

# Regulation of Sediment and Sediment Quality

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Water Board

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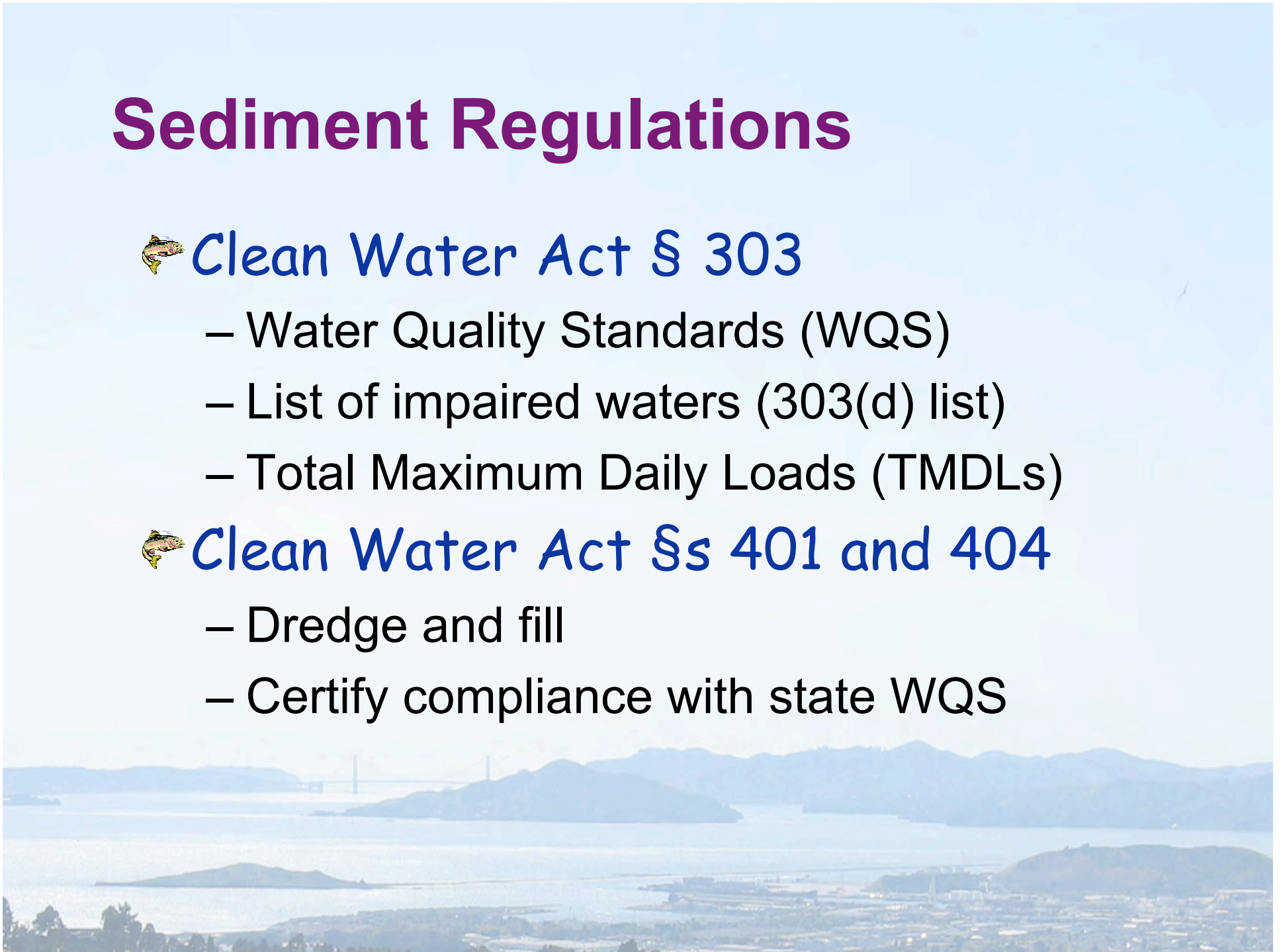
# Sediment Regulations

## Clean Water Act § 303


- Water Quality Standards (WQS)
- List of impaired waters (303(d) list)
- Total Maximum Daily Loads (TMDLs)


