## Watershed Characterization

August 2008

NMFS-SWR-HCD

# *Petaluma River Watershed*

| Area | Hydrologic Units | Calwater Subbasins --- | (Planning Watersheds) |
|---|---|---|---|
| 93,113 Acres | 18050002 | 2206300101 | Adobe Creek (9009 Acres) |
| 37,682 Hectares | 4th Field **HUC** | 2206300102 | Stage Gulch (6599 Acres) |
| 146 Square Miles | | 2206300103 | Lynch Creek (10476 Acres) |
| | 2206 | 2206300200 | Petaluma (14857 Acres) |
| **Location** | 4th Field **Calwater** | 2206300301 | Lower San Antonio Creek (10277 Acres |
| Marin County | | 2206300302 | Upper San Antonio Creek (9497 Acres) |
| Sonoma County | | 2206300400 | Lower Petaluma River (27246 Acres) |
| | | 2206300500 | Basalt Creek (5153 Acres) |

| Species Potential | Miles of Streams with Species Present |
|---|---|
| Central California Coast **Steelhead** | Steelhead |
| Interior San Francisco Bay Diversity Stratum | 57 |
| - Potentially Independent | NOAA Fisheries, Critical Habitat Redesignation, 2005 |
| Central California Coast **Coho** | Coho |
| San Francisco Bay Diversity Stratum | 0 |
| - Dependent Population | CDFG, Coho Distribution, May 2007 |

### Critical Habitat

| | |
|---|---|
| Central California Coast Steelhead | 57 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) |

| Miles of Waterway[A] | Miles | Number of Dams[C] |
|---|---|---|
| Naturally Occurring Waterways | | 7 |
| Intermittent Stream | 195 | 5 - Impassable |
| Perennial Stream | 56 | 2 - Not a Barrier |
| Canal / Ditch | 59 | |
| Connector | 1 | |
| Artificial Path | 45 | |

[C]Passage Assessment Database, Pacific States Marine Fisheries Commission, 2008

[A]USGS National Hydrography Dataset, High Resolution, 2004. 1:24,000

| USGS Gaging Stations[B] | Number of Barriers[C] |
|---|---|
| 11459000 | 115 |
| Petaluma River at Petaluma, CA | 7 Dams |
| 11459150 | 101 - Diversions |
| Petaluma River at Copland Pumping Station at Petaluma, CA | 5 Road Crossings (2 Partially Impassable) |
| 114593 | |
| San Antonio Creek near Petaluma, CA | [C]Passage Assessment Database, Pacific States Marine Fisheries Commission, 2008 |

EPA Total Maximum Daily Load Classification (**TMDL**)[I]

Low Priority - Diazinon, Nickel Medium Priority - Nutrients, Sediment/Siltation, Pathogens

Sources: Agriculture, Constructin/Land Development, Urban Runoff/Storm Sewers, Municipal Point Sources, Atmospheric Deposition

[I]State Water Resources Control Board, 2003

| Average Annual **Precipitation**[E] | Average Annual **Precipitation Range**[E] |
|---|---|
| 26.2" | 18 - 45" |

[E]California Mean Annual Precipitation Zones, 1900-1960, CA Department of Forestry, 1990

| Roads[A] | Miles |
|---|---|
| Roads in Watershed | |
| Primary Road / Highway | 17 |
| Secondary and connecting road, state highways | 9 |
| Local, neighborhood, and rural road, city street, unseparated | 473 |
| Vehicular trail, 4WD | 2 |
| Driveway or service road | 13 |
| Total Miles | |

| Road Density | |
|---|---|
| Miles of Roads per SqMi of Watershed | 3.5 |
| Miles of Roads per SqMi of 100m Riparian Buffer* | 2.8 |

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

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

| Slope[D] | Acres | Percent of watershed |
|---|---|---|
| Lands of 0-2 percent slope | 23,637 | 25% |
| Lands of 2-4 percent slope | 11,355 | 12% |
| Lands of 4-10 percent slope | 18,672 | 20% |
| Lands of 10-15 percent slope | 10,462 | 11% |
| Lands of 15-30 percent slope | 19,200 | 21% |
| Lands of 30-60 percent slope | 9,404 | 10% |
| Lands of 60-100 percent slope | 384 | 0% |
| Lands of 100-117 percent slope | 0 | 0% |
| **Elevation Range** | 0 - 2323 ft. | 0 - 708 m |

[D]Slope derived from USGS 10 meter Digital Elevation Models (DEM's)

| Vegetation[G] | Acres | Percent of watershed |
|---|---|---|
| Agriculture | 14,829 | 16% |
| Annual grassland | 42,285 | 45% |
| Barren | 42 | 0% |
| Conifer Forest | | |
| Douglas Fir | 2 | 0% |
| Unknown Conifer | 2 | 0% |
| Hardwood Forest | | |
| Montane Hardwood | 9,595 | 10% |
| Hardwood Woodland | | |
| Coastal Oak Woodland | 680 | 1% |
| Eucalytus | 284 | 0% |
| Valley Foothill Riparian | 341 | 0% |
| Valley Oak Woodland | 378 | 0% |
| Shrub | 571 | 1% |
| Urban | 16,820 | 18% |
| Water | 1,722 | 2% |
| Wetland | 5,594 | 6% |

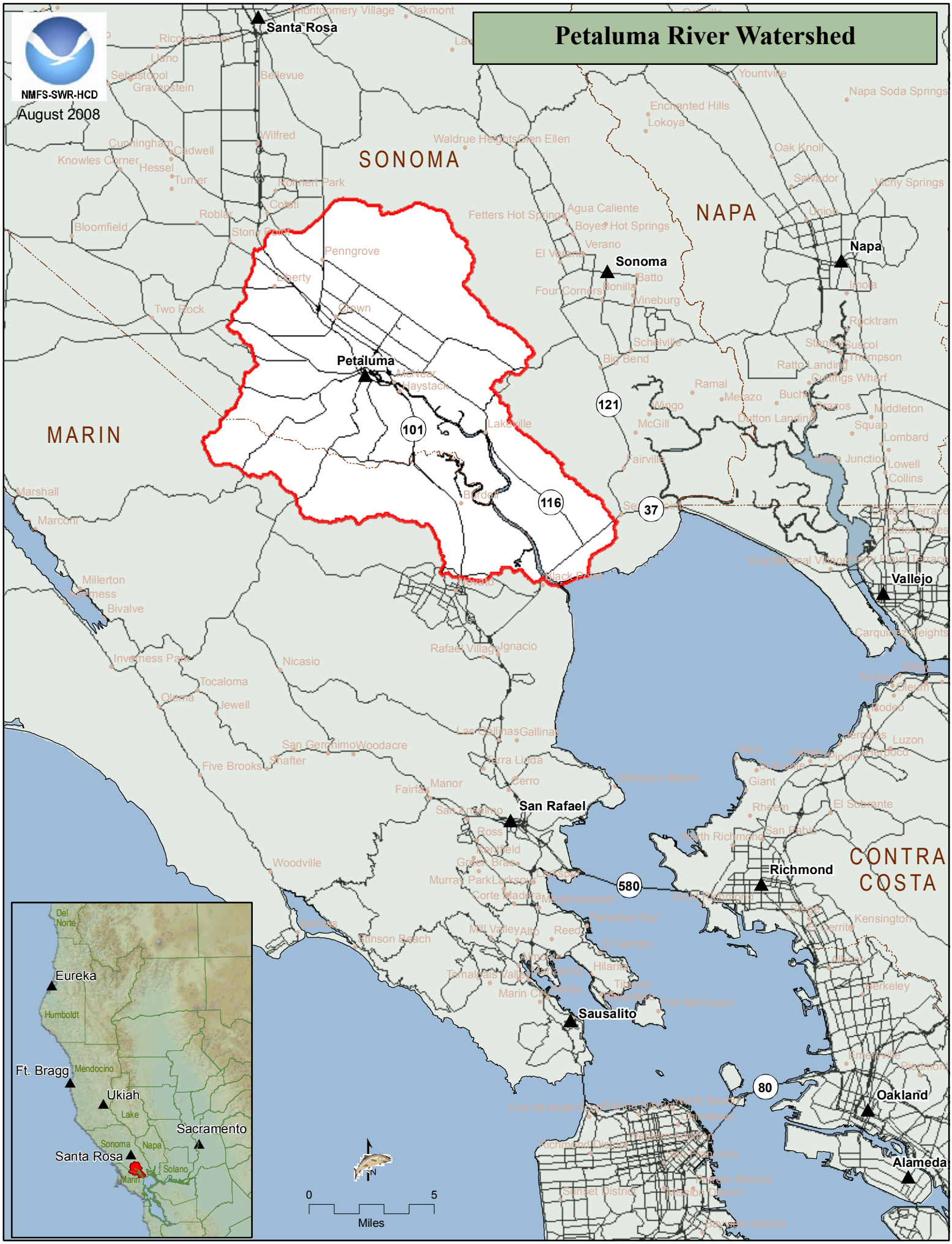
[G]Multi-source Land Cover Data (2002 v2), CA Department of Forestry, 2002. 100 meter Grid

