

California Ridgway's Rail Surveys for the San Francisco Estuary Invasive *Spartina* Project 2020

Report to:

The 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.

In collaboration with partner organizations, including Point Blue Conservation Science (PBCS), Don Edwards National Wildlife Refuge (DENWR), Avocet Research and Associates (ARA) and San Pablo Bay National Wildlife Refuge (SPBNWR), 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 2020 (Permit Number TE118356-4.2). Trained and permitted biologists performed standard-protocol surveys at 100 ISP sub-areas (made up of 109 rail "sites") between January 15 and April 15, 2020. 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 of surveys conducted for the ISP by OEI in 2020 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 2020 *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 (Federal Register 50 CFR 17.11) and the State of California (California Code of Regulations Title 14, Section 670.5). Its 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 and degradation and predators are among the biggest threats to the rail (USFWS 2013).

Between 2009 to 2011, PBCS estimated that the average total population was about 1,167 individuals (Liu et al. 2012). However, the number of rails detected in 2020 by all survey organizations at the subset of marshes where surveys occurred exceeds the extrapolated population estimate from that study period, indicating that the population is likely greater now.

2. Study Area

OEI conducted surveys for California Ridgway's rail at 100 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 Suisun (**Figure 1**). The study area spanned the counties of Alameda, Contra Costa, Marin, San Francisco, 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**).

Survey effort was incomplete at 19 ISP sub-areas across 12 transects in the San Mateo and Dumbarton South Regions due to the COVID-19 pandemic (**Table 1**). All of these sub-areas were on DENWR lands. At these sub-areas, only two of three survey rounds were complete before the end of the season.

Surveys by Partner Organizations

Partner organizations surveyed an additional 27 ISP sub-areas (39 rail program sites). Rail survey data from partner organizations are not included in this report; rather, the results from those surveys are reported on by the survey organizations themselves.

For a complete list of all ISP sub-areas and associated survey organizations, see **Appendix I: Complete List of 2020 Spartina Treatment Sub-Areas and Ridgway's Rail Survey Plans**. For a complete list of OEI survey stations and their geographic coordinates in UTM, see **Appendix II: 2020 Survey Station Coordinates**.

Table 1. Survey effort was incomplete at twelve transects due to the COVID-19 pandemic.

Transect	Site Name (Sub-Area Code)
<i>San Mateo Region</i>	
CORK-T1	Corkscrew Slough (02b.1)
GRIN-T1	Greco Island - North (02f)
GRIS-T1	Greco Island - South (02h)
MBE-T1	Middle Bair SE (02k)
	Middle Bair N (02k)
OBEN-T1	B2 North Quadrant West (02c.1a)
	B2 North Quadrant East (02c.1b)
OBEN-T2	B2 North Quadrant South (02c.2)
	B2 South Quadrant West (02d.1a)
OBES-T1	B2 South Quadrant East (02d.1b)
	B2 South Quadrant 2 (02d.2)
	B2 South Quadrant 3 (02d.3)
<i>Dumbarton South Region</i>	
A21-T1	Coyote Creek - Mud Slough (05f)
	Island Ponds - A21 (05i)
CAPT-T1	Calaveras Point (05a.2)
MALA-T1	Mayhew's Landing (05e)
	Cargill Pond (W Suites Hotel) (05g)
MOWN-T1	Mowry Marsh North (05a.1)
NEWS-T1	Newark Slough East (05c.1)
	Newark Slough West (05c.2)

2. Study Area

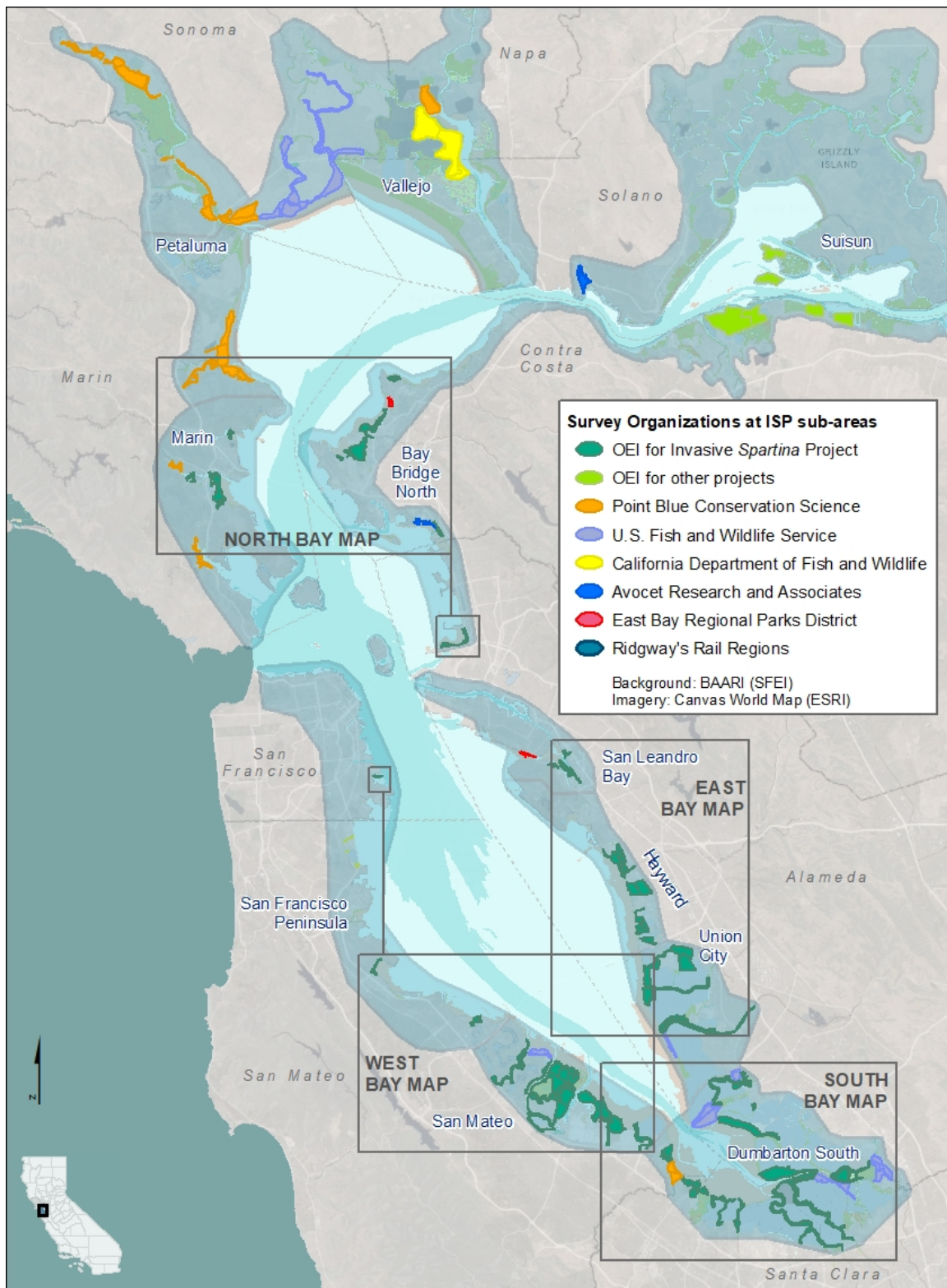


Figure 1. Regional boundaries of ISP sites surveyed for California Ridgway's rail by OEI and others in 2020.

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 NA Protocol.

3.1 Field Methods

California Ridgway's rail surveys were conducted by OEI at 100 ISP sub-areas between January 15 and April 15, 2020, using the NA survey protocol. Surveys were conducted by the following trained and permitted field biologists at Olofson Environmental, Inc.: Jen McBroom, Jeanne Hammond, Stephanie Chen, Tobias Rohmer, Simon Gunner, Kevin Eng, Nate Deakers, Pim Laulikitnont, Brian Ort, Melanie Anderson, and Lindsay Faye.

The NA 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. The NA Protocol is part of the FWS Site-specific Survey Protocol (Wood, 2016) and is based on the North American Marsh Bird Monitoring Protocol. The NA 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.

Note: Typically three rounds of surveys are conducted using the NA Protocol, however, due to the coronavirus pandemic, the third round of surveys was not completed at 19 sub-areas (12 transects) at Don Edwards National Wildlife Refuge (as noted in **Table 1** in the previous section).

3.2 Data Management

Data were recorded in the field on paper datasheets and GPS units 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. Compass 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. 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 NA 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 in order 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 the sites presented in this report: highest minimum count; index of relative density, annual rate of change, average annual rate of change, and occupancy by black rail (BLRA), Virginia rail (VIRA), and sora (SORA). 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 upland and mudflat areas. The resulting densities for each visit are then averaged. Note that previous reports used the highest of the three survey visits rather than the average of three survey visits (McBroom 2019; McBroom 2018). However, recent review of the NAm Protocol dictates that relative density should be calculated from the average of all visits rather than the max of the visits. This error in methods is corrected in this report, however direct comparison of relative density cannot be made between past reports.

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 $14 \text{ rails} / (7 \text{ points} * 31 \text{ acres} * 3 \text{ visits}) = 0.022 \text{ rails/ acres}$. In past reports, relative density was calculated using the max of the three rounds using the following equation: $6 \text{ rails} / (7 \text{ points} * 31 \text{ acres}) = 0.028 \text{ rails/ acres}$.

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 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 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 present at the sub-area but cannot be included in the density calculation.

Table 2. 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 survey area and are present at the 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 60 th percentile of observed winter densities reported in the TMRP
High	0.15 - 0.45	Rails detected at density between the 60 th to 90 th percentile of observed winter densities reported in the TMRP
Very high	> 0.45	Rails detected at density greater than 90 th percentile of observed winter densities reported in the TMRP

Index of one-year rate of change for the total highest minimum count was calculated 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 DESFB was 33 birds for 2014 and 35 birds for 2015, the index of the annual rate of population change would be: $((35 - 33)/33 \times 100\%) = 6.06\%$.

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

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

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, $t2$ is the end year ($t2 - t1 = 5$ in this five year analysis). For example, if the total highest minimum count of CA 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: $[(36/28)^{(1/[2015 - 2010])} - 1] \times 100\% = 5.15\%$ increase per year.

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 were 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 being occupied).

Caveats: It is important to point out that the preceding metrics of highest minimum count, relative density, population change and occupancy do not take into account factors such as detection probability, habitat covariates, etc.; thus, they should be interpreted with caution. More reliable estimates of population change will be calculated by PBCS using hierarchical models on an interval of approximately every 5 years. However, the simpler metrics provided above are easy to calculate and may allow managers to detect large changes in true abundance (assuming count indices are correlated with true abundance) over short time periods, which could be important for management interventions. The formulas for the above metrics (except for the formulas involving the index of relative density) assume that the exact same study areas are being 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

The number of rails detected by OEI in 2020 was about the same as the previous year at the same subset of sub-areas, calculated as +0.25% average annual rate of change. On the longer timescale of five years, rails have increased at a rate of 4% collectively at the same subset of sub-areas since 2015 (calculated as compound 5-year rate of change). Trends show small steady increases at both timescales in the group of sub-areas where non-native *Spartina* has been treated continuously since 2012 (+3% annual change, +2% 5-year change). and slightly higher At the group of sub-areas where *Spartina* treatment is currently restricted, there is no change from the previous year (0% annual change), but a larger positive trend at the five-year timescale (+6% 5-year rate of change). Sub-areas where *Spartina* treatment was previously-restricted but where treatment is now permitted (i.e. where treatment restrictions were lifted in the 2018 Biological Opinion) show disparate one- and five-year trends; these sub-areas have declined by 9% since 2019, but are 15% greater than five years ago.

Results from each region are summarized below and analysis at each sub-area is provided in **Appendix II**. 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 ten sub-areas in the Marin Region in 2020 (Table 2). PBCS surveyed an additional three sub-areas in the region, including Creekside Park (04g). OEI detected a total of 84 Ridgway's rails in the Marin Region in 2020, which is the same number as detected in 2019. It is also about a 3% since 2015 at the same subset of sub-areas.

