San Joaquin Tributaries Authority

State Water Resources Control Board

Workshop 2: Bay-Delta Fisheries
October 1-2, 2012

Tim O'Laughlin and Doug Demko

Flow Criteria Report: Full protection of fish and wildlife beneficial uses requires 60 percent of unimpaired SJR flow

Is the solution properly identified and quantifiable?

“X”% of unimpaired flow

=

“Y” benefit to fish and wildlife resources

Do we have an appropriate and achievable goal?

“Improve natural production of Chinook”

Are specific goals more appropriate?

- Increase juvenile survival in tributaries
- Increase juvenile survival in Delta
- Increase ocean abundance
- Increase freshwater returns
- Increase natural/wild fish abundance

What are some alternatives to help us meet specific goals?

- Increase Spring Flows
- Install HORB
- Suppress Predators
- Improve Habitat
- Mark/Harvest/Exclude Hatchery Fish
- Reduce Ocean Harvest

Increase Spring Pulse Flows

- 10,000+ cfs
- 30% unimpaired
- Dry-year relief
- Volume concept

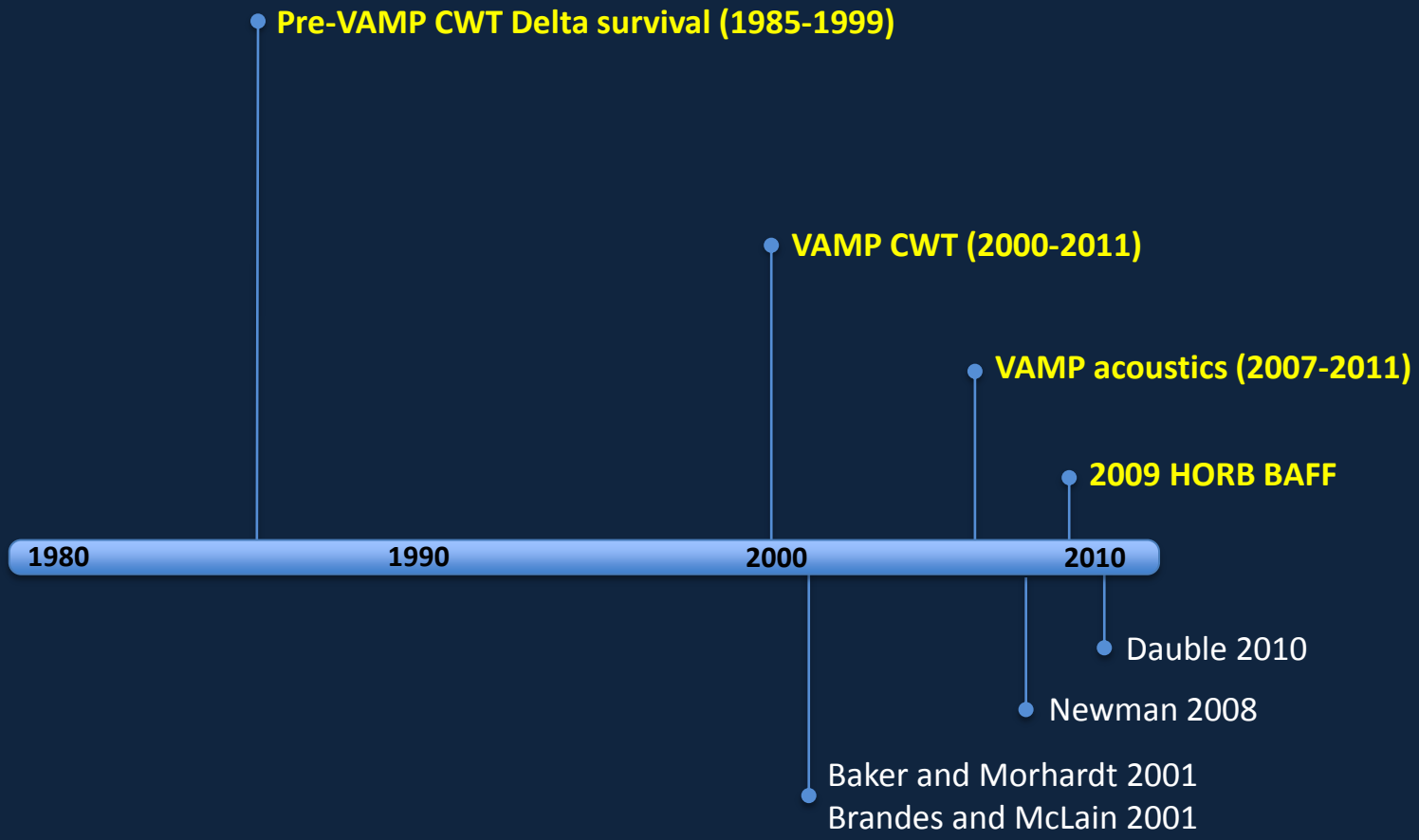
Goal

Increase salmon smolt survival through tributaries and Delta

Scientific Certainty

- **No evidence increases within managed flow range would increase salmon smolt survival in tribs/Delta**

25 Years of Flow and Survival Studies



Baker and Morhardt 2001

Summary of understanding relationship between river flow, exports and Chinook smolt survival through Delta

- **Relationship between flow and survival not well quantified within managed flow range**
- **No relationship between survival and export rate**
- **Choice of emigration route has dramatic effects on smolt survival, twice as high through the SJR compared to the Old River**
- **Serious knowledge gaps exists on need of smolts as they pass through the region**

Baker P. F. and J. E. Morhardt. 2001. Survival of Chinook Salmon Smolts in the Sacramento-San Joaquin Delta and Pacific Ocean. In: Brown RL, editor. Fish Bulletin 179: Contributions to the biology of Central Valley salmonids.

Newman 2008

Re-analysis of VAMP data using more sophisticated Bayesian hierarchical models

- **Conclusions were consistent with those from previous analyses**
- **Installation of the HORB can increase salmon survival**
- **Little evidence for an association between exports and survival**

Newman, K. B. 2008. An evaluation of four Sacramento-San Joaquin River Delta juvenile salmon survival studies. Project Report for Cal-Fed Science Program Project number SCI-06-G06-299. March 31, 2008.

Dauble et al. 2010

Independent panel reviewed VAMP studies to determine whether results provide evidence for a relationship between flows, exports and HORB operation, and salmon survival

- **Simply meeting certain flow objectives at Vernalis is unlikely to achieve consistent rates of smolt survival through the Delta**
- **Delta hydraulics and high and likely highly variable impacts of predation appear to affect survival rates more than the river flow**
- **Desirable to reduce or eliminate downstream passage through Old River**

Dauble, D., Hankin, D., Pizzimenti J.J., and Smith P. 2010. The Vernalis Adaptive Management Program (Vamp): Report of The 2010 Review Panel.

Use the Best Available Science

- DFG's 2005 San Joaquin River Fall-run Chinook Salmon Population Model has been found to be flawed through both peer and professional reviews
- Other heavily relied on references have not been peer-reviewed and their analyses are the same/similar to those used in DFG's SJRFRCS Model
- Bay Delta Conservation Program and OCAP-BO are not using these analyses

Scientific Certainty

- High, unmanaged spring flood flows may increase salmon smolt survival through the Delta
- Without the HORB in place, no significant relationship exists between spring flows in the managed range and smolt survival through the Delta

10,000 cfs for 14 Days

- Will not create floodplain habitat in tributaries
- Will create some floodplain habitat in lower SJR
  - Benefits from 1,500 acres floodplain habitat?
  - Appears to be above the managed flow and therefore may be better chance of salmon smolt survival. Quantification unknown.
- Can't install and operate HORB
- May lower water temps on tributaries but won't lower water temps on SJR or Delta
- May increase turbidity
- Significant impacts to
  - Water diversions
  - Reservoir storage

10,000 cfs for 14 Days - Conclusion

- Create limited floodplain habitat
  - What are the benefits?
- Increase in salmon smolt survival?

30% Unimpaired Flow

- More water wet / above normal years
- Less water in below normal / dry years
- Low or no flow variability
  - caps / % / 7, 15 day average

- No Floodplain habitat on tributaries, SJR, South Delta
- Puts water down in June/February when benefit questionable
- No functionality
  - Water temp / D.O. / turbidity / geomorphology

- % unimpaired in highly altered system provides little or no benefits

Volume Concept

- Dedicated volume of water based on reservoir storage and projected runoff
- In dry, below normal, critical years use water earlier (3/15-5/1), 1-3 pulse flows
- In above normal and wet years elongate the time period (3/15-5/15), 3-5 pulses
- Hybrid with dry year relief
  - Different indices
  - Coordinate tributaries
- More flow variation in tribs and SJR
- May diminish impacts to diversions

Dry-year Relief

- NRC says dry years are of concern
- So do we try to do more in dry years and realize wet years will happen
- Concept is to make additional water in below normal, dry, critical years
- Put water into April/May pulse flows
- Draws reservoirs down 1 to 2 years, but when hydrology returns the water is taken out of flood flows
- Provides more water with minimal impacts to diversions/hydropower
- Bad news, 3-5 years of drought less water in storage so shortages more severe

Alternative Summary: Increase Spring Flows

Action:	**Increase Spring Flows**
Goal/Objective:	**Increase salmon smolt survival in tribs/Delta**
Scientific Certainty:	**Lowest of all alternatives**
Feasibility:	**Low, given the significant costs and time to implement**
Result:	**No evidence more managed flow would increase salmon smolt survival in tribs/Delta**

