2022 California Ridgway's Rail Surveys for the San Francisco Estuary Invasive *Spartina* Project

Report to:

State Coastal Conservancy
San Francisco Estuary Invasive *Spartina* Project
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1. Introduction

Annual monitoring for the endangered California Ridgway's rail (*Rallus obsoletus obsoletus*; formerly California clapper rail, *Rallus longirostris obsoletus*) is an essential component of the State Coastal Conservancy's Invasive *Spartina* Project (ISP). California Ridgway's rails are year-round residents of the tidal wetlands of the San Francisco Estuary and co-occur with native and non-native *Spartina*. The ISP requires information on the number of rails at each site for the planning and permitting of *Spartina* treatment. Additionally, annual breeding-season surveys provide a standardized measure of Ridgway's rail presence and distribution in *Spartina*-invaded marshes throughout the Estuary. Results from these surveys also contribute to the understanding of the species and provide an important metric of tidal marsh restoration in the San Francisco Bay.

In collaboration with partner organizations, including Point Blue Conservation Science (PBCS), Don Edwards National Wildlife Refuge (DENWR), Avocet Research Associates (ARA), San Pablo Bay National Wildlife Refuge (SPBNWR), and East Bay Regional Park District (EBRPD), Olofson Environmental, Inc. (OEI) conducted surveys for California Ridgway's rails to inform the ISP about rail populations at sites slated for *Spartina* treatment in 2022 (Permit Number TE118356-4). Trained and permitted biologists performed standard-protocol surveys at 95 ISP sub-areas (made up of 97 rail "sites") between January 15 and April 15, 2022. The data were entered into the California Avian Data Center (CADC), an online database hosted by PBCS and part of the larger Avian Knowledge Network (AKN). Data were then downloaded from CADC, imported into GIS, and summarized by ISP sub-area boundaries.

Only results from surveys conducted by OEI in 2022 are presented in this report. The ISP relies on partner organizations to conduct surveys and report results collected at other *Spartina*-invaded sites that are not surveyed by OEI. The summary data presented here represent unique detections of Ridgway's rails within the areas surveyed by OEI. These data should not be misinterpreted to be a range-wide population estimate or a comprehensive count of Ridgway's rails at all *Spartina*-invaded sites.

For a complete list of ISP subareas and associated survey organizations, see **Appendix I**: Complete List of 2022 *Spartina* Treatment Sub-Areas and Ridgway's Rail Survey Plans.

Species Account

The **California Ridgway's rail** is classified as endangered by both the U.S. Fish and Wildlife Service and the State of California. Although once abundant in marshes ranging from Marin to San Luis Obispo, the loss of habitat through the historic conversion of marsh to development drove the population to such low numbers to necessitate legal protection. The subspecies' present range is limited to the tidal marshes of the San Francisco Estuary. California Ridgway's rails occur only in salt and brackish tidal marsh habitat and require vegetative cover suitable for both nesting and refuge during high tide events (U.S. Fish and Wildlife Service 2013). Marshes where they occur are characterized by unrestricted daily tidal

flows through a network of well-developed channels. Channel density has been shown to be the most important landscape feature to positively influence Ridgway's rail density (Liu et al. 2012). Additionally, large continuous marshes with a low perimeter-area ratio support higher densities of California Ridgway's rail (Liu et al. 2012). Habitat loss or degradation and predators are among the biggest threats to the rail (USFWS 2013). Recent analysis by Point Blue estimated the total population of Ridgway's rails in the Estuary to be about 1,426 individuals between 2019 – 2021 (Wood 2022).

In addition to Ridgway's rails, OEI records other rail species detected during surveys, including California black rails, Virginia rails, and sora. **California black rail (*Laterallus jamaicensis coturniculus*)** is listed as threatened under the California Endangered Species Act (CESA) and is a fully protected species in the State of California. In the San Francisco Estuary, black rails are most abundant in tidal marshes with some freshwater input (Evens et al. 1991). They nest primarily in pickleweed-dominated marshes with patches or borders of bulrushes, often near the mouths of creeks. Black rails build nests in tall grasses or other marsh vegetation during spring and lay about six eggs. Nests are usually constructed of pickleweed and are placed directly on or slightly above the substrate in vegetation. The California black rail breeding season in the San Francisco Estuary spans February through August.

Virginia rail (*Rallus limicola)* is listed as a species of "least concern" on the IUCN Red List but is protected under the US Migratory Bird Act. Virginia rails have a wide distribution and are found in brackish and freshwater marshes across North America. Virginia rails are year-round residents of the marshes where they occur in the San Francisco Estuary. Virginia rails are similar in appearance to Ridgway's rails, though are smaller with grey cheeks. In the Bay Area, the distributions of the two species overlap, but are loosely divided along a salinity gradient where Virginia rails tend to occupy brackish marshes and Ridgway's rails occupy salt marshes.

Sora (*Porzana carolina*) is listed as a species of "least concern" on the IUCN Red List but is protected under the US Migratory Bird Act. Soras are common in North America and are year-round residents in the marshes where they occur in the San Francisco Estuary. Soras are most often found in freshwater marshes without tidal inundation, although they do occur in brackish marshes and occasionally higher-salinity tidal wetlands.

2. Study Area

OEI conducted surveys for the Invasive *Spartina* Project at 59 transects covering 95 ISP sub-areas in nine reporting regions: Marin, San Francisco Peninsula, San Mateo, Dumbarton South, Union City, Hayward, San Leandro Bay, Bay Bridge North, and Petaluma (**Figure 1**). The study area spanned the counties of Alameda, Contra Costa, Marin, San Mateo, Santa Clara, and Sonoma. Summary survey results for each site are represented within one of four maps: North Bay (**Figure 2**), West Bay (**Figure 3**), South Bay (**Figure 4**), and East Bay (**Figure 5**). For a complete list of ISP survey stations and their geographic coordinates in UTM, see **Appendix II**: 2022 Survey Station Coordinates.

Surveys for Other Organizations

OEI also conducted surveys for several other projects, including: the South Bay Salt Pond Restoration Project (SBSPRP) Phase II; the Military Ocean Terminal at Concord (MOTCO); and the Ellis Outfall Replacement Pipeline Project in the City of Petaluma. These OEI surveys included ten transects covering seven ISP sub-areas. Survey details for these ten transects are included in **Appendix III:** 2022 OEI Survey Results for Each Round.

Partner organizations surveyed an additional 34 ISP sub-areas over 45 transects. Rail survey data from partner organizations are not included in this report; rather, the results from those surveys are reported by the survey organizations themselves.

For a complete list of all ISP sub-areas and associated survey organizations, see **Appendix I**: Complete List of 2022 *Spartina* Treatment Sub-Areas and Ridgway's Rail Survey Plans.

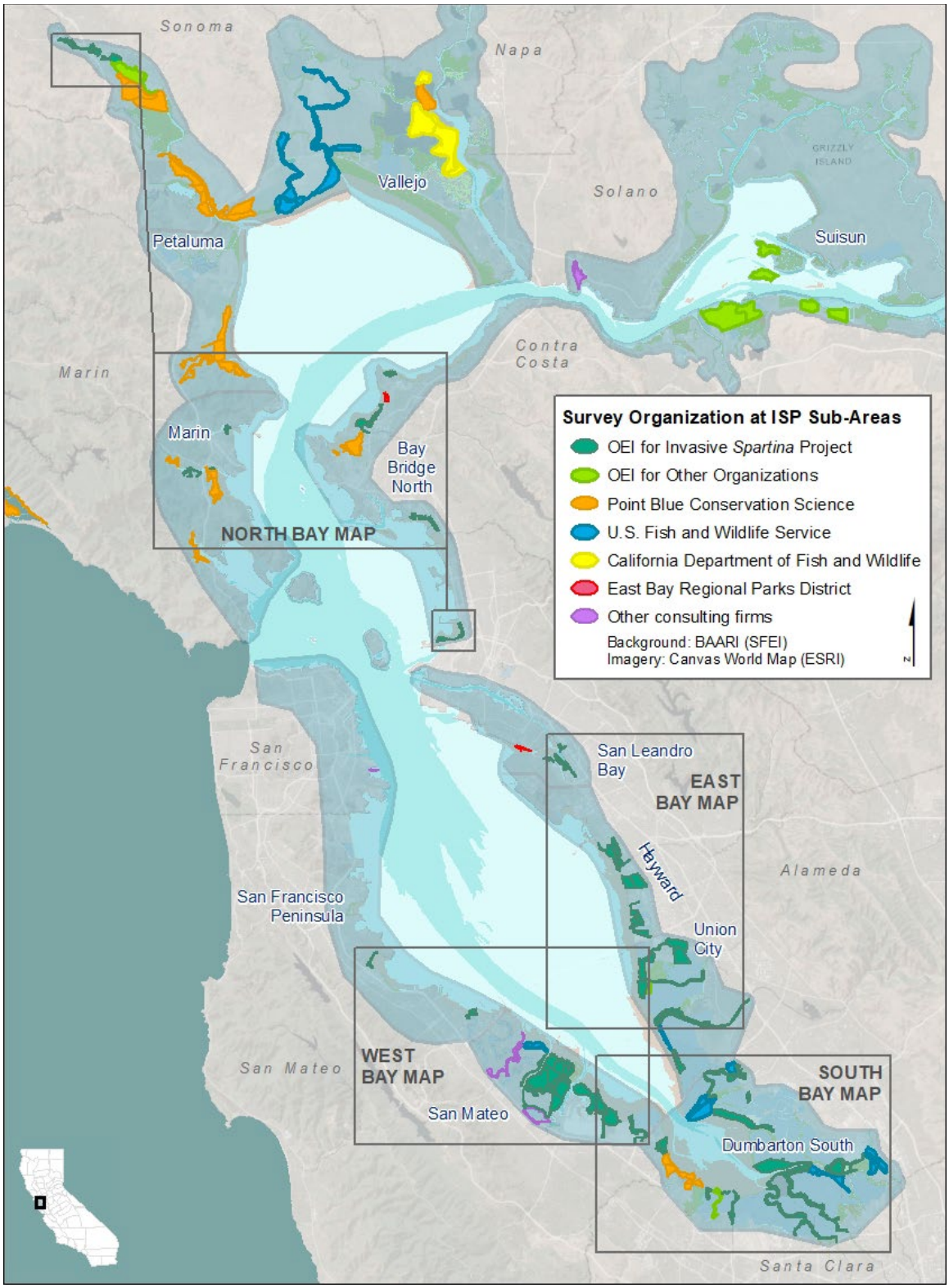

Figure 1. Regional boundaries of ISP sites surveyed for California Ridgway's rail by OEI and others in 2022. Other firms that conducted surveys at ISP sub-areas were as follows: Avocet Research Associates surveyed Southampton Marsh in Benicia; ESA surveyed Heron's Head Marsh in San Francisco; and Huffman Broadway Group surveyed Belmont Slough in Foster City.

3. Methods

Ridgway's rail surveys for the ISP were conducted using the Site-specific Protocol for Monitoring Marsh Birds (Wood et al, 2016, hereafter "NAm Protocol") based on the North American Survey Protocol (Conway 2016). Data were summarized in CADC, imported into GIS, and analyzed according to recommendations in the NAm Protocol.

3.1 Field Methods

California Ridgway's rail surveys were conducted by OEI at 95 ISP sub-areas in 2022 using the NAm survey protocol. Surveys were conducted by the following trained and permitted field biologists at Olofson Environmental, Inc.: Jen McBroom, Jeanne Hammond, Tobias Rohmer, Simon Gunner, Pim Laulikitnont, Brian Ort, Melanie Anderson, Lindsay Domecus, Dylan Pastor, Stephanie Chen, Tara Harmon, and Isabella Sanchez-Mendoza.

The NAm Protocol is a transect point count survey with broadcast of vocalizations of two species of rail (black rails and Ridgway's rails) on every survey round and at every survey station. Each transect is visited for three rounds during the survey season between January 15 and April 15. Detections of Ridgway's rails, black rails, Virginia rails, and sora are recorded during surveys. Data recorded includes species, call type for auditory detections, and an estimate of the distance and direction to the bird. The NAm Protocol is part of the FWS Site-specific Survey Protocol (Wood 2016) and is based on the North American Marsh Bird Monitoring Protocol. The NAm Protocol was developed to increase standardization and decrease the variance in survey results. It was first implemented in 2017 and is the standard call-count survey protocol in the Estuary.

3.2 Data Management

Data were recorded in the field on paper datasheets, and GPS units or GIS phone applications were used to navigate to survey stations. Each rail observation was recorded on the datasheet with time detected, call type, number of rails, distance, and direction to the observed rail. Additionally, each rail was assigned a unique map reference identifier and the approximate location of each detected rail was recorded on a paper field map allowing for interpretation of repeat detections of any individuals. Compasses and rulers were used to accurately plot rails on paper maps. At sites with overlap between other observers, birds were plotted together on a single map to determine which detections were unique. Observations of potential predators of rail nests, young, or adults were noted.

Researchers entered data into CADC, an online database developed and hosted by PBCS in support of the NAm Protocol. By using a shared database with common tables and field headings, results can be readily shared and analyzed by partner organizations.

Each observer entered their own data into CADC and then reviewed their data for quality and accuracy. Once all data from all observers were entered into CADC, rail detections were imported into GIS to determine where Ridgway's rails occurred with reference to ISP sub-area boundaries.

3.3 Data Interpretation

In accordance with recommendations in the NAm Protocol, several metrics were used to evaluate Ridgway's rails numbers at sites and regions presented in this report: highest minimum count (by site); index of relative density (by site), annual rate of change (by region), average annual rate of change over five-years (by region), and occupancy by black rail, Virginia rail, and sora (by site). The definitions and equations used to calculate these metrics are excerpted from the site-specific survey protocol (Wood 2016) and are summarized below.

Highest Minimum Count is the minimum number of unique rails detected during the survey round with the highest count. Birds that were detected from more than one station or by more than one observer during a single round were counted only once toward the total number of rails detected in a round. Birds that were detected outside of survey time were included in the summary and counted toward the total. Once all data were summed for each round at each site, the round with the highest count was reported as the number of rails detected at each site (termed the "highest minimum count").

Index of relative density is the number of unique rails detected per unit area and is calculated as follows. For each visit, the total number of unique birds detected within 200 meters of a survey point is calculated. That count is then divided by the area of rail habitat within 200 meters of the survey stations. The area of rail habitat was calculated in GIS by buffering 200 meters around each survey station and clipping the buffered area to the marsh habitat at the site, generally excluding both upland and mudflat areas. The resulting densities for each visit are then averaged.

As an example, assume 3, 6 and 5 unique birds are detected within 200 m of 7 survey points during three visits to a given marsh study area (assume that each point is surrounded by 100% rail habitat). The index of relative density for the study area would be calculated as 14 rails/ (7 points*31 acres*3 visits) = 0.022 rails/acres. Each unique bird is only counted once (e.g., the same bird heard from two different survey points would only be counted once). The area surveyed at each point is adjusted accordingly if there is less than 100% rail habitat within the 200-meter radius.

The index of relative density was categorized into bins and displayed geographically on maps (**Figure 2 – 5**). Density bins were based on density estimates outlined in the Tidal Marsh Recovery Plan (TMRP; U.S. Fish and Wildlife Service 2013). In the TMRP, the average rail population required for rail recovery was developed by multiplying the minimum marsh acreage for each recovery unit by rail densities at calculated percentiles of observed winter populations. In this report, the highest density bin represents sub-areas where rails were detected at a density greater than the 90th percentile of observed winter densities in the South San Francisco Bay Recovery Unit, 0.45 rails/acre (or 1.11 rails/hectare). The next density demarcation is 0.15 rails/acre (or 0.37 rails/hectare), which is the 60th percentile of observed winter densities; sub-areas above this demarcation are shaded dark orange and those below are shaded light orange. Below this level falls sub-areas where rails were detected at a density less than 0.04 rails/acre (or 0.1 rails/hectare). Sub-areas where rails were not detected within 200 meters of the survey stations are shaded green. This category does not indicate absence; rails may have been

detected beyond 200 meters and are therefore present at the sub-area but cannot be included in the density calculation.

Table 1. Density bins developed based on density estimates outlined in the TMRP (USFWS 2013).

Density Bins	Relative Density (rails per acre)	Description
Not detected within 200m	0	Rails were not detected within 200 meters of the survey station. Note, this category does not indicate absence; rails may have been detected beyond 200 meters within the survey site but cannot be included in the density calculation.
Low	< 0.04	Rails detected at a density less than 0.04 rails/acre (or 0.1 rails/hectare)
Mid	0.04 - 0.15	Rails detected at density less than the 60th percentile of observed winter densities reported in the TMRP but greater than the low category.
High	0.15 - 0.45	Rails detected at density between the 60th to 90th percentile of observed winter densities reported in the TMRP.
Very high	> 0.45	Rails detected at density greater than 90th percentile of observed winter densities reported in the TMRP.

Index of occupancy is the maximum proportion of occupied survey points in a study area and was calculated for three other rail species: black rails (BLRA), Virginia rails (VIRA), and sora (SORA). For each visit to a study area, the total number of points occupied by each species was calculated; to be considered occupied, at least one bird of the species of interest was detected from the survey point. The maximum number of occupied points across all visits is divided by the total number of points that were surveyed in the study area to arrive at the index of occupancy. For example, assume 3, 0 and 2 points were occupied by Virginia rails at a study area with 14 points across three visits in a given year. The "index of occupancy" for the study area would be 3/14 = 0.21. This is considered a minimum occupancy index (known as "naïve" occupancy) because we know that detection probability is <1, which means the true occupancy could be >3 points. Only unique birds are considered for occupancy (the same bird detected at two points would result in only one point considered occupied).

Index of one-year rate of change for the total highest minimum count was calculated at each Region using the following equation:

$$m = \frac{(p2 - p1)}{p1} \times 100\%$$

where $p1$ is the total highest minimum count for the previous year and $p2$ is the total highest minimum count in the current year. For example, if the total highest minimum count for rails at site DESFB was 33 birds for 2014 and 35 birds for 2015, the index of the annual rate of population change would be: ((35 – 33)/33*100%) = 6.06%.

Index of compound annual rate of change over a five-year period ($\bar{m}$) is a simple index of the average annual rate of change between two time points, calculated using the total highest minimum count (summed across one or more study areas) and was obtained using the following equation:

$$\bar{m} = \left[\left(\frac{p2}{p1}\right)^{\left(1/(t2-t1)\right)} - 1\right] \times 100\%$$

where $p1$ is the total highest minimum count for the first year, $p2$ is the total highest minimum count for the last year, $t1$ is the start year, and $t2$ is the end year ($t2$ - $t1$ = 5 in this five-year analysis). For example, if the total highest minimum count of Ridgway's rails at DESFB was 28 birds for 2010 and 36 birds for 2015, the index of the average annual rate of change would be: [(36/28) ^ (1/[2015 – 2010])-1]*100% = 5.15% increase per year.

