

# SALT RIVER ECOSYSTEM RESTORATION PROJECT

## SPRING-SUMMER FISH MONITORING PROGRAM

2019

Results of Fish Species Presence and Distribution Monitoring Conducted  
From March to August 2019 within the Salt River, Eel River Estuary,  
Phase 2 Project Area, Humboldt County California

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### **Abstract**

Phase 1 of the Salt River Ecosystem Restoration Project (SRERP), which includes 330 acres of a restored estuary and 2.5 miles of restored river channel, was implemented in 2013. Portions of the Phase 2 footprint (2.4 miles of river channel and 0.5 miles of the Frances Creek tributary) were constructed in 2014, 2015, 2017, and 2018. A fish sampling program was developed in the spring of 2014 and is conducted annually across the constructed reaches of the SRERP. In 2019, project monitoring documents only required that the Phase 2 river corridor be monitored for fish presence and distribution (i.e. Phase 1 was NOT included in the 2019 monitoring effort). Monitoring in 2019 began in March and continued through to August. A 1/8 inch mesh pole seines and baited minnow traps were methods used to sample various sites. Captured fish were identified, enumerated, and released. Surveys identified the presence of Coho salmon (*Oncorhynchus kisutch*), Steelhead salmon (*Oncorhynchus mykiss*), and Cutthroat trout (*Oncorhynchus clarkia*), Three-spined Stickleback (*Gasterosteus aculeatus*), Staghorn sculpin (*Leptocottus armatus*), Sacramento Pikeminnow (*Ptychocheilus grandis*), Starry flounder (*Platichthys stellatus*), among others.

## **1. INTRODUCTION**

The Salt River is a tidally influenced slough tributary to the Eel River Estuary located in Humboldt County near Ferndale, California. Salinity in the Salt River varies by the interaction of tides, Eel River flow stage, and the input of freshwater tributary streams that drain from the Wildcat Hills above Ferndale. In the mid 1800's the Salt River channel was deep enough to support ship traffic to Port Kenyon on the Salt River, however, increased sediment delivery from the upper watershed to the Salt River channel and the reduction of tidal prism in the lower watershed, resulted in an aggraded channel of much smaller dimension. The frequency of flooding of Ferndale and surrounding farmland increased incrementally as the Salt River filled with sediment over the last century, and efforts to find a solution were initiated as flooding became an annual issue. Planning by residents and agricultural interests, as well as local, state, and federal governments culminated in a multi-phase plan, known as the Salt River Ecosystem Restoration Project (SRERP), to restore hydraulic and ecological function to the Salt River.

The Humboldt County Resource Conservation District (HCRCD) is the lead agency implementing the SRERP, which has been constructed in phases since 2013. At the mouth of the Salt River, the 420-acre Riverside Ranch was purchased from an interested seller and transferred to CDFW. Phase 1 of the SRERP focused in this area in 2013 to restore 330 acres of tidal estuary, which included excavation of 2.5 miles of the main Salt River channel, excavation of three miles of a slough channel network, and levee and tide gate removal. These elements increase hydraulic function to the lower two and a half miles of the Salt River. By 2018, 2.4 miles of Salt River channel corridor, immediately upstream of Phase 1, have been restored, as well as 0.5 miles of the Francis Creek tributary. An additional 2.1 miles of Salt River channel will be restored in future construction seasons to complete Phase 2 and the SRERP construction implementation phase. Fish removal/relocation and dewatering occurred during each construction season of the project, thus fish captured during the post construction monitoring surveys all emigrated from surrounding areas.

In 2014, NOAA, CDFW, Humboldt State University, and HCRCD developed a post-implementation low-tide spring-summer fish sampling program to determine fish species presence and distribution after each phase of SRERP construction. SRERP's monitoring documents only required that the Phase 2 project footprint be monitored in 2019 for fish presence and distribution (i.e. Phase 1 was NOT included in the 2019 monitoring effort). This report describes the 2019 monitoring effort that occurred on the portions of the SRERP constructed from 2014 – 2018.