Alternative Action: Install HORB

Goal

Increase salmon smolt survival through the Delta

HORB Doubles Salmon Smolt Survival

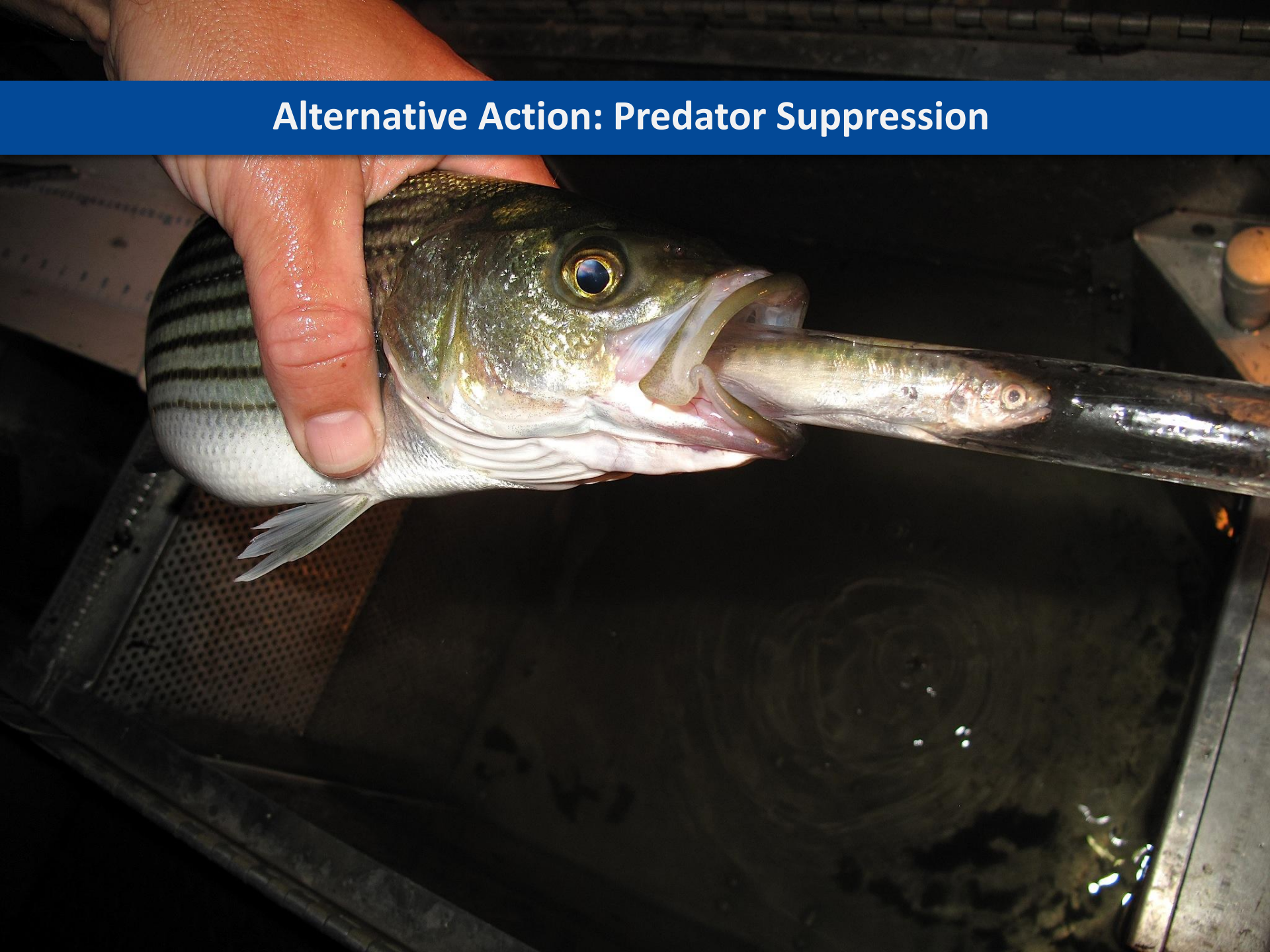
"While the gains in survival of 9-12 percent expected at flows that allow installation of a rock barrier might seem small, it is important to note that a combined increase in survival of 9% represents a doubling of the survival chances of an individual in the mainstem San Joaquin River route relative to the survival expected for an individual in the Old River route."

National Marine Fisheries Service. 2012. Summary of the Expected Benefits to Salmonid Survival of a Rock Barrier at the Head of Old River & Preferential Use of the Central Valley Project Export Facility. National Marine Fisheries Service, Southwest Region.

Alternative Summary: Install HORB

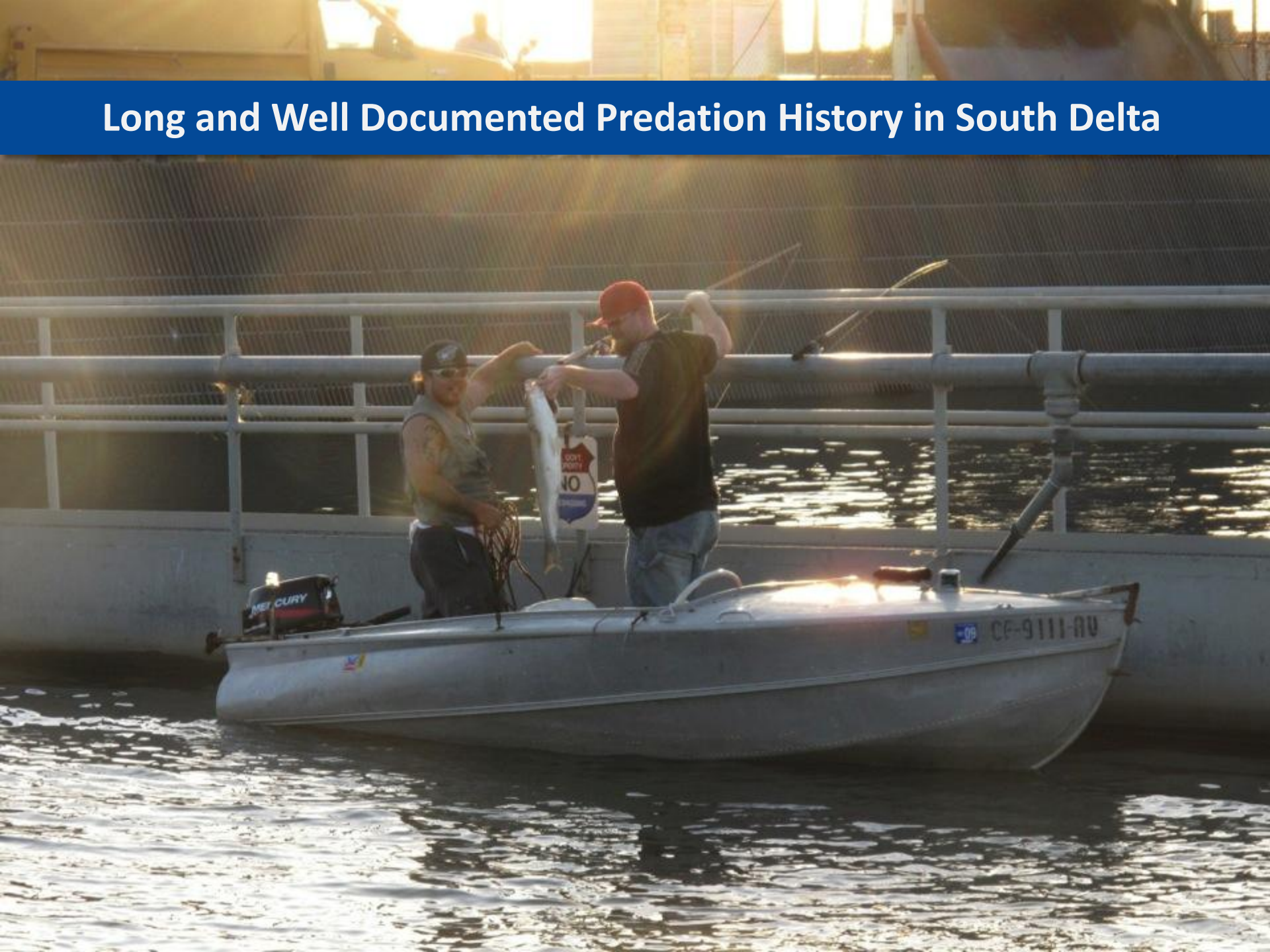
Action:	**Install physical HORB**
Goal/Objective:	**Increase salmon smolt survival through Delta**
Scientific Certainty:	**High**
Feasibility:	**High; annual costs to install until operable HORB; can be done in managed flow range (<7,000 cfs)**
Result:	**Increase in survival**

Alternative Action: Predator Suppression



Goal: Increase Salmon Smolt Survival Through Tribs and Delta

Long and Well Documented Predation History in South Delta



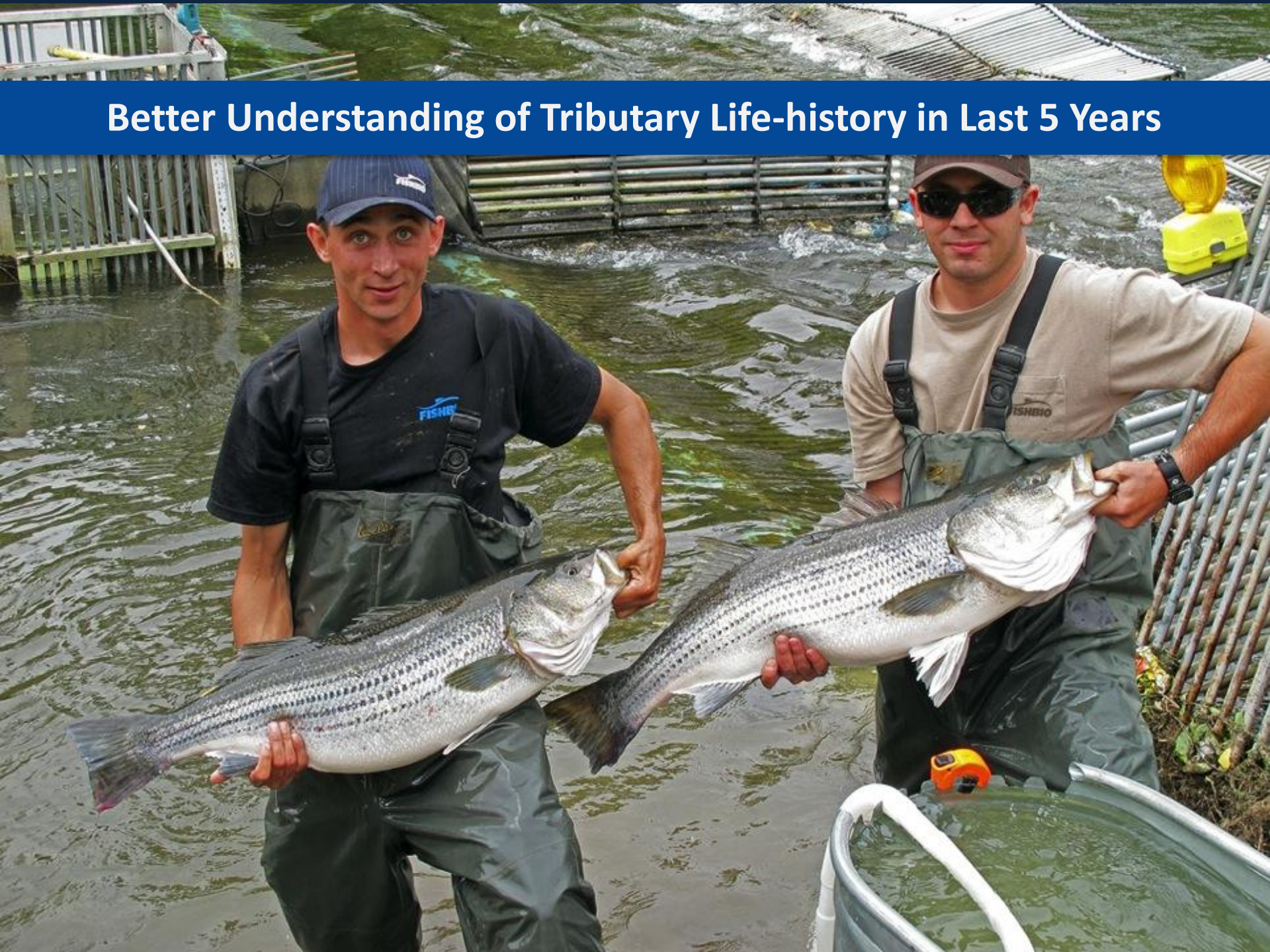
NMFS Recovery Plan Conclusions

- **Restoring the ecosystem for anadromous salmonids will require, among other actions, "*significantly reducing the nonnative predatory fishes that inhabit the lower river reaches and Delta*"**

- **Reducing abundance of striped bass and other non-native predators must be achieved to "*prevent extinction or to prevent the species from declining irreversibly*"**

National Marine Fisheries Service. 2009. Public Draft Recovery Plan for the Evolutionary Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring-run Chinook Salmon and the Distinct Population Segment of Central Valley Steelhead. Sacramento Protected Resources Division, October 2009.

