Age 0 Chinook and Coho Salmon Rearing Habitat Observations, Lower Junction City Rehabilitation Site, 2011-2015, Upper Trinity River, CA

Participating Agencies: Hoopa Valley Tribal Fisheries, US Fish and Wildlife Service, and Yurok Tribal Fisheries Program

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This document summarizes Age-0 Chinook and Coho Salmon rearing habitat present before and after construction of the Lower Junction City (LJC) rehabilitation site for consideration by the Trinity River Design Team, as well as other workgroups. For a more detailed description of the methods applied see Goodman et al. (2010). Criteria used for rearing habitat surveys are summarized in Tables 1 and 2.

The LJC rehabilitation site was constructed in 2014. An estimate of juvenile rearing habitat present before construction was obtained by combining data previously collected for the systemic habitat estimate in 2011 (GRTS ID# 45) and 2013 (GRTS ID# 77). The site was also surveyed after construction on July 28, 2015 (Figure 1). After construction and prior to the post-construction survey, the site experienced two peak streamflow events each approaching 283cms in February and May. Over the entire site, total rearing habitat area increased by 67% for fry and 51% for presmolt and optimal rearing habitat increased by 29% for fry and 10% for presmolt (Table 3, Figure 2). Construction feature-specific effects on habitat levels were investigated by selectively analyzing only the data collected directly adjacent to the two primary construction features (bar/meander and channel expansion) at the LJC site (Figures 4 and 5). The boundaries for this selective analysis were established by the extent of the construction features depicted in the Design_2D shapefile found in the TRRP As Built database (Trinity River Restoration Program, 2015). Total habitat area normalized by river length (sq.m/m) for fry and presmolt increased at both construction features. However, normalized optimal habitat increased at the bar/meander but decreased at the channel expansion for both life stages (Table 3, Figure 3). The floodplain of the newly expanded channel is expected to be colonized by new vegetation over time. Additionally, after construction a new bar formed on river left at the downstream extent of the site, which has resulted in substantial areas of suitable habitat both upstream and adjacent to it (Figures 1 and 5).

These surveys were conducted at summer base streamflow (12.7 cms) released from Lewiston Dam, however, actual streamflows at the site were 30% higher in 2011 (16.2cms) and 15% higher in 2013 (14.4cms) than in 2015 (12.5cms). These flow differences result from annual variation in tributary accretion and should be considered, along with the peak discharges mentioned above, when interpreting these results.

Literature Cited

Goodman, D., Martin, A., Alvarez, J., Davis, A., and Polos, J. 2010. Assessing Trinity River Salmonid habitat at channel rehabilitation sites, 2007-2008. U.S. Fish and Wildlife Service, Arcata Fish and Wildlife Office, Yurok Tribe, and Hoopa Valley Tribe, Arcata, CA. 54 pp.

TRRP (Trinity River Restoration Program). 2015. Trinity River Civil Restoration Actions, Plannimetric Designs, version 2015-11-06 [DRAFT]. GIS Data Package. TRRP, Weaverville, California.

Table 1. Guilds and their associated habitat criteria for fish habitat mapping as part of the 2014 Trinity River site assessment.

Habitat Guild	Variable	Criteria
Chinook and Coho Salmon fry (<50 mm)	Depth	>0 to 0.61 m
	Mean column velocity	0 to 0.15 m/sec
	Distance to Cover	0 to 0.61 m
	Cover type	No cover, vegetation or wood
Chinook and Coho Salmon presmolt (50 to 100 mm)	Depth	>0 to 1 m
	Mean column velocity	0 to 0.24 m/sec
	Distance to Cover	0 to 0.61 m
	Cover type	No cover, vegetation or wood

Table 2. Mapped habitat categories with four resulting habitat qualities. Chinook Salmon total habitat was defined as areas that meet any combination of depth/velocity and cover criteria. Optimal Chinook Salmon habitat or Coho Salmon habitat were defined as areas that simultaneously meet depth/velocity and cover criteria.

	Depth and Velocity (DV)	**Outside Depth and Velocity (No DV)**
Cover (C)	DV,C – *Optimal habitat	No DV, C – *Suitable habitat
Outside Cover (No C)	DV, No C – *Suitable habitat	No DV, No C – Unsuitable habitat (not reported)

*Total habitat reported includes optimal habitat + all suitable habitats present

Table 3. Habitat conditions at summer base flows before and after construction at LJC rehabilitation site. There are blank cells in the pre-construction portion of the table because the bar/meander and channel expansion were not present before construction and the flows experienced during the two pre-construction GRTS surveys cannot be combined across years. Habitat categories correspond to areas (m^2) meeting the depth/velocity dual criteria of rearing habitat for Chinook Salmon and Coho Salmon fry (<50 mm FL) and presmolt (50 to 100 mm FL) lifestages.

