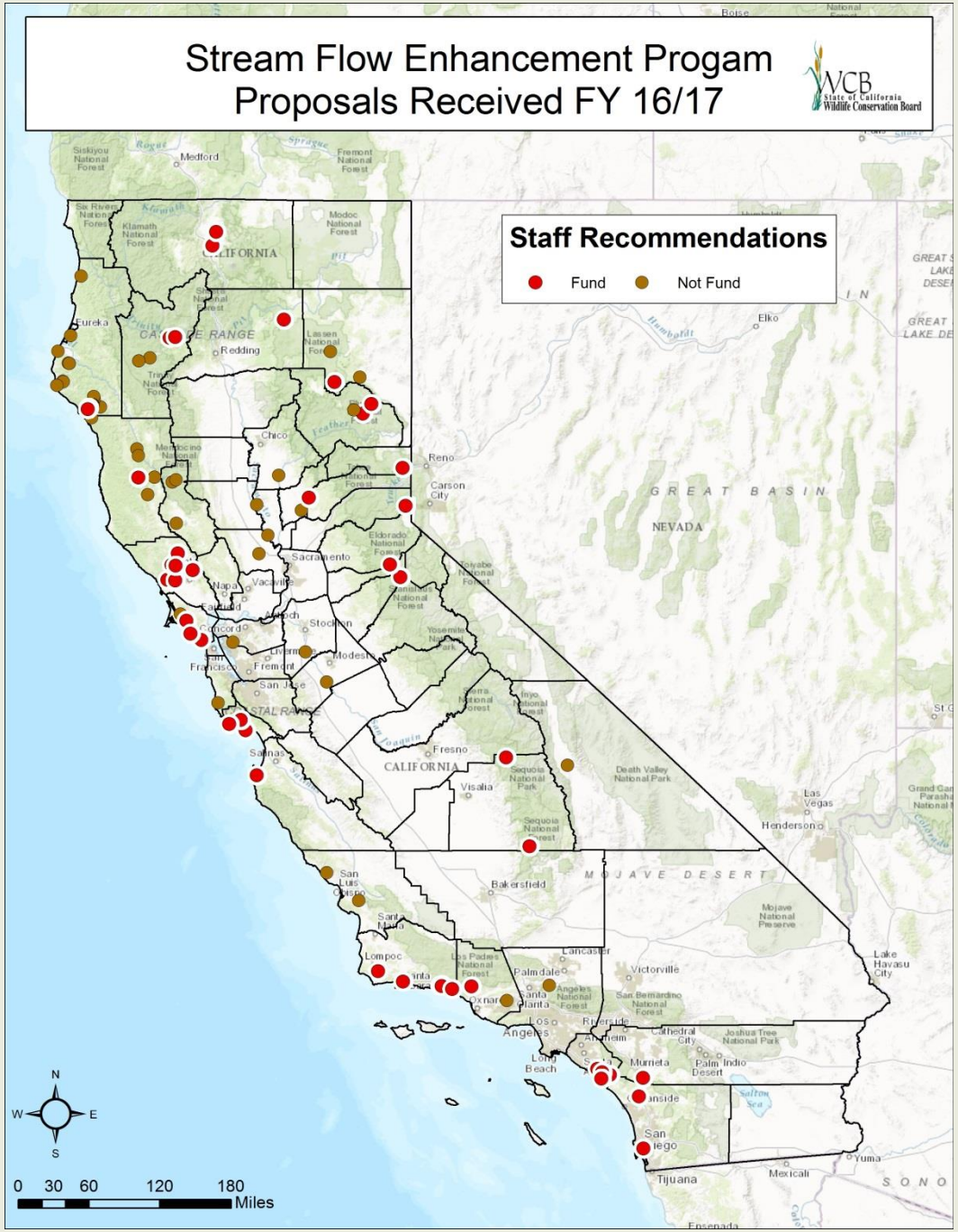
WILDLIFE CONSERVATION BOARD STREAM FLOW ENHANCEMENT PROGRAM FY 2016/17

WCB
State of California
Wildlife Conservation Board

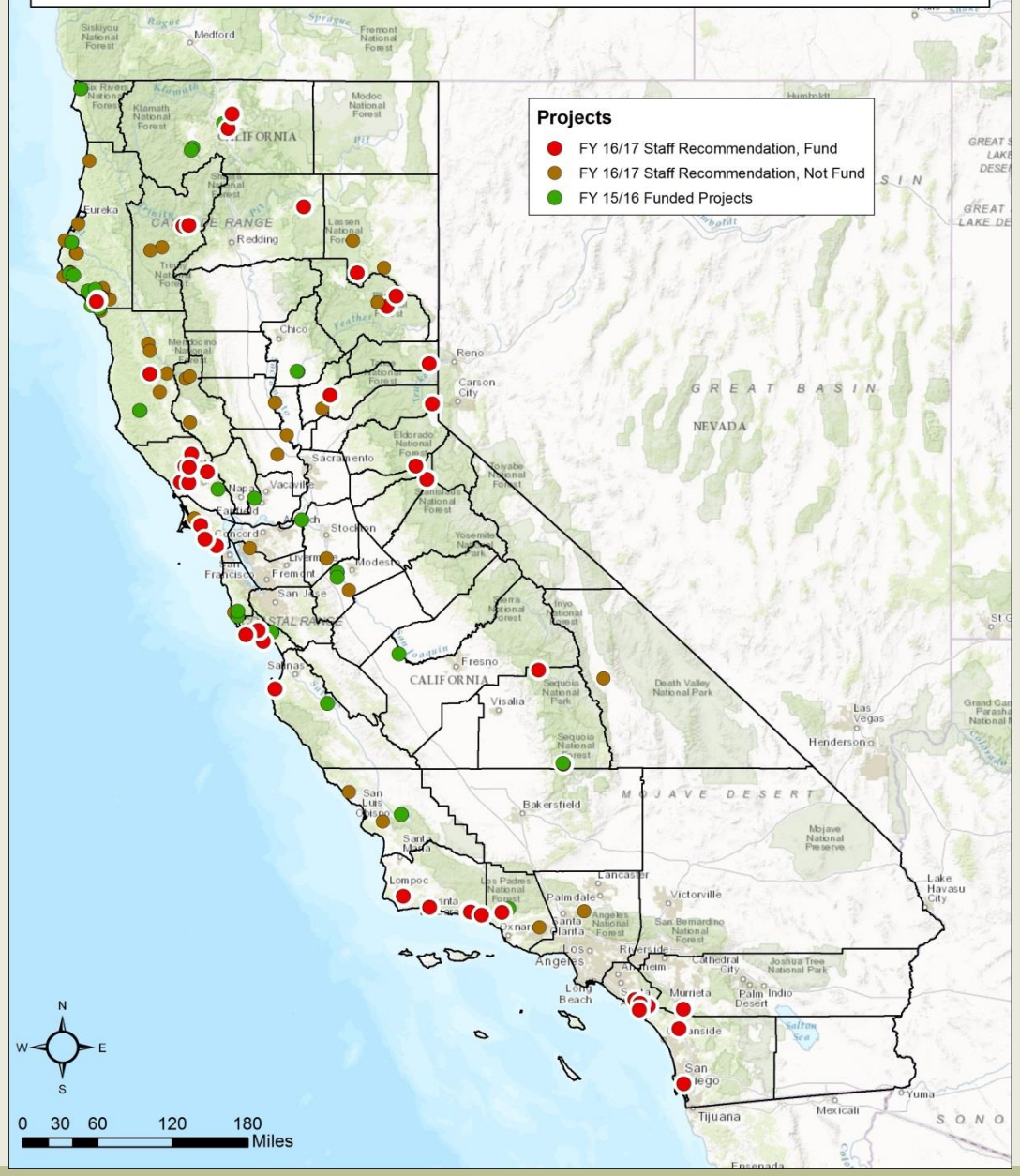
FUND ALLOCATION SUMMARY FOR WILDLIFE CONSERVATION BOARD, CALIFORNIA STREAM FLOW ENHANCEMENT PROGRAM FY 2016/17

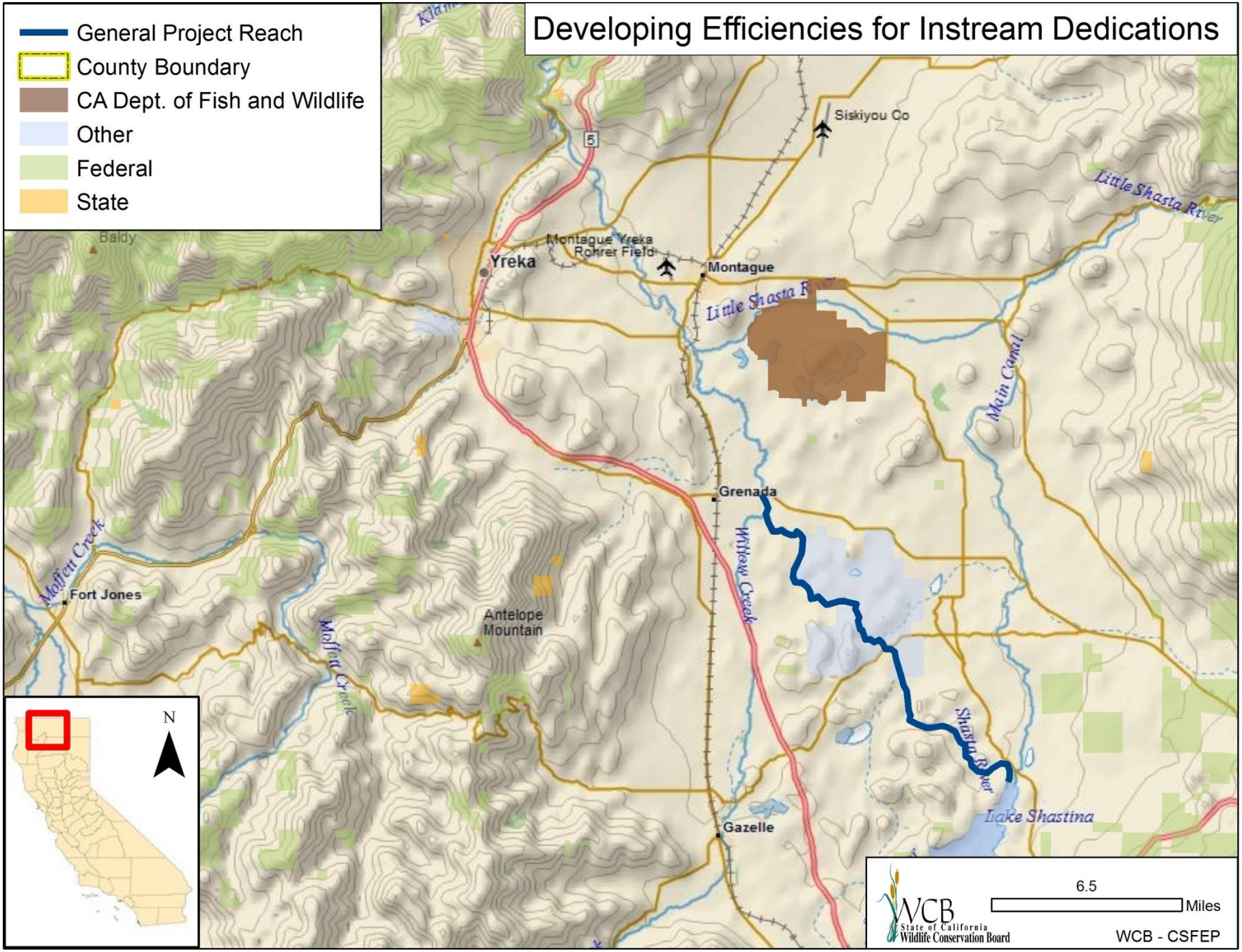
	WCB Prop 1 Funds Available for FY 2016/17	Number of Projects Received	Requested Funds	Number of Projects Recommended for Funding	Funds to be Allocated for Recommended Projects
Planning	$5,000,000.00	38	$13,117,251.37	13	$5,000,000.00
Implementation	$33,400,000.00	24	$32,983,187.38	10	$10,371,736.00
Acquisition		4	$12,015,466.00	1	$4,520,000.00
FY 15/16 Remaining Funds	18,243,722.00				
Totals	$56,643,722.00	66	$58,115,904.75	24	$19,891,736.00

Stream Flow Enhancement Progam
Proposals Received FY 16/17



Stream Flow Enhancement Progam
FY 15/16 & FY 16/17




Developing Efficiencies for Instream Dedications
General Project Reach
County Boundary
CA Dept. of Fish and Wildlife
Other
Federal
State
Siskiyou Co
Little Shasta River
Baldy
Montague Yreka Rohrer Field
Yreka
Montague
Little Shasta River
Main Canal
Grenada
Willow Creek
Moffett Creek
Fort Jones
Antelope Mountain
Moffett Creek
Shasta River
Lake Shastina
Gazelle
N
6.5
Miles
WCB
State of California
Wildlife Conservation Board
WCB - CSFEP

#3 DEVELOPING EFFICIENCIES FOR INSTREAM DEDICATIONS

Challenge:

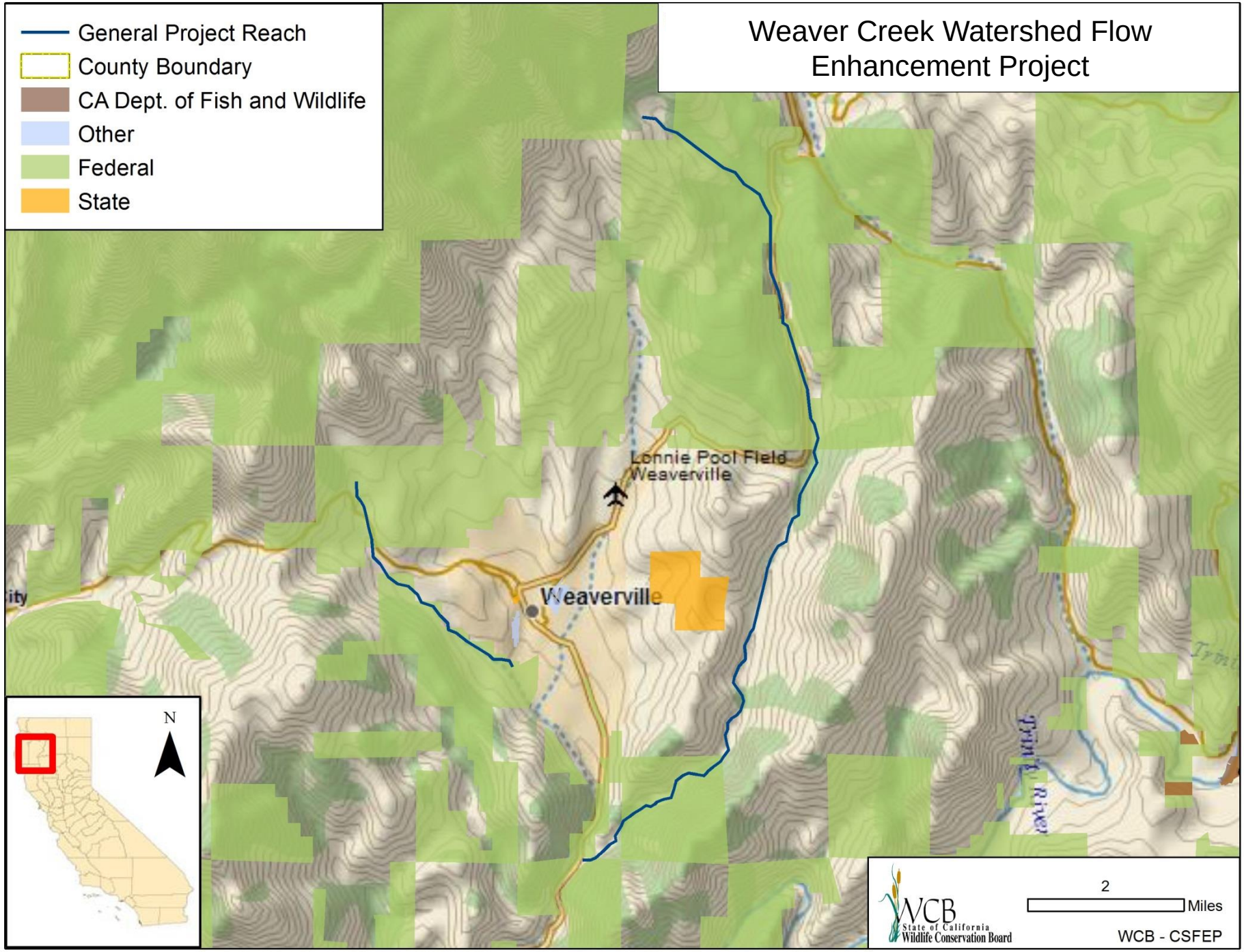
- Water rights that do not legally have fish and wildlife preservation and enhancement listed as a beneficial use cannot be left instream without risk of diversion by other water users

- The petition to change the allowable use of a water right to instream uses is known as a California Water Code (CWC) § 1707 transfer and process can be complex and extensive, including a consumptive use analysis.

