Wildlife Conservation Board

Stream Flow Enhancement Program Meeting

April 22, 2021

ZOOM Meeting

Introduction

- Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Proposition 1)
  - Funding to implement objectives of the California Water Action plan
    - More reliable water supplies
    - Restoration of important species and habitat
    - More resilient and sustainably managed water infrastructure
- $200,000,000 shall be administered by the Wildlife Conservation Board for projects that result in enhanced stream flows (CWC §79733)
- *Enhanced stream flow* – a change in the amount, timing, and/or quality of the water flowing down a stream, or portion of a stream, to benefit fish and wildlife

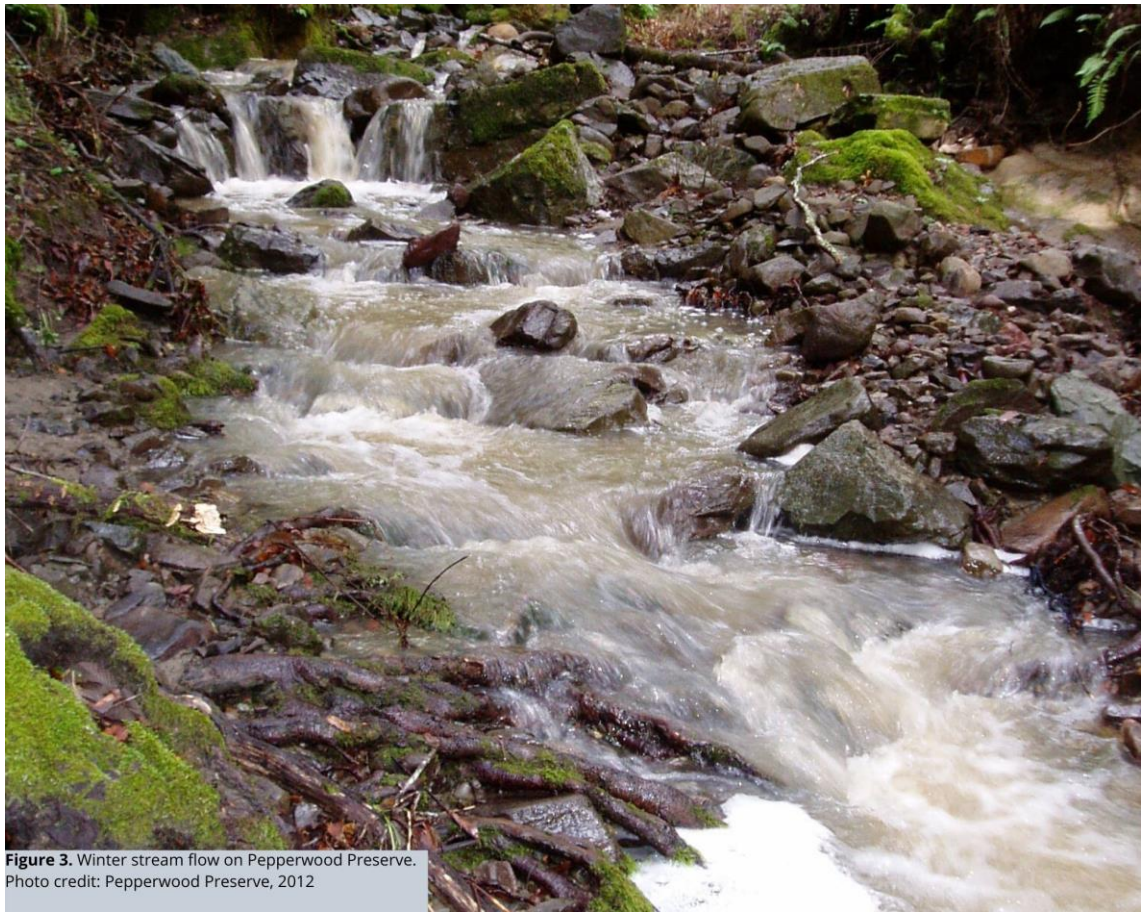


Figure 3. Winter stream flow on Pepperwood Preserve. Photo credit: Pepperwood Preserve, 2012

Project Categories

SCIENTIFIC STUDIES

PLANNING

IMPLEMENTATION

ACQUISITION

2020 Proposal Solicitation Notice

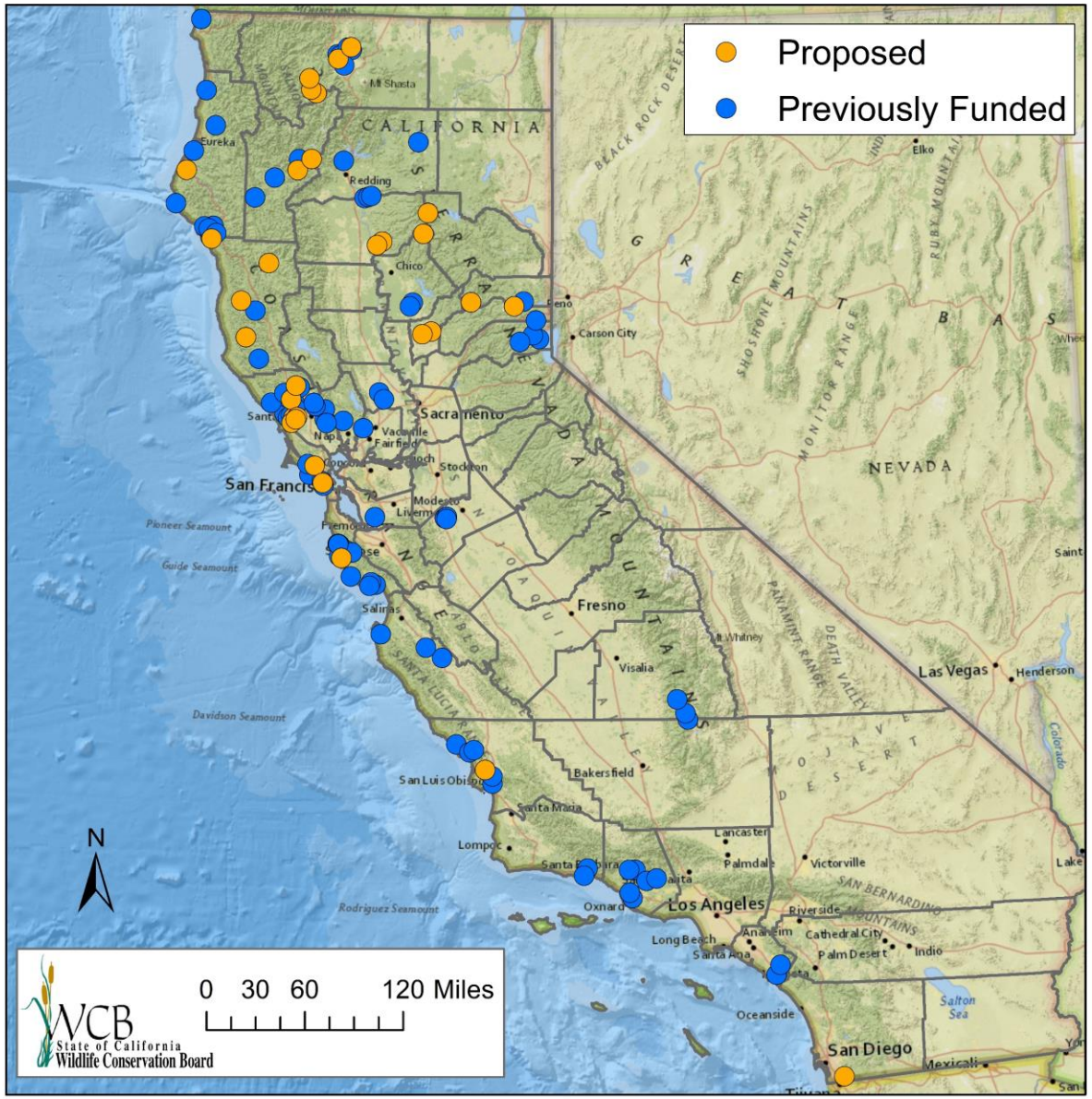
- $50 million available for award
- $3 million designated for Scientific Studies
- Call for proposals: July 9 – October 1, 2020
- Received 70 proposals, requesting $101.7 million

Proposal Evaluation Process

Fund Allocation of Recommended Projects

Project Category	Proposals Received	Funds Requested	Project Recommended for Funding	Proposed Allocation for Recommended Projects
Scientific Studies	9	$4,062,522	4	$1,405,529
Planning	34	$27,673,068	15	$9,414,596
Implementation	23	$55,941,515	10	$23,565,402
Acquisition	4	$14,007,272	2	$5,403,000
TOTAL	**70**	**$101,684,378**	**31**	**$39,788,527**

Map of Stream Flow Projects



Questions?

Consent Items 5-22

Butte Creek House Meadow
Credit: Butte County RCD

5. Little Shasta River Flow Enhancement Planning - Map

5. Little Shasta River Flow Enhancement Planning

slide 1

- The Shasta River was historically one of the most productive salmon streams in California
- Aquatic and riparian habitat degradation has resulted in dramatic declines in wild salmon populations, particularly coho salmon
- Historic adjudication of water rights did not consider the water needs of native fish
- Little Shasta River is over-appropriated for agricultural use
- During the recent drought, this led to seasonal "zero-flow" conditions in the lower reach

Credit: Gary Black

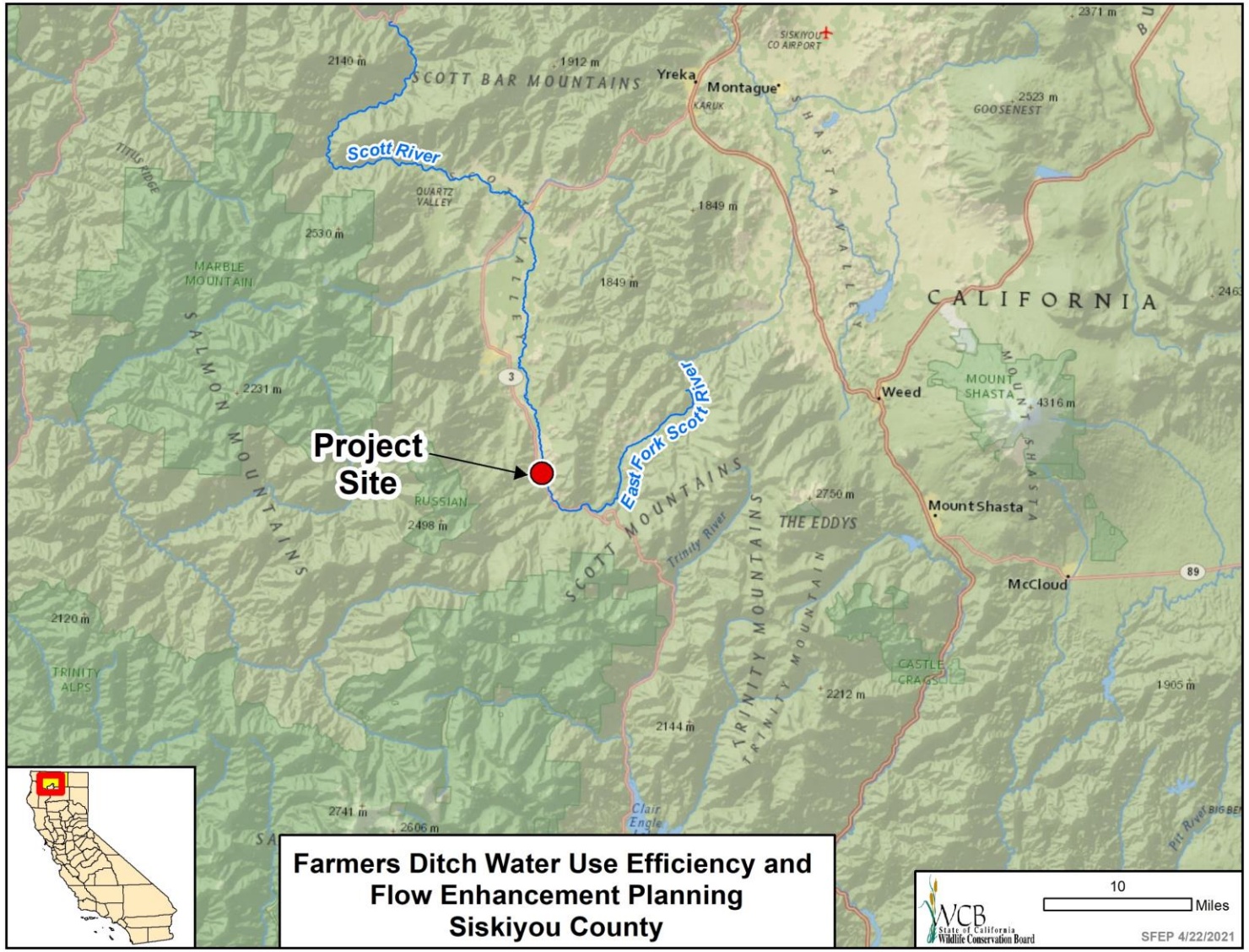
5. Little Shasta River Flow Enhancement Planning

slide 2

- Project will take a strategic approach to address limiting factors including altered hydrologic function (lack of flows), migration barriers, and water quality
- Project activities include:
  - Identify, select, and develop a preferred alternative to 30% design for:
    - replacement of the Musgrave and Linton Diversion
    - feasibility of returning a high priority spring water, Evan's Spring, to the Little Shasta River
    - increasing on-ranch irrigation efficiencies (1-2 projects)
  - Stream flow and water quality monitoring and assessment
  - Outreach

Little Shasta River, upstream of Musgrave/Linton diversion. Credit: Ann Willis

6. Farmers Ditch Water Use Efficiency and Flow Enhancement Planning - Map



6. Farmers Ditch Water Use Efficiency and Flow Enhancement Planning

slide 1

- The Scott River watershed supports several anadromous fish species
- Limiting stresses for the coho salmon population include degraded riparian habitat conditions and altered hydrologic function
- Farmers Ditch Company's combined water rights are the second largest point of diversion identified in the Scott River Decree
- The point of diversion is located within the Scott River tailings reach, an area where unmitigated mining operations severely degraded conditions

Scott River Tailings Reach, downstream of FDC property. Credit: Thomas Harter

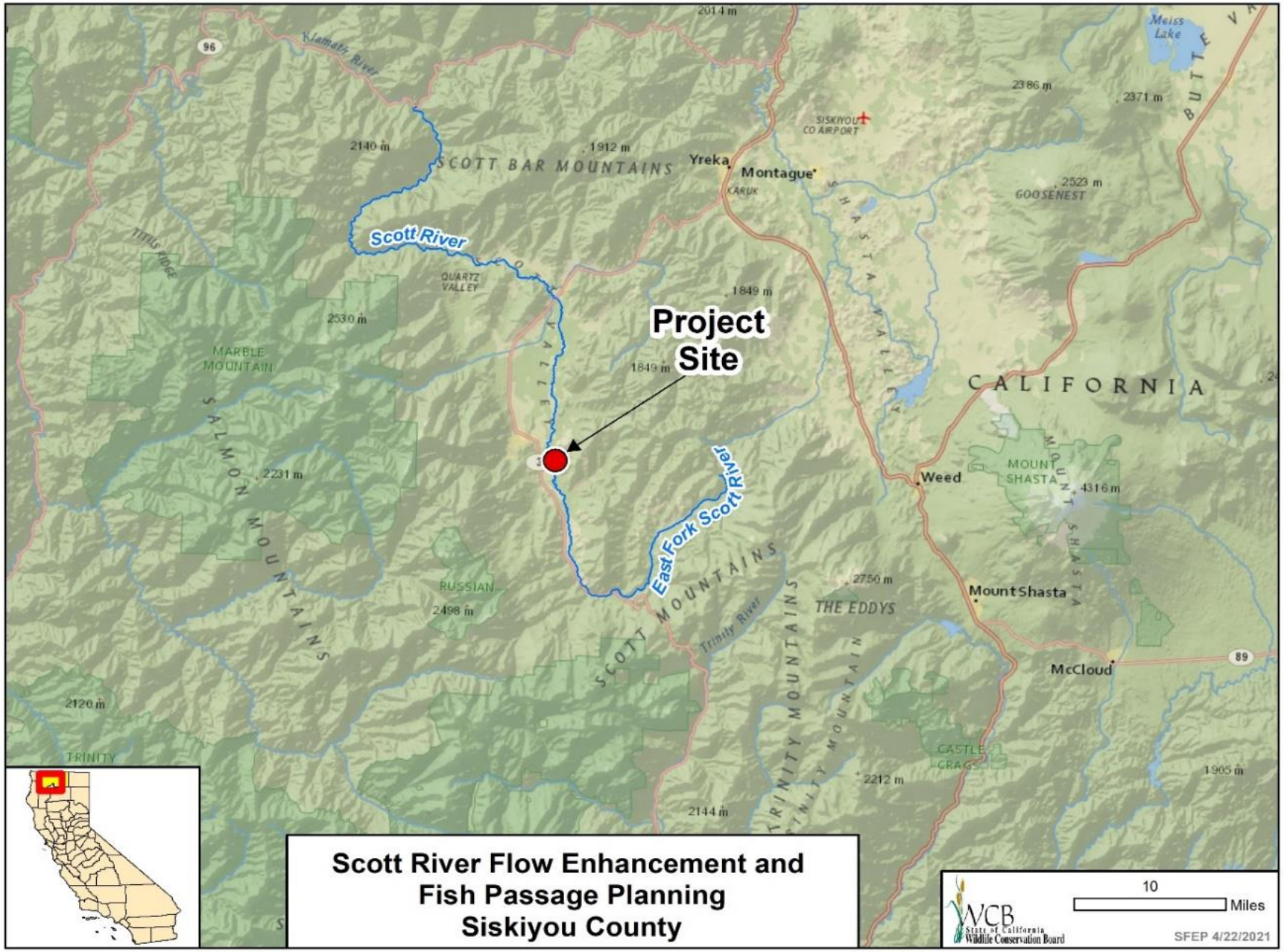
6. Farmers Ditch Water Use Efficiency and Flow Enhancement Planning

slide 2

- Project will conduct an initial suite of planning activities to support future implementation of actions that improve water management and enhance stream flows
- Project activities include:
  - Conveyance system assessment and efficiency evaluation
  - On-farm water use efficiency evaluation
  - Point of diversion and efficiency alternatives analysis
  - Water rights analysis and instream dedication opportunities assessment

Point of diversion, looking upstream.
Credit: Sari Sommarstrom

7. Scott River Flow Enhancement and Fish Passage Planning - Map



7. Scott River Flow Enhancement and Fish Passage Planning

slide 1

- The Scott River watershed supports coho salmon, Chinook salmon and steelhead trout
- Water diversions, associated small diversion dams and the diking of mainstem Scott River have reduced summer and winter rearing habitat, limiting juvenile success
- Exacerbated by drought and groundwater pumping
- Scott River Ranch Property encompasses the Young's Point diversion structure, shared by the Ranch and the Scott Valley Irrigation District
- Channel spanning splashboard dam features a fish ladder which is effective for adult salmonids, but juvenile passage is still largely restricted

