Stakeholder Needs

Lisa Lucas - **US Geological Survey**

Research Engineer/Ecohydrodynamicist

Integrated Modeling & Prediction Division, Water Mission Area

USGS

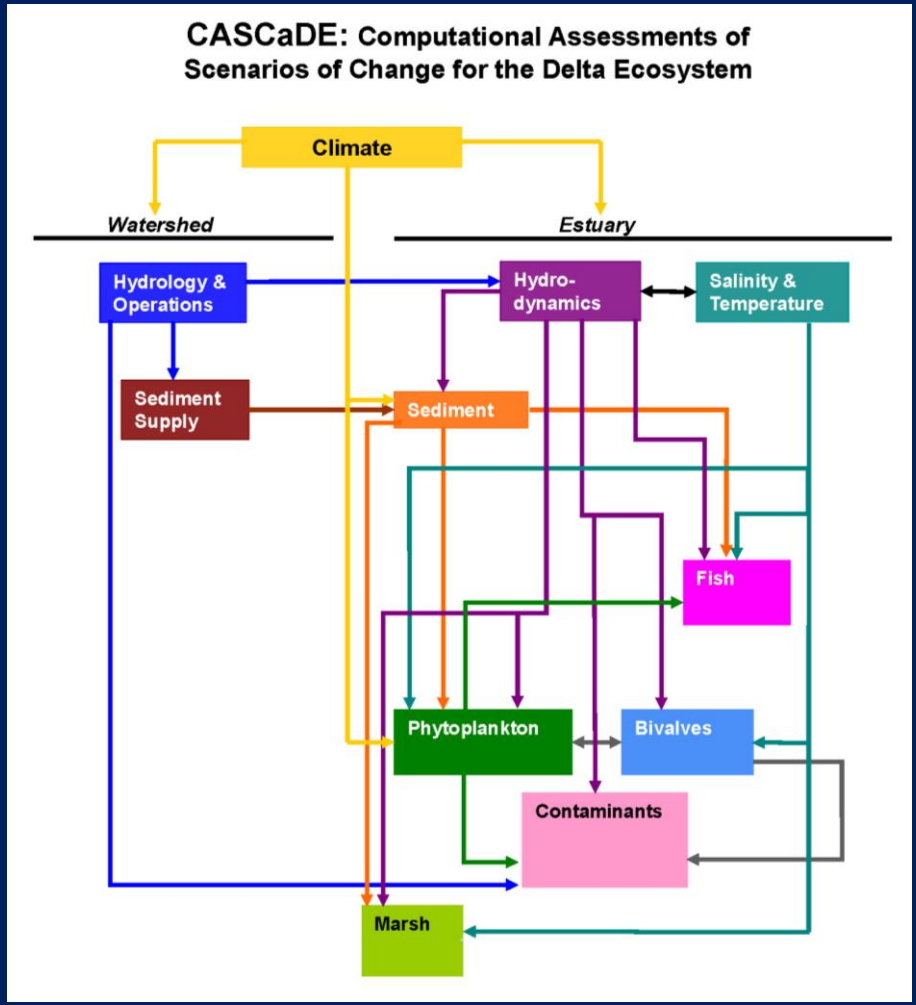
science for a changing world

USGS Integrated Modeling: CASCaDE

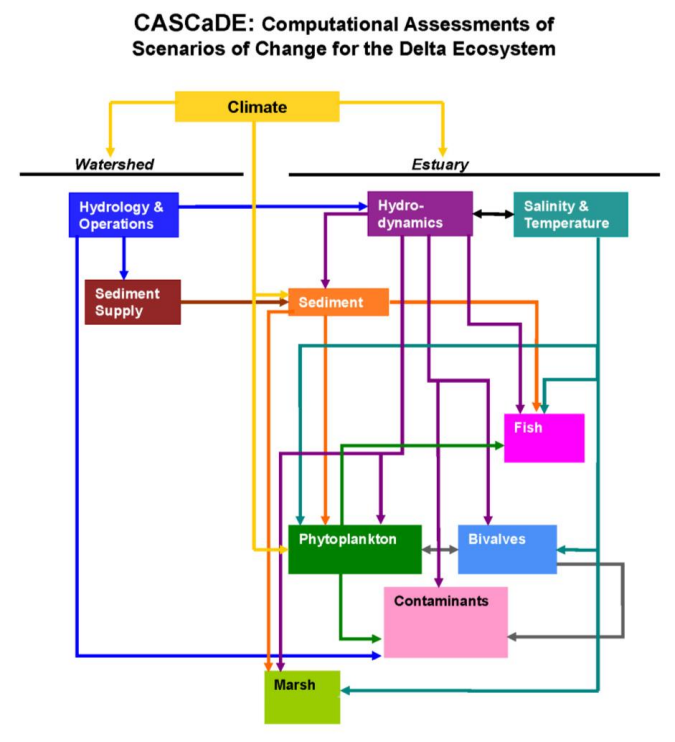
TEAM
- Multiple USGS offices + academia + non-profit
- Management-relevant research

SETTING
- Hub of CA water supply, fragile ecosystem
- State law requires co-equal management of water supply & ecosystem health
- Multiple interacting forces of change (climate change, infrastructure, exotics)

THE NEED
- Understanding of plausible scenarios
- Scientific basis for decision making



How did CASCaDE evolve?



