

Make Connections while Making Models

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Acknowledgements



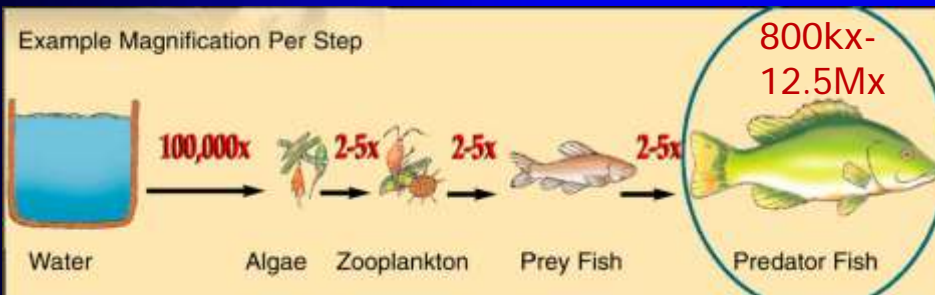
- Carol DiGiorgio
- Dave Bosworth
- Tara Smith
- Nicky Sandhu
- En-Ching Hsu
- Hari Rajbhandari



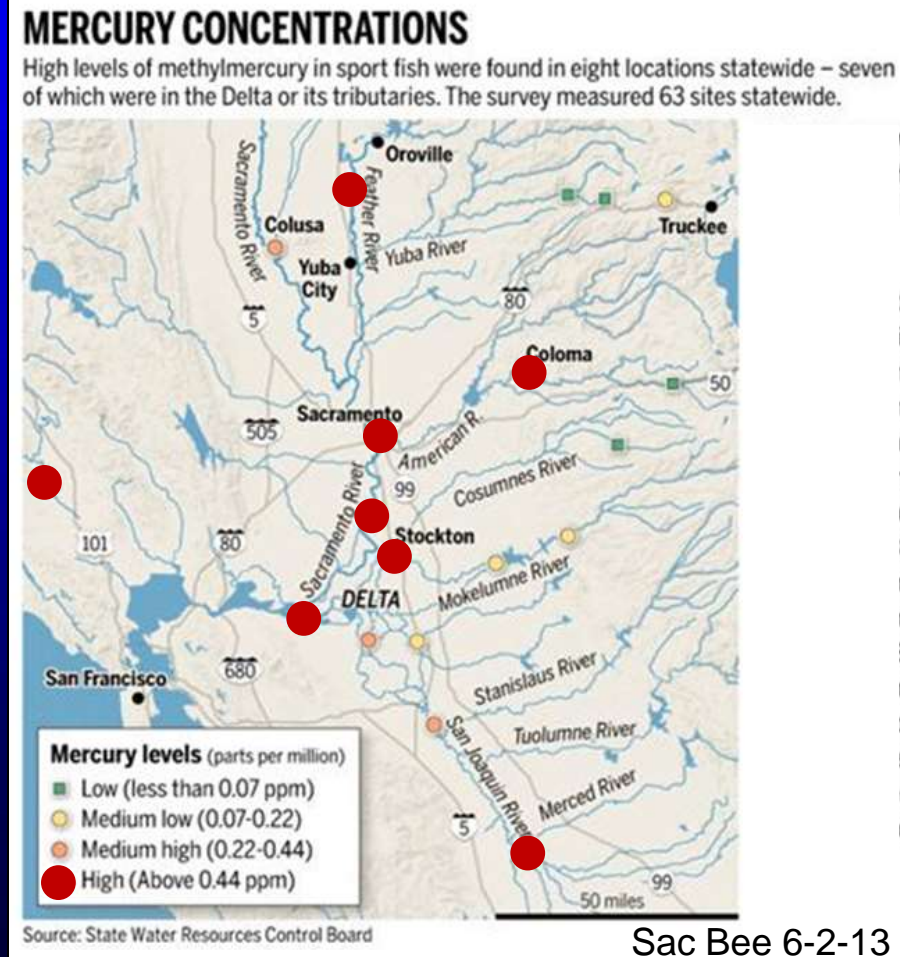
- Reed Harris
- Dave Hutchison
- Cody Beals

Why is Mercury an Issue in the Delta?

- Small amounts of Hg in water can lead to a lot of Hg in fish
- Delta sports fishes have high mercury levels



- Eating fish with high mercury concentrations can harm
 - nervous system, brain, heart, kidneys, lungs
 - pregnant women and children are most vulnerable



Where does Delta mercury come from?

- Upstream sources
 - Historic mining
 - Natural deposits
- In Delta production
- Atmospheric deposition
- Storm water runoff
- Wastewater discharge

What is methylation?

