



TUOLUMNE RIVER MANAGEMENT PLAN

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Topics

- Laws & Regulations
- How was the Plan developed?
- What's in the Plan?
- What's next in the process?



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Laws & Regulations



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Laws & Regulations

- The Federal Power Act
 - Section 4(e) – established equal consideration principle
 - Section 10(a) – instructs FERC to solicit recommendations from resource agencies and Indian tribes
 - Section 10 (j) - Emphasized the importance of fish and wildlife resources
 - Section 18 – Authorizes USFW and NMFS to prescribe upstream and downstream fishway passage requirements
- Electric Consumers Protection Act
 - Concerned FERC's process not adequately considering value of fish and wildlife resources
- The Clean Water Act
 - Section 401 of the CWA applies to hydropower project (re)licensing
 - Requires applicant to obtain certification from the state water quality agency
- Federal Energy Regulatory Commission
 - Authority to license non-federal hydropower projects
 - Renew licenses for a term of 30 to 50 years
 - FERC must give “equal consideration” to developmental and non-developmental values



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How was the Plan developed?



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Tuolumne River Management Plan Goals

- Maintain water supply reliability for agricultural and municipal users of the Tuolumne River and promote the long-term prosperity of the communities served.
- Using the empirically-based science developed for the lower Tuolumne River, identify potential measures to protect and expand the fall-run Chinook salmon and *O. mykiss* populations through in-river improvements.
- Support recreational opportunities and riparian resources on the lower Tuolumne River.
- Protect cultural, terrestrial, and recreational resources at the Don Pedro and La Grange Projects.



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Integrated Licensing Process - *Building the Record*

Don Pedro

- Pre-application Document filed on Feb 10, 2011
- FERC issues Study Plan Determination on Dec 22, 2011
- FERC issues formal study dispute determination on May 24, 2012
- Districts file Initial Study Report on Jan 17, 2013
- FERC issues determination on study modifications on May 21, 2013
- Districts file Draft License Application on Nov 26, 2013
- Updated Study Report filed on Jan 6, 2014
- Final License Application filed April 28, 2014
- Districts conduct additional studies in 2015/2016
- Amended Final License Application filed on Oct 11, 2017

La Grange

- FERC finds La Grange jurisdictional on Dec 19, 2012
- Districts file Pre-application Document on Jan 29, 2014
- FERC issues Study Plan Determination on Feb 2, 2015
- Initial Study Report issued on Feb 2, 2016
- FERC issues determination on study modifications on May 27, 2016
- Updated Study Report issued on Feb 1, 2017
- Draft License Application filed on April 24, 2017
- Final License Application to be filed on Oct 11, 2017



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Don Pedro and La Grange Study Plans

- Water and Aquatic Resources Study Plans
- Terrestrial Resource Study Plans
- Recreation Resources Study Plans
- Cultural Resources Study Plans



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Don Pedro Water and Aquatic Resources Studies

- Water Quality Assessment
- Project Operations/Water Balance Model
- Reservoir Temperature Model
- Spawning Gravel Study
- Salmonid Population Information Integration
- Chinook Salmon Population Model
- Predation Study
- Salmonid Redd Mapping
- O. Mykiss Population Study
- Chinook Salmon Otolith Study
- O. Mykiss Habitat Assessment
- La Grange Reservoir Fish Assemblage and Population Study
- Temperature Criteria Assessment
- Socioeconomic Study
- Lower Tuolumne River Temperature Model
- Don Pedro Reservoir Fish Population Study
- Sturgeon Study
- Riparian Information Study
- O. Mykiss Scale and Age Study



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Don Pedro Terrestrial Resources Studies

- Special Status Plant
- ESA and CESA Listed Plants Study
- Wetland Habitats Associated with Don Pedro Reservoir
- Noxious Weed Survey
- ESA Listed Wildlife – Valley Elderberry Longhorn Beetle
- Special Status Amphibian and Aquatic Reptiles
- ESA Listed Amphibian Red-Legged Frog
- ESA Listed Amphibians California Tiger Salamander
- Special Status Bats
- Bald Eagle Study



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Don Pedro Recreation Resources Studies

- Recreation Facility and Public Accessibility Assessment
- Whitewater Boating Take-out Improvement Feasibility
- Lower Tuolumne Boatable Flow Study
- Visual Quality Study



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Don Pedro Cultural Resources Studies

- Historic Properties Study
- Native American Traditional Cultural Properties Study



