



Board Workshop

Basin Plan Amendment for a Mercury Control Program for the Sacramento-San Joaquin River Delta Estuary

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Outline

- Regulatory Background
- The Delta Mercury Problem
- Draft Mercury Control Program
- Stakeholder Involvement
- Issues
- Next Steps

Issues

1. Fish tissue objectives
2. MeHg requirements for wetlands
3. Who is required to conduct studies
4. Mercury offsets

Regulatory Background

- Clean Water Act 303(d) list of impaired waters
- 49 water bodies in the Central Valley are impaired by mercury
- Total Maximum Daily Load (TMDL) control program

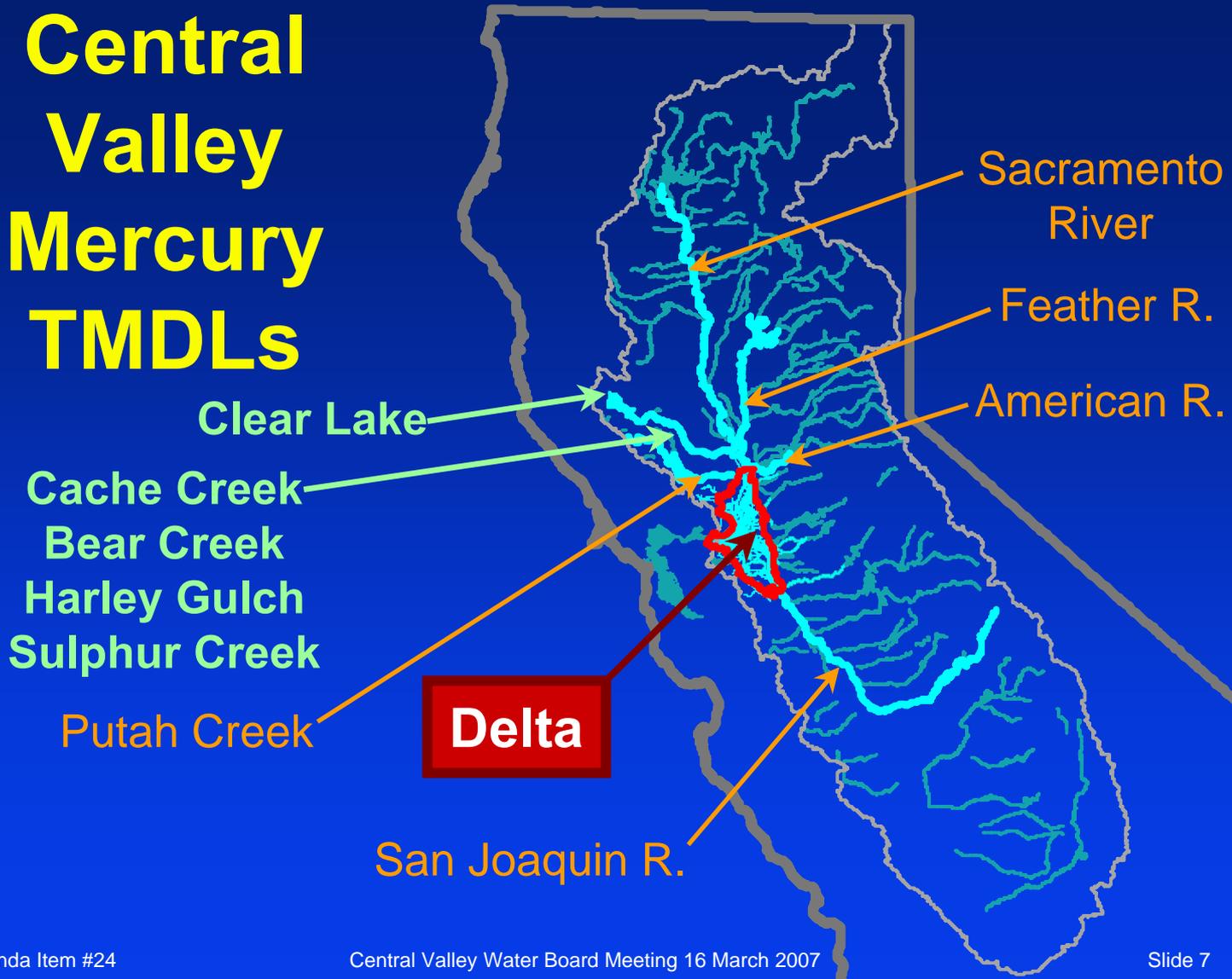
Total Maximum Daily Load

- Assimilative capacity
- Load allocations for nonpoint sources of pollution
- Waste load allocations for point sources
- Margin of safety

Water Quality Control Plan (Basin Plan)

- Includes TMDL elements, an implementation plan to achieve the TMDL, and a monitoring program
- Approved by the State Water Board, OAL & USEPA
- Modify as necessary

Central Valley Mercury TMDLs



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Delta Mercury Impairment

↑ High mercury levels



Who eats Delta fish?

Wildlife:

- ◆ Western grebes, kingfisher, Least tern



- ◆ Bald eagle, osprey

- ◆ River otter



Delta Mercury Impairment

↑ High mercury levels



Who eats Delta fish?

**~300,000 licensed
sport & subsistence
anglers per year**



& unknown # of unlicensed fishers

Why is Mercury a Problem?

