BDCP
BAY DELTA CONSERVATION PLAN

BDCP Appendix A: Conceptual Foundation and Analytical Framework

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Conceptual Foundation Articulates the Scientific and Social Underpinnings of BDCP

- The Conceptual Foundation provides
  - A vision for BDCP—what is it intended to accomplish?
  - A strategy for BDCP—how do the parties intend to accomplish the vision?
  - Goals and Objectives—how do we define progress and end points?
  - Ecological condition
  - A Conceptual Model for BDCP—what is our scientific understanding regarding how BDCP will affect the delta?
- Ecological Principles
  - BDCP Science Advisors

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BDCP Vision Statement: What is it trying to accomplish?

- BDCP envisions that the delta can be managed to meet the needs of native fish and wildlife species while supplying water to agriculture and, domestic and industrial use (i.e., to achieve to equal goals):
  - Provide for the conservation and management of aquatic and terrestrial species, including the restoration and enhancement of ecological functions in the Delta
  - Improve current water supplies and the reliability of delivery of water supplies conveyed through the State Water Project (SWP) and the Central Valley Project (CVP)

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BDCP Strategy: How will it achieve the vision?

- 19 Conservation Measures in three major categories of actions
  1. Construction of a new water intake on the Sacramento River connected to the CVP and SWP pumping facilities in the south Delta (dual conveyance)
  2. Restore up to 133,940 acres of aquatic and terrestrial habitat, including 65,000 acres of tidal marsh in the Delta, and improve floodplain environments on the Sacramento River
  3. Other measures
     - SAV control
     - Predator control
     - Hatchery Genetics Management Plans
     - Conservation hatchery

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Ecological Context for BDCP

- BDCP Study Area: Delta + Sacramento River & San Joaquin River
- BDCP Plan Area: Delta
  - Nexus of freshwater, marine and terrestrial environments
  - Natural-Cultural system
- Invasive species
- Climate Change
  - Temperature increase
  - Sea level rise
  - Precipitation change (volume and pattern)

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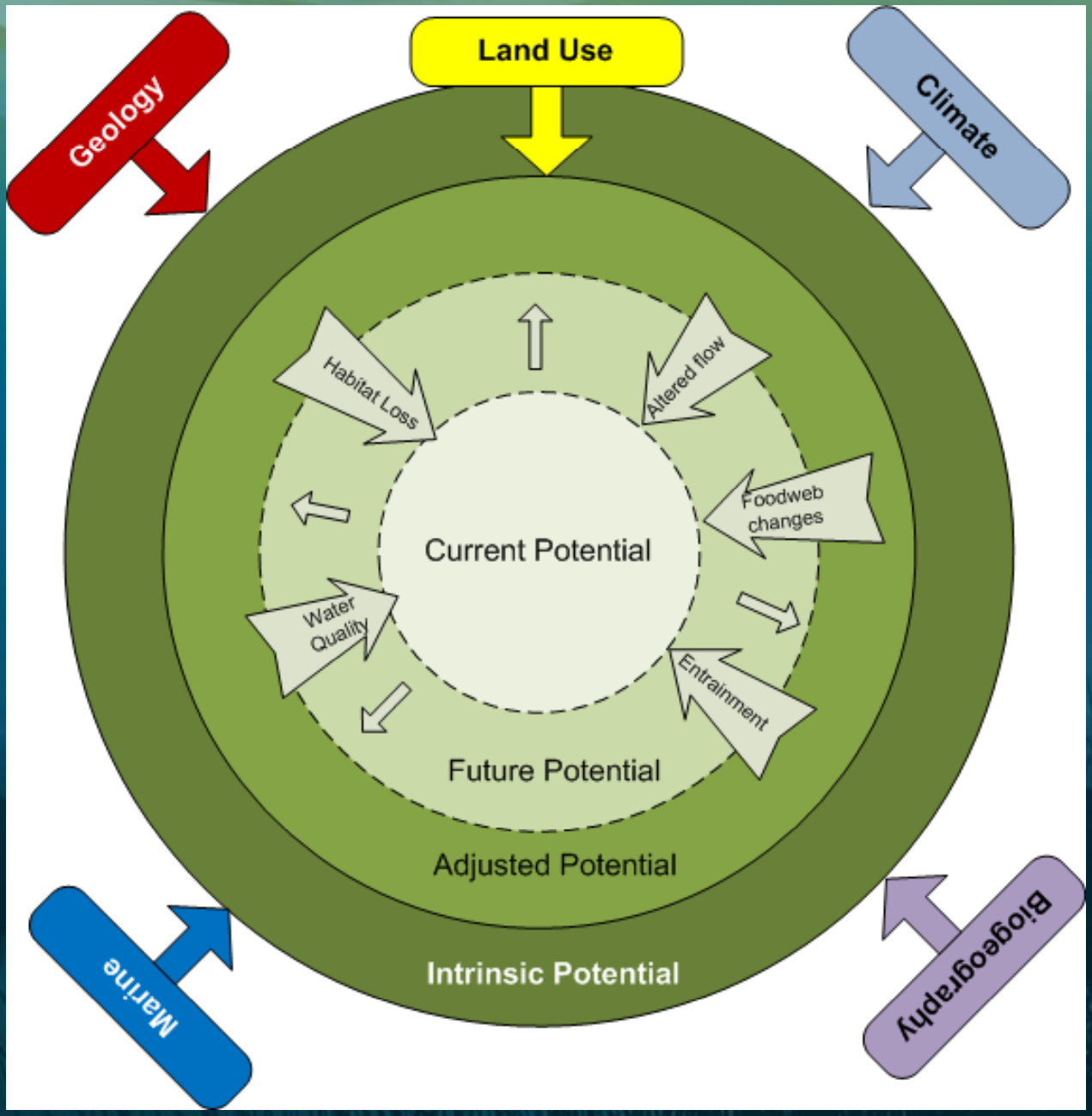
Conceptual Model for BDCP