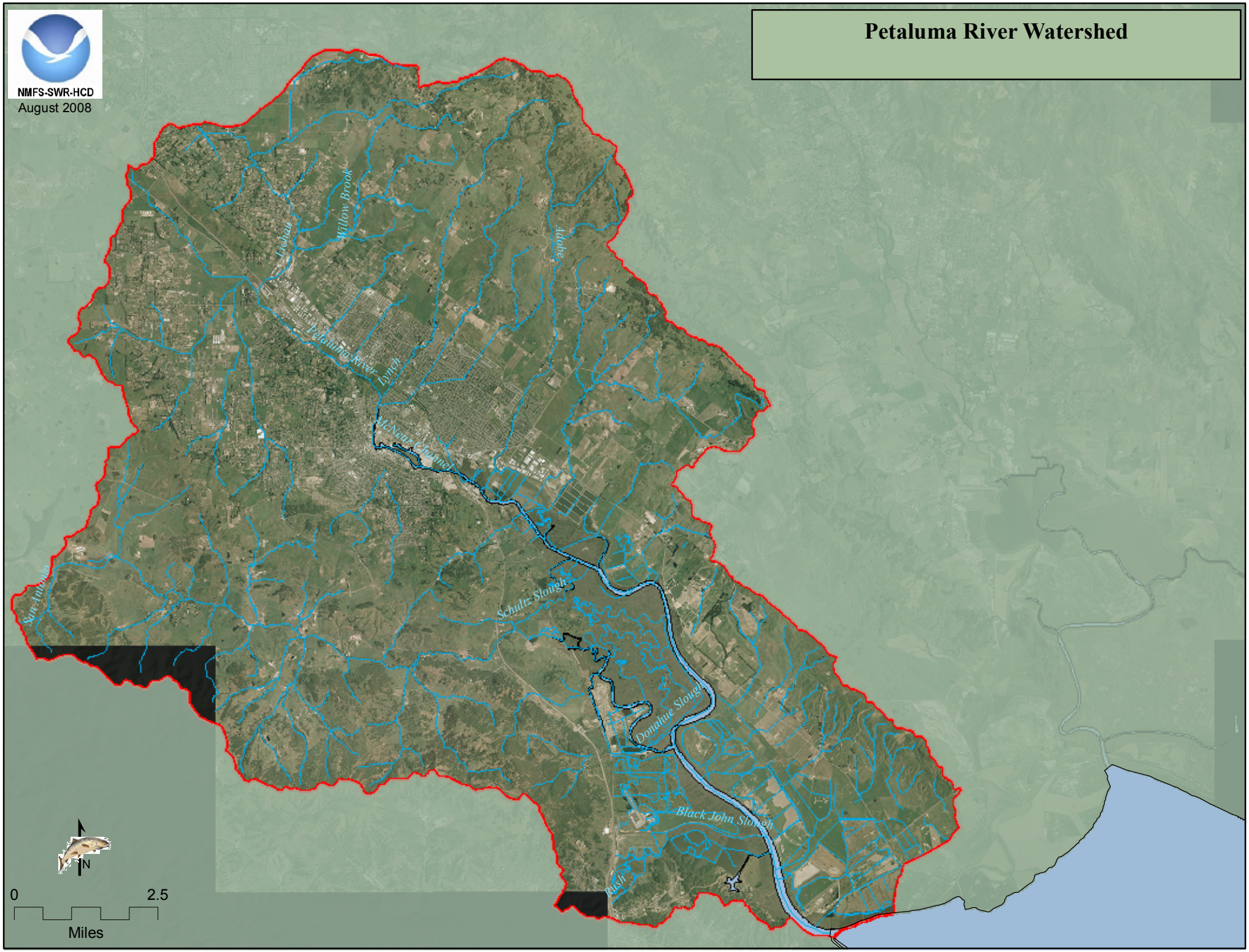
| Land Ownership[H] | Acres | Percent of watershed |
|---|---|---|
| Private | 87,156 | 94% |
| Local (Park / Open Space) | 723 | 1% |
| State (Fish & Game) | 3,652 | 4% |
| State (Parks & Recreation) | 707 | 1% |
| State (Other) | 877 | 1% |

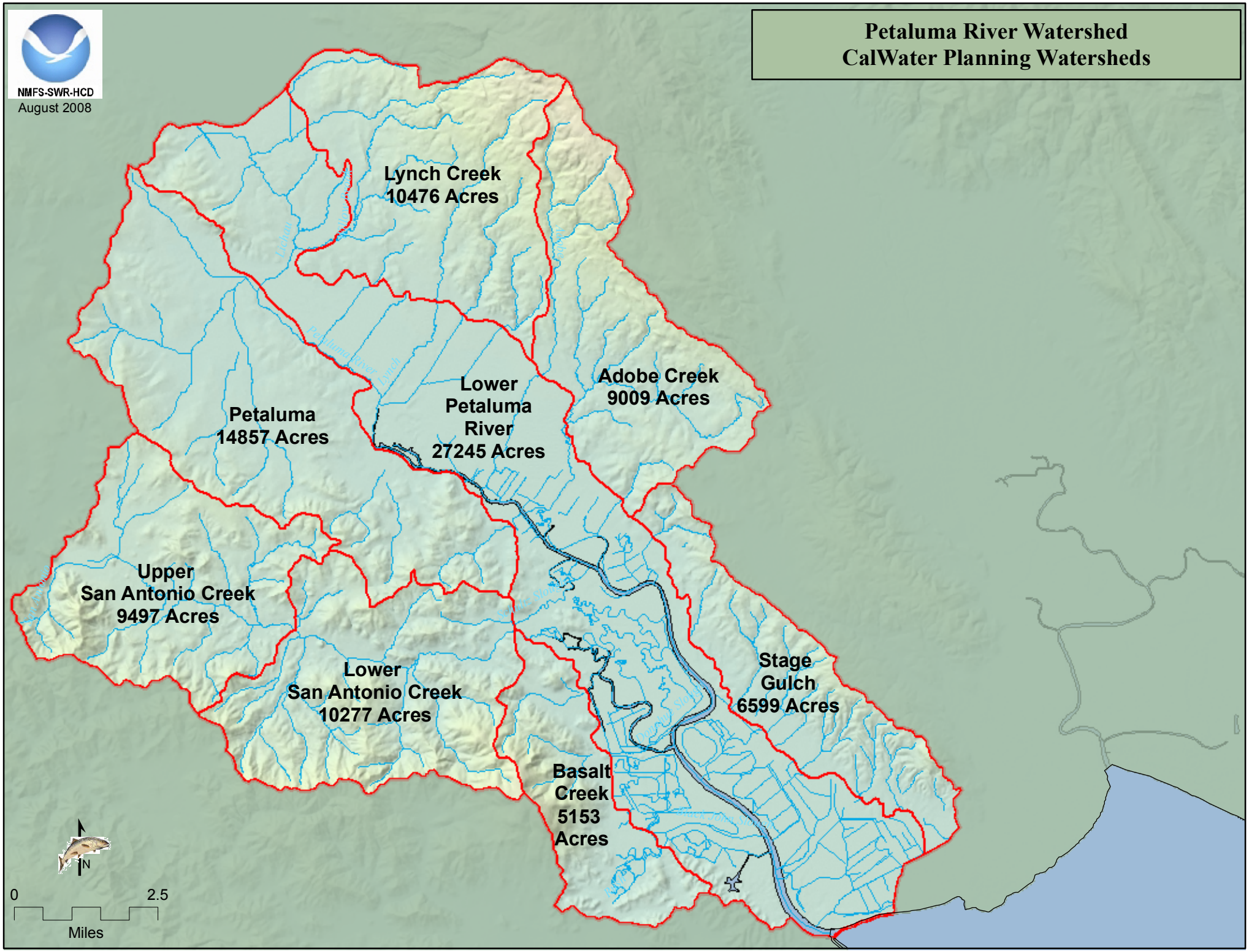
[H]Management Landscape, CA Department of Forestry, 2002

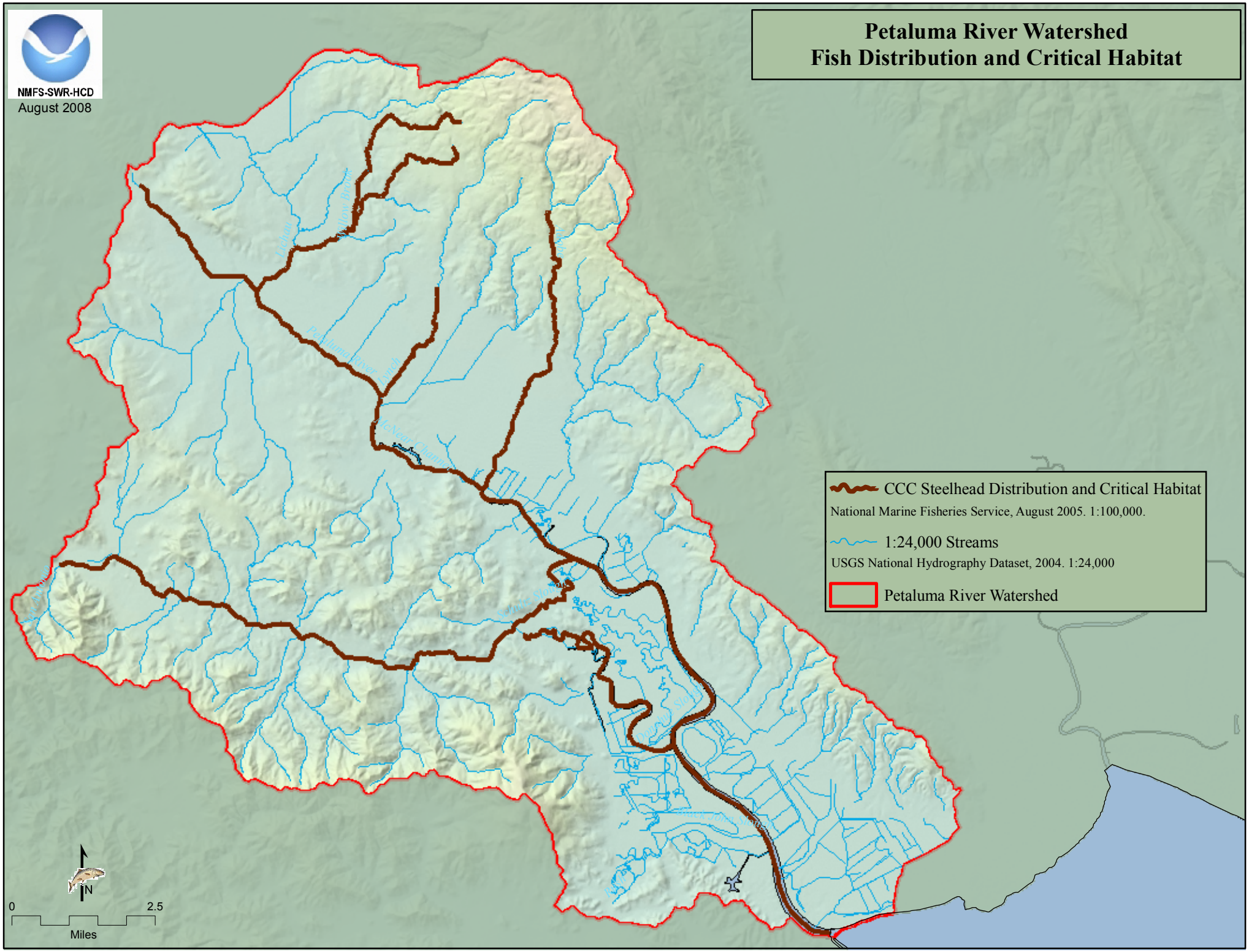
| Population[I] | Housing[I] | |
|---|---|---|
| Total Population within the watershed -- 69,478 People | Total Housing Units within the watershed -- 26,253 Houses | |
| | Housing Density | |
| | 0 to Less than 1 Housing Unit / 160 Acres | 40% |
| | 1 Unit / 160 Acres to 1 Unit / 20 Acres | 34% |
| | 1 Unit / 20 Acres to 1 Unit / 5 Acres | 11% |
| | 1 Unit / 5 Acres to 2 Units / Acre | 12% |
| | 2 Units / Acres to Greater than or Equal to 5 Units / Acre | 4% |