SCIENTISTS

- representing range of disciplines
- regional experts in fields
- who know the system
- plugged in to science+management community (know the players)
- understand sci+mgmt. challenges
- who know + like each other
- who recognized the value of doing something big *together*

FUNDING

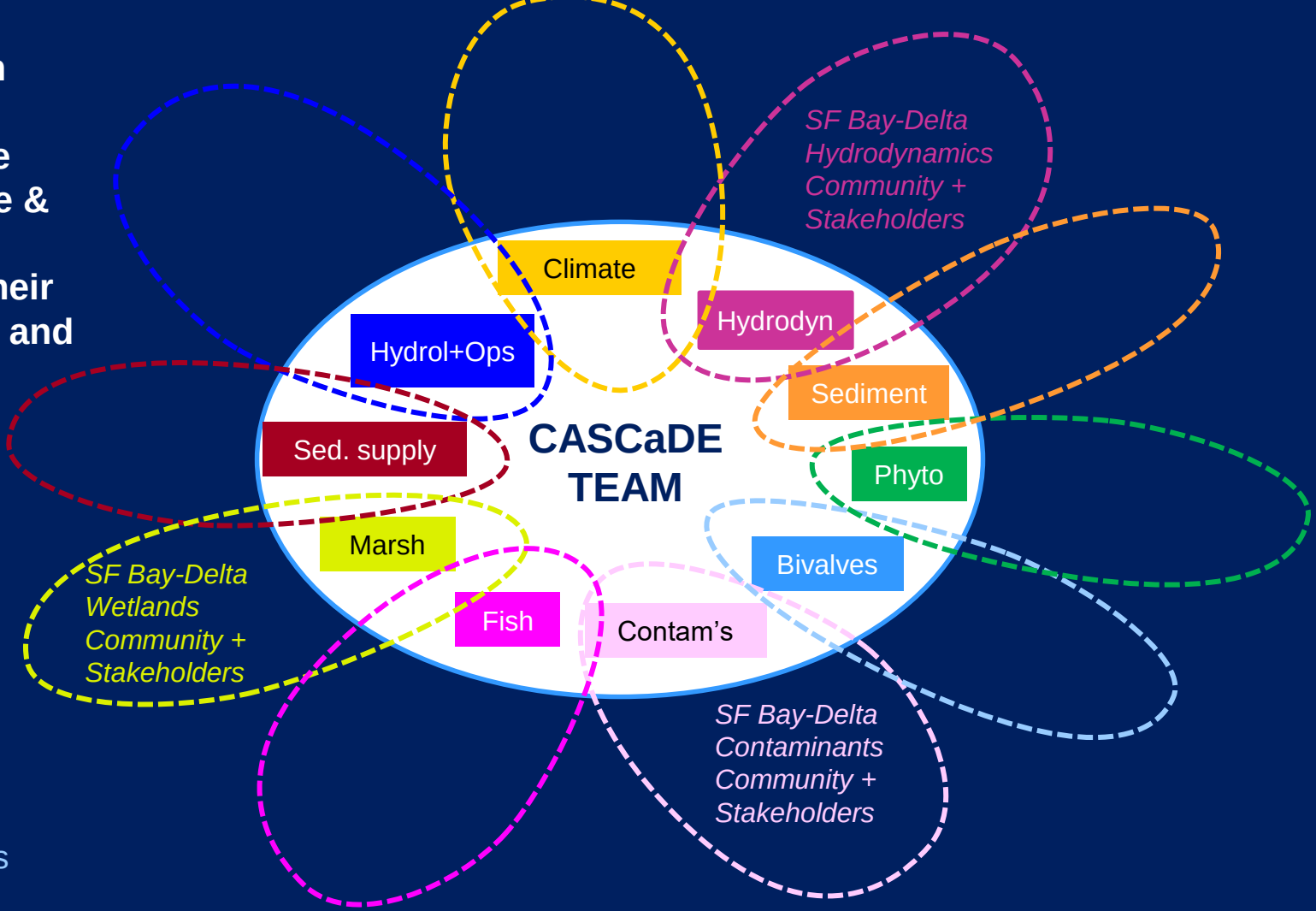
- USGS place-based $$ got us all working on the same thing at the same time; long-term
- Regional $$

