Yuba IRWMP – SYRCL-11

Project Short Form[1]

Please fill out the following information to the best of your ability/knowledge. Once the project has been received, and a preliminary review completed, the project team will work with you to develop additional information.

PROJECT SPONSOR INFORMATION

Lead Agency/Organization	South Yuba River Citizens League
Name of Primary Contact(s)	Aaron Zettler-Mann
Mailing Address	313 Railroad Ave. #101 Nevada City, CA 95959
Email Address	aaron@yubariver.org
Phone (###) ###-####	530-265-5961 x221
Project Partners/Collaborators	Cbec eco engineering, Cramer Fish Sciences, Long Bar Mine LLC, Yuba River Properties
YWA Liaison	Jacob Vander Meulen

GENERAL PROJECT INFORMATION

Project Title	Upper Long Bar Restoration Project
Project Total Budget (Attach detailed budget, if available)	$4,400,000
Budget Breakdown	Planning/Design Budget/monitoring: $1,400,000
	Implementation Budget: $3,000,000
Project Funding Match, if any	Agency cost share TBD
Total Project Funding Request	$3,600,000
Project Location (Attach map if available)	Upper portion of Long Bar, lower Yuba River
City/Community	Smartsville, CA
Watershed/subwatershed	Yuba River
Groundwater Basin	Yuba Groundwater Basin
Funding Area	SRFA or MC
Project Priority (Select one)	High/Medium/Low
Project Type (highlight in gray *all* that apply)	Conceptual Feasibility Study Study/Assessment Planning Engineering/Design Permitting CEQA/NEPA Facility Construction Restoration Monitoring Best Management Practices Acquisition Demonstration/Pilot Project

[1] Completed Project Short Forms should be sent via email to Keri Rinne at keri.rinne@gmail.com

Please select the *status* of the CEQA/NEPA/Permitting for this project:

CEQA **(Select one)**	Exempt - Not Started - Initial Study - EIR – Determination - Unknown if Required
NEPA **(Select one)**	Exempt - Not Started - Environmental Assessment - EIS – Record of Decision - Unknown if Required
Permitting **(Select one)**	Not Required - Not started – Identified – Consultations Complete – Application Submitted – Complete – Unknown if Required

PROJECT DESCRIPTION

Write a narrative briefly describing the project components and/or characteristics (maximum of 300 words).

Flow regulation and an altered sediment regime in the Lower Yuba River have resulted in a disconnection between the main channel and the hydraulically and geomorphically complex channel margins (floodplains, backwater refugia, side channels), which play a crucial role in the spawning and rearing of salmon and steelhead. Phase I of this project, funded by the Wildlife Conservation Board included drafting of the permits, development of 65% designs, and two years of pre-project hydrologic and biologic monitoring. This proposal seeks funding for Phase II of the Upper Long Bar Project. Phase II of this project includes submission of permits drafted during Phase I, completion of project designs to 100%, project construction, and two years of post-project monitoring. The completed Upper Long Bar project will reconnect flood flows with restored flood plains. Lateral reconnection will generate an increase in habitat availability and diversity as well as enhanced hydraulic complexity and quality of available flow for the benefit of spring- and fall-run Chinook salmon and steelhead. Enhanced flow quality will also benefit the riparian ecosystem by increasing riparian woody vegetation presence and growth leading to an increase in primary productivity, and the natural maintenance of side channel and backwater features through erosional and depositional processes. SYRCL proposes to work with a diverse team of Yuba River experts and local, state, tribal, and federal stakeholders to maximize the benefits of ecosystem improvements.
A guidance document developed in collaboration with Yuba Water Agency and other project partners (attached) is being used to guide the development, and refinement of the project designs. The project design team, led by cbec ecoengineering, is using this guidance document and operations forecasting by on-site aggregate mine Silica Resources Inc. to develop the restoration plans.