- Anaerobic organisms convert inorganic Hg to organic methyl mercury (MeHg or CH_3Hg^+)
- MeHg can be consumed by organisms and it remains in their tissues

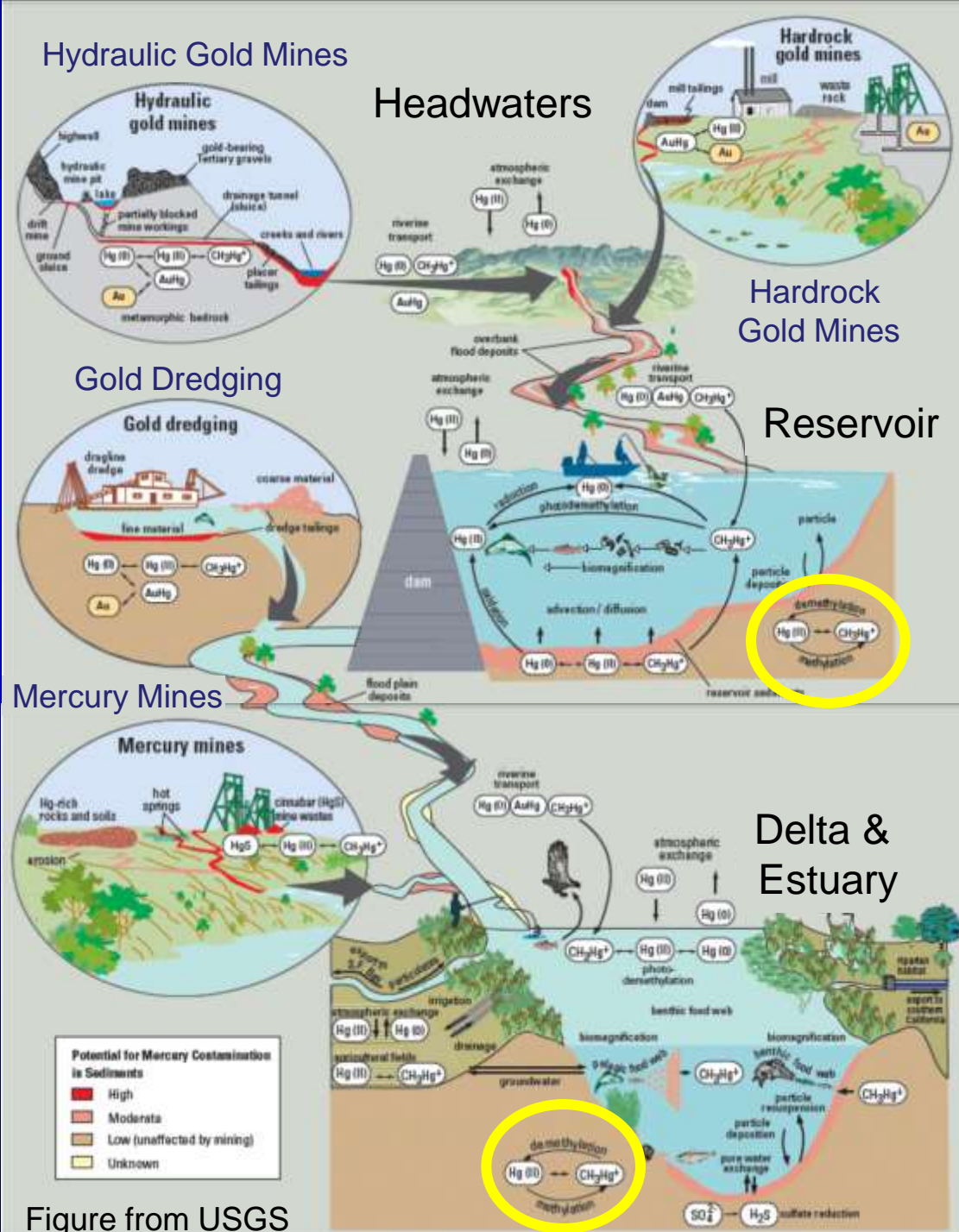
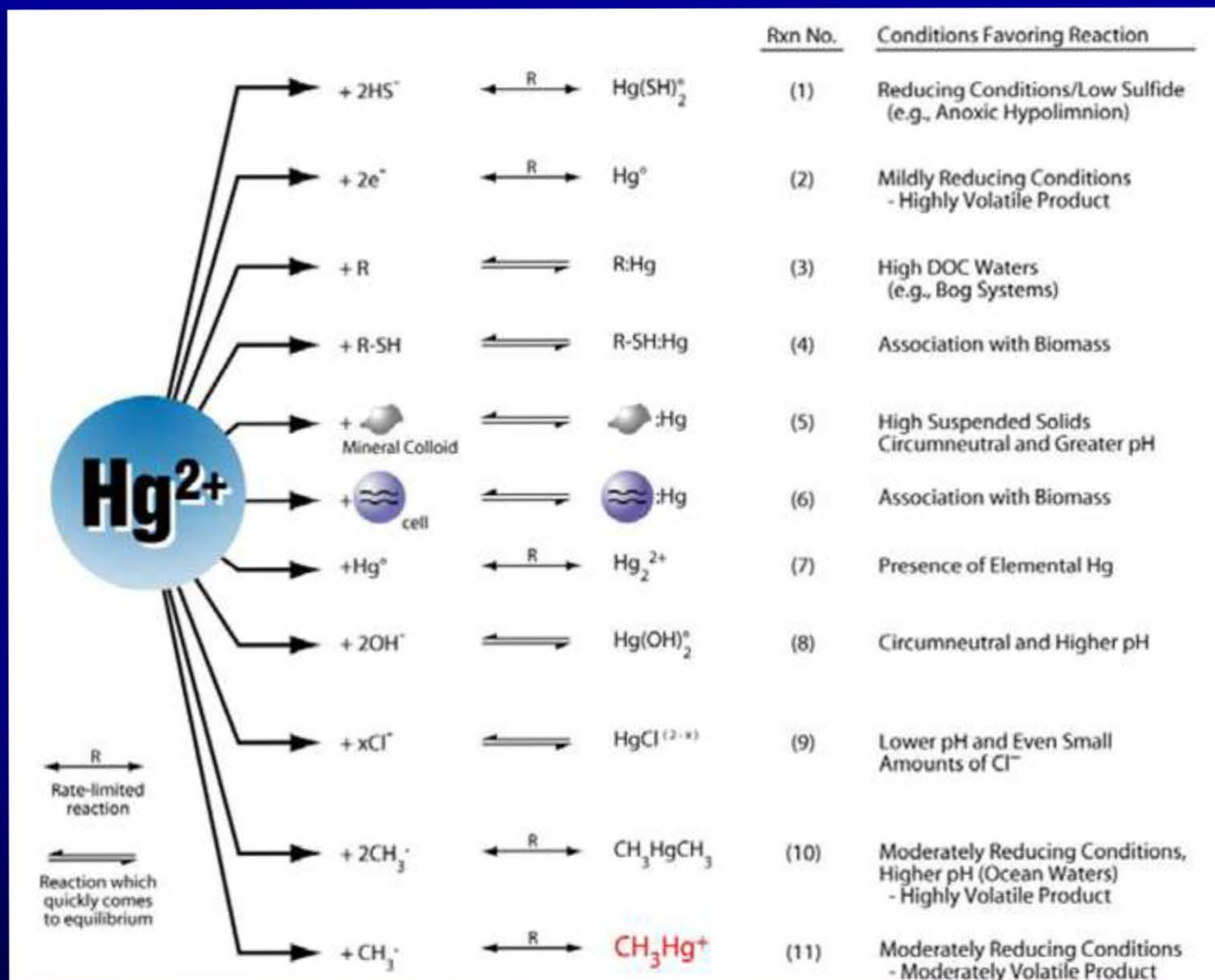