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La Grange Resources Studies

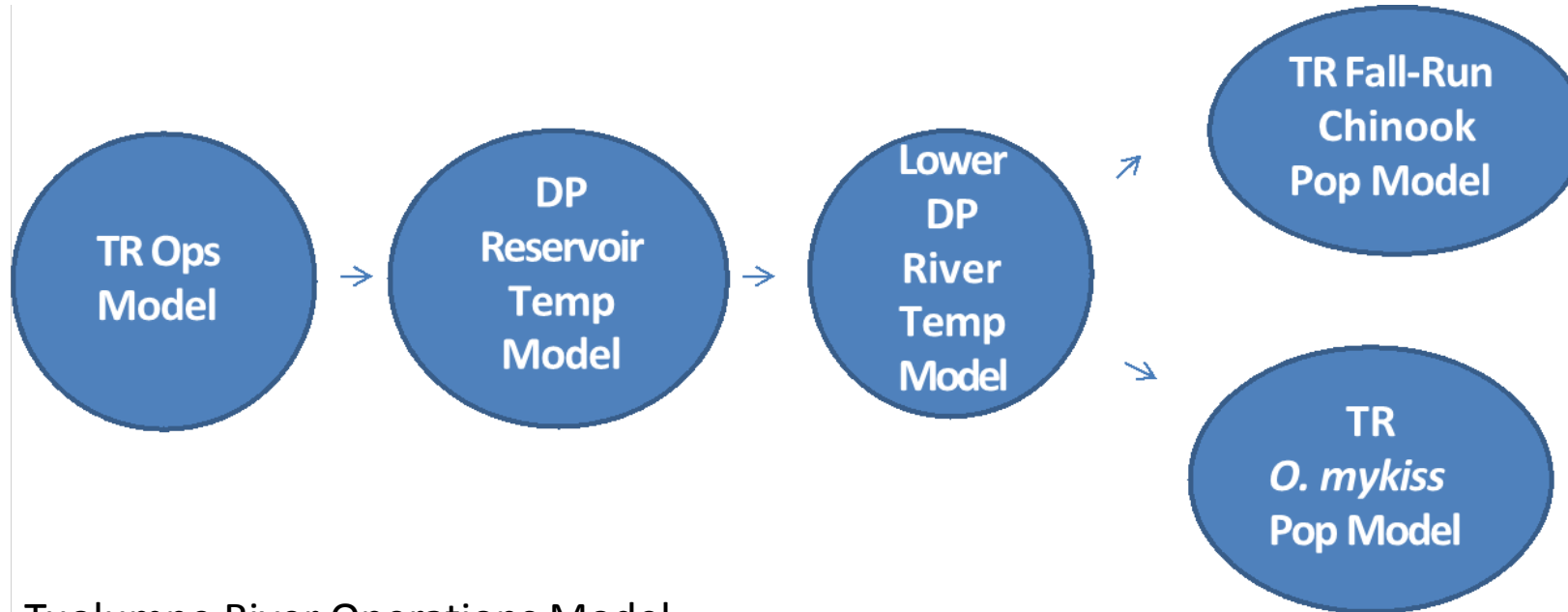
- Salmonid Habitat Mapping
- Losses of Marine Derived Nutrients
- Topographic Survey
- Upper Tuolumne River Fish Migration Barrier
- Hatchery and Stocking Practices Study
- Recreation Access and Safety Assessment
- Flow Records for Discharge Structures at the La Grange Project
- La Grange Project Fish Barrier Assessment
- Fish Presence and Stranding Assessment
- Investigation of Fish Attraction to Powerhouse Draft Tubes
- Fish Passage Facilities Alternatives Assessment
- Upper Tuolumne River Basin Water Temperature and Modeling Study
- Cultural Resource Study



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Integrated Model Structure



Tuolumne River Operations Model

Don Pedro Reservoir Temperature Model

Lower Don Pedro River Temperature Model

Tuolumne River Fall-Run Chinook Population Model

Tuolumne River *O. mykiss* Population Model



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What's in the Plan?



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Tuolumne River Management Plan

- Flow Measures
- Non-flow Measures
 - Predator Control and Suppression
 - Gravel Introduction
 - Gravel Cleaning
 - Gravel Quality Improvement
 - Habitat Complexity Improvement
 - Water Hyacinth Removal
 - Restoration Hatchery
- Recreation Measures
 - Whitewater Rafting Take-out
 - Boating Flows
- Management Plans
 - Historical Management Property Plan
 - Resource Management Plan

