CALIFORNIA DEPARTMENT OF WATER RESOURCES
UNITED STATES GEOLOGICAL SURVEY

DSM2 Learning Series: ECO-PTM

April 16, 2024

Delta Smelt

Longfin Smelt

Chinook Salmon

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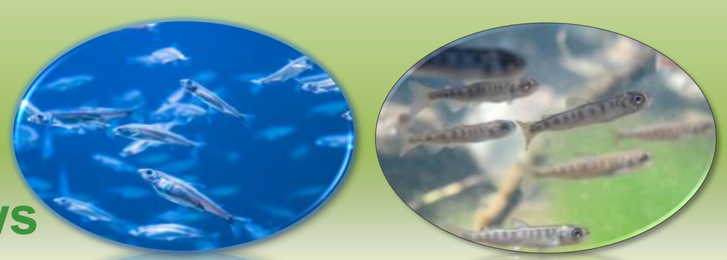
Adam Pope (USGS), Brad Tom (DWR)

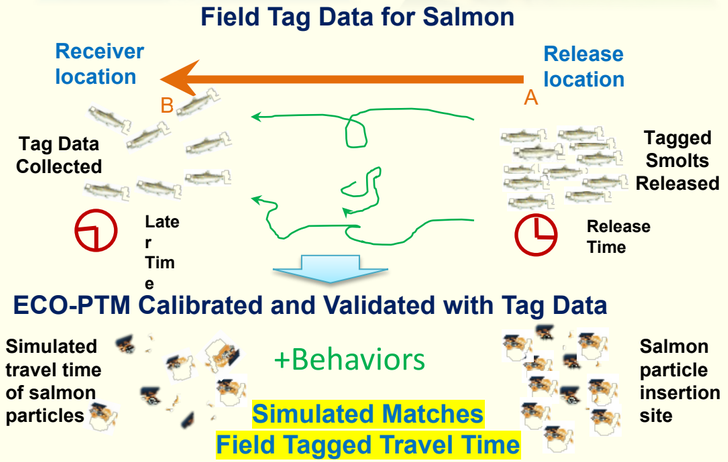
ECO-PTM -- An Individual Based Ecological Particle Tracking Model That Considers Tidal Flows



ECO-PTM FACTS

ECO-PTM is an individual-based ecological particle tracking model that tracks three types of particles, neutrally buoyant (Delta smelt larvae), position oriented (longfin smelt larvae), and salmon (Chinook salmon):

- Based on a random-walk particle-tracking method
- Utilizes flow information from a 15-minute-time-step hydrodynamic simulation of the Delta that captures the estuary's temporal and spatial tidal variations
- Used commonly for impact analyses of larvae entrainment of Delta smelt and longfin smelt into water project facilities
- Applied for analyses of juvenile salmon migration and survival through the Delta
- Attached fish-like behaviors to the salmon particles
- Calibrated and validated behavior parameters with field tag data: simulated outputs match observations



Model Applications

ECO-PTM can be an effective tool for quantitatively assessing water resources management actions, such as impacts on entrainment or fish survival from:

- Fish Barriers
- Project operation changes
- Restoration actions

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ECO-PTM Team

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  - Russ Perry, Adam Pope, Dalton Hance, Michael Dodrill
- QEDA Consulting:
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- California Department of Water Resources:
  - Xiaochun Wang, Bradley Tom, Gourab Saha

Why ECO-PTM ?

Quantitative assessment tool to explore and evaluate **management actions** that **benefit both** species recovery efforts and California's water demands

Delta Smelt

Longfin Smelt

Chinook Salmon

Delta Simulation Model II (DSM2)

Hydro

Flow, velocity, water levels

Qual
Water Quality Model

- Salinity including chloride, bromide, …
- Water Temperature
- Dissolved oxygen

GTM
General Transport Model

- Salinity
- Suspended sediment
- Sediment bed
- Mercury
- Modular for easy expansion

