

Evaluation of North Delta Intake Locations

BDCP Steering Committee

July 29, 2010

Separate Analyses

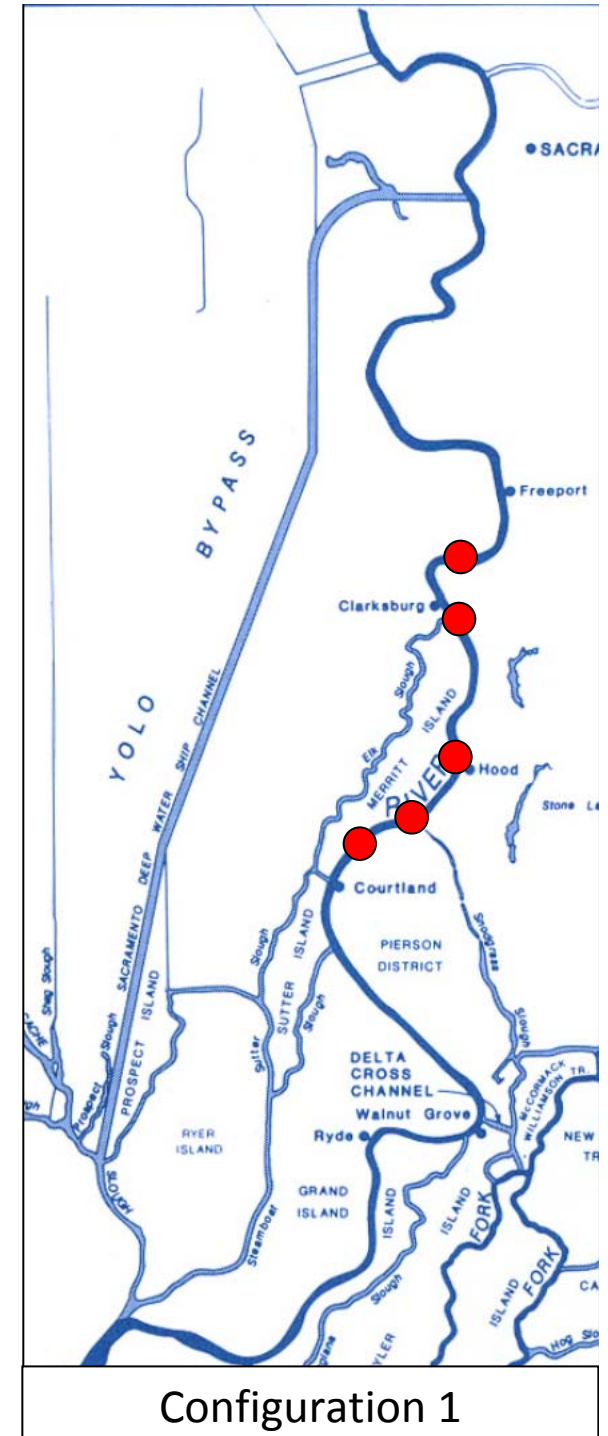
- Separate analyses designed to provide information to Steering Committee
- Separate Analyses
 - *North delta intake sizing sensitivity analysis
 - *North delta intake location sensitivity
 - *Delta levee failure and sea level rise
 - North delta bypasses evaluation summary
 - San Joaquin inflow sensitivity
 - Old River corridor integration

Objectives

- Evaluate various configurations of north Delta diversion intake locations in terms of
 - Availability of water for diversion
 - Ability to divert at each intake
 - Impacts to Other Diverters/Dischargers
 - Exposure to Intakes
 - Migration Corridor
 - Water Quality
 - Cost
- High level, preliminary analysis to provide information