Better Understanding of Tributary Life-history in Last 5 Years



In 2011 CDFG Agreed That Predation is a Problem

"By virtue of their abundance, habits, and size, predation by striped bass has been implicated as a substantial contributor to the poor survival of young salmon used in experiments to estimate reach- and site-specific survival rates through the Delta and in the Sacramento River."

California Department of Fish and Game December 2011. Report and Recommendation to the Fish and Game Commission in Support of a Proposal to Revise Sportfishing Regulations for Striped Bass.

Predator Suppression Success in Columbia Basin

"The program has been ongoing for roughly 20 years, has resulted in the removal of three million pikeminnow, and has reduced by nearly 40% the apparent predation on salmon by pikeminnow (Porter 2010). There is no sign that surviving northern pikeminnow compensated (e.g., by growing faster) for removals (Knutsen and Ward 1999) or that other species have expanded such that the salmon have not benefited by the program."

California Department of Fish and Game December 2011. Report and Recommendation to the Fish and Game Commission in Support of a Proposal to Revise Sportfishing Regulations for Striped Bass.

Everyone Agrees That Predator Suppression Works

"Sport anglers removed approximately 155,000 pikeminnow from the Columbia last year. The sport reward program has reduced pikeminnow predation on juvenile salmon by roughly 40 percent since 1990. The Action Agencies continue to focus on controlling predation by native and non-native species."

USBR, U.S. Army Corps of Engineers & Bonneville Power Administration. 2012. (Joint Press Release) New report charts progress to protect salmon and steelhead Spawning fish find more habitat, while tests show most fish getting past dams safely. Sept 28, 2012.

Immediate. No Cost. Significant Benefit.

- Raise daily bag limit from 2 to 6 fish
- Raise possession limit from 2 to 12 fish
- Lower the minimum size from 18 to 12 inches
- Establish “hot spot” fishing areas
  - Daily bag limit 20 fish, possession limit 40 fish, no size limit

Scientific Certainty

- **Predation by non-native species (especially striped bass) is a major impediment to salmon smolt survival through the lower San Joaquin River and Delta more than river flow**
- **Evidence from other basins indicates that predation can be easily and cost-effectively reduced**
- **“High and likely highly variable impacts of predation, appear to affect survival rates more than the river flow”**

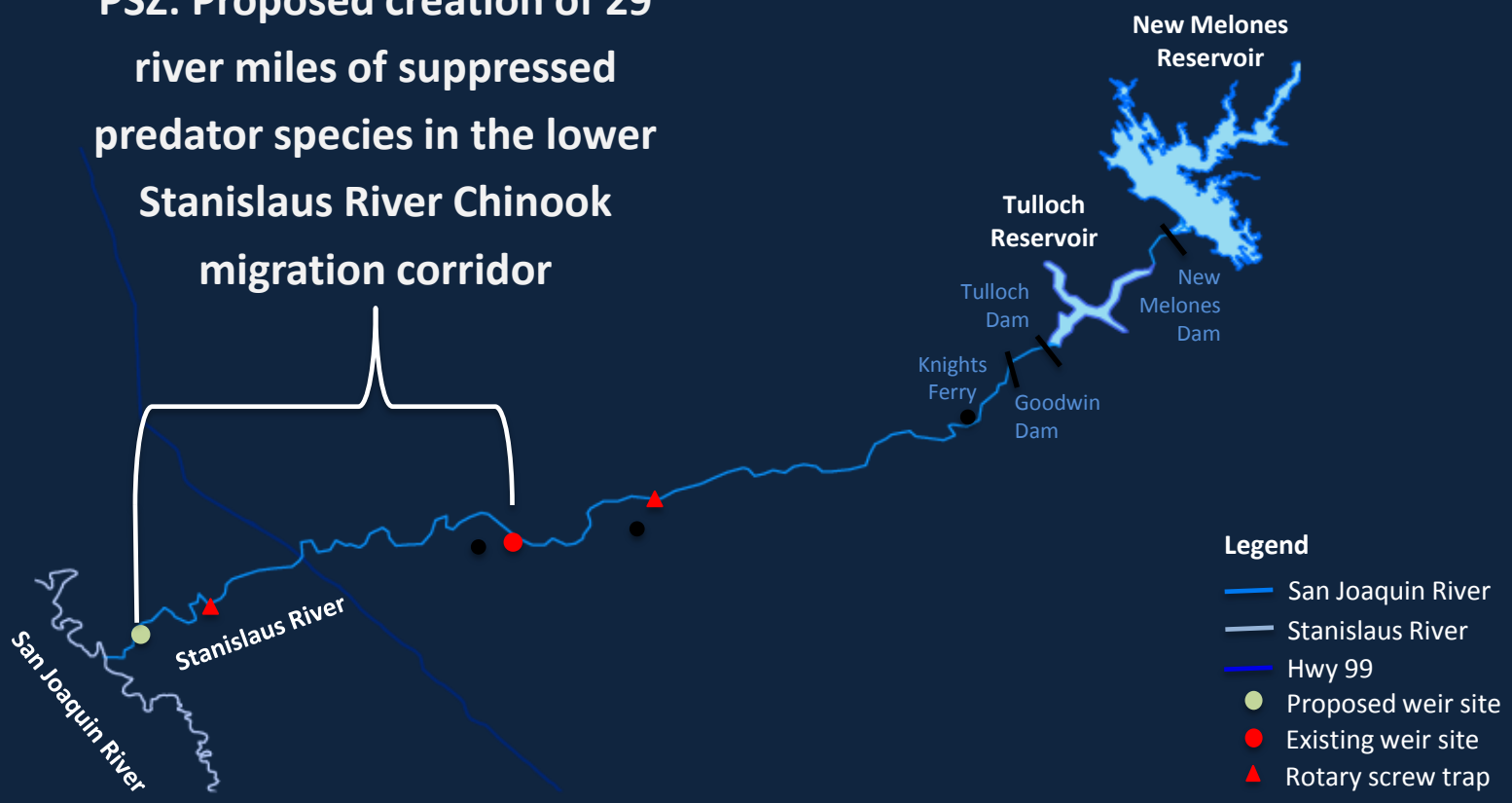
Dauble, D., Hankin, D., Pizzimenti J.J., and Smith P. 2010. The Vernalis Adaptive Management Program (Vamp): Report of The 2010 Review Panel.

Potential Predator Suppression Methods

- Angler harvest
- Hot spot removal
- Exclusion weirs

Predator Suppression Zone

PSZ: Proposed creation of 29 river miles of suppressed predator species in the lower Stanislaus River Chinook migration corridor



Alternative Summary: Predator Suppression

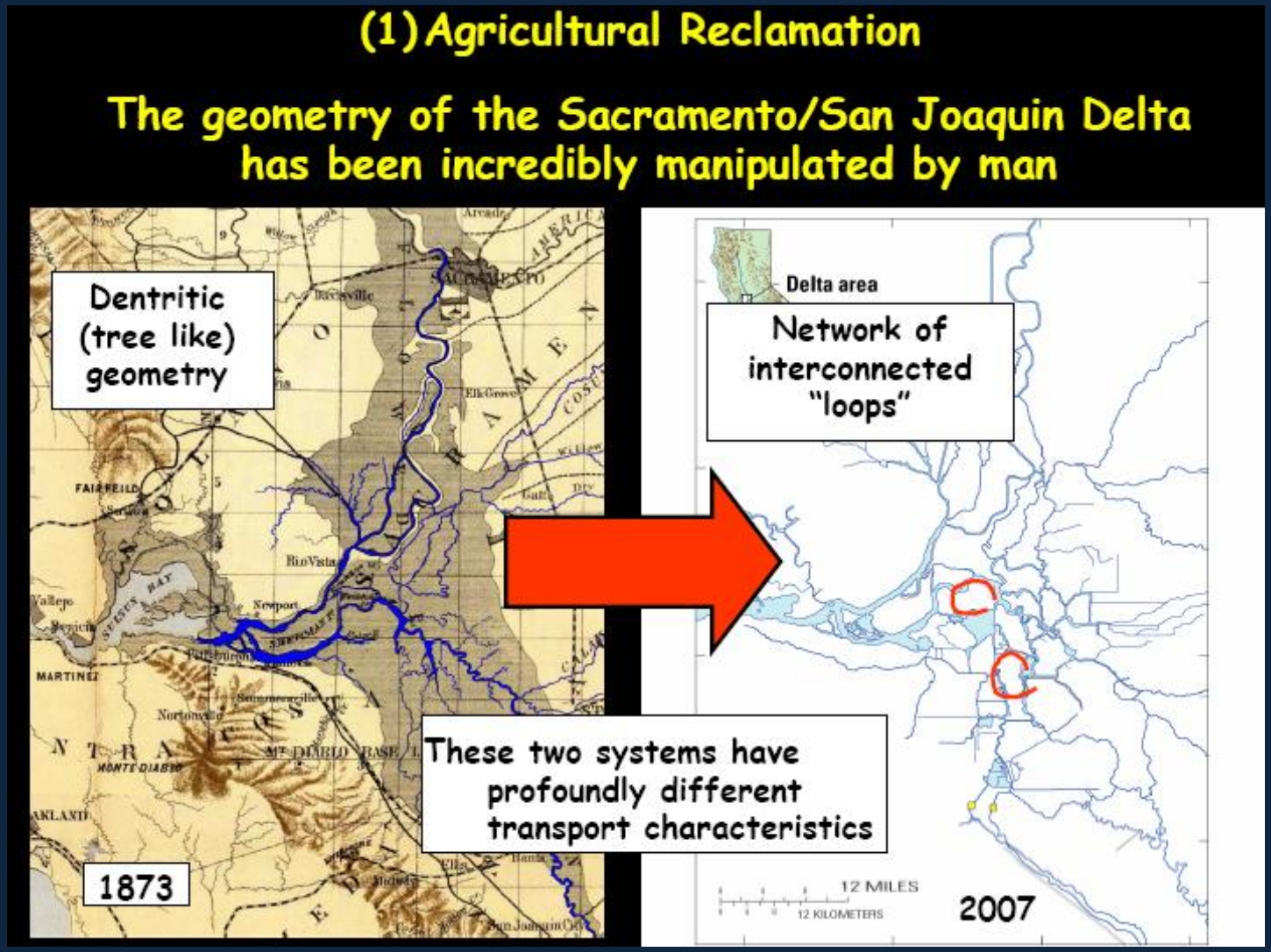
Action:	**Reduce abundance of predators (Angler harvest / hot spot removal / exclusion)**
Goal/Objective:	**Increase smolt survival in tributaries and Delta**
Scientific Certainty:	**High**
Feasibility:	**High, can be done immediately at little to no cost**
Result:	**Higher salmon smolt survival through tribs and Delta**