Evaluation type	Location	Length (m)	Life stage	Dis-charge (cms)	Habitat category (m^2)						
					DV,C	DV, No C	No DV, C	Total habitat	Total habitat (normalized)	Change Optimal	Change Total
LJC Pre-construction (2011/2013)	Entire Site	642	Fry	- -	605	1,808	550	2,963	4.62	- -	- -
			Presmolt	- -	805	2,880	350	4,036	6.29	- -	- -
	Bar/ Meander	140	Fry	16.19	171	343	120	634	4.53	- -	- -
			Presmolt	16.19	215	445	76	735	5.25	- -	- -
	Channel expansion	181	Fry	14.35	179	620	233	1,032	5.70	- -	- -
			Presmolt	14.35	285	1,022	127	1,434	7.92	- -	- -
LJC Post-construction (2015)	Entire Site	642	Fry	12.45	779	3,787	385	4,950	7.71	29%	67%
			Presmolt	12.45	884	4,923	280	6,086	9.48	10%	51%
	Bar/ Meander	140	Fry	12.45	367	733	23	1,123	8.02	115%	77%
			Presmolt	12.45	378	929	12	1,319	9.42	76%	79%
	Channel expansion	180	Fry	12.45	163	1,624	186	1,973	10.96	9%	91%
			Presmolt	12.45	210	1,894	139	2,243	12.46	-26%	56%

Figure 1. Aerial views of LJC (top: 2011 pre-construction; bottom: 2015 post-construction). White numbers (GRTS ID) straddle the boundary between the two GRTS sites. Black lines indicate wetted edge, blue areas indicate optimal presmolt habitat, red and green areas indicate suitable presmolt habitat. The black arrow indicates direction of flow. Note that the pre-construction data (collected in 2011 and 2013) are presented on an aerial photo obtained in 2011.

