

Salt River Ecosystem Restoration Project



Adaptive Management Plan Monitoring Report 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 for over 30 years. 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 bounded 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 flows across the 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, five Salt River tributaries originating in the Wildcat Hills above the town of Ferndale (Coffee, 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 in private ownership.

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 divided into the tidal salt marsh restoration area (Phase 1) and the riverine corridor restoration area (Phase 2). Within the two restoration areas, 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 environmental and geomorphically acceptable adaptive maintenance and management program to maintain hydraulic and ecological function in the Project area into the future.

In 2013, the restoration of Riverside Ranch (Phase 1 of the Project) restored 330 acres of pasture land back to intertidal wetland habitat, while also preserving approximately 70 acres that are 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 a 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 of 2013, 2014, 2015, 2017, 2018, and 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 Creek). The 2017 construction season also restored 0.5 miles of the channel and floodplain in Francis Creek. Approximately 1.2 miles of the Phase 2 construction remains to be constructed (Figure 1).

Salt River Ecosystem Restoration Project Permitted Project Area & Implementation Status

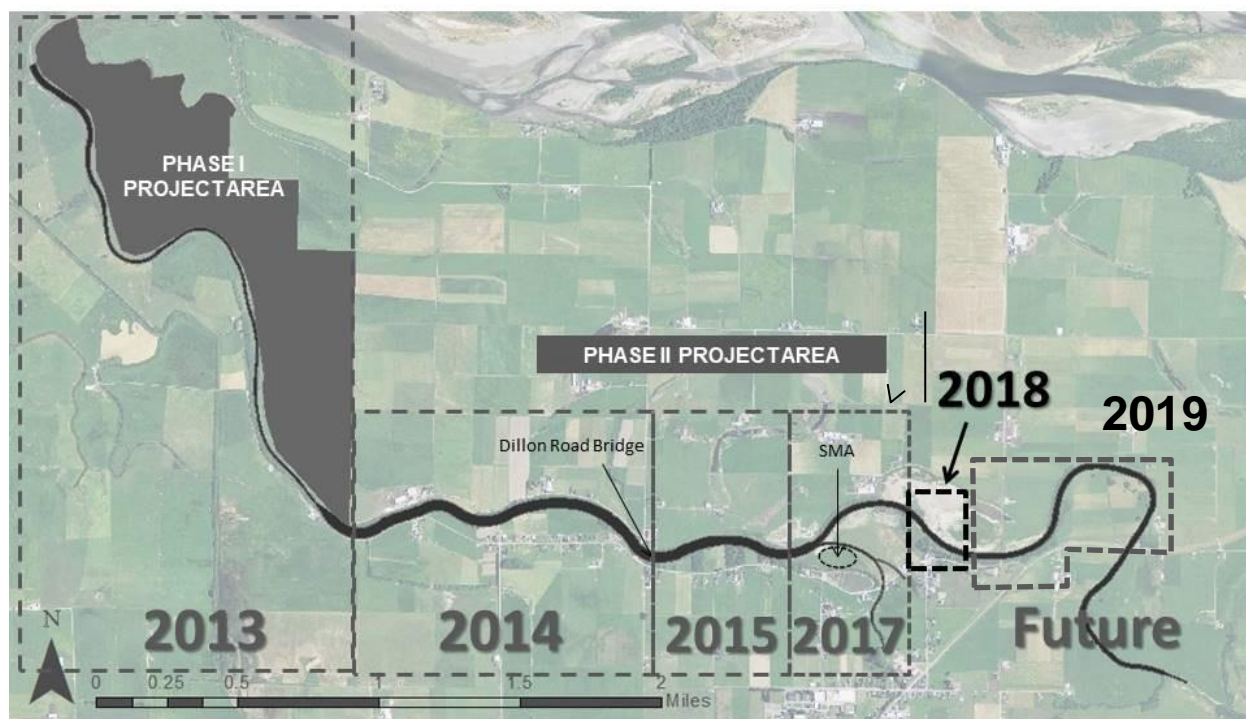


Figure 1: Salt River Ecosystem Restoration Construction Timeline as of 2023

Upon completing portions of the Project, monitoring is performed under the 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) and the Adaptive Management Plan (AMP). This report provides information on data collected for monitoring tasks pertaining to the AMP of the Salt River Ecosystem Restoration Project as follows:

- Phase 1: Year 10 (post-construction 2013)
- Phase 2: Year 9, Year 8, Year 6, Year 5, Year 4 (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 2023 monitoring results provide a point of reference on how the restoration activities completed in 2013, 2014, 2015, 2017, 2018, and 2019 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. The 2022/2023 hydrologic year experienced 39.58 inches of precipitation, which is about 5.4 inches below the average rainfall (45 inches) for coastal Humboldt County.

The following is a brief summary of the findings of the various monitoring efforts under the identified Adaptive Management Plan's monitoring categories. Please reference the individual reports listed at the end of this report for more detailed findings.

Erosion, Sediment Deposition, and Geomorphic Condition Monitoring and Adaptive Management for Salt River Corridor

Previous cross-section surveys on Phase 2 of the Salt River corridor indicate that the Salt River channel is adjusting to the environmental conditions and is trending toward a scour process where the channel bottom elevation is decreasing overall. Tidal exchange and water quality monitoring was required for the first three years after Project construction in tidally influenced regions and was concluded in its entirety across all phases in the Salt River Ecosystem Restoration Project in 2016. Monitoring indicated that water quality parameters achieved ranges appropriate for salmonids at sampling sites and the restored tidal prism reached the predicted extent in the restoration area. Other monitoring under this heading included observing the function of bridges and culverts. For the 2023 monitoring period, the existing Dillon Road Bridge and the replaced Port Kenyon Road Bridges located within the constructed Project footprint were functioning normally. The private agricultural bridge on Francis Creek and another private agricultural bridge on Salt River that was installed were checked for functionality in early January by HCRCD. No culverts were installed during the Phase 2 construction, though adjacent culverts are present along the Project footprint at Reas Creek, the Boynton swale, and Bush Street. These were found to be unimpeded. Geomorphic surveys in the Sediment Management Area (SMA) indicate that it captured approximately 16,150 cubic yards since it was last

cleaned out in 2022 due to a heavy winter. This triggered HCRCD to secure funding to clean out the SMA. 14,000 cubic yards of sediment were removed between September and October 2023.

Erosion, Sediment Deposition, and Geomorphic Condition Monitoring and Adaptive Management for Riverside Ranch

Previous surveys indicate this tidally influenced Phase of the Salt River Ecosystem Restoration Project is highly dynamic with channel capacity fluctuating between years. Past geomorphic surveys revealed deposition and scour in anticipated areas. Additional general visual inspections of the Phase 1 elements include the setback berm, outboard ditches, and tide gates. The setback berm is structurally stable, however, will undergo adaptive management measures to adjust for flooding and drainage needs. All three tide gates are functioning normally with typical leakage, the doors have not been observed to have any obstructions.

Water Quality Monitoring and Adaptive Management for the Salt River Corridor and Riverside Ranch

Water quality monitoring was required for the first three years after Project construction in tidally influenced regions. Water quality monitoring was concluded in its entirety across all phases of the Salt River Ecosystem Restoration Project in 2016. Monitoring indicated that water quality parameters achieved ranges appropriate for salmonids at sampling sites and the restored tidal prism reached the predicted extent in the restoration area.

