Salt River Ecosystem Restoration Project

Habitat Mitigation and Monitoring Plan Monitoring Report 2022

Finalized March 2023

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EXECUTIVE SUMMARY

The Salt River Ecosystem Restoration Project (Project) has been developed in collaboration with landowners and resource and regulatory agencies since the late 1980s. The Humboldt County Resource Conservation District (HCRCD) is spearheading the Project on behalf of multiple private landowners throughout the Salt River watershed. The Salt River watershed is located in Humboldt County, California; approximately 15 miles south of the City of Eureka. The watershed surrounds the City of Ferndale and is bordered to the south by the Wildcat Mountains, to the east and north by the Eel River and to the west by the Pacific Ocean. The watershed derives its name from the Salt River that historically flowed across the southern Eel River delta discharging into the Eel River estuary, approximately 0.2 miles from the mouth of the Eel River.

The overarching goal of the Project is to restore and improve hydrologic function and fish and wildlife habitat in the Salt River watershed. The Project area includes the main stem of the Salt River, four Salt River tributaries originating in the Wildcat Hills (Williams Creek, Francis Creek, Reas Creek, and Smith Creek), and the approximately 400-acre Riverside Ranch, which is contiguous to the Salt River estuary. The California Department of Fish and Wildlife (CDFW) acquired Riverside Ranch in 2012 from Western Rivers Conservancy, who had purchased the property from a willing seller. CDFW is an active partner in the Project. The remainder of the Project area is primarily under private ownership, and the City of Ferndale occupies multiple small parcels at the wastewater treatment plant.

The Project intends to restore natural hydrologic processes to a significant portion of the watershed, promoting restoration of ecological processes and functions. The Project is presented in two primary phases to distinguish between the tidal wetland restoration (known as Phase 1) and the riverine restoration work (known as Phase 2). The Project includes work that will be accomplished over several years. Within the two phases, the Project is further broken down in to four primary components, discussed below:

- **Upslope erosion control:** Work with willing landowners to implement upslope erosion control activities in the upper portions of the Francis, Williams, and Reas Creeks watersheds to reduce the level of sediment input and delivery to the Salt River, thereby improving water quality while reducing sediment deposits in the channel.
- **Riverside Ranch tidal marsh restoration:** Restore tidal marsh in the lower Salt River. This will also increase the tidal prism exchanged through the lower river, increasing sediment transport potential, increasing scour and promoting hydraulic connectivity with the upper watershed.

- **Salt River channel excavation:** Excavate and rehabilitate approximately 7.4 miles of the historic Salt River channel to restore hydrologic connectivity within the watershed thereby improving aquatic and riparian habitat, providing fish passage to tributaries, and improve drainage in the delta.
- **Adaptive Management:** Work with the community and regulatory agencies to implement an environmentally and geomorphically acceptable adaptive maintenance and management program to maintain hydraulic and ecological function in the Project area into the future.

In 2013, restoration of Riverside Ranch (Phase 1 of the Project) restored 330 acres of pasture land back into intertidal wetland habitat, while also preserving approximately 70 acres that will be agriculturally managed to provide short-grass habitat for Aleutian cackling geese and other wetland-associated birds. Three miles of internal slough networks were excavated to create additional habitat for salmonids, tidewater goby, and other fish and aquatic species, and provide areas for the natural recruitment of eelgrass. Two miles of setback berm were constructed to create a boundary between the tidal area and the retained agricultural area, and a gravel road was installed on top of the berm to provide access for monitoring and maintenance. This component of the Project also widened and deepened approximately 2.5 miles of the tidally-influenced portion of the Salt River channel, thereby increasing tidal exchange and greatly improving fish passage and fish habitat in the lower Salt River channel.

Phase 2 represents the Salt River “corridor restoration” portion of the larger project. Within Phase 2, 4.5 miles of the Salt River channel and its adjacent floodplain are being constructed and restored. Wetlands and riparian corridors are being re-vegetated with a diverse palette of native plants. Fish passage is being restored to three watershed tributaries – Reas, Francis and Williams Creeks.

Across the years 2013 – 2015 and 2017 – 2019, a total of 6.2 miles of Salt River channel and floodplain were constructed and re-vegetated. These construction efforts also reconnected two tributaries (Reas and Francis Creeks). The 2017 construction season also restored 0.5 miles of the channel and floodplain in lower Francis Creek (Figure 1). The remaining 1.2 miles of the Phase 2 construction will complete the Salt River corridor restoration. However, due to regulatory and hydraulic constraints, along with landowners’ beliefs of the watershed’s function, completion of the project is on indefinite hold.

Salt River Ecosystem Restoration Project
Permitted Project Area & Implementation Status

