

CALIFORNIA DEPARTMENT OF WATER RESOURCES

Old and Middle River Flow Management

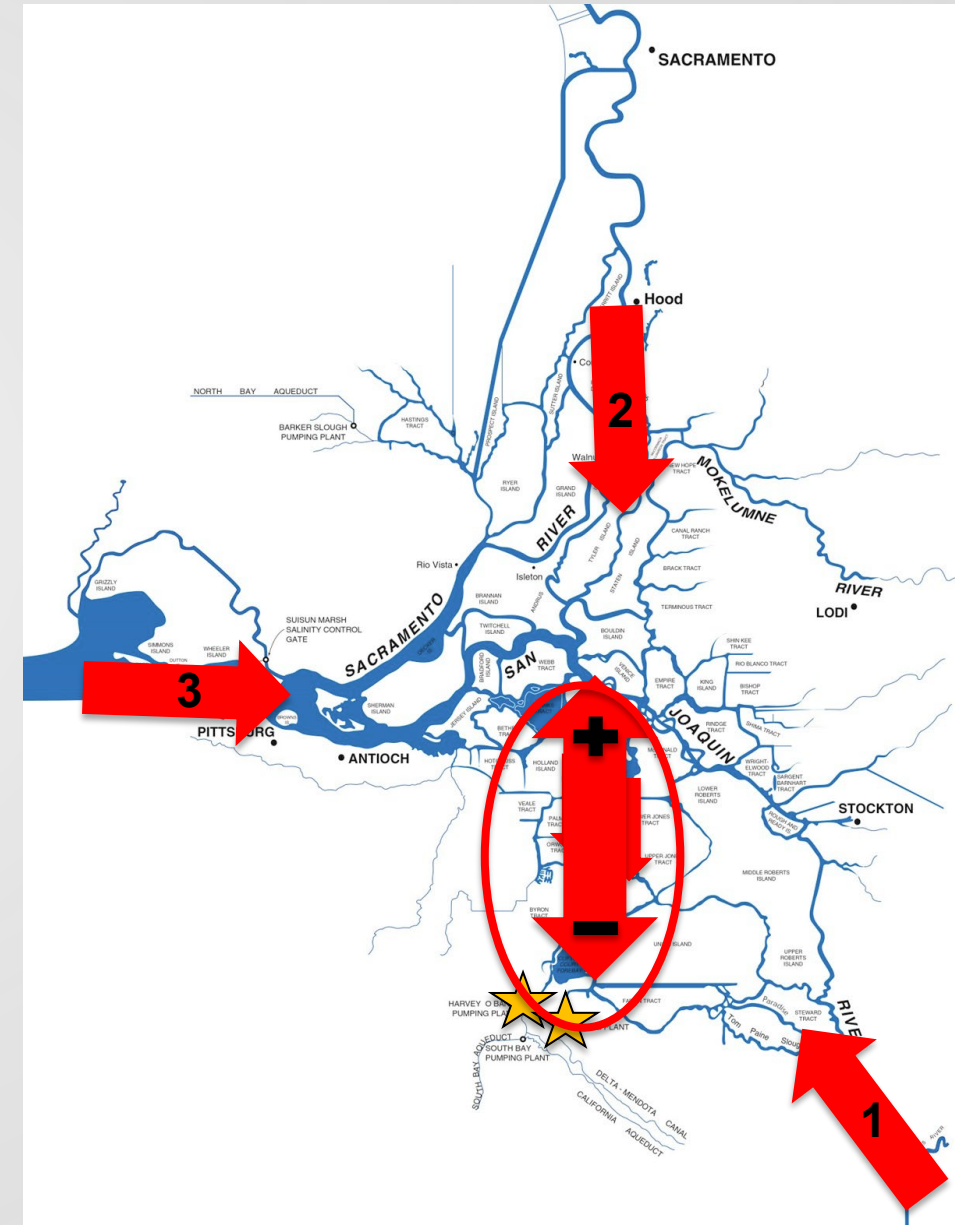
February 29, 2024



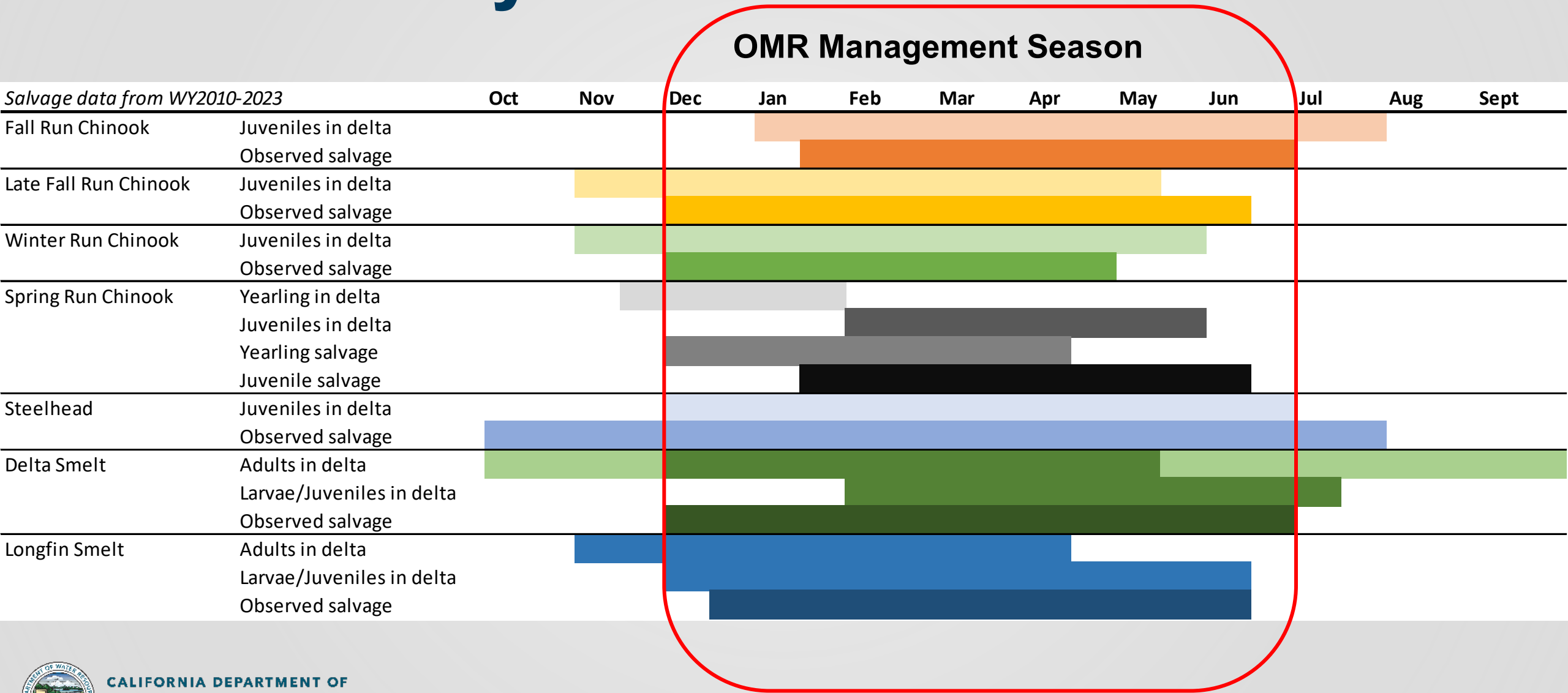
Brian Schreier (DWR), Brian Mahardja (USBR), and Bryant Giorgi (DWR)

Concept of Old and Middle River Flows

- Old and Middle Rivers = OMR
- Three tiers of export water
- Majority of time = north to south through OMR
- OMR can be positive or negative

