BUREAU OF RECLAMATION

PTM: Fate Effects from Operations

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Overview

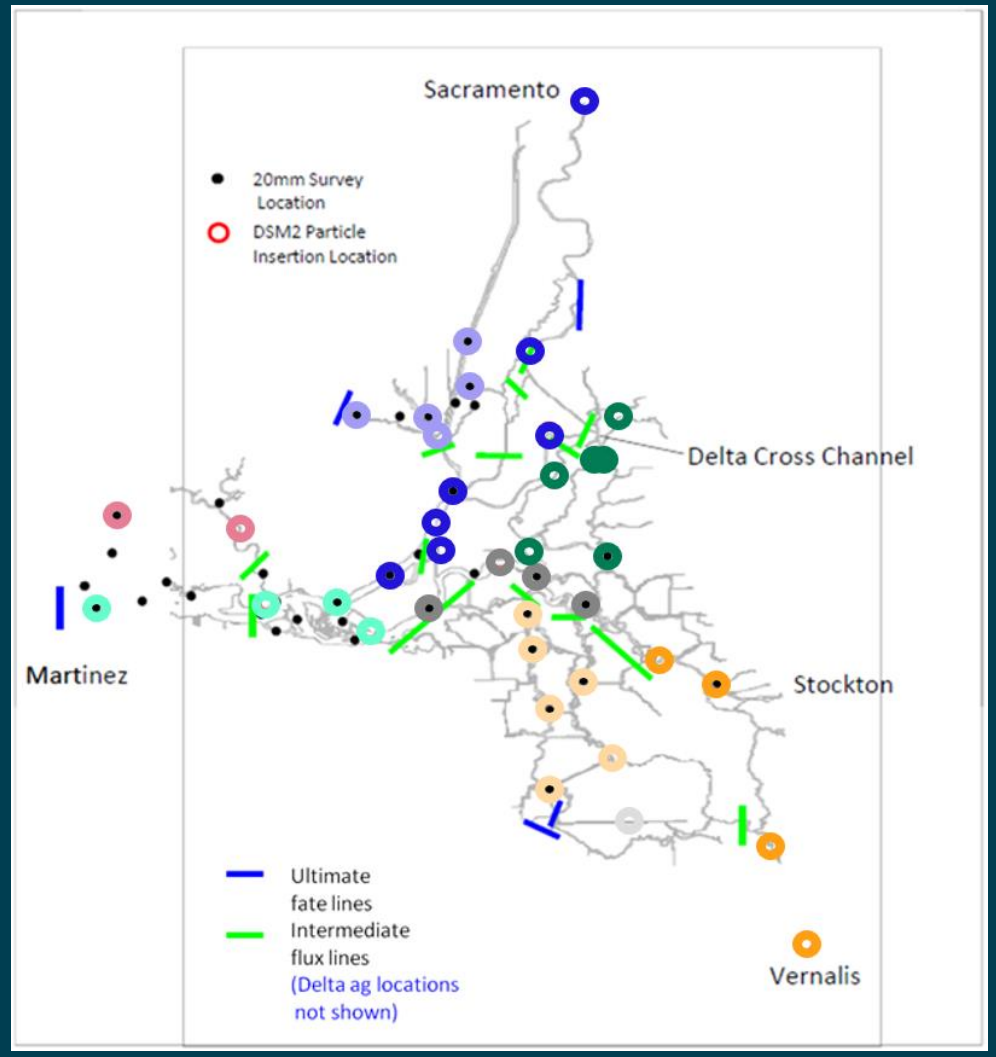
- Introduction and Approach
- PTM Assumptions
- Review of Results
- Application of ecoPTM

Introduction and Approach

- Goal:
  - Assess relative change to particle fate under a set of different Old and Middle River (OMR) limits
- Approach:
  - Conduct CalSim II simulations under OMR limits of:
    - -3,000 cfs, -4,000 cfs, -5,000 cfs, -6,000 cfs, and -7,000 cfs
  - Run DSM2 HYDRO and DSM2 PTM and ecoPTM simulations
  - Evaluate fate based on month, particle insertion location, and OMR condition

