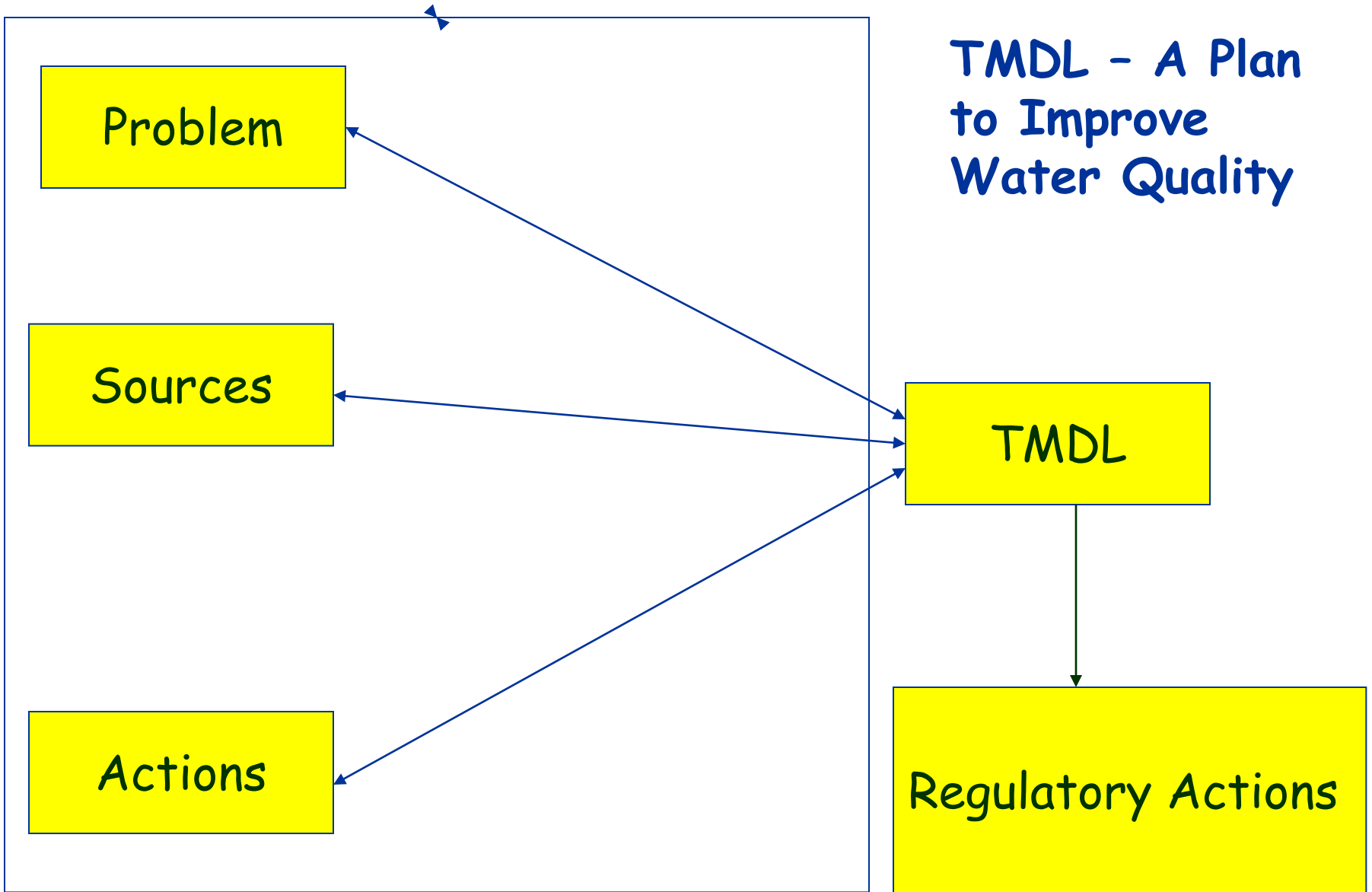


TMDL for PCBs [*Mercury*] in San Francisco Bay

**Presented to SF Bay Fish Project SAG
March 8, 2012
Jan O'Hara**



TMDL - A Plan to Improve Water Quality



***Total Maximum Daily Load**

PCBs Problem

- San Francisco Bay impaired by PCBs in fish
- Concentrations increase as you move up the food chain
- Exposure results in cancer risk and other health concerns



AVISO WARNING 警告事項

Fish in the San Francisco Bay have chemicals that may harm your health. Pregnant and nursing women, and children under six years should not eat more than one meal of fish a month. Other adults may safely eat up to two meals of fish a month.