Caveats: It is important to note that the preceding metrics of highest minimum count, relative density, occupancy, and population change do not consider factors such as detection probability, habitat covariates, etc.; thus, they should be interpreted with caution. More reliable estimates of population size and change over time will be calculated by PBCS using hierarchical models at an interval of approximately every five years. However, the simpler metrics provided above are easy to calculate and may allow managers to detect substantial changes in true abundance (assuming count indices are correlated with true abundance) over short time periods, which could be important for early detection of issues and implementing potential management interventions. The formulas for the above metrics (except for the formulas involving the index of relative density) assume that the same study areas are surveyed every year. If the number of study areas or transects within study areas changes over time (e.g., the number of survey points changes) then adjustments to the analyses will be required.

4. Survey Results

Surveyors at OEI detected 499 Ridgway's rails at ISP sub-areas in 2022. In 2021, surveyors detected 552 Ridgway's rails at the same subset of sub-areas, representing a 10% decrease over the past year at the sub-areas surveyed by OEI. On a longer five-year timescale, rail detections have declined at a rate of 7% each year since 2017 at the same subset of sub-areas.

The five-year trend shows declines across all groups of sub-areas regardless of treatment status. At sub-areas where treatment has been ongoing since 2012, rails are declining by about 4% a year since 2017; at sub-areas where treatment was recently authorized in 2018, rails are declining by about 9% per year since 2017; and at sub-areas where treatment has not occurred for over a decade, rails are declining by about 10% per year since 2017.

The one-year trend differs between treatment groups, declining at both sub-areas where treatment has been ongoing since 2012 (-4%) and at sub-areas where treatment was recently authorized in 2018 (-9%), but showing no change (0%) at the ten sub-areas where treatment has not occurred in over a decade.

Trends and summary results by region are summarized below. Summary data for each sub-area are included in **Table 2** and detailed survey results from each round are included in **Appendix III**.

The Marin Region extends from the Golden Gate Bridge to the Richmond Bridge in Marin County (**Figure 2**). OEI surveyed three transects spanning seven sub-areas in the Marin Region in 2022; PBCS surveyed an additional four transects spanning five sub-areas in the Region. OEI detected a total of 18 Ridgway's rails in the Marin Region in 2022, four more than detected at the same subset of sub-areas in 2021 but a 5% decline since 2017 at the same subset of sub-areas. Meaningful population trends are difficult to detect at the small number of transects surveyed by OEI in Marin in 2022.

The San Francisco Peninsula Region extends from the Golden Gate Bridge to the San Mateo Bridge (**Figure 3**) and represents an urban shoreline with little marsh habitat. In 2022, OEI surveyed three sub-areas the San Francisco Peninsula Region and ESA surveyed one additional sub-area (Heron's Head 12b). No Ridgway's rails were detected in the Region in 2022.

Trends are difficult to identify at low densities and when rails are not detected. Rails were detected in the Region in 2021 but not in 2020. The lack of detections in 2022 may be due to a real change in rail presence in the Region or it may be due to a low detection probability associated with low densities. The fragmented low-quality habitat in this Region will never support a large stable population of rails. There are few opportunities for restoration or enhancement of wetlands in this urban landscape and the creation of new habitat would likely require expensive environmental engineering.

The San Mateo Region extends from the San Mateo Bridge to the Dumbarton Bridge on the west side of the Bay (**Figure 3**). OEI surveyed eleven transects spanning 16 sub-areas within the San Mateo Region in 2022. DENWR conducted surveys at one transect (RESH-T1) at Redwood Shores (02a.3) and Huffman Broadway Group (HBG) conducted surveys along Belmont Slough, which includes three ISP sub-areas (02a.1a, 02a.1b, & 02a.2). OEI surveyed an additional transect along Ravenswood Slough (RAV-T2) in support of the South Bay Salt Pond Restoration Project (SBSPRP); however, Ridgway's rail detections from that transect may be duplicative to detections from the ISP transect RAV-T1 and thus these results are excluded from the analysis.

OEI detected a total of 75 Ridgway's rails in the San Mateo Region in 2022 (**Table 2**). This represents a 31% decrease since 2021 and a 9% decrease since 2017 at the same subset of sub-areas. This Region contains one sub-area, B2 North Quadrant East (02c.1b), where treatment was limited to seed-suppression from 2012 to 2018. This treatment restriction was lifted in 2018 and B2 North Quadrant East has been fully treated since then. OEI detected three rails at the sub-area in 2022 and a combined total of 15 rails at B2 North marsh. This is a decline from 2021 when OEI detected five rails at the sub-area and a combined total of 20 rails at B2 North marsh.

The Dumbarton South Region includes all marshes south of the Dumbarton Bridge, from Newark to Mountain View (**Figure 4**). In 2022, OEI conducted surveys at 18 sub-areas in the Dumbarton South Region. DENWR also surveyed four sub-areas: Dumbarton/Audubon (05b), La Riviere Marsh (05d), Coyote Creek Lagoon (05f.3), and Coyote Creek South-East (15a.5). PBCS surveyed an additional four transects spanning two sub-areas: Faber and Laumeister Marshes (15b) and Palo Alto Baylands (08). OEI also conducted surveys along a transect at Mountain View Slough (15a.1) in support of SBSPRP and detected four Ridgway's rails (see **Appendix III** for survey details).

OEI detected a total of 87 rails in the Region in 2022, up from 79 rails detected in 2021 at the same subset of sub-areas. This represents a one-year increase of 10% since 2021 but a 10% decline over the five-year timespan since 2017. Although OEI detected fewer than 100 rails, there are likely many more rails in the Region, since there are extensive tracts of tidal wetlands that are not included in the survey effort or are beyond the threshold of detection from the survey stations.

The Union City Region in Alameda County extends from the San Mateo Bridge to the Dumbarton Bridge (**Figure 5**). OEI surveyed 15 sub-areas in the region in 2022. DENWR surveyed one additional sub-area in 2022: Ideal Marsh - North (21a). OEI also conducted surveys along two additional transects in the Region: AFCC-T5 at ISP sub-area AFCC Lower (01b) and OAC-T4 at ISP sub-areas Whale's Tail South (13e) and Cargill Mitigation Marsh (13f) (see **Appendix III** for survey details).

OEI detected a minimum of 47 Ridgway's rails in the Union City Region in 2022 (**Table 2**). This represents a 20% decrease since 2021 but a 10% increase over the five-year timespan at the same subset of sub-areas. Notably, rails have increased over the past five years at the sub-areas where native *Spartina foliosa* has been planted by the ISP: Eden Landing Reserve - South (13k) (aka North Creek Marsh), Eden Landing - Mt Eden Creek (13j), and Cargill Mitigation Marsh (13f).

The Hayward Region in Alameda County extends from the Oakland International Airport south to the San Mateo Bridge (**Figure 5**). OEI surveyed 18 sub-areas in the Hayward Region. OEI detected 158 Ridgway's rails in 2022 (**Table 2**), a single year increase of 5% since 2021 but a 4% decrease over a five-year timespan at the same subset of sub-areas.

The Hayward Region contains seven sub-areas where treatment permissions changed with the ISP's 2018 Biological Opinion as part of the Phase 1 Treatment Plan, allowing portions of marshes to be fully treated to phase in hybrid *Spartina* removal over time. Six of the seven previously restricted sub-areas have been fully treated for at least two years: Citation Marsh Upper (20d.2a), Bunker Marsh (20g), San Lorenzo Creek North (20h.1), Cogswell B Bayfront (20n.1), Cogswell B South (20n.2), and Cogswell C (20o). The remaining previously-restricted sub-area, Cogswell Section B Main (20n.3), is now permitted for seed-suppression only, in which a sub-lethal dose of herbicide is applied to slow the production of seed without removing vegetative growth. Citation Marsh Central (20d.2b) and North Marsh (20f) remain restricted treatment sub-areas; no treatment will occur at these sub-areas under the current 2018-2022 Biological Opinion. Although rail numbers in the Region have declined since 2017 after the initiation of treatment at the previously restricted sub-areas, the number of rails estimated to be affected by treatment has not been exceeded at any sub-area.

The San Leandro Bay Region in Alameda County is bounded by the cities of Oakland and Alameda (**Figure 5**) and is surrounded by commercial development, landfills, highways, and the Oakland International Airport. OEI surveyed nine sub-areas within the region. EBRPD surveyed one additional sub-area: Elsie Roemer (17a). OEI detected 88 Ridgway's rails in San Leandro Bay in 2022. This represents a decline of 17% since 2021 and a decline of 11% since 2017.

The San Leandro Bay Region includes two previously restricted sub-areas where treatment is now permitted: Damon Marsh (17d.4) and Fan Marsh Wings (17j.1). These two sub-areas were not treated from 2011 to 2017. Treatment is still prohibited at three sub-areas in the San Leandro Bay Region: Arrowhead Marsh East (17c.2), Fan Marsh Main (17j.2), and MLK New Marsh (17h).

The two previously restricted sub-areas are small marshes that have been highly impacted by non-native *Spartina* and have little native vegetation. As expected, rail numbers have declined as non-native *Spartina* has been treated and removed at these sub-areas. Fan Marsh Wings (17j.1) is a marshy culvert alongside Doolittle Drive and has intermittently supported one to two rails in the past. No rails were detected at this sub-area in 2022. This sub-area is unsuitable for revegetation efforts because of the location, lack of tidal flow, and general low-quality habitat at this site. Damon Marsh (17d.4) is a small marsh, occupying an area less than four acres. No rails were detected at Damon Marsh in 2022, which is a decline from two detections in 2021 and four detections in 2017.

The Bay Bridge North Region is in Alameda and Contra Costa Counties, extending from the Bay Bridge in Emeryville to Point Pinole north of the City of Richmond in the North Central Bay (**Figure 2**)**.** OEI conducted surveys at five transects spanning eight sub-areas in 2022. EBRPD surveyed one additional sub-area: Giant Marsh (10c). OEI detected 34 Ridgway's rails in the region in 2022, a slight decline of 3% since 2021 but no change over a five-year timespan at the same subset of sub-areas.

The Petaluma Region includes the tidal wetlands along the Petaluma River, which are lumped into four large sub-areas. OEI conducted surveys for the ISP at two transects spanning the two smallest sub-areas: Petaluma River – Upper (24a) and Grey's Field (24b) (**Figure 2**). No Ridgway's rails were detected by OEI at either sub-area, however OEI only surveys a very small fraction of the habitat in the region. PBCS surveyed eleven additional transects and detected over 180 Ridgway's rails in the Petaluma Region in 2022. OEI also conducted surveys for the Ellis Outfall Pipeline Replacement Project at Ellis Creek Marsh in the City of Petaluma but did not detect any Ridgway's rails (**Appendix III**).

Table 2. Summary of survey results at all sub-areas surveyed by OEI using the North American Protocol (NAm) in 2022, grouped by region. Relative density is a ratio of rails per acre, calculated as the number of birds detected within 200 meters of a survey station; a zero in this column does not necessarily indicate absence from the site as birds may have been detected beyond 200 meters. Occupancy calculations are shown on a transect level, rather than sub-area level.

				RIRA Indices		Occupancy		
Sub-Area Name (Code)	Transect	Area (acres)	% Area Surveyed	Highest Count	Relative Density (rails/acre)	BLRA	SORA	VIRA
Marin Region								
Piper Park - East (04c)	PIPE-T1	10.1	99%	3	0.10	0	0	0
Piper Park - West (04d)	PIPE-T1	13.8	100%	11	0.31	0	0	0
CMC - Mouth (04j.1)	CMCM-T1	6.0	100%	0	0.00	0	0	0
CMC - Mouth (04j.2)	CMCM-T1	12.2	49%	0	0.00	0	0	0
Boardwalk No. 1 (04k)	PIPE-T1	8.4	100%	2	0.08	0	0	0
Pickleweed Park (09)	PIPK-T1	14.2	100%	2	0.07	0.33	0	0
San Rafael Canal Mouth (23d) - split into two sub-areas in 2011						0	0	0
San Rafael Canal East (23d.1)	PIPK-T1	3.6	100%	0	0.00	-	-	-
San Rafael Canal West (23d.2)	PIPK-T1	3.1	100%	0	0.00	-	-	-
San Francisco Peninsula Region								
SFO (19h)	SFO-T1	25.1	81%	0	0.00	0	0	0
Seal Slough (19p) - split into two sub-areas in 2011						0	0	0
Seal Slough Central (19p.1)	SEAL-T1	37.8	85%	0	0.00	-	-	-
Seal Slough Peripheral (19p.2)	SEAL-T1	30.8	75%	0	0.00	-	-	-
San Mateo Region								
Corkscrew Slough (02b.1)	CORK-T1	227.4	36%	5	0.02	0	0	0
Steinberger Slough (02b.2)	RESH-T2	105.6	50%	0	0.00	0	0	0
B2 North Quadrant (02c) - split into three sub-areas in 2011 and 2012						0	0	0
B2 North West (02c.1a)	OBEN-T1	150.5	47%	10	0.02	-	-	-
B2 North East (02c.1b)[1]	OBEN-T1	146.0	72%	3	0.01	-	-	-
B2 North South (02c.2)	OBEN-T2	226.7	56%	2	0.00	-	-	-
B2 South Quadrant (02d) - split into four sub-areas in 2011 and 2012						0	0	0
B2 South West (02d.1a)	OBES-T1	38.3	75%	0	0.00	-	-	-
B2 South East (02d.1b)	OBES-T1	23.2	45%	0	0.00	-	-	-
B2 South 2 (02d.2)	OBES-T1	58.8	73%	0	0.00	-	-	-
B2 South 3 (02d.3)	OBES-T1	67.9	22%	0	0.00	-	-	-
Greco Island - North (02f)	GRIN-T1	511.1	31%	0	0.00	0	0	0
West Point Slough - SW / E (02g)	WPSS-T1	39.8	65%	1	0.01	0	0	0
Greco Island - South (02h)	GRIS-T1	237.9	51%	20	0.07	0	0	0
Ravenswood Slough (02i)	RAV-T1	117.8	82%	11	0.04	0	0	0
Deepwater Slough (02k) - grouped into one sub-area by ISP Control Program						0	0	0
Middle Bair N (02k)	MBE-T1	221.6	52%	18	0.05	-	-	-
Middle Bair SE (02k)	MBE-T1	200.3	33%	2	0.01	-	-	-
Pond B3 Bair Island Restoration (02m)	OBW-T1	411.8	24%	3	0.01	0	0	0

[1] Treatment at these subareas was restricted in the 2012 Biological Opinion but was subsequently permitted through the 2018 Biological Opinion. Full treatment did not resume in the same year for all sub-areas listed in this category.

Table 2 continued next page.

Sub-Area Name (Code)	Transect	Area (acres)	% Area Surveyed	RIRA Indices: Highest Count	RIRA Indices: Relative Density (rails/acre)	Occupancy: BLRA	Occupancy: SORA	Occupancy: VIRA
Dumbarton South Region								
Mowry Marsh North (05a.1)	MOWN-T1	417.4	29%	14	0.04	0	0	0
Calaveras Point (05a.2)	CAPT-T1	478.7	14%	9	0.03	0	0	0
Newark Slough (05c) - split into two sub-areas in 2011						0	0	0
Newark Slough West (05c.1)	NEWS-T1	167.3	15%	5	0.13	-	-	-
Newark Slough East (05c.2)	NEWS-T1	73.1	52%	11	0.08	-	-	-
Mayhew's Landing (05e)	MALA-T1	27.9	81%	0	0.00	0	0	0
Coyote Creek - Mud Slough (05f)	A21-T1	210.2	41%	0	0.00	0.25	0	0
Cargill Pond (W Suites Hotel) (05g)	MALA-T1	18.2	99%	0	0.00	0	0	0
Plummer Creek Mitigation (05h)	PLCM-T1	16.6	97%	0	0.00	0.33	0	0.67
Island Ponds - A21 (05i)	A21-T1	159.2	50%	7	0.01	0	0	0
Charleston Slough to Mountain View Slough - grouped into one sub-area by ISP Control Program								
Charleston Slough (15a.1)	MVSL-T1	36.2	73%	2	0.03	0	0	0
Mountain View Mouth (15a.1)	MVSL-T1	30.9	66%	1	0.00	0	0	0
Mountain View Channel (15a.1)	MVSL-T2	43.1	99%	3	0.02	0	0	0
Stevens Creek to Long Point (15a.2)	STEV-T1	56.9	63%	0	0.00	0	0	0
Guadalupe Slough (15a.3)	GUSL-T1	316.2	28%	1	0.00	0	0	0
Alviso Slough (15a.4)	ALSL-T2	459.9	17%	11	0.11	0.13	0	0
Stevens Creek (15c)	STEV-T1	27.9	75%	0	0.00	1.00	0.50	1.00
Cooley Landing (16) - split into two sub-areas in 2011						0	0	0
Cooley Landing Central (16.1)	COLA-T1	41.9	91%	7	0.09	-	-	-
Cooley Landing East (16.2)	COLA-T1	133.2	55%	16	0.04	-	-	-
Union City Region								
AFCC - Mouth (01a)	AFCP-T1	23.6	60%	1	0.02	0	0	0
AFCC - Lower (01b)	AFCP-T2	135.4	69%	2	0.00	0	0	0
AFCC - Upper (01c)	AFCC-T4	75.3	90%	0	0.00	0	0.14	0
AFCC - to I-880 (01d)	AFCC-T4	39.7	23%	0	0.00	0	0.10	0.10
AFCC - Pond 3 (01f)	AFCP-T1	130.9	69%	0	0.00	0	0	0
OAC - North Bank (13a)	OAC-T3	26.9	67%	4	0.04	0	0	0
OAC - Island (13b)	OAC-T2	93.7	97%	12	0.05	0.17	0.17	0.06
OAC - South Bank (13c)	OAC-T2	24.1	100%	0	0.00	0	0	0
Whale's Tail - North (13d)	WTN-T1	140.6	49%	3	0.01	0	0	0
Whale's Tail - South (13e)	WTS-T1	149.3	51%	10	0.08	0	0	0
Cargill Mitigation Marsh (13f)	OAC-T4	47.2	100%	5	0.00	0	0	0
Eden Landing - Mt Eden Creek (13j)	EDEN-T1	124.8	49%	1	0.01	0	0	0
Eden Landing Reserve - South (13k)	ELRS-T1	239.6	36%	8	0.04	0	0	0
Eden Landing Reserve - North (13l)	ELRS-T1	229.8	18%	1	0.01	0	0	0
Ideal Marsh - South (21b)	IMAS-T1	131.2	67%	0	0.00	0	0	0

Table 2 continued next page.