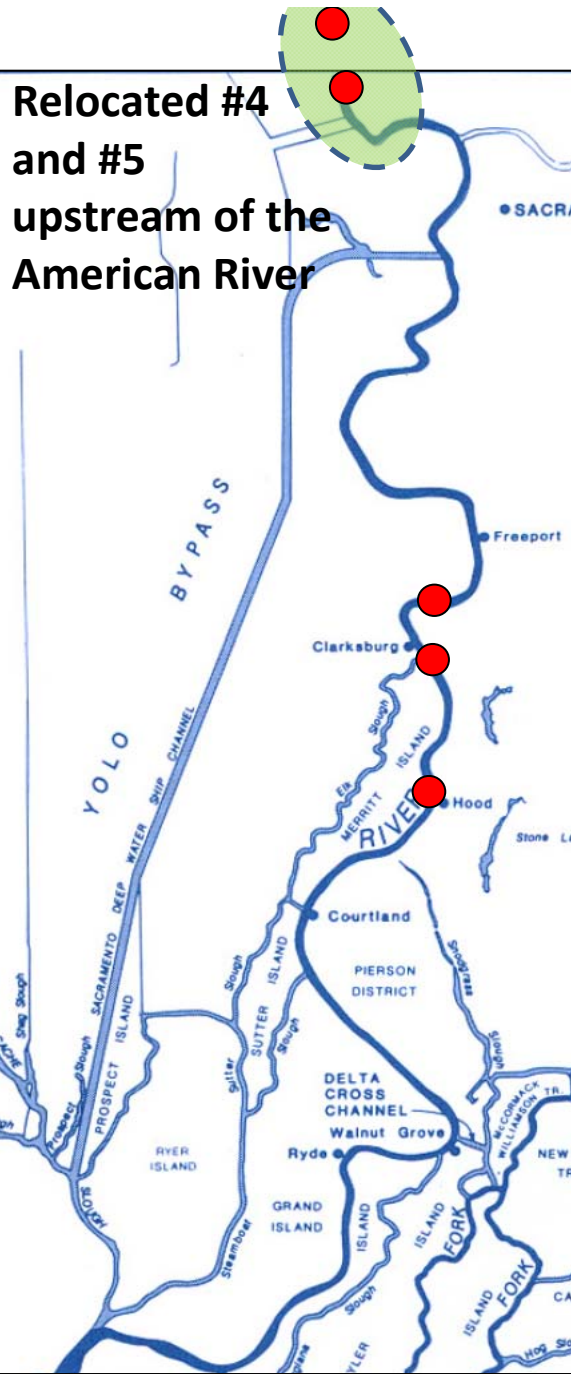
Intake Configurations

- Current locations analyzed have intakes between Freeport and Courtland
- Interest in assessing more geographically dispersed intake locations
- Four (4) configurations considered in this analysis
 - Configuration 1: Current Proposed Project
 - Configuration 2: Intakes #4 and #5 moved upstream of Sacramento-American River confluence
 - Configuration 3: Intakes #4 and #5 moved upstream of Freeport Regional Water Authority (FRWA) intake and downstream of Sacramento-American River confluence
 - Configuration 4: Intakes #4 and #5 moved downstream of Steamboat Slough and upstream of Delta Cross Channel