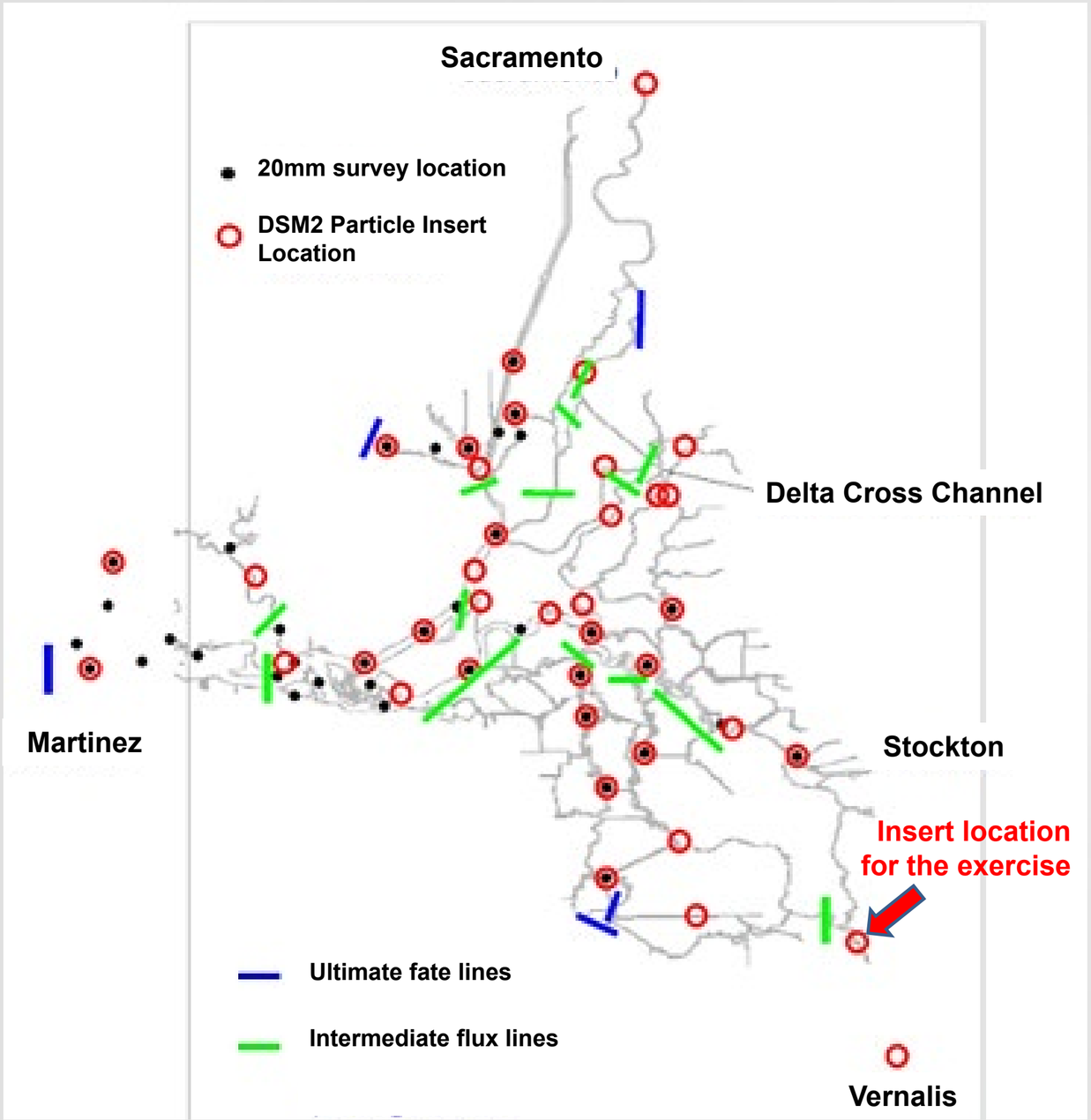
ECO-PTM
Ecological Particle Tracking Model

- Neutrally buoyant particles **Delta smelt larvae**
- Position oriented particles **Longfin smelt larvae**
- Salmon particles **Chinook salmon smolts**