Sub-Area Name (Code)	Transect	Area (acres)	% Area Surveyed	RIRA Indices: Highest Count	RIRA Indices: Relative Density (rails/acre)	Occupancy: BLRA	Occupancy: SORA	Occupancy: VIRA
Hayward Region								
Oro Loma - East (07a)	ORLW-T1	197.1	54%	3	0.01	0	0	0
Oro Loma - West (07b)	ORLW-T3	130.7	55%	5	0.02	0.14	0	0
Dog Bone Marsh (20c)	NORT-T1	7.0	58%	0	0.00	0	0	0
Citation Marsh (20d) - split into three sub-areas in 2012 and 2018						0	0.14	0
Citation Marsh South (20d.1)	CITA-T1	44.4	44%	4	0.17	-	-	-
Citation Marsh Upper (20d.2a)[1]	CITA-T1	36.0	69%	14	0.20	-	-	-
Citation Marsh Central (20d.2b)[2]	CITA-T1	35.8	80%	21	0.40	-	-	-
East Marsh (20e)	SLRZ-T1	37.2	26%	1	0.00	0	0	0
North Marsh (20f)[2]	NORT-T1	94.2	94%	40	0.28	0.14	0.29	0.14
Bunker Marsh (20g)[1]	BUNK-T1	35.8	95%	11	0.18	0	0	0
San Lorenzo Creek (20h) - split into two sub-areas in 2012						0	0	0
San Lorenzo Creek North (20h.1)[1]	SLRZ-T1	12.0	96%	4	0.14	-	-	-
San Lorenzo Creek South (20h.2)	SLRZ-T1	10.4	96%	1	0.07	-	-	-
Johnson's Landing (20l)	COGS-T2	10.1	91%	2	0.11	0	0	0
Cogswell - Sec A (20m)	COGS-T1	34.9	100%	10	0.06	0	0	0
Cogswell - Sec B - split into three sub-areas in 2018						0	0	0
Cogswell - Sec B Bayfront (20n.1)[1]	COGS-T3	11.9	89%	3	0.06	-	-	-
Cogswell - Sec B South (20n.2)[1]	COGS-T3	33.9	95%	8	0.11	-	-	-
Cogswell - Sec B Main (20n.3)[3]	COGS-T3	55.5	91%	22	0.14	-	-	-
Cogswell - Sec C (20o)[1]	COGS-T2	49.8	100%	9	0.12	0	0	0
HARD Marsh (20s)	HARD-T1	65.9	80%	0	0.00	0	0	0
Triangle Marsh - Hayward (20w)	COGS-T1	12.4	35%	0	0.00	0	0	0
San Leandro Bay Region								
Arrowhead Marsh (17c) - split into two sub-areas in 2011						0	0	0
Arrowhead Marsh West (17c.1)	ARHE-T2	21.2	97%	6	0.13	-	-	-
Arrowhead Marsh East (17c.2)[2]	ARHE-T2	22.7	90%	27	0.75	-	-	-
MLK Regional Shoreline (17d) - split into five sub-areas in 2011						0	0	0
Damon Marsh (17d.4)[1]	MLKS-T1	10.6	100%	0	0.00	-	-	-
Damon Slough (17.5)	MLKS-T1	3.8	65%	0	0.00	-	-	-
San Leandro Creek (17e) - split into two sub-areas in 2011						0	0	0
San Leandro Creek North (17e.1)	MLKR-T1	2.0	99%	0	0.00	-	-	-
San Leandro Creek South (17e.2)	MLKR-T1	5.3	17%	0	0.00	-	-	-
MLK New Marsh (17h)[2]	MLKR-T1	34.3	100%	43	1.16	0	0.17	0
Fan Marsh (17j) - split into two sub-areas in 2018						0	0	0
Fan Marsh Wings (17j.1)[1]	FANM-T1	2.4	57%	0	0.00	-	-	-
Fan Marsh Main (17j.2)[2]	FANM-T1	10.1	100%	12	0.89	-	-	-

[1] Treatment at these subareas was restricted in the 2012 Biological Opinion but was subsequently permitted through the 2018 Biological Opinion. Full treatment did not resume in the same year for all sub-areas listed in this category.

[2] Treatment is not currently permitted at these sub-areas and no treatment has occurred at these sub-areas since 2010.

[3] Treatment was not permitted at this sub-area in the 2012 Biological Opinion, however, restricted treatment in the form of seed-suppression was permitted at this sub-area in the 2018 Biological Opinion.

Table 2 continued next page.

Sub-Area Name (Code)	Transect	Area (acres)	% Area Surveyed	RIRA Indices: Highest Count	RIRA Indices: Relative Density (rails/acre)	Occupancy: BLRA	Occupancy: SORA	Occupancy: VIRA
Bay Bridge North Region								
Emeryville Crescent - East (06a)	EMCR-T1	54.2	7%	0	0.00	0	0	0
Emeryville Crescent - West (06b)	EMCR-T1	31.5	99%	0	0.00	0	0	0
Whittel Marsh (10a)	PTPN-T1	44.9	96%	0	0.00	0.50	0	0
San Pablo Marsh (22b) - split into two sub-areas in 2011						0.20	0	0
San Pablo Marsh East (22b.1)	RIF-T1	31.5	79%	4	0.08	-	-	-
San Pablo Marsh West (22b.2)	RIF-T1	130.6	60%	10	0.04	-	-	-
Rheem Creek Area (22c)	RCRA-T1	26.8	79%	0	0.00	0	0	0
Meeker Slough (22d)	STEG-T1	30.5	90%	10	0.24	0	0.33	0
Stege Marsh (22d)	STEG-T1	31.5	93%	7	0.14	0	0	0
Hoffman Marsh (22e)	STEG-T1	38.5	91%	3	0.06	0	0	0
Suisun Region								
Roe Island (27b)	ROEI-T1	223.8	35%	0	0.00	0.57	0.14	0.29
Ryer Island NW (27b)	RYNW-T3	215.7	30%	0	0.00	0.14	0	0.14
Point Edith Marsh (27d)	PEM-T2	1045.6	8%	0	0.00	0.60	0.80	1.00
Concord Naval Weapons Station (27d)	PEM-T2	335.4	21%	0	0.00	0.25	0.75	0.75
MOTCO Area 1 (27d)	MOT1-T1	216.7	44%	0	0.00	0.80	0.40	1.00
MOTCO Area 2 (27d)	MOT2-T1	248.5	33%	0	0.00	0.43	0.14	0.57
Petaluma Region								
Petaluma River - Upper (24a)	GRFI-T1	138.1	34%	0	0.00	1.00	0	0.67
Grey's Field (24b)	GRFI-T1	108.6	27%	0	0.00	0.67	0.33	0.67
Ellis Creek (24c)	ELCR-T2	539.4	15%	2	0.00	0.80	0.20	0.60

End of Table 2

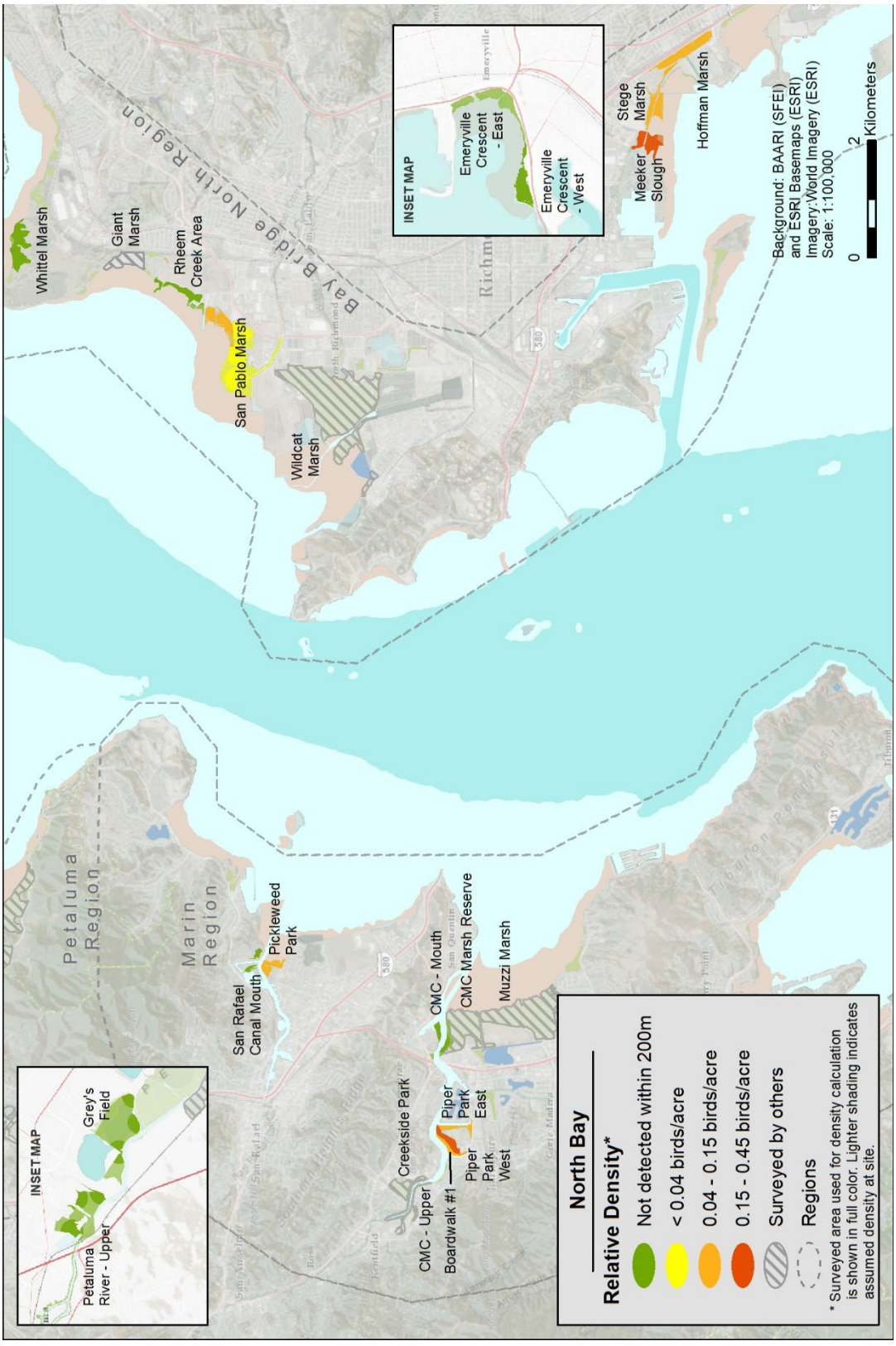

Figure 2. Overview map of North Bay, showing summary results from 2022 at sub-areas in the Bay Bridge North, Marin, and Petaluma Regions.

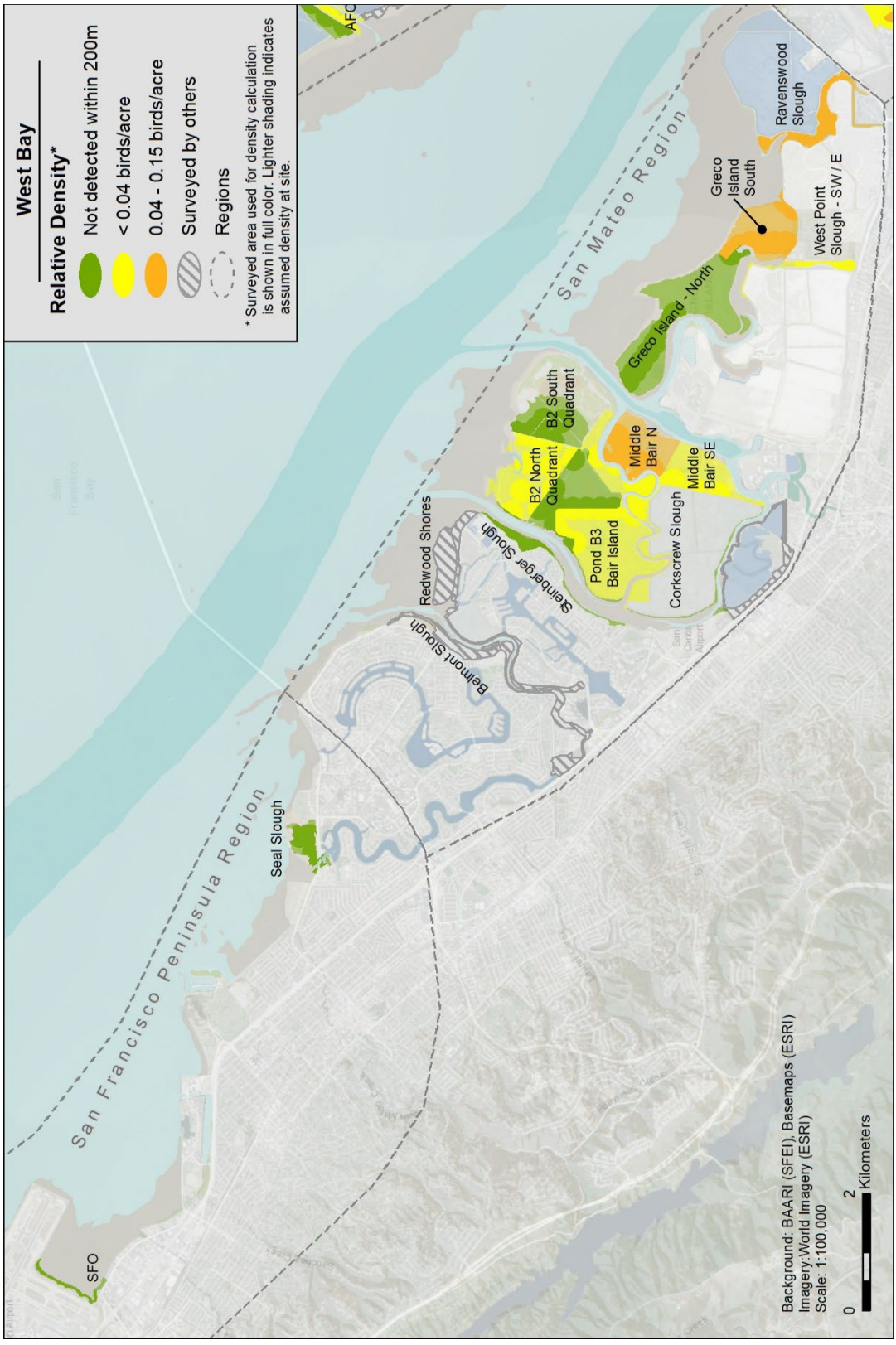

Figure 3. Overview map of West Bay, showing summary results from 2022 at sub-areas in the San Francisco Peninsula and San Mateo Regions.

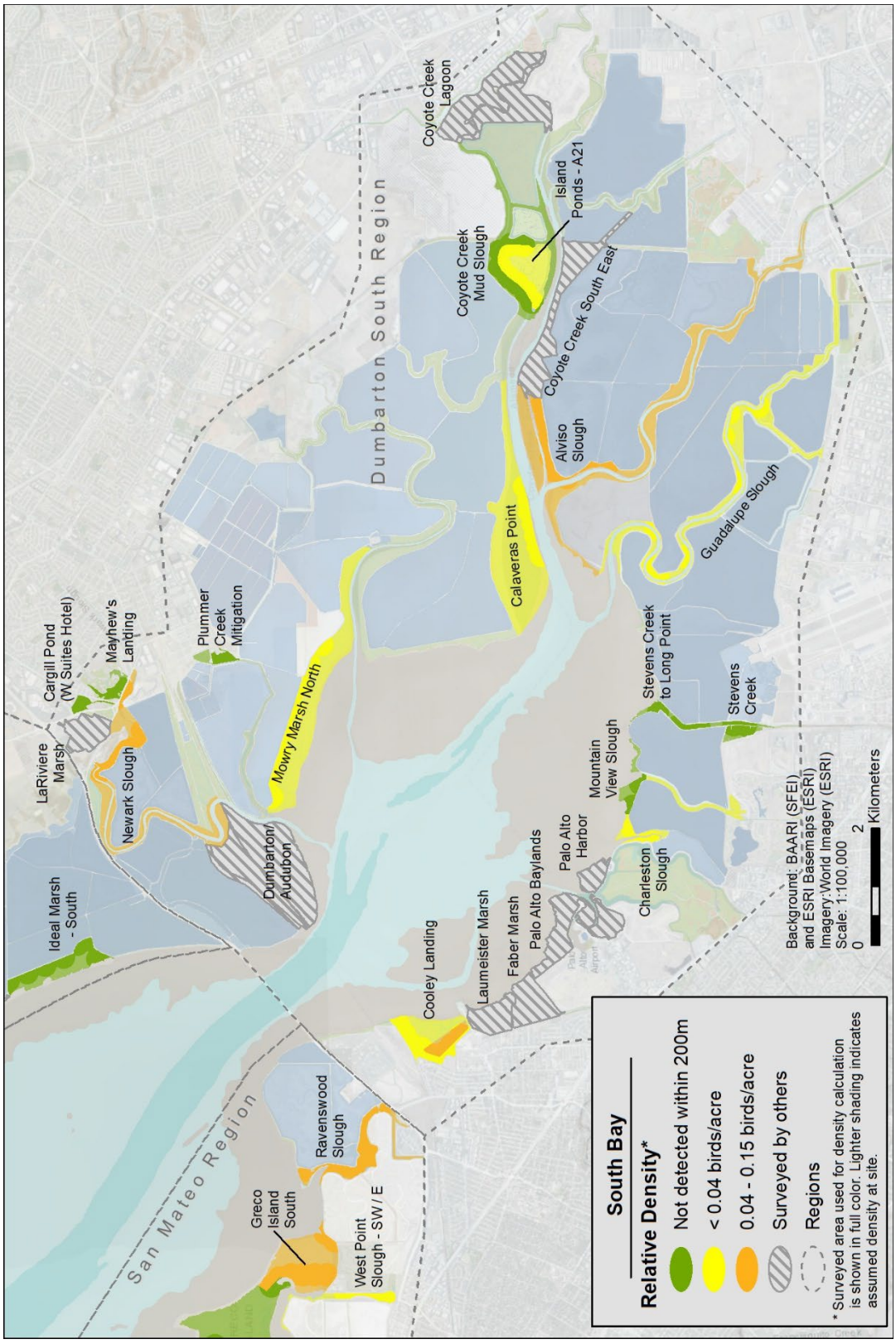

Figure 4. Overview map of South Bay, showing summary results from 2022 at sub-areas in the Dumbarton South Region.