#3 DEVELOPING EFFICIENCIES FOR INSTREAM DEDICATIONS

Objective(s):

- Conduct a pilot program that will batch petitions for change under CWC § 1707 on the upper Shasta River
  - Develop a concise guide to water rights and compliance
- For some types of 1707 changes, the amount of water that can be dedicated to instream flow is limited to the amount of water that would have been ***consumptively used***
  - Project will develop recommendations for conducting consumptive use analyses to support future instream flow transactions in California


Weaver Creek Watershed Flow Enhancement Project
General Project Reach
County Boundary
CA Dept. of Fish and Wildlife
Other
Federal
State
Lonnie Pool Field
Weaverville
Weaverville
Trinity River
N
2
Miles
WCB
State of California
Wildlife Conservation Board
WCB - CSFEP

#4 WEAVER CREEK WATERSHED FLOW ENHANCEMENT PROJECT

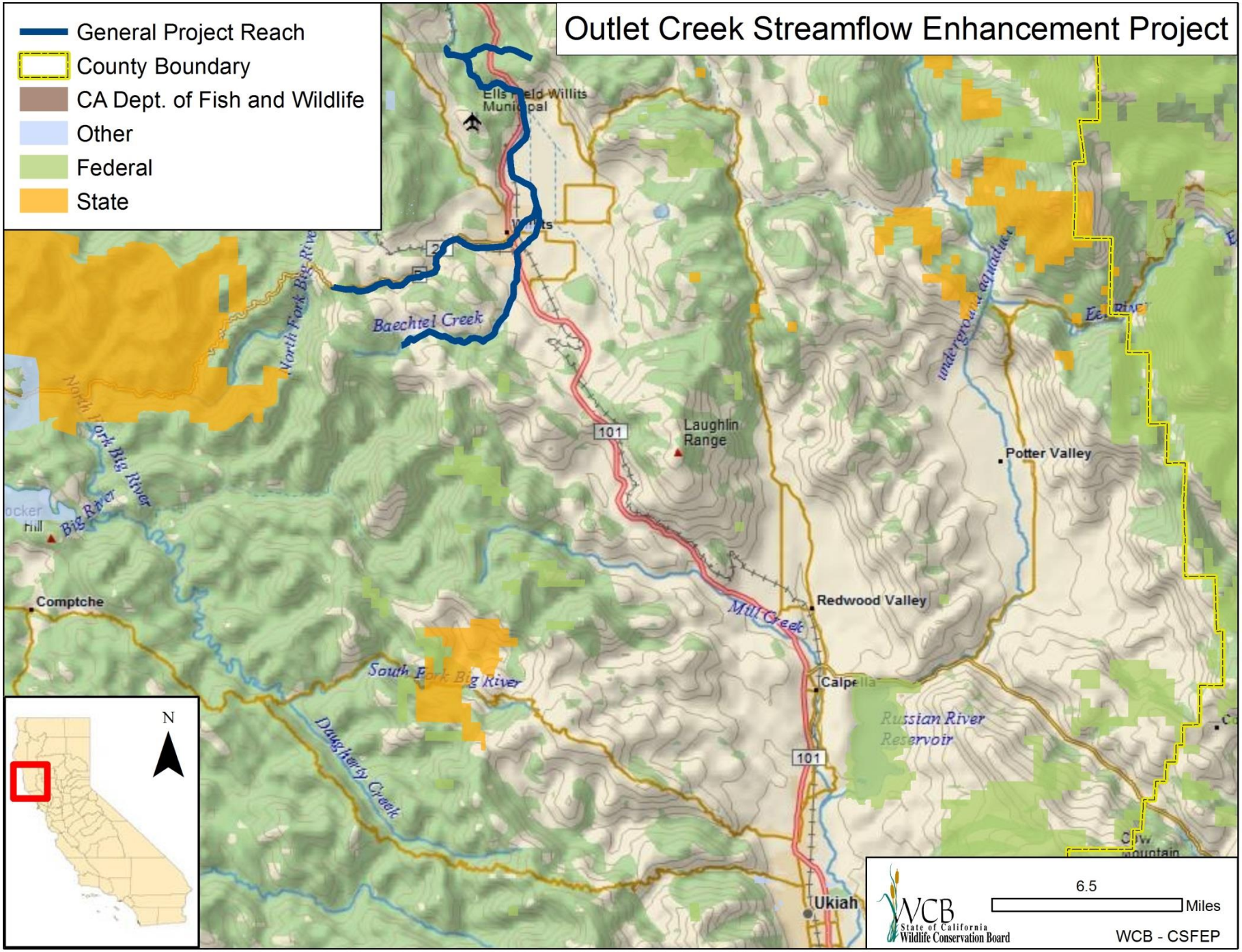
Challenge:

- Historic hydraulic mining from the gold rush era, through the early part of the last century, reshaped the landscape and dredged all the major streams
- Fire exclusion over the last 35 years, combined with the recent drought, has generated dangerous fuel loads

#4 WEAVER CREEK WATERSHED FLOW ENHANCEMENT PROJECT

Objective(s):

- Provide the foundation for future implementation projects that will support threatened anadromous fish by improving habitat and enhancing stream flow in the Weaver Creek Watershed through:
    - weed removal
    - fuel reduction
    - water conservation
    - channel rehabilitation


Outlet Creek Streamflow Enhancement Project
General Project Reach
County Boundary
CA Dept. of Fish and Wildlife
Other
Federal
State
Ellis Field Willits Municipal
Willits
Baechtel Creek
North Fork Big River
Big River
Laughlin Range
101
Potter Valley
Redwood Valley
Mill Creek
Comptche
South Fork Big River
Daugherty Creek
Calpella
Russian River Reservoir
Ukiah
N
6.5
Miles
WCB
State of California
Wildlife Conservation Board
WCB - CSFEP

#5 OUTLET CREEK STREAMFLOW ENHANCEMENT PROJECT

Challenge:

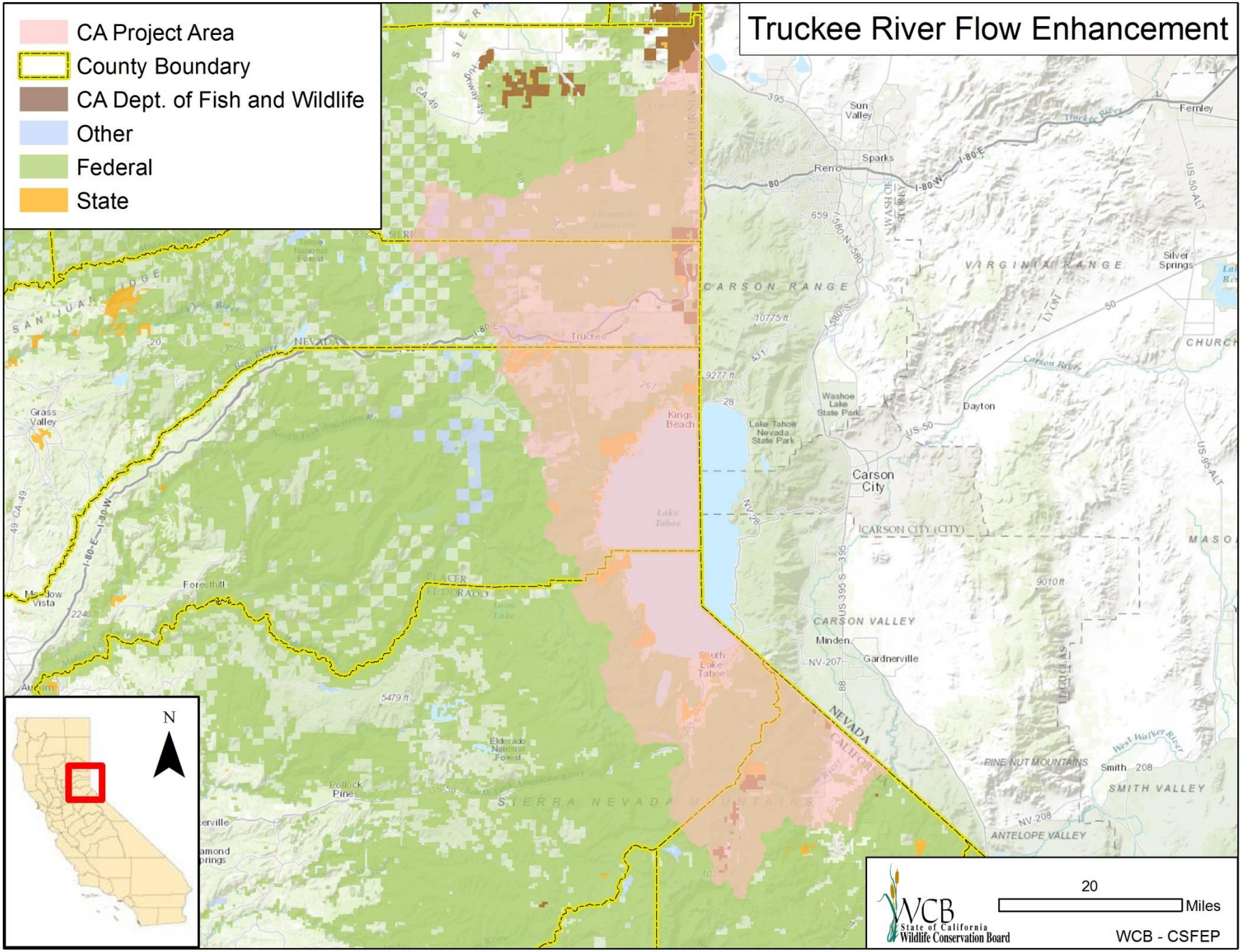
- Low dry season streamflow has been identified as a major limiting factor for coho in tributaries to Outlet Creek, and the NMFS coho Recovery Plan calls for the development and implementation of a forbearance program to reduce summer diversion as a high priority recovery action

#5 OUTLET CREEK STREAMFLOW ENHANCEMENT PROJECT

Objective(s):

- Establish the first on-the-ground water storage program to reduce summer diversions in tributaries of Outlet Creek

- Objectives include:
  - collecting streamflow data
  - quantifying existing human water use
  - identifying alternative sources of water
  - identifying the most promising project types and locations for increasing stream flows
  - landowner outreach


Truckee River Flow Enhancement
CA Project Area
County Boundary
CA Dept. of Fish and Wildlife
Other
Federal
State
N
20
Miles
WCB
State of California
Wildlife Conservation Board
WCB - CSFEP
Sun Valley
Sparks
Reno
Fernley
Silver Springs
VIRGINIA RANGE
CARSON RANGE
Truckee
Kings Beach
Lake Tahoe
Washoe Lake State Park
Lake Tahoe Nevada State Park
Dayton
Carson City
CARSON CITY (CITY)
CARSON VALLEY
Minden
Gardnerville
Grass Valley
Foresthill
Meadow Vista
Auburn
Pollock Pines
SIERRA NEVADA MOUNTAINS
PINE NUT MOUNTAINS
Smith
SMITH VALLEY
ANTELOPE VALLEY
NEVADA
CALIFORNIA

#6 TRUCKEE RIVER FLOW ENHANCEMENT

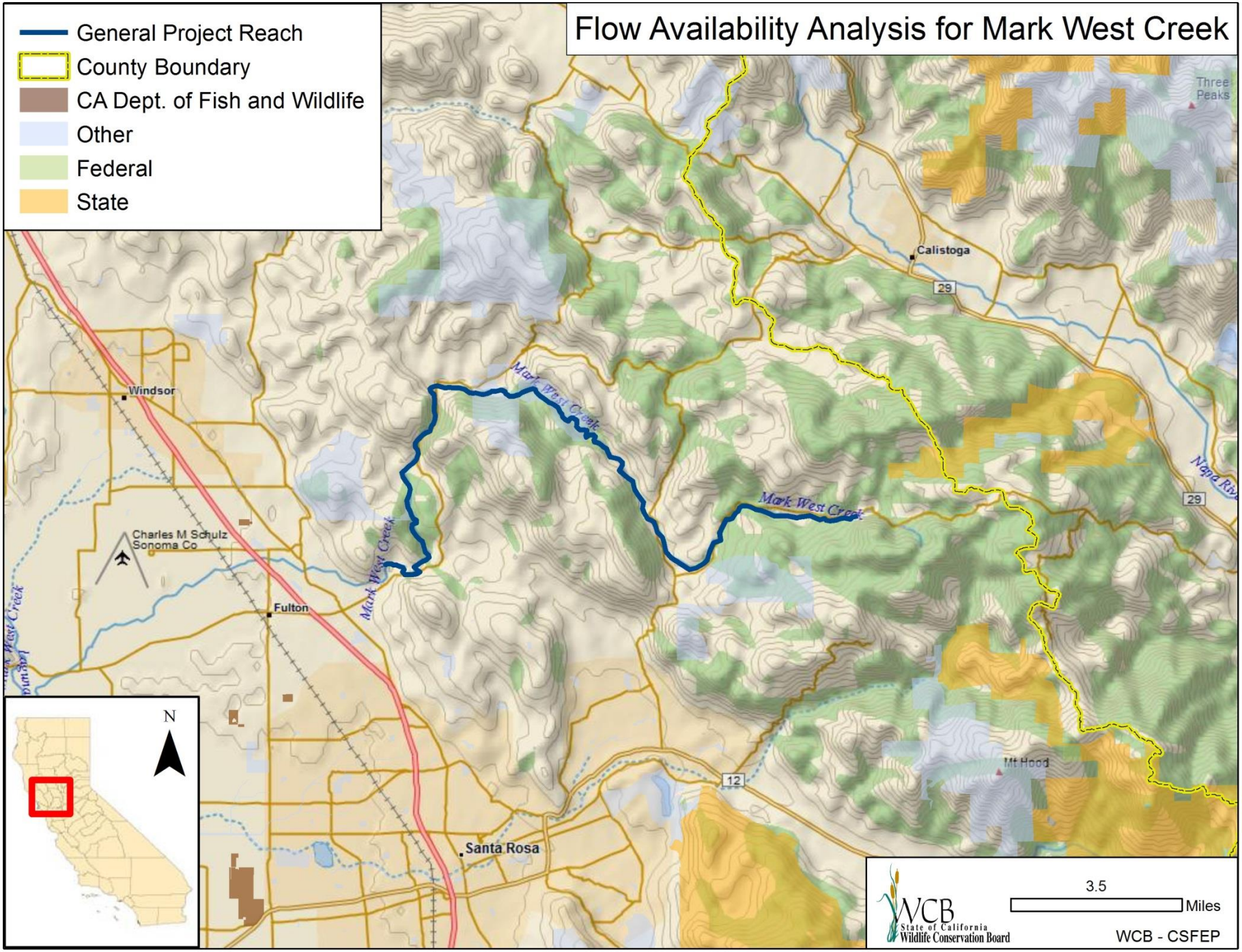
Challenge:

- Truckee River Operations Agreement
  - DWR is the Scheduling Party for the State of California
    - DWR integrates data from a wide variety of stakeholders but relies on CDFW for biological data
- Outdated data:
  - flow-habitat relationship data and flow recommendations are based on data from a 1996 study completed by CDFW - now over 20 years old.

