Restoration Goal Technical Feedback Group Meeting

San Joaquin River Restoration Program

November 1, 2011

Fresno, CA

SAN JOAQUIN RIVER RESTORATION PROGRAM

Agenda

- Introductions
- Program Background
- Technical Feedback Group Context/ Purpose
- Spring-run Chinook Salmon Experimental Population ESA10(j) and 4(d) rules
- San Joaquin River Recreation Study
- 2012 MAP fisheries studies
- Hills Ferry Barrier Monitoring

SAN JOAQUIN RIVER RESTORATION PROGRAM

Introductions

- Name
- Agency or Affiliation

SAN JOAQUIN RIVER RESTORATION PROGRAM

Settlement Background

1988	Lawsuit filed challenging Reclamation's renewal of the long-term contracts with Friant Division contractors
2004	Federal Judge rules Reclamation violated Section 5937 of the Fish and Game Code
2005	Settlement negotiations reinitiated to avoid remedy phase
2006	Settlement Agreement reached, implementation begins
2009	Federal legislation enacted

SAN JOAQUIN RIVER RESTORATION PROGRAM

Settlement Goals

- Restoration Goal
  - To restore and maintain fish populations in "good condition" in the main stem of the San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish.
- Water Management Goal
  - To reduce or avoid adverse water supply impacts to all of the Friant Division long-term contractors that may result from the Interim Flows and Restoration Flows provided for in the Settlement.

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Implementing Agencies

- Federal Agencies:
  - Bureau of Reclamation
  - Fish and Wildlife Service
  - National Marine Fisheries Service
- State Agencies:
  - Department of Water Resources
  - Department of Fish and Game

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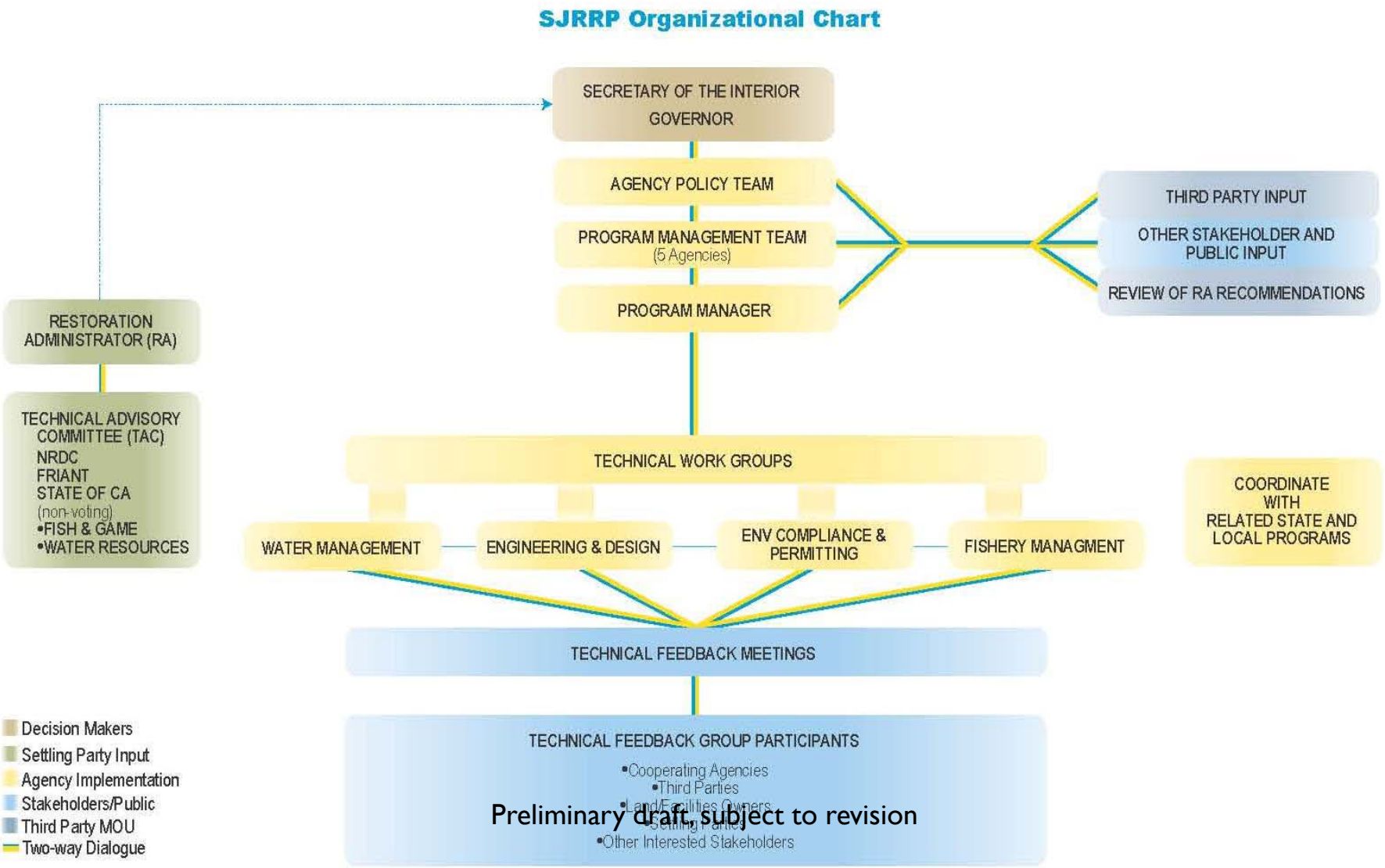
Technical Feedback Meetings



Preliminary draft, subject to revision

Restoration TFG Meeting Purpose

- Exchange of restoration technical information between the Implementing Agencies, Cooperating Agencies, Settling Parties, Third Parties, landowners, and other interested stakeholders.

SAN JOAQUIN RIVER
RESTORATION PROGRAM

Experimental Population Rules 10(j) and 4(d) for Spring-run Chinook Salmon Reintroduction

Rhonda Reed & Elif Fehm-Sullivan
NOAA's National Marine Fisheries Service

SJRRP salmon reintroduction

- Settlement: reintroduce spring-run and fall-run Chinook salmon (by 2012…)

- Federal legislation: spring-run reintroduced under the SJRR Settlement Act shall be as 10(j) experimental population

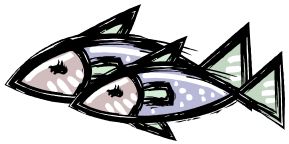
- State law: new authority - CDFG may concur with NMFS SJR spring-run experimental population designation.

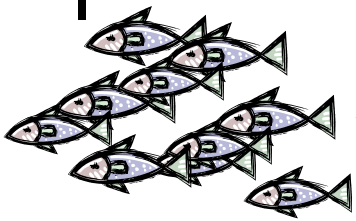
Component Elements for Chinook Salmon Reintroduction

Collect source fish

Make more

Release them





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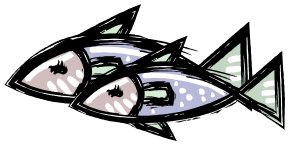
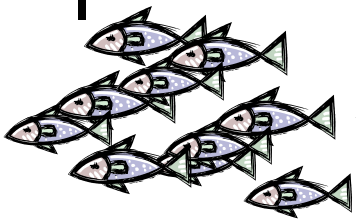
Component Regulatory Elements

Collect source fish

Make more

Release them





Section 10(a)1(A) Permit Species Enhancement

Hatchery & Genetic Management Plan (HGMP)

Section 10(j) Experimental Population Determination

Issue 10(a)(1)(A)

Federal Register Regulation (Rule)

NEPA + Internal section 7

Statutory and Regulatory Framework

Experimental Population 10(j)

- Delineated area
- Threatened Status
- Section 9: prohibits “take”
- Section 4(d):
  - May exempt “take” prohibition
  - For conservation purposes
  - For Threatened species
  - Applies also to non-federal entities

Essential or Non-essential

Essential population

- Critical habitat
- Federal agencies consult : Section 7

Non-essential population

- No critical habitat
- Federal agencies: Section 7 candidate species

Statutory and Regulatory Framework

- The 4(d) rule:
  - Usually reserved for essential experimental populations, but…
    - PL111-11 required 4(d) rule to be established with the San Joaquin experimental population whether or not it is essential or non-essential
    - *De minimus* [sic] impact on third parties:
      - Water supply (exports)
      - No unwilling releases
      - No added bypass flows at dams

Experimental Population Rule

SJRRP 10(j)Rule Proposal

- Initial introduction will be as non-essential experimental population (NEP)
  - A re-assessment will occur with the 5 year Status Review of Spring-Run Chinook salmon approx. 2015.
- Suggest cover from Friant Dam to Mossdale, and associated waterways
- Sunset at end of Settlement period (2025)

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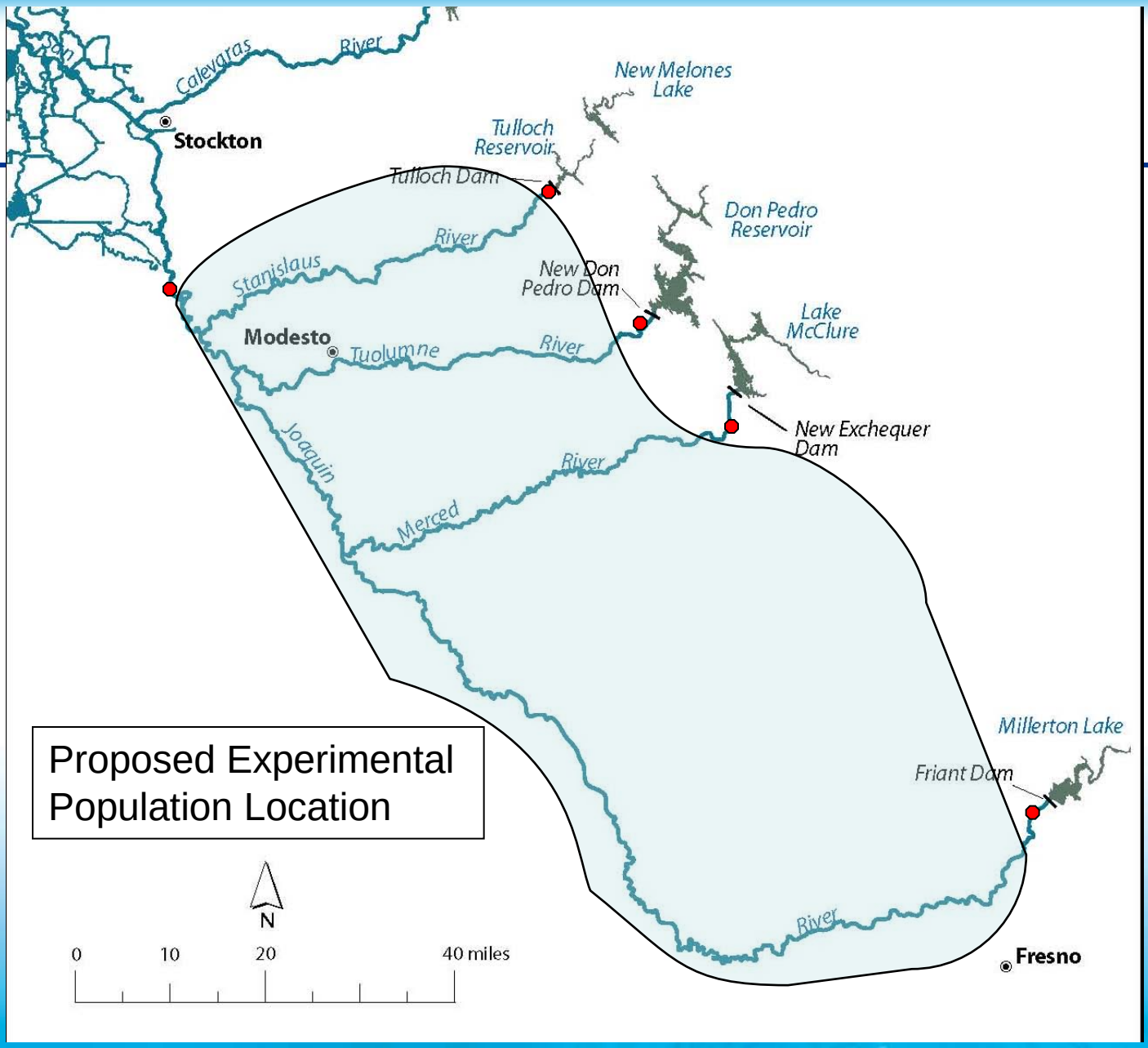


Management Considerations and Protective Measures

- Existing lawful land use activities will not change as a result of the NEP designation.
- The NEP designation will not require specific management by private land owners for reintroduced species in the NEP area.
- Private landowners within the NEP area will still be allowed to continue all legal agricultural and recreational activities.
- CDFG may modify fishing regulations for the benefit of the species in consultation with NMFS.

SJRRP 10(j) proposal (cont'd)

- Reintroduction will not impose more than de minimus: water supply reductions, additional storage releases, or bypass flows on unwilling third parties due to such reintroduction..