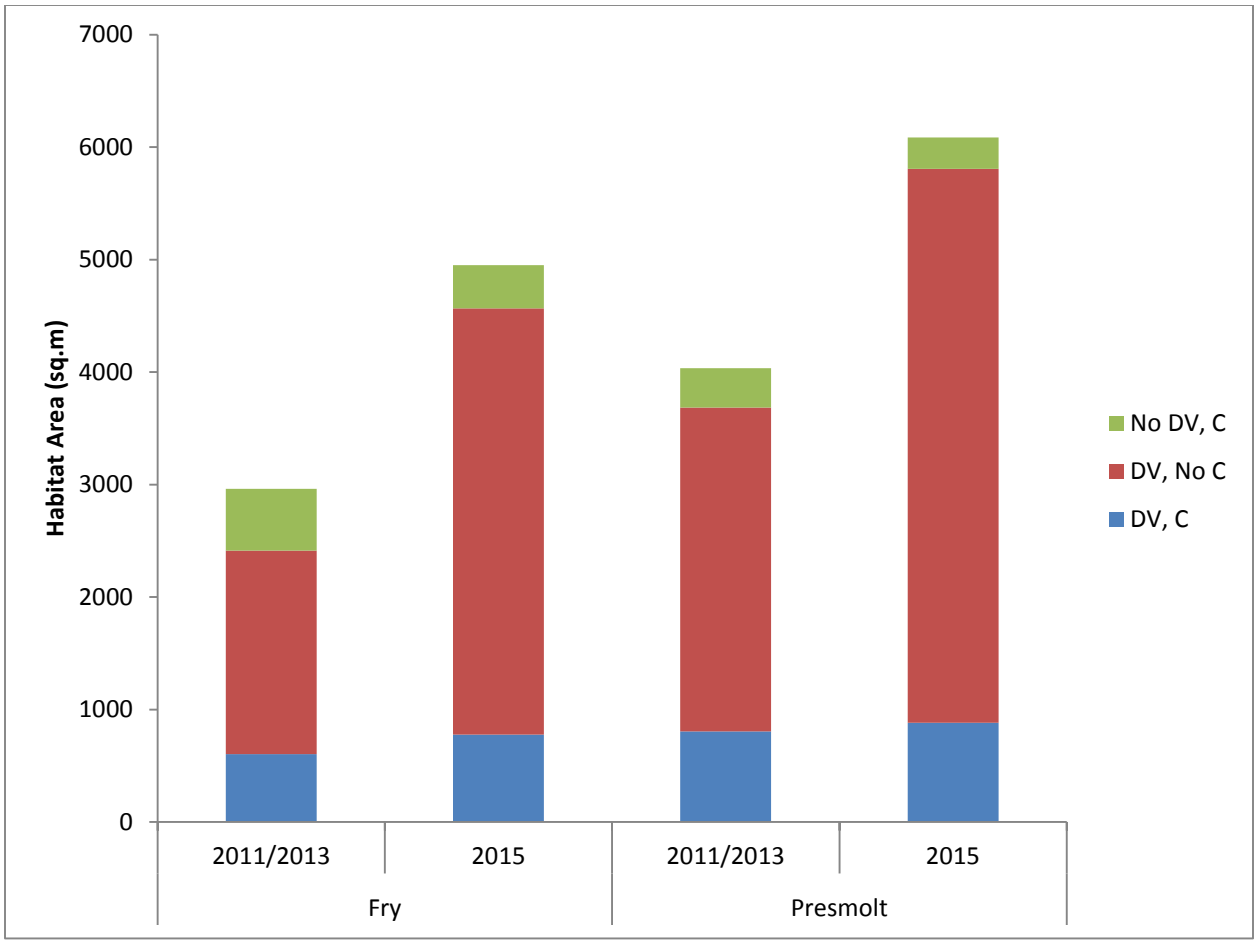

Figure 2. Total area of Age 0 Chinook and Coho Salmon rearing habitat types at the Lower Junction City rehabilitation site pre-construction (2011/2013) and post-construction (2015). Habitat categories correspond to combinations of depth/velocity (DV) and in-water escape cover (C) criteria (Table 2). Flows at the site were higher in 2011 (16.2cms/572cfs) and 2013 (14.4cms/507cfs) than in 2015 (12.5cms/440cfs) due to tributary accretion.