Young's Point diversion structure and fish ladder
Credit: Siskiyou Land Trust

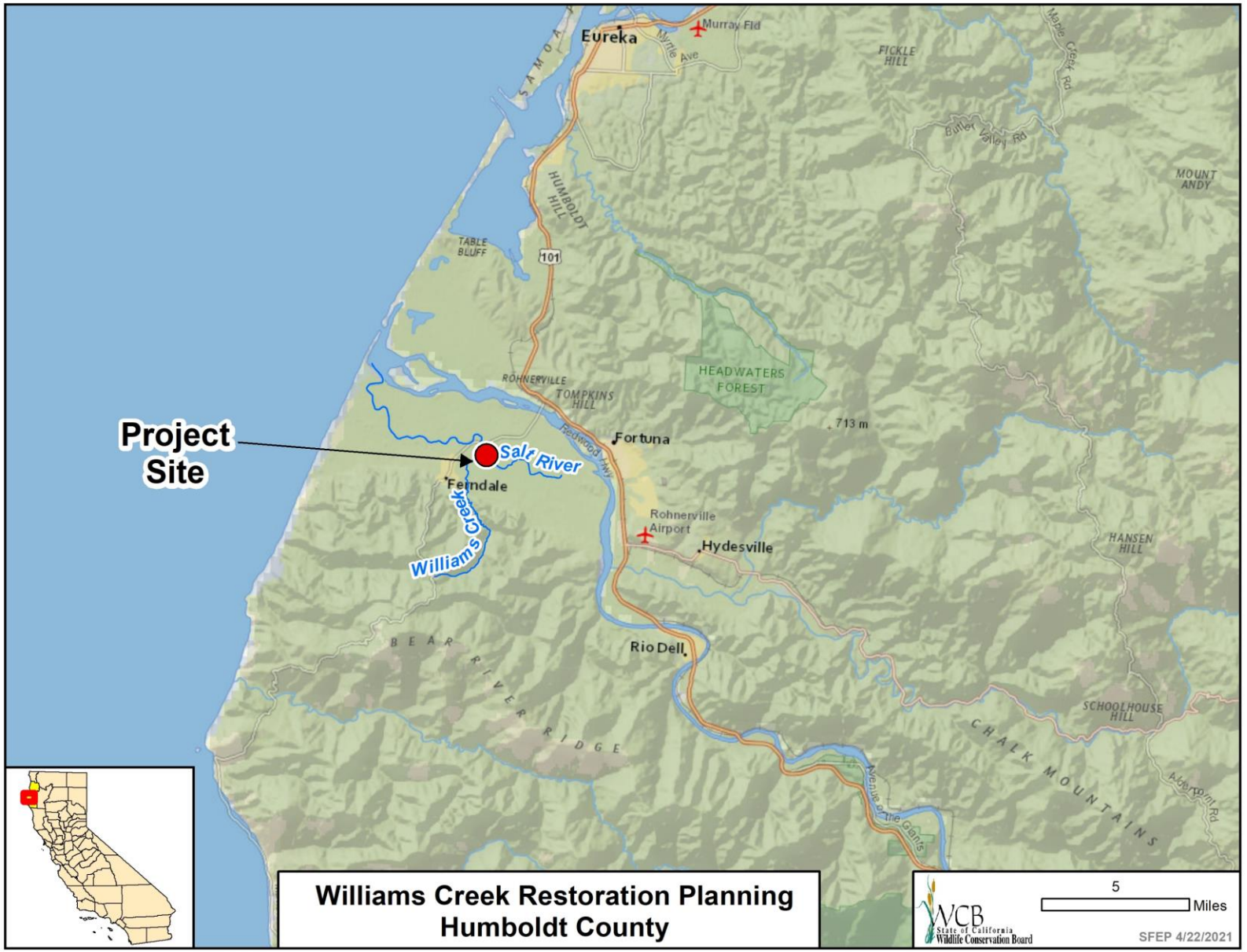
7. Scott River Flow Enhancement and Fish Passage Planning

slide 2

- Project Goals: support future actions that enhance stream flow conditions, fish passage, and on-farm water management
  - Stream flow enhancement analysis (Project effectiveness monitoring)
  - Young's Point fish passage assessment (fully funded by USFWS) and integration with results from other project analyses
  - Agricultural practices and efficiency analysis
  - Water right valuation and due diligence
  - Development of a long-term water dedication (preparation of a CWC Section 1707 Petition)

Fish ladder post seasonal flow transaction
Credit: Siskiyou Land Trust

8. Williams Creek Restoration Planning - Map



8. Williams Creek Restoration Planning

slide 1

- Williams Creek is hydrologically dysfunctional and annually floods residences, working agricultural lands, and infrastructure
- Extremely high sediment loads carried during flood events contribute to the reduction of the creek's channel capacity and exacerbate flood impacts
- Williams Creek is currently disconnected from the Salt River channel, with creek flow splaying across agricultural fields
- The Project is part of a larger watershed-level program: the Salt River Ecosystem Restoration Project (SRERP)
- Recent studies indicate it is necessary to restore Williams Creek to manage its sediment loads prior to connecting to the Salt River

Credit: Don Tuttle

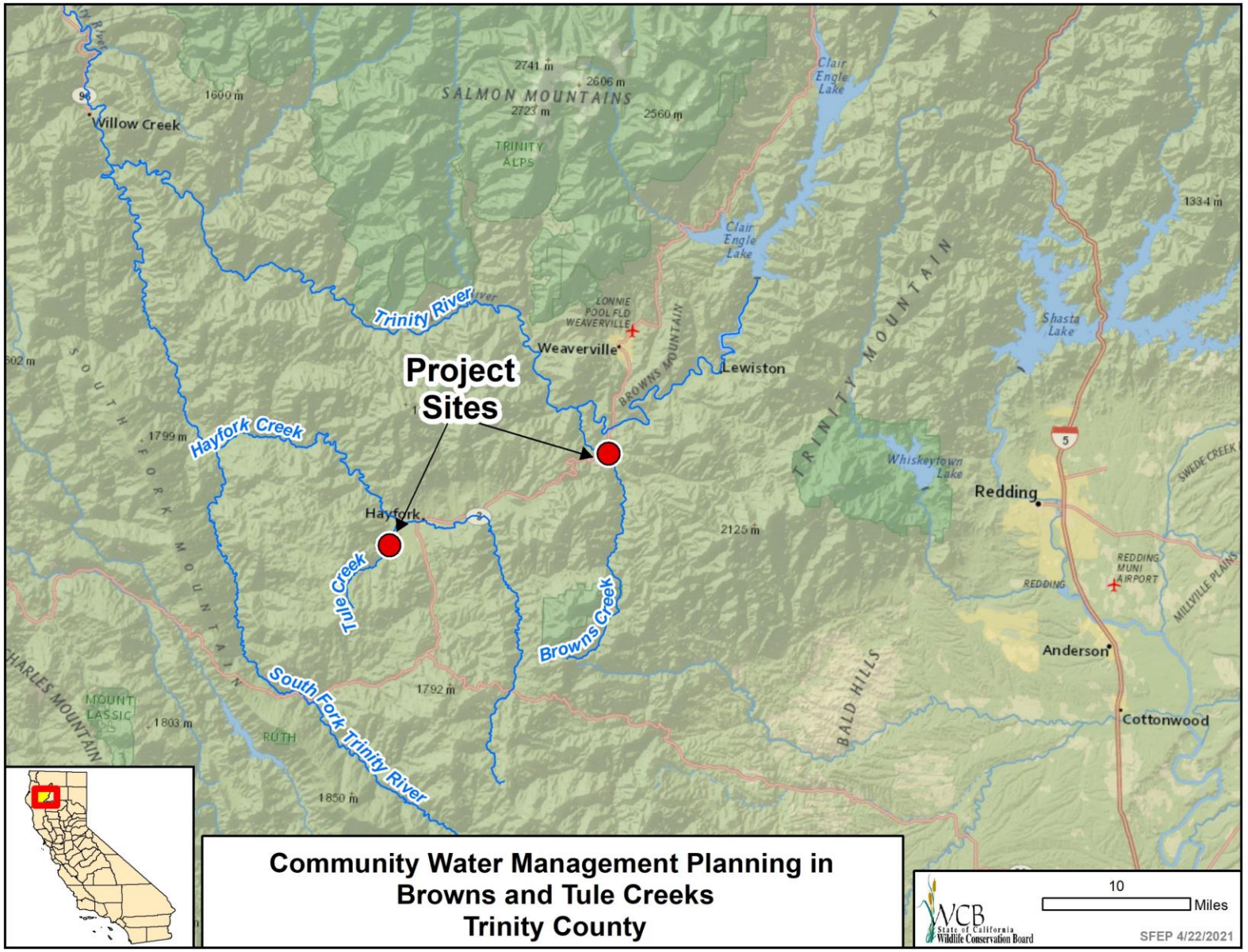
8. Williams Creek Restoration Planning

slide 2

- Project will conduct planning necessary to support the restoration of Williams Creek and its reconnection to the Salt River
  - Enabling completion of the SRERP
  - Return of Williams Creek flow into the Salt River
  - Reestablish fish passage from the Salt River to 6.9 miles of historic fish habitat in the Williams Creek watershed
- Project activities include:
  - Stakeholder engagement
  - Advance restoration designs to draft final (95%) level of development
  - Develop permit applications
  - Develop monitoring and management plan

Credit: Don Tuttle

9. Community Water Management Planning in Browns and Tule Creeks - Map



9. Community Water Management Planning in Browns and Tule Creeks

slide 1

- The Project area has a Mediterranean climate with seasonal low flows
- Historical land uses (e.g., logging, mining, ranching, agriculture), droughts, and residential stream diversions have further reduced seasonal stream flows in areas providing key spawning and rearing habitat for coho salmon, as well as Chinook salmon and steelhead trout
- Urgent need to protect and restore functional ecological flows, while also improving water resiliency for residents

Browns Creek. Credit: Watershed Research and Training Center

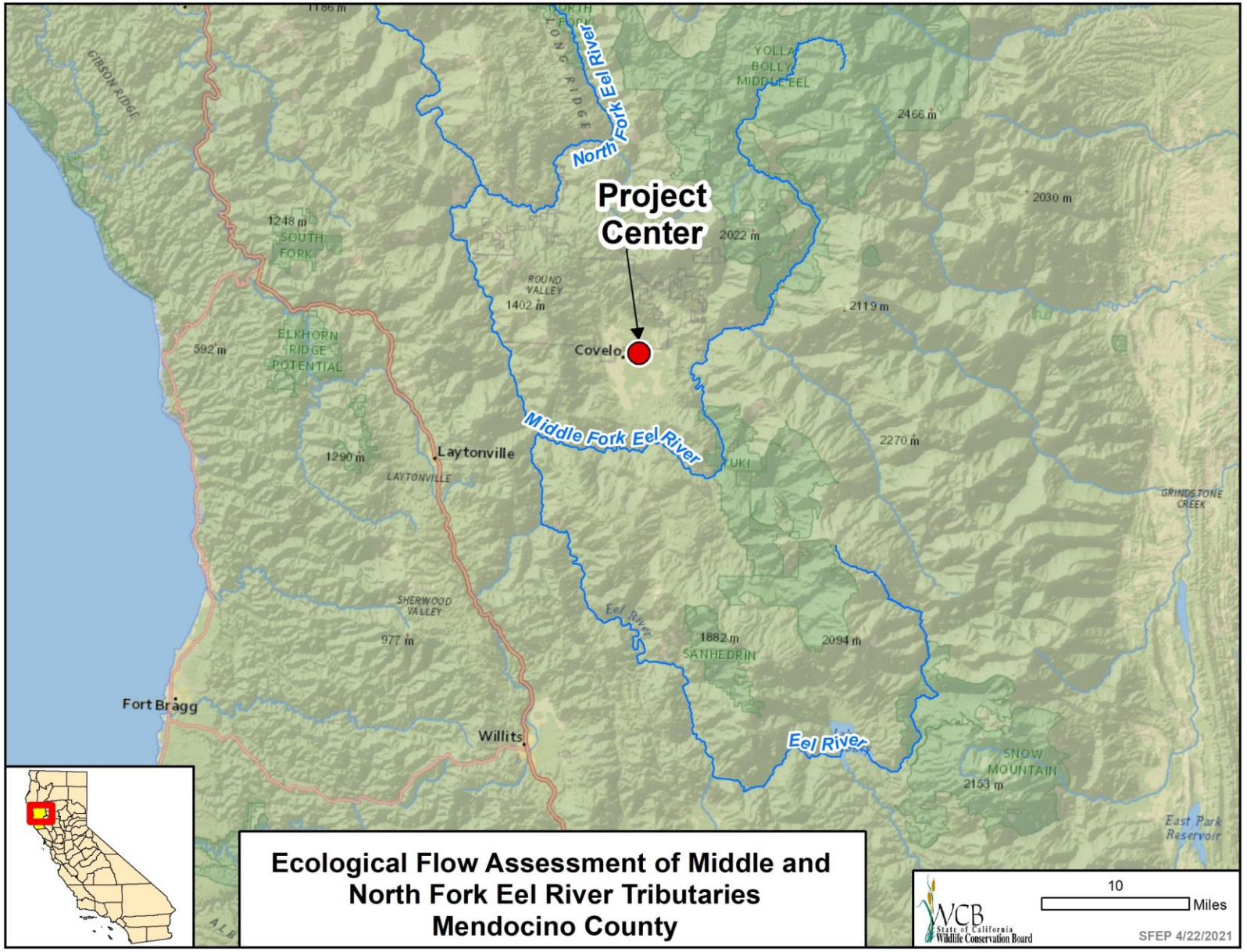
9. Community Water Management Planning in Browns and Tule Creeks

slide 2

- The Project will involve outreach to private landowners to help identify, design, and, in the future, implement projects that will directly improve instream flow and habitat conditions for anadromous fisheries
- Project activities include:
  - Employ the California Environmental Flow Framework to develop ecological flow objectives
  - Implement a voluntary Community Water Management planning process
    - Identify and prioritize projects to enhance dry season flows
  - Develop site specific plans for 2 to 6 water conservation and stream flow enhancement projects to an intermediate (65%) level of design
  - Outreach and information sharing

Tank Array. Credit: Watershed Research and Training Center

10. Ecological Flow Assessment of Middle and North Fork Eel River Tributaries - Map



10. Ecological Flow Assessment of Middle and North Fork Eel River Tributaries

slide 1

- Tributaries to the Middle and North Fork Eel River once supported healthy runs of salmonids and Pacific lamprey that have cultural significance for the Round Valley Indian Tribes and provided subsistence
- Changes in land management, degradation of the broader Eel River fishery, introductions of non-native species, and changes in local and regional flow management have contributed to the decline of these species
- Stream flow impairment represents a key limiting factor

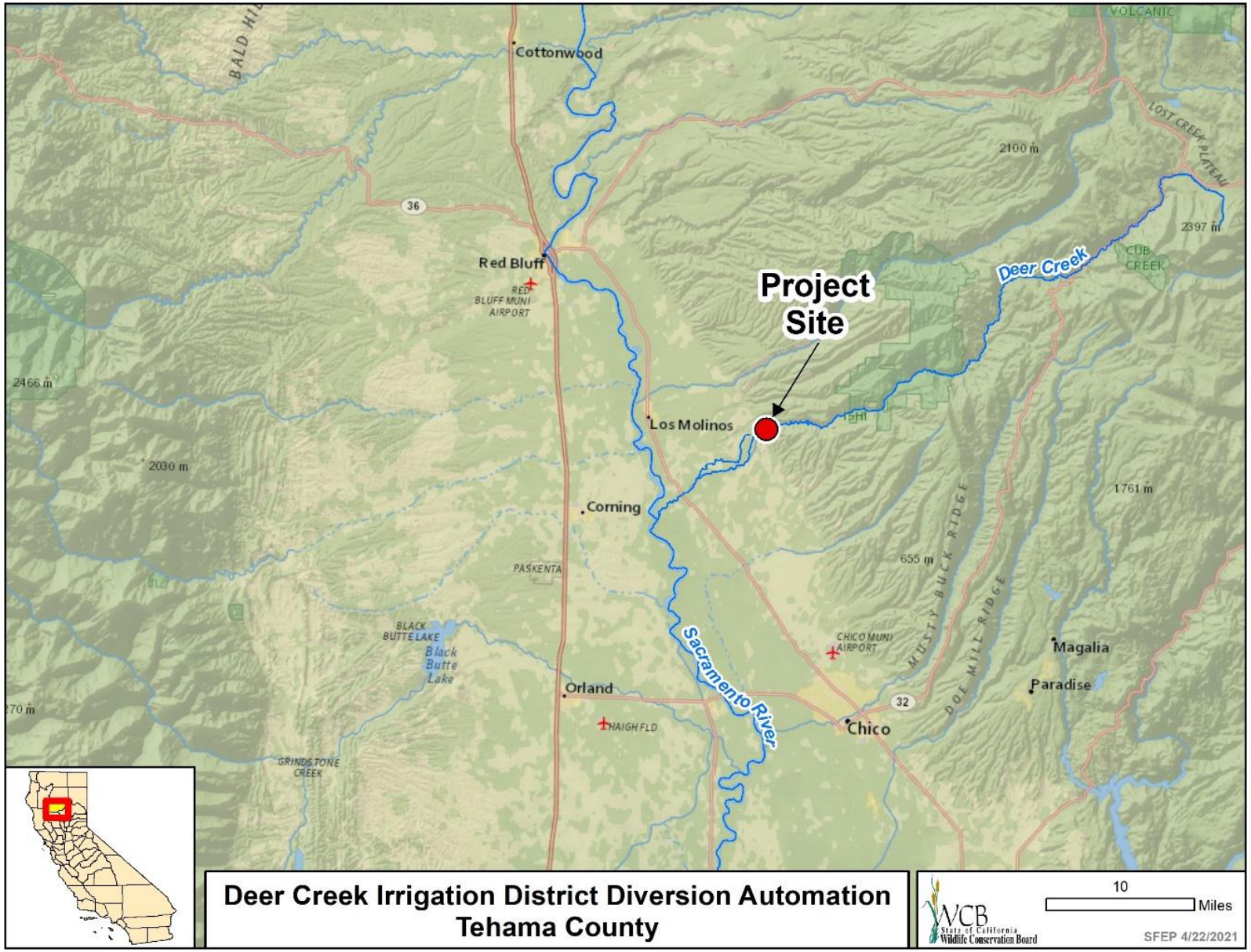
Lower Mill Creek. Credit: Round Valley Indian Tribes

10. Ecological Flow Assessment of Middle and North Fork Eel River Tributaries

slide 2

- Project Goal – Develop streamflow recommendations for tributaries to the Middle Fork and North Fork of the Eel River to be implemented in future project phases on the Round Valley Indian Tribes' tribal lands and help evaluate instream flow methods for broader application across California
- Project tasks include:
  - Conducting a stream assessment and diversion inventory
  - Stream gauging and water temperature monitoring to develop unimpaired flow and stream temperature estimates
  - Developing ecological flow recommendations using the California Environmental Flows Framework and percent-of-diversion methods
  - Evaluating the performance of those flow recommendations using the individual-based salmon model, inSALMO
  - Translating results into flow recommendations designed to improve fish productivity on the tribal lands
  - Disseminating findings through publication of a peer reviewed manuscript, presentations at scientific conferences, and at least one webinar for Eel River stakeholders