Group of women Pregnant women Nursing women Children under six years	Adults
1 MEAL A MONTH	2 MEALS A MONTH

EAT BAY FISH SAFELY

BABALA

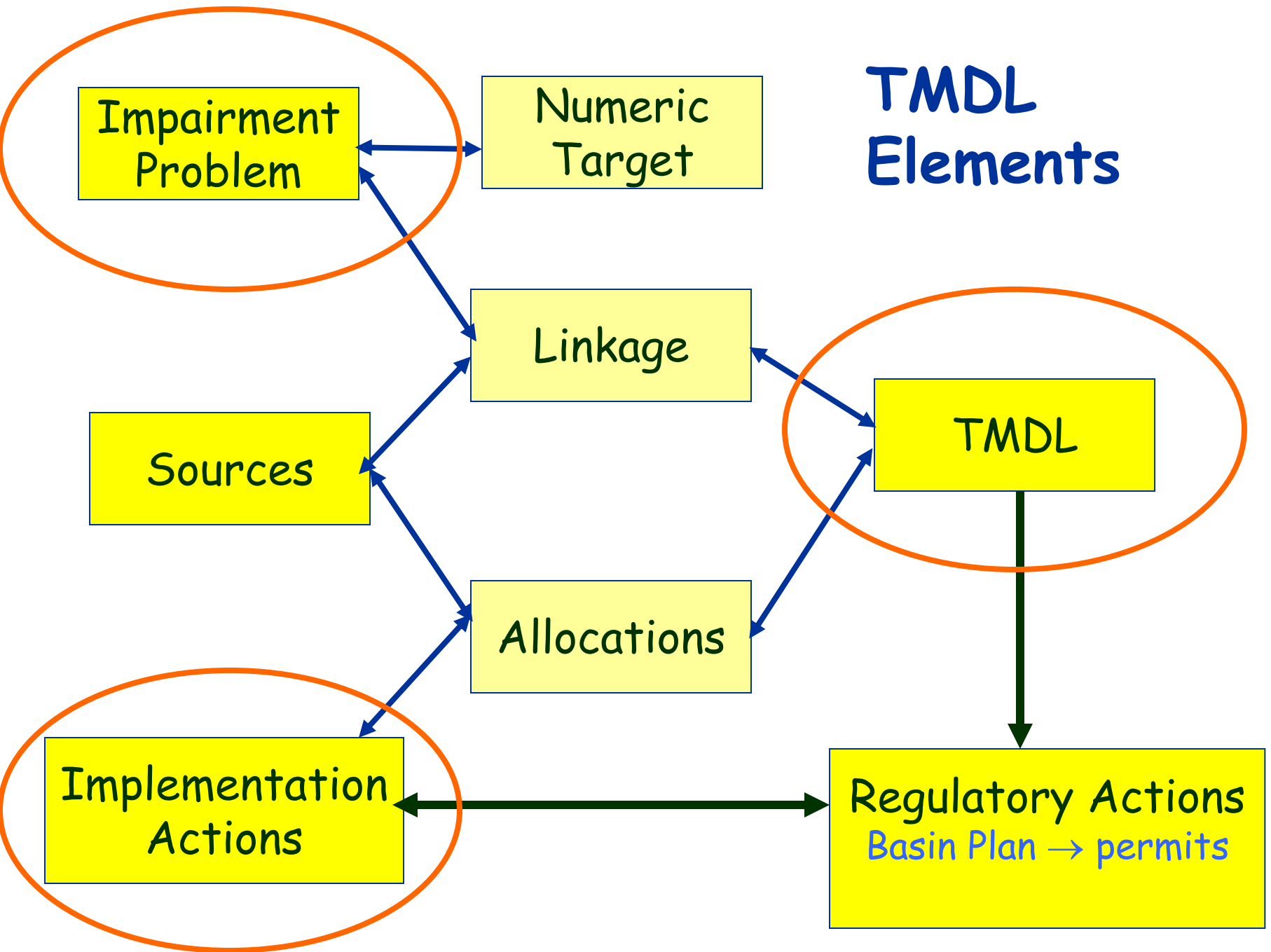
