

# **Stress Relief: Prescriptions for a Healthier Delta Ecosystem**



**PPIC**

**PUBLIC POLICY  
INSTITUTE OF CALIFORNIA**

**Supported by the S. D. Bechtel, Jr. Foundation**

# An interdisciplinary study team

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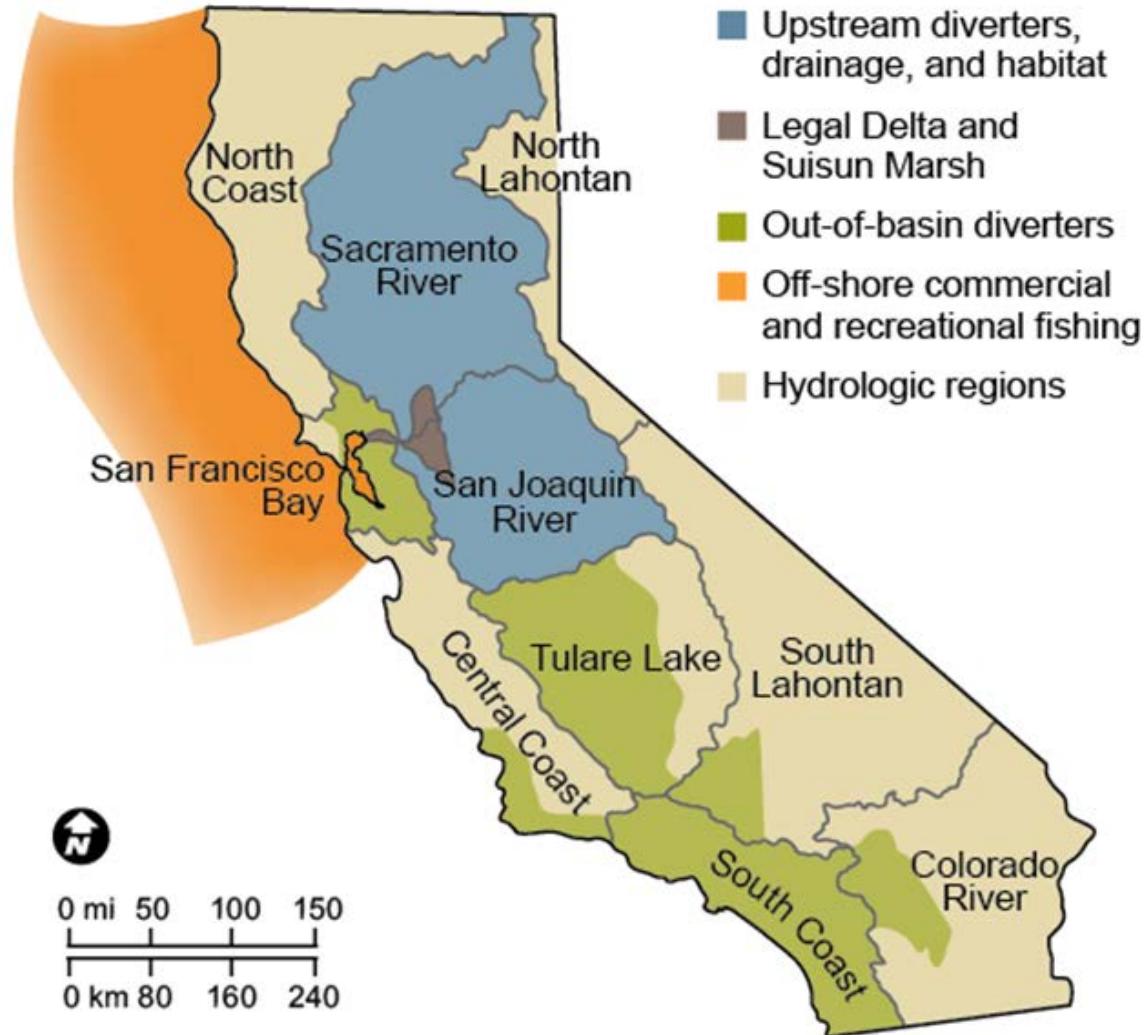
Brian Gray  
UC Hastings  
Law



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# Most Californians use Delta resources



# Improving the Delta's ecosystem health is a high-stakes task

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- Multiple stressors are harming native species
- Scientific uncertainty, costs of mitigation fuel “combat science”
- Fragmented institutions impede effective management
- No time to waste for environment, economy



# Study focused on improving conditions for native fish

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- How did we get here?
  - Causes of declines
- Where might we go?
  - A realistic vision
- How might we get there?
  - Promising actions, institutional solutions
- Methods:
  - Scientific, economic, and legal analysis
  - Small workshops
  - Surveys of scientists (122), stakeholders (240)



# Outline

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- Causes of stress
- A realistic vision
- Promising actions
- Prescriptions