11. Deer Creek Irrigation District Diversion Automation - Map



11. Deer Creek Irrigation District Diversion Automation

slide 1

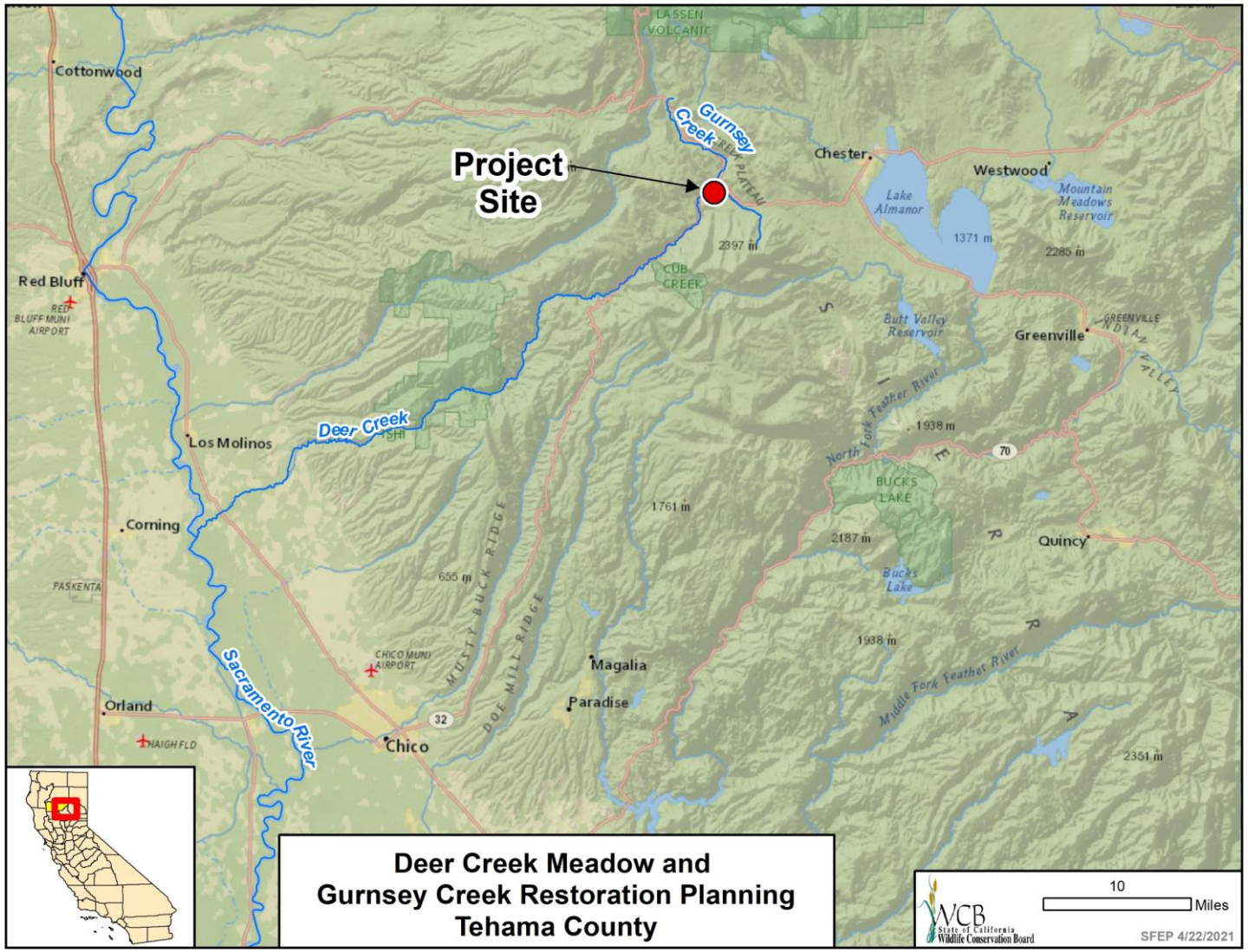
- Deer Creek supports Central Valley spring and fall run Chinook salmon and Central Valley steelhead trout
- Surface flow is provided to agricultural water users via three points of diversion, and delivered via a 12-mile system of canals dating back to the 1920's
- DCID operates the most upstream diversion and may legally divert 33% of available flow
- Aging components, along with lack of sufficient storage and the distance from the diversion structure, make it difficult to efficiently manage the system
- Automating the diversion system will allow operators to monitor flow rates in real-time and adjust diversion rates remotely
- Result: increase in efficiency and minimization of spillage and tailwater losses
  - Water savings are expected to translate to enhanced stream flow of up to 3 cfs

11. Deer Creek Irrigation District Diversion Automation - Photos

DCID diversion on the left and Deer Creek on the right
Credit: Ben Cook, Trout Unlimited

DCID diversion headwall
Credit: Ben Cook, Trout Unlimited

12. Deer Creek Meadow and Gurnsey Creek Restoration Planning - Map



12. Deer Creek Meadow and Gurnsey Creek Restoration Planning

slide 1

- Two abandoned bridges over Gurnesy Creek pose a water quality risk
  - The bridges were constructed with creosote-treated timber, which is leaching into the stream
  - The Highway 36 bridge is extremely degraded and is at risk of collapsing into Gurnsey Creek
- Legacy livestock grazing activities within Deer Creek Meadows have led to severe streambank erosion, channel incision, and meadow degradation
  - Reduced hydrologic connectivity between channel and floodplain
  - Decreased floodplain inundation
  - Loss of meadow groundwater storage
  - Increased erosion from lack of vegetation
  - Shallow, wide channels from scour

Deer Creek Meadow Bridge. Photo credit: Bethany Johnson, Collin Pine Company

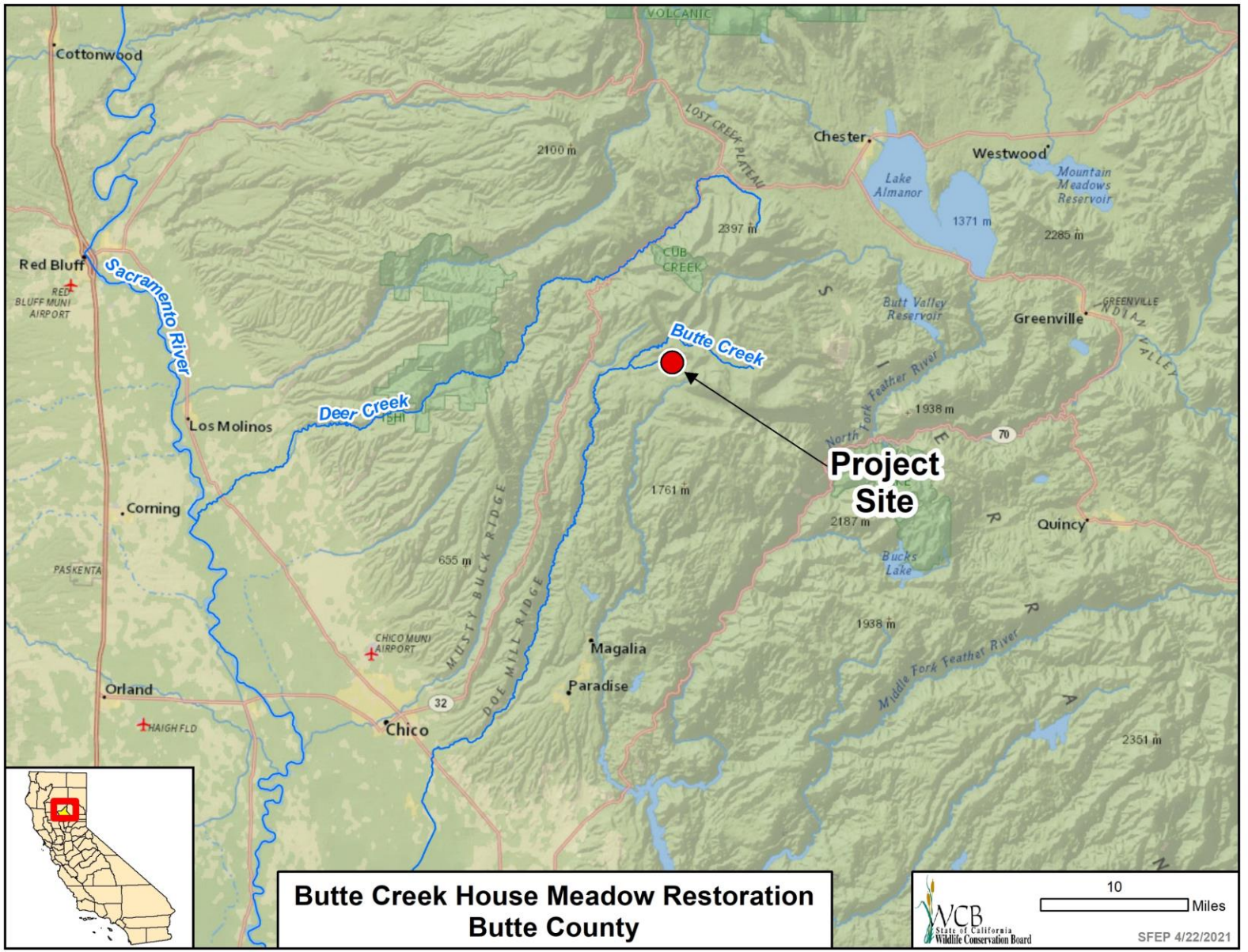
12. Deer Creek Meadow and Gurnsey Creek Restoration Planning

slide 2

- This Project will develop the overall project planning, design, permitting, and environmental documents for future implementation in the Upper Deer Creek Watershed
  - Removal of the 2 abandoned bridges over Gurnsey Creek
  - Habitat improvements within the footprint and upstream and downstream of the bridges (i.e., resloping and reestablishing native riparian vegetation)
  - Meadow restoration within Deer Creek Meadows (e.g., beaver dam analogues, cattle exclusion fencing, reestablishing native riparian vegetation)

Upper Deer Creek. Photo credit: Bethany Johnson, Collins Pine Company

13. Butte Creek House Meadow Restoration Planning - Map



13. Butte Creek House Meadow Restoration Planning

slide 1

- Butte Creek House Meadow exhibits significant damage from a variety of past management practices
  - degradation of the meadow and impaired flows into Butte Creek
- A series of check dams were placed in the main channel (1990)
  - helped retain spring runoff and improve aquatic habitat, but meadow still showing signs of poor hydrologic function
  - Checks are now 30 years old and starting to show signs of failure
- The meadow is next to an overly dense forest stand which reduces water infiltration, alters stream flow patterns and poses a wildfire risk
- Project's planning efforts will promote enhanced stream flow and resilient forests through forest health treatments and restoration of meadow functions
  - Conduct a geomorphic assessment of the historic stream channel
  - Complete a meadow restoration design with a goal to restore hydrologic function
  - Complete a timber harvest plan to thin the stand
  - Complete CEQA compliance documents as lead agency
  - Complete necessary permits

13. Butte Creek House Meadow Restoration Planning- Photos

Channel incision on Butte Creek
Credit: Thad Walker, Butte County RCD

Butte Creek House Meadow
Credit: Thad Walker, Butte County RCD

14. Upper Long Bar Restoration Planning - Map

14. Upper Long Bar Restoration Planning

slide 1

- Historically, the Yuba River supported large numbers of spring- and fall-run Chinook salmon and steelhead
- The fisheries were significantly impacted from Gold Rush era mining and the construction of Englebright Dam
  - Decreased floodplain inundation
  - Increased water temperature
  - Limited channel complexity
- The Project seeks to restore the Lower Yuba River to improve habitat for spring- and fall-run Chinook, steelhead, and other riverine, riparian, and floodplain species

Upstream portion of the Project Area (red line)
Photo credit: Aaron Zettler-Mann

14. Upper Long Bar Restoration Planning

slide 2

- The Project will be the planning and design phase
- The specific project objectives include
  - Secure land tenure
  - Negotiate long-term management with public access
  - Develop a monitoring plan
  - Pre-construction monitoring
  - Develop 65% designs
  - CEQA/NEPA compliance
  - Apply for necessary permits

Downstream portion of Project Area (red line)
Photo credit: Aaron Zettler-Mann

15. Russian River Watershed Stream Gauging - Map

15. Russian River Watershed Stream Gauging

slide 1

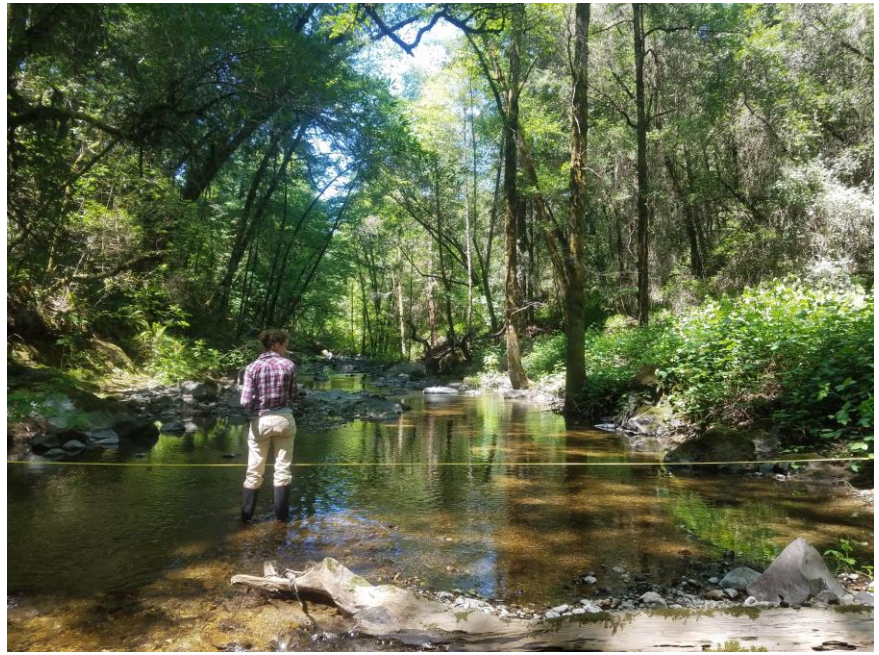
- TU's Conservation Hydrology Program provides the scientific foundation for over 10 project partners' on-the-ground projects and policy work in streams critical to salmonid recovery
- Datasets are used in several streamflow enhancement projects for pre-project, post-project, and project development work
- Stream gauging network in need of maintenance and upgrades to continue TU's monitoring program and to support hydrologic models for subwatersheds critical to the recovery of coho salmon and other native salmonids
- Winter season high flow gaging is needed for optimal calibration of hydrologic models

Credit: Trout Unlimited

15. Russian River Watershed Stream Gauging

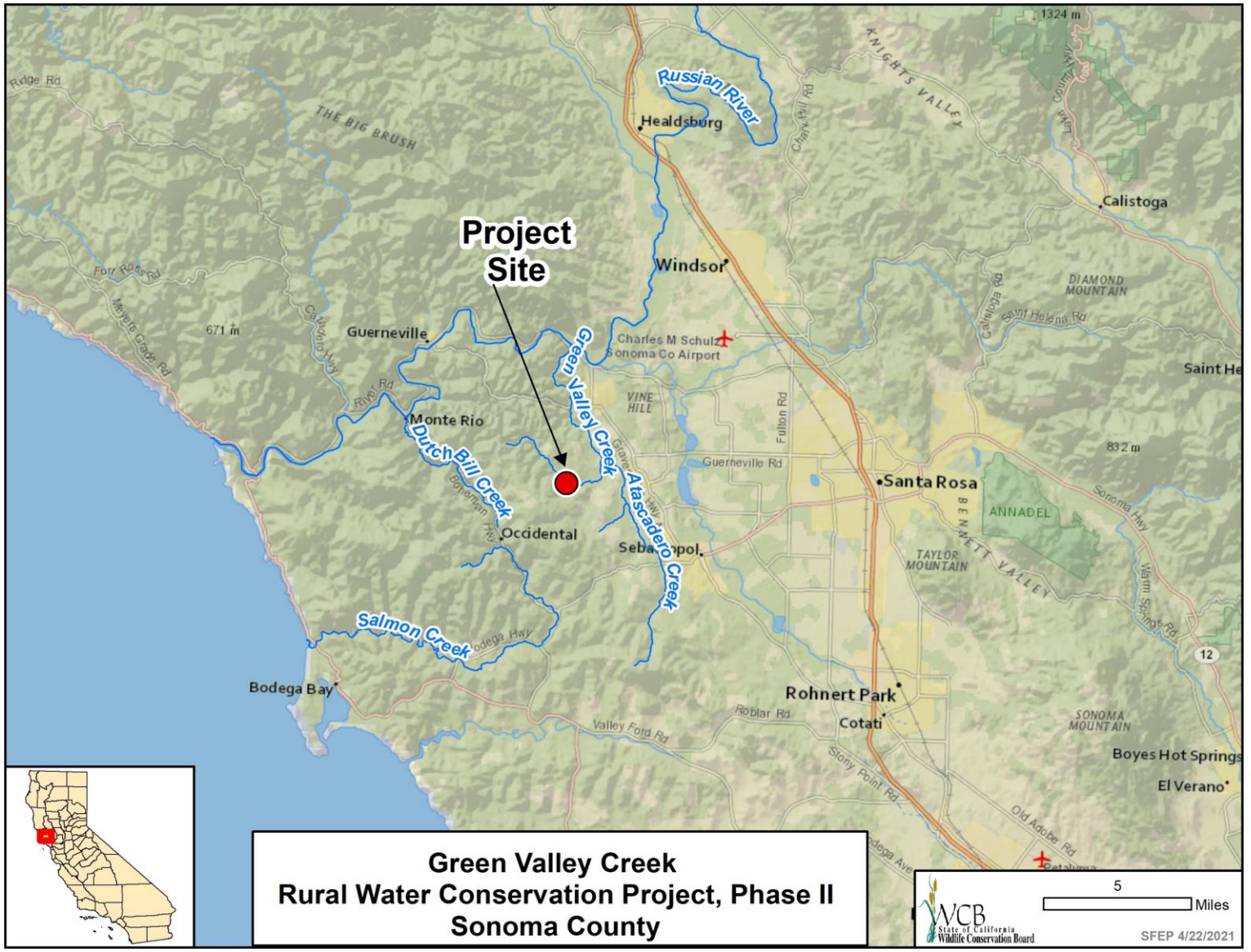
slide 2

- Improve 20 gauging sites by repairing and replacing equipment, installing local topographic benchmarks, and installing staff plates that read to 0.01 ft precision and are referenced to local datum
- At up to eight sights in Core Areas for coho salmon extend staff plates to observe winter water levels to facilitate year-round stream flow gauging
- Complete three years of data collection and analysis to create and calibrate annual hydrographs, establish annual rating curves for each winter gauging sites, and improve hydrologic models of Mark West, Mill, Green Valley/Atascadero, and Dutch Bill creek tributaries
- Integrate low-flow data and high-flow data to establish continuous record of stream flow in Core Areas
- Share project reports and findings on public data sharing site (CEDEN)
- Project tasks include:
  - Gauge repairs and upgrades to gauge network
  - Data collection and analysis
  - Data sharing
  - Project Management



Credit: Trout Unlimited

16. Green Valley Creek Rural Water Conservation Project, Phase II - Map



16. Green Valley Creek Rural Water Conservation Project, Phase II

slide 1

- Upper Green Valley Creek provides critical habitat for remnant native populations of endangered coho salmon and steelhead trout
- Summer flows have been significantly impacted by agriculture and rural residential development in the watershed
- Low summer streamflow is the main limiting factor to coho survival in lower Russian River tributaries, including Green Valley Creek
- Portions Upper Green Valley Creek disconnect or go dry in most years, including reaches important for coho spawning and rearing
- Phase I of the Project implemented rural residential rainwater catchment systems to offset over 250,000 gal of streamflow diversions and designed the systems for Phase II

16. Green Valley Creek Rural Water Conservation Project, Phase II

slide 2

- The Project seeks to enhance summer streamflows in a critical coho rearing reach of upper Green Valley Creek by constructing an additional 221,000 gallons of rainwater catchment storage
  - To be constructed on four rural resident properties
  - Development of associated forbearance agreements
- The Project will continue streamflow monitoring to document conditions before and after implementation and contribute to a comprehensive assessment of streamflow restoration in the watershed
- The Project will promote alternative water storage options among the rural residential communities