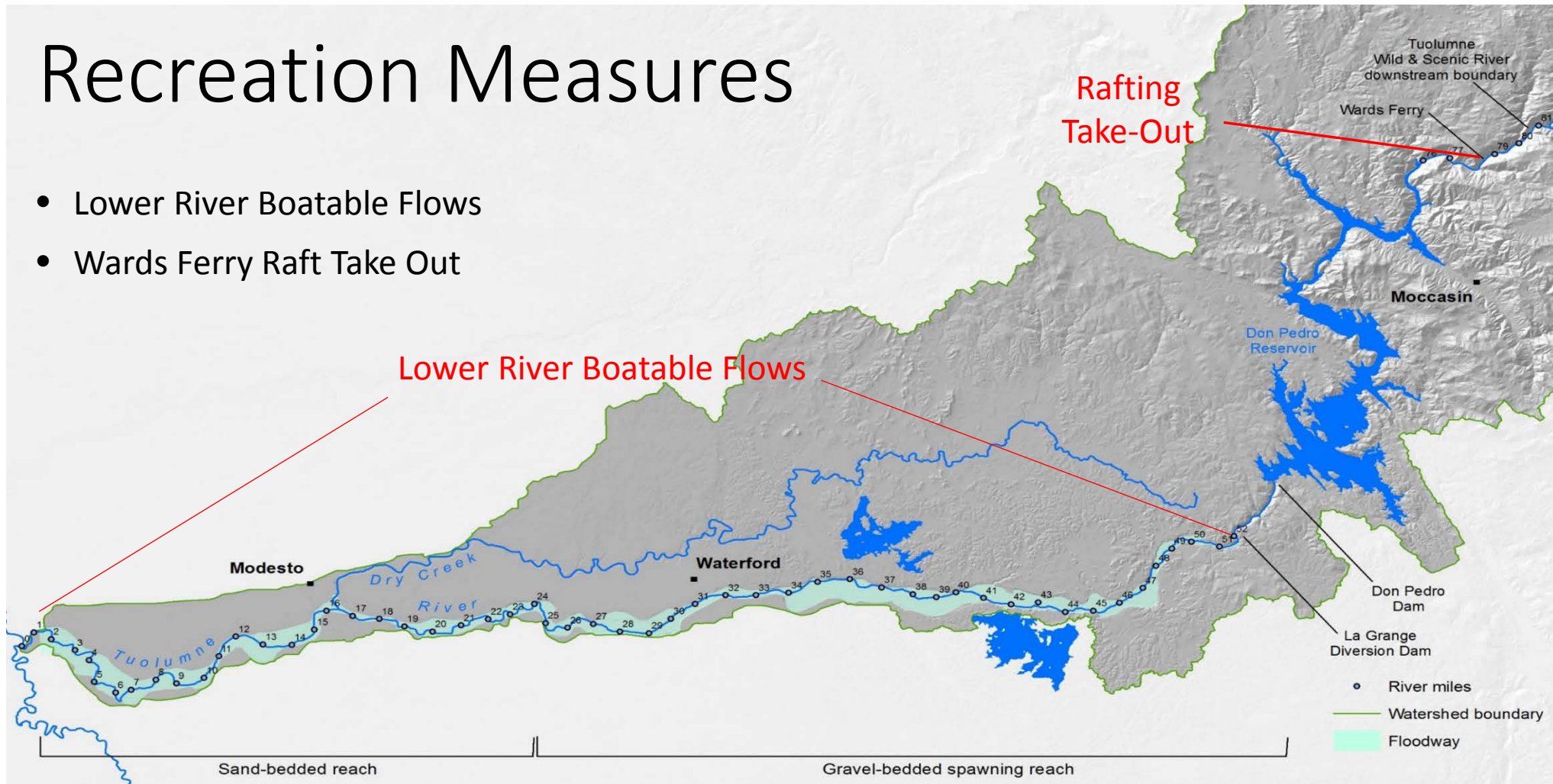


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Recreation Measures

- Lower River Boatable Flows
- Wards Ferry Raft Take Out



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Wards Ferry Raft Take-Out



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Predation

- Lower Tuolumne River supports significant populations of non-native predator fish species, including black bass and striped bass.
- Special run pools provide excellent black bass habitat; striped bass move and feed through the entire 52-mile reach.
- 1992 and 2012 studies support the conclusion that low survival of fry and juvenile fall-run Chinook is primarily a result of predation by non-native fish.
- Striped bass are voracious predators and highly mobile, accounting for 15% to 20% of the loss due to predation.
- From 2007 through 2013, smolt survival index (% passing Waterford /% passing Grayson) on the lower Tuolumne River averaged 9.5%, and ranged from 2.7% to 28%.
- From 2008 through 2013, fry survival index averaged 5.4%, and for four of the years was less than 1%.



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Predation



Tuolumne Weir (RM 24.5) – 923 mm 617 mm



Striped Bass passing La Grange
tailrace weir, estimated length
65 and 70 cm



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Predation



Juvenile *O. mykiss* Predation



Juvenile Salmon Predation
by Sub-legal Striped Bass



Pike minnow caught
near river mile 42.5



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Predation Measures

Goals:

- Exclude striped bass from the reach upstream of river mile 25.5
- Reduce and eventually eliminate smallmouth bass upstream of river mile 25.5
- Reduce black bass populations downstream of river mile 25.5 by 10 percent
- Overall 10% reduction in predation rate

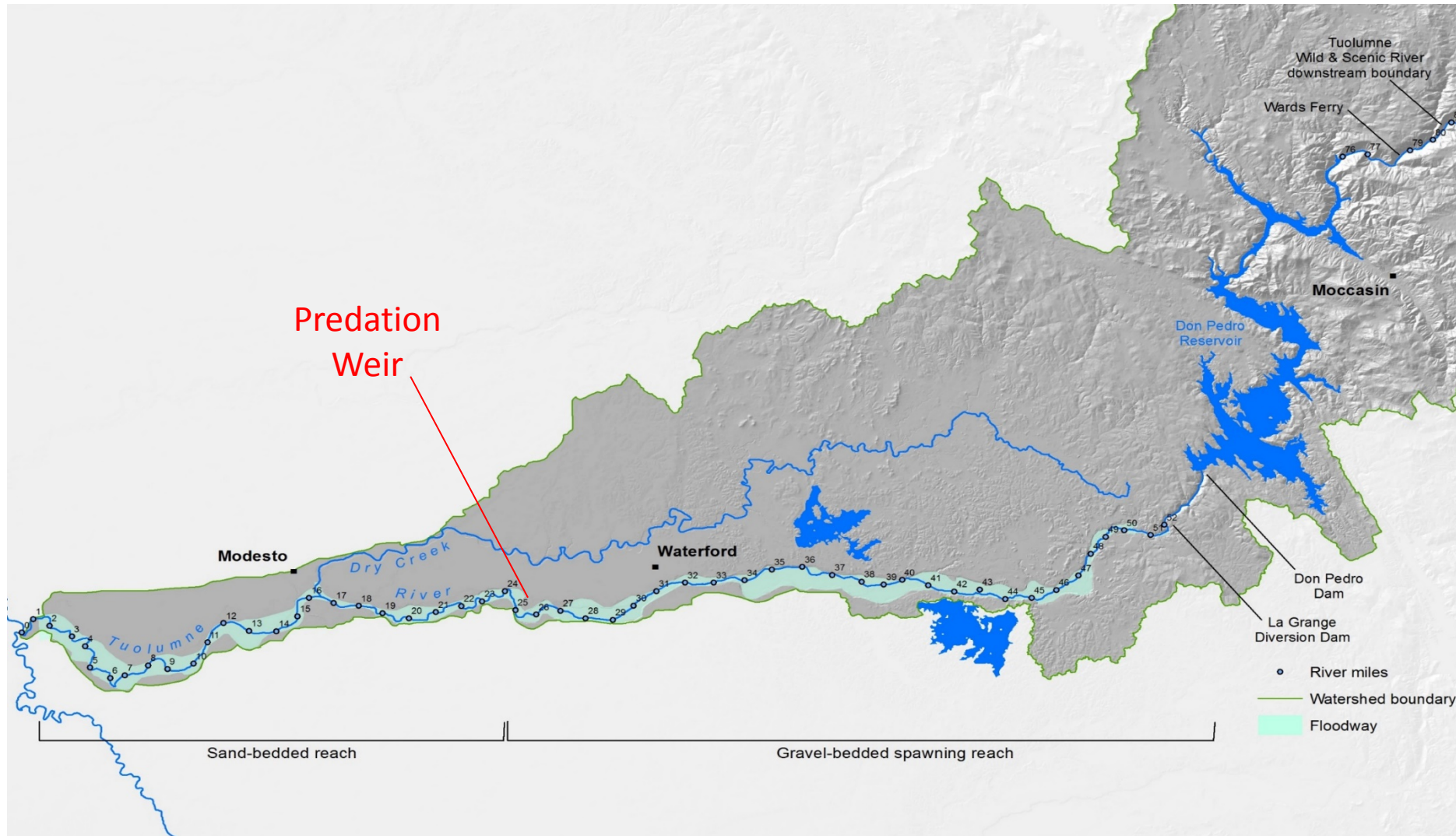
Proposed Measures:

- Striped Bass - Exclusion Weir and Fyke Trapping
- Black Bass - Boat Electrofishing and Fishing Derbies