警告事項

1 MEAL A MONTH

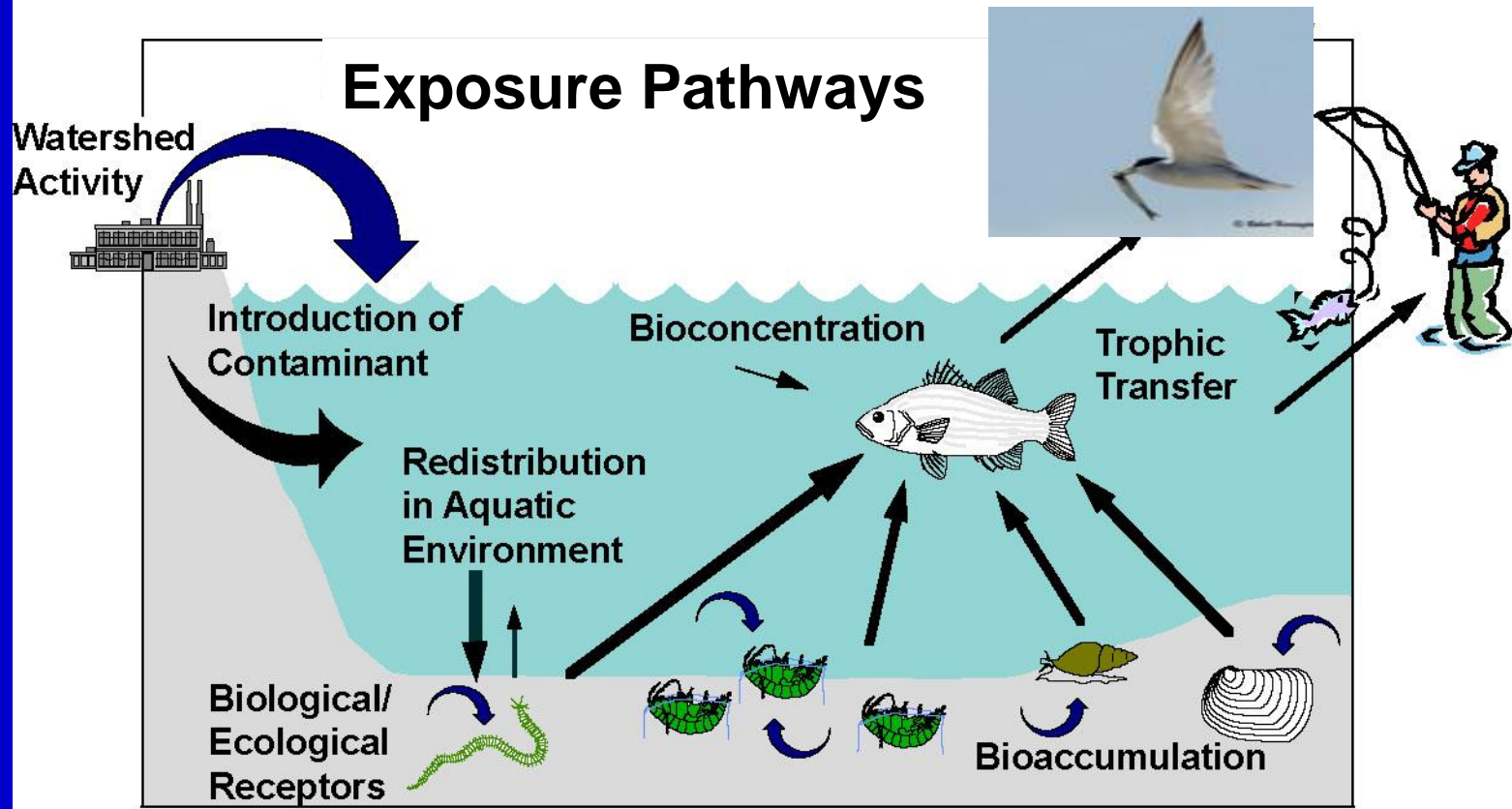
2 MEALS A MONTH

EAT BAY FISH SAFELY

TMDL Elements



Conceptual Understanding