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. OEI surveyed four sub-areas in this Region in 2020. One rail was detected in each of the two sub-area splits at Seal Slough. Although no rails were detected at SFO during surveys, a rail was incidentally detected outside of surveys at the south end of the shoreline beyond the detection threshold of our survey transect. In 2021, we recommend adding an additional station to the transect to detect rails in this portion of the marsh at SFO. Although only two rails were detected in the Region in 2020, this represents a 100% increase since 2019 when only a single rail was detected and an 11% decrease since 2015 at the same subset of sub-areas. Trends are difficult to identify at these 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 18 sub-areas within the San Mateo Region in 2020. DENWR conducted surveys at an additional sub-area, Redwood Shores (02a.3). Only two rounds of surveys were completed at seven transects in the San Mateo Region, accounting for incomplete results at eleven sub-areas. Data were summarized using

only two survey rounds for those sub-areas. OEI detected a total of 145 Ridgway's rails in the San Mateo Region in 2020 (**Table 3**). This represents a 6% decrease since 2019 and a 2% decrease since 2015 at the same subset of sub-areas.

This Region contains a previously restricted sub-area where full treatment resumed in 2018: B2 North Quadrant West (02c.1a). Between 2012 to 2018, the sub-area was treated with a sub-lethal dose of herbicide to inhibit the production of seeds while maintaining vegetative growth as habitat for rails. In 2020, we detected a total of nine rails at the sub-area split, representing a 59% decrease from the previous year. However, at the two adjacent sub-area splits, B2 North Quadrant West (02c.1a) and B2 North Quadrant South (02c.2), rails increased by 180% and 500% respectively since 2019. It is likely that rails from the newly treated sub-area have moved into that adjacent habitat.

The Dumbarton South Region includes all marshes south of the Dumbarton Bridge, from Newark to Mountain View (**Figure 4**). In 2020, OEI conducted surveys at 17 sub-areas in the Dumbarton South Region. DENWR also surveyed four sub-areas: Dumbarton/Audubon (05b), LaRiviere Marsh (05d), Coyote Creek Lagoon (05f.3), and Coyote Creek South East (15a.5). PBCS surveyed one additional sub-area: Faber and Laumeister Marshes (15b). Only two rounds of surveys were completed at five transects in the Dumbarton South Region, accounting for incomplete results at eight sub-areas. Data were summarized using only two survey rounds for those sub-areas.

OEI detected a total of 135 Ridgway's rails in the Dumbarton South Region in 2020 (Table 2). This represents a decline of 10% since 2019, but a 6% increase since 2015 at the same subset of sub-areas. There are likely many more rails in the region that are not detected by surveys, since there are large 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 fourteen sub-areas in the region in 2020. DENWR surveyed one additional sub-area in 2020: Ideal Marsh - North (21a). OEI detected a minimum of 46 Ridgway's rails (**Table 3**). This represents a 109% increase since 2019 and a 15% increase from 2015 detections at the same subset of sub-areas. Rails have been increasing particularly at the sub-areas where native *Spartina* has been planted by ISP: Eden Landing Reserve - South (13k) (AKA North Creek Marsh) and Eden Landing - Mt Eden Creek (13j).

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 221 Ridgway's rails in 2020 (**Table 3**). This represents an increase of 16% since last year and an increase of 17% since 2015 at the same subset of sub-areas.

The Hayward Region contains six sub-areas where treatment permissions changed in 2018, including Cogswell Section B and Citation Marsh North which were divided into five sub-areas so that portions of each marsh could be fully treated. Five of the six previously restricted sub-areas were fully treated in 2020 and one was treated with a sub-lethal dose of herbicide called seed-suppression. This season was the first time that Citation Marsh Upper (20d.2a) was treated since permissions changed in 2018 and the second time that Cogswell - Sec B Bayfront (20n.1) has been treated since 2018. Changes in the rail population at these

sub-areas may not be observed until two years after full treatment has resumed. Citation Marsh Central (20d.2b) and North Marsh (20f) remain restricted treatment sub-areas; no treatment will occur at this sub-area under the current Biological Opinion.

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, including Arrowhead Marsh, which was surveyed using the NAm protocol again this season for the third year in a row. EBRPD surveyed an additional sub-area: Elsie Roemer (17a). OEI detected 110 Ridgway's rails in San Leandro Bay in 2020. This represents a decline of 23% since last year and no change since 2015. Note that Arrowhead Marsh was surveyed using different methods in 2015, making it difficult to compare over this time period. Excluding Arrowhead from the analysis, rail detections in the region have increased by 8% since 2015.

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 until 2018 and have now had three seasons of treatment of non-native *Spartina*. 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 with the success of non-native *Spartina* treatment at these sub-areas. Fan Marsh Wings (17j.1) is a marshy culvert alongside Doolittle Drive and has intermitantly supported one to two rails in the past. No rails were detected at this sub-area in 2020. Damon Marsh (17d.4) is a small marsh, occupying an area less than four acres, which has declined from 17 rails in 2019 to eight rails in 2020. Revegetation is expected to occur in the future as *Spartina* control continues successfully at this sub-area.

The Bay Bridge North Region is located 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 six transects spanning eight sub-areas in 2020. EBRPD surveyed one additional sub-area: Giant Marsh (10c). OEI detected 55 Ridgway's rails in the region in 2020, an increase of 6% since last year and a 9% decrease since 2015 at the same subset of sub-areas. In 2020, Avocet Research and Associates (ARA) and OEI together surveyed the transect STEG-T1. OEI focused on three stations at Hoffman Marsh (22e), while ARA surveyed the five stations at Stege and Meeker Marshes (22d).

4. Results

Table 3. Summary of survey results at all sub-areas surveyed by OEI for ISP in 2020, 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. Percent change cannot be calculated when a value is zero; in these instances, arrows are used to show the change from zero. Occupancy calculations are shown on a transect level, rather than sub-area level.

Sub-Area Name (Code)	Transect	Area (acres)	% Area Surveyed	RIRA Indices				Occupancy		
				Highest Count	Relative Density (rails/acre)	One year Δ	Five year Δ	BLRA	SORA	VIRA
Marin Region										
CMC Marsh Reserve (04a)	CEF-T1	77.1	96%	23	0.12	-15%	0%	0	0	0
Piper Park - East (04c)	PIPE-T1	10.1	99%	4	0.23	0%	-4%	0	0	0
Piper Park - West (04d)	PIPE-T1	13.8	100%	6	0.29	-14%	4%	0	0	0
<i>CMC - Mouth (04j) - split into two sub-areas in 2011</i>								0	0	0
CMC - Mouth North (04j.1)	CMCM-T1	6.0	100%	1	0.00	↑	-4%	-	-	-
CMC - Mouth South (04j.2)	CMCM-T1	12.2	92%	1	0.03	0%	↑	-	-	-
Boardwalk No. 1 (04k)	PIPE-T1	8.4	100%	1	0.00	↑	-4%	0	0	0
Pickleweed Park (09)	PIPK-T1	14.2	100%	0	0.00	-	-	0	0	0
<i>San Rafael Canal Mouth (23d) - split into two sub-areas in 2011</i>								0	0	0
San Rafael Canal Mouth East (23d.1)	PIPK-T1	3.6	100%	0	0.00	-	-	-	-	-
San Rafael Canal Mouth West (23d.2)	PIPK-T1	3.1	100%	0	0.00	-	-	-	-	-
<i>Muzzi and Martas Marsh (23e) - grouped into one sub-area by ISP control program</i>								0	0	0
Martas Marsh (23e)	MUZZ-T1	19.8	99%	10	0.25	11%	22%	-	-	-
San Clemente Creek (23e)	MUZZ-T1	18.8	50%	3	0.14	50%	↑	-	-	-
Muzzi Marsh (23e)	MUZZ-T1	138.5	55%	35	0.21	3%	1%	-	-	-
San Francisco Peninsula Region										
Pier 98/Heron's Head (12b)	HEHE-T1	10.9	93%	0	0.00	-	-	0	0	0
SFO (19h)	SFO-T1	25.1	65%	0	0.00	-100%	-100%	0	0	0
<i>Seal Slough (19p) – split into two sub-areas in 2011</i>								0	0	0
Seal Slough Central (19p.1)	SEAL-T1	37.8	85%	1	0.01	↑	↑	-	-	-
Seal Slough Peripheral (19p.2)	SEAL-T1	30.8	75%	1	0.01	↑	↑	-	-	-

Table 2 continued on next page

Sub-Area Name (Code)	Transect	Area (acres)	% Area Surveyed	RIRA Indices				Occupancy		
				Highest Count	Density (rails/acre)	Relative		BLRA	SORA	VIRA
						One year Δ	Five year Δ			
San Mateo Region										
Belmont Slough (02a) - split into three sub-areas in 2011 and 2012								0	0	0
Belmont Slough Mouth (02a.1a)	BELM-T1	51.1	75%	3	0.04	↑	4%	-	-	-
Belmont Slough South (02a.1b)	BELM-T1	17.7	81%	3	0.02	↑	-4%	-	-	-
Belmont Slough to Steinberger (02a.2)	BELM-T1	109.3	14%	0	0.00	-100%	-100%	-	-	-
Corkscrew Slough (02b.1)	CORK-T1	227.4	36%	8	0.04	-50%	-15%	0	0	0
Steinberger Slough (02b.2)	RESH-T2	105.6	37%	2	0.01	0%	↑	0	0	0
B2 North Quadrant (02c) - split into three sub-areas in 2011 and 2012								0	0	0
B2 North Quadrant West (02c.1a)	OBEN-T1	150.5	47%	14	0.09	180%	31%	-	-	-
B2 North Quadrant East (02c.1b)	OBEN-T1	146.0	47%	9	0.06	-59%	-11%	-	-	-
B2 North Quadrant South (02c.2)	OBEN-T2	226.7	26%	6	0.03	500%	20%	-	-	-
B2 South Quadrant (02d) - split into four sub-areas in 2011 and 2012								0	0	0
B2 South Quadrant West (02d.1a)	OBES-T1	38.3	75%	2	0.05	-50%	10%	-	-	-
B2 South Quadrant East (02d.1b)	OBES-T1	23.2	45%	0	0.00	-	-	-	-	-
B2 South Quadrant 2 (02d.2)	OBES-T1	58.8	73%	4	0.02	0%	-8%	-	-	-
B2 South Quadrant 3 (02d.3)	OBES-T1	67.9	22%	0	0.00	-	-	-	-	-
Greco Island - North (02f)	GRIN-T1	511.1	27%	11	0.05	57%	2%	0	0	0
West Point Slough - SW / E (02g)	WPSS-T1	39.8	65%	3	0.08	0%	↑	0	0	0
Greco Island - South (02h)	GRIS-T1	237.9	42%	46	0.28	-15%	4%	0	0	0
Ravenswood Slough (02i)	RAV-T1	117.8	58%	14	0.12	40%	-1%	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	44%	18	0.07	-31%	-17%	-	-	-
Middle Bair SE (02k)	MBE-T1	200.3	33%	2	0.02	↑	↑	-	-	-
Inner Bair Island Restoration (02l)	IBI-T1	59.6	64%	0	0.00	-	-	0	0	0

KEY TO SHADING:

- Light grey shading indicates sub-areas where treatment permissions changed from restricted to permitted through the 2018 Biological Opinion.