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Gravel Introduction

- Tuolumne River Channel is severely altered
- Special Run Pools
- Predation Hot Spots
- Gravel Introduction from river mile 42 to river mile 51
 - 10 year program
 - Repeat Spawning Gravel Study

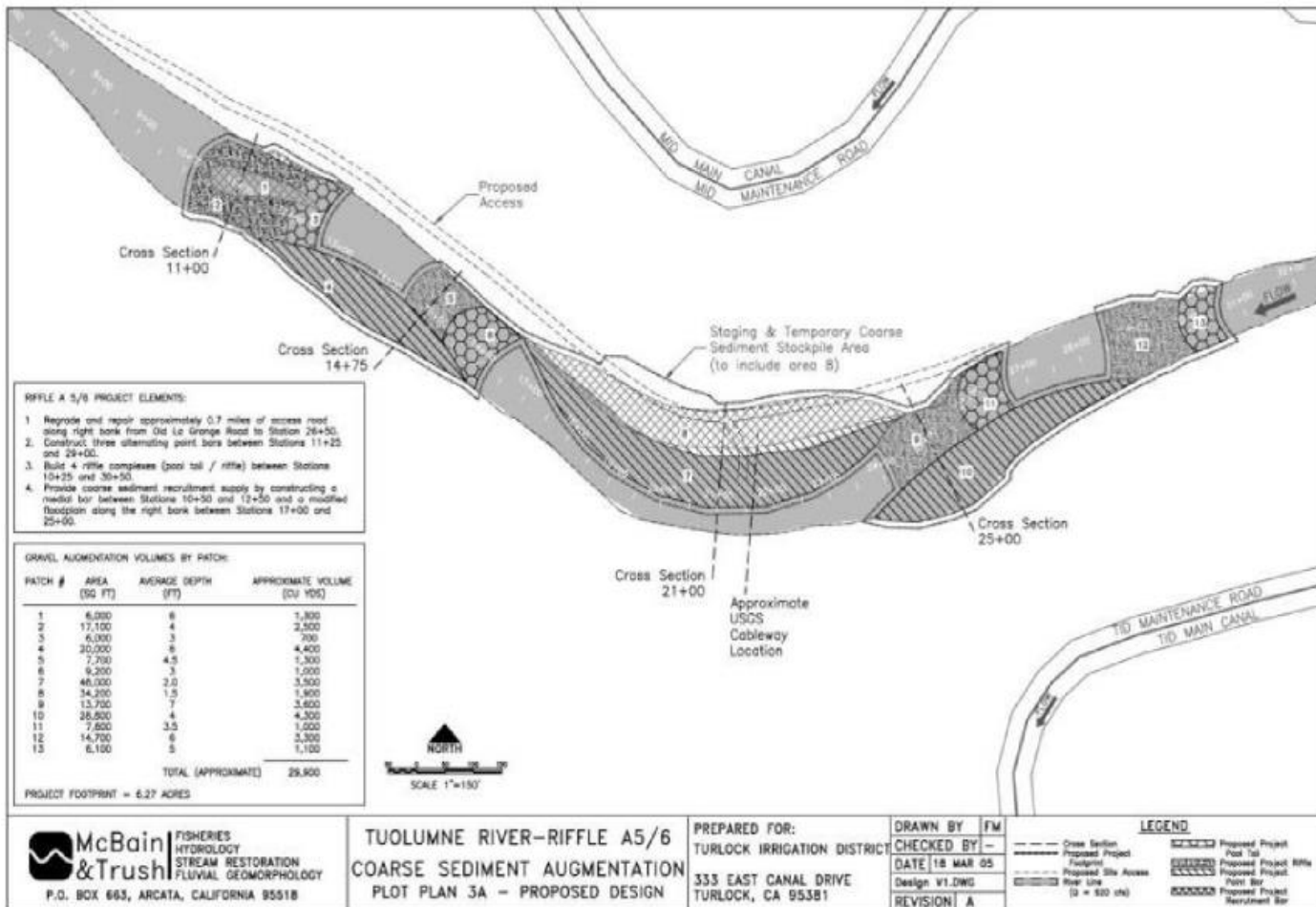


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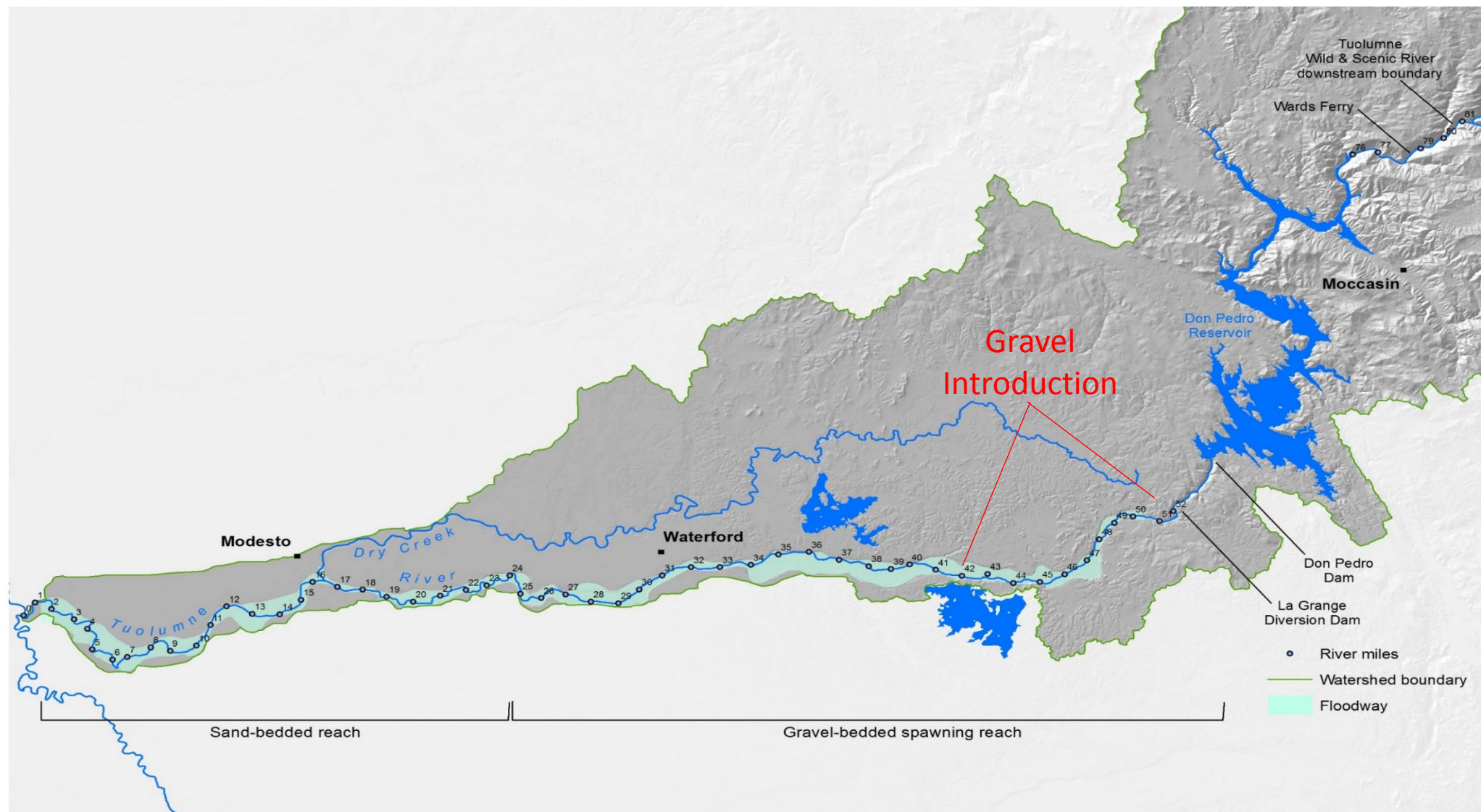
Potential Improvements to Riffle A 5/6

