Salt River Ecosystem Restoration Project

Adaptive Management Plan Monitoring Report 2020

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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 historically flowed 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 presented in two primary phases to distinguish between the tidal wetland restoration (known as Phase 1) and the riverine corridor 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 to 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.

The design of Phase 1 was intended to strike a balance between creating significant amounts of new tidal marsh habitat, retaining and enhancing some of the important existing upland and riparian features, preserving sufficient acreage to manage for short-grass habitat for Aleutian cackling geese, minimizing long-term site maintenance, and incorporating design features that accommodate sea-level rise. Earthwork on Phase 1 was balanced on site, with excavated materials all being utilized to construct a range of habitat features at varying elevations and to construct the 2-mile setback berm.

Phase 2 represents the Salt River “corridor restoration” portion of the larger project. Within Phase 2, design plans call for 4.5 miles of the Salt River channel and its adjacent floodplain to be excavated. Wetlands and riparian corridors will be re-vegetated with a diverse palette of native plants. Fish passage would be 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. It is anticipated that the remaining 1.2 miles of the Phase 2 construction will occur in 2022/2023, completing the Salt River corridor restoration (Figure 1).

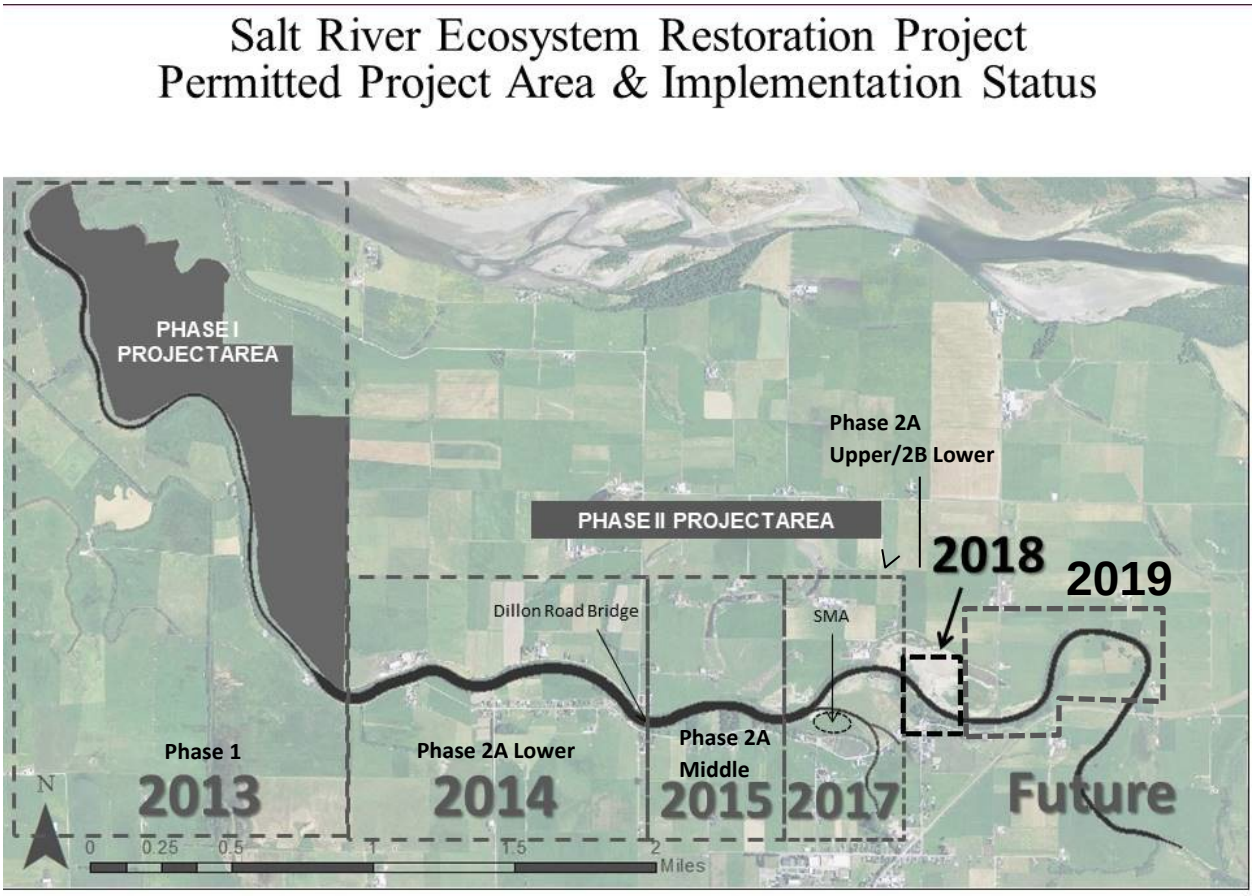

Figure 1: Salt River Ecosystem Restoration Construction Timeline as of 2020

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) 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 7 (post construction 2013)
- Phase 2: Year 6, Year 5, Year 3, Year 2, Year 1 (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 2020 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 2019/2020 hydrologic year experienced below average rain totals. Rainfall at nearby Scotia and Eureka stations were measured at 18.1 inches and 9.8 inches below normal, respectively. Thus, the area achieved only 63% to 76% of normal rainfall levels.

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 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

The 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. This monitoring 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 2020 monitoring period, existing Dillon Road Bridge and replaced Port Kenyon Road Bridges located within the constructed project footprint were functioning normally as well as one installed private agricultural bridge on Francis Creek and another private agricultural bridge on Salt River. 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 the Sediment Management Area (SMA) indicate that it captured approximately 475 cubic yards over the 2019/20 hydrologic year.

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. Phase 1 geomorphic surveys revealed deposition and scour in anticipated areas; however, some discrete sites in the northern slough channel had deposition and excessive scour to precipitate further field assessment. Additional monthly general visual inspections of the Phase 1 elements include the setback berm, outboard ditches, and tide gates. The setback berm is structurally stable, and no significant changes were observed. The outboard ditches are functioning as designed. All three tide gates are functioning normally with typical leakage and 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 in the Salt River Ecosystem Restoration Project in 2016. Monitoring indicated that water quality parameters achieved ranges appropriate for salmonids at sampling sites and restored tidal prism reached the predicted extent in the restoration area. Additional water quality spot measurements are taken monthly in spring and summer during fish surveys at each monitoring site and indicate appropriate water quality parameters for healthy fish habitat are being met.

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. A fish sampling program has been ongoing since 2014 in constructed phases of the Project. However, survey methods require multiple people to perform fish sampling which violated COVID 19 restriction guidelines in 2020. Therefore, fish sampling was cancelled due to potential health risks.

Phase 1 and the completed portions of Phase 2 were mapped to depict all projected habitat acreages for the various habitat types, including: tidal salt marsh, high marsh ecotone, riparian, and channel wetlands. In 2020, most phases reached their respective success acreage criteria, except for the tidal salt marsh in Phase 1. Tidal salt marsh was mapped to reach 94% of its success criteria and this is due to the prevalence of mudflats in the estuarine portion of the Phase 1 footprint. These mudflats appear to be converting

over to tidal salt marsh as years progress. The 2020 percent cover sampling results indicate that a majority of surveyed restored areas are achieving appropriate success criteria. However, Phase 1 has slightly fallen short for native species cover by 0.6%. Additionally, planted riparian on some sections of active berm along the Phase 2 portion of the channel corridor restoration (Phase 2B Middle and Upper) are not meeting appropriate success criteria and should be assessed to determine if further plantings are required. Most phases of the project exceed the minimum threshold for non-native non-invasive vegetation. All phases exceed invasive minimum thresholds where Spartina is severely encroaching in Phase 1, while reed canary grass and bent grass are becoming extensive in the Phase 2 channel corridor. Recommendations for addressing non-native non-invasive and invasive vegetation is stated in the 2020 vegetation monitoring report. To determine positive riparian growth rates, average tree diameter/basal area was estimated and compared to previous results for planted riparian areas in Phase 2A Middle (2015). A comparison between 2018 and 2020 estimated that basal area is increasing significantly in the riparian area.

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 period of ten years, 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/salt_river_ecosystem_restoration_project/reports_and_documents).

This report is structured and provides findings related to the monitoring requirements in the four identified Adaptive Management Plan 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) 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.

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: *Channel Profile Report: Salt River Ecosystem Restoration Project – Phase Two – Year 2020 by Doreen Hansen (Humboldt County Resource Conservation District and Peter Duin (Natural Resources Conservation Service). February 2021.*

Methods: Data collected in 2020/2021 were measured using a Trimble R10 RTK GPS unit. Upon completion of surveys, data were entered into Civil 3D which was used to create a surface and plot the cross sectional and longitudinal profiles. In previous years, cross-sectional and longitudinal profile data were collected using a CTS/Berger automatic level, tripod and stadia rod. For survey years 2015 through 2018, a Nikon DTM-352 Total Station laser theodolite, tripod, prism pole and single prism were used. Elevations are geo-referenced to the 1988 North American Vertical Datum (NAVD88) based on corrected positions from survey benchmarks SR11 and SR14. Horizontal locations were determined using GPS North American Datum 1983 (NAD83) in decimal degrees.

Cross-section elevations and distances were collected across the flood plain, channel slope, vegetation edge, water's edge, thalweg and channel- with a minimum of eight points within the channel between vegetation edges. Between 16 and 32 elevation points were collected per cross section depending on the size and morphological complexity of the channel, floodplain and banks. Longitudinal profiles extended parallel to channel flow following the thalweg. The data points were collected in the thalweg at approximately 60 meter intervals where possible; though coarser resolutions where were made due to channel water level height and/or when vegetation prevented sighting of the prism. Figure 2 provides the location of cross-section sites.

Cross-sectional profiles are presented looking downstream in the westerly direction and start on the south side of the channel (left bank) and extend to the north (right bank). The longitudinal begins (distance equals zero) at the confluence of Reas Creek and extends upstream to just upstream of cross-section 10.

Figure 2: Salt River Phase 2 Cross-Section Sites

Results and Discussion: Four cross-sections sites were surveyed in the 3.7 kilometers of the restored reaches of the Salt River (Figure 2). The following graphs (Figures 3 to 7) show cross-sections from 2020 and previous years. Excerpts and results from the Phase 2 2020 report are provided below:

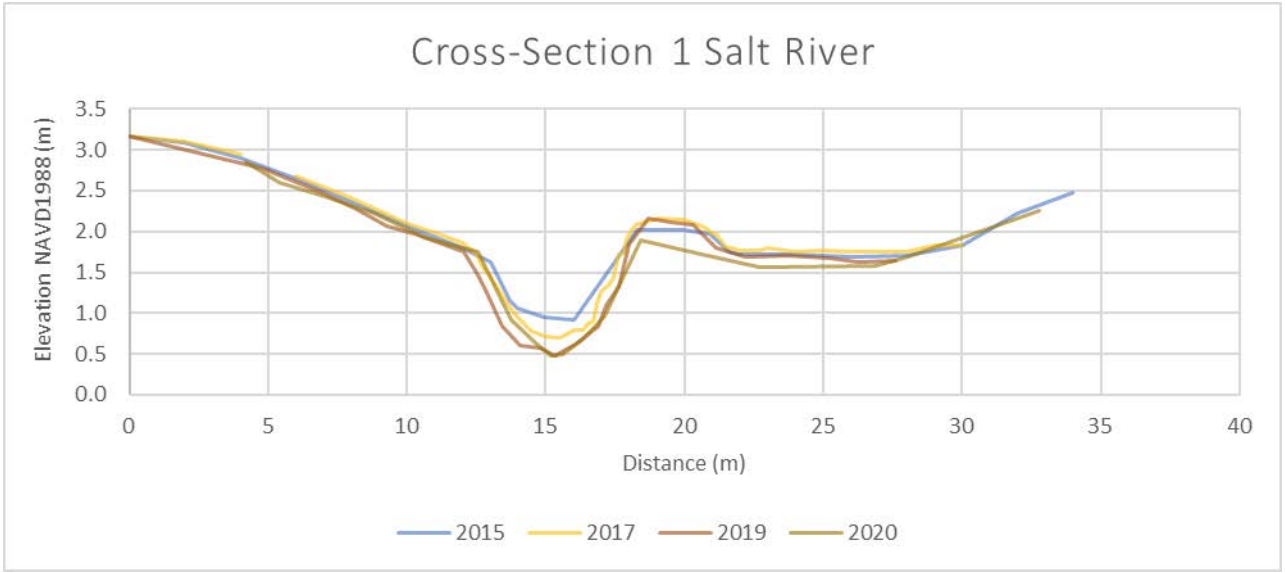

Figure 3: Cross-section one, profile for years 2015-2020.