HISTORY

- of investment in monitoring, process understanding

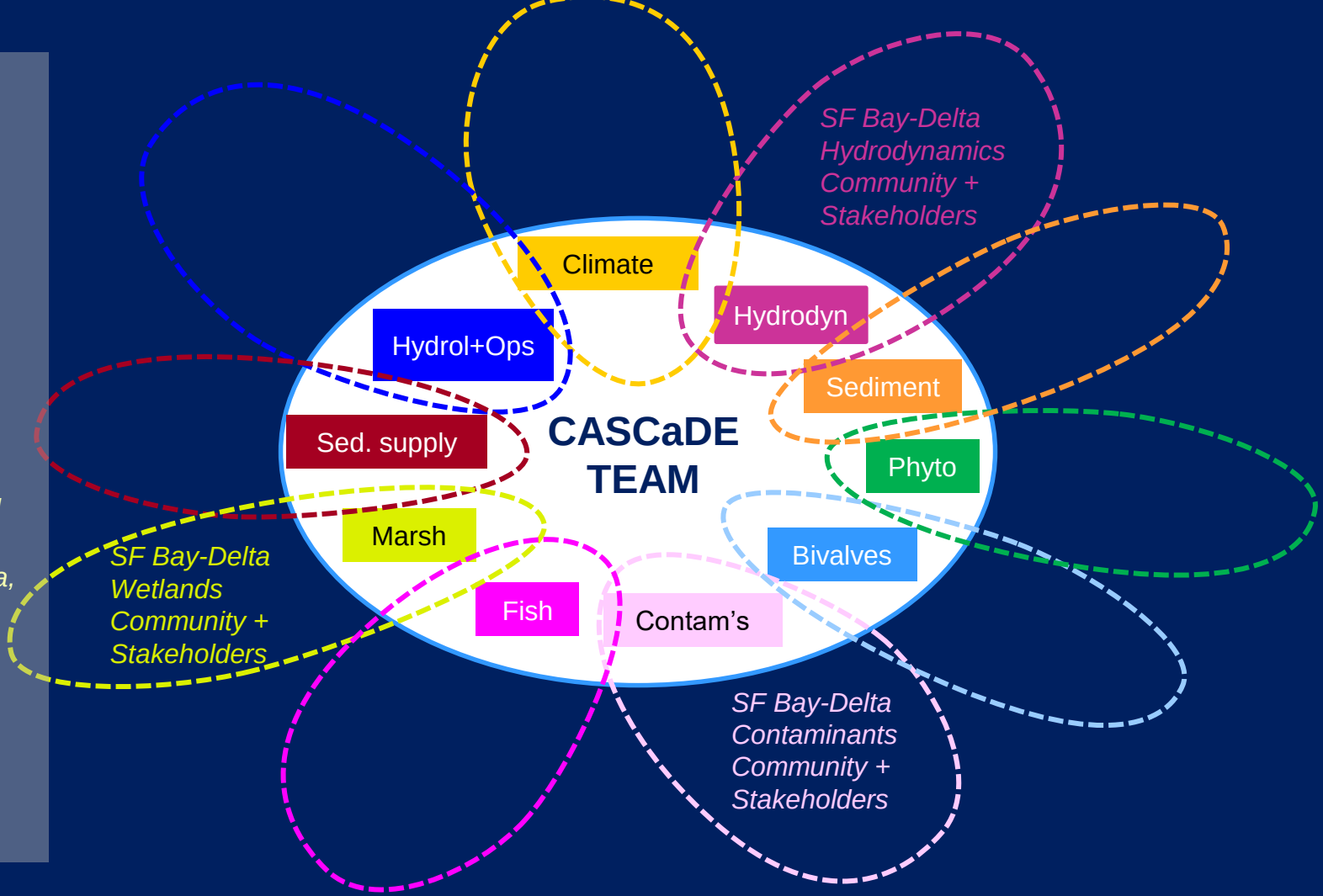
CASCaDE Team members are plugged into the regional science & management community in their own disciplines and beyond

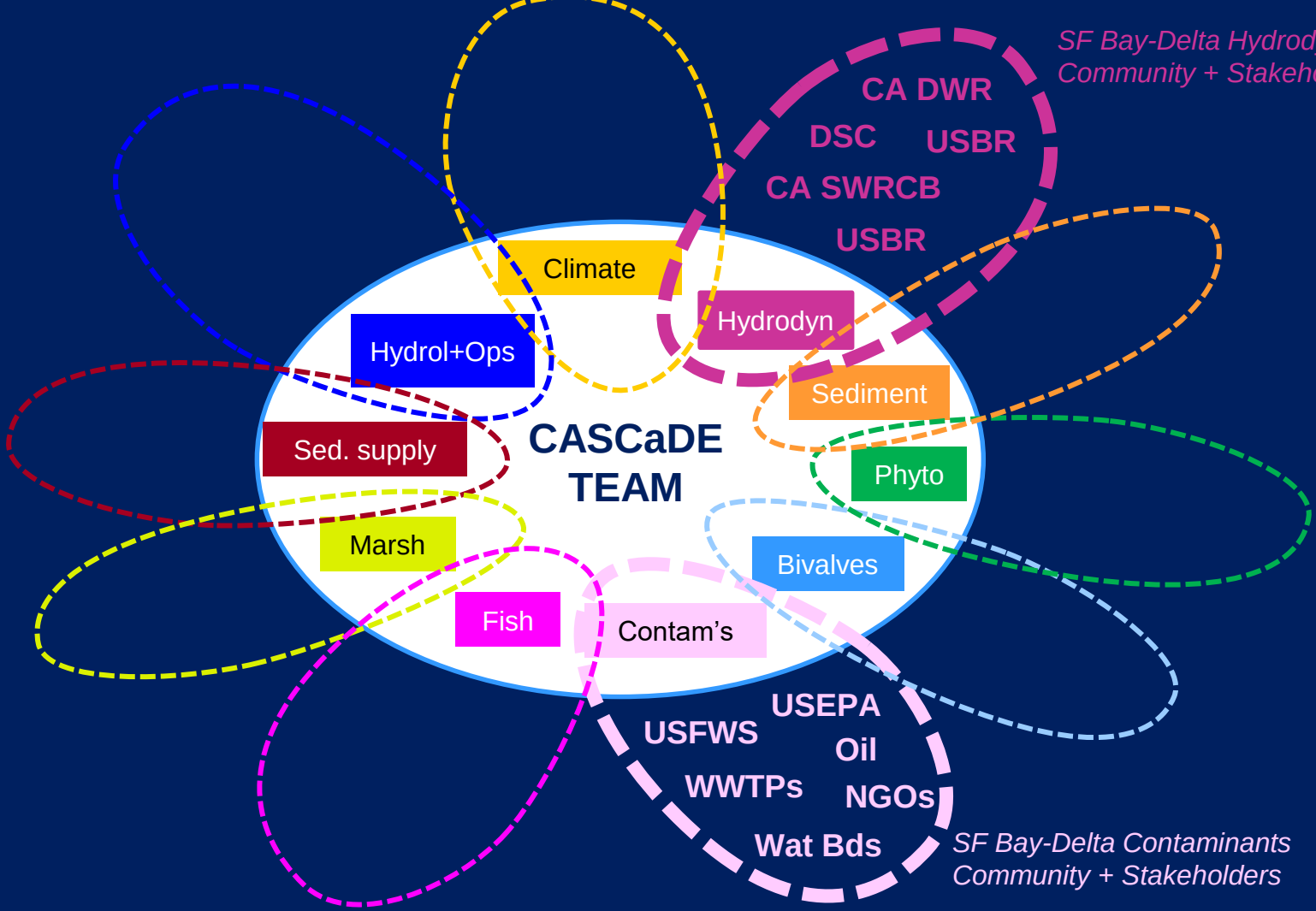
- workgroups, panels, advisory work, etc.
- know sci+mgmt. needs
- keep ears to the ground on latest issues
- know the players
- collectively provide info to numerous groups