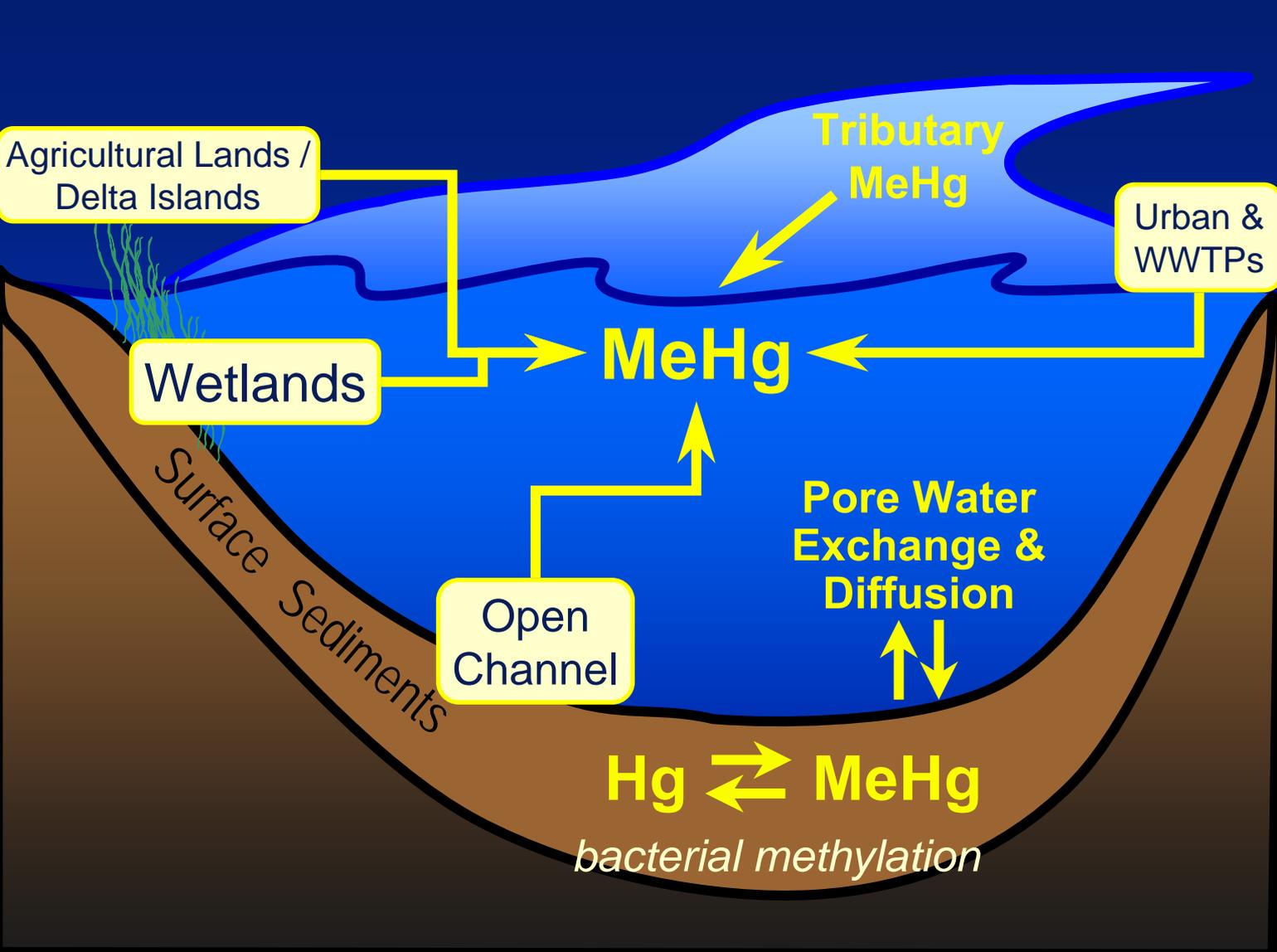
Neurotoxicant: Impairs nervous systems in humans & wildlife

Also affects reproductive & immune systems

- Humans: deficits in memory, attention, motor control
- Wildlife: reductions in learning, social behavior, physical abilities

Mercury Strategy for the Bay-Delta Ecosystem (CalFed, 2003):

“The problem with mercury in the Delta’s aquatic ecosystems can be defined as biotic exposure to methylmercury.”



MeHg Bioaccumulates...



Delta Water :
Largemouth Bass

1: 6,500,000

MeHg

Methylmercury

- Most toxic form of Hg
- Most bioavailable form of Hg
- MeHg bioaccumulates
- **Exposure to MeHg is through consumption of fish & shellfish**



How do we reduce exposure to MeHg?

Change the fish we eat:



↓ Lower MeHg levels

- Cannot change wildlife diet
- Not all people are aware of or pay attention to advisories
 - Subsistence fishing

How do we reduce fish MeHg levels?

↓ Reduce MeHg in Delta water

(1) ↓ Inorganic Hg available to be converted to MeHg

(2) Control activities that enhance MeHg production

Where does inorganic Hg come from?

Delta Area Sources:

- Waste water treatment plants
(dental, medical, household)
- Atmospheric deposition
(local & global emissions)
- Urban runoff

Where does inorganic Hg come from?

Watershed Sources [~97%]:

- WWTP, atmospheric deposition & urban runoff
- Historic mining activities in tributary watersheds
- Geothermal springs
- Naturally mercury-enriched soils

Watershed Inorganic Hg

- Millions of kilograms released to waterways by historic mining
- Mine tailings still releasing mercury
- Much remains in channels & may be difficult to remove

How & Where Does Hg Get Methylated?

- Wetlands & open water channels
- Waste water treatment systems
- Ag return flows & urban runoff

~ 1/2 from Within-Delta Sources
~ 1/2 from Tributary Inputs

Board Questions



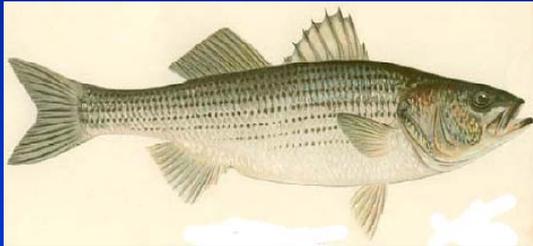
Outline

- Regulatory Background
- The Delta Mercury Problem
- **Draft Mercury Control Program**
- Stakeholder Involvement
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Recommended Control Program: Draft Basin Plan Amendment