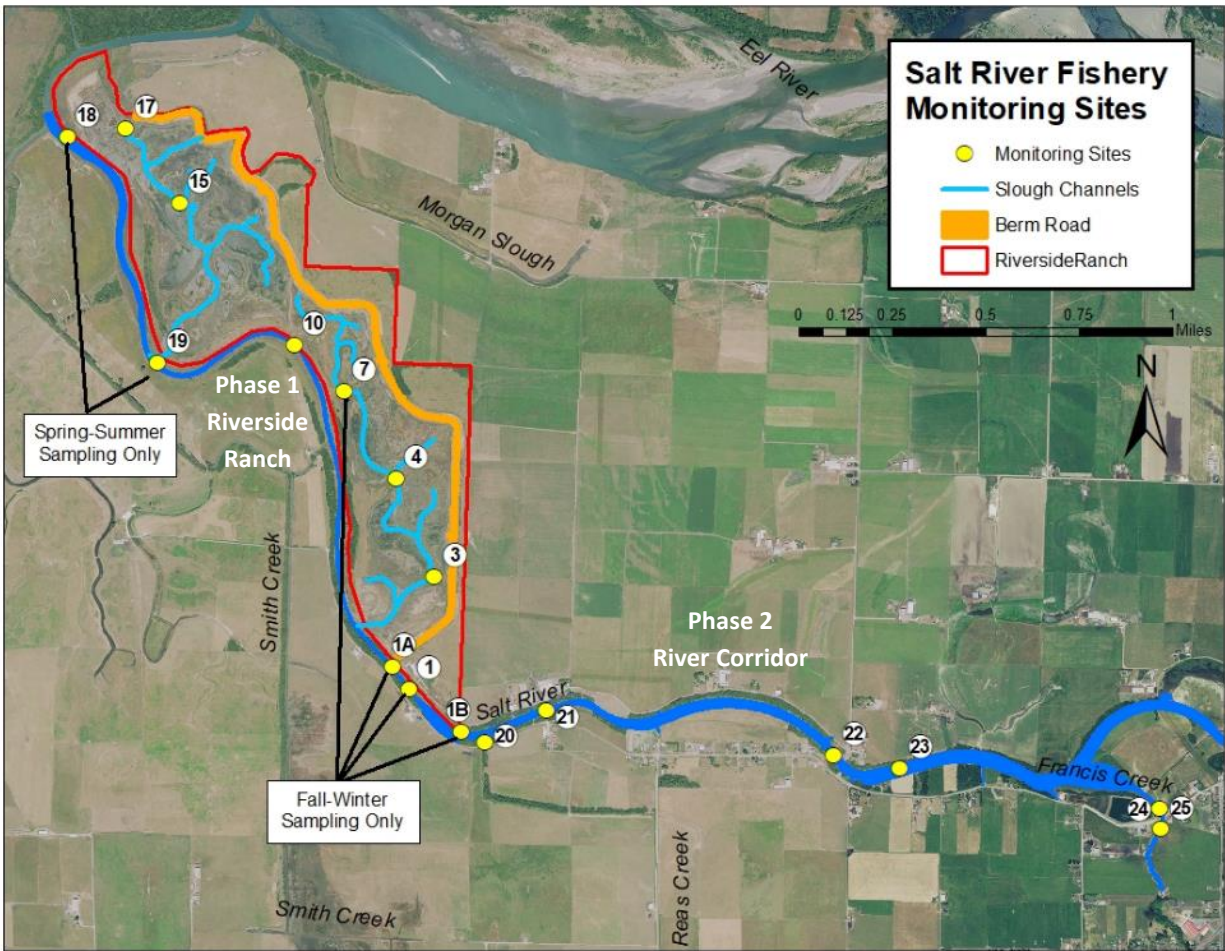
## **2. METHODS**

- a. Site Selection: As of 2018, 13 sites on Phase 1 and Phase 2 of the SRERP were selected for fish presence and distribution monitoring to represent the diversity of channel size and habitats in the main Salt River project footprint (Figure 1). Some sites are associated with constructed project habitat features such as in-channel

large wood. In 2019, six of the 13 sites were monitored and were confined to the Phase 2 project footprint (Sites: 21, 22, 23, 24, and 25).