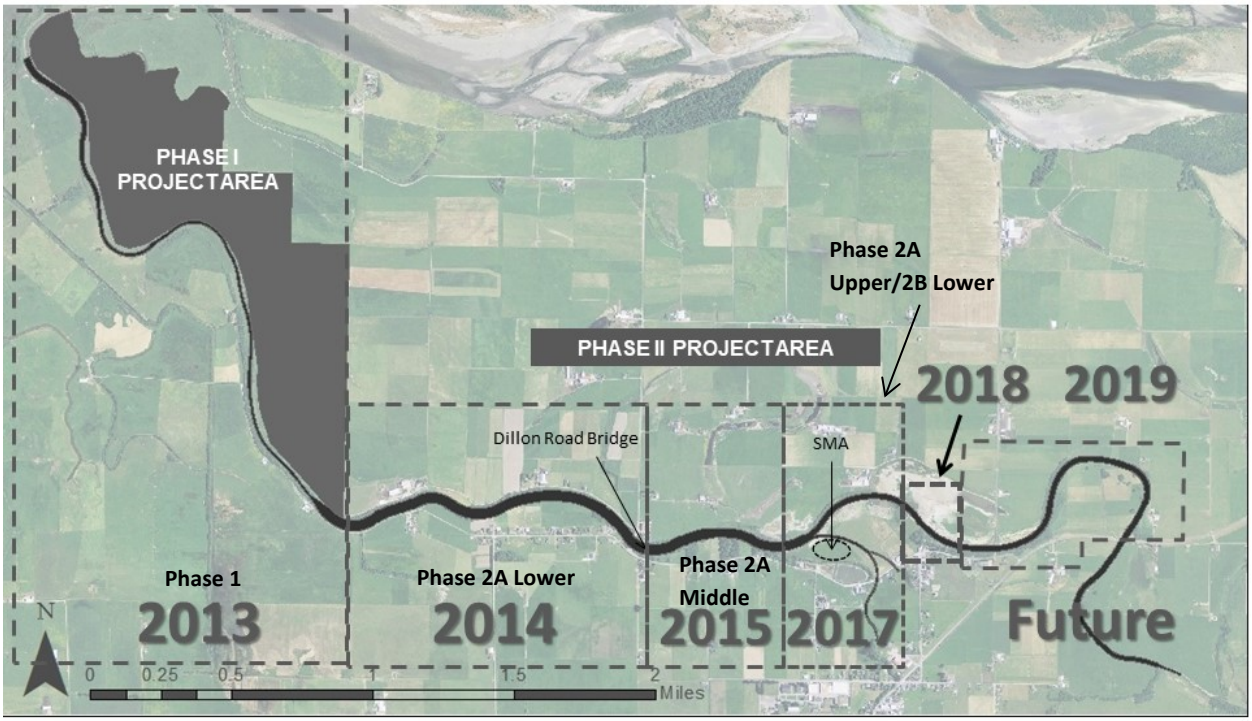


Figure 1: Salt River Ecosystem Restoration Construction Timeline as of 2022

Upon completed portions of the Project, monitoring is performed under direction of the Humboldt County Resource Conservation District and complies with requirements generated from Project documents, including the Salt River Ecosystem Restoration Project's Habitat Mitigation and Monitoring Plan (HMMP) (H. T. Havey et al 2012) and the Adaptive Management Plan (AMP). This report provides information on data collected for monitoring tasks pertaining to the HMMP of the Salt River Ecosystem Restoration Project as follows:

- Phase 1: Year 9 (post construction 2013)
- Phase 2: Year 8, Year 7, Year 5, Year 4, Year 3 (post construction 2014, 2015, 2017, 2018, and 2019 respectively)

As mentioned in the Summary of Conclusions section below, monitoring results demonstrate the Project is performing successfully and largely meeting Project goals.

SUMMARY OF CONCLUSIONS

As detailed in this report, the 2022 monitoring results provide a point of reference on how the restoration activities completed in 2013 (Phase 1), 2014 (Phase 2A Lower), 2015 (Phase 2A Middle), 2017 (Phase 2A Upper/2B Lower), 2018 (Phase 2B Middle), and 2019 (Phase 2B Upper) have responded to the area's environmental conditions during its formative years after construction. One important environmental input to consider is the previous season's amount of precipitation. The north coast of California generally experiences precipitation from October to the end of April. This period of time is referred to as a *hydrologic year*. The amount of the hydrologic year's precipitation prior to monitoring efforts can significantly affect the findings of a handful of monitoring tasks, such as riparian success and cross-sectional surveys. The 2021/2022 hydrologic year experienced 22.59 inches of precipitation, which is nearly 23 inches below the average (45 inches/year) rain totals.

The following is a brief summary of the findings of the various HMMP monitoring efforts. Detailed findings are located within reports listed at the end of this HMMP monitoring summary.

Vegetation
Habitat mapping occurred in riparian areas for the Phase 2A Middle (2015), Phase 2A Upper & 2B Lower (2017), and Phase 2B Upper (2019). Mapping concluded that the riparian areas are achieving and exceeding established success criteria.

Wetlands and riparian zones in the Phase 2A Middle, Phase 2A Upper & 2B Lower, and Phase 2B Upper restoration areas were monitored in 2022. The 2022 percent cover sampling results indicate that a majority of surveyed restored areas are achieving appropriate success criteria. The wetland and riparian habitats are achieving and exceeding the minimum success criteria for native species throughout the monitored areas except for the wetlands in Phase 2B Upper and Phase 2A Upper/2B Lower active benches (floodplain). Non-native species are not exceeding maximum cover thresholds except in the Phase 2B Upper wetland active bench and the riparian active berm. However, invasive species are impacting wetland and riparian habitats in all phases.

Average tree diameter/basal area was estimated in Phase 2A Upper & 2B Lower (2017) and were compared to the previously estimated basal area. Results demonstrate a statistically significant increasing trajectory in basal area within all habitat areas of the Phase 2A Upper & 2B Lower restoration reach.

Wildlife
Since 2014, CDFW has performed annual fish sampling across the Salt River restoration footprint. Due to COVID 19 restriction guidelines, sampling did not occur in 2020 and 2021. However, in 2022, an abbreviated sampling season was reinstated. April to June monthly sampling showed that native species are utilizing the restored channel throughout the project area. During April and May surveys, salmonids were captured in plunge pools of the restored Francis Creek.

Geomorphic
Geomorphic monitoring tasks include photo documentation at established photo points and cross-sectional and longitudinal surveys. The photo documentation visually records the dramatic differences between pre-construction to post-construction conditions and records the vegetation recruitment and tidal effects. Phase 1 and 2 geomorphic surveys were not performed in 2022 due to lack funding and available surveyors. However, observational accounts were collected throughout the Phase 2 channel corridor and no significant concerns were identified.

INTRODUCTION

The Salt River Ecosystem Restoration Project (SRERP) took some 30 years to develop and drew upon several studies and assessments completed during the time which examined cultural, biological, geological, aquatic, and vegetative resources as well as tidal influences in the watershed. Project proponents also developed documents to guide implementation, maintenance, and long-term monitoring. Monitoring documents include the Salt River Monitoring Plan, Habitat Mitigation and Monitoring Plan, the Adaptive Management Plan, and other specialized plans to assure the protection of sensitive wildlife habitats, landowner properties, and the hydrologic system itself.