- Intrinsic Biological Potential of delta constrained by large-scale drivers
- Land use is a driver adjusting intrinsic potential
- Current and future potential acts within these constraints
- Stressors and enhancers constrain performance over BDCP period



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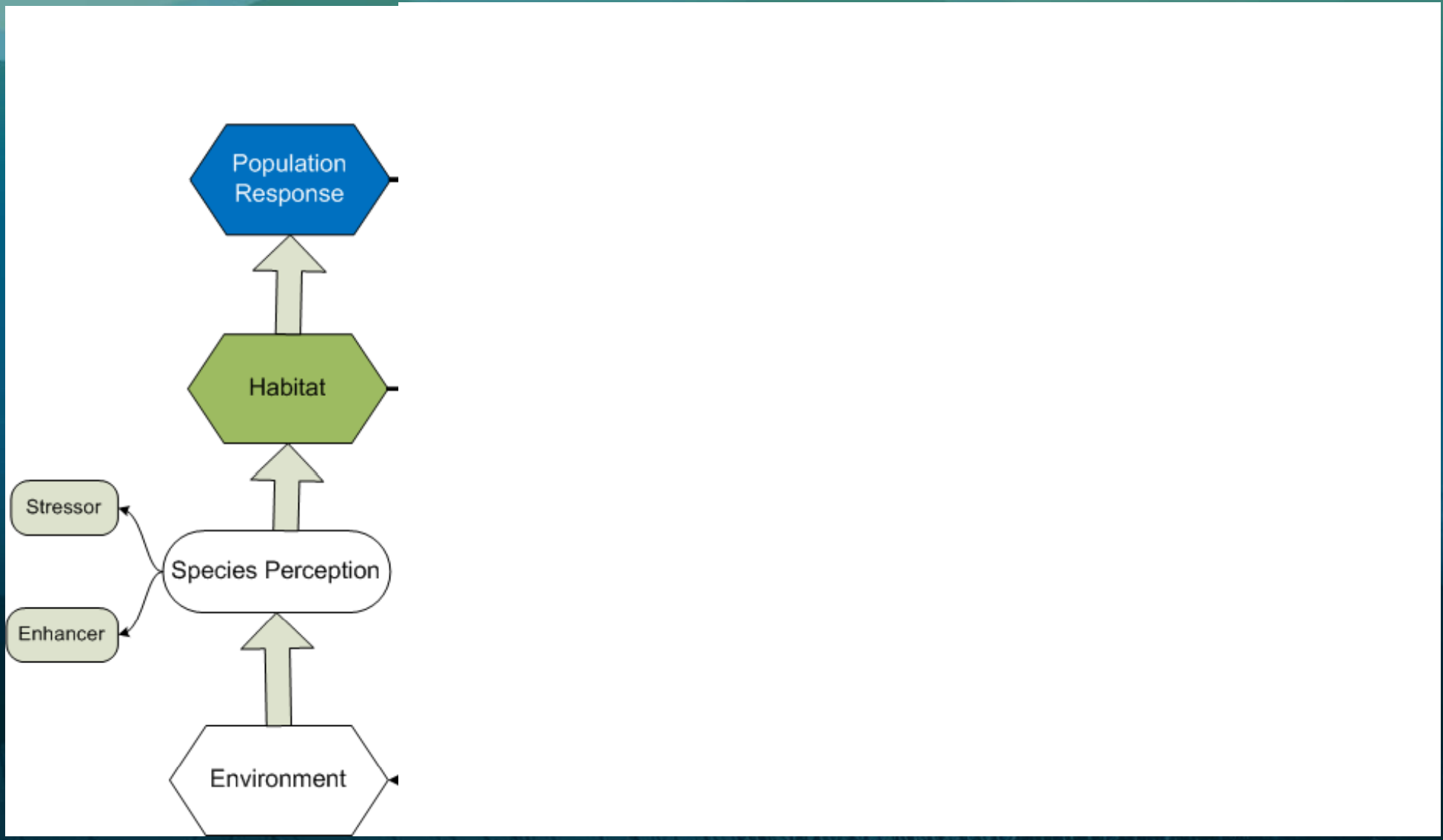
Conceptual Model: Species Perception Defines Habitat & BDCP Effects

