Opening Remarks to the Review Panel for the Proposal Regarding the Entrainment of Delta Smelt

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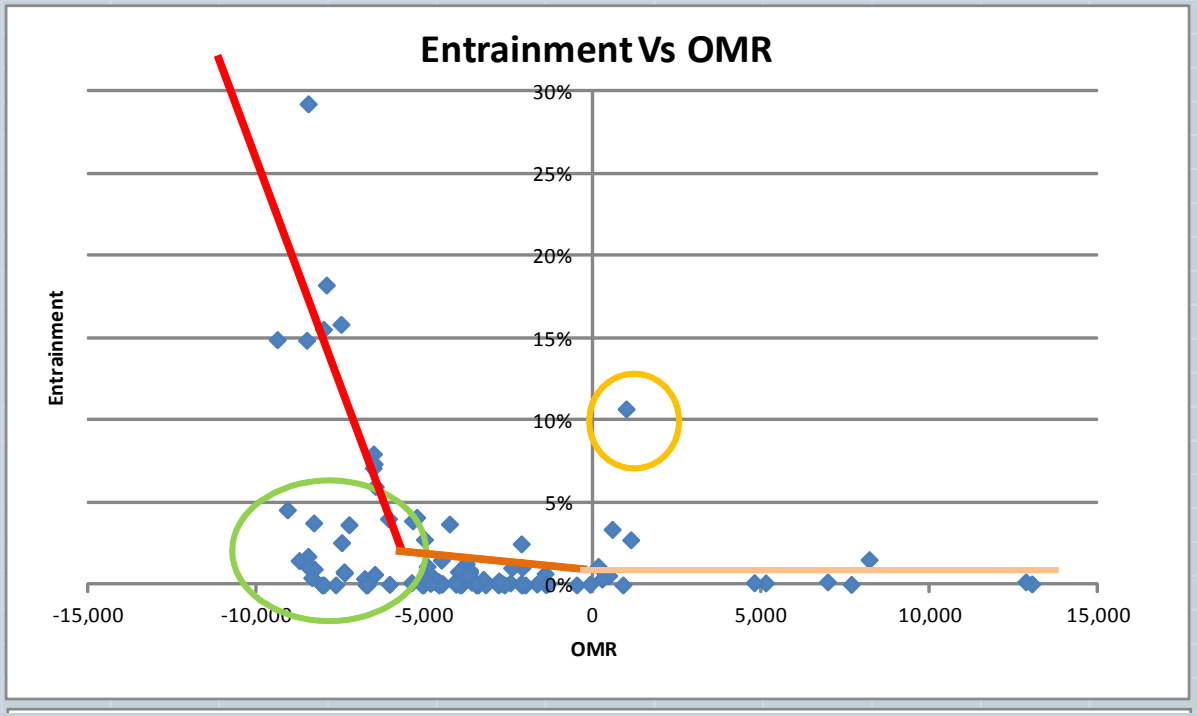
Factors Affecting Entrainment

- <u>Challenge:</u> Can we develop a more accurate risk index by understanding the combination of factors that are needed to produce entrainment affects?



Factors Affecting Entrainment

- Issues:
  - There is little disagreement on key factors affecting entrainment:
    - Interactive relationships between hydrodynamics (especially reverse flows), turbidity, presence of fish, pumping levels.
  - Relationships between the key factors
    - Are there non-linear relationships/thresholds between environmental factors and fish responses?
    - How do these factors interact?
    - If we understand the mechanisms, can a method be developed to assess entrainment risk accurately?
- Criticisms of past approaches:
  - A good conceptual model hasn't been properly articulated or tested.
  - Haven't considered all key factors simultaneously;
  - Haven't recognized how key factors combine to produce significant entrainment events;

Estimating the Proportion Entrained

- Challenge: Can we develop a defensible estimate of the percentage of adult delta smelt being entrained?
- Issue: How to reconcile survey data, which suggests that the percentage of smelt in Old and Middle Rivers is very small, with salvage data and mechanistic studies suggesting much larger percentage losses.
- Criticisms of past approaches:
  - The use of a large number of assumptions primarily due to insufficient data on key variables.
  - Disagreement on the adequacy of the assumptions
  - Poor characterization of uncertainty
  - Questions regarding the best way to use the survey data

Population Consequences of Entrainment

- Challenge: Can we determine the circumstances, if any, under which the entrainment of a given proportion of the population will have a significant effect on the abundance of the next generation?
- Issues: Are there times when other factors limit the population size such that the impacts of prior entrainment are muted?
- Criticisms of past efforts:
  - Wrong selection of years for analysis;
  - Too few or poorly specified explanatory variables;
  - Inappropriate concept of density dependence used.