- b. **Survey Gear:** Biologists determined that baited minnow traps are most effective in the Phase 2 channel corridor of the project area as the confined channel limits seining efforts. However, each site with a significant scour pool is sampled using either a 1/8<sup>th</sup> inch or a 1/16<sup>th</sup> inch mesh pole seine net and a baited minnow trap. Captured fish are held in aerated buckets, identified to species, counted, and released back into the waterway. Additionally, juvenile salmonids are measured, held in a recovery bucket, and then released back into the waterway. Captured non-native Sacramento Pikeminnow are enumerated into 100-millimeter size classes by ocular estimation, and humanely euthanized and buried via permit requirement.
- c. **Environmental Data Collection:** A start time, end time, and air and water temperature are recorded for each seine deployment. Salinity and dissolved oxygen measurements are also recorded for each seine and minnow trap deployment.
- d. **Survey Frequency:** A monthly survey interval, from March to July (this year, March to August (July not included)) of the six sites identifies seasonal use, presence, and distribution of fish within the Salt River Phase 2 project area.
- e. **Data Storage and Analysis:** Monitoring site survey data is recorded in the field on paper data forms. Paper data sheets are error checked in the field, and survey data is entered into an excel data file. Excel files are shared between CDFW, HCRCD, consultants, and Humboldt State University with a backup file system on the CDFW Fortuna server at location U/FRGP Data/Salt River/Monitoring. Paper data sheets are retained on file at CDFW Fortuna office 1487 Sandy Prairie Ct, Suite A, Fortuna, CA 95540. Data will be analyzed for fish species presence associated with each monitoring site, seasonality, water temperature, salinity, dissolved oxygen, and project habitat features. Pikeminnow data will be analyzed for presence of length classes of pikeminnow in 100-millimeter size class increments. Salmonid fork length data will be analyzed for seasonal growth rate.
- f. **Data Reporting and Distribution:** An annual report will be written and distributed under the title "*CDFW Salt River Restoration Project Fisheries Monitoring Annual Report Number Year\_Month\_Year\_Month. Results of Fish Species Presence and Distribution Monitoring Conducted Year Month to Year Month Within the Salt River, Eel River Estuary, Phases One and Two Project Areas, Humboldt County California.*" Reporting is distributed to HCRCD, United States Fish and Wildlife Service (USFWS), NOAA Fisheries Service, and the California Coastal Commission. Reports are archived and available from CDFW Fortuna office 1487 Sandy Prairie Ct, Suite A, Fortuna, CA, 95540.

Figure 1: Salt River 2018 Project Area Fisheries Monitoring Site locations



Salt River Project fisheries monitoring site location descriptions:

- Site 1 is located on the main stem Salt River near the Riverside Ranch Barn and a telephone pole adjacent to the main road. Seine the main channel from approximately 150 feet up stream of the telephone pole down to the pole. Associated sites for high-tide fall-winter surveys, 1A and 1B, are approximately 100' upstream and 50' downstream of Site 1. Site 1 has been **ABANDONED** for low-tide spring-summer surveys, however, is sampled during fall-winter high-tide surveys when conducted.
- Site 3 is located at the confluence of the S1 slough and a left bank tide gated drainage channel not depicted in blue line on the map. Seine both the S1 slough and runoff channel.
- Site 4 is located at a LWD structure in the lower third of the S1 slough channel. Seine around LWD structure.

- Site 7 is associated with a piece of placed large woody debris (LWD) in the S1 slough. Seine 100 feet on either side of the LWD. Site has been **ABANDONED** for low-tide spring-summer surveys, however, is sampled during fall-winter high-tide surveys when conducted.
- Site 8 is associated with a goby lift on a branch of the S1 slough. Seine from the lift to the upstream end of the excavated channel. Site has been **ABANDONED**.
- Site 9 is associated with a goby lift on a branch of the S1 Slough. Seine from the lift to the upstream end of the excavated channel. Site has been **ABANDONED**.
- Site 10 is on the main stem Salt River between the mouths of the two sloughs. Seine 150 feet of the river channel (Fig. 2).
- Site 14 is located on a branch of the N1 Slough. Seine last 150 feet of the channel and has been **ABANDONED**.
- Site 15 is on main stem of the N1 slough upstream of the second left bank branch. Seine 150 feet above confluence with slough branch (Fig. 3).
- Site 17 is associated with a piece of placed LWD on the main stem of the N1 Slough. Seine 100 feet on both sides of the LWD.
- Site 18 is on the main stem of the Salt River near the confluence with Cutoff Slough. Seine 150' of river channel.
- Site 19 is on the main stem of the Salt River just upstream of the confluence with the N1 Slough. Seine the 150 feet above the confluence.
- Site 20 is located at the confluence of Reas Creek. Seine in the main Salt River channel across the mouth of Reas Creek. Seine up the Reas Creek wood weirs (step pools) to the outfall of the box culvert.
- Site 21 is located approximately 400' upstream from the "Regli" rocked entrance on Port Kenyon Road (or 1,100' upstream from Reas Creek). The site is located just downstream of a floodplain outlet and associated with a LWD. Deploy baited minnow traps at near-by LWD and seine if possible.
- Site 22 is approximately 180' downstream of Dillon Road Bridge. The site is associated with LWD. Deploy baited minnow traps at near-by LWD and seine if possible.
- Site 23 is approximately 650' upstream of Dillon Road Bridge. It is the first LWD structure encountered upstream of the first floodplain outlet above Dillon Road Bridge. Deploy baited minnow traps at near-by LWD and seine if possible.
- Site 24 is located on Francis Creek at the first LWD structure downstream of the Port Kenyon Bridge. Deploy baited minnow traps in plunge pool and seine.