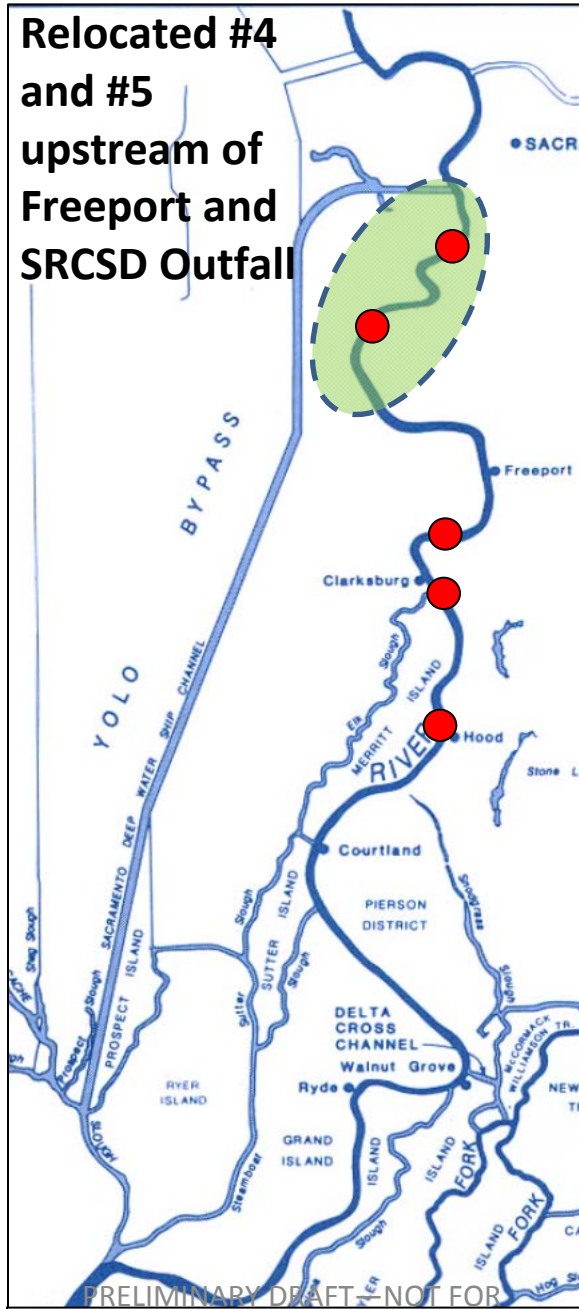


PRELIMINARY DRAFT—NOT FOR
DISTRIBUTION

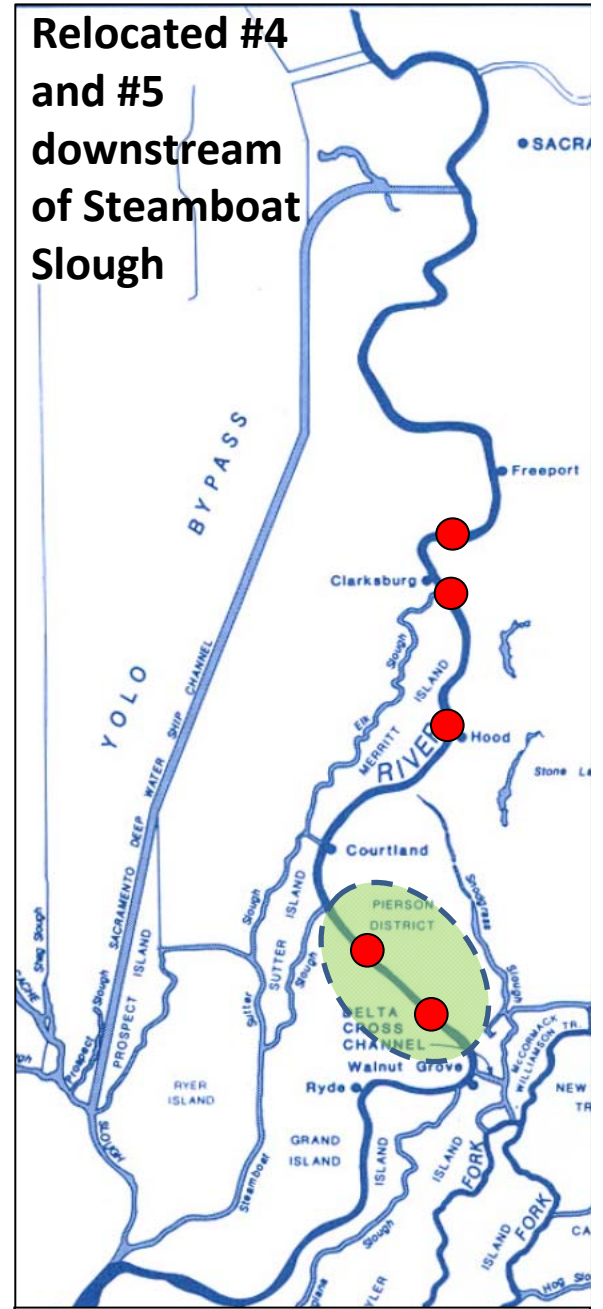
Configuration 1



Configuration 2



Configuration 3



Configuration 4

PRELIMINARY DRAFT - NOT FOR DISTRIBUTION

Methodology

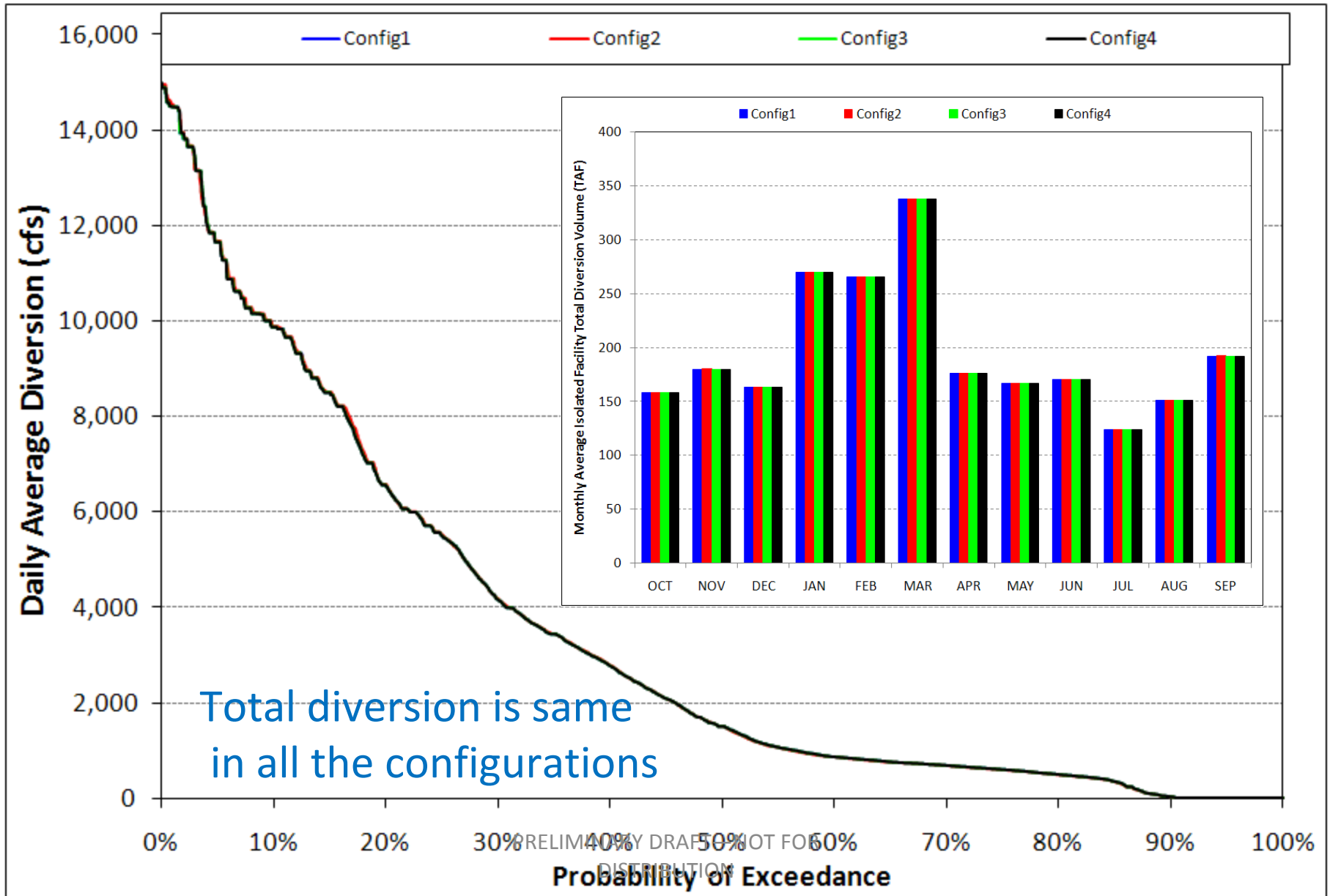
- Proposed Project (Early Long-Term) CALSIM II results used as the boundary conditions for all configurations
- 16-year DSM2 HYDRO simulation
- PTM was simulated for three periods and four insertion locations
 - Sac R at Sacramento, Sac R at Sutter Sl, Sac R at Ryde and Steamboat Sl at Sutter Sl