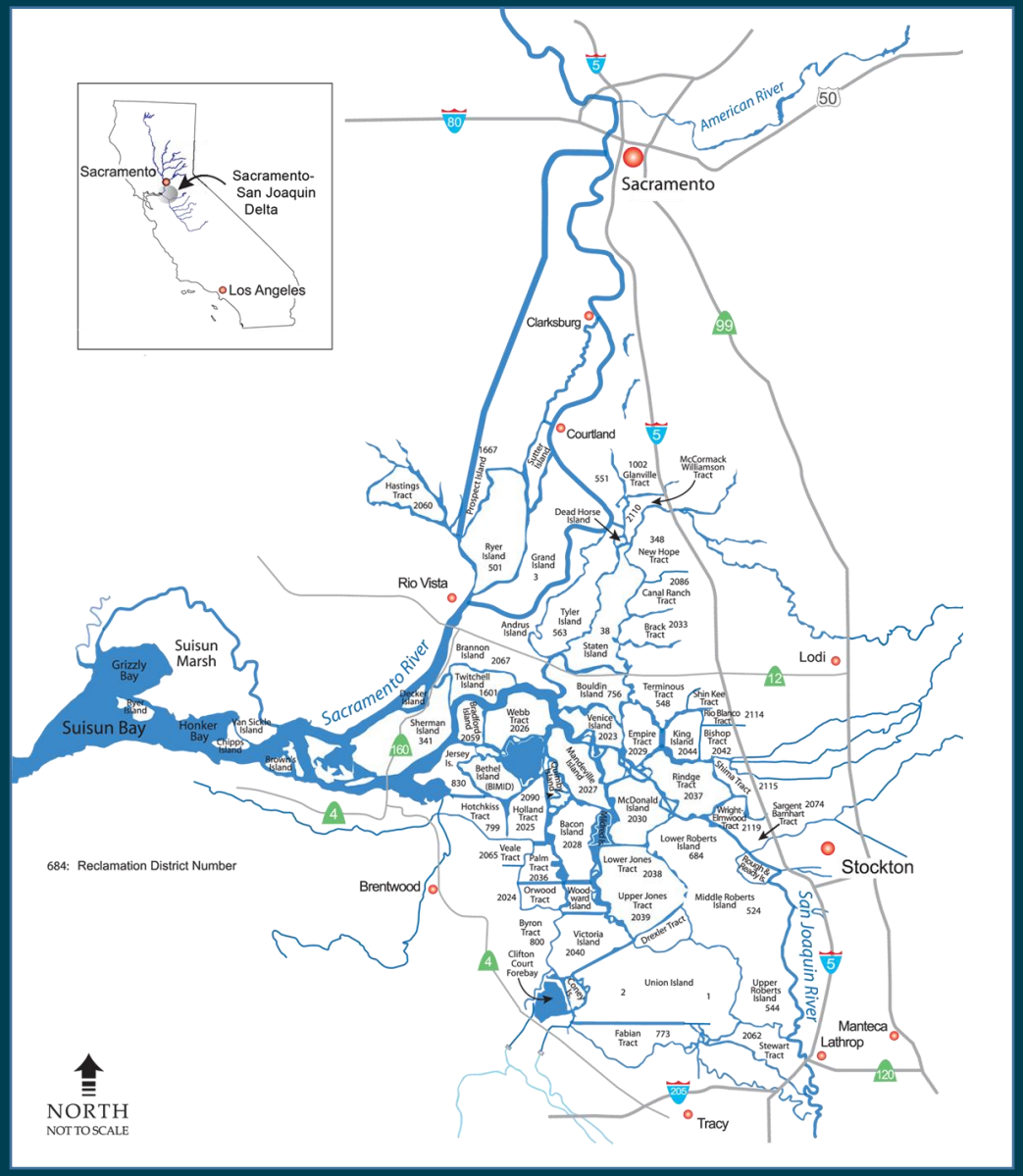
Insertion Locations

- 39 insertion locations, based on 20mm Delta Smelt Survey Stations
- Color-coded by region in the Delta
- 4000 particles evenly injected over a 24.75-hour period



Particle Fate Tracking

- Particle flux is tracked at following locations:
  - South Delta Exports
  - Past Chipps Island
  - San Joaquin River