As outlined in the Project’s CEQA and the Habitat Mitigation and Management Plan documents, a variety of monitoring tasks are required to be conducted to help determine if Project goals and objectives are being achieved, as well as to guide Project management and maintenance. Most of the monitoring tasks are to be completed over a period of ten years, post-implementation. Monitoring was conducted prior to the Project’s implementation to establish baseline data and/or assist in identifying and protecting resources in the Project area. Post-implementation monitoring is being conducted as required by the Project’s various funders, permit requirements, and environmental compliance documents. Many of the individual monitoring reports are available from the Humboldt County Resource Conservation District upon request or

can be accessed on the website (http://humboldtrcd.org/resources/reports-and-documents/).

This report presents monitoring results under three broad categories:

1. Vegetation
2. Wildlife
3. Geomorphic

Within each category is a discussion that identifies 1) the discrete task called for, 2) the agency requiring the task, 3) the reference document, 4) a description of the task, 5) goals and objectives of the tasks, 6) the resulting monitoring report (if applicable), 7) a description of methods, and 8) a results and discussion section.

VEGETATION

Monitoring Task: Habitat Mapping – Riparian Acreage (Phase 2A Middle, Phase 2A Upper & 2B Lower, and Phase 2B Upper project areas)

Agencies/Acts: Coastal Commission

Compliance Documents: Coastal Development Permit- Special Conditions; SRERP Habitat Mitigation and Monitoring Plan and the Adaptive Management Plan

Description: For the 2022 monitoring effort, the Phase 2A Middle, Phase 2A Upper & 2B Lower, and Phase 2B Upper existing and planted riparian acreages are estimated.

Goals:

- Achieve 85 acres of riparian in Phase 2 by Year 10

Report: 2022 Annual Habitat Monitoring Report - Salt River Ecosystem Restoration Project, Prepared for the Humboldt County Resource Conservation District by J.B. Lovelace & Associates

Methods: Habitat maps were created by refining and updating project data and using ArcMap® Field Maps (ESRI) geographic information system (GIS) desktop software, the most recent satellite imagery (ESRI World Imagery 2022, Google Earth 2022, and National Agriculture Imagery Program [NAIP]) and were based on observations made during fieldwork performed in 2022.

Results & Discussion: Monitoring efforts determined that the riparian habitats cover 50.48 acres of the Phase 2 restoration areas in 2022, 7% more than expected (Table 1).

Of these, 22.28 acres is of existing riparian forest, 12.82 acres are revegetated riparian planting zones, and 15.38 acres of supplemental planting areas.

Table 1. Summary of 2022 Observed Riparian Acreage & Respective Success Criteria

	Riparian Area (Acres)		
Habitat Areas	**2022 Observed**	**Final Success Criteria**	**% of Projected**
PHASE 2			
Riparian – Planted, Existing, & Supplemental			
Phase 2A Middle	14.39		
Phase 2A Upper and 2B Lower	12.86		
Phase 2B Upper	23.23		
TOTAL PHASE 2 Existing and Planted Riparian	***50.48***	**≥ 42.38**	**107%**

VEGETATION

Monitoring Task: Vegetation Percent Cover – Wetland and Riparian Areas (Phase 2A Middle, Phase 2A Upper & 2B Lower, and Phase 2B Upper project areas)

Agencies/Acts: Coastal Commission

Compliance Documents: Coastal Development Permit- Special Conditions; SRERP Habitat Mitigation and Monitoring Plan and the Adaptive Management Plan

Description: Estimate percent cover of vegetation for: wetlands and riparian areas in Phase 2A Middle, Phase 2A Upper & 2B Lower, and Phase 2B Upper; including native, non-native, and invasive species within all monitored areas.

Goals:

- Achieve Native Vegetation Percent Cover of: ≥50% in Phase 2A Middle Wetlands; ≥60% in Phase 2A Middle Riparian; ≥50% in Phase 2A Upper & 2B Lower Wetlands; ≥40% in Phase 2A Upper & 2B Lower Riparian; ≥30% Phase 2B Upper Wetlands; and ≥30% Phase 2B Upper Riparian.

- Achieve Non-Native Non-Invasive Vegetation Percent Cover of: <15% in all restored habitats
- Achieve Invasive Vegetation Percent Cover of: <5% in all restored habitats

Report: 2022 Annual Habitat Monitoring Report - Salt River Ecosystem Restoration Project, Prepared for the Humboldt County Resource Conservation District by J.B. Lovelace & Associates

Methods: Percent cover field data collection occurred from August 8 to 10, 2022. A stratified, randomized sampling approach is used to characterize the abundance, species composition, and structural composition of existing vegetation in each vegetation sampling area. A previous year power analyses of vegetation sampling data, established a sample size for this year's monitoring effort.

Using updated SRERP habitat GIS data and ArcMap® software, each phase and sub-phase of the restoration area was partitioned into vegetation sampling areas of specific habitat types within project phases. ArcMap® software was then used to randomly distribute sampling plots throughout each of these sampling areas. Given that each sampling area is composed of multiple, geographically separated polygons, the 32 sample plots were randomly allocated throughout each sampling area, in quantities proportionate to the size (i.e., area) of each polygon. Once sample plots were located in the field, a 1m^2 sampling frame, or "quadrat," constructed from ¼-inch diameter PVC was then used to visually estimate:

- (total) percent vegetative cover, and
- (absolute) percent cover of each species present.

In order to evaluate these data against the success criteria for specific vegetative parameters, each observed plant species was categorized as:

- native,
- non-native non-invasive,
- non-native invasive, or
- sterile "wheatgrass" hybrid (Elymus x Triticum);

as well as being:

- herbaceous (an herb),
- arborescent (a tree), or a
- shrub
- vine

Percent cover data collected for each species is absolute cover for each species observed during sampling. Median percent cover values for the range associated with each cover class were then used in subsequent analyses.
The vegetation success criteria specified in the HMMP consist of minimum percent cover thresholds for native species and maximum percent cover thresholds for both non-native non-invasive and non-native invasive species.

