Lead Scientist's Report

Summary: Delta Lead Scientist Dr. John Callaway will discuss an article from *Global Change Biology* on impacts to juvenile salmon, provide an overview of the final report of the Social Science Task Force, review updates on the Delta Science Tracker, cover the Delta Science Program's peer review services, review upcoming events, and provide the By the Numbers Report.

Changing Estuaries and Impacts on Juvenile Salmon: A Systematic Review. Hodgson, E.E., S.M. Wilson, and J.W. Moore. *Global Change Biology*. February 2020.

Salmon have significant cultural, economic, and ecological value across the globe, and estuaries provide food and shelter for juvenile salmon as they migrate to the ocean. However, estuaries worldwide are increasingly impacted by human activities that can create stressful conditions for juvenile salmon. To make informed decisions for salmon management, it is necessary to evaluate the consequences of different human actions on salmon, and there is a growing body of research assessing these impacts from estuaries across the globe, particularly in the Pacific Northwest. This article synthesizes that information to ask: what stressors have been studied for juvenile salmon, how do different stressors affect salmon, and what are the knowledge gaps related to stressors?

Researchers examined 167 studies that considered a number of potential stressors on juvenile salmon and cataloged information on species studied, human activities, stressors, responses and effects, and the statistical robustness of the studies. They identified connections between 24 human activities, 14 stressors, and 11 biological responses that reflect potential pathways of impacts on juvenile salmon. Based on these studies, researchers found that four of the 14 stressors were most likely to have a negative effect on juvenile salmon (moderate to high confidence in these factors), including: pollutants, sea lice (a common parasite on salmon), connectivity, and flow. Lower-ranking stressors included temperature within the estuary and habitat modification. The researchers concluded that multiple activities and stressors are likely to affect salmon. They also identified research gaps including the need for studies on individual stressors such as entrainment, species that have not been well studied (sockeye salmon), and more research on cumulative impacts of multiple stressors.

Juvenile Chinook salmon face many stressors as they move through the Delta and San Francisco Bay Estuary. The Delta Plan's ecosystem restoration strategies address stressors to the Delta ecosystem (ER R2), and many strategies for ecosystem restoration directly tie to improving habitat and conditions for salmon. In addition, the Delta Science Plan Objective 3 and Science Action Agenda Priority 2 both focus on using and promoting synthesis, and this paper highlights the value of synthesis to provide greater insight of stressor impacts than any single study. The increased

understanding of stressors impacts on salmon also directly relates to Science Action Agenda Priority 4 on improving understanding of interactions between stressors and managed species. Increased studies on human activities, stressors, and impacts on salmon will also increase consensus and confidence in evaluating risk factors that may inform management.

Final Report from the Social Science Task Force

The Delta Social Science Task Force (Task Force) was convened in 2018 by the Delta Science Program and charged with developing a strategic plan to strengthen and integrate social sciences into the science, management, and policy landscape of the Delta. As stated in their report, "the integration of social and natural science recognizes that humans are a central part of the system, as is the case in the Delta—and that overlooking this human component often leads to unintended consequences and management ineffectiveness." A draft of their report was completed in late 2019 and presented to the Council in January 2020. Their final report is now available at: https://deltacouncil.ca.gov/social-science. The three findings and eight recommendations in the final report focus on areas to strengthen and integrate social science efforts in the Delta: building capacity for social science research and funding within agencies and beyond, developing an integrated research approach including support for collaboratively developed social indicators, and addressing institutional barriers to learning and improving adaptive management processes. Dr. Jim Sanchirico, Chair of the Task Force and Professor at the University of California, Davis, will present an overview of the report findings and recommendations. Rachael Klopfenstein, Environmental Scientist in the Delta Science Program, has led this effort for the Council.

The Delta Science Tracker.

Action 5.3 of the 2019 Delta Science Plan calls for the development of an internet-based tracking system of science activities in the Delta. The Delta Science Tracker (Tracker) will serve this role by providing a searchable inventory of science activities in the Delta. The Tracker is envisioned to include projects ranging from research to mandated monitoring, including projects funded through recent competitive solicitations, as well as projects identified by the Delta Independent Science Board's ongoing Monitoring Enterprise Review. This tool will be of use to a broad audience that includes technical users (e.g., agency and academic scientists), decision-makers, program managers, and other stakeholders. For example, the Tracker would allow users to gain a better understanding of current priorities for Delta science expenditures, gaps and opportunities for future funding (decision-makers and mangers), and opportunities for collaboration and coordination on science activities (technical users).

Invitations for proposals (bids) for the development of the Tracker were sent out in early February 2020, bids were evaluated and scored in mid-March, and a contract is scheduled to be awarded in mid-April. A kick-off meeting with the new contractor is scheduled for early May. The initial design and development of the Tracker will be ongoing through 2020, and an initial release of the Tracker is planned for early 2021, followed by further compilation of project information and fine-tuning of the system.

Workshops and training opportunities for the Tracker will be scheduled with agency staff, the Delta community, and other interested users.

Delta Science Program's Peer-Review and Advice Services FAQ

The Delta Science Program is a recognized leader in coordinating independent scientific peer reviews and advice services, and has organized over 25 reviews since 2009 for both state and federal agencies. These services support the Science Program's mission of providing the best possible unbiased scientific information to inform water and environmental decision-making in the Delta. By providing these services to other agencies and organizations, the Delta Science Program also works to achieve the Delta Science Plan's goal of managing and reducing scientific conflict to achieve the vision of One Delta, One Science.

A new "Frequently Asked Questions" (FAQ) document has been developed to identify key aspects of these important services (see attachment 3) in order to better inform potential users of these services. The FAQ provides answers that clarify the differences between independent scientific review and advice, the importance of these services in building trust and legitimacy of scientific products, and an overview of basic procedures for requesting and developing a review or advisory panel. Additional details regarding the policies and procedures for review and advisory panels can be found in Appendices H and I of the Delta Science Plan.

On your radar

There are some events and initiatives that have recently occurred, or will be occurring, to keep in mind:

The Interagency Ecological Program Annual Workshop

The annual workshop, originally planned for March 17-18, 2020 has been postponed and is now tentatively scheduled for August 25-27, 2020 at Lake Natoma Inn in Folsom. Updates on the workshop will be available closer to the event.

Science Needs Assessment Workshop:

The workshop originally scheduled for April 27-28, 2020 has been postponed until October 5-6, 2020. A virtual discussion to review the briefing paper for the workshop and climate change impacts on the Delta is planned for April 28, 2020 at 9:15am, with additional virtual discussions occurring on June 3, July 28, and September 9, 2020. More information is available at:

http://deltacouncil.ca.gov/pdf/dpiic/flyers/2020-04-27-28-science-needs-assessment-flyer.pdf.

By the Numbers

Delta Science Program staff will provide a summary of current numbers related to Delta water and environmental management. The summary (Attachment 1) will inform the

Council of recent counts, measurements, and monitoring figures driving water and environmental management issues.

List of Attachments

Attachment 1: By the Numbers Summary.

Attachment 2: Visual abstract - Impacts of Human Activities on Estuary Juvenile Salmon.

Attachment 3: FAQ for Science Review and Advice Services.

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