#6 TRUCKEE RIVER FLOW ENHANCEMENT

Objective(s):

- Update flow recommendations in the TROA California Guidelines
  - Habitat Suitability Determination (field habitat typing)
  - Inundation mapping
  - Incorporation of flow targets into CA. Guidelines
  - Ramping rates establishment
  - Hydraulic studies for flushing flows and weed management
  - Due diligence to facilitate water rights acquisition
  - Identification of existing water rights and willing sellers
  - Local stakeholder coordination (TRWC will participate in monthly planning meetings between DWR, DFW, and the TRBWG chair to set agendas, identify speakers, and outline future agenda items)
  - Technical meeting participation


Flow Availability Analysis for Mark West Creek
General Project Reach
County Boundary
CA Dept. of Fish and Wildlife
Other
Federal
State
Three Peaks
Calistoga
29
Windsor
Mark West Creek
Mark West Creek
Mark West Creek
Napa Riv
Charles M Schulz Sonoma Co
Fulton
Mark West Creek
Mt Hood
12
Santa Rosa
N
3.5
Miles
WCB
State of California
Wildlife Conservation Board
WCB - CSFEP

#7 FLOW AVAILABILITY ANALYSIS FOR MARK WEST CREEK

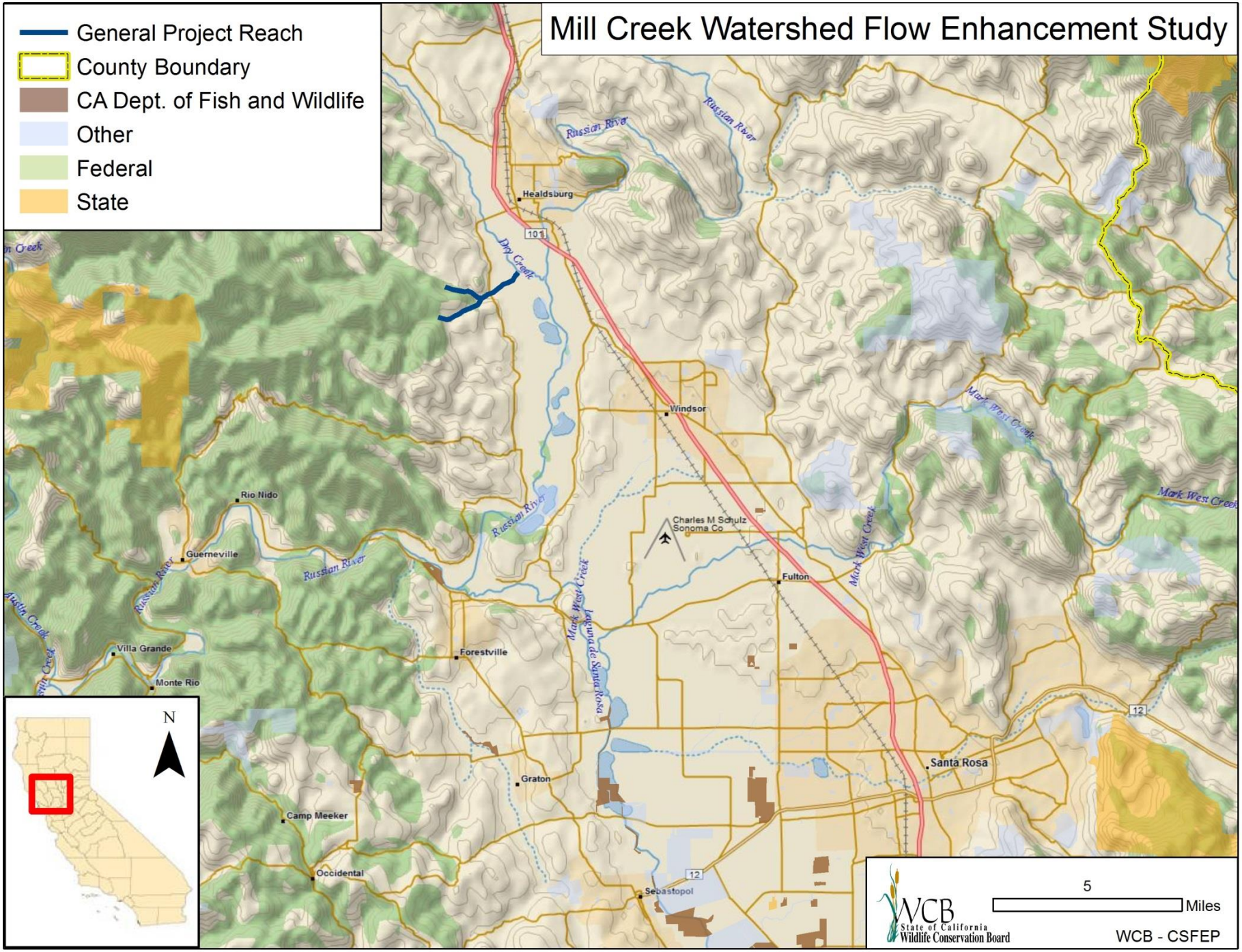
Challenge:

- Currently, insufficient summer streamflows, low dissolved oxygen levels, and disconnected pools are the limiting factors impacting Mark West Creek

#7 FLOW AVAILABILITY ANALYSIS FOR MARK WEST CREEK

Objective(s):

- Generate restoration prioritization maps which identify where flow enhancement projects would provide the greatest coho benefits.
  - integrated hydrologic model - The model will provide the basis for describing spatial and temporal variations in hydrologic conditions throughout the watershed.


Mill Creek Watershed Flow Enhancement Study
General Project Reach
County Boundary
CA Dept. of Fish and Wildlife
Other
Federal
State
Russian River
Healdsburg
101
Dry Creek
Windsor
Mark West Creek
Rio Nido
Guerneville
Charles M Schulz Sonoma Co
Fulton
Austin Creek
Villa Grande
Monte Rio
Forestville
Laguna de Santa Rosa
Graton
Santa Rosa
12
Camp Meeker
Occidental
Sebastopol
N
5
Miles
WCB
State of California
Wildlife Conservation Board
WCB - CSFEP

#8 MILL CREEK WATERSHED FLOW ENHANCEMENT STUDY

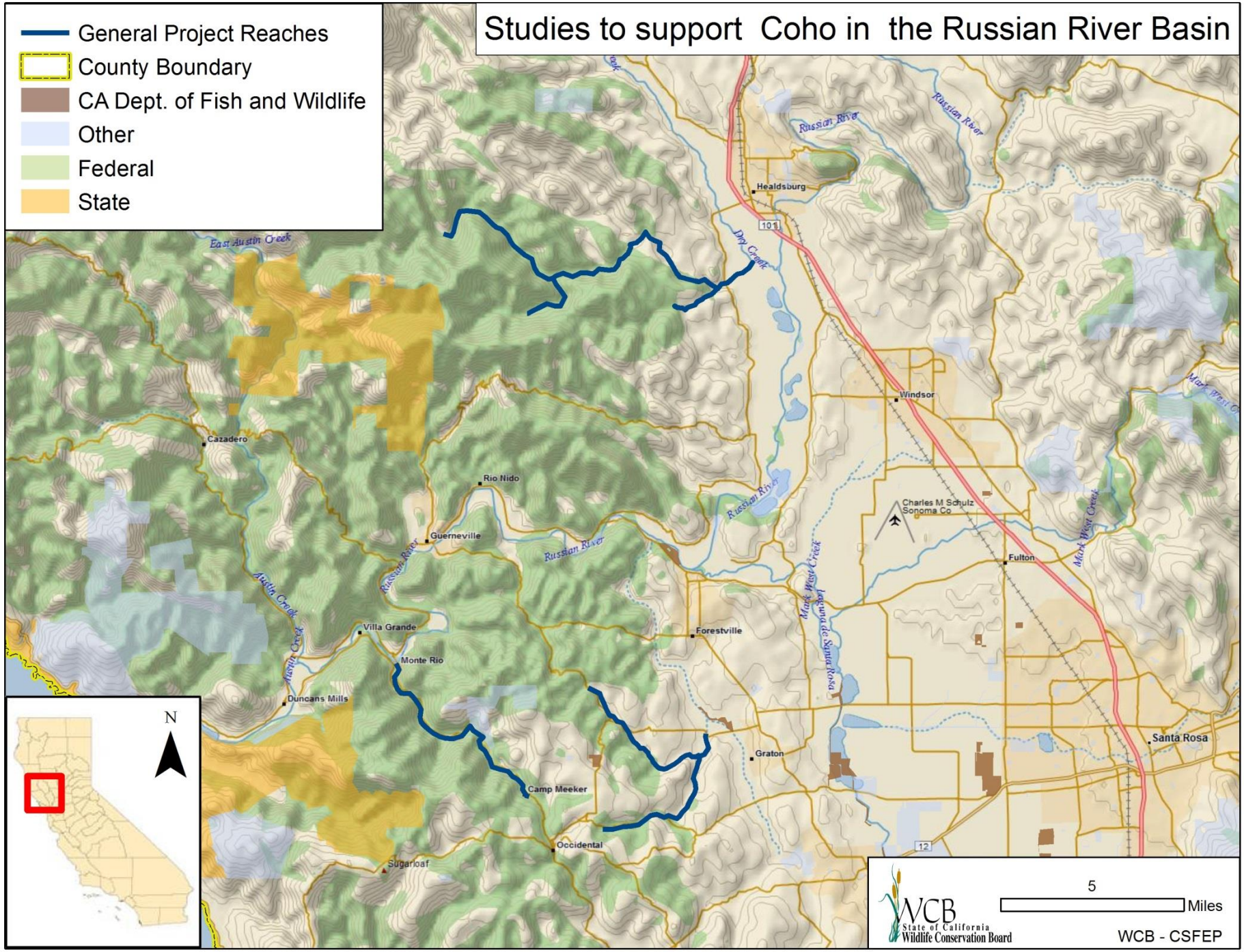
Challenge:

- NMFS has identified Mill Creek as a Core Area for Coho protection and restoration
- Insufficient summer streamflow, low dissolved oxygen levels, and disconnected pools are considered limiting factors in the Mill Creek Watershed

#8 MILL CREEK WATERSHED FLOW ENHANCEMENT STUDY

Objective(s):

- Generate restoration prioritization maps that identify reaches that are likely to provide the greatest habitat value and where flow enhancement projects would be most beneficial.
  - integrated hydrologic model - The model will provide the basis for describing spatial and temporal variations in hydrologic conditions throughout the watershed.


Studies to support Coho in the Russian River Basin
General Project Reaches
County Boundary
CA Dept. of Fish and Wildlife
Other
Federal
State
Healdsburg
Russian River
Dry Creek
East Austin Creek
Windsor
Cazadero
Rio Nido
Guerneville
Charles M Schulz Sonoma Co
Fulton
Mark West Creek
Austin Creek
Martin Creek
Villa Grande
Monte Rio
Forestville
Santa Rosa Creek
Duncans Mills
Graton
Santa Rosa
Camp Meeker
Occidental
Sugarloaf
101
12
N
5
Miles
WCB
State of California
Wildlife Conservation Board
WCB - CSFEP

#9 STUDIES TO SUPPORT COHO IN THE RUSSIAN RIVER BASIN

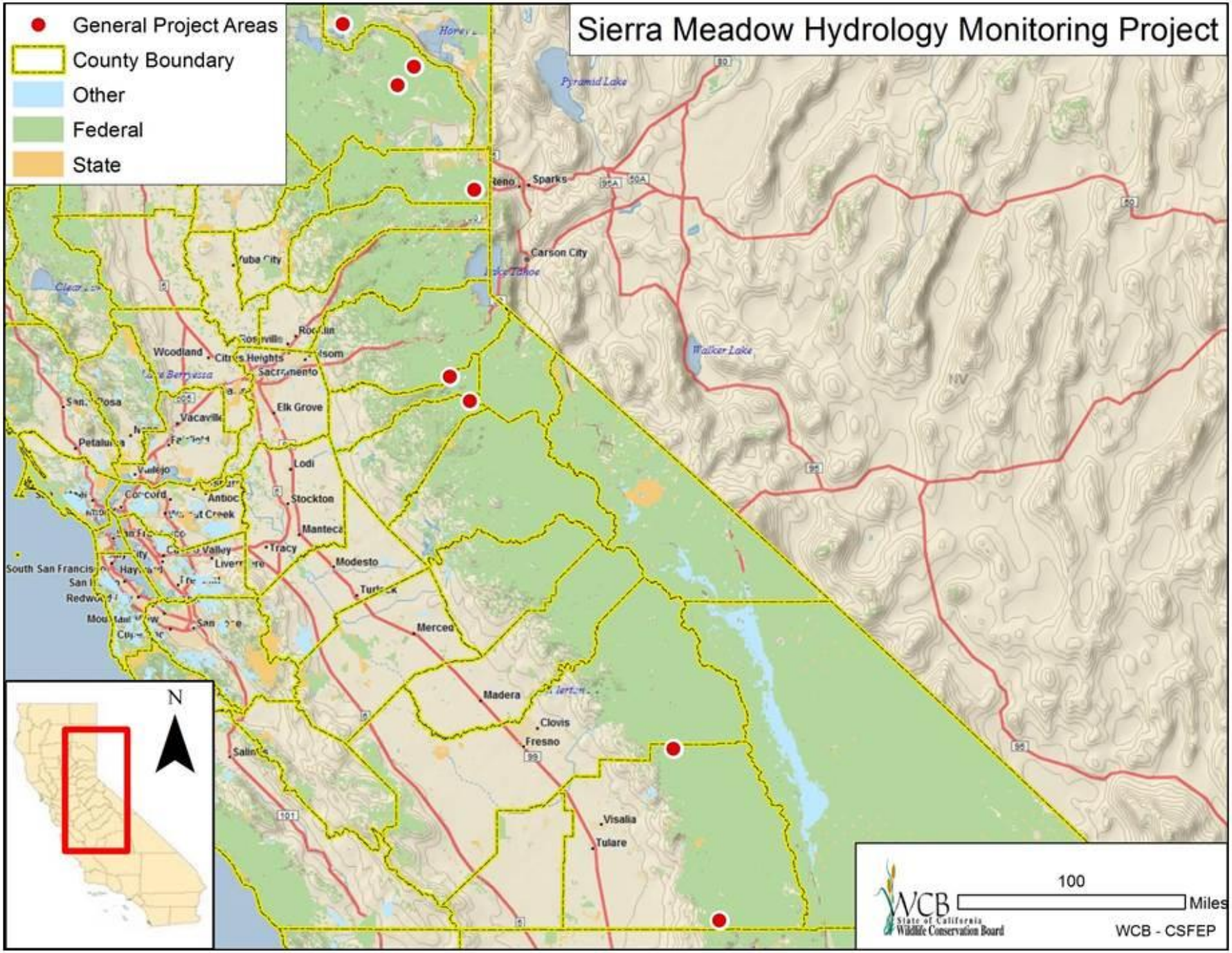
Challenge:

- Streams in project reach have been identified by CDFW and NOAA Fisheries as flow-impaired streams
  - CDFW has rescued thousands of juvenile salmonids from drying pools throughout the Russian River watershed during drought years - relocating them to reaches with suitable flow.
- Need for rigorous monitoring and scientific analysis to evaluate and improve the effectiveness of flow enhancement projects.