Table 2 continued on next page

4. Results

Sub-Area Name (Code)	Transect	Area (acres)	% Area Surveyed	RIRA Indices				Occupancy		
				Highest Count	Relative Density (rails/acre)	One year Δ	Five year Δ	BLRA	SORA	VIRA
Dumbarton South Region										
Mowry Marsh North (05a.1)	MOWN-T1	417.4	29%	21	0.04	-13%	20%	0	0	0
Calaveras Point (05a.2)	CAPT-T1	478.7	14%	5	0.04	-76%	-21%	0	0	0
<i>Newark Slough (05c) - split into two sub-areas in 2011</i>								0	0	0
Newark Slough West (05c.1)	NEWS-T1	167.3	15%	4	0.06	100%	↑	-	-	-
Newark Slough East (05c.2)	NEWS-T1	73.1	37%	6	0.15	-40%	10%	-	-	-
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	-100%	-	0	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%	1	0.02	↑	↑	0	0.33	0.67
Island Ponds - A21 (05i)	A21-T1	159.2	50%	4	0.01	100%	↑	0	0.13	0.25
<i>Palo Alto Baylands (08) – grouped into one sub-area by ISP control program</i>								-	-	-
Palo Alto Baylands (08)	PAB-T1	116.2	74%	20	0.17	43%	2%	0	0	0.14
Palo Alto Harbor (08)	PAHA-T1	128.4	69%	28	0.20	-13%	-1%	0	0	0
<i>Charleston to Mountain View Sl (15a.1) - grouped into one sub-area by ISP control program</i>								0	0	0
Charleston Slough (15a.1)	MVSL-T1	36.2	73%	4	0.08	0%	2%	-	-	-
Mountain View Slough (15a.1)	MVSL-T1	74.0	30%	0	0.00	-100%	-	-	-	-
Stevens Creek to Long Point (15a.2)	STEV-T1	56.9	63%	0	0.00	-100%	-	0	0	0.33
Guadalupe Slough (15a.3)	GUSL-T1	316.2	28%	4	0.02	33%	-4%	0	0	0.13
Alviso Slough (15a.4)	ALSL-T2	459.9	17%	10	0.05	-17%	-2%	0	0	0.25
Stevens Creek (15c)	STEV-T1	27.9	75%	0	0.00	-100%	-	0.50	0.50	1.00
<i>Cooley Landing (16) - split into two sub-areas in 2011</i>								0	0	0
Cooley Landing Central (16.1)	COLA-T1	41.9	93%	19	0.14	138%	51%	-	-	-
Cooley Landing East (16.2)	COLA-T1	133.2	55%	9	0.05	-18%	30%	-	-	-
Union City Region										
AFCC - Mouth (01a)	AFCP-T1	23.6	60%	0	0.00	-	-100%	0	0	0
AFCC - Lower (01b)	AFCP-T2	135.4	39%	1	0.00	↑	-4%	0	0	0
AFCC - Upper (01c)	AFCC-T4	75.3	63%	0	0.00	-	-	0	0	0
AFCC - to I-880 (01d)	AFCC-T4	39.7	23%	0	0.00	-	-	0	0	0
AFCC - Pond 3 (01f)	AFCP-T1	130.9	69%	1	<0.01	↑	-23%	0.14	0	0
OAC - North Bank (13a)	OAC-T2 &									
	OAC-T3	26.9	67%	3	0.07	50%	↑	0.11	0	0
	OAC-T2 &									
OAC - Island (13b)	OAC-T3	93.7	68%	7	0.08	-13%	23%	0.11	0.06	0.06
OAC - South Bank (13c)	OAC-T2 &									
	OAC-T3	24.1	61%	3	0.16	0%	↑	0.06	0	0
	OAC-T2 &									
Whale's Tail - North (13d)	WTN-T1	140.6	46%	8	0.05	700%	27%	0	0	0
Whale's Tail - South (13e)	WTS-T1	149.3	51%	4	0.03	100%	-14%	0	0	0
Cargill Mitigation Marsh (13f)	WTS-T1	47.2	79%	0	0.00	-100%	-100%	0	0	0
Eden Landing - Mt Eden Creek (13j)	EDEN-T1	124.8	49%	11	0.03	1000%	↑	0	0	0
Eden Landing Reserve - South [AKA										
North Creek Marsh](13k)	ELRS-T1	239.6	36%	8	0.02	100%	↑	0	0.13	0
Eden Landing Reserve - North (13l)	ELRS-T1	229.8	18%	0	0.00	-	-	0	0	0

Table 2 continued on next page

Sub-Area Name (Code)	Transect	Area (acres)	% Area Surveyed	RIRA Indices				Occupancy		
				Highest Count	Relative Density (rails/acre)	One year Δ	Five year Δ	BLRA	SORA	VIRA
Hayward Region										
Oro Loma - East (07a)	ORLW-T1	197.1	54%	0	0.00	-	-100%	0	0	0
Oro Loma - West (07b)	ORLW-T3	130.7	55%	1	0.00	-50%	-4%	0	0	0
Dog Bone Marsh (20c)	NORT-T1	7.0	58%	0	0.00	-100%	-	0	0	0
Citation Marsh (20d) - - split into three sub-areas in 2012 and 2018								0.14	0.43	0
Citation Marsh South (20d.1)	CITA-T1	44.4	44%	2	0.07	-50%	↑	-	-	-
Citation Marsh Upper (20d.2a)	CITA-T1	36.0	69%	23	0.42	15%	NA	-	-	-
Citation Marsh Central (20d.2b)	CITA-T1	35.8	80%	20	0.36	5%	NA	-	-	-
East Marsh (20e)	SLRZ-T1	37.2	30%	1	0.00	-80%	↑	0	0	0
North Marsh (20f)	NORT-T1	94.2	94%	70	0.27	25%	16%	0	0.43	0.14
Bunker Marsh (20g)	BUNK-T1	35.8	95%	27	0.53	13%	30%	0	0	0
San Lorenzo Creek (20h) - split into two sub-areas in 2011								0	0	0
San Lorenzo Creek North (20h.1)	SLRZ-T1	12.0	96%	2	0.12	0%	↑	-	-	-
San Lorenzo Creek South (20h.2)	SLRZ-T1	10.4	96%	3	0.17	↑	↑	-	-	-
Cogswell - Sec A (20m)	COGS-T1	34.9	100%	5	0.09	400%	15%	0	0	0
Cogswell - Sec B (20n) – split into three sub-areas in 2018								0.14	0.14	0
Cogswell - Sec B Bayfront (20n.1)	COGS-T3	11.9	89%	7	0.00	17%	NA	-	-	-
Cogswell - Sec B South (20n.2)	COGS-T3	33.9	95%	22	0.35	47%	NA	-	-	-
Cogswell - Sec B Main (20n.3)	COGS-T3	55.5	91%	23	0.22	44%	NA	-	-	-
Cogswell - Sec C (20o)	COGS-T2	49.8	100%	14	0.15	-13%	1%	0	0	0
HARD Marsh (20s)	HARD-T1	65.9	80%	1	0.00	-67%	↑	0	0	0
Triangle Marsh - Hayward (20w)	TRMA-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%	5	0.23	67%	33%	-	-	-
Arrowhead Marsh East (17c.2)	ARHE-T2	22.7	90%	25	0.86	-34%	-14%	-	-	-
MLK Shoreline (17d) - split into five sub-areas in 2011								0	0	0
MLK Regional Shoreline - Damon (17d.4)	MLKS-T1	10.6	100%	8	0.44	-53%	27%	-	-	-
MLK Regional Shoreline - 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	-100%	-100%	-	-	-
San Leandro Creek South (17e.2)	MLKR-T1	5.3	17%	0	0.00	-	-	-	-	-
MLK New Marsh (17h)	MLKR-T1	34.3	100%	55	1.27	-7%	8%	0.17	0.33	0.33
Fan Marsh (17j) – split into two sub-areas in 2018								0	0.33	0
Fan Marsh Wings (17j.1)	FANM-T1	2.4	57%	0	0.00	-100%	NA	-	-	-
Fan Marsh Main (17j.2)	FANM-T1	10.1	100%	17	1.45	-23%	NA	-	-	-

KEY TO SHADING:

- Light grey shading indicates sub-areas where treatment permissions changed from restricted to permitted through the 2018 Biological Opinion.
- Dark grey shading indicates sub-areas where treatment is still restricted.
- Medium grey shading indicates the sub-area where only seed-suppression is permitted, Cogswell Section B Main (20n.3). Seed-suppression is a sub-lethal dose of herbicide meant to halt the production of inflorescences but preserve the vegetative structure of non-native *Spartina*.

Table 2 continued on next page

4. Results

Sub-Area Name (Code)	Transect	Area (acres)	% Area Surveyed	RIRA Indices				Occupancy		
				Highest Count	Density (rails/acre)	Relative		BLRA	SORA	VIRA
						One year Δ	Five year Δ			
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%	2	0.03	100%	↑	0	0	0
Whittell Marsh (10a)	PTPN-T1	44.9	96%	0	0.00	-100%	-100%	0.75	0	0
Wildcat Marsh (22a)	WIMA-T1	333.5	40%	28	0.10	56%	-11%	0.13	0	0
San Pablo Marsh (22b) - split into two sub-areas in 2011								0.4	0	0
San Pablo Marsh East (22b.1)	RIF-T1	36.5	68%	5	0.11	-44%	-7%	-	-	-
San Pablo Marsh West (22b.2)	RIF-T1	125.6	62%	9	0.07	-36%	-15%	-	-	-
Rheem Creek Area (22c)	RCRA-T1	26.8	79%	9	0.13	13%	13%	0.50	0	0
Hoffman Marsh (22e)	STEG-T1	38.5	91%	2	0.02	↑	10%	0	0	0

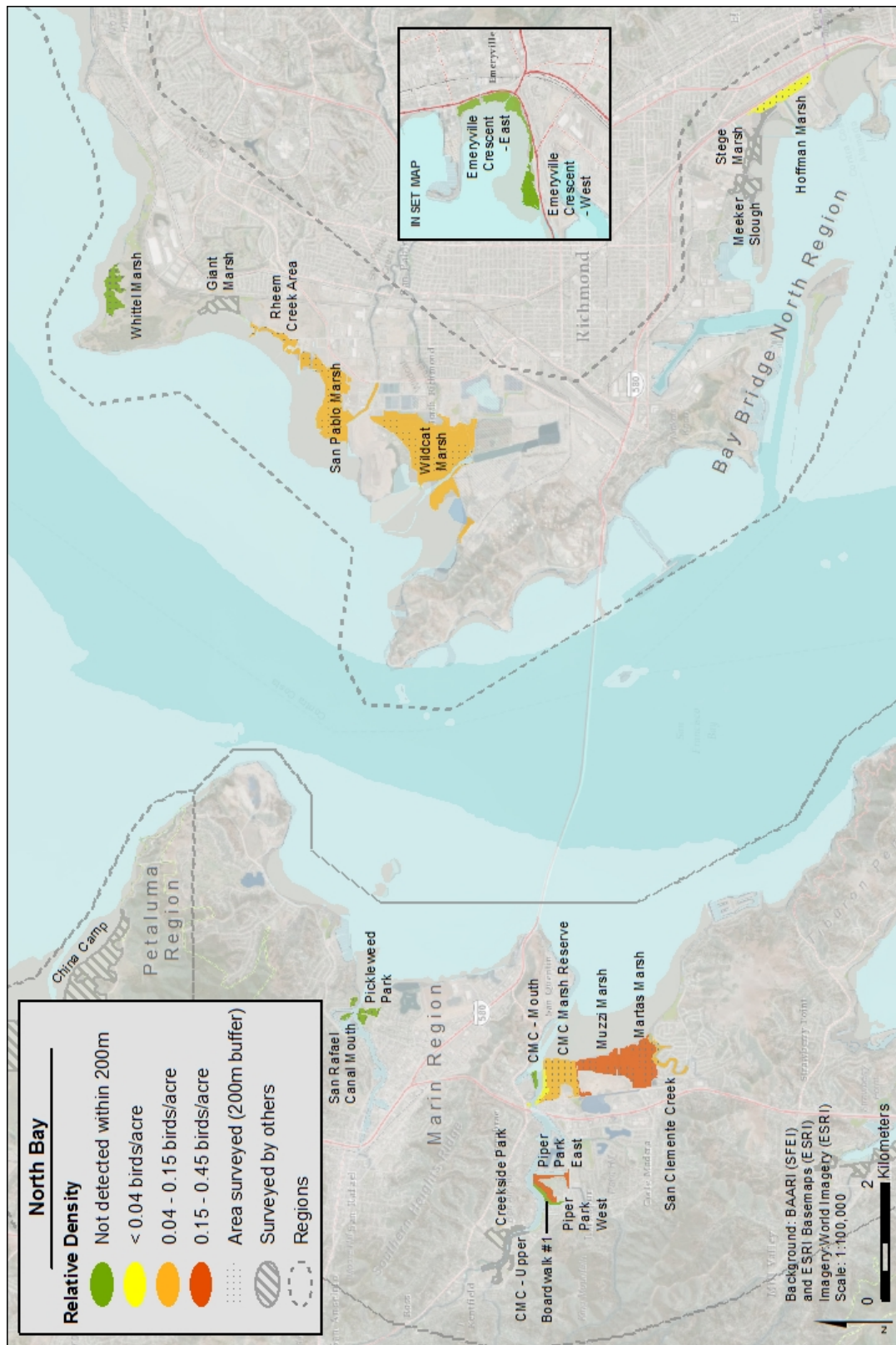


Figure 2. Overview map of North Bay, showing summary results at sub-areas in the Bay Bridge North and Marin Regions. To see survey stations and rail locations, view the map attachment named North Bay (scaled to 1:24,000 on a 24x36 poster).