# Five broad categories of ecosystem stressors — all related to human actions

Discharges



Direct fish management



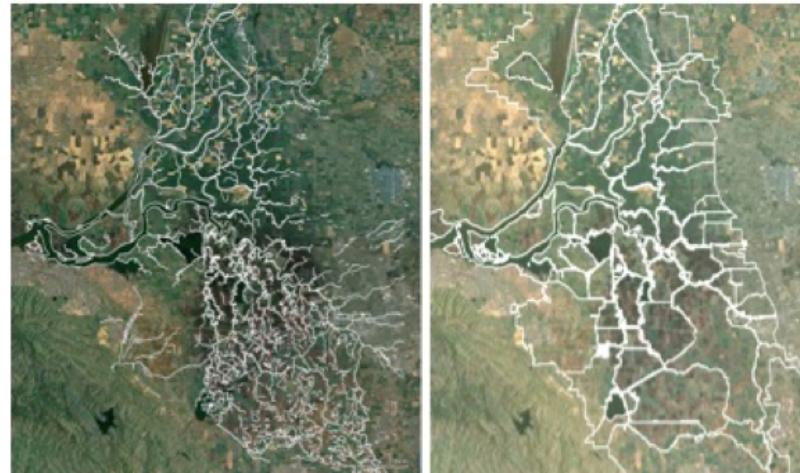
Flow regime change



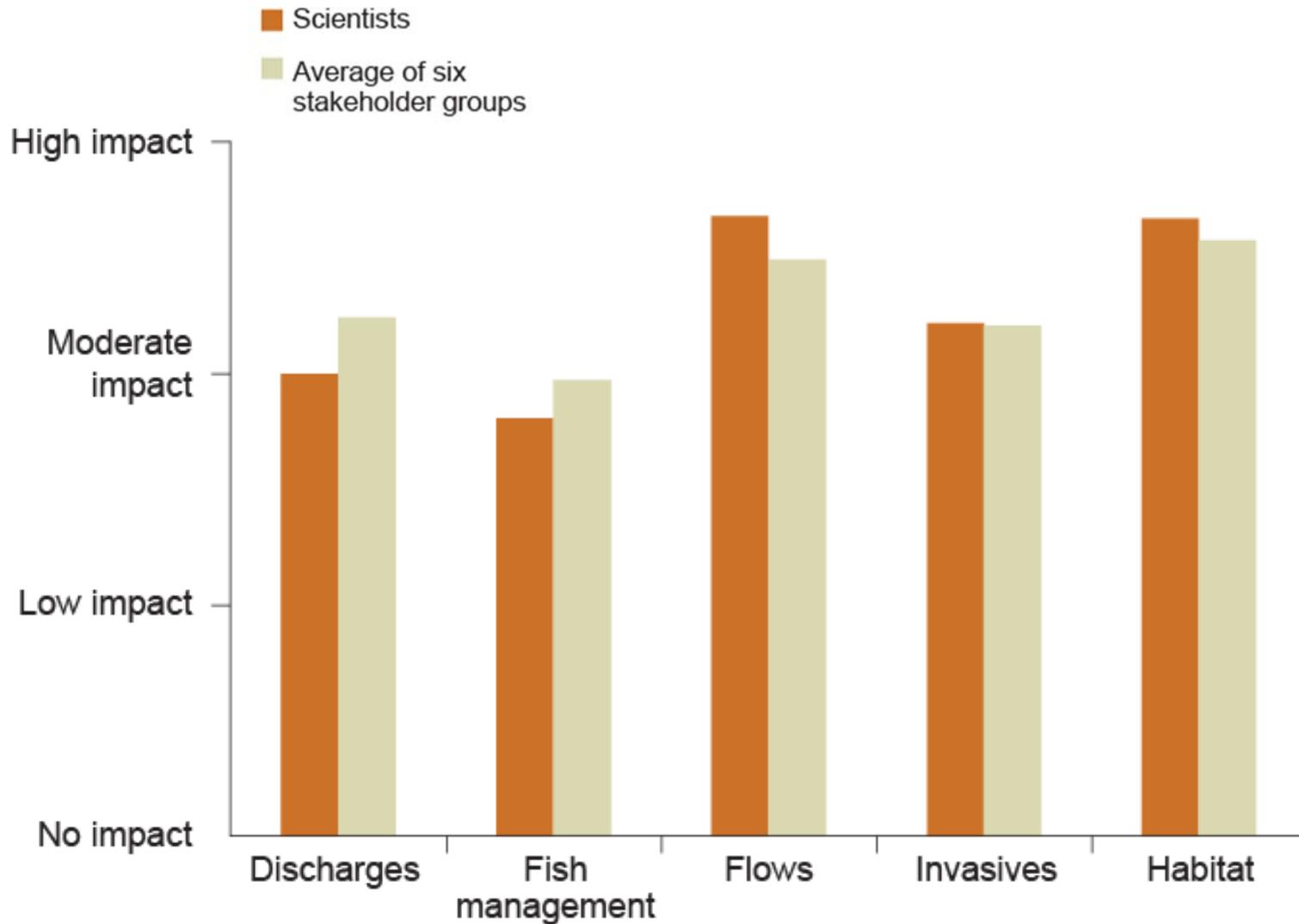
Invasive species



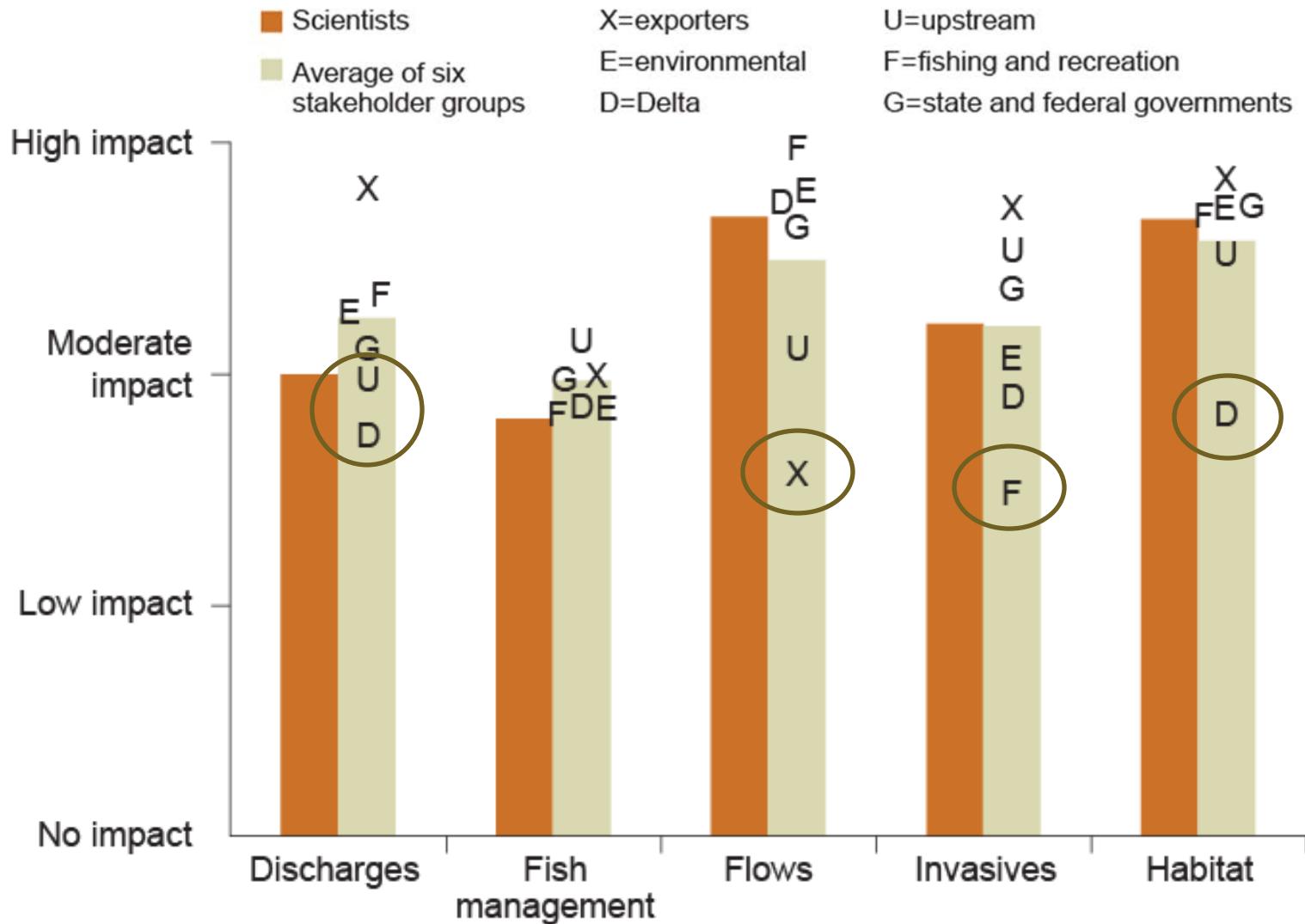
Physical habitat loss and alteration



# Scientists and stakeholders agree that all five types of stressors matter...