The profile for cross-section one (figure 3) indicates some possible deposition on the left side of the channel since 2019, however is consistent with surveyed channel morphology in

previous years. Channel bottom elevation is consistent with the 2019 survey. Since the original survey in 2015, the channel elevation has dropped by 0.42 meters. The coarse resolution on the active channel berm, above the right side of the channel, does not capture the relief of the feature. Possible minor scour and elevational lowering of 0.14 meters occurred on the floodplain compared to previous years.

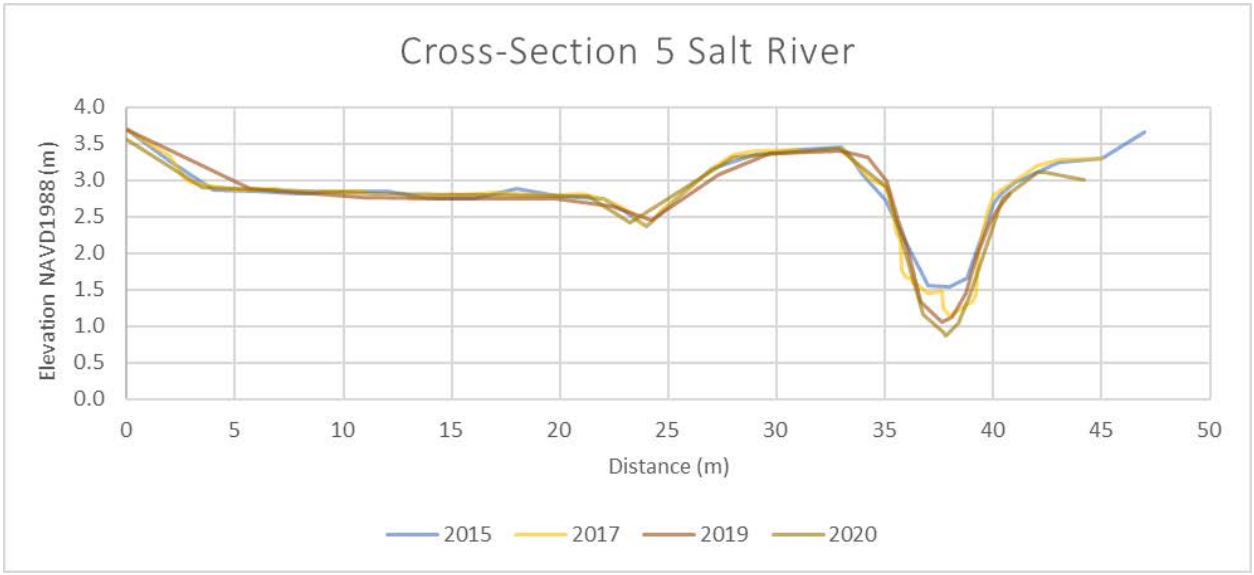

Figure 4: Cross-section five, profile for year 2015-2020.

Cross-section five closely maintained a similar configuration with 2019's survey, with a decrease in thalweg elevation of 0.19 m from the previous year (figure 4). Overall, the channel bottom has decreased by 0.57 meters since 2015. The cross-sectional profile shows floodplain elevations consistent with previous survey years.

Current and previous surveys show consistent floodplain and active berm elevations for cross-section seven (figure 5). However, the collection of the 2020 active channel data points are far too coarse to compare them to previous surveys. This may have been due to high water levels in the channel. Some deposition appears to have occurred in 2019 on the left side of the channel and scour on the right channel bottom and side, resulting in slight widening and decrease in thalweg elevation of 0.26 m compared to 2018. Channel geometry remains relatively stable with potential for more lateral migration based on visual observation in the field of slumping on the right bank.

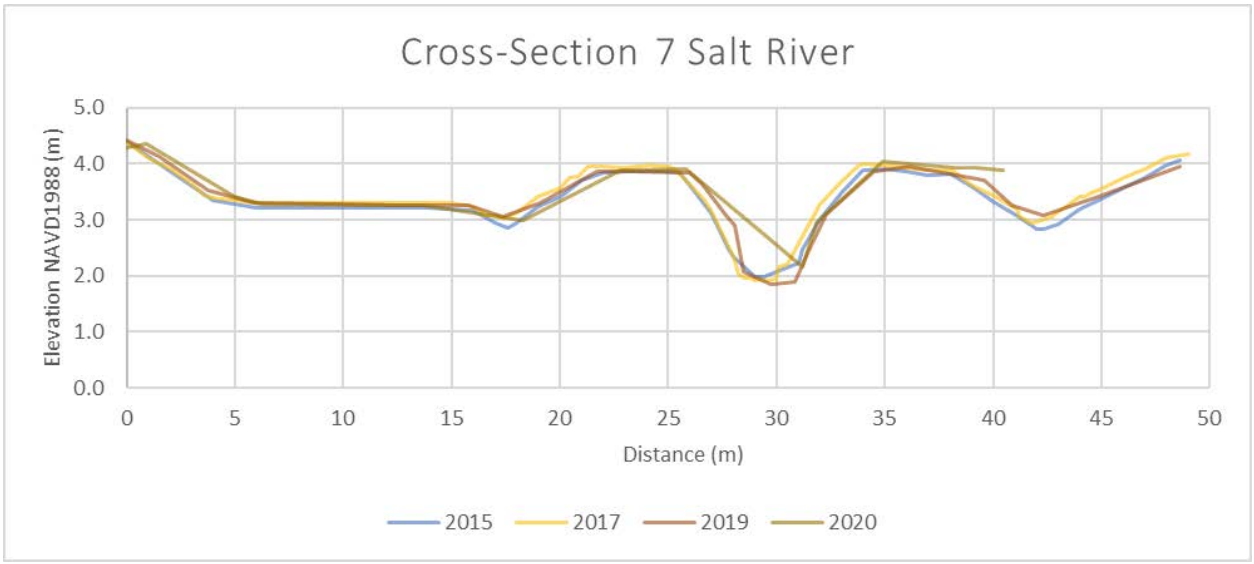

Figure 5: Cross-section seven, profile for years 2015-2020.

Cross-section ten was established in 2019 on a reach of the restored Salt River that was constructed in 2018 (figure 6). The Salt River constructed upstream of cross-section ten is not connected to a perennial water source as of 2021. Therefore, water entering the system upstream of cross-section ten is surface runoff during winter rain events. The deviations of surveyed points between years maybe due to typical surveying error, though some scour may have occurred in the channel bottom (0.19 meters). Deposition is unlikely on channel sides.

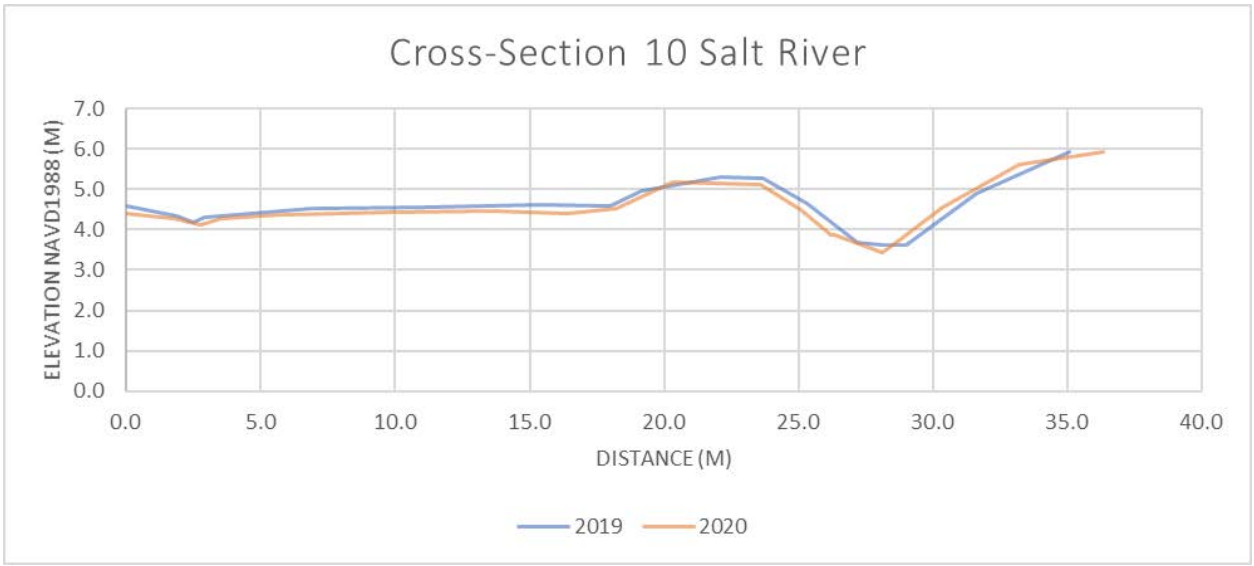

Figure 6: Cross-section ten, profile for year 2019.

Channel degradation is the dominant trend across transects; particularly in cross-sections one and five, which have decreased in thalweg elevation by approximately half a meter since 2015. The dynamic processes that cross-section one and five have experienced is likely due to the two sites being in an older constructed reach (constructed in 2014) compared to cross-

section seven (constructed in 2015). Cross-section one and five are also influenced by daily tidal cycles, where cross-section seven and ten are not. Cross-section seven shows a trend toward erosion in the channel but of less overall magnitude than the other cross-sections.

The longitudinal profile spans a distance of 3,700 meters and is presented between years 2016 and 2020. Cross-section sites are labled to show approximate locations. The sediment management area (SMA) on Francis Creek, at the confluence of the Salt River, is also shown. Data resolution is coarser in portions of the reach due to dense vegetation and excessive water depth. In agreement with cross-sectional surveys, the longitudinal profile shows a dominant trend of scouring as illustrated by reductions in elevation throughout majority of the channel. However, the 2020 survey did not capture the scour holes between 400 meters to 2,200 meters. This may be due to the increased water level heights during the time of the survey. Notably, the 2019 deposition immediately downstream of the SMA was not captured in the 2020 profile due to lack of data points taken in that reach. In-channel vegetation in that reach was thick and in late 2020 vegetation was removed in a 200-foot reach in that area. Overall, the 2020 profile was consistent with the recent 2019 survey (figure 7).