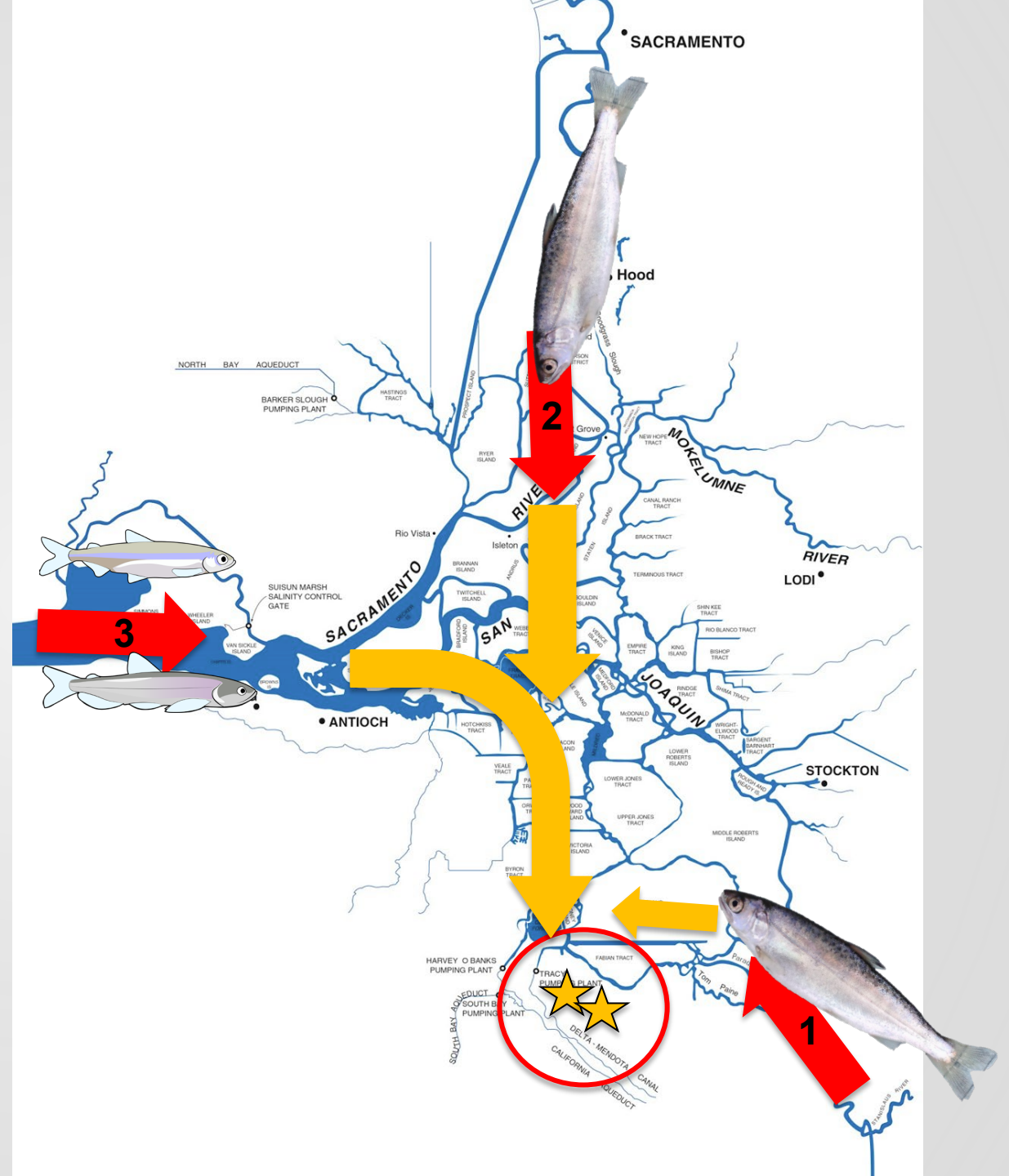


Seasonality of Fish



Where are fish coming from?

- Entrainment
- Salvage
- Loss



Layers of Export Management

Infrastructure capacity

- Maximum export rate that infrastructure can safely support

Storm Flex Operations

2020 CESA ITP (CDFW; SWP only)

- OMR range –1,250 to –5,000

2019 BiOps (USFWS, NMFS)

- OMR range –2,000 to –5,000

D-1641 (State Water Resources Control Board)

- Water quality and flow criteria

Drought Operations

Minimum Exports

- 1,500 cfs combined exports to meet health and safety needs, critical refuge supplies, and senior water right holder obligations



Water Rights Decision 1641

- Water quality and flow requirements
- No direct OMR management
- But is often controlling exports



Bay-Delta Standards

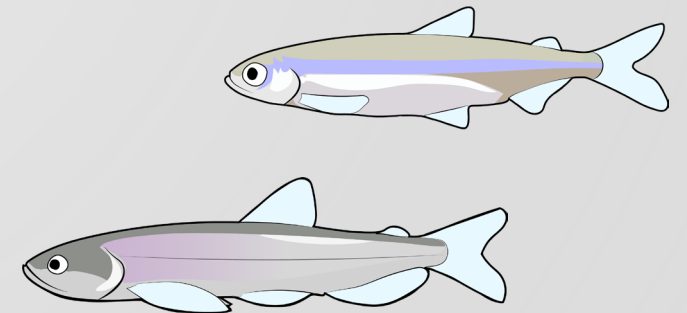
Contained in D-1641

DRAFT

CRITERIA	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FLOW/OPERATIONAL												
• Fish and Wildlife												
SWP/CVP Export Limits				1,500cfs [1]								
Export/Inflow Ratio [2]	65%	35% of Delta Inflow [3]					65% of Delta Inflow					
Minimum Delta Outflow	[4]						3,000 - 8,000 cfs [4]					
Habitat Protection Outflow		7,100 - 29,200 cfs [5]										
Salinity Starting Condition [6]		[6]										
River Flows:												
@ Rio Vista								3,000 - 4,500 cfs [7]				
@ Vernalis - Base		710 - 3,420 cfs [8]				[8]						
- Pulse				[9]					*28TAF			
Delta Cross Channel Gates	[10]	Closed				[11]	Conditions [12]					
WATER QUALITY STANDARDS												
• Municipal and Industrial												
All Export Locations	≤ 250 mg/l Cl											
Contra Costa Canal	150 mg/l Cl for the required number of days [12]											
• Agriculture												
Western/Interior Delta				Max 14-day average EC mmhos/cm [13]								
Southern Delta [14]	1.0 mS		30 day running avg EC 0.7 mS						1.0 mS			
• Fish and Wildlife												
San Joaquin River Salinity [15]				14-day avg. 0.44 EC								
Suisun Marsh Salinity [16]	12.5 EC	8.0 EC	11.0 EC						19.0 EC	[17]	15.5 EC	

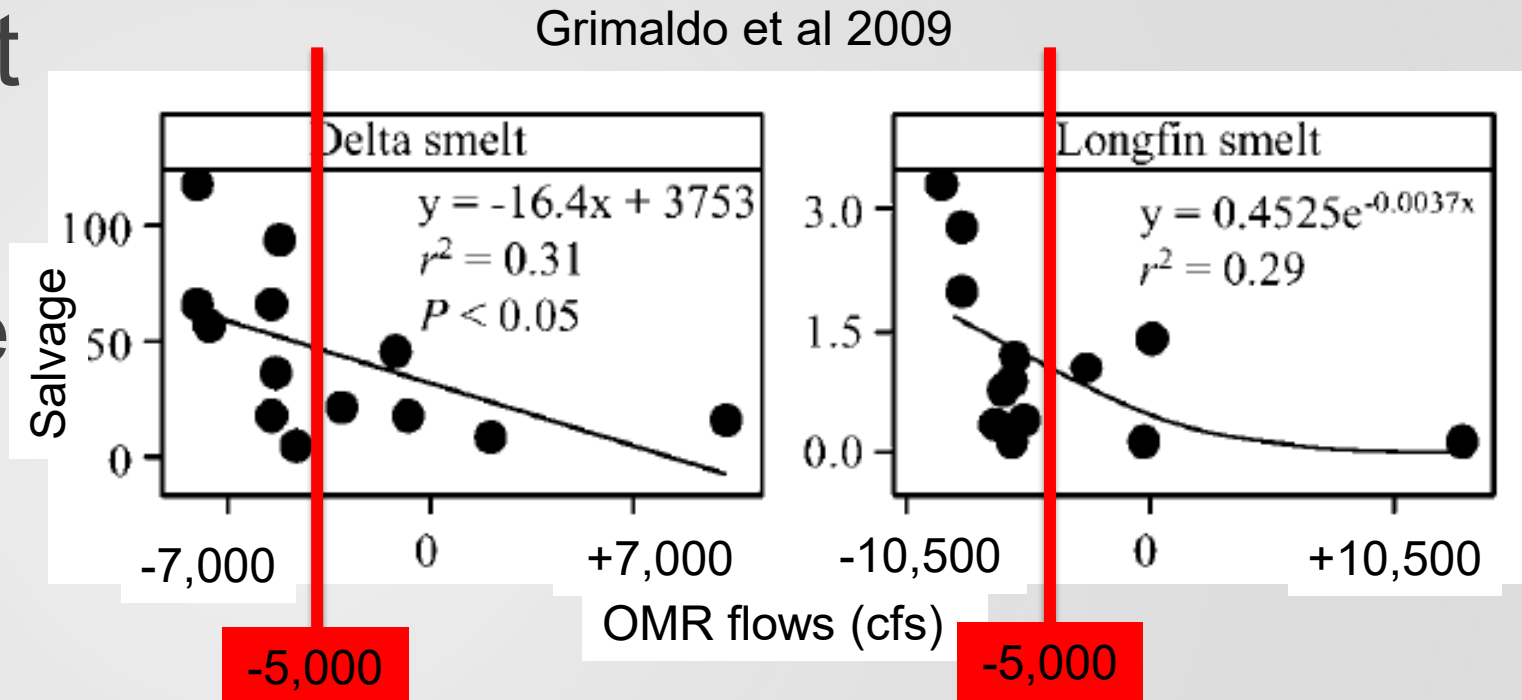
Types of OMR Management Approaches

- Ecosystem response: First Flush migratory period
- Real-time species entrainment response
 - Monitoring or salvage detections
- Minimizing entrainment risk using environmental surrogates
 - Temperature => Life Stage
 - Turbidity => Presence