Upper Green Valley Creek. Credit: Gold Ridge RCD

17. Lower Atascadero and Green Valley Creek Flow and Habitat Enhancement Master Plan - Map

17. Lower Atascadero and Green Valley Creek Flow and Habitat Enhancement Master Plan

slide 1

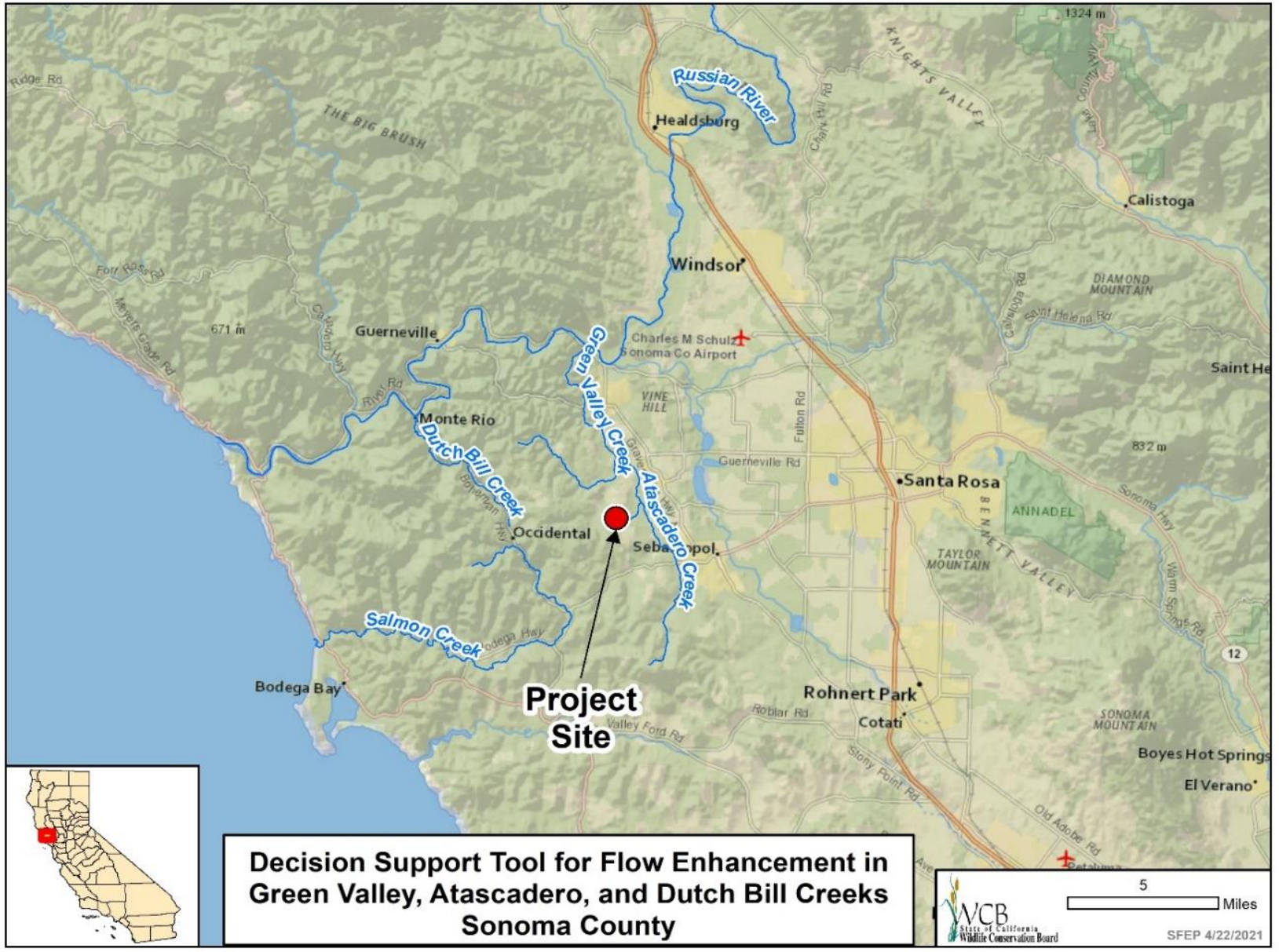
- Green Valley Creek is a consistent producer of large and abundant juvenile salmonids in the lower Russian River, and its populations are believed to utilize lower Atascadero Creek as well
- Project will address several key limiting factors for salmonids in Green Valley and Atascadero creeks:
  - Insufficient stream flow
  - Impaired water quality
  - Migration barriers and stranding risks
- Removal of recently-accumulated sediment through future implementation actions will convert much of the perennially-inundated wetlands in lower Atascadero to seasonally-inundated wetlands, reversing the trend of the past few decades
- Project area: lowest 2.7 miles of Atascadero Creek and upper 0.8 miles of lower Green Valley Creek
  - Five target project sites; final design plans have been completed for two sites and are in progress for a third site
  - Project seeks to develop designs for the two additional sites as well as obtain CEQA compliance for all five sites with the end goal of advancing the projects to implementation

17. Lower Atascadero and Green Valley Creek Flow and Habitat Enhancement Master Plan - Photos

Floodplain with vineyard on Lower Green Valley Creek
Credit: Matt O'Connor, Coast Range Watershed Institute

Culvert replacement, January 2018
Credit: John Green, Gold Ridge RCD

18. Decision Support Tool for Flow Enhancement in Green Valley, Atascadero, and Dutch Bill Creeks - Map



18. Decision Support Tool for Flow Enhancement in Green Valley, Atascadero, and Dutch Bill Creeks

slide 1

- Green Valley and Dutch Bill creeks are priority watersheds for stream flow enhancement and coho recovery.
- Limiting factors for salmonids:
  - Insufficient summer baseflows
  - Lack of high-quality pool habitat
  - Lack of winter refugia
  - In addition, portions of the Atascadero Creek watershed are experiencing the fastest rates of new groundwater development in Sonoma County
- The project will utilize a hydrologic modeling-based Decision Support Tool for addressing insufficient summer baseflows, pool habitat and winter refugia
- Existing hydrologic model
  - A valuable starting point to guide water management and flow enhancement efforts in the watersheds
  - At the time of its development, limited information was available regarding existing sources and rates of water use, which prohibited full application of the model in the previous effort
  - These elements were represented with generalized parameters and assumptions

18. Decision Support Tool for Flow Enhancement in Green Valley, Atascadero, and Dutch Bill Creeks

slide 2

- Project will update the existing model to more accurately represent groundwater and surface water uses and perform a more robust calibration
- Model will be applied as a Decision Support Tool to:
  - Evaluate the effectiveness of already implemented stream flow enhancement projects
  - Identify and prioritize strategies and locations for future work
  - Generate annual flow forecasts for emergency drought planning
  - Increase survival rates for juvenile salmonids

Upper Green Valley Creek
Credit: Matt O'Connor, Coast Range Watershed Institute

19. Green Gulch Farm Water Storage and Flow Enhancement Planning - Map

19. Green Gulch Farm Water Storage and Flow Enhancement Planning

slide 1

- The San Francisco Zen Center's Green Gulch Farm is a meditation and retreat center with an organic farm and garden. The property is adjacent to Green Gulch Creek, a tributary to Redwood Creek
  - Redwood Creek supports one of the few remaining native populations of endangered California Central Coast coho salmon in the North Bay area
  - Sufficient stream flow is critical for providing high-quality rearing habitat
  - SFEP awarded planning funds in 2017 to complete a feasibility study and analysis of historic and future water demand at the Farm
- Project will prepare engineered designs and secure the regulatory permits and water rights modifications required to implement needed improvements to the water supply and distribution system for the Farm. The project has two primary goals:
  - Remove an existing on-channel reservoir and significantly reduce or eliminate direct surface diversion during critical stream flow periods
  - Provide sufficient and reliable water supply and storage to sustainably run the Farm through future droughts and climate change
- Preferred Alternative activities: increase storage capacity of 2 existing off-channel reservoirs (and build a third if necessary), decommission Zendo pond, and replace aging pipelines around the Farm

19. Green Gulch Farm Water Storage and Flow Enhancement Planning - Photos

Upper Reservoir (off-channel)
Credit: Prunuske Chatham, Inc.

Zendo Pond (on-channel)
Credit: Prunuske Chatham, Inc.

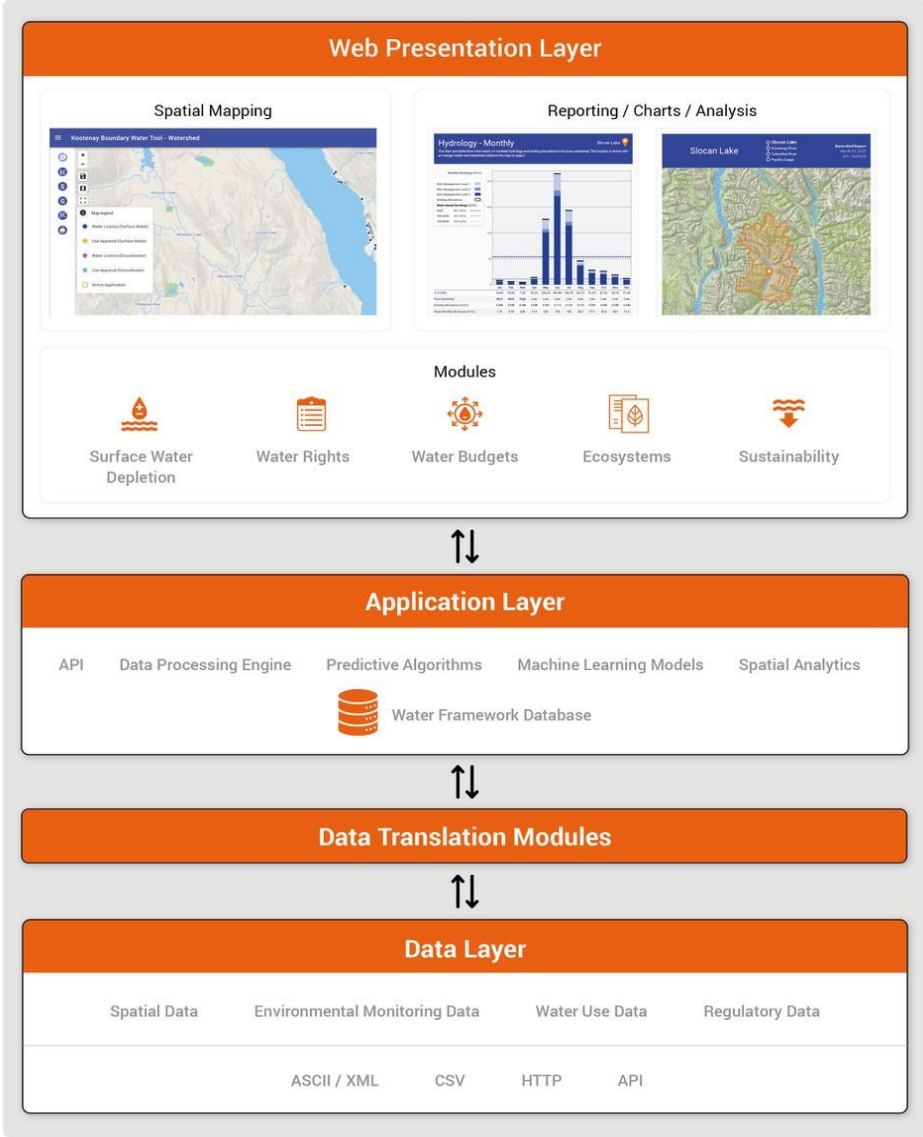
Lower Green Gulch Creek Restoration (2014)
Credit: Brian Cluer, NOAA

20. Online Water Availability Tool - Map

20. Online Water Availability Tool

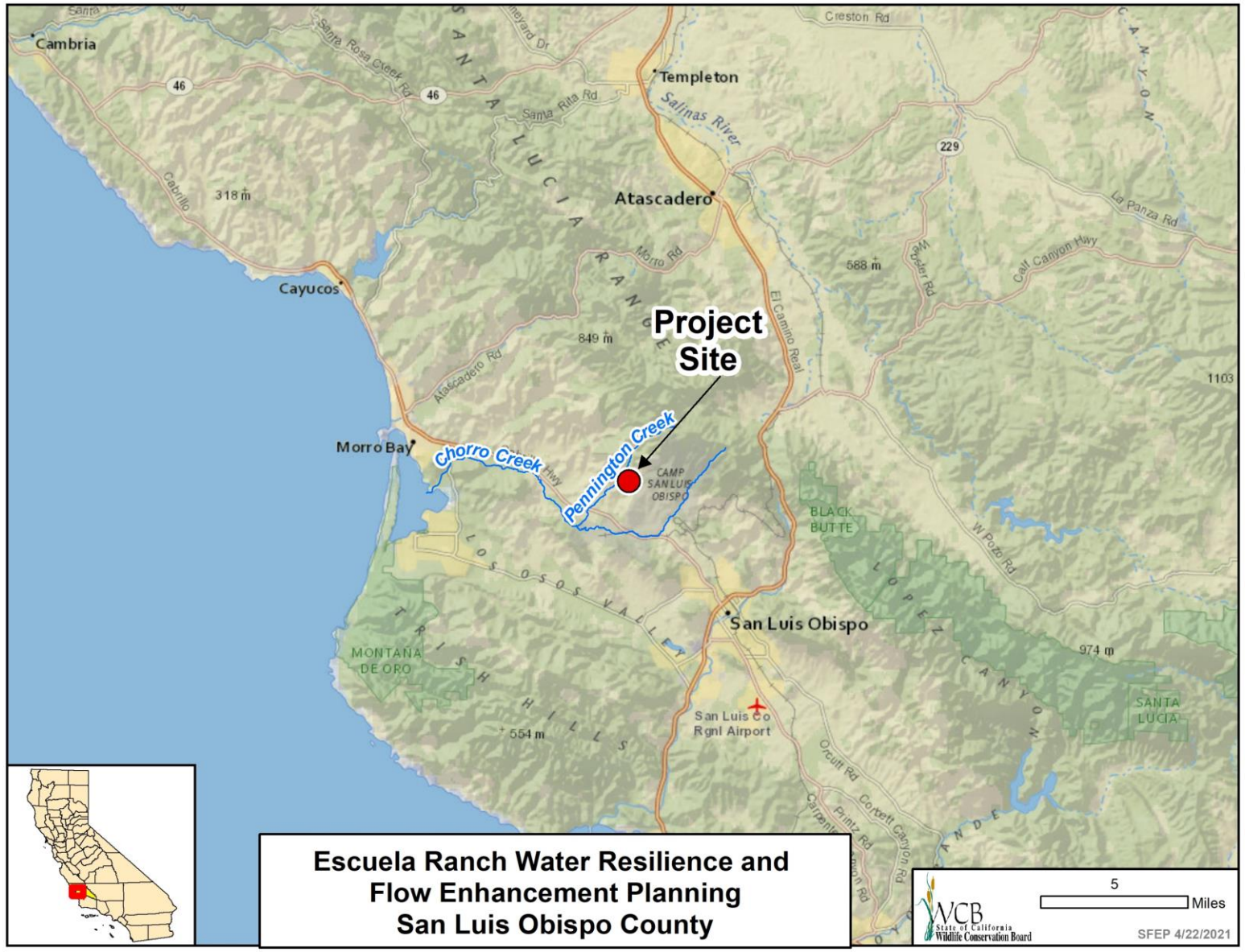
slide 1

- The SWRCB's Policy for Maintaining Instream Flows in Northern California Coastal Streams requires that new appropriative water right applications provide a Water Availability Analysis
  - Water Supply Report
  - Cumulative Diversion Analysis
- Preparation of these reports can require significant time, effort, and professional experience.
- There is currently no widely available tool to perform these analyses consistently across individual projects and locations.
- Project will create an online Water Availability Analysis tool
  - Easily accessible by practitioners, landowners, and government agencies
  - Use of a common set of data, tools, and assumptions
  - User-centered design group will include SWRCB, practitioners and other potential users
- North Coast Policy Area (pilot project)
  - Potential for future expansion



Data flow diagram for the water availability tool
Credit: Ben Kerr, Foundry Spatial

21. Escuela Ranch Water Resilience and Flow Enhancement Planning - Map



21. Escuela Ranch Water Resilience and Flow Enhancement Planning

slide 1

- Pennington Creek is critical habitat for South-Central California coast steelhead
- In 2012, a Rainwater Harvesting Demonstration Project was implemented at Escuela Ranch
- An evaluation of the Demonstration Project found that rainwater at the site is insufficient to fill the existing tanks, even in very wet years

Existing tanks at Escuela Ranch. Credit: Aleksandra Wydzga

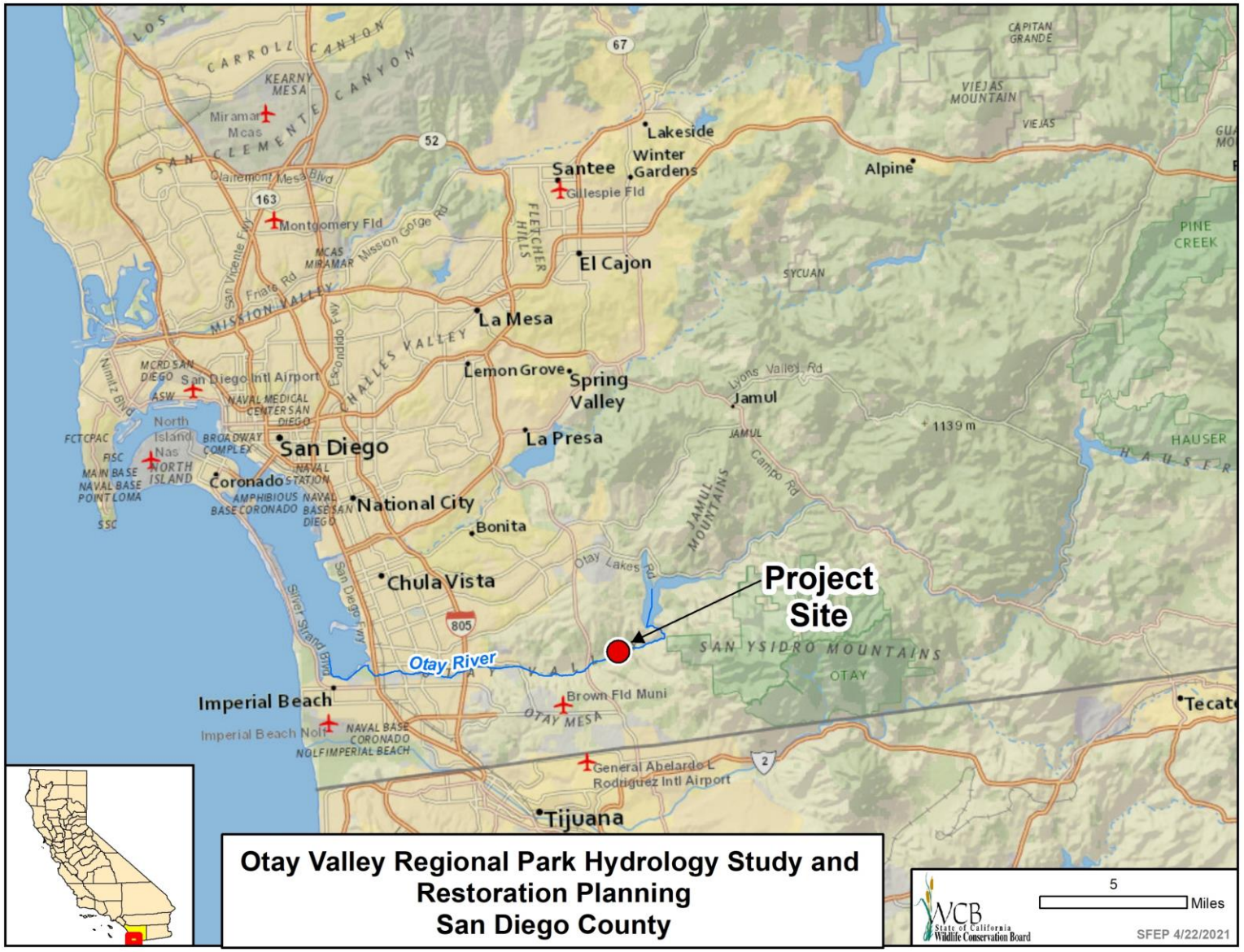
21. Escuela Ranch Water Resilience and Flow Enhancement Planning

slide 2

- Conduct necessary planning activities to expand and improve the existing system
- Divert peak winter flows from Pennington Creek to fill existing tanks, as well as 1-3 additional tanks
- Offset all non-potable water use from riparian wells from July to November, except in extreme drought years
- Reduce drawdown in water table adjacent to Pennington Creek and improve stream flow during times of non-pumping