# ...but groups tend to downplay stressors that benefit them most



# Outline

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- Causes of stress
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# A realistic and hopeful pathway: reconciliation ecology

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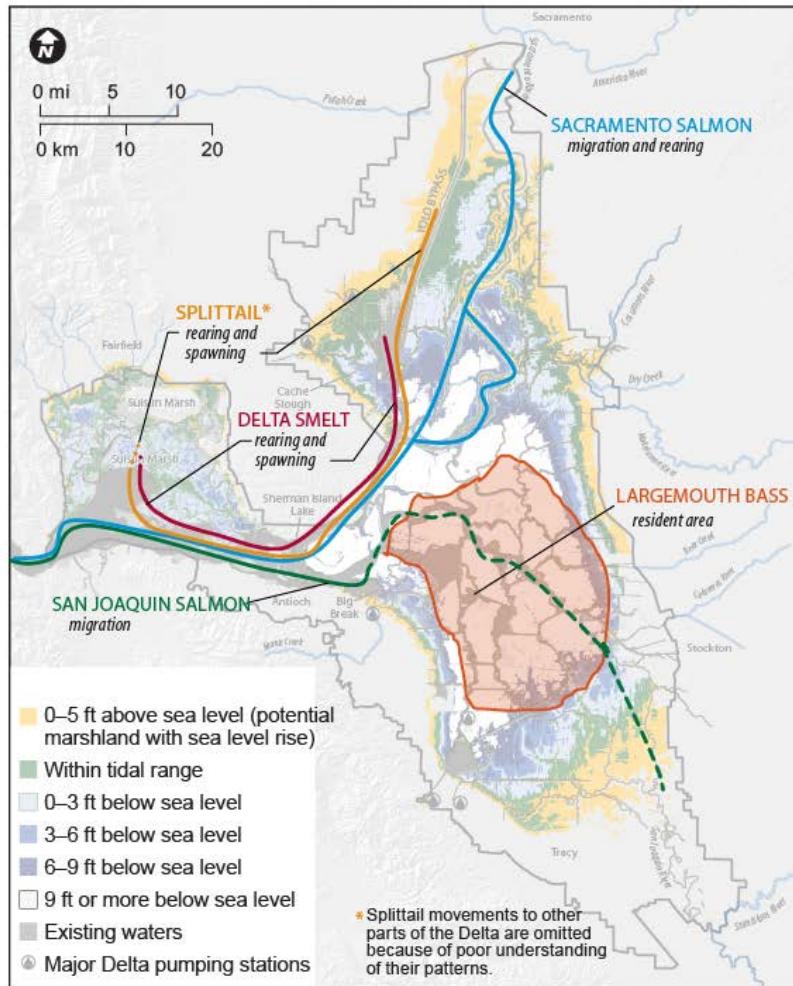
- Support ecosystem alongside continued human use of region's natural resources (co-equal goals)
- Restore natural processes where practical
- Infrastructure, technology can also help