- Prior to the 1996 flood, Riffle A 5/6 (**RM 51; 0.4 miles upstream of Old La Grange Bridge**) provided an estimated 34,700 ft² of riffle habitat. The 1996 flood eliminated this riffle habitat. The limited spawning area upstream of Old La Grange Bridge makes Riffle A 5/6 an important near-term coarse sediment augmentation site. An estimated **25,000 yd³ of coarse sediment would restore alternating riffle/pool habitat.**



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Gravel Quality Improvement Program

- Improve quality of spawning gravels through a program of experimental gravel cleaning to remove fine sediments that in-fill the spawning gravels.



Gravel Cleaning Experiments using an excavator



Hydraulic Gravel Cleaner

Gravel Quality Improvement Program



Before Cleaning Gravel Patch

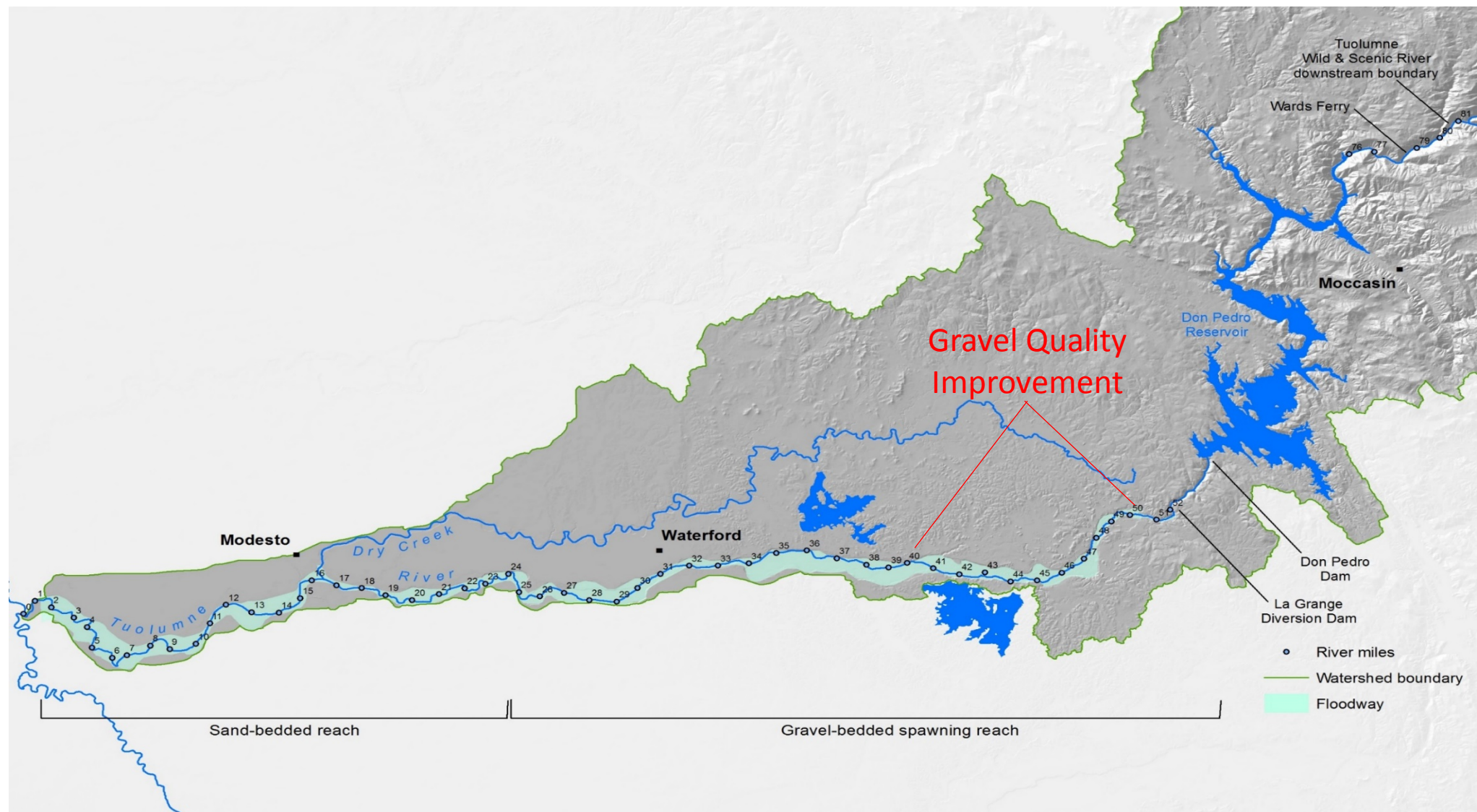


After Cleaning Gravel Patch



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Water Hyacinth Removal



Water Hyacinth at Fox Grove Park, late 2014 at river mile 26)

Proposed Measure:

- Districts will contribute funds to the Division of California Boating and Waterways to further water hyacinth removal efforts.