Pennington Creek. Credit: California Conservation Corps

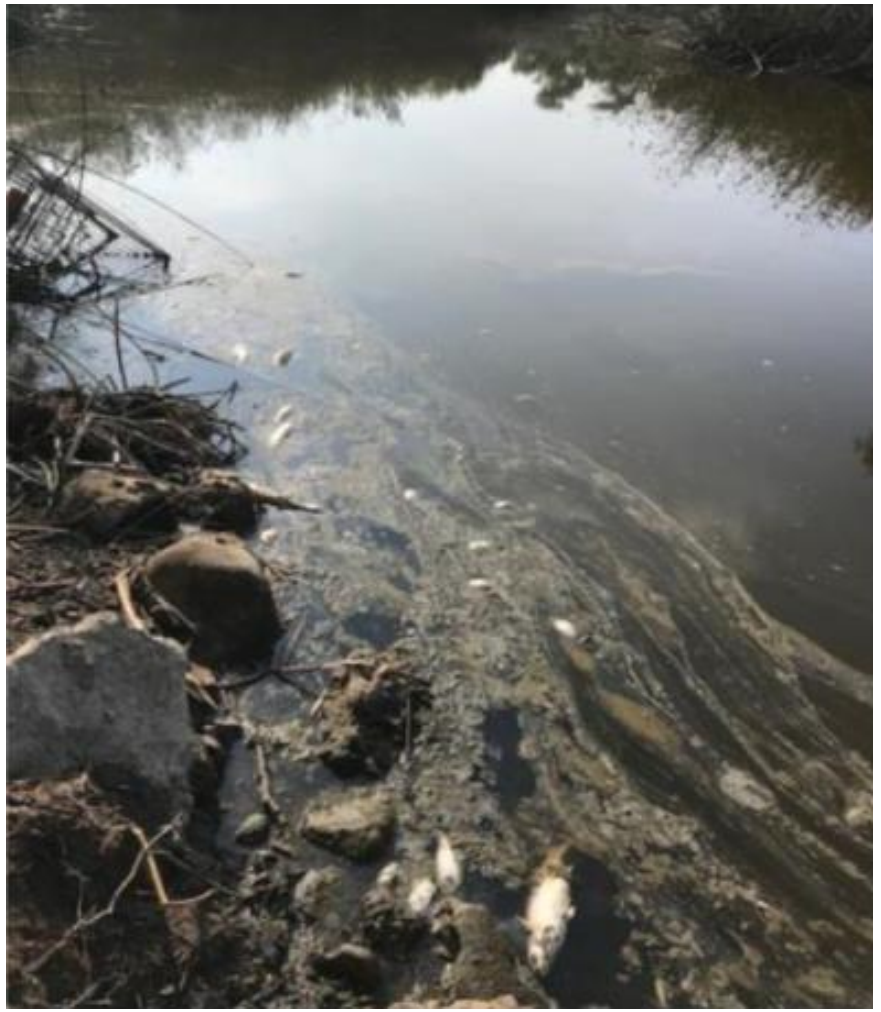
22. Otay Valley Regional Park Hydrology Study and Restoration Planning - Map



22. Otay Valley Regional Park Hydrology Study and Restoration Planning

slide 1

- Lower Otay River Valley riparian and wetland habitats have been degraded due to historic in-stream mining and reduced streamflow since the installation of the Savage Dam
- The main channel in this area is ill-defined due to historic mining and side tributaries often discharge into shallow pooling flats rather than the river channel system. Seasonal ponding followed by high evaporation in these areas has resulted in the creation of alkaline flats
- Tamarisk, an invasive plant species, draws away groundwater and contributes to increased salt concentration in surface soils
- Urban runoff has impacted the lower Otay River water quality, causing algal blooms and fish die-offs



Fish die-off from eutrophication lower Otay River. Photo credit: City of San Diego

22. Otay Valley Regional Park Hydrology Study and Restoration Planning

slide 2

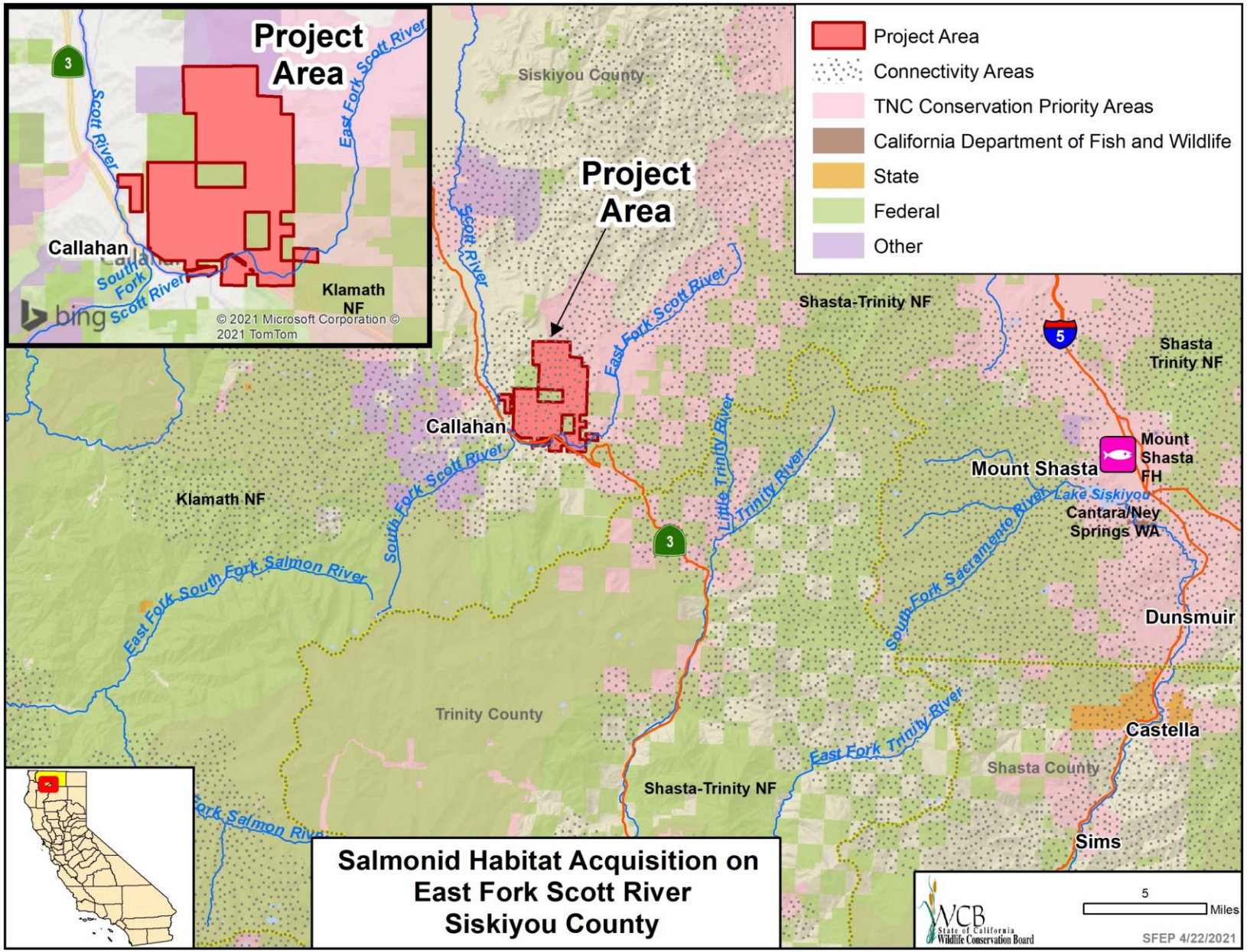
- The Project will
  - Assess current hydrologic conditions in the lower Otay River and identify priorities for future restoration and enhancement projects.
  - Evaluate future hydrologic conditions considering upstream development, in-process or planned mitigation projects and Climate Change.
  - Identify up to ten priority areas to improve streamflow in the lower Otay River valley.
  - Prepare up to ten "shovel-ready" conceptual restoration plans that detail site-specific actions (i.e., recontouring, invasive species removal, planting/seeding, trail improvements, etc.) to improve streamflow, habitat quality and water quality.

Invasive tamarisk and rabbit-foot grass in lower Otay River. Photo credit: City of San Diego

Proposed Items 23-35

North Fork of the Eel River
Credit: Round Valley Indian Tribes

23. Salmonid Habitat Acquisition on East Fork Scott River - Map



23. Salmonid Habitat Acquisition on East Fork Scott River

slide 1

Looking west from Hayden Ridge over the Scott Valley. Credit: The Wildlands Conservancy

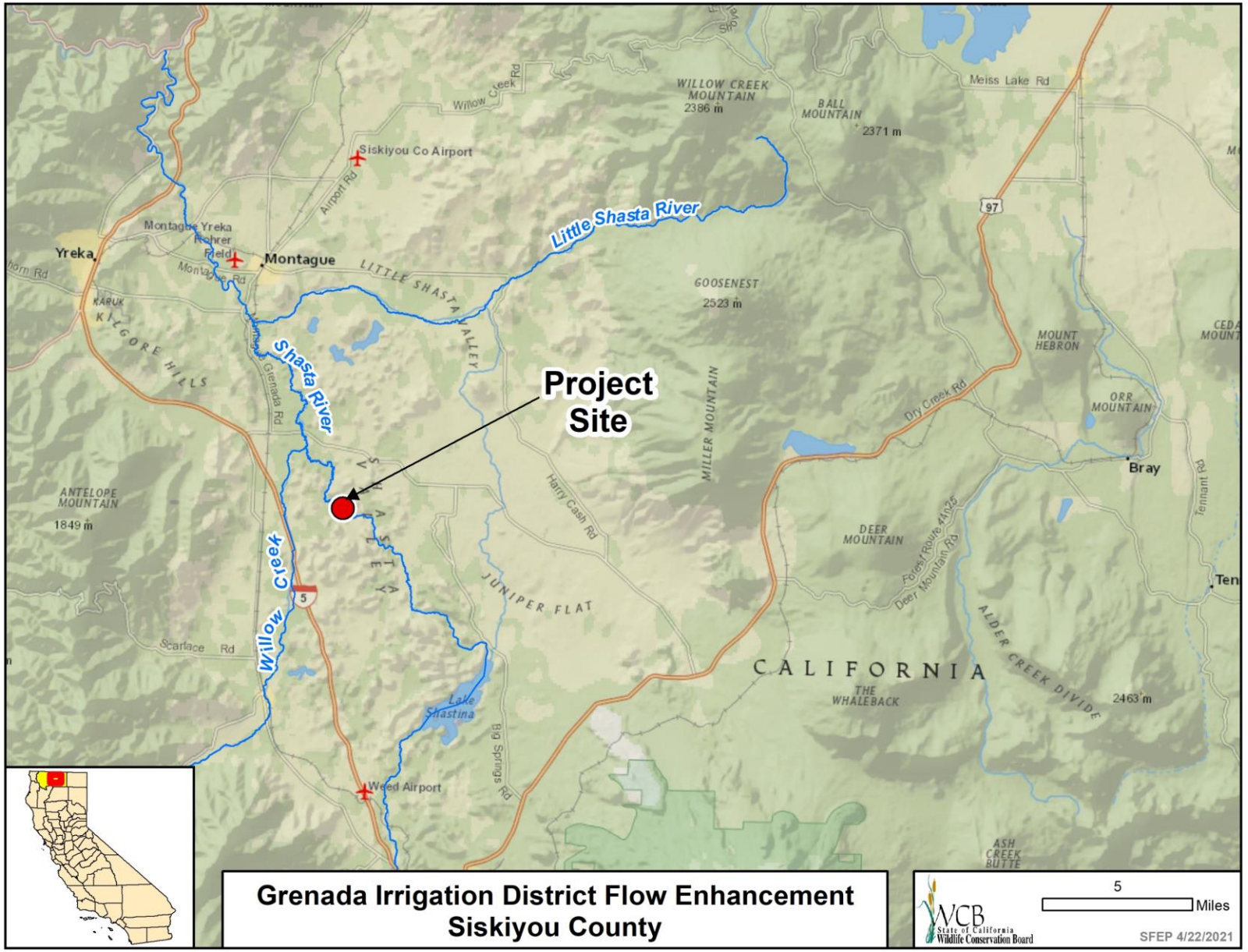
Noyes Valley Creek. Credit: The Wildlands Conservancy

23. Salmonid Habitat Acquisition on East Fork Scott River

slide 2

East Fork Scott River. Credit: The Wildlands Conservancy

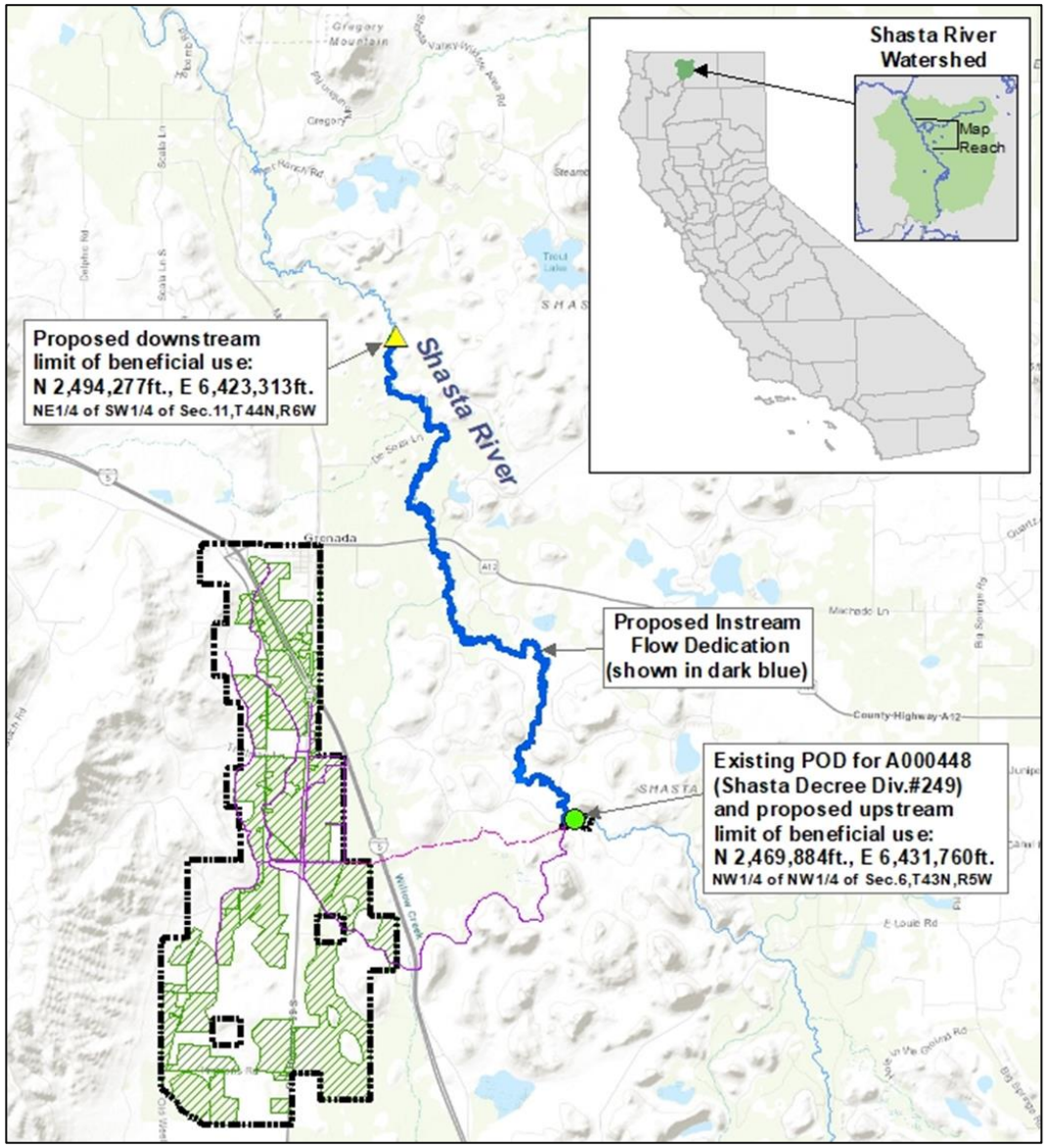
24. Grenada Irrigation District Flow Enhancement - Map



24. Grenada Irrigation District Flow Enhancement

slide 1

- Permit to divert up to 40 cfs from April 1 through October 1 of each year. This right is also identified in the Shasta River Decree
- Water right is large in volume, but low in priority
- Over past 10-15 years, operated between 135-140 (138 average) days a year through the irrigation season with an average maximum diversion volume of approximately 28-32 cfs
- Diversion volumes are usually reduced or turned off during base flow conditions
- Typically allowed to divert again later in September when higher priority rights reduce their diversion volume



24. Grenada Irrigation District Flow Enhancement

slide 2

- Diverted water runs through a compliant fish screen situated on the edge of the Shasta River
- Water is lifted approximately 60 feet and is discharged into an earthen ditch
- Transmission loss during conveyance through the ditch can be significant
- During a study in 2006, average ditch loss values were 17% over the study period and approximately 1,100-acre feet was lost in delivery transmission

GID Fish Screen. Credit: Gary Black

24. Grenada Irrigation District Flow Enhancement

slide 3

- Project will replace the existing earthen ditch with a buried pipeline.
- Recovery action in the SONCC Coho Salmon Recovery Plan
- Operate to diversion schedule developed with NOAA and CDFW in support of a Safe Harbor Agreement
- Permissive instream dedication via 1707
- Enter into a forbearance agreement
- Diversion data will be provided publicly on California Data Exchange Center