PCB TMDL Development

Fish Target \Rightarrow 10 ppb



Food web model

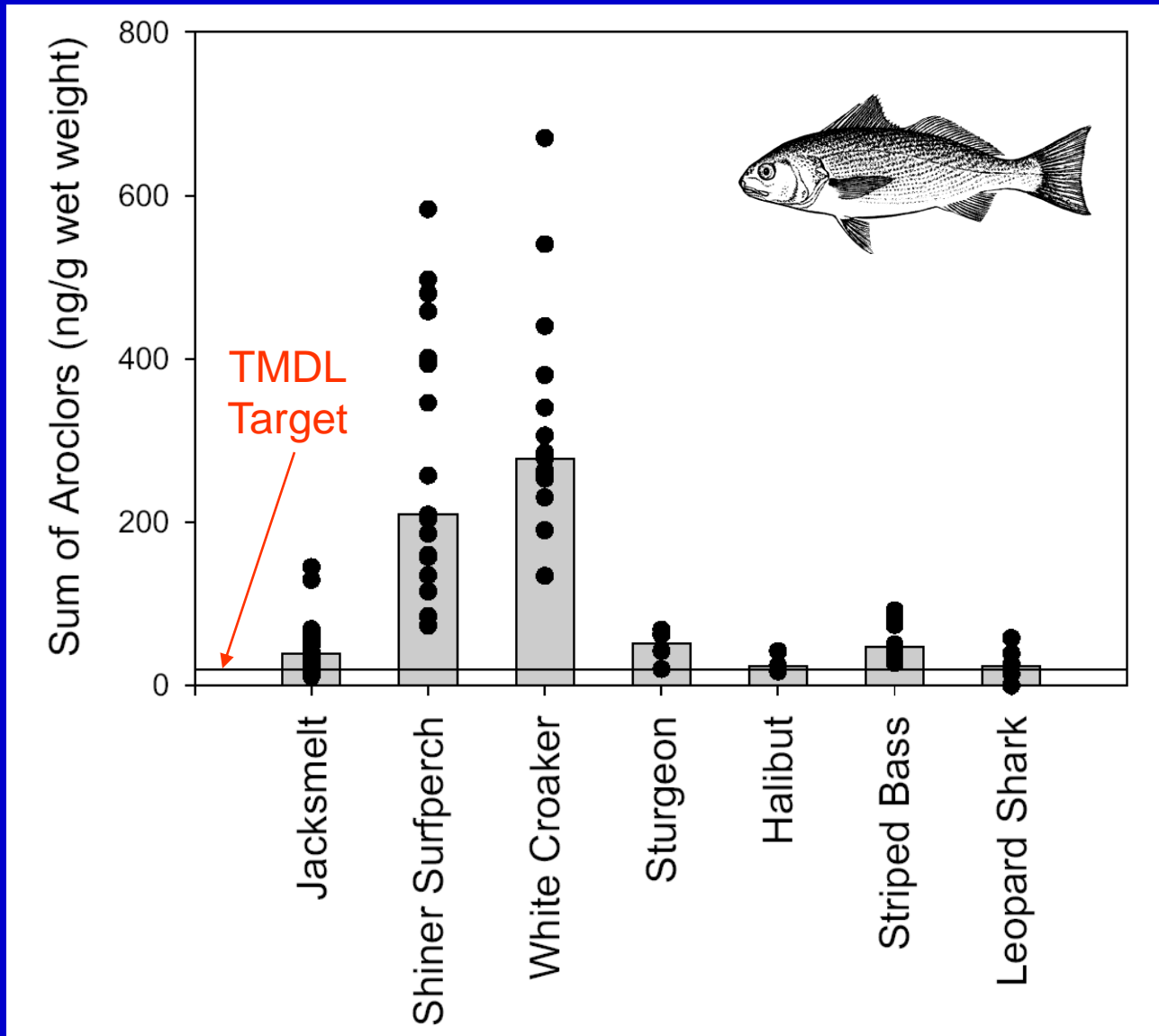
PCBs in Bay \Rightarrow 1 ppb or 160 kg
in surface sediments