Figure 3.1-4. Monitoring Station WHDO-C Carpenter, upstream view at river mile 12.7
Photo date – September 8, 2014



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Restoration Hatchery

- Tuolumne River is challenged by a minimum level of natural in-basin reproduction and overwhelming numbers of strays
- Experts suggest that out of basin hatchery strays should not exceed 5%.
- 10% is considered “High Risk” for a river
- Study over 10 years shows that the Tuolumne averages well over 50% of hatchery strays

Goals:

- Enhance genetic diversity and bolster self-sustaining, naturally reproducing, local origin salmon
- Dovetails with Predation Plan to bolster population over time

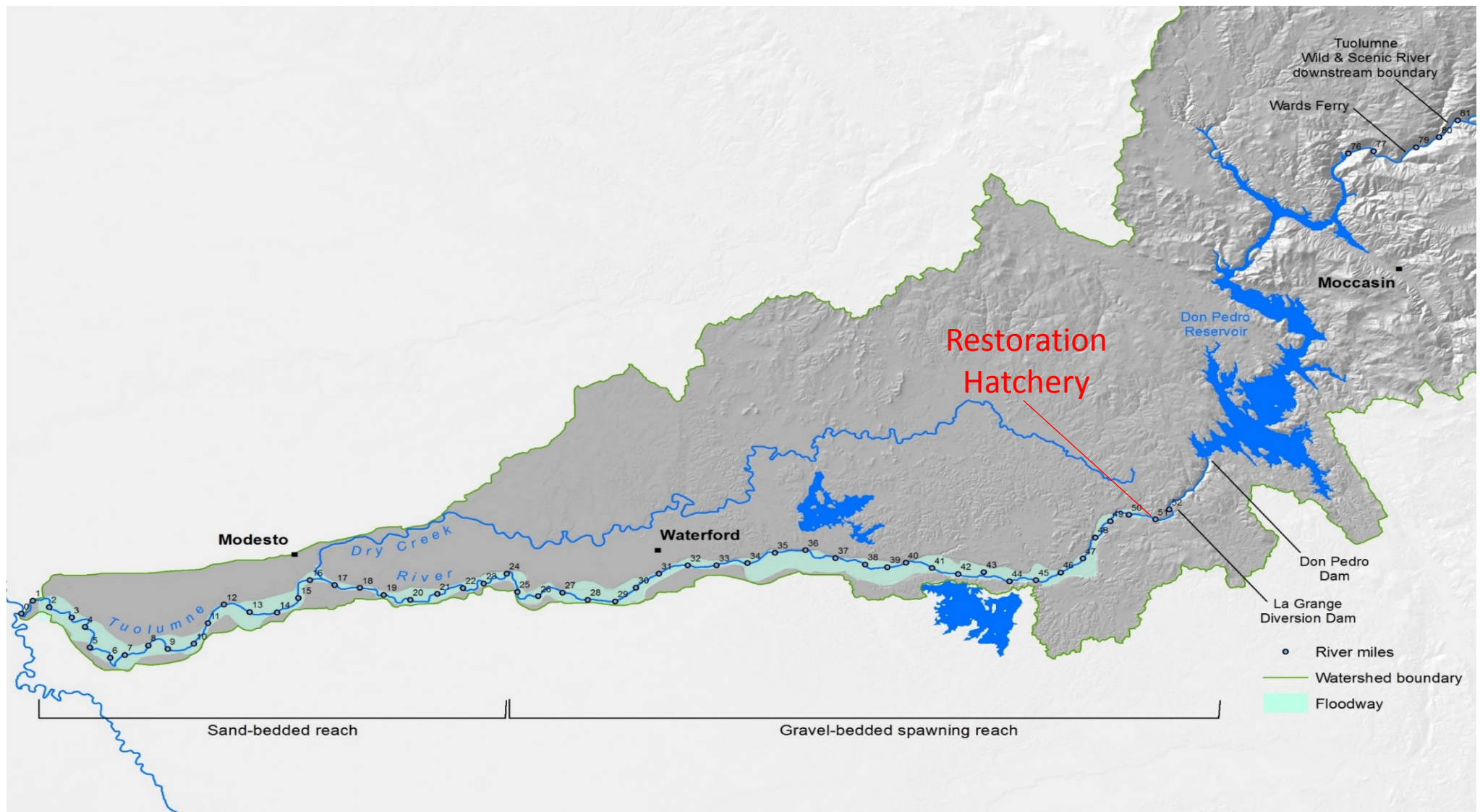
Proposed Measures:

- The Districts will pay for a fall-run Chinook restoration hatchery which will be operated by California Department of Fish and Wildlife