## Clean Water Act §§ 401 and 404

- Dredge and fill
- Certify compliance with state WQS



# Sediment Regulations

 **CA Water Code § 13263**  
– Waste Discharge Requirements

 **CA Water Code § 13390+**  
– Bay Protection and Toxic Cleanup Program  
– Sediment Quality Objectives

 **State Water Board Resolution 92-49**  
– Sediment cleanup actions

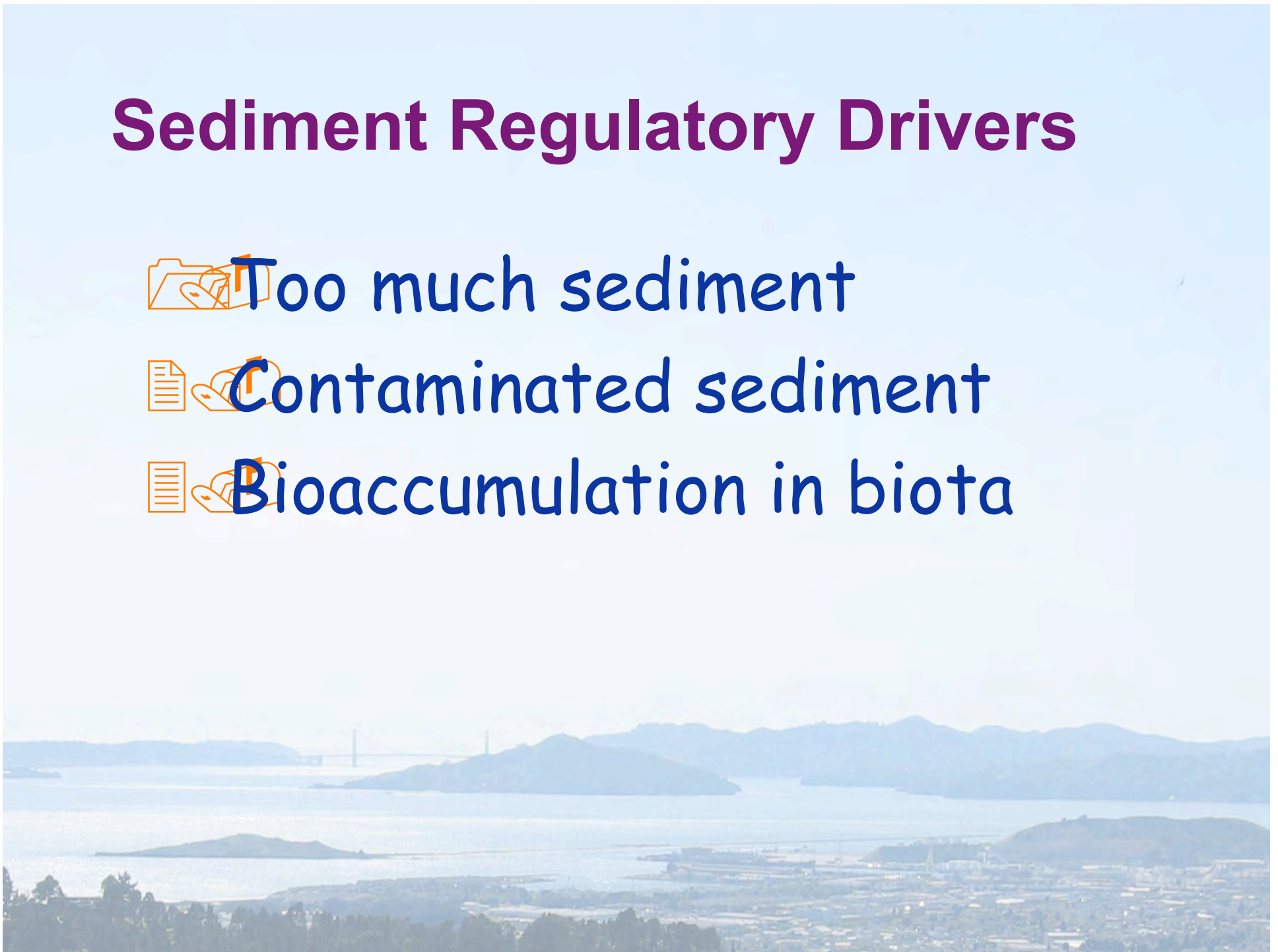


# Sediment Regulatory Drivers

 Too much sediment

  Contaminated sediment

  Bioaccumulation in biota



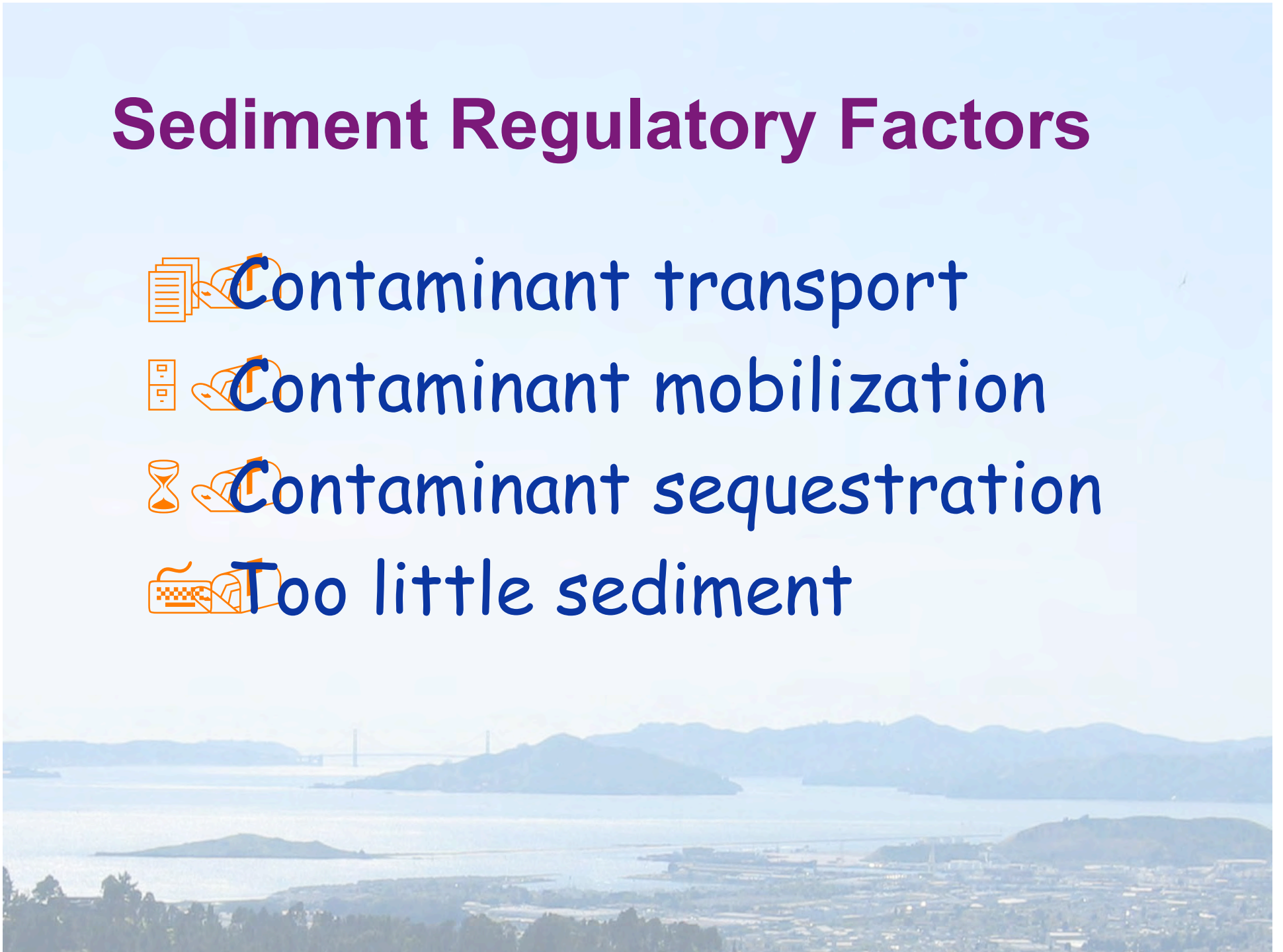
# Sediment Regulatory Factors

 Contaminant transport

 Contaminant mobilization

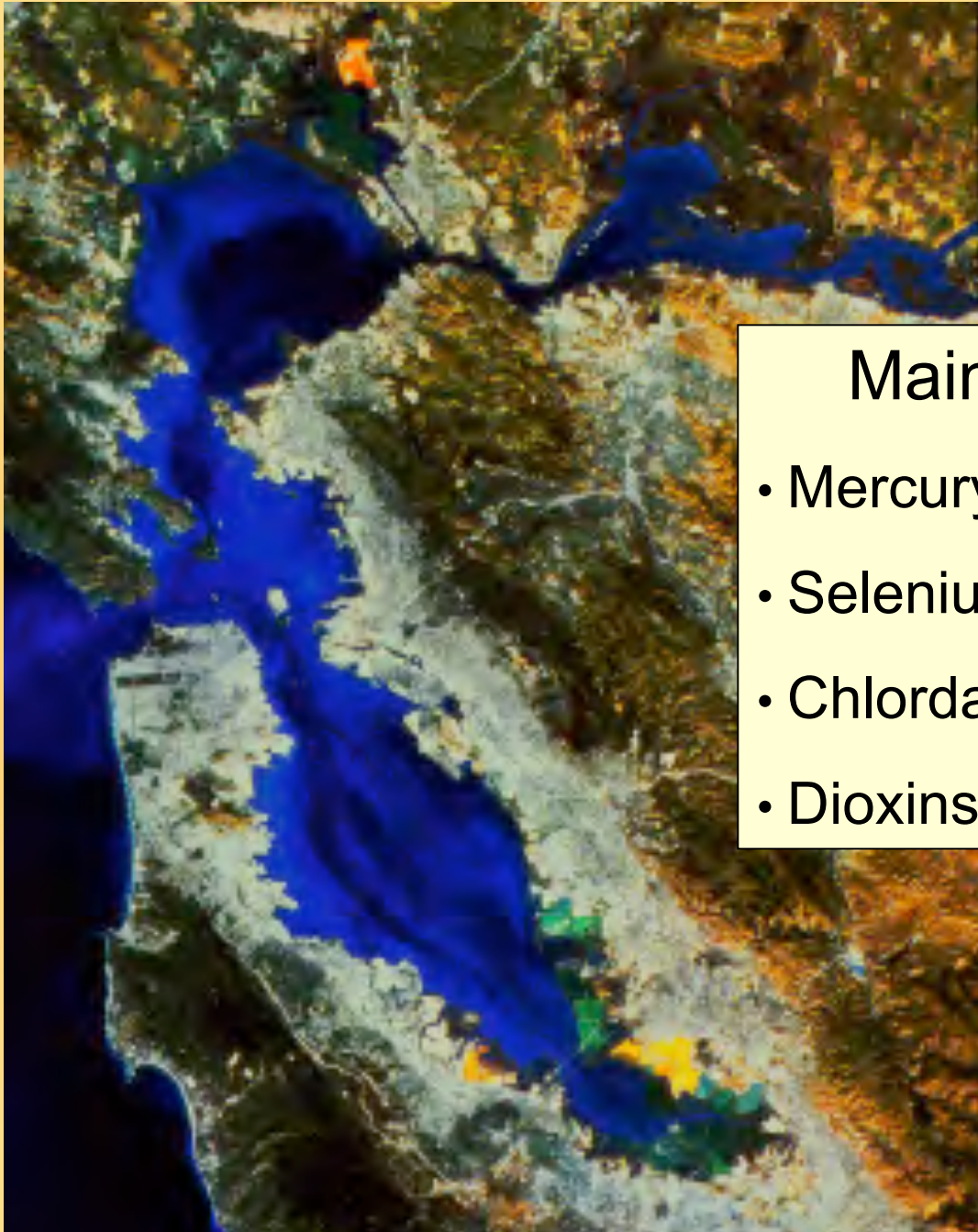
 Contaminant sequestration

 Too little sediment



|             | 1. Too Much | 2. Contamin | 3. Bioaccum | 4. Transport | 5. Mobilize | 6. Sequest | 7. Too Little |
|-------------|-------------|-------------|-------------|--------------|-------------|------------|---------------|
| SQOs        |             | X           | X           |              |             |            |               |