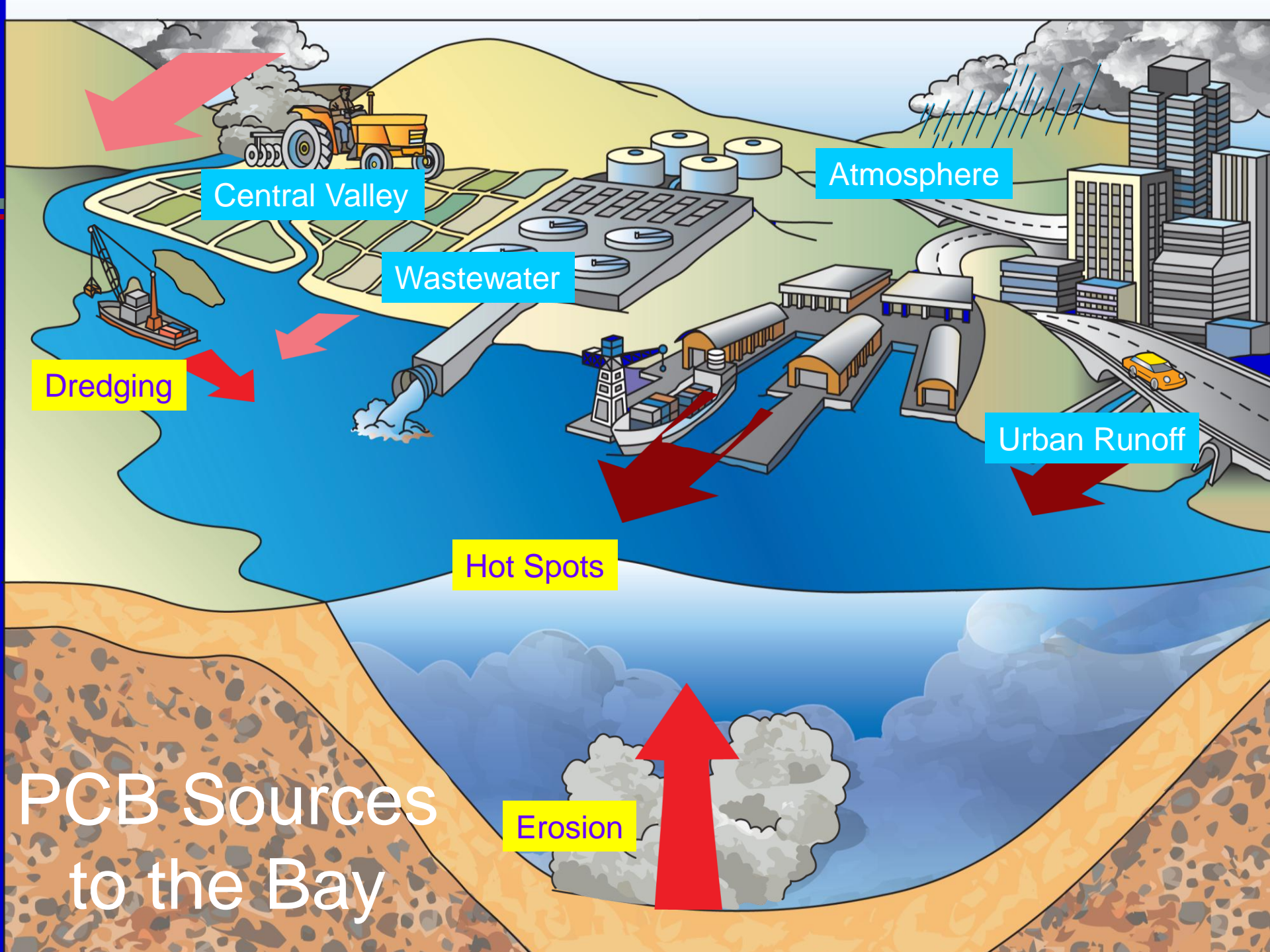


Mass budget model

TMDL \Rightarrow 10 kg/yr

PCB Concentrations in Fish





Central Valley

Atmosphere

Wastewater

Dredging

Urban Runoff

Hot Spots

Erosion

PCB Sources
to the Bay

Large Mass of PCBs in the Bay due to Past Activities

Compartment		PCB Mass (kg)
Water		3-5
Sediments	Total	18,000-52,000
	Active Layer	500-3,300

In-Bay “PCBs Hot Spots”

■ Work Completed

- » Oyster Point
- » Redwood City Harbor
- » Emeryville Crescent
- » Moffett field/NASA Ames-Northern Channel
- » Hamilton Army Airbase-Coastal Salt Marsh