Stakeholder engagement:

- organic
- informal
- unstructured
- personal
- long-term
- science-driven
- multi-pronged
- pro-active *(provide info. we think SHs should know)*
- requested *(data, interpretation, advice, etc.)*




SF Bay-Delta Hydrodynamics
Community + Stakeholders
CA DWR
DSC
USBR
CA SWRCB
USBR
Climate
Hydrodyn
Hydrol+Ops
Sediment
Sed. supply
CASCaDE
TEAM
Phyto
Marsh
Bivalves
Fish
Contam's
USEPA
USFWS
Oil
WWTPs
NGOs
Wat Bds
SF Bay-Delta Contaminants
Community + Stakeholders

Selenium

(Lead: Robin Stewart, USGS)

Photo: Fred Feyrer, USGS; Johnson et al. 2020 ES&T

THE SCIENCE

- *Se in food webs/toxicity*
- *monitoring*
- *process understanding*
- *source tracking (modeling)*

STAKEHOLDER NEEDS

- *data*
- *Interpretation, process understanding*
- *analytical methodologies*
- *sampling advice*
- *scientific basis for TMDLs, regulatory criteria*

STAKEHOLDERS

USFWS
USEPA
USBR
Western States Petroleum Assoc.
Water Dischargers
State Water Boards
NGOs

HOW MODELING IS INFLUENCED

Ongoing engagement with SHs

+

Accumulated experience in discipline & system

=

Understanding of how modeling can help the regulatory process

(plus loading data!!!)

How does the engagement happen?

Robin
(Se Expert)

Initial invitation

Ongoing participation

Monitoring data

Interpretation, process understanding, advice

Offer sampling stns, model scenarios

Latest science: papers, offers to present

Direct feedback

Understanding of SH challenges and needs
(e.g. source attrib.)

Loading data for modeling

Funding opportunities

SF Bay Se
Workgroup
(stakeholders)