#9 STUDIES TO SUPPORT COHO IN THE RUSSIAN RIVER BASIN

Objective(s):

- Develop predictive models relating stream flow, environmental metrics, and juvenile coho salmon survival in small coastal California streams.
- Document and model wetted habitat conditions in Dutch Bill, Green Valley, and Mill creeks in relation to stream flow and fish distribution, and build a predictive model for surface water recession.


Sierra Meadow Hydrology Monitoring Project
General Project Areas
County Boundary
Other
Federal
State
Pyramid Lake
Sparks
Carson City
Lake Tahoe
Walker Lake
Yuba City
Woodland
Citrus Heights
Folsom
Sacramento
Elk Grove
Vacaville
Petaluma
Vallejo
Lodi
Stockton
Antioch
Concord
Manteca
Tracy
Modesto
Livermore
South San Francisco
Hayward
Turlock
Merced
Madera
Clovis
Fresno
Salinas
Visalia
Tulare
N
100
Miles
WCB
State of California
Wildlife Conservation Board
WCB - CSFEP

#10 SIERRA MEADOW HYDROLOGY MONITORING PROJECT

Challenge:

- Quantifying improvement in hydrologic function from restoration of degraded meadows, onsite and downstream, has been difficult.
- Numerous studies on individual restored meadows in short time frames (2-5 years) have shown a wide range of outcomes.
  - Estimates of potential water retention and release from restored meadows in the Sierra Nevada vary by an order of magnitude, approximately 50,000 to 500,000 acre-feet annually.

#10 SIERRA MEADOW HYDROLOGY MONITORING PROJECT

Objective(s):

- Collect baseline pre-restoration and post-restoration hydrologic data on a suite of meadow restoration projects representing a range of watershed characteristics.
  - All the meadow systems will be restored in the next 2-3 years, or have already been restored.
- Assess the effectiveness of, and demonstrate the link between meadow hydrologic conditions and enhanced stream flows emanating from restoration of degraded meadows.

Green Gulch Creek Water Conservation
General Project Area
County Boundary
CA Dept. of Fish and Wildlife
Other
Federal
State
Corte Madera
Mill Valley
101
1
Belvedere
Sausalito
Angel Island
Golden Gate National Recreation Area
580
Treasure Island
80
Ghirardelli Square
Union Square
San Francisco
AT&T Park
Golden Gate Park
35
N
3.5
Miles
WCB
State of California
Wildlife Conservation Board
WCB - CSFEP

#11 GREEN GULCH CREEK WATER CONSERVATION

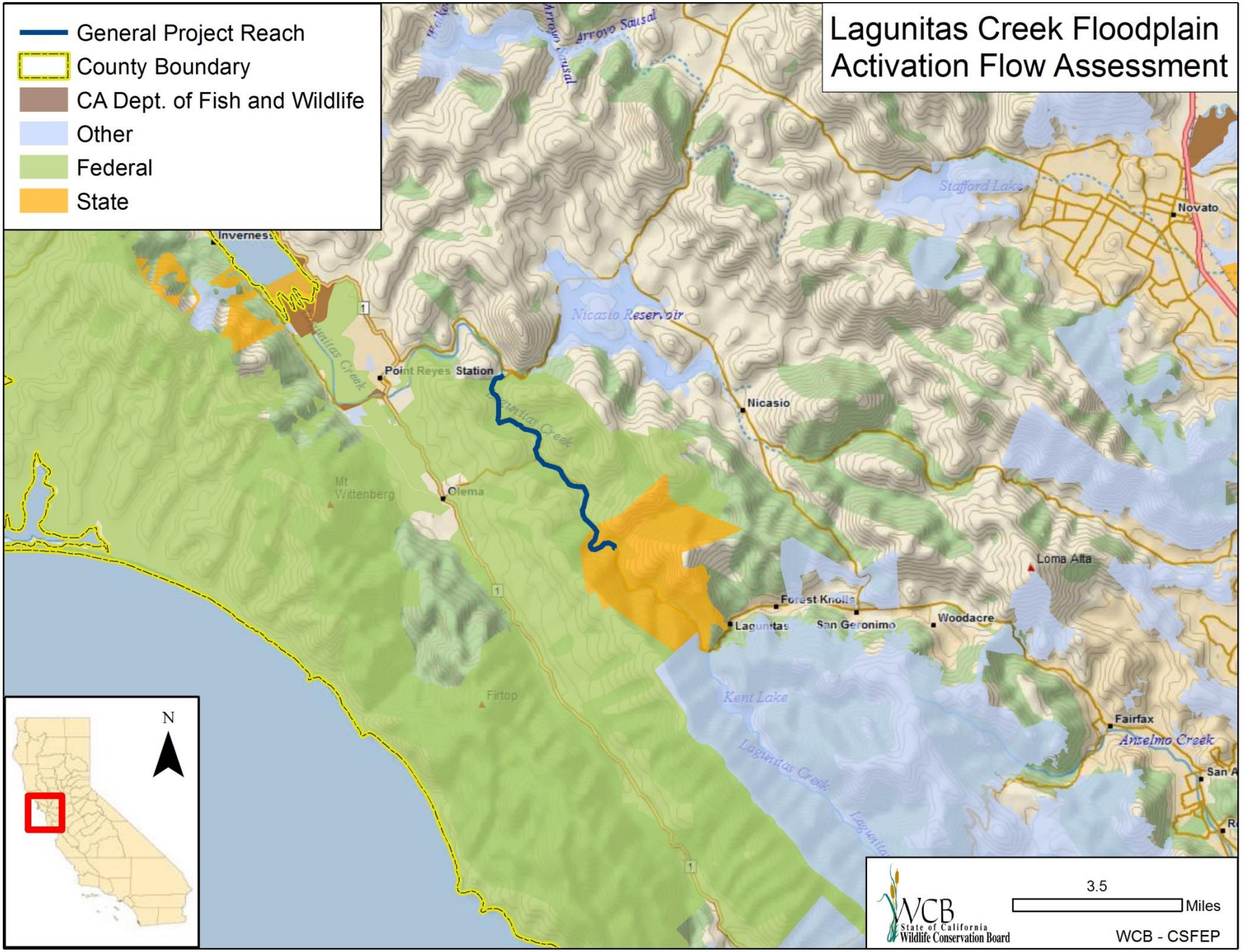
Challenge:

- The salmonid populations have been negatively impacted by the drought, with typically viable summer rearing locations drying up or becoming uninhabitable due to temperature and dissolved oxygen conditions.
- Green Gulch Farm uses stored water (on- and off-channel ponds) and riparian diversions to irrigate their organic vegetable fields and gardens. These fields and diversions are located just upstream of recently restored reach and likely reduce streamflows during the spring and summer.

#11 GREEN GULCH CREEK WATER CONSERVATION

Objective(s):

- Compile and analyze the water use data and map the Farm's current water management system to improve efficiency.
- Identify a method for achieving flow enhancement through modifications to the operation of an instream pond and a shallow near-channel well benefiting late spring and summer flow rates in Green Gulch Creek during average and dry years.


Lagunitas Creek Floodplain Activation Flow Assessment
General Project Reach
County Boundary
CA Dept. of Fish and Wildlife
Other
Federal
State
Arroyo Sausal
Stafford Lake
Novato
Nicasio Reservoir
Point Reyes Station
Nicasio
Olema
Mt Wittenberg
Loma Alta
Forest Knolls
Lagunitas
San Geronimo
Woodacre
Kent Lake
Fairfax
Anselmo Creek
Firtop
N
3.5
Miles
WCB
State of California
Wildlife Conservation Board
WCB - CSFEP

#12 LAGUNITAS CREEK FLOODPLAIN ACTIVATION FLOW ASSESSMENT

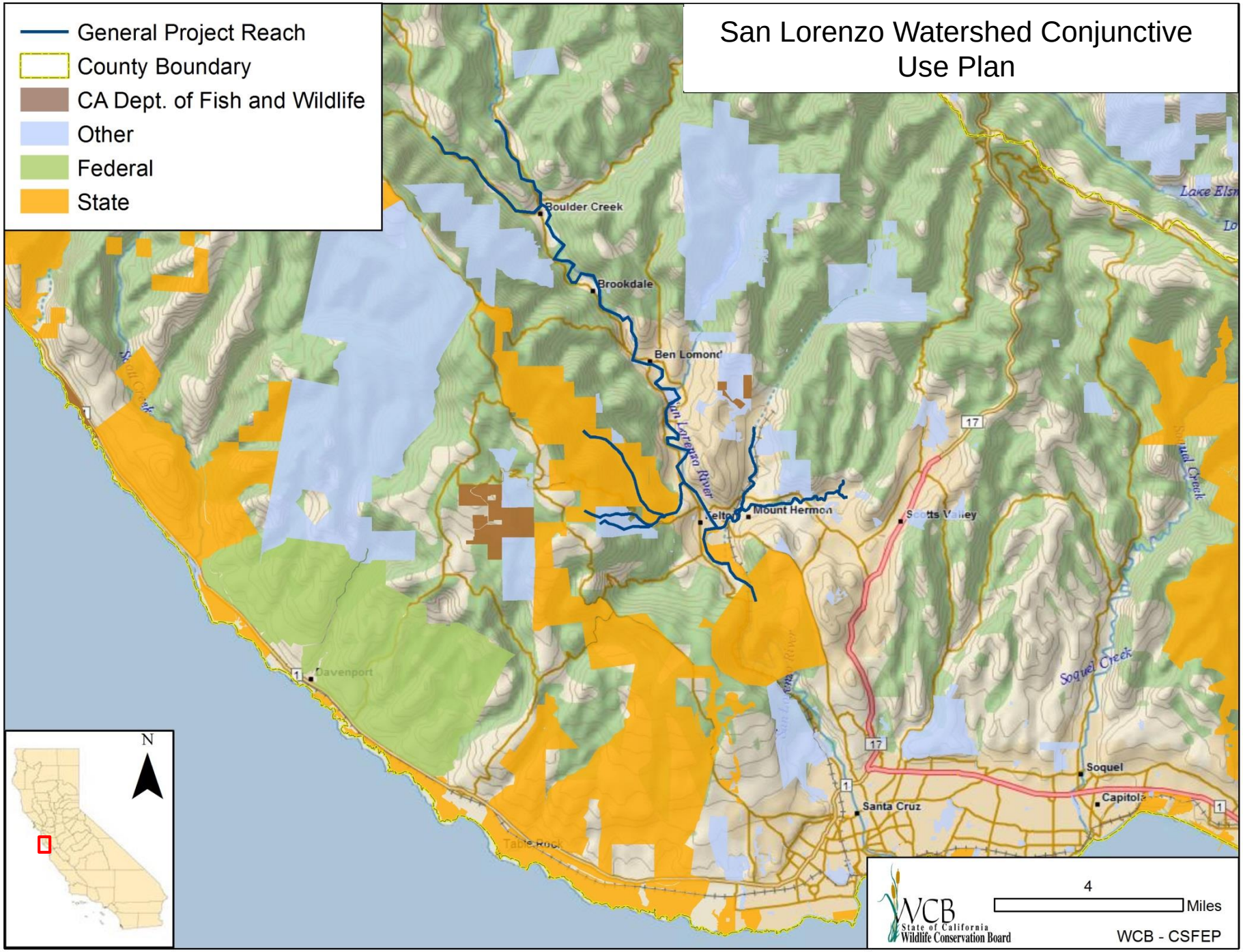
Challenge:

- Current water releases from Peters Dam were set under Water Board Order: WR 95-17 and are now 21 years old.
- The water releases do not account for the new knowledge acquired on habitat needs, limiting factors analysis, and instream flow requirements for salmonids.

#12 LAGUNITAS CREEK FLOODPLAIN ACTIVATION FLOW ASSESSMENT

Objective(s):

- Identify stream reaches of lower Lagunitas Creek that can benefit from restoration to facilitate floodplain enhancement and connection under the determined flow changes.
- Flow assessment will identify the magnitude, frequency, duration, timing, rate of change, and intensity of stream discharges needed for a long-term flood event that produces characteristic ecological benefits for salmonids.
- Following the identification of the floodplain activation flow, if changes to water rights are needed to improve flows, then filing a petition pursuant to Water Code Section 1707 will be planned.