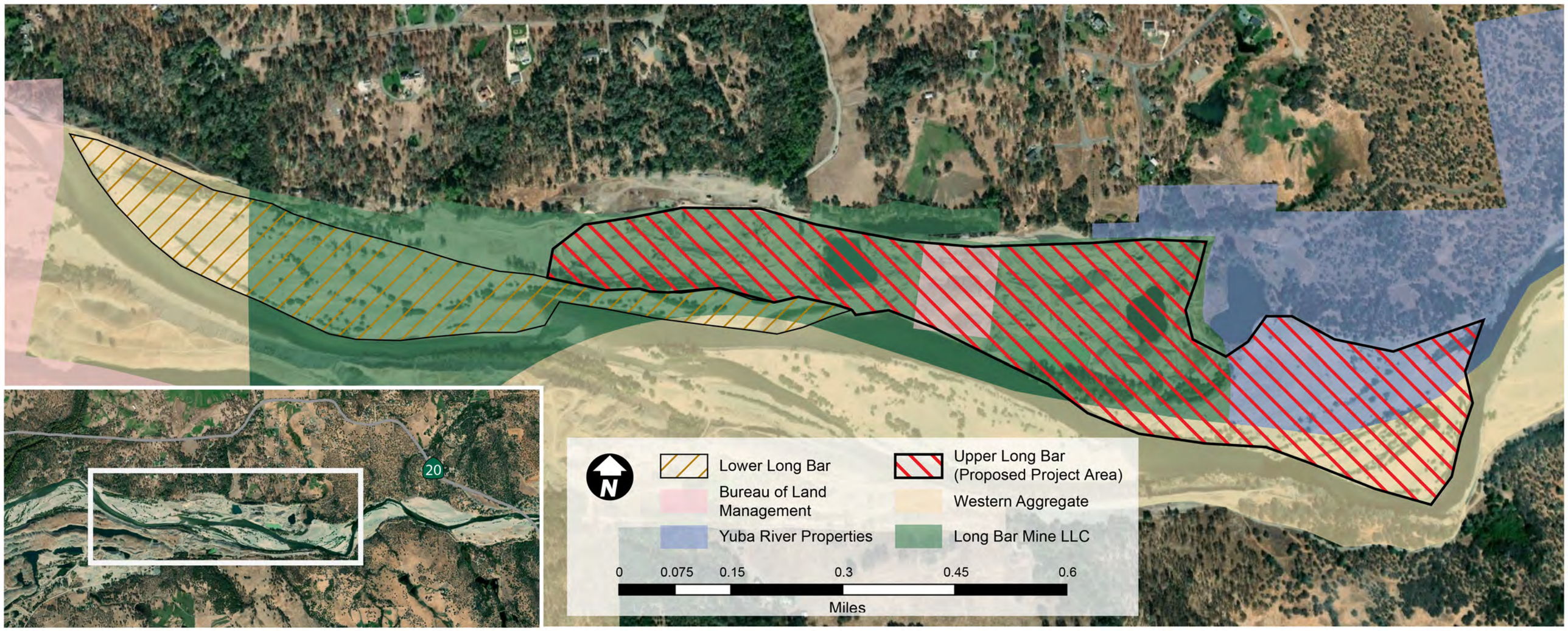
PROJECT RATIONALE/ISSUES STATEMENT

Briefly describe the need for the project and the desired outcomes/deliverables (maximum of 200 words).

The proposed project addresses specific portions of the NOAA Endangered Species Act recovery plans for chinook salmon and steelhead. Specifically, it will create floodplain and riparian habitat (YUR-1.3, 2.2, and 2.5) critical for the recovery of those species (NMFS, 2014). Additionally, this project supports the population doubling goals of the U.S. Fish and Wildlife Service's Anadromous Fisheries Restoration Program (AFRP). The AFRP called for additional spawning and rearing habitat in the Yuba River as a high-priority need by their Restoration Plan (U.S. Fish and Wildlife, 2001). Restoring rearing habitat in the lower Yuba River is expected to have a positive impact on the Central Valley's salmonid populations (NMFS 2014). The long-term eco-geomorphic trajectory of the Yuba River will be a critical factor in restoring salmonid habitat that is self-sustaining over time. Enhanced flow conditions at Upper Long Bar will create rearing habitat, and a healthy riparian ecosystem which will be self-sustaining within the existing flow regime, enhancing floodplain connectivity and the quality of available flow.

ATTACHMENTS:

- Biologic Guidance Document
- Map of project location


20
N
Lower Long Bar
Upper Long Bar
(Proposed Project Area)
Bureau of Land
Management
Western Aggregate
Yuba River Properties
Long Bar Mine LLC
0
0.075
0.15
0.3
0.45
0.6
Miles

Upper Long Bar Habitat Enhancement Project:

Goals, Objectives, and Considerations

July 20, 2022

Introduction and Background

The primary goal of habitat enhancement along the lower Yuba River is to improve juvenile salmonid rearing habitat productivity, complexity, and diversity to support diverse life history strategies. Enhancement efforts will aim to increase the carrying capacity of the system by improving quantity and quality of available habitat. In particular, enhancements which support the "stream-type" life history strategy where spring-run Chinook juveniles rear over summer and outmigrate during the next fall and winter may improve population resiliency and support outmigration at a larger size[1,2]. Anticipated biological outcomes of rearing habitat enhancement include increased juvenile growth, survival, and subsequent contribution to spawning stock escapement. Projects should support juvenile salmonid rearing across a broad temporal and spatial range by providing: (1) sustainable and seasonally functional habitat structure (i.e., complexity, sinuosity, diversity, instream structures and over-hanging cover); (2) high food availability and quality; (3) predator refugia; and (4) high flow refugia. Provided habitat structure will be tailored towards the requirements of rearing salmonids and exclude habitat preferences of non-native predators and competitors, thereby reducing the risks they present.