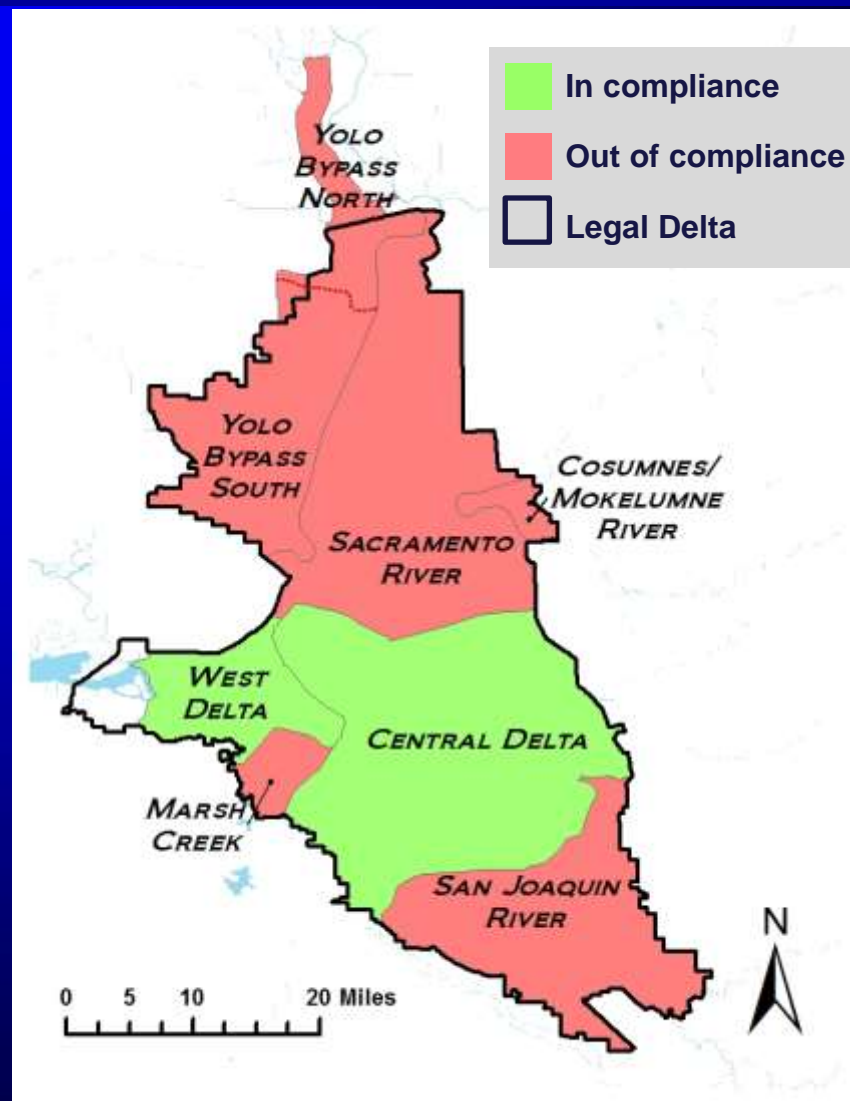
Figure from USGS

Mercury Cycling



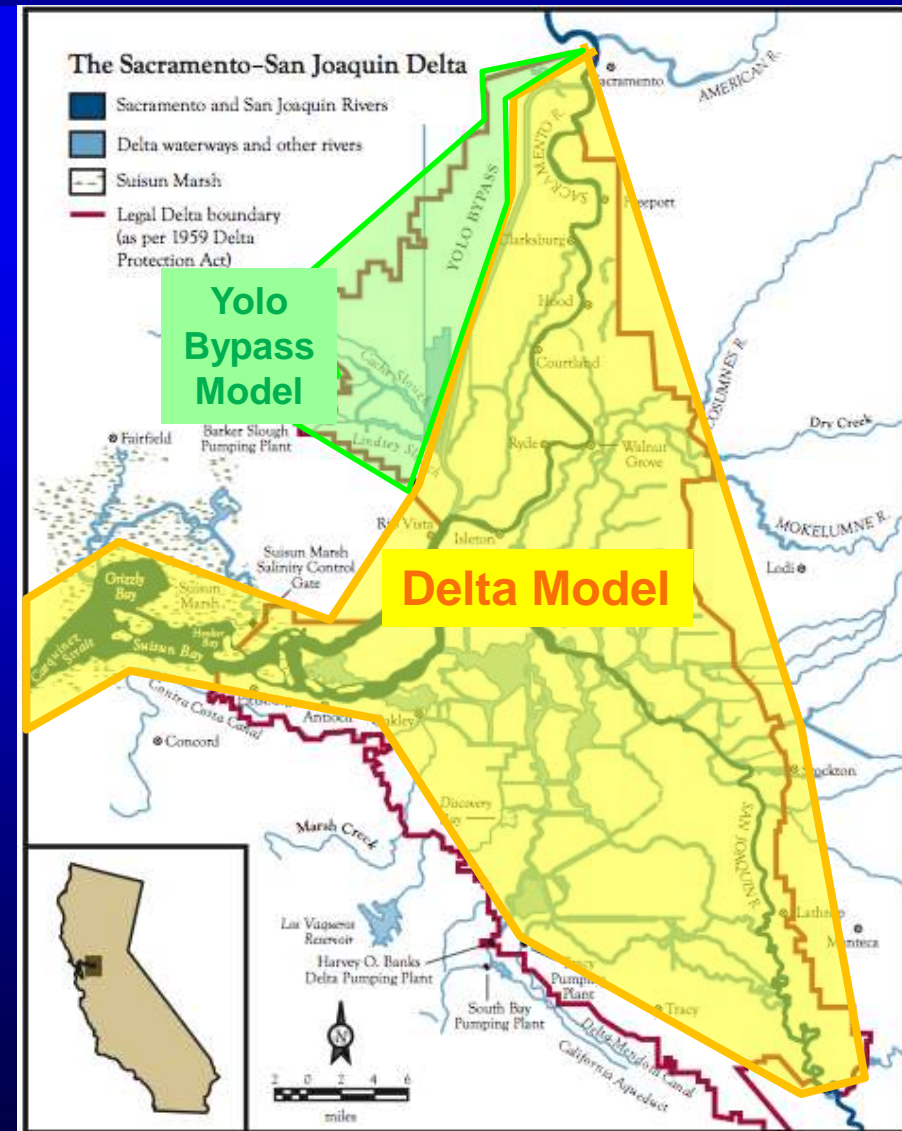
Delta Mercury Total Maximum Daily Load (TMDL)

- **1990** Sacramento-SJ Delta listed as impaired for fish consumption due to mercury [Clean Water Act 303 (d) list]
- **2010** Regional Water Quality Control Board adopted amendments to the Sacramento River and San Joaquin River Basin Plan to establish the **Delta Mercury Control Program** which establish Total Maximum Daily Loads (TMDL) for mercury in the Delta
- **2011** US EPA approved the TMDL and DWR is required to comply with the TMDL