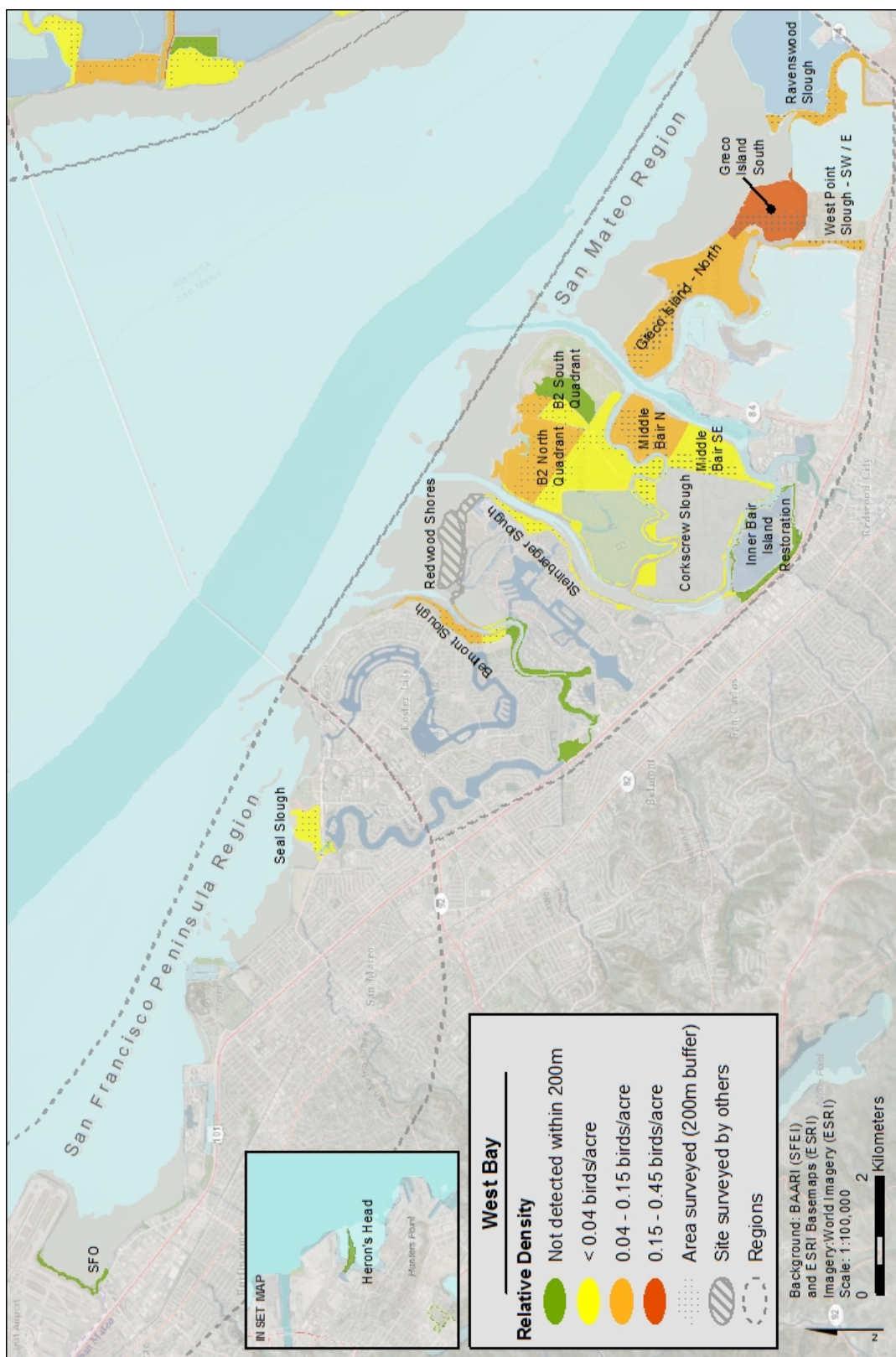


Figure 3. Overview map of West Bay, showing summary results at sub-areas in the SF Peninsula and San Mateo Regions. To see survey stations and rail locations, view the map attachment named West Bay (scaled to 1:24,000 on a 24x36 poster).

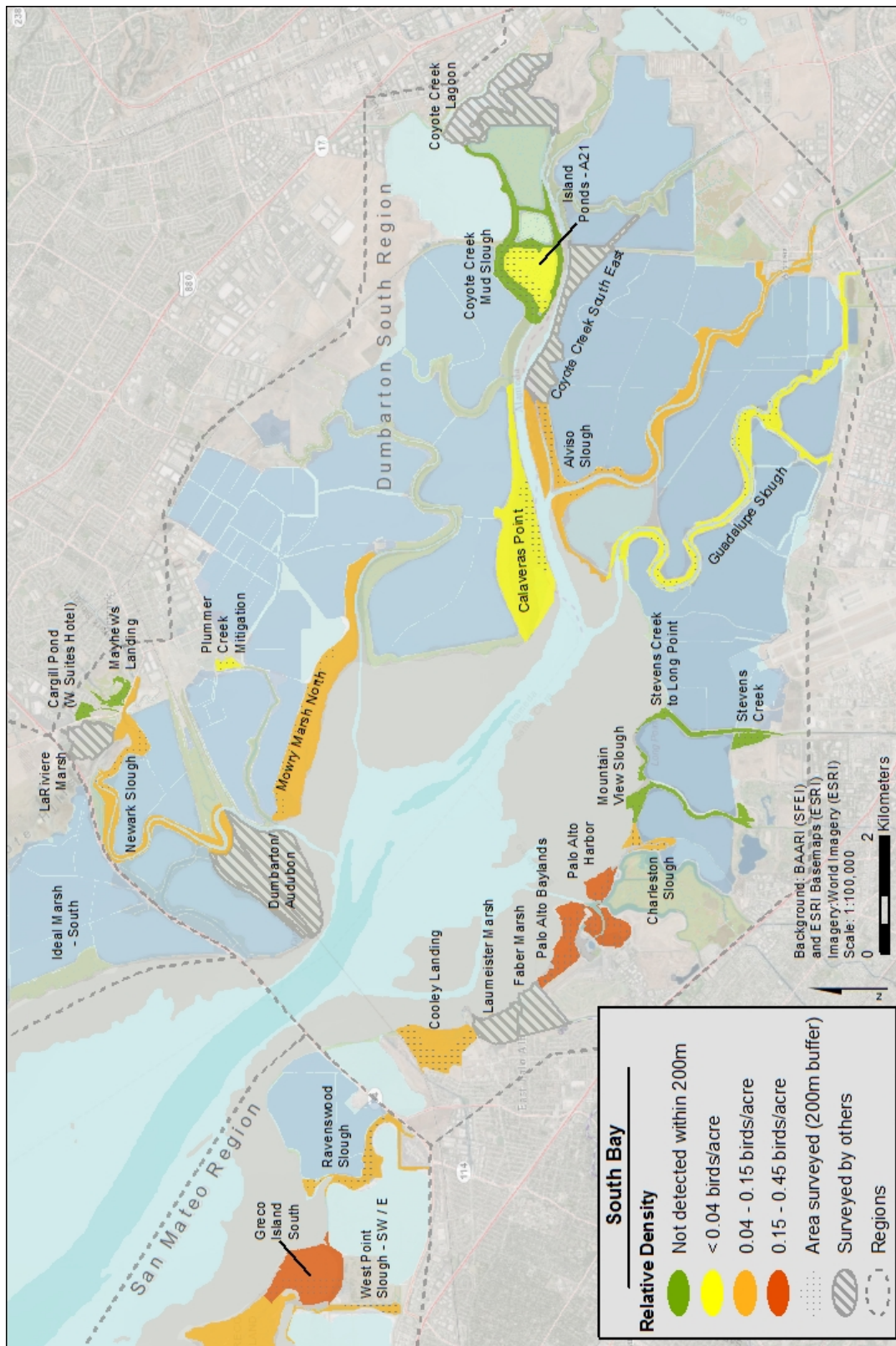


Figure 4. Overview map of South Bay, showing summary results at sub-areas in the Dumbarton South Region. To see survey stations and rail locations, view the map attachment named South Bay (scaled to 1:24,000 on a 24x36 poster).

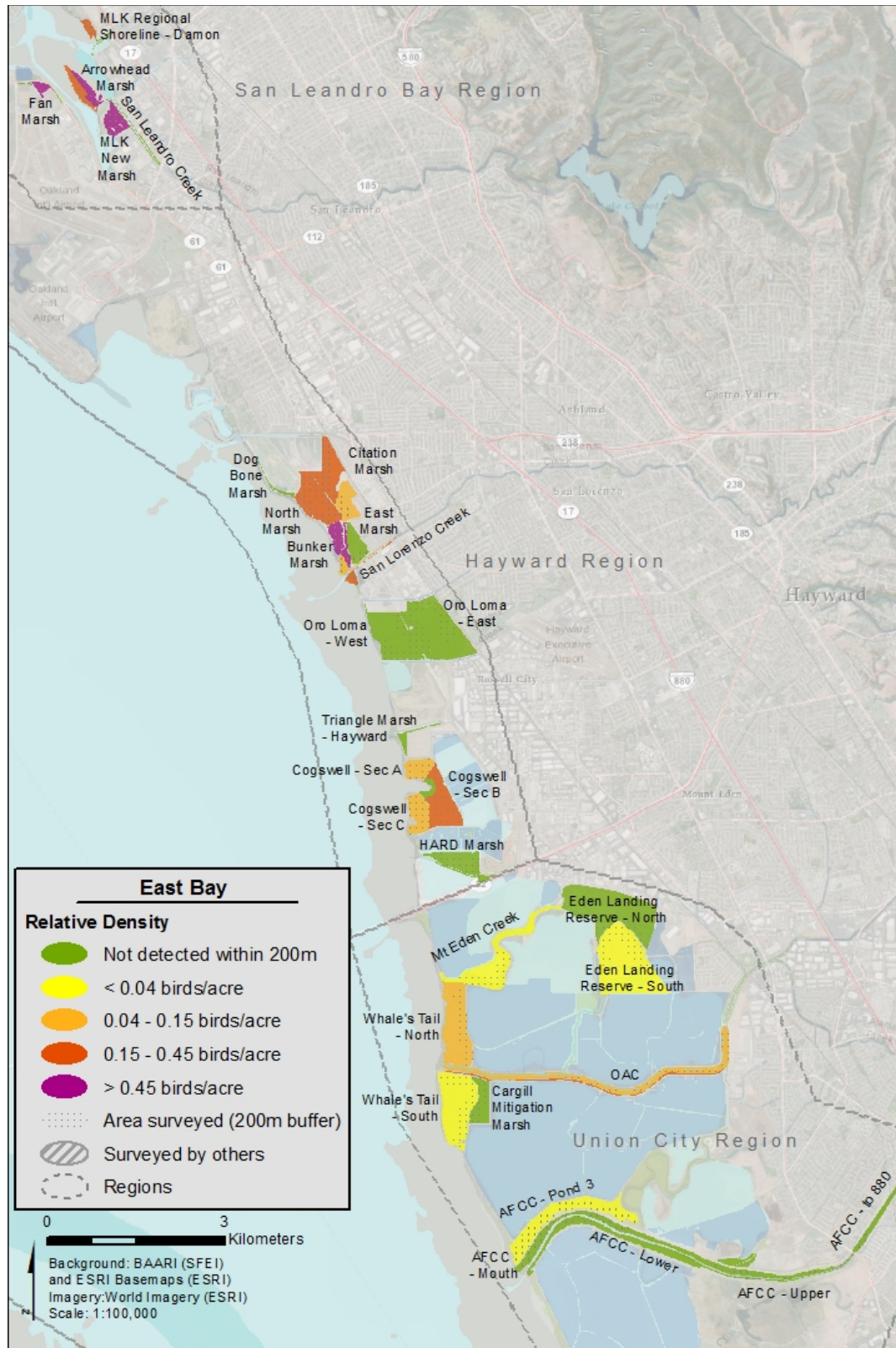


Figure 5. Overview map of East Bay, showing summary results at sub-areas in the Union City, Hayward, and San Leandro Bay Regions. To see survey stations and rail locations, view the map attachment named East Bay (scaled to 1:24,000 on a 24x36 poster).