Diversion Volume Schedule – Normal and Drier Years

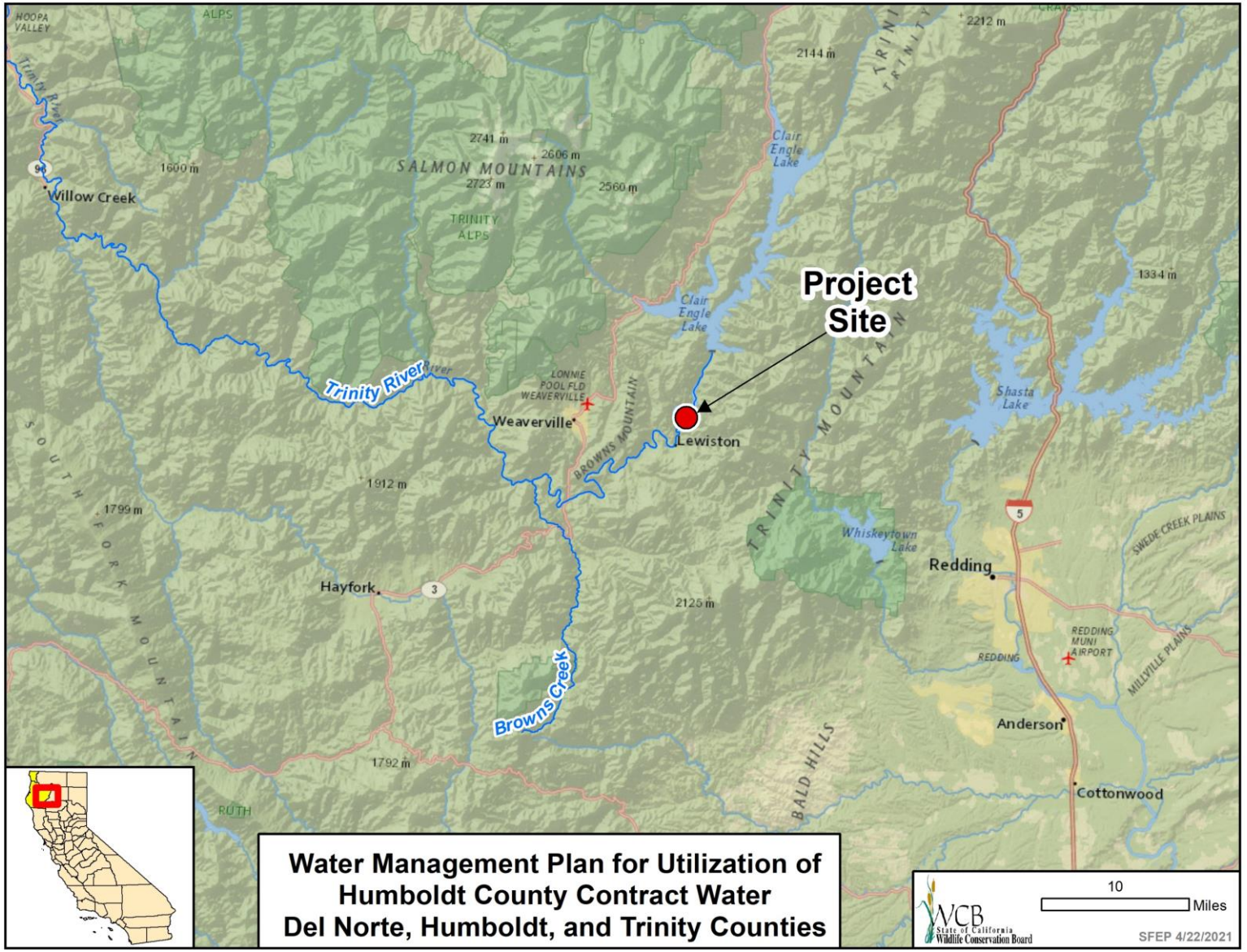
Date	Life Stage	Maximum Diversion Rate (cfs)	Current (cfs)	Proposed (cfs)	Conserved (Acre Feet)
4/1 – 4/9	Juvenile	40	30	0	535
4/10 – 5/20	Juvenile	40	30	24	464
5/21 – 8/15	Over-summering	40	24	24*	0
8/16 – 9/6	Over-summering	40	0-15	0-15*	0
9/7 – 9/30	Over-summering	40	21	18*	137
Average Annual Volume Conserved					1,136

Diversion Volume Schedule – Wet Years

Date	Life Stage	Maximum Diversion Rate (cfs)	Current (cfs)	Proposed (cfs)	Conserved (Acre Feet)
4/1 – 4/9	Juvenile	40	30	0	535
4/10 – 5/20	Juvenile	40	30	24	464
5/21 – 8/15	Over-summering	40	24	24*	0
8/16 – 9/6	Over-summering	40	24	24*	0
9/7 – 9/30	Over-summering	40	24	18*	274
Average Annual Volume Conserved					1,273

* Commitment to the diversion schedules is not inter-related with curtailment resulting from GID's low priority within the Shasta Decree. Maximum diversion schedule will be adhered to when curtailment is not enacted. Diversion for irrigation will be curtailed or turned off by direction of Watermaster.

25. Water Management Plan for Utilization of Humboldt County Contract Water - Map



25. Water Management Plan for Utilization of Humboldt County Contract Water

slide 1

- 1955 Trinity River Division Act
- Section 2 of the 1955 Act
  - Proviso 1 – directed Secretary to ensure preservation of fish and wildlife in Trinity River (e.g., minimum flows)
  - Proviso 2 – specified that "not less than 50,000 AF shall be released annually from the Trinity Reservoir and made available to Humboldt County and downstream users"
- In recognition of Proviso 2, a similar distinct condition was included in:
  - 1959 water delivery contract between Reclamation and Humboldt County
  - Reclamation's water permits
- Reclamation historically asserted view that Proviso 2 should be read in conjunction with Proviso 1

Trinity Reservoir, stores water for Trinity River Division.
Credit: Bureau of Reclamation

25. Water Management Plan for Utilization of Humboldt County Contract Water

slide 2

- 2000 Record of Decision – established Trinity River Restoration Program and adopted variable annual flow regime for mainstem Trinity River
  - Flow regime mimics spring snowmelt hydrograph for the basin, with higher flows focused in spring and early summer and relatively low base flows from July through March
- 2014 – Department of Interior Solicitor memorandum
  - Two provisos represent separate and independent limitations
  - Recommended an appropriate level of analysis in response to a request for release of water
- Need for Project is created by legal and compliance steps that must be completed for Reclamation to release Proviso 2 water

Lewiston Dam provides downstream releases to Trinity River and diverts water to Whiskeytown Lake through the Clear Creek tunnel.
Credit: Trinity County Chamber of Commerce

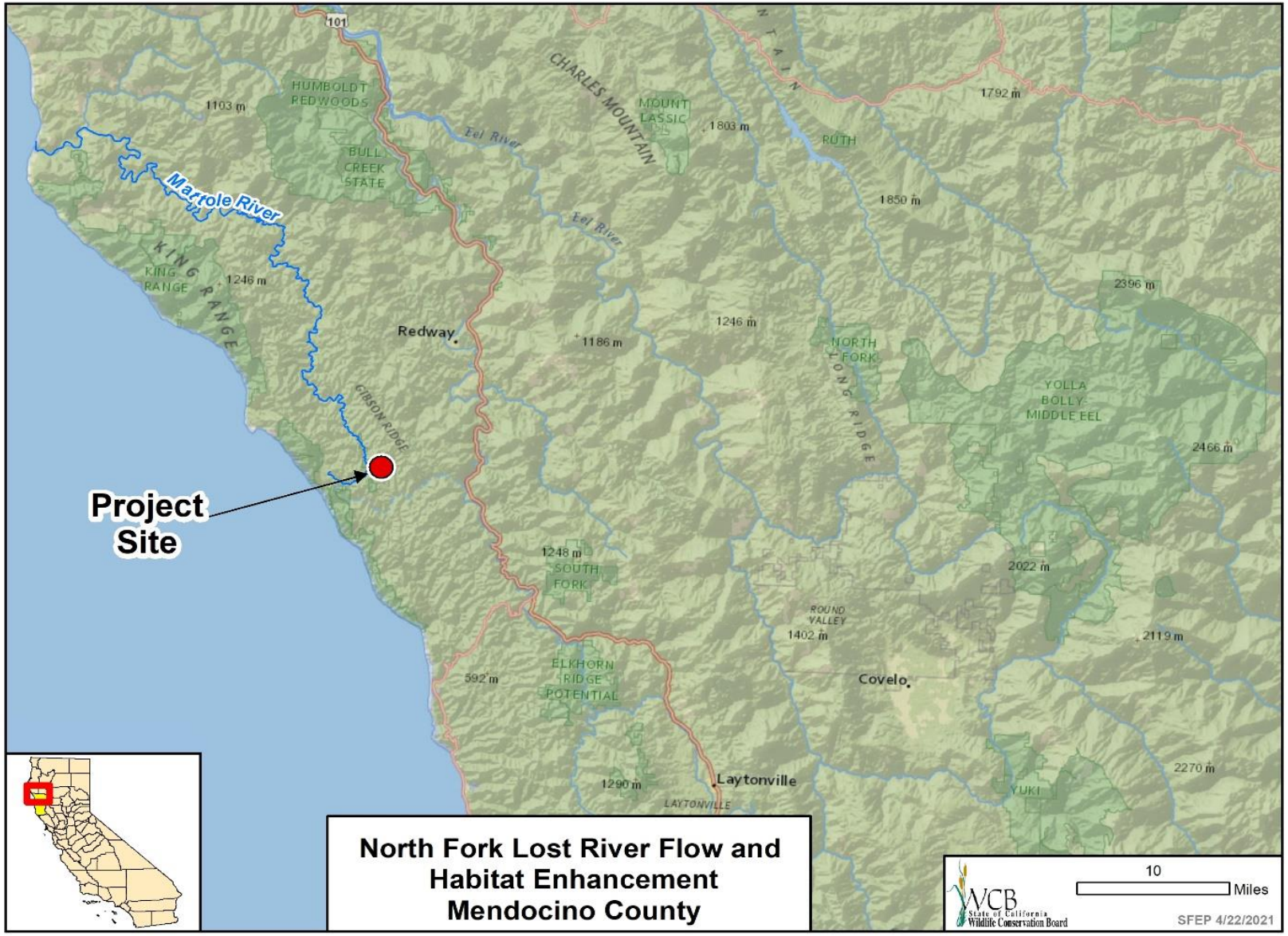
25. Water Management Plan for Utilization of Humboldt County Contract Water

slide 3

- Conduct planning activities including:
  - Stakeholder engagement
  - Evaluation of baseline conditions
  - Hydrologic modelling and analysis
  - Analyze effects on fish habitat availability, fish production, water temperature, and hydraulics
  - Create a Water Management Plan (25-year term)
  - Work with Reclamation and SWRCB regarding water rights
  - Develop environmental compliance strategy

Credit: Trinity River Restoration Program

26. North Fork Lost River Flow and Habitat Enhancement - Map



26. North Fork Lost River Flow and Habitat Enhancement

slide 1

Project reach for placement of Large Woody Debris structures
Credit: Tasha McKee McCorkle

- The Project will restore geomorphic, hydrologic, and ecological processes to a 5,200 ft reach of Lost River in order to address key limiting factors:
  - Channel entrenchment
  - Loss of floodplain connectivity
  - Reduced groundwater storage
  - Low summer flows
  - Lack of pool habitat
- The Project has three primary objectives which are intended to recover stream habitat essential to salmonid production:
  - Stream flow enhancement
  - Instream and floodplain habitat enhancement
  - Fish passage improvements

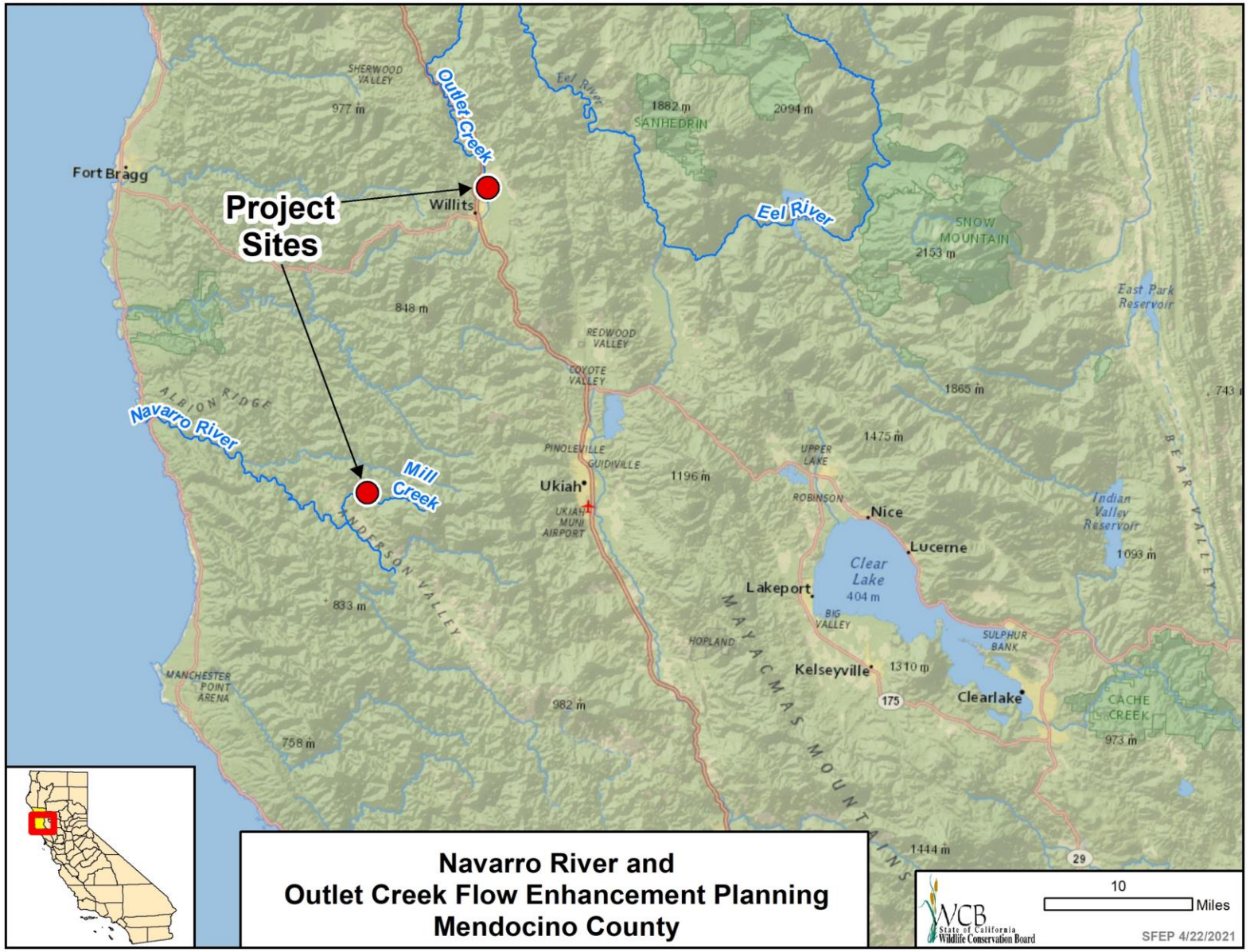
26. North Fork Lost River Flow and Habitat Enhancement

slide 2

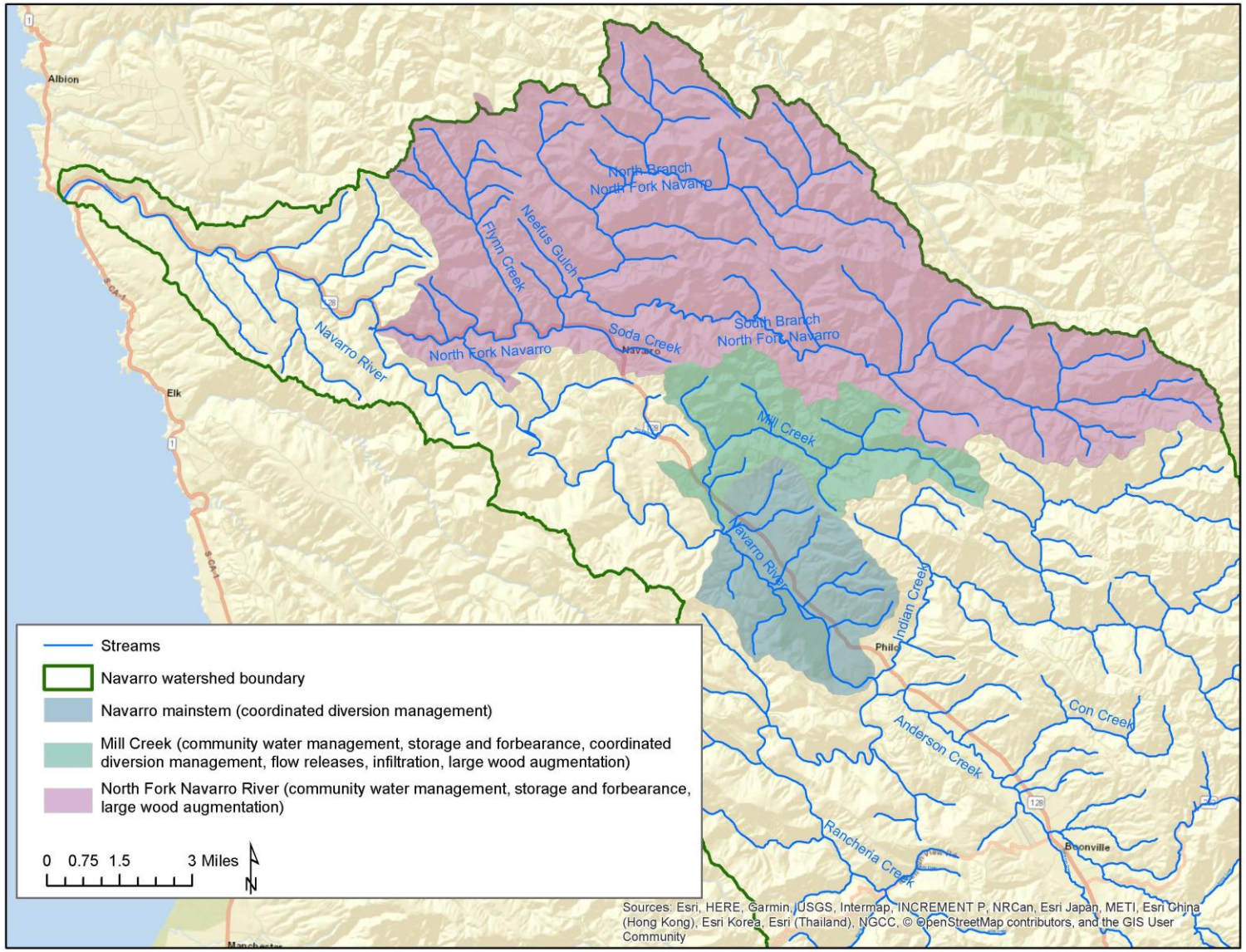
- Stream flow benefits will be achieved through installation of instream channel-spanning structures and subsurface clay restrictive layers
  - Reduce channel entrenchment
  - Enhance instream and floodplain habitat by raising the stream bed to engage with the floodplain, increasing pool depth, and adding instream habitat complexity through wood placement
- Two terrace ponds will provide metered flow into the project reach during the lowest flow period between August and October
- Natural processes restored over the long term, promoting the formation of a complex meandering stream and wetlands.