- Substantial regulatory relief provided by NEP designations,

- Voluntary third party programs (eg diversion screens)

- The SJRRP Implementing agencies will all be involved in the management of the reintroductions to ensure successful reintroductions of the species

Protect Existing Populations

- Take only allowed through ESA section 10 and section 7 authorities.
- Conservation fish facility will minimize the number individuals taken from existing populations.
- Collection of fish for founding stock will consider source population condition and San Joaquin River habitat condition.
- Essential/non-essential definition reviewed with 5 year spring-run Chinook salmon status review

Sample Language

- From a NMFS 10(j) proposed rule

  "Incidental Take:

  – *allowed, provided that the take is unintentional,*

  – *not due to negligent conduct,*

  – *or is consistent with State fishing regulations that have been coordinated with NMFS.*

  – *in compliance with ODFW fishing regulations, and Tribal regulations on land managed by the CTWSRO, such take will not be a violation of the ESA."*

NEPA Alternatives

- Source populations
- 10(j) Experimental Population
  - Geographic coverage
  - Duration of NEP designation
- 4(d) rule
  - Existing (no action)
  - De minimis effect on 3rd party water supply, releases, and bypass flows
  - Other – but no ideas yet

Discussion

Current Spring-run 4(d) Rule

- NMFS's 10 harm categories of activities
  - where take is exempted
  - when they contribute to the conservation of the species
  - or under a program that adequately limits impacts on these species:

4 (d) continued…

Exemptions:

– existing ESA incidental take authorization;
– Ongoing scientific research activities, for a period of 6 months;
– Emergency actions related to injured, stranded, or dead salmonids;
– Fishery management activities;
– Hatchery and genetic management programs

4 (d) continued…

- Scientific research activities permitted or conducted buy the State of California;
- habitat restoration activities that are part of an approved watershed conservation plans;
- Properly screened water diversion devices
- Routine road maintenance activities**;
- Municipal, residential, commercial, and industrial (MRCI) development activities**.

November 1, 2011

Key Points from a Preliminary Survey of Recreation
on the San Joaquin River from Friant Dam to Skaggs Bridge Park
and Millerton Reservoir in Fresno County, CA

An estimated 190,000 individual visits occur along
the San Joaquin River in a single year

Approximately 100,000 of these visits are in Lost Lakes and Skaggs Bridge Parks

Educational and recreation groups account for approximately 40,000 visits

Private recreation and fishing sites report approximately 25,000 visits

Millerton Reservoir received 320,000 visitors in CY 2010

****

Fishing pressure on the San Joaquin River is concentrated at Lost Lakes State Park

Largest number of anglers on a single day is 44 on June 19th at Lost Lakes Park

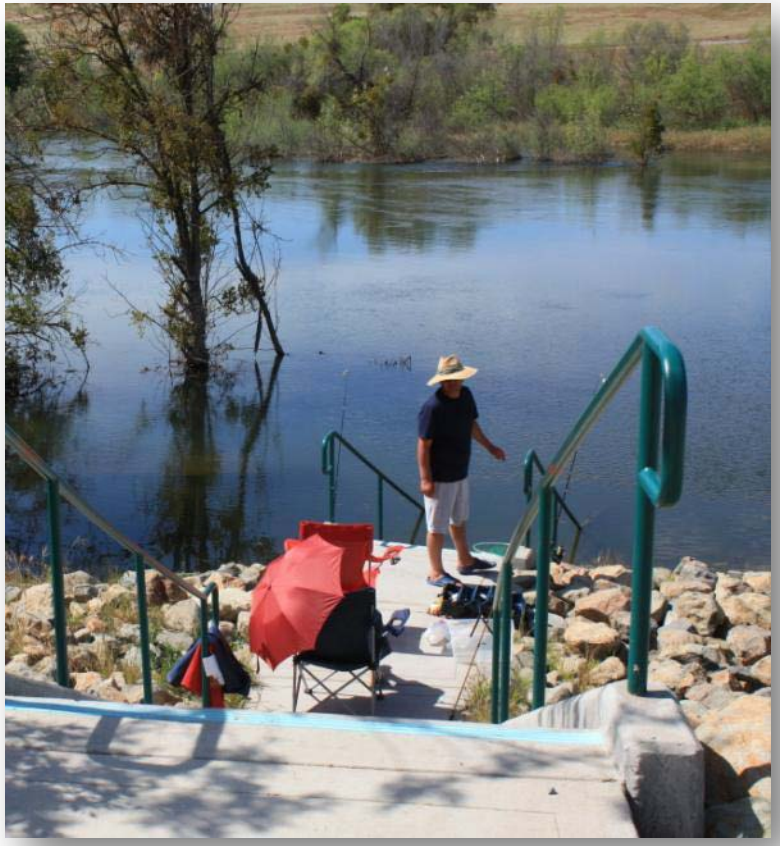
19,187 boats were launched at Millerton Reservoir in CY 2010

SJR Recreation Use Study – Angling

- Identify and contact fishing groups in the region
- Literature reviews: the 'science' of creel surveys
- Systematic creel survey –
  randomized spatial and temporal coverage
- Nearly 2,000 creel surveys to date

SJR Recreation Use Study – Angling

"Trophy Trout" in upper SJR?



SJR Recreation Use Study – Angling

Kong Vang, Sarah Rutherford, Mike Grill, Jamie Castro
(not pictured: Zak Foster, Marissa Williams , Laura Kosbie

California State University Fresno
San Joaquin River Creel Census

Survey Information - Page ___ of ___	
Date	
Day of Week	
Weather (Temp, Clds, Pressure, Moon phase)	
Start Time	
Stop Time	
Surveyor	
Notes	

Arrival Information					
Site Code	Arrival Time	#Anglers	# Non-Fishing	# Cars	# Water craft

Fish Species Codes

Rainbow Trout = **RBT** Largemouth Bass = **LMB**
Spotted Bass = **SPB** Striped Bass = **STB** Catfish **= CF**
Sunfish (e.g. Green, Bluegill) = **SF** Crappie = **CR**
Carp = **CA** Sacramento Pikeminnow = **SP** Suckers=**SU**

One row for each angler or group		Angler Info			Effort					Fish Landed			Other River Options?
Access Site/ Angler # / Time (24 hr clock)	Prior survey?	Zip Code	Paddle, Boat or Shore	Fish for food? (√=yes)	Fishing trips/yr	Other trips/yr	Start Time	Trip Complete	Targeted Fish Species	Species	# Kept	# Released	Where else would you fish if not SJR? How far would you go?

_____ ***Check here if there are additional notes on the back of this sheet***

Oct 2011 – Sept 2012 (Year 2 of 2)

- Lower River: One Weekend shift / wk 2 Weekday shifts / mo

1) San Mateo Crossing (turn right off Highway 180 onto N San Mateo Road)

2) Mendota Pool

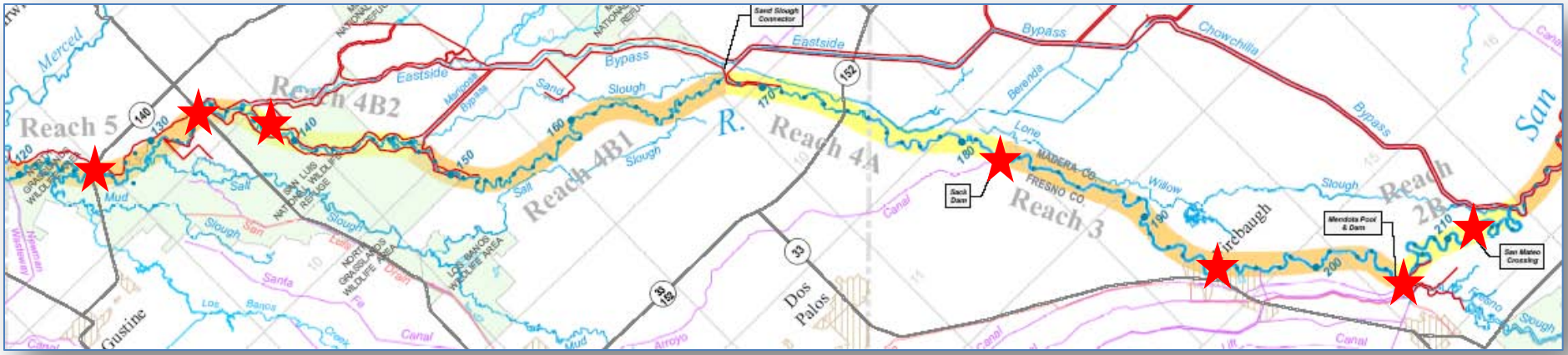
3) 13th Street Firebaugh River Park

4) Sack Dam down Valaria Road off Highway 33

5) West Bear Creek off Highway 33 north of Los Banos

6) Highway 165 bridge over the SJ River (dangerous parking)

7) Highway 140 bridge over the SJ River (turn left from Hwy 165 onto Hwy 140)

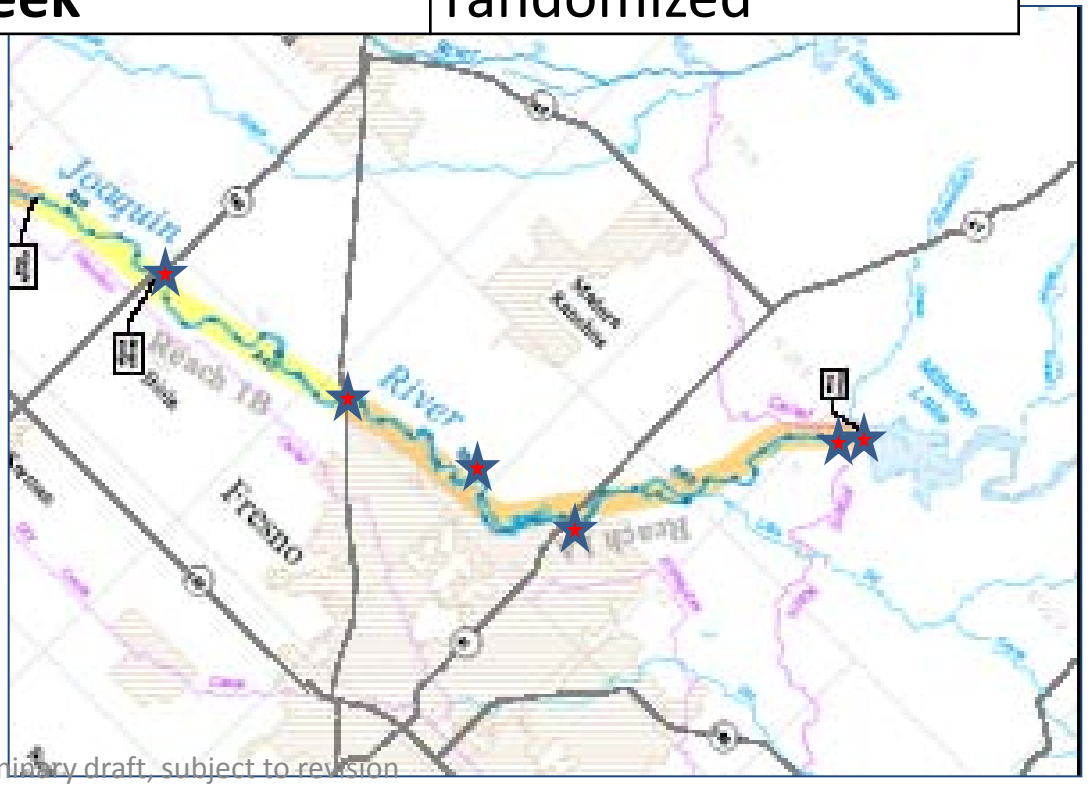


Oct 2010 – Sept 2011; Oct 2011 – Sept 2012 (abbreviated)

- Upper River: Friant Cove - Skaggs Bridge

Sites	Period	Rotation	Planning
River	Weekend	One early, mid, or late shift **each day**	Shift time Randomized
	Weekday	One early & late shift **each week**	Day & Shift time randomized

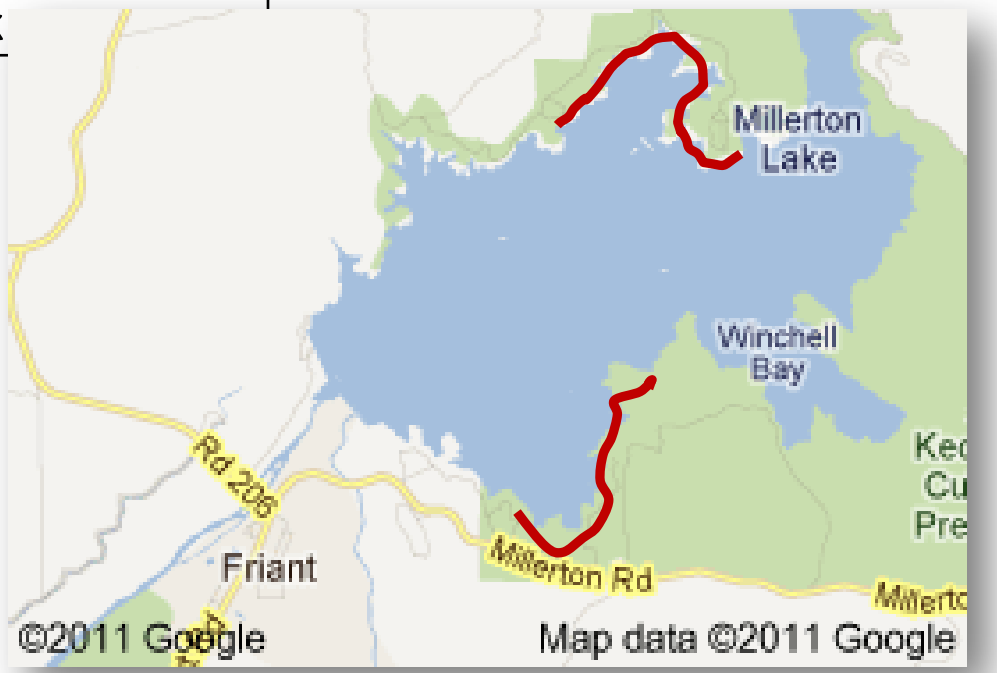
River Stations – All 'Spot Check'/ Roving
1) Friant Cove
2) Lost Lake
3) Hwy 41 / Wildwood
4) Palm and Nees
5) Camp Pashayan / Highway 99
6) Skaggs Bridge (SB)



Oct 2010 – Sept 2011

- Millerton

Sites	Period	Rotation
Millerton Madera/ Fresno	Weekend	One early & late shift **each day**
	Weekday	One early & late shift **each week**



Frequency distribution of interviewed anglers by zip code of residence. Residents of zip code 93650 (Pinedale) had an exceptionally high rates of visits / year.