Particle Insertion Periods used in the Analysis

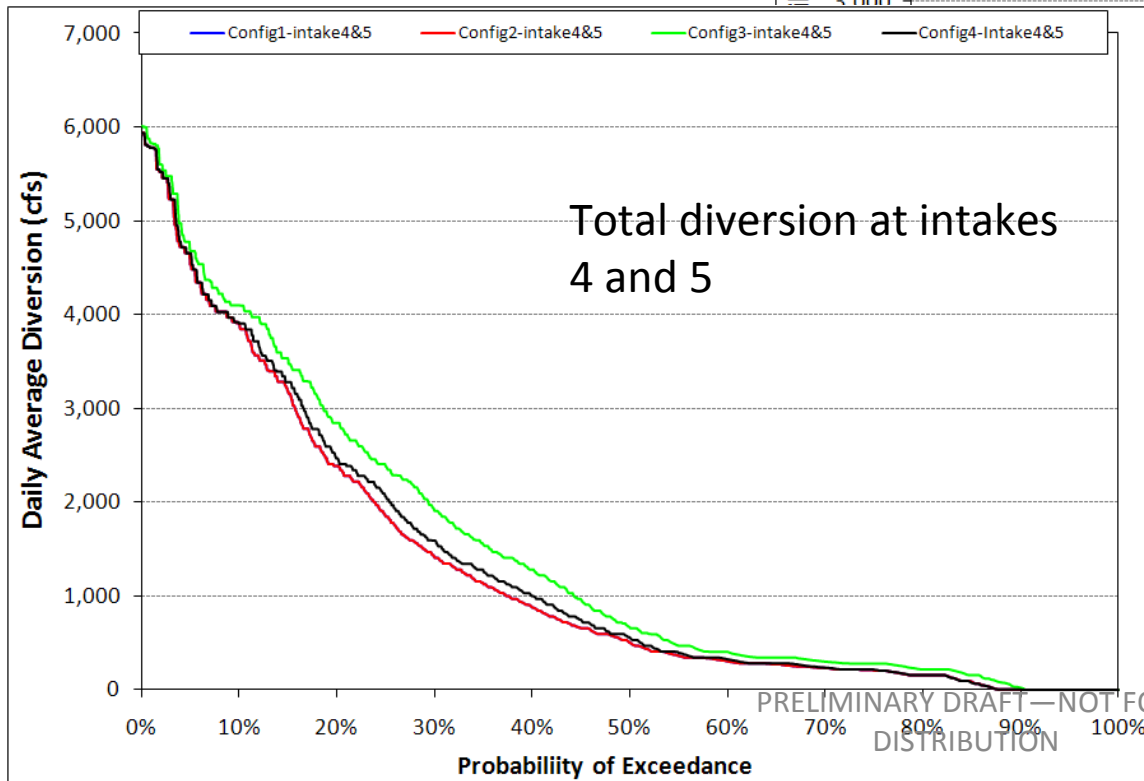
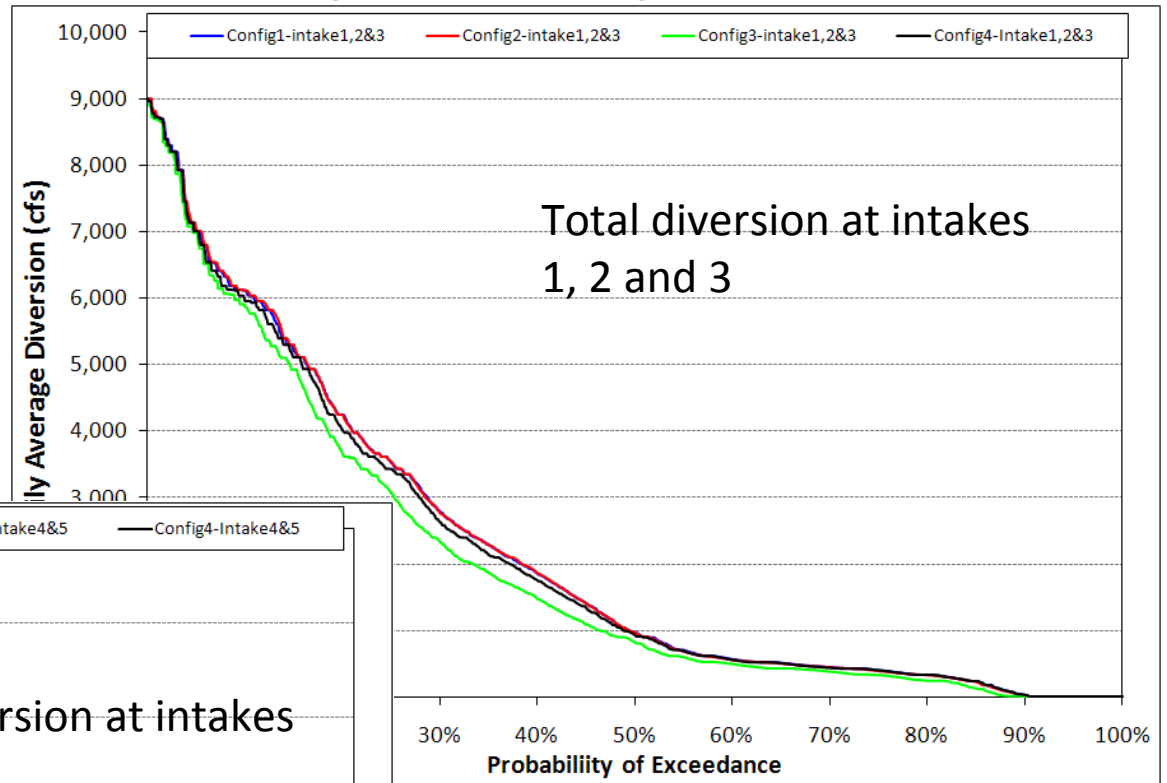
| Period Selected | Sacramento River Inflow (cfs) | IF Diversion (cfs) |
|-----------------|-------------------------------|--------------------|
| Apr 1929 (Low) | 9,298 | 558 |
| Mar 1961 (Med) | 17,753 | 3,218 |
| Feb 1940 (High) | 56,698 | 14,540 |

PRELIMINARY DRAFT—NOT FOR
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Diversion Capability