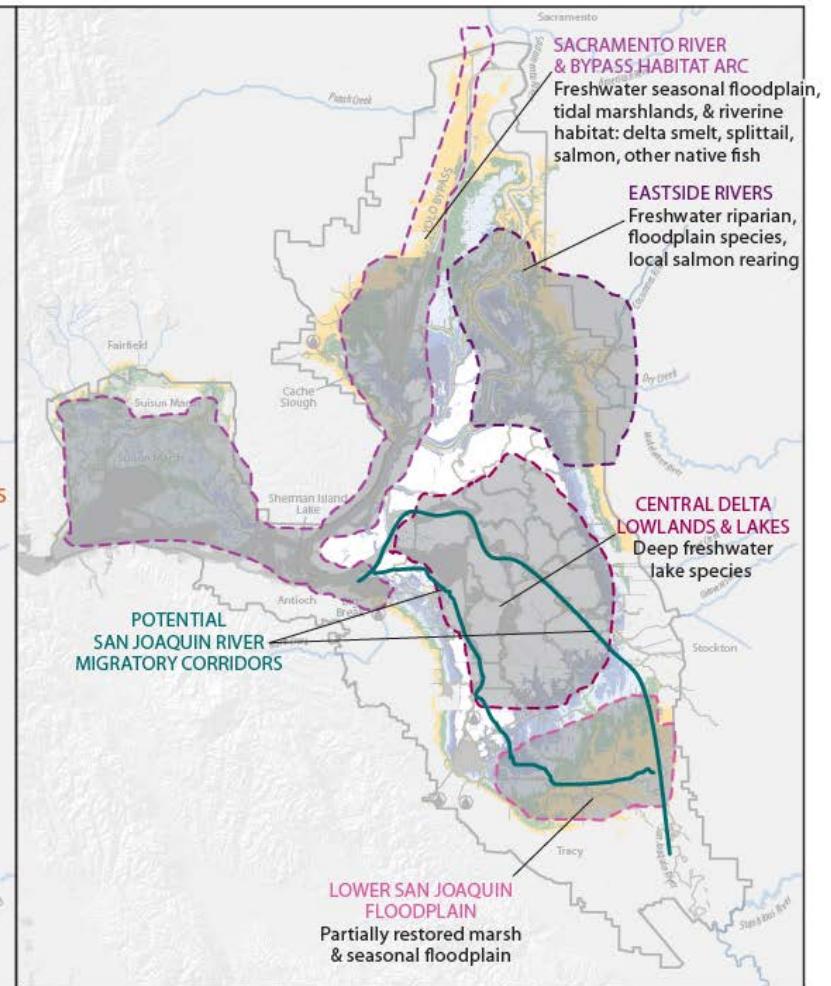
Yolo Bypass

# Area specialization will be needed to focus ecosystem efforts

## Fish habitat in today's Delta



## Fish habitat in specialized Delta



# Outline

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- Causes of stress
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# Survey sought views on actions to help native fish—some already under way

Discharges	Fish Mgmt	Flow Mgmt	Invasives	Habitat
Reduce toxics	Separate hatcheries	Increase outflows	Control invasive weeds	Tidal marsh, shallow habitat
Reduce farm fertilizers	Use conservation hatcheries	Reduce exports	Control invasive clams	Seasonal floodplains
Reduce farm pesticides	Harvest more predators	Vary flows for native fish	Prevent new invasions	Channel margin habitat
Reduce urban nonpoint	Reduce salmon harvest	Exports with canal/tunnel	Vary salinity	Upstream habitat
Reduce urban point	More fish screens	Use gates to steer fish		Increase sediment
Dilute with more flows	Enforce poaching	Improve upstream flows		Remove selected dams
	Truck fish around Delta/dams	Reduce entrainment		Deep water habitat

Level of implementation: Under way, Planned, Considered, Conceptual



# Scientists agree on high potential for some habitat, flow actions

Discharges	Fish Mgmt	Flow Mgmt	Invasives	Habitat
Reduce toxics	Separate hatcheries	Increase outflows	Control invasive weeds	<b>Tidal marsh, shallow habitat</b>
Reduce farm fertilizers	Use conservation hatcheries	<b>Reduce exports</b>	Control invasive clams	<b>Seasonal floodplains</b>
Reduce farm pesticides	Harvest more predators	<b>Vary flows for native fish</b>	Prevent new invasions	Channel margin habitat
Reduce urban nonpoint	Reduce salmon harvest	Exports with canal/tunnel	Vary salinity	<b>Upstream habitat</b>
Reduce urban point	More fish screens	Use gates to steer fish		Increase sediment
Dilute with more flows	Enforce poaching	Improve upstream flows		<b>Remove selected dams</b>
	Truck fish around Delta/dams	Reduce entrainment		Deep water habitat

**Level of implementation: Under way, Planned, Considered, Conceptual**



# Scientists disagree on potential of some other, highly uncertain actions

Discharges	Fish Mgmt	Flow Mgmt	Invasives	Habitat
Reduce toxics	Separate hatcheries	Increase outflows	Control invasive weeds	Tidal marsh, shallow habitat
Reduce farm fertilizers	<b>Use conservation hatcheries</b>	Reduce exports	Control invasive clams	Seasonal floodplains
Reduce farm pesticides	<b>Harvest more predators</b>	Vary flows for native fish	Prevent new invasions	Channel margin habitat
Reduce urban nonpoint	Reduce salmon harvest	<b>Exports with canal/tunnel*</b>	Vary salinity	Upstream habitat
Reduce urban point	More fish screens	<b>Use gates to steer fish*</b>		<b>Increase sediment*</b>
Dilute with more flows	Enforce poaching	Improve upstream flows		Remove selected dams
	<b>Truck fish around Delta/dams</b>	Reduce entrainment		<b>Deep water habitat</b>