Zip Code	# Surveys or responses	Percent	Avg # Trips / Year
93727 East Fresno	42	7.3%	22
93722 West Fresno	34	5.9%	13
93611 Clovis	33	5.7%	41
93726 S of CSUF	32	5.5%	13
93711 NW Fresno	31	5.4%	28
93612 Cent Clovis	30	5.2%	19
93710 N of CSUF	30	5.2%	21
93702 SE Fresno	29	5.0%	32
93704 Hwy 41 N	25	4.3%	55
NA	23	4.0%	48
93703	21	3.6%	16
93720	20	3.5%	27
93706	19	3.3%	44
93657	18	3.1%	55
93728	16	2.8%	13
93637	15	2.6%	14
93705	14	2.4%	20
93650 Pinedale	13	2.3%	**79**
Remainder < 10 responses			Average = 30

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93728	16	2.8%	13
93637	15	2.6%	14
93705	14	2.4%	20
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Fishing Effort & Success by Study Sites

	# Fishing Hours	# Fish Kept	# Fish Released	% Kept	Catch / Hour
Reservoir Sites					
Boat Ramp 1	51	2	15	12%	0.33
Boat Ramp 2	374	21	204	9%	0.60
Madera side	16	4	3	57%	0.45
River Sites					
Friant Cove	469	122	29	81%	0.32
Lost Lake	1561	640	94	87%	0.47
Palm & Nees	63	2	3	40%	0.08
Riverside	9	1	2	33%	0.34
Skaggs Bridge	12	7	1	88%	0.70
TOTALS	2553	799	351		

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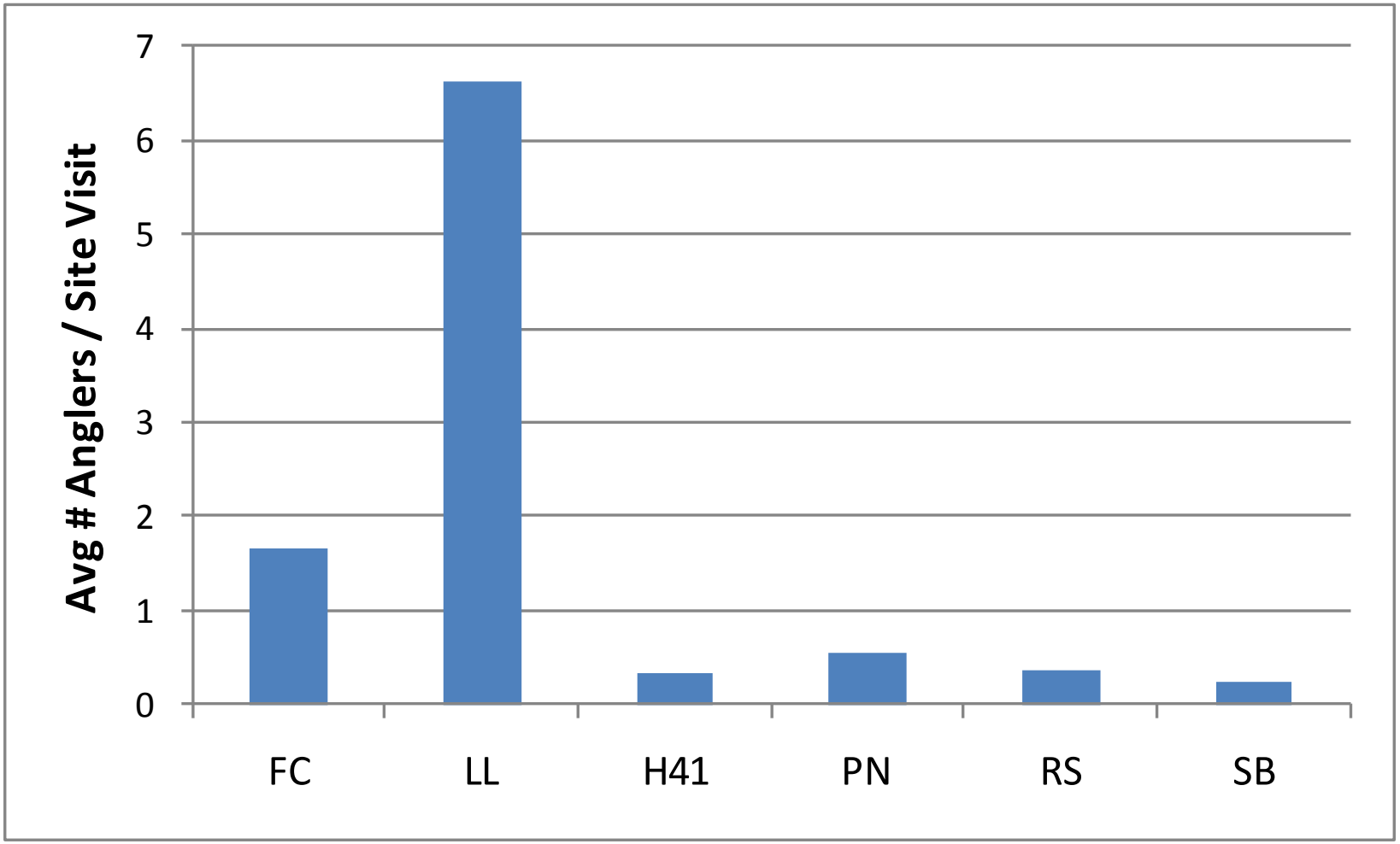
Skaggs Bridge	12	7	1	88%	0.70
TOTALS	2553	799	351		

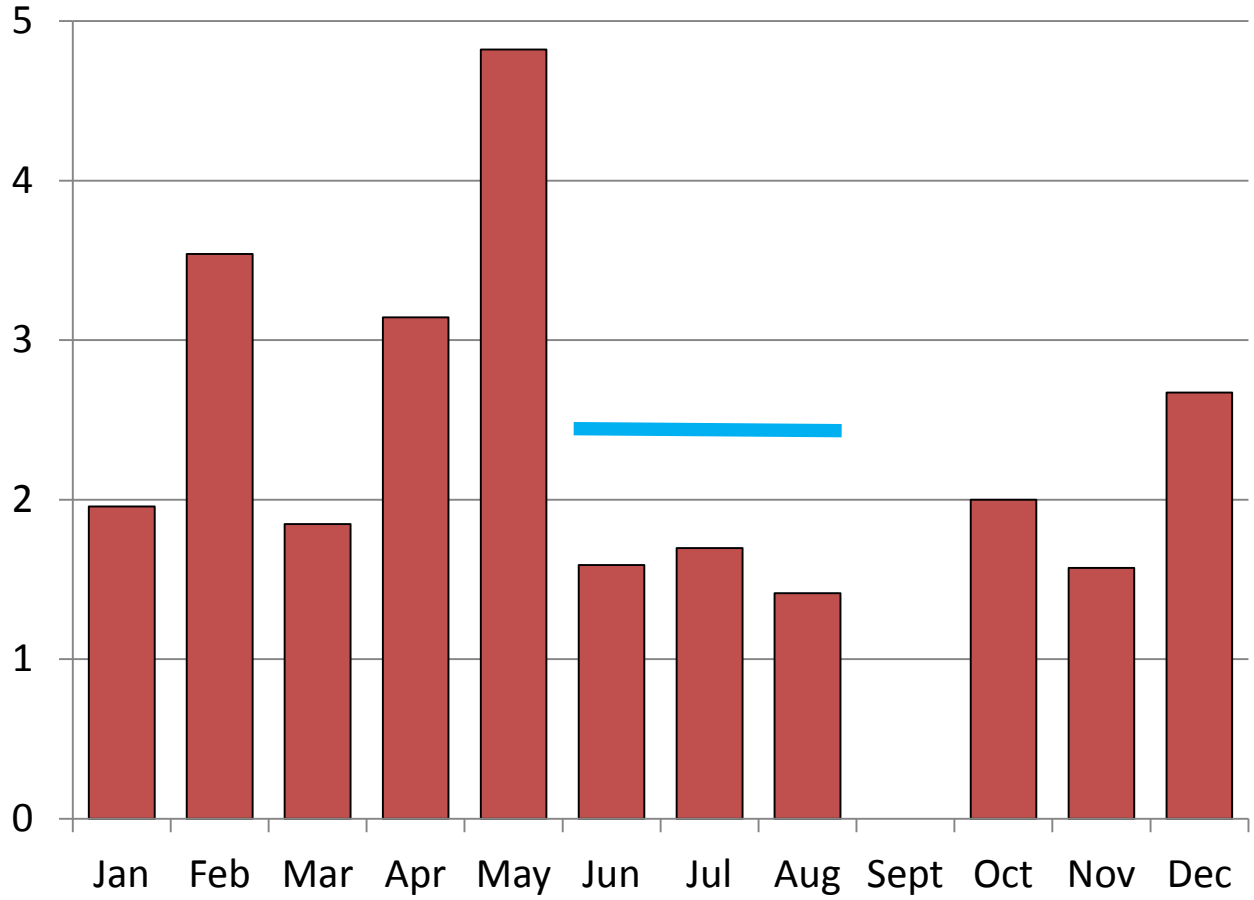
Average number of anglers counted per site on the San Joaquin River, in left to right order down river. Only the upper two most stations (FC & LL) were sampled continuously since Oct 2010, whereas the downriver stations were sampled starting in May 2011. (FC=Friant Cove; LL=Lost Lake; H41=Highway 41; PN=Palm & Nees; RS=Riverside; SB=Skaggs Bridge).



Fishing Alternative to SJR?	Count	Percentage
Pine Flat lake	137	17%
Millerton Lake	94	12%
Kings River	91	11%
Hensley Lake	76	9%
Shaver Lake	64	8%
Bass lake	40	5%
Mendota	37	5%
Eastman lake	32	4%
SJR Only	31	4%
Delta	23	3%
San Louis	20	2%
Huntington Lake	17	2%
Tahoe	16	2%
Not sure	16	2%

Starting in February 2011, anglers interviewed in the study area were asked where they would fish if not in the SJR (restoration area). Our survey strategy included asking anglers whether they have been interviewed by our team before (described in Appendix A). Overall, our sampling strategy allowed for multiple locations to be given by anglers, but they were not asked this question more than once.

Average number of anglers by month (upper river)



Questions & Discussion?

SAN JOAQUIN RIVER RESTORATION PROGRAM

Fisheries Studies Proposed for FY 2012

Map of San Joaquin River with reach designations

Water Quality and Fish

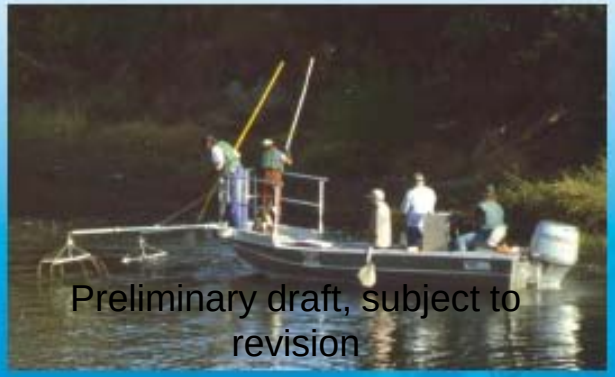
- **Purpose and Need:** to summarize water quality date being collected by the Program and provide assessments for fisheries implications
- **Study Elements:** summarize WQ data, recommend sampling frequency, sampling locations, and sampling methods for appropriate media (water, sediment, tissue) and adequate detection levels meaningful for fisheries investigations. Discuss comparisons to available criteria and thresholds for salmonids, native fishes, and other aquatic organisms.
- **Access Required:** No. Uses WQ data already being collected by the Program
- **PI:** Marissa Bauer, USGS

SWAMP – BMI Bioassessment

- **Purpose and Need:** benthic macroinvertebrate assemblages can be used to indicate water quality and is a primary food source for fish. Biological assessment of the benthic community will provide information needed to evaluate the impact/benefit of restoration flows on salmonid riverine habitat.
- **Study Elements:** 30 sampling sites selected based on access, wadeable depths and other criteria consistent with California's Surface Water Ambient Monitoring Program (SWAMP) Bioassessment Procedures. 2011 is year 2 of the study. Collect physical habitat measures, BMI samples, laboratory analysis.
- **Access required:** Yes, restoration area wide.
- **PI:** Abimael Leon, DWR

Fish Community/Monitoring and Inventory

- **Purpose and Need:** Develop baseline fish assemblage date throughout the Restoration Area, develop standardized sampling locations and methods for long term monitoring of program success in "maintaining fish populations in good conditions:
- **Study Elements:** Define reach specific sampling location representing available habitats within each reach, conduct seasonal sampling at each location, develop a database and report out annually.
- **Access required:** Yes, Appropriate sites will be determined based on biological need and available access.
- **PI:** Michelle Workman, USFWS; Don Portz, USBR

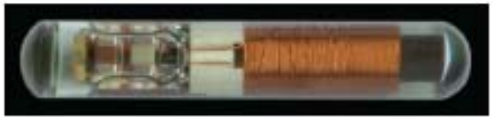


Basin-wide PIT Tag Monitoring and Technology

- **Purpose and Need:** To monitor Chinook salmon movement throughout their life history in the Restoration Area to determine survival and return at adulthood.