1. Delta-specific fish tissue mercury objective
2. Implementation plan to achieve the fish tissue objective

1. Proposed Fish Tissue MeHg Objective for Delta Fish

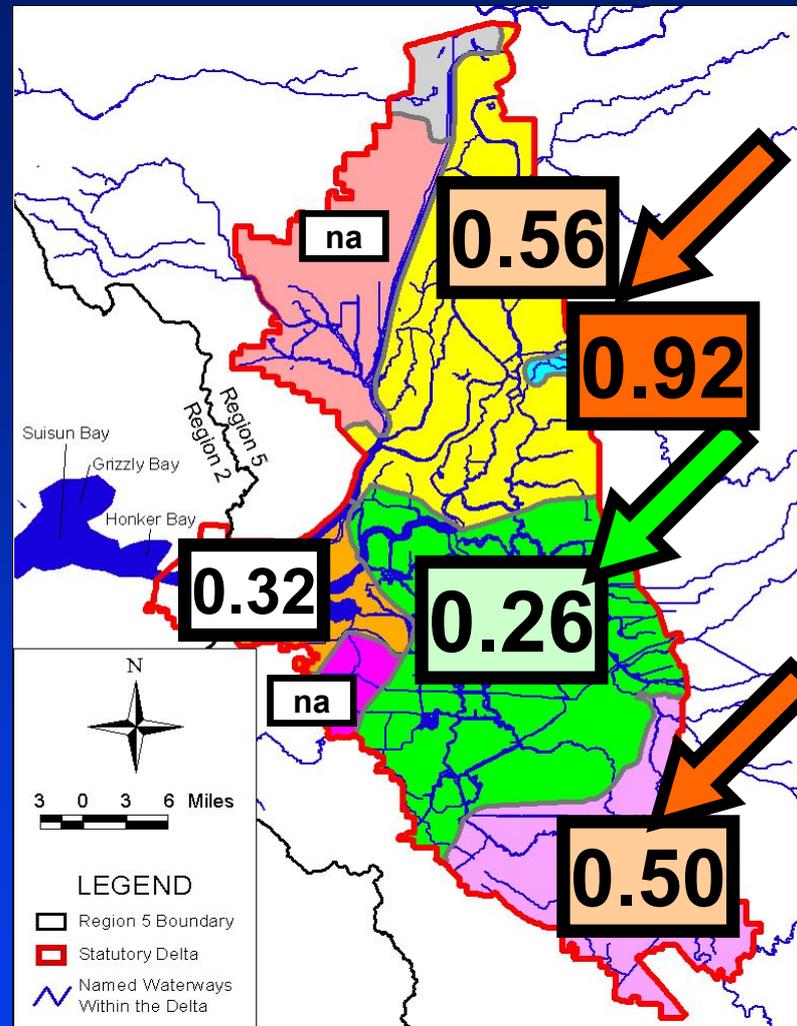


0.24 mg/kg mercury
in large bass & catfish

1 meal/wk



**Average
MeHg
Levels
in Large
TL4 Fish
(mg/kg)
[Compare to
Proposed WQO of
0.24 mg/kg]**



2. Implementation Plan

A. Reduce Inorganic Mercury

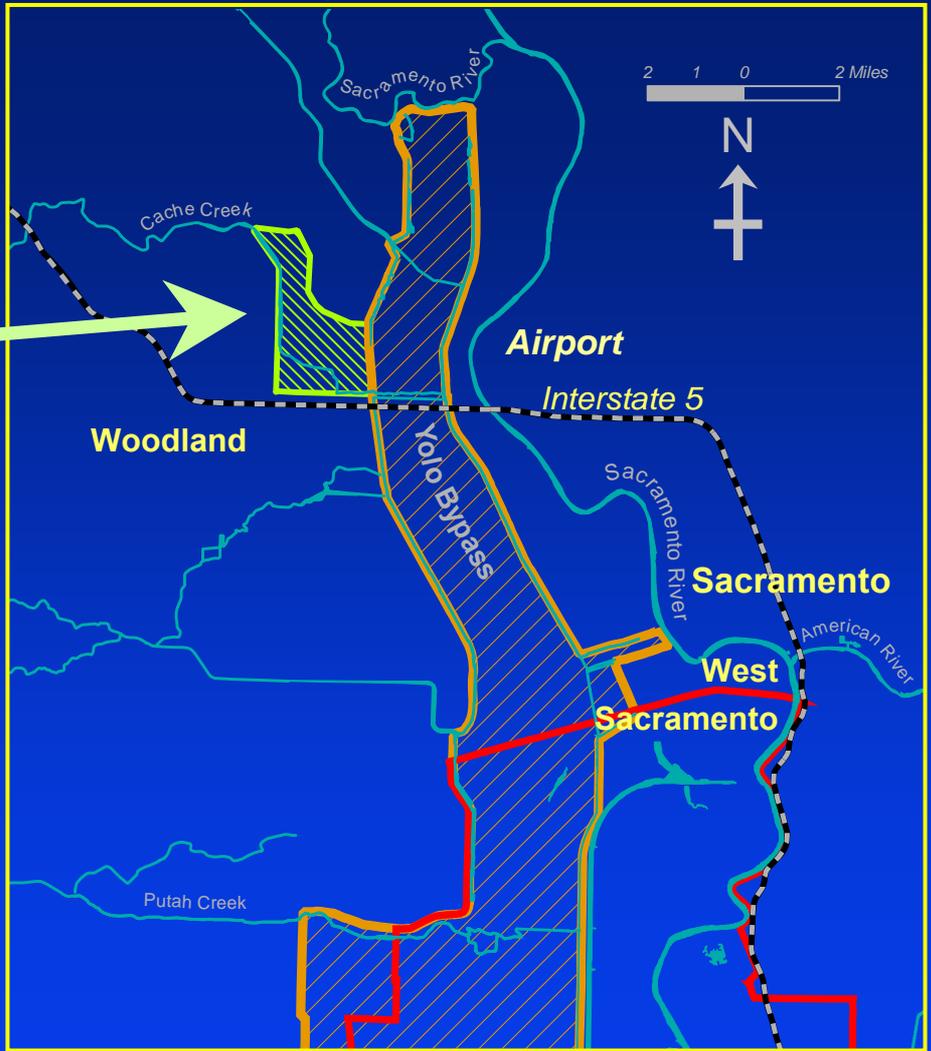
B. Control Methylmercury

A. Focused Mercury Reduction

1. Cache Creek Settling Basin
2. Feather River
American River
Putah Creek

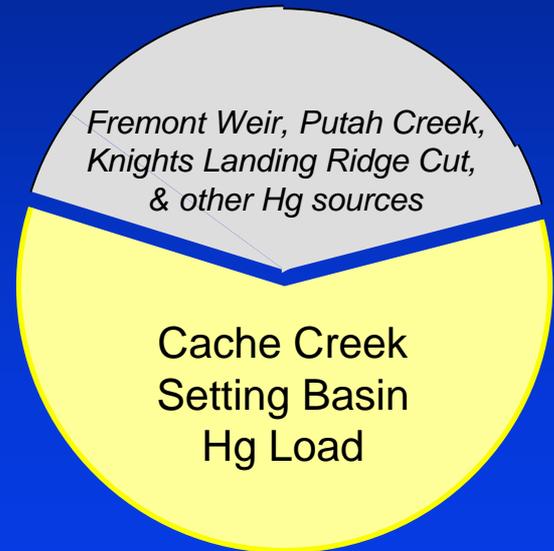
Top 4 dischargers of Hg-contaminated sediment to the Delta

Cache Creek Settling Basin



Settling Basin is a High Priority

1. It discharges about **60%** of all Hg that enters the Yolo Bypass.



Settling Basin is a High Priority

2. It discharges directly to the Yolo Bypass

- ◆ High MeHg in water and fish
- ◆ Extensive wetland restoration activities are underway
- ◆ Reduce Hg leaving the Basin, reduce MeHg production downstream

Improving an Existing Basin is Easier than Building a New Basin...