OMR Levels

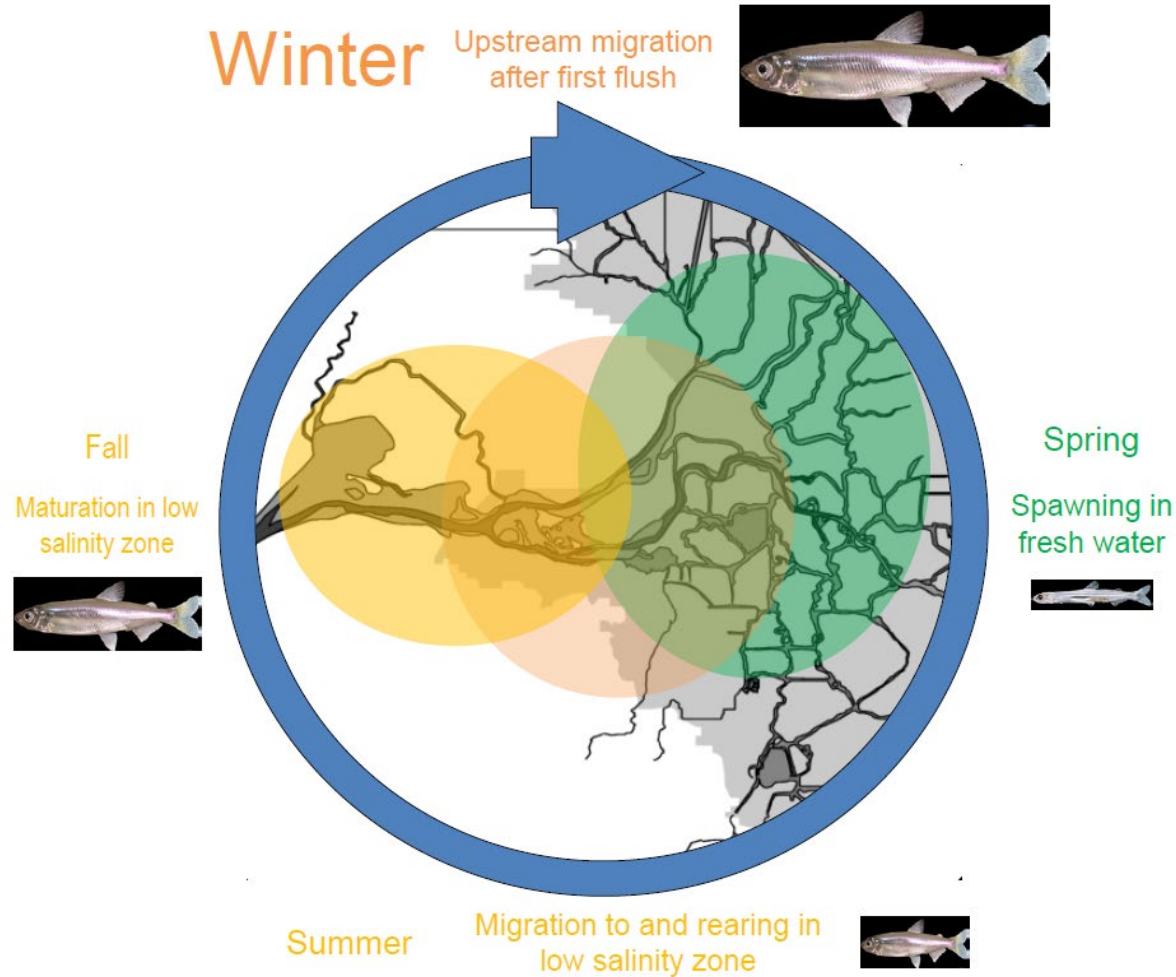
- OMR management
 - -5,000 cfs baseline



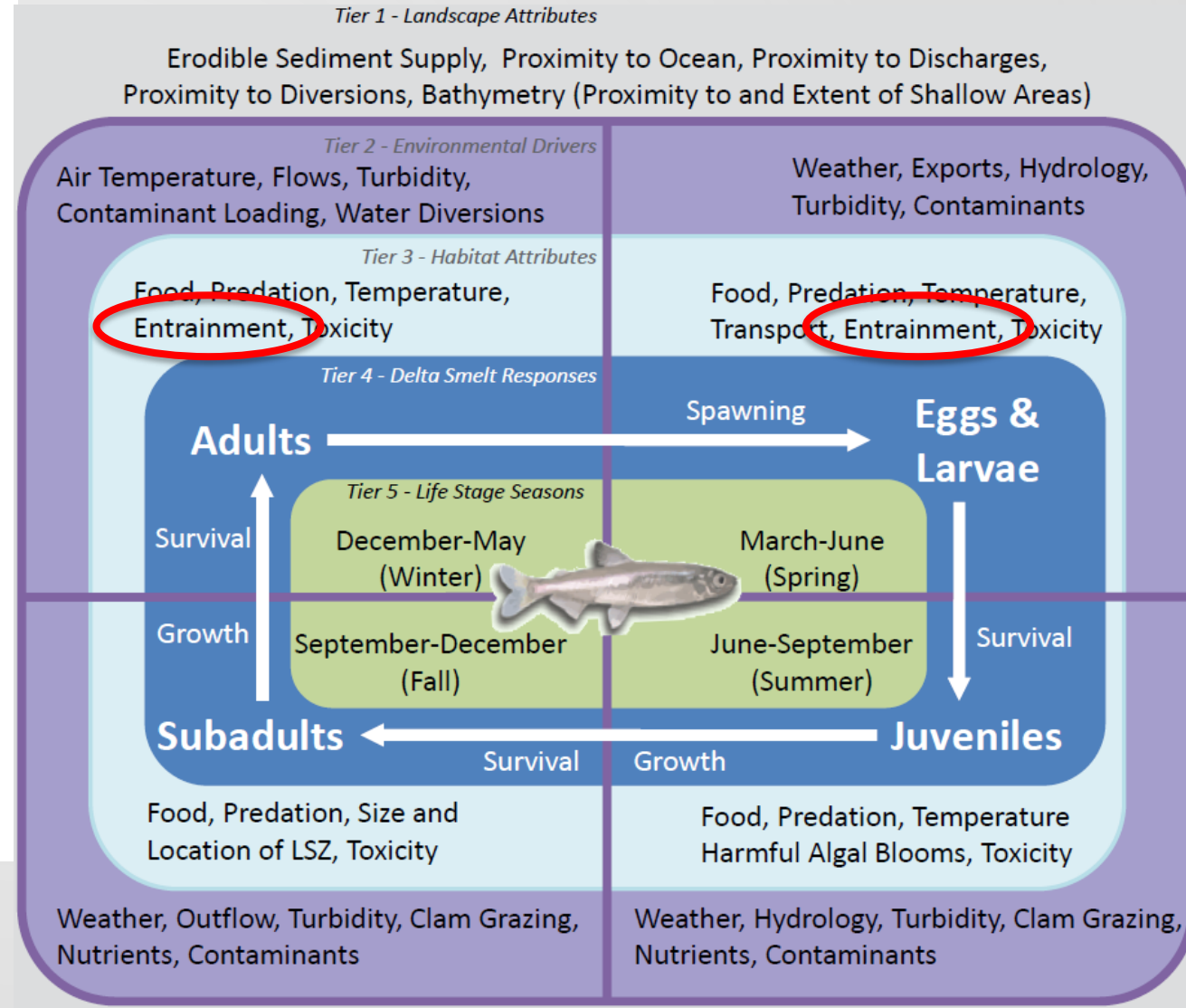
- More positive OMR = less entrainment risk