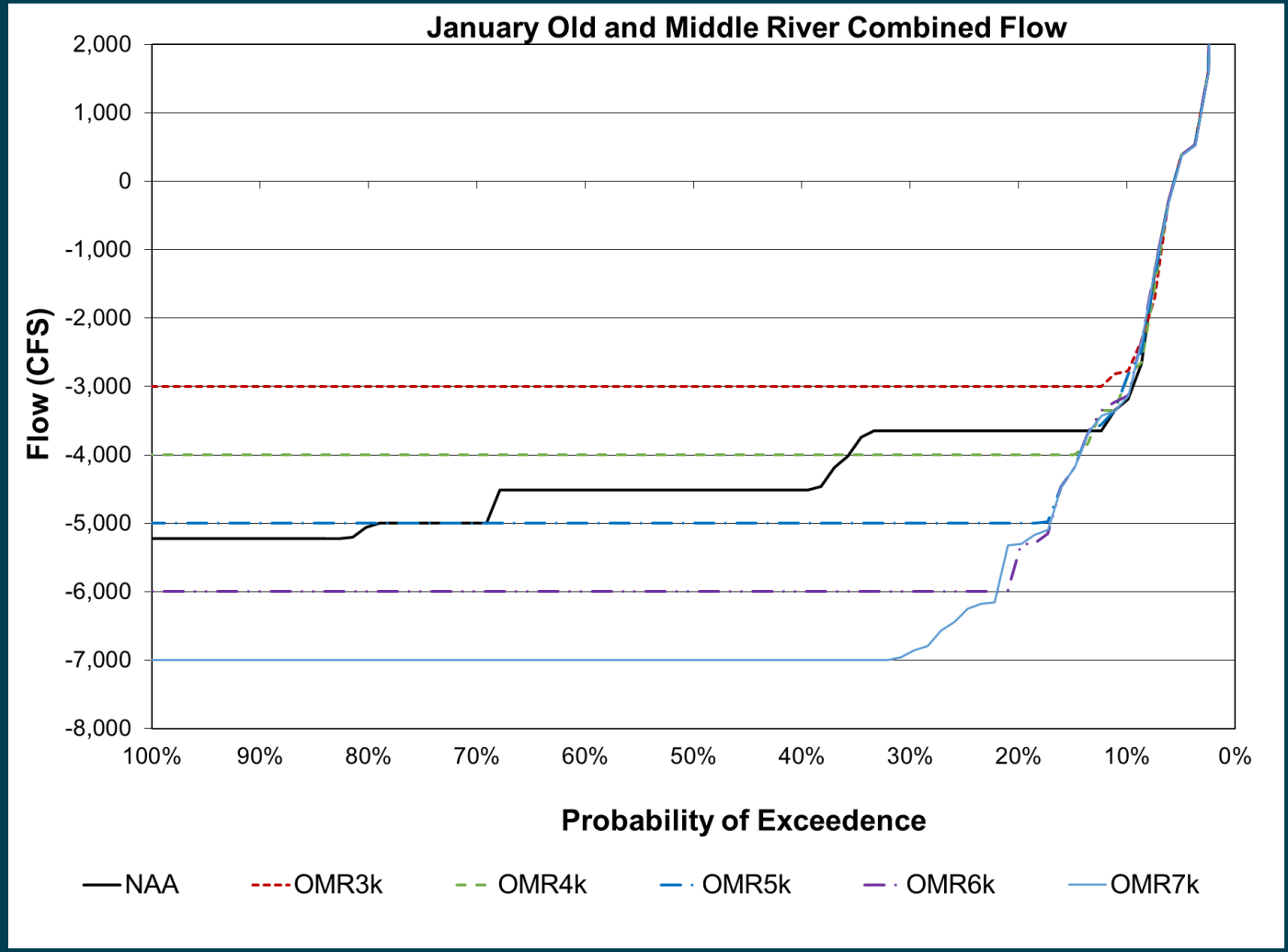
Source: USGS

Period Selection and Particle Behavior

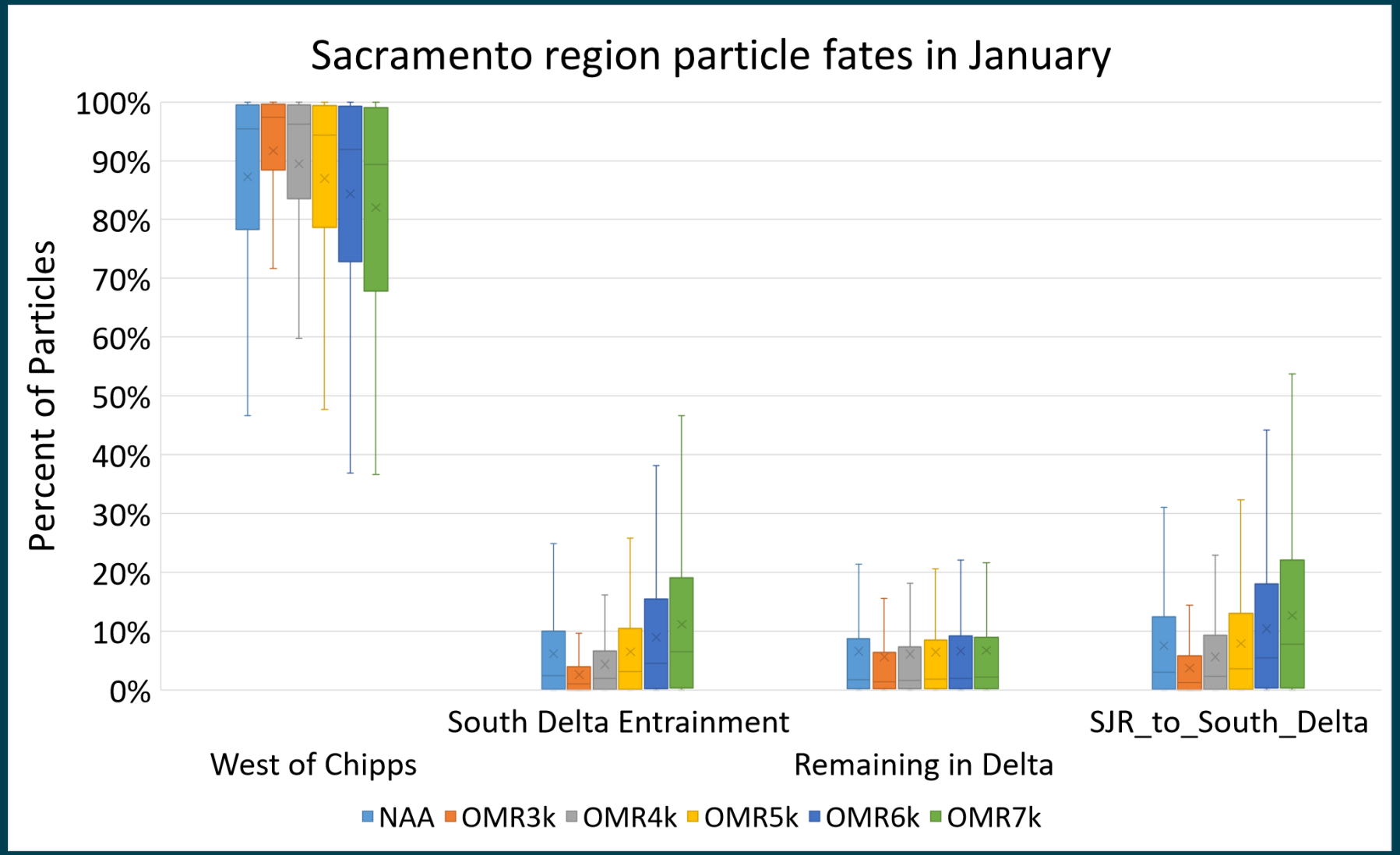
- 82-year planning simulation period
- December through June in each year
- 30-day March through June
  - Larval Delta Smelt
  - Behavior: Neutrally Buoyant (flowing in whole water column)
- 45-day December through March
  - Larval Longfin Smelt
  - Behavior: Neutrally Buoyant and Surface-Oriented (flowing in the top 10% water depth)

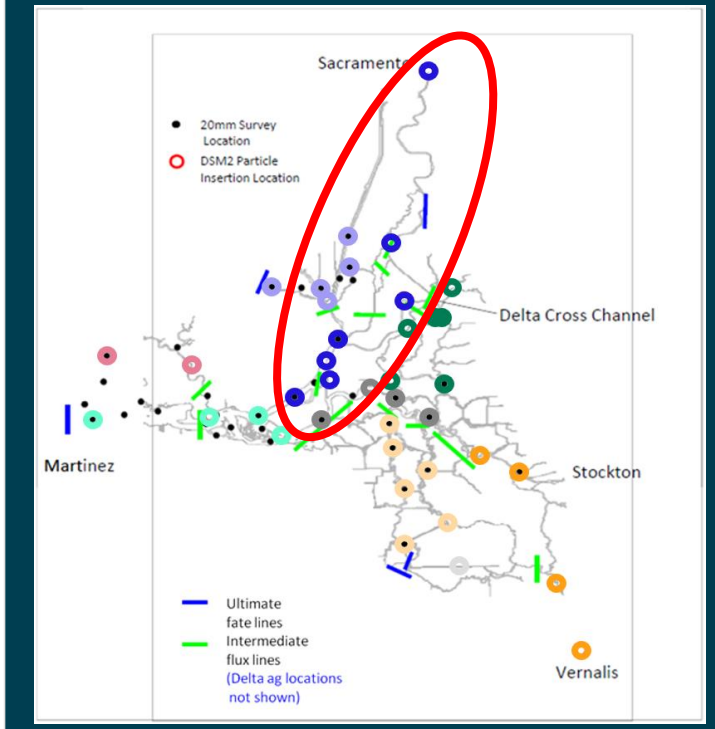
CalSim II Approach and Results

- CVP and SWP exports are limited to meet OMR values
- Note that each OMR limit is a minimum