Habitat defines population response



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Species Models

- For each covered species describes
  - Life history
  - Life stages
  - Spatial and temporal distribution of life stages
  - Key habitats for each life stage
  - Stressor ranking by species
- Species models guide effects evaluation

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Analytical Framework

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Analytical Framework Provides Structure and Global Assumptions for the Effects Analysis

- The Analytical Framework describes
  - Models used in effects analysis
  - Analytical comparisons—base case assumptions
  - Climate Change assumptions
  - Weight of Evidence—how to resolve different analytical methods
  - Roll-up—How to form final conclusions
- Details of individual methods are found in appendices

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Models Used in the Effects Analysis

- Conceptual models
  - Capture ideas, organize analysis, describe assumptions
  - DRERIP, IEP, BDCP specific
- Environmental models
  - Evaluate environmental change
  - CALSIM II, DSM2
- Biological models
  - Evaluate environmental change in terms of species performance
  - Based on Environmental Models
- Habitat Suitability models
  - Evaluate habitat restoration
  - Weight restored habitat for species perception
- Population and life history models
  - Integrate flow/entrainment analyses

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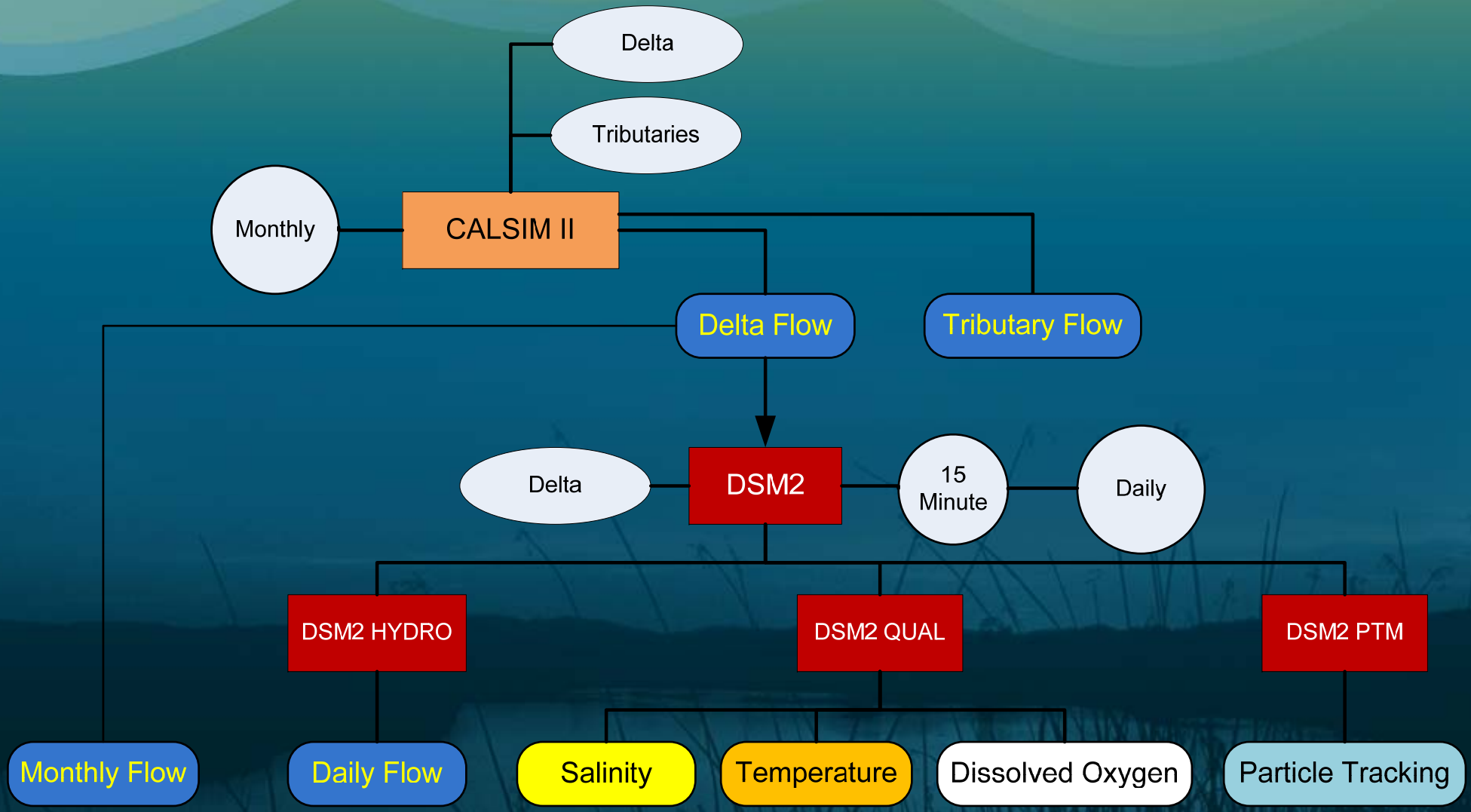
Environmental Models