Modeling Objectives to Support Hg TMDL

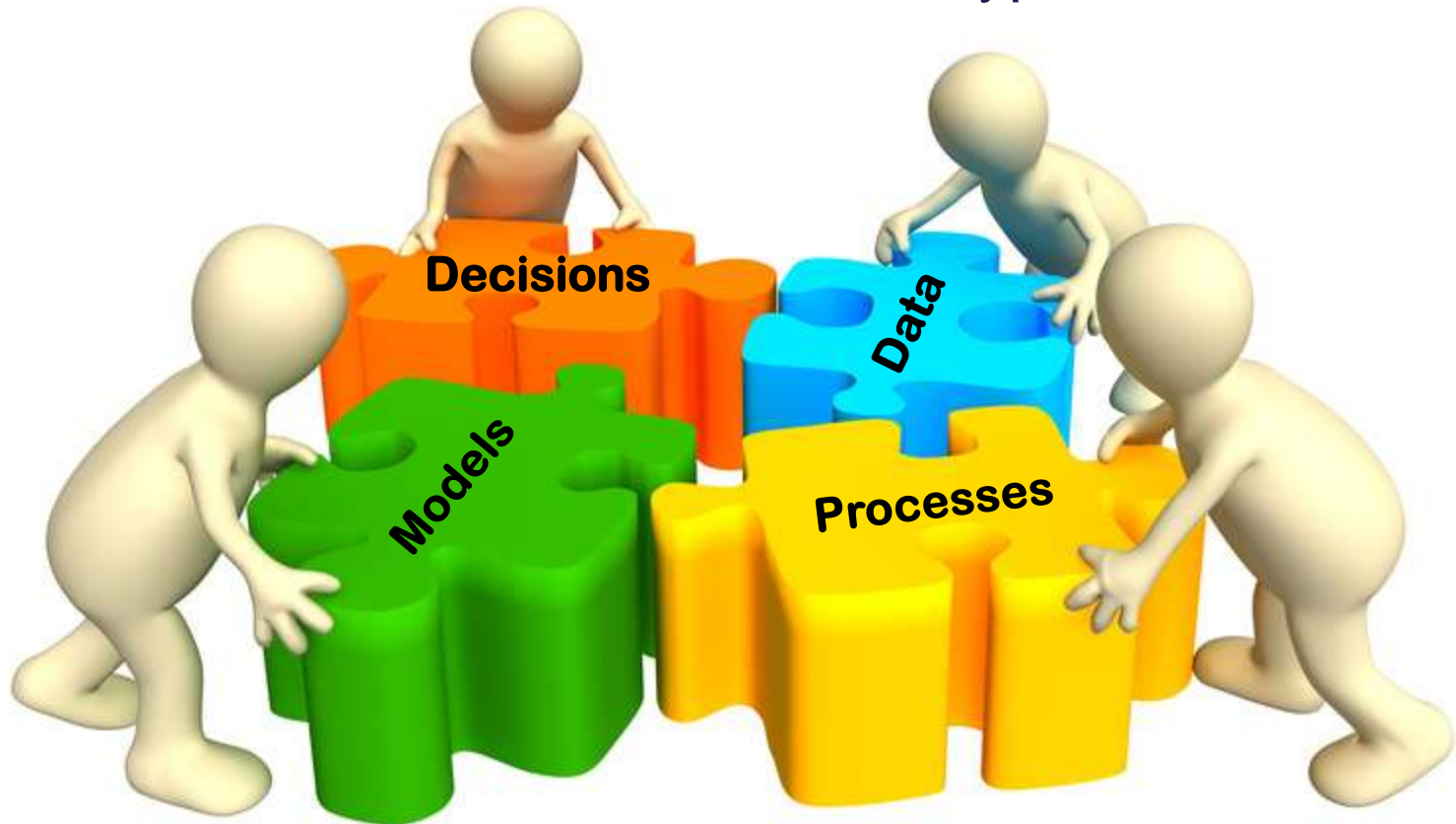
- Two models are being developed
 - Yolo Bypass
Tuflow + D-MCM
 - Delta Open Waters
DSM2 + D-MCM
- Goal: assess impacts of current & proposed operational changes on mercury methylation potential
 - Flood conveyance
 - Water management