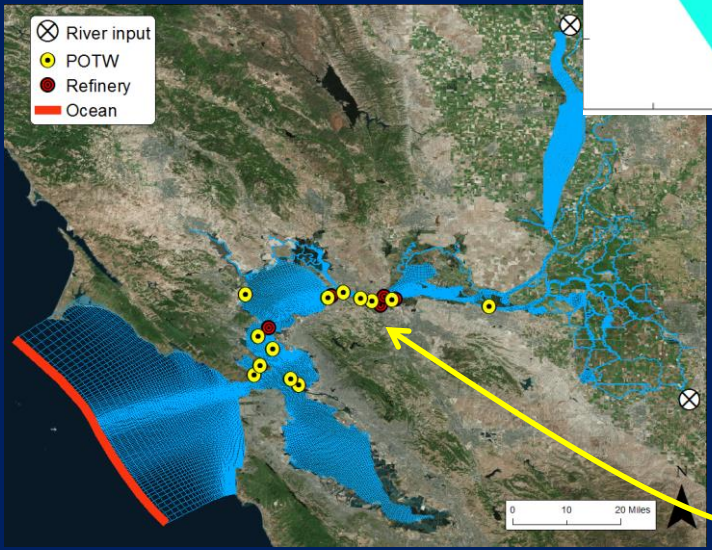
Annual Meetings w/Stakeholders

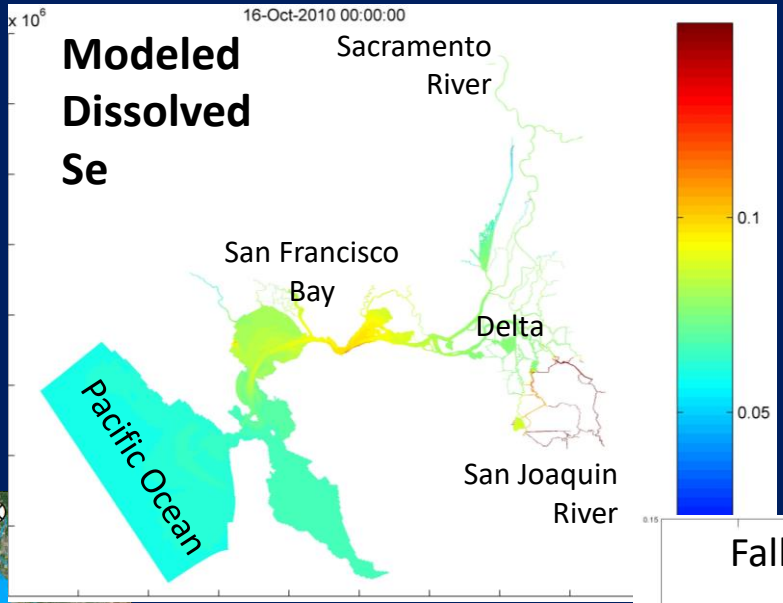
- Honest, respectful discussion
- Not too big
- "in the trenches together"
- Learn their needs
- Face-to-face, body language
- Develop trust
- Sensitive to their concerns

1-on-1
Engagement with
Stakeholder Org's

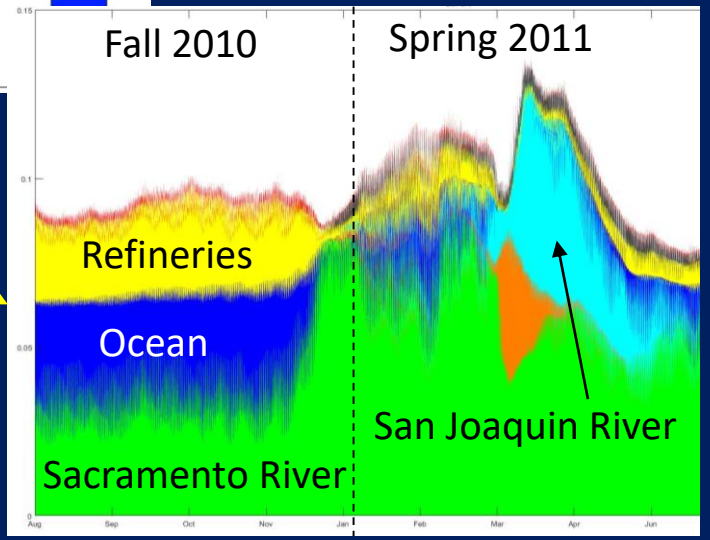
Modeling Selenium

Loading points, grid





Modeled Dissolved Se source mixture at Carquinez Strait



Bishop et al. in prep

This information is preliminary or provisional and is subject to revision

Sea level rise & salinity intrusion

Noah Knowles (USGS),
Rosanne Martyr-Koller (Climate Analytics),
Mick van der Wegen (IHE-Delft, Deltares), Me



STAKEHOLDER NEEDS *(proactively addressed, not requested,)*

1. What are the **effects** of SLR on S-intrusion?
2. How should current **flow requirements** be adjusted to account for SLR?
3. What will be the **water cost** of complying with salinity standards under SLR?

STAKEHOLDERS

CA Dept. Water Res.
CA State Water Res. Cont. Bd.
Delta Stewardship Council
Sacramento Reg. Wat. Qual. Cont. Bd.
Delta Watermaster
USBR
USACE

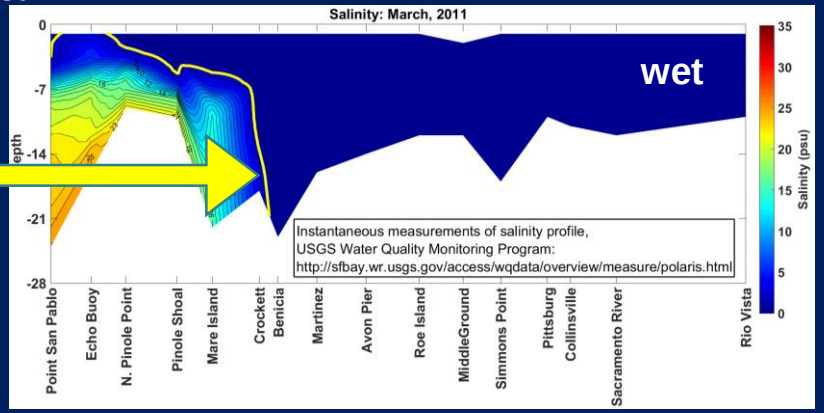
HOW MODELING IS INFLUENCED

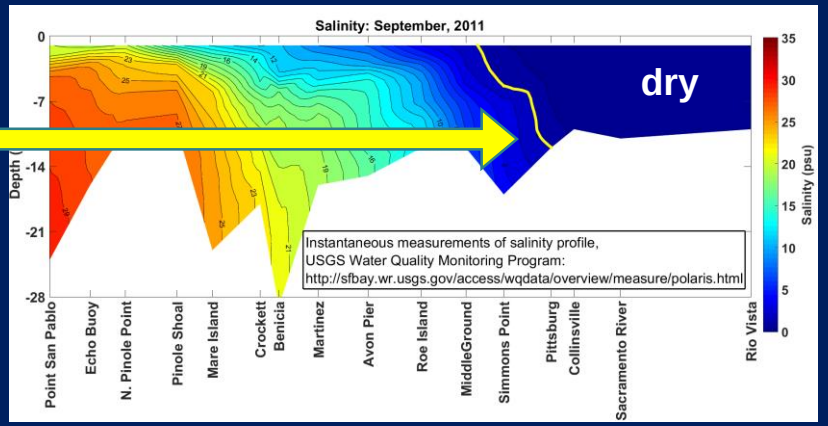
Networking
+
Engagement with SHs
+
Accumulated experience in discipline & system
=
Understanding of regulatory process & how modeling can help (questions to ask)

X2: location of low-salinity zone

"X2" : distance from Golden Gate Bridge to the daily 2 psu isohaline near the bottom of the water column.