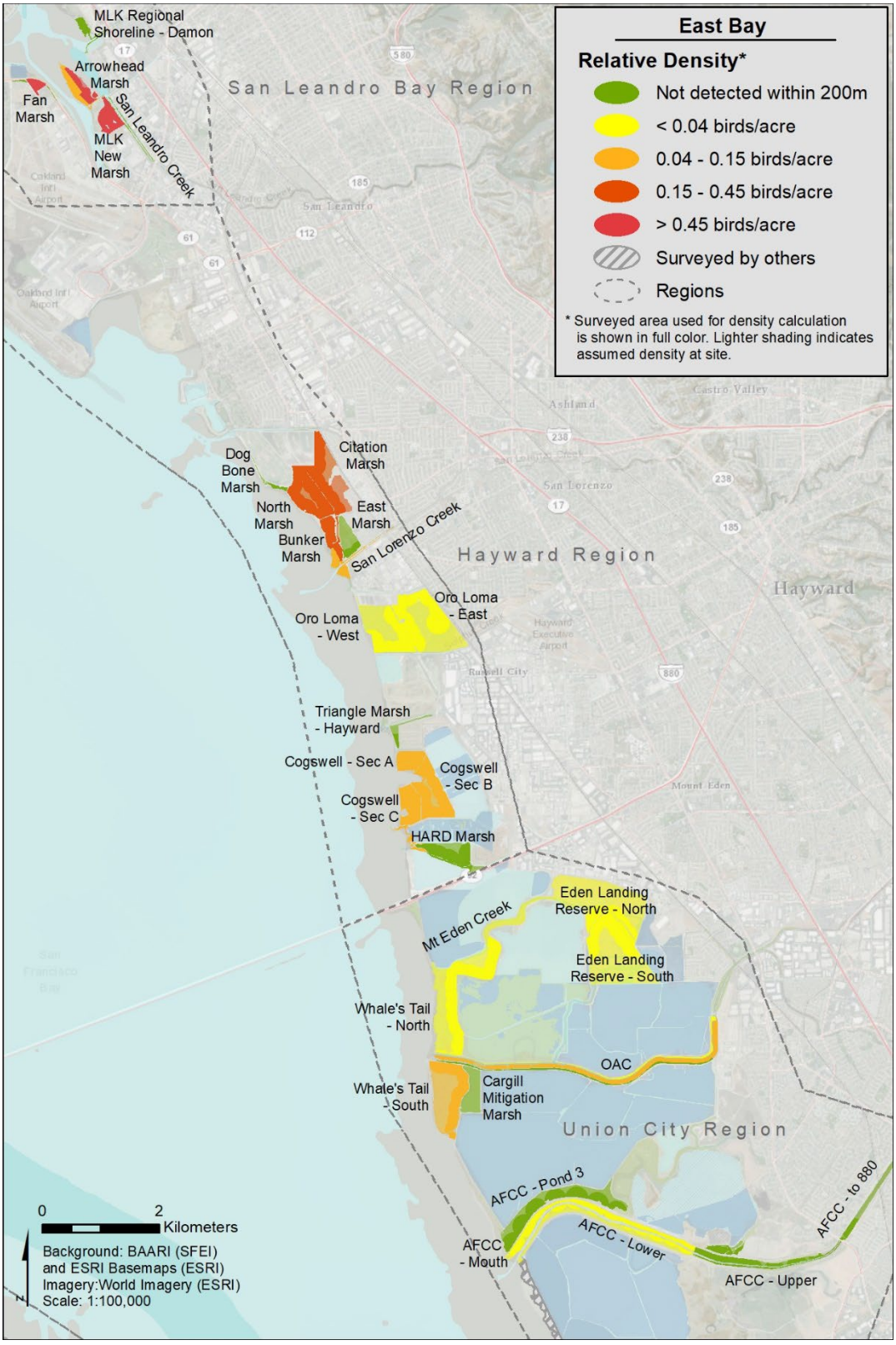

Figure 5. Overview map of East Bay, showing summary results from 2022 at sub-areas in the Union City, Hayward, and San Leandro Bay Regions.

5. Discussion

OEI surveyed 95 *Spartina*-invaded sub-areas for California Ridgway's rails. OEI staff detected a minimum of 499 California Ridgway's rails at 56 of the 95 sub-areas surveyed by OEI for the ISP in 2022, representing a 9% decline in rail detections since 2021 at the same set of sub-areas. Declines occurred at the group of sub-areas that are authorized for treatment of non-native *Spartina*, including at sub-areas where there is very little to no non-native *Spartina* remaining. The declines are mirrored at sites surveyed by Don Edwards National Wildlife Refuge (R. Tertes pers comm).

Rail numbers remained unchanged at the small group of sub-areas where treatment is restricted. Because there are only six sub-areas where treatment is restricted, it is difficult to draw significant conclusions on a single year trend. This subset of restricted sub-areas also shows the largest decline over the longer-term five-year timespan, declining by about 10% since 2017. Sub-areas where treatment has been ongoing have also experienced declines since 2017, but at a lower rate of 4%.

Reasons for these declines in rail survey numbers at restricted sites are unknown. It is possible that the decline is a part of a normal population cycle, or it may be in response to a larger unidentified trend. Studies by USGS have shown significant adult mortality occurs during winter high tides, which may contribute to declines in the overall population. Reproductive success during the breeding season may also contribute to changes in the population, however there is little research on factors that influence nesting success of Ridgway's rails. Non-native land mammals, including feral cats, are known predators of Ridgway's rails and may also play a significant role in limiting the rail population.

Recommendations

Habitat enhancement and restoration may ameliorate the effects of the temporary loss of cover due to *Spartina* removal. Additionally, the gradual initiation of phased treatment at the previously restricted sub-areas can also stem declines as the habitat converts from invasive *Spartina* meadows to a native marsh vegetation community. The ISP is working to rapidly reestablish native vegetation and high tide refuge to support and increase the bay-wide Ridgway's rail population. These efforts include extensive revegetation of both *Grindelia stricta* and *Spartina foliosa* plantings. Additionally, the Coastal Conservancy has invested in the construction of high tide refuge islands.

Ultimately, the most effective tool to increase the Ridgway's rail population in the Estuary in the long term will be to increase the amount of salt marsh habitat available through the restoration of large tracts of tidal wetlands. Many of these efforts are already well on their way through the South Bay Salt Pond Restoration Project and the restoration of the Napa-Sonoma Baylands. As more of these newly breached sites mature and become vegetated, biologists expect to see Ridgway's rails colonize and increase in numbers in response to the restored habitat. The first evidence of this positive rail response can already be seen in some recently restored sites that now support rails, including Island Ponds A21 in Coyote Creek, Eden Landing Reserve South (13k, aka North Creek Marsh), and Sonoma Baylands Restoration at the mouth of the Petaluma River, which currently supports a substantial rail

population at a high density. These large tracts of native marshlands are the key to the resiliency of the rail and the ecosystem in the face of an uncertain future due to climate change.

6. Permits

Surveys were conducted under the authority of U.S. Fish and Wildlife Service permit TE118356-4. Surveys were required by and conducted pursuant to conditions of the Programmatic Formal Intra-Service Endangered Species Consultation on the San Francisco Estuary Invasive *Spartina* Project and subsequent additional formal intra-Service consultations on implementation of the San Francisco Estuary Invasive *Spartina* Project. Permission for site access was granted by East Bay Regional Park District, the City of San Leandro, California Department of Fish and Wildlife, Cargill, City of Mountain View, Mid-Peninsula Regional Open Space District, Redwood City Marina, SFO International Airport, and Don Edwards San Francisco Bay National Wildlife Refuge.

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Appendix I: Complete List of 2022 *Spartina* Treatment Sub-Areas and Ridgway's Rail Survey Plans

KEY to Survey Organizations:

- **ARA** = Avocet Research Associates (contact Jules Evens)
- **CDFW** = California Department of Fish and Wildlife (contact Karen Taylor)
- **EBRPD** = East Bay Regional Park District (contact David Riensche)
- **ESA** = ESA Environmental Consulting Firm (contact Len Liu)
- **HBG** = Huffman Broadway Group (contact Emilie Strauss)
- **ISP** = Olofson Environmental, Inc. for the Invasive *Spartina* Project (contact Jen McBroom)
- **OEI** = Olofson Environmental, Inc. for an outside agency or company (contact Jen McBroom)
- **PBCS** = Point Blue Conservation Science (contact Julian Wood)
- **DENWR** = Don Edwards National Wildlife Refuge (contact Rachel Tertes)
- **SPBNWR** = San Pablo Bay National Wildlife Refuge (contact Meg Marriott)

Appendix I: Complete list of 2022 *Spartina* treatment sub-areas and associated Ridgway's rail sites and survey plans by survey organization, survey type, and transect.

Sub-area Name (ID)	Survey Organization	Survey Type	Transect	Notes
Area 01: Alameda Flood Control Channel in Union City Region				
AFCC - Mouth (01a)	ISP	NAm	AFCP-T1	
AFCC - Lower (01b)	ISP	NAm	AFCP-T2	Also surveyed for SBSPRP from AFCP-T5 using NAm Protocol
AFCC - Upper (01c)	ISP	NAm	AFCC-T4	Also surveyed for SBSPRP from AFCP-T5 using NAm Protocol
AFCC - to I-880 (01d)	ISP	NAm	AFCC-T4	
AFCC - Strip Marsh (01e)	none	none	none	Insufficient habitat (2017)
AFCC - Pond 3 (01f)	ISP	NAm	AFCP-T1; AFCP-T2	Formerly surveyed by DENWR
Area 02: Bair and Greco Complex in San Mateo Region				
Belmont to Steinberger Slough (02a)	-	-	-	Split into five sub-areas in 2011 and 2012
Belmont Slough Mouth (02a.1a)	HBG	NAm	BELM-T1	
Belmont Slough South (02a.1b)	HBG	NAm	BELM-T1	
Belmont Slough to Steinberger (02a.2)	HBG	NAm	BELM-T2	
Redwood Shores (02a.3)	DENWR	NAm	RESH-T1	
Redwood Shores Mitigation Bank (02a.4)	none	none	none	Insufficient habitat (2017)
Steinberger to Redwood Creek (02b)	-	-	-	Split into three sub-areas in 2011
Corkscrew Slough (02b.1)	ISP	NAm	CORK-T1	
Steinberger Slough (02b.2)	ISP	NAm	RESH-T2	
Redwood Creek (02b.2)	none	none	none	Not surveyed
B2 North Quadrant (02c)	-	-	-	Split into three sub-areas in 2011 and 2012
B2 North Quadrant West (02c.1a)	ISP	NAm	OBEN-T1	
B2 North Quadrant East (02c.1b)	ISP	NAm	OBEN-T1	
B2 North Quadrant South (02c.2)	ISP	NAm	OBEN-T2	
B2 South Quadrant (02d)	-	-	-	Split into four sub-areas in 2011 and 2012
B2 South Quadrant West (02d.1a)	ISP	NAm	OBES-T1	
B2 South Quadrant East (02d.1b)	ISP	NAm	OBES-T1	
B2 South Quadrant 2 (02d.2)	ISP	NAm	OBES-T1	
B2 South Quadrant 3 (02d.3)	ISP	NAm	OBES-T1	
West Point Slough - NW (02e)	none	none	none	No site access – assume presence
Greco Island - North (02f)	ISP	NAm	GRIN-T1	
West Point Slough - SW / E (02g)	ISP	NAm	WPSS-T1	
Greco Island - South (02h)	ISP	NAm	GRIS-T1	
Ravenswood Slough (02i)	ISP	NAm	RAV-T1	Also surveyed by RAV-T2 for SBSPRP
Ravenswood Open Space Preserve (02j)	none	none	none	Insufficient habitat (2017)
Deepwater Slough (02k)	-	-	-	
Middle Bair N (02k)	ISP	NAm	MBE-T1	
Middle Bair SE (02k)	ISP	NAm	MBE-T1	
Inner Bair Island Restoration (02l)	ESA	G	none	
Pond B3 Bair Island Restoration (02m)	none	none	none	Insufficient habitat (2018)
SF2 (02n)	none	none	none	Insufficient habitat (2017)
Middle Bair West (02o)	none	none	none	Insufficient habitat (2017)

Sub-area Name (ID)	Survey Organization	Survey Type	Transect	Notes
Area 03: Blackies Pasture and Mouth in Marin Region				
Blackie's Creek (03a)	none	none	none	Insufficient habitat (2017)
Blackie's Creek Mouth (03b)	none	none	none	Insufficient habitat (2017)
Area 04: Corte Madera Creek in Marin Region				
CMC Marsh Reserve (04a)	PBCS	NAm	HEER-T1	
College of Marin (04b)	none	none	none	Insufficient habitat (2019)
Piper Park - East (04c)	ISP	NAm	PIPE-T1	
Piper Park - West (04d)	ISP	NAm	PIPE-T1	
Larkspur Ferry Landing Area (04e)	none	none	none	Insufficient habitat (2017)
Riviera Circle (04f)	none	none	none	Insufficient habitat (2017)
Creekside Park (04g)	PCBS	NAm	CSPK-T1	
CMC - Upper (04h)	PCBS	NAm*	CSPK-T1	*Surveyed from adjacent site
CMC - Lower (04i)	none	none	none	Not surveyed – assume presence
CMC - Mouth (04j)	-	-	-	Split into two sub-areas in 2011
CMC - Mouth North (04j.1)	PBCS	NAm*	HEER-T1	*Surveyed from adjacent site
CMC - Mouth South (04j.2)	PBCS	NAm*	HEER-T1	*Surveyed from adjacent site
Boardwalk No. 1 (04k)	ISP	NAm	PIPE-T1	
Murphy Creek (04l)	none	none	none	Insufficient habitat (2016)
Area 05: Coyote Creek / Mowry in Dumbarton South Region				
Mowry Marsh (05a.1)	-	-	-	Grouped into one sub-area by ISP control program
Mowry Marsh North (05a.1)	ISP	NAm	MOWN-T1	
Mowry Marsh South Bayshore (05a.1)	none	none	none	Not surveyed
Mowry Slough Upper (05a.1)	none	none	none	Not surveyed
Mowry Marsh South (05a.1)	none	none	none	Not surveyed
Calaveras Point (05a.2)	ISP	NAm	CAPT-T1	
Dumbarton/Audubon (05b)	-	-	-	Grouped into one sub-area by ISP control program
Dumbarton/Audubon (05b)	DENWR	NAm	DUMA-T2	
Dumbarton/Audubon East (05b)	none	none	none	Not surveyed
Plummer Creek (05b)	none	none	none	Not surveyed
Newark Slough (05c)	-	-	-	Split into two sub-areas in 2011
Newark Slough West (05c.1)	ISP	NAm	NEWS-T1	
Newark Slough East (05c.2)	ISP	NAm	NEWS-T1	
LaRiviere Marsh (05d)	DENWR	NAm	LARV-T1	
Mayhew's Landing (05e)	ISP	NAm	MALA-T1	
Coyote Creek - Alameda County (05f)	-	-	-	Grouped into one sub-area by ISP control program
Coyote Creek - Mud Slough (05f)	ISP	NAm	A21-T1	Surveyed from adjacent site
Coyote Creek - North (05f)	none	none	none	Not surveyed
Coyote Creek Lagoon (05f)	DENWR	NAm	CCL-T1	
Cargill Pond (W Suites Hotel) (05g)	ISP	NAm	MALA-T1	Surveyed from adjacent site
Plummer Creek Mitigation (05h)	ISP	NAm	PLCM-T1	
Island Ponds (05i)	-	-	-	Grouped into one sub-area by ISP control program
Island Ponds - A21 (05i)	ISP	NAm	A21-T1	
Island Ponds - A20 (05i)	none	none	none	
Island Ponds - A19 (05i)	none	none	none	

Sub-area Name (ID)	Survey Organization	Survey Type	Transect	Notes
Area 06: Emeryville Crescent in Bay Bridge North Region				
Emeryville Crescent - East (06a)	ISP	NAm	EMCR-T1	
Emeryville Crescent - West (06b)	ISP	NAm	EMCR-T1	
Area 07: Oro Loma in Hayward Region				
Oro Loma - East (07a)	ISP	NAm	ORLW-T1	
Oro Loma - West (07b)	ISP	NAm	ORLW-T3	
Area 08: Palo Alto Baylands in Dumbarton South Region				
Palo Alto Baylands (08)	-	-	-	Grouped into one sub-area by ISP control program
Palo Alto Baylands (08)	PBCS	NAm	PAB-T1	
Palo Alto Harbor (08)	PBCS	NAm	PAHA-T1	
Area 09: Pickleweed Park in Marin Region				
Pickleweed Park (09)	ISP	NAm	PIPK-T1	
Area 10: Point Pinole Marshes in Bay Bridge North Region				
Whittel Marsh (10a)	ISP	NAm	PTPN-T1	
Southern Marsh (10b)	none	none	none	Insufficient habitat (2017)
Giant Marsh (10c)	EBRPD	NAm	unknown	
Breuner Marsh Restoration (10d)	none	none	none	Insufficient habitat (2017)
Area 11: Carquinez Straits in Vallejo Region				
Southampton Marsh (11)	ARA	G	n/a	
Area 12: Southeast San Francisco in San Francisco Bay Region				
Pier 94 (12a)	none	none	none	Insufficient habitat (2016)
Pier 98/Heron's Head (12b)	ESA	G	n/a	
India Basin (12c)	none	none	none	Insufficient habitat (2014)
Hunters Point Naval Reserve (12d)	none	none	none	Insufficient habitat (2017)
Yosemite Channel (12e)	none	none	none	Insufficient habitat (2017)
Candlestick Cove (12f)	none	none	none	Insufficient habitat (2017)
Crissy Field (12g)	none	none	none	Insufficient habitat (2017)
Yerba Buena Island (12h)	none	none	none	Insufficient habitat (2017)
Mission Creek (12i)	none	none	none	Insufficient habitat (2016)
Area 13: Whales Tail Complex in Union City Region				
OAC - North Bank (13a)	ISP	NAm	OAC-T2; OAC-T3	
OAC - Island (13b)	ISP	NAm	OAC-T2; OAC-T3	
OAC - South Bank (13c)	ISP	NAm	OAC-T2; OAC-T3	Also surveyed for SBSPRP from OAC-T4 using NAm Protocol
Whale's Tail - North (13d)	ISP	NAm	WTN-T1	
Whale's Tail - South (13e)	ISP	NAm	WTS-T1	
Cargill Mitigation Marsh (13f)	ISP	NAm	WTS-T1	Also surveyed for SBSPRP from OAC-T4 using NAm Protocol
OAC - Upstream 20 Tide Gates (13g)	none	none	none	Insufficient habitat (2016)
Eden Landing - North Creek (13h)	none	none	none	Insufficient habitat (2017)
Eden Landing - Pond 10 (13i)	none	none	none	Insufficient habitat (2017)
Eden Landing - Mt Eden Creek (13j)	ISP	NAm	EDEN-T1	
Eden Landing Reserve - South (13k)	ISP	NAm	ELRS-T1	
Eden Landing Reserve - North (13l)	ISP	NAm	ELRS-T1	
Eden Landing - Ponds E8A, E9, E8X (13m)	none	none	none	Insufficient habitat (2017)