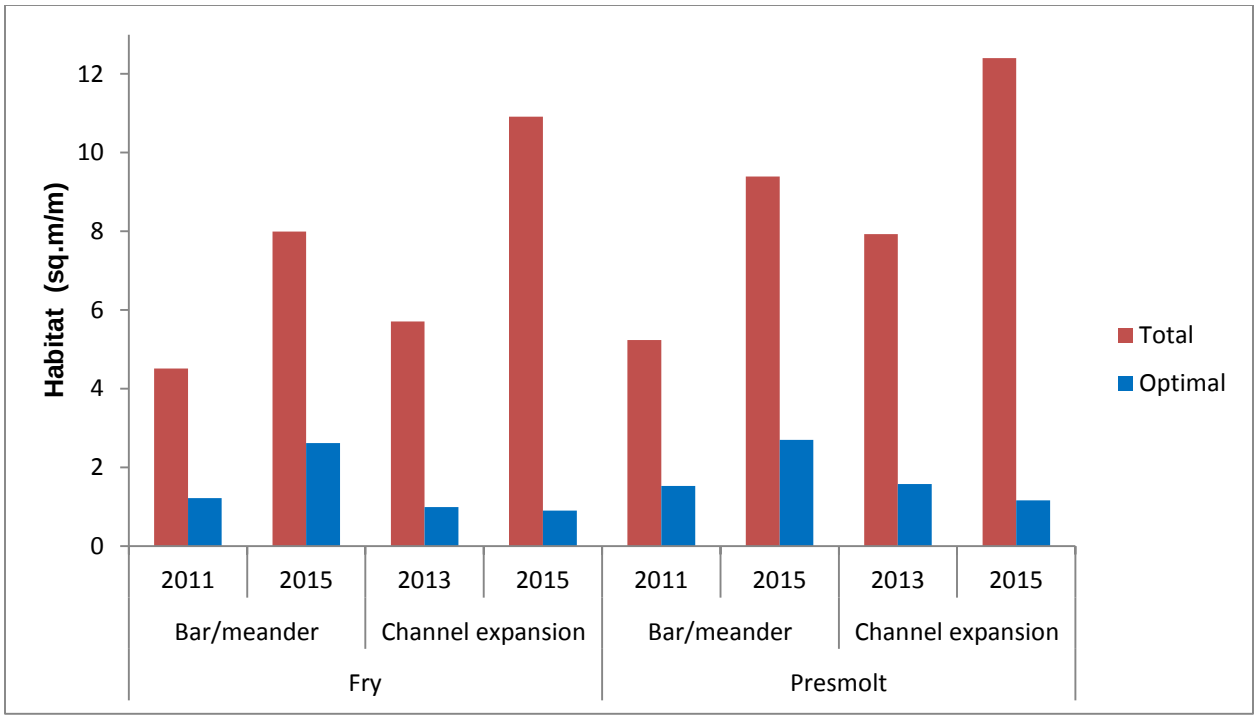

Figure 3. Normalized total and optimal habitat area before (2011/2013) and after (2015) construction at LJC rehabilitation site for both the bar/meander and channel expansion construction features. All surveys were conducted during summer base flow (12.7 cms released from Lewiston Dam). Flows at the site were higher in 2011 (16.2cms) and 2013 (14.4cms) than in 2015 (12.5cms) due to tributary accretion.

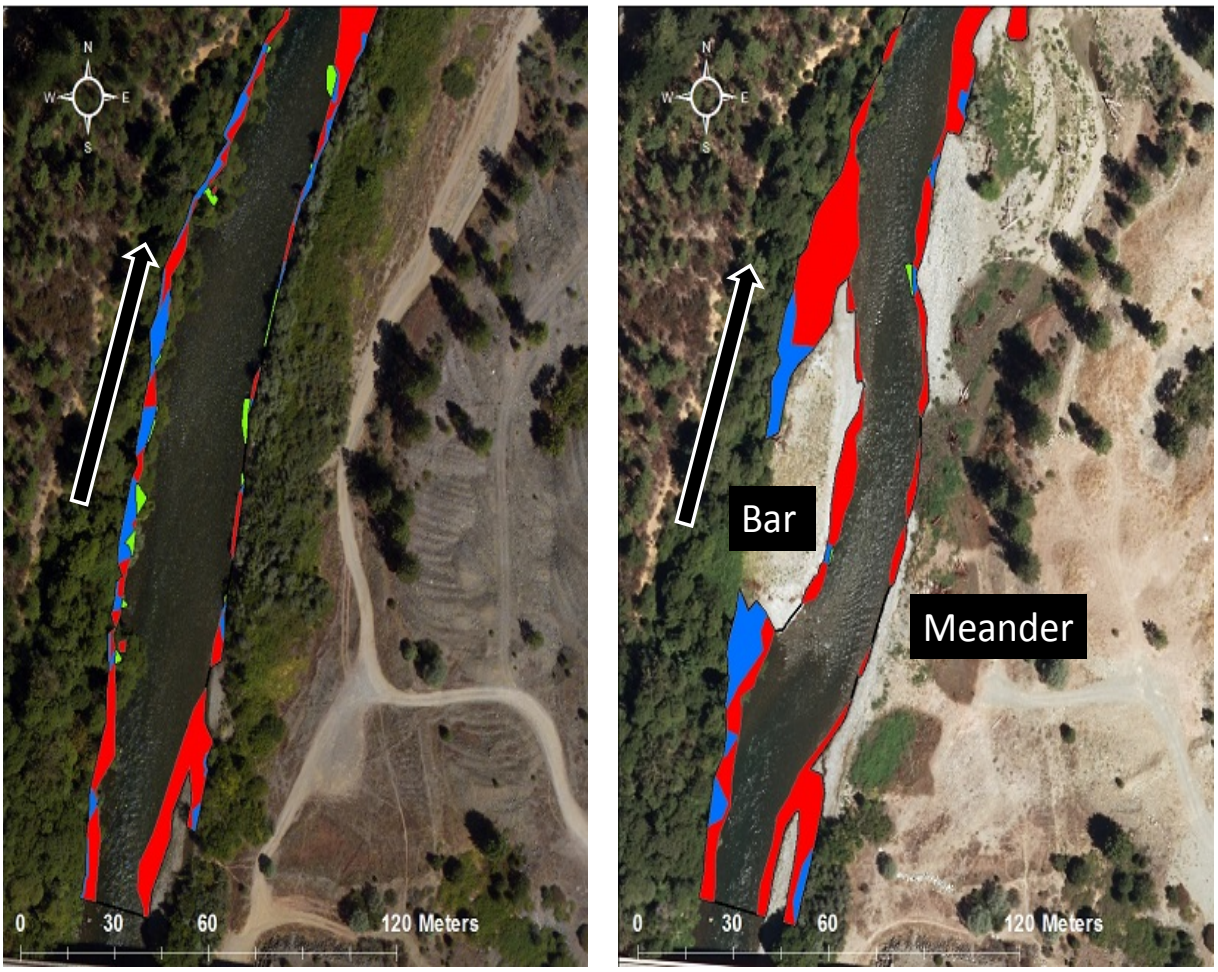

Figure 4. Aerial views of bar/meander, LJC site (left: 2011 pre-construction; right: 2015 post-construction). Black lines indicate wetted edge, blue areas indicate optimal presmolt habitat, red and green areas indicate suitable presmolt habitat. The black arrow indicates direction of flow.