3. Raising the weir & removing sediment will substantially reduce Hg loading to the central & western Delta & San Francisco Bay



Other Inorganic Mercury Limits

- **Cap** Hg concentrations from sources in the Delta & tributaries downstream of major dams
- **Minimize** Hg from new sources

Underway or Completed Mine Projects



Coast Range Hg Mines

- Sulphur Bank Hg Mine
- Abbott Mine
- Turkey Mine
- Rathburn & Rathburn-Petray Mines
- New Idria Mine

Sierra Gold Mines

- Polar Star Mine
- Boston Pit Mine
- Sailor Flat Mine
- Pond Mine
- Poore Mine
- Davis Lode Mine & Stamp Mill

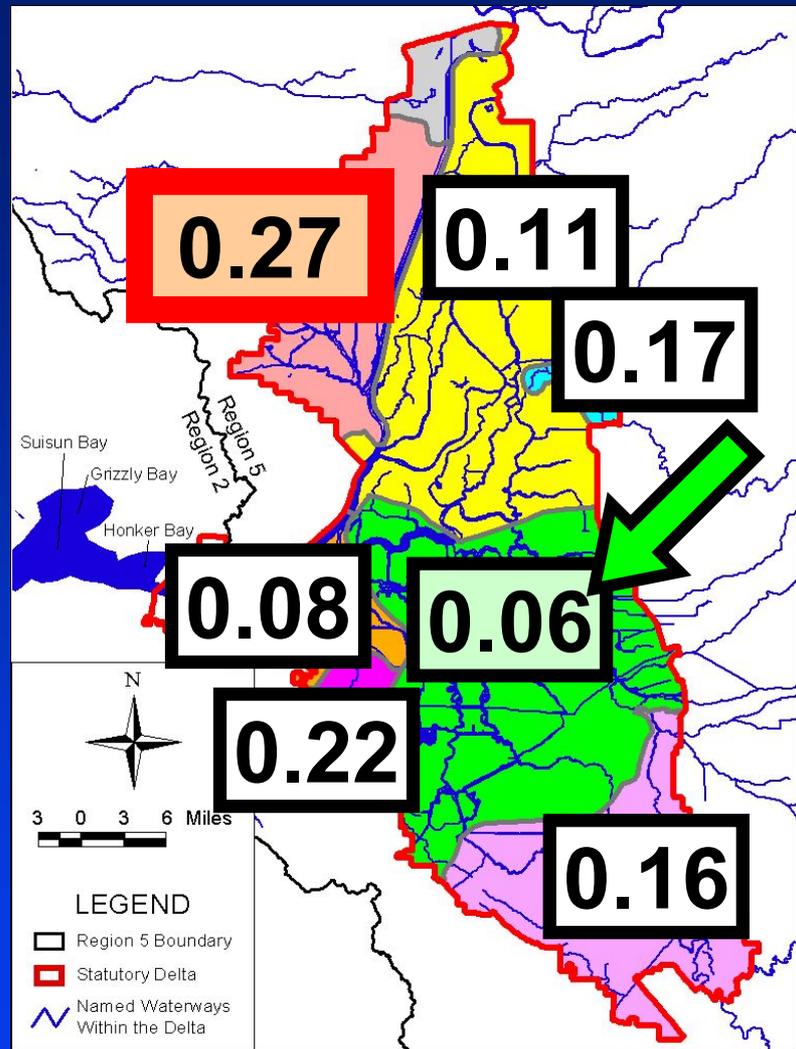
Reduce Methylmercury

- Identify key sources of MeHg
 - ◆ Reduce methylation, and/or
 - ◆ Reduce mercury sources that supply the methylation sources
- Shorten time for measurable decreases in fish mercury