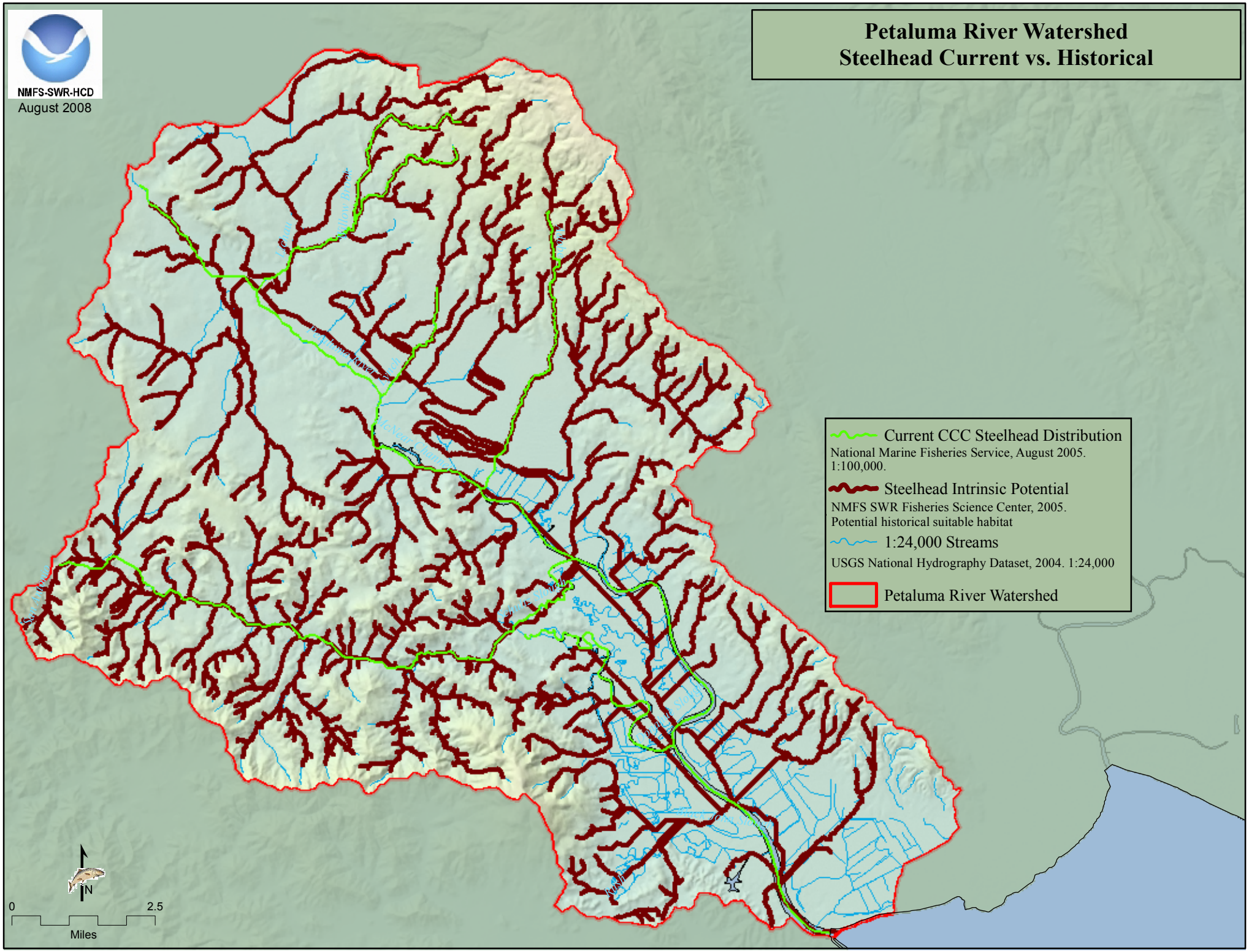
[I]Census 2000 Block Data (Migrated), CA Department of Forestry, 2003

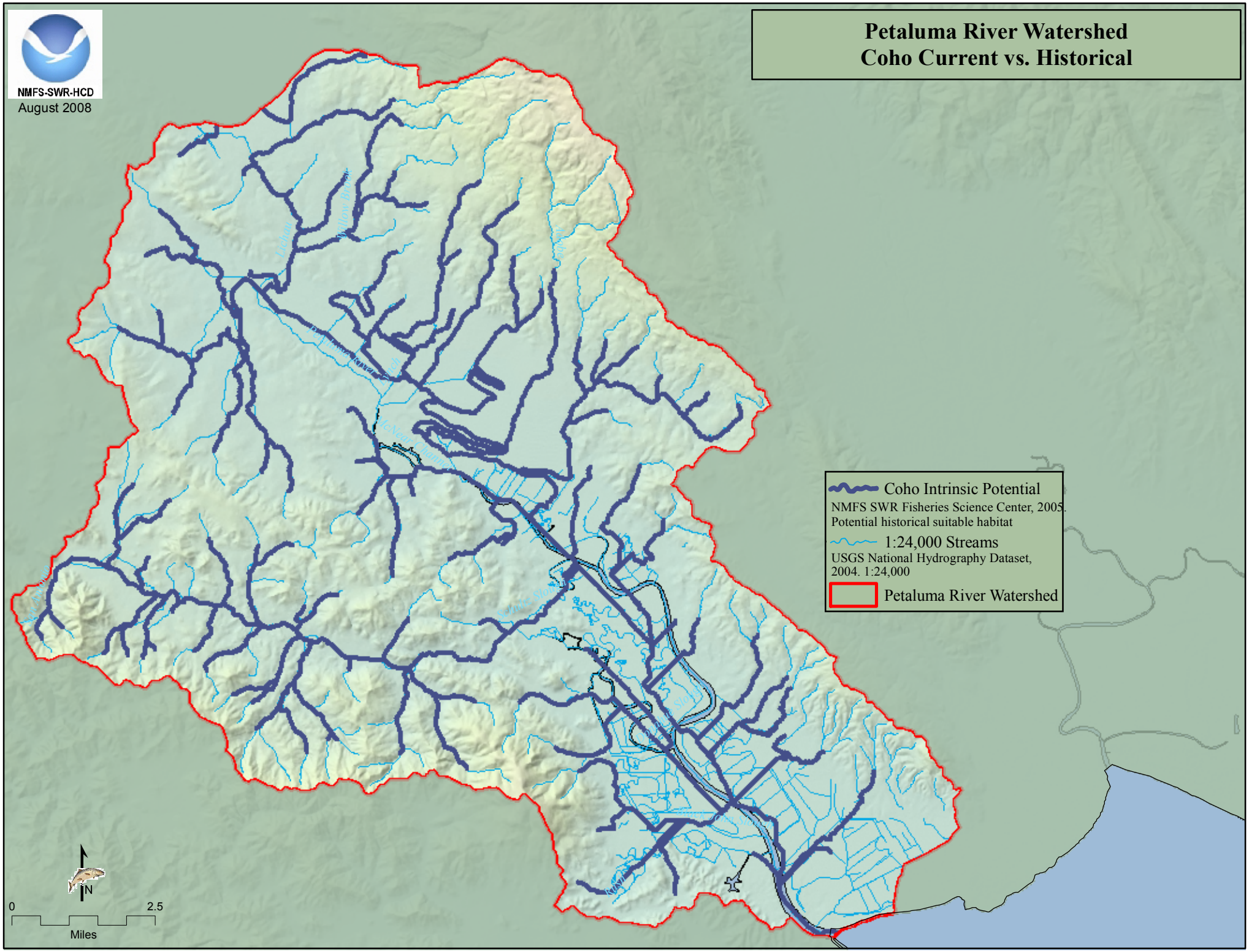

Petaluma River Watershed
NMFS-SWR-HCD
August 2008
SONOMA
NAPA
MARIN
CONTRA COSTA
Santa Rosa
Sonoma
Napa
Petaluma
Vallejo
San Rafael
Richmond
Sausalito
Oakland
Alameda
101
121
116
37
580
80
Eureka
Ft. Bragg
Ukiah
Sacramento
Santa Rosa
Del Norte
Humboldt
Mendocino
Lake
Sonoma
Napa
Solano
Marin
0
5
Miles

