Agenda Item 5
Mercury Strategy for the Bay-Delta Ecosystem

A Unifying Framework for Science, Adaptive Management, and Ecological Restoration
Sources of Mercury

Natural abundance
High in Coast Ranges
Lower in Sierra Nevada

Mining sources
Current and historic wastes from 239 known mines, most in Coast Range (inorganic Hg & MeHg)

Up to 3.6-million kg of Hg lost during precious-metal processing in Sierra Nevada during the late 1800’s (Alpers & Hunerlach 2000)

Riverine inputs
Contaminated waterways in Coastal and Sierra ranges continue to export inorganic Hg and MeHg to the Bay-Delta

Adapted from USGS
Hydraulic mining
Why is it a problem?

Mercury

Methyl mercury

Fish reproduction

Avian reproduction

Neurological impairment

Wetlands

Floodplains

Dredge tailings

Eliminate to the extent possible toxic impacts to aquatic organisms, wildlife and people.

Protect or restore functional habitats in the Bay-Delta estuary.
Mercury Contamination of Striped Bass
Comparison of Two Estuaries

Fish Length (cm)

Mercury Concentration (ppm)

Chesapeake Bay
San Francisco Bay-Delta

USEPA Criterion (0.3 ppm)

Gilmour and Riedel 2000
Davis et al. 2002
Methylmercury exposure: Is reproductive success being affected in California clapper rails?

Laboratory data by Heinz (USGS)
Field data by Schwarzbach & Adelsbach (FWS)
Process for development of the mercury strategy

- Public workshop (review of past research)
- Public workshop (Identification of management questions, critical information gaps, goals)
- Draft strategy document
  - Public & workshop participant review
  - Revisions to draft
  - Scientific peer review
- Final strategy document
Mercury Strategy

- A Unifying Framework for Science, Adaptive Management and Ecological Restoration

- Problem: biotic exposure to methylmercury

- Management goal: To avoid increasing – and to eventually decrease biotic exposure to methylmercury
The Mercury Strategy: Core Components and Linkages

Strategies for Reducing Exposure to Methylmercury (MeHg)

Evaluate & Remediate Sources of Mercury
- Characterize
- Prioritize
- Remediate
- Evaluate

Monitor, Assess Risk, Advise, and Evaluate
- Monitor mercury in fish
- Assess health risks
- Communicate advice
- Measure performance

Manage Landscapes to Reduce MeHg
- Identify factors controlling MeHg production that can be manipulated
- Evaluate responses to pilot-scale manipulation

Assess Ecological Risk
- Quantify MeHg exposure in field
- Experimentally examine effects of MeHg on reproduction
- Identify trophic pathways, areas, and habitats associated with high exposure to MeHg

Ecosystem Restoration

Assess Effects of Wetland Restoration on MeHg Exposure
- Examine Hg cycling processes
- Identify controls on MeHg
- Evaluate effects on exposure
## The Scientific & Management Challenge: Reducing Exposure to Methylmercury

<table>
<thead>
<tr>
<th>Approach</th>
<th>Objective</th>
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<tbody>
<tr>
<td>Source reduction</td>
<td>Decrease mercury inputs to environment and mass available for methylation</td>
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<tr>
<td>Fish advisories</td>
<td>Reduce dietary exposure in humans</td>
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<tr>
<td>Landscape management (largely untested)</td>
<td>Decrease methylmercury production in ecosystems</td>
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Next steps

- Solicit proposals consistent with the strategy
- Develop monitoring program
- Build institutional framework to support strategy
- Develop implementation plan