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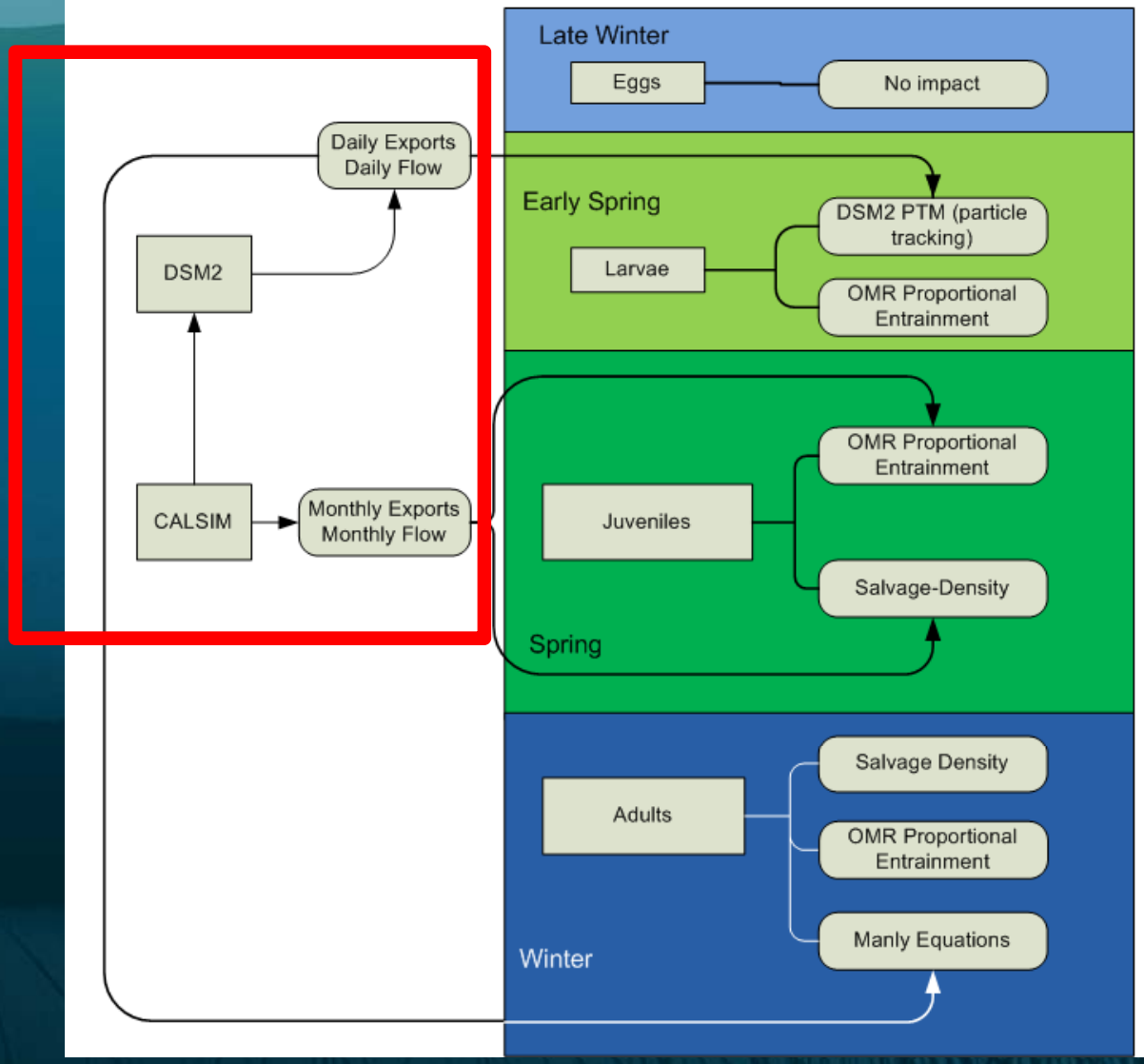
Biological Models—Entrainment

September 29, 2011

Delta Smelt Entrainment-South Delta



Hypotheses

Eggs are demersal and adhesive. Therefore they are not entrained in South Delta pumps.

Larvae lack fins and swim bladder and have limited ability to swim or orient. They generally move with water flow. They are generally modeled as neutrally buoyant water particles, based on the distribution in the 20mm trawl and DSM2-PTM

Juveniles can swim and orient but move toward pumps in relation to negative OMR, turbidity and other factors. Entrainment can be estimated by scaling up estimates of juveniles in salvage at SWP and CVP fish facilities. All smelt salvage assumed to be mortalities. Salvage density figures