Alternative Action: Habitat Restoration (Delta)

Goal

Increase salmon smolt survival through the Delta

Delta Habitat Problem is Extensive



Burau, J. 2007. Presentation: Variable Delta - A Hydrodynamic Perspective, USGS.

Flow Has No Impact on Delta Habitat Anymore

Over 95% of the Delta is leveed and removed from floodwater inundation

Simenstad, C. and S. Bollens. 2003. Into the BREACH: Tidal Marsh Restoration in the San Francisco Estuary. Estuarine Research Federation Newsletter. Winter 2002/2003.

Scientific Certainty

- Physical habitat has been substantially reduced by non-flow measures (e.g., land reclamation activities, levees)
- Shallow water rearing habitat has virtually been eliminated from the Delta
- Restoring Delta shallow water habitat cannot be accomplished through flow management

Alternative: Habitat Restoration (Delta)

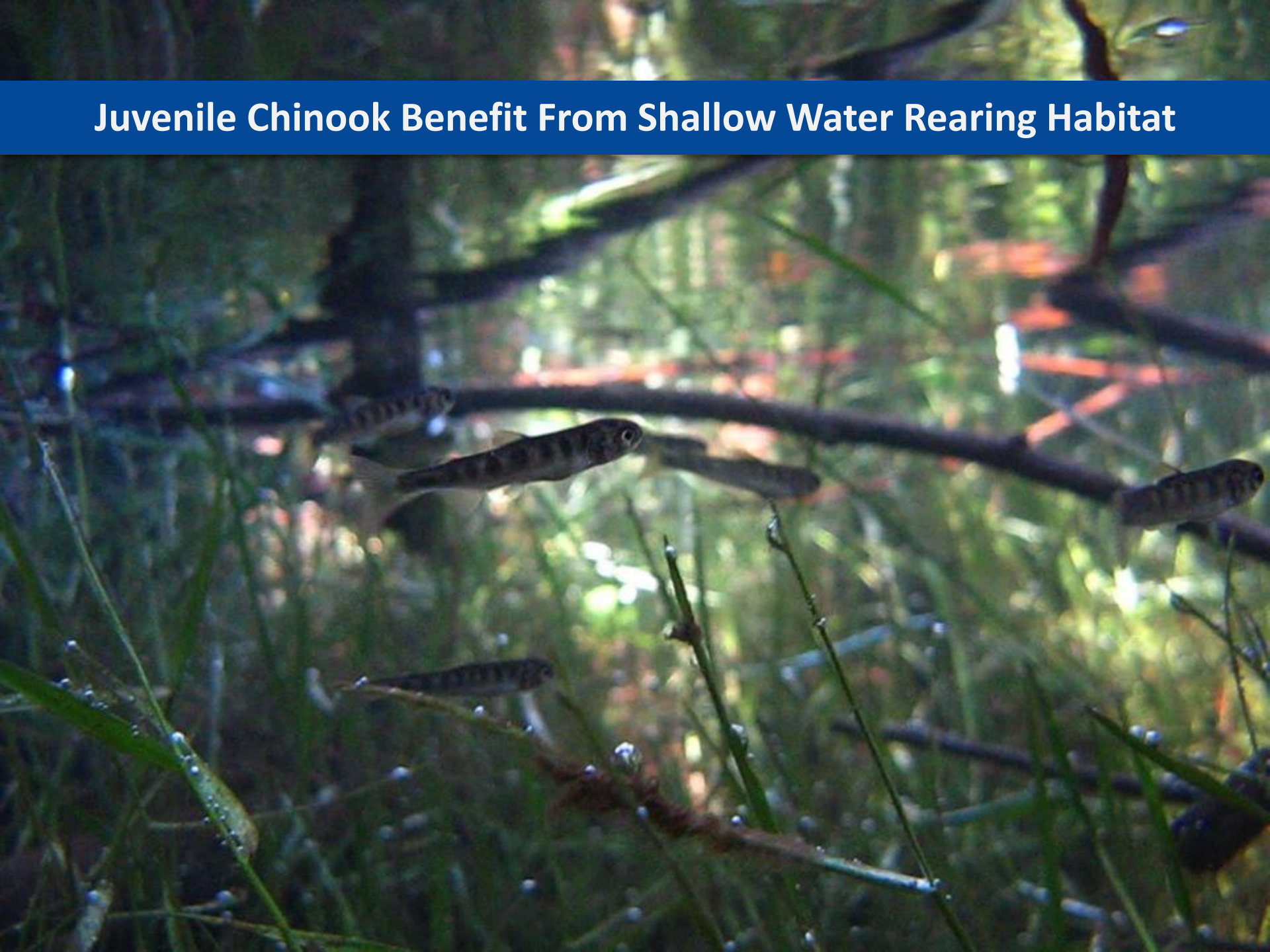
Action:	**Restore shallow water Delta habitat**
Goal/Objective:	**Increase salmon smolt survival in Delta**
Scientific Certainty:	**Medium**
Feasibility:	**Long-term and very costly**
Result:	**Uncertain w/o dealing with other stressors**

Alternative: Habitat Restoration (SJR Floodplain)