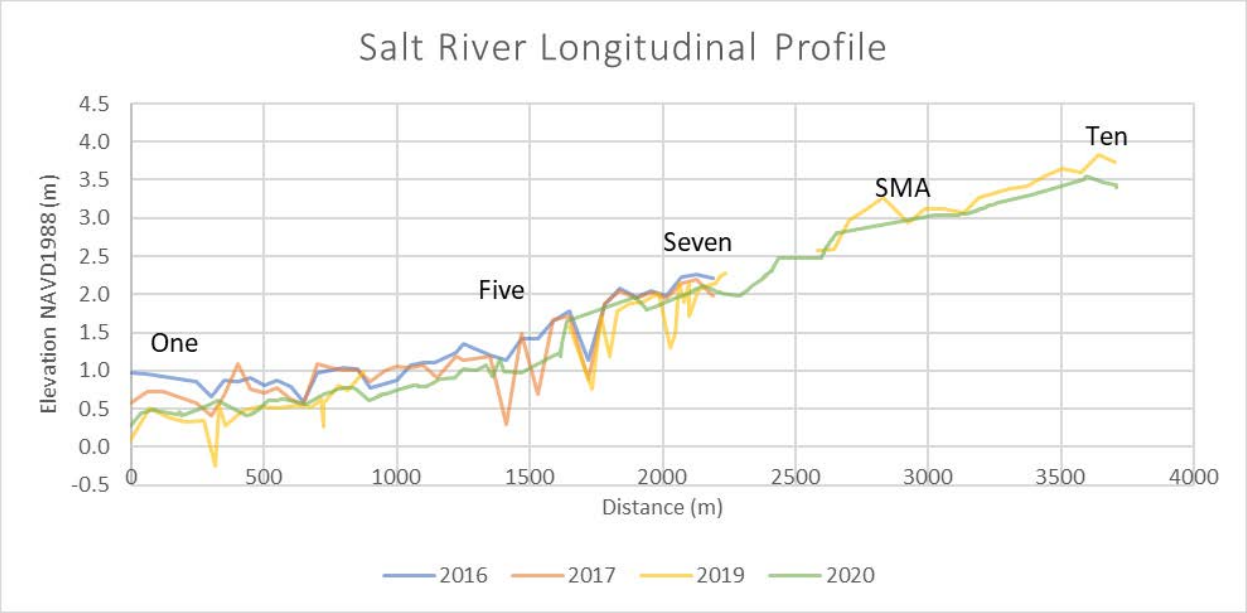

Figure 7: Phase 2 longitudinal profile

In total, the data shows trends of decreased channel bottom elevations and potential net sediment transport out of the project area, which is consistent with past survey years. Channel degradation is most prominent in the downstream portions of the river as indicated by mean bed lowering in the longitudinal profile and lower thalweg elevations in cross-sectional profiles compared to previous years. In previous years' surveys, the downstream section had relatively uniform bed lowering, whereas the upstream portion had more variable scour patterns leading to incipient pool formation and greater morphological complexity.

Cross-sectional profiles indicate more lateral erosion in the lowest cross-section one site compared to the upstream sites. This could partially be due to several factors; vegetation was anecdotally observed to have propagated more rapidly in the upstream portion, these reaches are also dominated by a freshwater hydrology regime towards Francis Creek and are less tidally influenced in the middle portions compared to the lower reach near Reas Creek. Increased exposure to fluvial processes, compounded by a lack of root stabilization (as lower bank vegetation is limited in these areas) could be contributing to the higher rates of lateral erosion in the downstream portion. Conversely, riparian vegetation in the upper portions may lead to greater bank stability and less lateral erosion. Additionally, dense in-channel vegetation in the upper portions was observed, potentially causing water velocity to slow and allow entrained particles to settle out, thus leading to less overall change in channel geometries.

Future geomorphic surveys are required. It is recommended that surveys occur in the late fall when water levels are at their lowest in order to collect sufficient points for high resolution depiction of the active channel and when tree leaf vegetation is sparse as to not interfere with equipment collecting data.

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. Observational data sheets are available upon request.

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, and Fulmor Bridges span the restored Salt River as of 2019 monitoring season. Existing and adjacent culverts at Reas Creek, Boynton Swale, and Bush Street deliver flows to the Salt River (Figure 8).

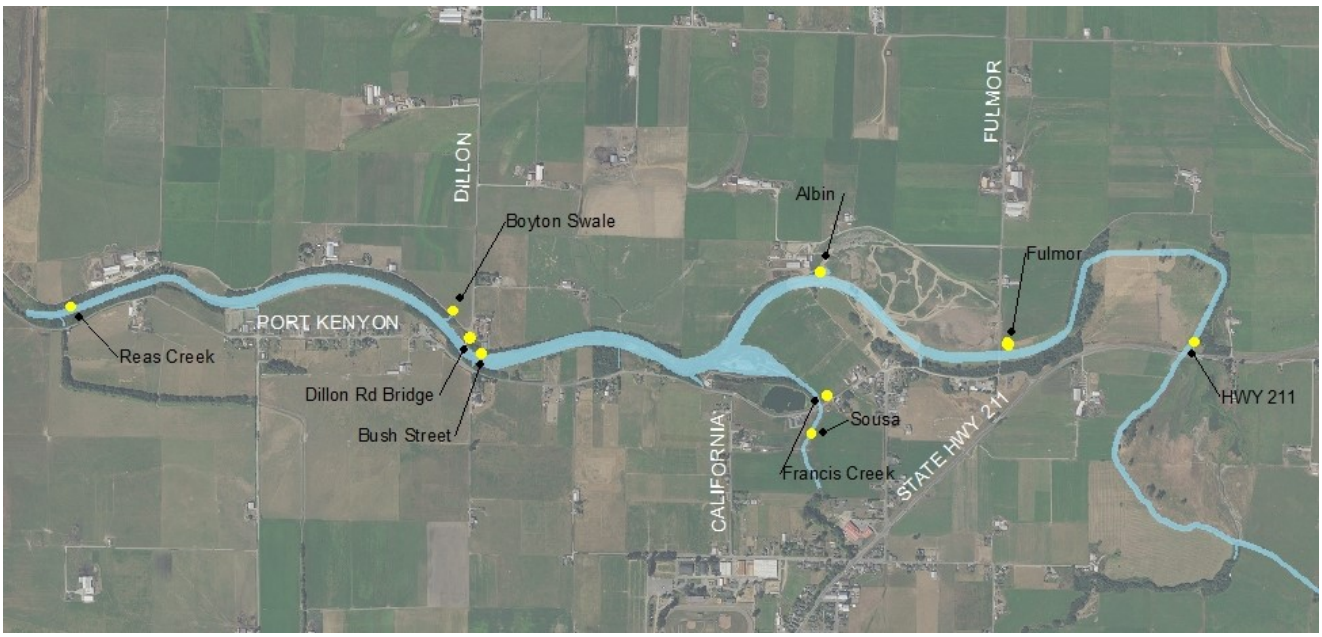

Figure 8: Bridges and Culverts Locations on the Salt River restored corridor

Results and Discussion: Four bridges (Dillion Road, Albin, Sousa, Francis, and Fulmor) span the restored Salt River channel as of the 2019 monitoring period. The Albin, Sousa, and Francis were bridges replaced or constructed as part of the Salt River restoration. All bridges were observed during low and high flows and no debris in the channel or flood plain are racking up on the bridge abutments or installed rock slope protection. Erosion around the footings is not occurring. The Reas Creek, Boynton Swale, 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 dense vegetation obscuring visual observation and possibility that vegetation will eventually impede the opening of the flap gate on the outlet of the culvert.

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

Monitoring Task: Inspection of Sediment Management Areas
Agencies/Acts: Coastal Commission

Compliance Documents: Coastal Development Permit- Special Conditions; Salt River

Description: Annual inspection of the sediment management area at the confluence of Francis Creek and the Salt River as well as passive sediment management areas in the restored Salt River corridor.

Goals:

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

Report: N/A

Methods: Methods to determine sediment deposition in the active and passive sediment management areas include topographic surveys.

Visual inspections of the active sediment management area (SMA) at the confluence of Francis Creek and Salt River are performed annually in the late spring. Two staff plates are installed at the west and east ends areas of the SMA. If staff plates indicate that significant sediment appears to be deposited in the SMA, sediment deposition will be measured. The surface of the SMA was measured by taking GPS points and a surface model was developed for 2020.

Cross-sectional surveys and visual inspections of connection points of passive sediment management areas (floodplains) to the main stem Salt River are also used as an evaluation method for site specific deposition. Visual assessments of vegetation growth within passive sediment management areas will determine whether present vegetation affects flow and deposition.

Results & Discussion: The active sediment management area at the confluence of Francis Creek and Salt River was constructed in the fall of the 2017 and experienced its third winter. By spring of 2020, the SMA captured an estimated amount of 475 cy of sediment (Figure 9). The SMA can accommodate up to 15,000cy, therefore no excavation occurred in the summer/fall of 2020. Sediment volumes will be assessed in the spring of 2021.

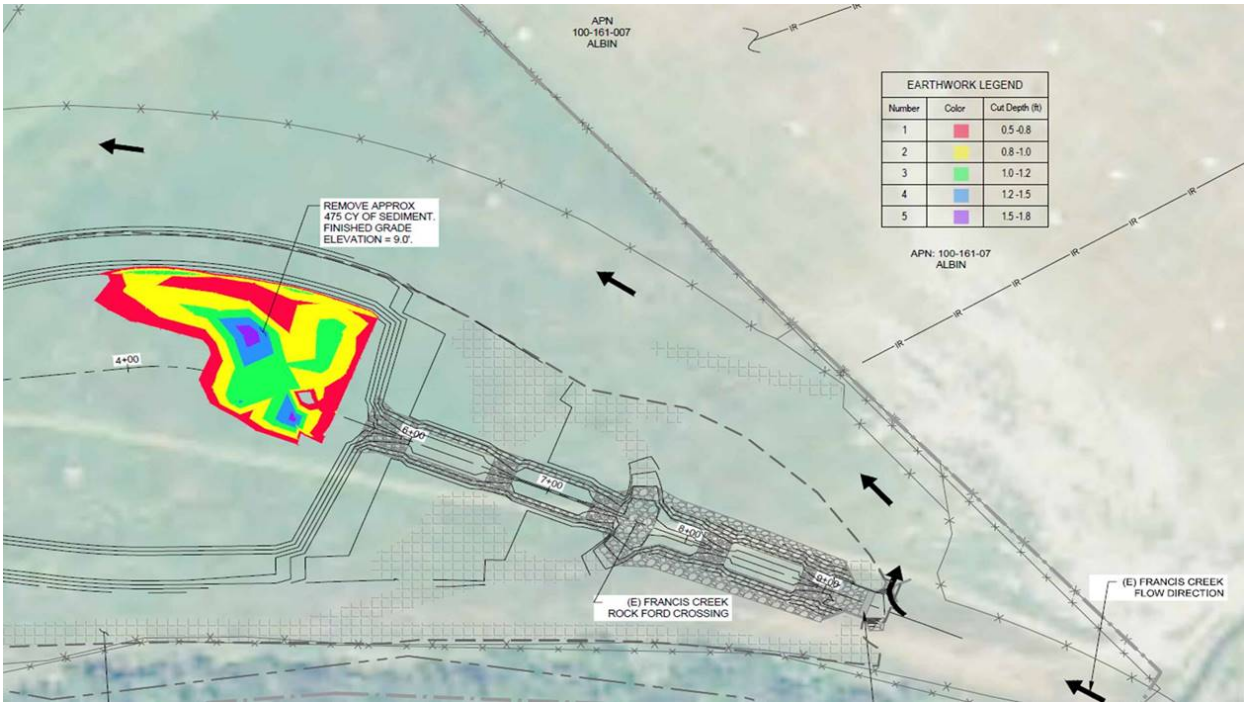

Figure 9. Geomorphic survey of the sediment management area and estimated captured sediment volume (475 cy).