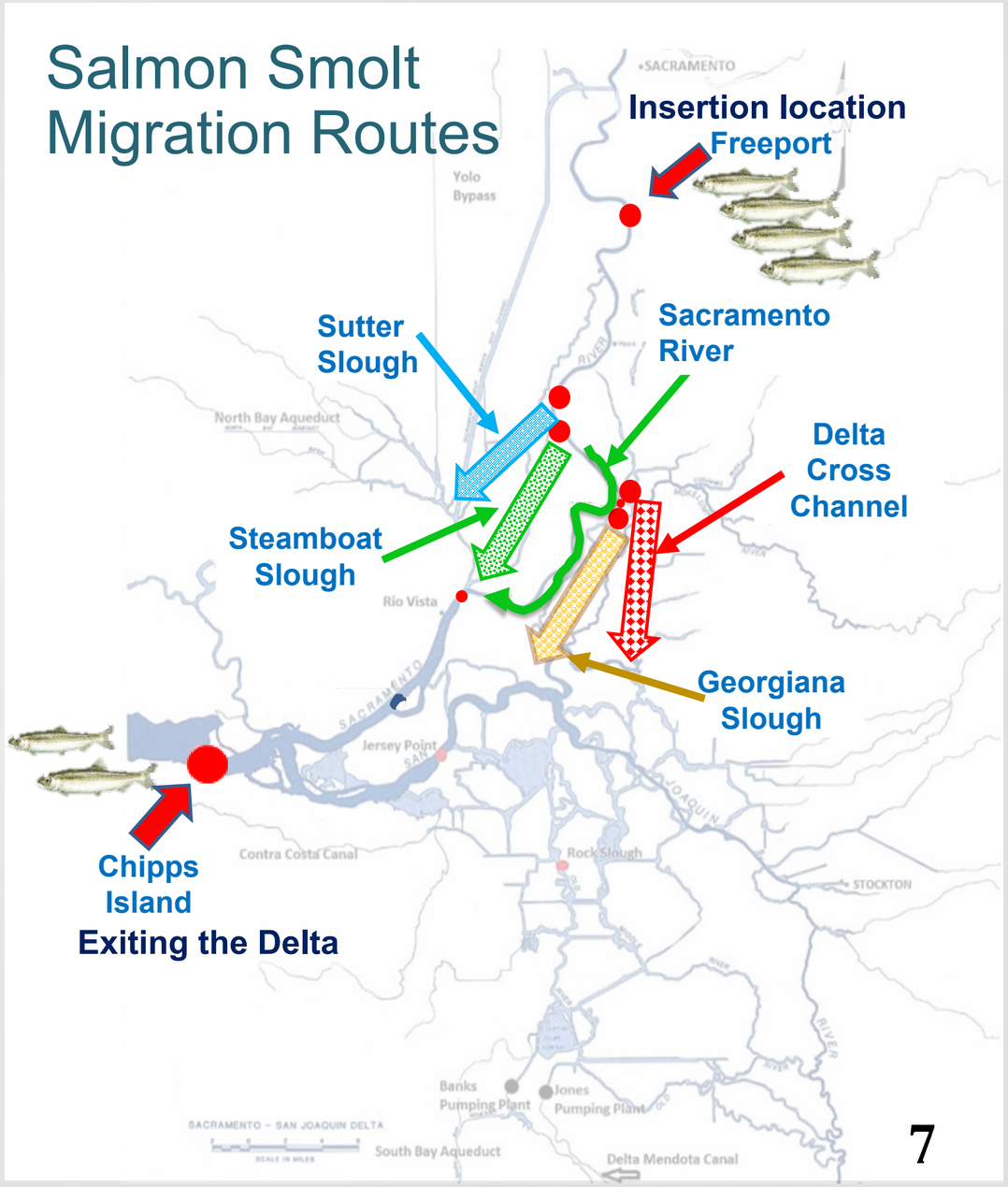
ECO-PTM Output

- Entrainment into facilities (smelt larvae)
- Survival through the Delta (salmon smolt)

Entrainment (smelt larvae)