Results & Discussion: The sampling effort shows that the 2022 monitoring areas are approaching 100% cover throughout the sampling areas. Herbaceous vegetation in habitats sampled in 2022 was consistently greatest in active bench sampling regions and was typically lowest in active channel habitats likely due to fluvial disturbance or withing riparian replanting zones with more well-developed shrub and tree vegetation. Woody riparian vegetation is established and developing throughout all sampling regions addressed in 2022. In most instances, increasing cover of woody riparian vegetation appears to be directly related to the age of restoration sub-phases.

Native Vegetation – All regions are exceeding native species minimum success thresholds in 2022 except in the Phase 2A Upper/2B Lower and Phase 2B upper channel wetlands active bench habitats. Channel wetlands of the Phase 2A Upper/2B Lower active bench reached 37.1% native cover, whereas the success criteria for 2022 is 50%. Results indicate that invasive vegetation may be outcompeting native vegetation in this area (Table 2). Channel wetlands of the Phase 2B upper was calculated to be 0.8% under (29.2%) the 2022 success criteria of 30%.

Non-Native Non-Invasive Vegetation – The presence of non-native non-invasive vegetation remains below the final maximum threshold (i.e., <15% cover) throughout all sampling areas of both the Phase 2A Middle and the combined Phase 2A Upper/2B Lower restoration areas. However, the maximum threshold was exceeded in Phase 2B Upper channel wetlands active bench (20.7%) and riparian planting zones (17.0%) (Table 2). It is expected that non-native and non-invasive vegetation will decrease over time.

Invasive Vegetation – The levels of invasive vegetation remains elevated throughout the monitored areas, exceeding the <5% maximum threshold (Table 2). The most abundant invasive species in the Phase 2 channel corridor consists of *Phalaris arundinacea* (reed canary grass) species, which was present prior to restoration efforts.

Recommendations include to initiate immediate efforts to reduce and/or eradicate invasive vegetation across the project area.

Table 2: Summary of 2022 SRERP Vegetation Percent Cover Sampling Results

Summary of 2022 SRERP Quantitative Vegetation Percent Cover Sampling Results & Respective Success Criteria. Mean percent cover estimates are in bold and associated 95% confidence intervals follow in brackets.

	Mean Percent Cover for Vegetation Categories of Interest							
	Total Vegetation[1]	Native Vegetation		Non-Native Non-Invasive Vegetation		Invasive Vegetation	
SRERP Habitat Sampling Area	Observed	Observed	2022 Success Criteria[2]	Observed	Final Success Criteria[3]	Observed	Final Success Criteria[3]
Phase 2 — Salt River Corridor Restoration Area							
Phase 2A (Middle) — Salt River Channel Wetlands							
Active Channel (n=10)	**98.5** [96.0, 99.5]	**86.6** [74.3, 91.0]	≥50%	**1.6** [0, 5.7]	<15%	**10.3** [4.3, 18.7]	<5%
Active Bench (n=20)	**99.0** [96.7, 99.5]	**79.9** [69.8, 88.0]	≥50%	**2.9** [1.1, 6.6]	<15%	**16.2** [9.6, 24.9]	<5%
Phase 2A (Middle) — Riparian Planting Zones							
Replanted Riparian Forest (n=25)	**100.0** [N/A]	**79.0** [66.3, 88.5]	≥60%	**1.7** [0.6, 3.4]	<15%	**19.2** [10.2, 31.5]	<5%
Active Riparian Berm (n=10)	**100.0** [N/A]	**89.0** [77.5, 95.5]	≥60%	**0.7** [0, 2.2]	<15%	**10.3** [3.5, 22.0]	<5%
Phase 2A (Upper)/2B (Lower) — Salt River Channel Wetlands							
Active Channel (n=25)	**99.0** [97.0, 99.6]	**75.4** [63.9, 83.8]	≥50%	**3.0** [0.8, 10.3]	<15%	**20.6** [13.7, 29.2]	<5%
Active Bench (n=25)	**95.8** [90.6, 98.2]	**37.1** [24.4, 51.0]	≥50%	**13.8** [7.1, 23.6]	<15%	**44.9** [33.5, 57.5]	<5%
Phase 2A (Upper)/2B (Lower) — Riparian Planting Zones							
Replanted Riparian Forest (n=25)	**99.6** [98.4, 99.8]	**66.3** [53.5, 76.2]	≥40%	**11.3** [5.5, 21.7]	<15%	**22.0** [15.1, 30.4]	<5%
Active Riparian Berm (n=20)	**100.0** [N/A]	**53.8** [41.0, 65.8]	≥40%	**2.4** [0.9, 4.8]	<15%	**43.7** [31.8, 57.2]	<5%
Phase 2B (Upper) — Salt River Channel Wetlands							
Active Channel (n=15)	**97.7** [94.6, 99.0]	**60.7** [46.9, 71.2]	≥30%	**8.3** [4.6, 13.9]	<15%	**28.7** [18.5, 40.7]	<5%
Active Bench (n=20)	**100.0** [N/A]	**29.2** [18.2, 42.3]	≥30%	**20.7** [11.8, 33.9]	<15%	**50.1** [36.7, 64.4]	<5%
Phase 2B (Upper) — Riparian Planting Zones							
Replanted Riparian Forest (n=20)	**99.5** [96.5, 100.0]	**69.6** [53.9, 81.5]	≥30%	**9.2** [2.7, 23.1]	<15%	**20.6** [11.5, 34.3]	<5%
Active Riparian Berm (n=20)	**99.3** [97.7, 99.8]	**31.8** [23.7, 39.5]	≥30%	**17.0** [8.8, 30.0]	<15%	**50.5** [40.7, 60.2]	<5%

[1] No specific success criteria are indicated in the HMMP (H.T. Harvey & Associates with Winzler & Kelly 2012).

[2] Adapted from Tables 8–10 of the HMMP (H.T. Harvey & Associates with Winzler & Kelly 2012).

