

# SALMONID FLOODPLAIN HABITAT CREDIT MODEL

The Salmonid Floodplain Credit Model is designed for calculating salmonid floodplain habitat credits that can be used to satisfy mitigation requirements under the National Marine Fisheries Service (NMFS) Biological Opinion on the Long-Term Operations of the Central Valley Project and State Water Project (OCAP BiOp).

The Salmonid Floodplain Habitat Credit Model is specifically designed to be used to meet the objective as presented in Action 1.6.1 of the OCAP BiOp:

## **Action 1.6.1. Restoration of Floodplain Rearing Habitat**

**Objective:** *To restore floodplain rearing habitat for juvenile winter-run, spring-run, and CV steelhead in the lower Sacramento River basin. This objective may be achieved at the Yolo Bypass, and/or through actions in other suitable areas of the lower Sacramento River.*

There are seven criteria in the Credit Model, which capture key elements of salmonid floodplain habitat. Each criterion contains metrics so that project sites can be scored based on the value of the habitat provided. The criteria, metrics and scoring align with Action 1.6.1 of the OCAP BiOp and reflect the most up to date and accurate understanding of salmonid habitat within the scientific community.

The reference habitat for the Credit Model is a natural floodplain in the Sacramento River Basin, which would score 10 points and be awarded 1 credit for 1 acre. A project's total score is divided by 10 to determine the number of credits awarded. Project sites can receive additional points, compared to a natural floodplain, for inundation that occurs more frequently and for a longer duration. The maximum score a project site could receive is 15 points, or 1.5 credits for 1 acre. Four of the criteria, if metrics are not met, disqualify a project from receiving credits entirely. This prevents project sites with unsuitable salmon floodplain habitat from receiving credits.

## **SALMON CREDIT CRITERIA**

### **1. Location**

The OCAP BiOp specifies that DWR and Reclamation shall provide significantly increased acreage of seasonable floodplain habitat in the lower Sacramento River Basin. Therefore, this model only awards credits to projects located in the lower Sacramento River Basin. Projects outside this area are disqualified from consideration.

### **2. Salmonid Access**

The proposed habitat should provide juvenile salmonids access to inundated aquatic habitat through volitional entry to avoid potential adverse effects to salmonid population diversity associated with trap and haul operations. Projects that do not provide volitional passage on and off of floodplain habitats are disqualified.

### 3. Seasonal Salmonid Floodplain Rearing Habitat

Salmonid floodplain rearing habitat is defined as areas that are inundated from the surface waters of an anadromous fish-bearing stream during the December through April season, at an average inundation depth of 10 cm to 2 m. The area may not be perennial water. Perennial floodplain habits such as ponds or flooded gravel pits not only produce less foodweb biomass but also are likely to harbor adult predatory fish, thereby increasing mortality of juvenile salmonids.

### 4. Inundation Frequency

Frequent inundation from waters of an anadromous fish-bearing stream creates greater opportunities for more juvenile salmonids from multiple runs to access, utilize and benefit from the floodplain habitat. Greater frequency of floodplain inundation also supports an expanded portfolio of outmigration timing, diversifying potential life histories strategies and supporting the diversity and resilience of Central Valley salmonid populations. Furthermore, the dynamic process of connection and disconnection of floodplains, and the draining period in particular, drives maximum productivity in the floodplains.

### 5. Inundation Duration

Numerous studies have documented the importance of inundation duration to primary and secondary productivity on floodplains, in relation to salmonid growth and survival rates. Scientific work has shown that when the floodplain is inundated for a sufficient period of time, the floodplain becomes a highly productive area due to autochthonous production and from decomposition of terrestrial vegetation.

The Yolo Bypass Implementation Plan sets a duration operational criterion of at least 14 days to allow for phytoplankton biomass to accumulate. The Salmonid Credit Model allocates additional points for

longer inundation periods with a range of 7 to 35 days of inundation.

### 6. Stranding Risk

Fish stranding may occur as a floodplain is draining, but native fishes typically exhibit life history and/or behavioral adaptations that reduce the potential for stranding, such as leaving the floodplain in response to changes in flow, water depth, temperature or clarity. Current scientific research presents findings that a relatively low proportion of juvenile Chinook salmon would likely be stranded in the Yolo Bypass, although anthropogenic structures like gravel pits can increase risk of stranding, as does rapid disconnection of the floodplain from the river.

### 7. Management & Protection

To ensure the long-term continuation of salmonid rearing habitat, project sites must be protected under a conservation easement or be owned in fee by the public and have a long-term management plan. Unprotected sites are disqualified from receiving credits.



(above) salmonids pulled from floodplain habitat at Knaggs Ranch for testing



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