PTM Results – 45 days, Surface Oriented





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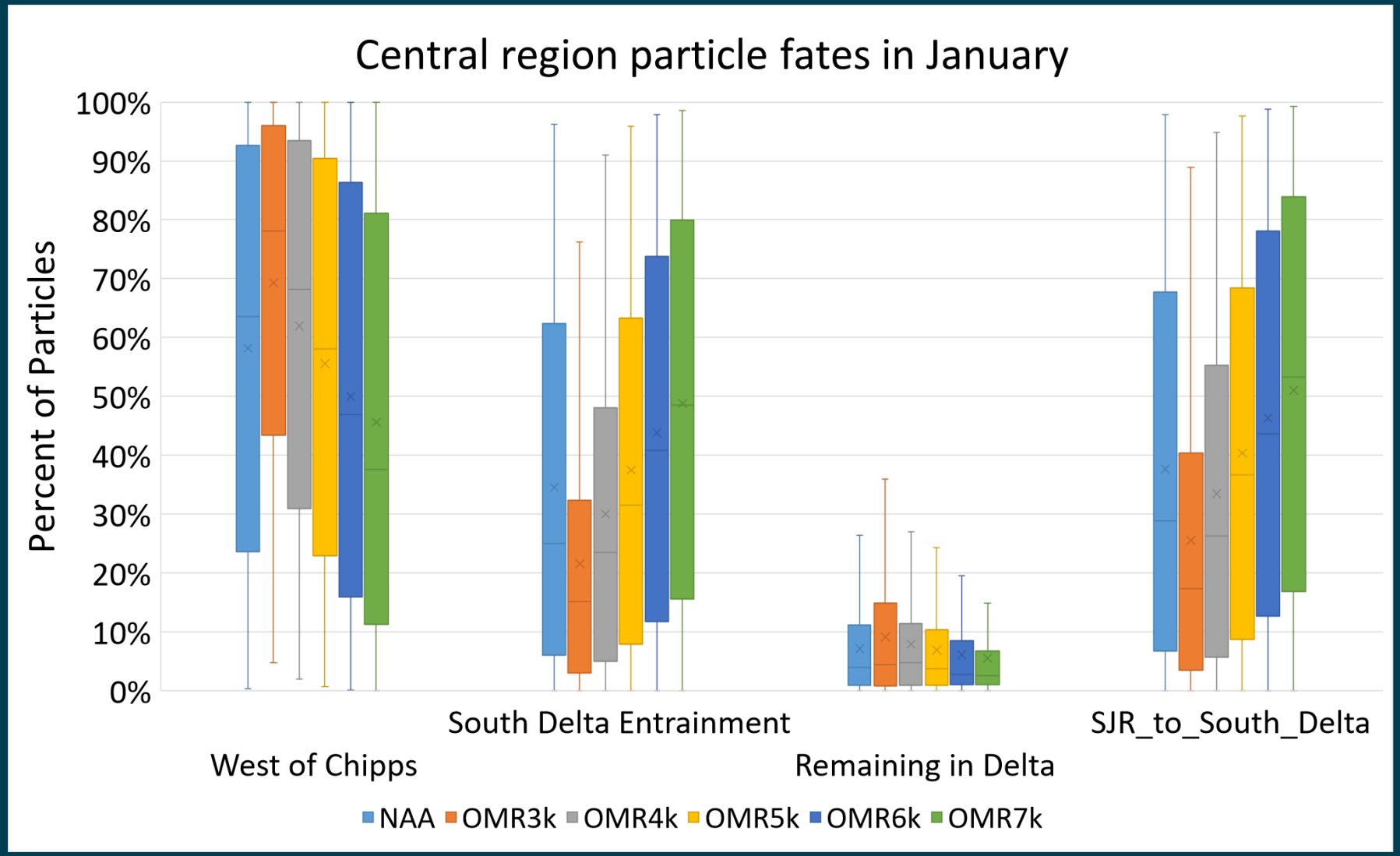