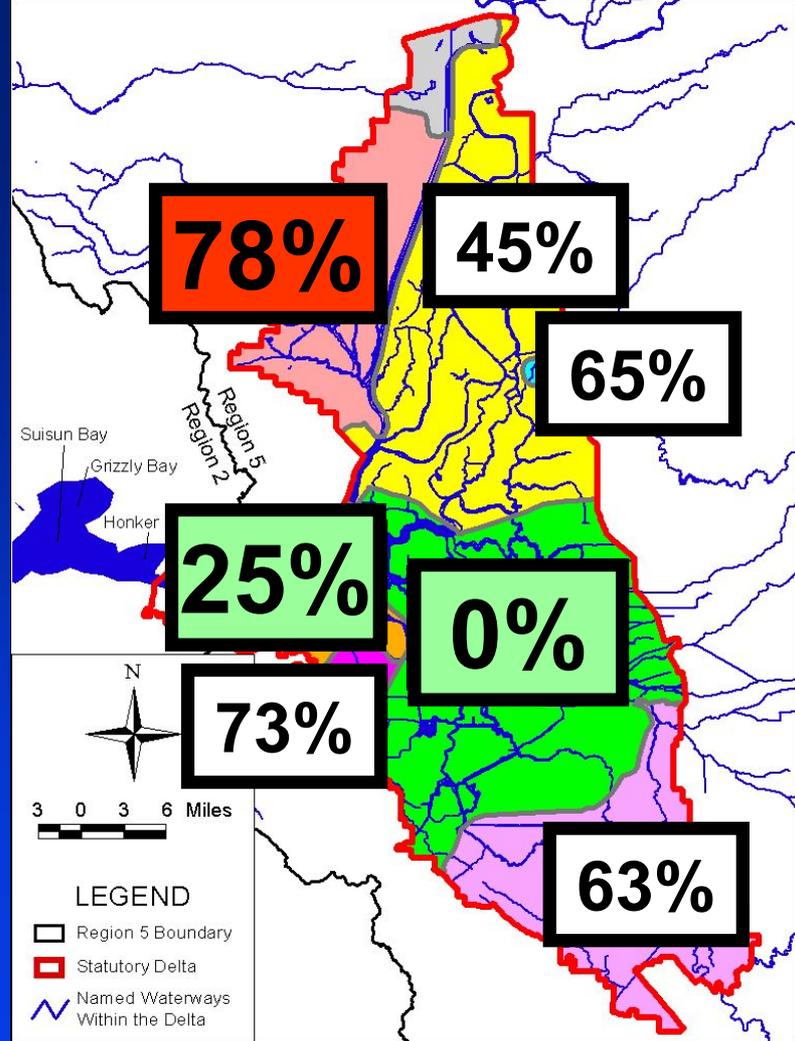
Proposed MeHg Goal

- **0.06 ng/l** in unfiltered ambient water, annual average, based on Delta-specific data
- Use goal to establish how much reduction from each source is needed to achieve WQOs

Average Annual Ambient MeHg Levels in Water (ng/l)



**MeHg
Source
Reductions
needed to
achieve
proposed
0.06 ng/l
goal**



Proposed MeHg Allocations

- Delta & Yolo Bypass sources
- **Need allocation to discharge**
- Allocation compliance date:
2030

Proposed MeHg Allocations Would Require:

- Reduce Existing Delta & Yolo Bypass Sources:
 - WWTPs & urban runoff
 - Wetlands & irrigated Ag areas
- Reduce tributary inputs

Proposed MeHg Allocations Would Require:

○ Minimize new MeHg sources

- Wetland restoration
- New WWTP discharges
- Water management changes
 - Water diversion & storage
 - Dredging
 - Flood conveyance

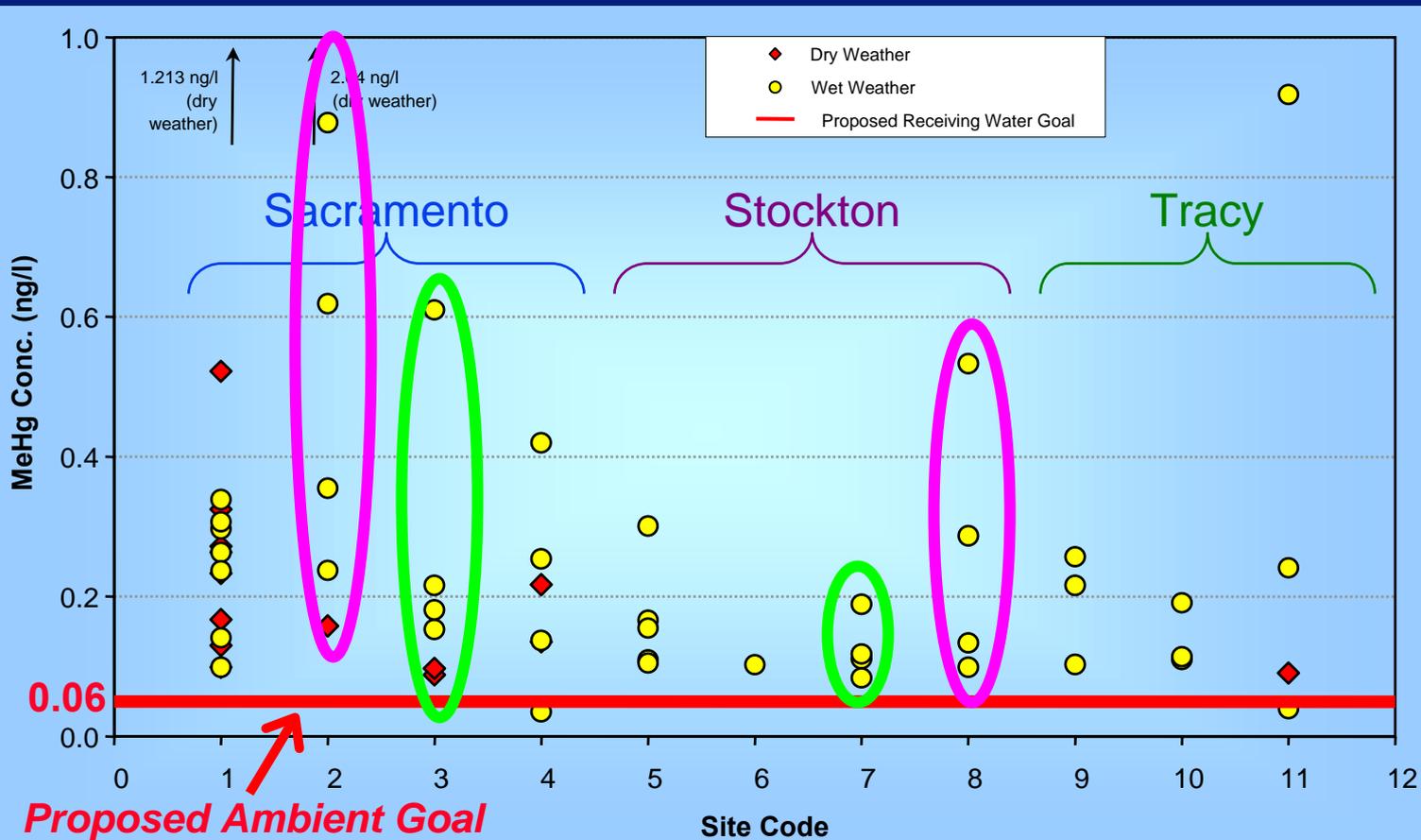
Phased Approach for MeHg Allocations

- **2008 to 2015: Phase 1 – Study period**
 - ◆ Improve MeHg source estimates
 - ◆ Develop MeHg management practices
- **2015: Board reviews study results**
- **2015 to 2030: Phase 2 – Implementation**