←Ocean River





Slide courtesy of Noah Knowles

X2-related requirements
(habitat protection component of D-1641)

- *Intended to control X2 relative to **three locations** for the period Feb-June*
- ***FLOW** ("NDO") or **SALINITY** criteria must be met for a certain # of days/month*
- *Flows are controlled via upstream **dam releases***

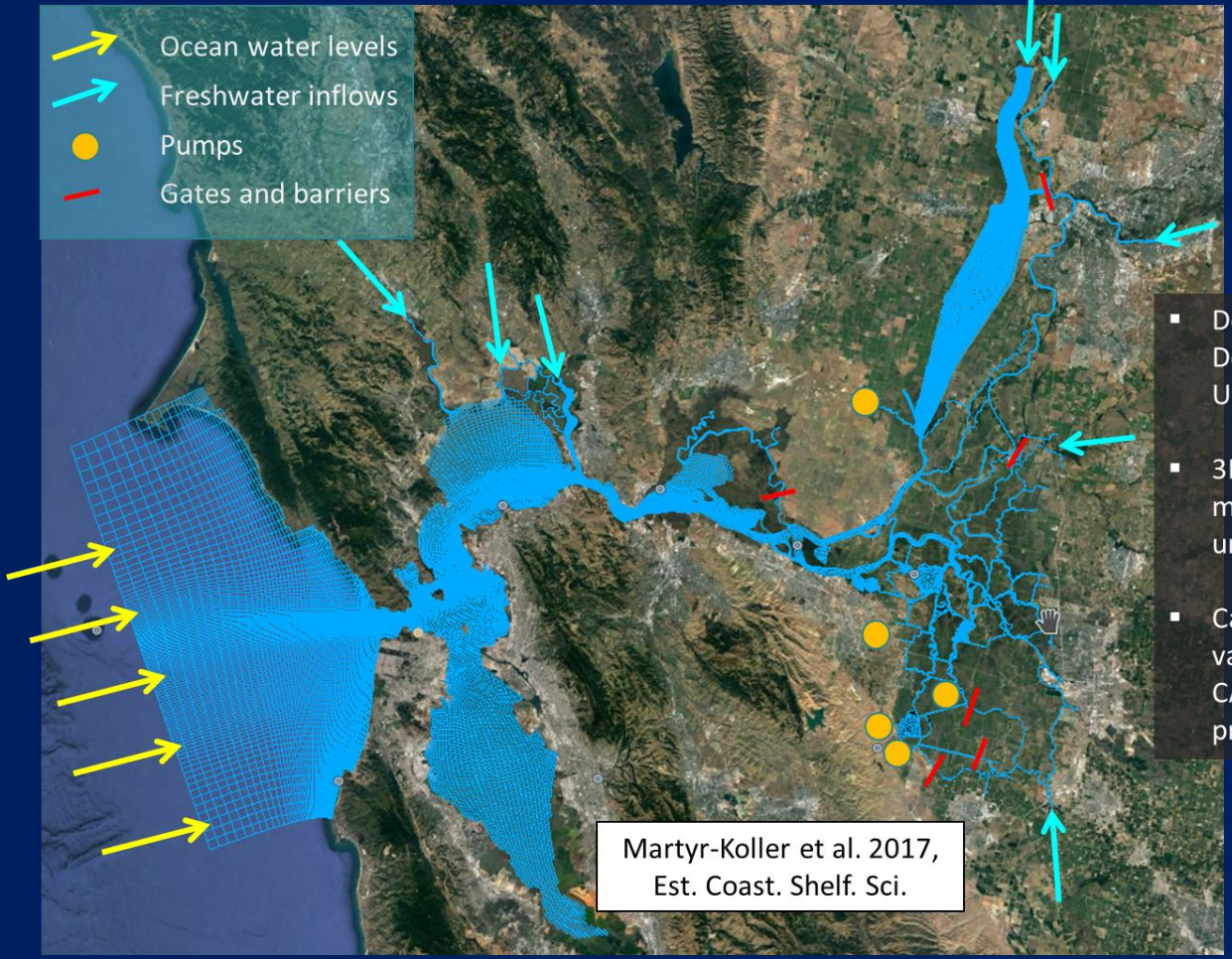
CURRENT FLOW (NDO_{min}) REQUIREMENTS (cfs)
(to meet X2 standard @ 3 locations)