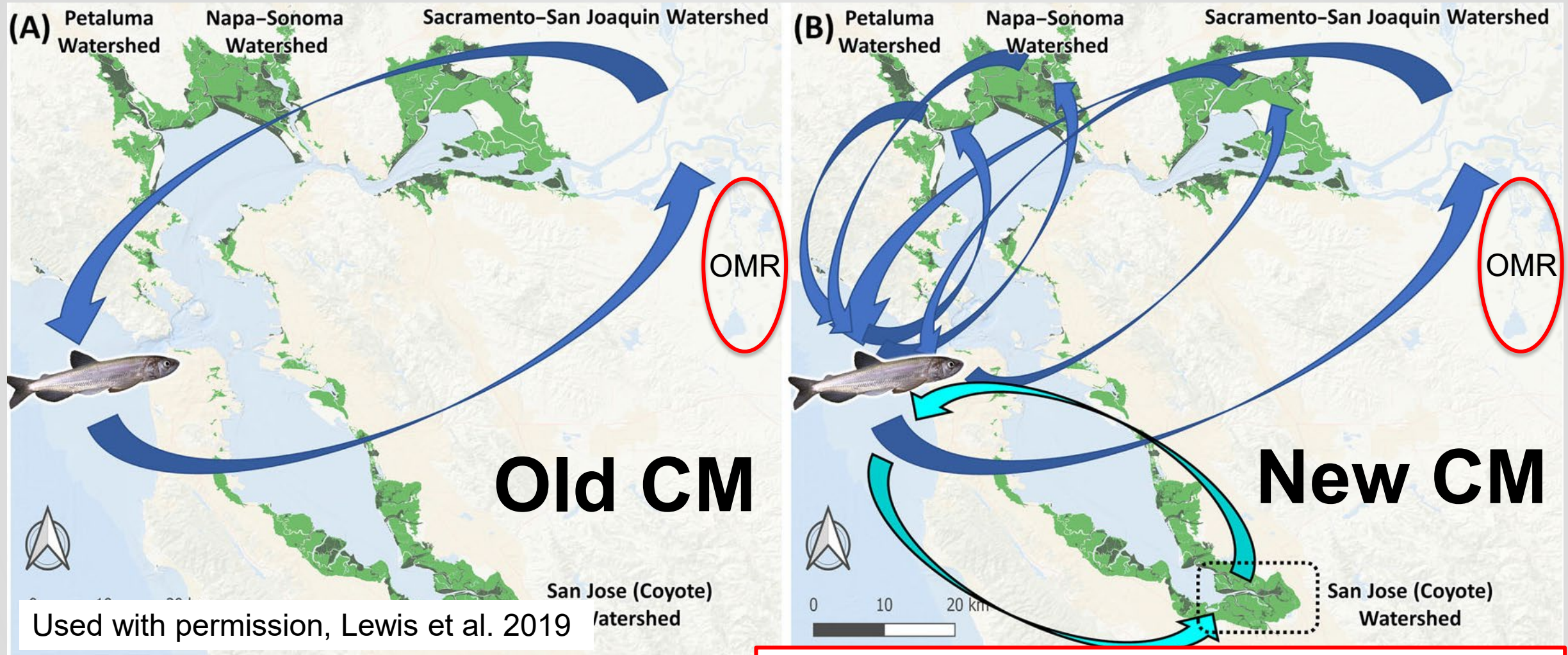
Delta Smelt Conceptual Model



IEP MAST 2014



Longfin Smelt Conceptual Model

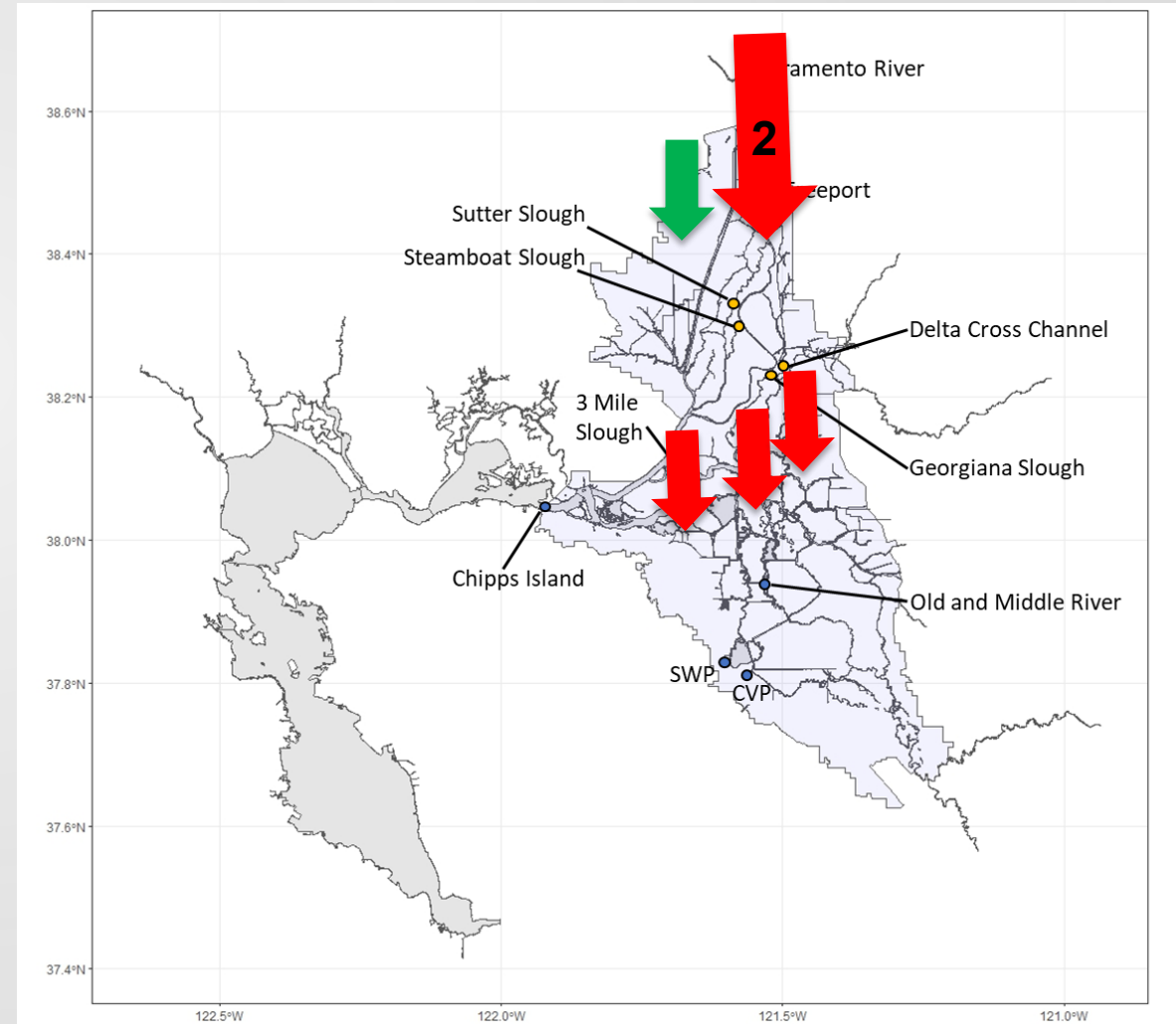


Annual larval entrainment loss estimates:

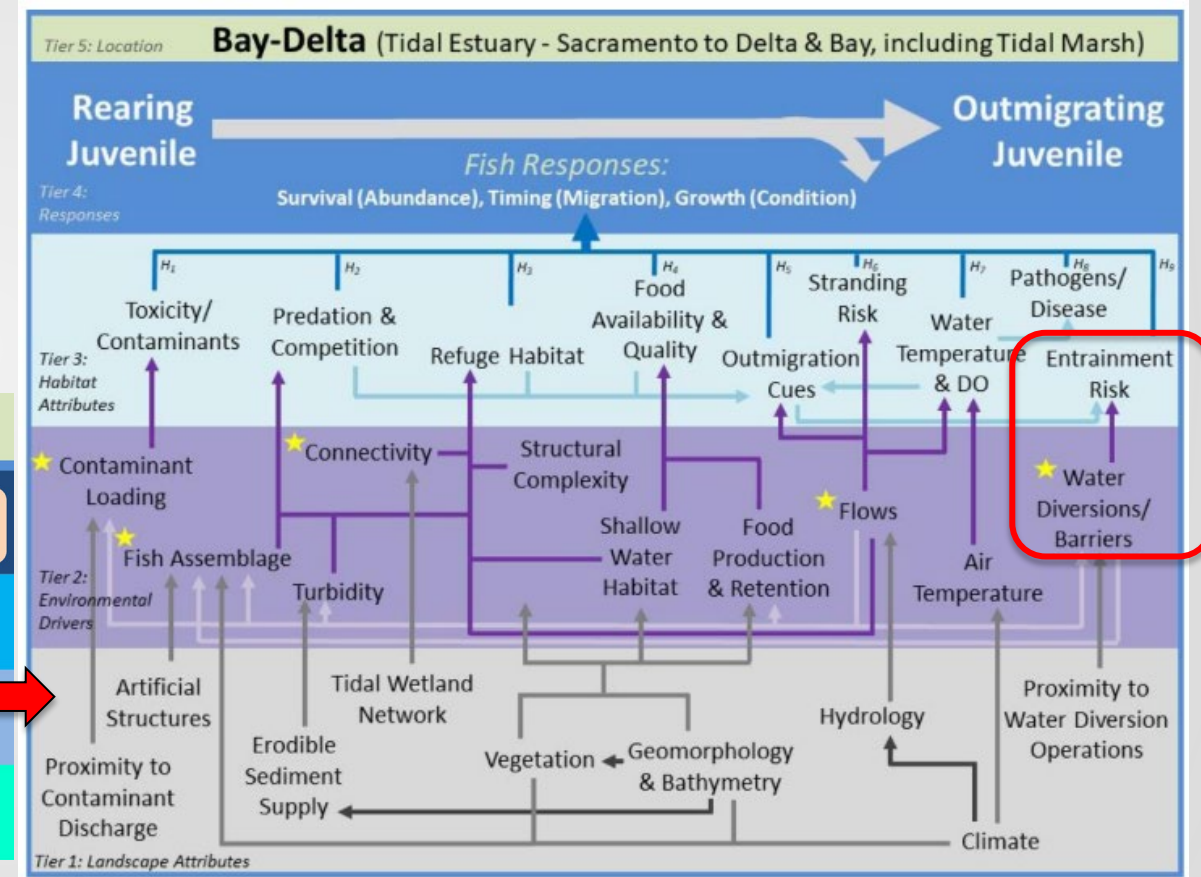
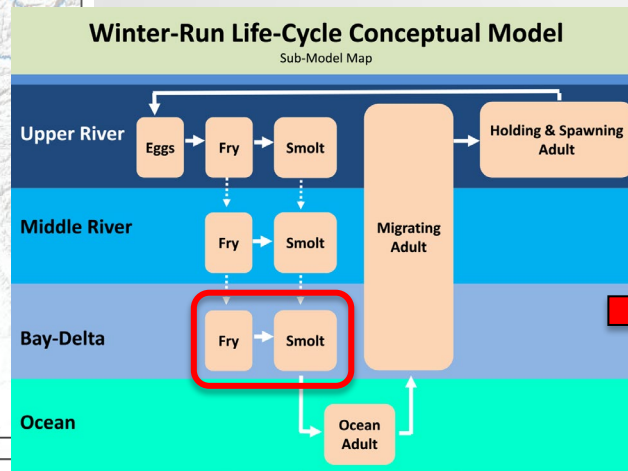
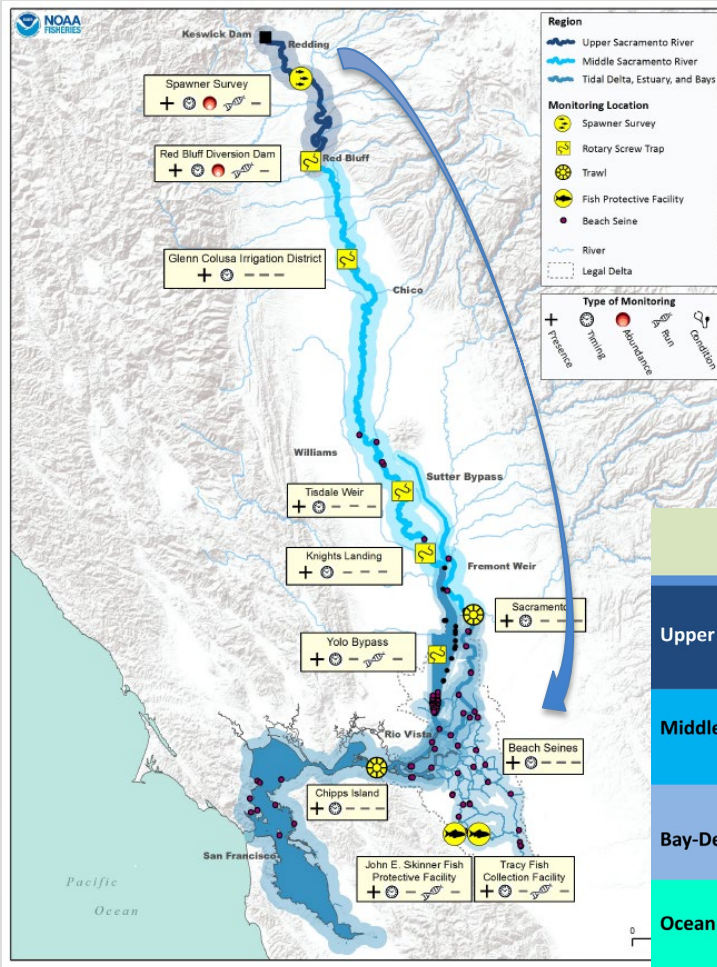
- 0.5 – 2.9% (avg 1.5%): Kimmerer and Gross (2022)
- 0.6 – 2%: Gross et al (2022)

Chinook Salmon Routing and Survival

- Two routes at which juvenile salmon can enter the Delta:
 - Sacramento River
 - Yolo Bypass
- Fish can enter the interior Delta from the Sacramento River through:
 - Delta Cross Channel
 - Georgiana Slough
 - 3-mile slough
- Interior Delta is associated with low survival

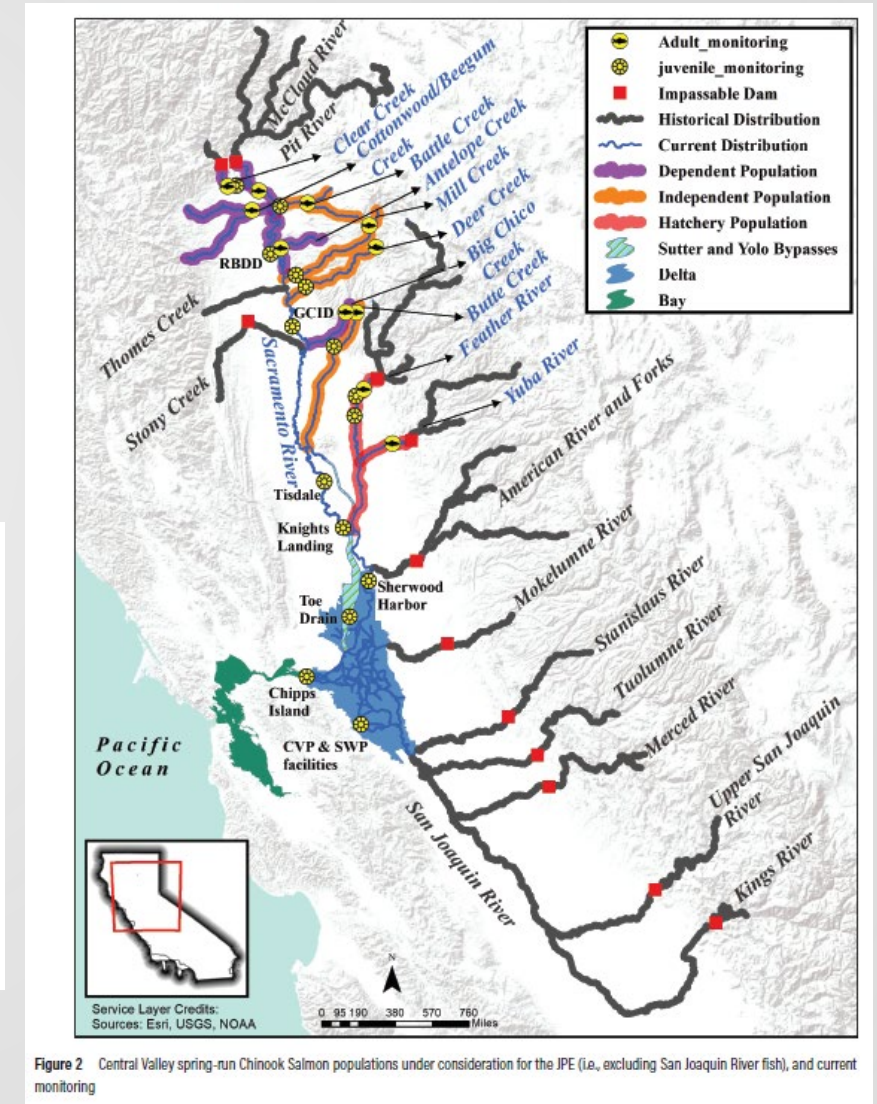
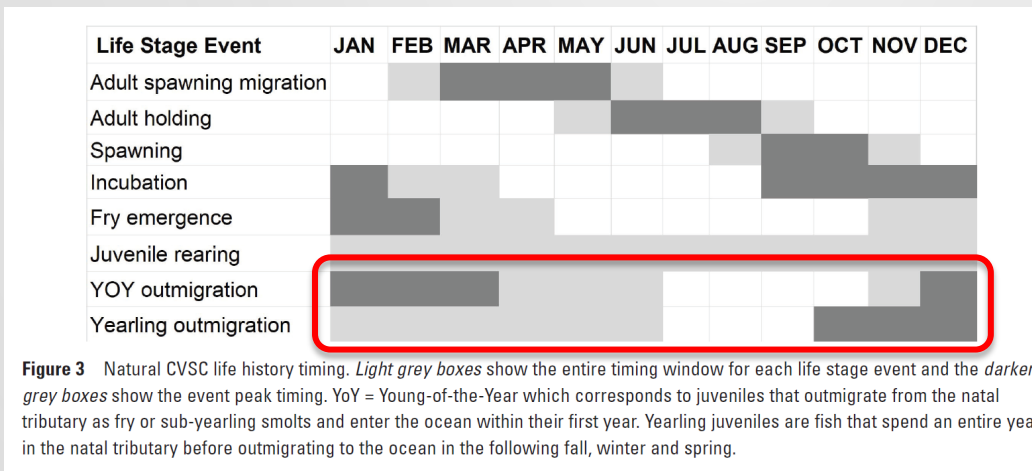