  (1) Juvenile — emigration, movement, & entrainment

  (2) Adult — escapement, entrainment, and straying



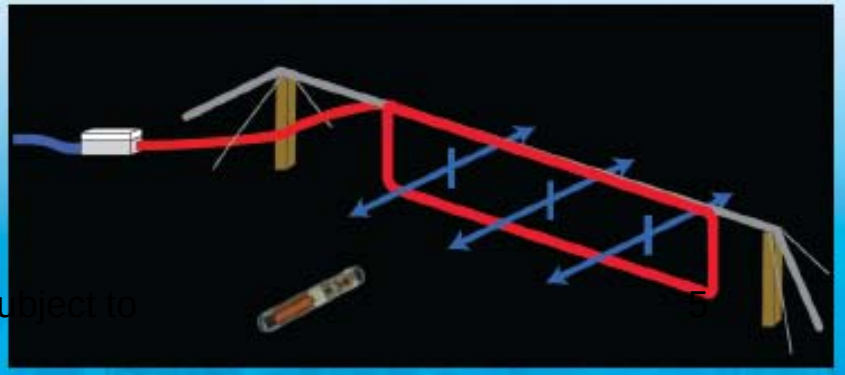
- **Brief Description of Study elements:**

  Phase I — Assessment of PIT tag technology & site-specific limitations

  Phase II — Construction of arrays, fish tagging, monitoring, and database management throughout life cycle

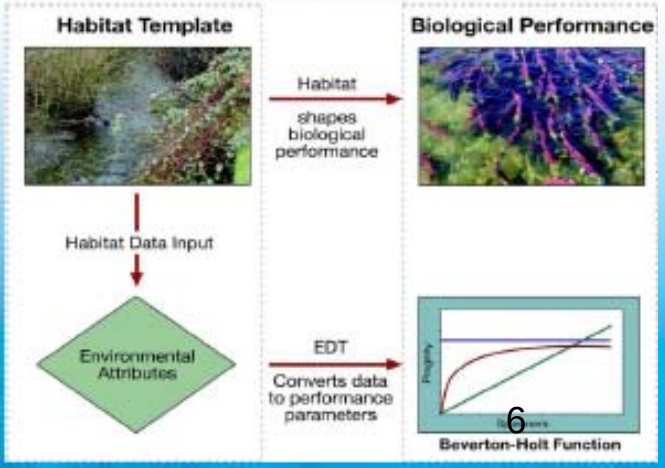
- **Where:** Entire Restoration Area and throughout migration.

- **PI:** Donald E. Portz, Ph.D. Reclamation



EDT Modeling

- Purpose and Need:Ecosystem Diagnosis and Treatment modeling is required to model likely Chinook salmon responses to proposed restoration actions. This will assist in developing adaptive management actions as the Program progresses.
- Study Elements:
  - Task 1: training to agency staff to apply and interpret the model to SJRRP applications
  - Task 2:use the model to assess high priority projects to be implemented under the SJRRP
  - Task 3:support to the resource agencies on formulation of model strategy, supporting model documentation, and outreach
- Access required: No
- PI: Carl Mesick, USFWS



Fisheries Studies Proposed for FY 2012

Adult Salmon Migration and Passage

Adult Passage (non-structural)

- **Purpose and Need:** to assess passage issues not related to structures (water depth, temperature, false migration pathways). Needed to inform reintroduction decisions and monitoring decisions.

- **Brief Description of Study Elements:** Compile temperature, bathymetry data and discharge data from inputs (salt slough, mud slough). Report on potential problem areas.

- **Access Required:** No, will use existing data. May lead to proposed field work at identified critical areas in future years.

- **PI:** Marissa Bauer, USGS

Temperature Monitoring – Adult Migration

- Purpose and Need:
  - The purpose of the temperature study is to collect sufficient data to develop and implement a systematic water temperature monitoring scheme capable of fully describing the water temperature conditions likely to be experienced by all life stages of spring- and fall-run Chinook salmon in the Restoration Area.
  - Understanding the longitudinal distribution of temperatures in relation to the Restoration Flows on the San Joaquin River is critical to our ability to successfully prepare the system for reintroduction of Chinook salmon (i.e., evaluate site specific alternatives, make recommendations on water allocations, make recommendations for stock selection and reintroduction strategies)

- Brief Description of Study elements: Deployment of temperature loggers at selected locations in the SJR.

- Access required: Need additional access in Reaches 2 – 4, the bypasses and tributaries (Newman Wasteway, Bear Creek, and Mud/Salt Slough).

- PI: Eric Guzman, DFG

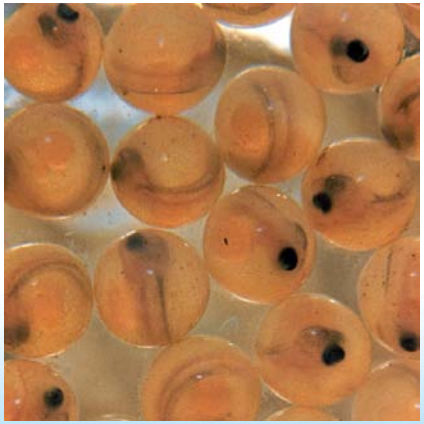
Evaluation of Law Enforcement Needs

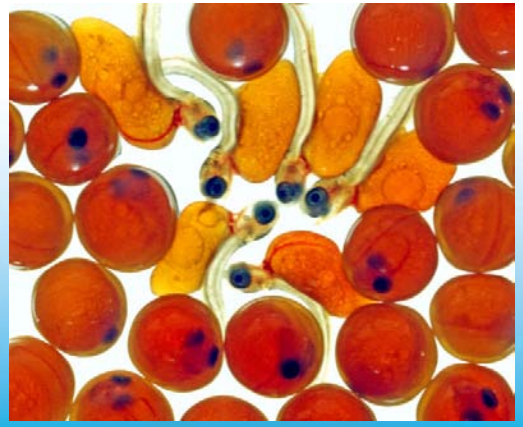
- Purpose and Need:
  - It is anticipated that unlawful take of spring and fall run Chinook salmon may occur within the San Joaquin River (SJR) restoration area. Impacts could occur affecting migrating adults and juveniles, adults holding over summer in pools, spawning, incubating eggs, and rearing juveniles.
  - The Department is currently in the process of developing new SJR regulations for Chinook salmon reintroduction in 2012. The new regulations will likely include permanent and seasonal closure areas and fishing gear restrictions to protect potentially spawning, holding, and migrating Chinook salmon.
- Brief Description of Study elements: A Recreational Impact Study is currently being conducted to identify existing conditions relating to recreation activities within the Restoration Area. DFG is conducting public outreach with local angling groups to provide information and receive feedback on the new regulations.
- Access required: No access required.
- PI: Eric Guzman, DFG

Fisheries Studies Proposed for FY 2012

Spawning Habitat Quality

Egg Survival



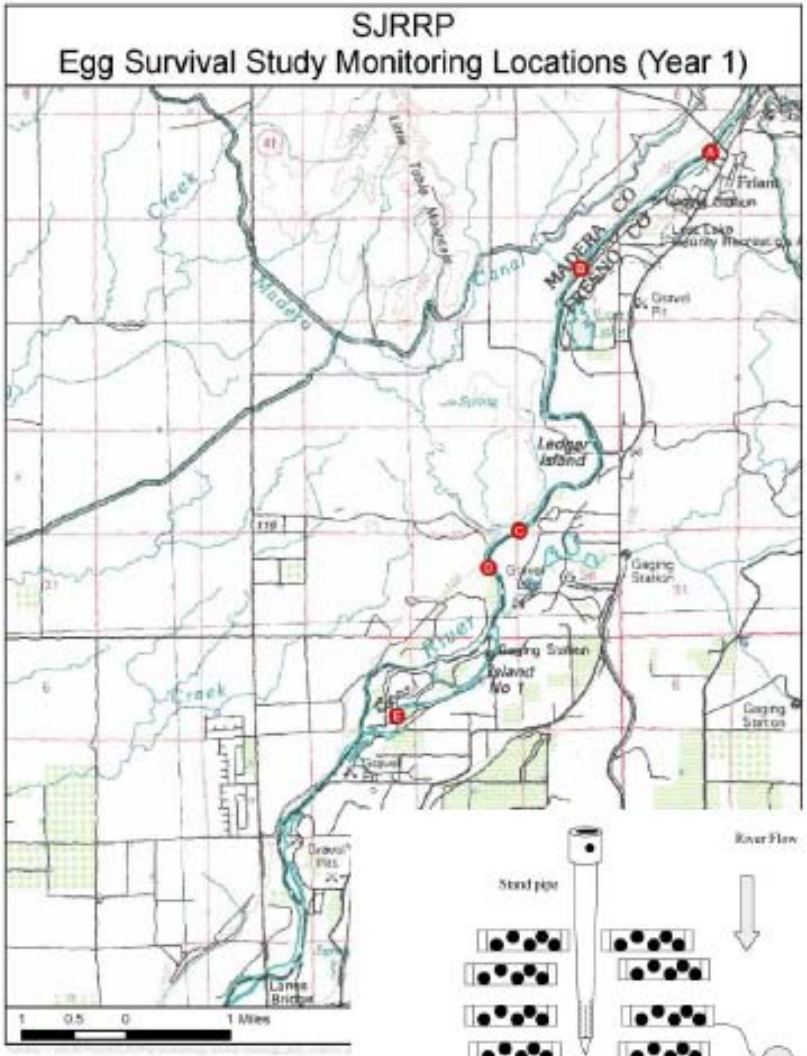


Spawning Habitat Physical Processes

- Spawning Habitat Quantity
- Spawning Gravel Mobility
  - Current / Improvement
- Scour and Fine Sediment Effects on Spawning Habitat
- PI: Matthew Myers (DWR)

Egg Survival

- **Purpose and Need:** Evaluation of the survivability of existing gravel beds to chinook salmon eggs. Necessary to support reintroduction planning.
- **Study Elements:** Model predicted egg survival using DWR's particle size analysis; create 10 artificial redds from Friant Dam to Skaggs Bridge, measure water quality (DO, Temp), sediment particle sizes. Bury egg tubes with fall run chinook eggs, and assess development and survival of embryos
- **Access required:** Reach 1 only.
- **PI:** Michelle Workman, USFWS
  Eric Guzman, DFG



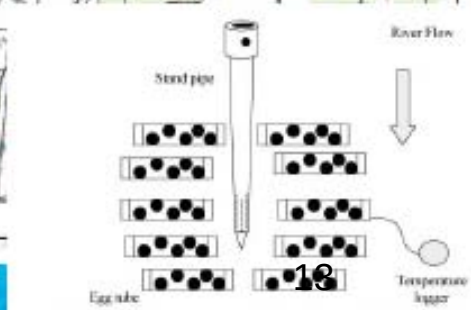


Figure 2. Diagram of constructed "redd" with egg tubes, stand pipe and temperature logger (top view). Figure is not to scale.

Millerton Temperature Modeling

- Purpose and Need:
  - Reservoir management may be necessary to conserve the cold water pool in Millerton Lake to ensure that release temperatures remain suitable for spawning and egg incubation.
  - Real-time monitoring is particularly important because it will provide data on the rate that the volume of the cold water pool declines during reservoir operations and provide a potential alert as to whether release temperatures would be expected to exceed the temperature targets for salmon egg incubation in the fall. That alert may give the Flow Scheduling Subgroup time to decide how best to manage the remaining cold water pool through flow management.
- Brief Description of Study elements: Water temperature measurements will be collected at 5-foot increments with a YSI meter or Hydro-Lab at weekly intervals. Measurements will be taken at three locations within Millerton Reservoir.
- Access required: No access required.
- PI: Eric Guzman, DFG

Monitoring Spawning/Holding Habits

- Purpose and Need:
  - it is necessary to determine if spawning and holding habitat quality and quantity is sufficient to meet long-term population goals
  - information regarding the suitability and availability of potential spawning and holding habitats within Reach 1 will help guide decisions for the reintroduction of Chinook salmon (i.e., evaluate site specific alternatives, make recommendations on water allocations, make recommendations for stock selection and reintroduction strategies)

- Brief Description of Study elements: Collect micro-habitat measurements (i.e., water temperature, DO, and flow) and conduct additional studies (i.e., egg survival, artificial redd construction, and bedload sampling). Meso-habitat mapping will be conducted to document the longitudinal distribution of habitat units in an effort to plan for other studies (microhabitat, holding, and spawning).

- Access required: River access to selected spawning and holding habitats in Reach 1 (RM 267-233). Need boat launch access in Reaches 2 – 5 for meso-habitat mapping.

- PI: Eric Guzman, DFG

Pilot Gravel Augmentation

- **Purpose and Need:** high quality spawning habitat may be limited in Reach 1A of the Restoration Area, gravel augmentation may be needed to support self-sustaining chinook salmon populations. This study is a pilot level investigation to determine the value of gravel augmentation in Reach 1A
- **Study Elements:** construct a small amount of spawning habitat in the area near Friant Dam, where water temperatures are most likely to be suitable in late summer, to evaluate the preferred spawning areas for spring-run and fall-run and to determine the longevity of the constructed beds in this upper reach.
- **Access required:** Yes, Reach 1A
- **PI:** Carl Mesick, USFWS

Fisheries Studies Proposed for FY 2012

Juvenile Salmon Migration and Survival

Juvenile Chinook salmon survival and migration (Year 2)

- **Purpose and Need:** necessary to assess migration and survival over a variety of operations scenarios that both include and do not include the use of the bypass system for juvenile migration. Determine relationship of migration/survival with predation, entrainment, temperature and flow.
- **Study Elements:** Deploy receivers at critical points for survival migration (split channels, mine pits, structures, diversions, etc), to determine areas of concern or losses of fish. Tag and release fall-run chinook and track movement, survival through the system.
- **Access required:** Yes, in year 2 we would like to maintain existing coverage and add a few more critical elements (Sack Dam area, downstream of Merced Confluence, Reach 3 and 4a – more coverage)
- **PI:** Michelle Workman, USFWS

Predation Evaluation

- Purpose and Need:
  - information on predator abundance and distribution is necessary to prioritize the mine pits for restoration from a biological perspective as required in the settlemen
  - information regarding predator distribution throughout the Restoration Area will help guide decisions regarding the introduction of juvenile salmonids (locations, timing, etc.)
- Brief Description of Study elements: electrofish, gill/trammel netting; mark recapture population assessment; habitat assessment;
- Access required: Boat access to captured mine pit habitat in Reach 1 (RM 257-233)
- PI: Michelle Workman, USFWS

Predator Impacts

- **Purpose and Need:** Reducing nonnative piscivorous fishes at in-river structures, passages, screens, and diversions is needed to decrease predation pressure on juvenile salmon and other native fishes.

- **Brief Description of Study elements:** Synthesis report recommending techniques to remove predators at fish screens and passage structures throughout the restoration area.