Collinsville	Chipps Island	Port Chicago
7100	**11400**	**29200**

NDO=Net Delta Outflow

Slide courtesy of Noah Knowles

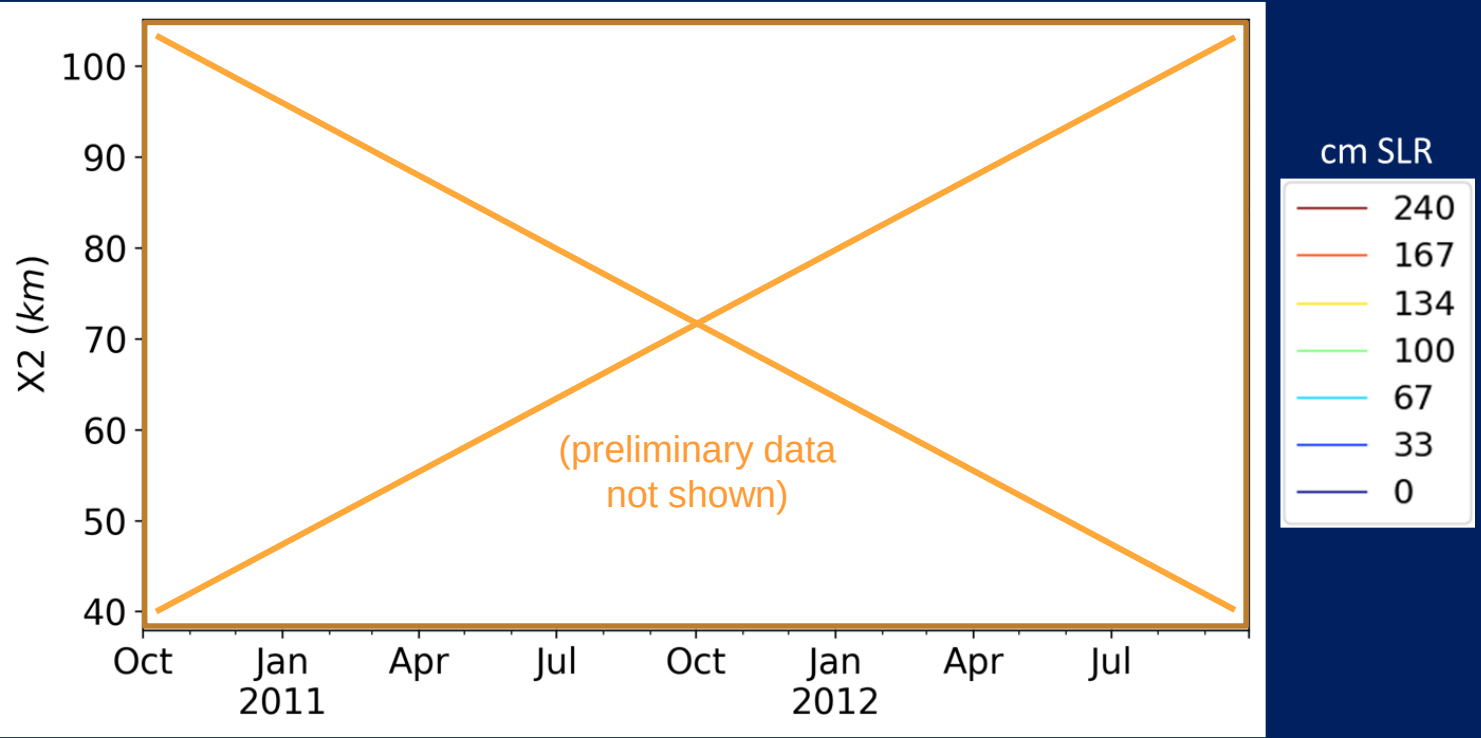
D-Flow FM Hydrodynamic Model



- Developed by Deltares and USGS
- 3D finite volume model with unstructured grid
- Calibrated and validated in CASCaDE 2 project

Slide courtesy of Noah Knowles

What are the (modeled) effects of sea level rise on X2?



Slide courtesy of Noah Knowles

How should the **flow requirements** be **adjusted** to meet X2 requirements under sea level rise?

(flows in cfs)

SLR	Collinsville	Chipps Island	Port Chicago
0			
33			
67			
100			
134			
167			
240			

(preliminary data not shown)