Habitat Development, Vegetation and Invasive Species Monitoring, and Adaptive Management for Salt River Corridor and Riverside Ranch

A variety of monitoring and management actions are included under this category, primarily relating to fish and vegetation. An annual spring and summer fish sampling program has been established since 2014 in the constructed phases of the Project. The California Department of Fish and Wildlife led fish monitoring efforts from April to June 2023. Over 16 salmonids were sampled across the Salt River and Francis Creek restoration area. Other native fish species that were sampled include three-spined stickleback, staghorn sculpin, prickly sculpin, saddleback gunnel, and starry flounder.

Both Phase 1 tidal marsh restoration and Phase 2 Salt River corridor restoration areas were surveyed in 2023. The vegetative monitoring indicated that invasive species are exceeding the maximum percent cover allowances. Some invasive

species control occurred throughout the Project footprint in 2022 but has not been continued in 2023.

INTRODUCTION

The Salt River Ecosystem Restoration Project (SRERP) took some 30 years to develop and drew upon several studies and assessments completed during that time that 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 Adaptive 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 ten year period, post-implementation. Monitoring was conducted prior to beginning Project 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 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 2023 Adaptive Management Plan Monitoring report is structured and provides findings related to the monitoring requirements in the four identified categories:

- *Erosion, Sediment Deposition, and Geomorphic Condition Monitoring and Adaptive Management for Salt River Corridor*
- *Erosion, Sediment Deposition, and Geomorphic Condition Monitoring and Adaptive Management for Riverside Ranch*
- *Water Quality Monitoring and Adaptive Management for the Salt River Corridor and Riverside Ranch*
- *Habitat Development, Vegetation and Invasive Species Monitoring,*

and Adaptive Management for Salt River Corridor and Riverside Ranch

Within each category is a description 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) the 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.

*Erosion, Sediment Deposition, and Geomorphic Condition
Monitoring and Adaptive Management for Salt River Corridor*

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 main channel of the 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: N/A.

Methods: In previous 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, starting in 2022, due to funding constraints and limited availability of surveyors and engineers, elevational surveys were not performed. As a substitute for these surveys, Humboldt County Resource Conservation District staff members perform an annual creek walk to check for the channel's geomorphic conditions (Figure 2). This year due to weather constraints and staff availability the creek walk will be completed in early January.

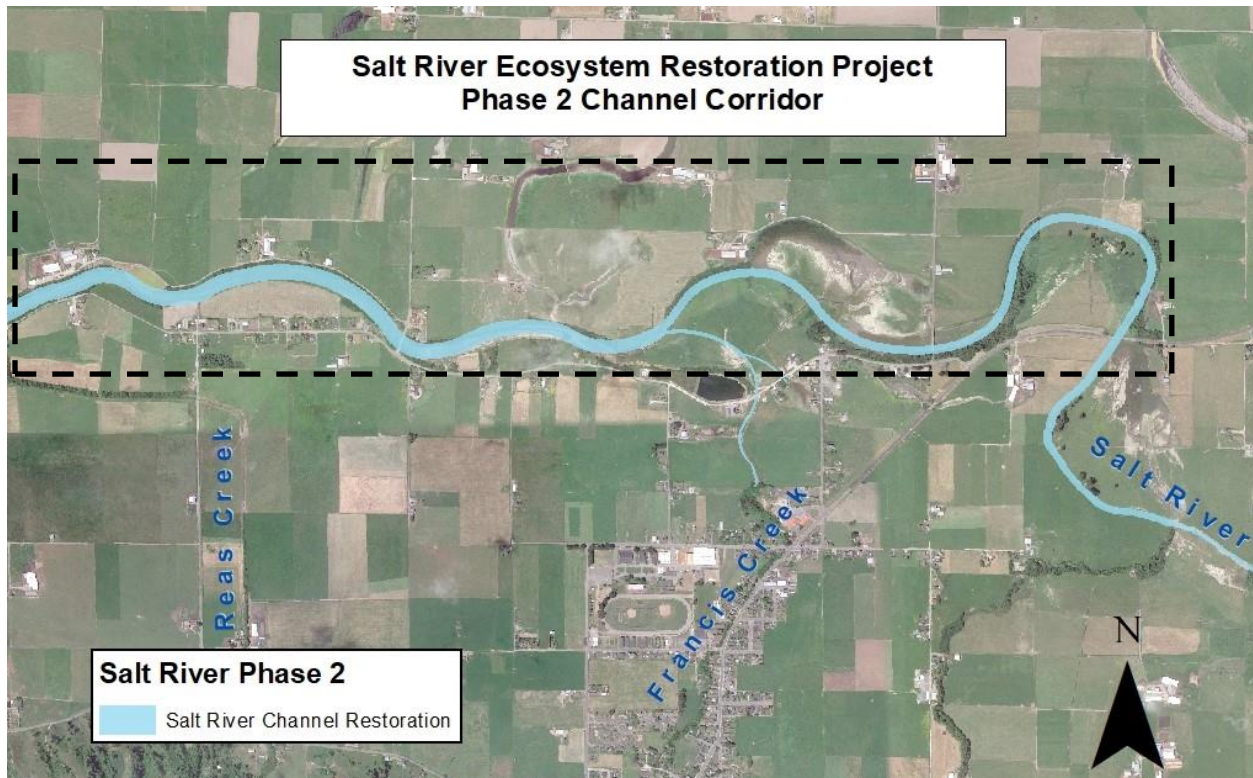


Figure 2: Salt River Phase 2 Channel Corridor. The dashed box delineates the Phase 2 channel that is constructed and surveyed.

Results and Discussion: Although the creek walk was not completed in 2023, HCRCD did check all culverts, tide gates, and bridges along the Project and found them all to be functioning properly. No concerns about the channel or floodplains were received from participating Project landowners. Furthermore, HCRCD staff and consulting engineers did not note any concerns when discrete areas of the Salt River and Francis Creek were observed.

Recommendations: Continue to perform geomorphic or observational surveys in the Salt River channel corridor.

Erosion, Sediment Deposition, and Geomorphic Condition
Monitoring and Adaptive Management for Salt River Corridor

Monitoring Task: Bridges and Culvert Inspections on Salt River Corridor

Agencies/Acts: Coastal Commission

Compliance Documents: Coastal Development Permit- Special Conditions; Salt River Ecosystem Restoration Project Adaptive Management Plan

Description: Annual visual inspection of culverts and bridges in the restored Salt River corridor.

Goals:

- All culverts and bridges on the restored Salt River corridor are to remain unobstructed and functional.

Report: N/A.

Methods: All culverts and bridges will be visually inspected upstream and downstream, inlet/outlet, at low and high water flows to determine that these structures are functioning as intended and not being occluded by debris or sediment deposition. Erosion factors will also be noted. Dillion Road, Sousa, Albin, Francis Creek, and Fulmor Road Bridges span the restored Salt River since 2019. Existing and adjacent culverts at Reas Creek, Boynton Swale, and Bush Street deliver flows to the Salt River (Figure 3).



