

CAMT Fall Outflow Investigation

Objective. Identify environmental variables that are associated strongly with annual changes in survival during autumn and recruitment of delta smelt.

Response variable. Survival of delta smelt during autumn. We anticipate that the response variable will be estimated on the basis of catch data collected during summer townet, fall midwater trawl, and, where possible, spring kodiak trawl surveys.

Covariates shall include outflow and salinity in autumn. Outflow and salinity in other seasons, and other covariates in any season, will be selected by the investigators. The location of X2 likely be included, especially given its relevance to management, but was not mandated by the group's scope of work. Among other covariates, the group aims to include an estimate of predation. The group recognized that predators (striped bass) and delta smelt may have different responses to a given environmental variable, and it may be necessary to develop a separate model in which striped bass is the response variable. We anticipate that the set of covariates will be culled on the basis of empirical evidence or mechanistic hypotheses, data availability and uncertainty, and best practices for species–environment models (e.g., parsimony). The reasons for inclusion or exclusion of candidate covariates will be documented.

Analyses ideally will allow inference to topics including but not limited to the following.

1. The extent to which environmental variables hypothesized to be strongly associated with autumn survival and recruitment of delta smelt are correlated. [This is a restatement of key question 3 in the draft scope of work. If fall outflow is highly correlated with other candidate covariates, then not all of those covariates will be included in the models.]
2. The strength of association between fall outflow and autumn survival and recruitment of delta smelt. [Key question 1 in the draft scope of work.]
3. The strength of association between environmental covariates and autumn survival and recruitment of delta smelt if fall outflow is not included in the model [Key question 4 in the draft scope of work.]
4. The strength of association between fall outflow and other environmental variables that are strongly associated with autumn survival and recruitment of delta smelt. [Key question 2 in the draft scope of work. Answering this question likely will require additional models in which covariates in the delta smelt model that are associated strongly with the response variable themselves become response variables.]