Meeting Summary
Restoration Goal Technical Feedback Group Meeting
Thursday, July 19, 2012

Stanislaus County Agricultural Commissioner's Office, Harvest Hall,
3800 Cornucopia Way, Modesto, California
DRAFT: 2012.08.14

Attendees

Michelle Banonis, Bureau of Reclamation
Paul Bergman, Cramer Fish Sciences
Joshua Biggs, MWH Americas Inc.
Carrie Buckman, CDM Smith
Valentina Cabrera, US Environmental Protection Agency
Steve Chedester, San Joaquin River Exchange Contractors
Dan Dombroski, Reclamation
Jason Faridi, Fish Bio
Chuck Hanson, Technical Advisory Committee
Katrina Harrison, Reclamation
Steve Haze, SJUCF
Rene Henery, SJR TAC/TU
Neil Lassettre, Cardno Entrix
Shannon Leonard, URS
Clifton Lollar, KRWA
Bill Luce, Friant Water Authority
Len Marino, Central Valley Flood Protection Board
Scott McBain, TAC
Palmer McCoy, Henry Miller Reclamation District
Rod Meade, SJRRP Restoration Administrator
Joseph Merz, Cramer Fish Sciences
Matt Meyers, Dept. of Water Resources
Erica Meyers, DFG
Leslie Mirise, National Marine Fisheries Service
Craig Moyle, MWH Americas Inc.
Alexis Phillips-Dowell, DWR
Julie Renter, River Partners
Erin Rice, Reclamation
Ben Rook, Cramer Fish Sciences
Monty Schmitt, Natural Resources Defense Council
Mark Tompkins, New Fields
Magill Weber, The Nature Conservancy
Beth M. Wrege, NMFS

Next Meeting

September 20, 2012 – 1:30 p.m. to 4:30 p.m., location to be determined, California

Welcome and introductions

Craig Moyle welcomed the meeting participants, and provided an overview of the agenda. Introductions were made around the room.

Standing Items

Erin Rice, Reclamation explained that today the group would be discussing modeling exercises that look at minimum suitable habitat area requirements.

Restoration Goal Background:
Mr. Rice highlighted a timeline of the Restoration Program. He explained that the Settlement has two goals - the Restoration Goal and the Water Management Goal. The focus of today's meeting is the Restoration Goal. Restoration Goal Technical Feedback Meetings are for exchange of technical information between San Joaquin River Restoration Program (SJRRP) Implementing Agencies, Settling Parties, Third Parties, and other interested stakeholders and public members.

SJRRP Documents: Upcoming documents include the Program Environmental Impact Statement/Report, and the mid-year 2012 Annual Technical Report.

River Operations: Reclamation is currently releasing 350 cubic feet per second at Friant Dam until the fall pulse scheduled for October or November.

Announcement: Craig Moyle made an announcement about email procedure. If anyone receives an email invitation and would like to forward it to someone else – please do so but also forward their contact information to Craig Moyle.

Minimum Suitable Habitat Area Requirements and Availability for Spring-run and Fall-run Chinook Salmon in the San Joaquin River

Introduction and Ground Rules

Michelle Banonis,Reclamation, introduced the purpose of the meeting within the context of the application of two models – Emigrating Salmonid Habitat Estimate (ESHE) and the Sedimentation and River Hydraulics-Two-Dimensional model (SRH-2D) – to the Restoration Program, particularly site-specific projects in Reach 2B and 4B. Both models are being utilized during a Minimum Book End Phase and a Site-Specific Phase. Each phase contributes to evaluate the risks, benefits, and alternatives for fisheries assumptions that result in a range of potential levee alignments and then a minimum river channel area to enclose in Reaches 2B and 4B. The estimated schedule for each phase is as follows:

Minimum Bookend Phase (dates estimated)

Date	Event
July 19, 2012	Restoration Goal Technical Feedback Group Meeting
Aug. 24, 2012	Public Draft Report
Sept. 7, 2012	Formal Comments Due
Sept. 21, 2012	Initial Reponses to Comments
Oct. 5, 2012	Resolution

Site-Specific Phase (dates estimated)

Date	Event
2013 Spring	Site-Specific Public Draft EIS/R
2013 Summer	Site-Specific Final and Record of Decision
2013	Final Design

Goals for Today:

- Establish the analytical tools and the parameters to test
- Develop scenarios for the parameters in the analytical tools
- Discuss the process for the technical discussions on minimum floodplain analysis
- Continue working toward a culture of constructive collaboration between agencies and stakeholders

Michelle Banonis led a brief facilitation exercise that focused on encouraging a culture of constructive collaboration between Restoration Goal TFG participants.

After the exercise, Ms. Banonis emphasized that this process will require difficult discussions. She asked that participants be clear when asking questions, and make productive comments about the process.