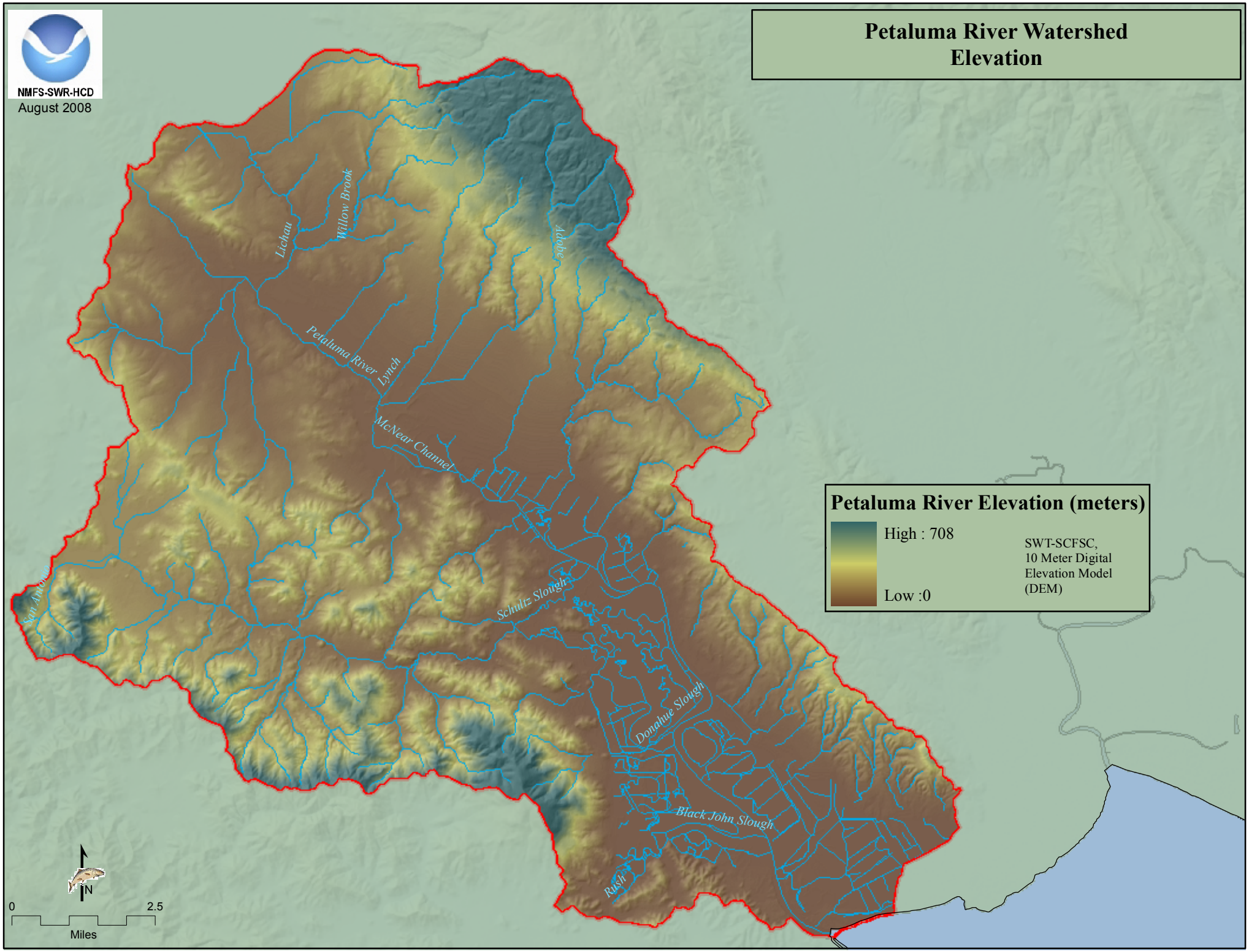

Petaluma River Watershed
NMFS-SWR-HCD
August 2008
Willow Brook
Lichau
Adobe
Petaluma River
Lynch
McNear Channel
San Antonio
Schultz Slough
Donahue Slough
Black John Slough
Rush
N
0
2.5
Miles

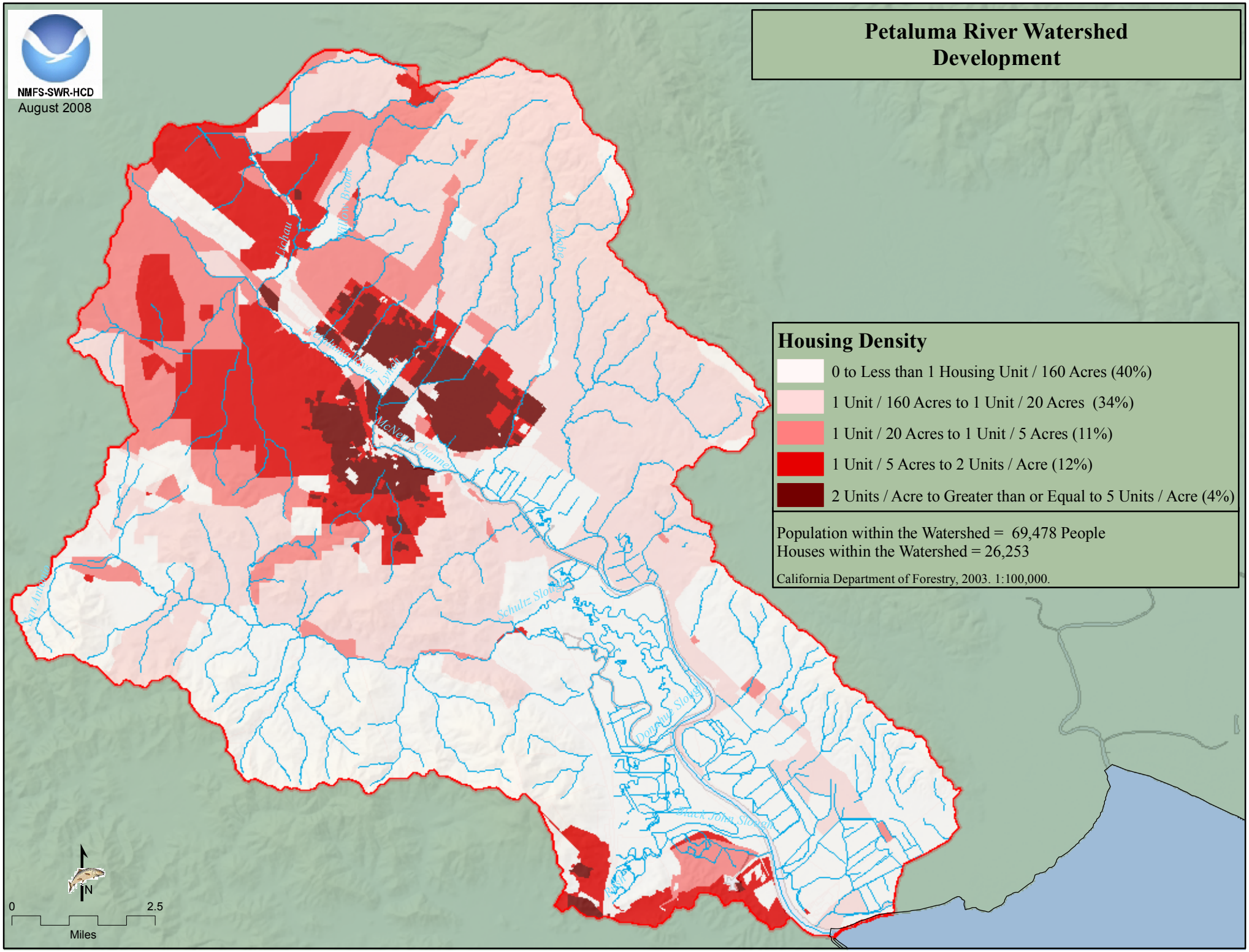

Petaluma River Watershed
CalWater Planning Watersheds
NMFS-SWR-HCD
August 2008
Lynch Creek
10476 Acres
Petaluma
14857 Acres
Lower
Petaluma
River
27245 Acres
Adobe Creek
9009 Acres
Upper
San Antonio Creek
9497 Acres
Lower
San Antonio Creek
10277 Acres
Stage
Gulch
6599 Acres
Basalt
Creek
5153
Acres
N
0
2.5
Miles