Figure 3: Bridges and Culverts Locations on the Salt River restored corridor

Results and Discussion: Four bridges (Dillion Road, Albin, Sousa, Francis, and Fulmor) span the restored Salt River channel. The Albin, Sousa, and Francis bridges were replaced or constructed as part of the Salt River restoration. Bridges were observed during variable flows throughout 2023 and no debris in the channel or flood plain is racking up on the bridge abutments or along banks. Erosion around the footings is not occurring. The Reas Creek and Bush Street culverts have been functioning during high and low flows and appear to be functioning normally. Further follow-up on the Bush Street culvert is merited due to the dense

vegetation blocking the tide gate from functioning fully. The drainage does not seem to be affected but the tide gate appears to have potential blockages preventing its ability to close completely. The Boynton Swale has been cleared and maintained by the landowners ensuring its continued function.

Recommendation: Continue to monitor bridges and culverts at high and low flows.

Erosion, Sediment Deposition, and Geomorphic Condition
Monitoring and Adaptive Management for Salt River Corridor

Monitoring Task: Inspection of the Sediment Management Area

Agencies/Acts: Coastal Commission

Compliance Documents: Coastal Development Permit- Special Conditions; Salt River Ecosystem Restoration Project Adaptive Management Plan

Description: Annual inspection of the sediment management area at the confluence of Francis Creek and the Salt River.

Goals:

- Sustain hydraulic conveyance and ecological function.
- Minimize sediment management maintenance activities.

Report: N/A

Methods: Observational assessments in late spring determined the need for sediment removal after two storm-related FEMA disaster events. Topographic elevational points were taken across the surface of the sediment management area in June 2023 by an engineer. Sediments in the sediment management area were dry and solid enough to accommodate access by foot.

Results & Discussion: The active sediment management area was evaluated in the summer of 2023 when surface water was confined to an established channel through the SMA. A topographic survey determined that the SMA warranted the removal of captured sediment. In June 2023, topographical surveys calculated that SMA captured approximately 16,150cy of sediment (the SMA can accommodate up to 15,000cy) (Figure 4). To prepare for the clean out of the SMA, a portion of the Francis Creek channel, from the SMA diversion structure to the confluence of the Salt River, was de-fished by CDFW in mid-June, and flow was diverted from the SMA into the SMA diversion channel to allow for the SMA collection basin to dry. Funding was secured for the excavation of sediments and delivery of sediments to

[illegible]

13



Figure 5a (left) 2023 before the removal of sediment from the SMA. Figure 5b (right) 2023 after the removal of sediment from the SMA.

Recommendation: Perform vegetation control measures in summer 2024 if no clean out occurs to avoid the need to remove large vegetation during future cleanout activities. Perform a visual evaluation in May 2024 to determine if sediment removal activities are required in the fall of 2024.

*Erosion, Sediment Deposition, and Geomorphic Condition
Monitoring and Adaptive Management for Riverside Ranch*

Monitoring Task: Cross-Sectional and Longitudinal Surveys- Phase 1 - Riverside Ranch 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 and on the interior northern and southern slough channels.

Goals:

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

Report: PHASE 1 GEOMORPHIC SURVEY WAS NOT PERFORMED IN 2023

DUE TO THE LACK OF A QUALIFIED SURVEYOR.

Considering 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 are occurring that would merit intervention.

Recommendation: Perform geomorphic or observational monitoring in the future.

Erosion, Sediment Deposition, and Geomorphic Condition Monitoring and Adaptive Management for Riverside Ranch

Monitoring Task: Culvert and Tide Gate Inspections on Riverside Ranch

Agencies/Acts: Coastal Commission

Compliance Documents: Coastal Development Permit- Special Conditions; Salt River Ecosystem Restoration Project Adaptive Management Plan

Description: Annual inspection of tide gates, culverts, and outboard drainage ditch.

Goals:

- All tide gates and remaining culverts on Riverside Ranch remain unobstructed and operational.
- The Riverside Ranch outboard ditch will be monitored for flow and erosion impacts and maintained.

Report: N/A.

Methods: Any culverts or tide gates remaining or installed in Riverside Ranch (Figure 6) as part of the restoration design will be inspected annually and regularly maintained to ensure that they are functioning as designed. Annual reconnaissance of the outboard drainage ditch adjacent to the Riverside Ranch berm will also be conducted to identify areas of impacted flow conveyance and/or erosion and any maintenance recommendations.

HCRCDD staff monitored the above items periodically to ensure tide gates and the outboard ditch were working properly to prevent high salinity water from encroaching onto neighboring lands.

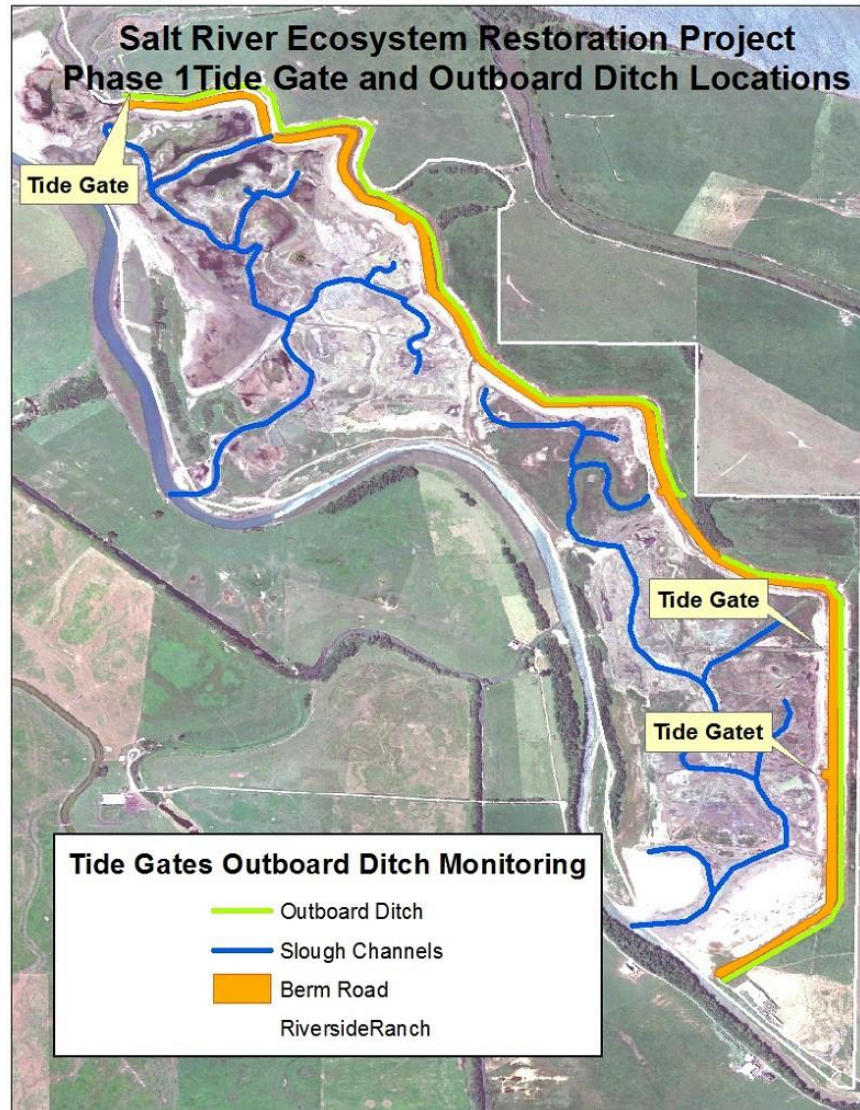


Figure 6: Tide Gates and Outboard Ditch Locations

Results and Discussion: The Phase 1 (Riverside Ranch) Project area is monitored for various items, which include the three tide gates and the outboard ditch. The 2023 monitoring was conducted periodically. The installed tide gates are functioning as expected. No debris has been observed to obstruct the closing or opening of the tide gates. Vegetation in the outboard ditch is managed through grazing activities by the agricultural lessee.

