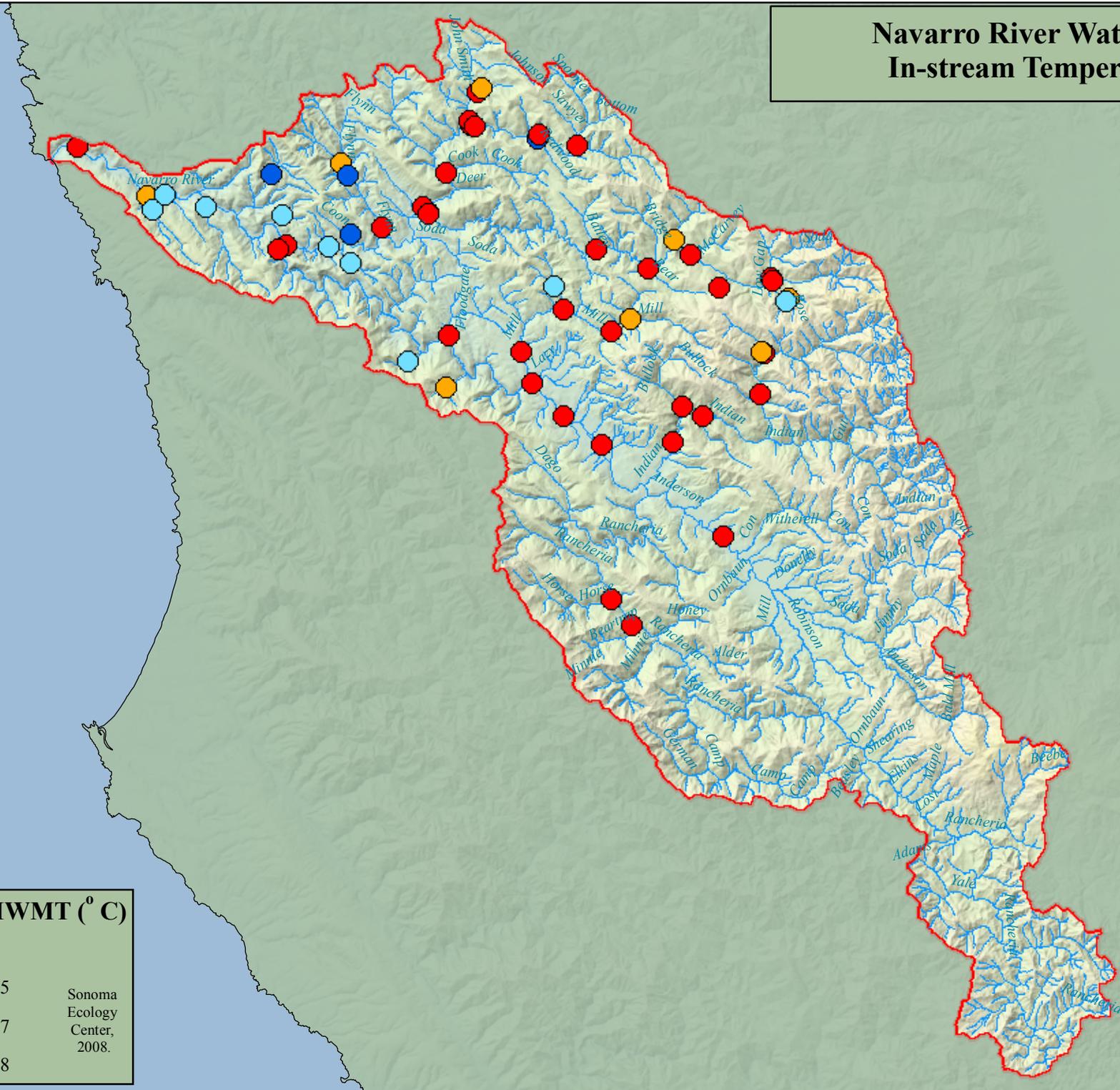
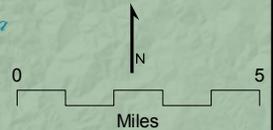
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Navarro River Watershed In-stream Temperature

Averate MWMT (° C)

- 0 - 14
- 14 - 15
- 15 - 17
- 17 - 28

Sonoma
Ecology
Center,
2008.





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Navarro River Watershed Public Consultation Tracking System

**NRCS Navarro River Watershed
Permit Coordination Program**

**Navarro River TMDL
for Sediment and Temp.**

THP 1-01-279 "Yes Deer"

CALTRANS Storm Repair Projects

THP 1-01-259 MEN Somedays Are Better Than Others

31004 Bradford
30717 Jenks
30930 Rose Family Vineyards
30870 Navarro Fairhills Ranch
30869 Navarro Fairhills Ranch
Pet 28947 Anderson Vineyards
29810 Oswald
29810 & 30792 Oswald
30448 & 30449 Jackson

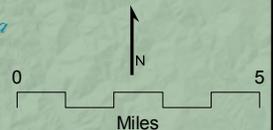
29594 Londer Neg. Dec.
30721 Boltz

31097 Wasson
30348 AgriPerpetua, Inc.
30718 & 31003 Elke
31133 Cakebread Properties, LLP Navarro River
Anderson Ck Bridge Replacement on Hwy 128-Caltrans
Pet 27758 Anderson Vineyards
30735 Meyer Dismissal of Protest
30479 Jones
30533 & 31080 Schoeneman
30722 Donnelly Creek Vineyards
31096 Trust
30024 and 30474 Onacrest Properties

● 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/>

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

1983-2001

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

MWMT_20080117_selected_watersheds

Vector digital data

Sonoma Ecology Center

2008

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