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Flow Related Measure

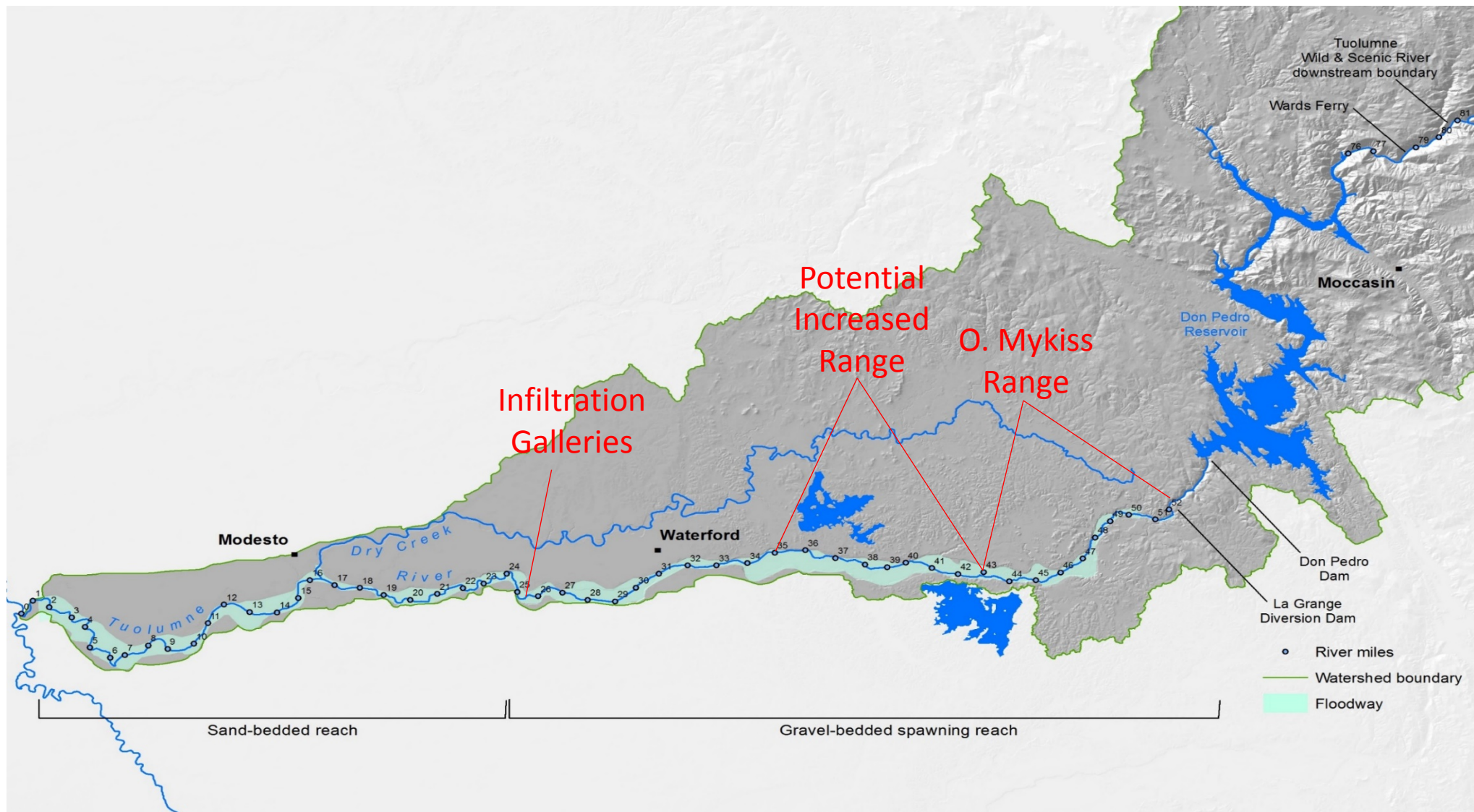


Infiltration Galleries



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Flow Measures

San Joaquin Index water-year type	Base Case - current FERC flows	Preferred Plan flows at La Grange	Preferred Plan flows Below Infiltration Gallery @ RM 25.7	Likely alternative proposal submitted by others
Critical	133	193	139	323
Dry	171	268	217	338
Below Normal	201	292	245	433
Above Normal	282	354	308	458
Wet	276	348	301	451
All Years	216	291	242	398

Average Required Flow (WY 1971-2012 – in Thousand Acre-Feet)



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Water Supply Impact

Water Deliveries as a Percent of Full Supply

Years	Base Case*	Preferred Plan**
1976-1977	88.7%	86.3%
1987-1992	88.3%	86.4%
All Years (1971-2012)	97.7%	97.3%

*Base Case represents current FERC flows

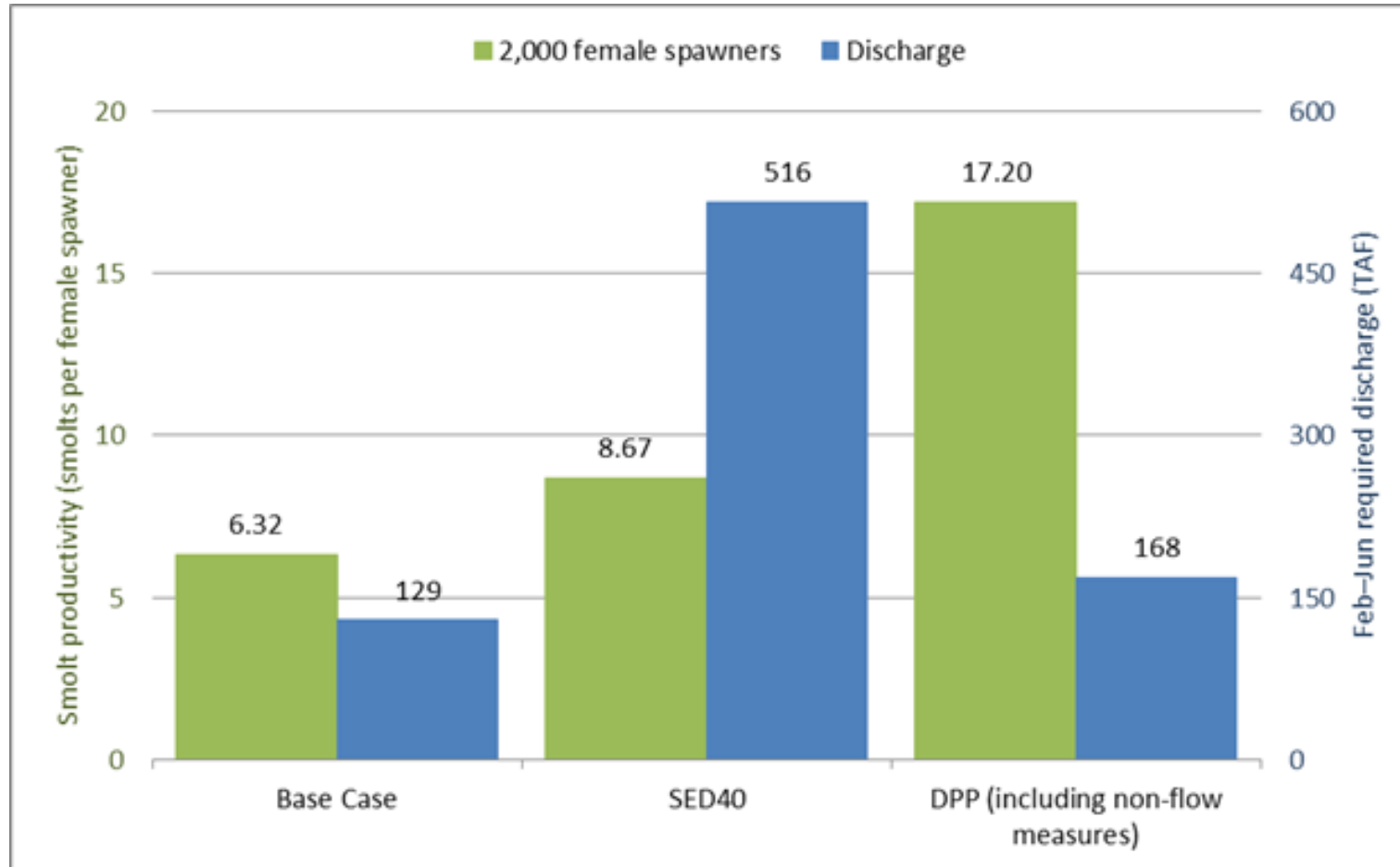
**Represents flow below Infiltration Gallery