Recommendation: Continue to perform culvert and tide gate inspections on Riverside Ranch.

*Erosion, Sediment Deposition, and Geomorphic Condition
Monitoring and Adaptive Management for Riverside Ranch*

Monitoring Task: Setback Berm Inspection

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

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

Description: Visual inspections for evidence of erosion and/or cracks after major storm events and high tides.

Goals:

- Determine if any annual maintenance is needed on the setback berm (berm road).

Report: N/A.

Methods: Monitoring will consist of qualitative monitoring including visual inspections performed annually and after major storm and high tide events. Monitoring will look for evidence of obvious erosion caused by flooding or erosion resulting from wind-generated waves. If significant erosion or signs of potential failure are observed, engineering evaluations will be performed to determine whether any structural repairs are needed.

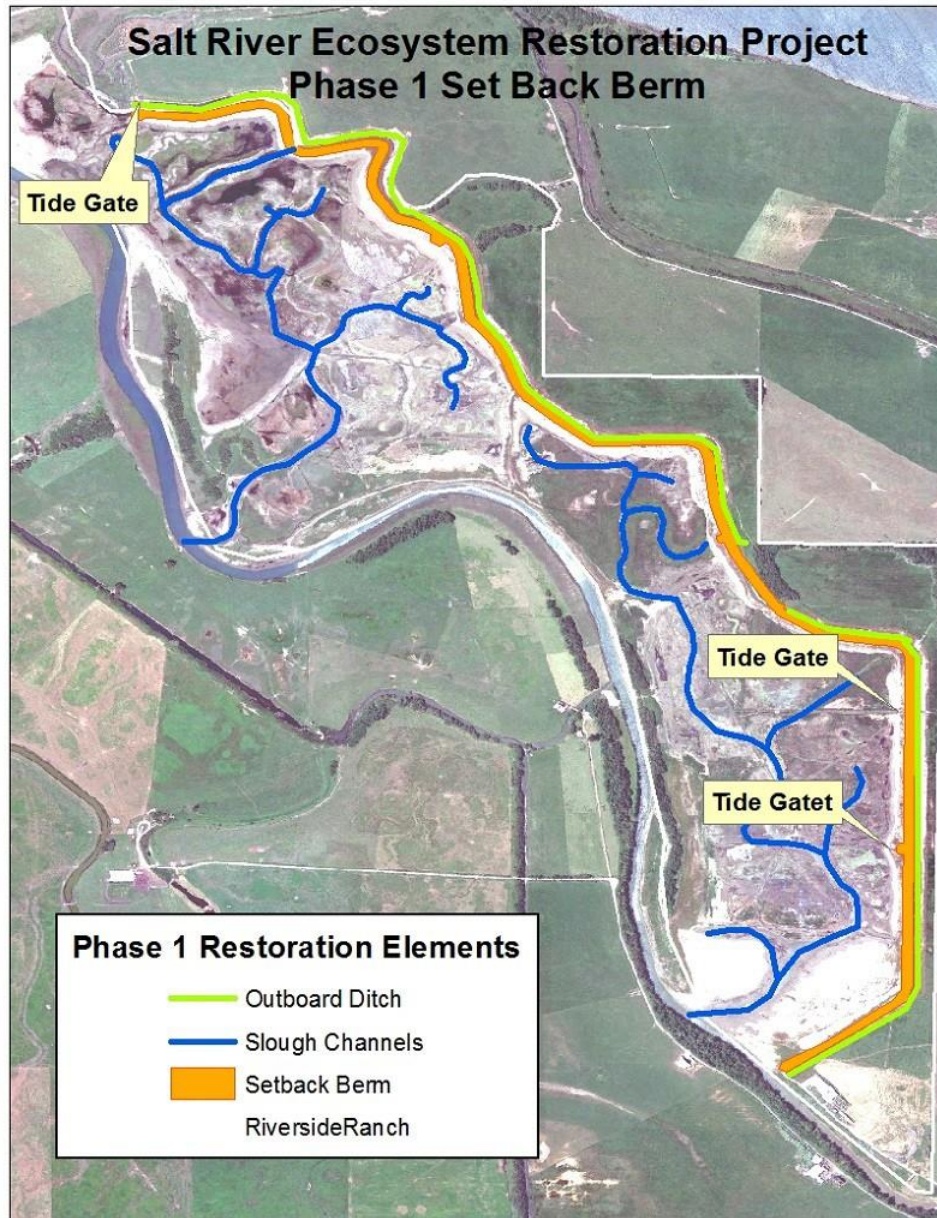


Figure 7: Setback Berm Location

Results and Discussion: Observations of the setback berm and the berm road (Figure 7) were performed periodically in 2023. Minor rills are observed on the estuary side of the berm and have been stable since 2016. Some previous minor erosion caused by wind wave fetch during large winter events is also evident on the northern end of the berm on the estuary side. The road that leads up to the berm from the barn was impacted by a large Eel River flood event in February 2021, where all gravel and road base material was washed away. California Department of Fish and Wildlife (Riverside Ranch landowner) intends to repair the impacts to the road.

Evaluation of the setback berm occurred during 2021 following the initial assessment of potentially modifying the setback berm to alleviate large flood impacts. A topographic survey of the setback berm indicates that the berm has not settled as anticipated and is approximately the same construction height as in 2013 (GHD and Michael Love & Associates 2021). In 2022, further extensive hydrologic analysis also indicates that the setback berm and the associated outboard ditch could be modified to increase drainage and alleviate large flood impacts. In early 2023, funding was secured to finalize plans, confirm permitting, and implement modifications. It is anticipated that construction could occur in the summer of 2024.

Recommendation: Continue to perform annual setback berm inspections. Move forward with berm modification implementation.

Water Quality Monitoring and Adaptive Management for the Salt River Corridor and Riverside Ranch

Monitoring Task: Tidal Exchange and Water Quality

Agencies/Acts: Coastal Commission

Compliance Documents: Coastal Development Permit- Special Conditions; Salt River Ecosystem Restoration Project Adaptive Management Plan

**Water level and water quality parameters within the tidally influenced areas of the restored Project were required to be conducted for the first three years post-construction. The 2016 monitoring effort marked the end of water level and water quality monitoring. Therefore, water level or water quality monitoring data was not produced for this monitoring report. Additional water quality spot measurements are taken monthly from spring to summer during fish surveys at each monitoring site and indicate appropriate water quality parameters for healthy fish habitat are being met.*

Recommendation: Discontinue water quality monitoring as this monitoring task is complete.