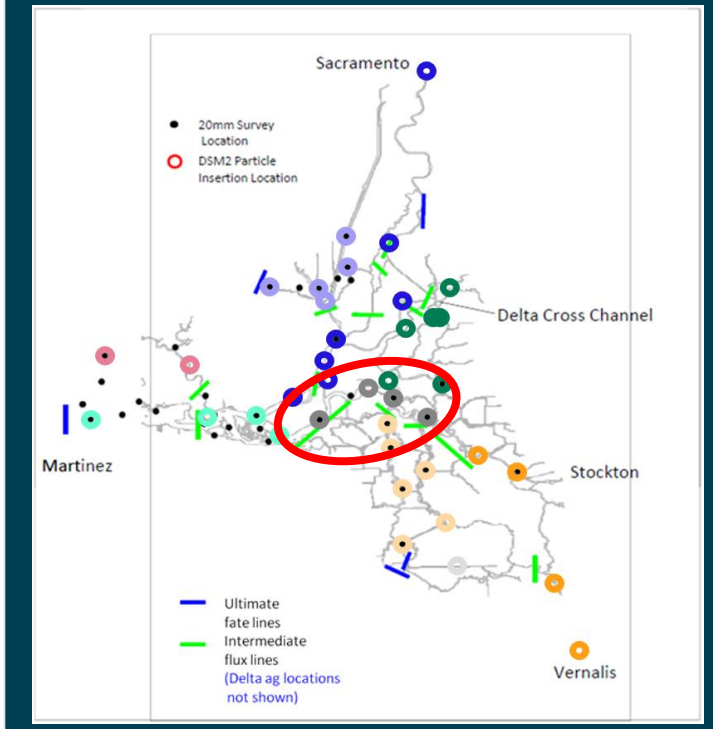

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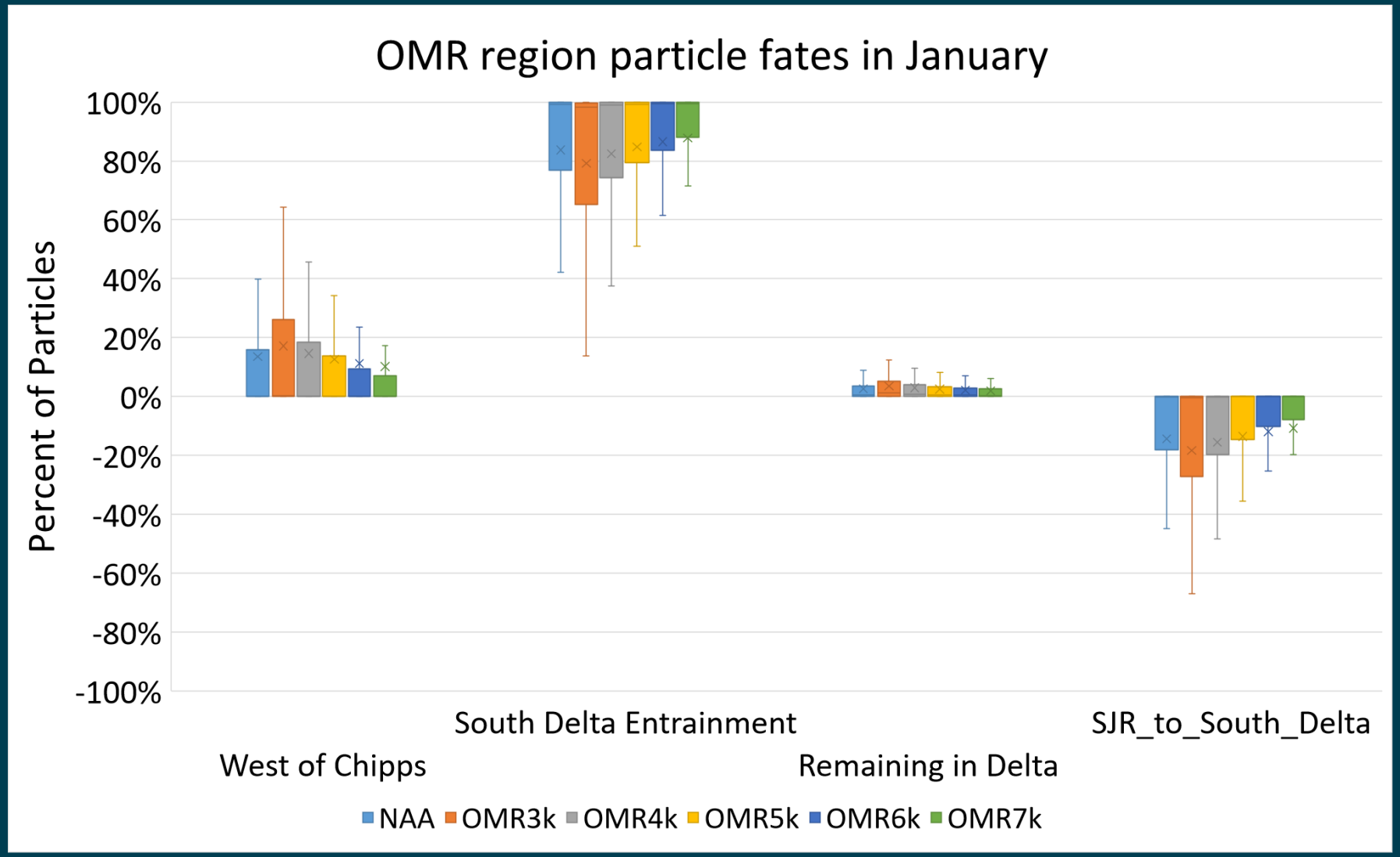