- **PI:** Norm Ponferrada, Reclamation

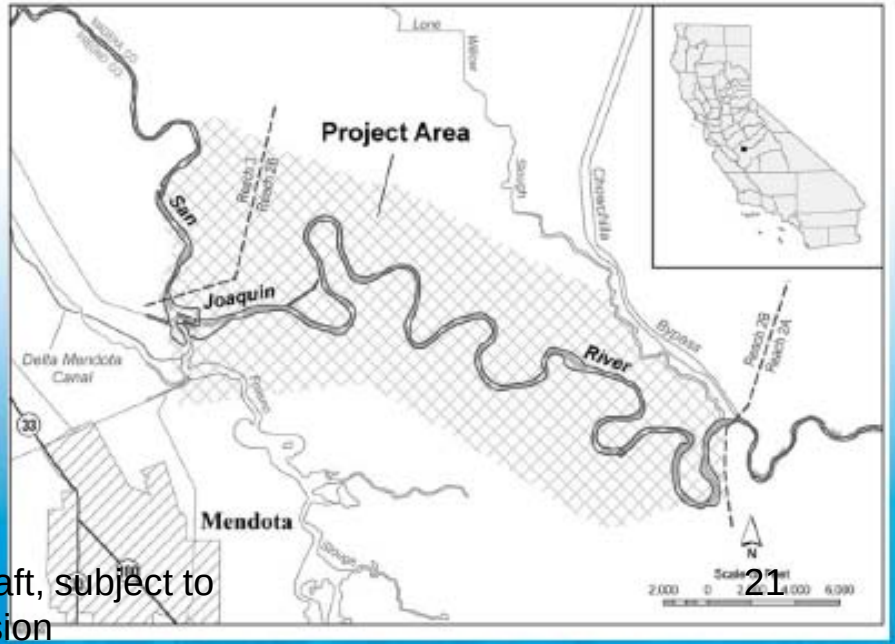
Minimum Floodplain Requirement

- Purpose and Need: To quantify rearing habitat for juvenile Chinook salmon.

- Brief Description of Study elements:
  - (1) Estimate area required per individual fish
  - (2) Vegetation Survey
  - (2) Invertebrate Sampling
  - (3) Fish Sampling

- Where – Reaches 2B and 4

- PI: Norm Ponferrada
  Reclamation



2d Hydraulic Modeling Gravel Pits and Instream

- Purpose and Need: Resolve uncertainty for salmon habitat
- Brief Description of Study elements: Hydraulic modeling of depth, temperature, and velocity.
- Access required? No
- PI: Elaina Gordon (USBR)

Fisheries Studies Proposed for FY 2012

Salmon Reintroduction

SAN JOAQUIN RIVER RESTORATION PROGRAM

Captive Rearing Study

- Purpose and Need:
  - It is important to refine conservation hatchery practices in advance of working with threatened spring-run Chinook salmon.
  - The study is the second year of an ongoing study. Year-one of the study focused on installing and testing fish culture equipment; developing and testing transportation, handling, and rearing methods; and monitoring and modulating fish growth.
- Brief Description of Study elements: During year-two of the study it is anticipated that more information will be learned regarding strategies for growth rate modulation, use of ultrasound equipment for monitoring ova development, handling and propagation of juvenile salmon removed from the wild, and use of cryopreservation techniques and equipment.
- Access required: No access required.
- PI: Paul Adelizi, DFG

Collection/Transport From Source Stocks

- Purpose and Need:
  - Information regarding limitations and impacts associated with collection and transportation methods is needed to inform the donor stock collection process

- Brief Description of Study elements: evaluation of effects (e.g., condition, survival) of potential in-hatchery collection and transportation methods in comparison to normal hatchery operations; future needs will also evaluate in-river collection and transportation methods in comparison to normal hatchery operations

- Access required: NA (FRFH access only

- PI: Zac Jackson, USFWS

Tagging, Marking, Genetics From Source Stocks

- Purpose and Need:
  - Individual identification will be an important component of the donor stock collection and reintroduction processes because of genetics concerns
  - Determine the most appropriate marking and tissue collection techniques that will facilitate genetic analysis to inform donor stock selection without causing significant impacts to donor or reintroduction stocks

- Brief Description of Study elements: Methodologies will be evaluated in a stream-side environment using individual enclosures.

- Access required: Boat access to Butte Creek

- PI: Zac Jackson, USFWS

Fish Health Assessments From Source Stocks

- Purpose and Need:
  - Evaluation of the health of donor stock fish will be necessary before reintroduction can occur
  - Collection of donor stock for fish health evaluations and associated quarantine procedures need to be developed to streamline the collection and reintroduction process while ensuring that diseased fish are not transferred between watersheds
- Brief Description of Study elements: Develop fish health assessment, handling, and quarantine procedures
- Access required: NA
- PI: Zac Jackson, USFWS

Real-Time Data Collection From Source Stocks

- Purpose and Need:
  - Real-time data describing relative abundance and temporal distribution of potential donor stocks is critical to informing donor stock collection requests

- Brief Description of Study elements: Rotary screw trap monitoring on Butte Creek; future needs may include snorkel and carcass surveys and video and hydroacoustic monitoring on potential donor stock streams

- Access required: Boat access to Butte Creek

- PI: Zac Jackson, USFWS

Fisheries Studies Proposed for FY 2012

- **Studies to advance Reintroduction (off-river)**
  - Collection and Transport Methods
  - Real Time Data Collection Techniques
  - Tagging/Marking and Genetics Sampling
  - Fish Health Assessments
  - Captive Rearing Assessment

- **Information Gathering (no river access necessary)**
  - UC Davis Genetics
  - Adult Passage (non-structural)
  - Water Quality and Fish
  - Millerton Temperature Monitoring
  - EDT modeling
  - Site Specific Fisheries Modeling (IBM)
  - Predator Impacts at structures
  - Evaluation of Law Enforcement Needs

- **Studies occurring on the River**
  - SWAMP
  - Fish Community/Monitoring and Inventory
  - Predation Evaluation
  - Monitoring Spawning/Holding Habitat
  - Pilot Gravel Augmentation
  - Temperature Monitoring – Adult Migration
  - Steelhead Monitoring

- **Studies occurring on the River + using experimental fish**
  - Juvenile Survival/Migration*
  - Egg Survival*
  - Hills Ferry Barrier Assessment*
  - Minimum Floodplain Requirements
  - Pit Tag Feasibility Evaluation

RECLAMATION

Managing Water in the West

Hills Ferry Barrier Operation & Evaluation

Donald E. Portz, Ph.D.

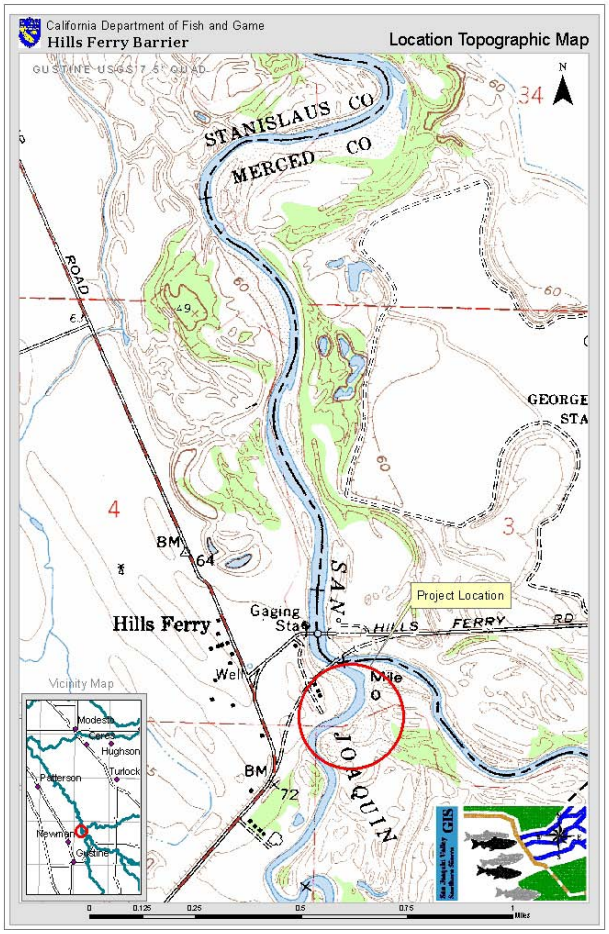
Bureau of Reclamation
Fisheries & Wildlife Resources Group

U.S. Department of the Interior
Bureau of Reclamation

Preliminary draft, subject to revision

SAN JOAQUIN RIVER RESTORATION PROGRAM

Hills Ferry Barrier Location



Purpose: To redirect upstream migrating adult fall-run Chinook salmon into suitable habitat of the Merced River

Preliminary draft, subject to revision

Hills Ferry Barrier History

- Prior to the Hills Ferry Barrier there was a trapping and egg salvage effort at Los Banos Wildlife Area (1988-1991)
- Barrier has been in seasonal operation since 1992 employing many different designs:
  - ✓ Smith-Root Electrical Barrier (1992)
  - ✓ Physical Weir (1993-1994)
  - ✓ Alaskan Weir (1995-2001)
  - ✓ Resistance Board Weir (2002)
  - ✓ Sliding Pipe-Resistance Board Weir (2003)
  - ✓ Sliding Pipe Weir (2004-2011)

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2002 Resistance Board Weir

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2004 Sliding Pipe Weir (Low Water)

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2004 Sliding Pipe Weir (High Water)

Preliminary draft, subject to revision

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2010 Sliding Pipe Weir

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2011 Sliding Pipe Weir

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Daily Barrier Cleaning

Preliminary draft, subject to revision

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Daily Barrier Maintenance

Preliminary draft, subject to revision

SAN JOAQUIN RIVER RESTORATION PROGRAM

Hills Ferry Barrier Evaluation

- **HFB effectiveness was monitored throughout the installation period and under a wide range of flows to understand the current limitations of the structure.**
- **Physical characteristics of the barrier and river were examined as well as fish behavior adjacent to the barrier.**
- **Dual-frequency identification sonar underwater camera (DIDSON™) and an Acoustic Doppler Current Profiler (ADCP) were used to identify problems and limitations.**
- **Information will be used to recommend improvements with barrier design, operation, and location.**
- **Scour holes and gaps in the barrier can be found and possibly predicted using erosion depth and sediment transition behavior.**

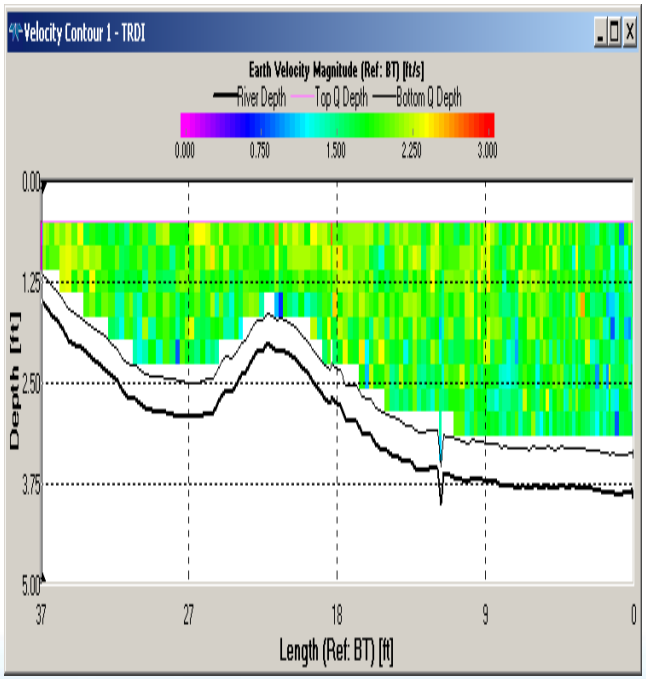
SAN JOAQUIN RIVER RESTORATION PROGRAM

Bathymetry Mapping & Velocity Profiling

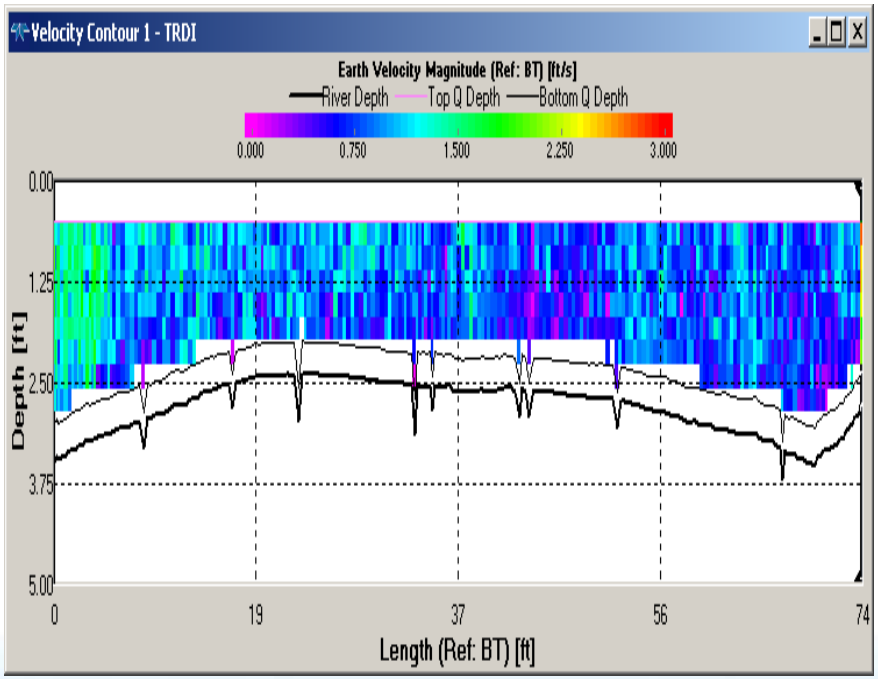
Measuring river velocity and bathymetric transects using an Acoustic Doppler Current Profiler

