Mercury Imports and Exports of Four Tidal Wetlands in the Sacramento Valley

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What are we going to talk about?

Background

• DWR's Involvement

•The Study

Results and Conclusions



47,000 abandoned mines in California.

Main source = mines*

Wonderful graphic from USGS Fact Sheet 2005-3014 (thank you thank you!)

Mercury vs Methylmercury

Methylmercury is more <u>toxic</u>

Organic molecule

Crosses blood brain barrier

Accumulates in nervous system

Kidney and brain damage





Methylmercury, the master bioaccumulator and biomagnifer!



DWR's Involvement

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY REGIONAL WATER QUALITY CONTROL BOARD CENTRAL VALLEY REGION

> Sacramento – San Joaquin Delta Estuary TMDL for Methylmercury

> > Staff Report

ANAGED WETLANDS CREATED MANAGED WETLANDS CREATED MORE THAN 30,000 ACRES OF DELTA HABITAT RESTORATION & PROTECTION MORE THAN 30,000 ACRES OF DELTA HABITAT RESTORATION & PROTECTION MORE THAN 30,000 ACRES OF DELTA HABITAT RESTORATION & PROTECTION MORE THAN 30,000 ACRES OF DELTA HABITAT RESTORATION & PROTECTION MORE THAN 30,000 ACRES OF DELTA HABITAT RESTORATION ACRES OF DELTA HABITAT RESTORATION MORE THAN ACRES OF DELTA HABITAT ACRES OF A The Study

Four wetlands

Not hydrodynamically leaky!*

Measured for ONE year EACH

Imports vs Exports

Monthly Hg and MeHg sampling



Yolo Bypass Wildlife Area Tidal Wetland



Blacklock Tidal Wetland





North and South Breaches

Blacklock

0 0.05 0.1 0.2 Miles

Source: Es A, Digital@lobe, GeoEye, Leubed, USBA, USBS, AEX, Getmapping Aerogrid, IGN, IGP, and the GIS User Community

North Lindsey Slough Tidal Wetland





Westervelt Cosumnes River Tidal Wetland

Cosumnes River

Westervelt Cosumnes **River Tidal Wetland**

Staten Island

12

160

160

Elk Grove

Galt

Lodi

Westervelt Cosumnes

River Tidal Wetland

New Hope Rd



1. Tidal wetlands are a <u>net source</u> of <u>total</u> <u>methylmercury</u> on an <u>annual basis</u>; and

2. Tidal wetlands are a <u>net source</u> of <u>total</u> <u>mercury</u> on an <u>annual basis</u>.

*that we care about for the purposes of this presentation

FLOW X CONCENTRATION = LOAD Cubic feet per second (CFS) ng/L grams per tide

We measured...





- 1. Continuous flow
- 2. Mercury, methylmercury, total suspended solids ~monthly concentrations

Equipment









Westervelt Cosumnes River Tidal Wetland

Cosumnes River



Tidal wetlands are a <u>net</u> <u>source</u> of <u>total</u> MeHg on an <u>annual basis</u>.



Methyl mercury per Event

Source

Sink



6/27/2017 8/27/2017 9/26/2017 10/24/2017 11/14/2017 12/12/2017 2/6/2018 4/3/2018 4/24/2018 5/15/2018 6/12/2018

2 0.00Z

-0.003

0.004



Particulate and Filtered MeHg Loads at Blacklock Tidal Wetland 0.8 0.6 0.4 Source 0.2 47% 52% 9-0.2 -0.4 Sink -0.6 -0.8 Filtered MeHg -1 Particulate MeHg -1.2 Jun-15 Jul-15 Aug-15 Sep-15 Oct-15 Nov-15 Dec-15 Jan-16 Feb-16 Mar-16 Apr-16 May-16 Jun-16 % - percent of days included in monthly estimates Particulate and Filtered MeHg Loads at Westervelt Cosumnes Tidal Wetland 1.5 0.5 Wetland Flooded 30 100% 87% 32% -0.5 Filtered MeHg Particulate MeHg -1 Jul-18 Aug-18 Sep-18 Oct-18 Nov-18 Dec-18 Jan-19 Feb-19 Mar-19 Apr-19 May-19 Jun-19 Jul-19 % = percent of days included in monthly estimates

Source

Sink

Methyl

per

Month

Tidal wetlands are a <u>net</u> <u>source</u> of <u>total</u> MeHg on an <u>annual basis</u>.

Tidal wetlands are a <u>net</u> source of total MeHg on an annual basis.

Tidal wetlands are a <u>net source</u> of <u>total</u> THg on an <u>annual basis</u>.





Source

Sink

Total Mercury per Event







Source

Sink

Total

per

Month





% = percent of days included in monthly estimates

Tidal wetlands are a <u>net source</u> of <u>total</u> THg on an <u>annual basis</u>.

Tidal wetlands are a <u>net source</u> of total Hg on an <u>annual basis</u>.

Total Mercury – A More Mixed Result!

- Blacklock and Yolo both likely sinks of total mercury, mostly particulate.
 - Blacklock sunk PARTICLES!
 - Yolo water sink, sunk everything
- North Lindsey possibly <u>source</u> of particulate total mercury
 - Very small historical wetland
- Westervelt likely a <u>source</u> of total mercury
 - Floodplain, lotsa total mercury coming in and out



All the people who helped, thank you!

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Questions?



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