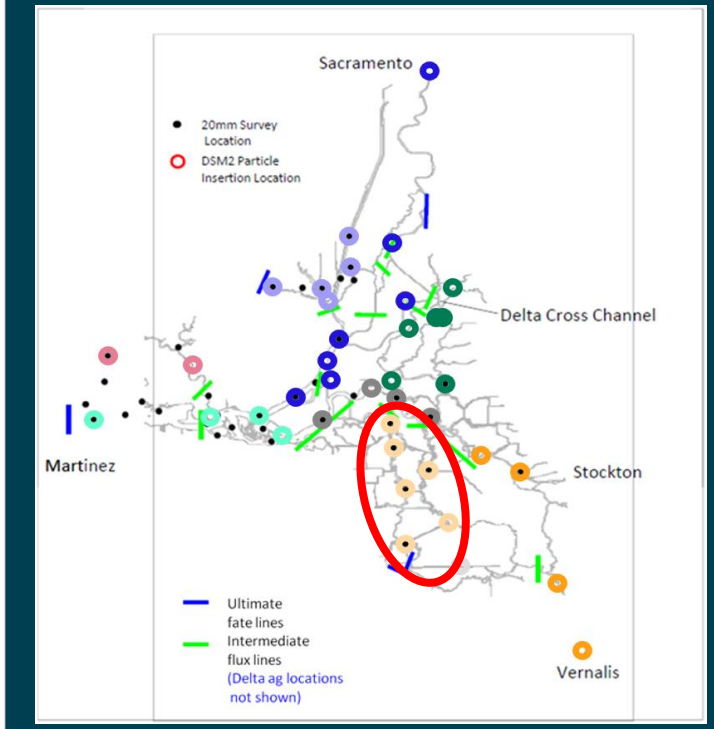

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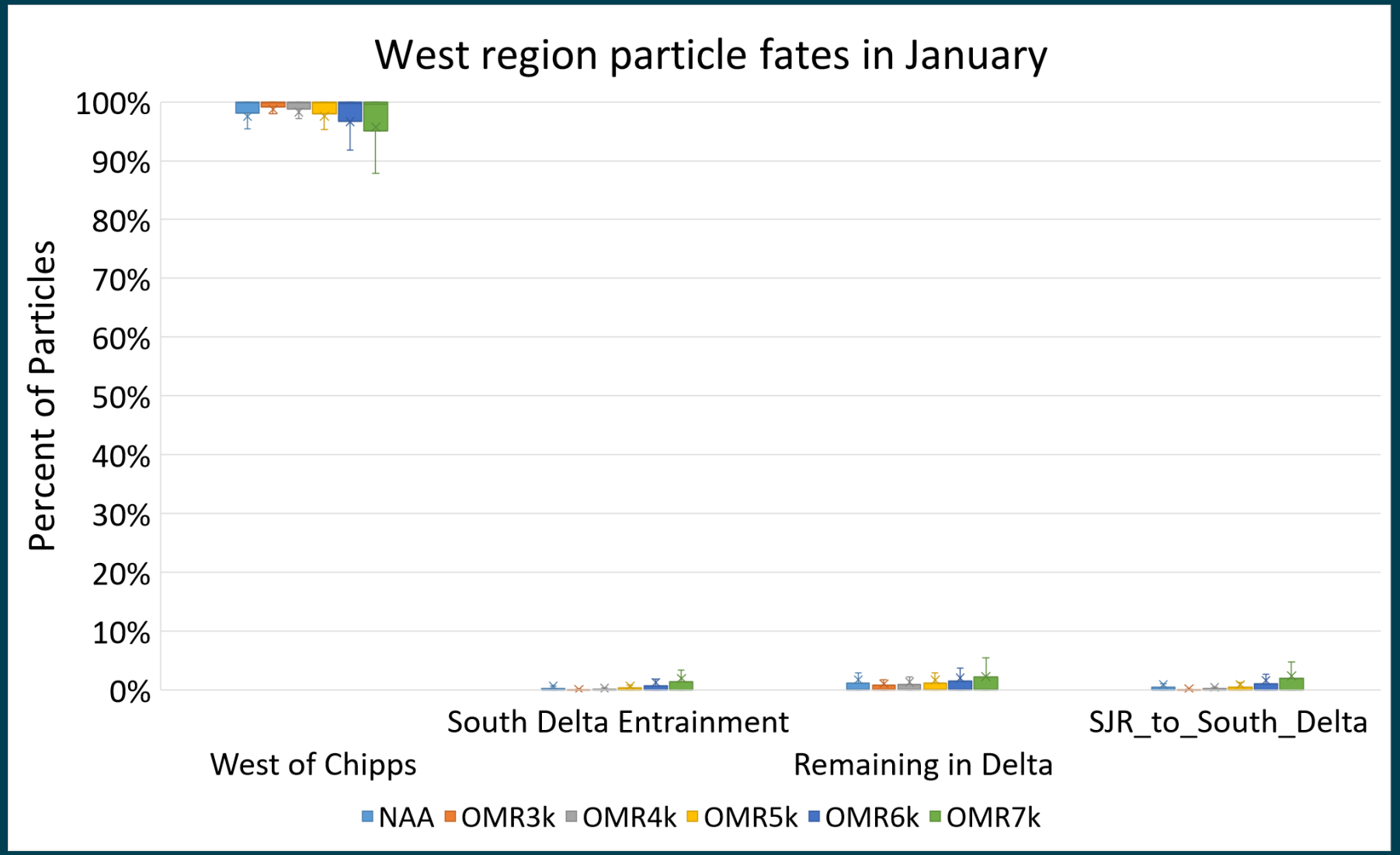
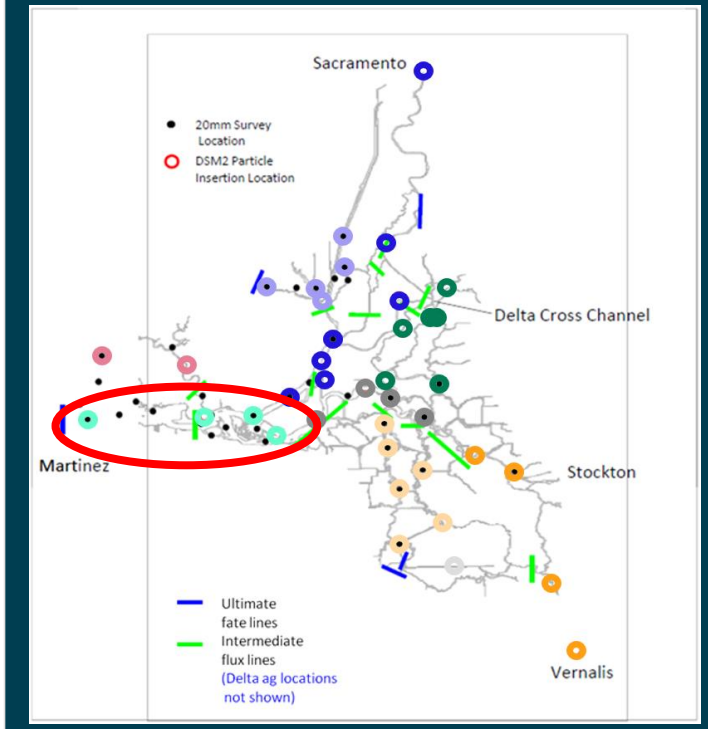