Habitat Development, Vegetation and Invasive Species Monitoring, and Adaptive Management for Salt River Corridor and Riverside Ranch

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 the presence of salmonids throughout the Project footprint and for 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, 2023. Results of Fish Species Presence and Distribution Monitoring Conducted From April to June 2023 within the Salt River, Eel River Estuary, Phase 1 & 2 Project Area, Humboldt County California Prepared by HCRCD. August 2023.

Methods: The California Department of Fish and Wildlife and the Humboldt County Resource Conservation District led and/or participated in the 2023 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 the 2023 monitoring season, eleven sites were selected across the Project footprint (Figure 8). The site selection was based on environmental conditions at each site (e.g., the presence of water and depth of water). The monitoring sites were selected across the Phase 1 and 2 Project footprints as required by monitoring documents.

In 2023, once a month, from April to June, sites across the restored portions of Phase 1 & 2 (Figure 8) of the Salt River Ecosystem Restoration Project were surveyed for salmonids and tidewater gobies during low tide periods. Eleven (11) sites on constructed portions of the Phase 1 and 2 restoration areas were selected and surveyed for fish presence and species distribution. In 2023 sites included: 3, 4, 10, 15, 19, 20, 24, 25, 26, 27, and 29. 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 a 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 a 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 was limited to sites 24, 25, 26, 27, 29.

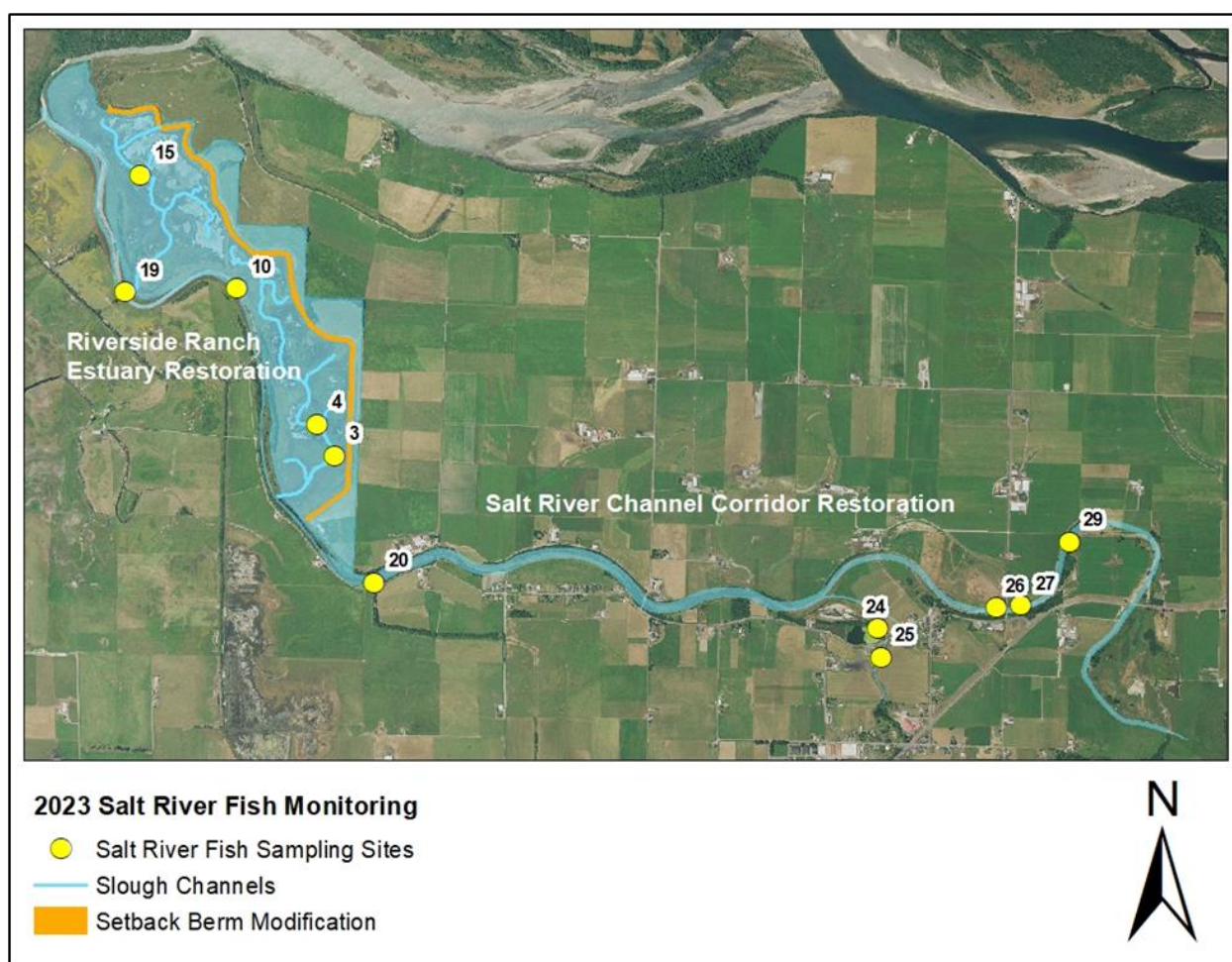


Figure 8: Fish Monitoring Sites Across Phase 1 & 2 of the Salt River Ecosystem Restoration Project

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 25.4°C (June) and a minimum of

10.3°C (April).

Seining and minnow trapping efforts at the eleven fisheries monitoring sites identified the presence of 13 known species. Approximately 2,224 individuals were captured (approximate numbers in 2023 were often estimated during the capture of large numbers of fish such as three-spined stickleback). The following table (Table 1) presents the total number of fish and marine invertebrates sampled from April to June in 2023.

Table 1. Number of Individual Fish Captured by Each Month's Fish Survey Efforts in Salt River Ecosystem Restoration Project, Phase 2 Area, in 2023

Common Species Name	2023			
	April	May	June	Total
Chinook Salmon	0	1	0	1
Coho Salmon	10	4	0	14
Steelhead	0	0	1	1
California Roach	27	6	0	33
Prickly Sculpin	11	62	35	108
Sacramento Pikeminnow	52	135	16	203
Saddleback Gunnel	0	0	2	2
Shiner Perch	0	1	39	40
Staghorn Sculpin	68	73	42	183
Starry Flounder	0	5	6	11
Three-Spine Stickleback	38	109	278	425
Top smelt	0	0	1	1
Unknown Baitfish	0	0	1200	1200
Unknown Sculpin	0	0	2	2
TOTAL	206	395	1622	2223

Salmonid Species:

Ten juvenile Coho salmon (*Oncorhynchus kisutch*) were present during the April sampling and four were present during the May sampling. One juvenile Chinook salmon (*Oncorhynchus tshawytscha*) was found during the May sampling. One Steelhead (*Oncorhynchus mykiss*) juvenile was sampled during the June sampling (Table 1). Seven coho were captured at site #10, two were captured at site #19, and one at site #26 in the minnow trap. One Steelhead (*Oncorhynchus mykiss*) juvenile was sampled at site #24 (Figure 8).