[3] Must be achieved by the final monitoring year for each respective habitat sampling area (i.e., Year 5 for Salt River Channel Wetlands or Year 10 for all others) (H.T. Harvey & Associates with Winzler & Kelly 2012).

VEGETATION

Monitoring Task: Average Tree Diameter – Average Basal Area – Phase 2A Upper/2B Lower

Agencies/Acts: Coastal Commission

Compliance Documents: Coastal Development Permit- Special Conditions; SRERP Habitat Mitigation and Monitoring Plan and the Adaptive Management Plan

Description: Estimate average tree diameter at breast height (DBH) in Phase 2A Upper/2B Lower (2017).

Goals:

- Planted trees in restoration area will show an increasing trend of average DBH between sampling years 3, 5, and 10.

Report: 2022 Annual Habitat Monitoring Report - Salt River Ecosystem Restoration Project, Prepared for the Humboldt County Resource Conservation District by J.B. Lovelace & Associates

Methods: Established basal area Phase 2A Upper/2B Lower sampling plots were resampled in 2022 (November 18 to 19,2022).

Previously, the percent cover sampling approach was used for stratifying restoration sampling areas and creating random basal area 10-meter radius sampling plots (using ArcMap® GIS software and the Trimble GPS unit), throughout Phase 2A Upper/2B Lower which include the active riparian berm and replanted riparian forest. Diameter-at-breast-height (DBH) in millimeters, species, and geographic coordinates were recorded for all trees located within the plot that were ≥4.5 feet tall. For sampling purposes, “Breast Height” is defined as 4.5 feet.

All metric DBH measurements collected during fieldwork were subsequently converted to inches, and were then squared and multiplied by 0.005454 ("the forester's constant") to derive basal area values (measured in square-feet), otherwise expressed as:

Basal area = DBH^2 x 0.005454

Resulting sampling plot measurements of both basal area and actual-plot-area were summed to derive basal-area-per-unit-area-sampled totals for each tree species in each sampled habitat. These measurements were then extrapolated to produce projected estimates of total habitat- and phase-wide basal area for each species using respective habitat areas (acreages) obtained from current SRERP GIS data. Tabulated values for

the resulting projected basal area estimates are provided to characterize the current developmental status of this vegetation type in sampled habitats.

Results & Discussion: Results reflect the continued establishment, development, and diversification of woody riparian vegetation throughout sampled portions of the combined Phase 2A (Upper) & 2B (Lower) restoration area. In 2022, basal-area-per-unit-area-sampled ("BAPA") increased throughout the combined Phase 2A (Upper) & 2B (Lower) restoration reach since the previous sampling effort in 2020 ($x\Delta$ = 28.95 ft^2/acre). The establishment and development of the single species, *Alnus rubra* ("red alder"), being responsible for the vast majority of observed BAPA increases. Increases in BAPA were statistically significant at the combined sub-phase level (p = 0.0001), as well as at the level of the individual sampling regions—with the exception of the active bench ($x\Delta$ = 7.92 ft^2/acre, p = 0.054 or 0.0620). In the other two sampling regions, mean BAPA increased by 29.49 ft^2/acre (p = 0.043 or 0.0305) in the active riparian berm and by 39.18 ft^2/acre (p = 0.0014) in the replanted riparian forest (Table 3).

However, the increase in BAPA from 2020–2022 was small and lacking in statistical significance in the Phase 2A (Upper) & 2B (Lower) active bench sampling region. This was due in part to poor responses observed in two of the five basal area sampling plots. Regardless, results demonstrate a statistically significant increasing trajectory in basal area within all habitat areas of the Phase 2A (Upper) & 2B (Lower) restoration reach at this interval in the SRERP monitoring period.

Table 3: Summary of Phase 2A Upper/2B Lower of Planted SRERP Woody Riparian Basal Area Sampling Results.

2022 Sampling Area	Mean Change in BAPA (ft2/acre)
Phase 2A Upper/2B Lower	
Replanted Riparian Forest	39.18
Active Riparian Berm	29.49
Active Bench (Floodplain)	7.92
Total Riparian	**28.95**

WILDLIFE

Monitoring Task: Salmonid and Tidewater Goby Monitoring

Agencies/Acts: Coastal Commission

Compliance Documents: Coastal Development Permit- Special Conditions 12, 13; SRERP Habitat Mitigation and Monitoring Plan and the Adaptive Management Plan

Description: Survey for presence of salmonids across the constructed SRERP and tidewater gobies on Phase 1 in the spring through summer months.

Goals:

- Surveys will show that salmonids and tidewater gobies will utilize the restored Salt River main channel and the tidal slough networks.

Report: Salt River Ecosystem Restoration Project Spring-Summer Fish Monitoring Program, 2022. Results of Fish Species Presence and Distribution Monitoring Conducted From April to June 2022 within the Salt River, Eel River Estuary, Phase 2 Project Area, Humboldt County California Prepared by HCRCD. February 2023.

Methods: The California Department of Fish and Wildlife and the Humboldt County Resource Conservation District led and/or participated in the 2022 fish monitoring program.

A fish sampling program was developed in the spring of 2014 and is conducted annually across the constructed reaches of the SRERP. However, from 2020 to 2021, fish sampling monitoring did not occur due to the worldwide pandemic (COVID 19). In 2022, fish sampling monitoring resumed. During this monitoring season, 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 2022 monitoring effort).

In 2022, once a month, from April to June, sites across the restored portions of Phase 2 (Figure 2) of the Salt River Ecosystem Restoration Project were surveyed for salmonids and tidewater gobies during low tide periods. Seven (7) sites on constructed portions of the Phase 2 restoration areas were selected and surveyed for fish presence and species distribution. The 2022 sites included sites #20, #24, #25, #26, #27, #29, and #31. These sites represent the diversity of channel size and habitats in the main Salt River channel and Francis Creek. Sites where the channel was wide enough were sampled using a 1/8th inch mesh pole seine net. Typically, a single pass with an 1/8-inch seine was made at each site. Non-seined sites were solely sampled by minnow traps which were deployed for at least an hour.

