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| ESSA_Large.png | ESSA Technologies Ltd.600 – 2695 Granville St.Vancouver, BC Canada V6H 3H4Phone: (604) 733-2996[**essa.com**](file:///D%3A%5CUsers%5CClint%5CDesktop%5Cessa.com) |

June 12, 2017

**Re**: Soliciting Information on Environment-Recruitment Relationships in the Bay-Delta

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Environment-Recruitment Relationship Information Form

ESSA Technologies Ltd. has been contracted by Metropolitan Water to carry out and publish a study that **(1)** performs a literature review of environment-recruitment relationships for Bay Delta, **(2)** re-analyzes the relationships where new data is available, to quantify their value from a policy and decision making perspective, and **(3)** provides guidance on best practices for the analysis, use, and refinement of environment-recruitment relationships to inform decision making in natural resource management.

#### HOW YOU CAN HELP - Identifying & Cataloging Environment-Recruitment[[1]](#footnote-1) Relationships

We are seeking to document knowledge among interested parties of important environment-recruitment relationships (defined in the footnote) that you know of for the Bay-Delta species as a starting point for further research by ESSA. We are interested in both relationships created in the past that are no longer used for management purposes, as well as relationships that are still actively used in management. For each relationship you are aware of, please complete as much information as you can in the table below. ***We are particularly interested in your knowledge of unpublished relationships, and knowledge about how these relationships have been used in decision-making***, as this type of information will not be accessible in the published literature.

Please return the completed table to ntamburello@essa.com.

**Your Information** (Name, Role, Affiliation, Email): e.g., Interested Party 1, Fisheries Biologist, Agency W, ip1@agencyw.gov

Table 1: Template for cataloguing environment-recruitment relationships in the Bay-Delta (*first 2 rows are worked examples*)

| Species | Location(s) (Sub-Region) | Type of Model / Analysis | Type of Population Data (e.g., counts, CPUE, etc.) | Key Envir. Covariates (and units) | Uses in Decision-Making & Other Comments | Reference(s)(if applicable) | Key Contact(s)(if applicable, Name, Role, Affiliation, Email / Phone) |
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| Delta Smelt | Bay Delta | Correlation | Abundance indices | Numerous, including water temperature | Possible support for flow measures. This paper was the definitive statement on Delta Smelt when published in 2005. It has numerous relationships starting at page 31. It also quotes relationships by others. I have highlighted those relationships in the rows below, though I don’t always have the papers.  | William Bennett, Critical Assessment of the Delta Smelt Population in the San Francisco Estuary, California. San Francisco Estuary & Watershed Science. 2005. Starting at page 31 |  |
| Delta Smelt | Bay Delta | Correlation | Abundance indices |  | Cited by Bennett p 32. I haven’t been able to find this document.  | Obrebski S. 1993. Relationship between deltasmelt abundance and entrapment zoneposition. Draft report to California Dept. ofWater Resources. 29 p. |  |
| Delta Smelt | Bay Delta | Correlation | Abundance indices | X2 | Cited by Bennett p 32 as example of a relationship that no longer holds. I am attaching this article. | Herbold B. 1994. Habitat of delta smelt. IEPNewsletter 7(Winter):1-3. Available from:California Dept. of Water Resources,Division of Environmental Services,Sacramento, Calif. |  |
| Delta Smelt | Bay Delta | Correlation | Abundance indices | Volume within salinity band | Cited by Bennett. Page 32. Attached | Unger PA. 1994. Quantifying salinity habitat ofestuarine species. IEP Newsletter7(Autumn):7-10. Available from: CaliforniaDept. of Water Resources, Division ofEnvironmental Services, Sacramento,Calif. |  |
| Delta Smelt | Bay Delta |  | FMWT index | Total copepods | Cited by Bennett Page 46. I have not found the reference | Stevens DE, Miller LE, Bolster BC. 1990.Report to the Fish and Game Commission:a status review of delta smelt (Hypomesustranspacificus) in California. CandidateSpecies Status Report 90-2. Sacramento(CA): California Department of Fish andGame. |  |
| Delta Smelt |  |  |  | Eurytemora abundance | Cited by Bennett 46. Attached | Miller LW. 2000. The tow-net surveyabundance index for delta smelt revisited.IEP Newsletter 13(1):37-44. |  |
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1. Recruitment is defined as the abundance of the earliest age at which a cohort (group of organisms of the same species and age) can be estimated. In fisheries, this often refers to the abundance of a cohort at the age at which they enter a fishery. In the context of the present project, we use the term "environment-recruitment" relationship to describe any relationship between the number of individuals in a population (or their survival rate) and their environment (e.g., river flow, pesticide concentration, water temperature, etc.) [↑](#footnote-ref-1)