Non-Salmonid Species:

Other fish species sampled in 2023 included the following: Three-spined Stickleback

(*Gasterosteus aculeatus*), Staghorn sculpin (*Leptocottus armatus*), Prickly Sculpin (*Cottus asper*), Sacramento Pikeminnow (*Ptychocheilus grandis*), Starry flounder (*Platichthys stellatus*), Saddleback Gunnel (*Pholis ornate*), Shiner Perch (*Cymatogaster aggregate*), Topsmelt (*Atherinops affinis*), and California Roach (*Hesperoleucus symmetricus*) among others unidentifiable species. The number of captured Sacramento pikeminnow (*Ptychocheilus grandis*) (203 individuals) has once again increased from the 2022 sample size of 175 individuals and the 2019 sample size of 65 individuals. The largest number of pikeminnow sampled was at site 24 with 73 individuals counted.

Fish are utilizing the restored length of the 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.

Recommendations: Continue spring-summer salmonid and tidewater goby fish surveys.

Habitat Development, Vegetation and Invasive Species Monitoring, and Adaptive Management for Salt River Corridor and Riverside Ranch

Monitoring Task: Aleutian Goose Short-Grass Habitat Monitoring

Agencies/Acts: California Department of Fish and Wildlife (CDFW)

Compliance Documents: Salt River Ecosystem Restoration Project Adaptive Management Plan

Description: Approximately 72 acres of land retained on Phase 1 (Riverside Ranch) of the Salt River Ecosystem Restoration Project will be agriculturally managed. Agricultural activities will follow CDFW protocols in order to achieve short-grass habitat for migrating flocks of Aleutian cackling geese and other wetland-associated birds.

Goals:

- Develop a pasture management plan in Phase 1.
- Annual evaluation of vegetation in Phase 1.
- Provide short-grass habitat for Aleutian Cackling Geese.

Report: 2023 Aleutian Goose Habitat Evaluation – Riverside Ranch – Salt River Ecosystem Restoration Project – Memorandum. Prepared for and by the Humboldt

County Resource Conservation District.

Methods: To evaluate pasture vegetation for Aleutian Cackling geese habitat, two fields were chosen which provided the highest opportunity for access for geese (Figure 9). The criteria for these areas primarily included open habitat with little or no hedgerows or trees where predators could roost. Grass and other vegetative species were identified in each field. Sward heights were measured at 5 sites across each field and the average was determined. Other observations were considered such as the presence of standing water and density of pasture vegetation.

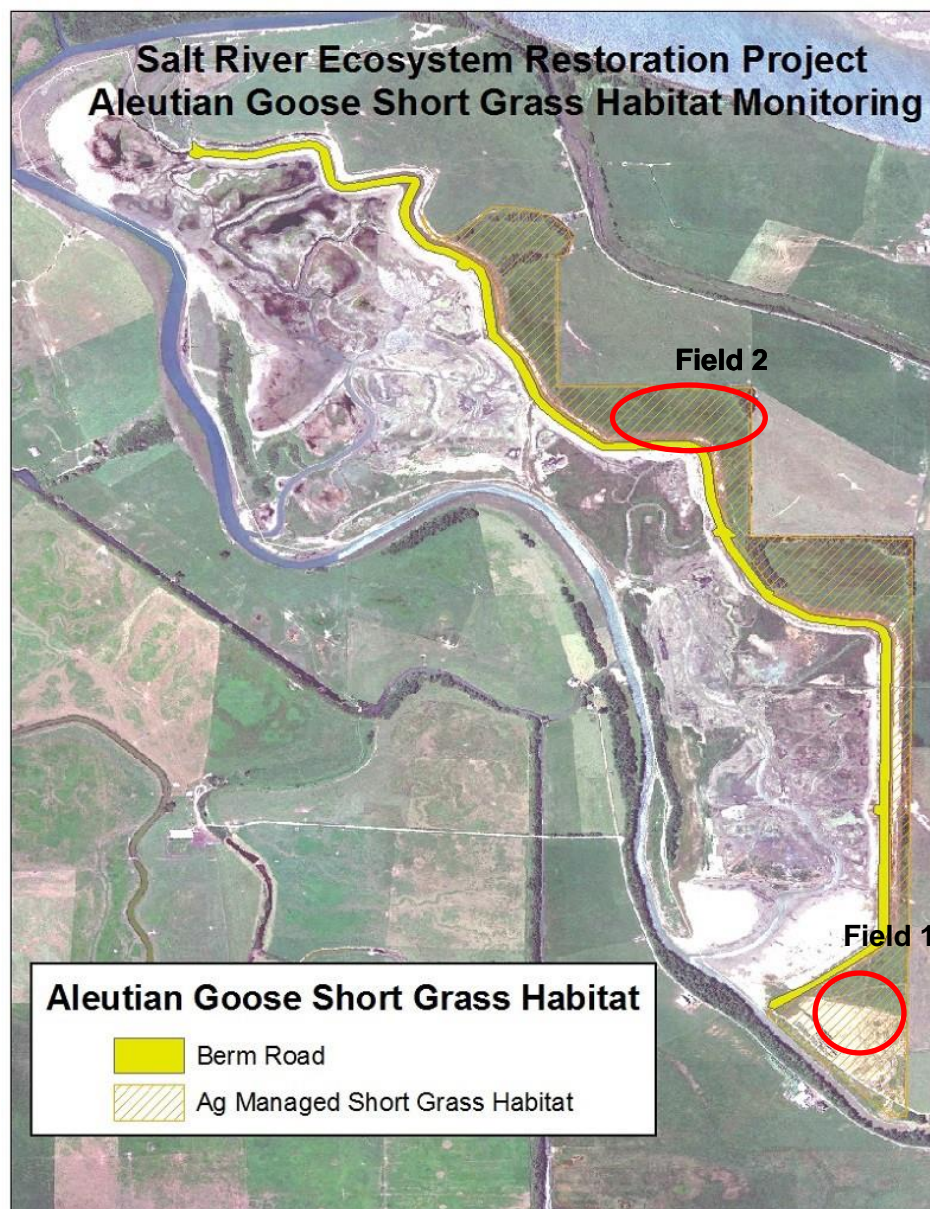


Figure 9: Managed Short-Grass Habitat on Phase 1

Results and Discussion:

The 72 acres of agricultural lands (Figure 9) on Riverside Ranch are managed by the California Department of Fish and Wildlife (CDFW) as a Wildlife Management Area (WMA). The 72 acres are grazed by an agricultural lessee. CDFW approved the lessee's submitted agricultural management practices for Riverside Ranch which includes rotational grazing of 40 to 200 heifers, depending on grass height, with the option to hay after August 15th to maintain desired grass height.

A field visit was performed on March 24, 2023, prior to spring turnout. It should be noted that geese have not been observed in the Ferndale bottoms area during the 2022/2023 winter. Aleutian and Canada geese were present further north in the Humboldt Bay area. Results for sward height and habitat features are shown in Table 2.

