Statewide Mercury Control Program for Reservoirs

Reservoir Owner/Operator Workshop
Sacramento, CA

November 2, 2017
Statewide Mercury Control Program for Reservoirs

ADDRESSING MERCURY IN CALIFORNIA’S WATERS

Mercury is negatively impacting the beneficial uses of many waters of the state by making fish unsafe for human and wildlife consumption. Although mercury occurs naturally in the environment, concentrations of mercury exceed background levels because of human activities. Gold and mercury mines and atmospheric deposition are the predominant sources of mercury, with minor contributions from industrial and municipal wastewater discharges and urban run-off.

State and Regional Water Board staff are developing a statewide water quality control program for mercury in reservoirs.

The Statewide Mercury Control Program for Reservoirs will address 132 reservoirs identified as mercury-impaired as of July 2017.

> NEW! The draft staff report and draft regulatory language submitted for scientific peer review are posted below.

> NEW! The revised draft summary is available here (and is included in the draft staff report submitted for scientific peer review, which is posted below).

Peer Review Documents

The draft staff report and draft Mercury Reservoir Provisions (regulatory language) submitted to external scientific peer reviewers are provided here as a courtesy to stakeholders. Please note that no written public comments will be accepted on these documents at this time. A formal notice will be provided to the public, likely in mid-2018 at the earliest, identifying the public review period along with release of documents for review and comments, including proposed Mercury Reservoir Provisions, Staff Report, and other relevant supporting documents.


> Text, "Staff Report for Scientific Peer Review"

> Figures, "Staff Report Figures"

> Tables, folder of MS Excel tables, "Staff Report Tables"

> Appendices, folder of PDF files and MS Excel tables, "Staff Report Appendices"
Sport Fish
Average Methylmercury (top trophic level)

Average mercury concentrations in top trophic level reservoir fish
- Greater than 0.2 mg/kg
- Less than 0.2 mg/kg
Benefits and Challenges
Building a Reservoir

Before

After
Staff Report – key chapters

Chapter 4: Literature Review

Chapter 5: Factors Analysis

Chapter 6: Sources

Chapter 7: Implications
Chapter 4: Literature Review

Chapter 5: Factors Analysis
- aq Tot Hg
- Ratio aq MeHg : Chl-a
- Water Level Fluctuation

Chapter 6: Sources
- Soil Hg:
  - Natural Background
  - Modern Background

Chapter 7: Implications
- aq MeHg @ 0.009 ng/L
Implementation Plan

Pollution  Water Chemistry  Fisheries
Water Boards

Pollution

Water Chemistry

Fisheries
Summary

Mercury source control actions apply statewide – and (bullet 3) apply upstream of all mercury-impaired reservoirs.

Exposure reduction applies to all reservoirs.

Phase 1 pilot tests apply to non-hydropower mercury-impaired reservoirs.
Y-axis: standardized-size sport fish MeHg (mg/kg)
X-axis: Hg Atmospheric Deposition rate (modeled g/km²/yr)
Pollution → Reservoirs → Water Chemistry → Fisheries
Manage redox conditions

Redox sequence:
- $O_2$ aerobic heterotrophs
- $NO_3^-$ denitrifiers
- $MnO_2(s)$ fermenters
- $Fe(OH_3)(s)$ fermenters
- $SO_4^{2-}$ sulfate reducers
- $H^+$ methane producers

Desirable

Avoid
Oxygenation Pilot Tests

Santa Clara Valley Water District
- Solar-powered circulators
- HOS line diffuser

Water Chemistry
Santa Clara Valley Water District

HOS: Hypolimnetic Oxygenation System

Citation: Dave Drury SCVWD
Source Removal and Nitrate Addition
Onondaga Lake, New York

Citation:
Charles T. Driscoll Syracuse University
Manage redox with $\text{NO}_3^-$

Citation:
Charles T. Driscoll Syracuse University
Reservoirs

Water Chemistry  Fisheries
Food lower in MeHg: Algal Bloom Dilution

Fertilize
increase algae
same MeHg

Carefully
no more than 2x Chl-a
and Chl-a ≤5 ug/L
Food lower in MeHg

Stock prey with low MeHg e.g., Rainbow trout

Citation: Jesse Lepak
Questions?

Discussion: Pilot Tests

- What are the biggest limitations to coordinating for pilot tests?
- What other pilot tests would you suggest?