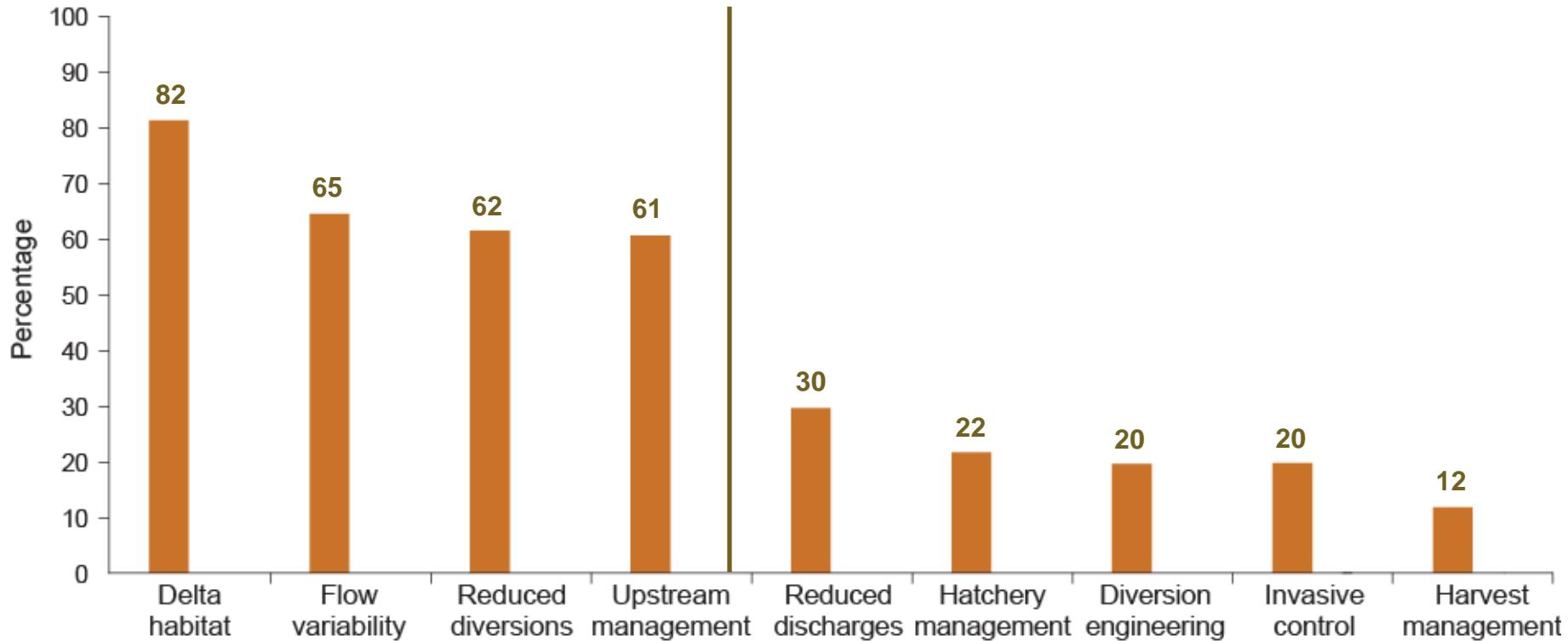
**Level of implementation: Under way, Planned, Considered, Conceptual**