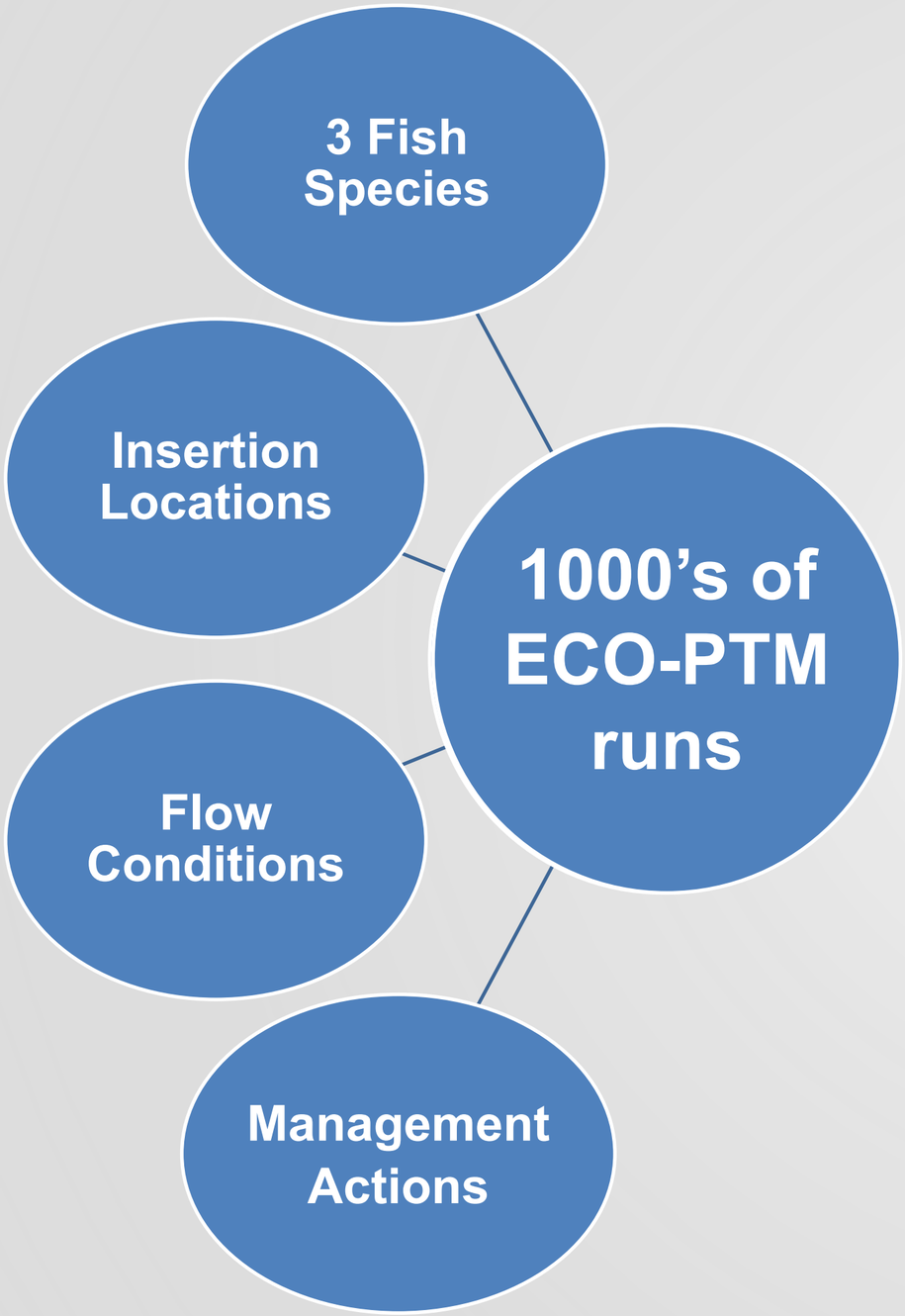
Survival (salmon smolt)



ECO-PTM output depends on:

- species
- insert locations
- flow conditions
- management scenarios
- ……

Cloud Computing



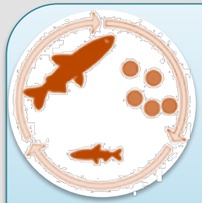
How to use Cloud Computing is not covered in this Intro class

ECO-PTM: Take Home Points

Collaborative Development

3 Fish Species
Delta Smelt Larvae
Longfin Smelt Larvae
Chinook Salmon Smolts

DATA
Calibrated & Validated to Fish tag data



Entrainment & Survival
Routing
Movement
Survival

Today's Training

- What is ECO-PTM
- Why it can be used for evaluations
- How we use it

Delta Smelt

Longfin Smelt

Chinook Salmon

Questions? Please type them into Teams chat

Include slide # if possible

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