■ Work Not Started

- » Oakland Harbor
- » San Francisco Airport
- » San Leandro Bay
- » Vallejo Ferry Terminal

■ Work in Progress

- » Alameda Naval Air Station Seaplane Lagoon
- » Hunter’s Point Shipyard
- » Yosemite Slough
- » Moffett Field/NASA Ames-Site 25
- » Oakland Army Base
- » Potrero Point
- » Stege Marsh

PCBs Allocations (kg/y)

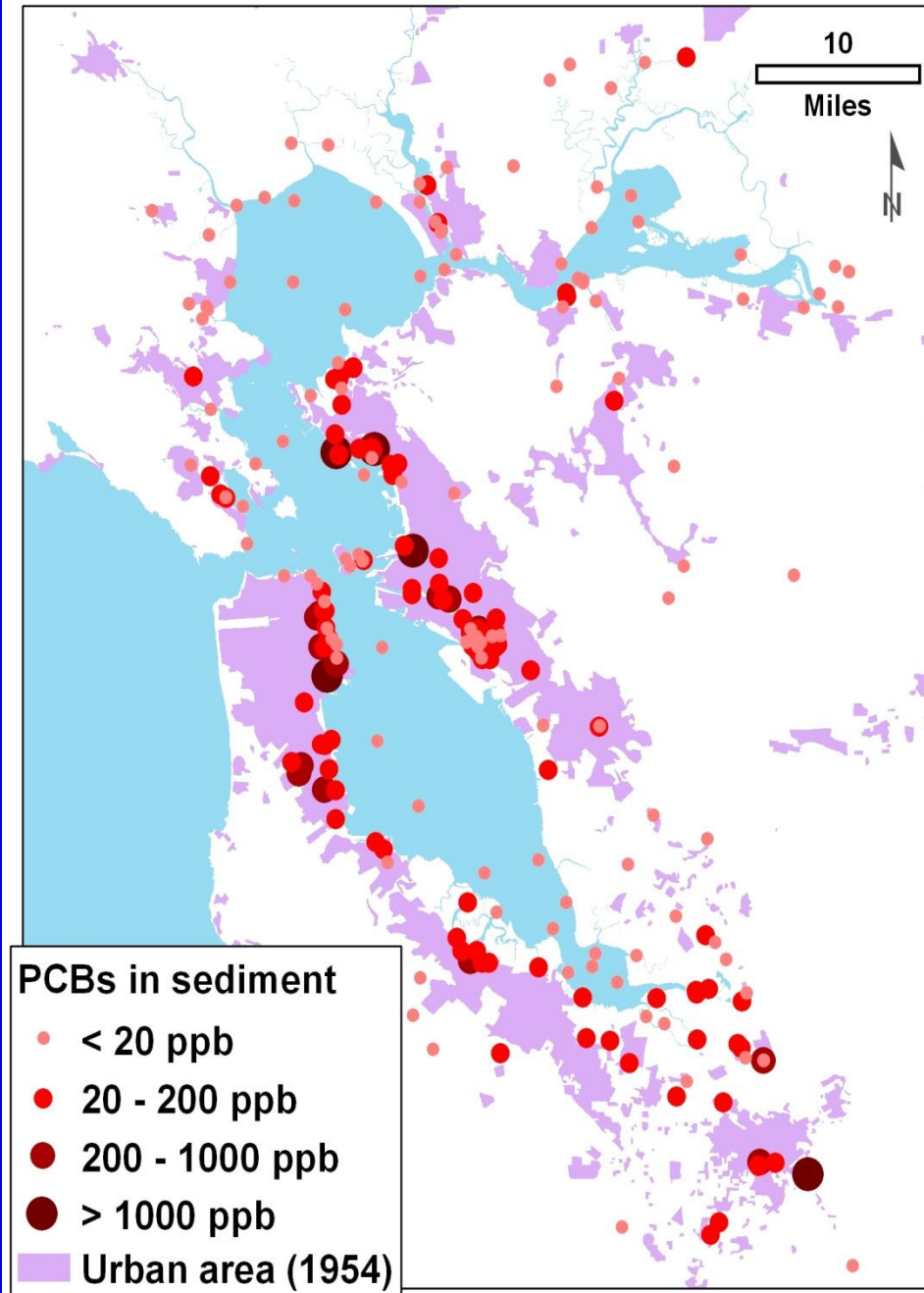
Source	Current Loads	Allocations
Atmospheric Deposition	net loss	0
Central Valley	11	5
Wastewater (WW)	2.3	2
Stormwater Runoff	20	2
Urban Runoff Treatment by WW		1