Captured fish were held in aerated buckets, identified to species, counted, and released back into the waterway. Additionally, juvenile salmonids were measured, held in a recovery bucket, and then released back into the waterway. Captured non-native pike minnow were enumerated into 100 millimeter size classes by visual estimation, and were humanely euthanized and buried via permit requirement. A start time, end time, and air and water temperatures, measured by thermometer, were recorded for each minnow trap and seine deployment. In previous years, minnow traps were deployed at each site, but results did not significantly add further information to the seining effort, thus minnow trapping has since been limited to specific sites.

Figure 2: Fish Monitoring Sites Across Phase 2 of the Salt River Ecosystem Restoration Project

Results and Discussion: Concurrent with the fish seining and trapping, water quality measurements were taken for temperature. Over the three month sampling period, water temperatures ranged between a maximum of 17.5°C (June) and a minimum of 10.8.0°C (April).

Seining and minnow trapping efforts at the seven fisheries monitoring sites identified the presence of 15 known species. Approximately 2,699 individuals were captured

(approximate numbers in 2022 were often estimated during the capture of large numbers of three-spined stickleback). The following table (Table 4) presents the total number of fish and marine invertebrates sampled from April to June in 2022.

Table 4. Number of Individual Fish Captured by Each Month's Fish Survey efforts in Salt River Ecosystem Restoration Project, Phase 2 Area, in 2022

	2022			
Common Species Name	**April**	**May**	**June**	**Total**
Coho Salmon	28	1	0	**29**
Steelhead	8	7	8	**23**
Green Sunfish	1	0	0	**1**
Larval Sculpin	0	13	0	**13**
Bullfrog larvae	0	17	0	**17**
California Roach	31	0	0	**31**
Lamprey Sp.	13	1	0	**14**
Chorus Frog Larvae	0	0	5	**5**
Prickly Sculpin	21	17	34	**72**
Three-Spined Stickleback	104	1109	1032	**2245**
Sacramento Pikeminnow	98	77	0	**175**
Staghorn sculpin	30	24	4	**58**
Starry Flounder	0	0	1	**1**
Northern Red-Legged Frog larvae	0	3	12	**15**
TOTAL	**334**	**1269**	**1096**	**2699**

Salmonid Species:
Twenty-eight juvenile Coho salmon (*Oncorhynchus kisutch)* were present during the April sampling; 12 were captured at site #24 (Figures 2 and 3), 15 were captured at site #31, and 1 at site #25. Eight Steelhead (*Oncorhynchus mykiss*) juvenile were sampled at site #24.

Non-Salmonid Species:
Three-spined stickleback (*Gasterosteus aculeatus*) continue to be captured in high numbers. Fifty-eight Staghorn sculpin (*Leptocottus armatus*), 31 California Roach, 72 prickly sculpin, and 14 unidentified lamprey species were also sampled. The number of captured Sacramento pikeminnow (*Ptychocheilus grandis*) (175 individuals) has greatly increased from the 2019 sampling effort (65 individuals); though a majority of the 2022 pikeminnow sampled was at site 31, which did not exist in 2019 during that year's sampling effort.

Fish are utilizing the restored length of Salt River channel. The past 10 years of fish surveys have shown that, overall, the Salt River Ecosystem Restoration Project has been successful for native fish species.

GEOMORPHIC

Monitoring Task: Restoration Documentation Photos

Agencies/Acts: Coastal Commission

Compliance Documents: SRERP Habitat Mitigation and Monitoring Plan

Description: Perform qualitative documentation of the restoration project with feature and landscape photos such as stream profile, floodplain, and riparian conditions.

Goals:

- Photo point monitoring will be used to qualitatively document pre- and post-project visual changes at restoration sites.

Report(s): Salt River Ecosystem Restoration Project – Photo Monitoring - 2022. Prepared by HCRCD.

Methods: Photo monitoring was performed across the Phase 1 and the completed Phase 2 footprint by a staff member of the HCRCD.

Five photo monitoring sites were established across Phase 1 and ten sites across the completed Phase 2 channel corridor (Figure 3). Photos were taken prior to construction and annually post construction. The compass direction of the photo was recorded and

aligned with previous photo elements. Post-project photos will be taken during the same season or month as pre-project photos (Fall/Winter - November/December).