Currently, floodplain habitat outside the lower Yuba River channel inundates at levels exceeding bankfull flow (generally characterized as 5,000 cfs) and does not provide high quality rearing habitat due to extensive amounts of hydraulic and dredger mining debris and a general lack of cover. High elevation terrace, perched bar, and floodplain habitat could be lowered so these areas would function (i.e., provide desired hydraulic and physical characteristics) at specified times of year corresponding with specific flow levels, frequency, and duration beneficial to rearing juvenile salmonids. These shallow and low water velocity habitats provide conditions favorable for growth (e.g., suitable water temperatures, benthic macroinvertebrate productivity, and allochthonous inputs), instream structures and overhead cover intended to increase salmonid fry and parr survival during the winter and early spring. In addition, these habitats are expected to support "stream-type" life histories from late spring and over summer in relatively cool habitats upstream of Daguerre Point Dam[3].

Upper Long Bar, located at approximately RM 16, could provide rearing habitat just downstream of some of the most heavily utilized Chinook salmon and steelhead spawning habitat in the lower Yuba River. The site represents an opportunity for enhancement of extensive and complex rearing habitat that provides benefits over a range of flow conditions in alignment with the lower Yuba River habitat enhancement strategy.

Goal and Objectives

Project Goal

The goal of this project is to improve the productivity, complexity, and diversity of anadromous salmonid juvenile rearing habitat within the Upper Long Bar project area to support diverse life history strategies, increased growth and survival, and population viability and resiliency. Project designs in support of the

goals and objectives detailed below will be adapted as informed by pre-project monitoring, other restoration projects and studies currently being undertaken on the Yuba River.

Specific Restoration Project Goals

- Create a diversity of seasonal off-channel juvenile salmonid rearing habitat types (e.g., floodplain, side channel, alcove). Habitat types should promote survivorship during the summer and fall, and growth in the winter and spring to support a diversity of runs and life history strategies.
- Increase aquatic habitat productivity (primary and secondary) and food availability to encourage juvenile growth.
- Increase floodplain inundation frequency and duration during winter and spring to support primary and secondary productivity while maximizing food conversion efficiency.
- Limit warming in side-channel and backwater features to discourage the suitability of these features to predator species such as bass and bluegill.

Objectives

The objectives of this project are to create the environmental and biological conditions necessary for, and indicative of, progress toward achieving the projects goals within the defined project life. The biologic and environmental objectives should be specific, measurable, achievable, relevant, and time-bound (SMART).

Biological Objectives

Biological objectives serve as indicators of population viability and diversity, through variable distribution of phenotypic expression. SMART biological objectives are related to the focal species or population (e.g., annual population abundance) with specific targets identified across a range of environmental (e.g., hydrological and thermal) conditions. Project designs will be consistent with encouraging the biological objectives below. However, not all biological objectives will necessarily be monitored as part of pre- and post-project monitoring.

The biological objectives for the Upper Long Bar Project include:

- Match or exceed food density (primary and secondary productivity) per comparable habitat unit area in the project footprint as compared to existing main channel edge and backwater habitat.
- Within the project footprint, observe presence of similarly sized or larger juveniles as those within existing main channel edge habitat at the same point in time.
- Spatial densities of juvenile salmonids rearing in the project footprint through the spring (February – May) will be equal to or greater than those observed in the main channel edge habitat at the same point in time.
- Increased relative abundance of juveniles over-summering (stream-type life strategy) within the project footprint relative to the main channel edge habitat.

Environmental Objectives

Environmental objectives identify conditions necessary to support a desired biological response. SMART environmental objectives are related to the physical habitat (suitability and availability) and the spatially and temporally dynamic ecosystem conditions necessary to support the biological objectives. Project designs will be consistent with encouraging the environmental objectives below. However, not all environmental objectives will necessarily be monitored as part of pre- and post-project monitoring.

Environmental Objectives for the Upper Long Bar Project include:

- Engineered features will strive to maintain optimum temperature ranges for different species during various life-stages through all seasons. Optimum temperatures mean warmer water temperatures (not to exceed 65°F) during spring in the project footprint relative to existing main channel edge habitat. And cooler water temperatures during summer (once riparian vegetation has matured) in the project footprint if off-channel habitat at a control site exceeds 65°F.
- Seasonal inundation of floodplain habitat during winter and spring targeting continuous inundation for 14 days in two out of three years. Perennial inundation of side channel and alcove/backwater habitat types in all but the driest years. Inundated habitats will provide biologically relevant water depths and velocities for the seasonally relevant life stage. See Table 1 and Figure 1 below.