In previously restored portions of the Phase 2 channel corridor, passive sediment management areas are identified as specific constructed floodplain features. 2020 cross-sectional surveys performed of the floodplains show little to no deposition in four cross-sections in the channel corridor.

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 is remaining consistent with restoration designs or if areas are aggrading or eroding to the point of intervention.

Report: Channel Profile Report: Salt River Ecosystem Restoration Project, Post-Construction Geomorphic Channel Survey Report, Phase 1, Year 7 – 2020. Prepared by Humboldt County Resource Conservation District and P. Duin, Engineer NRCS.

Methods: Data collected in 2020 were measured using a Trimble R10 RTK GPS unit. Upon completion of surveys, data were entered into Civil 3D which was used to create a surface and plot the cross sectional and longitudinal profiles. In previous years, cross-sectional and longitudinal profile data were collected using a CTS/Berger automatic level, tripod and stadia rod. For survey years 2015 through 2018, a Nikon DTM-352 Total Station laser theodolite, tripod, prism pole and single prism were used. Elevations are geo- referenced, in feet, to the 1988 North American Vertical Datum (NAVD88) based on corrected positions from survey benchmarks SR11 and SR14. Horizontal locations were determined using GPS North American Datum 1983 (NAD83) in decimal degrees.

Cross-section elevations and distances were collected across the flood plain, channel slope, vegetation edge, water's edge, thalweg and channel- with a minimum of eight points within the channel between vegetation edges. Between 16 and 32 elevation points were collected per cross section depending on the size and morphological complexity of the channel, floodplain and banks. Floodplain measurements were collected up to 200-feet on either side of the main channel when feasible. Cross sectional profiles for North and South slough channels are viewed looking downstream towards their confluence with the main-stem Salt River with the zero-point on the graph starting from the east and extending west. Main channel SR cross sectional profiles are viewed looking upstream starting from the right bank (zero-point on the graph) and extending south. Longitudinal profiles extended parallel to channel flow following the thalweg and were conducted on the main-stem Salt River (SRL), the North slough channel (NCL), and of the South slough channel (SCL). The prism pole was placed in the thalweg approximately every 200-feet along the survey length. Figure 10 provides the location of cross-section sites and longitudinal profiles.

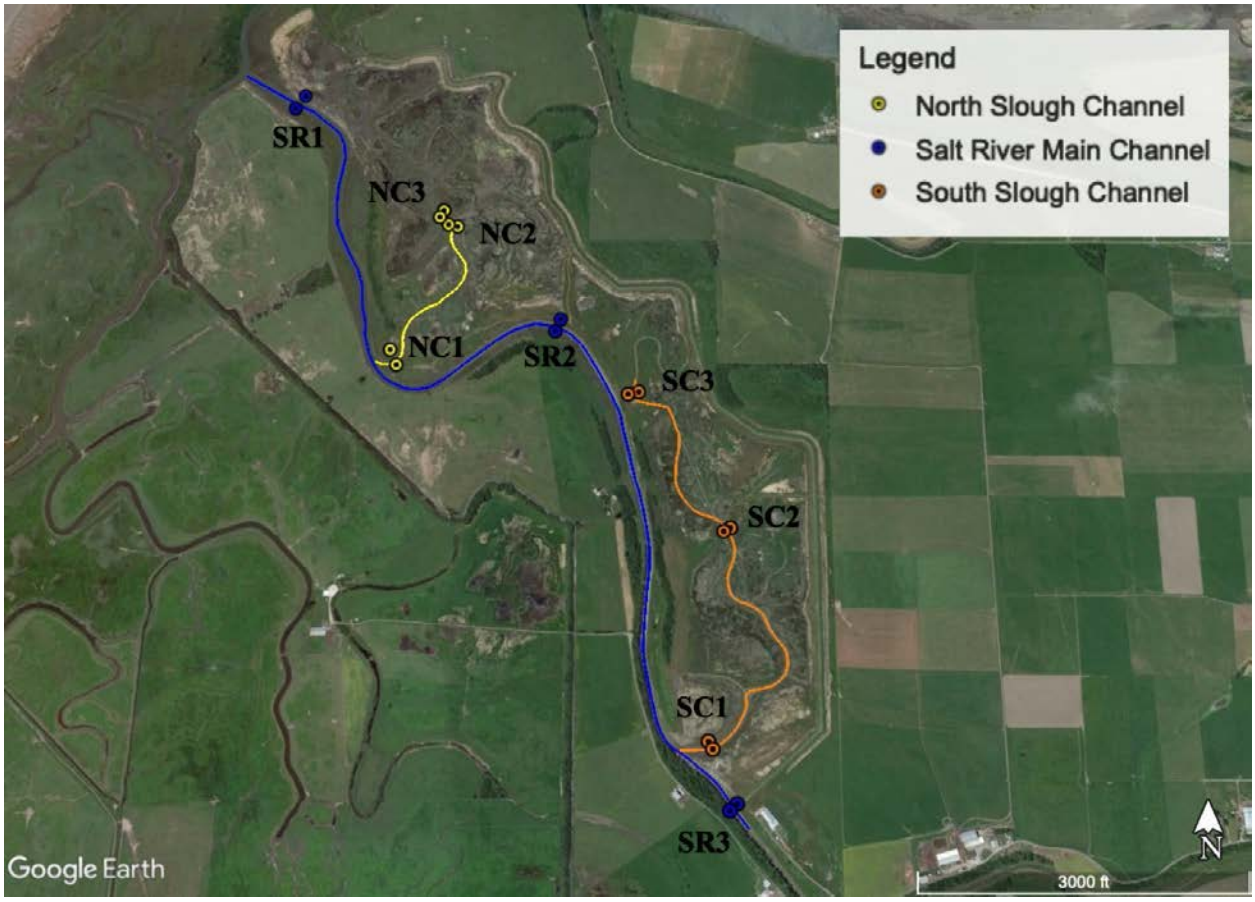

Figure 10: Locations of the cross section and longitudinal profiles for Salt River Ecosystem Restoration Survey Project, 2020. SR = Salt River main channel profiles; NC= North slough channel profiles; SC= South slough channel profiles.

Results and Discussion: Cross section profiles of the main channel indicate that the SR1 and SR2 has predominately experienced scour and deposition (Figures 11 and 12). SR2 channel capacity is estimated to have decreased by approximately 13% from possible side bank deposition. SR3 channel shape remains relatively stable compared to recent years but experienced deposition between 0.25ft and 0.5ft throughout the channel width compared to the 2014 cross section (Figure 13).

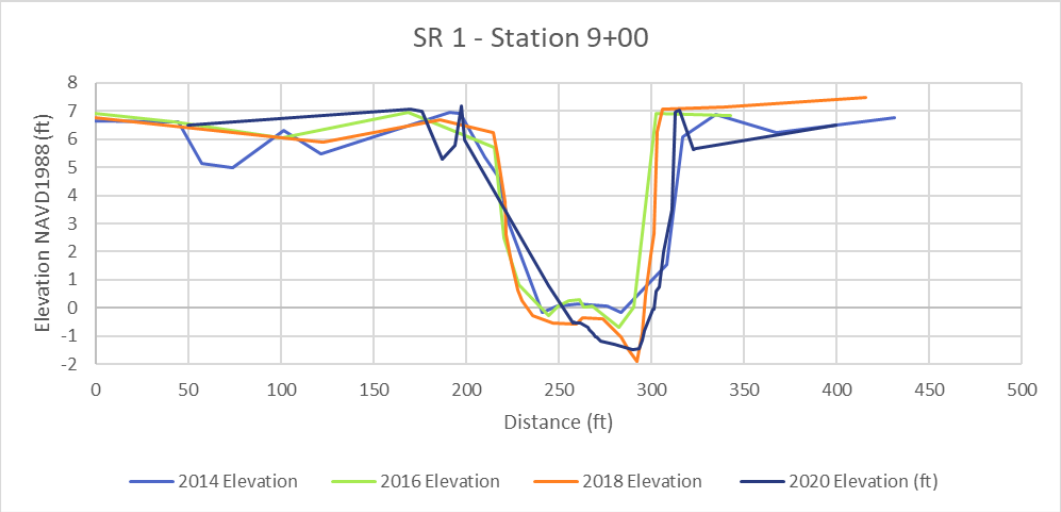

Figure 11. SR1 – Salt River main channel cross section for selected years between 2014 and 2020

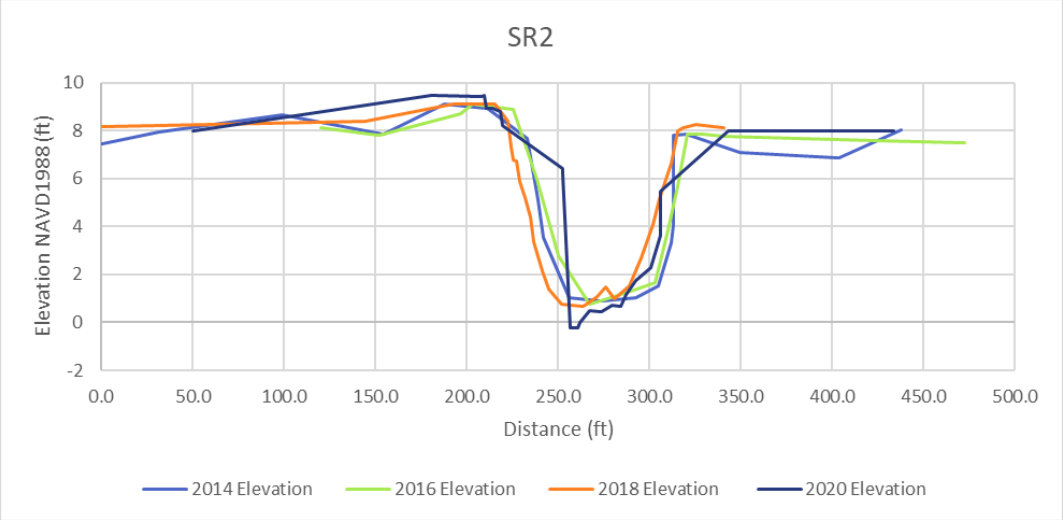

Figure 12: SR2 – Salt River main channel cross section for selected years between 2014 and 2020.