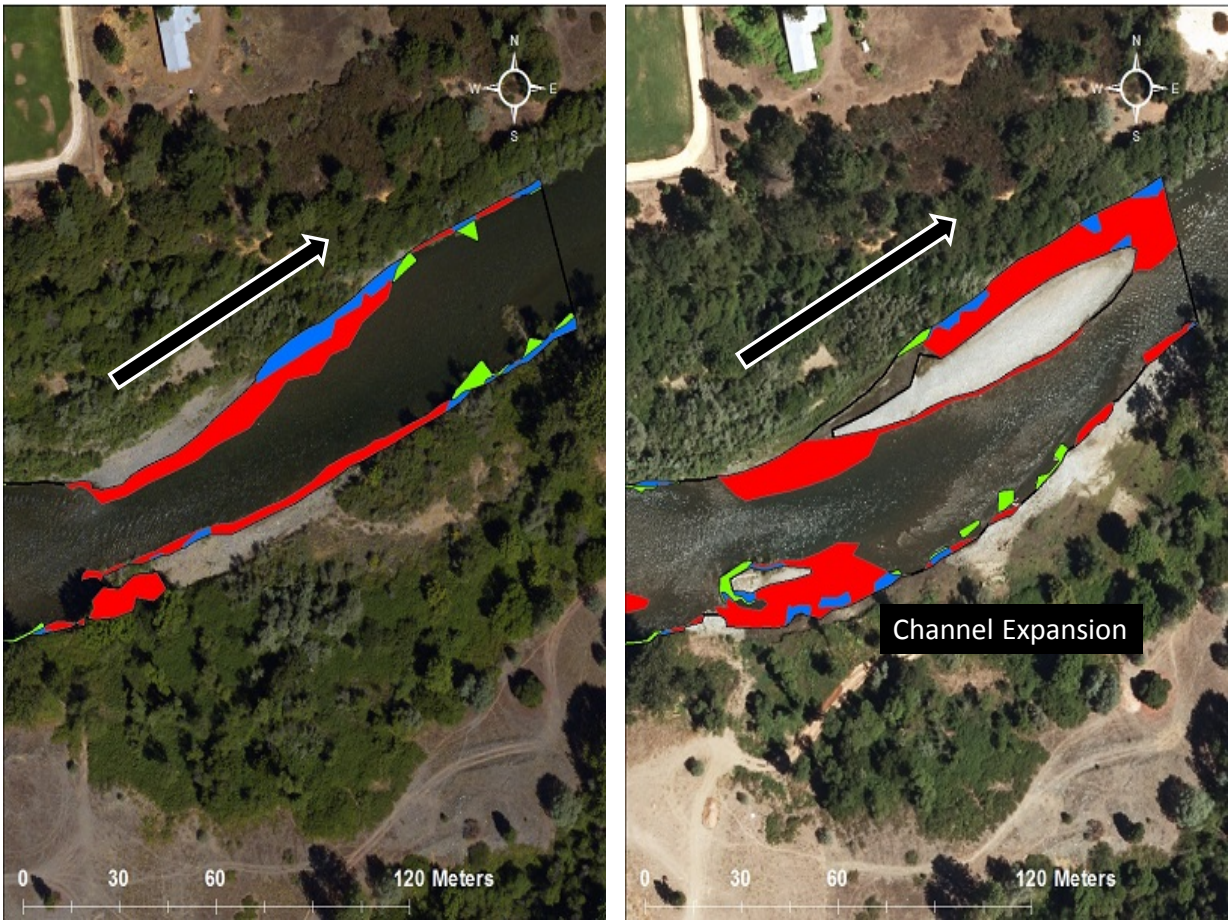

Figure 5. Aerial views of channel expansion, LJC site (left: 2013 pre-construction; right: 2015 post-construction). Black lines indicate wetted edge, blue areas indicate optimal presmolt habitat, red and green areas indicate suitable presmolt habitat. The black arrow indicates direction of flow.