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Preliminary Water Supply Estimates for Delta Conveyance Project

Overview of Scenarios and Draft Modeling Results

Prepared for the State Water Contractors

August 26, 2020

Preliminary DCP Water Supply Analysis

- DWR is currently developing the Delta Conveyance Proposed Project.
- At this time, DWR has not defined the project operations and has not completed regulatory processes that may impact project operations.
- Coarse estimate of water supply changes using CalSim II.
- Estimates will change as Delta Conveyance Project is further defined, permitting is completed and modeling is refined.

Purpose

- Assess the improvement and continuity of the State Water Project (SWP) delivery reliability and resiliency under the Delta Conveyance Project (DCP)
- To inform upcoming decision on funding for DCP Planning Costs

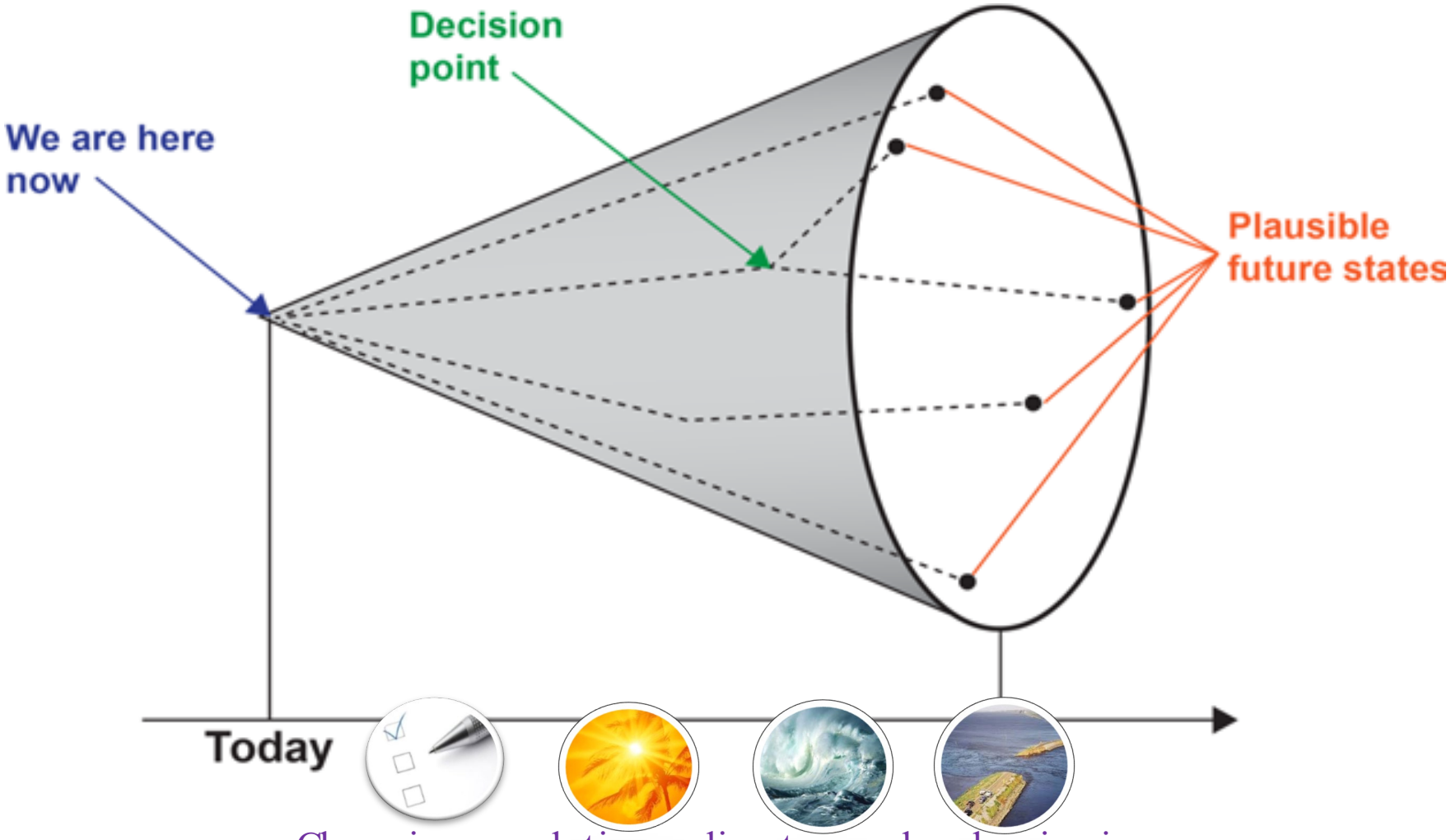
Scope

- Coarse estimate of the potential SWP water supply changes with the DCP under a range of existing and future scenarios (with and without DCP) simulated with CalSim II
- Key question to be answered- How will DCP improve or ensure resiliency of SWP delivery reliability under future:
    - different regulatory conditions?
    - climate change and sea level rise?
    - seismic events that disrupt levee system?

Overall Approach

- Strategic planning approach
- Use of high-level assumptions
- Use of available models, tools, and data
- Preliminary assessment to support early decisions
- SWC- an internal effort

Scenario Approach to Understanding DCPPerformance



- Understand that the DCPwill be constructed and operated under future conditions