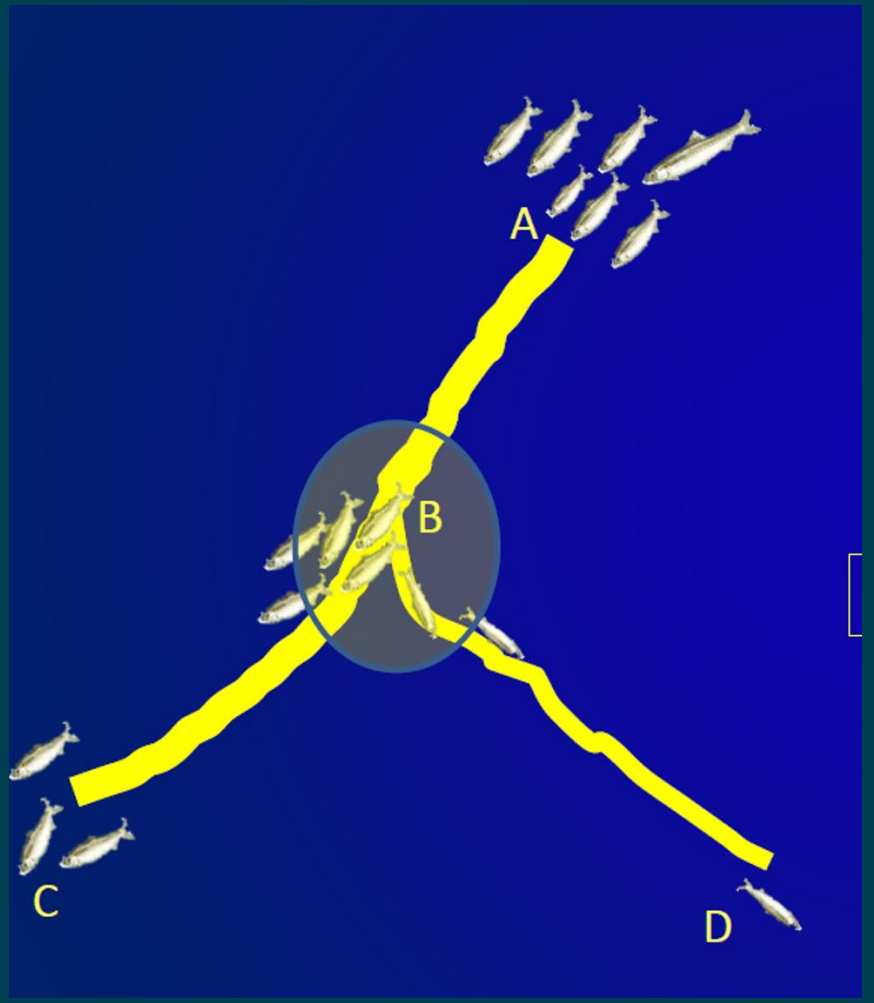
PTM Results - Summary

- Particle response is region dependent
- Within a given region and OMR flow condition, a range of particle fates may occur
- With lower OMR flows,
  - particles entrained at pumps increases and
  - particles exiting the Delta decreases

Initial Results of ECO-PTM Juvenile Salmon Behaviors

- Travel Time
- Routing
- Survival Rate

Limitation: not calibrated in the south delta



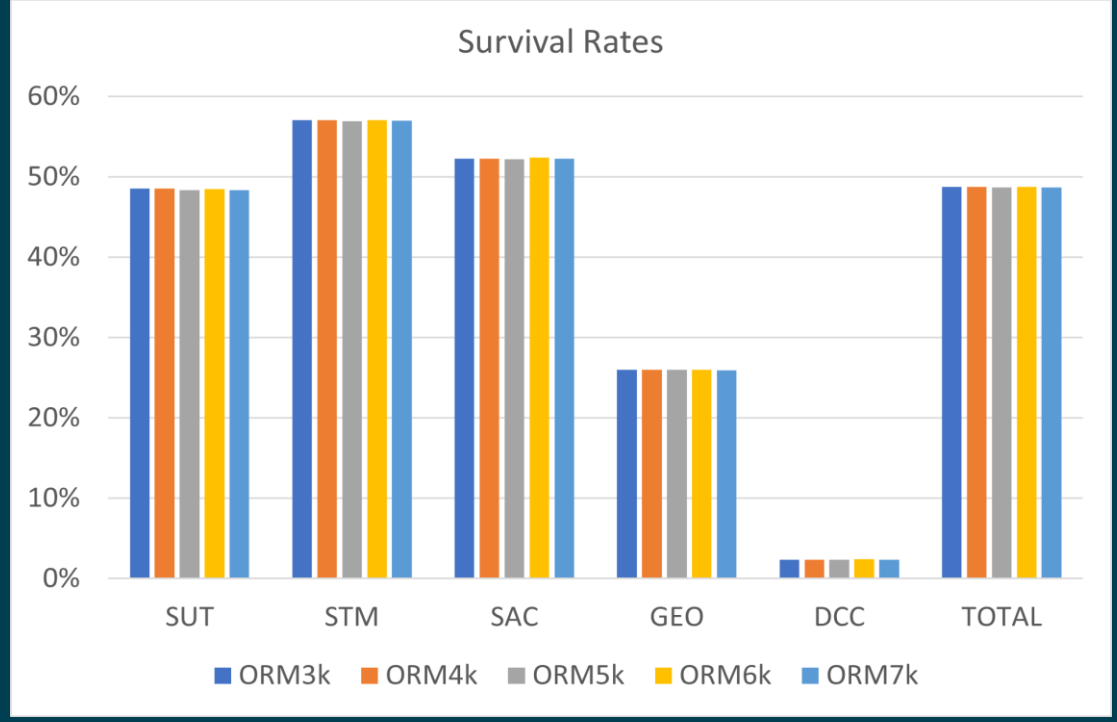
Simulation Matrix

- 1 insertion locations: Sacramento River at Freeport
- 81 years simulations (1923-2003)
- Dec, Jan, Feb, and Mar

- ORM-3000, ORM-4000, ORM-5000, ORM-6000, ORM-7000

Survival Rates

Locations



Source: ECO-PTM Application:Assess Effectiveness of Fish Barriers (Wang 2020)