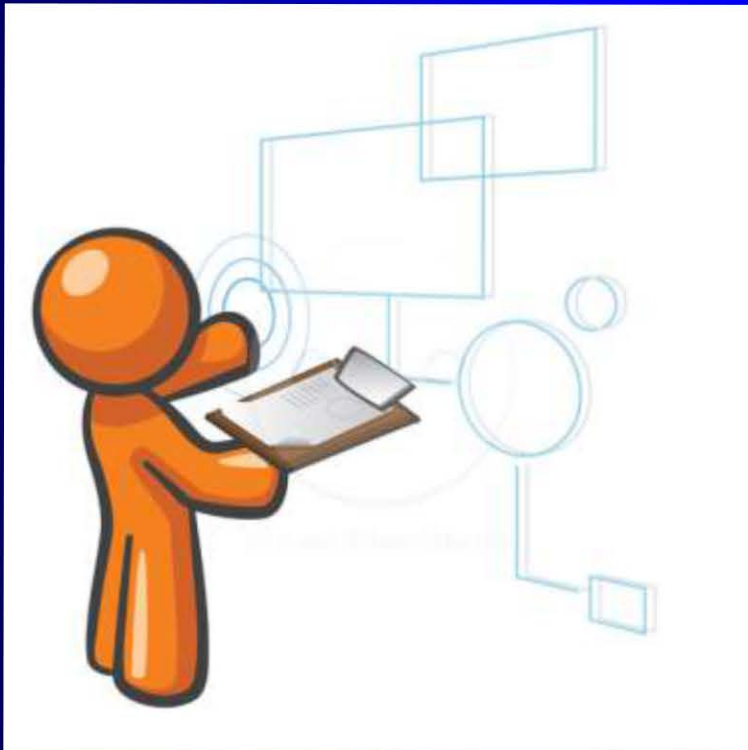
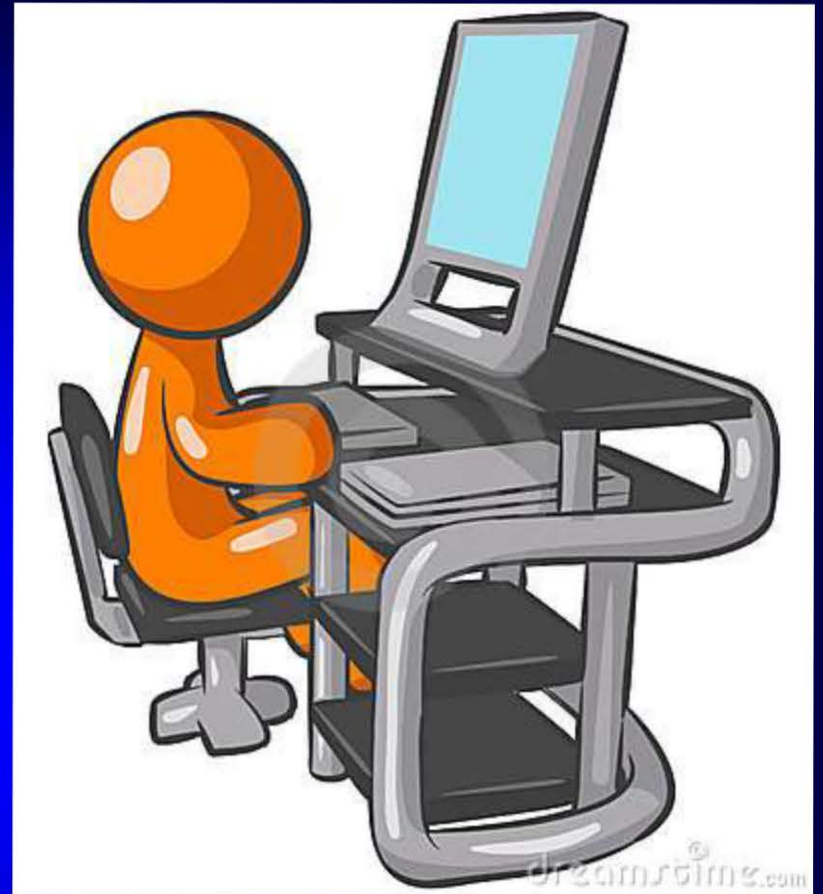


Highlighted areas are approximate

Making a Model is
an Opportunity to
Make Connections

Making Connections while making Mercury Models for the Delta and Yolo Bypass







Connecting early on will
have the greatest
potential impact on the
model development





Delta Tributaries Mercury
Council (DTMC)