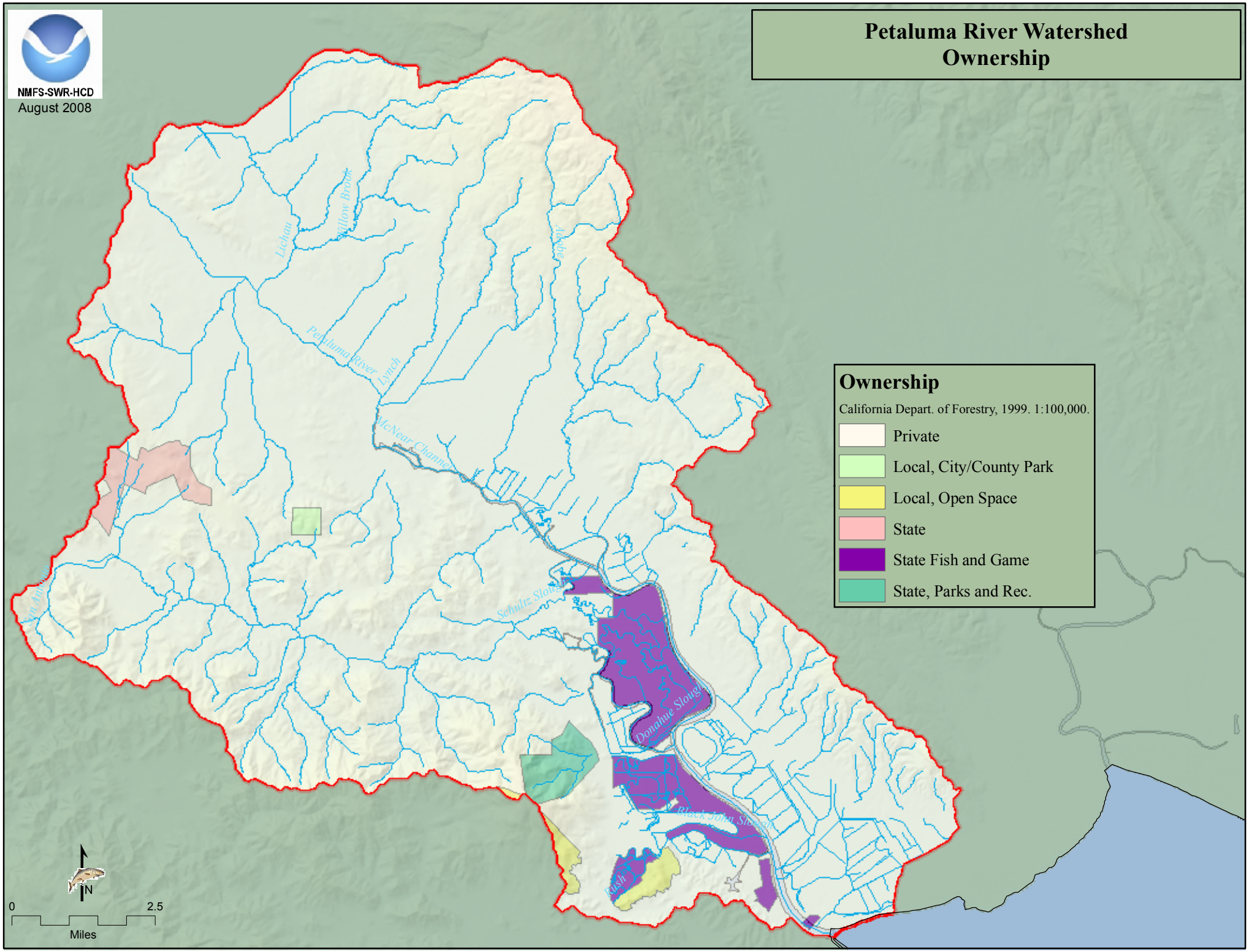

NMFS-SWR-HCD
August 2008
Petaluma River Watershed
Fish Distribution and Critical Habitat
CCC Steelhead Distribution and Critical Habitat
National Marine Fisheries Service, August 2005. 1:100,000.
1:24,000 Streams
USGS National Hydrography Dataset, 2004. 1:24,000
Petaluma River Watershed
N
0
2.5
Miles

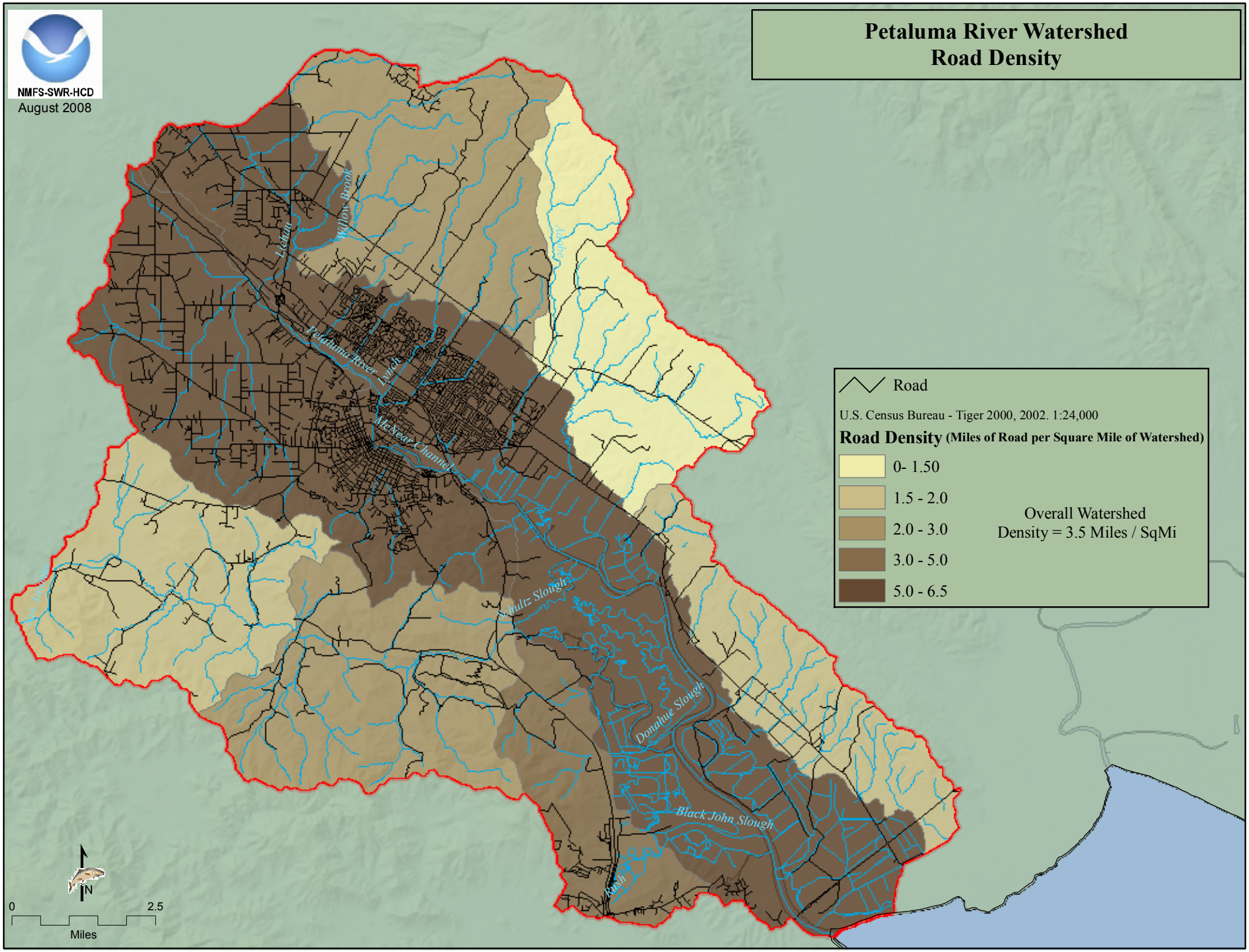

Petaluma River Watershed
Steelhead Current vs. Historical
NMFS-SWR-HCD
August 2008
Current CCC Steelhead Distribution
National Marine Fisheries Service, August 2005.
1:100,000.
Steelhead Intrinsic Potential
NMFS SWR Fisheries Science Center, 2005.
Potential historical suitable habitat
1:24,000 Streams
USGS National Hydrography Dataset, 2004. 1:24,000
Petaluma River Watershed
N
0
2.5
Miles

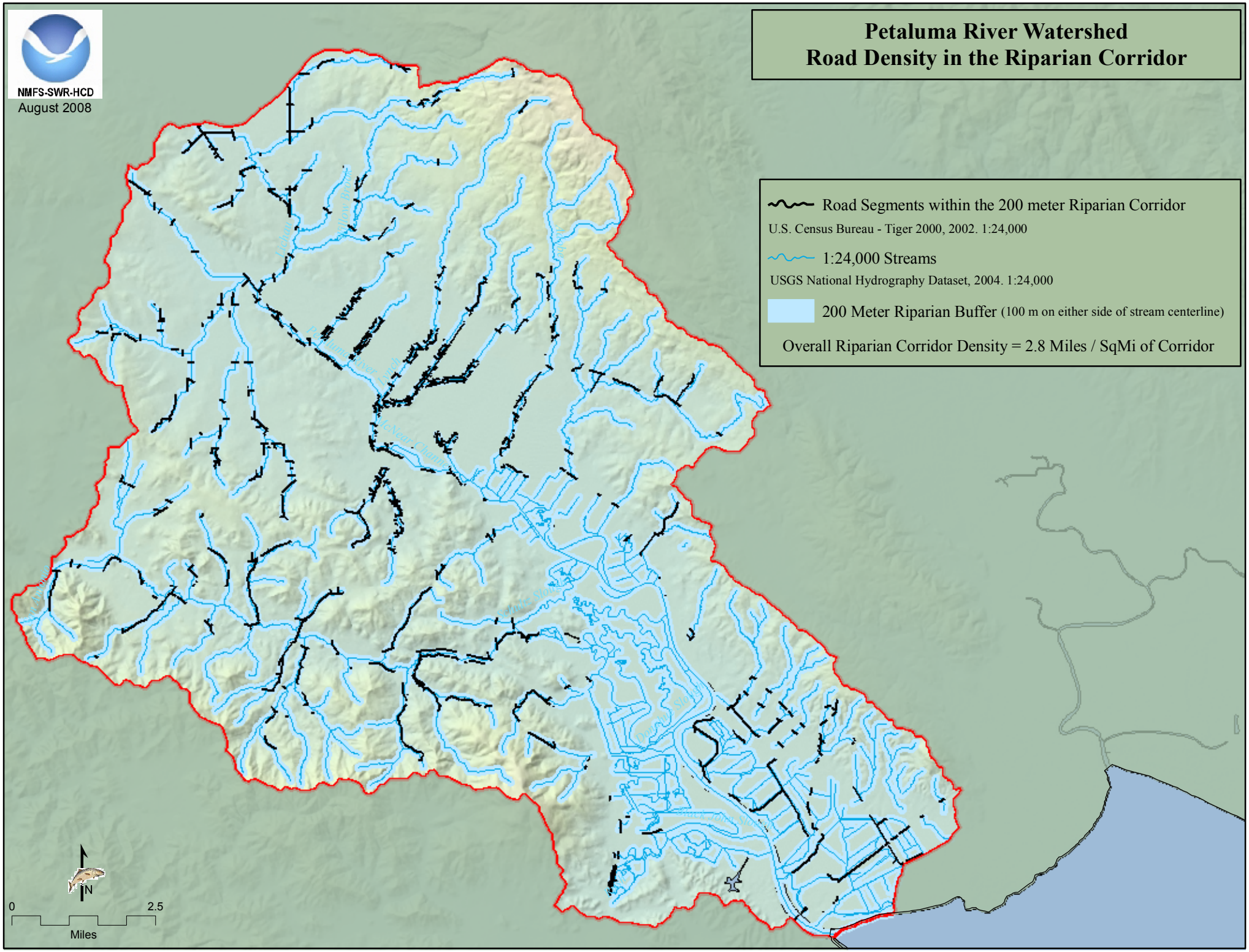

Petaluma River Watershed
Coho Current vs. Historical
NMFS-SWR-HCD
August 2008
Coho Intrinsic Potential
NMFS SWR Fisheries Science Center, 2005.
Potential historical suitable habitat
1:24,000 Streams
USGS National Hydrography Dataset,
2004. 1:24,000
Petaluma River Watershed
N
0
2.5
Miles