Habitat Type, Definition, and Purpose

The habitat types, definitions, and purposes below are intended to guide conversation, and create common understandings, for how individual habitat features will function in terms of meeting the project goals. Additionally, these definitions clarify under what flow conditions each feature should be active and the percentage of time they should be inundated based on exceedance probabilities outlined in Appendix A.

Perennial Side-Channel Habitats

- Definition: Concentrated flow channels that perennially carry water and connect to the main channel at both an upstream and downstream location.
- Purpose: Increased primary and secondary productivity, high quality complex habitat with instream object (and overhead) cover for feeding stations, and predator refugia during summer and early fall for stream-type spring-run and steelhead juveniles.
- Target species/lifestage:
  - Primary – Over-summer and early fall (Jul – Oct) spring-run Chinook salmon and steelhead juveniles.
  - Secondary – Winter and spring (Dec – Apr) spring-run and fall-run Chinook salmon fry.
- Functionality:
  - Minimum Inundation Flow: 500 cfs (Yuba Accord minimum flow requirement for Schedule 5 and drier conditions under the Yuba River Index).
  - Functional Flow Range (achieving target depths and velocities): 500 cfs – 1,500 cfs.
  - Percent of Time (based on exceedance probability): Primary target about 50% of the time during Jul and Aug, and about 90-100% of the time during the lowest flow months of Sep and Oct of the spring-run and steelhead juvenile rearing period. Secondary target about 50-70% of the time during Dec-Feb, and about 30% of the time during Mar and Apr during the spring-run and fall-run Chinook salmon fry periods.
  - Target Period: Year-round under dry conditions, particularly during Sep and Oct.

Ephemeral Side-Channel Habitats

- Definition: Concentrated flow channels that seasonally carry water and connect to the main channel at both an upstream and downstream location.

- Purpose: Increased primary and secondary productivity, high quality complex habitat with instream object (and overhead) cover for feeding stations, high water refugia, and predator refugia during winter and spring (e.g., Jan - Jun) for spring-run and fall-run Chinook salmon and steelhead juveniles.
- Target species/lifestage:
  - Primary – Winter and spring (Jan - Jun) spring-run and fall-run Chinook salmon and steelhead juveniles.
  - Secondary – Winter and spring (Jan – Apr) spring-run and fall-run Chinook salmon and steelhead fry.
- Functionality:
  - Minimum Inundation Flow: 1,500 cfs.
  - Functional Flow Range (achieving target depths and velocities): 1,500 cfs – 4,200 cfs and higher.
  - Inundation: in at least 1 out of 3 years
  - Percent of Time (based on exceedance probability): Primary target about 20-40% of the time during Jan-Mar, and about 50-70% of the time during Apr-Jun of the juvenile rearing period. Secondary target about 20-40% of the time during Jan-Mar and about 50% of the time during Apr of the fry rearing period
  - Target Period: January through June

Alcove/Backwater Habitats

- Definition: Perennial alcoves and backwater habitats are distinct from the channel features in that for the majority of flows they do not have an upstream channel connection and therefore are generally characterized as relatively shallow and low velocity habitats. They can be, but do not have to be functional down to base flow conditions.
- Purpose: Highly productive, relatively shallow and low velocity habitat providing primary and secondary conditions favorable for juvenile salmonid growth. In addition, this feature would include overhanging vegetation for localized shading and escape cover from avian predators and instream object cover for feeding stations and localized refugia.
- Target species/lifestage:
  - Year-round for fry and juvenile lifestages of spring-run and fall-run Chinook salmon and steelhead.
- Functionality:
  - Minimum Inundation Flow: 700 cfs (Yuba Accord minimum flow requirement for Schedules 1-4 under the Yuba River Index).
  - Functional Flow Range (achieving target depths and velocities): 700 cfs – 4,200 cfs.
  - Percent of Time (based on exceedance probability): About 60-80% of the time during Jan-Jun, and 90-100% of the time during Jul-Dec.
  - Target Period: Year-round.

Floodplain Habitat

- Definition: Floodplains are broad areas that may be flat or have a gentle slope and can be vegetated. They tend to be characterized by relatively low velocities with little to no concentrated flow paths.
- Purpose: Increased primary and secondary productivity, and high water refugia for juvenile salmonids during the winter and spring.
- Target species/lifestage:
  - Winter and spring (Jan-Jun) for fry and juvenile lifestages of spring-run and fall-run Chinook salmon and steelhead.
- Functionality:
  - Minimum Inundation Flow: 2,000 cfs.
  - Functional Flow Range (achieving target depths and velocities): 2,000 cfs – 4,200 cfs and higher.
  - Percent of Time (based on exceedance probability): About 20-30% of the time during Jan-Mar, and 40-50% of the time during Apr-Jun.
  - Continuous Inundation: 14 days during 2 out of 3 years.
  - Target Period: Jan through Jun.