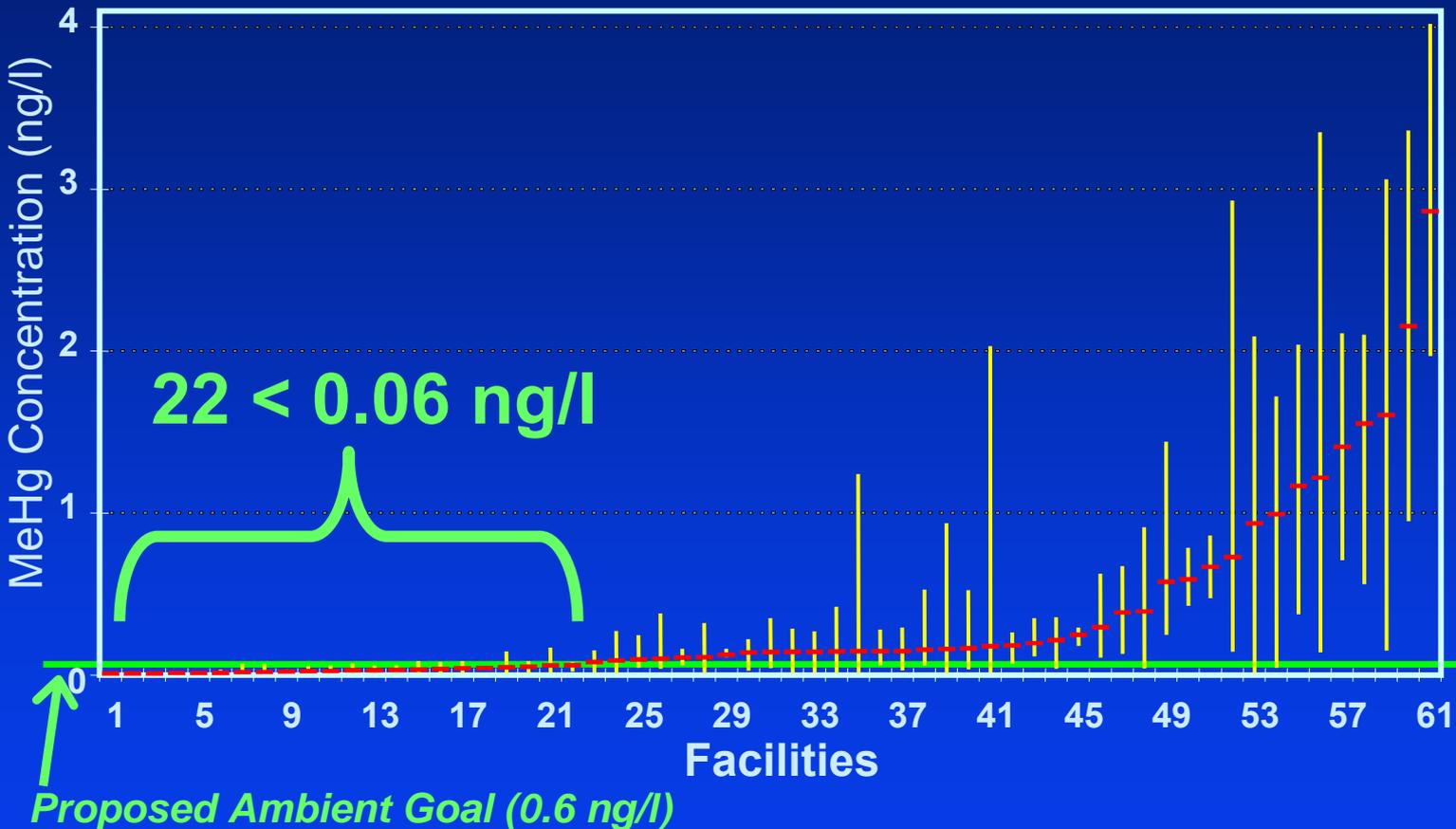
OVERALL PREMISE:

Understanding the differences between individual MeHg sources leads to the development of MeHg management practices.