| 303(d) List |             | X           | X           |              |             |            |               |
| TMDLs       |             | X           | X           | X            |             |            |               |
| Hot Spots   |             | X           | X           | X            | X           | X          |               |
| Dredging    | X           | X           |             |              | X           |            |               |
| Disposal    |             | X           |             |              |             | X          | X             |
| Wetlands    | X           | X           | X           |              |             | X          | X             |





## Main SF Bay 303(d) List

- Mercury, PCBs (TMDLs Completed)
- Selenium (No Bay TMDL in progress)
- Chlordane, DDT, Dieldrin
- Dioxins and Furans

# 303(d) List - Sediment Hot Spots





# Sediment Quality Objectives

Pollutants in sediments shall not be present

- In quantities that, alone or in combination, are toxic to benthic communities
- in sediments at levels that will bioaccumulate in aquatic life to levels that are harmful to human health



# Sediment Quality Objectives

## Multiple lines of evidence

- Sediment chemistry, sediment toxicity, benthic community

## Sediment Quality Station Categories

**Severity of Effect**

|  | Unaffected         | Low Effect                        | Moderate Effect                   | High Effect                       |
|--|--------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| Potential that Effects are Chemically Mediated | Minimal Potential  | Unimpacted                        | Likely Unimpacted                 | Likely Unimpacted or Inconclusive |
|  | Low Potential      | Unimpacted                        | Likely Unimpacted                 | Possibly Impacted                 |
|  | Moderate Potential | Likely Unimpacted                 | Possibly Impacted or Inconclusive | Likely Impacted                   |
|  | High Potential     | Likely Unimpacted or Inconclusive | Likely Impacted                   | Clearly Impacted                  |