Background and Process

Katrina Harrison, Reclamation, gave an overview of the background and process on estimating the minimum habitat methodology. The quantity, quality, life stage and population (time and space), and fish accessibility are all included in the definition.

Habitat terms include:

Term	Definition
Total Inundated Area	The amount of land that water covers
Suitable Habitat	Inundated land that meets fish criteria (i.e. depth, velocity, cover, etc.)
Available Suitable Habitat	Inundated land that meets fish criteria currently existing in the SJRRP area

Ms. Harrison described the minimum habitat methodology as it related to the models individually and in combination.

- ESHE contributes to identification of a minimum bookend amount (area) of suitable habitat for juvenile Chinook salmon.
- SRH-2D hydraulic modeling results inform estimates on the amount of suitable habitat currently available.
- When combined, the differences identify a deficit or surplus of available suitable habitat for juvenile Chinook salmon.

Fishery inputs to the models include: juvenile population numbers, survival rates, juvenile timing, migration speed, entry date, relationships between juvenile size, time habitat amount and habitat quality. Hydraulic inputs include: depth, velocity, cover delineation, and flow scenarios. Ms. Harrison noted that these inputs were subject to changes, based on suggestions from meeting attendees.

The results presented include 12 scenarios from ESHE, six hydraulic modeling scenarios, and a range of habitat deficits.

Ms. Harrison highlighted that the technical team will be looking for additional input data on fisheries biology, and available habitat criteria.

Estimating floodplain habitat requirements for emigrating salmonids

Paul Bergman, Cramer Fish Sciences, gave a presentation on the purpose of the ESHE model, explaining that long term survival and maintenance of healthy San Joaquin River fall and spring-run Chinook salmon populations depend on sufficient suitable habitat (both quality and quantity).

The ESHE model assumes that juvenile salmon capacity (maximum number in a river reach) is limited by the territory size of the fish and the amount of available suitable habitat. The amount of territory required for each fish is a function of fish size (larger fish = larger territory size) and habitat quality (better habitat quality = smaller fish territory size). Suitable habitat area is the total amount of inundated riverbed that meets habitat quality requirements of juvenile salmon. By tracking the abundance and size of juvenile Chinook salmon throughout their emigration and rearing period, and inputting estimates of the habitat

quality of each river reach, the ESHE model can estimate the amount of suitable habitat required to sustain the number of salmon present in each reach.

The goal of the ESHE model is to enumerate the amount of rearing habitat required to support the Fisheries Management Plan production targets for San Joaquin River fall and spring-run Chinook salmon. Early in the year, juvenile Chinook salmon are relatively small and can be found in large numbers in upstream reaches. While the abundance of fish declines during downstream migration, individually the fish require more space as they grow. The ESHE model tracks the rearing and emigration of individual daily cohorts of juvenile Chinook salmon, and tracks their abundance, growth, speed of movement, and territory size requirements.

Preliminary results:
In low flow scenarios, fish enter over a wider period of time, and move at a slower pace, leading to fish residing longer in each reach and a greater proportion rearing in the river and emigrating out as smolts. Conversely, in high flow years, fish move faster and a greater proportion emigrate out as fry-size fish. Therefore, the number of fish present in the system at any given time is generally higher in a low flow versus high flow year.

Because data was used from two surrogate systems (Feather and Stanislaus) that do not have extensive floodplains, modeled juveniles don't exhibit the behavior of moving into floodplains and slowing down in high flow years. In fact, they do the opposite, and move fast out of the system in conjunction with early flood pulses. Even though this pattern of movement will not likely mimic the movement of juveniles in a restored floodplain river system like the San Joaquin, the authors assume that ESHE output captures the range of emigration behaviors we might expect to see in the San Joaquin River. In fact, an assumption could be made that the ESHE low flow scenario (slower, more drawn out-migration) may mimic a high flow year in the restored floodplain habitat of the San Joaquin River, and the ESHE high flow scenario (faster, truncated out-migration) may mimic a low flow year in the future San Joaquin River when floodplain habitat is not inundated and juveniles migrate exclusively in the main channel.

It is important to remember that the ESHE model estimates "suitable" habitat that is only a fraction of the total habitat required to support it (2-D modeling addresses this). The authors pointed out that they are modeling an "average" population, with average timing and migration speed. Therefore, ESHE estimates of habitat in each particular reach should be assumed to be flexible – i.e. due to the unpredictable nature of fish populations, habitat could be available downstream or upstream and still meet the needs of the salmon population. Lastly, nearly all ESHE model inputs can be altered (e.g. growth curve, production targets). Therefore, if better information is available to inform model functions, or if SJRRP management targets are changed, the ESHE model can easily be updated.