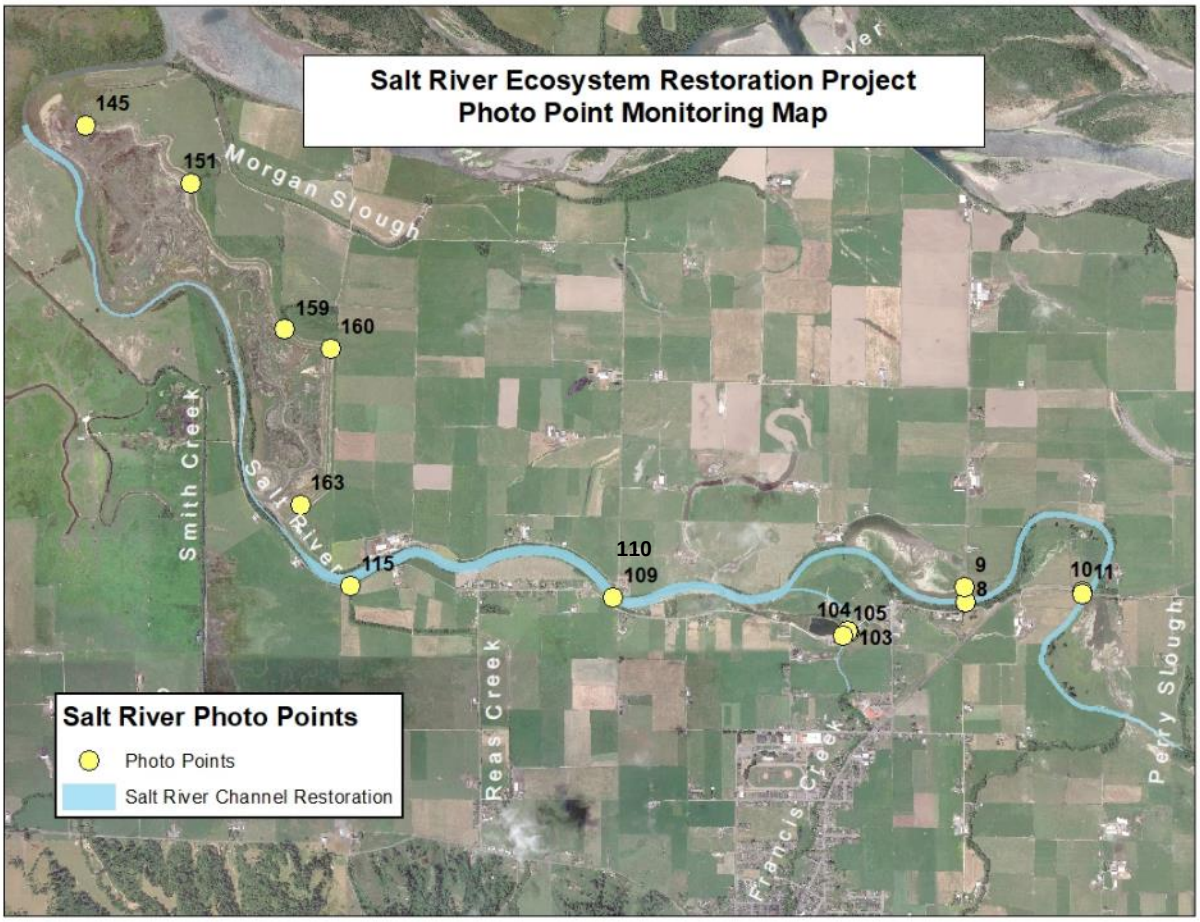
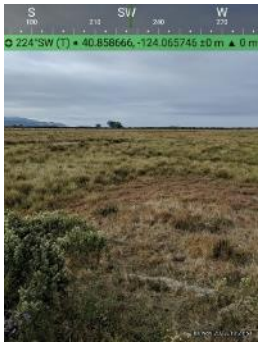


Figure 3: Photo Monitoring Points for the Constructed Footprint - 2022

Results and Discussion: A total of 15 photo point sites are established across the Phase 1 and the completed portion of the Phase 2 project area. Pre-construction and post-construction photos have been recorded. The following six photo points are a sample of the 15 sites.

PP145 – SW – Nov 2013

Dec 2017



Dec 2022



PP159 – SW Tidegates – Nov 2013 Nov 2015 Dec 2022



PP115 – Reas Ck – Jul 2011 Jan 2018 Nov 2022

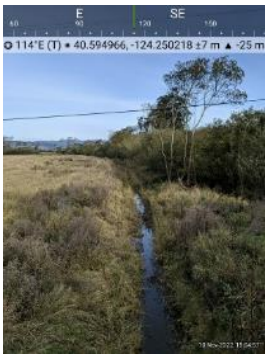


PP109 – Dillon Br Dwn – Nov 2014 Jan 2015 Dec 2022



PP103 – Up Strm – Apr 2017 Dec 2017 Nov 2022





PP9 – Fulmor Br E – Oct 2018 Oct 2020 Dec 2022

Photo documentation indicates that vegetation continues to establish on Phase 1 and 2 where seed mixes are persisting and natural recruitment of natives, non-natives, and invasives are evolving. Some sites are experiencing increasing canopy cover.

GEOMORPHIC

Monitoring Task: Cross Sectional and Longitudinal Surveys – Riverside Ranch – Phase 1 - Erosion and Sediment Deposition Surveys

Agencies/Acts: Coastal Commission, and California Environmental Quality Act (CEQA)

Compliance Documents: Coastal Development Permit- Special Conditions; Salt River Ecosystem Restoration Project Final Environmental Impact Report (FEIR); and Salt River Ecosystem Restoration Project Adaptive Management Plan

Description: Cross-sectional and longitudinal profile surveys are performed across and along the main channel Salt River at established sites on the interior northern and southern slough channels.

Goals:

- Cross-sectional and longitudinal surveys will describe how the channel is remaining consistent with restoration designs or if areas are aggrading or eroding to the point of intervention.

Report: DUE LIMITED FUNDING AND THE LACK OF A QUALIFIED SURVEYOR, A PHASE 1 GEOMORPHIC SURVEY WAS NOT PERFORMED IN 2022.

However, considering the limited winter flow input due to critical drought conditions and the relatively stable geometry of the constructed Salt River channel and interior slough channels over the past eight years, the Humboldt County Resource Conservation District feels confident that no significant changes in channel functionality is occurring that would merit intervention.

GEOMORPHIC

Monitoring Task: Cross Sectional and Longitudinal Surveys-Salt River Channel Corridor –Phase 2 - Erosion and Sediment Deposition Surveys

Agencies/Acts: Coastal Commission, and California Environmental Quality Act (CEQA)

Compliance Documents: Coastal Development Permit- Special Conditions; Salt River Ecosystem Restoration Project Final Environmental Impact Report (FEIR); and Salt River Ecosystem Restoration Project Adaptive Management Plan

Description: Cross-sectional and longitudinal profile surveys are performed across and along the Phase 2 main channel Salt River.

Goals:

- Cross-sectional and longitudinal surveys will describe how the channel is remaining consistent with restoration designs, or if areas are aggrading or eroding to the point of intervention.

Report: 2022 Channel Profile Report: Salt River Ecosystem Restoration Project – Phase Two – Year 2022 by Humboldt County Resource Conservation District. January 2022.

Methods: In the previous four years, channel monitoring consisted of performing elevational surveys at four established cross-sections and within the entire constructed 3.5 mile length of the Phase 2 channel by an experienced surveyor or engineer. However, in 2022, due to funding constraints and limited availability of surveyors and engineers, elevational surveys were not performed. As a substitute for these surveys,

three Humboldt County Resource Conservation District staff members noted observations of the channel's geomorphic condition when out in the corridor throughout the 2022 year (Figure 4).