San Lorenzo Watershed Conjunctive Use Plan
General Project Reach
County Boundary
CA Dept. of Fish and Wildlife
Other
Federal
State
Boulder Creek
Brookdale
Ben Lomond
Felton
Mount Hermon
Scotts Valley
Davenport
Santa Cruz
Soquel
Capitola
Soquel Creek
Table Rock
17
1
N
4
Miles
WCB
State of California
Wildlife Conservation Board
WCB - CSFEP

#13 SAN LORENZO WATERSHED CONJUNCTIVE USE PLAN

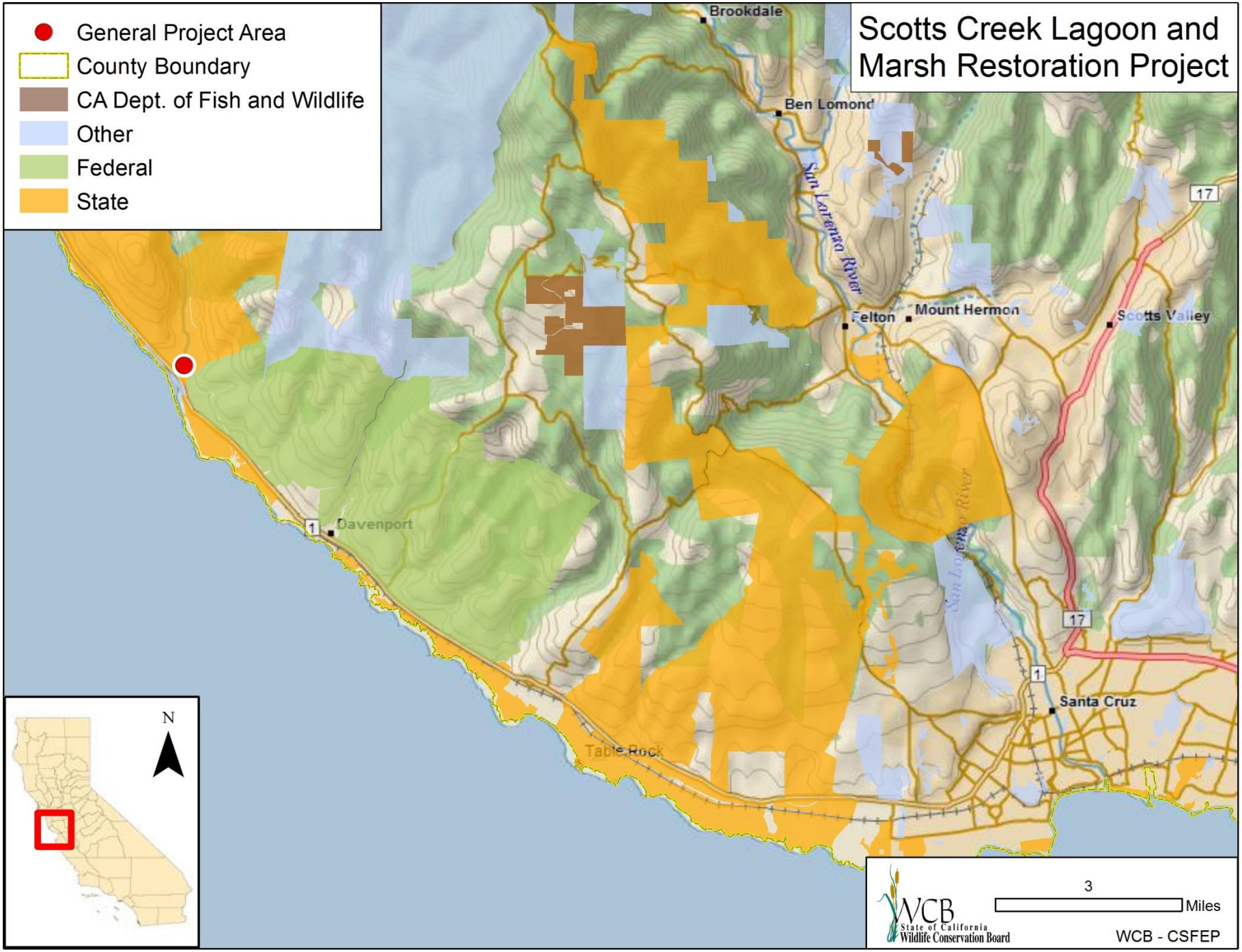
Challenge:

- Currently, the summer baseflow is considered poor for juvenile steelhead rearing as a result of the number and magnitude of water diversions. Water diversions and impoundments are also considered a very high threat to the population.

#13 SAN LORENZO WATERSHED CONJUNCTIVE USE PLAN

Objective(s):

- San Lorenzo Watershed Conjunctive Use Plan (Plan) will identify ways to enhance dry season stream flows through increased water resource management efficiencies.
  - The Plan will be based on system modelling, operational procedures and environmental analysis necessary to select the optimal management alternatives accompanied by CEQA review and water rights filings, as well as a list of recommended infrastructure upgrades.
- Allowing the Santa Margarita Groundwater Basin to rest and recharge, conjunctive use will contribute to increased basin storage, recovery, and sustainability.
  - Utilizing more groundwater during the dry season, less surface water will be diverted from streams.


Scotts Creek Lagoon and Marsh Restoration Project
General Project Area
County Boundary
CA Dept. of Fish and Wildlife
Other
Federal
State
Brookdale
Ben Lomond
San Lorenzo River
Felton
Mount Hermon
Scotts Valley
17
Davenport
1
Santa Cruz
Table Rock
N
3
Miles
WCB
State of California
Wildlife Conservation Board
WCB - CSFEP

#14 SCOTTS CREEK LAGOON AND MARSH RESTORATION PROJECT

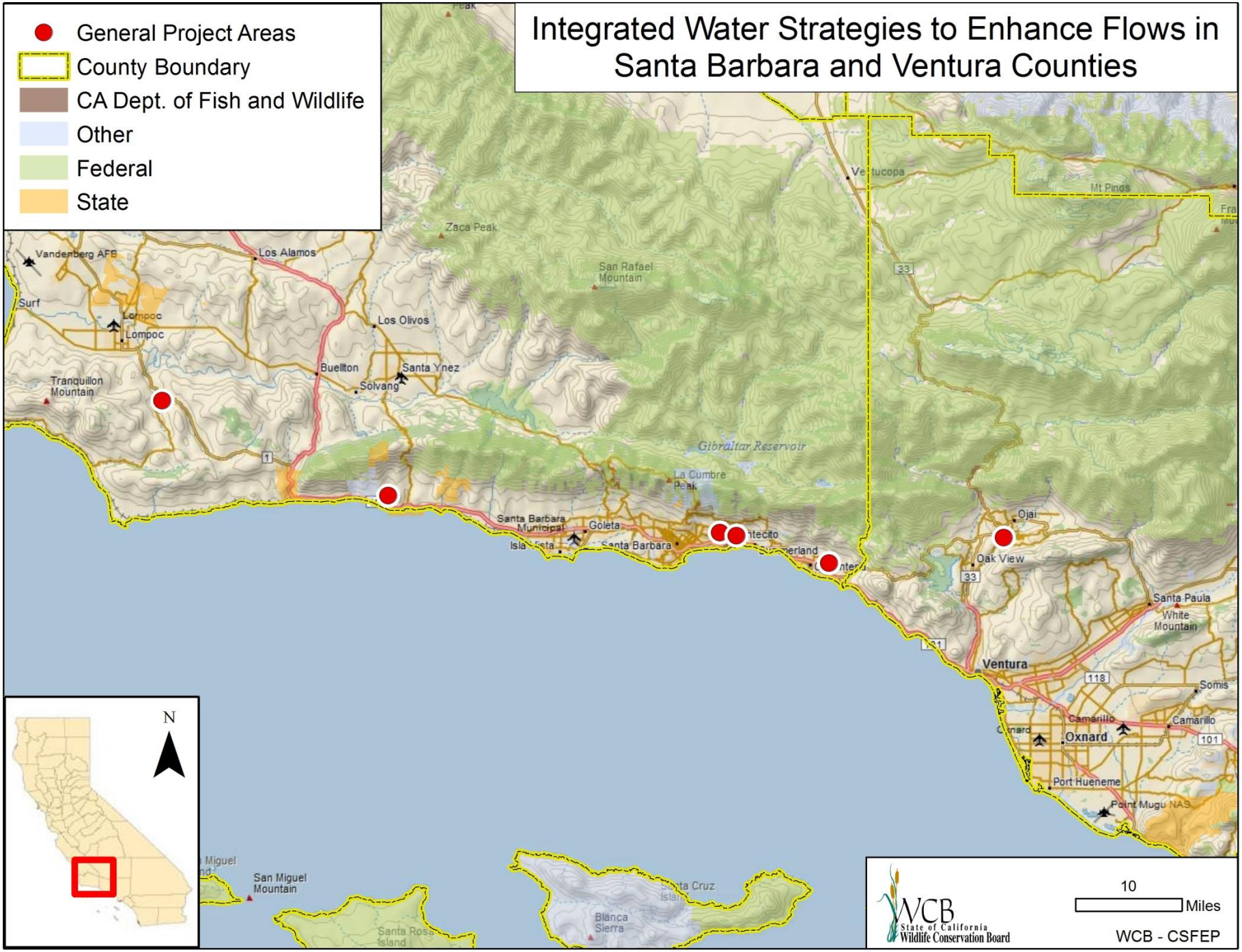
Challenge:

- Three major limiting factors have been identified for the Scotts Creek estuary and they are all linked to the current infrastructure associated with the Highway 1 crossing. These factors are:
  - Lack of hydrologic connectivity between the channel and the marshplain,
  - Lack of complexity in the main channel
  - Changes to the natural timing and duration of lagoon breaching.

#14 SCOTTS CREEK LAGOON AND MARSH RESTORATION PROJECT

Objective(s):

- Develop:
  - Quantitative tools to support scientific and consensus based decision-making
  - Restoration designs that restore ecological integrity and connectivity
  - Design of new Highway 1 transportation infrastructure that maximizes the resilience and ecological capacity of the system and anticipates impacts of climate change.


Integrated Water Strategies to Enhance Flows in Santa Barbara and Ventura Counties
General Project Areas
County Boundary
CA Dept. of Fish and Wildlife
Other
Federal
State
Vandenberg AFB
Surf
Lompoc
Los Alamos
Los Olivos
Buellton
Solvang
Santa Ynez
Tranquillon Mountain
Zaca Peak
San Rafael Mountain
Gibraltar Reservoir
La Cumbre Peak
Santa Barbara Municipal
Goleta
Santa Barbara
Ojai
Oak View
Santa Paula
White Mountain
Ventura
Somis
Camarillo
Oxnard
Port Hueneme
Point Mugu NAS
Mt Pinos
San Miguel Mountain
Santa Cruz Island
Blanca Sierra
Santa Rosa Island
N
10
Miles
WCB
State of California
Wildlife Conservation Board
WCB - CSFEP

#15 INTEGRATED WATER STRATEGIES TO ENHANCE FLOWS IN SANTA BARBARA AND VENTURA COUNTIES

Challenge:

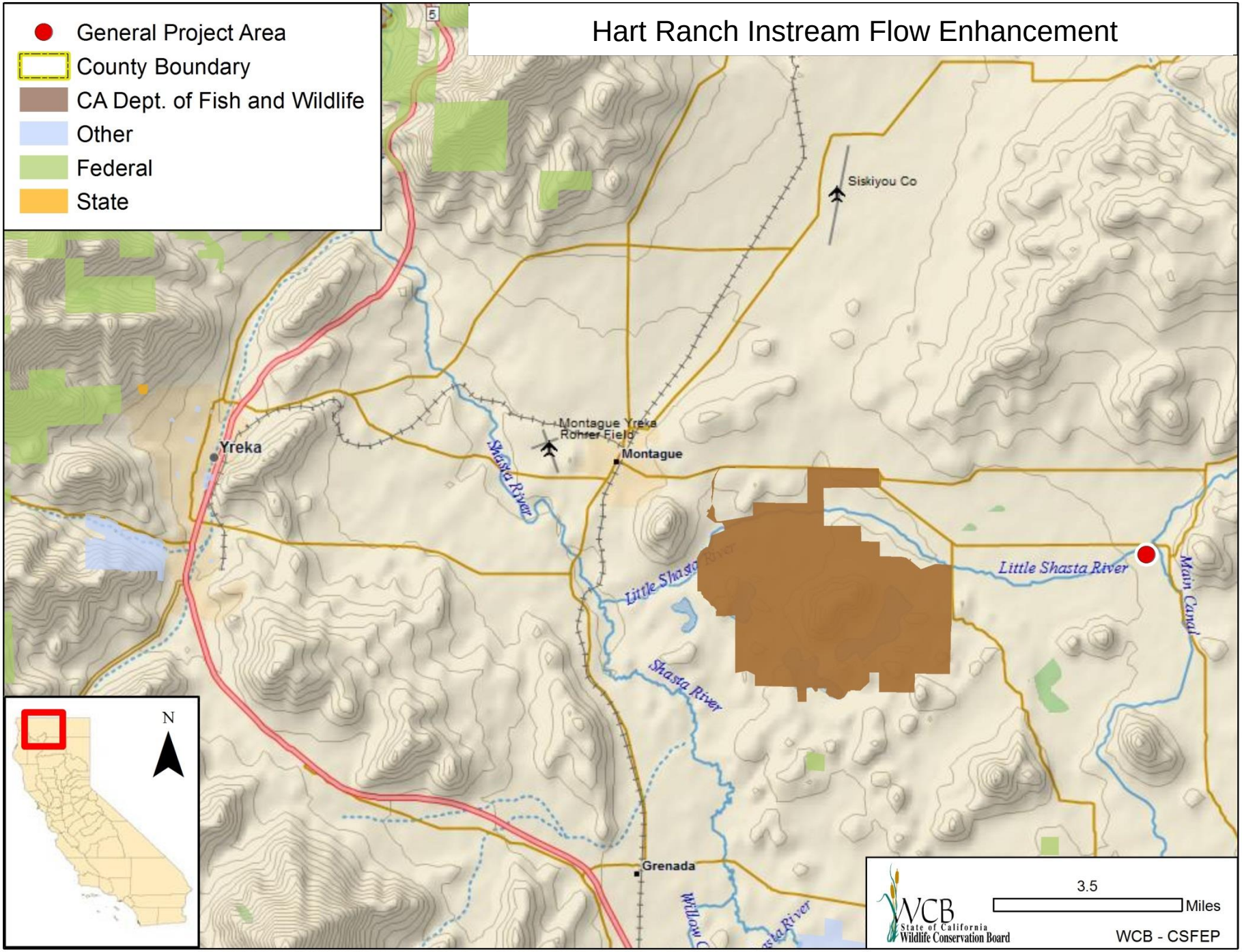
- Modification of natural flow regimes has resulted in depleted flows necessary for migration, spawning and rearing, increased water temperatures, changes in fish community structures, flushing of sediments from spawning gravels, and reduced gravel recruitment. Across both counties, adequate stream flow is a significant barrier to the recovery of steelhead.

#15 INTEGRATED WATER STRATEGIES TO ENHANCE FLOWS IN SANTA BARBARA AND VENTURA COUNTIES

Objective(s):

- Geographically identify and prioritize opportunities for water conservation and reduced consumptive use that promotes the highest potential for instream flow contributions in five different watersheds in Santa Barbara and Ventura Counties.