Sub-area Name (ID)	Survey Organization	Survey Type	Transect	Notes
Area 15: South Bay Marshes in Dumbarton South Region				
Charleston Slough to Mountain View Slough (15a.1)	-	-	-	Grouped into one sub-area by ISP control program
Charleston Slough (15a.1)	ISP	NAm	MVSL-T1	
Mountain View Sl. Mouth (15a.1)	ISP	NAm	MVSL-T1	
Mountain View Slough (15a.1)	SBSPRP	NAm	MVSL-T2	
Stevens Creek to Guadalupe Slough (15a.2)	-	-	-	Grouped into one sub-area by ISP control program
Stevens Creek to Long Point (15a.2)	ISP	NAm	STEV-T1	
Guadalupe to Stevens Bayfront (15a.2)	none	none	none	Not surveyed
Guadalupe Slough (15a.3)	ISP	NAm	GUSL-T1	
Alviso Slough (15a.4)	ISP	NAm	ALSL-T2	
Coyote Creek to Artesian Slough (15a.5)	-	-	-	Grouped into one sub-area by ISP control program
Coyote Creek South East (15a.5)	DENWR	NAm	COYE-T1	
Coyote Creek South Tributary Marsh (15a.5)	none	none	none	Not surveyed
Artesian Slough (15a.5)	none	none	none	Not surveyed
Knapp Tract (15a.6)	none	none	none	Insufficient habitat (2017)
Pond A17 (15a.7)	none	none	none	Insufficient habitat (2019)
Faber/Laumeister (15b)	-	-	-	Grouped into one sub-area by ISP control program
Faber Marsh (15b)	PBCS	NAm	FABE-T1	
Laumeister Marsh (15b)	PBCS	NAm	LAUM-T1	
Stevens Creek (15c)	ISP	NAm	STEV-T1	
Area 16: Cooley Landing in Dumbarton South Region				
Cooley Landing (16)	-	-	-	Split into two sub-areas in 2011
Cooley Landing Central (16.1)	ISP	NAm	COLA-T1	
Cooley Landing East (16.2)	ISP	NAm	COLA-T1	
Area 17: San Leandro Bay in San Leandro Bay Region				
Elsie Roemer (17a)	EBRPD	unknown	unknown	
Bay Farm Island (17b)	none	none	none	Insufficient habitat (2017)
Arrowhead Marsh (17c)	-	-	-	Split into two sub-areas in 2012
Arrowhead Marsh West (17c.1)	ISP	NAm	ARHE-T2	
Arrowhead Marsh East (17c.2)	ISP	NAm	ARHE-T2	
MLK Shoreline (17d)	-	-	-	Split into five sub-areas in 2011
Airport Channel - Fan Shore (17d.1)	none	none	none	Insufficient habitat (2017)
Airport Channel - MLK Shoreline (17d.2)	none	none	none	Insufficient habitat (2017)
East Creek - MLK Shoreline (17d.3)	none	none	none	Insufficient habitat (2017)
MLK Regional Shoreline - Damon (17d.4)	ISP	NAm	MLKS-T1	
Elmhurst Creek - MLK Shoreline (17d.5)	ISP	NAm*	MLKS-T1	*Surveyed from adjacent site
San Leandro Creek (17e)	-	-	-	Split into two sub-areas in 2011
San Leandro Creek North (17e.1)	ISP	NAm*	MLKR-T1	*Surveyed from adjacent site
San Leandro Creek South (17e.2)	ISP	NAm*	MLKR-T1	*Surveyed from adjacent site
Oakland Inner Harbor (17f)	none	none	none	Insufficient habitat (2017)
Coast Guard Is (17g)	none	none	none	Insufficient habitat (2017)
MLK New Marsh (17h)	ISP	NAm	MLKR-T1	
Coliseum Channels (17i)	none	none	none	Insufficient habitat (2017)

Sub-area Name (ID)	Survey Organization	Survey Type	Transect	Notes
Fan Marsh (17j)	-	-	-	Split into two sub-areas in 2018
Fan Marsh Wings (17j.1)	ISP	NAm	FANM-T1	
Fan Marsh Main (17j.2)	ISP	NAm	FANM-T1	
Airport Channel (17k)	none	none	none	Insufficient habitat (2017)
Doolittle Pond (17l)	none	none	none	Insufficient habitat (2017)
Alameda Island - East (17m)	none	none	none	Insufficient habitat (2017)
Area 18: Colma Creek/ San Bruno in San Francisco Peninsula Region				
Colma Creek (18a)	none	none	none	Insufficient habitat (2017)
Navigable Slough (18b)	none	none	none	Insufficient habitat (2017)
Old Marina (18c)	none	none	none	Insufficient habitat (2014)
Inner Harbor (18d)	none	none	none	Insufficient habitat (2014)
Sam Trans Peninsula (18e)	none	none	none	Insufficient habitat (2017)
Confluence Marsh (18f)	none	none	none	Insufficient habitat (2017)
San Bruno Marsh (18g)	none	none	none	Insufficient habitat (2017)
San Bruno Creek (18h)	none	none	none	Insufficient habitat (2017)
Area 19: West San Francisco Bay in San Francisco Peninsula Region				
Brisbane Lagoon (19a)	none	none	none	Insufficient habitat
Sierra Point (19b)	none	none	none	Insufficient habitat (2015)
Oyster Cove (19c)	none	none	none	Insufficient habitat (2016)
Oyster Point Marina (19d)	none	none	none	Insufficient habitat (2015)
Oyster Point Park (19e)	none	none	none	Insufficient habitat (2016)
Point San Bruno (19f)	none	none	none	Insufficient habitat (2017)
Seaplane Harbor (19g)	none	none	none	Insufficient habitat (2017)
SFO (19h)	ISP	NAm	SFO-T1	
Mills Creek Mouth (19i)	none	none	none	Insufficient habitat (2017)
Easton Creek Mouth (19j)	none	none	none	Insufficient habitat (2017)
Sanchez Marsh (19k)	None	None	None	Insufficient habitat (2019)
Burlingame Lagoon (19l)	none	none	none	Insufficient habitat (2017)
Fisherman's Park (19m)	none	none	none	Insufficient habitat (2014)
Coyote Point Marina (19n)	none	none	none	Insufficient habitat (2017)
San Mateo Creek (19o)	none	none	none	Insufficient habitat (2017)
Seal Slough (19p)	-	-	-	Split into two sub-areas in 2011
Seal Slough Central (19p.1)	ISP	NAm	SEAL-T1	
Seal Slough Peripheral (19p.2)	ISP	NAm	SEAL-T1	
Foster City (19q)	none	none	none	Insufficient habitat (2017)
Anza Lagoon (19r)	none	none	none	Insufficient habitat (2016)
Maple Street Channel (19s)	none	none	none	Insufficient habitat (2017)
Area 20: San Leandro / Hayward Shoreline in Hayward Region				
Oyster Bay Regional Shoreline (20a)	none	none	none	Insufficient habitat (2017)
Oakland Golf Links (20b)	none	none	none	Insufficient habitat (2017)
Dog Bone Marsh (20c)	ISP	NAm	NORT-T1	
Citation Marsh (20d)	-	-	-	Split into three sub-areas in 2011 & 2018
Citation Marsh South (20d.1)	ISP	NAm	CITA-T1	
Citation Marsh Upper (20d.2a)	ISP	NAm	CITA-T1	Split in renegotiated in 2020
Citation Marsh Central (20d.2b)	ISP	NAm	CITA-T1	Split in renegotiated in 2020
East Marsh (20e)	ISP	NAm*	SLRZ-T1	*Surveyed from adjacent site
North Marsh (20f)	ISP	NAm	NORT-T1	

Sub-area Name (ID)	Survey Organization	Survey Type	Transect	Notes
Bunker Marsh (20g)	ISP	NAm	BUNK-T1	
San Lorenzo Creek (20h)	-	-	-	Split into two sub-areas in 2012
San Lorenzo Creek North (20h.1)	ISP	NAm	SLRZ-T1	
San Lorenzo Creek South (20h.2)	ISP	NAm	SLRZ-T1	
Bockman Channel (20i)	none	none	none	Insufficient habitat (2017)
Sulphur Creek (20j)	none	none	none	Insufficient habitat (2017)
Hayward Landing (20k)	none	none	none	Insufficient habitat (2017)
Johnson's Landing (20l)	none	none	none	Insufficient habitat (2017)
Cogswell - Sec A (20m)	ISP	NAm	COGS-T1	
Cogswell - Sec B (20n)	-	-	-	Split into three sub-areas in 2018
Cogswell - Sec B Bayfront (20n.1)	ISP	NAm	COGS-T3	
Cogswell - Sec B South (20n.2)	ISP	NAm	COGS-T3	
Cogswell - Sec B Main (20n.3)	ISP	NAm	COGS-T3	
Cogswell - Sec C (20o)	ISP	NAm	COGS-T2	
Hayward Shoreline Outliers (20p)	none	none	none	Insufficient habitat (2017)
San Leandro Shoreline Outliers (20q)	none	none	none	Insufficient habitat (2017)
Oakland Airport (20r)	none	none	none	
HARD Marsh (20s)	ISP	NAm	HARD-T1	
San Leandro Marina (20t)	none	none	none	Insufficient habitat (2017)
Estudillo Creek Channel (20u)	none	none	none	Insufficient habitat (2017)
Hayward Landing Canal (20v)	none	none	none	Insufficient habitat (2017)
Triangle Marsh - Hayward (20w)	ISP	NAm	TRMA-T1	
Area 21: Ideal Marsh in Union City Region				
Ideal Marsh - North (21a)	DENWR	NAm	IMAN-T1	
Ideal Marsh - South (21b)	ISP	NAm	IMAS-T1	
Area 22: Two Points Complex in Bay Bridge North Region				
Wildcat Marsh (22a)	PBCS	NAm	WIMA-T1	
San Pablo Marsh (22b)	-	-	-	Split into two sub-areas in 2011
San Pablo Marsh East (22b.1)	ISP	NAm	RIF-T1	
San Pablo Marsh West (22b.2)	ISP	NAm	RIF-T1	
Rheem Creek Area (22c)	ISP	NAm	RCRA-T1	
Stege Marsh (22d)	-	-	-	Grouped into one sub-area by ISP control program
Stege Marsh (22d)	ISP	NAm	STEG-T1	
Meeker Slough (22d)	ISP	NAm	STEG-T1	
Hoffman Marsh (22e)	ISP	NAm	STEG-T1	
Albany Shoreline (22f)	none	none	none	Insufficient habitat (2017)
Area 23: Marin Outliers in Marin and Petaluma Regions				
Brickyard Cove (23a)	none	none	none	Insufficient habitat (2017)
Beach Drive (23b)	none	none	none	Insufficient habitat (2017)
Loch Lomond Marina (23c)	none	none	none	Insufficient habitat (2017)
San Rafael Canal Mouth (23d)	-	-	-	Split into two sub-areas in 2011
San Rafael Canal Mouth East (23d.1)	ISP	NAm	PIPK-T1	
San Rafael Canal Mouth West (23d.2)	ISP	NAm	PIPK-T1	

Sub-area Name (ID)	Survey Organization	Survey Type	Transect	Notes
Muzzi and Martas Marsh (23e)	-	-	-	Grouped into one sub-area by ISP control program
Martas Marsh (23e)	PBCS	NAm	MUZZ-T1	
San Clemente Creek (23e)	PBCS	NAm	MUZZ-T1	
Muzzi Marsh (23e)	PBCS	NAm	MUZZ-T1	
Paradise Cay (23f)	none	none	none	Insufficient habitat (2017)
Greenwood Beach (23g)	none	none	none	Insufficient habitat (2017)
Strawberry Point (23h)	none	none	none	Insufficient habitat (2017)
Strawberry Cove (23i)	none	none	none	Insufficient habitat (2017)
Bothin Marsh (23j)	PCBS	NAm	THF-T1	
Sausalito (23k)	none	none	none	Insufficient habitat (2015)
Starkweather Park (23l)	none	none	none	Insufficient habitat (2020)
Novato (23m)	-	-	-	Grouped into one sub-area by ISP control program
Hamilton South (23m)	PBCS	NAm	MIN-T1	
Mitchell Fragment (23m)	PBCS	NAm	GACR-T1	
Santa Venetia (23m)	PBCS	NAm	STVE-T1	
Gallinas Creek North (23m)	PBCS	NAm	GACR-T1	
McInnis Marsh (23m)	PBCS	NAm	MIM-T1	
Novato Creek Mouth (23m)	none	none	none	Not surveyed – assume presence
Gallinas Creek South (23m)	PBCS	NAm	GACM-T1	
Hamilton North (23m)	none	none	none	Not surveyed – assume presence
Novato Creek Mid Reach (23m)	none	none	none	Not surveyed – assume presence
Triangle Marsh - Marin (23n)	none	none	none	Insufficient habitat (2020)
China Camp (23o)	PBCS	NAm	CCM-T1	
Area 24: Petaluma River in Petaluma Region				
Petaluma River - Upper (24a)	ISP	NAm	PDF-T1	
Grey's Field (24b)	ISP	NAm	GRFI-T1	
Petaluma Marsh (24c)	-	-	-	Grouped into one sub-area by ISP control program
Tule Slough (24c)	PBCS	NAm	FASL-T1	
False Slough (24c)	PBCS	NAm	FASL-T1	
Lakeville Marina (24c)	none	none	none	Not surveyed – assume presence
Ellis Creek (24c)	OEI	NAm	ELCR-T2	Surveyed for City of Petaluma
Petaluma Marsh Expansion Project (24c)	none	none	none	Not surveyed – assume presence
San Antonio Creek (E) (24c)	none	none	none	Not surveyed – assume presence
Petaluma River (C) (24c)	none	none	none	Not surveyed – assume presence
San Antonio Creek (A) (24c)	none	none	none	Not surveyed – assume presence
Mira Monte Slough (B) (24c)	none	none	none	Not surveyed – assume presence
Mud Hen Slough (D) (24c)	none	none	none	Not surveyed – assume presence
Schultz Slough (24c)	PBCS	NAm	SCHU-T1	
Gambini Marsh (24c)	PBCS	NAm	SCHU-T1	
Woloki Slough (24c)	none	none	none	Not surveyed – assume presence

Sub-area Name (ID)	Survey Organization	Survey Type	Transect	Notes
Lower Petaluma River (24d)	-	-	-	Grouped into one sub-area by ISP control program
Day Island Wildlife Area (24d)	none	none	none	Not surveyed
Petaluma River - West Side (24d)	PBCS	NAm	GRPT-T1	
Carl's Marsh (24d)	PBCS	NAm	PRM-T1	
Green Point Area Marshes (24d)	PBCS	NAm	GRPT-T1	
Sonoma Marina (24d)	PBCS	NAm	RMA-T1	
Petaluma River - Lower (24d)	PBCS	NAm	BJSN-T1	
Black John Slough North (24d)	PBCS	NAm	BJSN-T1	
Black John Slough A (24d)	PBCS	NAm	BJSN-T1	
Bahia Channel (24d)	none	none	none	Not surveyed
Black John Slough B (24d)	none	none	none	Not surveyed
Area 25: Outer Coast in Outer Coast Region				
Tom's Point, Tomales (25a)	none	none	none	Not surveyed
Limantour Estero (25b)	none	none	none	Not surveyed
Drakes Estero (25c)	none	none	none	Not surveyed
Bolinas Lagoon - North (25d)	PBCS	NAm	BOLA-T1	
Bolinas Lagoon - South (25e)	none	none	none	Not surveyed
Area 26: North San Pablo Bay in Petaluma and Vallejo Regions				
Napa River (26a)	-	-	-	Grouped into one sub-area by ISP control program
Coon Island (26a)	PBCS	NAm	COIS-T1	
Fly Bay (26a)	CDFW	NAm	FB-T1	
Napa Tract Salt Pond 5 (26a)	CDFW	NAm	NASL-T1	
Napa Tract Salt Pond 4 (26a)	CDFW	NAm	NACM-T1	
White Slough Marsh (26a)	none	none	none	Not surveyed
Fagan Slough (26a)	none	none	none	Not surveyed
Pond 2A Restoration (26a)	none	none	none	Not surveyed
Napa Centennial Marsh (26a)	CDFW	NAm	NACM-T1	
Bull Island (26a)	none	none	none	Not surveyed
Napa Plant Site Restoration (26a)	none	none	none	Not surveyed
Skaggs Island Bridge / Napa Slough (26a)	none	none	none	Not surveyed
Dutchman Slough Mouth (26a)	none	none	none	Not surveyed
Napa Tract Salt Pond 7 (26a)	none	none	none	Not surveyed
Napa Tract Intake Pond 1A (26a)	none	none	none	Not surveyed
Hudeman Slough (26a)	none	none	none	Not surveyed
Napa Tract Intake Pond 1 (26a)	none	none	none	Not surveyed
Napa Tract Salt Pond 6A (26a)	none	none	none	Not surveyed
Napa Tract Salt Pond 6 (26a)	none	none	none	Not surveyed
Guadacanal Village (26a)	none	none	none	Not surveyed
Dutchman Slough (26a)	none	none	none	Not surveyed
Napa Tract Salt Pond 2 (26a)	none	none	none	Not surveyed
Napa Tract Salt Pond 3 (26a)	none	none	none	Not surveyed
Napa Tract Salt Pond 7A (26a)	none	none	none	Not surveyed
China Slough (26a)	none	none	none	Not surveyed
Devil's Slough (26a)	none	none	none	Not surveyed
Cullinan Ranch (26a)	none	none	none	Not surveyed

Sub-area Name (ID)	Survey Organization	Survey Type	Transect	Notes
San Pablo Bay NWR Shoreline (26b)	none	none	none	Not surveyed
Sonoma Creek (26c)	SPBNWR	NAm	SC-T1,T2	
Sonoma Baylands (26d)	-	-	-	Grouped into one sub-area by ISP control program
Lower Tubbs Island (26d)	SPBNWR	NAm	LTI-T2	
Tolay Creek (26d)	SPBNWR	NAm	TC-T1	
Tubbs Island Restoration (26d)	SPBNWR	NAm	TS-T1	
Petaluma River Mouth (26d)	PBCS	NAm	RMA	
Sonoma Baylands Restoration (26d)	PBCS	NAm	SBR-T1	
Sonoma Baylands East (26d)	SPBNWR	NAm	SMW-T1	
Area 27: Suisun Marshes in Suisun Region				
Point Buckler (27a)	none	none	none	
MOTCO Islands (27b)	OEI	NAm	RYNW-T1, FREE-T1, SNAG-T1	Freeman, Snag, and Ryer Islands
Honker Bay (27c)	none	none	none	

Appendix II: 2022 Survey Station Coordinates in UTM (NAD83, Zone 10)

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Appendix II: Survey stations by site and transect ID. Geographic coordinates are in UTM (NAD83, Zone10).