Diversion Capability

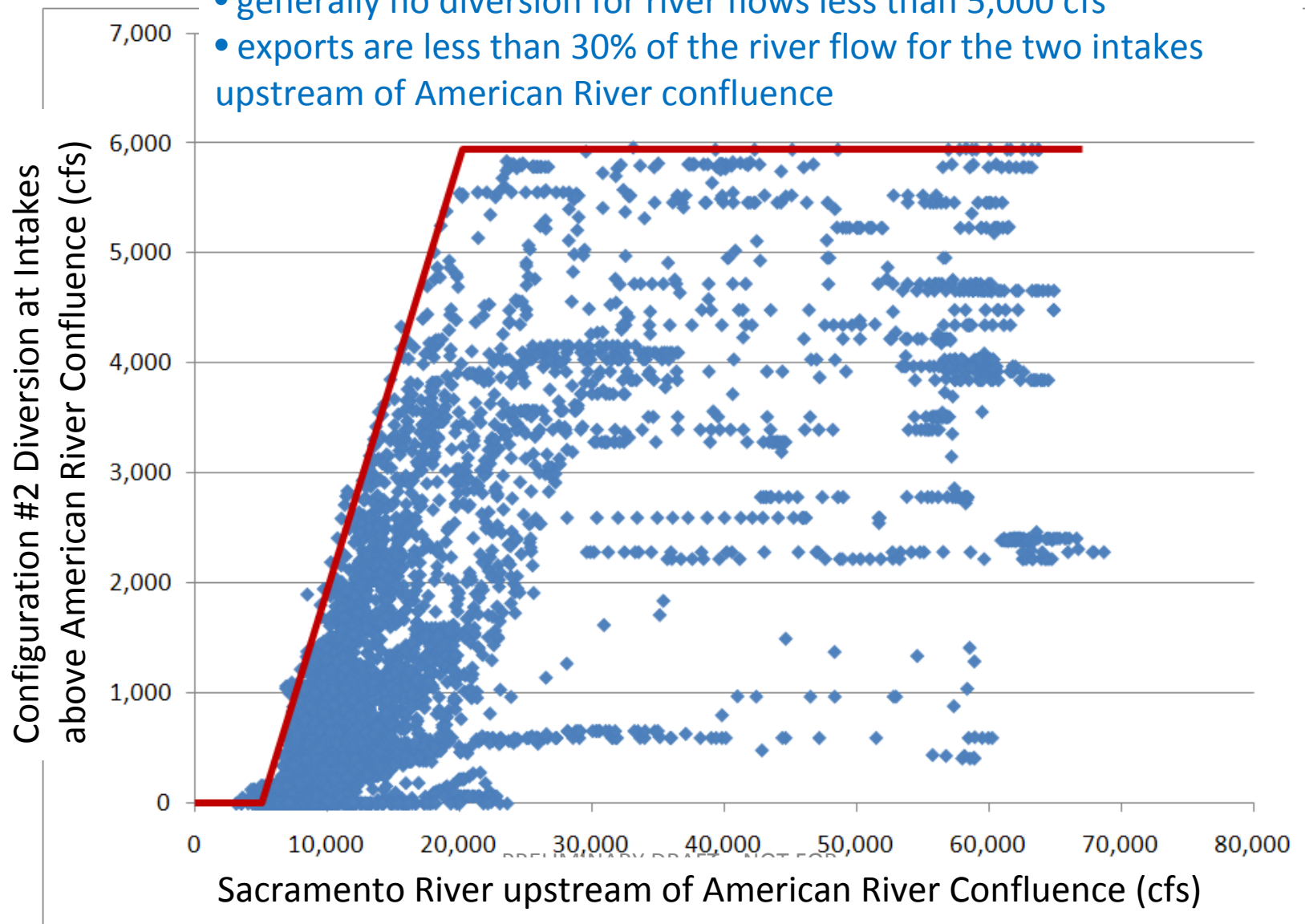


Distribution of diversion changed primarily due to operational preference

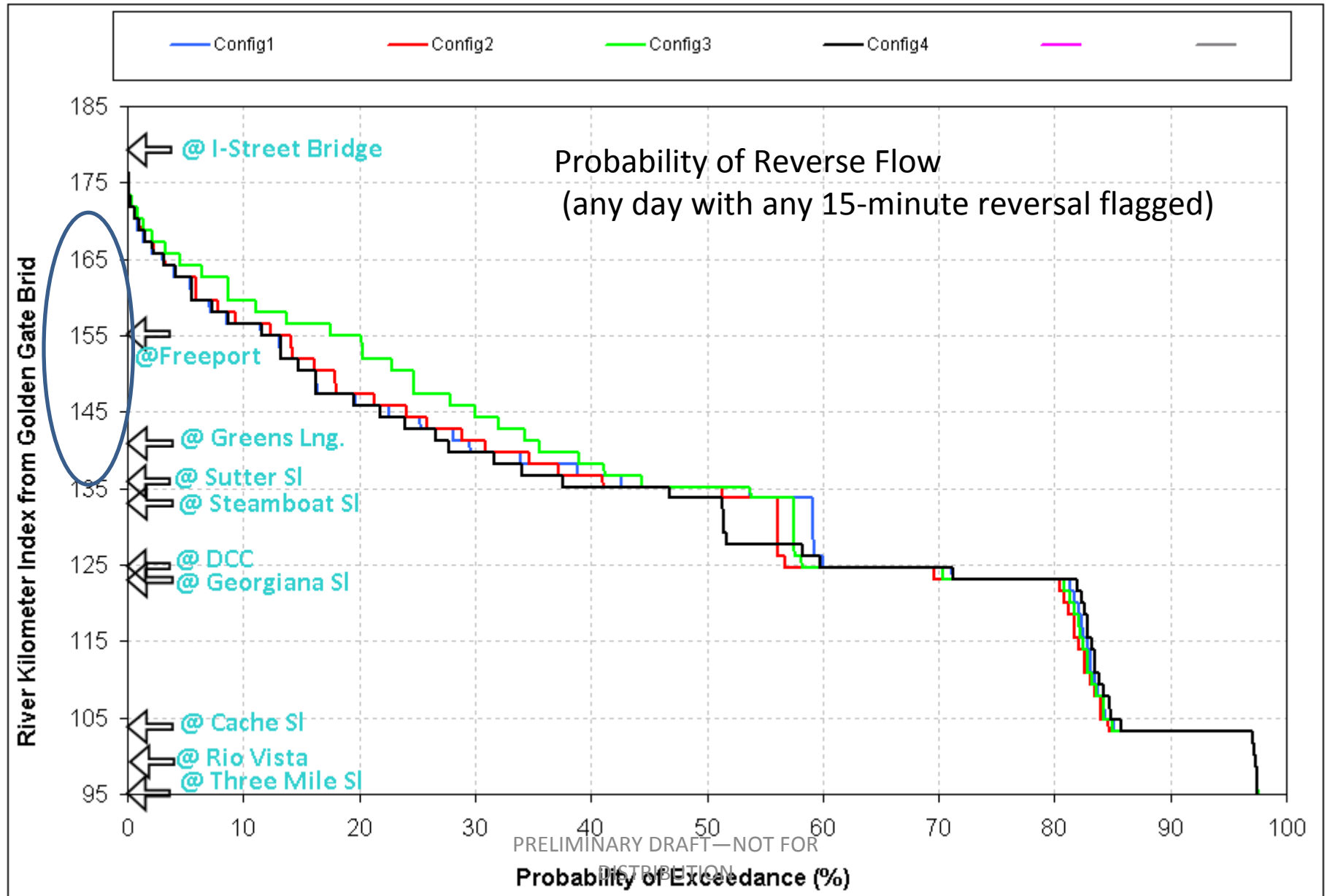
Availability of Water for Diversion

For Configuration 2 (Sac R diversions u/s of American),

- generally no diversion for river flows less than 5,000 cfs
- exports are less than 30% of the river flow for the two intakes upstream of American River confluence