5. Discussion

OEI detected 798 California Ridgway's rails at 70 of the 100 sub-areas surveyed by OEI for the ISP in 2020. This is nearly the same number as detected in 2019, when 796 rails were detected at the same subset of sub-areas. Good weather allowed for most surveys to be completed early in 2020, before the COVID-19 pandemic began to affect California. However, in mid-March the Bay Area announced an emergency shelter-in-place order due to the pandemic and most surveys were subsequently cancelled. Access to all National Wildlife Refuge lands and waters was restricted after March 13th and twenty (20) sub-areas in their jurisdiction were not surveyed for the third and final round. Because the round with the highest count is the only round included in the overall summary of detections, the total count from 2020 might have been higher had we been able to complete the third round of surveys on the Refuge. However, the third round of surveys is rarely the most productive survey and it is unlikely that the total number of rails detected in 2020 would have been significantly greater if the third round of surveys had been completed.

Spartina Treatment Effects

The footprint of hybrid *Spartina* has been reduced to a small fraction of the available habitat at the vast majority of ISP sub-areas where treatment has been on-going since 2012. At these sub-areas, Ridgway's rail numbers are stable and no additional treatment effects are anticipated at these sub-areas. However, at the sub-areas where treatment was restricted in 2012, hybrid *Spartina* was able to grow into large meadows, crowding out native vegetation but also providing ample cover for Ridgway's rails. Ridgway's rail numbers grew with the expansion of hybrid *Spartina* at these handful of sub-areas, which are focused along the East Bay shoreline. Through the process of consultation with the Service, treatment was allowed to resume at nine of the previously-restricted sub-areas in 2018 (six sub-areas remain restricted to treatment).

In the 2018 Biological Opinion, the Service estimated that rails inhabiting the nine previously-restricted sub-areas may be lost due to mortality or exhibit decreased reproductive success due to loss of hybrid *Spartina* cover when treatment of these sub-areas resumed. Since then, treatment has resumed at all nine previously-restricted sub-areas: B2 North Quadrant East (02c.1b), Citation Marsh Upper (20d.2a), Bunker Marsh (20g), San Lorenzo Creek North (20h.1), Cogswell - Sec B Bayfront (20n.2), Cogswell - Sec B South (20n.2), Cogswell - Sec C (20o), Damon Marsh (17d.4), and Fan Marsh Wings (17j.1).

After two years of treatment, the number of Ridgway's rails detected at these previously-restricted sub-areas have declined by 9% over the past year. Because it may take several growing seasons and treatment events to show changes in habitat, rail numbers are expected to continue to decline at these sub-areas next year. The change in rails at these sub-areas is still less than predicted in the 2018 Biological Opinion.

Recommendations

Habitat enhancement and restoration may ameliorate the effects of the temporary loss of cover due to *Spartina* removal. Additionally, the slower-paced phased treatment of the previously-restricted sub-areas will also stem declines as the habitat converts from invasive *Spartina* meadows to native marshes. 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, with ten more islands installed in the 2020 to 2021 winter season.

Ultimately, the most effective means 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 already supports a substantial rail population at a fairly 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 and a Memorandum of Understanding with the California Department of Fish and Wildlife. 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, Westpoint Harbor, SFO International Airport, and Don Edwards San Francisco Bay National Wildlife Refuge.

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7. References

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Appendix I: Complete List of 2020 *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)
- **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 2019 *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	Formerly surveyed by DENWR
AFCC - Lower (01b)	ISP	NAm	AFCP-T1; AFCP-T2	Formerly surveyed by DENWR
AFCC - Upper (01c)	ISP	NAm	AFCC-T4	Formerly surveyed by DENWR
AFCC - to I-880 (01d)	ISP	NAm	AFCC-T4	Formerly surveyed by DENWR
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
<i>Belmont Slough Mouth (02a.1a)</i>	ISP	NAm	BELM-T1	
<i>Belmont Slough South (02a.1b)</i>	ISP	NAm	BELM-T1	
<i>Belmont Slough to Steinberger (02a.2)</i>	ISP	NAm	BELM-T1	
<i>Redwood Shores (02a.3)</i>	DENWR	NAm	RESH-T1	
<i>Redwood Shores Mitigation Bank (02a.4)</i>	none	none	none	Insufficient habitat (2017)
Steinberger to Redwood Creek (02b)	-	-	-	Split into three sub-areas in 2011
<i>Corkscrew Slough (02b.1)</i>	ISP	NAm	CORK-T1	
<i>Steinberger Slough (02b.2)</i>	ISP	NAm	RESH-T2	
<i>Redwood Creek (02b.2)</i>	none	none	none	Not surveyed
B2 North Quadrant (02c)	-	-	-	Split into three sub-areas in 2011 and 2012
<i>B2 North Quadrant West (02c.1a)</i>	ISP	NAm	OBEN-T1	
<i>B2 North Quadrant East (02c.1b)</i>	ISP	NAm	OBEN-T1	
<i>B2 North Quadrant South (02c.2)</i>	ISP	NAm	OBEN-T2	
B2 South Quadrant (02d)	-	-	-	Split into four sub-areas in 2011 and 2012
<i>B2 South Quadrant West (02d.1a)</i>	ISP	NAm	OBES-T1	
<i>B2 South Quadrant East (02d.1b)</i>	ISP	NAm	OBES-T1	
<i>B2 South Quadrant 2 (02d.2)</i>	ISP	NAm	OBES-T1	
<i>B2 South Quadrant 3 (02d.3)</i>	ISP	NAm	OBES-T1	
West Point Slough - NW (02e)	none	none	none	No site access in 2019
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	
Ravenswood Open Space Preserve (02j)	none	none	none	Insufficient habitat (2017)
Deepwater Slough (02k)	-	-	-	Grouped into one sub-area by ISP control program
<i>Middle Bair N (02k)</i>	ISP	NAm	MBE-T1	
<i>Middle Bair SE (02k)</i>	ISP	NAm	MBE-T1	
Inner Bair Island Restoration (02l)	ISP	NAm	IBI-T1	
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)	ISP	NAm	HEER-T1	Typically surveyed by PBCS
College of Marin (04b)	none	none	none	Insufficient habitat (2019)
Piper Park - East (04c)	ISP	NAm	PIPE-T1	Typically surveyed by PBCS
Piper Park - West (04d)	ISP	NAm	PIPE-T1	Typically surveyed by PBCS
Larkspur Ferry Landing Area (04e)	none	none	none	Insufficient habitat (2017)
Riviera Circle (04f)	none	none	none	Insufficient habitat (2017)
Crescent 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
CMC - Mouth (04j)	-	-	-	Split into two sub-areas in 2011
CMC - Mouth North (04j.1)	ISP	NAm	CMC-T1	Not surveyed
CMC - Mouth South (04j.2)	ISP	NAm	CMC-T1	
Boardwalk No. 1 (04k)	ISP	NAm	PIPE-T1	Typically surveyed by PBCS
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	Typically surveyed by DENWR
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	Not surveyed
Island Ponds - A19 (05i)	none	none	none	Not surveyed

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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
<i>Palo Alto Baylands (08)</i>	ISP	NAm	PAB-T1	Typically surveyed by PBCS
<i>Palo Alto Harbor (08)</i>	ISP	NAm	PAHA-T1	Typically surveyed by PBCS
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	unknown	n/a	
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)	ISP	NAm	HEHE-T1	Also surveyed by ESA in 2020
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	
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	
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	*surveyed from adjacent site
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
<i>Charleston Slough (15a.1)</i>	ISP	NAm	MVSL-T1	
<i>Mountain View Slough (15a.1)</i>	ISP	NAm	MVSL-T1	
Stevens Creek to Guadalupe Slough (15a.2)	-	-	-	Grouped into one sub-area by ISP control program
<i>Stevens Creek to Long Point (15a.2)</i>	ISP	NAm	STEV-T1	
<i>Guadalupe to Stevens Bayfront (15a.2)</i>	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
<i>Coyote Creek South East (15a.5)</i>	DENWR	NAm	COYE-T1	
<i>Coyote Creek South Tributary Marsh (15a.5)</i>	none	none	none	Not surveyed
<i>Artesian Slough (15a.5)</i>	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
<i>Faber Marsh (15b)</i>	PBCS	NAm	FABE-T1	
<i>Laumeister Marsh (15b)</i>	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
<i>Cooley Landing Central (16.1)</i>	ISP	NAm	COLA-T1	
<i>Cooley Landing East (16.2)</i>	ISP	NAm	COLA-T1	
Area 17: San Leandro Bay in San Leandro Bay Region				
Elsie Roemer (17a)	EBRPD	unknown	n/a	
Bay Farm Island (17b)	none	none	none	Insufficient habitat (2017)
Arrowhead Marsh (17c)	-	-	-	Split into two sub-areas in 2012
<i>Arrowhead Marsh West (17c.1)</i>	ISP	NAm	ARHE-T2	
<i>Arrowhead Marsh East (17c.2)</i>	ISP	NAm	ARHE-T2	
MLK Shoreline (17d)	-	-	-	Split into five sub-areas in 2011
<i>Airport Channel - Fan Shore (17d.1)</i>	none	none	none	Insufficient habitat (2017)
<i>Airport Channel - MLK Shoreline (17d.2)</i>	none	none	none	Insufficient habitat (2017)
<i>East Creek - MLK Shoreline (17d.3)</i>	none	none	none	Insufficient habitat (2017)
<i>MLK Regional Shoreline - Damon (17d.4)</i>	ISP	NAm	MLKS-T1	
<i>Elmhurst Creek - MLK Shoreline (17d.5)</i>	ISP	NAm*	MLKS-T1	*surveyed from adjacent site
San Leandro Creek (17e)	-	-	-	Split into two sub-areas in 2011
<i>San Leandro Creek North (17e.1)</i>	ISP	NAm*	MLKR-T1	*surveyed from adjacent site
<i>San Leandro Creek South (17e.2)</i>	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)