# Sediment Quality Station Categories

- Unimpacted
  - Likely Unimpacted
- 

Good

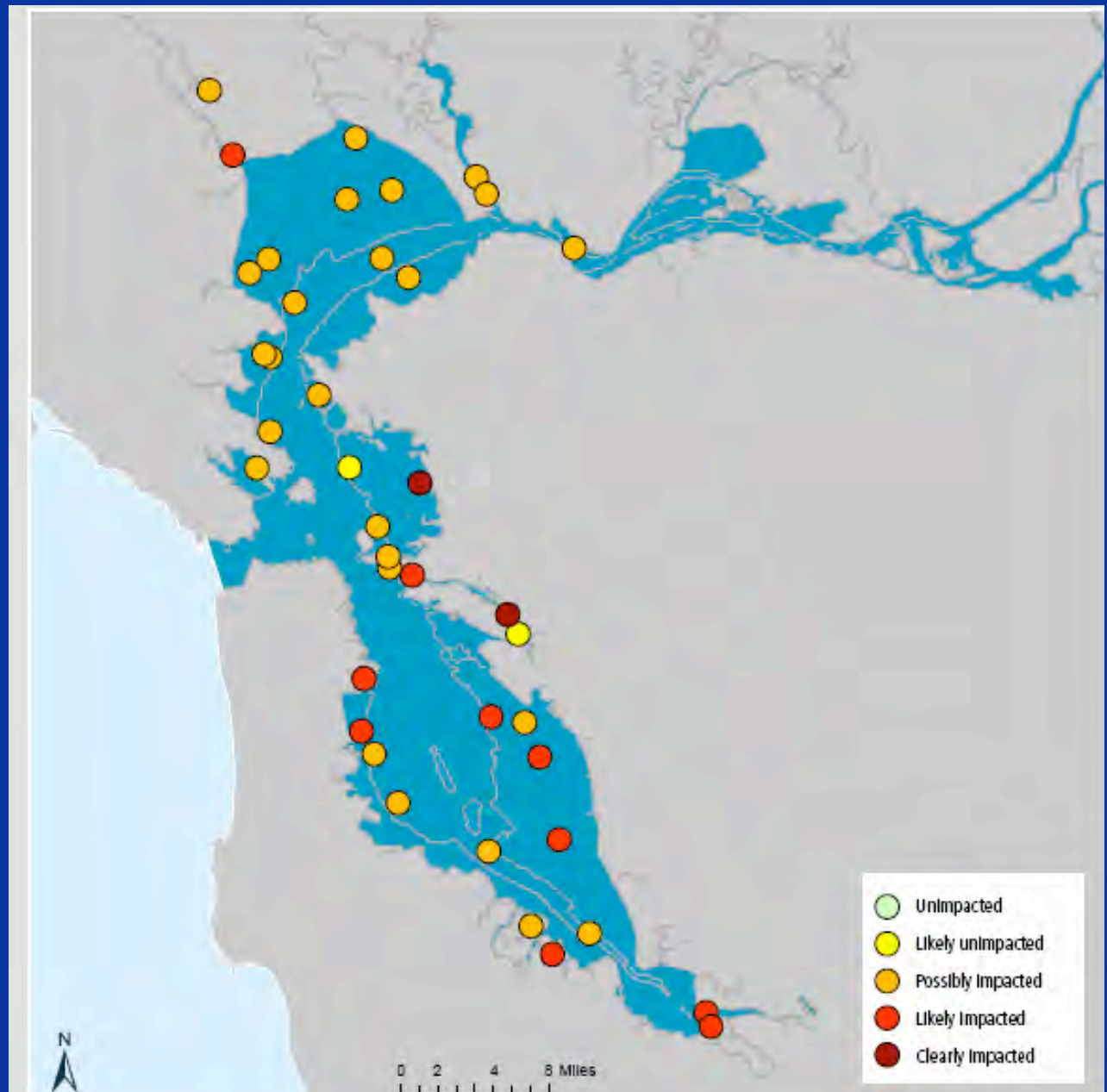
- Possibly Impacted
  - Likely Impacted
  - Clearly Impacted
- 