Winter-run Chinook Salmon Conceptual Model

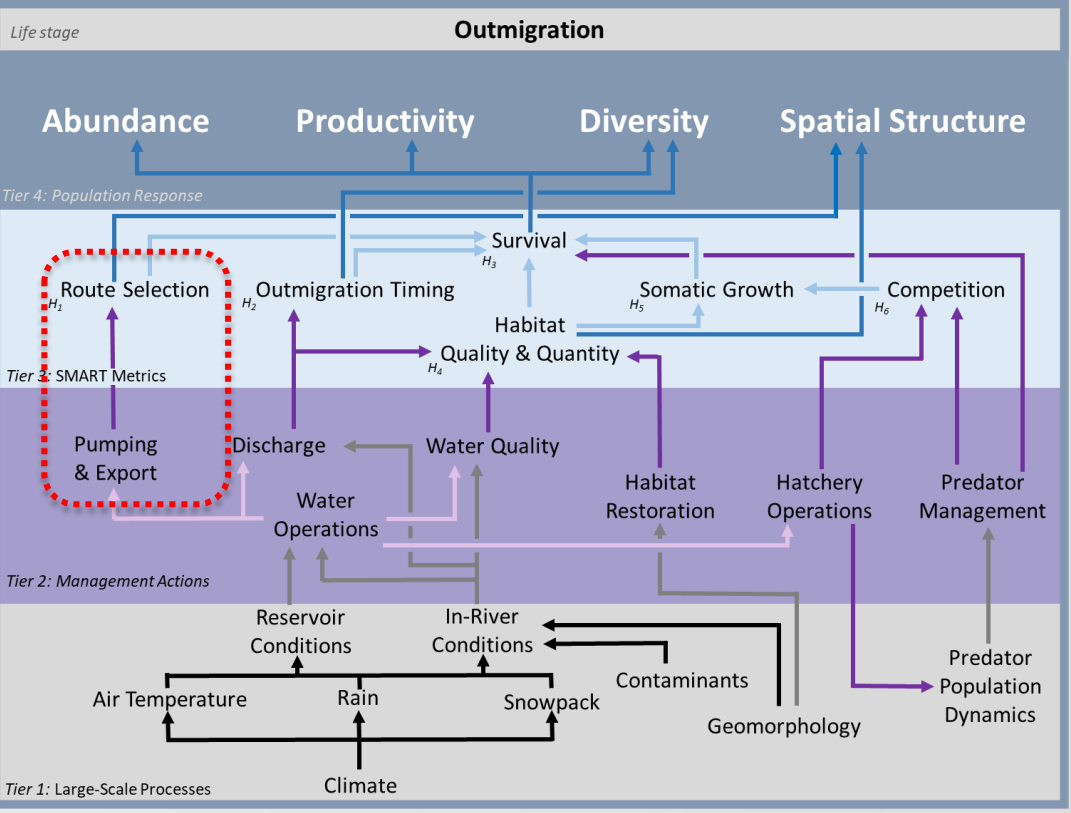
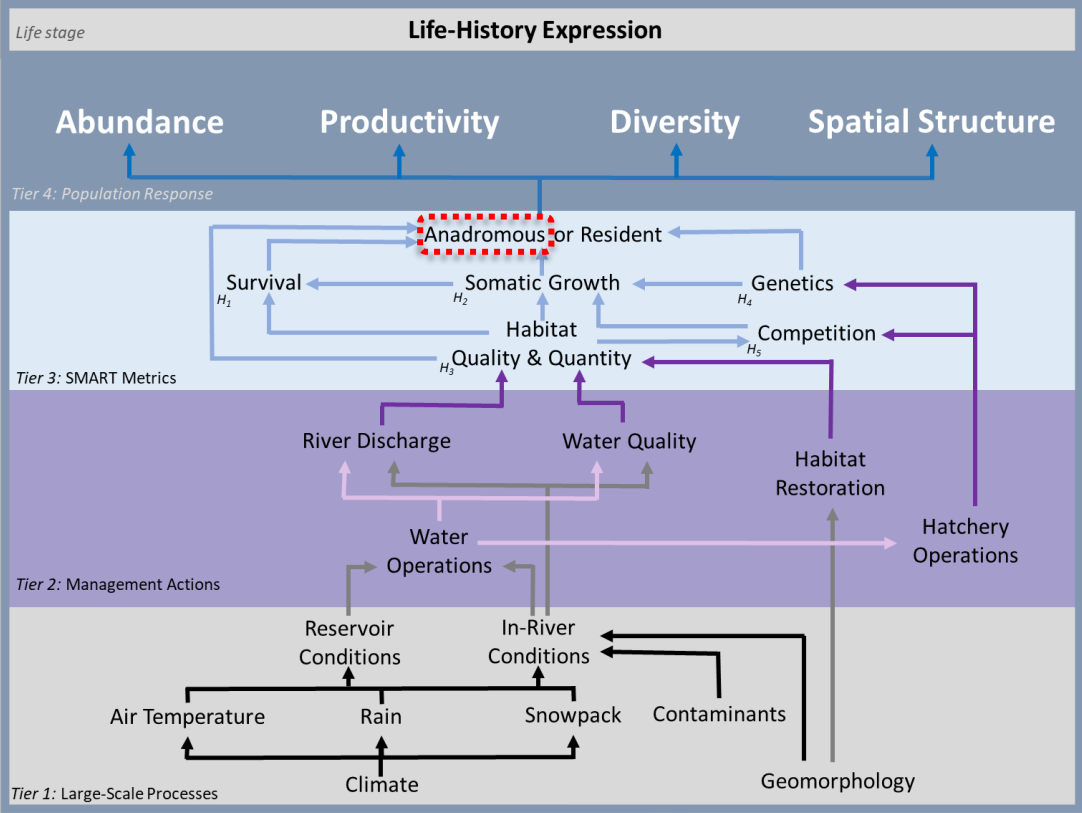


Spring-run Chinook Salmon Conceptual Model

- Conceptual model for fry and smolt in the Bay-Delta will likely be similar to winter-run
- Key differences with winter-run:
 - Timing
 - Yearling outmigrants
 - Multiple populations
- San Joaquin River Restoration Program Experimental Population not shown