*\* More than 20% answered "don't know"*

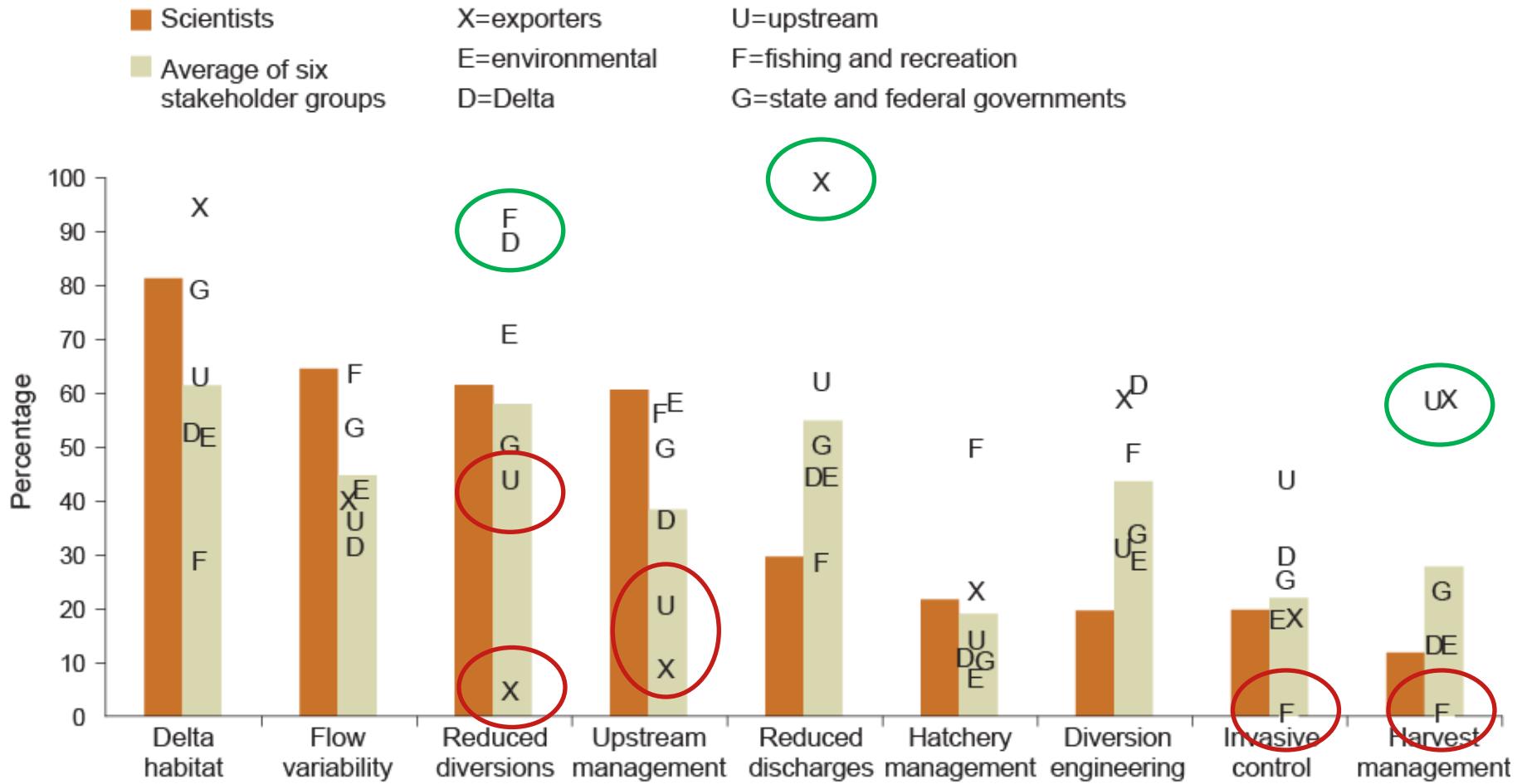


# Scientists' top priorities: restoring natural processes within Delta and upstream

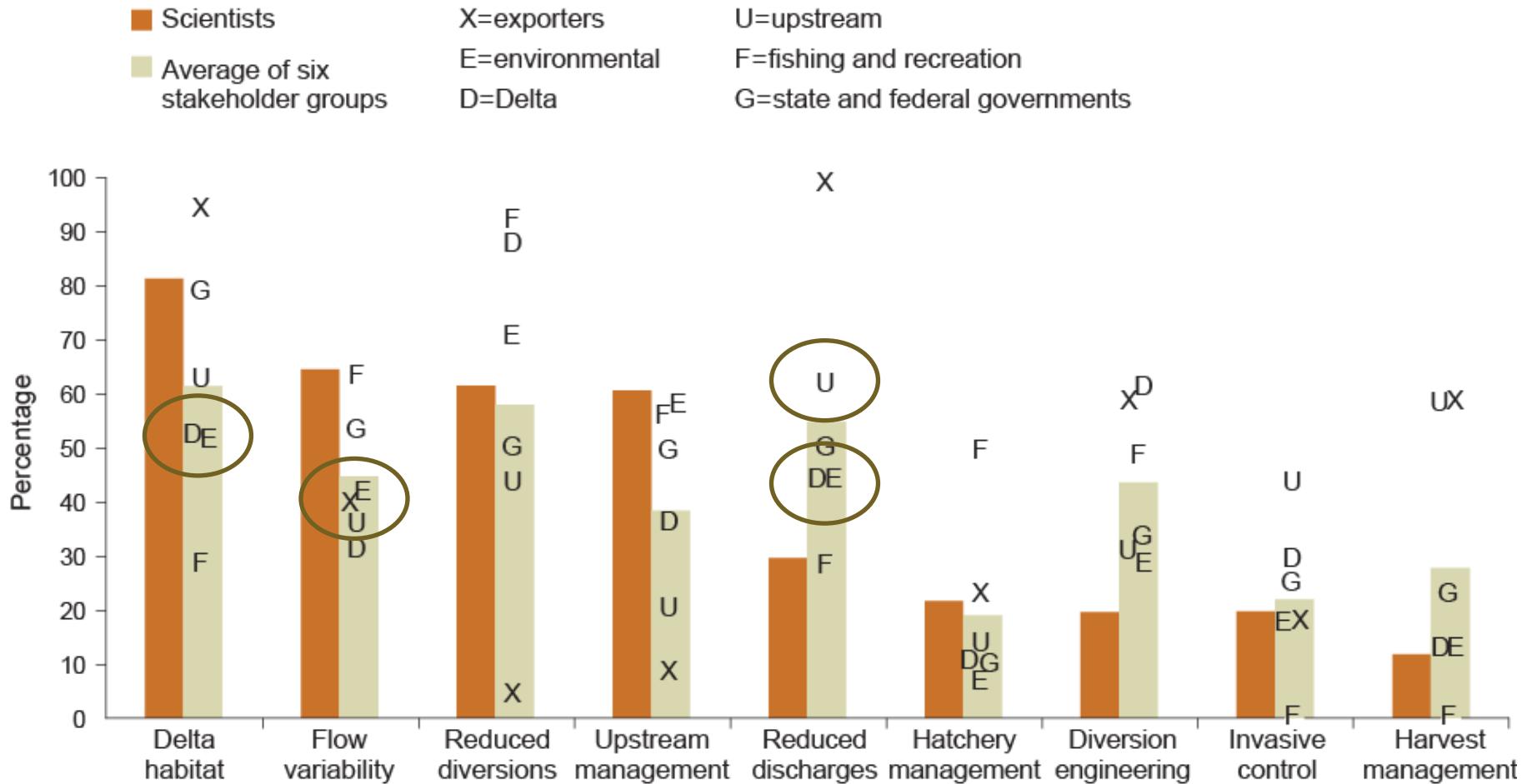
Habitat and flow cluster



# Again, stakeholder priorities reflect economic interests



# Some signs of common ground?



# Outline

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- Causes of stress
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- Promising actions
- Prescriptions