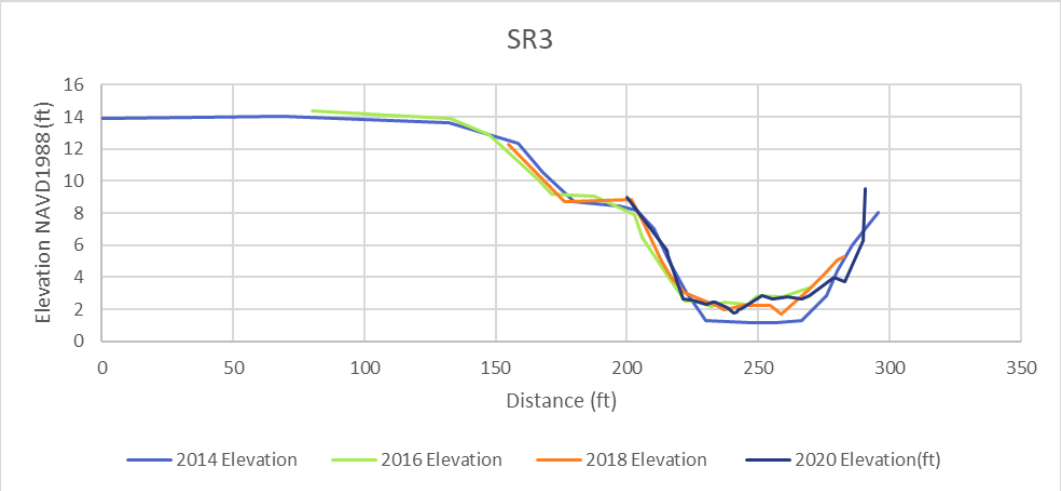

Figure 13. SR3 – Salt River main channel cross section for selected years between 2014 and 2020

The Northern slough channel cross section profiles show a general trend of deepening in the upper reaches of the slough channels and minor deposition in the lower reach. NC1 has appeared to have deposition in the channel bottom since 2018, however overall scour has significantly occurred since 2014 (Figure 14). NC2's capacity has significantly increased and has continued to increase since 2014. NC2 capacity has increased by 150% since 2014 and by 64% since 2018. Scour at this site is dominantly reducing elevation (deepened by 0.78ft since 2017) while widening of the channel increases at a lower rate (Figure 15). The 2020 cross section at NC3 depicts the channel as deepening and incising with deposition occurring on the sides of the channel (Figure 16).

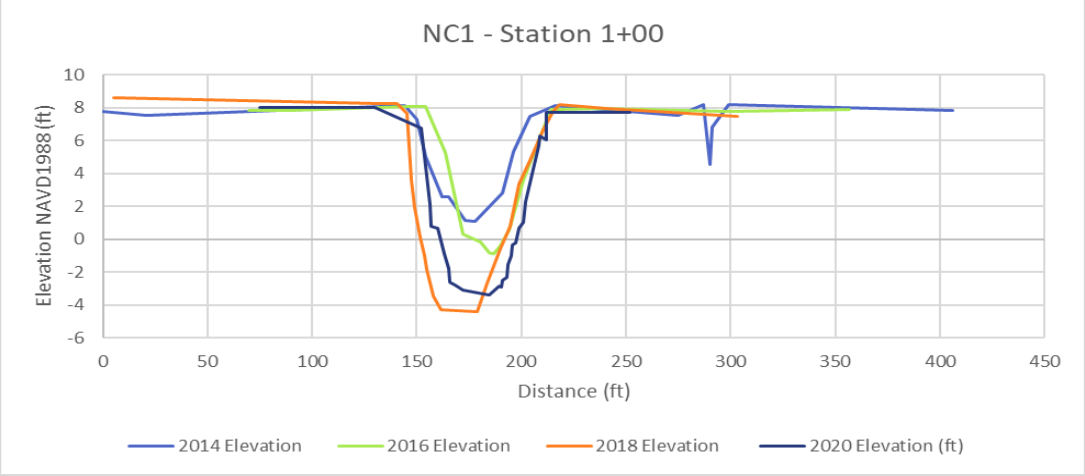

Figure 14. NC1 – Northern Slough channel cross section for selected years between 2014 and 2020

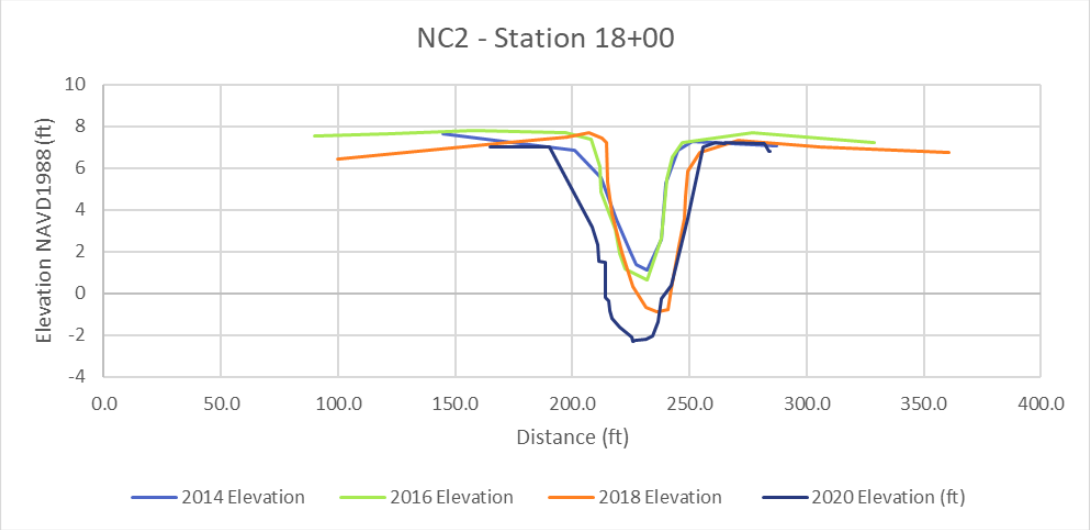

Figure 15. NC2 – Northern Slough channel cross section for selected years between 2014 and 2020

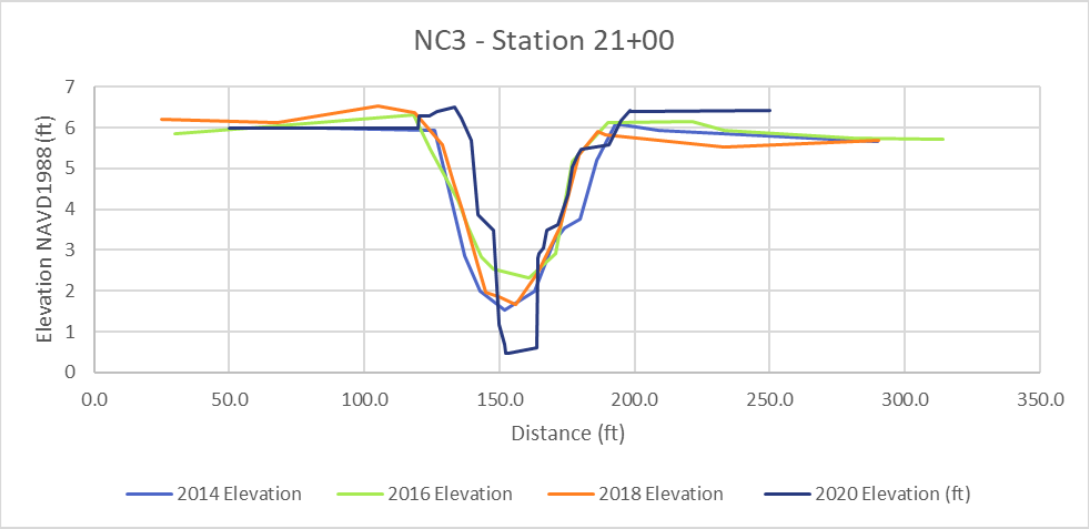

Figure 16. NC3 – Northern Slough channel cross section for selected years between 2014 and 2020

The Southern slough channel cross-sectional profiles indicate that the mid and upper portions of the project area have undergone the least morphological change while the lower reach of the slough channel experienced larger modifications by environmental factors. SC1 showed lateral migration of the right bank from 2014 and 2018 (10 to 15ft) and change in thalweg elevation of eight inches since 2014 and 1.4ft since 2018 (Figure 17). Therefore, capacity increased by approximately 15% since 2018. SC2 uniformly remained primarily unchanged from pervious years' surveys (Figure 18). SC3 experienced a decrease in capacity with approximately 0.3 ft. of aggradation along the channel bottom and 4ft of deposition along the left bank (Figure 19) equating to approximately a 25% change in capacity.

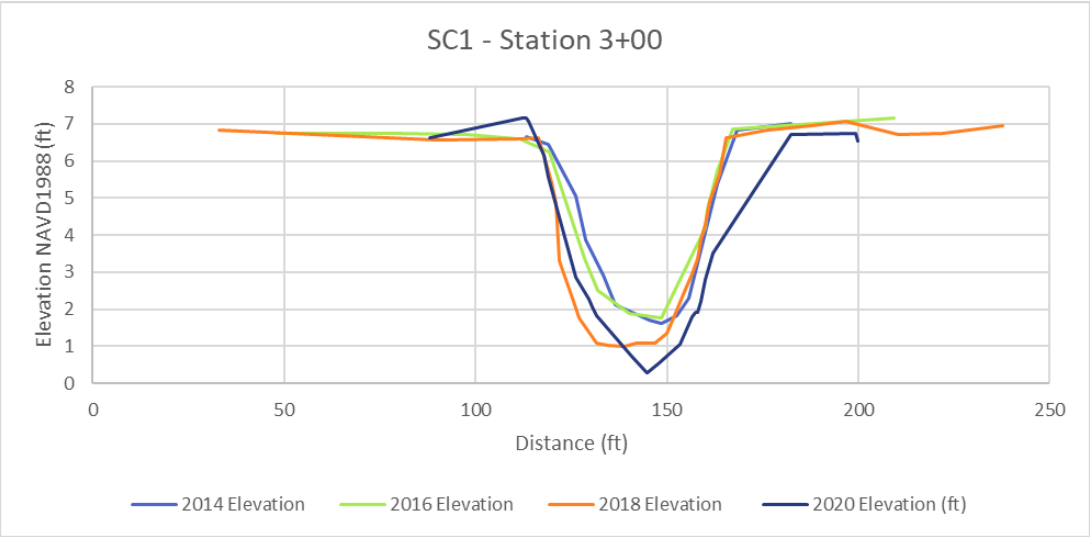

Figure 17. SC1 – Southern Slough channel cross section for selected years between 2014 and 2020