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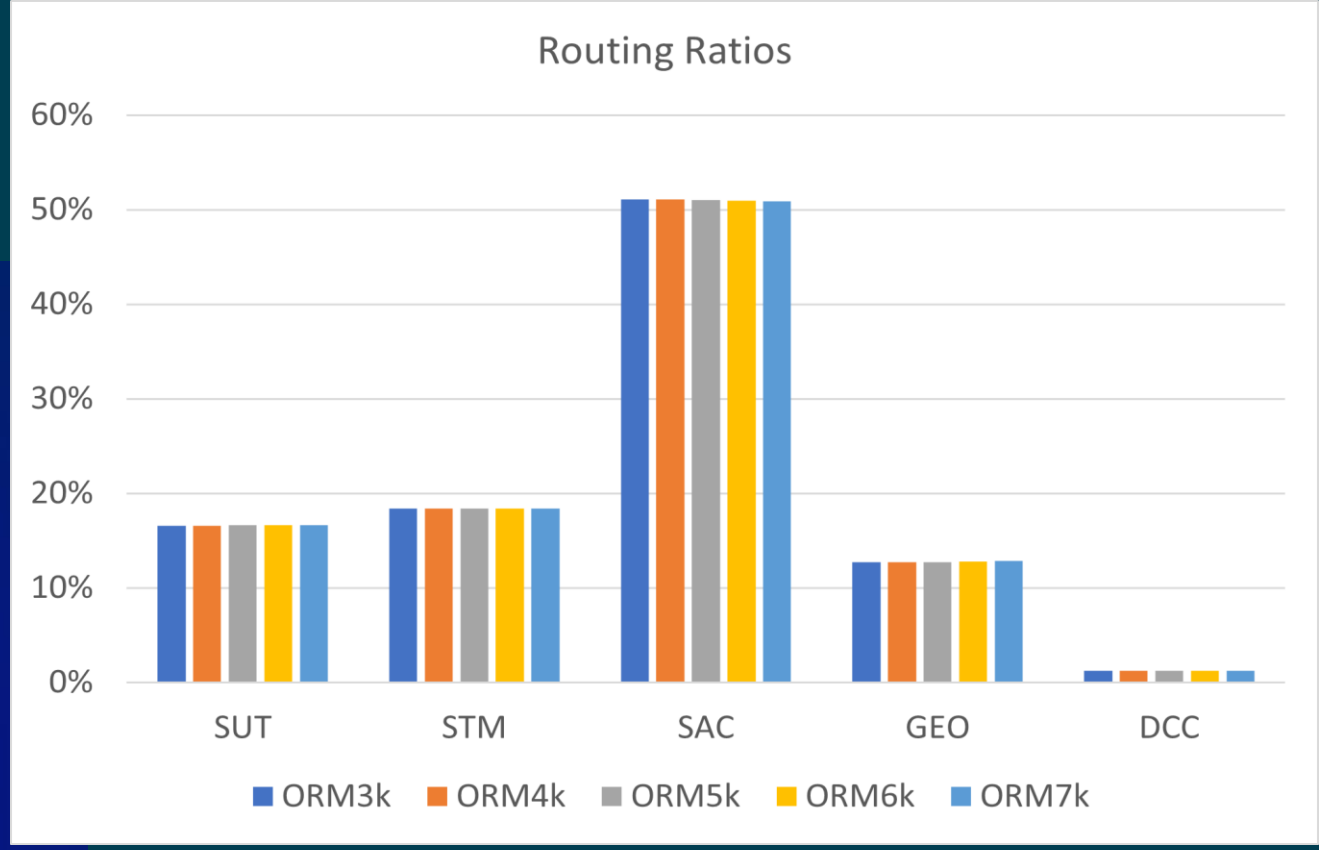

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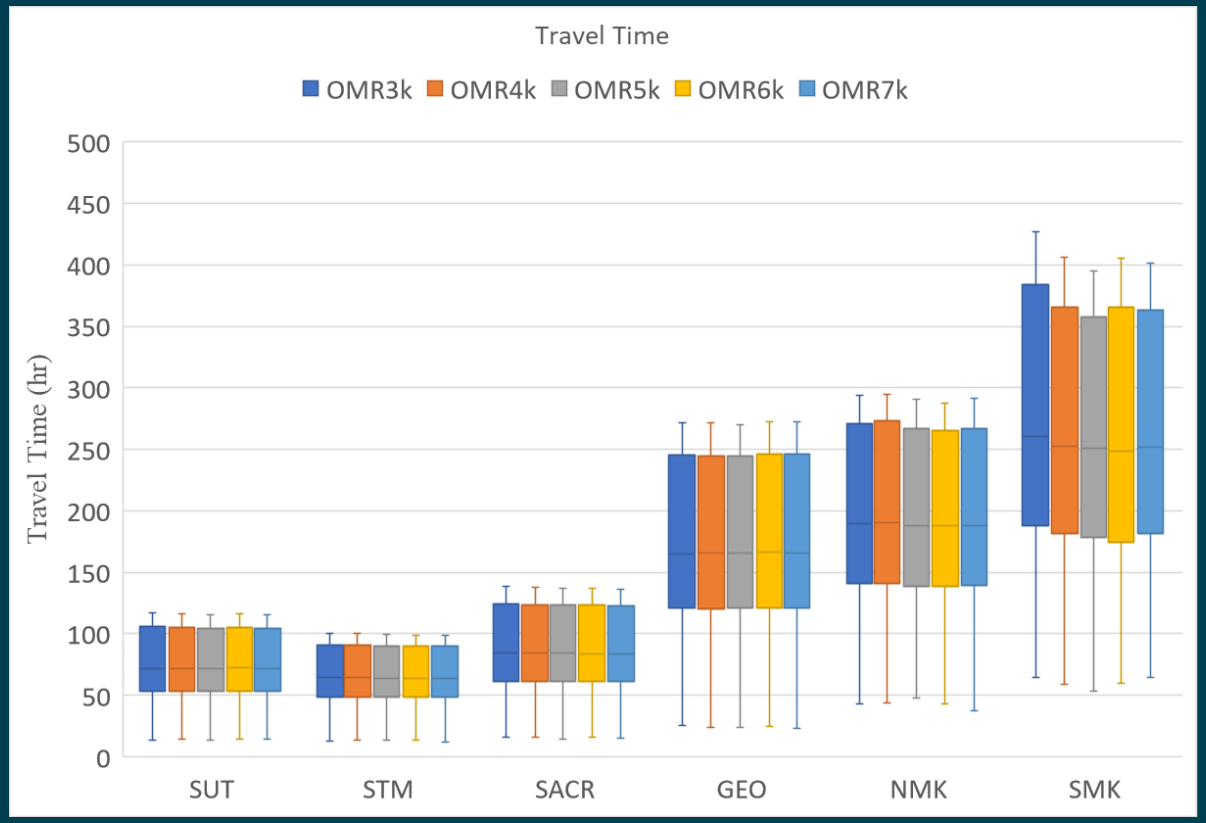

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Thank you!

Acknowledgements:

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