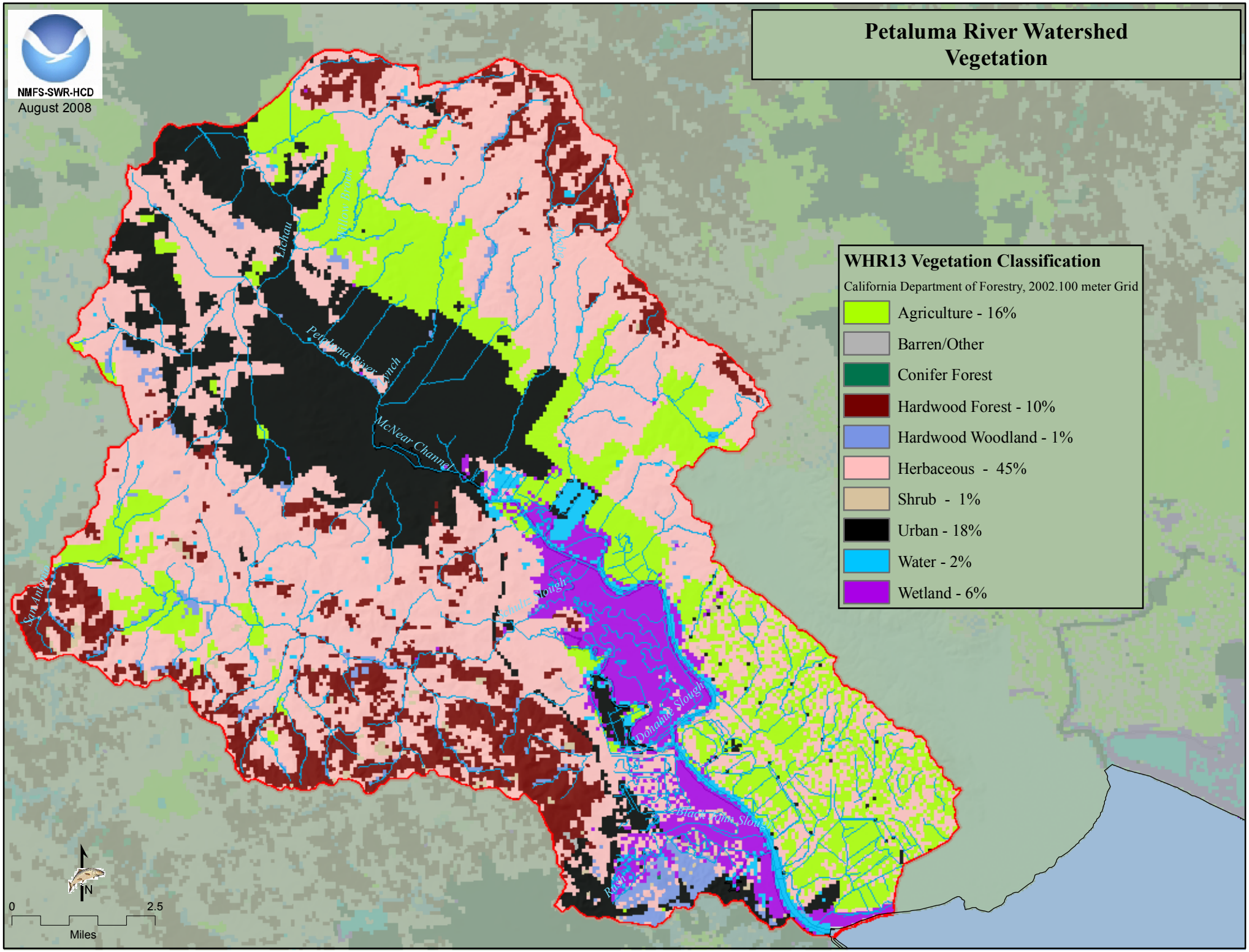

Petaluma River Watershed
Elevation
NMFS-SWR-HCD
August 2008
Lichau
Willow Brook
Adobe
Petaluma River
Lynch
McNear Channel
Schultz Slough
Donahue Slough
Black John Slough
Rush
Petaluma River Elevation (meters)
High : 708
Low :0
SWT-SCFSC,
10 Meter Digital
Elevation Model
(DEM)
N
0
2.5
Miles


Petaluma River Watershed
Development
NMFS-SWR-HCD
August 2008
Housing Density
0 to Less than 1 Housing Unit / 160 Acres (40%)
1 Unit / 160 Acres to 1 Unit / 20 Acres (34%)
1 Unit / 20 Acres to 1 Unit / 5 Acres (11%)
1 Unit / 5 Acres to 2 Units / Acre (12%)
2 Units / Acre to Greater than or Equal to 5 Units / Acre (4%)
Population within the Watershed = 69,478 People
Houses within the Watershed = 26,253
California Department of Forestry, 2003. 1:100,000.
Lichau
Willow Brook
Adobe
McNear Channel
Schultz Slough
Donahue Slough
Black John Slough
N
0
2.5
Miles

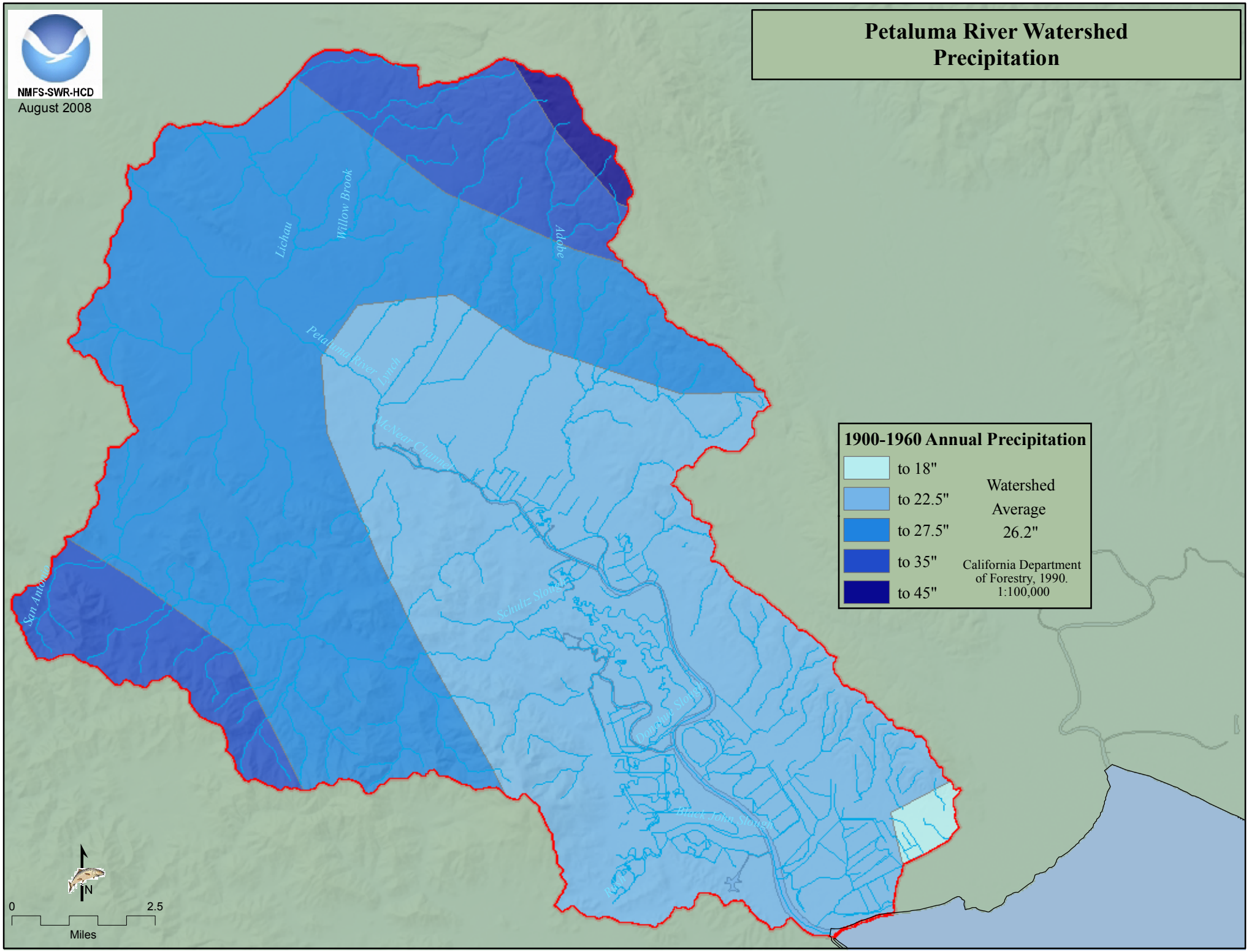

Petaluma River Watershed
Ownership
NMFS-SWR-HCD
August 2008
Ownership
California Depart. of Forestry, 1999. 1:100,000.
Private
Local, City/County Park
Local, Open Space
State
State Fish and Game
State, Parks and Rec.
Lichau
Willow Brook
Adobe
Petaluma River
Lynch
McNear Channel
Schultz Slough
Donahue Slough
Black John Slough
Rush
N
0
2.5
Miles


Petaluma River Watershed
Road Density
NMFS-SWR-HCD
August 2008
Road
U.S. Census Bureau - Tiger 2000, 2002. 1:24,000
Road Density (Miles of Road per Square Mile of Watershed)
0- 1.50
1.5 - 2.0
2.0 - 3.0
3.0 - 5.0
5.0 - 6.5
Overall Watershed
Density = 3.5 Miles / SqMi
Willow Brook
Lichau
Petaluma River
McNear Channel
Schultz Slough
Donahue Slough
Black John Slough
Rush
N
0
2.5
Miles