Central Valley Steelhead Conceptual Model

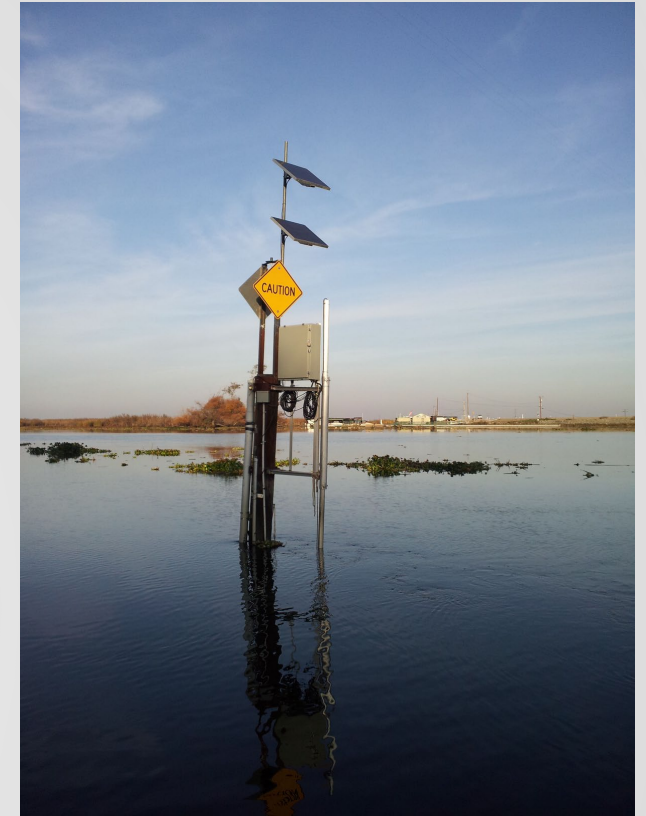


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Beakes, M. P., Bilski, R., Brown, H., Collins, A., Ehlo, C., Ferguson, E., Ferguson, J., Goertler, P. A.L., Green, E., Gutierrez, M., Israel, J., Jensen, A., Kurth, R., Mahardja, B., Mathias, B., Nelson, J., Pien, C., Spear, K., and Vick, P. 2023. A Framework for Evaluating O. mykiss Juvenile Production and Factors Affecting Anadromy. Available upon request

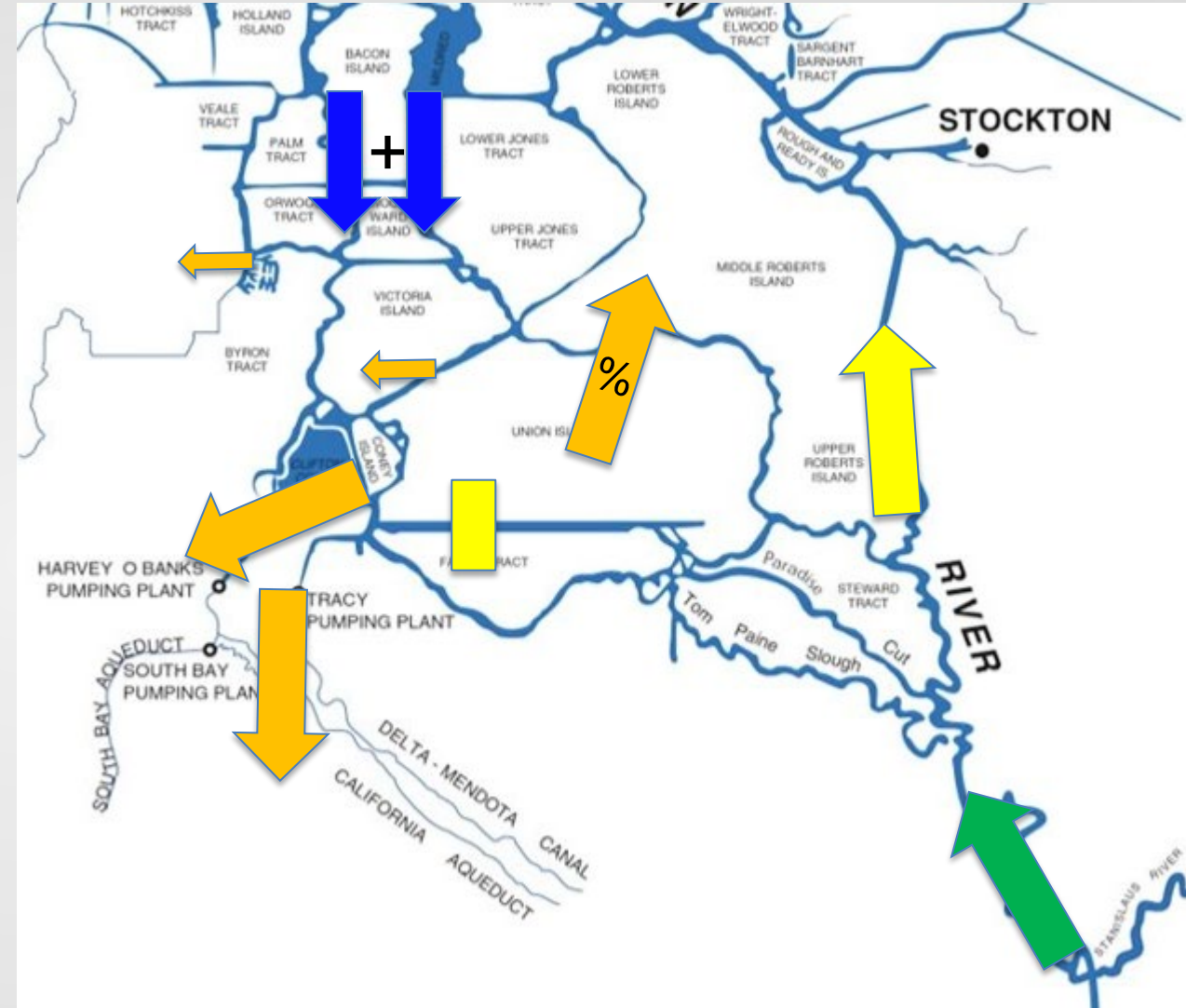
Calculating OMR

- Two USGS Monitoring Locations
 - Old River at Bacon Island
 - Middle River at Middle River
- Sum of the daily average tidally filtered flow
 - The Godin filter, a low-pass digital filter