Pending revision

Bathymetry Mapping & Velocity Profiling (continued)



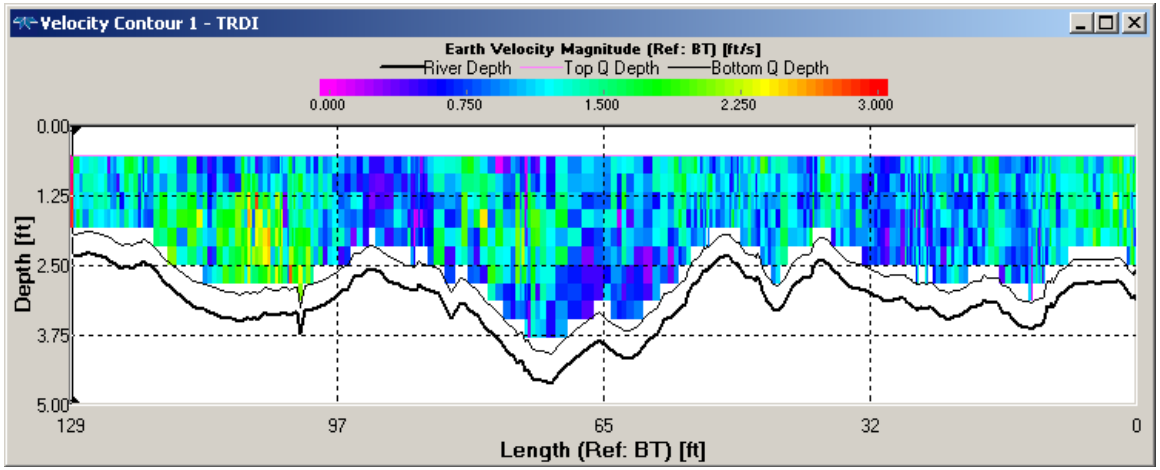
Left river transect collected November 2010. Flow rate 189.42 ft^3/s, velocity 1.77 ft/s, flow area 110.50 ft^2



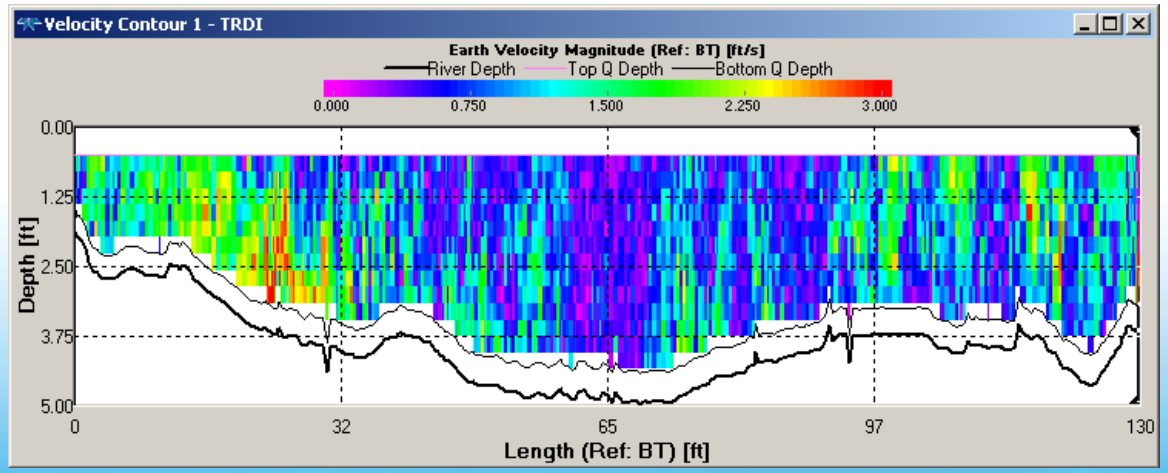
Right river transect collected November 2010. Flow rate 156.28 ft^3/s, velocity 0.83 ft/s, flow area 200.08 ft^2

River transect collected with an Acoustic Doppler Current Profiler at 1.5 m (5 ft) upstream of the Hills Ferry Barrier.

Bathymetry Mapping & Velocity Profiling (continued)



Full river transect collected October 2010. Flow rate 381.45 ft^3/s, velocity 0.97 ft/s, flow area 383.74 ft^2.



Full river transect collected November 2010. Flow rate 343.88 ft^3/s, velocity 0.65 ft/s, flow area 453.45 ft^2.

River transect collected with an Acoustic Doppler Current Profiler at 0.61 m (2 ft) downstream of the Hills Ferry Barrier.

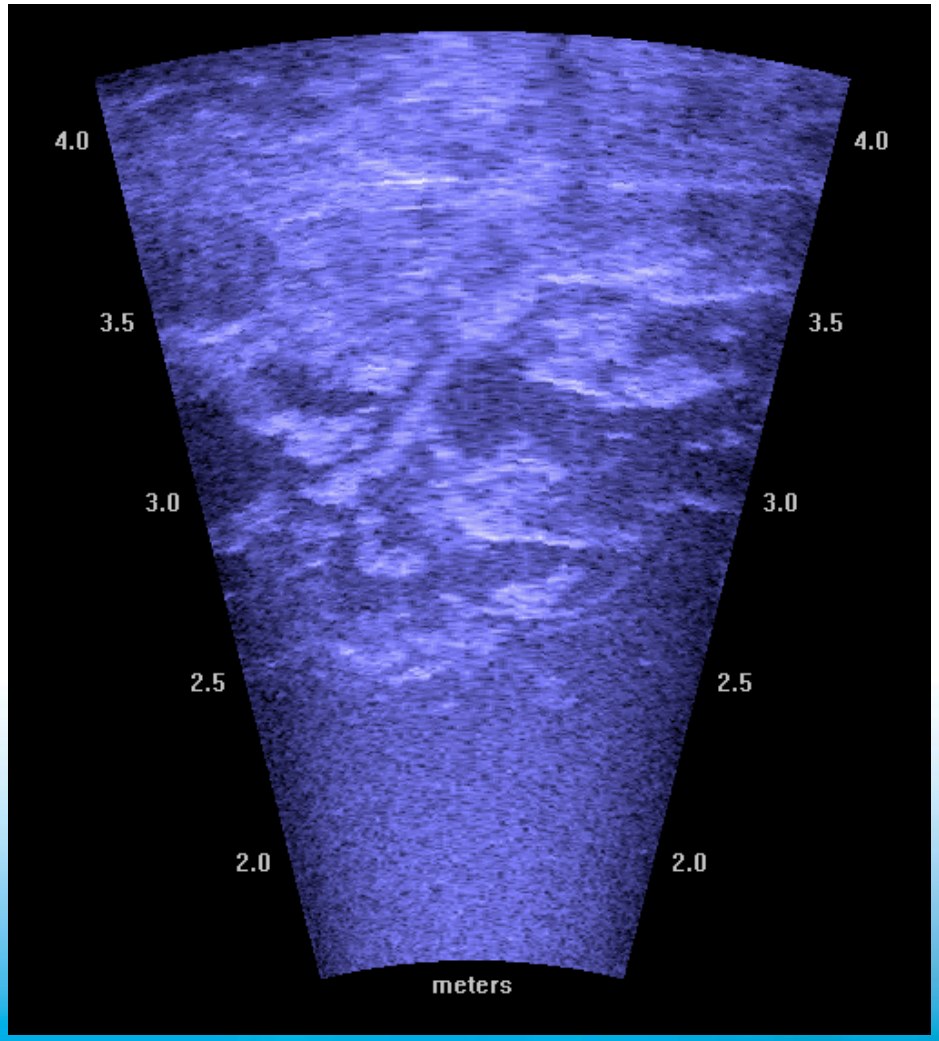
DIDSON Acoustic Camera

River-wide transects were recorded along the barrier to monitor scouring and passage issues along with fish behaviors using a DIDSON™ camera affixed to a transom mount of a jon boat and manually maneuvered across the channel directly adjacent the barrier.

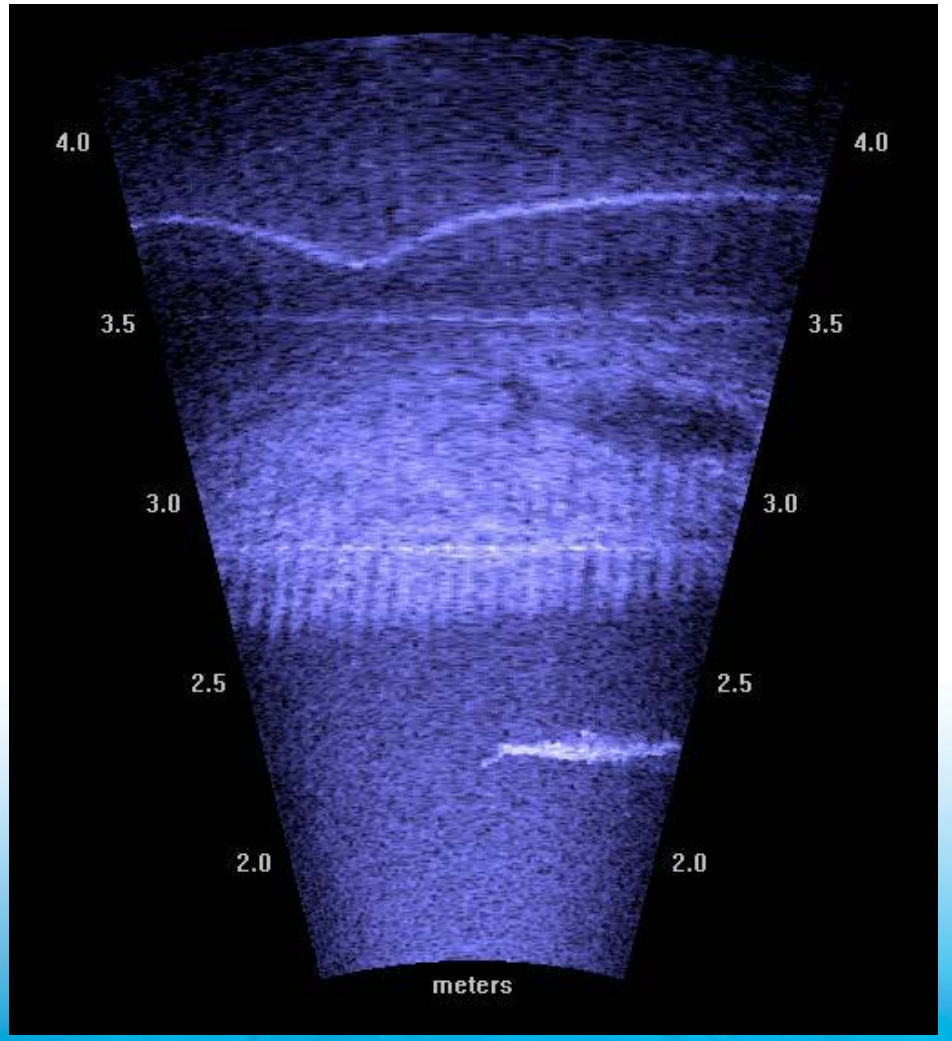
Preliminary draft, subject to revision

SAN JOAQUIN RIVER RESTORATION PROGRAM

DIDSON Observations (continued)



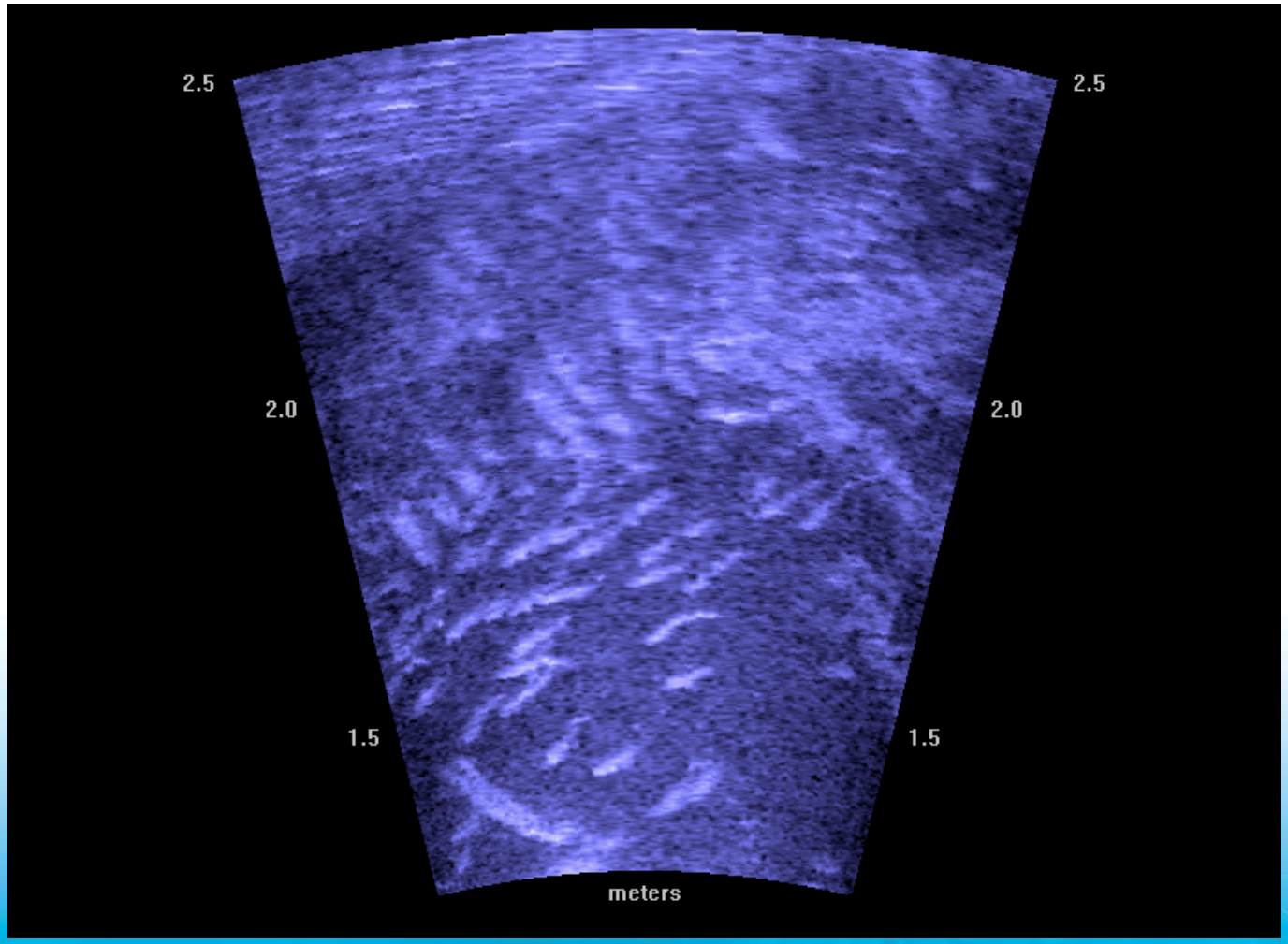
Chinook salmon swimming downstream of HFB



Carp swimming downstream of HFB searching for upstream passage.