Not Good

- Inconclusive



# SF Bay Stations Sediment Quality



# PCBs TMDL

Fish Target  $\Rightarrow$  10 ng/g



**Food web model**

PCBs in Bay  $\Rightarrow$  1 ng/g in surface sediments

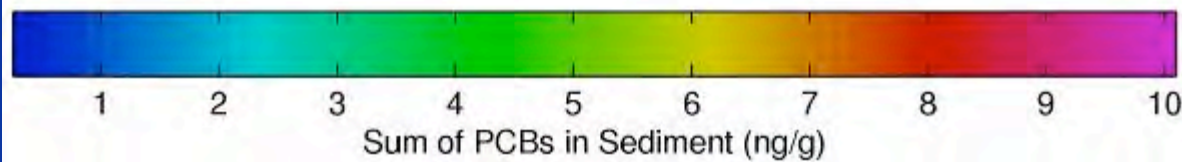
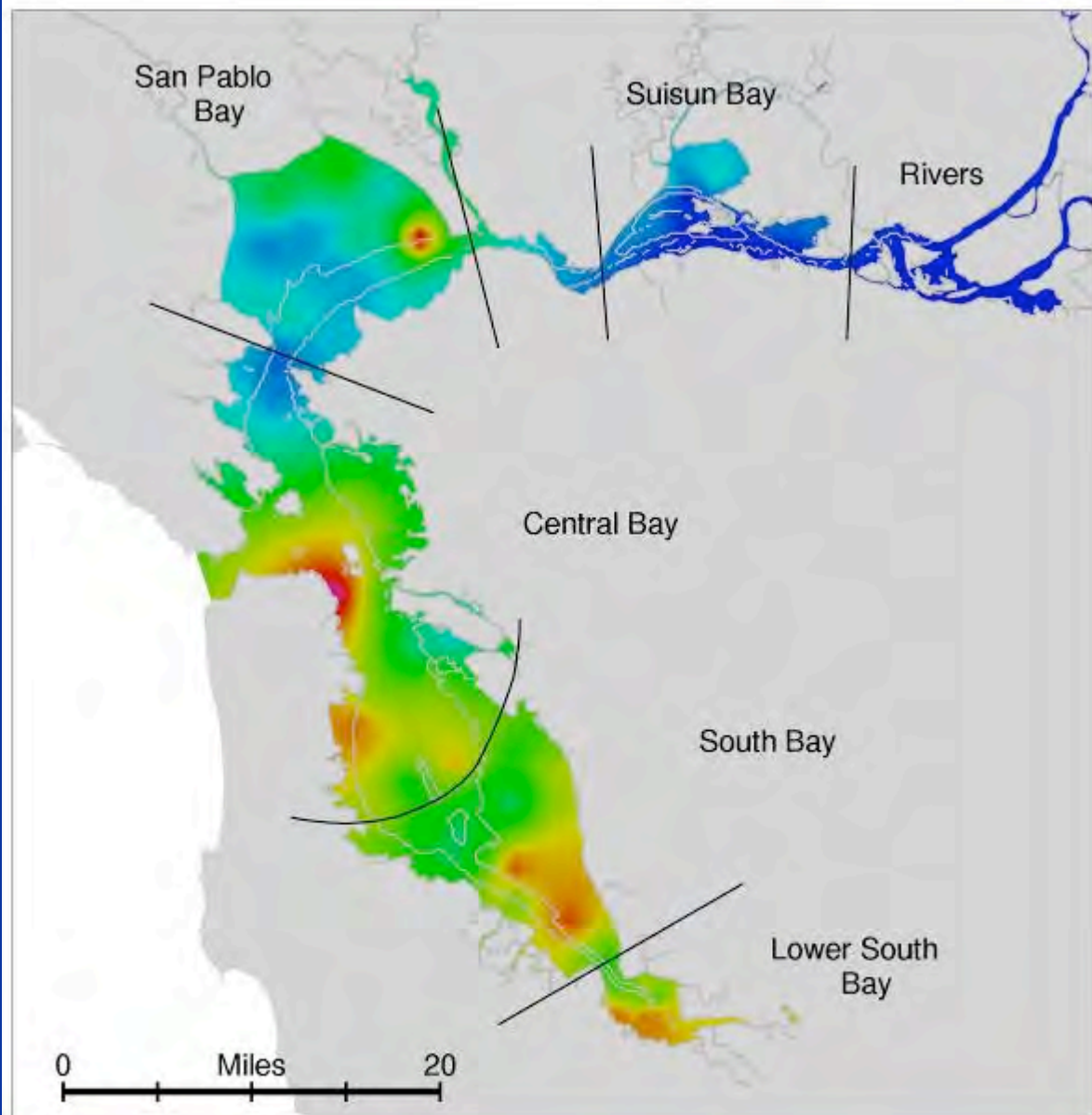