- Unknown exact future conditions
- Scenarios help us explore plausible futures

Changing regulations, climate, sea level, seismic and levee conditions?

Scenarios

- 5 combinations of regulatory, climate and sea level, and seismic/levee system
- Each scenario simulated with and without DCP
- DCPoperational alternatives:
  - More restrictive (all scenarios)
  - Less restrictive (Scenario 2 only)

Scenario	Regulatory Condition	Climate and Sea Level Change	Seismic and Delta Levee Svstem
Scenario 1A – Existing (2019 BiOps)	2019 DEIR PP	Existing	Existing
Scenario 1B – Existing (2020 ITP)	2020 ITP	Existing	Existing
Scenario 2 – Current Trends	2020 ITP	2035 median projection, plus 45 cm SLR	Existing
Scenario 3A – More Restrictive South Delta	2020 ITP + Restrictive South Delta Exports	2035 median projection, plus 45 cm SLR	Existing
Scenario 3B – Increased Delta Outflow Requirements	2020 ITP + Increased Delta Outflow	2035 median projection, plus 45 cm SLR	Existing
Scenario 4 – Rapid Climate and Sea Level Change	2020 ITP	2035 median projection, plus 140 cm SLR	Existing
Scenario 5 – (Seismic Risk) Delta Levee System	2020 ITP	2035 median projection, plus 45 cm SLR	Seismic Disruption

Scenarios 1 and 2 – Existing and Current Trends

Scenario 1 – Existing*

- Regulatory Conditions
  - D-1641 + 2019 Biological Opinion (1A)
  - D-1641 + 2019 Biological Opinion + 2020 ITP (1B)
- Climate and Sea Level Change
  - Existing
- Seismic and Delta Levee System
  - Existing

Scenario 2 – Current Trends*

- Regulatory Conditions
  - D-1641 + 2019 Biological Opinion + 2020 ITP
- Climate and Sea Level Change
  - 2035 median projection, plus 45cm SLR
- Seismic and Delta Levee System
  - Existing