Hart Ranch Instream Flow Enhancement



#16 HART RANCH INSTREAM FLOW ENHANCEMENT

Challenge:

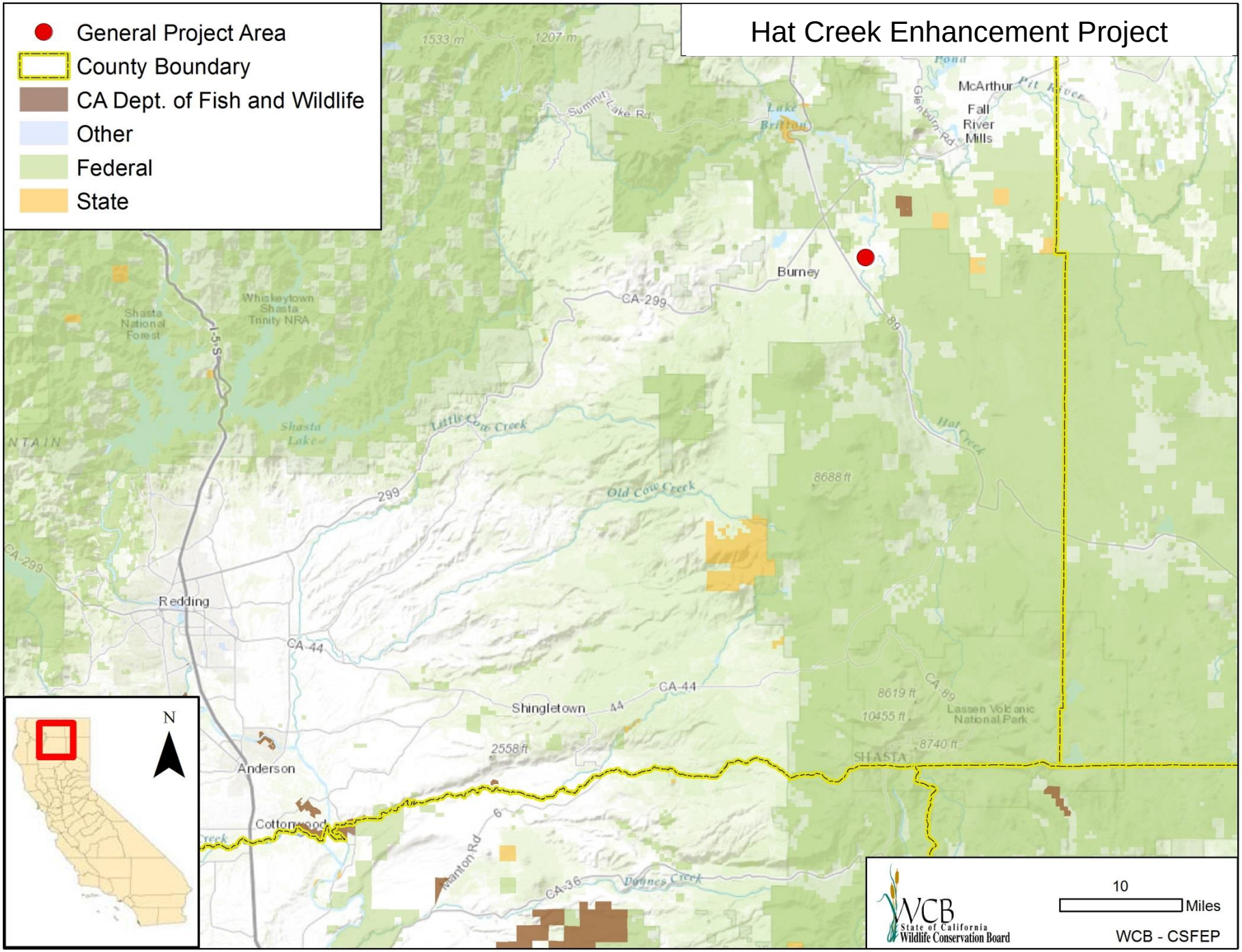
- The observed decline of coho in the Shasta River coincided with the development of both surface and groundwater sources in support of irrigated agricultural activities throughout the Shasta Basin including the Little Shasta River.

- Water development led to reductions in the quantity and quality of cold-water habitat for rearing coho salmon. Historic adjudication of water rights did not consider the water needs of native fish species.

#16 HART RANCH INSTREAM FLOW ENHANCEMENT

Objective(s):

- Provide 1.5 cfs to the stream at targeted times of the year.
- Foundation for future enhancements through improved water management flexibility at Hart Ranch
  - Collaborate with the Montague Water Conservation District (MWCD) to explore options for lining the MWCD Canal that currently crosses the Hart Property.
- Removal of the Hart's flashboard dam and re-profiling of the stream channel below the diversion structure will provide access to seven additional kilometers of ideal, cold-water juvenile rearing salmonid habitat.


Hat Creek Enhancement Project
General Project Area
County Boundary
CA Dept. of Fish and Wildlife
Other
Federal
State
1533 m
1207 m
Summit Lake Rd
Lake Britton
McArthur
Fall River Mills
Glenburn Rd
Pit River
Burney
CA-299
89
Whiskeytown Shasta Trinity NRA
Shasta National Forest
I-5
Shasta Lake
Little Cow Creek
Hat Creek
8688 ft
Old Cow Creek
299
Redding
CA-44
Shingletown
8619 ft
10455 ft
CA-89
Lassen Volcanic National Park
8740 ft
SHASTA
2558 ft
Anderson
Cottonwood
Manton Rd
CA-36
Dagnes Creek
N
WCB
State of California
Wildlife Conservation Board
10
Miles
WCB - CSFEP

#17 HAT CREEK ENHANCEMENT PROJECT

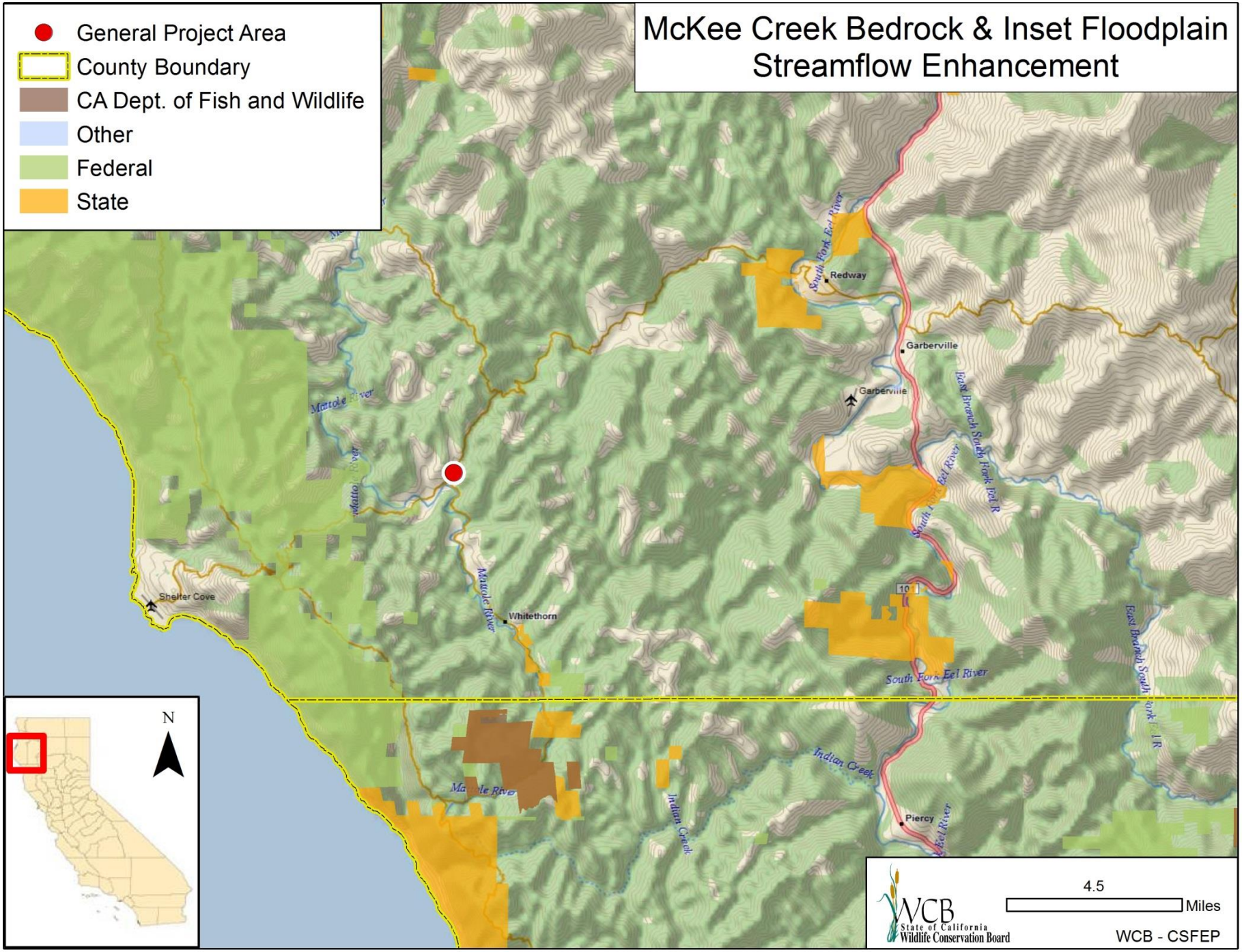
Challenge:

- Hat Creek was channelized in the 1950s, resulting in severely diminished hydrological and ecological function.
- Inspection of Hat Creek in the 4000' project reach confirms poor habitat value due to its ditch-like morphology
- Project reach is prone to late season low flows.

#17 HAT CREEK ENHANCEMENT PROJECT

Objective(s):

- Utilize the “Pond and Plug” technique
- Reshape the hydrograph within project reach to enhance late-season stream flows, and enhance water quality and other habitat benefits for trout and native birds


McKee Creek Bedrock & Inset Floodplain Streamflow Enhancement
General Project Area
County Boundary
CA Dept. of Fish and Wildlife
Other
Federal
State
Redway
Garberville
Garberville
Mattole River
Mattole River
Mattole River
Shelter Cove
Whitethorn
South Fork Eel River
East Branch South Fork Eel R
South Fork Eel River
South Fork Eel River
East Branch South Fork Eel R
Indian Creek
Indian Creek
Piercy
Eel River
N
4.5
Miles
WCB
State of California
Wildlife Conservation Board
WCB - CSFEP

#18 MCKEE CREEK BEDROCK & INSET FLOODPLAIN STREAMFLOW ENHANCEMENT

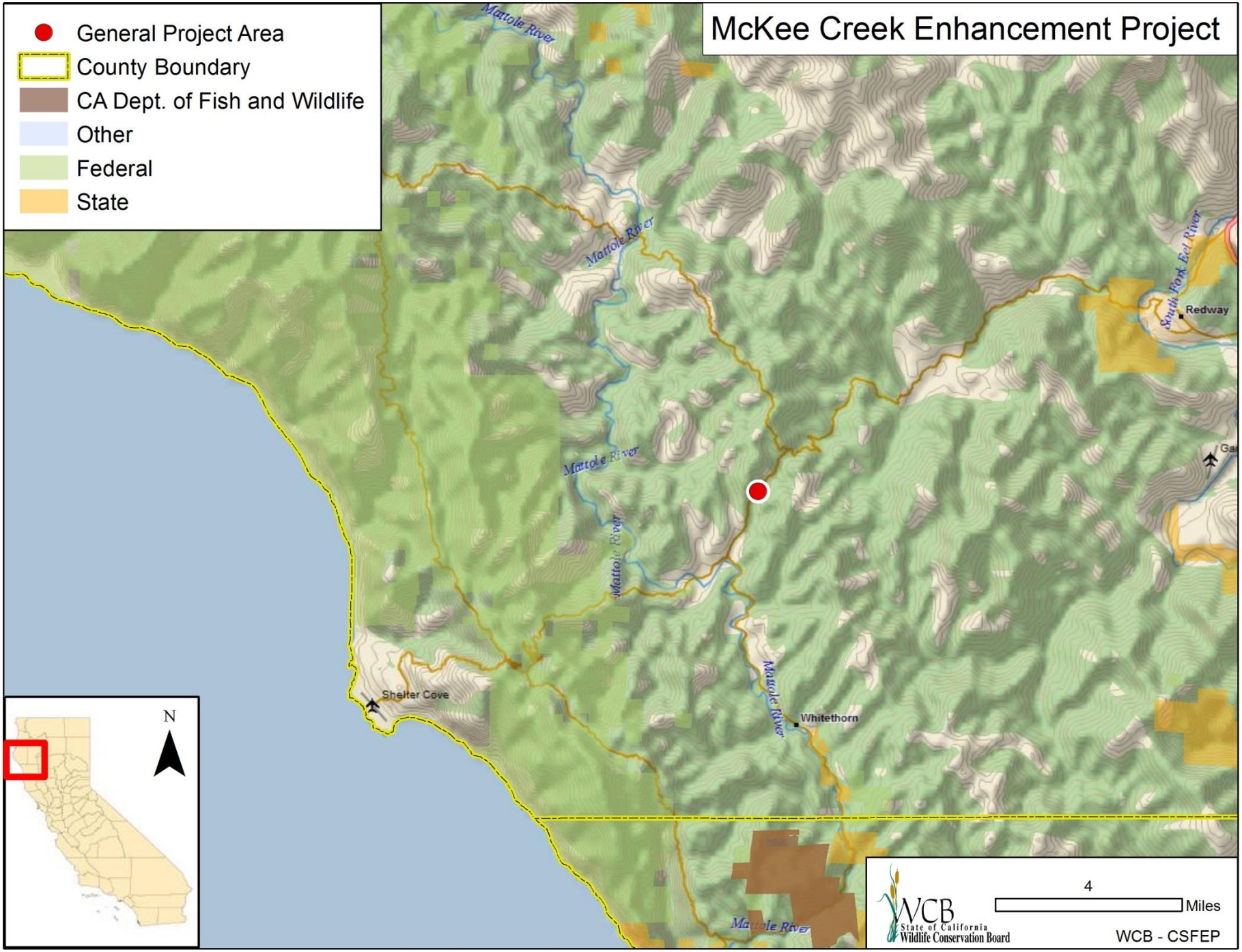
Challenge:

- Historic land management practices have led to disconnected floodplains, lowering of the water table, reduced groundwater storage, reduced magnitude and duration of baseflows, and reduced quality and extent of riparian vegetation and aquatic habitat.

#18 MCKEE CREEK BEDROCK & INSET FLOODPLAIN STREAMFLOW ENHANCEMENT

Objective(s):

- Raise the streambed through a series of 18 instream structures planned at 13 sites in the reach including 8 pool habitat and scour structures, 4 log weir structures, 3 boulder weir structures and 3 unanchored structures.
  - These structures will mimic the natural accumulation of large wood jams and will be strategically placed to cause the inundation and connection of the floodplain.
  - Groundwater recharge, storage, and corresponding instream flow, as well as create much needed winter and summer rearing habitat for anadromous salmonids will be enhanced.