TMDL = 10 kg/yr

Implementation-External Sources

Air deposition	→	No action
Central Valley	→	Reduction from natural attenuation
Wastewater	→	Maintain current performance
Urban runoff	→	Reductions via source and treatment controls

PCBs in Urban Runoff Drainages



Urban Stormwater Runoff

■ Pilot projects – what works best?

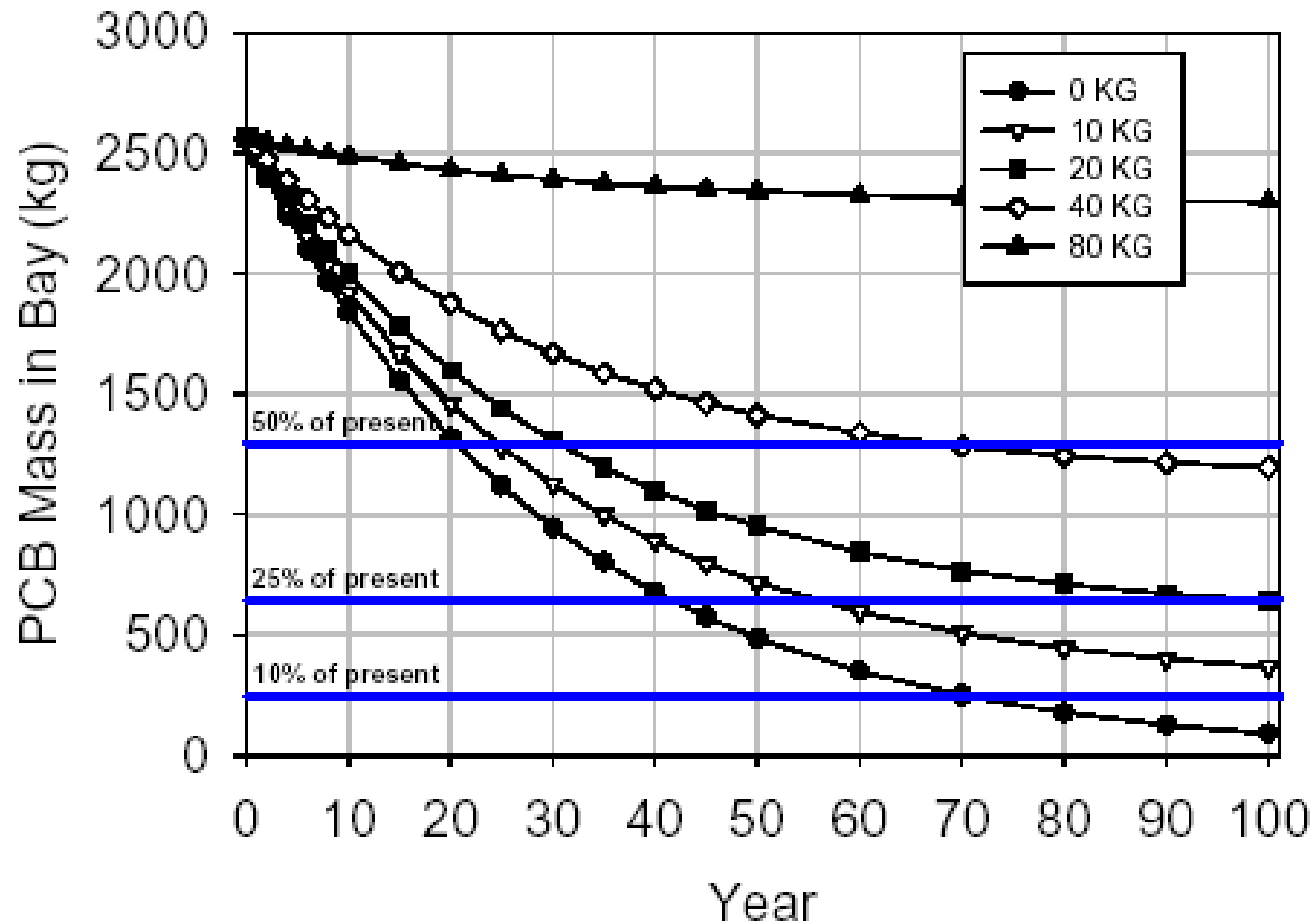
- » Contain PCB-Caulk
- » Identify PCB problem sites
- » Improve street “dirt mngt” O&M
- » Retrofit on-site treatment
- » Route runoff to Wastewater Plant



■ Fish Risk Reduction Project

- » Addresses risk to fish consumers while we are working on reducing PCBs & Hg in the Bay
- » Wastewater Plants & Industries participate also

Modeled Recovery of the Bay as a Function of PCBs loads



Mercury Fish Tissue