**Based on DWR's SWP LTO EIR Modeling.*

Scenario 3 – Future Increased Operational Restrictions

Hypothetical future regulatory scenarios

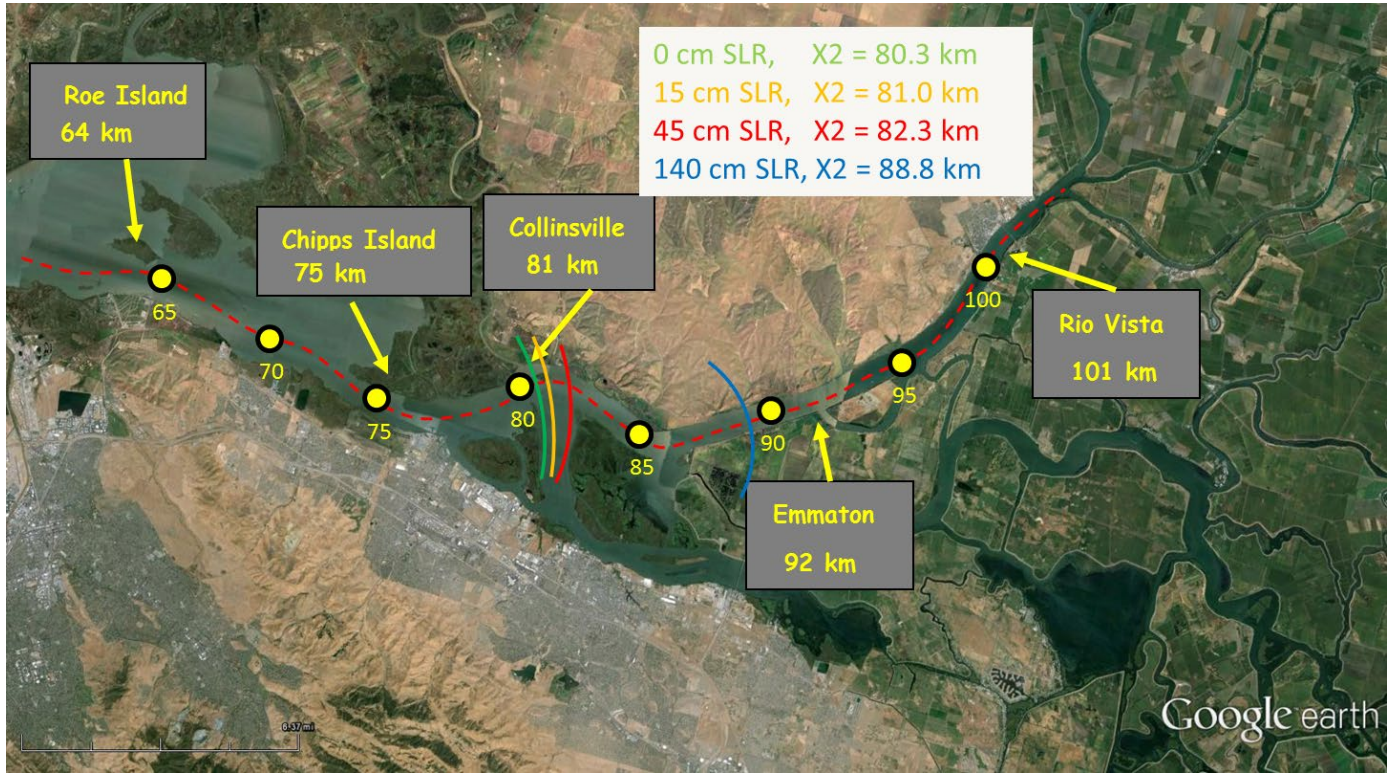
- More Restrictive South Delta (3A)*
  - 2020 ITP
  - Further restrictions on South Delta diversion
    - Dec-June: OMR > -2,000 cfs
    - Oct-Nov: OMR > -5,000 cfs
    - July- Sep: OMR > -5,000 cfs
- Climate and Sea Level Change
  - 2035 median projection, plus 45cm SLR
- Seismic and Delta Levee System
  - Existing

**Hypothetical assumptions were used for purposes of this analysis.*

- Increased Outflow Requirements (3B)*
  - 2020 ITP
  - Increased outflow requirements
    - Jan-Jun
    - 55% unimpaired flow Sacramento R
    - 40% unimpaired flow San Joaquin R
    - Requirement is limited to 44,500 cfs
    - Met with export cuts and upstream releases
- Climate and Sea Level Change
  - 2035 median projection, plus 45cm SLR
- Seismic and Delta Levee System
  - Existing