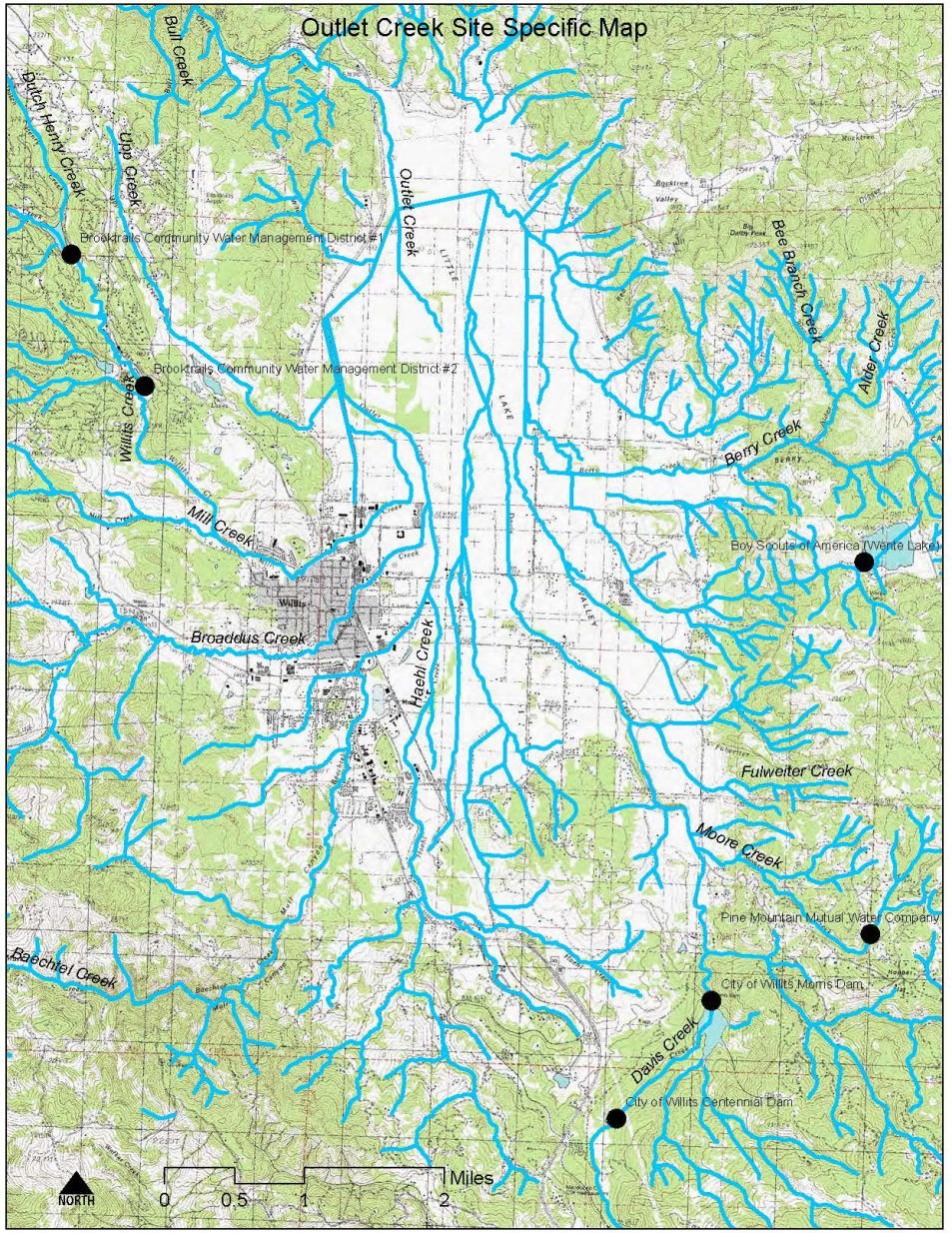
Future pond site
Credit: Tasha McKee McCorkle

27. Navarro River and Outlet Creek Flow Enhancement - Map



27. Navarro River and Outlet Creek Flow Enhancement - Maps





27. Navarro River and Outlet Creek Flow Enhancement

slide 1

- Due to Mediterranean climate, most rainfall and snow occur in the winter followed by long dry seasons
- As a result, many rivers and streams experience critically low flows or even dry up during late dry season months
- Impaired conditions threaten the health of streams and survival of salmon, steelhead and other native species; and reduce water supply reliability for farms and communities that depend on streams to meet their water needs
- California's rural watersheds need a collaborative portfolio of flow enhancement strategies and techniques that foster collaboration among water diverters, support habitat needs for fish and wildlife, and improve water security for communities

North Fork Navarro. Credit: Linda MacElwee

27. Navarro River and Outlet Creek Flow Enhancement

slide 2

- Expand successful strategies that have been developed in the Navarro River watershed
- Diverse number of Planning actions including:
  - Community water management planning
  - Planning and design of storage and forbearance projects
  - Design of infiltration projects
  - Planning for and assessment of targeted flow releases
  - Planning and design of coordinated diversion schedules
  - Development of large wood augmentation projects
- Continue implementing a complimentary monitoring program

Sample post card for Mill Creek Community Outreach. Credit: Trout Unlimited

28. Deer Creek Instream Flow Planning and Design - Map

28. Deer Creek Instream Flow Planning and Design

slide 1

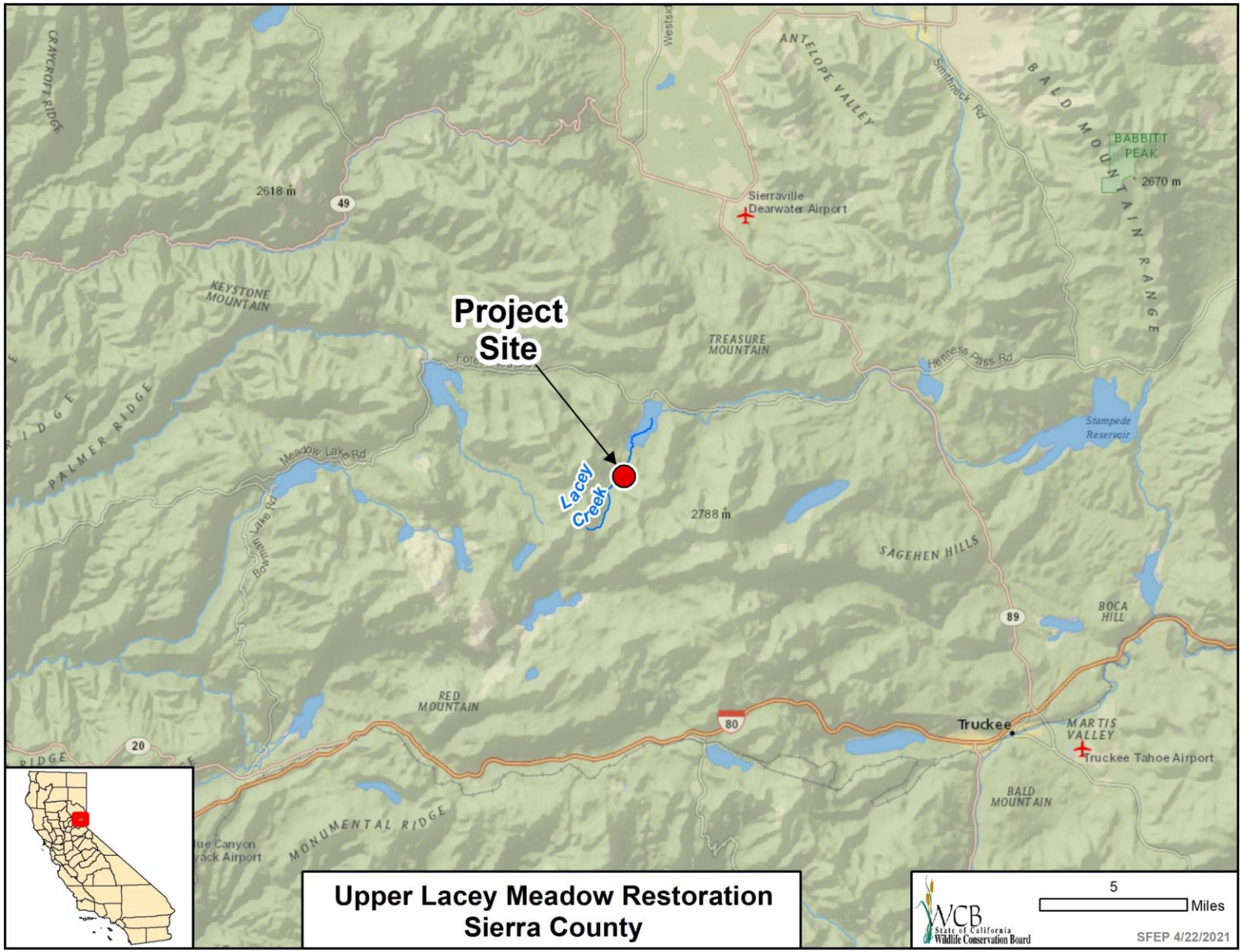
- Stream flow in the lower Deer Creek watershed is affected by three irrigation diversions
  - Deer Creek Irrigation District (DCID) - may divert 33% of the creek's flow
  - Stanford-Vina Ranch Irrigation Company (SVRIC) - may divert 64% of the flow
  - Cone-Kimball diversion - right to the remaining 3% of the flow
- Project is a component of a larger strategy for meeting stream flow targets in Deer Creek
- Objectives:
  - 65% design, permits, and management plan for two groundwater substitution projects to reduce diversion from Deer Creek
    - DCID's Sheep Camp Ditch (Reduce diversion by 1-3 cfs)
    - Cone-Kimball Ditch (Reduce diversion by 1-5 cfs)
  - Reconnaissance-level report identifying specific opportunities for water savings in the SVRIC and DCID systems
  - Integrated Water Management Plan for meeting flow targets and conjunctively managing groundwater

28. Deer Creek Instream Flow Planning and Design- Photos

Looking downstream at the Deer Creek Irrigation District roughened rock ramp
Credit: Ben Cook, Trout Unlimited.

Stanford-Vina Ranch Irrigation Company dam
Credit: Ben Cook, Trout Unlimited.

29. Upper Lacey Meadow Restoration - Map



29. Upper Lacey Meadow Restoration

slide 1

- Past and present human activities have led to degraded conditions
- Lacey Creek is incised through Lacey Meadow
- The incised channel appears to act as a drain on the surrounding shallow groundwater table
- Meadow desiccation and encroachment of lodgepole pines have decreased meadow acreage and function

Credit: Beth Christman

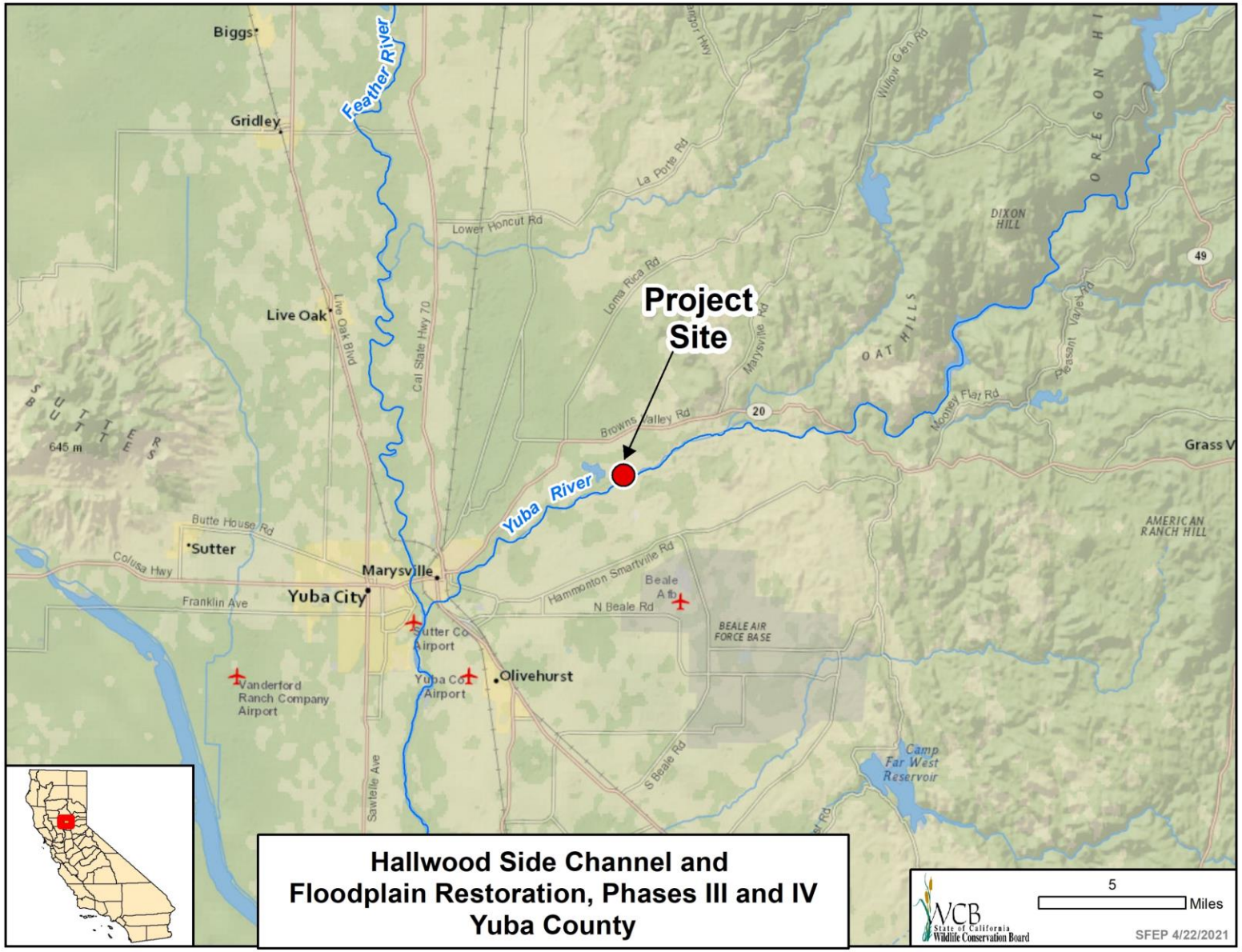
29. Upper Lacey Meadow Restoration

slide 2

- Goal is to restore hydrologic function to approximately 100 meadow acres
- Facilitate increased frequency and duration of meadow floodplain inundation and shallow groundwater recharge
- Colder and more persistent baseflow longer into the dry season
- Additional benefits include improved water quality, increased resilience to climate change, and improved habitat conditions for native meadow-dependent species

Credit: Beth Christman

30. Hallwood Side Channel and Floodplain Restoration, Phases III and IV- Map



30. Hallwood Side Channel and Floodplain Restoration, Phases III and IV

slide 1

- The Lower Yuba River (LYR) provides rearing habitat for fall-run and spring-run Chinook salmon and California Central Valley steelhead
- Riparian and aquatic habitat in the LYR have been degraded or lost due to agriculture, gravel and gold mining, and other land uses that impacted stream flows
- The Project reach is constrained by tall, linear cobble embankments (training walls) that are remnants from hydraulic dredges in the early 1900s

View from the Middle Training Wall. Photo credit: CBEC Eco Engineering (April Sawyer)

30. Hallwood Side Channel and Floodplain Restoration, Phases III and IV

slide 2

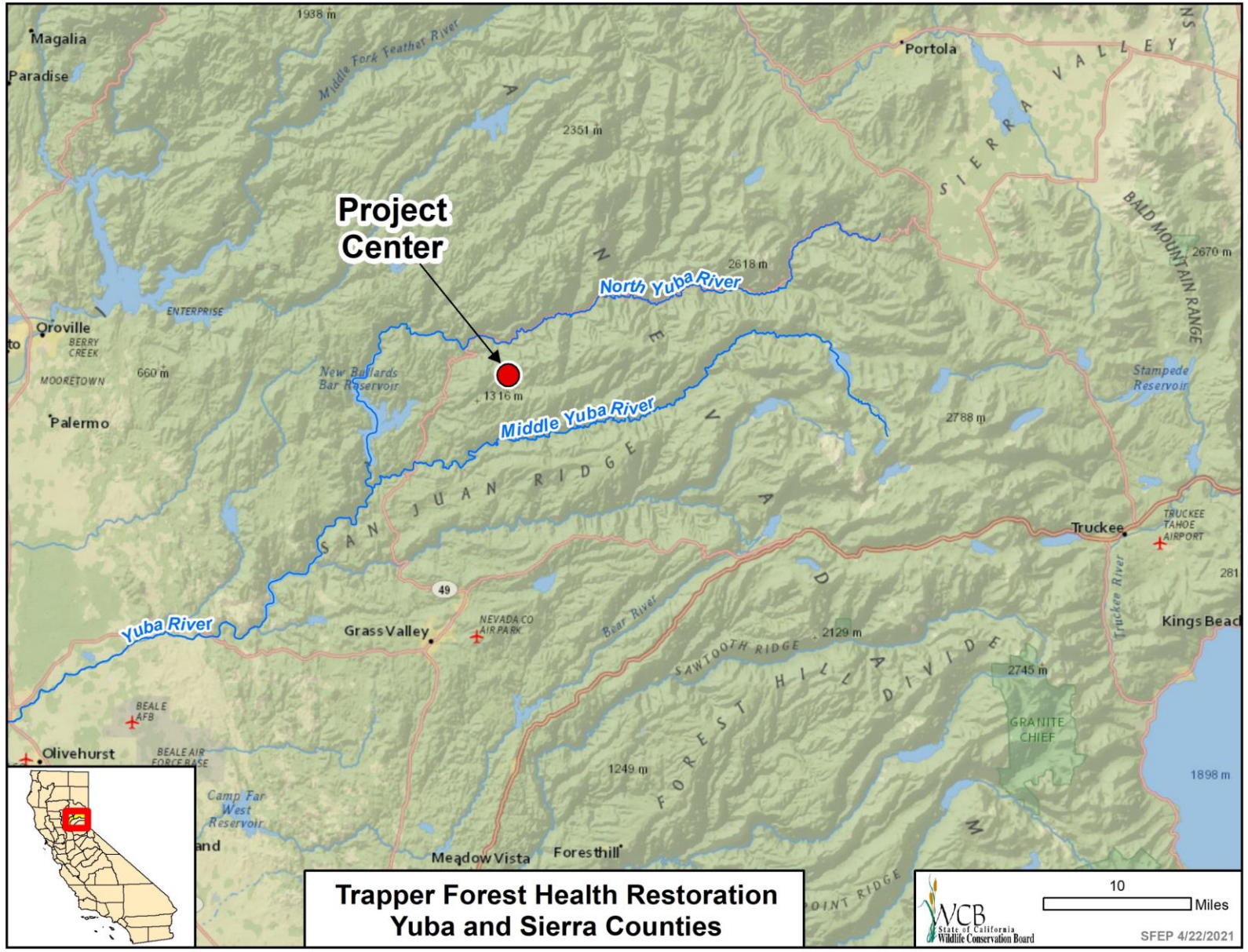
- The Project will enhance stream flows and increase rearing habitat acreage by
  - Removing the Middle Training Wall to increase channel connectivity
  - Constructing perennially and seasonally inundated channels to increase connectivity and create additional off-channel habitat
  - Focused riparian planting to provide structural complexity and cover to rearing juveniles
- The Project will also provide flood risk reduction benefits by reducing
  - Flow velocities
  - Water surface elevations, and
  - Scour potential to the remaining training walls and other infrastructure during large flood events

Spring 2018 pre-project condition in the historic overflow channel at Hallwood. Photo credit: CBEC Eco Engineering (April Sawyer)

30. Hallwood Side Channel and Floodplain Restoration, Phases III and IV - Photos

Phase I pre- (left) and post-fine (right) grading completed in 2020 at the perennial channel in the upper half of the site. Photo credit: CBEC Eco Engineering (Abe Aufdermauer)