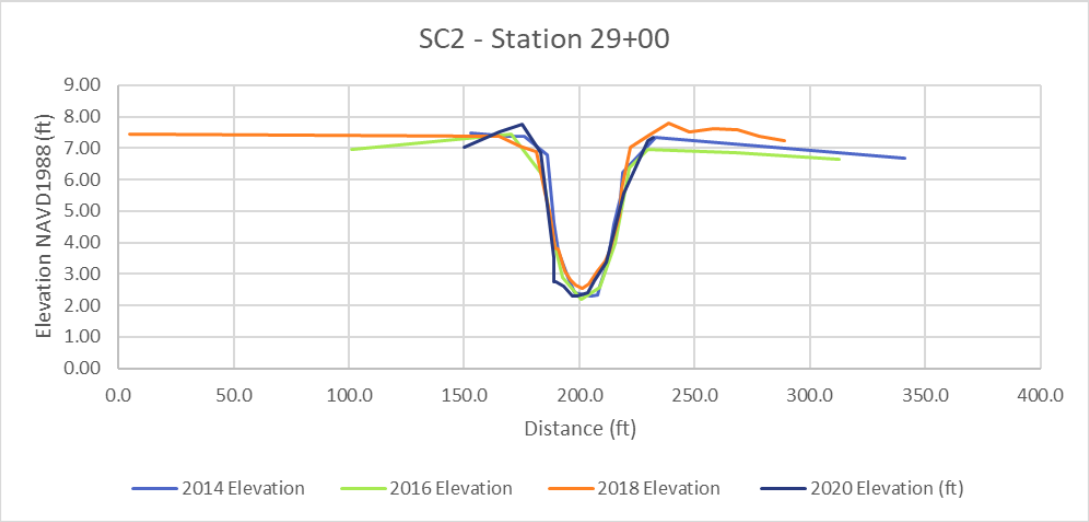

Figure 18. SC2 – Southern Slough channel cross section for selected years between 2014 and 2020

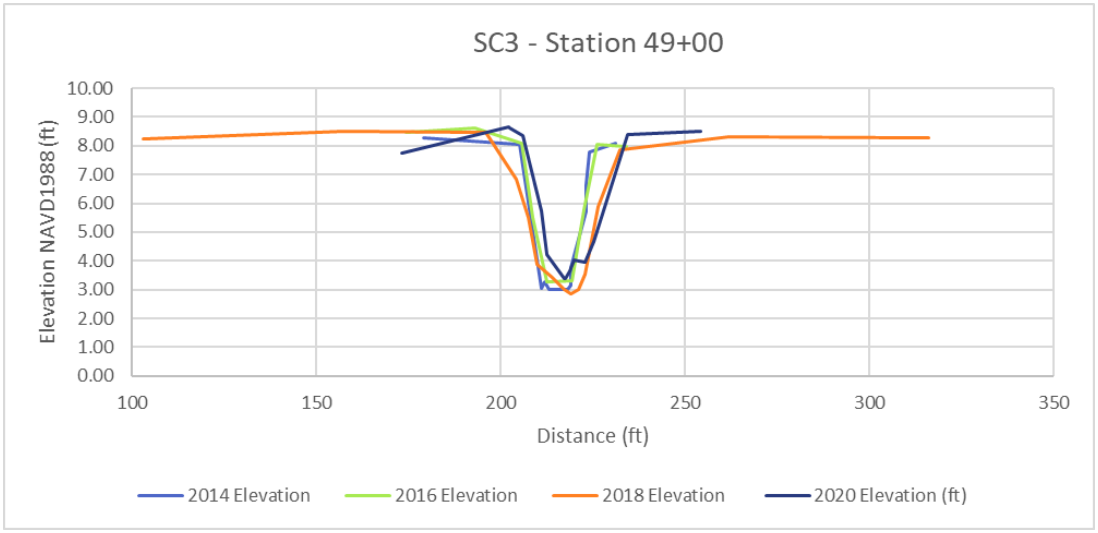

Figure 19. SC3 – Southern Slough channel cross section for selected years between 2014 and 2020

The total relief on the approximate 11,200-foot longitudinal profile section of the main Salt River channel surveyed in 2020 is 4.6 feet, yielding an average gradient of 0.41% per thousand feet, which is a 0.11% increase from 2018 (Figure 20). Compared to the 2018 survey, the dominant trend in the 2020 main channel longitudinal profile was deposition, most notably in the upper and lower reaches. However, comparing the 2020 to the 2014 and 2016 surveys, deposition occurred in the upper half of the reach and scoured in the lower half.

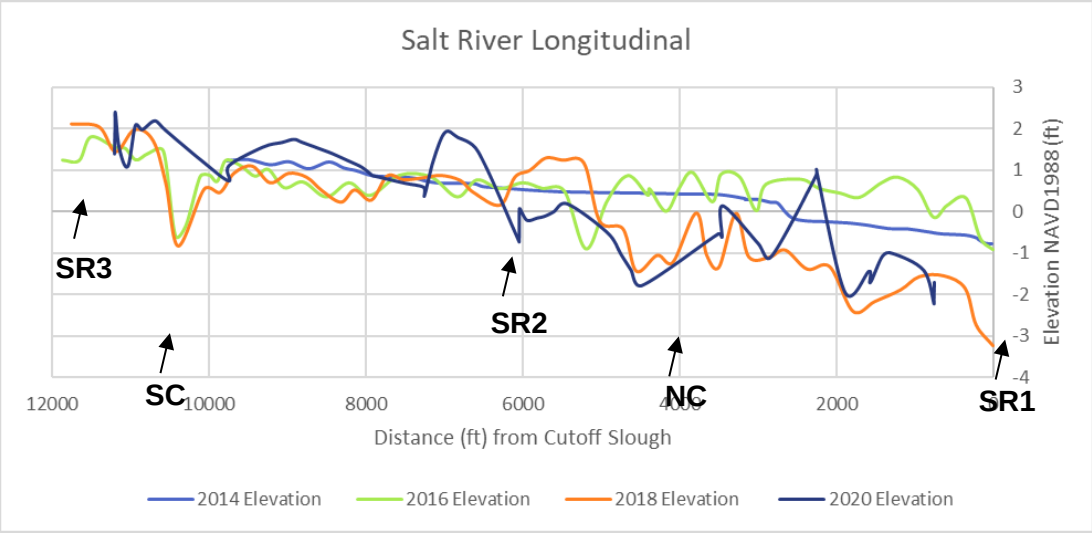

Figure 20. Salt River Longitudinal surveys for selected years between 2014 and 2020

The longitudinal profile of the NC for 2020 indicates scouring throughout almost the entirety of the channel reach with the exception of approximately one foot of deposition on either side of the cross section NC2 (Figure 21). Degradation of the channel was relatively consistent, with considerable thalweg scour occurred at the beginning of the reach (at NC1) and undercutting of the bank was observed.

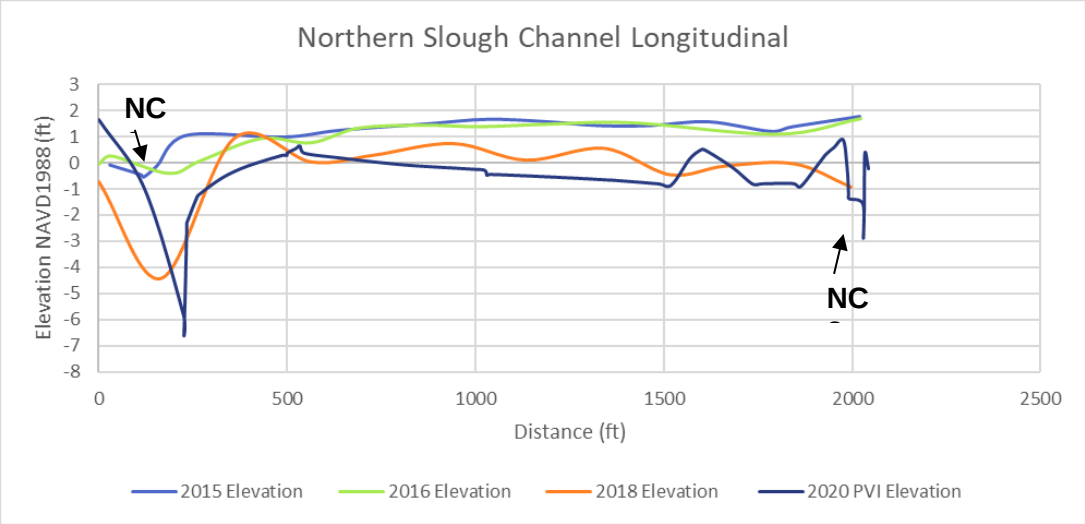

Figure 21. Northern Slough Channel Longitudinal surveys for selected years between 2014 and 2020

The 2020 longitudinal profile for the southern slough channel is relatively consistent with previous surveyed channel elevations, excluding significant deposition in the lowest (500 ft) and upper (4,500 ft) sections. These sites experienced six feet and 2.5 feet of deposition, respectively, compared to the 2018 profile (Figure 22).

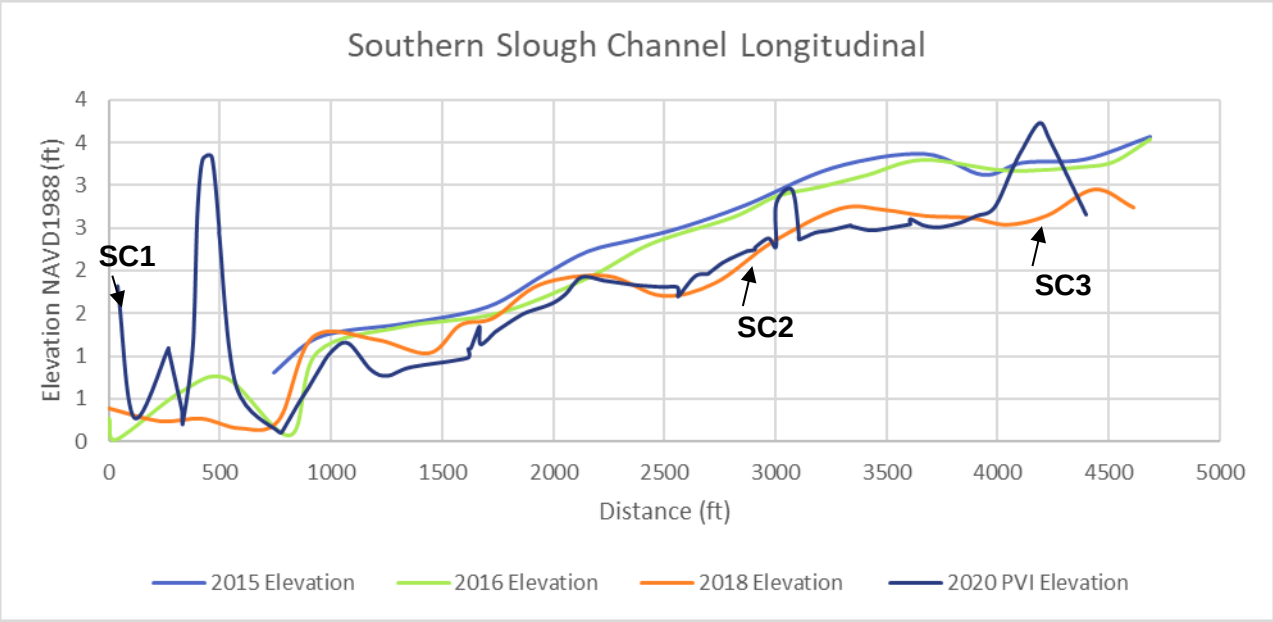

Figure 22. Southern Slough Channel Longitudinal surveys for selected years between 2014 and 2020

Though the Salt River cross-section sites did not have any dramatic changes, the longitudinal profile showed some unexpected deposition throughout 12,000 ft reach. It is highly recommended to perform a 2021 survey to determine if the south slough channel confluence has indeed filled in with sediment. The northern slough channel cross-sectional surveys indicate that approximately one foot of deposition occurred in the lower reach, while scour up to one foot is present in the upper reach. Site NC2 should be observed in the field to assess the significant scour and increase of channel capacity. The southern slough channel network appears to be mostly stable with little change from recent surveys.