Scenario 4 – Rapid Climate and Sea Level Change

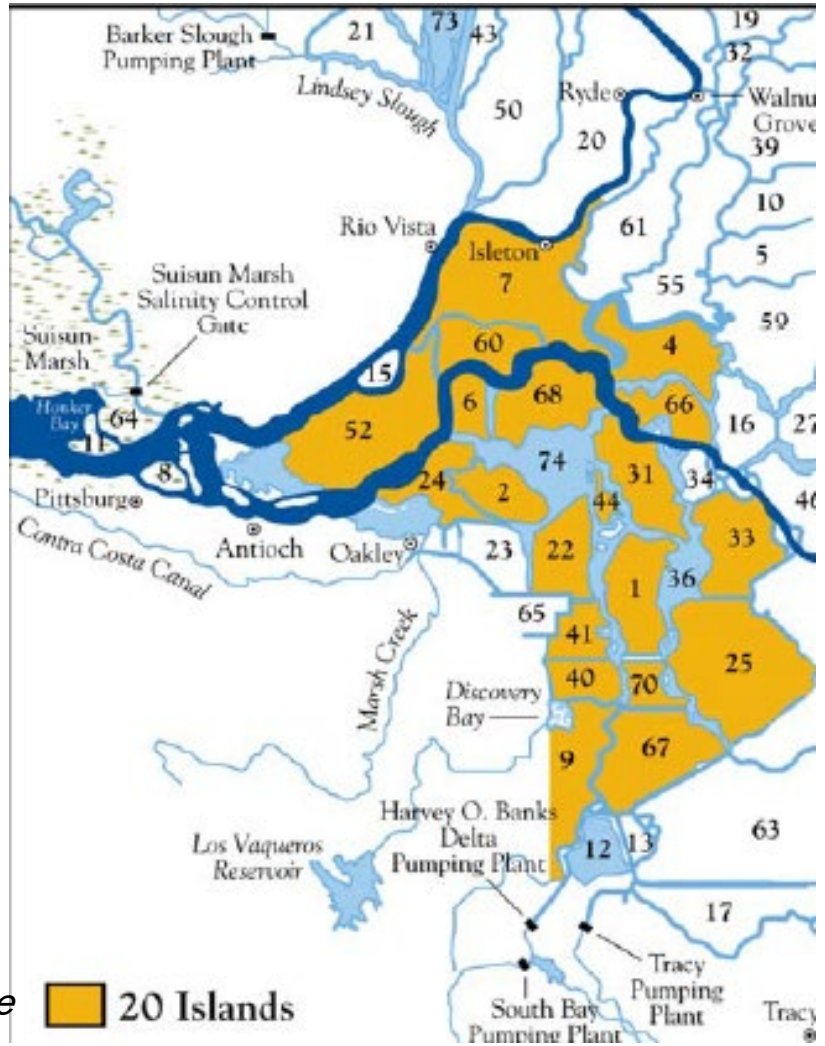
- Regulatory Conditions
  - 2020 ITP
- Climate and Sea Level Change*
  - 2035 median projection
  - 140 cm sea level rise
  - Modified delta flow-salinity relationships due to increased tidal prism
  - X2 position moves inland by 8-9 km
  - When salinity control is not possible through Delta outflow, exports limited to H&S levels (1500 cfs)
  - Sacramento releases for salinity control are limited to 12,000–15,000 cfs depending on water year type
  - South delta exports restricted when EC at Clifton Court Forebay Intake is above water quality threshold (900 EC) to avoid pumping water with an EC above 1,250
- Seismic and Delta Levee System
  - Existing



Future water quality requirements and beneficial uses under a rapid climate and sea level rise scenario are unknown. Hypothetical assumptions were used for purposes of this analysis.

Scenario 5 – Seismic and Levee System Integrity

- Regulatory Conditions
  - 2020 ITP
- Climate and Sea Level Change
  - 2035 median projection; 45 cm sea level rise
- Seismic and Delta Levee System
  - Consistent with assumptions in DRMS (2009) and DFEMP (2018)
  - Adopting 20 island failure scenario
  - Substantial changes to tidal prism and interior delta salinity due to island flooding
  - Assume prolonged or extended changes to delta
  - Similar operational assumptions as Scenario 4*



Future water quality requirements and beneficial uses under a rapid climate and sea level rise scenario are unknown. Hypothetical assumptions were used for purposes of this analysis.