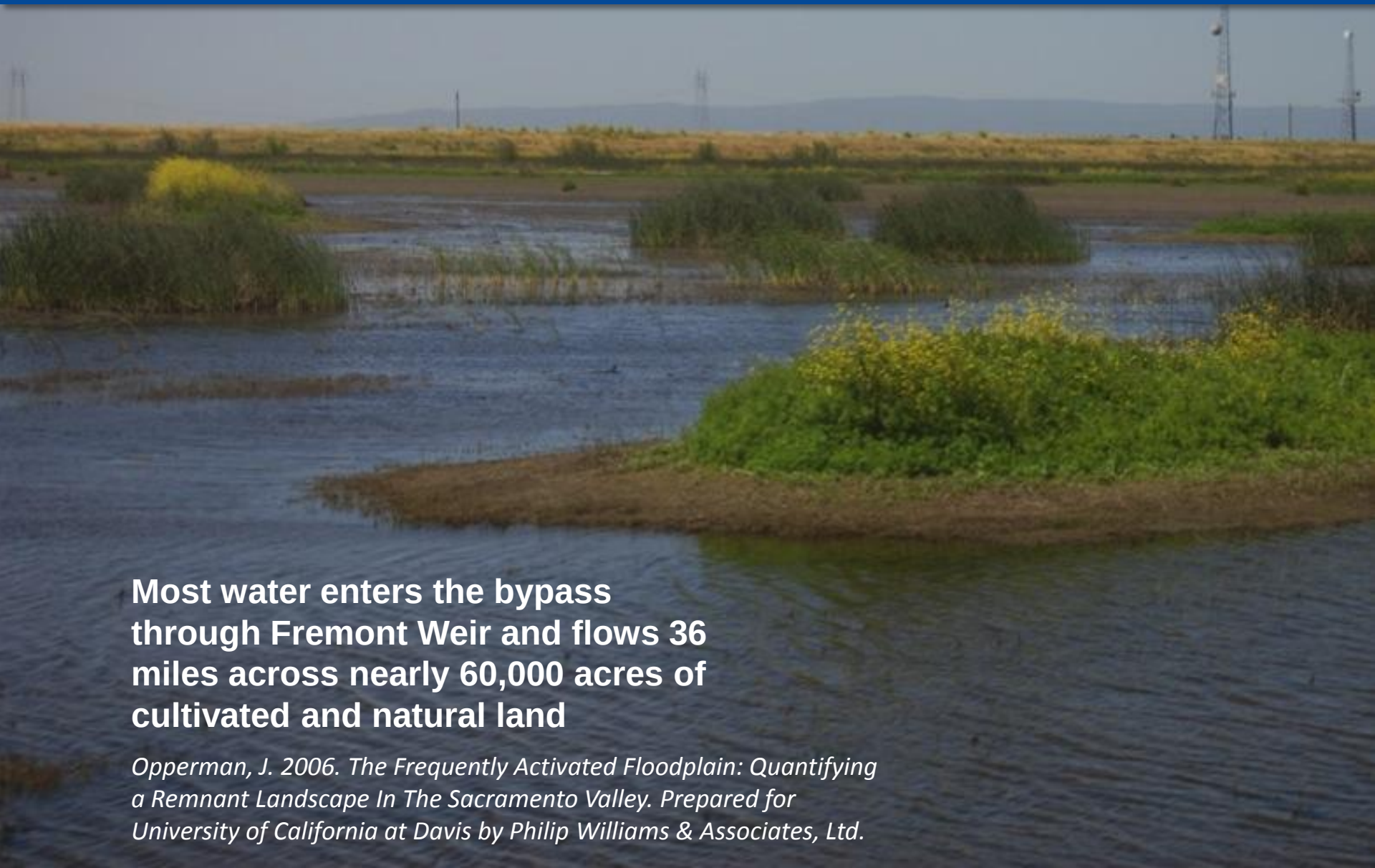
Goal

Increase salmon smolt survival through SJR

Juvenile Chinook Benefit From Shallow Water Rearing Habitat



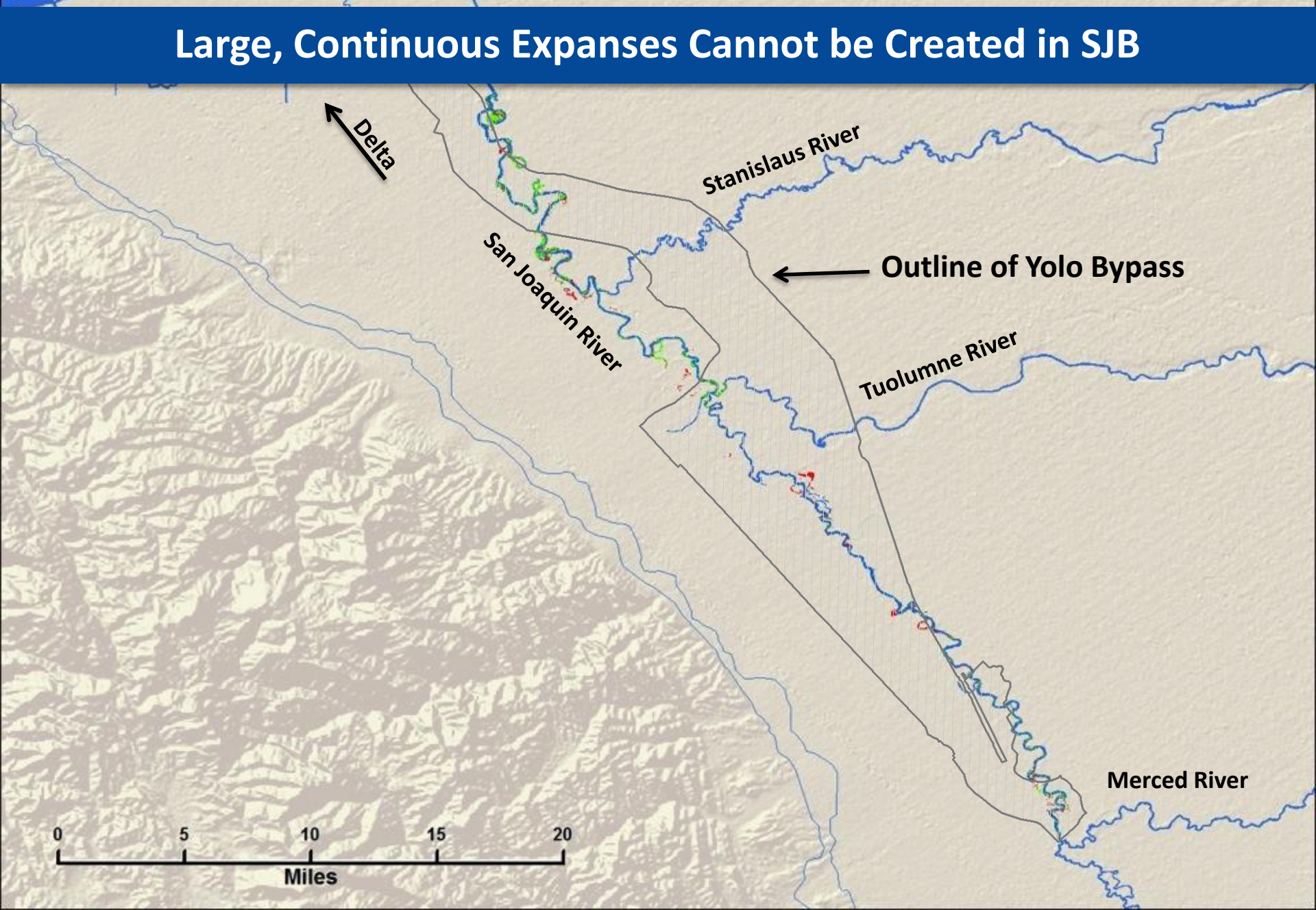
Yolo Bypass



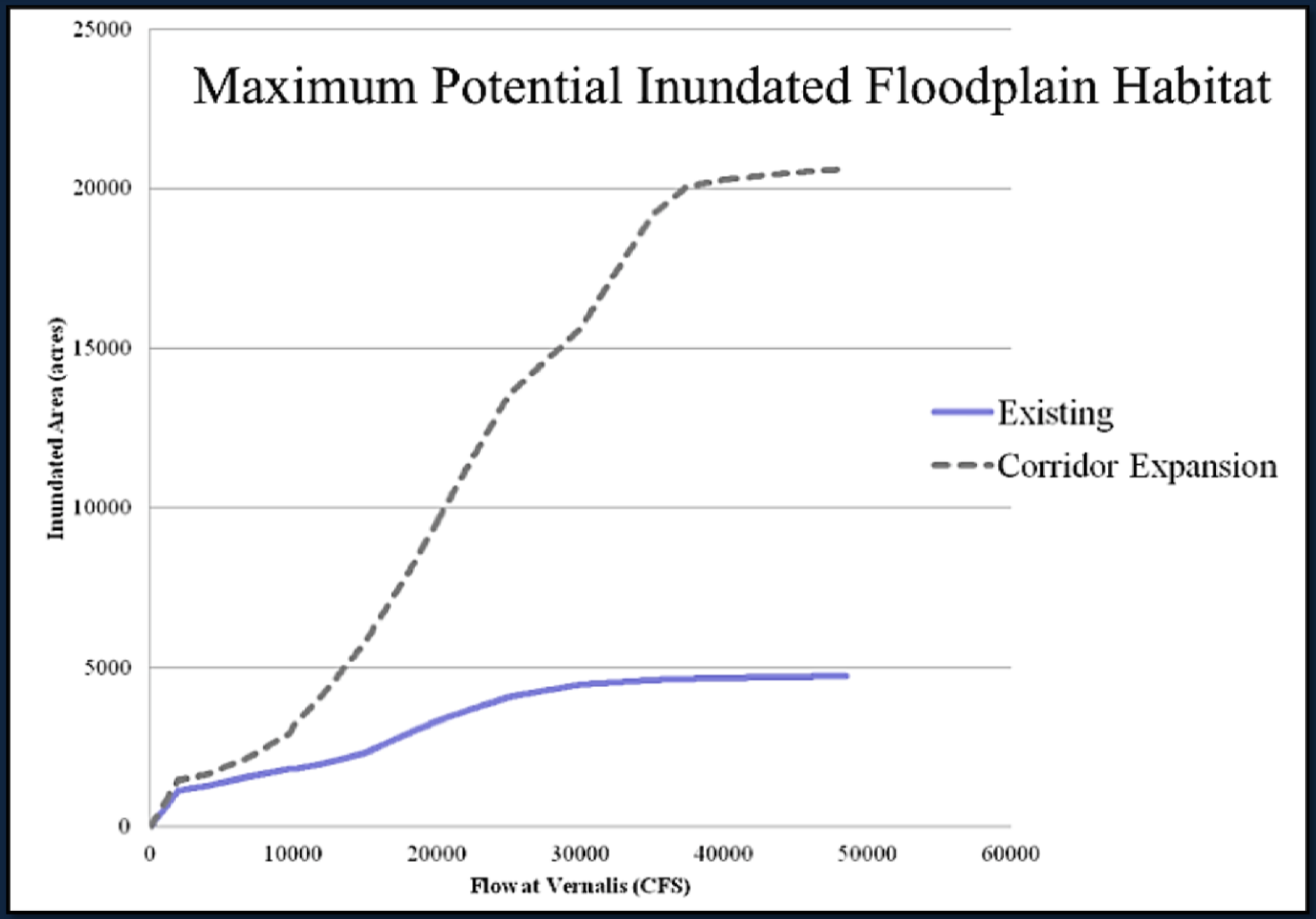
Most water enters the bypass through Fremont Weir and flows 36 miles across nearly 60,000 acres of cultivated and natural land

Opperman, J. 2006. The Frequently Activated Floodplain: Quantifying a Remnant Landscape In The Sacramento Valley. Prepared for University of California at Davis by Philip Williams & Associates, Ltd.