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Sub-area Name (ID)	Survey Organization	Survey Type	Transect	Notes
Fan Marsh (17j)	-	-	-	Split into two sub-areas in 2019
<i>Fan Marsh Wings (17j.1)</i>	ISP	NAm	FANM-T1	
<i>Fan Marsh Main (17j.2)</i>	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)	OEI	G	n/a	surveyed by OEI for CalTrain
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
<i>Seal Slough Central (19p.1)</i>	ISP	NAm	SEAL-T1	
<i>Seal Slough Peripheral (19p.2)</i>	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
<i>Citation Marsh South (20d.1)</i>	ISP	NAm	CITA-T1	
<i>Citation Marsh Upper (20d.2a)</i>	ISP	NAm	CITA-T1	Split in renegotiated in 2020
<i>Citation Marsh Central (20d.2b)</i>	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
<i>San Lorenzo Creek North (20h.1)</i>	ISP	NAm	SLRZ-T1	
<i>San Lorenzo Creek South (20h.2)</i>	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
<i>Cogswell - Sec B Bayfront (20n.1)</i>	ISP	NAm	COGS-T3	
<i>Cogswell - Sec B South (20n.2)</i>	ISP	NAm	COGS-T3	
<i>Cogswell - Sec B Main (20n.3)</i>	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)	none	none	IMAS-T1	Not surveyed
Area 22: Two Points Complex in Bay Bridge North Region				
Wildcat Marsh (22a)	ISP	NAm	WIMA	Typically surveyed by PBCS
San Pablo Marsh (22b)	-	-	-	Split into two sub-areas in 2011
<i>San Pablo Marsh East (22b.1)</i>	ISP	NAm	RIF	Typically surveyed by PBCS
<i>San Pablo Marsh West (22b.2)</i>	ISP	NAm	RIF	Typically surveyed by PBCS
Rheem Creek Area (22c)	ISP	NAm	RCRA-T1	
Stege Marsh (22d)	-	-	-	Grouped into one sub-area by ISP control program
<i>Stege Marsh (22d)</i>	ARA	NAm	STEG-T1	Typically surveyed by ISP
<i>Meeker Slough (22d)</i>	ARA	NAm	STEG-T1	Typically surveyed by ISP
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
<i>San Rafael Canal Mouth East (23d.1)</i>	ISP	NAm	PIPK-T1	
<i>San Rafael Canal Mouth West (23d.2)</i>	ISP	NAm	PIPK-T1	

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Sub-area Name (ID)	Survey Organization	Survey Type	Transect	Notes
Muzzi and Martas Marsh (23e)	-	-	-	Grouped into one sub-area by ISP control program
<i>Martas Marsh (23e)</i>	ISP	NAm	MUZZ	Typically surveyed by PBCS
<i>San Clemente Creek (23e)</i>	ISP	NAm	MUZZ	Typically surveyed by PBCS
<i>Muzzi Marsh (23e)</i>	ISP	NAm	MUZZ	Typically surveyed by PBCS
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
<i>Hamilton South (23m)</i>	PBCS	NAm	MIN-T1	
<i>Mitchell Fragment (23m)</i>	none	none	none	Not surveyed
<i>Santa Venetia (23m)</i>	PBCS	NAm	STVE-T1	
<i>Gallinas Creek North (23m)</i>	none	none	none	Not surveyed
<i>McInnis Marsh (23m)</i>	PBCS	NAm	MIM-T1	
<i>Novato Creek Mouth (23m)</i>	none	none	none	Not surveyed
<i>Gallinas Creek South (23m)</i>	PBCS	NAm	GACM-T1	Not surveyed
<i>Hamilton North (23m)</i>	none	none	none	Not surveyed
<i>Novato Creek Mid Reach (23m)</i>	none	none	none	Not surveyed
Triangle Marsh - Marin (23n)	none	None	none	Insufficient habitat (2020)
China Camp (23o)	PBCS	NAm	CCM-T1	
Petaluma River - Upper (24a)	PBCS	NAm	PDF-T1	
Grey's Field (24b)	PBCS	NAm	GRFI-T1	
Area 24: Petaluma River in Petaluma Region				
Petaluma Marsh (24c)	-	-	-	Grouped into one sub-area by ISP control program
<i>Tule Slough (24c)</i>	none	none	none	Not surveyed
<i>False Slough (24c)</i>	none	none	none	Not surveyed
<i>Lakeville Marina (24c)</i>	none	none	none	Not surveyed
<i>Ellis Creek (24c)</i>	PBCS	NAm*	GRFI-T1	*surveyed from adjacent site
<i>Petaluma Marsh Expansion Project (24c)</i>	none	none	none	Not surveyed
<i>San Antonio Creek (E) (24c)</i>	none	none	none	Not surveyed
<i>Petaluma River (C) (24c)</i>	none	none	none	Not surveyed
<i>San Antonio Creek (A) (24c)</i>	none	none	none	Not surveyed
<i>Mira Monte Slough (B) (24c)</i>	none	none	none	Not surveyed
<i>Mud Hen Slough (D) (24c)</i>	none	none	none	Not surveyed
<i>Schultz Slough (24c)</i>	none	none	none	Not surveyed
<i>Gambini Marsh (24c)</i>	none	none	none	Not surveyed
<i>Woloki Slough (24c)</i>	none	none	none	Not surveyed

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)	none	none	none	Not surveyed
Green Point Area Marshes (24d)	PBCS	NAm	GRPT-T1	
Sonoma Marina (24d)	PBCS	NAm*	SBR-T1	*surveyed from adjacent site
Petaluma River - Lower (24d)	none	none	none	Not surveyed
Black John Slough North (24d)	none	none	none	Not surveyed
Black John Slough A (24d)	none	none	none	Not surveyed
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)	none	none	none	Not surveyed
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	no data	
Napa Tract Salt Pond 5 (26a)	CDFW	NAm	no data	
Napa Tract Salt Pond 4 (26a)	CDFW	NAm	no data	
White Slough Marsh (26a)	none	none	none	Not surveyed
Fagan Slough (26a)	PBCS	NAm	FAGA-T1	
Pond 2A Restoration (26a)	none	none	none	Not surveyed
Napa Centennial Marsh (26a)	CDFW	NAm	no data	
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

Appendix I: Survey Plans

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
<i>Lower Tubbs Island (26d)</i>	SPBNWR	NAm	LTI-T1,T2,T3	
<i>Tolay Creek (26d)</i>	SPBNWR	NAm	TC-T1	
<i>Tubbs Island Restoration (26d)</i>	SPBNWR	NAm	TS-T1	
<i>Petaluma River Mouth (26d)</i>	PBCS	NAm	RMA	
<i>Sonoma Baylands Restoration (26d)</i>	PBCS	NAm	SBR-T1	
<i>Sonoma Baylands East (26d)</i>	SPBNWR	NAm	SMW-T1,T2	
Area 27: Suisun Marshes in Suisun Region				
Point Buckler (27a)	none	none	none	
MOTCO Islands (27b)	OEI	NAm	RYNW-T1, ROEI-T1	Roe and Ryer Islands
Honker Bay (27c)	none	none	none	

Appendix II: 2020 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	Sub-Area 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
CMCM-T1	04j	CMC - Mouth	CMCM14	542814	4199523
CMCM-T1	04j	CMC - Mouth	CMCM15	543007	4199427
CMCM-T1	04j	CMC - Mouth	CMCM16	543234	4199447
HEER-T1	04a	CMC Marsh Reserve	CEF01	543102	4199205
HEER-T1	04a	CMC Marsh Reserve	CEF03	543330	4199066
HEER-T1	04a	CMC Marsh Reserve	CEF05	543015	4198956
HEER-T1	04a	CMC Marsh Reserve	CEF13	543351	4199248
HEER-T1	04a	CMC Marsh Reserve	CEF16	542823	4199275
HEER-T1	04a	CMC Marsh Reserve	CEF20	543437	4199425
MUZZ-T1	23e	Muzzi Marsh	MUZZ02	543270	4198714
MUZZ-T1	23e	Muzzi Marsh	MUZZ04	543198	4198296
MUZZ-T1	23e	Muzzi Marsh	MUZZ06	543162	4198086
MUZZ-T1	23e	Muzzi Marsh	MUZZ08	543187	4197605
MUZZ-T1	23e	Muzzi Marsh	MUZZ09	543380	4197655
MUZZ-T1	23e	Muzzi Marsh	MUZZ10	543569	4197718
MUZZ-T1	23e	Muzzi Marsh	MUZZ11	543740	4197849
MUZZ-T1	23e	Muzzi Marsh	MUZZ12	543657	4197566
PIPE-T1	04c	Piper Park - East	PIF03	541478	4199615
PIPE-T1	04c	Piper Park - East	PIPE01	541484	4199149
PIPE-T1	04c	Piper Park - East	PIPE02	541459	4199364
PIPE-T1	04d	Piper Park - West	PIPE04	541308	4199419
PIPE-T1	04d	Piper Park - West	PIPE05	541136	4199313
PIPK-T1	9	Pickleweed Park	PIPK01	544265	4202286
PIPK-T1	9	Pickleweed Park	PIPK02	544239	4202484
PIPK-T1	9	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					
HEHE-T1	12b	Pier 98/Heron's Head	HEHE01	555235	4176946
HEHE-T1	12b	Pier 98/Heron's Head	HEHE02	555429	4176923
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

Appendix II: 2020 Station Coordinates

Transect Name	Sub-Area Code	Sub-Area Name	Point ID	X-coordinate	Y-coordinate
San Mateo Region					
BELM-T1	02a	Belmont Slough	BELM01	566369	4156426
BELM-T1	02a	Belmont Slough	BELM02	566069	4156168
BELM-T1	02a	Belmont Slough	BELM03	565966	4155996
BELM-T1	02a	Belmont Slough	BELM04	565882	4155814
BELM-T1	02a	Belmont Slough	BELM05	565895	4155614
BELM-T1	02a	Belmont Slough	BELM06	565938	4155419
BELM-T1	02a	Belmont Slough	BELM07	566028	4155239
BELM-T1	02a	Belmont Slough	BELM08	565828	4155213
CORK-T1	02b	Corkscrew Slough	CORK01	569367	4153611
CORK-T1	02b	Corkscrew Slough	CORK02a	569244	4153305
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
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
IBI-T1	02l	Inner Bair Island Restoration	IBI11	567713	4150454
IBI-T1	02l	Inner Bair Island Restoration	IBI13	567298	4150636
IBI-T1	02l	Inner Bair Island Restoration	IBI15	567004	4150939
IBI-T1	02l	Inner Bair Island Restoration	IBI17	566763	4151267
MBE-T1	02k	Middle Bair N	MBE01	569714	4153286
MBE-T1	02k	Middle Bair N	MBE02	569544	4153178
MBE-T1	02k	Middle Bair N	MBE03	569366	4153061
MBE-T1	02k	Middle Bair N	MBE04	569249	4152883
MBE-T1	02k	Middle Bair N	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

Transect Name	Sub-Area Code	Sub-Area Name	Point ID	X-coordinate	Y-coordinate
San Mateo Region (continued)					
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	OBE24	569733	4154871
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
Dumbarton South Region					
A21-T1	05i	Island Ponds - A21	A21-1	589676	4146880
A21-T1	05i	Island Ponds - A21	A21-2	589848	4146987
A21-T1	05i	Island Ponds - A21	A21-3	590549	4147430
A21-T1	05i	Island Ponds - A21	A21-4	589991	4147127
A21-T1	05i	Island Ponds - A21	A21-5	590110	4147286
A21-T1	05i	Island Ponds - A21	A21-6	590276	4147430
A21-T1	05i	Island Ponds - A21	A21-7	590658	4147236
A21-T1	05i	Island Ponds - A21	A21-8	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	CAPT14a	585333	4146717

Appendix II: 2020 Station Coordinates

Transect Name	Sub-Area Code	Sub-Area Name	Point ID	X-coordinate	Y-coordinate
Dumbarton South Region (continued)					
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
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
PAB	8	Palo Alto Baylands	PAB07	578542	4146295
PAB	8	Palo Alto Baylands	PAB14	578746	4146217
PAB	8	Palo Alto Baylands	PAB16	579129	4146185
PAB	8	Palo Alto Baylands	PAB17	579308	4146093
PAB	8	Palo Alto Baylands	PAB18	579124	4146384
PAB	8	Palo Alto Baylands	PAB19	578494	4146491
PAB	8	Palo Alto Baylands	PAB20	578214	4146646
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