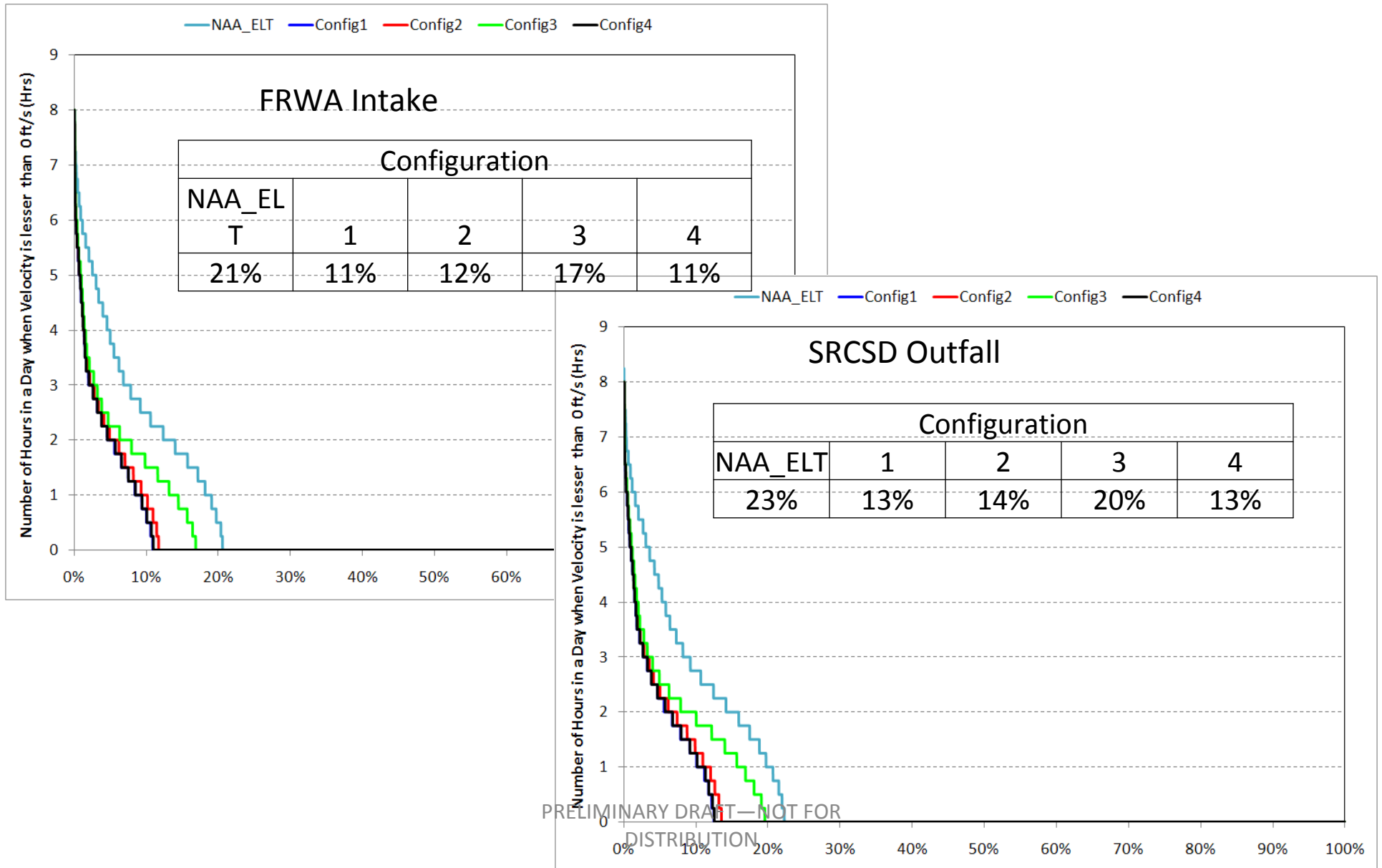


Impacts to Other Diverters/Dischargers



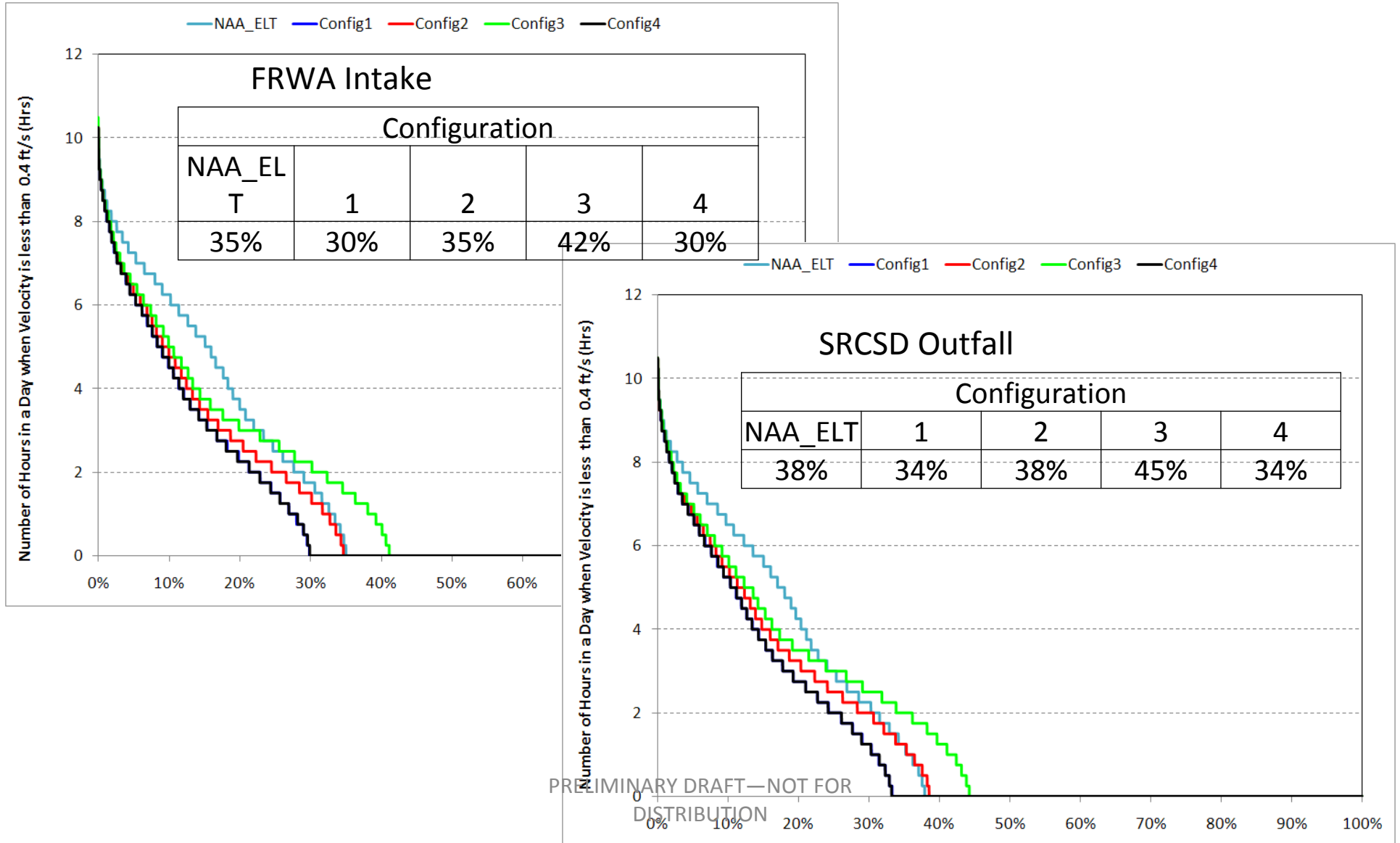
Impacts to Other Diverters/Dischargers

Number of Days with a Flow Reversal

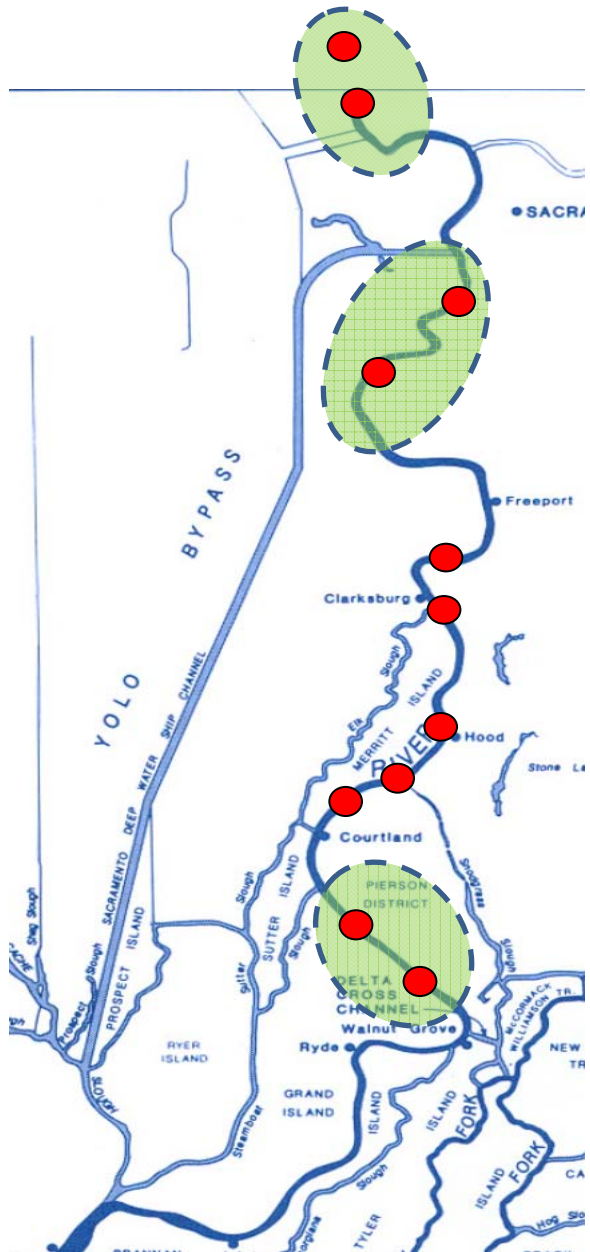


Impacts to Other Diverters/Dischargers

Number of Days with Velocity < 0.4 fps



Outmigrant Exposure to Intakes



Intakes in the reach u/s of American River

| Origin of Fish | Configuration | | | |
|------------------|---------------|------|----|----|
| | 1 | 2 | 3 | 4 |
| Sacramento River | 0% | 100% | 0% | 0% |
| American River | 0% | 0% | 0% | 0% |

Intakes in the reach d/s of American River and u/s of FRWA intake

| Origin of Fish | Configuration | | | |
|------------------|---------------|----|------|----|
| | 1 | 2 | 3 | 4 |
| Sacramento River | 0% | 0% | 100% | 0% |
| American River | 0% | 0% | 100% | 0% |

Intakes in the reach d/s of SRCSD outfall and u/s of Sutter Slough

| Origin of Fish | Configuration | | | |
|------------------|---------------|------|------|------|
| | 1 | 2 | 3 | 4 |
| Sacramento River | 100% | 100% | 100% | 100% |
| American River | 100% | 100% | 100% | 100% |

Intakes in the reach d/s of Steamboat Slough

| Origin of Fish | Configuration | | | |
|------------------|---------------|----|----|-----|
| | 1 | 2 | 3 | 4 |
| Sacramento River | 0% | 0% | 0% | 55% |
| American River | 0% | 0% | 0% | 55% |

Summary of Exposure to Intakes

Sacramento River Fish

| Intake # | Configuration | | | |
|----------|---------------|------|------|------|
| | 1 | 2 | 3 | 4 |
| 1 | 100% | 100% | 100% | 100% |
| 2 | 100% | 100% | 100% | 100% |
| 3 | 100% | 100% | 100% | 100% |
| 4 | 100% | 100% | 100% | 55% |
| 5 | 100% | 100% | 100% | 55% |

Delta Smelt

| Intake # | Configuration | | | |
|----------|---------------|------------|-----|----------------|
| | 1 | 2 | 3 | 4 |
| 1 | Low | Low | Low | Low |
| 2 | Low | Low | Low | Low |
| 3 | Low | Low | Low | Low |
| 4 | Moderate | Negligible | Low | Moderate -High |
| 5 | Moderate | Negligible | Low | Moderate -High |