Discussion followed the presentation, and included:

- Temperature will be modeled in a separate process to be integrated later.
- Discussion and explanation of the confidence intervals that were selected by the technical team.
- The model focuses on juvenile emigrating salmon, but does not account for returning adults.
- Some conversation took place on the model's assumptions on fish behavior derived from studies in the Stanislaus and Feather Rivers. This is due to a lack of adequate data on the San Joaquin River.
- One meeting participant asked if the technical team would consider assigning sensitivity values to individual variables within the ESHE model.

- An attendee suggested that alternative modeling scenarios consider squeezing the distribution of migrating fish to simulate seasonal water temperature constraints.

Estimating existing floodplain habitat

Dan Dombroski, Reclamation, presented how modeling is used to estimate existing floodplain habitat in the Restoration Area. The objective is estimating available *suitable habitat*. Existing suitable habitat is determined based on the quantity that meets the habitat quality criteria for depth, velocity, and cover. The basic workflow is to:

- Collect data to document the current state of the system
- Predict hydraulic conditions within each river reach
- Estimate rearing habitat within each river reach

This team uses a Reclamation software package called SRH-2D. The hydraulic modeling provides spatial distribution information including: areas of inundation, water depth, and flow velocity.

The objective is to map observable physical variables like depth and velocity. All of this combines into one metric called *hydraulic suitability criteria*. This is repeated for varying hydraulic and geomorphic conditions.

Mr. Dombroski highlighted that it is important to include cover features in the analysis. Cover polygons for the model were delineated manually in a GIS by Reclamation staff, distinguishing between two representative definitions: edge cover and full cover. The edge cover scenario is a buffer area (based on the concept of fish darting distance). The full cover assumes that the fully delineated area can be used.

Computations were run for three different water year types: about 1,000 cfs for dry; 2,500 cfs for normal; and around 4,000 cfs for wet. These flow levels represent flows that could be expected for approximately 2 weeks in duration during these water year types.

Suitable habitat numbers are computed taking into account the cover (full or edge) and river hydraulics. The model can also accommodate changing levee alignments. This produces new total inundated area statistics, and hydraulic suitable areas. However, the model doesn't produce numbers for cover area in Reaches 2B and 4B because it is unclear what the vegetative cover conditions (and cover habitat) will be after future projects are constructed.

Hydraulic modeling demonstrates that in the constrained (leveed) reaches, greater flows do not necessarily produce more habitat. The results of habitat assessment indicate sensitivity to how cover is defined, and suggest utility in strategic placement and modification of cover features.

Discussion followed the presentation, and included:

- Digital removal of levee features was considered in the model topography for certain reaches.
- Flow levels for different year type scenarios were derived from SJRRP flow benchmarks.
- Roughness and topography have a significant impact on hydraulic results. This should be considered in future cost estimates.
- One attendee noted that the output could potentially have more value being shown as a range or frequency associated with specific times that habitat are available, rather than as a "total

available" number. NOTE: Cover definition is currently being revised with the goal of better representing all available cover features.

Biological & Physical Model Integration

Katrina Harrison gave a presentation on how the various model outputs are integrated to produce a comprehensive analysis. The five calculation steps are:

- Needed suitable habitat from ESHE
- Available suitable habitat from hydraulic model
- Calculate suitable habitat – deficit/surplus
- Calculate total inundated area - deficit/surplus
    - Percent of inundated area that is suitable per reach
- Calculate 2B/4B total inundated area to enclose

Ms. Harrison described how the models calculated final total inundated area deficits and surpluses, and shared some of the preliminary results with the group during the presentation.

Flow trade-offs and habitat quality have significant effect on the outputs seen from the model. Ms. Harrison described some of the assumptions and limitations of the analysis and modeling. Flow corresponds to ESHE parameters for fish entry timing and migration speed.

Discussion followed the presentation, and included:

- Discussions followed about assumptions made for Reaches 2B and 4B. Currently, the model averages all of the reaches together as a placeholder because of projects in these reaches.
- The wide range in survival values for the fish were attributed to the different flow scenarios.
- The model assumes hypothetical river conditions, with no passage issues for the fish.
- One participant noted that the analysis was sensitive to the cover definitions used. He suggested that small shrubs and other low vegetation may provide additional cover that is not currently being considered by the model.

Next Steps

John Netto, USFWS, provided an overview of the estimates provided today for existing suitable habitat, the tools for linking fish needs to physical habitat, and the range of estimates of habitat needs. He outlined that this group was in the middle of a longer term process. The goal today was to provide a minimum bookend to the amount of habitat needed to support goals for levee re-alignment. Feedback from today's meeting would be used to improve the analysis outlined.

Discussion followed the presentation, and included:

- Some attendees suggested that the model take into consideration adult fish migrating back upstream.
- It was noted that site-specific levee alignment changes in Reach 2B and 4B would take place in the context of those larger projects.
- One participant noted that there are outstanding issues with defining floodplain habitat in the models, including quality of habitat.

Information Sharing

Craig Moyle asked the group for future topic suggestions for the remaining 2012 meetings.

Meeting Adjourned