# Delta Plan, BDCP contain elements of a reconciled Delta vision

- Still weak on adaptive management and integrating science
- BDCP is ambitious but narrow: Upstream management and other stressors also matter
- And system is still too fragmented





# More effective institutions are needed to implement reconciliation

Name \_\_\_\_\_  
Address \_\_\_\_\_ Date \_\_\_\_\_

**R<sub>x</sub>**

More integrated

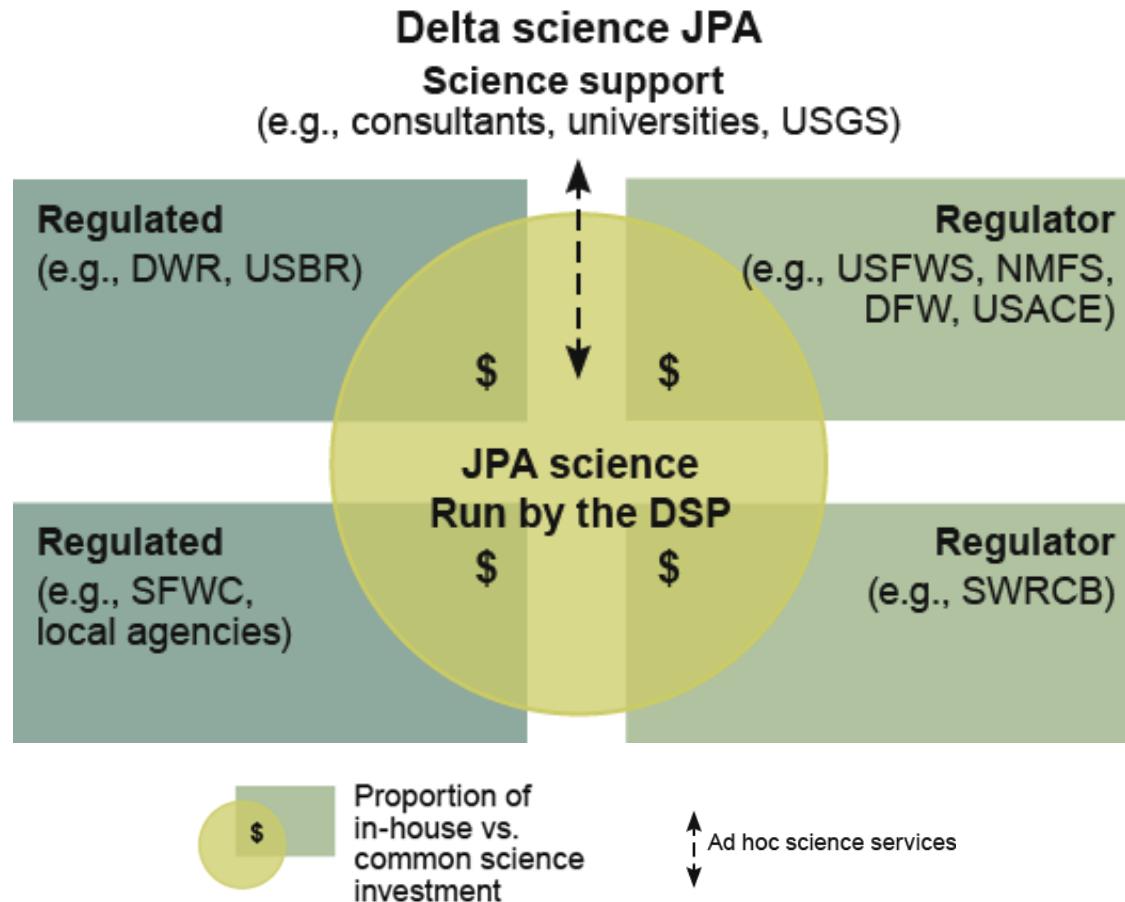
- Science
- Planning and (adaptive) management
- Regulatory oversight