Large, Continuous Expanses Cannot be Created in SJB

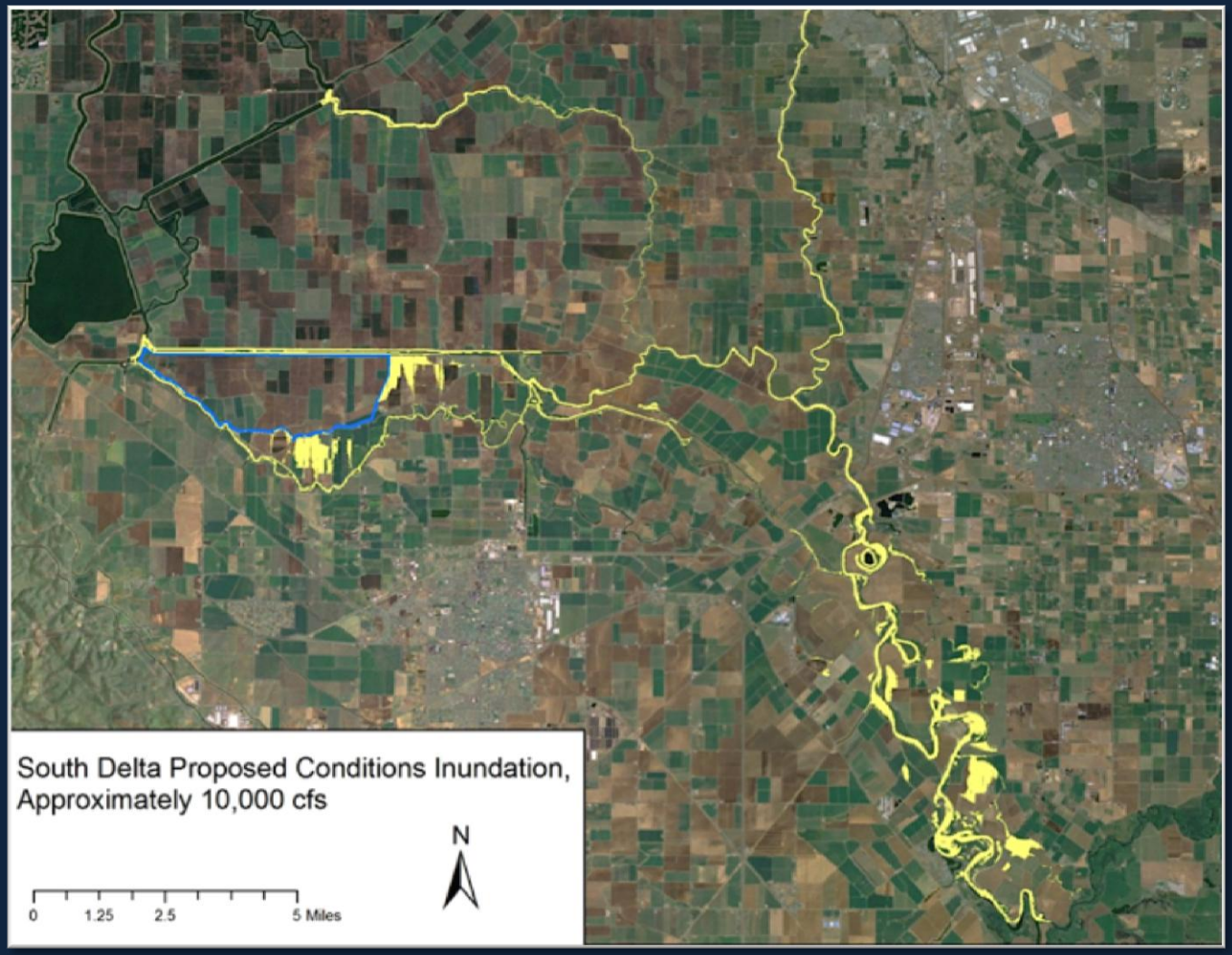


Potential for SJR Floodplain Habitat

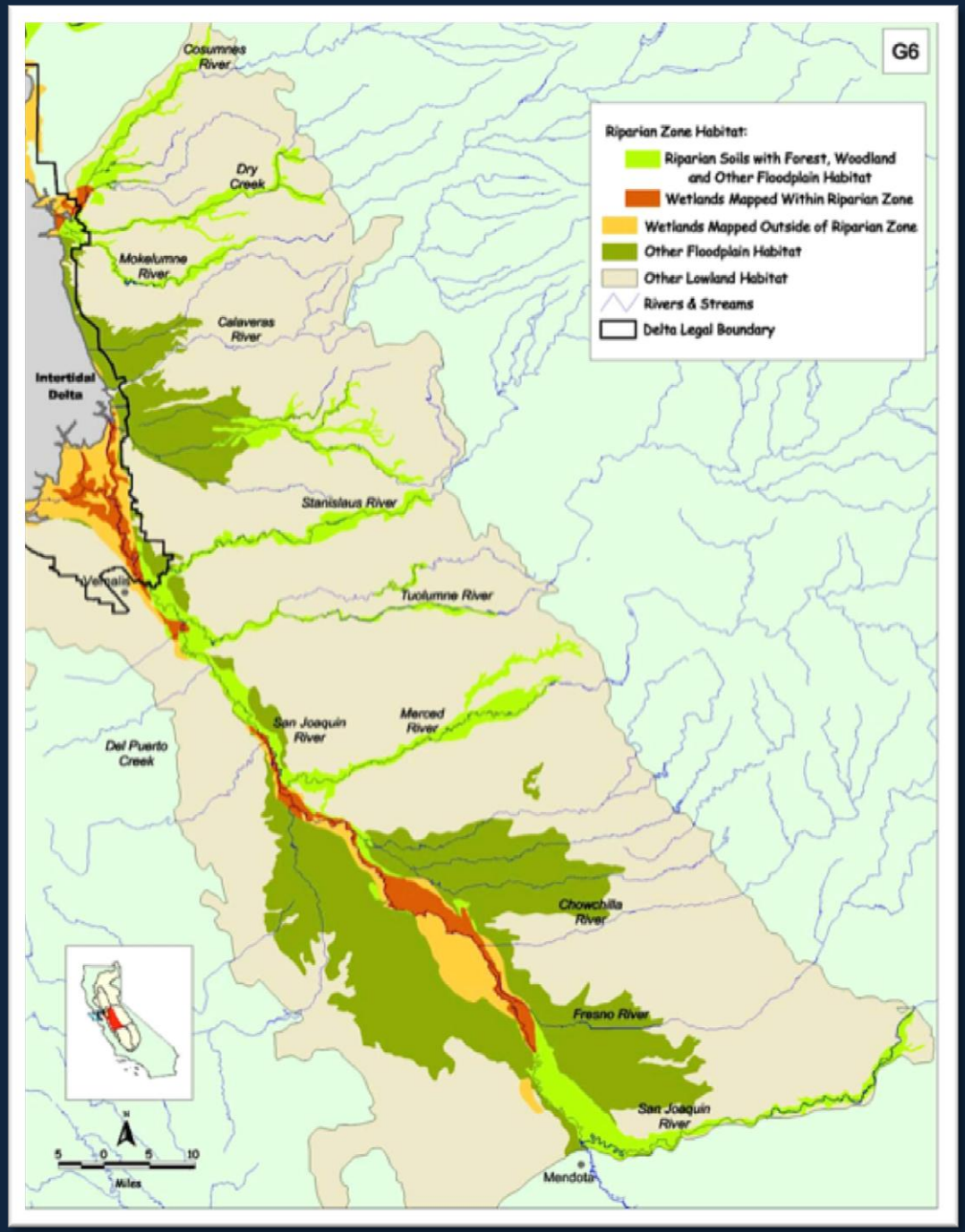


American Rivers. Bay-Delta and Central Valley Flood Management, Public Comments to Bay-Delta Fishery Resources Workshop. October 1-2, 2012.

Potential for Lower SJR and South Delta Floodplain



American Rivers. Bay-Delta and Central Valley Flood Management, Public Comments to Bay-Delta Fishery Resources Workshop. October 1-2, 2012.



San Joaquin Valley Historical River Floodplain

The Bay Institute. 1998. From the Sierra to the Sea. The Ecological History of the San Francisco Bay-Delta Watershed.

Scientific Certainty

- **Floodplains with characteristics like Yolo cannot be created through managed flows in the San Joaquin Basin**
- **Benefits of floodplain habitat on salmon smolt abundance/survival not quantified**
- **Juvenile *O. mykiss* do not utilize floodplain habitat**

Alternative Action Summary: Habitat Restoration (SJR)

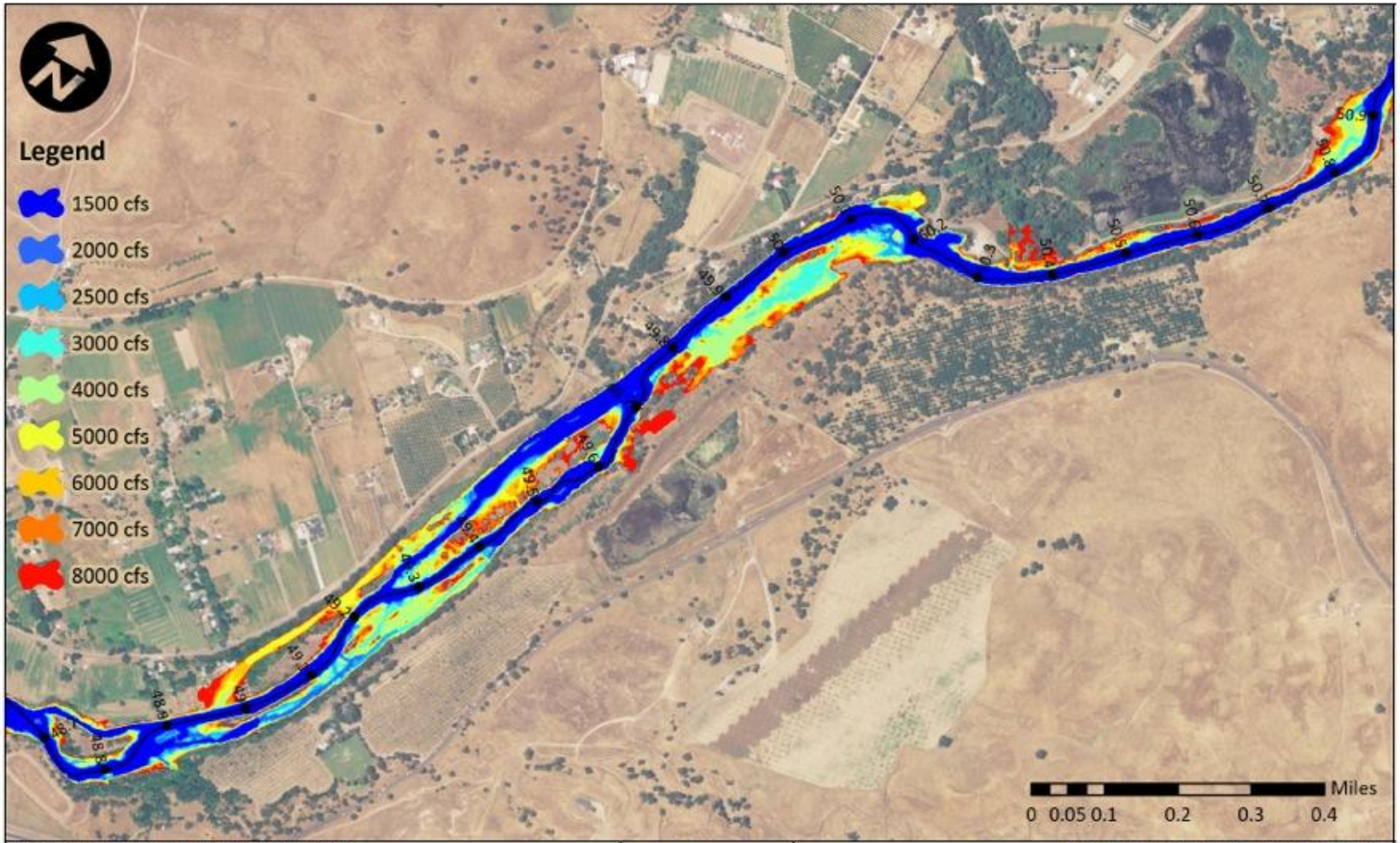
Action:	**Restore SJR floodplain habitat**
Goal/Objective:	**Increase salmon smolt survival in SJR**
Scientific Certainty:	**Medium**
Feasibility:	**Long-term and costly; SJR floodplain opportunities limited**
Result:	**Uncertain w/o dealing with other stressors**

Alternative: Habitat Restoration (tributaries)