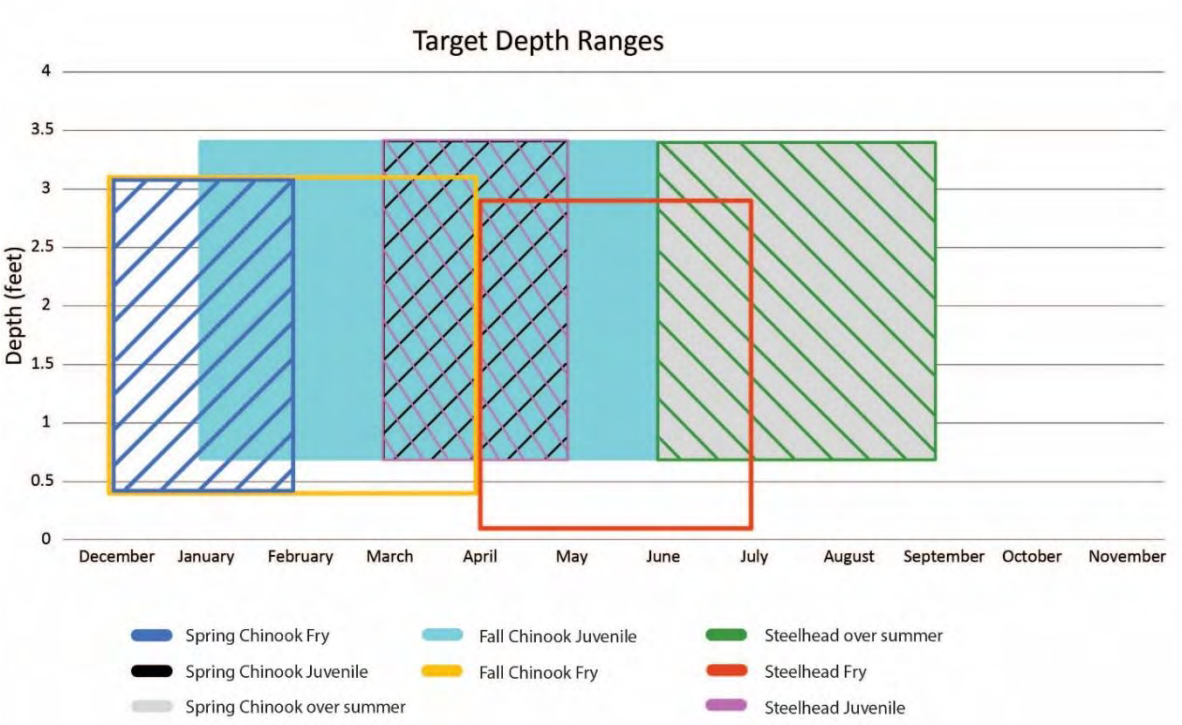
High-terrace Areas

- Definition: High-terrace areas are broad areas that inundate during high flow events (>4,200 cfs). They may be flat or have a gentle slope and can be vegetated. They tend to be low velocity areas with little to no concentrated flow paths. Vegetation communities are likely to be different than those seen in floodplain habitat features.
- Purpose: Provide velocity refugia to salmonid fry and juveniles during uncontrolled high flow events.
- Target species/lifestage:
  - Winter and spring (Jan-Jun) for fry and juvenile lifestages of spring-run and fall-run Chinook salmon and steelhead.
- Functionality:
  - Minimum Inundation Flow: 4,200 cfs.
  - Functional Flow Range (achieving target depths and velocities): n/a
  - Percent of Time (based on exceedance probability): About 20-40% of time during Jan-Jun.
  - Target Period: Jan through Jun.