**Mass budget model**

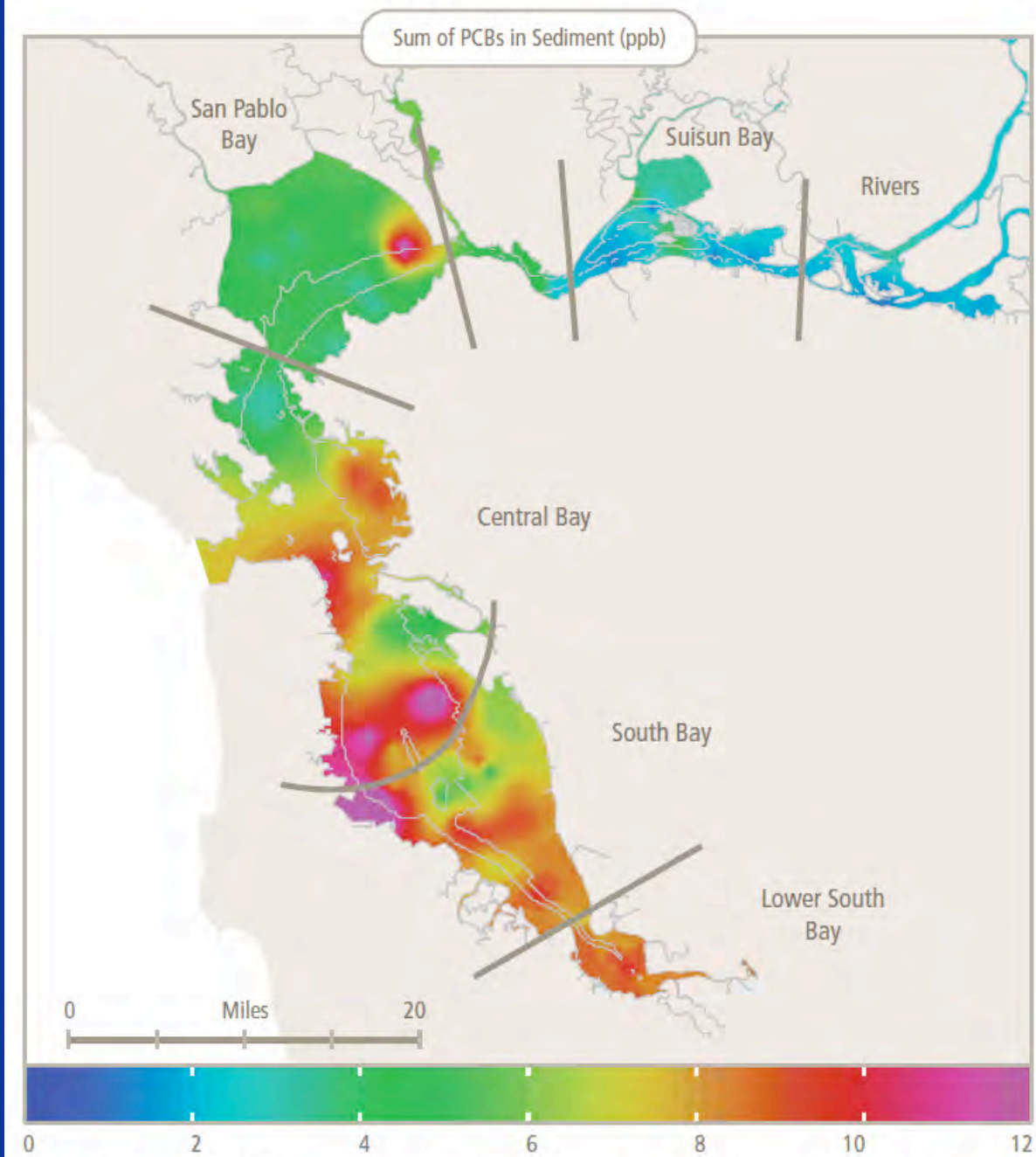
TMDL  $\Rightarrow$  10 kg/yr



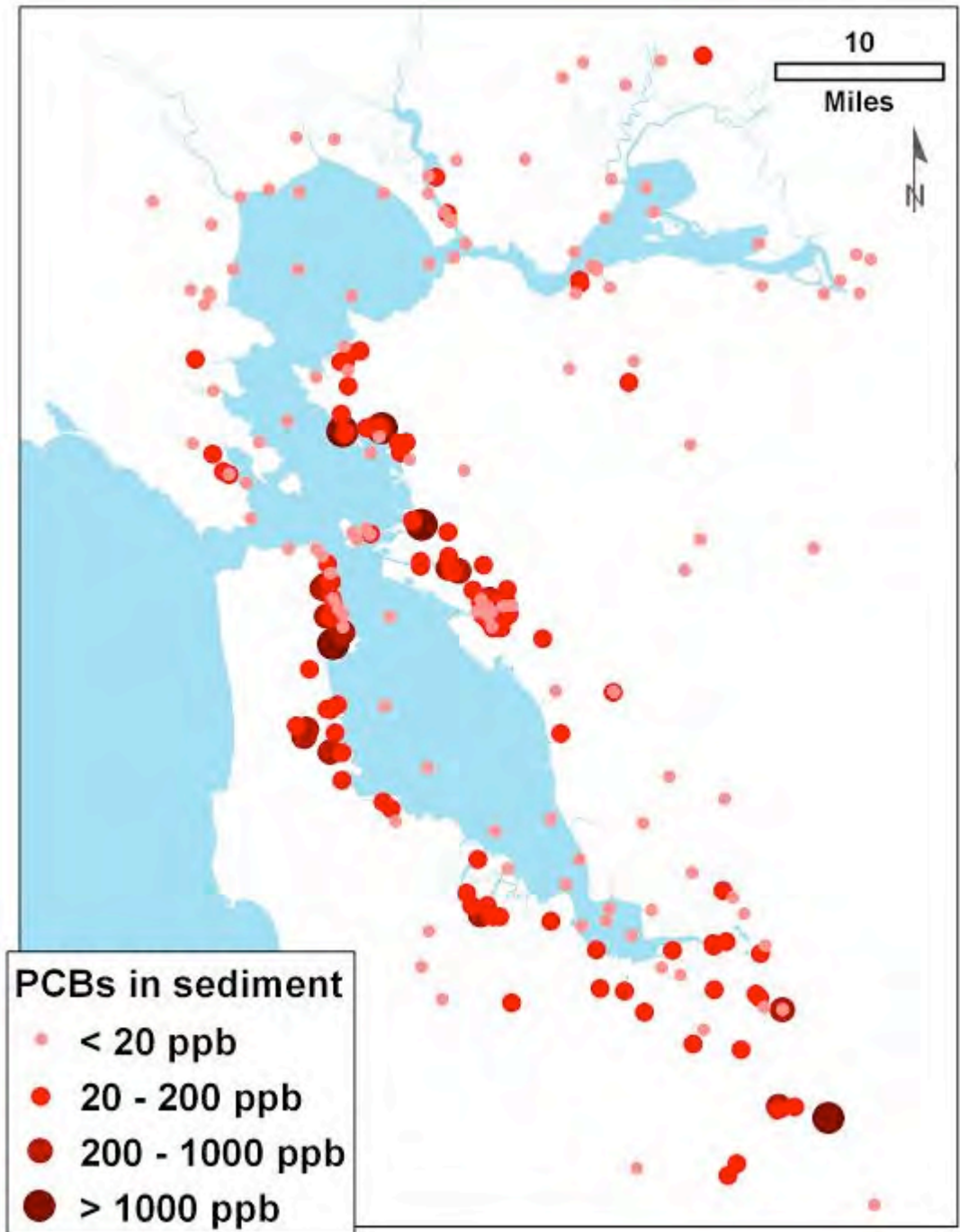
# PCBs in Bay Sediment 2004 - 06



# PCBs in Bay Sediment 2004 - 08



# PCBs in Bay and Urban Runoff Sediment



# San Leandro Bay











# Cleanup & Abate Contamination in San Leandro Bay?





# Cleanup and Abatement Project

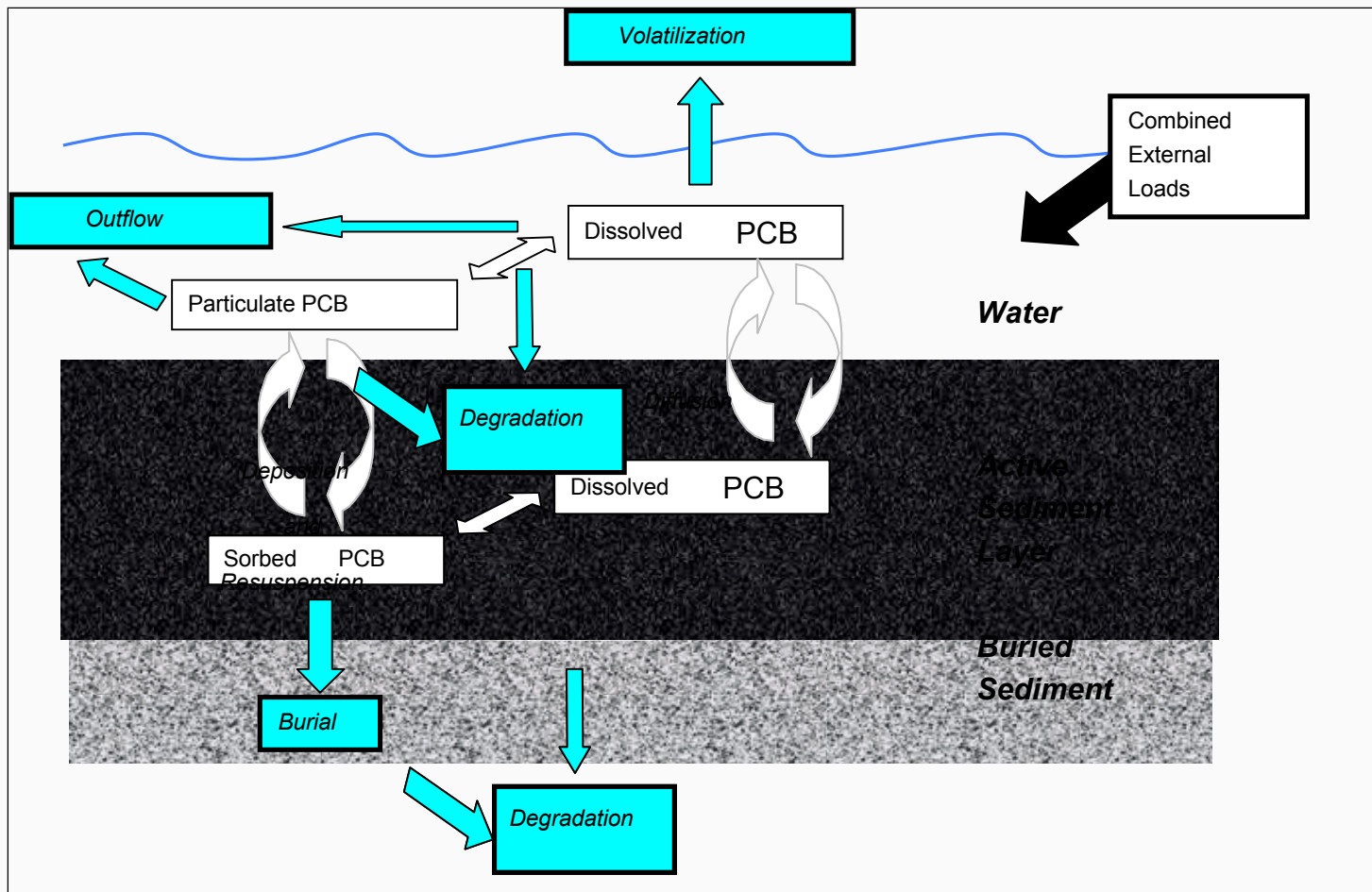
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-  Spatial extent of contamination
-  Temporal trends in sediment contamination
-  Past and current sources and loads
-  Ecological and human health risk assessment
-  Feasibility study of remedial alternatives
-  Cleanup and abatement actions

# Clear as Mud?



# PCBs Conceptual Model





# PCBs “Hot-Spots” in the Bay