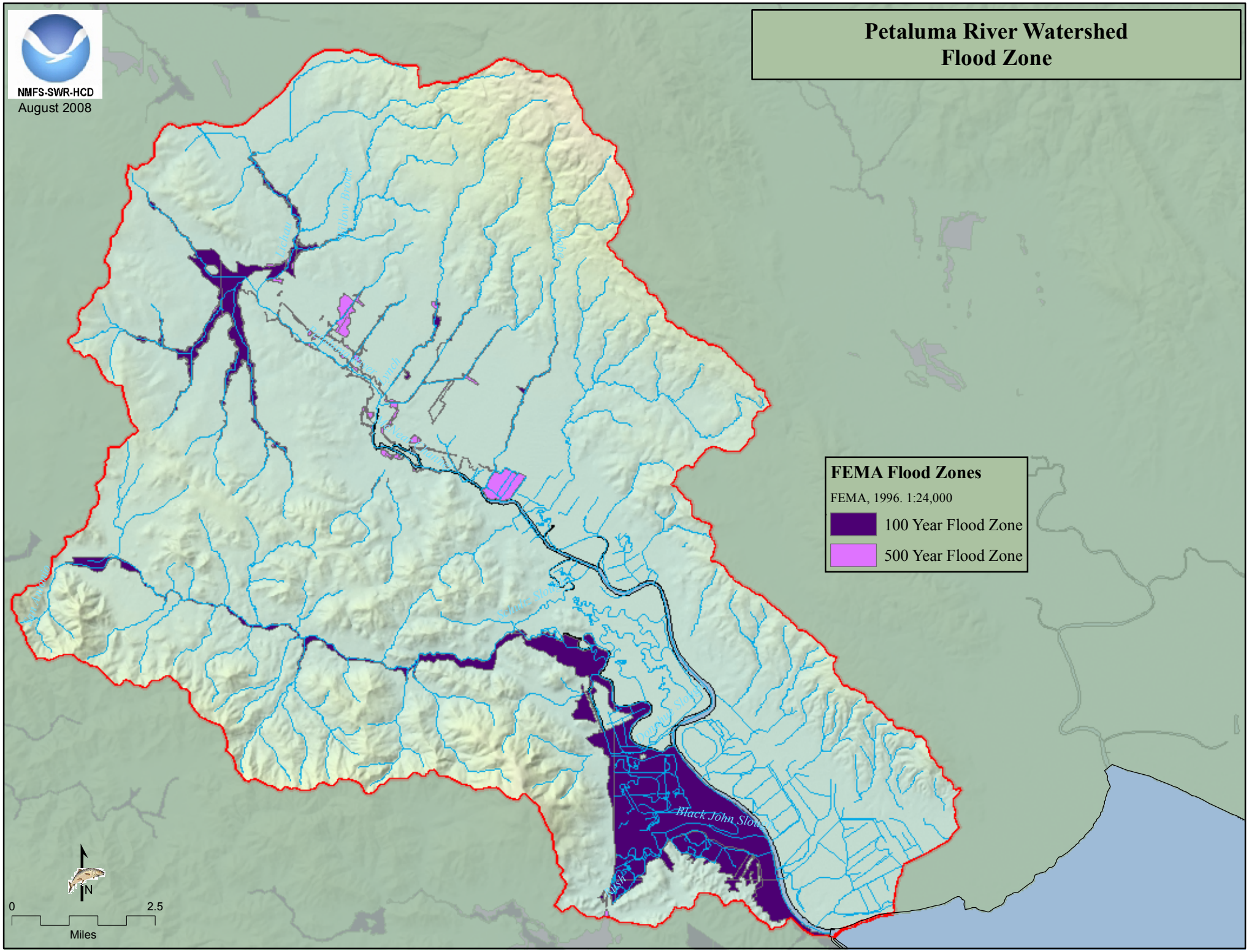

NMFS-SWR-HCD
August 2008
Petaluma River Watershed
Road Density in the Riparian Corridor
Road Segments within the 200 meter Riparian Corridor
U.S. Census Bureau - Tiger 2000, 2002. 1:24,000
1:24,000 Streams
USGS National Hydrography Dataset, 2004. 1:24,000
200 Meter Riparian Buffer (100 m on either side of stream centerline)
Overall Riparian Corridor Density = 2.8 Miles / SqMi of Corridor
N
0
2.5
Miles