entrainment as a proportion of exports; OMR proportional entrainment calculates entrainment loss as a proportion of South Delta abundance a f(OMR, 20mm)

Adults can swim and orient but move toward pumps in relation to negative OMR, turbidity and other factors. Entrainment can be estimated by scaling up estimates of adults in salvage at SWP and CVP fish facilities. All smelt salvage assumed to be mortalities. Salvage density figures entrainment as a proportion of exports; OMR proportional entrainment calculates entrainment loss as a proportion of South Delta abundance a f(OMR, Kodiak). Manly projects entrainment based on detailed correlations of past patterns.

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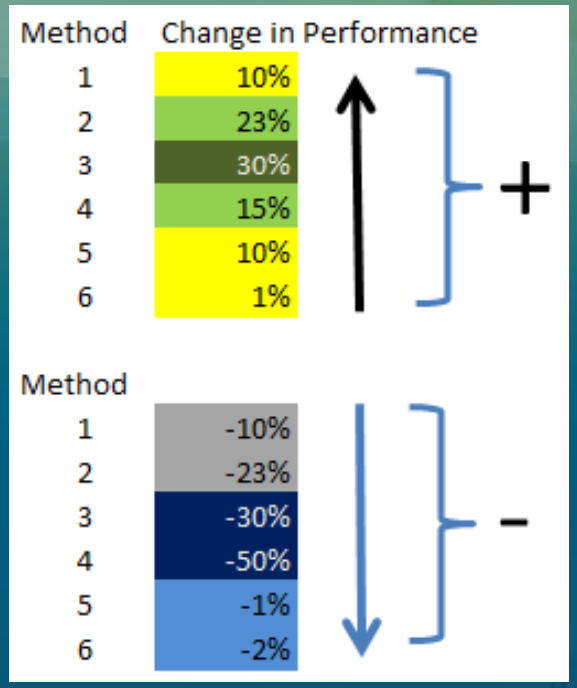
Reconciling Results from Multiple Analyses