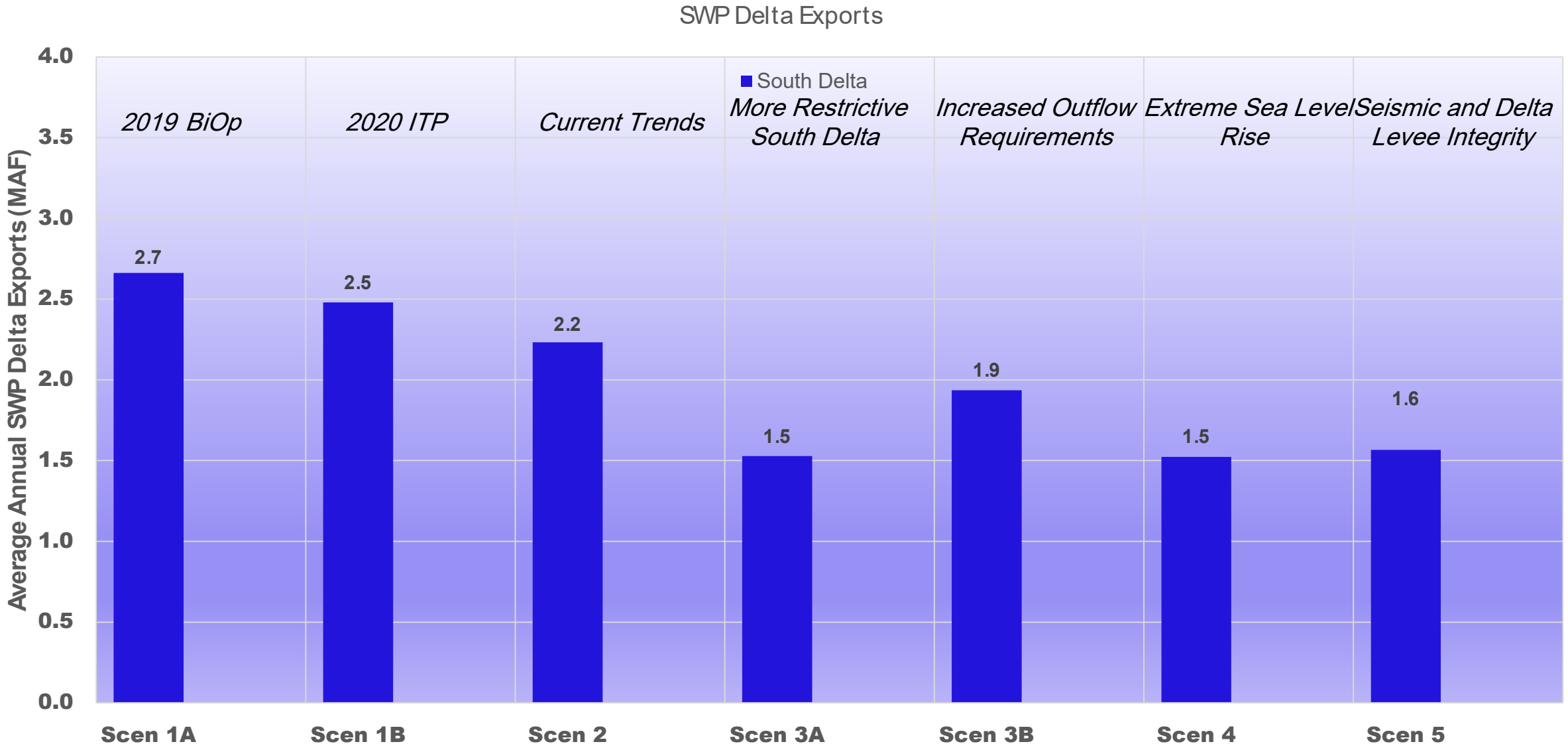
Delta Conveyance Project Assumptions

- Based on "California Water Fix" operational criteria*
- Delta Conveyance proposed capacity of 6,000 cfs only for SWP
- "Less" and "More" Restrictive operational scenarios

**At this time, DWR has not defined the project operations and has not completed regulatory processes that may impact project operations. Hypothetical assumptions were used for purposes of this analysis.*

Operating Criteria	Period	Less Restrictive	More Restrictive
North Delta Diversion	Dec – Jun	• CWF Level 1,2,3 bypass flow criteria (applicable all the time except during pulse protection period) • Single pulse protection (Low level pumping of 6% or 600 cfs)	• CWF Level 1 bypass flow criteria (applicable all the time except during pulse protection period) • Unlimited pulse protection (Low level pumping of 6% or 600 cfs)
	Jul – Sep	• 5,000 cfs bypass flow criterion	• 5,000 cfs bypass flow criterion
	Oct – Nov	• 7,000 cfs bypass flow criterion unless pulse is triggered, after which Level 1 bypass flow criteria applies. • Single pulse protection (Low level pumping of 6% or 600 cfs)	• 7,000 cfs bypass flow criterion unless pulse is triggered, after which Level 1 bypass flow criteria applies. • Single pulse protection (Low level pumping of 6% or 600 cfs)
E/I ratio	Oct - Sep	NDD part of inflow calculation	NDD part of export calculation

Delta Water Supply Analysis – What Could the Future Look Like?