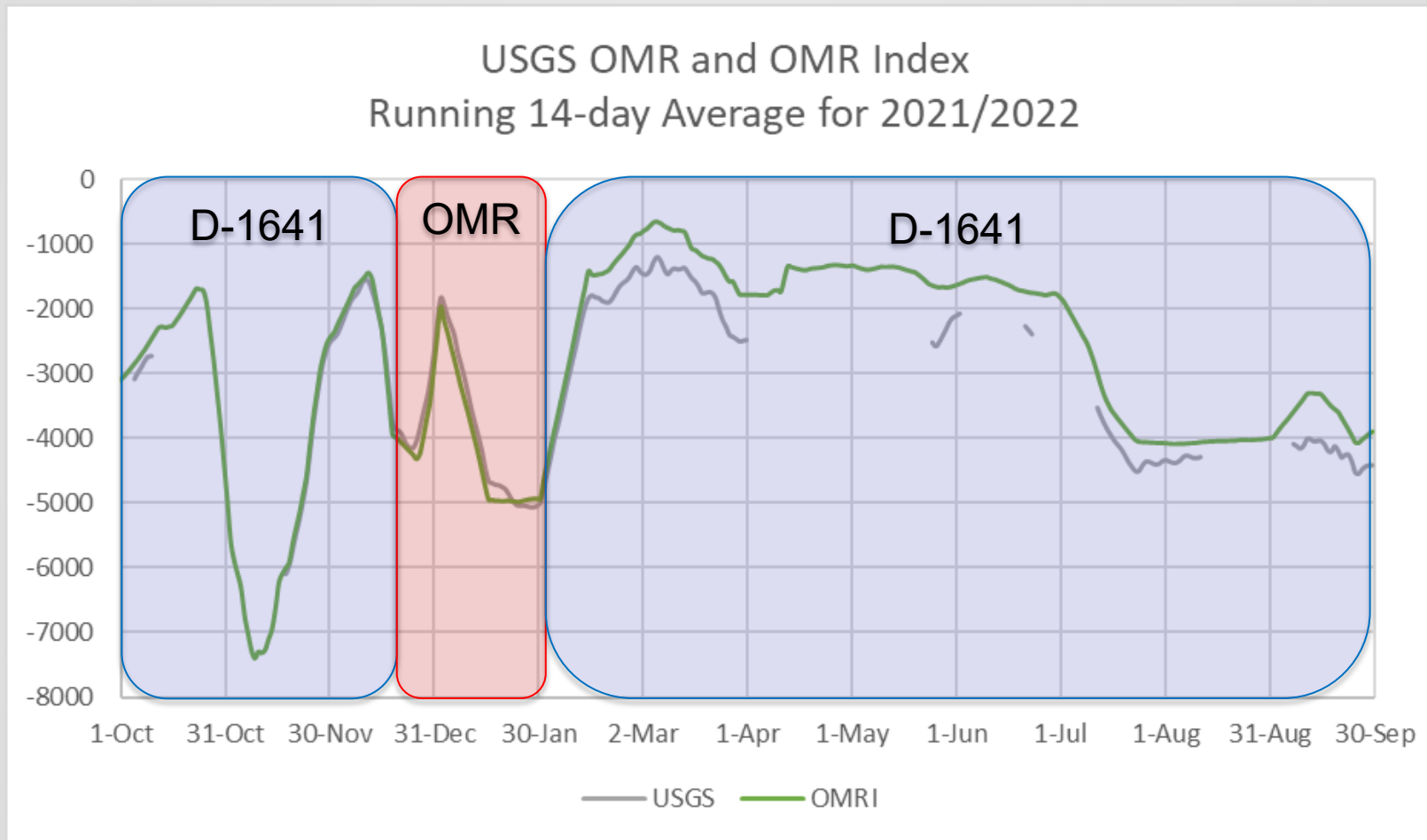


Calculating OMRI

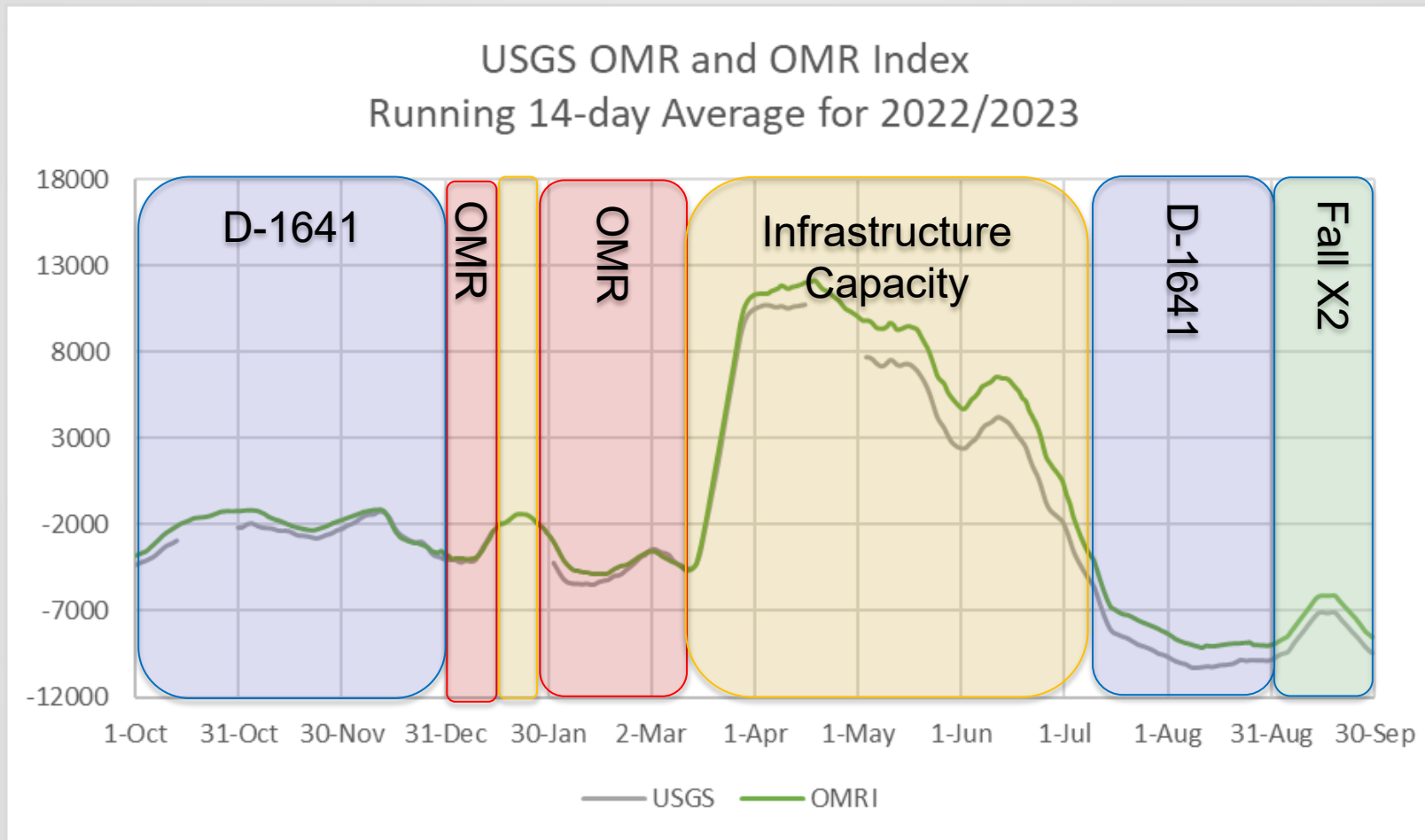
- Old and Middle River Index (OMRI)
 - Mass balance calculation on flows in the South Delta
 - Function of exports, San Joaquin River flows, assumption on local use, and physical structures in the Delta channels
- Different actions can have a different averaging period



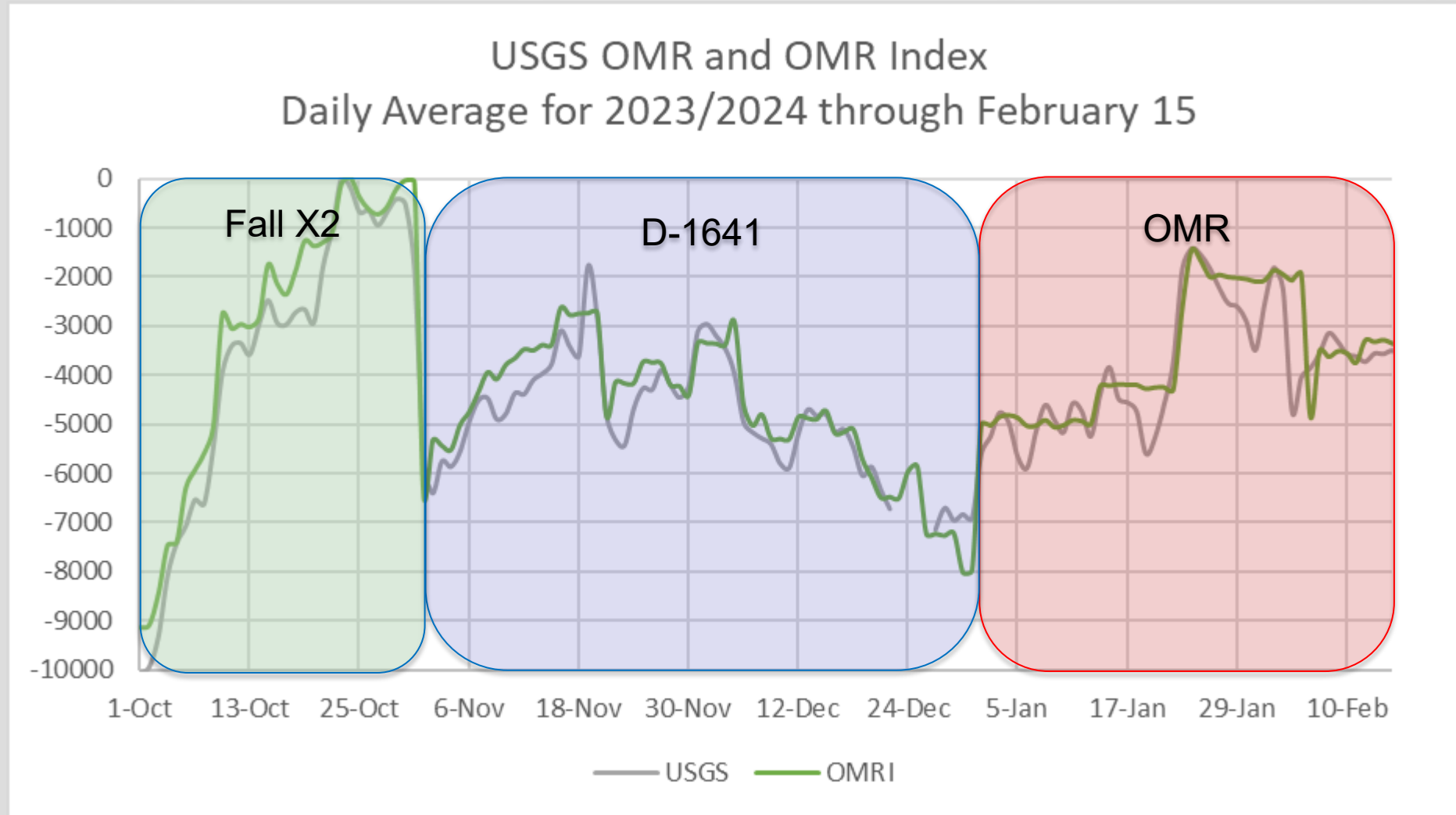
Water Year 2022 (Critically Dry)



Water Year 2023 (Wet)



Water Year 2024 (in development)



Questions?



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