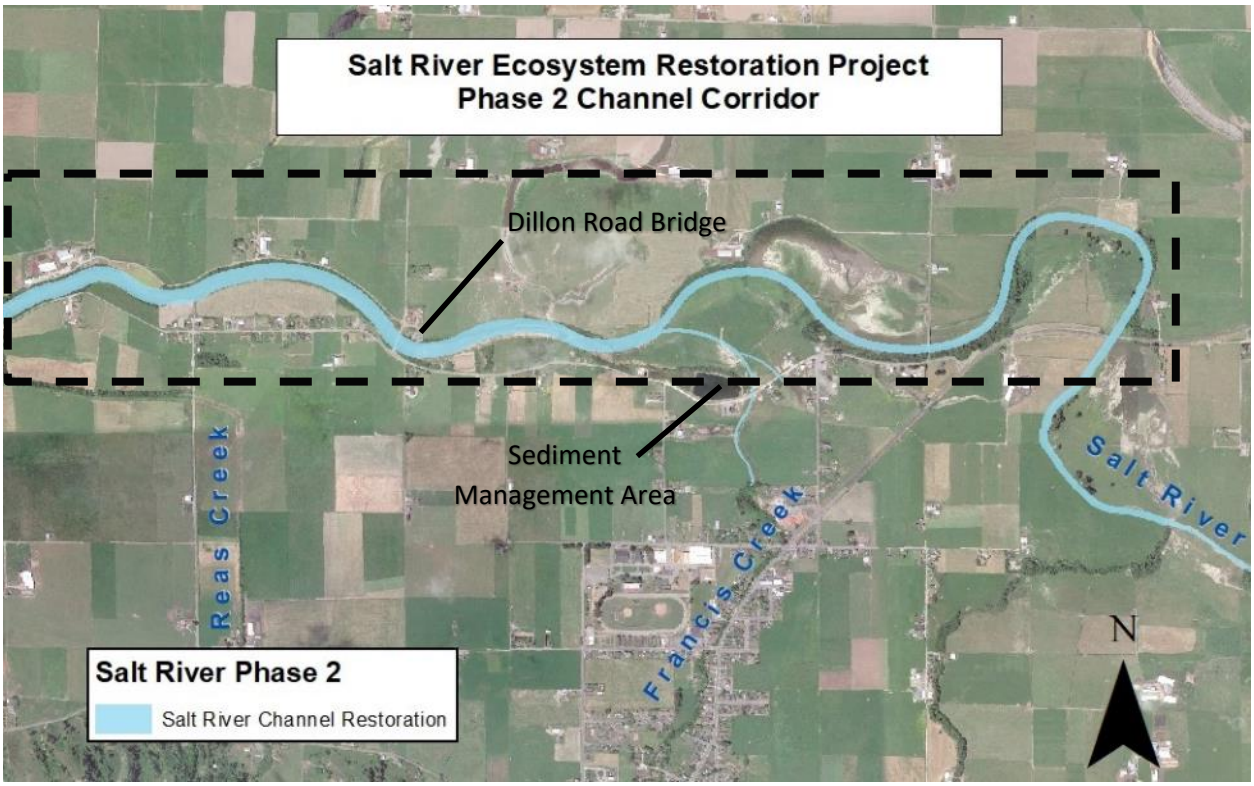


Figure 4: Salt River Phase 2 Channel Corridor. Dashed box delineates the Phase 2 channel that is constructed and surveyed.

Results and Discussion: The observational survey noted water presence throughout the Salt River Phase 2 active channel from Reas Creek to Francis Creek, where tidal influence was seen up to the Dillon Road Bridge area. Limited river flow occurred during wet winter months in the Salt River channel above the Francis Creek confluence, but was primarily dry in the summer and fall months, as no consistent flow input exists in this upstream area.

Established reaches of the Salt River channel (below the confluence of Francis Creek) were seen to have a channel bottom with a naturally formed thalweg, some undercut banks, and vegetated banks. The Salt River channel above the Francis Creek confluence is retaining its constructed channel trapezoidal geometry. Further observations gathered during the entire channel walk did not indicate substantial changes in the channel geometry from previous surveys. No new bank slumping, erosion, scour, or deposition were observed in or along the channel.

Some beds of cattail (*Typha sp.*) continue to be noted in the channel between the Sediment Management Area and Dillon Road Bridge. This area could slow down water flow, causing deposition within the river channel. It was noted that sections of the channel that had a closed riparian canopy and/or tidal influence did not contain in-channel vegetation. In 2022, maintenance of the channel included the excavation of aggraded sediments in the Salt River immediately upstream and downstream of the sediment management area (SMA) confluence, as well as wood debris removal within the Salt River channel approximately 1,000 feet upstream of the SMA.

LIST OF AVAILABLE REPORTS

H. T. Harvey with Winzler and Kelly. 2012. Salt River Ecosystem Restoration Project Habitat Mitigation and Monitoring Plan. Prepared for the Humboldt County Resource Conservation District. Eureka, California

Humboldt County Resource Conservation District. 2022. Salt River Ecosystem Restoration Project – Photo Monitoring - 2022. Eureka, California.

Humboldt County Resource Conservation District. 2023. 2022 Channel Profile Report: Salt River Ecosystem Restoration Project – Phase Two – Year 2022. Prepared by the Humboldt County Resource Conservation District. Eureka, California. January 2022.

Humboldt County Resource Conservation District. 2023. Salt River Ecosystem Restoration Project Spring-Summer Fish Monitoring Program, 2022. Results of Fish Species Presence and Distribution Monitoring Conducted From April to June 2022 within the Salt River, Eel River Estuary, Phase 2 Project Area, Humboldt County California Prepared by HCRCD. February 2023.

J.B. Lovelace & Associates. 2023. 2022 Annual Habitat Monitoring Report - Salt River Ecosystem Restoration Project. Prepared for the Humboldt County Resource Conservation District.