McKee Creek Enhancement Project
General Project Area
County Boundary
CA Dept. of Fish and Wildlife
Other
Federal
State
Mattole River
Mattole River
Mattole River
Mattole River
Mattole River
Mattole River
South Fork Eel River
Redway
Shelter Cove
Whitethorn
N
4
Miles
WCB
State of California
Wildlife Conservation Board
WCB - CSFEP

#19 MCKEE CREEK ENHANCEMENT PROJECT

Challenge:

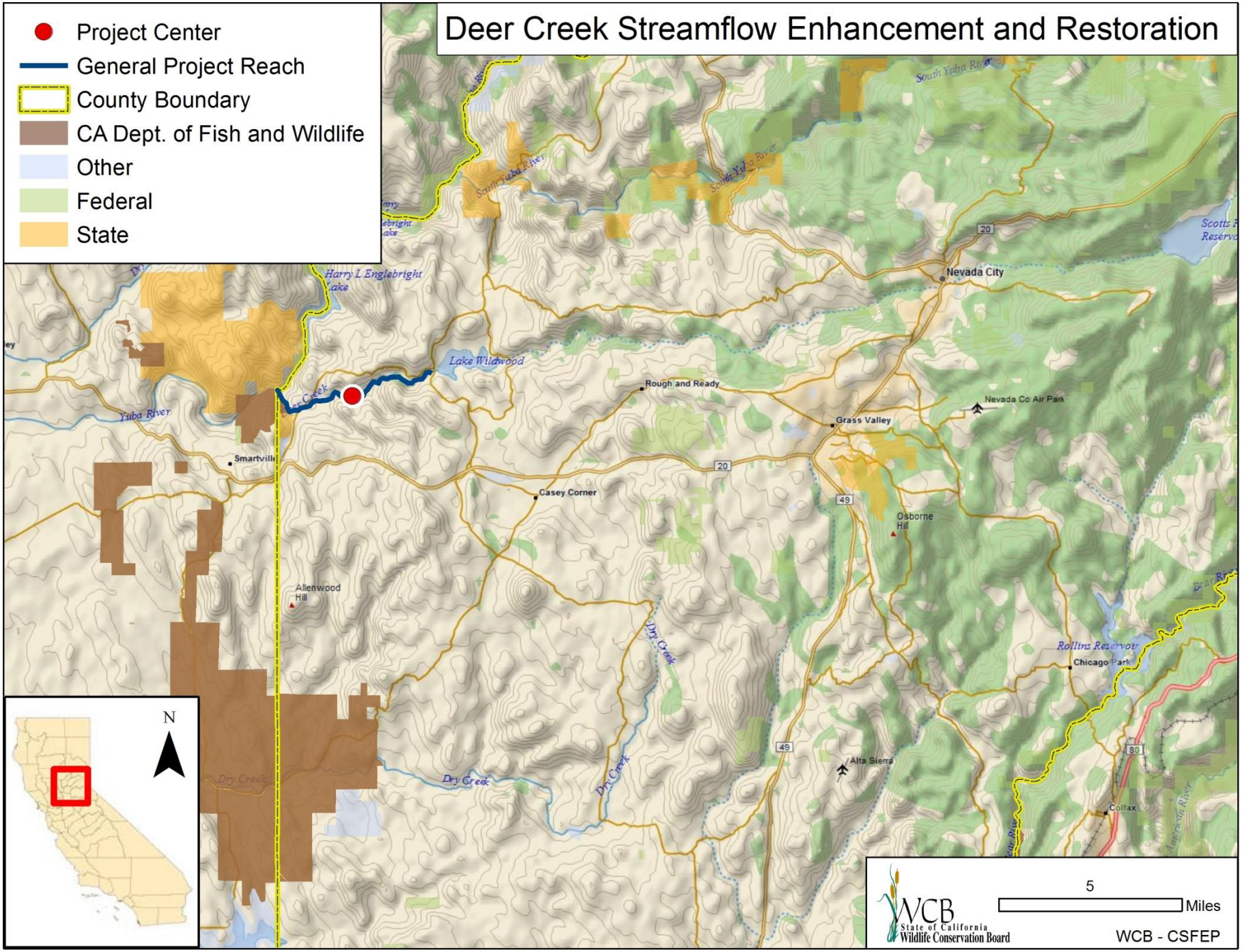
- Historic land management practices have lead to disconnected floodplains, lowering of the water table, reduced groundwater storage, reduced magnitude and duration of baseflows, and reduced quality and extent of riparian vegetation and aquatic habitat.

#19 MCKEE CREEK ENHANCEMENT PROJECT

Objective(s):

- Raise the streambed through a series of log and boulder step pools in the main stem of McKee Creek and by utilizing check dam techniques in an intermittent tributary to McKee Creek, above the point where fish can migrate
  - Check dams will elevate the bed elevation by trapping sediment which, will create pools, increasing groundwater recharge in the channel bed alluvium and in the toe of the hillslopes in a steep intermittent tributary.
  - Step pools will mimic the natural accumulation of large wood jams and will be strategically placed to cause the inundation of the inset floodplain

Deer Creek Streamflow Enhancement and Restoration



#20 DEER CREEK STREAMFLOW ENHANCEMENT AND RESTORATION

Challenge:

- The primary limiting factors in lower Deer Creek include poor water quality and quantity, and gravel recruitment.
- The presence of Lake Wildwood dam alters flow and natural sediment supply downstream rendering gravels immobile and unsuitable for spawning.

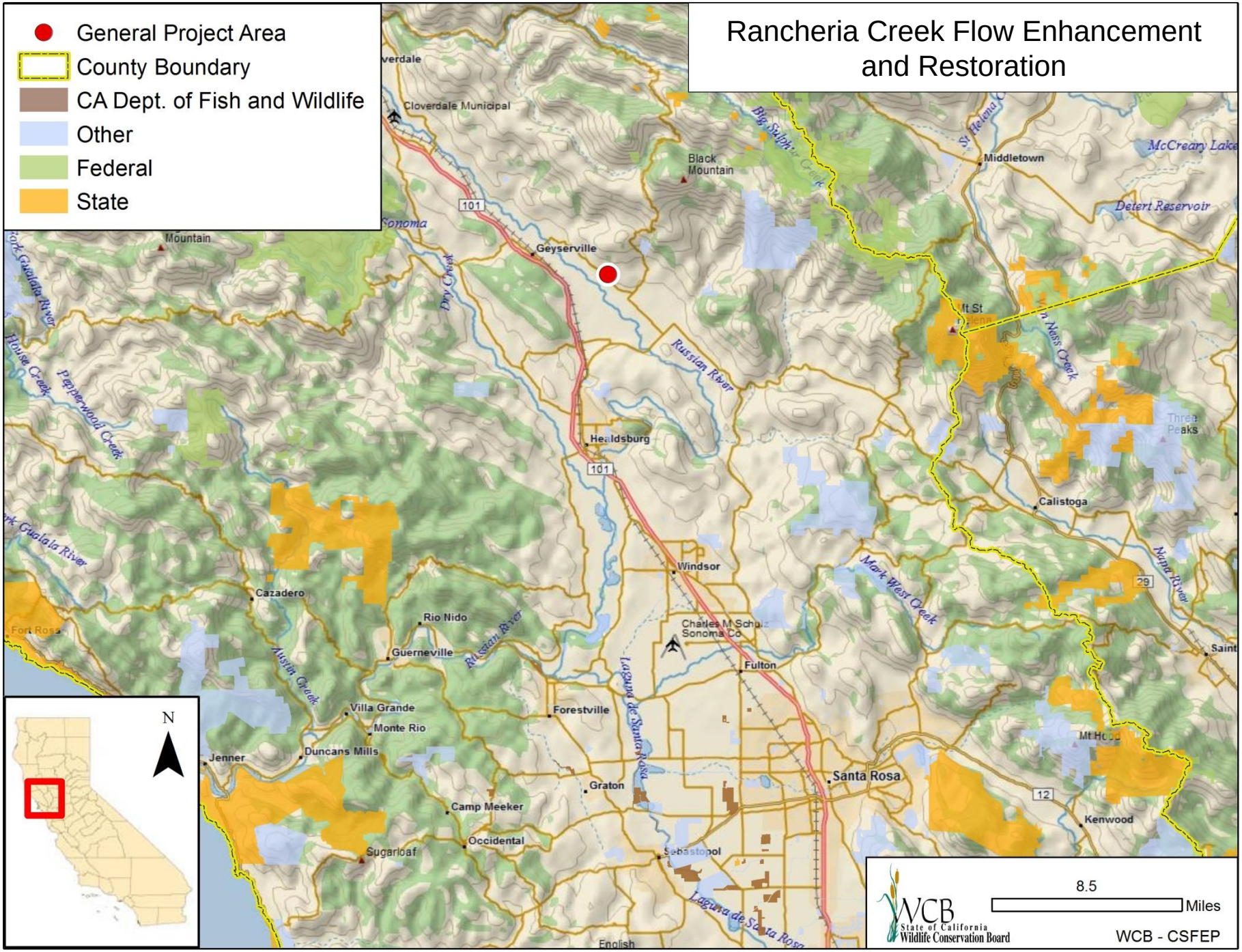
#20 DEER CREEK STREAMFLOW ENHANCEMENT AND RESTORATION

Objective(s):

- Sierra Streams Institute (SSI), in collaboration with Lake Wildwood Association (LWA), will use low flow release structures on the dam to implement the appropriate hydrograph depending on water management and drought conditions.

- SSI will collaborate with LWA to use drawdown releases to enhance flows in Deer Creek, acting like a fall storm event to trigger fish migration or provide enhanced flows for fish

- The dredging of the lake has afforded a unique opportunity to release suitable spawning gravels from Upper Deer Creek downstream of the dam


Rancheria Creek Flow Enhancement and Restoration
General Project Area
County Boundary
CA Dept. of Fish and Wildlife
Other
Federal
State
Cloverdale Municipal
Black Mountain
Middletown
McCreary Lake
Detert Reservoir
Geyserville
Russian River
Healdsburg
Calistoga
Windsor
Cazadero
Rio Nido
Guerneville
Fulton
Forestville
Villa Grande
Monte Rio
Jenner
Duncans Mills
Graton
Santa Rosa
Camp Meeker
Occidental
Sugarloaf
Sebastopol
Kenwood
Mt Hood
Saint
English
Laguna de Santa Rosa
Mark West Creek
Napa River
Austin Creek
Dry Creek
Pepperwood Creek
House Creek
Fort Ross
Three Peaks
Charles M Schulz Sonoma Co
101
12
29
N
8.5
Miles
WCB
State of California Wildlife Conservation Board
WCB - CSFEP

#21 RANCHERIA CREEK FLOW ENHANCEMENT AND RESTORATION

Challenge:

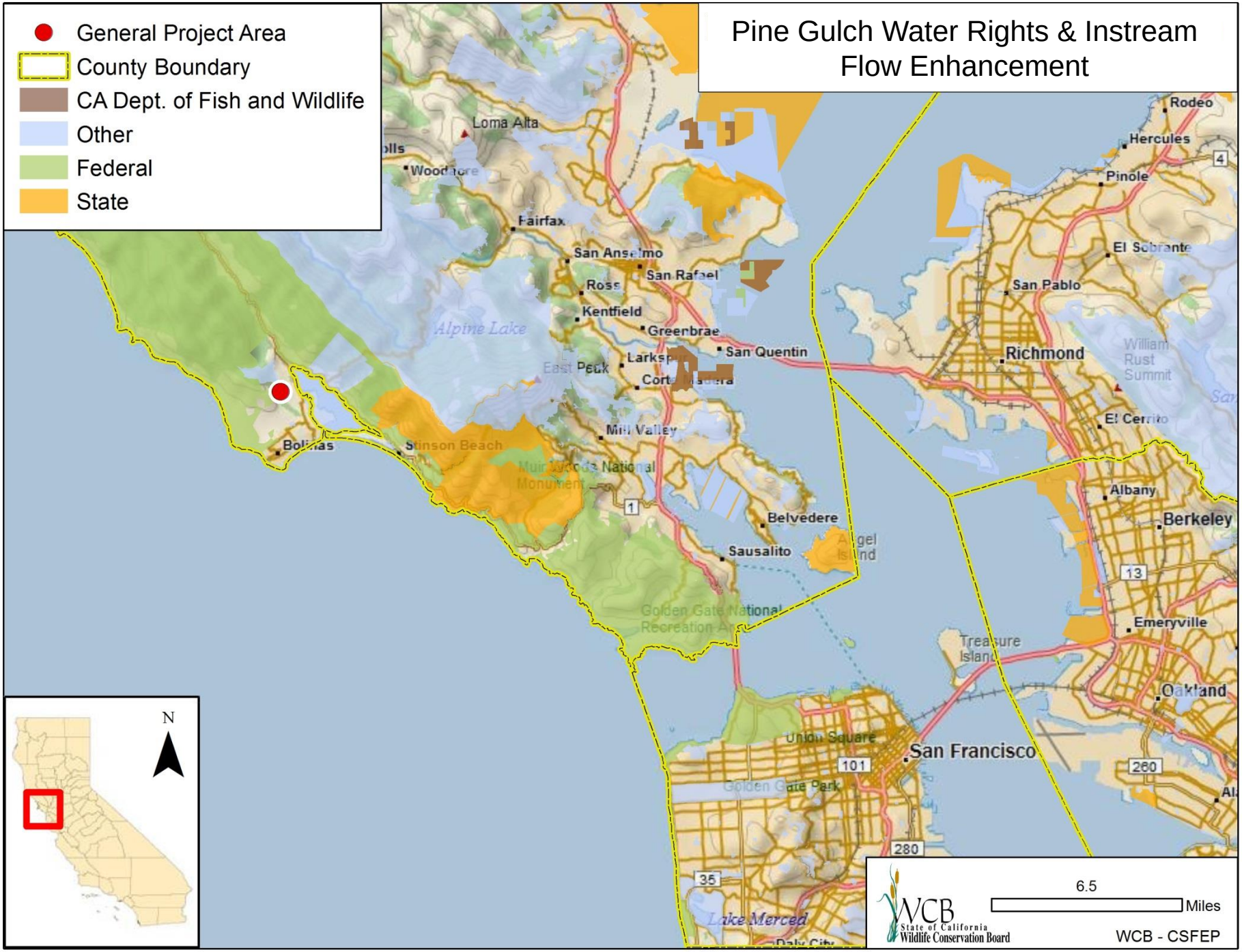
- Limiting factors negatively impacting steelhead and salmon in the project area include limited instream flows, impaired passage, high sediment load, contaminated runoff from roadways and agriculture; high stream temperature; and lack of complex habitat, cover, and high flow refugia.

#21 RANCHERIA CREEK FLOW ENHANCEMENT AND RESTORATION

Objective(s):

- The ecological benefits of the project related to improved instream water quality and quantity will be realized via:
  - floodplain reconnection to reduce sediment from bed and bank incision
  - strategic releases of treated wastewater and storm-water to increase instream flows during critical dry periods;
  - riparian vegetation planting along the vineyard reach to provide shade and reduce stream temperature and reduce pollutants by filtering agricultural runoff.

Pine Gulch Water Rights & Instream Flow Enhancement



#22 PINE GULCH WATER RIGHTS & INSTREAM FLOW ENHANCEMENT

Challenge:

- Short-term irrigation demands exceed the creek's base flows and reduce rearing habitat for salmonids:
  - Farms started to develop off-site water storage to reduce agricultural summer demands upon the creek.
- Four ponds were constructed in 2015; two un-lined ponds were losing in excess of 4 acre-feet per month due to seepage and two farms cannot fully relinquish their summer riparian water rights until modifications are made to stop the seepage.

#22 PINE GULCH WATER RIGHTS & INSTREAM FLOW ENHANCEMENT

Objective(s):

- Project seeks to complete the two ponds to stop seepage.
  - The farmers have secured their water rights permits to dedicate their commercial agricultural riparian diversions between July 1 and December 15 of each year to instream flows under CA Water Code §1707
- This project is expected to reduce the rate of diversion and increase streamflow rates by 15 - 45%.