Transect Name	Sub-Area Code	Sub-Area Name	Point ID	X-coordinate	Y-coordinate
Dumbarton South Region (continued)					
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-T1	01a	AFCC - Pond 3	AFCC02	576726	4157943
AFCC-T1	01f	AFCC - Pond 3	AFCC04	576913	4158254
AFCC-T1	01f	AFCC - Pond 3	AFCC06	577134	4158519
AFCC-T2	01f	AFCC - Pond 3	AFCC08	577453	4158695
AFCC-T2	01f	AFCC - Pond 3	AFCC10	577812	4158729
AFCC-T2	01f	AFCC - Pond 3	AFCC12	578156	4158628
AFCC-T2	01f	AFCC - Pond 3	AFCC14	578481	4158477
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
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
OAC-T2	13a	OAC - North Bank	ALCK10	577579	4161047
OAC-T2	13a	OAC - North Bank	ALCK11	577774	4161008
OAC-T2	13a	OAC - North Bank	ALCK12	577954	4160949
OAC-T2	13a	OAC - North Bank	ALCK13	578133	4160880
OAC-T2	13a	OAC - North Bank	ALCK14	578290	4160821
OAC-T2	13a	OAC - North Bank	ALCK15	578491	4160791
OAC-T2	13a	OAC - North Bank	ALCK16	578684	4160842
OAC-T2	13a	OAC - North Bank	ALCK17	578837	4160946
OAC-T2	13a	OAC - North Bank	ALCK18	578983	4161058

Appendix II: 2020 Station Coordinates

Transect Name	Sub-Area Code	Sub-Area Name	Point ID	X-coordinate	Y-coordinate
Union City Region (continued)					
OAC-T3	13a	OAC - North Bank	ALCK19	579146	4161152
OAC-T3	13a	OAC - North Bank	ALCK20	579342	4161159
OAC-T3	13a	OAC - North Bank	ALCK21	579538	4161155
OAC-T3	13a	OAC - North Bank	ALCK22	579723	4161150
OAC-T3	13a	OAC - North Bank	ALCK23	579901	4161149
OAC-T3	13a	OAC - North Bank	ALCK24	580056	4161217
OAC-T3	13a	OAC - North Bank	ALCK25	580098	4161389
OAC-T3	13a	OAC - North Bank	ALCK26	580095	4161571
OAC-T3	13a	OAC - North Bank	ALCK27	580088	4161744
WTN-T1	13d	Whale's Tail - North	WTN10	575754	4162376
WTN-T1	13d	Whale's Tail - North	WTN4	575865	4161341
WTN-T1	13d	Whale's Tail - North	WTN5	575886	4161530
WTN-T1	13d	Whale's Tail - North	WTN6	575813	4161676
WTN-T1	13d	Whale's Tail - North	WTN7	575771	4161849
WTN-T1	13d	Whale's Tail - North	WTN8	575767	4162027
WTN-T1	13d	Whale's Tail - North	WTN9	575762	4162212
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-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

Transect Name	Sub-Area Code	Sub-Area Name	Point ID	X-coordinate	Y-coordinate
Hayward Region (continued)					
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
COGS-T4	20m	Cogswell - Sec A	COGS01	574738	4166041
COGS-T4	20m	Cogswell - Sec A	COGS02	574713	4166250
COGS-T4	20m	Cogswell - Sec A	COGS03	574862	4166363
COGS-T4	20m	Cogswell - Sec A	COGS04	575059	4166368
COGS-T4	20m	Cogswell - Sec A	COGS05	575218	4166336
COGS-T4	20m	Cogswell - Sec A	COGS06	575158	4166170
COGS-T4	20m	Cogswell - Sec A	COGS07	575043	4166004
COGS-T4	20w	Triangle Marsh - Hayward	TRMA02	574714	4166471
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

Appendix II: 2020 Station Coordinates

Transect Name	Sub-Area Code	Sub-Area Name	Point ID	X-coordinate	Y-coordinate
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	568410	4177818
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
MLKS-T1	17d	MLK Regional Shoreline - Damon	MLKS09	569336	4178901
MLKS-T1	17d	MLK Regional Shoreline - Damon	MLKS10	569456	4178741
MLKS-T1	17d	MLK Regional Shoreline - Damon	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	Whittell Marsh	PTPN01	556260	4206711
PTPN-T1	10a	Whittell Marsh	PTPN02	556460	4206771
PTPN-T1	10a	Whittell Marsh	PTPN03	556645	4206685
PTPN-T1	10a	Whittell 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

Transect Name	Sub-Area Code	Sub-Area Name	Point ID	X-coordinate	Y-coordinate
Bay Bridge North Region (continued)					
WIMA-T1	22a	Wildcat Marsh	WIMA02	553708	4201035
WIMA-T1	22a	Wildcat Marsh	WIMA03	553655	4201231
WIMA-T1	22a	Wildcat Marsh	WIMA04	553598	4201446
WIMA-T1	22a	Wildcat Marsh	WIMA05	553731	4201639
WIMA-T1	22a	Wildcat Marsh	WIMA06	553891	4201784
WIMA-T1	22a	Wildcat Marsh	WIMA07	554041	4201921
WIMA-T1	22a	Wildcat Marsh	WIMA08	554207	4202077
WIMA-T1	22a	Wildcat Marsh	WIMA09	553759	4200843

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Appendix III: 2020 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
- **JH** = Jeanne Hammond
- **JM** = Jen McBroom
- **KE** = Kevin Eng
- **LF** = Lindsay Faye
- **MA** = Melanie Anderson
- **ND** = Nate Deakers
- **PL** = Pim Laulikitnont
- **SG** = Simon Gunner
- **SC** = Stephanie Chen
- **TR** = Tobias Rohmer

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MARIN REGION

Site Name (ID)	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
CMC Marsh Reserve (04a)	NAm	1/24/2020	SC	8	0	16	2/24/2020	MA	17	4	23	3/20/2020	TR	5	2	16
Piper Park - East (04c)	NAm	1/24/2020	SG	9	2	2	2/24/2020	PL	19	1	2	3/20/2020	ND	5	2	4
Piper Park - West (04d)	NAm	1/24/2020	SG	9	2	5	2/24/2020	PL	19	1	4	3/20/2020	ND	5	2	6
CMC - Mouth North Bank (04j.1)	NAm	1/24/2020	MA	9	0	1	2/24/2020	ND	19	2	0	3/20/2020	PL	5	0	0
CMC - Mouth South Bank (04j.2)	NAm	1/24/2020	MA	9	0	0	2/24/2020	ND	19	2	0	3/20/2020	PL	5	0	1
Boardwalk No. 1 (04k)	NAm	1/24/2020	SG	9	2	1	2/24/2020	PL	19	1	0	3/20/2020	ND	5	2	0
Pickleweed Park (09)	NAm	1/24/2020	JH	18	1	0	2/18/2020	BO	14	1	0	3/10/2020	ND	6	2	0
San Rafael Canal East (23d.1)	NAm	1/24/2020	JH	18	1	0	2/18/2020	BO	14	1	0	3/10/2020	ND	6	2	0
San Rafael Canal West (23d.2)	NAm	1/24/2020	JH	18	1	0	2/18/2020	BO	14	1	0	3/10/2020	ND	6	2	0
San Clemente Creek (23e)	NAm	1/24/2020	TR	9	0	0	2/24/2020	SC	20	0	1	3/3/2020	KE	5	2	3
Martas Marsh (23e)	NAm	1/24/2020	TR	9	0	2	2/24/2020	SC	20	0	3	3/3/2020	KE	5	2	10
Muzzi Marsh (23e)	NAm	1/24/2020	TR	9	0	18	2/24/2020	SC	20	0	35	3/3/2020	KE	5	2	20

SAN FRANCISCO PENINSULA REGION

Site Name (ID)	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
Pier 98/Heron's Head (12b)	NAm	1/28/2020	TR	13	8	0	2/13/2020	PL	11	2	0	3/5/2020	PL	12	2	0
Brisbane Lagoon (19a) ¹	G ¹	1/20/2020	TR PL	13	0	0	2/4/2020	LD PL	12	3	0	2/19/2020	BO	16	0	0
SFO (19h)	NAm	1/24/2020	PL	9	1	0	2/11/2020	TR	9	3	0	3/4/2020	PL	18	8	0
Seal Slough Central (19p.1)	NAm	1/22/2020	PL	15	4	0	2/11/2020	LD	9	2	1	3/10/2020	LD	8	2	0
Seal Slough Peripheral (19p.2)	NAm	1/22/2020	PL	15	4	0	2/11/2020	LD	9	2	1	3/10/2020	LD	8	2	0

¹ Survey conducted by OEI for CalTrain. Fourth round conducted on 3/10/2020 by MA. No RIRA were detected.

SAN MATEO REGION

Site Name (ID)	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
Belmont Slough Mouth (02a.1a)	NAm	1/23/2020	PL	8	1	2	2/17/2020	LD	20	2	3	3/3/2020	KE	8	0	2
Belmont Slough South (02a.1b)	NAm	1/23/2020	PL	8	1	3	2/17/2020	LD	20	2	1	3/3/2020	KE	8	0	2
Belmont to Steinberger Slough (02a.2)	NAm	1/23/2020	PL	8	1	0	2/17/2020	LD	20	2	0	3/3/2020	KE	8	0	0
Corkscrew Slough (02b.1) ¹	NAm	1/30/2020	SC	17	2	6	2/20/2020	LD	10	1	8	-	-	-	-	-
Steinberger Slough (02b.2)	NAm	1/28/2020	TR	13	1	1	2/19/2020	TR	17	5	2	3/11/2020	LD	19	1	1
B2 North Quadrant West (02c.1a) ¹	NAm	2/6/2020	JM	6	1	14	3/5/2020	ND	12	2	0	-	-	-	-	-
B2 North Quadrant East (02c.1b) ¹	NAm	2/6/2020	JM	6	1	6	3/5/2020	ND	12	2	9	-	-	-	-	-
B2 North Quadrant South (02c.2) ¹	NAm	2/6/2020	LD	6	2	6	3/5/2020	MA	13	1	1	-	-	-	-	-
B2 South Quadrant West (02d.1a) ¹	NAm	1/30/2020	LD	17	5	1	2/20/2020	PL	7	2	2	-	-	-	-	-
B2 South Quadrant East (02d.1b) ¹	NAm	1/30/2020	LD	17	5	0	2/20/2020	PL	7	2	0	-	-	-	-	-
B2 South Quadrant 2 (02d.2) ¹	NAm	1/30/2020	LD	17	5	4	2/20/2020	PL	7	2	1	-	-	-	-	-
B2 South Quadrant 3 (02d.3) ¹	NAm	1/30/2020	LD	17	5	0	2/20/2020	PL	7	2	0	-	-	-	-	-
Greco Island - North (02f) ¹	NAm	1/30/2020	PL	16	2	11	2/20/2020	JM	6	0	9	-	-	-	-	-
West Point Slough - SW / E (02g)	NAm	1/27/2020	TR	13	3	1	2/21/2020	SG	20	1	3	3/12/2020	PL	8	2	3
Greco Island - South (02h) ¹	NAm	1/22/2020	TR	13	2	43	3/8/2020	PL	14	3	46	-	-	-	-	-
Ravenswood Slough (02i)	NAm	1/28/2020	PL	10	2	9	2/20/2020	TR	15	4	14	3/12/2020	LD	8	3	9
Middle Bair SE (02k) ¹	NAm	1/30/2020	TR	19	1	2	2/20/2020	MA	4	1	0	-	-	-	-	-
Middle Bair N (02k) ¹	NAm	1/30/2020	TR	19	1	12	2/20/2020	MA	4	1	18	-	-	-	-	-
Inner Bair Island Restoration (02l)	NAm	2/7/2020	TR	18	7	0	2/28/2020	PL	11	1	0	3/17/2020	BO	14	3	0

¹ Not surveyed round 3 due to COVID-19 Pandemic.