DRAFT MODELING RESULTS SUBJECT TO REVISION

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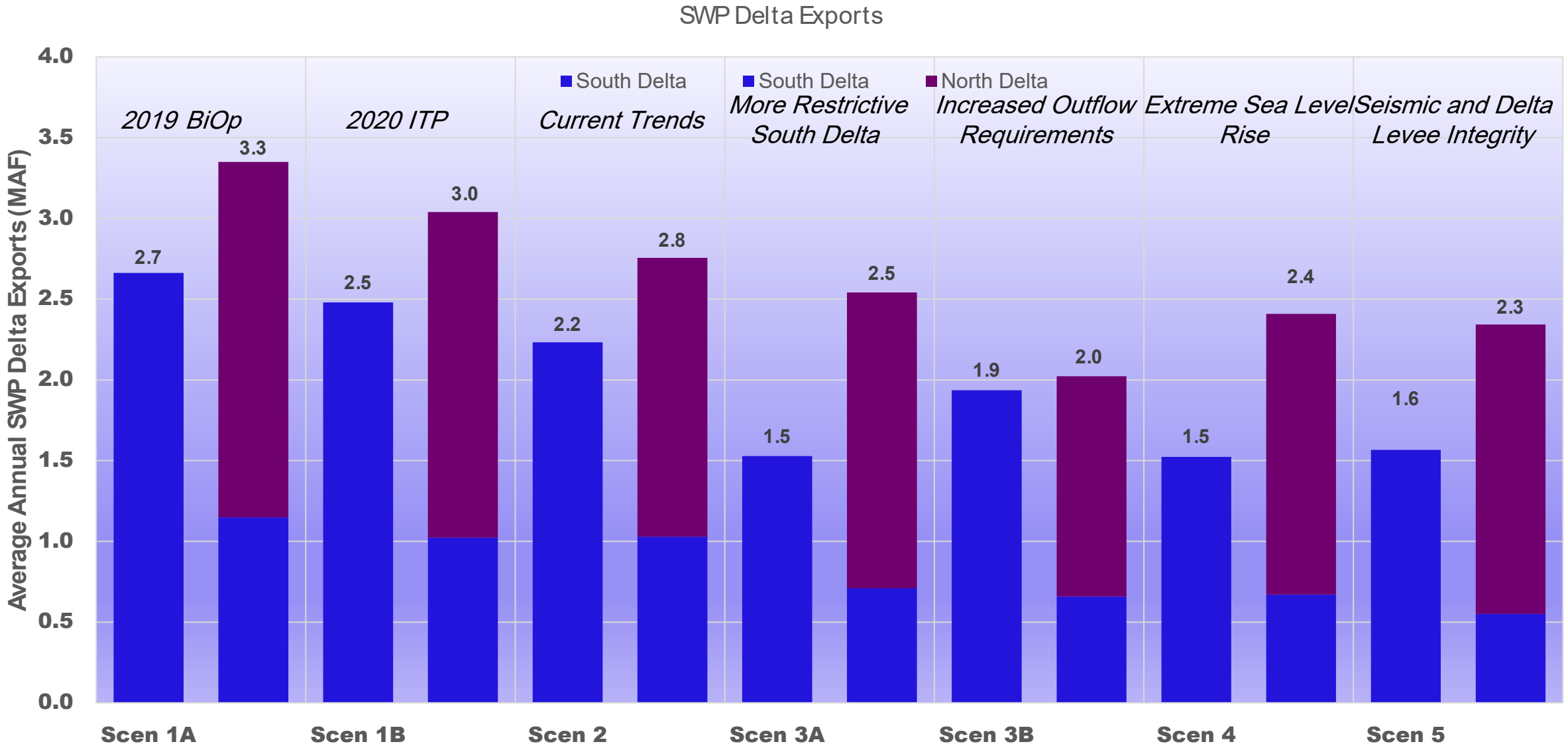