31. Trapper Forest Health Restoration - Map



31. Trapper Forest Health Restoration

slide 1

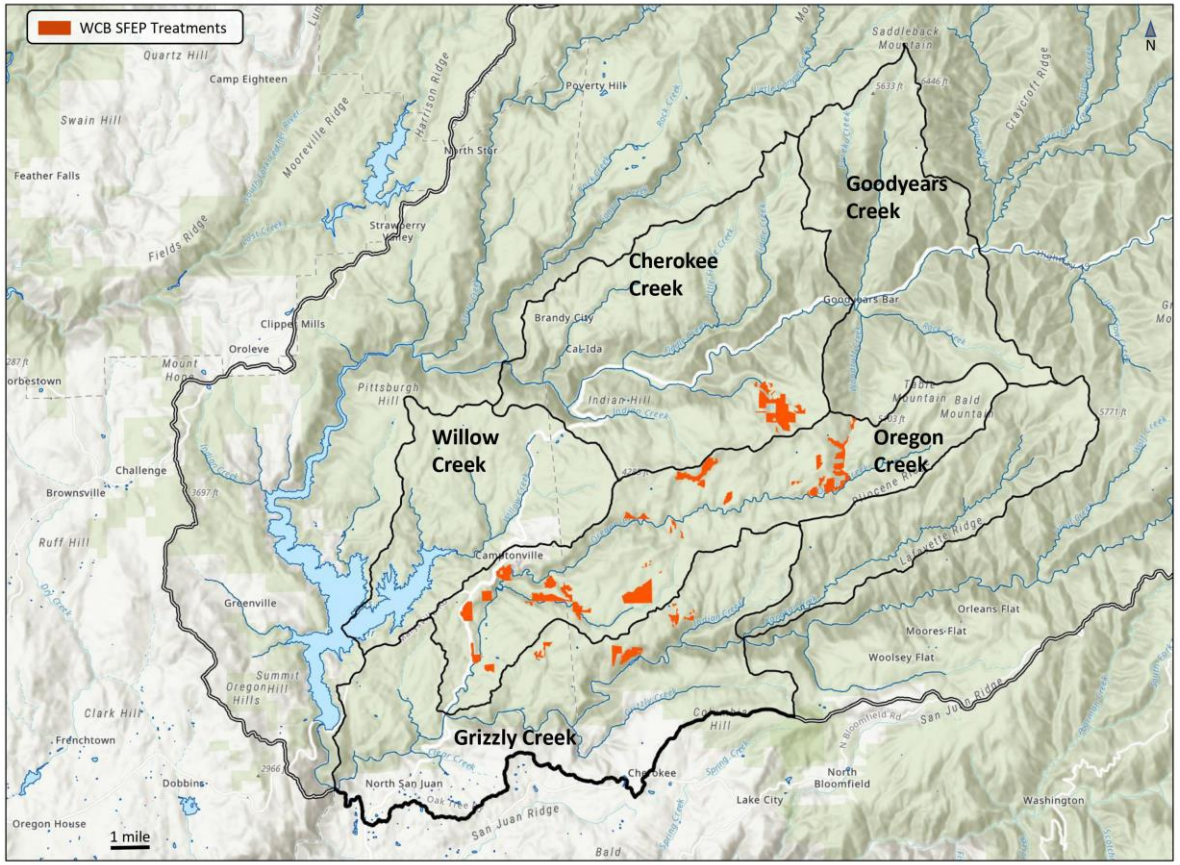
- Project area exhibits a uniform-aged-second-growth forest that lacks the structural diversity of the old-growth forests that once dominated the landscape.
- Fire suppression has removed fire as a process that naturally thinned the forest, resulting in unnaturally high tree densities and fuel loads
- Prevalence of small-diameter trees lead to increased water demand by forest vegetation and serve as ladder fuels that lead to high-intensity, catastrophic wildfire

Credits: Blue Forest Conservation

31. Trapper Forest Health Restoration

slide 2

- The Project will implement approximately 1,308 acres of ground-based fuels treatments
  - Hand cutting, hand thinning, and hand piling of small diameter trees located in overstocked forests, which are in an unhealthy condition
- Project objectives
  - Restore forest habitat and resilience
  - Increase stream flow through the reduction of vegetation water demand in overstocked forests
  - Reduce catastrophic wildfire risk to forest habitat and adjacent communities
- Monitor stream flow changes



32. Mill Creek Water Storage for Flow Enhancement - Map

32. Mill Creek Water Storage for Flow Enhancement

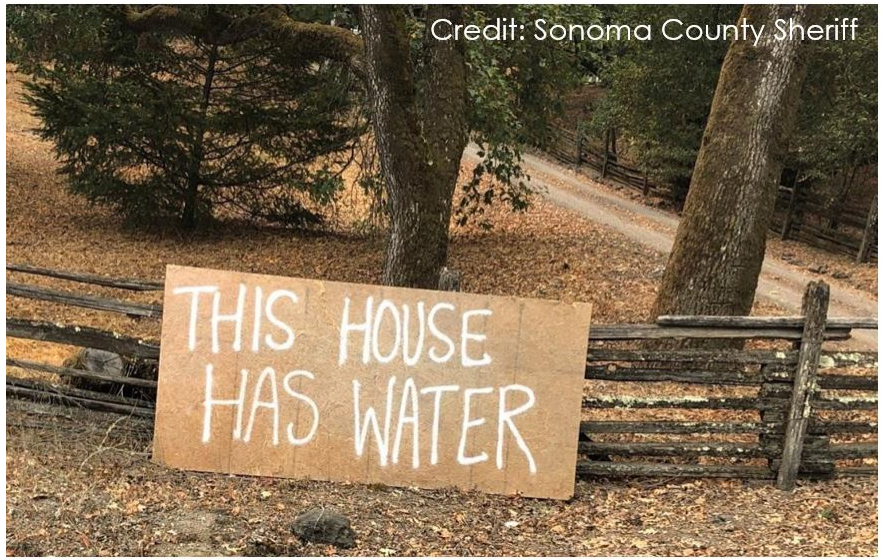
slide 1

- Mill Creek and its tributaries support endangered coho salmon and insufficient summer flow is a primary limiting factor for the survival of rearing coho and steelhead
- Creekside rural residential properties can shift the timing of their diversion from summer to winter through water storage
  - More water is left instream when fish are rearing
  - Tanks can be filled via direct diversion, rainwater catchment, or diversion from wells and springs, depending on the property's resources
- Project will construct 18 water storage systems totaling 300,000 gallons of water storage
  - Landowners will forbear diversion in equivalent amount to storage capacity
  - Estimated 0.2 cfs in stream flow enhancement

Stream drying in Mill Creek
Credit: California Sea Grant

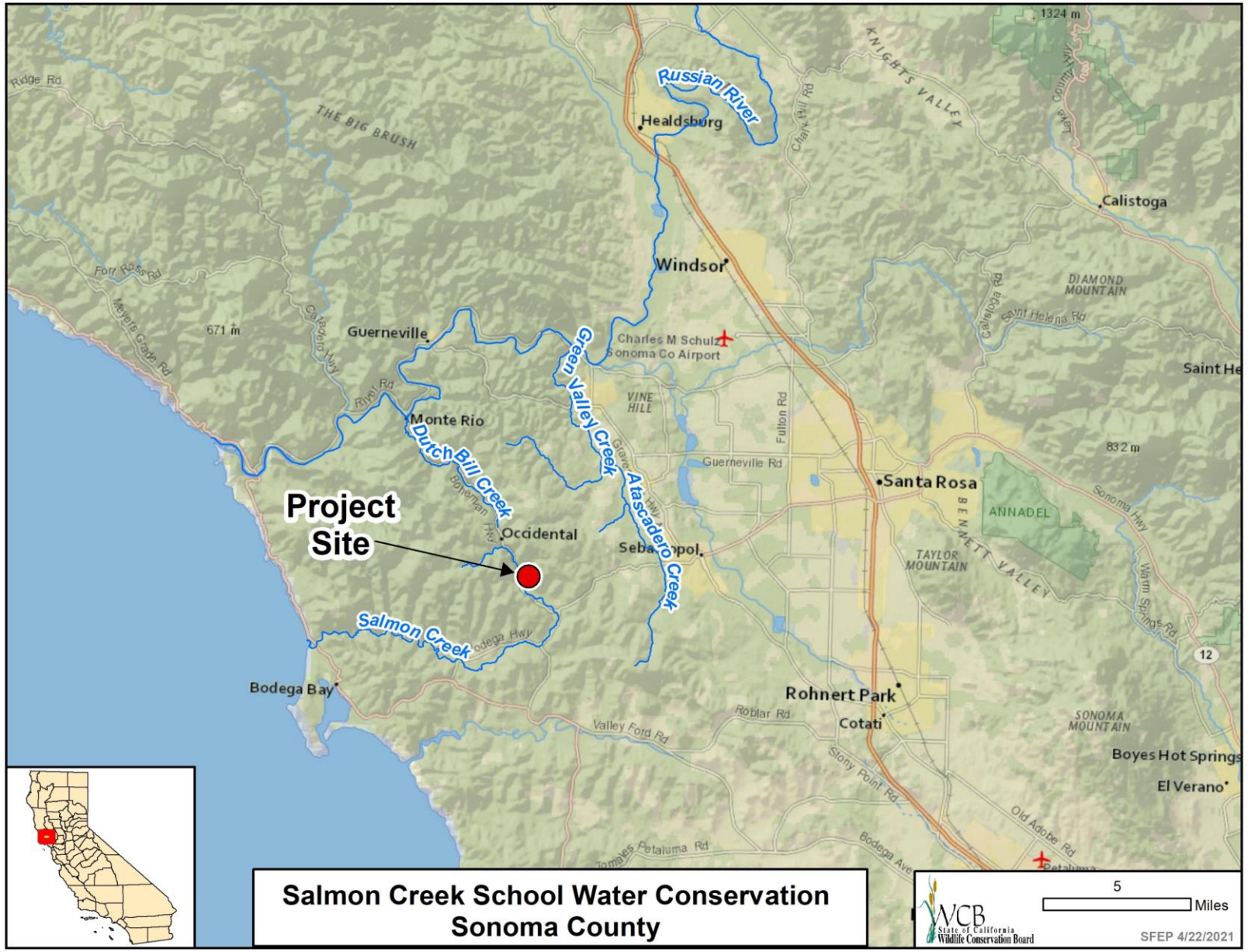
32. Mill Creek Water Storage for Flow Enhancement
slide 2

- Additional benefit: Fire protection
  - Tanks will provide more easily accessible water sources during wildfire emergencies
  - Increases community support and need for these kinds of projects



Images captured during the 2020 Walbridge Fire

33. Salmon Creek School Water Conservation - Map



33. Salmon Creek School Water Conservation

slide 1

- Salmon Creek is home to populations of both California central coast coho salmon (federally listed as endangered species) and steelhead trout (federally listed as threatened species)
- Assessments of water quality and instream habitat indicate that low summer stream flows is one of the primary issues impairing ecological function of Salmon Creek
- Salmon Creek typically has more than adequate streamflow during the rainy season and early summer, but following the end of spring rains, discharge drops steadily through the summer into fall
- Coho Partnership research shows that restoration of very small increments of flow in streams comparable in size to Salmon Creek can dramatically reduce the incidence of flow disconnection, and its spatial and temporal extents

Credit: Gold Ridge RCD

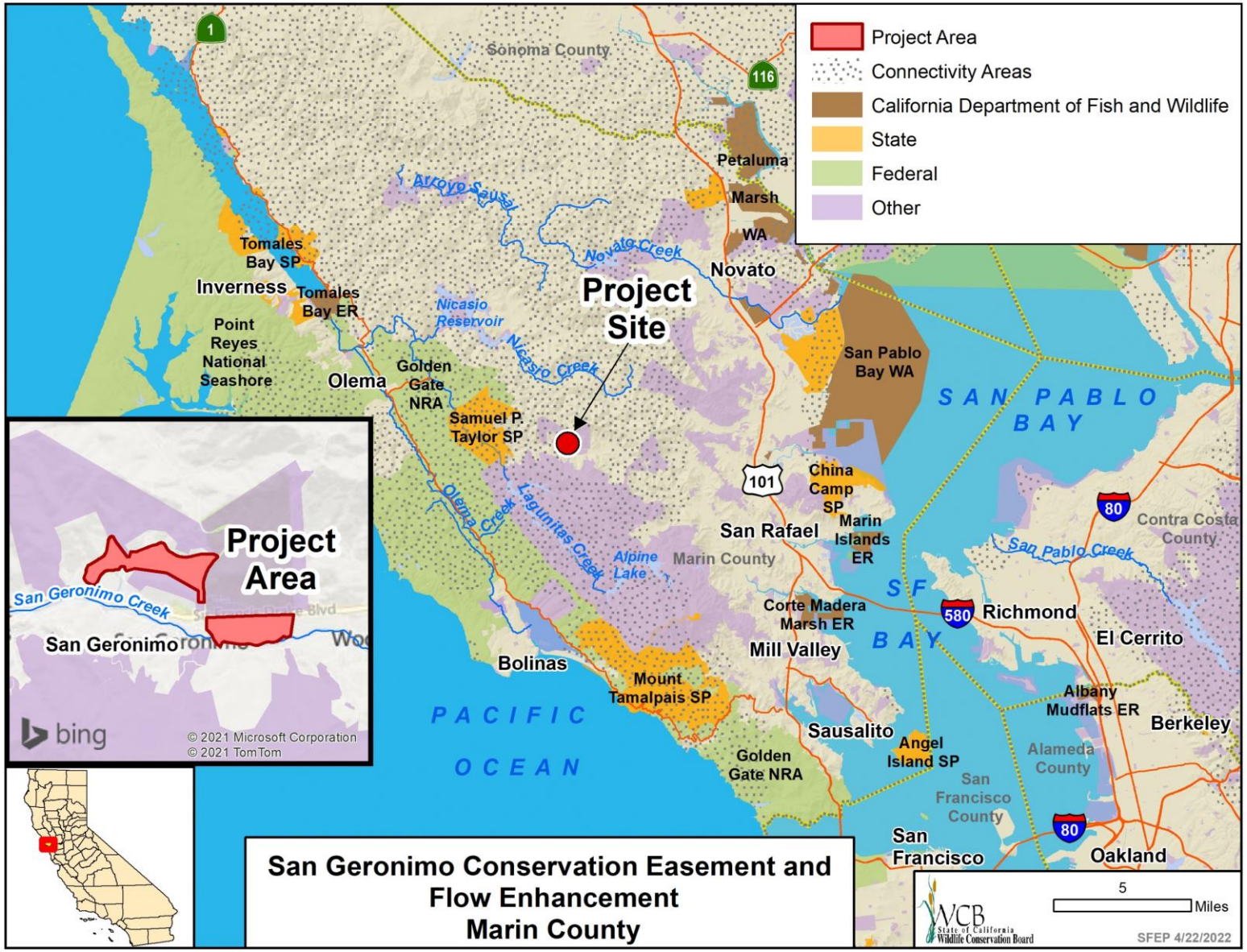
33. Salmon Creek School Water Conservation

slide 2

- Project implementation will increase summer baseflow through the upper and middle reaches of Salmon Creek, which include areas of documented coho use and experience extremely low flows and disconnection during the late dry season
- The Project will eliminate the annual extraction of up to 1.5 million gallons of water from a shallow, near-stream alluvial well for playing field irrigation at Salmon Creek School
- The Project will implement a suite of irrigation water conservation measures and construct a 517,000-gallon rainwater catchment system

Rendering of concrete cistern from playing field, with seat wall and mural
Credit: Prunuske Chatham, Inc.

34. San Geronimo Conservation Easement and Flow Enhancement - Map



34. San Geronimo Conservation Easement and Flow Enhancement

slide 1

Aerial view of the San Geronimo property, looking southeast over the Larsen Creek parcel. Credit: The Trust for Public Land

Credit: The Trust for Public Land

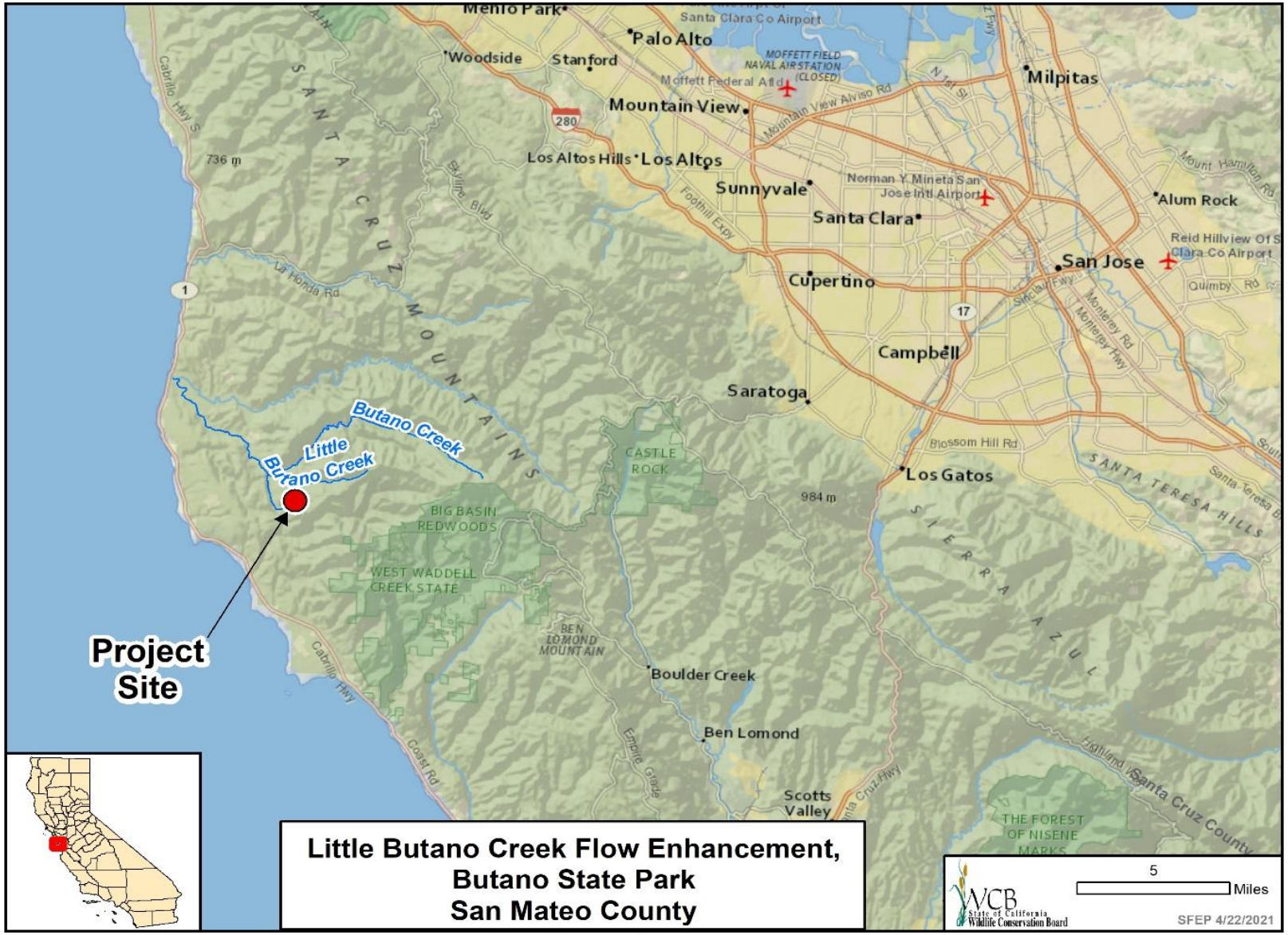
34. San Geronimo Conservation Easement and Flow Enhancement

slide 2

Larsen Creek Meadow, looking southwest toward Point Reyes. Credit: The Trust for Public Land

San Geronimo Creek. Credit: The Trust for Public Land

35. Little Butano Creek Flow Enhancement, Butano State Park - Map



35. Little Butano Creek Flow Enhancement, Butano State Park

slide 1

- Pescadero-Butano watershed historically supported robust steelhead trout and coho salmon runs, but populations have declined due to low stream flow
- Butano State Park domestic water system draws 100% of its supply from a single point of diversion on Little Butano Creek
  - Normal / wetter years: 22% of the creek's flow
  - Drought year: 50% of flow
  - Currently recognized best practice is to divert no more than 10% of flow
- Project will construct a reliable, drought-resilient water system for Butano State Park facilities and campgrounds
  - Enhance and protect stream flow in Little Butano Creek
  - Provide a sustainable and reliable water source during emergencies

Point of diversion pre-fire looking downstream. The RCD and State Parks will replace this diversion as it was lost to the CZU fire. Credit: Jarrad Fisher

35. Little Butano Creek Flow Enhancement, Butano State Park

slide 2

- Project objectives and activities:
  - Reduce total water demand by 35% by fixing systemic pipeline leaks and upgrading fixtures
  - Reduce diversion rate by 66% between April 1st and September 14th by installing a new pump and constructing a 100,000-gallon water storage tank
  - Forbear 100% of diversions from September 15th to October 31st and dedicate 0.04 cfs to stream flow annually
  - Limit diversions to 10% of average stream flow the remainder of the year.

Campground facilities at Butano State Park which will receive water saving fixtures and upgrades
Credit: Jarrad Fisher