Goal

Increase salmon smolt survival in tributaries

Modeling Demonstrates Little Floodplain Created by Managed Flows



Notes: 2005 background aerial courtesy of NAIP

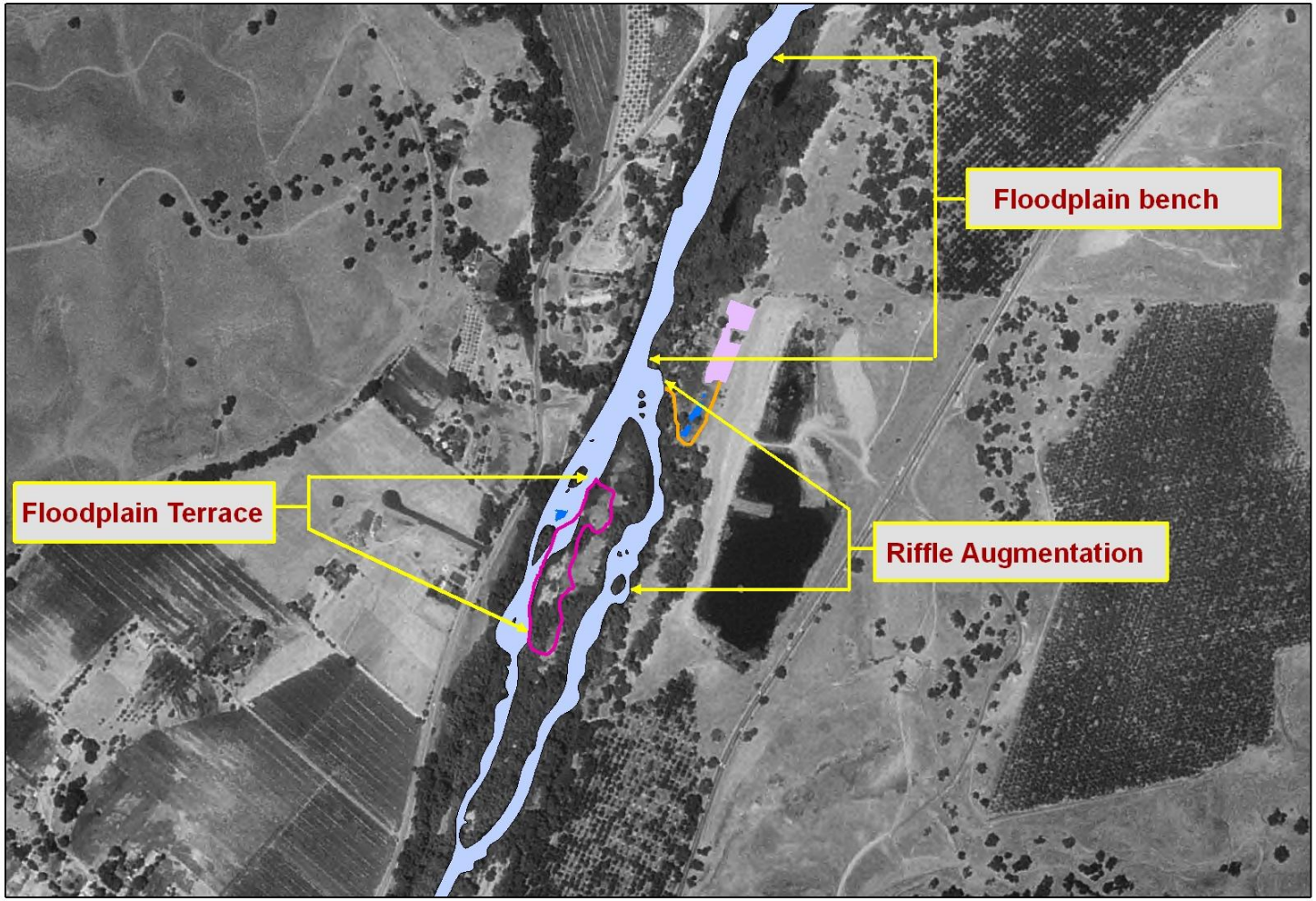
cbec

Stanislaus River Pilot Floodplain Modeling

Floodplain inundation (2 of 3)

Project No. 09-1032	Created By: CRC	**Figure 26**

Create Floodplain Habitat for Contemporary Flows



Restored Floodplain Rearing Habitat

Alternative Action Summary: Habitat Restoration (tributaries)

Action:	**Restore tributary floodplain habitat**
Goal/Objective:	**Increase salmon smolt survival**
Scientific Certainty:	**Medium**
Feasibility:	**Long-term and costly**
Result:	**Uncertain w/o dealing with other stressors**

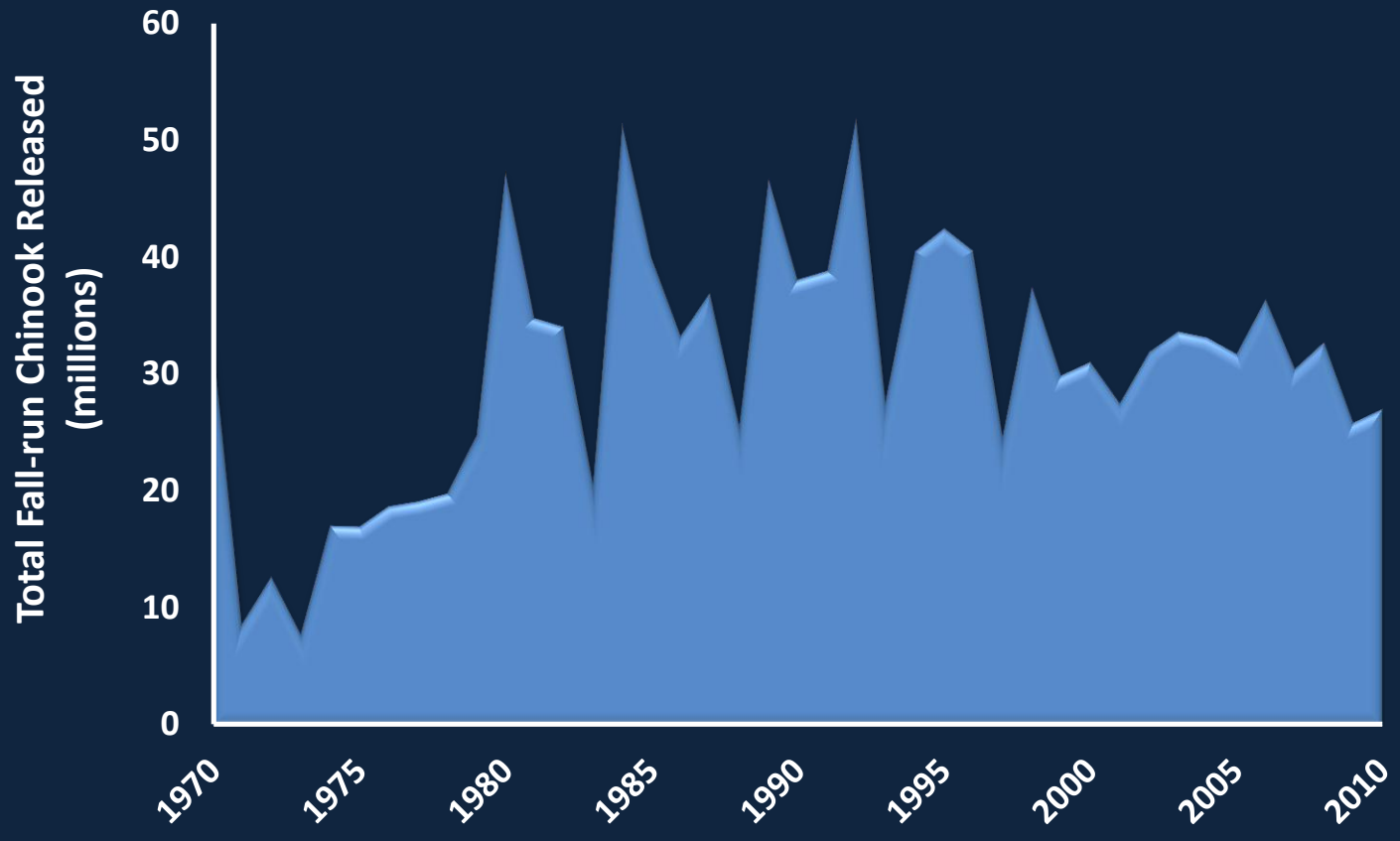
Alternative Action: Mark/Harvest/Exclude Hatchery Fish

University of Washington Digital Library

Goal

Increase natural salmon population

Central Valley Fall-run Hatchery Releases



Where has the hatchery-harvest cycle gotten us?

Year	Ad-clipped	Total Passage	% Ad-clipped
2011*	**692**	**796**	**87 %**
2010	365	1382	26 %
2009	141	1256	11 %
2008	37	923	4 %
2007	9	405	2 %

** Stanislaus River weir was only operational Nov 8 – Dec 31 due to high flows.*

Mark Select Fishery

Any fishery where a regulation specifies retention of only marked fish and release of unmarked fish

- **Objective is to simultaneously maintain fishing opportunity for marked stocks, while decreasing impacts on stocks of concern**
  - **Immediate benefit to natural spawners**
  - **Ad-clip all Hatchery Chinook**

Why We Need To Mark and Harvest Hatchery Fish

Fishing both natural and hatchery not only masked the decline of wild fall-run Chinooks, but has lead to the exploitation of wild stocks at unsustainably high rates with probable negative consequences for their life history and genetic diversity

Moyle, P. B., J. A. Israel, and S. E. Purdy. 2008. Salmon, Steelhead, and Trout in California: Status of an Emblematic Fauna. Center for Watershed Sciences. Davis, CA.

Lindley, S. T. et al. March 18, 2009. What caused the Sacramento River fall Chinook stock collapse? Pre-publication report to the Pacific Fishery Management Council.