Transect Name	Sub-Area Code	Site Name	Point ID	X-coordinate	Y-coordinate
MARIN REGION					
CMCM-T1	04j	CMC - Mouth	CMCM12	542958	4199629
CMCM-T1	04j	CMC - Mouth	CMCM13	543185	4199682
PIPE-T1	04c	Piper Park	PIF03	541478	4199615
PIPE-T1	04c	Piper Park	PIPE01	541484	4199149
PIPE-T1	04c	Piper Park	PIPE02	541459	4199364
PIPE-T1	04d	Piper Park	PIPE04	541308	4199419
PIPE-T1	04d	Piper Park	PIPE05	541136	4199313
PIPK-T1	09	Pickleweed Park	PIPK01	544265	4202286
PIPK-T1	09	Pickleweed Park	PIPK02	544239	4202484
PIPK-T1	09	Pickleweed Park	PIPK03	544183	4202641
PIPK-T1	23d	San Rafael Canal Mouth	SRCM01	544244	4202876
PIPK-T1	23d	San Rafael Canal Mouth	SRCM02	544370	4202758
SAN FRANCISCO PENINSULA REGION					
SEAL-T1	19p	Seal Slough	SEAL01	562560	4158484
SEAL-T1	19p	Seal Slough	SEAL03	562728	4158450
SEAL-T1	19p	Seal Slough	SEAL04	562857	4158548
SEAL-T1	19p	Seal Slough	SEAL05	562861	4158725
SEAL-T1	19p	Seal Slough	SEAL07	562432	4158448
SFO-T1	19h	SFO	SFO04	555438	4163237
SFO-T1	19h	SFO	SFO05	555203	4162889
SFO-T1	19h	SFO	SFO06	555111	4162711
SFO-T1	19h	SFO	SFO07	555019	4162530
SFO-T1	19h	SFO	SFO18	554906	4162329
SAN MATEO REGION					
CORK-T1	02b	Corkscrew Slough	CORK01	569367	4153611
CORK-T1	02b	Corkscrew Slough	CORK03	568904	4152988
CORK-T1	02b	Corkscrew Slough	CORK04	568894	4152635
CORK-T1	02b	Corkscrew Slough	CORK05	568642	4152904
CORK-T1	02b	Corkscrew Slough	CORK06	568356	4153005
CORK-T1	02b	Corkscrew Slough	CORK12	569244	4153305
GRIN-T1	02f	Greco Island - North	GRIN11	570647	4153106
GRIN-T1	02f	Greco Island - North	GRIN12	570811	4152993
GRIN-T1	02f	Greco Island - North	GRIN13	570976	4152877
GRIN-T1	02f	Greco Island - North	GRIN14	571140	4152762
GRIN-T1	02f	Greco Island - North	GRIN15	571306	4152647
GRIN-T1	02f	Greco Island - North	GRIN16	571471	4152533
GRIN-T1	02f	Greco Island - North	GRIN17	571635	4152418
GRIN-T1	02f	Greco Island - North	GRIN18	571800	4152305
GRIS-T1	02h	Greco Island - South	GRIS01	573018	4150394
GRIS-T1	02h	Greco Island - South	GRIS02	573016	4150596
GRIS-T1	02h	Greco Island - South	GRIS03	573015	4150799
GRIS-T1	02h	Greco Island - South	GRIS04	573014	4150998
GRIS-T1	02h	Greco Island - South	GRIS05	572969	4151193
GRIS-T1	02h	Greco Island - South	GRIS06	572825	4151345

Transect Name	Sub-Area Code	Site Name	Point ID	X-coordinate	Y-coordinate
SAN MATEO REGION (continued)					
MBE-T1	02k	Deepwater Slough	MBE01	569714	4153286
MBE-T1	02k	Deepwater Slough	MBE02	569544	4153178
MBE-T1	02k	Deepwater Slough	MBE03	569366	4153061
MBE-T1	02k	Deepwater Slough	MBE04	569249	4152883
MBE-T1	02k	Deepwater Slough	MBE05	569153	4152697
MBE-T1	02k	Middle Bair SE	MBSE02	568726	4151546
MBE-T1	02k	Middle Bair SE	MBSE04	568800	4151947
MBE-T1	02k	Middle Bair SE	MBSE06	568955	4152326
OBEN-T1	02c	B2 North Quadrant	OBE12	569256	4154869
OBEN-T1	02c	B2 North Quadrant	OBE14	569206	4154429
OBEN-T1	02c	B2 North Quadrant	OBE16	568775	4154924
OBEN-T2	02c	B2 North Quadrant	OBE06	569311	4154036
OBEN-T2	02c	B2 North Quadrant	OBE09	568814	4154381
OBEN-T2	02c	B2 North Quadrant	OBE11	568471	4154620
OBEN-T2	02c	B2 North Quadrant	OBE19	568408	4155098
OBES-T1	02d	B2 South Quadrant	OBE04	569963	4154250
OBES-T1	02d	B2 South Quadrant	OBE22	569611	4154402
OBES-T1	02d	B2 South Quadrant	OBE23	569663	4154619
OBES-T1	02d	B2 South Quadrant	OBE25	569779	4155053
OBES-T1	02d	B2 South Quadrant	OBE26	569843	4154667
OBES-T1	02d	B2 South Quadrant	OBE27	569990	4154545
OBES-T1	02d	B2 South Quadrant	OBES24	569733	4154871
OBW-T1	02m	Pond B3 Bair Island Restoration	OBW01	567882	4154015
OBW-T1	02m	Pond B3 Bair Island Restoration	OBW02	567997	4154227
OBW-T1	02m	Pond B3 Bair Island Restoration	OBW03	568180	4154348
OBW-T1	02m	Pond B3 Bair Island Restoration	OBW04	568467	4154287
OBW-T1	02m	Pond B3 Bair Island Restoration	OBW05	568469	4154054
OBW-T1	02m	Pond B3 Bair Island Restoration	OBW06	568470	4153817
OBW-T1	02m	Pond B3 Bair Island Restoration	OBW07	568471	4153575
OBW-T1	02m	Pond B3 Bair Island Restoration	OBW08	568471	4153347
RAV-T1	02i	Ravenswood Slough	RAV02	575826	4149650
RAV-T1	02i	Ravenswood Slough	RAV03	575665	4149768
RAV-T1	02i	Ravenswood Slough	RAV04	575468	4149813
RAV-T1	02i	Ravenswood Slough	RAV05	575260	4149863
RAV-T1	02i	Ravenswood Slough	RAV06	574884	4150110
RAV-T1	02i	Ravenswood Slough	RAV09	574950	4149885
RAV-T1	02i	Ravenswood Slough	RAV10	574806	4150724
RESH-T2	02b	Steinberger Slough	RESH13	567756	4154757
RESH-T2	02b	Steinberger Slough	RESH14	567816	4154983
RESH-T2	02b	Steinberger Slough	RESH15	567780	4154559
RESH-T2	02b	Steinberger Slough	RESH16	567956	4155133
RESH-T2	02b	Steinberger Slough	RESH17	568105	4155282
RESH-T2	02b	Steinberger Slough	RESH18	568239	4155444
WPSS-T1	02g	West Point Slough - SW / E	WPSS09	572707	4150059
WPSS-T1	02g	West Point Slough - SW / E	WPSS10	572706	4149686
WPSS-T1	02g	West Point Slough - SW / E	WPSS11	572704	4149455
WPSS-T1	02g	West Point Slough - SW / E	WPSS12	572561	4149237

Transect Name	Sub-Area Code	Site Name	Point ID	X-coordinate	Y-coordinate
DUMBARTON SOUTH REGION					
A21-T1	05i	Island Ponds - A21	A21-01	589676	4146880
A21-T1	05i	Island Ponds - A21	A21-02	589848	4146987
A21-T1	05i	Island Ponds - A21	A21-03	590549	4147430
A21-T1	05i	Island Ponds - A21	A21-04	589991	4147127
A21-T1	05i	Island Ponds - A21	A21-05	590110	4147286
A21-T1	05i	Island Ponds - A21	A21-06	590276	4147430
A21-T1	05i	Island Ponds - A21	A21-07	590658	4147236
A21-T1	05i	Island Ponds - A21	A21-08	590646	4147026
ALSL-T2	15a	Alviso Slough	MAL01	586761	4146451
ALSL-T2	15a	Alviso Slough	MAL02	586668	4146281
ALSL-T2	15a	Alviso Slough	MAL04	586898	4145918
ALSL-T2	15a	Alviso Slough	MAL06	586942	4145527
ALSL-T2	15a	Alviso Slough	MAL07	587021	4146548
ALSL-T2	15a	Alviso Slough	MAL08	587328	4146607
ALSL-T2	15a	Alviso Slough	MAL09	587646	4146656
ALSL-T2	15a	Alviso Slough	MAL10	587905	4146704
CAPT-T1	05a	Calaveras Point	CAPT08	586510	4147007
CAPT-T1	05a	Calaveras Point	CAPT09	586281	4146933
CAPT-T1	05a	Calaveras Point	CAPT10	586088	4146915
CAPT-T1	05a	Calaveras Point	CAPT11	585889	4146857
CAPT-T1	05a	Calaveras Point	CAPT12	585689	4146818
CAPT-T1	05a	Calaveras Point	CAPT13	585492	4146774
CAPT-T1	05a	Calaveras Point	CAPT16	585333	4146717
COLA-T1	16	Cooley Landing	COLA05	576891	4148770
COLA-T1	16	Cooley Landing	COLA06	576956	4148944
COLA-T1	16	Cooley Landing	COLA07	577129	4149051
COLA-T1	16	Cooley Landing	COLA08	577293	4149164
COLA-T1	16	Cooley Landing	COLA09	576775	4148568
COLA-T1	16	Cooley Landing	COLA10	576825	4148373
COLA-T1	16	Cooley Landing	COLA11	576961	4148238
COLA-T1	16	Cooley Landing	COLA12	577112	4148090
GUSL-T1	15a	Guadalupe Slough	GUSL02	587891	4143002
GUSL-T1	15a	Guadalupe Slough	GUSL03	587773	4143515
GUSL-T1	15a	Guadalupe Slough	GUSL04	587365	4143596
GUSL-T1	15a	Guadalupe Slough	GUSL05	586585	4143375
GUSL-T1	15a	Guadalupe Slough	GUSL06	585318	4144262
GUSL-T1	15a	Guadalupe Slough	GUSL07	585019	4144717
GUSL-T1	15a	Guadalupe Slough	GUSL08	585795	4144766
GUSL-T1	15a	Guadalupe Slough	GUSL09	585184	4144825
MALA-T1	05g	Cargill Pond (W Suites Hotel)	MALA01	582737	4154617
MALA-T1	05e	Mayhew's Landing	MALA02	583007	4154376
MALA-T1	05e	Mayhew's Landing	MALA03	582878	4154195
MALA-T1	05e	Mayhew's Landing	MALA04	582888	4154002
MALA-T1	05e	Mayhew's Landing	MALA05	583046	4153879

Transect Name	Sub-Area Code	Site Name	Point ID	X-coordinate	Y-coordinate
DUMBARTON SOUTH REGION (continued)					
MOWN-T1	05a	Mowry Marsh North	MOSL10	581198	4151329
MOWN-T1	05a	Mowry Marsh North	MOSL12	581587	4151341
MOWN-T1	05a	Mowry Marsh North	MOSL14	581968	4151220
MOWN-T1	05a	Mowry Marsh North	MOSL16	582349	4151098
MOWN-T1	05a	Mowry Marsh North	MOSL18	582734	4150973
MOWN-T1	05a	Mowry Marsh North	MOSL20	583117	4150850
MOWN-T1	05a	Mowry Marsh North	MOSL22	583484	4150697
MOWN-T1	05a	Mowry Marsh North	MOSL24	583816	4150474
MVSL-T1	15a	Charleston Slough	CHSL01	580426	4145106
MVSL-T1	15a	Charleston Slough	CHSL03	580657	4145153
MVSL-T1	15a	Charleston Slough	CHSL04	580414	4144826
MVSL-T1	15a	Mountain View Slough	MVSL04	581043	4145153
MVSL-T1	15a	Mountain View Slough	MVSL05	581422	4145011
NEWS-T1	05c	Newark Slough	NEW02	581705	4154094
NEWS-T1	05c	Newark Slough	NEW03	581878	4153982
NEWS-T1	05c	Newark Slough	NEW04	582059	4153878
NEWS-T1	05c	Newark Slough	NEW05	582040	4153642
NEWS-T1	05c	Newark Slough	NEW06	582159	4153474
NEWS-T1	05c	Newark Slough	NEW07	582333	4153544
NEWS-T1	05c	Newark Slough	NEW09	581635	4154254
PLCM-T1	05h	Plummer Creek Mitigation	PLCM01	583615	4152372
PLCM-T1	05h	Plummer Creek Mitigation	PLCM02	583484	4152202
PLCM-T1	05h	Plummer Creek Mitigation	PLCM03	583517	4152021
STEV-T1	15a	Stevens Creek to Long Point	LONG09	582630	4144724
STEV-T1	15a	Stevens Creek to Long Point	LONG10	582401	4144385
STEV-T1	15a	Stevens Creek to Long Point	LONG11	582369	4144019
STEV-T1	15c	Stevens Creek	STEV01	582431	4143425
STEV-T1	15c	Stevens Creek	STEV02	582421	4143224
UNION CITY REGION					
AFCC-T4	01c	AFCC - Upper	AFCC19	580009	4157650
AFCC-T4	01c	AFCC - Upper	AFCC21	580393	4157555
AFCC-T4	01c	AFCC - Upper	AFCC23	580793	4157508
AFCC-T4	01c	AFCC - Upper	AFCC25	581190	4157474
AFCC-T4	01c	AFCC - Upper	AFCC27	581585	4157557
AFCC-T4	01c	AFCC - Upper	AFCC29	581966	4157673
AFCC-T4	01c	AFCC - Upper	AFCC31	582309	4157863
AFCC-T4	01d	AFCC - to I-880	AFCC33	582544	4158195
AFCP-T1	01a	AFCC - Pond 3	AFCP02	576726	4157943
AFCP-T1	01f	AFCC - Pond 3	AFCP04	576913	4158254
AFCP-T1	01f	AFCC - Pond 3	AFCP06	577134	4158519
AFCP-T2	01f	AFCC - Pond 3	AFCP08	577453	4158695
AFCP-T2	01f	AFCC - Pond 3	AFCP10	577812	4158729
AFCP-T2	01f	AFCC - Pond 3	AFCP12	578156	4158628
AFCP-T2	01f	AFCC - Pond 3	AFCP14	578481	4158477

Transect Name	Sub-Area Code	Site Name	Point ID	X-coordinate	Y-coordinate
UNION CITY REGION (continued)					
EDEN-T1	13j	Eden Landing - Mt Eden Creek	EDEN01	576480	4163098
EDEN-T1	13j	Eden Landing - Mt Eden Creek	EDEN02	576489	4162896
EDEN-T1	13j	Eden Landing - Mt Eden Creek	EDEN03	576430	4162704
EDEN-T1	13j	Eden Landing - Mt Eden Creek	EDEN04	576379	4162512
EDEN-T1	13j	Eden Landing - Mt Eden Creek	EDEN05	576179	4162480
EDEN-T1	13j	Eden Landing - Mt Eden Creek	EDEN06	575980	4162529
EDEN-T1	13j	Eden Landing - Mt Eden Creek	WTN11	575778	4162563
ELRS-T1	13k	Eden Landing Reserve - South	ELRS01	578202	4163533
ELRS-T1	13k	Eden Landing Reserve - South	ELRS02	578057	4163383
ELRS-T1	13k	Eden Landing Reserve - South	ELRS03	577994	4163189
ELRS-T1	13k	Eden Landing Reserve - South	ELRS04	578001	4162988
ELRS-T1	13k	Eden Landing Reserve - South	ELRS05	578422	4163525
ELRS-T1	13k	Eden Landing Reserve - South	ELRS06	578540	4163362
ELRS-T1	13k	Eden Landing Reserve - South	ELRS07	578657	4163200
ELRS-T1	13k	Eden Landing Reserve - South	ELRS08	578777	4163039
IMAS-T1	21a	Ideal Marsh - North	IMAN12	577759	4155895
IMAS-T1	21b	Ideal Marsh - South	IMAN14	578069	4155835
IMAS-T1	21b	Ideal Marsh - South	IMAN16	578193	4155524
IMAS-T1	21b	Ideal Marsh - South	IMAN18	578323	4155214
IMAS-T1	21b	Ideal Marsh - South	IMAN20	578454	4154898
IMAS-T1	21b	Ideal Marsh - South	IMAN22	578674	4154665
IMAS-T1	21b	Ideal Marsh - South	IMAN24	578733	4154408
IMAS-T1	21b	Ideal Marsh - South	IMAN26	578426	4154305
OAC-T2	13a	OAC	ALCK10	577579	4161047
OAC-T2	13a	OAC	ALCK11	577774	4161008
OAC-T2	13a	OAC	ALCK12	577954	4160949
OAC-T2	13a	OAC	ALCK13	578133	4160880
OAC-T2	13a	OAC	ALCK14	578290	4160821
OAC-T2	13a	OAC	ALCK15	578491	4160791
OAC-T2	13a	OAC	ALCK16	578684	4160842
OAC-T2	13a	OAC	ALCK17	578837	4160946
OAC-T2	13a	OAC	ALCK18	578983	4161058
OAC-T3	13a	OAC	ALCK19	579146	4161152
OAC-T3	13a	OAC	ALCK20	579342	4161159
OAC-T3	13a	OAC	ALCK21	579538	4161155
OAC-T3	13a	OAC	ALCK22	579723	4161150
OAC-T3	13a	OAC	ALCK23	579901	4161149
OAC-T3	13a	OAC	ALCK24	580056	4161217
OAC-T3	13a	OAC	ALCK25	580098	4161389
OAC-T3	13a	OAC	ALCK26	580095	4161571
OAC-T3	13a	OAC	ALCK27	580088	4161744
WTN-T1	13d	Whale's Tail - North	WTN04	575865	4161341
WTN-T1	13d	Whale's Tail - North	WTN05	575886	4161530
WTN-T1	13d	Whale's Tail - North	WTN06	575813	4161676
WTN-T1	13d	Whale's Tail - North	WTN07	575771	4161849
WTN-T1	13d	Whale's Tail - North	WTN08	575767	4162027
WTN-T1	13d	Whale's Tail - North	WTN09	575762	4162212
WTN-T1	13d	Whale's Tail - North	WTN10	575754	4162376