Delta Regional Monitoring Program

Drinking from the fire hydrant



Models help us organize our thoughts

-Eli Ateljevich DWR Delta Modeling



Processes



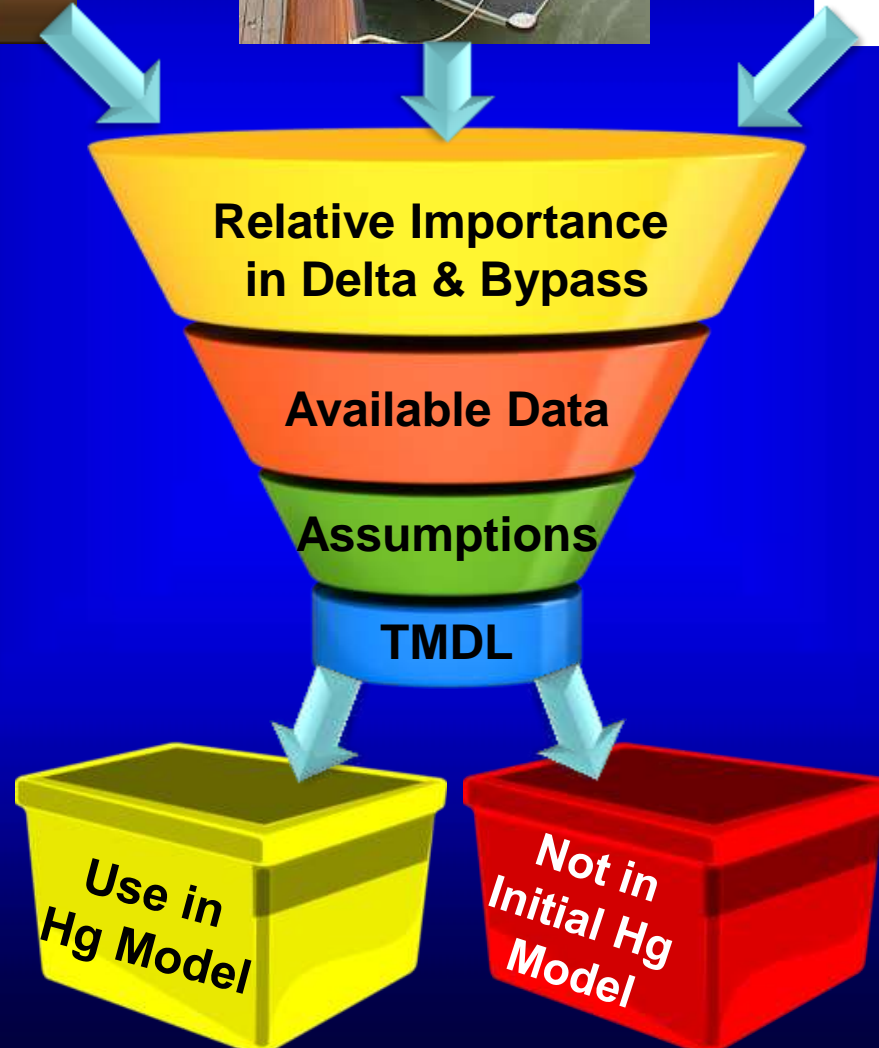
Data



Models



D-MCM
DSM2
TuFlow



Models only include connections that we put in them



Processes not
in the model



Though Delta Transport and Deposition are the major sources/sinks of Delta MeHg

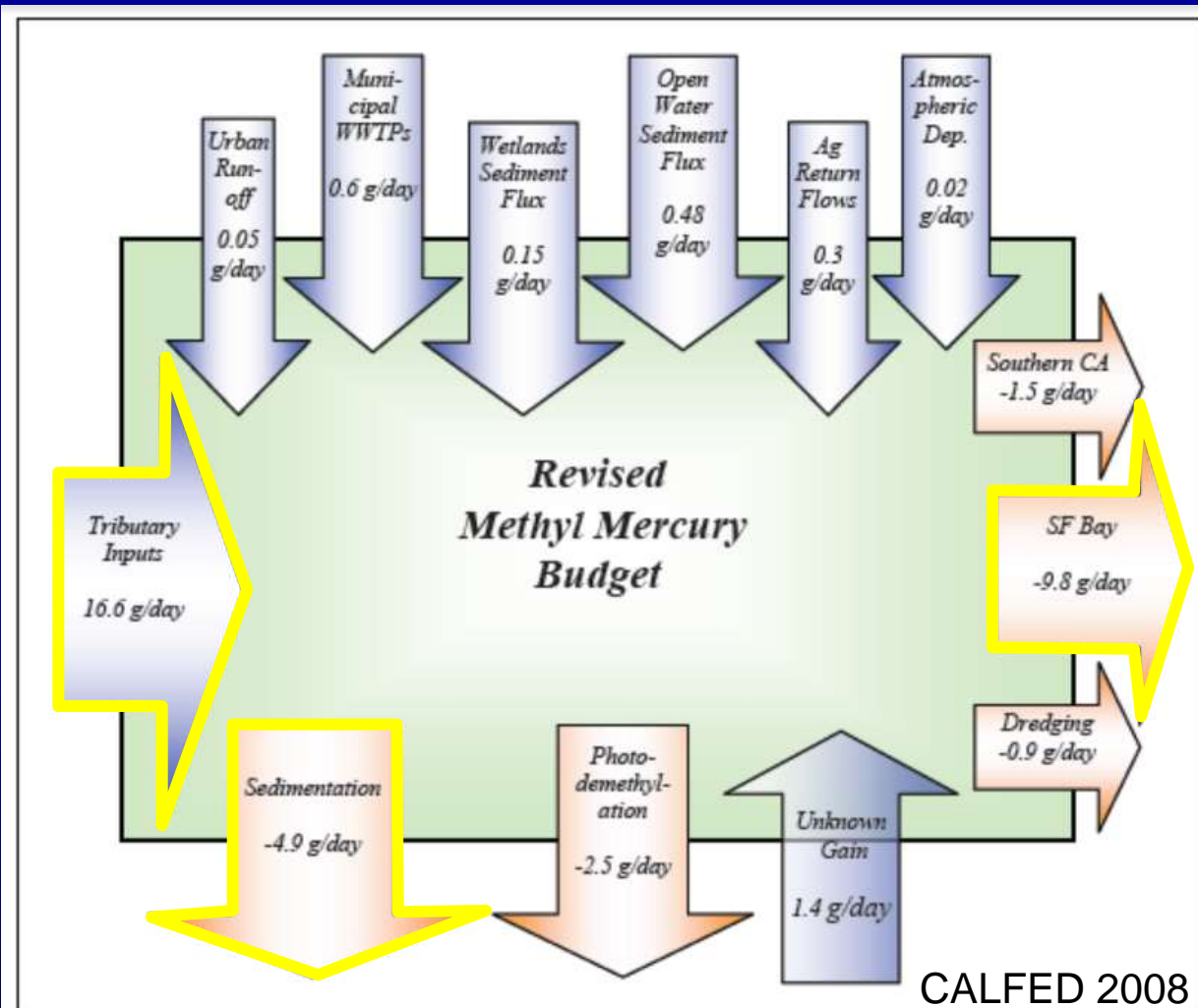
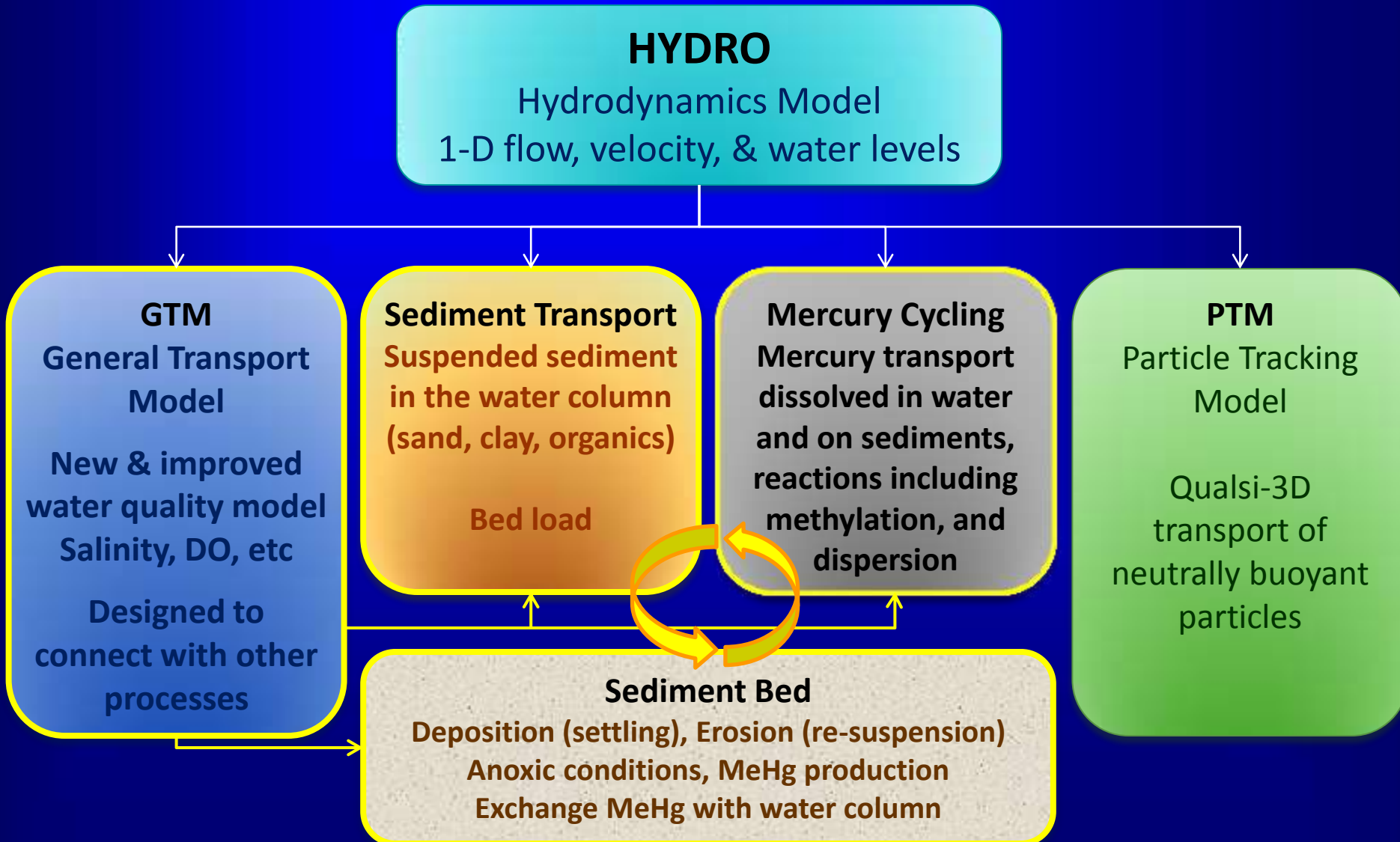


Figure 9. Revised methyl mercury mass balance model for the Delta. The revised model incorporates both some new rates for previously measured terms (tributary inputs and exports to southern California and San Francisco Bay) and rates for two previously unmeasured processes, (photo demethylation and sedimentation).

Future DSM2 with Sediment & Mercury



Take Home Points

- Creating a model is an opportunity to build connections, especially early on
- Models can help us organize our thoughts
- Models only include processes & connections that we put in them
- CALL ME with ideas or data for Hg modeling



Thank You!

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