Addressing Limiting Factors in the San Lorenzo River Lagoon
General Project Reach
County Boundary
CA Dept. of Fish and Wildlife
Other
Federal
State
San Lorenzo River
17
1
Santa Cruz
N
1.5
Miles
WCB
State of California
Wildlife Conservation Board
WCB - CSFEP

#23 ADDRESSING LIMITING FACTORS IN THE SAN LORENZO RIVER LAGOON

Challenge:

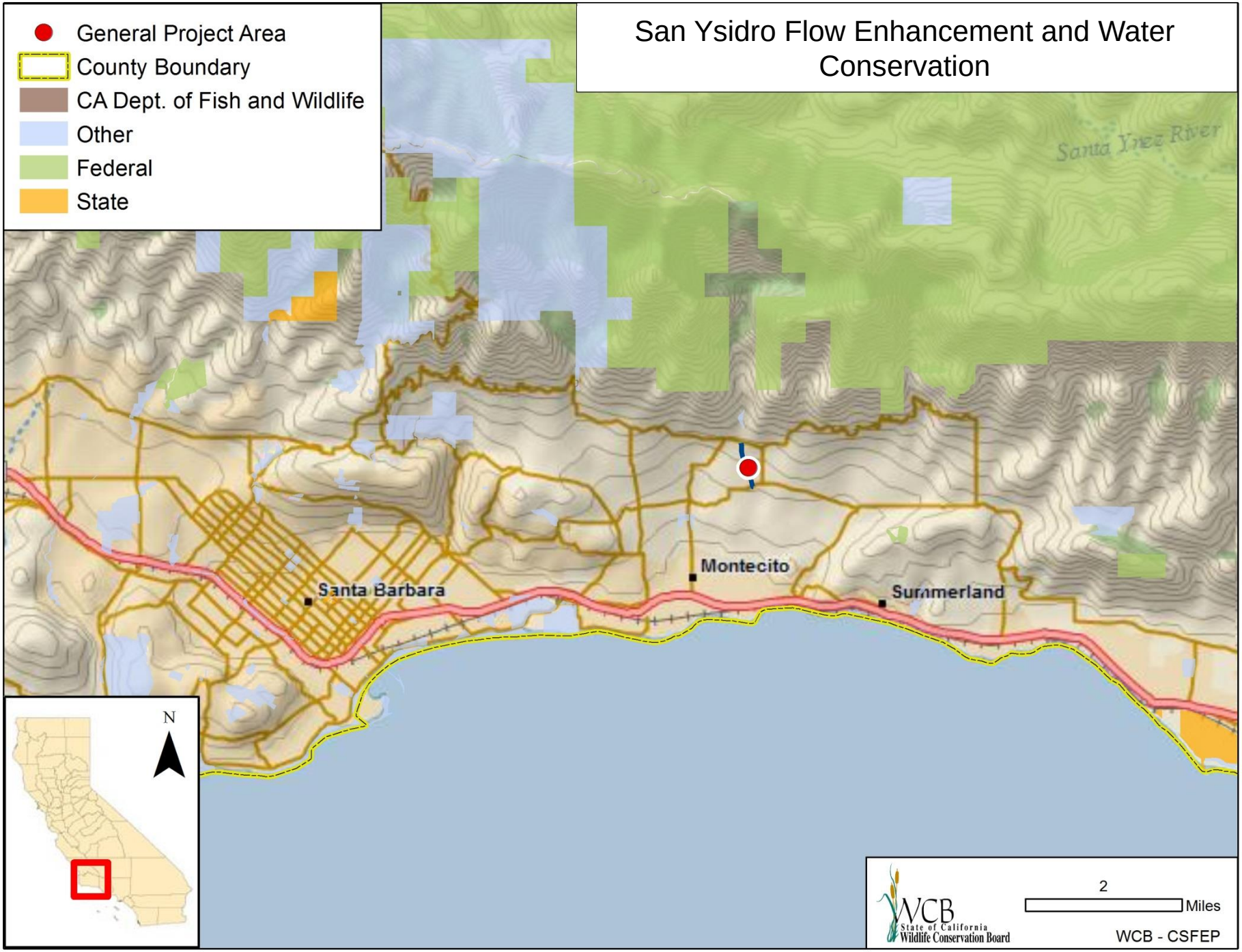
- The lagoon closes as a result of the formation of a natural sandbar however, constricted flood channels upstream of the lagoon has increased susceptibly to flooding for low-lying public and private infrastructure when the closed lagoon water elevation reaches about 7.0’
- Unauthorized and illegal breaching frequently occurs in response to the flooding of the beach and low lying properties.
  - Flush steelhead and tidewater goby into the ocean prematurely
  - Creates poor habitat conditions for steelhead and impact the productivity

#23 ADDRESSING LIMITING FACTORS IN THE SAN LORENZO RIVER LAGOON

Objective(s):

- Install a water level control structure in the San Lorenzo River lagoon that will provide a stabilized water elevation and lessen localized flooding, while maintaining a closed lagoon for salmonids and tidewater goby

- The City of Santa Cruz will dedicate approximately 0.5 cfs of summer instream flows in two important cold-water tributaries in the lower watershed & install large woody material in the San Lorenzo River estuary to provide protective cover and temperature refuge for juvenile steelhead.


San Ysidro Flow Enhancement and Water Conservation
General Project Area
County Boundary
CA Dept. of Fish and Wildlife
Other
Federal
State
Santa Ynez River
Santa Barbara
Montecito
Summerland
N
2
Miles
WCB
State of California
Wildlife Conservation Board
WCB - CSFEP

#24 SAN YSIDRO FLOW ENHANCEMENT AND WATER CONSERVATION

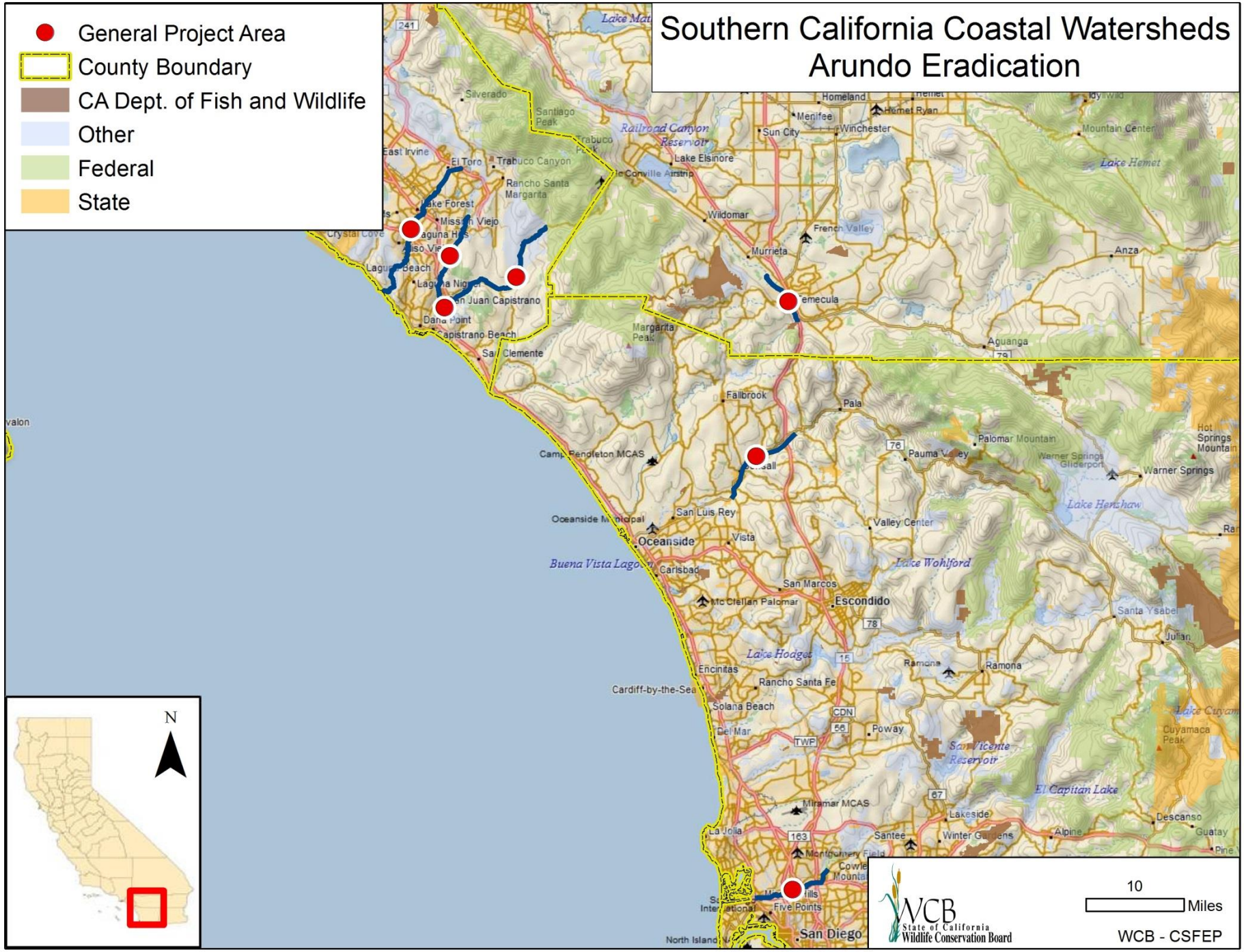
Challenge:

- The San Ysidro Creek reach is channelized from local property density and high storm intensity inputs
- The creek has irregular summer surface flows due to cumulative diversions for summer irrigation.
- Poor water quantity and quality to meet spawning and rearing requirements, poor fish passage, excessive storm water erosion, and excessive nutrient loading:

#24 SAN YSIDRO FLOW ENHANCEMENT AND WATER CONSERVATION

Objective(s):

- Increase summer base flows through direct offset of stream diversions
  - Dedicate this offset to instream flow
- Decrease peak storm event discharge and contribution of rainwater tank capture
- Increase summer base flows through groundwater infiltration; and
- Model successful best practices through active local community and regional outreach.


Southern California Coastal Watersheds
Arundo Eradication
General Project Area
County Boundary
CA Dept. of Fish and Wildlife
Other
Federal
State
N
10
Miles
WCB - CSFEP
WCB
State of California
Wildlife Conservation Board
Lake Elsinore
Wildomar
Murrieta
Temecula
Fallbrook
Pala
San Luis Rey
Oceanside
Vista
Carlsbad
San Marcos
Escondido
Valley Center
Poway
Ramona
Lake Hemet
Lake Henshaw
Lake Wohlford
Lake Hodges
El Capitan Lake
San Vicente Reservoir
San Diego
Lake Forest
Mission Viejo
Dana Point
San Clemente
Anza
Aguanga
Warner Springs
Palomar Mountain
Lakeside
Santee
Alpine
Descanso
Julian
Santa Ysabel
Encinitas
Solana Beach
Del Mar
La Jolla
Rancho Santa Fe
Cardiff-by-the-Sea
Camp Pendleton MCAS
Miramar MCAS
Mc Clellan Palomar
Oceanside Municipal
Buena Vista Lagoon
Railroad Canyon Reservoir
Lake Mat
Silverado
Santiago Peak
Trabuco Peak
Trabuco Canyon
Rancho Santa Margarita
El Toro
East Irvine
Crystal Cove
Laguna Beach
Laguna Niguel
San Juan Capistrano
Capistrano Beach
Margarita Peak
Homeland
Menifee
Sun City
Winchester
Hemet Ryan
French Valley
Mountain Center
Idyllwild
Warner Springs Gliderport
Hot Springs Mountain
Pauma Valley
Cuyamaca Peak
Lake Cuyam
Five Points
Cowles Mountain
Montgomery Field
Winter Gardens
North Island
Santa Ana
241
76
78
15
56
163
67
CDN
TWP

#25 SOUTHERN CALIFORNIA COASTAL WATERSHEDS ARUNDO ERADICATION

Challenge:

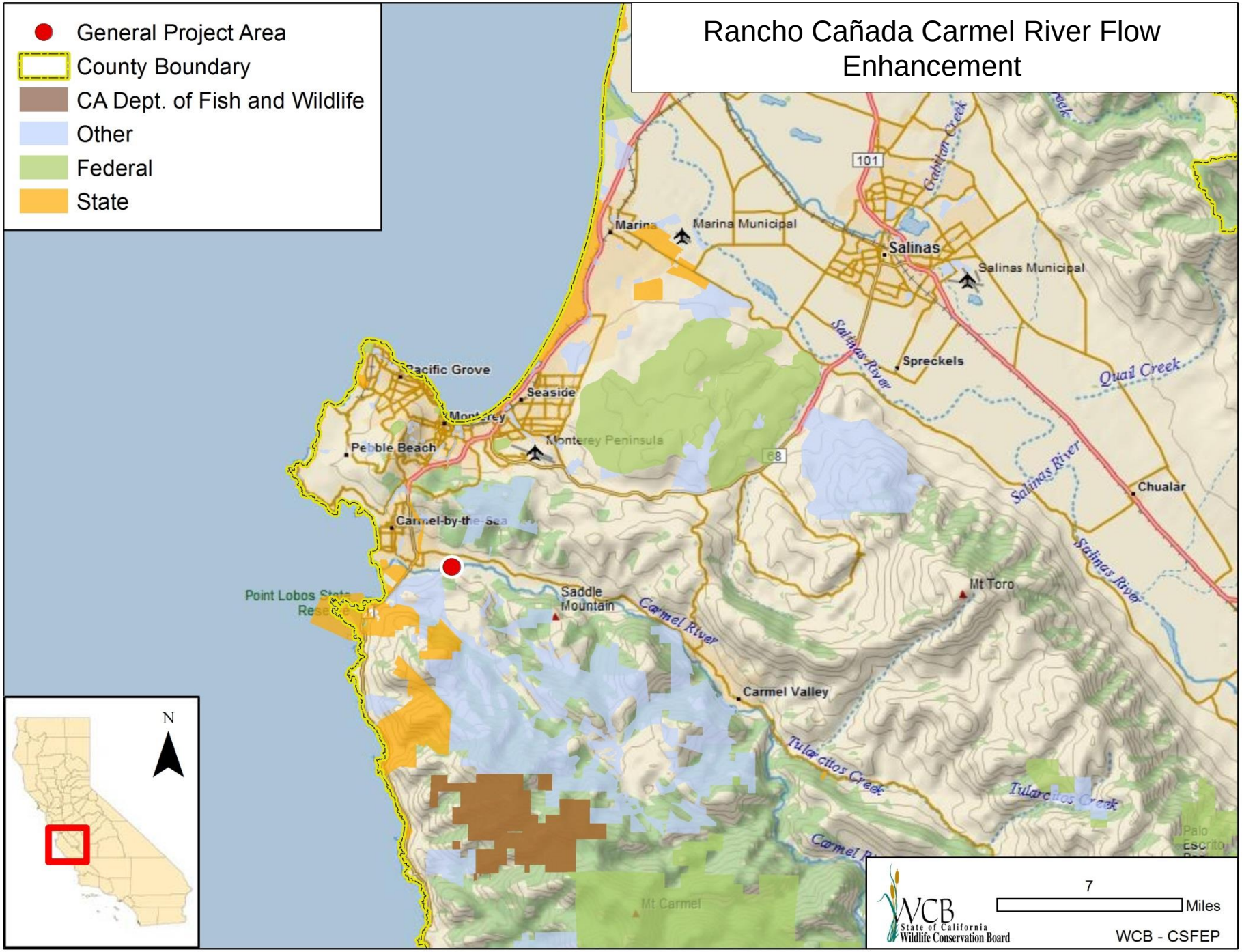
- *Arundo* stands have numerous significant impacts negatively affecting abiotic and biotic processes within river systems:
  - Stands modify fluvial processes by changing the magnitude and direction of flows, which in turn change the structure of the habitat.
  - *Arundo* consumes significantly more water annually due to its dense biomass

#25 SOUTHERN CALIFORNIA COASTAL WATERSHEDS ARUNDO ERADICATION

Objective(s):

- Eradicate 98 acres of Arundo from the San Juan, Santa Margarita, San Luis Rey, and San Diego watersheds:
  - Restore fluvial process and riparian habitat, while also reducing flood, erosion, and fire risk
  - Will save significant water resources, estimated at 1,960 acre feet per year

Rancho Cañada Carmel River Flow Enhancement



#26 RANCHO CAÑADA CARMEL RIVER FLOW ENHANCEMENT

Challenge:

- The Property has been used for over 40 years as a 36-hole golf course.
  - Second-largest diverter of water on the Carmel River

#26 RANCHO CAÑADA CARMEL RIVER FLOW ENHANCEMENT

Objective(s):

- Public protection of 185± acres of the golf course, and permanently reduced water diversion by the second largest water diverter in the Carmel River system.
  - The Project will dedicate 185 ± acre feet of water to the Carmel River system.