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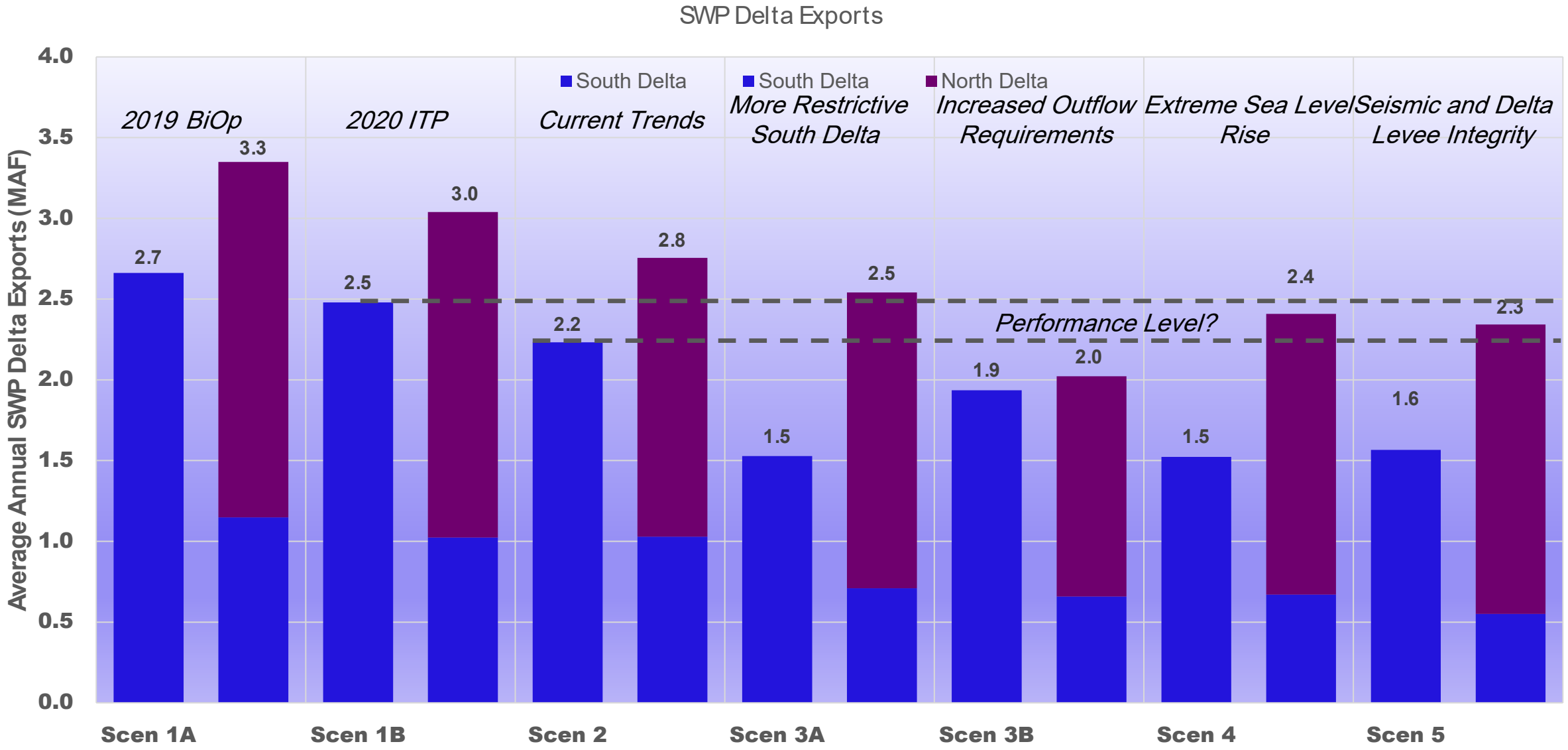

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Key Findings

- DCP provides potential to increase SWP reliability or offset losses under many plausible future risk scenarios
  - 100 TAFY to 1.0 MAFY under tightening regulatory restrictions
  - 700 TAFY under seismic risks and long-term delta island flooding
  - 900 TAFY under extreme sea level rise
- Future is unknown, but will likely consist of blends of climate/ hydrology, regulatory, seismic/ levee, and other risk drivers
- Future scenarios demonstrate increased water system ***Resilience*** with DCP

System resilience is defined as the capacity to respond, absorb, adapt to, and recover from disruptive events

- Haimes 2009, Risk Analysis

"… intended to strengthen the resilience of water systems, thereby helping communities prepare for disruptions, to withstand and recover from shocks, and to adapt and grow from these experiences."

- California Water Resilience Portfolio 2020