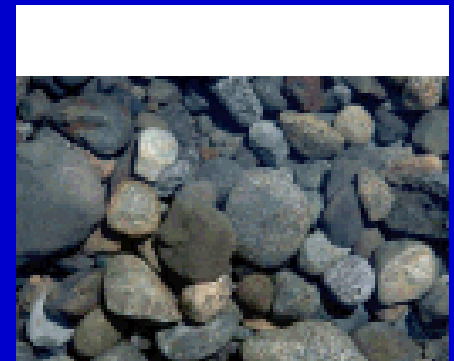
Target = 0.2 ppm

- Relates to human health
- Based on U.S. EPA Fish Tissue Residue Criterion (0.3 ppm)
- Accounts for local fish consumption patterns
- Need to reduce fish tissue concentrations by 40-50%



Mercury Sediment Target = 0.2 ppm

- Relates to sources
- Linked to other targets via linkage analysis
- Based on 50% reduction in existing sediment concentrations
- Used to allocate loads



Bird Egg Target = 0.5 ppm



- Relates to wildlife and rare and endangered species
- Based on lowest concentration where adverse effects observed
- May be inadequate to protect some species
 - » Proposed as “interim” target, pending new information
 - » Also expressed narratively
 - » OK because not sole target
- Need to reduce bird egg mercury concentrations by ~50%