MD \_\_\_\_\_  
Signature \_\_\_\_\_





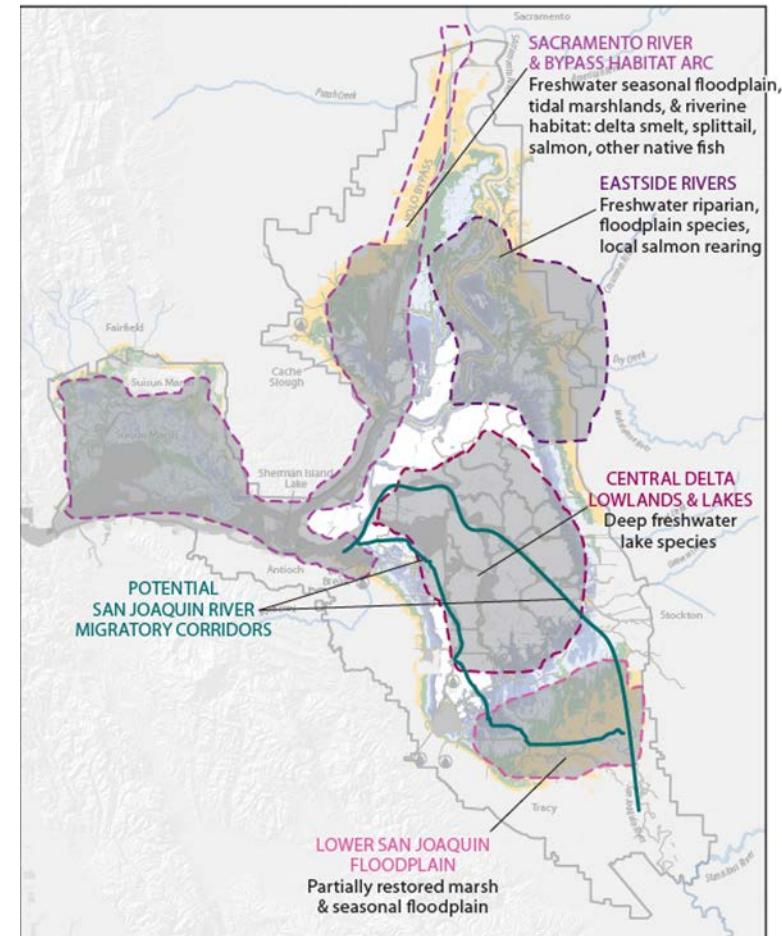
# Build “common pool” science for shared understanding, knowledge





# Use the Delta Plan to integrate planning and management

- Consistency determinations AND opinions on relevant planning efforts
- A proactive Delta Plan Interagency Implementation Committee
  - Requires agencies to present action plans
  - Coordinates implementation
  - Holds agencies accountable
  - Coordinates adaptive management



Use sub-region focus for adaptive management





# Strengthen and streamline regulatory oversight

- Increase regulatory coverage of stressors
- Reduce duplication and inconsistencies
- Provide incentives for joint stressor approach
- Coordinate and expedite environmental permitting: Delta Ecosystem Regulatory Coordinator (DERC)

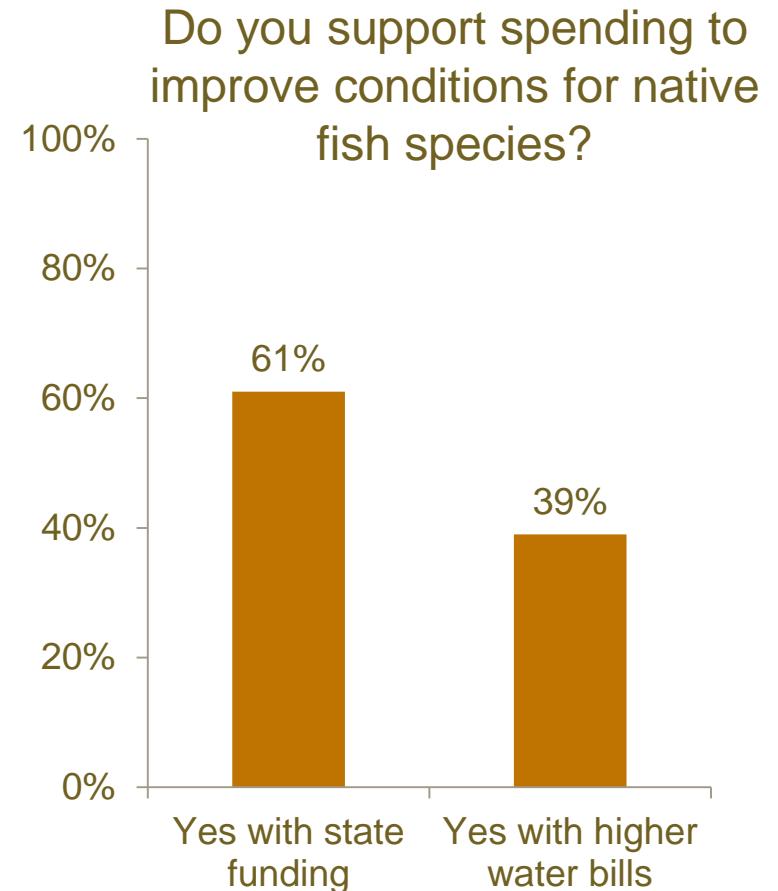


McCormack-Williamson Tract



# Achieving ecosystem goals will require broad public support

- Reconciliation efforts will be costly (at least several hundred million \$/year)
- Need to communicate the goals and benefits...
- ...and demonstrate coordinated and cost-effective efforts



SOURCE: PPIC Statewide Survey (2012)



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# More information available at [www.ppic.org](http://www.ppic.org)

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*Stress Relief: Prescriptions for a Healthier Delta Ecosystem*  
(Hanak et al. 2013) (Overview report)

*Aquatic Ecosystem Stressors in the Sacramento San-Joaquin Delta*  
(Mount et al. 2012) (Stressor descriptions)

*Where the Wild Things Aren't: Making the Delta a Better Place for Native Species*  
(Moyle et al. 2012) (Reconciled Delta)

*Integrated Management of Delta Stressors: Institutional and Legal Options*  
(Gray et al. 2013) (Institutional reforms)

*Scientist and Stakeholder Views on the Delta Ecosystem*  
(Hanak et al. 2013) (Details from the surveys)

*Costs of Ecosystem Management Actions for the Sacramento-San Joaquin Delta*  
(Medellín-Azuara et al. 2013) (Cost estimates)



# Notes on the use of these slides

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These slides were created to accompany a presentation. They do not include full documentation of sources, data samples, methods, and interpretations. To avoid misinterpretations, please contact:

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Thank you for your interest in this work.