Transect Name	Sub-Area Code	Site Name	Point ID	X-coordinate	Y-coordinate
UNION CITY REGION (continued)					
WTS-T1	13e	Whale's Tail - South	WTS22	575754	4159900
WTS-T1	13e	Whale's Tail - South	WTS23	575792	4160057
WTS-T1	13e	Whale's Tail - South	WTS24	575813	4160265
WTS-T1	13e	Whale's Tail - South	WTS28	575489	4161055
WTS-T1	13e	Whale's Tail - South	WTS29	575688	4161029
WTS-T1	13e	Whale's Tail - South	WTS30	575854	4160992
WTS-T1	13e	Whale's Tail - South	WTS31	575960	4160824
WTS-T1	13e	Whale's Tail - South	WTS32	575969	4160626
WTS-T1	13e	Whale's Tail - South	WTS33	575857	4160461
HAYWARD REGION					
BUNK-T1	20g	Bunker Marsh	BUNK01	573456	4170331
BUNK-T1	20g	Bunker Marsh	BUNK02	573507	4170104
BUNK-T1	20g	Bunker Marsh	BUNK03	573561	4169912
BUNK-T1	20g	Bunker Marsh	BUNK04	573631	4169725
BUNK-T1	20f	Bunker Marsh	NORT08	573588	4170397
BUNK-T1	20h	Bunker Marsh	SLRZ01	573737	4169556
CITA-T1	20d	Citation Marsh	CITA01	573661	4170466
CITA-T1	20d	Citation Marsh	CITA02	573555	4170639
CITA-T1	20d	Citation Marsh	CITA03	573435	4170800
CITA-T1	20d	Citation Marsh	CITA04	573314	4170961
CITA-T1	20d	Citation Marsh	CITA05	573318	4171265
CITA-T1	20d	Citation Marsh	CITA06	573316	4171466
CITA-T1	20d	Citation Marsh	CITA07	573314	4171666
COGS-T1	20m	Cogswell - Sec A	COGS01	574738	4166041
COGS-T1	20m	Cogswell - Sec A	COGS02	574713	4166250
COGS-T1	20m	Cogswell - Sec A	COGS03	574862	4166363
COGS-T1	20m	Cogswell - Sec A	COGS04	575059	4166368
COGS-T1	20m	Cogswell - Sec A	COGS05	575218	4166336
COGS-T1	20m	Cogswell - Sec A	COGS06	575158	4166170
COGS-T1	20m	Cogswell - Sec A	COGS07	575043	4166004
COGS-T1	20w	Triangle Marsh - Hayward	TRMA02	574714	4166471
COGS-T2	20o	Cogswell - Sec C	COGS08	574984	4165788
COGS-T2	20o	Cogswell - Sec C	COGS09	575124	4165612
COGS-T2	20o	Cogswell - Sec C	COGS10	575138	4165412
COGS-T2	20o	Cogswell - Sec C	COGS11	575105	4165165
COGS-T2	20o	Cogswell - Sec C	COGS12	574791	4165248
COGS-T2	20o	Cogswell - Sec C	COGS13	574779	4165542
COGS-T2	20o	Cogswell - Sec C	COGS14	574781	4165740
COGS-T2	20o	Cogswell - Sec C	JOLA04	574909	4165104
COGS-T3	20n	Cogswell - Sec B	COGS15	575367	4165223
COGS-T3	20n	Cogswell - Sec B	COGS16	575572	4165228
COGS-T3	20n	Cogswell - Sec B	COGS17	575710	4165373
COGS-T3	20n	Cogswell - Sec B	COGS18	575620	4165538
COGS-T3	20n	Cogswell - Sec B	COGS19	575531	4165722
COGS-T3	20n	Cogswell - Sec B	COGS20	575436	4165912
COGS-T3	20n	Cogswell - Sec B	COGS21	575340	4166092

Transect Name	Sub-Area Code	Site Name	Point ID	X-coordinate	Y-coordinate
HAYWARD REGION (continued)					
HARD-T1	20s	HARD Marsh	HARD01	575252	4164654
HARD-T1	20s	HARD Marsh	HARD02	575438	4164560
HARD-T1	20s	HARD Marsh	HARD03	575619	4164493
HARD-T1	20s	HARD Marsh	HARD04	575816	4164414
HARD-T1	20s	HARD Marsh	HARD05	575988	4164619
HARD-T1	20s	HARD Marsh	JOLA02	575064	4164736
NORT-T1	20c	Dogbone Marsh	DOGB01	572695	4170847
NORT-T1	20f	North Marsh	NORT01	573097	4171251
NORT-T1	20f	North Marsh	NORT02	572949	4171118
NORT-T1	20f	North Marsh	NORT03	572920	4170920
NORT-T1	20f	North Marsh	NORT04	572877	4170757
NORT-T1	20f	North Marsh	NORT05	572997	4170591
NORT-T1	20f	North Marsh	NORT06	573168	4170488
ORLW-T1	07a	Oro Loma - East	ORLW16	574840	4168558
ORLW-T1	07a	Oro Loma - East	ORLW17	574749	4168949
ORLW-T1	07a	Oro Loma - East	ORLW18	574912	4169047
ORLW-T1	07a	Oro Loma - East	ORLW19	575313	4169028
ORLW-T1	07a	Oro Loma - East	ORLW20	575474	4168815
ORLW-T1	07a	Oro Loma - East	ORLW21	575441	4168567
ORLW-T1	07a	Oro Loma - East	ORLW22	574705	4168708
ORLW-T3	07b	Oro Loma - West	ORLW01	574936	4168382
ORLW-T3	07b	Oro Loma - West	ORLW02	575023	4168204
ORLW-T3	07b	Oro Loma - West	ORLW03	574972	4168062
ORLW-T3	07b	Oro Loma - West	ORLW04	574771	4168057
ORLW-T3	07b	Oro Loma - West	ORLW05	574584	4168057
ORLW-T3	07b	Oro Loma - West	ORLW06	574382	4168054
ORLW-T3	07b	Oro Loma - West	ORLW07	574308	4168235
SLRZ-T1	20h	San Lorenzo Creek	SLRZ03	573943	4169633
SLRZ-T1	20h	San Lorenzo Creek	SLRZ04	574138	4169774
SLRZ-T1	20h	San Lorenzo Creek	SLRZ05	574277	4169889
SLRZ-T1	20h	San Lorenzo Creek	SLRZ07	573896	4169503
SLRZ-T1	20h	San Lorenzo Creek	SLRZ08	573955	4169323
SAN LEANDRO BAY REGION					
ARHE-T2	17c	Arrowhead Marsh	ARHE01	569510	4177535
ARHE-T2	17c	Arrowhead Marsh	ARHE04	569262	4177549
ARHE-T2	17c	Arrowhead Marsh	ARHE05	569146	4177718
ARHE-T2	17c	Arrowhead Marsh	ARHE06	569063	4177898
FANM-T1	17j	Fan Marsh	FANM01	568582	4177668
FANM-T1	17j	Fan Marsh	FANM03	568635	4177820
FANM-T1	17j	Fan Marsh	FANM05	568397	4177843
MLKR-T1	17h	MLK New Marsh	MLKR01	569671	4177003
MLKR-T1	17h	MLK New Marsh	MLKR02	569622	4177196
MLKR-T1	17h	MLK New Marsh	MLKR03	569706	4177372
MLKR-T1	17h	MLK New Marsh	MLKR05	569837	4177413
MLKR-T1	17h	MLK New Marsh	MLKR06	569948	4177254
MLKR-T1	17h	MLK New Marsh	MLKR07	570046	4177104

Transect Name	Sub-Area Code	Site Name	Point ID	X-coordinate	Y-coordinate
SAN LEANDRO BAY REGION (continued)					
MLKS-T1	17d	MLK Regional Shoreline	MLKS09	569336	4178901
MLKS-T1	17d	MLK Regional Shoreline	MLKS10	569456	4178741
MLKS-T1	17d	MLK Regional Shoreline	MLKS11	569515	4178546
BAY BRIDGE NORTH REGION					
EMCR-T1	06b	Emeryville Crescent - West	EMCR02	560250	4186896
EMCR-T1	06b	Emeryville Crescent - West	EMCR03	560177	4186720
EMCR-T1	06b	Emeryville Crescent - West	EMCR04	560358	4186670
EMCR-T1	06b	Emeryville Crescent - West	EMCR05	560565	4186723
EMCR-T1	06b	Emeryville Crescent - West	EMCR06	560742	4186744
EMCR-T1	06a	Emeryville Crescent - East	EMCR07	560954	4186746
PTPN-T1	10a	Whittel Marsh	PTPN01	556260	4206711
PTPN-T1	10a	Whittel Marsh	PTPN02	556460	4206771
PTPN-T1	10a	Whittel Marsh	PTPN03	556645	4206685
PTPN-T1	10a	Whittel Marsh	PTPN04	556830	4206771
RCRA-T1	22c	Rheem Creek Area	RCRA03	555821	4203918
RCRA-T1	22c	Rheem Creek Area	RCRA04	555895	4204106
RCRA-T1	22c	Rheem Creek Area	RCRA05	555917	4204343
RCRA-T1	22c	Rheem Creek Area	RCRA12	555741	4203735
RIF-T1	22b	San Pablo Marsh	RCRA06	555455	4203421
RIF-T1	22b	San Pablo Marsh	RIF03	555123	4202989
RIF-T1	22b	San Pablo Marsh	RIF09	554287	4203087
RIF-T1	22b	San Pablo Marsh	RIF10	554704	4203067
RIF-T1	22b	San Pablo Marsh	RIF11	555284	4203315
STEG-T1	22e	Hoffman Marsh	HOM06	559640	4195672
STEG-T1	22e	Hoffman Marsh	HOM07	559818	4195374
STEG-T1	22e	Hoffman Marsh	HOM08	560031	4195055
STEG-T1	22d	Stege Marsh	MEEK03	558280	4196127
STEG-T1	22d	Stege Marsh	MEEK04	558463	4196076
STEG-T1	22d	Stege Marsh	MEEK05	558183	4195946
STEG-T1	22d	Stege Marsh	MEEK06	558770	4195989
STEG-T1	22d	Stege Marsh	MEEK07	559080	4195902
PETALUMA REGION					
GRFI-T1	24b	Grey's Field	GRFI01	536303	4230247
GRFI-T1	24b	Grey's Field	GRFI02	535350	4230500
GRFI-T1	24b	Grey's Field	GRFI03	535850	4230155
PDF-T1	24a	Petaluma River - Upper	PDF12	534648	4230802
PDF-T1	24a	Petaluma River - Upper	PDF13	533995	4231302
PDF-T1	24a	Petaluma River - Upper	PDF15	534562	4231234

Appendix III: 2022 OEI Survey Results for Each Round

The following tables describe the surveys conducted at each site including: the name of the project, the site name and ID code, the protocol used, whether broadcast was used, and the date, observer, temperature, and number of Ridgway's rails detected at the site for each round. A key to the tables is below.

Key to Protocol

- **NAm** = North American Protocol: 2-species active transect survey
- **G** = Protocol G: active stationary survey (consultant's survey)

Key to Observer

- **BO =** Brian Ort
- **DP** = Dylan Pastor
- **IS** = Isabella Sanchez-Mendoza
- **JH** = Jeanne Hammond
- **JM** = Jen McBroom
- **LD** = Lindsay Faye Domecus
- **MA** = Melanie Anderson
- **PL** = Pim Laulikitnont
- **SG** = Simon Gunner
- **TR** = Tobias Rohmer

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MARIN REGION

Site Name (ID)	Transect	Protocol	Round 1					Round 2					Round 3				
			Date	Observer	Temp (C)	Wind (mph)	RIRA	Date	Observer	Temp (C)	Wind (mph)	RIRA	Date	Observer	Temp (C)	Wind (mph)	RIRA
Pickleweed Park (09)	PIPK-T1	NAm	2/3/2022	TR	15	0	1	2/28/2022	PL	21	2	2	3/22/2022	SG	13	0	2
Piper Park - East (04c)	PIPE-T1	NAm	2/3/2022	SG	22	4	3	3/4/2022	LD	11	0	1	3/22/2022	PL	12	1	1
Piper Park - West (04d)	PIPE-T1	NAm	2/3/2022	SG	22	4	1	3/4/2022	LD	11	0	1	3/22/2022	PL	12	1	11
CMC - Mouth North (04j.1)	CMCM-T1	NAm	2/10/2022	SG	23	0	0	3/4/2022	LD	12	1	0	3/22/2022	PL	12	1	0
CMC - Mouth South (04j.2)			2/10/2022	SG	23	0	0	3/4/2022	LD	12	1	0	3/22/2022	PL	12	1	0
Boardwalk No. 1 (04k)	PIPE-T1	NAm	2/3/2022	SG	22	4	2	3/4/2022	LD	11	0	0	3/22/2022	PL	12	1	0
San Rafael Canal Mouth East (23d.1)	PIPK-T1	NAm	2/3/2022	TR	15	0	0	2/28/2022	PL	21	2	0	3/22/2022	SG	13	0	0
San Rafael Canal Mouth West (23d.2)	PIPK-T1	NAm	2/3/2022	TR	15	0	0	2/28/2022	PL	21	2	0	3/22/2022	SG	13	0	0

SAN FRANCISCO PENINSULA REGION

Site Name (ID)	Transect	Protocol	Round 1					Round 2					Round 3				
			Date	Observer	Temp (C)	Wind (mph)	RIRA	Date	Observer	Temp (C)	Wind (mph)	RIRA	Date	Observer	Temp (C)	Wind (mph)	RIRA
SFO (19h)	SFO-T1	NAm	2/1/2022	TR	3	2	0	3/2/2022	PL	10	0	0	3/29/2022	LD	11	3	0
Seal Slough Central (19p.1)	SEAL-T1	NAm	2/3/2022	PL	16	2	0	3/1/2022	TR	15	5	0	3/22/2022	IS	11	0	0
Seal Slough Peripheral (19p.2)	SEAL-T1	NAm	2/3/2022	PL	16	2	0	3/1/2022	TR	15	5	0	3/22/2022	IS	11	0	0

SAN MATEO REGION

Site Name (ID)	Transect	Protocol	Round 1					Round 2					Round 3				
			Date	Observer	Temp (C)	Wind (mph)	RIRA	Date	Observer	Temp (C)	Wind (mph)	RIRA	Date	Observer	Temp (C)	Wind (mph)	RIRA
Corkscrew Slough (02b.1)	CORK-T1	NAm	1/24/2022	SC	14	8	**5**	2/17/2022	DP	9	2	2	3/14/2022	BO	7	0	3
Steinberger Slough (02b.2)	RESH-T2	NAm	1/26/2022	LD	17	1	0	2/15/2022	PL	8	4	0	3/17/2022	TH	10	2	0
B2 North West (02c.1a)	OBEN-T1	NAm	2/7/2022	DP	20	0	**10**	3/7/2022	DP	18	1	8	4/7/2022	DP	12	3	2
B2 North East (02c.1b)	OBEN-T1	NAm	2/7/2022	DP	20	0	**3**	3/7/2022	DP	18	1	0	4/7/2022	DP	12	3	**3**
B2 North South (02c.2)	OBEN-T2	NAm	2/7/2022	LD	17	2	**2**	3/7/2022	MA	16	1	**2**	4/7/2022	TH	10	1	0
B2 South West (02d.1a)	OBES-T1	NAm	1/24/2022	LD	15	5	0	2/17/2022	PL	8	3	0	3/14/2022	TR	5	0	0
B2 South East (02d.1b)	OBES-T1	NAm	1/24/2022	LD	15	5	0	2/17/2022	PL	8	3	0	3/14/2022	TR	5	0	0
B2 South 2 (02d.2)	OBES-T1	NAm	1/24/2022	LD	15	5	0	2/17/2022	PL	8	3	0	3/14/2022	TR	5	0	0
B2 South 3 (02d.3)	OBES-T1	NAm	1/24/2022	LD	15	5	0	2/17/2022	PL	8	3	0	3/14/2022	TR	5	0	0
Greco Island - North (02f)	GRIN-T1	NAm	1/24/2022	TR	14	6	0	2/17/2022	LD	8	0	0	3/14/2022	JM	7	2	0
West Point Slough - SW / E (02g)	WPSS-T1	NAm	1/28/2022	TR	12	1	0	2/18/2022	PL	5	0	**1**	3/16/2022	MA	8	2	0
Greco Island - South (02h)	GRIS-T1	NAm	1/27/2022	TR	13	2	12	2/17/2022	JM	17	2	**20**	3/17/2022	SG	8	0	15
Greco Island - South (02h) [south levee for SBSPRP]	RAV-T2	NAm	2/10/2022	PL	23	4	**16**	3/2/2022	LD	8	3	4	3/18/2022	TR	8	1	15
Ravenswood Slough (02i)	RAV-T1	NAm	1/19/2022	LD	9	0	3	2/9/2022	TR	22	4	**11**	4/1/2022	TR	8	3	10
Ravenswood Slough (02i) [west levee for SBSPRP]	RAV-T2	NAm	2/10/2022	PL	23	4	**11**	3/2/2022	LD	8	3	9	3/18/2022	TR	8	1	9
Middle Bair N (02k)	MBE-T1	NAm	1/24/2022	JM	15	8	**18**	2/17/2022	TR	8	1	10	3/14/2022	DP	6	1	9
Middle Bair SE (02k)	MBE-T1	NAm	1/24/2002	JM	15	8	0	2/17/2022	TR	8	1	**2**	3/14/2022	DP	6	1	0
Pond B3 Bair Island Restoration (02m)	OBW-T1	NAm	2/7/2022	PL	19	3	**3**	3/7/2022	SG	18	4	2	4/7/2022	IS	12	0	0