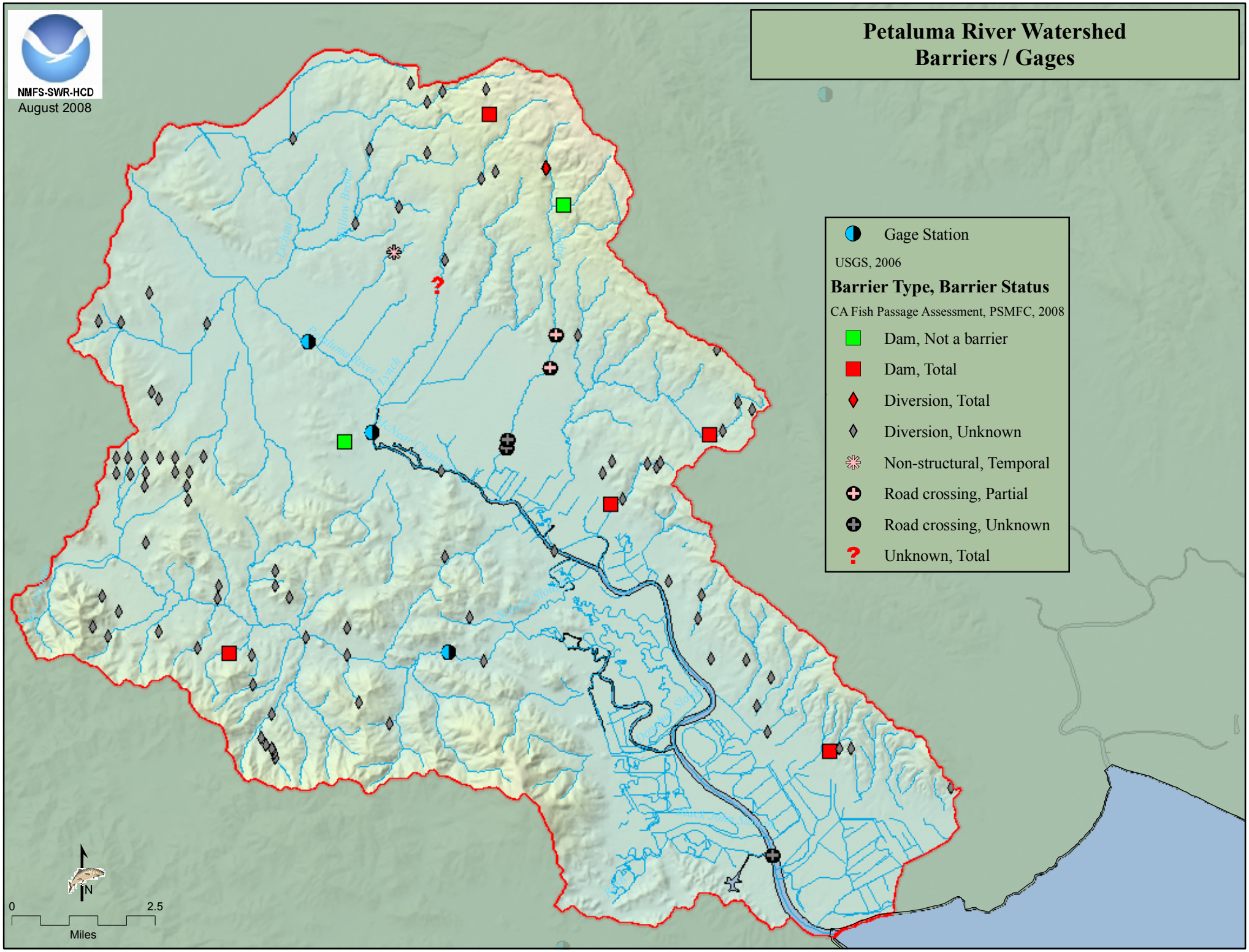


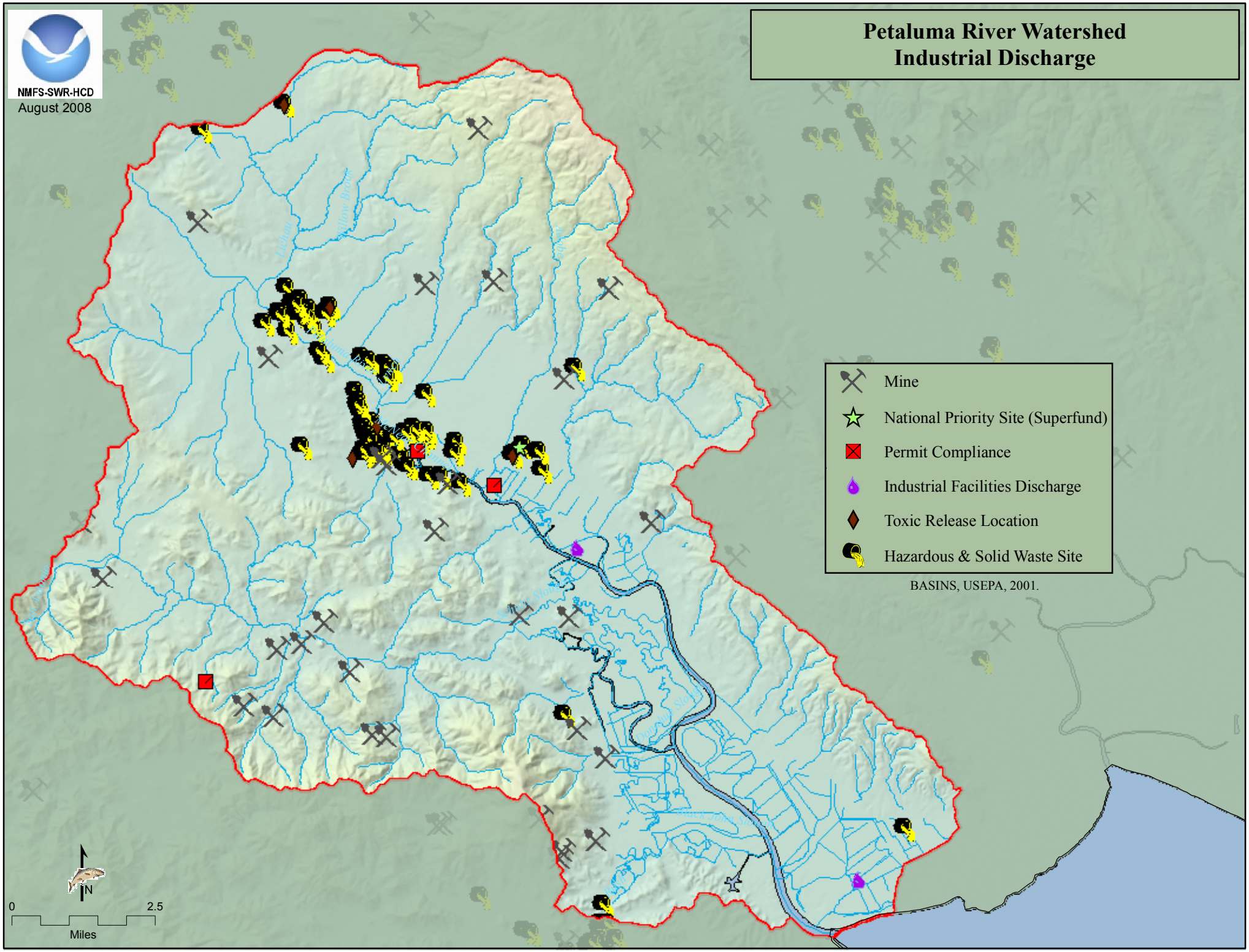
Petaluma River Watershed
Vegetation
NMFS-SWR-HCD
August 2008
WHR13 Vegetation Classification
California Department of Forestry, 2002.100 meter Grid
Agriculture - 16%
Barren/Other
Conifer Forest
Hardwood Forest - 10%
Hardwood Woodland - 1%
Herbaceous - 45%
Shrub - 1%
Urban - 18%
Water - 2%
Wetland - 6%
Lichau
Petaluma River Lynch
McNear Channel
Schultz Slough
Donahue Slough
Black Tom Slough
San Antonio
N
0
2.5
Miles

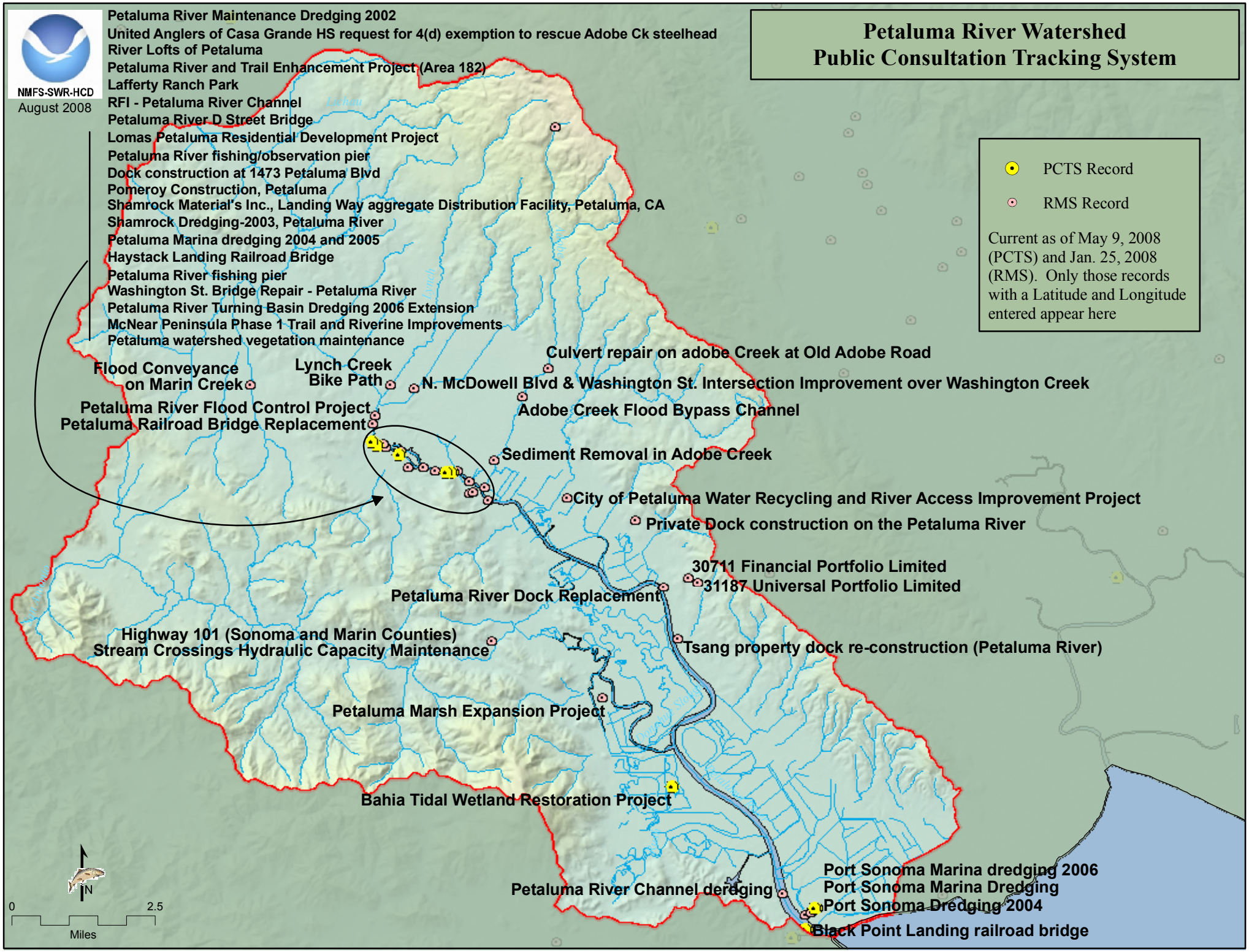


Petaluma River Watershed
Precipitation
NMFS-SWR-HCD
August 2008
1900-1960 Annual Precipitation
to 18"
to 22.5"
to 27.5"
to 35"
to 45"
Watershed
Average
26.2"
California Department
of Forestry, 1990.
1:100,000
Lichau
Willow Brook
Adobe
Petaluma River
Lynch
McNear Channel
Schultz Slough
Black John Slough
San Antonio
N
0
2.5
Miles


NMFS-SWR-HCD
August 2008
Petaluma River Watershed
Flood Zone
FEMA Flood Zones
FEMA, 1996. 1:24,000
100 Year Flood Zone
500 Year Flood Zone
Black John Slough
N
0
2.5
Miles


Petaluma River Watershed
Barriers / Gages
NMFS-SWR-HCD
August 2008
Gage Station
USGS, 2006
Barrier Type, Barrier Status
CA Fish Passage Assessment, PSMFC, 2008
Dam, Not a barrier
Dam, Total
Diversion, Total
Diversion, Unknown
Non-structural, Temporal
Road crossing, Partial
Road crossing, Unknown
Unknown, Total
N
0
2.5
Miles


Petaluma River Watershed
Industrial Discharge
NMFS-SWR-HCD
August 2008
Mine
National Priority Site (Superfund)
Permit Compliance
Industrial Facilities Discharge
Toxic Release Location
Hazardous & Solid Waste Site
BASINS, USEPA, 2001.
N
0
2.5
Miles


NMFS-SWR-HCD
August 2008
Petaluma River Watershed
Public Consultation Tracking System
Petaluma River Maintenance Dredging 2002
United Anglers of Casa Grande HS request for 4(d) exemption to rescue Adobe Ck steelhead
River Lofts of Petaluma
Petaluma River and Trail Enhancement Project (Area 182)
Lafferty Ranch Park
RFI - Petaluma River Channel
Petaluma River D Street Bridge
Lomas Petaluma Residential Development Project
Petaluma River fishing/observation pier
Dock construction at 1473 Petaluma Blvd
Pomeroy Construction, Petaluma
Shamrock Material's Inc., Landing Way aggregate Distribution Facility, Petaluma, CA
Shamrock Dredging-2003, Petaluma River
Petaluma Marina dredging 2004 and 2005
Haystack Landing Railroad Bridge
Petaluma River fishing pier
Washington St. Bridge Repair - Petaluma River
Petaluma River Turning Basin Dredging 2006 Extension
McNear Peninsula Phase 1 Trail and Riverine Improvements
Petaluma watershed vegetation maintenance
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
Culvert repair on adobe Creek at Old Adobe Road
Flood Conveyance on Marin Creek
Lynch Creek Bike Path
N. McDowell Blvd & Washington St. Intersection Improvement over Washington Creek
Petaluma River Flood Control Project
Petaluma Railroad Bridge Replacement
Adobe Creek Flood Bypass Channel
Sediment Removal in Adobe Creek
City of Petaluma Water Recycling and River Access Improvement Project
Private Dock construction on the Petaluma River
30711 Financial Portfolio Limited
31187 Universal Portfolio Limited
Petaluma River Dock Replacement
Highway 101 (Sonoma and Marin Counties) Stream Crossings Hydraulic Capacity Maintenance
Tsang property dock re-construction (Petaluma River)
Petaluma Marsh Expansion Project
Bahia Tidal Wetland Restoration Project
Petaluma River Channel dredging
Port Sonoma Marina dredging 2006
Port Sonoma Marina Dredging
Port Sonoma Dredging 2004
Black Point Landing railroad bridge
N
0
2.5
Miles

## 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**
1805 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 Protection1990
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

**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

**Imagery**
naip_1-1_2n_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
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/

**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/

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

Toxic_release_inventory
vector digital data
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