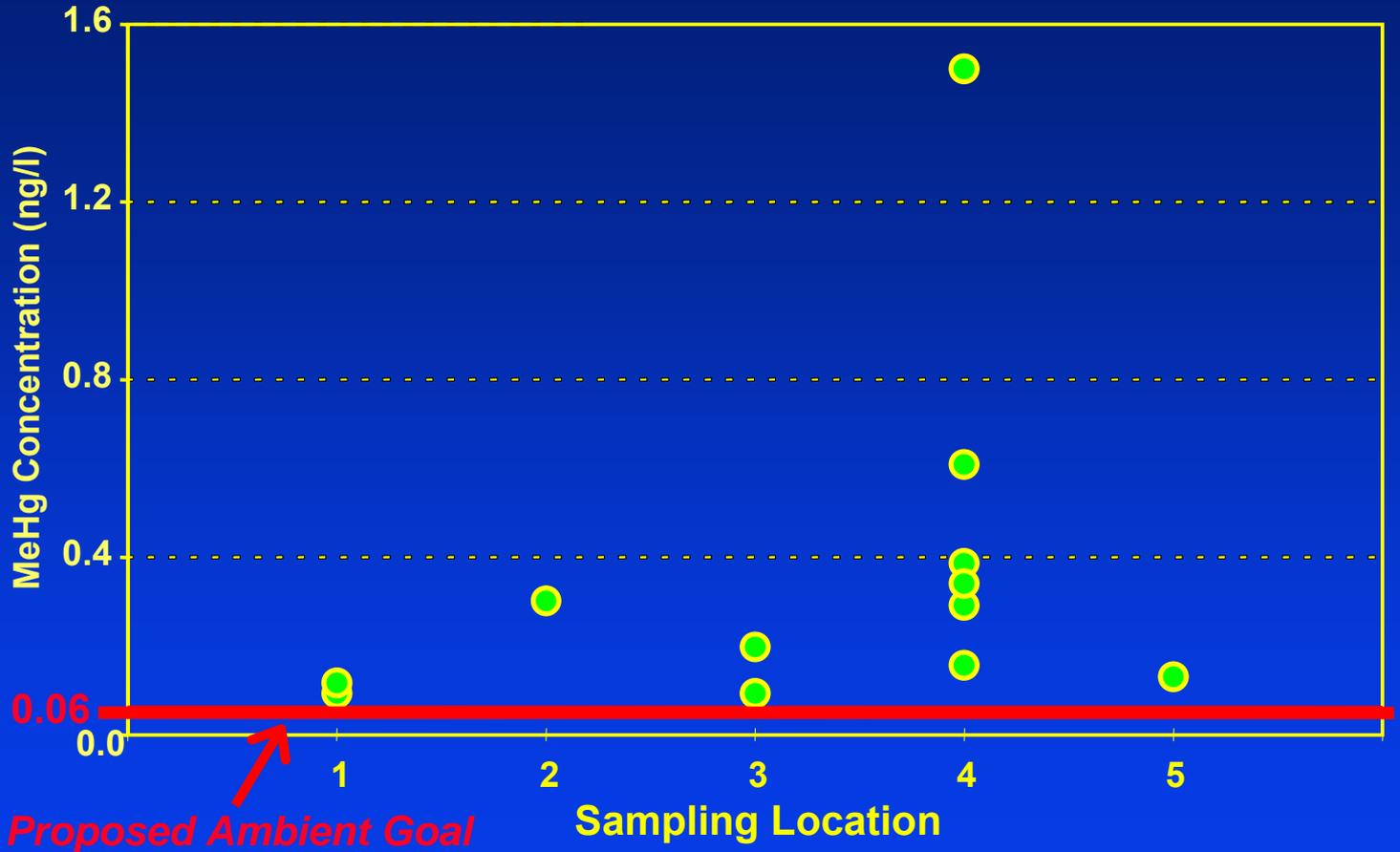
Urban Runoff MeHg Concentrations



Municipal WWTP Effluent MeHg



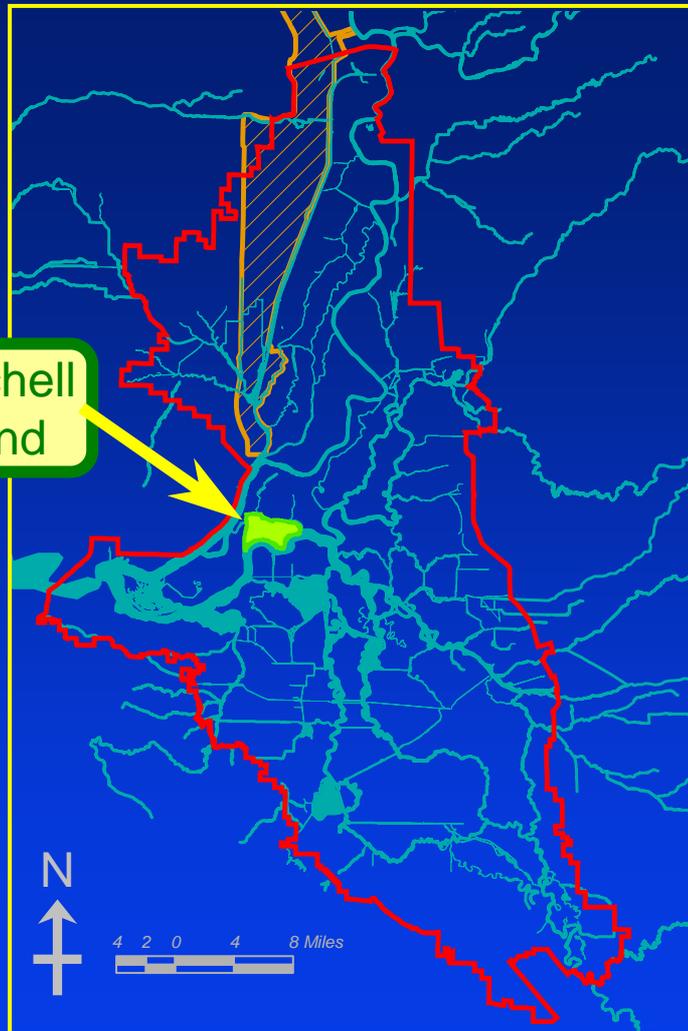
Delta Island Ag Drain MeHg



MeHg Loading from Delta Wetlands

TMDL based on
evaluation of
MeHg production
at two
experimental
ponds on
Twitchell Island

Twitchell
Island



Twitchell Island Marshes

Two Experimental Ponds



- 10:1 difference in summer production between shallow pond with submerged aquatic vegetation & deeper pond with more open water
- Winter production was the same at both ponds

Wetland MeHg Characteristics

Preliminary Summary

Watershed	Site	Marsh Type	MeHg Characteristics
Delta	Twitchell Island	2 Permanent (test ponds)	Both sources  (one with 10x the summer production)
	Browns Island	Permanent, tidal	Small source 
	Sycamore Slough	Permanent, tidal	Sink 
Cache Creek	Anderson Marsh	Permanent	Source 
	The Nature Conservancy	Permanent	Source 
Mud Slough	San Luis Wildlife Refuge	2 Permanent	Both neutral 
		6 Seasonal	All sources 
Suisun Marsh	First Mallard Branch (interior marsh)	Permanent, tidal	Source 
	Suisun Slough (mouth)	Permanent, tidal	Sink 

Understanding MeHg Differences Between Individual Sources Leads to MeHg Controls...

*In addition, better characterization of Delta wetlands is critical because if all ~26,000 acres of Delta wetlands behave like Twitchell Island's shallow marsh or Mud Slough's seasonal marshes, **within-Delta wetlands** could account for **20% or more** of all Delta MeHg loading.*



Phase 1 Studies

- Irrigated Ag lands & wetlands
- Large WWTPs & stormwater agencies
- Cache Creek Settling Basin

Coordinated Studies:

Minimize Cost & Maximize Effectiveness

More Phase 1 MeHg Requirements

- **Existing Sources:**
 - ◆ MeHg concentration limits
- **New Sources:**
 - ◆ Characterize MeHg discharge
 - ◆ Participate in MeHg control studies
 - ◆ Implement management practices

Mercury Offsets

- Reduce inorganic Hg and/or MeHg at another watershed source rather than on-site
- Phase 1: Adopt guidance for voluntary pilot projects

Summary – Phase 1

- Dischargers conduct MeHg studies
- Watershed mercury reductions
 - ◆ High priority: Cache Creek Settling Basin
- Develop upstream TMDLs
- New MeHg & Hg sources:
 - ◆ Conduct studies
 - ◆ Implement feasible management practices

Summary – End of Phase 1

- Review MeHg study results
- Consider:
 - ◆ Allocation adjustments
 - ◆ Compliance schedule adjustments
 - ◆ Mercury load limits
 - ◆ Offset program

Summary – Phase 2

- Dischargers implement MeHg and Hg controls
- 2030 compliance date

Board Questions



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- Draft Mercury Control Program
- **Stakeholder Involvement**
- Issues
- Next Steps