Table 1: Species, Run, and Lifestage-Specific Water Depth and Velocity Targets

Species/run	Life stage	Timing	Depth (ft)	Velocity (fps)	Without Veg cover	Proposed Habitat Type
Spring-run	Fry	Dec, Jan, Feb	0.4 – 3.1	0.0 – 0.9	0.0 – 0.7	Alcove/Backwater Floodplain
Fall-run	Fry	Dec, Jan, Feb, Mar, April	0.4 – 3.1	0.0 – 0.9	0.0 – 0.7	Alcove/Backwater Floodplain
Steelhead	Fry	Apr, May, Jun, July	0.1-2.9	0.0 – 0.8	0.0 – 0.5	Alcove/Backwater Floodplain
Spring-run	Juvenile	Mar, Apr, May	0.7 – 3.4	0.0 – 1.5	0.0 – 1.0	Ephemeral Side-Channel Alcove/Backwater Floodplain
Fall-run	Juvenile	Jan, Feb, Mar, Apr, May, Jun	0.7 – 3.4	0.0 – 1.5	0.0 – 1.0	Ephemeral Side-Channel Alcove/Backwater Floodplain
Steelhead	Juvenile	Mar, Apr, May	0.7 – 3.4	0.0 – 1.7	0.0 – 1.3	Ephemeral Side-Channel Alcove/Backwater Floodplain
Spring-run	Over-summer juvenile	Jun, Jul, Aug, Sept	0.7 – 3.4	0.0 – 1.5	0.0 – 1.0	Alcove/Backwater Perennial Side-channel
Steelhead	Over-summer juvenile	Jun, Jul, Aug, Sept	0.7 – 3.4	0.0 – 1.7	0.0 – 1.3	Alcove/Backwater Perennial Side-channel

Figure 1: Species, Run, and Lifestage-Specific Water Depth and Velocity Targets



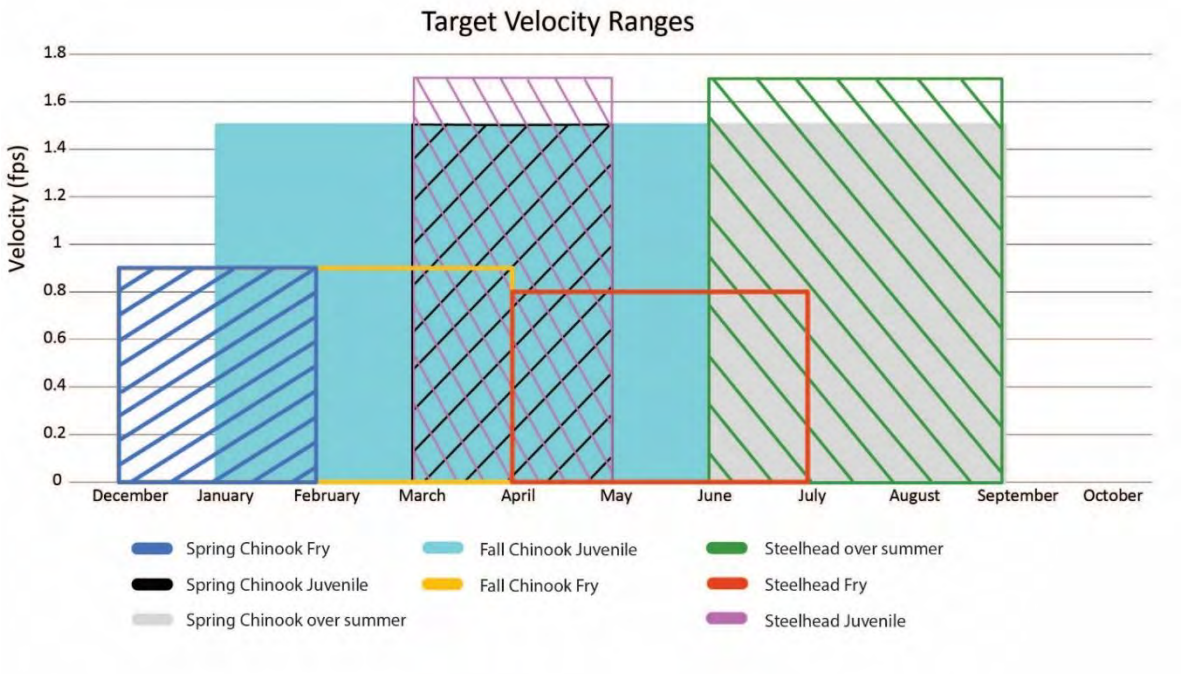


Figure 1: Boxes illustrate the minimum and maximum velocity and depth thresholds for each species during each lifestage. For design purposes, the approximate middle value of each box should be targeted. These values are not displayed in the figure as there would be significant overlap making interpretation challenging.