DUMBARTON SOUTH REGION

Site Name (ID)	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) ¹	NAm	2/10/2020	ND	6	2	21	2/25/2020	SG	22	7	10	-	-	-	-	-
Calaveras Point (05a.2) ¹	NAm	2/19/2020	KE	5	3	5	1/31/2020	ND	19	2	5	-	-	-	-	-
Newark Slough East (05c.1) ¹	NAm	2/5/2020	BO	15	6	0	2/25/2020	JM	6	3	2	-	-	-	-	-
Newark Slough West (05c.2) ¹	NAm	2/5/2020	BO	15	6	6	2/25/2020	JM	6	3	5	-	-	-	-	-
Mayhew's Landing (05e) ¹	NAm	2/5/2020	SG	15	6	0	2/25/2020	BO	12	1	0	-	-	-	-	-
Coyote Creek - Mud Slough (05f) ¹	NAm	1/31/2020	SC	18	3	0	2/19/2020	PL	5	1	0	-	-	-	-	-
Cargill Pond (W Suites Hotel) (05g) ¹	NAm	2/5/2020	SG	15	6	0	2/25/2020	BO	12	1	0	-	-	-	-	-
Plummer Creek Mitigation (05h)	NAm	1/23/2020	BO	17	2	1	2/12/2020	LD	10	1	0	3/4/2020	KE	20	4	0
Island Ponds - A21 (05i) ¹	NAm	1/31/2020	SC	18	3	1	2/19/2020	PL	5	1	4	-	-	-	-	-
Palo Alto Baylands (08)	NAm	1/24/2020	KE	8	1	14	2/18/2020	LD	19	4	20	3/11/2020	TR	18	8	18
Palo Alto Harbor (08)	NAm	1/24/2020	JM	10	0	23	2/18/2020	TR	15	9	17	3/11/2020	PL	13	1	28
Mountain View Slough (15a.1)	NAm	2/4/2020	BO	11	3	0	2/18/2020	SC	18	7	0	3/5/2020	SC	16	5	0
Charleston Slough (15a.1)	NAm	2/4/2020	BO	11	3	3	2/18/2020	SC	18	7	2	3/5/2020	SC	16	5	4
Stevens Creek to Long Point (15a.2)	NAm	1/23/2020	ND	8	1	0	2/17/2020	MA	18	2	0	3/9/2020	TR	16	6	0
Guadalupe Slough (15a.3)	NAm	2/4/2020	ND	12	7	1	2/18/2020	MA	17	3	4	3/5/2020	JM	16	8	2
Alviso Slough (15a.4)	NAm	2/4/2020	SG	13	4	9	2/18/2020	ND	18	6	10	3/5/2020	KE	18	9	5
Stevens Creek (15c)	NAm	1/23/2020	ND	8	1	0	2/17/2020	MA	18	2	0	3/9/2020	TR	16	6	0
Cooley Landing Central (16.1)	NAm	2/10/2020	PL	6	1	14	2/24/2020	TR	20	5	4	3/18/2020	PL	12	3	19
Cooley Landing East (16.2)	NAm	2/10/2020	PL	6	1	7	2/24/2020	TR	20	5	9	3/18/2020	PL	12	3	6

¹ Not surveyed round 3 due to coronavirus pandemic.

UNION CITY REGION

Site Name (ID)	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)	NAm	1/23/2020	KE	8	1	0	2/17/2020	JH	19	7	0	3/9/2020	MA	13	2	0
AFCC - Lower (01b)	NAm	1/23/2020	KE	8	1	0	2/17/2020	JH	19	7	0	3/9/2020	MA	13	2	1
AFCC - Upper (01c)	NAm	1/20/2020	SG	13	3	0	2/10/2020	KE	6	2	0	3/3/2020	ND	20	5	0
AFCC - to I-880 (01d)	NAm	1/20/2020	SG	13	3	0	2/10/2020	KE	6	2	0	3/3/2020	ND	20	5	0
AFCC - Pond 3 (01f)	NAm	1/23/2020	KE	8	1	0	2/17/2020	JH	19	7	0	3/9/2020	MA	13	2	1
OAC - North Bank (13a)	NAm	2/4/2020	JM	13	2	3	2/20/2020	SC	7	1	1	3/5/2020	BO	18	7	3
OAC - Island (13b)	NAm	2/4/2020	TR	13	9	6	2/20/2020	JH	7	0	6	3/5/2020	SG	15	6	7
OAC - South Bank (13c)	NAm	2/4/2020	TR	13	9	2	2/20/2020	JH	7	0	3	3/5/2020	SG	15	6	2
Whale's Tail - North (13d)	NAm	2/12/2020	MA	6	3	4	3/4/2020	BO	21	7	0	3/24/2020	KE	9	5	8
Whale's Tail - South (13e)	NAm	2/4/2020	SC	13	4	2	2/18/2020	SG	17	6	4	3/4/2020	JM	20	8	3
Cargill Mitigation Marsh (13f)	NAm	2/4/2020	SC	13	4	0	2/18/2020	SG	17	6	0	3/4/2020	JM	20	8	0
Eden Landing - Mt Eden Creek (13j)	NAm	1/30/2020	MA	8	2	0	2/12/2020	PL	7	2	11	3/4/2020	SG	20	6	3
Eden Landing Reserve - South (13k)	NAm	1/30/2020	JH	15	3	1	2/24/2020	SG	17	6	8	3/20/2020	SG	16	8	2
Eden Landing Reserve - North (13l)	NAm	1/30/2020	JH	15	3	0	2/24/2020	SG	17	6	0	3/20/2020	SG	16	8	0

HAYWARD REGION

Site Name (ID)	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)	NAm	2/6/2020	MA	15	0	0	2/27/2020	PL	12	1	0	3/26/2020	MA	5	0	0
Oro Loma - West (07b)	NAm	2/6/2020	BO	15	2	0	2/27/2020	MA	13	1	0	3/26/2020	SG	4	3	1
Dog Bone Marsh (20c)	NAm	2/5/2020	KE	16	1	0	2/26/2020	ND	7	0	0	3/18/2020	TR	6	1	0
Citation Marsh South (20d.1)	NAm	2/5/2020	MA	13	3	0	2/26/2020	SC	9	0	2	3/18/2020	KE	8	1	2
Citation Marsh North Channels (20d.2a)	NAm	2/5/2020	MA	13	3	19	2/26/2020	SC	9	0	33	3/18/2020	KE	8	1	12
Citation Marsh North Main (20d.2b)	NAm	2/5/2020	MA	13	3	10	2/26/2020	SC	9	0	10	3/18/2020	KE	8	1	12
East Marsh (20e)	NAm	2/5/2020	TR	12	3	1	2/26/2020	MA	9	1	0	3/25/2020	ND	7	2	0
North Marsh (20f)	NAm	2/5/2020	KE	16	1	38	2/26/2020	ND	7	0	70	3/18/2020	TR	6	1	42
Bunker Marsh (20g)	NAm	2/5/2020	JH	15	3	17	2/26/2020	BO	18	0	18	3/25/2020	BO	13	2	15
San Lorenzo Creek North (20h.1)	NAm	2/5/2020	TR	12	3	2	2/26/2020	MA	9	1	2	3/25/2020	ND	7	2	2
San Lorenzo Creek South (20h.2)	NAm	2/5/2020	TR	12	3	3	2/26/2020	MA	9	1	0	3/25/2020	ND	7	2	2
Cogswell - Sec A (20m)	NAm	1/27/2020	JM	8	1	5	2/25/2020	ND	20	6	4	3/20/2020	JH	14	8	2
Cogswell - Sec B Bayfront (20n.1)	NAm	1/27/2020	PL	8	0	2	2/25/2020	SC	23	4	4	3/19/2020	SC	14	5	7
Cogswell - Sec B South (20n.2)	NAm	1/27/2020	PL	8	0	12	2/25/2020	SC	23	4	22	3/19/2020	SC	14	5	14
Cogswell - Sec B Main (20n.3)	NAm	1/27/2020	PL	8	0	19	2/25/2020	SC	23	4	23	3/19/2020	SC	14	5	23
Cogswell - Sec C (20o)	NAm	1/27/2020	MA	7	0	13	2/25/2020	TR	19	4	14	3/19/2020	JM	13	9	6
HARD Marsh (20s)	NAm	1/27/2020	SG	7	0	0	2/26/2020	LD	22	4	1	3/19/2020	SG	13	5	0
Triangle Marsh - Hayward (20w)	NAm	1/27/2020	JM	8	1	0	2/25/2020	ND	20	6	0	3/20/2020	JH	14	8	0

SAN LEANDRO BAY REGION

Site Name (ID)	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)	NAm	1/23/2020	TR	14	3	5	2/12/2020	SC	9	0	5	3/9/2020	JM	17	4	4
Arrowhead Marsh East (17c.2)	NAm	1/23/2020	TR	14	3	19	2/12/2020	SC	9	0	25	3/9/2020	JM	17	4	23
MLK Regional Shoreline - Damon (17d.4)	NAm	1/28/2020	JM	10	3	2	2/20/2020	ND	17	3	4	3/12/2020	SC	17	6	8
MLK Regional Shoreline - Damon Slough (17.5)	NAm	1/28/2020	JM	10	3	0	2/20/2020	ND	17	3	0	3/12/2020	SC	17	6	0
San Leandro Creek North (17e.1)	NAm	1/20/2020	JM	14	1	0	2/11/2020	SC	14	3	0	3/3/2020	TR	17	1	0
San Leandro Creek South (17e.2)	NAm	1/20/2020	JM	14	1	0	2/11/2020	SC	14	3	0	3/3/2020	TR	17	1	0
MLK New Marsh (17h)	NAm	1/20/2020	JM	14	1	46	2/11/2020	SC	14	3	55	3/3/2020	TR	17	1	45
Fan Marsh Wings (17j.1)	NAm	1/27/2020	MA	10	3	0	2/21/2020	BO	15	1	0	3/12/2020	ND	9	1	0
Fan Marsh Main (17j.2)	NAm	1/27/2020	MA	10	3	17	2/21/2020	BO	15	1	11	3/12/2020	ND	9	1	16

BAY BRIDGE NORTH REGION

Site Name (ID)	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)	NAm	1/20/2020	ND	9	1	0	2/10/2020	TR	9	8	0	3/10/2020	BO	15	1	0
Emeryville Crescent - West (06b)	NAm	1/20/2020	ND	9	1	2	2/10/2020	TR	9	8	1	3/10/2020	BO	15	1	1
Whittel Marsh (10a)	NAm	1/28/2020	JH	13	5	0	2/26/2020	TR	17	1	0	3/13/2020	MA	10	3	0
Wildcat Marsh (22a)	NAm	1/23/2020	JM	14	4	20	2/10/2020	JH	5	1	28	3/3/2020	MA	18	5	7
San Pablo Marsh East (22b.1)	NAm	1/20/2020	MA	10	2	2	2/10/2020	BO	8	3	5	3/3/2020	JM	22	3	3
San Pablo Marsh West (22b.2)	NAm	1/20/2020	MA	10	2	7	2/10/2020	BO	8	3	6	3/3/2020	JM	22	3	9
Rheem Creek Area (22c)	NAm	1/22/2020	JH	13	0	3	2/11/2020	MA	9	4	9	3/3/2020	BO	19	7	3
Hoffman Marsh (22e)	NAm	1/22/2020	MA	12	3	0	2/11/2020	JM	10	2	2	3/3/2020	SC	16	4	0

SUISUN REGION

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

Site Name (ID)	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
MOTCO Area 1 (27) ¹	NAm	2/12/2020	TR	15	0	0	2/27/2020	LD	23	0	0	-	-	-	-	-
MOTCO Area 2 (27) ¹	NAm	2/12/2020	ND	14	2	0	2/27/2020	SG	24	0	0	-	-	-	-	-
Point Edith Marsh (27) ¹	NAm	2/12/2020	JM	20	0	0	2/28/2020	ND	18	1	0	-	-	-	-	-
Concord Naval Weapons Station (27) ¹	NAm	2/12/2020	JM	20	0	0	2/28/2020	ND	18	1	0	-	-	-	-	-
Roe Island (27b) ¹	NAm	2/12/2020	KE	19	1	0	3/3/2020	KE	11	4	0	-	-	-	-	-
Ryer Island NW (27b) ¹	NAm	2/14/2020	KE	8	2	0	2/27/2020	SC	24	0	0	-	-	-	-	-

¹ Not surveyed round 3 due to COVID-19 Pandemic.

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