Preliminary draft, subject to revision

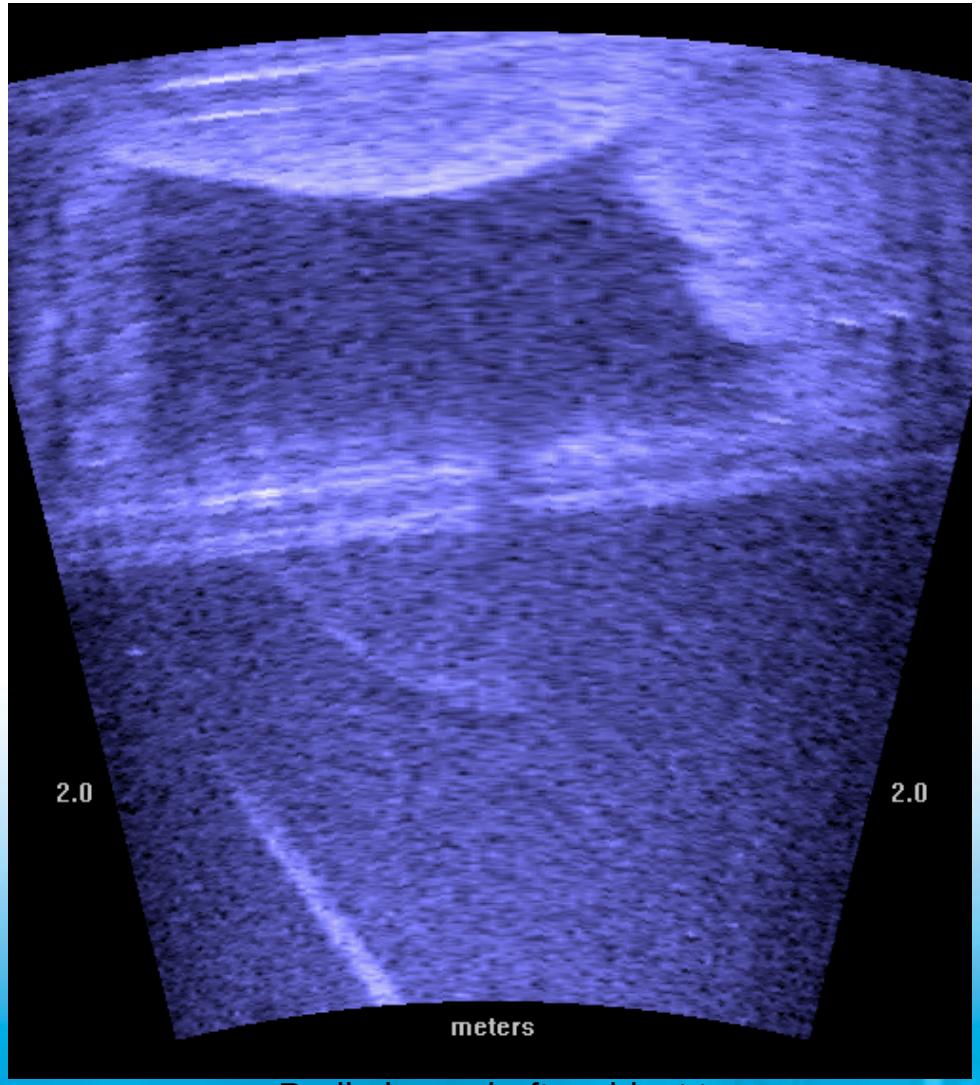
DIDSON Observations (continued)



Threadfin Shad and Carp Upstream of HFB in September

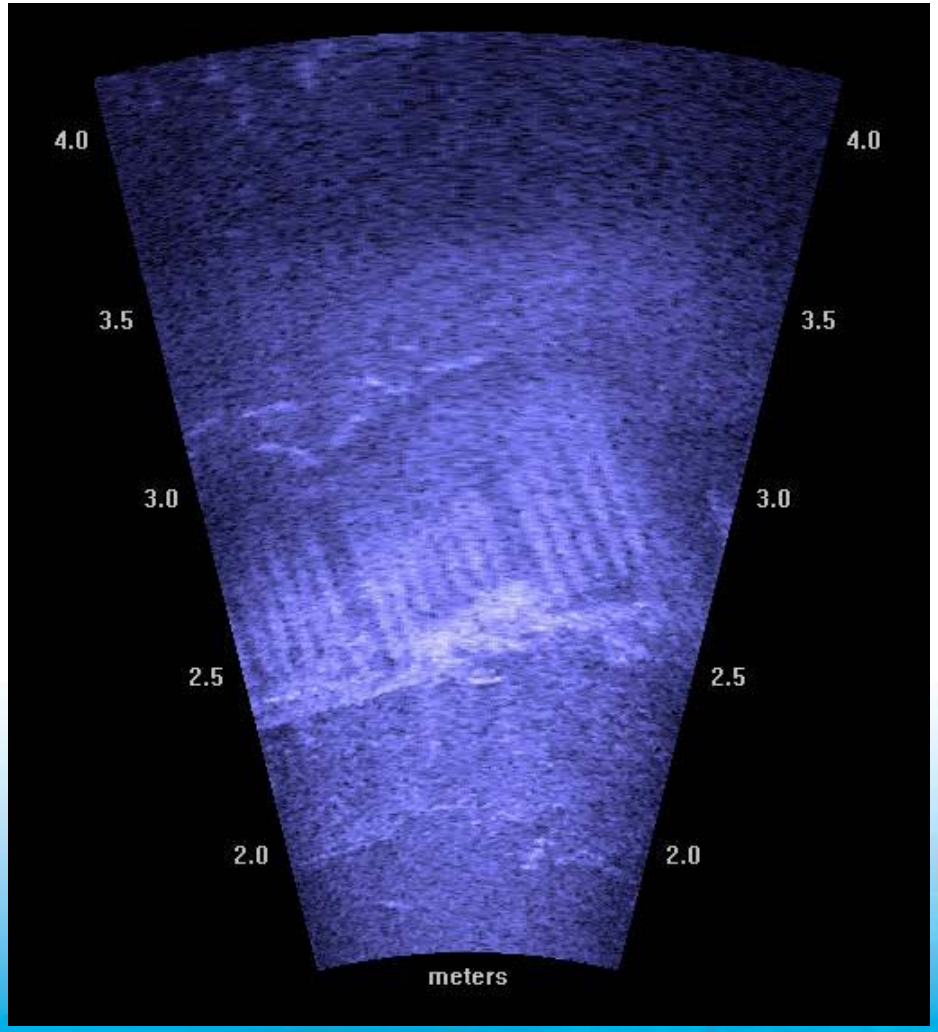
Preliminary draft, subject to revision

DIDSON Observations (continued)



Trap Opening Downstream of HFB

DIDSON Observations (continued)



DIDSON observation of gap in conduit

Preliminary results, subject to revision

SAN JOAQUIN RIVER RESTORATION PROGRAM

2010 Fish Trap Design

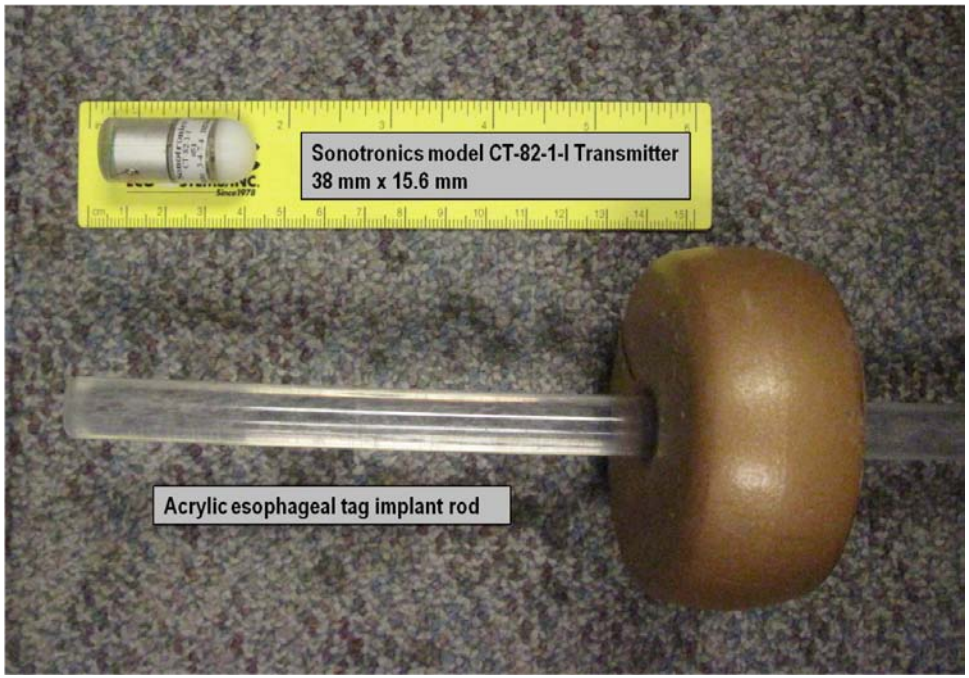
Preliminary draft, subject to revision

SAN JOAQUIN RIVER RESTORATION PROGRAM

Acoustic Telemetry

Preliminary draft, subject to revision

Acoustic Telemetry (continued)



Sonotronics acoustic transmitter and acrylic rod used for esophageal tag insertion

Esophageal insertion of acoustic transmitter

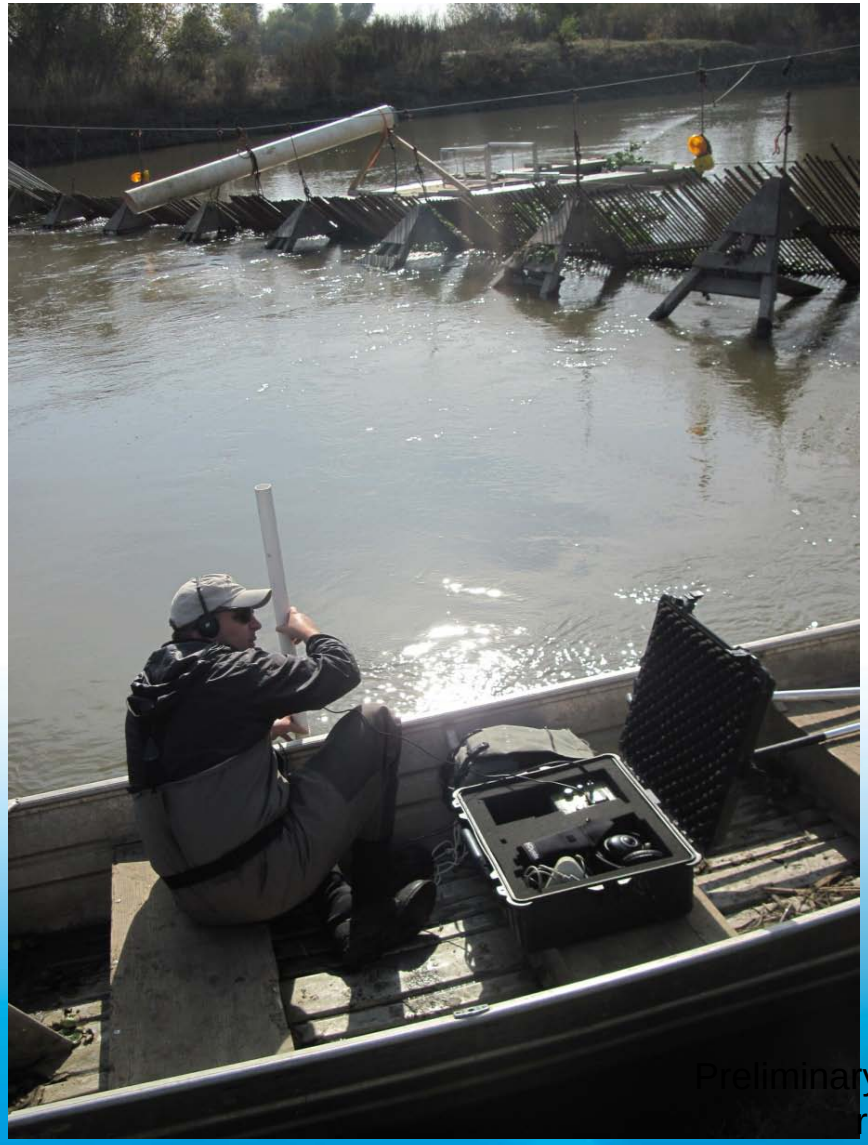
Acoustic Telemetry (continued)

Improving Fisheries Techniques

- ✓ Bovine pill inserter
- ✓ Compatible telemetry technology

Preliminary draft, subject to revision

Acoustic Telemetry (continued)