Appendix A

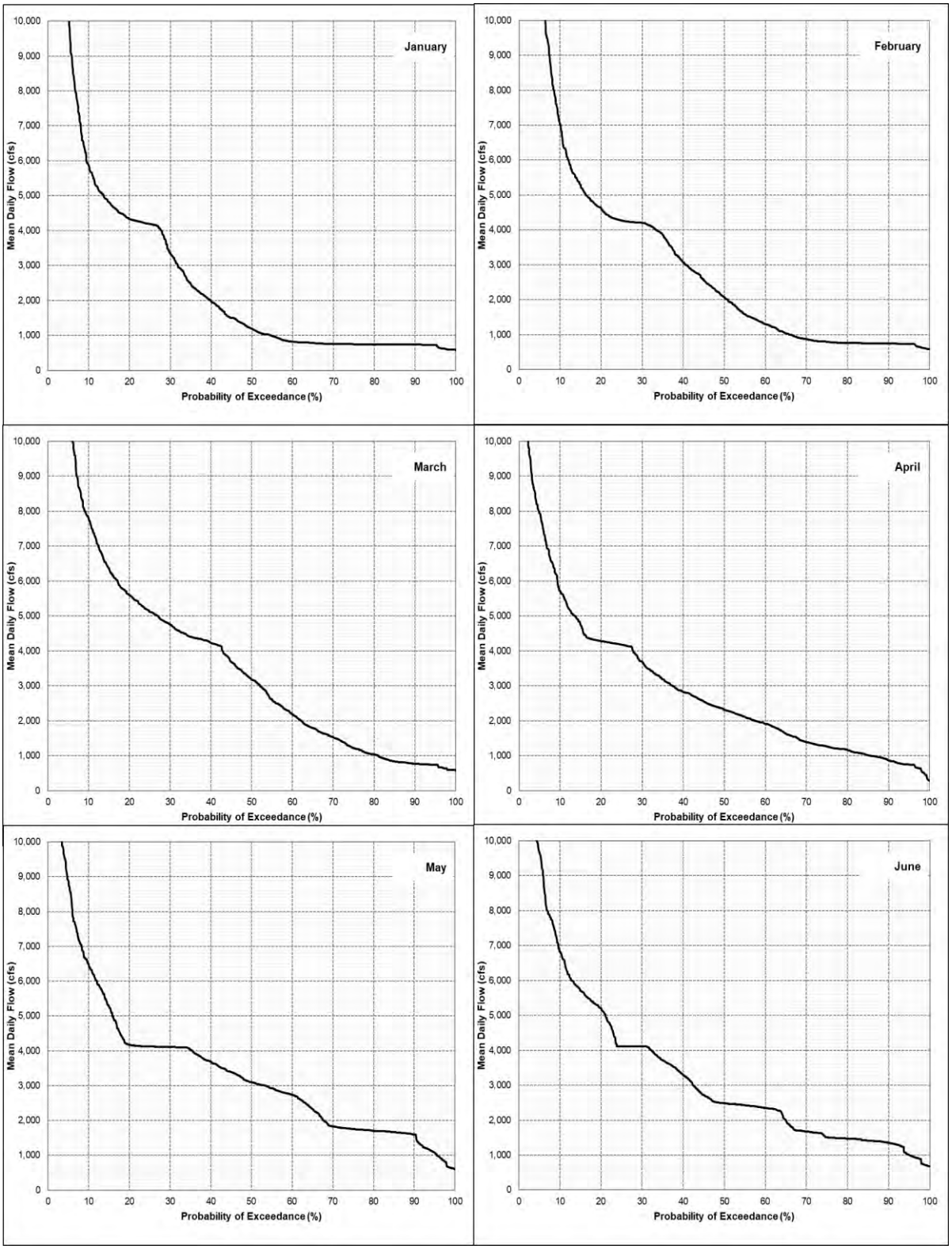


Figure A-1. Simulated monthly flow exceedance probabilities during January through June below Deer Creek in the lower Yuba River for WY 1970-2017.