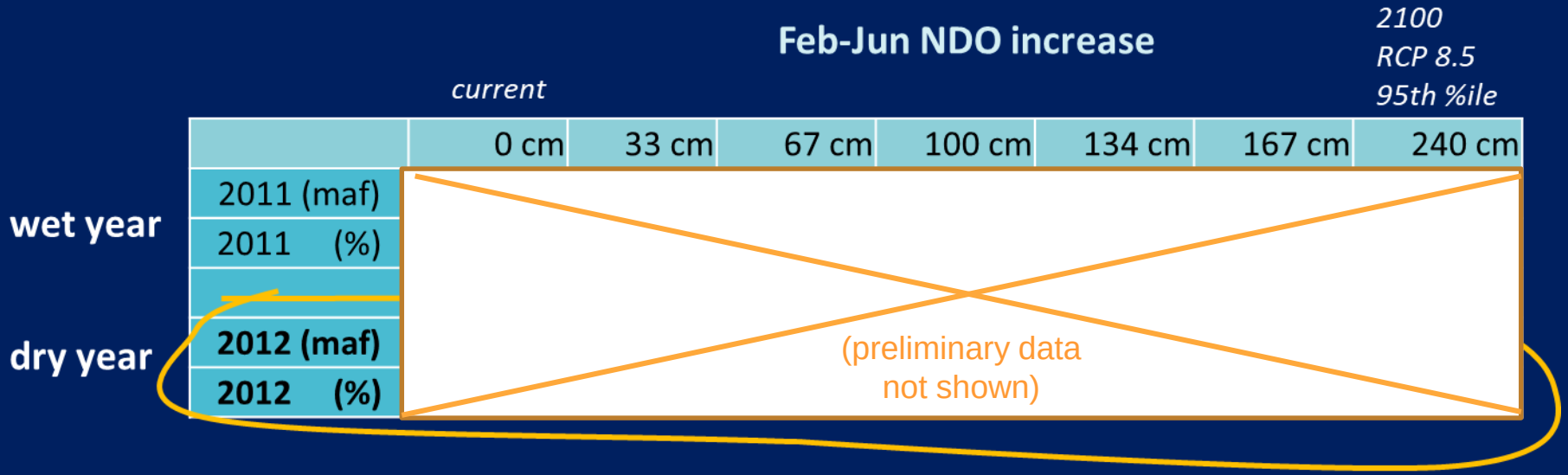
← current

NEW (SUGGESTED)

*Based on a combination of 3D modeling and curve-fitting to established X2-flow equations

Slide courtesy of Noah Knowles

How much **additional flow** would be needed to comply with adjusted X2 regulations?



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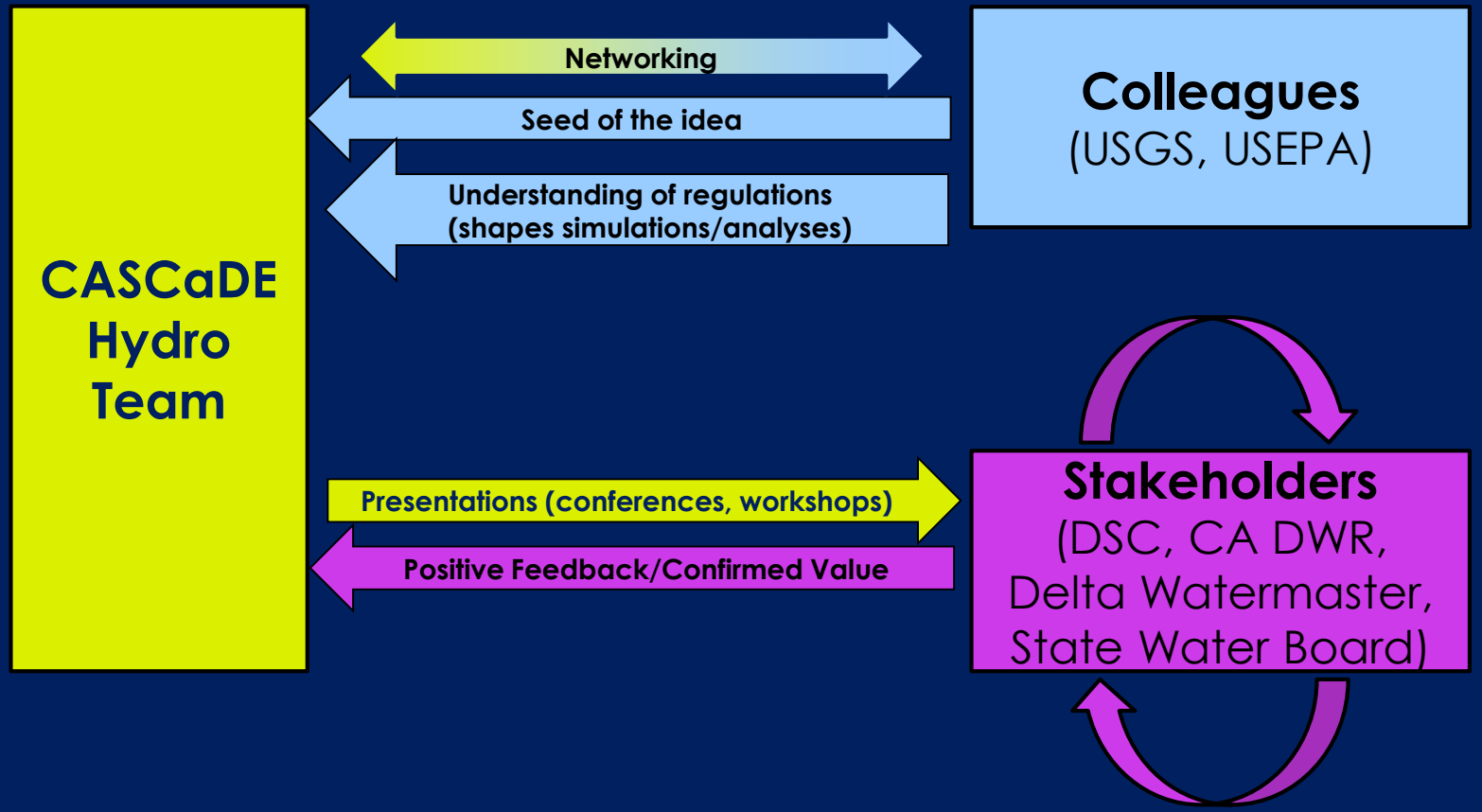
How does the engagement happen?



Keys to CASCaDE team’s engagement with stakeholders

- We are PART of the COMMUNITIES we’re engaging with
- Understanding the state of the system & of the science
- Knowing the players
- Long-term, personal relationships
- Proactively sharing info SHs may not know they need
- Remaining engaged, keeping ear to the ground





THANKS!