- Site 25 is located on Francis Creek at the first LWD structure upstream of the Port Kenyon Bridge. Deploy baited minnow traps in plunge pool and seine.

Figure 2. Seining at site 10



Figure 3. Seining at site 15



### 3. Observations

Following the SEREP monitoring documents, only the six Phase 2 channel corridor sites were monitored in 2019 (Sites: 21, 22, 23, 24, and 25). Salt River surveys occurred once monthly from March to August 2019 (the month of July was not included). The March through May surveys were performed by CDFW's biologists and associated crew members. The June and August surveys were conducted by Humboldt State University (HSU) fisheries biology professor, Darren Ward, and his associates.

Concurrent with the fish seining and trapping, water quality measurements are recommended to be taken for temperature, salinity/conductivity (depending on what equipment was available), and dissolved oxygen. Unfortunately, monitoring equipment was unavailable for most of the spring-summer survey dates. Temperature was the only reliable water quality measurement taken in 2019. Surveys throughout the spring and summer months showed that water temperatures ranged between a maximum of 22.2°C (August) and minimum of 9.0°C (March). Average temperatures increased across sampling months from spring to summer, with a 10 °C increase between March and August.

**Table 1. Water Quality Parameters Across Phase 2 Channel Corridor of the Salt River Ecosystem Restoration Project.**

	2019				
Phase 2 Water Temperature (°C)	March	April	May	June	August
Average	9.6	13.1	12.2	18	19.7
Range	9 to 10	12 to 14.5	11.7 to 13	14.1 to 22.1	15.7 to 22.2

Seining and minnow trapping at the six fisheries monitoring sites, over the five-month sampling period, identified the presence of 12 known species. Approximately 1,083 individuals were captured (approximate values were estimated due the capture of large amounts of three-spined stickleback). Table 2 presents the total number of fish and marine invertebrates sampled from March to August in 2019.

Nineteen juvenile Coho salmon (*Oncorhynchus kisutch*) were present during the April sampling (Fig. 4 and 6); 10 were captured at site #20 on Reas Creek stepped weirs (Figures 2 and 3), six were captured at site #21, and three at site #22. One Steelhead (*Oncorhynchus mykiss*) juvenile (site #25) (Figure 5) and two Cutthroat (*Oncorhynchus clarkii*) juveniles (site #24) (Figure 5) were also captured in April. One unidentified juvenile salmonid was captured at site #25 in April as well.

**Table 2. Number of Individual Fish Captured by Each Month's Fish Survey efforts in Salt River Ecosystem Restoration Project, Phase 2 Area, in 2019**

Common Species Name	2019					TOTAL
	March	April	May	June	August	
Tidewater Goby	0	0	0	0	0	0
Coho Salmon	0	19	0	0	0	19
Steelhead	0	1	0	0	0	1
Cutthroat	0	2	0	0	0	2
Unidentified Salmonid	0	1	0	0	0	1
Bay Pipefish	0	0	0	0	30	30
California Roach	0	1	0	0	0	1
Lamprey Sp.	0	0	7	0	0	7
Lined Shore Crab	0	0	0	0	1	1
Prickly Sculpin	0	8	0	0	0	8
Three-Spined Stickleback	7	92	66	535	259	959
Sacramento Pikeminnow	1	15	3	35	10	64
Staghorn sculpin	0	3	15	5	16	39
Starry Flounder	0	0	0	0	1	1
Un. ID Sculpin	9	1	4	0	0	14
<b>TOTAL</b>	<b>17</b>	<b>143</b>	<b>95</b>	<b>575</b>	<b>317</b>	<b>1147</b>