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. Observational data sheets are available upon request.

Methods: Any culverts or tide gates remaining or installed in Riverside Ranch (Figure 23) 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.

HCRCD 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. A site-check form has been developed to help monitor various elements on Riverside Ranch. The form includes observations pertaining to the tide gates, outboard ditch, pasture conditions, fencing, wildlife, roads, structures, etc. The forms are reviewed by the HCRCD Project Manager to determine any issues that need to be addressed.

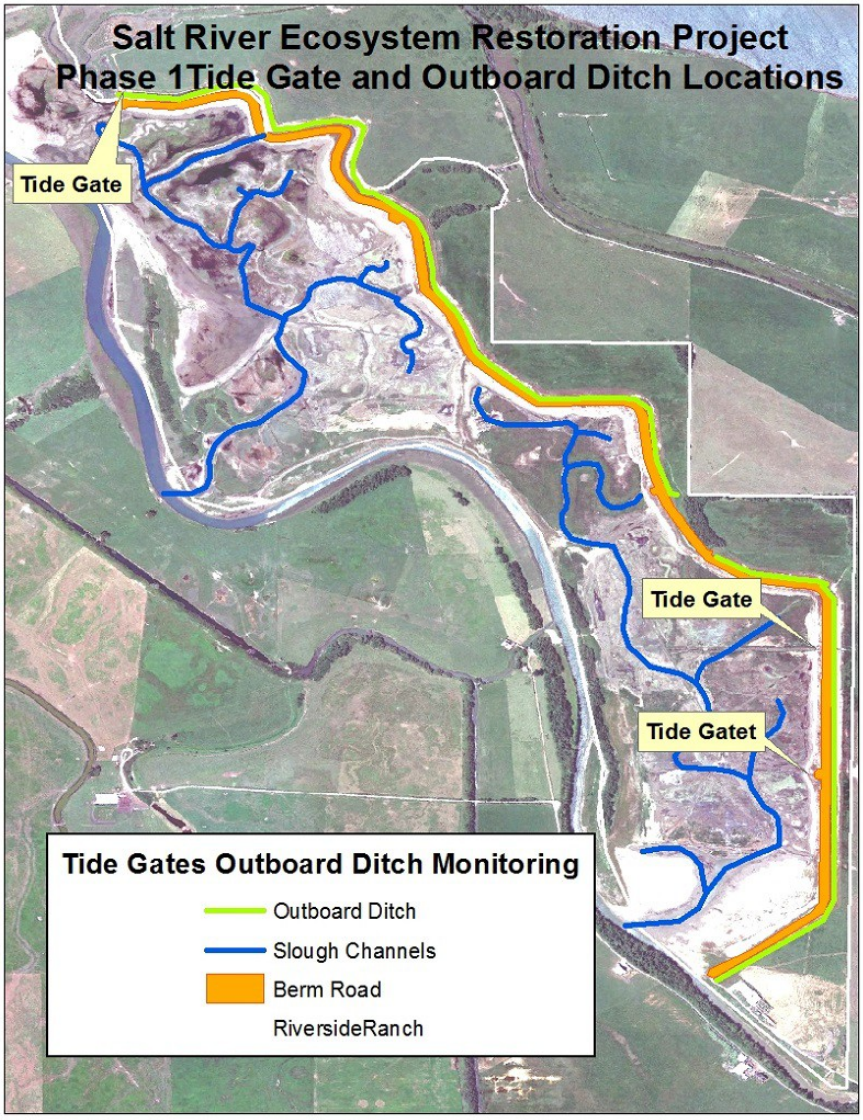

Figure 23: Tide Gates and Outboard Ditch Locations

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 2020 monitoring was conducted on a periodic basis. No culverts remain on Riverside Ranch; all culverts were removed during construction. 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.

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. Observational data sheets are available upon request.

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.

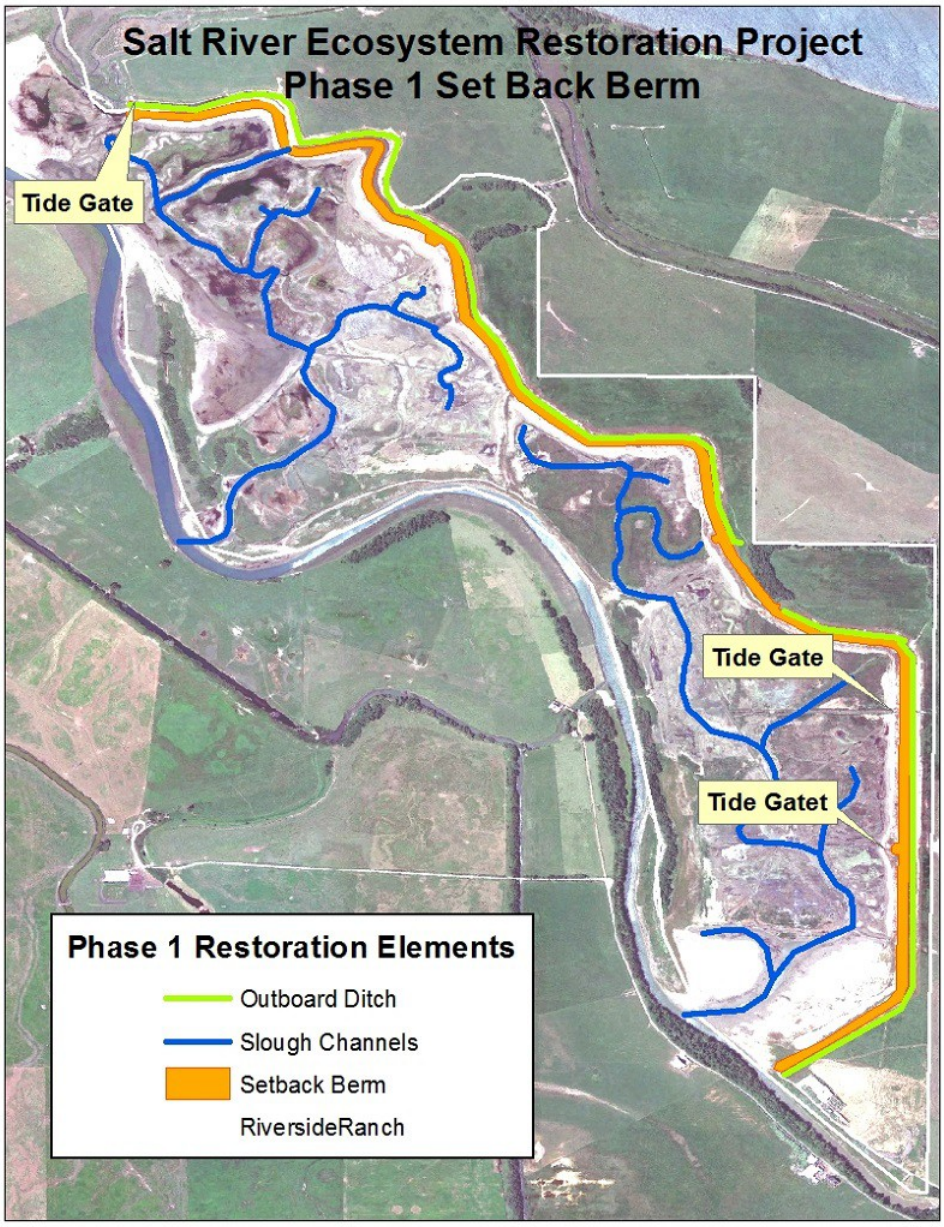

Figure 24: Setback Berm Location

Results and Discussion: Observations of the setback berm and the berm road (Figure 24) are were performed periodically in 2020. Minor rills are observed on the estuary side of the berm and have been stable since 2016. Some 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 very large Eel River flood event in February 2019, where all gravel and road base material were washed away. California Department of Fish and Wildlife (Riverside Ranch landowner) intends to address the impacts to the road.

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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.*

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 presence of salmonids 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:

DUE TO COVID 19 RESTRICTIONS MONITORING FOR SALMONID AND TIDEWATER GOBY DID NOT OCCUR

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 is 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 on Phase 1.
- Annual evaluation of vegetation on Phase 1.
- Provide short-grass habitat for Aleutian Cackling Geese.

Report: 2020/2021 Aleutian Goose Habitat Evaluation – Riverside Ranch – Salt River ecosystem Restoration Project – Memorandum. Prepared for and by the Humboldt County Resource Conservation District. February 2021.

Methods: To evaluate pasture vegetation for Aleutian Cackling geese habitat, two fields were chosen which provided the highest opportunity for access for geese (Figure 25). 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.

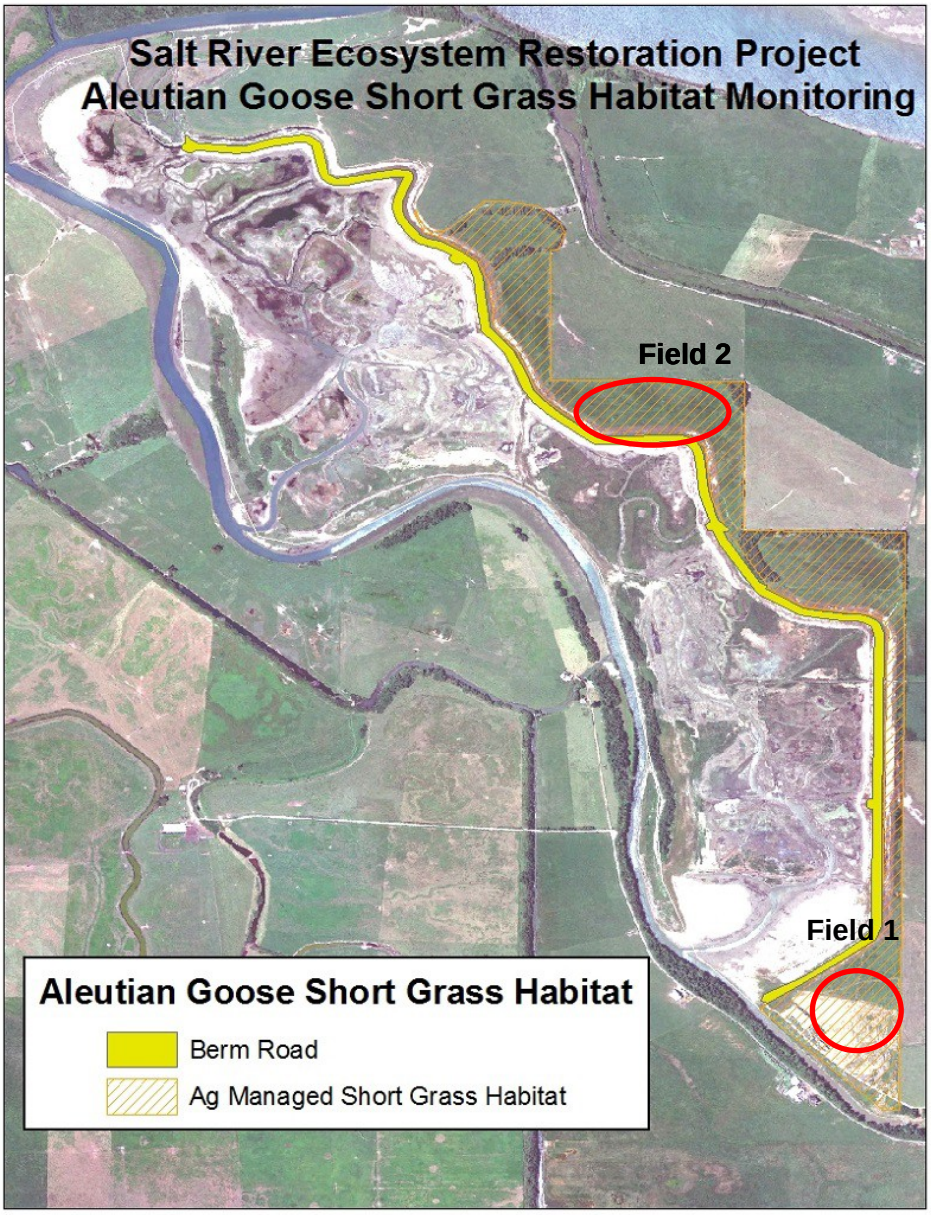

Figure 25: Managed Short-Grass Habitat on Phase 1

Results and Discussion:

The 72 acres of agricultural lands (Figure 25) on Riverside Ranch was not managed from 2013 to 2017 due to the State suspending activities on all California Wildlife Management Areas (WMAs). Currently CDFW WMAs are managed by CDFW.
In March 2018, CDFW released a Request for Proposals for Permit for Excess Vegetation Disposal on the Salt River Unit of the Eel River Wildlife Area (aka Phase 1/Riverside Ranch). An adjacent dairy producer was awarded a 3-year lease and began management practices in the summer of 2018. CDFW approved the dairy producer'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. Over two years of agricultural vegetation management has occurred on Riverside Ranch.

It should be noted that geese have not been observed in the Ferndale bottoms area during the 2020/2021 winter. Reduced rainfall may contribute to their absence (as of February 2021, rainfall is 50% of annual winter average). Aleutian and Canada geese were present further north in the Humboldt Bay area. Results for sward height and habitat features are shown in Table 1:

Table 1: Short grass habitat monitoring results for Riverside Ranch – February 2021

FIELD	MONTH	AVERAGE SWARD HEIGHT (inches)	CDFW SWARD HEIGHT CRITERIA (Dec to March) (inches)	VEGETATION AND FEATURES
1	Feb	3.6	1.5 to 3	Dominant rye grass, sparse bent grass, and sparse clover. Dense green pasture. Small ponds of standing water.
2	Feb	2.7	1.5 to 3	Sparse bent grass, sparse clover, sparse rye, undesirable wetland species such as juncus. Frequent bare ground and some small ponds of standing water.

A field visit was performed on February 10, 2021, prior to spring turnout. The two Riverside Ranch fields were sampled in February 2021. The fields were agriculturally managed by using light weight 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 to forage, as shrub and tree vegetation was minimal or absent. Sward heights were averaged and the values equaled 3.6 inches and 2.7 inches in the respective fields. CDFW recommends 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 (3.6 inches) slightly exceeds the criteria range. However, field 1 appeared to have productive grass habitat and small water features that are more desirable to geese. Average sward height in field 2 falls within the range of the December-March criteria, however, the vegetation composition is not as desirable (sparse rye grass with wetland species) and frequent bare ground was observed (Figures 26 and 27).


Figures 26 (left) and 27 (right). Field 1 (Figure 26) shows lush pastures with water features. Field 2 (Figure 27) shows sparse pasture with juncus clumps, bare ground, and water features.

Overall, the agricultural fields provide habitat for migrating geese and other species. Previously, the fields laid fallow for five years and is now being agriculturally managed under a lease agreement with CDFW. Short grass habitat appears to be moving in a positive trajectory for Riverside Ranch.

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

Monitoring Task: Salt Marsh and High Marsh Ecotone Vegetation Percent Cover Survey

Agencies/Acts: Coastal Commission

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

Description: Estimate year 2020 percent cover of vegetation for: tidal marsh areas in Phase 1

Goals: Achieve Native Vegetation Percent Cover of ≥50% in Phase 1 tidal marsh

Report: 2020 Annual Habitat Monitoring Report - Salt River Ecosystem Restoration Project, Prepared for the Humboldt County Resource Conservation District by J.B. Lovelace & Associates

Methods:
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 (n=32) that was determined to be sufficient to detect a “medium” effect size of

0.5 standard deviations (following Cohen 1988) between the observed sample means and their respective success criteria using a two-sided t-test, and assuming both 95% confidence and a statistical power of 80%.

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 (Figures 4 – 7). 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.

Percent cover data collected for each species is absolute cover, which is distinct from relative cover. Absolute cover quantifies the vegetative coverage of each species, or category, within the sample frame, regardless of any canopy overlap between different species. When measuring absolute cover, resulting cumulative cover values for sampled locations that exceed 100% for a given sample are not uncommon (Barbour et al. 1998, etc.).

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 2020 monitoring areas are both achieving and regressing from the 2020 percent cover success criteria of native

vegetation depending on the Phase and habitat area. The salt marsh of the Phase 1 Tidal Marsh area is just under the success criteria of ≥50% of native vegetation; likely due to the aggressive encroachment of invasive *Spartina densiflora*. The high marsh ecotone of the Phase 1 Tidal Marsh area exceeded the ≥50% of native vegetation (Table 2). It is recommended that management actions for invasive *Spartina densiflora* be implemented.

Table 2: 2020 Salt Marsh and High Marsh Ecotone Vegetation Percent Cover Results

Sampling Area	Observed Total Vegetation (%)	Observed Native Vegetation (%)	2020 Success Criteria
Phase 1			
Salt Marsh (n=32)	92.7	49.4	≥ 50%
High Marsh Ecotone (n=40)	98.8	75.4	≥ 50%

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 consistent with the goal to maintain 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: Salt River Maintenance SOP, 2020 Woody Vegetation Maintenance. Prepared by the Humboldt County Resource Conservation District. 2020.

Methods: Accept and record landowner maintenance requests. The Humboldt County Resource Conservation District (HCRCD) evaluated sites identified by landowners where instream vegetation growth or downed wood was located. Evaluations considered hydrologic processes, future wood growth, and potential fish habitat. If

evaluations determined that wood removal was merited, CDFW was contacted to inform them of environmental conditions and considered if a site visit was necessary. Next steps included coordinating with landowners to perform work and develop a plan to remove and dispose of vegetation. HCRCD observed and assisted landowners during the vegetation removal.

Results & Discussion: Two landowners submitted maintenance request forms for multiple sites where woody vegetation fell or was growing in the active channel of the channel corridor in the 2019 restoration footprint. All but one case concerned arroyo willow. Chainsaws were used to remove or limb back woody vegetation. Removed vegetation was either added to an existing wood pile on one landowner's property or placed in an adjacent riparian area. All debris was removed from the channel.

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 shall be 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.

Report: Refer to:

- 2020 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 non-native non-invasive and invasive findings to determine 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. Much of the weed species include invasive species such as *Spartina densiflora* in Phase 1 (tidal esturay), and *Agrostis stolonifera* (creeping bent grass)*, Phalaris arundinacea (reed canary grass),* and a variety of thistles (*Helminthotheca echioides and Cirsium vulgare)* in Phase 2 (channel corridor).

No formal project wide weed abatement efforts were made on the restored project footprint. However discrete areas were targeted. The HCRCD staff removed tansy (*Tanacetum vulgare*) and pampas grass (*Cortaderia selloana*) from the 2017 restored reach on Salt River, near the City of Ferndale's wastewater treatment plant, and near the project's sediment management area. The California Conservation Corps controlled hemlock, bristly ox tongue, radish, and bull thistle near the entrance area on Phase 1/Riverside Ranch. Further invasive species removal efforts are described in the "Invasive Species Management – Vegetation" section.

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.

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 desiflora,* and reed canary grass) within sampling areas will not exceed a percent cover of 5%.

Report: Refer to:

- 2020 Annual Habitat Monitoring Report - Salt River Ecosystem Restoration Project, Prepared for the Humboldt County Resource Conservation District by J.B. Lovelace & Associates
- DRAFT Salt River Ecosystem Restoration Project – Channel Maintenance – Cattail and Reed Canary Grass Removal 2020. Prepared by the Humboldt County Resource Conservation District. July 2020. Eureka, CA.

Methods: Review vegetation/habitat monitoring report for invasive findings to determine 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 2020 Annual Habitat Monitoring Report reveals that all areas of the restored Salt River experiences invasive species presence that exceeds maximum criteria and recommends that action take place. Much of the invasive species that are present include *Spartina densiflora* in Phase 1 (tidal esturay), while *Agrostis stolonifera* (creeping bent grass) 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. However discrete areas were targeted. The HCRCD staff removed tansy (*Tanacetum vulgare*) and blessed thistle (*Cnicus benedictus*) from the restored reach on Francis Creek. Staff also removed bull thistles (*Cirsium vulgare*) and bristly oxtongue (*Picris echioides)* around the SMA area and in the 2017 restored areas of the Salt River. The California Conservation Corps removed 200 feet of cattails and reed canary grass from the Salt River active channel just downstream from the confluence of the sediment management area. This area of the instream channel became over vegetated in the past years and vegetation was recommended to be removed by project engineers to ensure efficient hydrologic flow and sediment transport. CDFW was consulted in order to comply with any fish presence and habitat concerns. The City of Ferndale Wastewater Treatment Plant also coordinated with the effort by providing transport and disposal of removed vegetation.

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.

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: N/A

Methods: The California Department of Fish and Wildlife, Humboldt State University, 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: Due to COVID restrictions, spring and summer fish sampling did not occur. Therefore, pikeminnow control was not addressed. As fish sampling re-commence in following seasons, fish monitoring efforts will continue to capture and euthanize Sacramento Pikeminnow to reduce their occupation in newly created and restored habitats.

LIST OF AVAILABLE REPORTS

Hansen, D. and Duin, P. 2021. Channel Profile Report: Salt River Ecosystem Restoration Project – Phase Two – Year 2020. Prepared for the Humboldt County Resource Conservation District. February 2021.

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. 2020. DRAFT Salt River Ecosystem Restoration Project – Channel Maintenance – Cattail and Reed Canary Grass Removal 2020. Prepared for the Humboldt County Resource Conservation District. July 2020. Eureka, CA.

Humboldt County Resource Conservation. 2020. Salt River Maintenance SOP, 2020 Woody Vegetation Maintenance. Prepared for the Humboldt County Resource Conservation District. November 2020.

Humboldt County Resource Conservation. 2021. 2020/2021 Aleutian Goose Habitat Evaluation – Riverside Ranch – Salt River ecosystem Restoration Project – Memorandum. Prepared for the Humboldt County Resource Conservation. February 2021.

Humboldt County Resource Conservation District and Duin, P. 2021. Channel Profile Report: Salt River Ecosystem Restoration Project, Post- Construction Geomorphic Channel Survey Report, Phase 1, Year 7 – 2020. Prepared for the Humboldt County Resource Conservation District. February 2021.

J.B. Lovelace & Associates. 2021. 2020 Annual Habitat Monitoring Report - Salt River Ecosystem Restoration Project, Prepared for the Humboldt County Resource Conservation District.