American River Fish

| Intake # | Configuration | | | |
|----------|---------------|------|------|------|
| | 1 | 2 | 3 | 4 |
| 1 | 100% | 0% | 100% | 100% |
| 2 | 100% | 0% | 100% | 100% |
| 3 | 100% | 100% | 100% | 100% |
| 4 | 100% | 100% | 100% | 55% |
| 5 | 100% | 100% | 100% | 55% |

Migration Corridors

- Analysis using particle tracking to identify shifts in the pathways

To Sutter and Steamboat Sloughs

| SacR Flow | To Sutter and Steamboat | | | |
|-----------|-------------------------|---------|---------|---------|
| | Config1 | Config2 | Config3 | Config4 |
| Low | 44% | 44% | 45% | 45% |
| Mid | 46% | 47% | 47% | 44% |
| High | 47% | 48% | 46% | 44% |

To DCC and Georgiana Sloughs

| SacR Flow | To DCC and Georgiana | | | |
|-----------|----------------------|---------|---------|---------|
| | Config1 | Config2 | Config3 | Config4 |
| Low | 19% | 20% | 19% | 19% |
| Mid | 19% | 18% | 19% | 21% |
| High | 15% | 15% | 15% | 15% |

- Particles inserted just downstream of American River confluence on the Sacramento River
- No substantial change in any configurations
- Minor reduction in the percent of particles into Sutter and Steamboat under high flow conditions

Export Water Quality

- Salinity risk for configurations
 - Salt propagation near the intake configurations does not appear to be a significant concern under extreme sea level rise
 - all configurations appear to have same salinity levels at the intake locations based on RMA modeling
- Nutrients from the SRCSD treated effluent
 - Configurations 2 and 3 have two intakes upstream of the outfall; three intakes downstream
 - Configurations 1 and 4 have all the intakes exposed to the treated discharge
 - Unknown implications

Summary

- Diversion capability appears insensitive to the intake configurations considered
- Operations and operational preference are more important than location of the intakes for effects on tidal dynamics
- Intake locations primarily influence exposure risk and but to a lesser extent migration pathways