- Weight of Evidence
  - Direction of change
- Evaluate
  - Reliability of methods
  - Direction of conclusions
  - Value of the metrics



Factor	More Weight	Less Weight
Scientific credibility	Peer-reviewed in published literature	Unpublished with limited documentation
Usage	Widely used in the Delta or other systems (utility independently verified)	New and untested model (unverified)
Strength of conclusion	Highly statistically significant result or technically robust	Weak statistical significance or based on limited theory and data
Variability of results	Highly consistent results with different inputs (low uncertainty)	Highly variable results depending on inputs (high uncertainty)

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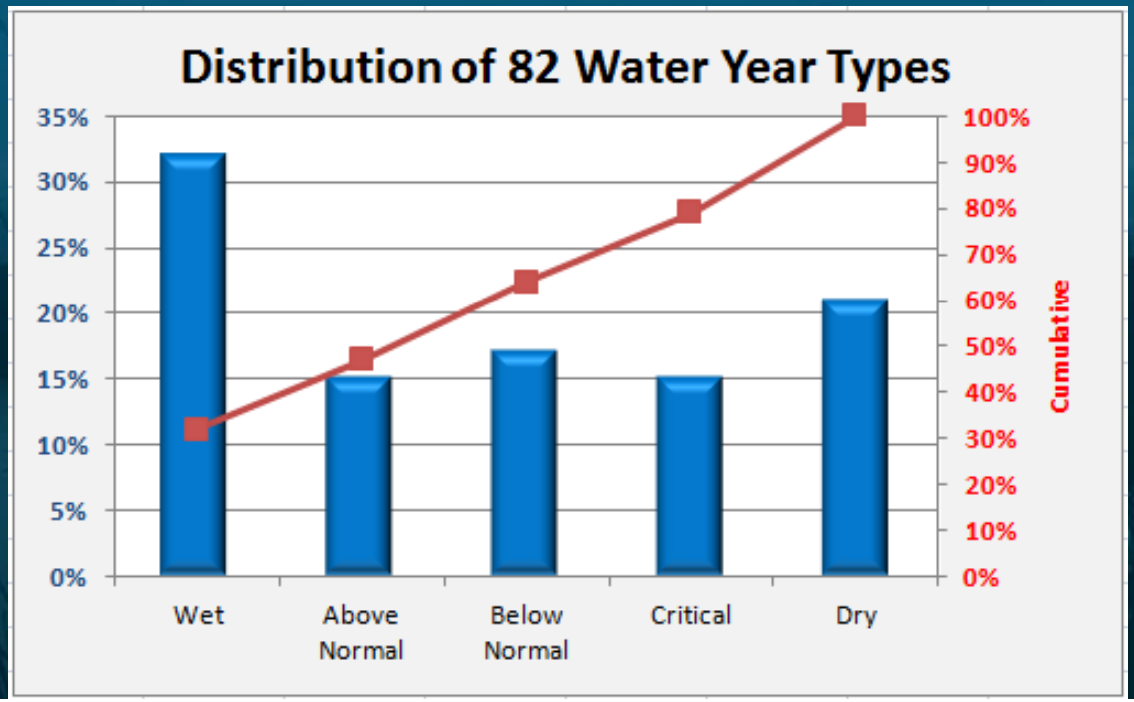
BDCP Analytical Structure

Baseline Scenario	Regulatory Basis	Description
EBC1	CEQA	2008 USFWS BO and 2009 NMFS BO, but without Fall X2
EBC2	ESA Section 7 and NEPA	2008 USFWS BO and 2009 NMFS BO
PP	BDCP	BDCP Preliminary Project Description (19 Conservation Measures)

Description	Time Period
Early Long Term (ELT)	2025
Late Long Term LLT	2060



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BDCP Effects Analysis