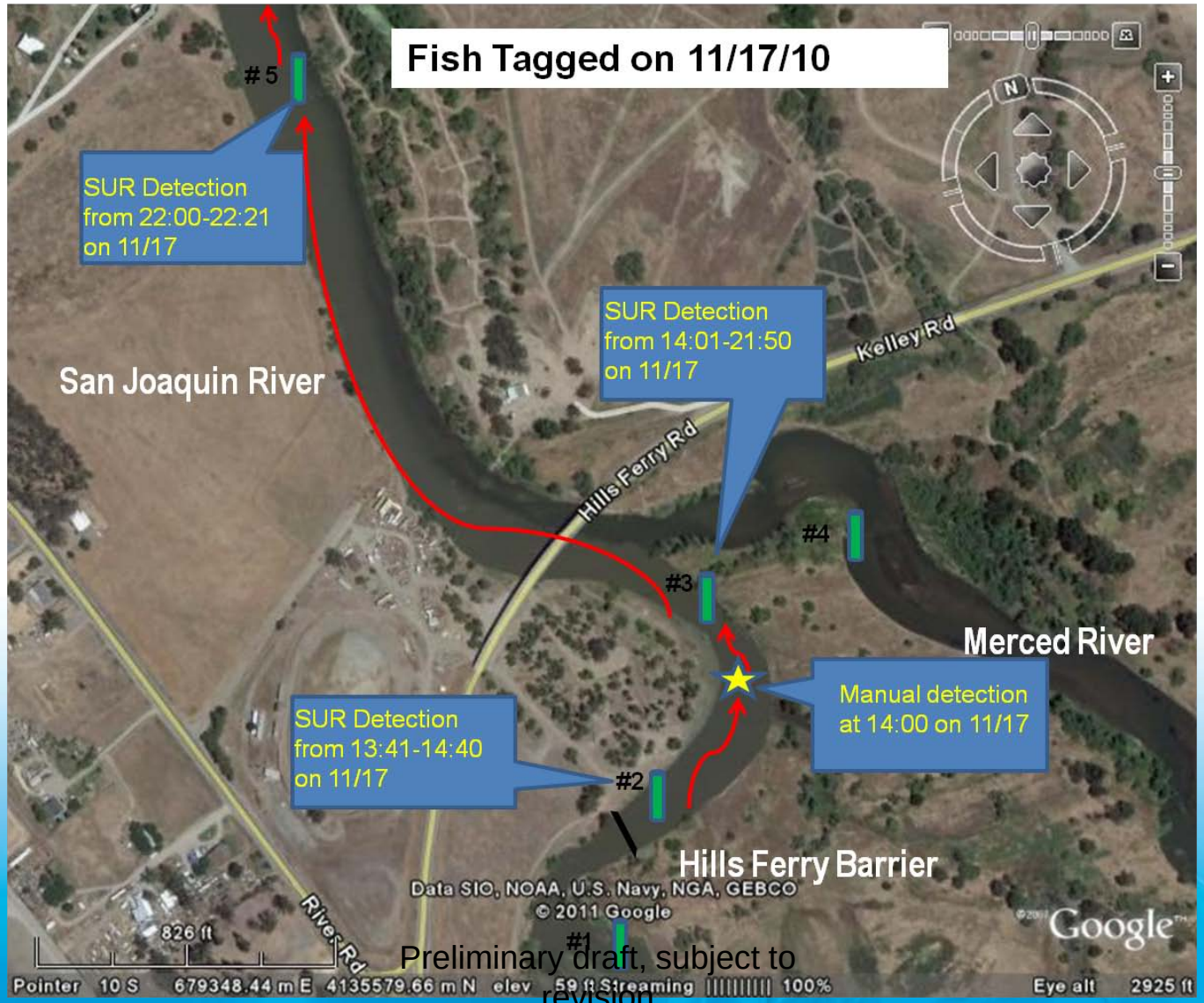
Manual tracking of an acoustically-tagged Chinook salmon using a Sonotronics USR-5W wide band receiver with DH-4 directional hydrophone.

Acoustic Telemetry (continued)

Stand-alone submersible ultrasonic receiver (Photo courtesy of Sonotronics Inc.)

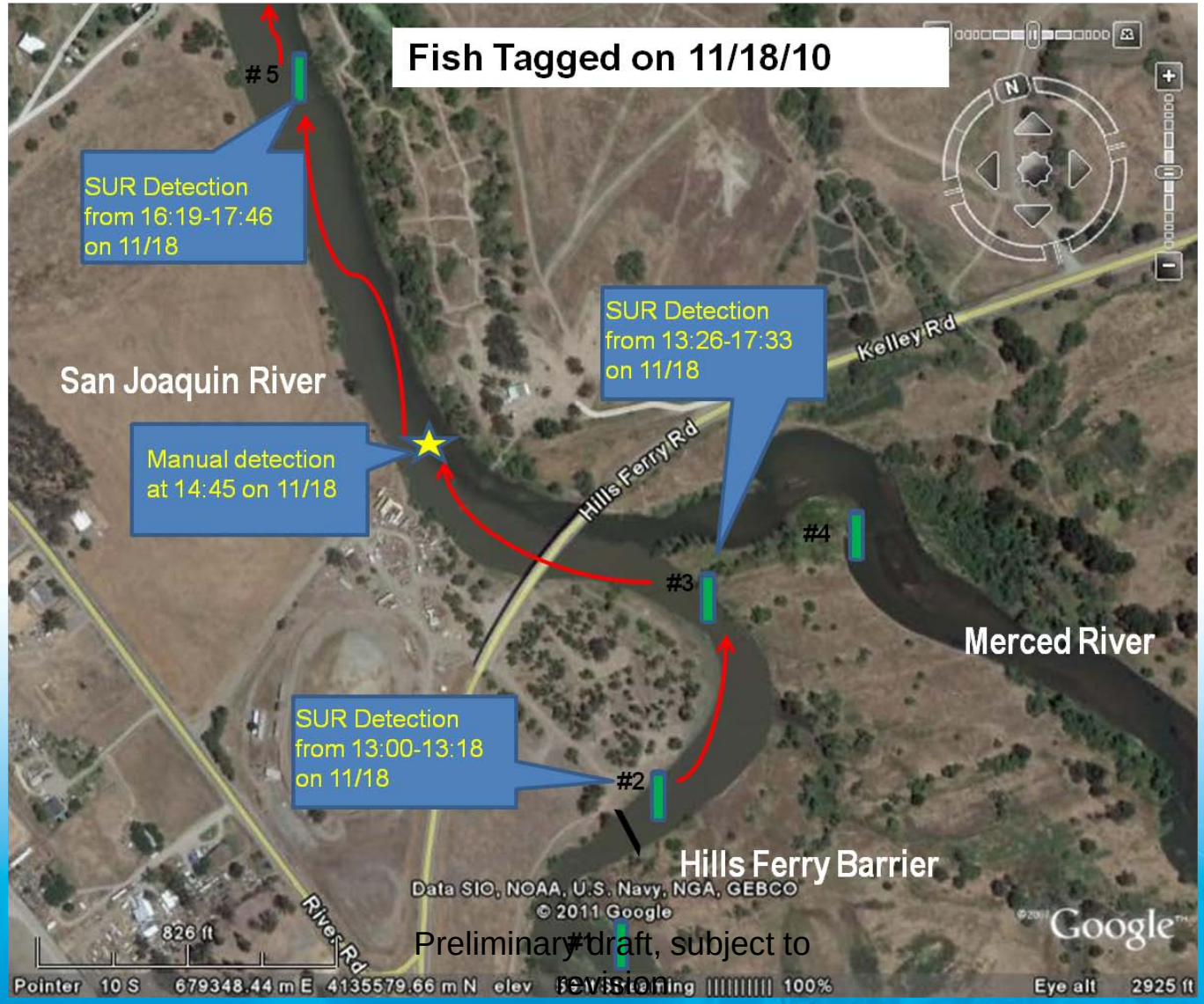
Locations of fixed SUR-1-2D submersible ultrasonic receivers (SUR).

Acoustic Telemetry (continued)



Preliminary draft, subject to revision

Acoustic Telemetry (continued)



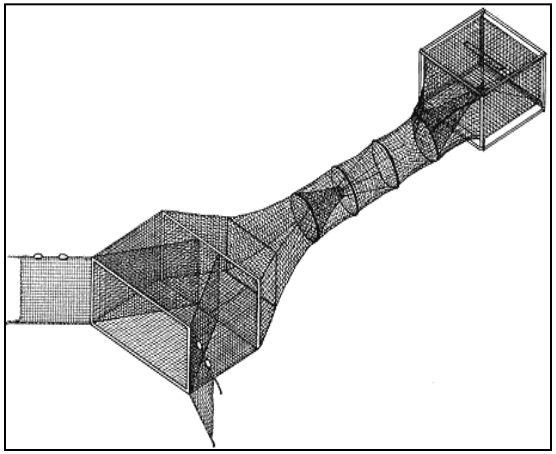
Preliminary draft, subject to revision

Changes for 2011: Fish Trap with Wing Walls

Preliminary draft, subject to revision

SAN JOAQUIN RIVER RESTORATION PROGRAM

Changes for 2011: Fish Trap Design



Preliminary draft, subject to revision

SAN JOAQUIN RIVER RESTORATION PROGRAM

Increased Fish Species Capture

Preliminary draft, subject to revision

SAN JOAQUIN RIVER RESTORATION PROGRAM

Changes for 2011: Barrier Passage

Preliminary draft, subject to revision

Changes for 2011: Barrier Location

2011 barrier location was moved downstream to the 2009 site

Preliminary draft, subject to revision

Upstream Passage Accounts

Chinook Salmon Detection at Sack Dam, Mendota Dam, and San Luis Canal System

- Twenty-two fish were observed upstream of the Hills Ferry Barrier and documented by DFG, DWR, and Reclamation staff in 2010.

Preliminary draft, subject to revision

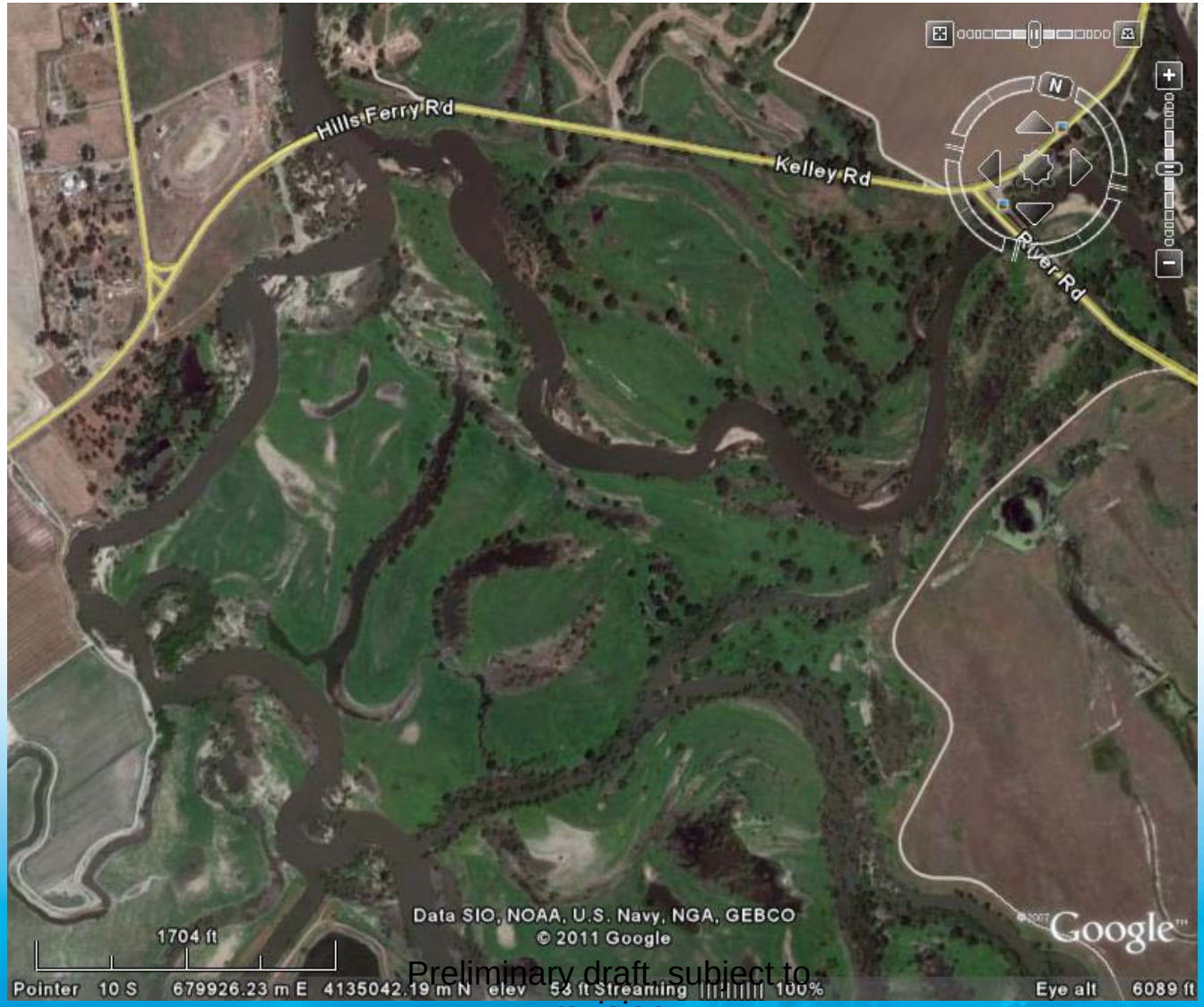
SAN JOAQUIN RIVER RESTORATION PROGRAM

November 2010 Flooding

Preliminary draft, subject to revision

SAN JOAQUIN RIVER RESTORATION PROGRAM

Connecting Slough Upstream of Barrier



Preliminary draft, subject to revision

SAN JOAQUIN RIVER RESTORATION PROGRAM

Connecting Slough Upstream of Barrier

Preliminary draft, subject to revision