Stakeholder & Scientific Peer Review

□ June 2006:

Draft TMDL / BPA report

- ✓ Scientific peer review
- ✓ Public review
- ✓ Built upon 2005 TMDL report

□ July 2006 - March 2007:

Input from numerous stakeholder groups

Stakeholder Involvement

- State & Federal Agencies
- NPDES Dischargers
- Irrigated Lands and Wetlands
- Environmental Justice
- Multi-Stakeholder Groups

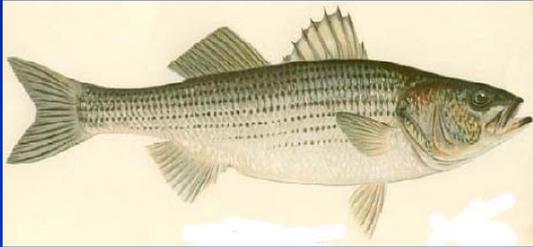
Status

- Feb 2007 Draft BPA language reflects scientific peer reviewer & stakeholder comments
- *Several issues remain*

Issues

1. Fish tissue objectives
2. MeHg requirements for wetlands
3. Who is required to conduct studies
4. Mercury Offsets

1. Proposed Fish Tissue MeHg Objective for Delta Fish



0.24 mg/kg mercury
in large bass & catfish

1 meal/wk



1. Proposed Fish Tissue MeHg Objective for Delta Fish

Stakeholder Comments:

-  Too high: Not stringent enough
-  Too low: Overly protective
Possibly unachievable



Safe Levels for Wildlife

Available information indicates
0.3 mg/kg in bass & catfish
would be protective of Delta wildlife



How should fishable be defined?

Fish Tissue Objective Alternatives

Mercury Objective (catfish & bass, mg/kg)	# of Meals* per Week	Consistent with USEPA Criterion for Sport Anglers	Consistent with USFWS Recommend- ations	Consistent with S.F. Bay WQOs	Consistent with USEPA Criterion for Subsistence Fishers
0.58	0.5	✓			
0.29	0.5	✓	✓		
0.24	1	✓	✓	✓	
0.05	4	✓	✓		✓

Proposed Fish Tissue Objective: 0.24 mg/kg

- Consistent with San Francisco Bay objective: Protects humans who eat one meal a week of Delta fish
- Reasonable because fish in the Central Delta meet this number

How should fishable be defined?

Fish Tissue Objective Alternatives

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0.05	4	✓	✓		✓

2. MeHg Requirements for Wetlands

Why put any limits on wetlands
when they provide ecosystem
benefits?

Wetland Concerns

- Wetlands can be sources of MeHg
- 30-45,000 acres wetland planned
- CalFed ROD: MeHg concerns, requires mitigation measures, locate restoration projects away from Hg enriched areas

Wetland Options

- Determine MeHg characteristics & develop management practices
- **Alternative:** No wetland MeHg control, but could result in increased MeHg controls for other sources
- **Need to consider:** Ecosystem functions & effects of MeHg management

3. Phase 1 Studies

- Irrigated Ag lands & wetlands
- Large WWTPs & stormwater agencies
- Cache Creek Settling Basin

Coordinated Studies:

Minimize Cost & Maximize Effectiveness

Alternative: Require more upstream dischargers to do studies

- Tributary wetland & Ag lands not included because, at the time of TMDL development, no data were available
- Comment: More effective & fair if upstream Ag and wetland managers were included in study requirement

Another Alternative:

Comment: State & Federal Government
should conduct MeHg studies

Board Questions



Issues

1. Fish tissue objectives
2. MeHg requirements for wetlands
3. Who is required to conduct studies
4. **Mercury Offsets**

Mercury Offsets

- Voluntary: Phase 1 control program does not require immediate controls
- Pilot projects to determine feasibility of watershed mercury reduction projects instead of on-site controls
- State Board Offset Policy under development

Pilot Mercury Offset Guidelines

- First evaluate on-site controls
- Credits earned in Phase 1 could be applied to Phase 2 MeHg allocations
- Credits based on reductions to the Delta or Yolo Bypass
- Can occur in different watersheds

Offset Issues

- Approval process
- Public involvement
- Offset project location
- Offset projects at sites that also have MeHg allocations
- Offset ratios

Offset Issues

- Approval process and public involvement for individual offset projects?
 - ◆ Basin Plan, permits, EO approval
 - ◆ Concerns:
 - How to incorporate new information
 - Level of Board and public review

Offset Issues

- Location of offset project: same watershed as the discharger, or a different watershed if there are overall benefits?
- What is the responsibility of the project site where an offset is implemented?

Offset Issues

- Offset ratios: How much credit will be given for a project towards meeting MeHg allocations or other Hg limits?

Offset Recommendations

- Guidance for pilot projects in this Basin Plan amendment
- Project-specific details in permits or future Basin Plan amendments

Next Steps

- Revise reports
- Public review & comment period
- Board Hearing

Panels

- WWTPs
- Urban runoff
- Wetlands & Irrigated Agriculture
- Agencies: DWR / DFG
- Environmental Justice

Acknowledgements

Water Board Staff

Janis Cooke, Chris Foe, Melanie Medina-Metzger, Stephen Louie, Davis Bosworth, Helena Kulesza, Danny McClure, and many other staff from the Irrigated Lands, NPDES and Stormwater programs

State & Federal Agencies

CA Depts. of Health Services & Water Resources, CalFed, Central Valley Joint Venture Group, State Water Board Divisions of Water Rights & Water Quality, U.S. Bureau of Reclamation, USEPA Region 9 TMDL, Dredging & Sediment Management Teams

Stakeholders

Mercury Working Group, Delta Protection Commission/Delta Mercury TMDL Collaborative, Central Valley Clean Water Association, Northern Section of the Sacramento Valley California Water Environment Association, Sacramento Stormwater Quality Partnership, Sacramento Regional County Sanitation District, California Rice Commission, Northern California Water Association - Sacramento Valley Water Quality Coalition, San Joaquin-Delta Water Quality Coalition, Ducks Unlimited, The Nature Conservancy, State & Federal wetland managers, wetlands interests in the Yolo Bypass and other wetland groups/managers, representatives of Delta fish consumers, Clean Water Action

******CalFed Mercury Program Studies******

Questions, Comments & Panelists



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