Table 2: Short grass habitat monitoring results for Riverside Ranch – February 2023

FIELD	MONTH	AVERAGE SWARD HEIGHT (inches)	CDFW SWARD HEIGHT CRITERIA (Dec to March) (inches)	VEGETATION AND FEATURES
1	Mar	5.47	1.5 to 3	Dominant ryegrass, sparse bent grass, and sparse clover. Dense green pasture. 97% of the field consists of grass and clover. High-quality field. Contains multiple water features
2	Mar	5.52	1.5 to 3	Sparse bent grass, sparse clover, sparse rye, undesirable wetland species such as Juncus. Mostly wetland species 70% Juncus reeds Low-quality field for forage

				Frequent bare ground and some small ponds of standing water.
FIELD	MONTH	AVERAGE SWARD HEIGHT (inches)	CDFW SWARD HEIGHT CRITERIA (Dec to March) (inches)	VEGETATION AND FEATURES
1	Mar	5.47	1.5 to 3	<p>Dominant ryegrass, sparse bent grass, and sparse clover. Dense green pasture.</p> <p>97% of the field consists of grass and clover.</p> <p>High-quality field.</p> <p>Contains multiple water features</p>
2	Mar	5.52	1.5 to 3	<p>Sparse bent grass, sparse clover, sparse rye, undesirable wetland species such as Juncus.</p> <p>Mostly wetland species 70% Juncus reeds</p> <p>Low-quality field for forage</p> <p>Frequent bare ground and some small ponds of standing water.</p>

Riverside Ranch Pasture fields were evaluated for short grass habitat in March 2023. The fields were agriculturally managed by using lightweight cows (heifers) to graze the pastures. Cows were removed from the pastures in late winter. Grass sward heights were sampled across two fields where biologists determined geese would prefer in terms of access. Sward heights were averaged and the values equaled 5.47 inches and 5.52 inches in the respective fields. CDFW requires that sward height be in the range of 1.5 inches to 3 inches from December to March. The average sward height in field 1 (5.47 inches) is exceeding the criteria range. However, field 1 appeared to have productive grass habitat and small water features that are more desirable to geese (Figure 10a). The average sward height in field 2 is above the range of the December-March criteria, however, the vegetation composition is not as desirable (sparse ryegrass

with wetland species), and frequent bare ground was observed (Figure 10b).



Figure 10a: Field 1 (left) shows lush pastures with water features on the right of the photo. **Figure 10b:** Field 2 (right) shows a sparse pasture with *Juncus* clumps, bare ground, and a water feature that runs through the left side of the field in the image. Overall, the agricultural fields provide a habitat for migrating geese and other species.

Recommendation: Continue the grazing management regime with the lessee and annual monitoring efforts.

Habitat Development, Vegetation and Invasive Species Monitoring, and Adaptive Management for Salt River Corridor and Riverside Ranch

Monitoring Task: Salt Marsh, Riparian, and High Marsh Ecotone Vegetation Percent Cover Survey on Riverside Ranch

Agencies/Acts: Coastal Commission

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

Description: Estimate percent cover of vegetation in the salt marsh, riparian, and high marsh ecotone habitats within the Phase 2B (Middle) Salt River Corridor Restoration Area and Phase 1 Riverside Ranch Tidal Marsh Restoration Area

Goals:

- Achieve Native Vegetation Percent Cover of $\geq 50\%$ in Phase 2B (Middle) Salt River Corridor Restoration Area and Phase 1 Riverside Ranch Tidal Marsh Restoration Area

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

Method: A stratified, randomized sampling approach was used to characterize the abundance, composition, and structural developmental stage of existing vegetation within each sampling region. Sample sizes were determined based on power analyses performed on the most recent preceding SRERP vegetation sampling data for respective habitat types. Using updated SRERP habitat GIS data and ArcMap desktop software, each phase and sub-phase of the restoration area was partitioned into ecologically distinct vegetation sampling regions of perceived relative homogeneity based on currently mapped restoration habitat design components. ArcMap desktop software was then used to randomly distribute sampling plots throughout each of these sampling areas. Given that most sampling regions are composed of multiple, geographically separated polygons, 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 1-m² 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 field data against respective success criteria for specific vegetative parameters, each observed plant species was subsequently

- categorized as: native,
- "non-native non-invasive", or
- invasive

As well as being:

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

The same modified Braun-Blanquet (1928) cover-abundance scale used in previous monitoring efforts was used in the 2023 sampling fieldwork to assign a “cover class” to the visually estimated absolute percent 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 MMP 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: 2023 represents the final monitoring year where vegetation percent cover sampling is scheduled to occur. The total vegetative cover continues to remain fairly stable throughout portions of the SRERP area sampled, with all mean cover estimates exceeding 92%. The lowest total vegetative cover estimate recorded in 2023 was observed in the active channel sampling region of the Phase 2B (Middle) restoration area (Table 3). This is neither surprising nor concerning given the dynamic nature of that sampling region.

Table 3: Summary of 2023 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						
SRERP Habitat Sampling Area	Total Vegetation ¹	Native Vegetation		Non-Native Non-Invasive Vegetation		Invasive Vegetation
	Observed	Observed	2023 Success Criteria ²	Observed	Final Success Criteria ³	Observed
Phase 1 — Riverside Ranch Tidal Marsh Restoration Area						
Salt Marsh <i>Sensu Stricto</i> (n=35)	98.1 [96.0, 99.2]	47.0 [37.4, 56.6]	≥60%	6.4 [3.7, 10.5]	<15%	44.7 [35.0, 55.1] <5%
High Marsh Ecotone (n=20)	96.3 [91.5, 98.3]	72.2 [61.0, 79.8]	≥60%	6.8 [3.8, 10.5]	<15%	17.3 [9.7, 28.1] <5%
Phase 2 — Salt River Corridor Restoration Area						
<i>Phase 2B (Middle) — Salt River Channel Wetlands</i>						
Active Channel (n=25)	92.8 [86.0, 96.6]	40.6 [32.1, 50.2]	≥50%	6.2 [3.6, 9.6]	<15%	46.0 [36.9, 54.8] <5%
Active Bench (n=25)	94.4 [90.4, 97.0]	20.6 [11.1, 33.8]	≥50%	19.9 [12.9, 29.0]	<15%	53.9 [41.9, 65.7] <5%
<i>Phase 2B (Middle) — Riparian Planting Zones</i>						
Replanted Riparian Forest (n=20)	100.0 [N/A]	37.0 [26.3, 51.3]	≥40%	10.5 [5.3, 19.6]	<15%	52.4 [39.3, 64.5] <5%
Active Riparian Berm (n=20)	100.0 [N/A]	22.6 [12.2, 36.4]	≥40%	10.1 [5.7, 16.0]	<15%	67.3 [54.1, 78.4] <5%

Recommendation: Additional revegetation efforts for woody riparian vegetation in the Phase 2B (Middle) restoration area and continued invasive vegetation management actions are recommended throughout SRERP habitats addressed in 2023.

*Habitat Development, Vegetation and Invasive Species Monitoring,
and Adaptive Management for Salt River Corridor and Riverside
Ranch*

Monitoring Task: Woody Vegetation Management

Agencies/Acts: Coastal Commission

Compliance Documents: Coastal Development Permit- Special Conditions; SRERP Adaptive Management Plan

Description: Perform woody vegetation management (e.g. removal or planting of woody vegetation) to ensure the hydrologic function of the Salt River channel.

Goals:

- Woody vegetation will be managed consistently with the goal of maintaining the structure and function of the Salt River corridor.
- Manage situations that impede channel function.
- Woody vegetation management cannot contribute to bank or channel erosion.

