Joint Informational Hearing of the
Assembly Water, Parks & Wildlife Committee
Assembly Environmental Safety and Toxic Materials Committee
Assembly Natural Resources Committee

on

Public Land and Water Contamination Issues
Related to Historic Gold Mining in California

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Testimony of Carl Wilcox, Chief
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Chair's and Committee members, good morning. My name is Carl Wilcox and I am Chief of the Water Branch in the Department of Fish and Game. The Department appreciates the opportunity to provide information on its work in the Bay-Delta to address mercury contamination and its effects on wildlife and humans. The Department is the State Implementing Agency for the CALFED Ecosystem Restoration Program (ERP).

As you all know, mercury contamination is widespread throughout the Bay-Delta ecosystem. Although mercury is a naturally-occurring element, gold mining and processing released high concentrations to the environment. Methylation of mercury produces a toxic form that accumulates in fish and wildlife poses a human health risk principally through the consumption of mercury-contaminated fish and shellfish. Elevated concentrations of mercury in fish tissue may also represent a hazard to wildlife, especially fish eating birds and mammals.

The challenge to scientists and managers is to avoid increasing exposure of biota to methylmercury. It is desirable to decrease methylmercury exposure so fishery resources, wildlife, and human health are protected. To do this effectively we need to understand mercury cycling in the Bay-Delta ecosystem.

To address this, CalFED developed a strategy to provide a unifying framework for mercury investigations, and to build a scientific foundation for ecosystem restoration, environmental planning, and the assessment and reduction of mercury-related risk in the Bay Delta ecosystem. The strategy contains six components:

- evaluate mercury and methylmercury sources
- remediate mercury source areas
- quantify the effects of ecosystem restoration on methylmercury exposure
- assess ecological risk
- develop management approaches for reducing methylmercury contamination
- monitor mercury in fish, assess the health-risk, and communicate that risk to the public

Following the mercury strategy, ERP funding has supported many advancements in understanding mercury fate, transport, and biological effects.

ERP studies

ERP-funded research on mercury sources demonstrated that methylmercury is introduced to the Delta from its tributary rivers, especially under high flow conditions. Unlike mercury cycling in the eastern US, atmospheric deposition is a minor source of mercury loading.

The ERP also funded inventories of abandoned mine sites that may be affecting Delta water quality.

New research demonstrated that mercury and methylmercury concentrations in Delta sediments are major sites of methylmercury production. Dissolved organic matter binds mercury, and different wetlands with different concentrations and types of dissolved organic matter cycle mercury at different rates.

It also appears that intermittently-flooded areas, such as high marsh interiors and floodplains, produce more methylmercury than perennially wet areas. Methylmercury production is higher in sediments with high living root density, whereas absence of vegetation seems to reduce rates of methylmercury production.

These findings from ERP-funded research have important implications for wetland restoration and management, as understanding mercury methylation is critical to minimizing mercury contamination of fish and wildlife.

ERP research was also focused on the direct effects of mercury on water birds. This research showed mercury in eggs of some species are above levels known to be toxic, especially in fish-eating birds, and that embryos of the endangered California clapper rail maybe especially sensitive to mercury.

The program also identified a link between methylmercury and other contaminants found in the Bay-Delta system, such as selenium. In bird embryos of some species, exposure to both methylmercury and selenium resulted in greater effects than were seen from exposure to either one of these alone,

Future actions to address the identified mercury problems.

The *first recommendation is to Reduce Mercury Loading to the Bay-Delta System from the Cache Creek Watershed.*

The Cache Creek watershed comprises about two percent of the Central Valley but exports about sixty percent of the mercury, and about half of that is trapped by the Cache Creek Settling Basin with the remainder flowing into the Yolo Bypass. Reducing mercury loading from the Settling Basin is key to reducing methyl mercury production in the Yolo Bypass and its discharge into the Delta.

ERP and the Central Valley Regional Water Quality Control Board are planning efforts to periodically clean out the Settling Basin and raise the weir to maintain and increase mercury trapping capacity. This new effort has three independent actions. .

The first step is to Improve Mercury Trapping Efficiency of the existing water system. These actions would cost in the range of 3 to 6 million dollars. The next action is to excavate Mercury polluted sediments. The cost for this effort is significant; ranging upwards of 70 million dollars. The last action is to create a long-term program to maintain low levels by periodically excavating and maintaining the basin's sediment trapping efficiency.

Initial project implementation would be funded in part with existing ERP funds from Proposition 13, although additional funding will be needed for long-term maintenance of the basin.

D*evelop and implement wetland Best Management Practices.*

The Central Valley Regional Water Quality Control Board staff have estimated that wetlands in the Yolo Bypass need to reduce methyl mercury loading by 84% to protect fish consumption and wildlife. The ERP and the CVRWQCB are developing a project to evaluate how seasonal wetlands might be managed to minimize methylmercury production and export, including the amount and type of vegetation, the importance of disking and mowing, and whether pre-wetting might reduce methylmercury production. The effort could cost: $600,000, using existing funds from Proposition 13.

Research is needed on the effects of wetland restoration on methyl mercury production.

It is possible that on-going restoration efforts could exacerbate the mercury problem. We need to characterize existing levels of mercury and other factors that might influence methylmercury production. The cost of this effort would depend on the level of effort and no funding source is currently available to support this work.

Finally, to make sure our restoration efforts are effective we need to monitor mercury throughout the Delta.

Periodic monitoring at key locations within the Bay-Delta system is critical to track changes in methylmercury concentrations and bioaccumulation, and to identify potential effects of restoration projects and hydrology changes resulting from changes in conveyance. Without a monitoring program, adaptive management is impossible. Several active long term water quality monitoring programs are ongoing in the Bay-Delta system, and a mercury monitoring program could be included in one of these programs. We estimate costs to be $50,000 to $200,000 per year, however no funding source is currently available to support this work. An important tool for this would be fish monitoring including “biosentinel” fish monitoring which will be discussed in the following presentation.

This concludes my remarks. If you have any question I would be happy to answer them now.