DUMBARTON SOUTH REGION

Site Name (ID)	Transect	Protocol	Round 1					Round 2					Round 3				
			Date	Observer	Temp (C)	Wind (mph)	RIRA	Date	Observer	Temp (C)	Wind (mph)	RIRA	Date	Observer	Temp (C)	Wind (mph)	RIRA
Mowry Marsh North (05a.1)	MOWN-T1	NAm	1/18/2022	MA	9	1	14	2/10/2022	TH	25	4	7	3/16/2022	JM	8	2	11
Calaveras Point (05a.2)	CAPT-T1	NAm	1/25/2022	TR	16	5	1	2/23/2022	BO	7	7	9	3/11/2022	LD	9	2	4
Newark Slough West (05c.1)	NEWS-T1	NAm	1/20/2022	MA	7	2	3	2/18/2022	LD	5	3	5	3/14/2022	TH	18	7	5
Newark Slough East (05c.2)	NEWS-T1	NAm	1/20/2022	MA	7	2	1	2/18/2022	LD	5	3	11	3/14/2022	TH	18	7	1
Mayhew's Landing (05e)	MALA-T1	NAm	1/31/2022	LD	13	3	0	3/1/2022	IS	10	0	0	3/31/2022	PL	8	1	0
Coyote Creek - Mud Slough (05f)	A21-T1	NAm	1/25/2022	JM	16	5	0	2/23/2022	MA	10	10	0	3/11/2022	SG	5	3	0
Cargill Pond (W Suites Hotel) (05g)	MALA-T1	NAm	1/31/2022	LD	13	3	0	3/1/2022	IS	10	0	0	3/31/2022	PL	8	1	0
Plummer Creek Mitigation (05h)	PLCM-T1	NAm	2/3/2022	LD	4	3	0	3/1/2022	SG	8	2	0	3/29/2022	IS	10	3	0
Island Ponds - A21 (05i)	A21-T1	NAm	1/25/2022	JM	16	5	2	2/23/2022	MA	10	10	0	3/11/2022	SG	5	3	7
Charleston Slough (15a.1)	MVSL-T1	NAm	1/27/2022	BO	14	4	2	2/17/2022	MA	10	5	0	3/31/2022	LD	15	2	0
Mountain View Slough (15a.1)	MVSL-T1	NAm	1/27/2022	BO	14	4	0	2/17/2022	MA	10	5	0	3/31/2022	LD	15	2	1
Mountain View Slough Channel (15a.1) [SBSPRP][1]	MVSL-T2	NAm	1/27/2022	LD	17	0	1	2/16/2022	PL	10	1	1	3/10/2022	TR	19	1	3
Stevens Creek to Long Point (15a.2)	STEV-T1	NAm	1/17/2022	JM	8	0	0	2/18/2022	IS	10	0	0	3/15/2022	SG	18	9	0
Guadalupe Slough (15a.3)	GUSL-T1	NAm	1/26/2022	MA	13	3	1	2/15/2022	IS	10	8	0	4/1/2022	DP	8	3	1
Alviso Slough (15a.4)	ALSL-T2	NAm	2/2/2022	PL	16	2	11	2/18/2022	SG	6	2	11	3/14/2022	TR	21	8	9
Stevens Creek (15c)	STEV-T1	NAm	1/17/2022	JM	8	0	0	2/18/2022	IS	10	0	0	3/15/2022	SG	18	9	0
Cooley Landing Central (16.1)	COLA-T1	NAm	1/20/2022	LD	6	0	6	2/18/2022	TR	5	1	4	3/15/2022	PL	18	8	7
Cooley Landing East (16.2)	COLA-T1	NAm	1/20/2022	LD	6	0	2	2/18/2022	TR	5	1	16	3/15/2022	PL	18	8	5

[1] Surveyed by OEI for Ducks Unlimited in support of the South Bay Salt Pond Restoration Project.

UNION CITY REGION

Site Name (ID)	Transect	Protocol	Round 1					Round 2					Round 3				
			Date	Observer	Temp (C)	Wind (mph)	RIRA	Date	Observer	Temp (C)	Wind (mph)	RIRA	Date	Observer	Temp (C)	Wind (mph)	RIRA
AFCC - Mouth (01a)	AFCP-T1	NAm	2/4/2022	PL	4	1	0	3/1/2022	LD	7	2	0	4/1/2022	BO	15	1	1
AFCC - Lower (01b)	AFCP-T2	NAm	2/4/2022	PL	4	1	0	3/1/2022	LD	7	2	2	4/1/2022	BO	15	1	1
AFCC - Lower (01b) [SBSPRP]	AFCC-T5	NAm	2/7/2022	BO	18	1	0	3/1/2022	TH	9	2	0	3/31/2022	IS	10	0	0
AFCC - Upper (01c)	AFCC-T4	NAm	2/4/2022	LD	4	0	0	3/1/2022	BO	11	1	0	4/1/2022	IS	7	0	0
AFCC - to I-880 (01d)	AFCC-T4	NAm	2/4/2022	LD	4	0	0	3/1/2022	BO	11	1	0	4/1/2022	IS	7	0	0
AFCC - Pond 3 (01f)	AFCP-T1	NAm	2/4/2022	PL	4	1	0	3/1/2022	LD	7	2	0	4/1/2022	BO	15	1	0
OAC - North Bank (13a)	OAC-T3	NAm	2/7/2022	JM	18	5	0	3/2/2022	TH	10	2	4	3/24/2022	IS	15	10	0
OAC - Island (13b)	OAC-T2	NAm	2/7/2022	TH	20	3	12	3/2/2022	BO	12	1	6	3/24/2022	DP	12	10	4
OAC - South Bank (13c)	OAC-T2	NAm	2/7/2022	TH	20	3	0	3/2/2022	BO	12	1	0	3/24/2022	DP	12	10	0
Whale's Tail - North (13d)	WTN-T1	NAm	2/7/2022	SG	17	2	3	3/3/2022	JM	7	2	1	3/29/2022	BO	15	4	0
Whale's Tail - South (13e)	WTS-T1	NAm	1/19/2022	IS	15	3	7	2/9/2022	MA	19	3	7	3/18/2022	JM	5	2	10
Whale's Tail - South (13e) [SBSPRP][1]	OAC-T4	NAm	1/26/2022	BO	15	2	**9**	2/17/2022	SG	10	2	0	3/14/2022	JM	15	7	2
Cargill Mitigation Marsh (13f)	WTS-T1	NAm	1/19/2022	IS	15	3	0	2/9/2022	MA	19	3	0	3/18/2022	JM	5	2	0
Cargill Mitigation Marsh (13f) [SBSPRP][1]	OAC-T4	NAm	1/26/2022	BO	15	2	1	2/17/2022	SG	10	2	0	3/14/2022	JM	15	7	**5**
Eden Landing - Mt Eden Creek (13j)	EDEN-T1	NAm	2/7/2022	TR	17	2	0	3/2/2022	IS	11	3	0	3/29/2022	PL	12	3	1
Eden Landing Reserve - South (13k)	ELRS-T1	NAm	1/31/2022	JM	12	9	8	2/28/2022	MA	19	4	6	3/24/2022	SG	13	9	6
Eden Landing Reserve - North (13l)	ELRS-T1	NAm	1/31/2022	JM	12	9	0	2/28/2022	MA	19	4	0	3/24/2022	SG	13	9	1
Ideal Marsh - South (21b)	IMAS-T1	NAm	2/4/2022	SG	3	0	0	3/2/2022	JH	13	0	0	4/1/2022	JM	8	1	0

[1] Surveyed by OEI for Ducks Unlimited in support of the South Bay Salt Pond Restoration Project.

HAYWARD REGION

Site Name (ID)	Transect	Protocol	Round 1					Round 2					Round 3				
			Date	Observer	Temp (C)	Wind (mph)	RIRA	Date	Observer	Temp (C)	Wind (mph)	RIRA	Date	Observer	Temp (C)	Wind (mph)	RIRA
Oro Loma - East (07a)	ORLW-T1	NAm	2/9/2022	DP	21	1	3	3/11/2022	JM	18	6	0	3/30/2022	BO	10	8	0
Oro Loma - West (07b)	ORLW-T3	NAm	2/9/2022	LD	20	3	5	3/11/2022	TR	19	8	0	3/30/2022	PL	10	8	0
Dog Bone Marsh (20c)	NORT-T1	NAm	2/9/2022	BO	23	1	0	3/3/2022	DP	10	1	0	3/29/2022	JH	11	2	0
Citation Marsh South (20d.1)	CITA-T1	NAm	2/9/2022	SG	21	0	3	3/3/2022	BO	9	1	4	3/29/2022	TR	10	2	4
Citation Marsh Upper (20d.2a)	CITA-T1	NAm	2/9/2022	SG	21	0	14	3/3/2022	BO	9	1	6	3/29/2022	TR	10	2	4
Citation Marsh Central (20d.2b)	CITA-T1	NAm	2/9/2022	SG	21	0	21	3/3/2022	BO	9	1	13	3/29/2022	TR	10	2	12
East Marsh (20e)	SLRZ-T1	NAm	2/9/2022	IS	20	3	1	3/4/2022	SG	12	7	0	3/29/2022	TH	12	1	0
North Marsh (20f)	NORT-T1	NAm	2/9/2022	BO	23	1	40	3/3/2022	DP	10	1	29	3/29/2022	JH	11	2	27
Bunker Marsh (20g)	BUNK-T1	NAm	2/9/2022	JM	19	0	5	3/3/2022	IS	8	0	11	3/31/2022	MA	9	3	7
San Lorenzo Creek North (20h.1)	SLRZ-T1	NAm	2/9/2022	IS	20	3	1	3/4/2022	SG	12	7	4	3/29/2022	TH	12	1	0
San Lorenzo Creek South (20h.2)	SLRZ-T1	NAm	2/9/2022	IS	20	3	1	3/4/2022	SG	12	7	0	3/29/2022	TH	12	1	1
Johnson's Landing (20l)	COGS-T2	NAm	1/31/2022	SG	13	4	0	3/1/2022	JH	11	0	2	4/4/2022	JM	10	12	1
Cogswell - Sec A (20m)	COGS-T1	NAm	1/31/2022	BO	12	8	0	3/1/2022	DP	8	5	10	4/4/2022	IS	10	9	0
Cogswell - Sec B Bayfront (20n.1)	COGS-T3	NAm	1/31/2022	MA	12	5	0	3/1/2022	JM	6	0	3	4/4/2022	DP	11	9	3
Cogswell - Sec B South (20n.2)	COGS-T3	NAm	1/31/2022	MA	12	5	2	3/1/2022	JM	6	0	5	4/4/2022	DP	11	9	8
Cogswell - Sec B Main (20n.3)	COGS-T3	NAm	1/31/2022	MA	12	5	9	3/1/2022	JM	6	0	22	4/4/2022	DP	11	9	3
Cogswell - Sec C (20o)	COGS-T2	NAm	1/31/2022	SG	13	4	9	3/1/2022	JH	11	0	6	4/4/2022	JM	10	12	6
HARD Marsh (20s)	HARD-T1	NAm	1/31/2022	TH	13	5	0	3/1/2022	MA	9	3	0	4/5/2022	SG	11	4	0
Triangle Marsh - Hayward (20w)	COGS-T1	NAm	1/31/2022	BO	12	8	0	3/1/2022	DP	8	5	0	4/4/2022	IS	10	9	0

SAN LEANDRO BAY REGION

Site Name (ID)	Transect	Protocol	Round 1					Round 2					Round 3				
			Date	Observer	Temp (C)	Wind (mph)	RIRA	Date	Observer	Temp (C)	Wind (mph)	RIRA	Date	Observer	Temp (C)	Wind (mph)	RIRA
Arrowhead Marsh West (17c.1)	ARHE-T2	NAm	2/10/2022	JM	20	5	3	3/3/2022	PL	10	2	2	3/31/2022	TR	11	2	6
Arrowhead Marsh East (17c.2)	ARHE-T2	NAm	2/10/2022	JM	20	5	18	3/3/2022	PL	10	2	27	3/31/2022	TR	11	2	16
MLK Regional Shoreline - Damon Marsh (17d.4)	MLKS-T1	NAm	2/3/2022	BO	14	1	0	3/3/2022	TR	9	0	0	3/31/2022	TH	12	1	0
MLK Regional Shoreline - Damon Slough (17.5)	MLKS-T1	NAm	2/3/2022	BO	14	1	0	3/3/2022	TR	9	0	0	3/31/2022	TH	12	1	0
San Leandro Creek North (17e.1)	MLKR-T1	NAm	2/4/2022	JM	7	1	0	2/28/2022	TR	16	5	0	3/21/2022	JH	14	0	0
San Leandro Creek South (17e.2)	MLKR-T1	NAm	2/4/2022	JM	7	1	0	2/28/2022	TR	16	5	0	3/21/2022	JH	14	0	0
MLK New Marsh (17h)	MLKR-T1	NAm	2/4/2022	JM	7	1	41	2/28/2022	TR	16	5	43	3/21/2022	JH	14	0	40
Fan Marsh Wings (17j.1)	FANM-T1	NAm	2/3/2022	JM	12	6	0	2/24/2022	JH	11	6	0	3/21/2022	TR	9	0	0
Fan Marsh Main (17j.2)	FANM-T1	NAm	2/3/2022	JM	12	6	8	2/24/2022	JH	11	6	12	3/21/2022	TR	9	0	9

BAY BRIDGE NORTH REGION

Site Name (ID)	Transect	Protocol	Round 1					Round 2					Round 3				
			Date	Observer	Temp (C)	Wind (mph)	RIRA	Date	Observer	Temp (C)	Wind (mph)	RIRA	Date	Observer	Temp (C)	Wind (mph)	RIRA
Emeryville Crescent - East (06a)	EMCR-T1	NAm	1/17/2022	IS	10	5	0	2/18/2022	BO	13	0	0	3/14/2022	JH	15	5	0
Emeryville Crescent - West (06b)	EMCR-T1	NAm	1/17/2022	IS	10	5	0	2/18/2022	BO	13	0	0	3/14/2022	JH	15	5	0
Whittel Marsh (10a)	PTPN-T1	NAm	1/26/2022	JM	11	2	0	2/18/2022	TH	7	1	0	3/21/2022	PL	22	2	0
San Pablo Marsh East (22b.1)	RIF-T1	NAm	1/18/2022	SG	7	5	0	2/18/2022	JM	3	2	4	3/14/2022	MA	16	6	2
San Pablo Marsh West (22b.2)	RIF-T1	NAm	1/18/2022	SG	7	5	3	2/18/2022	JM	3	2	10	3/14/2022	MA	16	6	0
Rheem Creek Area (22c)	RCRA-T1	NAm	2/3/2022	TH	12	2	0	2/24/2022	BO	13	2	0	3/18/2022	DP	13	1	0
Meeker Slough (22d)	STEG-T1	NAm	2/8/2022	BO	16	2	5	3/4/2022	MA	12	4	10	3/22/2022	JH	12	0	9
Stege Marsh (22d)	STEG-T1	NAm	2/8/2022	BO	16	2	4	3/4/2022	MA	12	4	7	3/22/2022	JH	12	0	5
Hoffman Marsh (22e)	STEG-T1	NAm	2/8/2022	BO	16	2	3	3/4/2022	MA	12	4	1	3/22/2022	JH	12	0	2

SUISUN REGION

NOTE: All surveys shown in table below were conducted by OEI in support of the Military Ocean Terminal Concord (MOTCO) Integrated National Resources Management Plans and Barge Pier Repair Project

			Round 1					Round 2					Round 3				
Site Name (ID)	Transect	Protocol	Date	Observer	Temp (C)	Wind (mph)	RIRA	Date	Observer	Temp (C)	Wind (mph)	RIRA	Date	Observer	Temp (C)	Wind (mph)	RIRA
Fringe Marsh at Barge Pier[1]	none	G	1/17/2022	TR DA	16	2	0	1/31/2022	IS DS	10	4	0	2/14/2022	DA	11	5	0
Point Edith Marsh (27)	PEM-T2	NAm	1/20/2022	TR	7	0	0	2/16/2022	TH	7	6	0	3/22/2022	JM	25	2	0
Concord Naval Weapons Station (27)	PEM-T2	NAm	1/20/2022	TR	7	0	0	2/16/2022	TH	7	6	0	3/22/2022	JM	25	2	0
MOTCO Area 1 (27)	MOT1-T1	NAm	1/20/2022	JM	4	0	0	2/16/2022	IS	8	1	0	3/22/2022	MA	20	2	0
MOTCO Area 2 (27)	MOT2-T1	NAm	1/19/2022	DP	9	6	0	2/16/2022	MA	5	2	0	3/22/2022	LD	27	4	0
Roe Island (27b)	ROEI-T1	NAm	1/20/2022	SG	6	4	0	2/16/2022	TR	5	4	0	3/22/2022	TR	24	9	0
Ryer Island NW (27b)	RYNW-T3	NAm	1/19/2022	MA	5	3	0	2/16/2022	DP	4	5	0	3/22/2022	BO	22	7	0

[1] Survey conducted by OEI for Barge Pier Repair Project. Fourth round conducted on 2/28/2022 by IS. No RIRA were detected.

PETALUMA REGION

Site Name (ID)	Transect	Protocol	Round 1					Round 2					Round 3				
			Date	Observer	Temp (C)	Wind (mph)	RIRA	Date	Observer	Temp (C)	Wind (mph)	RIRA	Date	Observer	Temp (C)	Wind (mph)	RIRA
Petaluma River - Upper (24a)	GRFI-T1	NAm	2/4/2022	BO	5	5	0	2/28/2022	JM	19	10	0	3/24/2022	JM	8	2	0
Grey's Field (24b)	GRFI-T1	NAm	2/4/2022	BO	5	5	0	2/28/2022	JM	19	10	0	3/24/2022	JM	8	2	0
Ellis Creek (24c)[1]	ELCR-T2	NAm	1/25/2022	LD	17	2	0	2/8/2022	PL	21	3	0	3/17/2022	TR	5	1	0

[1]Ellis Creek surveyed by OEI in support of the Ellis Creek Wastewater Pipeline Replacement Project for the City of Petaluma