Report: N/A

Methods: During field visits to the Salt River and Francis Creek, HCRCD staff performed observational assessments of channel vegetation. The HCRCD also invited landowners to submit maintenance request forms if concerns arise.

Results and Discussion: No notable woody vegetation management actions were observed. However, some woody vegetation was trimmed in the area of the Sediment Management Area. No maintenance request forms, or other communications, were received.

Recommendation: Continue to disseminate and collect landowner maintenance forms to determine woody vegetation maintenance needs.

*Habitat Development, Vegetation and Invasive Species Monitoring,
and Adaptive Management for Salt River Corridor and Riverside
Ranch*

Monitoring Task: Weed Abatement

Agencies/Acts: Coastal Commission

Compliance Documents: Coastal Development Permit- Special Conditions; SRERP Adaptive Management Plan

Description: After 3 years post-construction – weed abatement was performed using a variety of methods

Goals:

- Limit colonization of weedy species within the restoration area.
- Ensure that weedy species do not dominate the restoration area or expand onto adjacent properties.
- Weedy species do not present a detriment toward maintaining a self-sustaining riparian forest or tidal salt marsh.

Reports:

- 2023 Annual Habitat Monitoring Report - Salt River Ecosystem Restoration Project, Prepared for the Humboldt County Resource Conservation District by J.B. Lovelace & Associates
- Salt River Flash Grazing Assessment 2022. Prepared by the Humboldt County Resource Conservation District. Eureka, CA

Methods: Review 2023 vegetation/habitat monitoring report for non-native non-invasive and invasive findings to determine the location and percent cover of weed species. Additional observations of invasive vegetation by Humboldt County Resource Conservation staff or other stakeholders will be considered. Weed abatement may include mechanical or manual control by paid staff, contractors, or volunteers. Controlled and limited flash grazing may also be used to control weeds.

Results & Discussion: Staff observation and the vegetation/habitat monitoring effort have found that numerous weedy species exist and are becoming prolific in the restored portions of the Project area. The dominant invasive species in both Phase 1 (tidal marsh) and Phase 2 (Salt River Corridor) include *Spartina densiflora* (dense-flowered cord grass), and *Phalaris arundinacea* (reed canary grass). Other invasive plant species detected in 2023 included *Parapholis strigosa* (hairy sickle grass), *Helminthotheca echioides* (bristly ox-tongue), *Holcus lanatus* (common velvet grass), *Conium maculatum* (poison hemlock) and *Cirsium vulgare* (bull thistle), *Dipsacus fullonum* (wild teasel) and *Agrostis stolonifera* (creeping bent).

No formal project wide weed abatement efforts were made on the restored Project footprint.

The grazing pilot project was not continued this year. No effort was made to control vegetation across the three acres in the riparian corridor.

It has been recommended by re-vegetation experts that much of the reed canary and creeping bent grasses will eventually be controlled when woody riparian species achieve a shaded canopy in the river corridor. Funding proposals are periodically submitted for *Spartina densiflora* treatment, however no awards were received.

Recommendations: Perform weed vegetation treatment when funding and timing allow.

Habitat Development, Vegetation and Invasive Species Monitoring, and Adaptive Management for Salt River Corridor and Riverside Ranch

Monitoring Task: Invasive Species Management – Vegetation

Agencies/Acts: Coastal Commission

Compliance Documents: Coastal Development Permit- Special Conditions; SRERP Adaptive Management Plan

Description: Monitor invasive vegetation species during vegetative surveys required by the Habitat Mitigation and Monitoring Plan for the Salt River Ecosystem Restoration Project. Treat identified areas.

Goals: Total invasive plant species (dwarf eel grass, *Spartina densiflora*, and reed canary grass) within sampling areas will not exceed a percent cover of 5%.

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

Methods: Review vegetation/habitat monitoring report for invasive findings to determine the location and percent cover of weed species. Additional observations of invasive vegetation by Humboldt County Resource Conservation staff or other stakeholders will be considered. Weed abatement may include mechanical or manual control by paid staff, contractors, or volunteers. Controlled and limited flash grazing may also be used to control weeds.

Results & Discussion: The 2023 Annual Habitat Monitoring Report reveals that

all areas of the restored Salt River experience invasive species presence that exceeds the 5% maximum criteria and recommends that action take place. Much of the invasive species that are present include *Spartina densiflora* in Phase 1 (tidal estuary), while *Agrostis stolonifera* (creeping bentgrass) and *Phalaris arundinacea* (reed canary grass) are dominant in Phase 2 (channel corridor).

No formal project wide weed abatement efforts were made on the restored Project footprint.

It has been recommended by re-vegetation experts that much of the reed canary and creeping bent grasses will eventually be controlled when woody riparian species achieve a shaded canopy in the river corridor. Funding proposals are periodically submitted for *Spartina densiflora* treatment, however no awards were received.

Recommendations: Perform vegetative invasive species vegetation treatment when funding and timing allows. Continue grazing management on the Salt River Watershed Council's property and implement flash grazing two to three times during the growing season.

Habitat Development, Vegetation and Invasive Species Monitoring, and Adaptive Management for Salt River Corridor and Riverside Ranch

Monitoring Task: Invasive Species Management - Pikeminnow

Agencies/Acts: Coastal Commission

Compliance Documents: Coastal Development Permit- Special Conditions; SRERP Adaptive Management Plan

Description: Attempt to control pikeminnow (*Ptychocheilus grandis*) populations.

Goals:

- Reduce occupation of pikeminnow in newly created habitat.
- Increase occupation by native fish species in newly created habitat.

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

Methods: The California Department of Fish and Wildlife, Cal Poly Humboldt, and the Humboldt County Resource Conservation District developed a fish monitoring program in early 2014. During the development of this program, participants determined that pikeminnow populations cannot be eradicated or controlled in the Salt River watershed. However, a standard practice was adopted for all pikeminnow encountered during fish monitoring will be humanely euthanized. Additionally, if pikeminnow individuals are longer than 10 inches, those individuals will be measured and the stomach contents examined for evidence of piscivory and findings recorded.

Results & Discussion: During the 2023 fish monitoring effort, 203 Sacramento pikeminnow were captured and euthanized. A majority of the pikeminnow were captured at site #24.

Recommendation: Continue to implement invasive Sacramento pikeminnow control during fish sampling efforts.

SUMMARY OF ADAPTIVE MANAGEMENT RECOMMENDATIONS

- Perform visual assessment of sediment accumulation in the Sediment Management Area in late spring. If no excavation of sediment will occur in 2024, consider vegetation control after nesting bird season ends (August 15).
- Move forward with Riverside Ranch setback berm modification implementation.
- Perform non-native and invasive vegetation treatment when funding and timing allows; including instream cattail beds.
- Continue to perform annual established monitoring tasks.

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

GHD and Michael Love & Associates. 2021. Riverside Ranch Hydraulic Assessment. Prepared for the Humboldt County Resource Conservation District. Eureka, CA. November 18, 2021.

Humboldt County Resource Conservation District. 2021. 2023 Aleutian Goose Habitat Evaluation – Riverside Ranch – Salt River Ecosystem Restoration Project –

Memorandum. Prepared for and by the Humboldt County Resource Conservation District. March 2023.

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

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