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Results of all Proposed Measures



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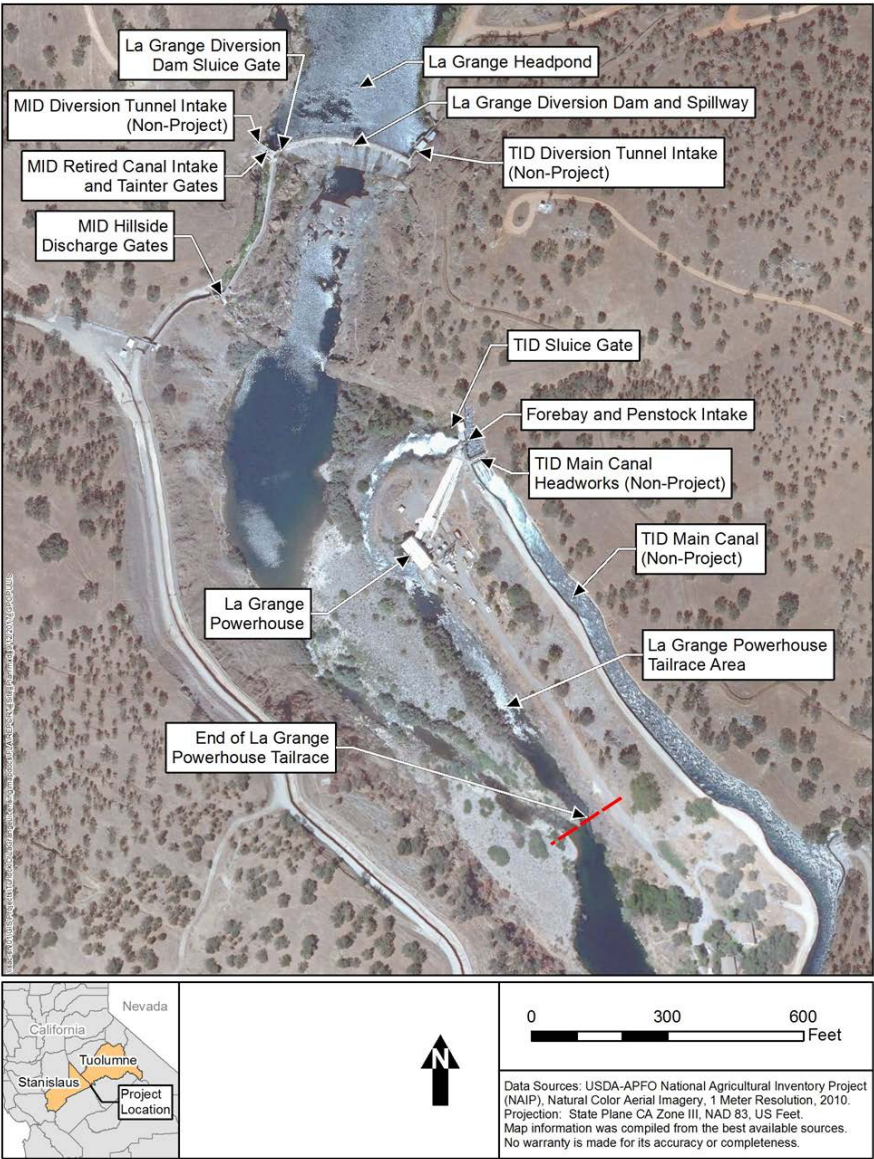
La Grange



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La Grange Facilities



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La Grange Measures

- Formalization of Flow to Plunge Pool
- Sluice Gate Barrier
- Recreation Access Trail
- Historic Property Management Plan Implementation
- Dissolved Oxygen Monitoring



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La Grange Recreation Access



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Tuolumne River Management Plan Costs

Don Pedro Measures	
Capital	\$77,567,000
O&M	\$57,525,000
Environmental Monitoring	\$22,945,000
Don Pedro Total	\$158,037,000
La Grange Measures	
Capital	\$710,000
O&M	\$60,500
La Grange Total	\$770,500
Total Plan Cost	\$158,807,500



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What is next in the process?



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Next Steps

- Submit Don Pedro Amended Final License Application and La Grange Final License Application to FERC
- FERC Reviews Filings
 - Additional Information Request(s)
 - Ready for Environmental Analysis
- Agency and Public Review begins
- Preliminary Conditions from Mandatory Conditioning Agencies
- Possible Trial Type Hearing on Preliminary Conditions



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For more information:

- To learn general highlights of the plan, visit www.tuolumnerivermanagementplan.com
- For technical information, please visit www.donpedro-relicensing.com and www.lagrange-licensing.com.



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