Figure 2: Juvenile Coho caught at site 20 on April 22<sup>nd</sup>, 2019



Figure 3: Juvenile Coho caught at site 20 on April 22<sup>nd</sup>, 2019



Figure 4: Juvenile Cutthroat Trout caught at site 24 on April 22<sup>nd</sup>, 2019



Figure 5: Juvenile Steelhead and unidentified salmonid caught at site 25 on April 22<sup>nd</sup>, 2019



In previous years immediately after construction of the tidal marsh in 2013, tidewater gobies (*Eucyclogobius newberryi*) were abundant in the southern slough channel terminal arms, where over a hundred individuals would be caught in one sampling period (month). The numbers of tidewater goby captured since 2014 has been dramatically declining. In 2018, only five tidewater goby individuals were captured during the sampling season. The low numbers are likely due to degraded or loss of backwater habitat, caused by sedimentation and/or erosion of channel features within the created slough channels at three former sites. The 2019 fish monitoring effort captured zero tidewater. This is not unusual given that the tidal marsh project area was not sampled in 2019; though tidewater gobies are occasionally captured at the tidally influenced Reas Creek and Salt River confluence and step pools site (#20). Two other marine dependent species, a lined shore crab (*Pachygrapsus crassipes*) and 30 bay pipefish (*Syngnathus leptorhynchus*), were captured at site #20.

Other typical fish species sampled included the following: Three-spined stickleback (*Gasterosteus aculeatus*) continue to be captured in high numbers. The 2019 sampling effort captured less than 40 Staghorn sculpins (*Leptocottus armatus*). The number of captured Sacramento pikeminnow (*Ptychocheilus grandis*) continue to decrease from 2017 to 2019.

#### **4. DISCUSSION**

Multiple phases of the SRERP were constructed across years 2013, 2014, 2015, 2017 and 2018. Further phases are being constructed in coming years. During each construction season, the construction site was de-fished, cut off from inflowing water by coffer dams and diversions, and fully dewatered. Water is allowed back into the Salt River following completion of the project's excavation and construction activities. A multi-year monitoring effort of fish species presence and distribution within the Salt River restored areas was initiated with monitoring site selection and fish capture and identification surveys in March of 2014. Additional sites are determined and added after each completed restoration phase. Fish surveys are conducted once monthly, from March to July, annually. However, in 2019 the month of July was skipped, and August was substituted.

Thirteen spring-summer fish sampling sites exist across the Phase 1 and Phase 2 areas of the SRERP. In 2019, the project was required to only sample the six sites across the Phase 2 area (riverine corridor). These six sites include stepped weirs at the Reas Creek confluence of the Salt River and scour pools associated with log structures along the Salt River corridor.

The presence of juvenile salmonids is expected in the early spring months (March and April), given their presence in previous years' sampling efforts. In 2019, juvenile salmonids were not

captured in March, likely due high flows minimizing seining sampling efforts. However, 23 juvenile salmonids were captured in April, including species such as Coho (*Oncorhynchus kisutch*), Steelhead (*Oncorhynchus mykiss*), and Cutthroat trout (*Oncorhynchus clarkia*). Ten of the Coho were captured at site #20 (stepped weirs at the Reas Creek confluence), six at site #21, and three at site #22. One steelhead was captured at site #25. And the two Cutthroat trout were sampled at site #24.

Two of the lower sites in the Salt River corridor (sites #20 and 21) are tidally influenced. Species specific to these sites in 2019 include Bay pipefish (*Syngnathus leptorhynchus*), Starry flounder (*Platichthys stellatus*), California roach (*Hesperoleucus symmetricus*), and Staghorn sculpin (*Leptocottus armatus*). Tidally tolerant fish such as the Three-spined stickleback (*Gasterosteus aculeatus*), Prickly sculpin (*Cottus asper*), and Sacramento pikeminnow (*Ptychocheilus grandis*) were found throughout the project area. Unidentified juvenile lamprey were strictly found at freshwater sites #24 and #25.

As each new restoration reach is completed, fish appear to utilize the newly constructed channel immediately. The past six years of fish surveys have shown that, overall, the Salt River Ecosystem Restoration Project has been successful for native fish species.