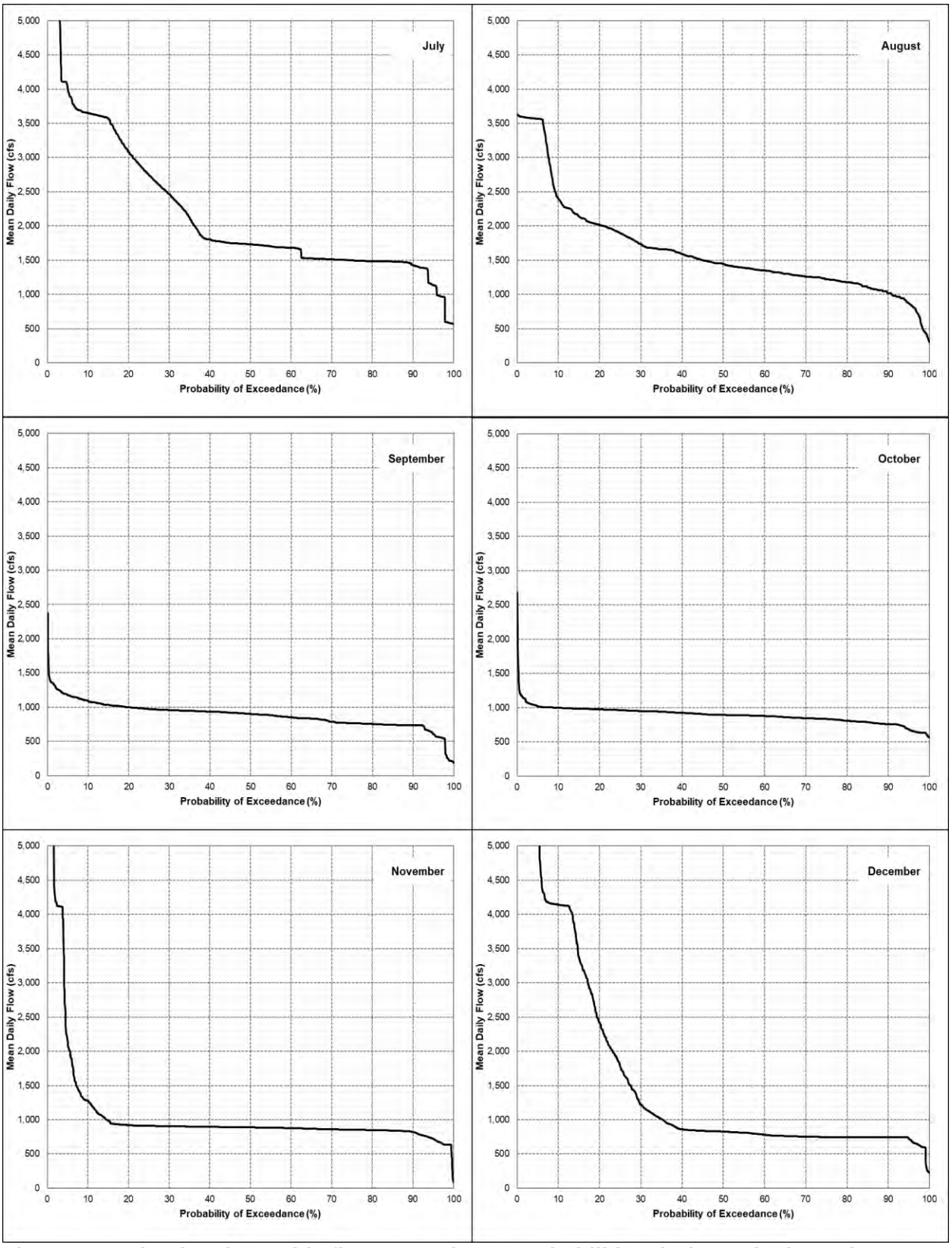


Figure A-2. Simulated monthly flow exceedance probabilities during July through December below Deer Creek in the lower Yuba River for WY 1970-2017.

Citations

[1] CDFG (J. Nelson). 2003. Testimony at the Augmentation of the Administrative Record and Reconsideration of Water Right Decision 1644 in Light of Additional Specified Evidence as Directed by the Yuba County Superior Court State Water Resources Control Board Hearing.

[2] R. R. Reisenbichler, J. D. McIntyre, and R. J. Hallock. 1982. Relations between size of Chinook salmon, Oncorhynchus tshawytscha, released at hatcheries and returns to hatcheries and ocean fisheries. California Fish and Game: 68(1). Winter 1982.

[3] Provision of highly productive, cool-water habitat is particularly important for juvenile anadromous salmonid survival during drought conditions and in consideration of long-term climate change.

[4] Target habitat suitability criteria (HSC) were identified based upon bioverified HSCs for the lower Yuba River (Moniz and Pasternack 2019). Based on residual analyses of forage ratio indices using the geometric mean of water depth, water velocity and cover habitat suitability indices (HSIs), Chinook salmon fry and juveniles were found to prefer a combined habitat suitability index (CHSI) of greater than 0.5, steelhead fry preferred a CHSI of greater than 0.25, and steelhead juveniles preferred a CHSI of greater than 0.75. For the purposes of establishing target HSCs, a CHSI value of 0.5 for species/run and lifestage-specific combinations was utilized. Because a specific CHSI value does not directly provide the depths and velocities preferred by Chinook salmon and steelhead fry and juveniles, for the purposes of developing depth and velocity targets, ranges of depths and velocities were identified that correspond to a CHSI value of 0.5 assuming equivalent depth and velocity HSIs under two cover HSI conditions - with vegetative cover (i.e., cover HSI of 1.0), and assuming “bare substrate” (i.e., cover HSI of 0.5). Moniz and Pasternack (2019) established a bare substrate cover HSI of 0.5 because of the predominance of large cobble, and associated hydraulic roughness, at locations of juvenile salmonid observation. The ranges of target depths and velocities provide a useful guideline for the determination of preferred habitat, although a given CHSI value can result from varying combinations of depths and velocities and the presence of different cover type.