Decrease the Impacts of Hatcheries

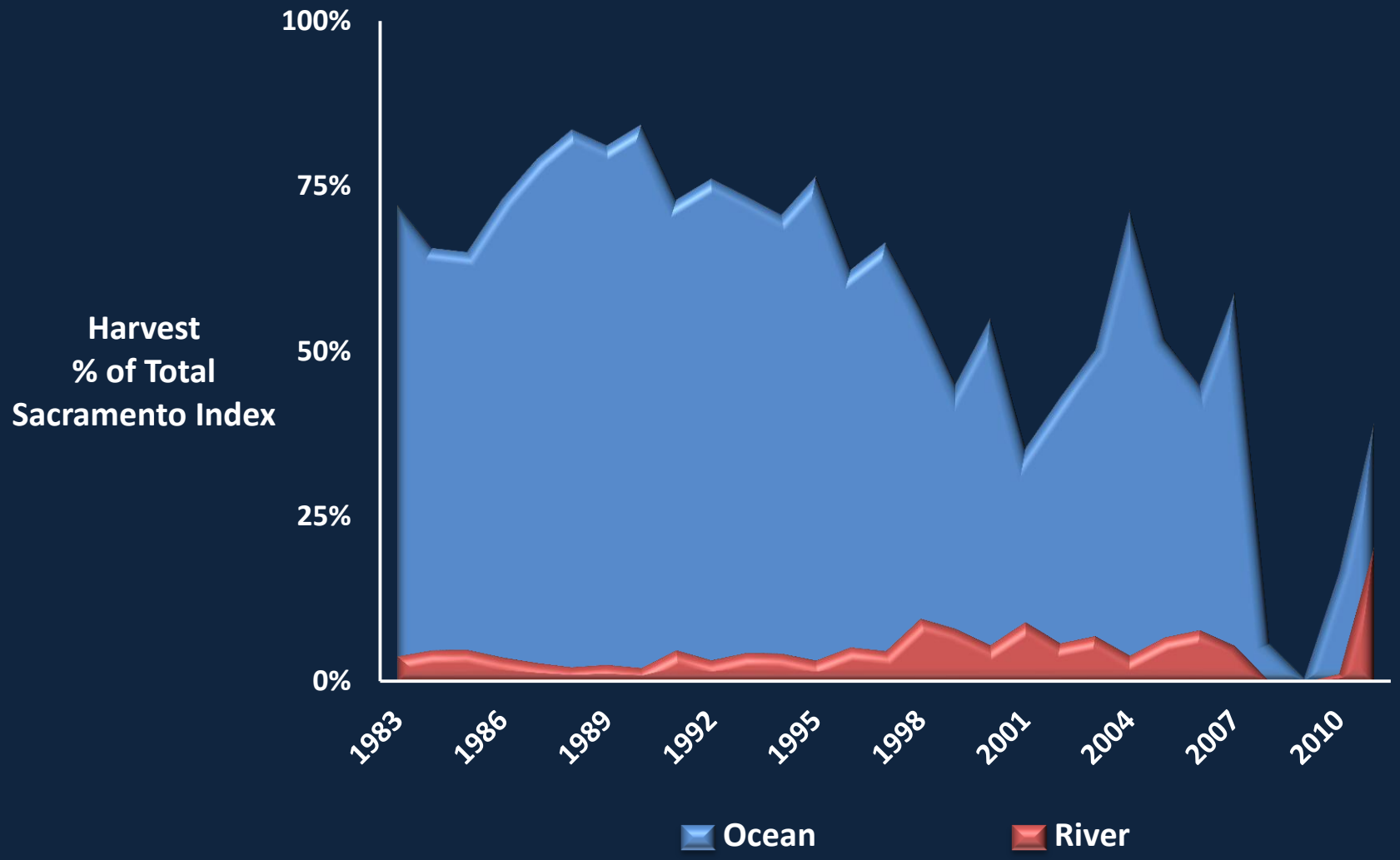
- **Eliminate all off-site releases of hatchery Chinook salmon**
- **100% of hatchery Chinook should be CWTed**
  - Identify strays from other hatcheries and remove from broodstock
  - Monitor and potentially control spawner composition in natural spawning areas
- **Develop management plans with population-specific targets for:**
  - % natural-origin fish in hatchery broodstock
  - % hatchery-origin fish on natural spawning grounds
  - Natural spawning populations not integrated with a hatchery should have < 5% total hatchery-origin spawners

California Hatchery Scientific Review Group (California HSRG). 2012. California Hatchery Review Report. Prepared for the US Fish and Wildlife Service and Pacific States Marine Fisheries Commission.

Reduce Non-native Predator and Chinook Hatchery Fish Influences

Operate exclusion weirs at tributary mouths

Alternative Action: Reduce Ocean Harvest



Goal

Increase number of salmon returning to freshwater

Current Harvest is Unsustainable

The CA Hatchery Scientific Review Group (2012) recommends a review and revision of the current approach to CV Chinook harvest management:

- **70% harvest rate cap may be too high for naturally-spawning fish**
- **The aggregate fall-run Chinook escapement target lacks biological support (122,000 natural and hatchery adults)**
  - **"not based directly on the capacity and productivity of SRFC spawning in natural areas"**
  - **"it is at odds with the desire for sustainable natural production"**
  - **current management not aligned with the salmon doubling goal**

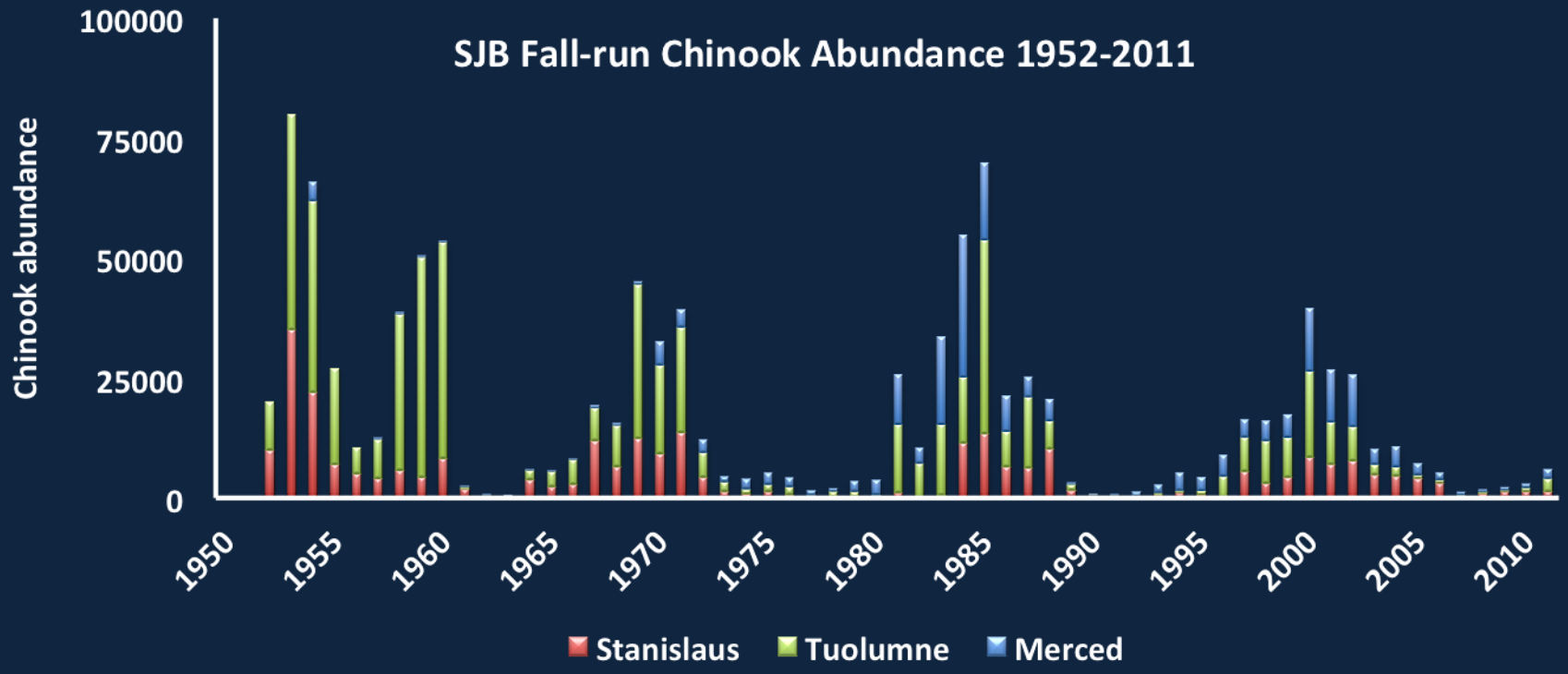
California Hatchery Scientific Review Group (California HSRG). 2012. California Hatchery Review Report. Prepared for the US Fish and Wildlife Service and Pacific States Marine Fisheries Commission.

NMFS Defense on Ocean Harvest

"***Despite Plaintiff's attempt to paint a dire picture, the record shows that SRFC are not in decline. "***

Case No. 1:11-CV-725-OWW-GSA [Federal Defendants' Cross Motion for Summary Judgment], at 1.

Do freshwater flows drive this pattern?



Alternative Action: Decrease Ocean Harvest

If we want to increase freshwater returns, harvest has to be better managed

Alternative Summary: Decrease Ocean Harvest

Action:	**Decrease ocean harvest**
Goal/Objective:	**Increase freshwater salmon returns; allow for ocean harvest**
Scientific Certainty:	**High**
Feasibility:	**High; immediate cost to fishermen**
Result:	**Immediate increase in freshwater returns; decrease natural fish harvest and increase hatchery fish harvest**

Where We Agree / Disagree

Alternative	SJTA	USFWS	NMFS	CDFG	TBI TU NRDC	GCID SVWU NCWA	American Rivers
Increase Spring Flows	Disagree	Agree	Agree	Agree	Agree	Disagree (Pulse Concept)	Agree
Predator Suppression	Agree	Somewhat Agree	Not Addressed	Not Addressed	Somewhat Agree	Agree	Not Addressed
Habitat Improvement	Agree	Somewhat Agree	Not Addressed	Unclear	Unclear	Somewhat Agree	Disagree
Install HORB	Agree	Agree	Not Addressed	Not Addressed	Not Addressed	Not Addressed	Not Addressed
Reduce hatchery impacts on natural stocks	Agree	Not Addressed	Not Addressed	Somewhat Agree	Not Addressed	Not Addressed	Not Addressed
Improve Harvest Management	Agree	Not Addressed	Not Addressed	Not Addressed	Not Addressed	Not Addressed	Not Addressed

Agree That a Suite of Flow and Non-flow Actions are Necessary

Pick a flow alternative that will provide reasonable protection to public trust resources. Do not be vague or ambiguous. Clearly state what public trust resources will be protected and at what level.

"The Board should connect percent unimpaired flows (UIF) to the physical or chemical variables that directly affect beneficial uses and are measurable in the field. For example, salinity or temperature may directly affect the aquatic resource (e.g., fish, invertebrate, algae) and are readily measurable. "

(EPA Aug 17, 2012 letter to SWRCB Bay-Delta Workshop 1 – Ecosystem Changes and the Low Salinity Zone)

Agree That a Suite of Flow and Non-flow Actions are Necessary

- **Install HORB**
  - Increase salmon smolt survival through Delta
- **Suppress Predators**
  - Increase survival through predator suppression in lower tribs and Delta
  - Change angling regulations / operate exclusion weirs / remove predators
- **Improve Habitat**
  - Restore habitat at contemporary flow levels

Agree That a Suite of Flow and Non-flow Actions are Necessary

- **Mark/Harvest/Exclude Hathery Fish**
  - **Reduce need for hatcheries by reducing harvest**
  - **Develop MSF**
- **Reduce Ocean Harvest**

Conclusion

We have heard for 24 years that the goal of the SWRCB is to increase the number of adults returning to freshwater

The only way to achieve this is to change in how NMFS' manages ocean harvest

Thank You

San Joaquin Tributaries Authority