IEP Spring-run Chinook salmon Project Work Team

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Charge

The IEP spring-run Chinook salmon PWT will provide a venue for scientists from diverse agencies/groups to coordinate and synthetize findings, which will in turn inform research and monitoring needs in the future. Key roles and activities will include: 1) coordination on in-season status and trend monitoring updates, 2) technical guidance to IEP Lead Scientist, Coordinators and Directors on science priorities, 3) development, coordination, and technical review of management-relevant research and studies for IEP and other partners (e.g., modeling, manipulation, and monitoring).

The Interagency Ecological Program (IEP)

IEP is a consortium of nine state and federal agencies that conducts research and monitoring in the San Francisco estuary. For the past 40 years, IEP scientists and partners (e.g. universities, NGOs) have worked to: 1) describe the status and trends of aquatic ecological factors of interest in the estuary; 2) develop an understanding of environmental factors that influence the resources of the estuary; and 3) provide information to support natural resource planning, management, and regulatory activities in the estuary. One of the most effective tools for IEP activities has been the formation of Project Work Teams (PWTs) that focus on specific research and monitoring topics of interest. Examples of some of the current PWTs are available on the IEP's website. These teams are formed to organize new studies, to review study plans and proposals, to write scientific papers and reports, and to promote collaboration among different groups working on the topic of interest.

Status Background

Central Valley spring-run Chinook (CVSRC) salmons were once a major component of the Central Valley Chinook stock, with annual catches of over a half million fish in the 1880's. They historically ranged throughout the Central Valley in both the Sacramento and San Joaquin watersheds. Eighteen or 19 independent populations of CVSRC are thought to have occurred in the Pit River in the north to the southern reaches of the upper San Joaquin (NMFS 2016; Johnson and Lindley 2016). These populations inhabited five distinct geologic/hydrologic regions: 1) Basalt and Porous Lava, 2) Northern Sierra Nevada, 3) Northwestern California, 4) Southern Sierra Nevada, and 5) Central Valley domains.

The ESU is currently limited to independent populations in Mill, Deer, and Butte creeks, persistent and presumably dependent populations in the Feather and Yuba rivers and in Big Chico, Antelope, and Battle creeks, and a few ephemeral or dependent populations in the Northwestern California region (e.g., Beegum, Clear, and Thomes creeks). This ESU continues to be threatened by habitat loss, degradation and modification, small hydropower dams and water diversions that reduce or eliminate instream flows during migration, unscreened or

inadequately screened water diversions, excessively high water temperatures, and predation by non-native species (NMFS 2014, Lindley *et al.* 2007, Yoshiyama *et al.* 1998, figure 1). Since 1999 CVSRC ESU is state and federally listed as a threatened species. The CVSRC ESU is currently faced with three primary threats: (1) loss of most historic spawning habitat; (2) degradation of the remaining rearing and migration habitats; and (3) genetic introgression with the Feather River Fish Hatchery spring-run Chinook salmon strays (NMFS 2014).

While NMFS reports that the status of the ESU has probably improved since 2008 due to extensive restoration in spawning and rearing habitat and increases in spatial structure of populations (e.g. Battle and Clear creeks), this evaluation does not quantify the more recent impacts of 2012 to 2016 drought and climate change to the viability of the ESU (NMFS 2016; Johnson and Lindley 2016). Therefore, the recent declines of many of the dependent populations, high pre-spawn mortality in the largest spring-run population (i.e., Butte Creek), uncertain juvenile survival and poor ocean conditions during the recent drought are all causes for concern for the long-term viability of the CVSRC ESU. In addition, straying of FRFH CVSRC salmon to other watersheds and introgression with other populations may also be working against the resiliency of remaining natural-origin populations.

Spring-run monitoring programs vary across tributaries and monitoring methods and results are reported inconsistently. Additionally, a life cycle model has been developed by NMFS in partnership with USBR to study the dynamics of the three sustainable CVSRC salmon populations (i.e. Butte, Mill and Deer Creeks), and significant life cycle data gaps have been identified. This lack of data limits our scientific understanding of the ESU and ability to prioritize recovery actions. Therefore, to manage CVSRC salmon for recovery there is an important need for continued high quality monitoring of watershed conditions and population abundance throughout the ESU. Furthermore, identifying the factors that lead to successful population abundance increases, such as those observed over the past decade on Butte Creek, could help provide insights and recommendations for future management actions under various Central Valley water operations, habitat restoration, and climate change scenarios. Further, several independent science panels have recommended the need for experimental manipulations in the Central Valley to increase knowledge on how native fishes respond to environmental drivers (e.g., pulse flows). To plan and implement such efforts requires multi-agency and stakeholder coordination, which would be part of the roles and responsibilities of this IEP PTW for CVSRC.

An IEP spring-run Chinook salmon PWT will provide a venue for scientists from diverse agencies/groups to convene and synthetize findings, which will in turn inform research and monitoring needs in the future.

Examples of PWT Activities

1) **Guidance for monitoring, prioritizing projects and developing action plan to collect data**

   One of the first PWT tasks will be to identify gaps in current data collection efforts for CVSRC, provide guidance for the development of action plan that will allow to fill these data gaps and identify sources of potential funding for the implementation of the data

monitoring projects, similar to what has been conducted for winter run salmon and sturgeon through IEP SAIL and Delta Smelt through IEP MAST (Johnson et al. In press; Heublein et al. In press).

2) **Development of CVSRC juvenile production and freshwater survival indices**

   Although adult escapement and holding indices are available for spring-run throughout their range, juvenile production indices are currently not available. Development of such indices would fill a life cycle data gap for this species and is needed to improve our ability to protect and recovery the species.

3) **Evaluating the role(s) of the Butte sink, Sutter Bypass, Yolo Byapss and Feather and San Joaquin rivers floodplains for the rearing and migration of spring-run juvenile Chinook salmon populations**

   As an example, the Sutter bypass has been suggested to be an important seasonal rearing habitat for Butte Creek spring-run juvenile salmon, especially in years of extensive winter and spring flooding. Moreover, juveniles also use this system as migratory corridor. However, little is known about the growth potential and the survival benefit of the Butte sink and Sutter Bypass. Identifying the role of this floodplain habitat on the success of Butte Creek spring-run Chinook, which is currently the largest population of CVSRC could have strong potential management implications for the spring-un ESU.

4) **Evaluating the survival of juvenile spring-run Chinook salmon through the Sacramento River under different river flow scenarios**

   From the acoustic tagging work done with late-fall run Chinook smolts, outmigration survival appears to increase with higher flows, and has been shown in several other studies throughout the Pacific coast. However, the exact relationships between flow and survival and the specific mechanisms prove more challenging. The specific relationship can have a large influence on how effective management actions such as pulse flows (magnitude and duration) at particular life stages are at providing population-level benefits. Early efforts by NMFS and CDFW to plan experimental water release strategies to test these flow-survival relationships revealed the value in multi-agency coordination and coordinated study plans with a team such as could be provided by the IEP CVSRC PWT.

Haiku

Precious spring-run king

How do I know what you need?

Go Project Work Team!