California Ridgway's Rail Surveys for the San Francisco Estuary Invasive *Spartina* Project 2018

Report to:

The State Coastal Conservancy
San Francisco Estuary Invasive *Spartina* Project
1515 Clay St., 10th Floor
Oakland, CA 94612

Prepared by:

Olofson Environmental, Inc.
1830 Embarcadero Cove, Suite 100
Oakland, California 94606
Contact: jtmcbroom@*Spartina*.org

November 28, 2018

ACKNOWLEDGEMENTS

This report was designed and prepared under the direction of Jen McBroom, the Invasive *Spartina* Project Ridgway's Rail Monitoring Manager, with considerable hard work by Jen and other OEI biologists and staff, including Anastasia Ennis, Brian Ort, Jeanne Hammond, Kevin Eng, Nate Deakers, Pim Laulikitnont, Simon Gunner, Stephanie Chen, and Tobias Rohmer.

We are especially grateful for the support of our partners who shared Ridgway's rail survey data that they collected over the past six years: Point Blue Conservation Science (formerly PRBO), Don Edwards National Wildlife Refuge, and Avocet Research and Associates.

Coastal Conservancy

This report was prepared for the California Coastal Conservancy's San Francisco Estuary Invasive *Spartina* Project with support and funding from the following contributors:

RECOVERY.GOV

California Coastal Conservancy

California Wildlife Conservation Board (MOU #99-054-01 and subsequent)

Table of Contents

Table of Figures

Table of Tables

This page is intentionally left blank.

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.

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, with the exception of occasional observations along the outer coast in Tomales Bay. 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).

Between 2009 to 2011, Point Blue Conservation Science (PBCS) estimated that the average total population was about 1,167 individuals (Liu et al. 2012). However, the number of rails detected in 2018 exceeds the extrapolated population estimate from that study period, indicating that the population is likely greater now.

In collaboration with partner organizations, including 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 2018 (Permit Number TE118356-4). Trained and permitted biologists performed standard-protocol surveys at 98 ISP sub-areas between January 15 and April 15, 2018. The data were entered into an access database shared between partner organizations, exported into GIS, and then summarized on a site-by-site basis.

Only results of surveys conducted for the ISP by OEI in 2018 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 2018 Spartina Treatment Sub-Areas and Ridgway's Rail Survey Plans.

This page is intentionally left blank.

2. Study Area

OEI conducted surveys for California Ridgway's rail within 98 sub-areas in eight reporting regions: Marin, San Francisco Peninsula, San Mateo, Dumbarton South, Union City, Hayward, San Leandro Bay, and Bay Bridge North (**Figure 1**). The study area spanned the counties of Alameda, Contra Costa, Marin, San Francisco, San Mateo, and Santa Clara. Summary survey results for each site are represented within one of four maps: Central North Bay, Central East Bay, Central West Bay, and South Bay.

Treatment Restrictions

All of the 98 sub-areas surveyed contained non-native *Spartina*, and all but seven sub-areas were slated for full treatment by the ISP in 2018. *Spartina* treatment had been restricted at eleven sub-areas from 2012 through 2017. However, in October 2018, a new Biological Opinion from the Service authorized treatment for full or partial treatment at some of these previously restricted sub-areas.

To begin treatment at the previously restricted sub-areas, a combination of treatment mechanisms were authorized. Large or disjointed sub-areas were split into smaller sub-areas, so that portions of marshes would be treated for invasive *Spartina*, while other portions would remain untreated. Also, seed-suppression (a sub-lethal dose of herbicide intended to suppress *Spartina* seed set) was authorized at several sub-areas in an attempt to reduce the spread of *Spartina* through seed dispersal while leaving the habitat intact for rails. A summary of treatment restrictions and sub-area splits that have occurred since 2011 are presented in Table 1. Not all treatment that was authorized will be conducted in 2018 due to lack of funding; for instance, seed-suppression will not occur at any sub-area in 2018 despite authorization. Full funding for *Spartina* treatment will resume in 2019.

Surveys by Partner Organizations

Partner organizations surveyed an additional 17 ISP sub-areas (32 rail program sites) that were treated for non-native *Spartina* in 2018. 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.

Both PBCS and DENWR decreased their survey effort from prior years' efforts due to either reduced funds or staff. OEI was able to survey seven of the transects typically surveyed by PBCS or DENWR (see text box at right). In order to complete the additional surveys in 2018, OEI altered or dropped transects at sub-areas with low rail density and/or where exisitng transects could partially cover the sub-area.

Additional Surveys by OEI:

- CMC Marsh Reserve
- Muzzi/Martas Marsh
- Wildcat Marsh
- San Pablo Marsh
- Palo Alto Baylands
- Palo Alto Harbor
- AFCC/Pond 3

For a complete list of all ISP sub-areas and associated survey organizations, see **Appendix I**: Complete List of 2018 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**: 2018 Survey Station Coordinates.

Table 1. Summary of treatment restrictions at ISP sub-areas for the past 9 years. Black shading indicates prohibited treatment, grey shading indicates treatment by seed-suppression only, and no shading indicates treatment is permitted. Sub-areas have been split so that treatment can occur in phases.

Sub-Area Name	2010	2011	2012	2013	2014	2015	2016	2017	2018
Belmont Slough - Mouth	02a	02a.1	02a.1a						
Belmont Slough - South			02a.1b						
Belmont Slough to Steinberger		02a.2							
Redwood Shores / Bird Island		02a.3							
Redwood Shores Mitigation Bank		02a.4							
B2 North Quadrant - NW	02c	02c.1	02c.1a						
B2 North Quadrant - NE			02c.1b						
B2 North Quadrant - South		02c.2	02c.2						
B2 South Quadrant - NW	02d	02d.1	02d.1a						
B2 South Quadrant - NE			02d.1b						
B2 South Quadrant - 2		02.d2							
B2 South Quadrant - 3		02d.3							
West Point Slough - NW	02e	02e							
Ravenswood Slough	02i	02i							
CMC - Mouth - North	04j	04j.1							
CMC - Mouth - South		04j.2							
Newark Slough West	05c	05c.1							
Newark Slough East		05c.2							
Alviso Slough	15a.4	15a.4							
Cooley Landing - Central	16	16.1							
Cooley Landing - Outer		16.2							
Arrowhead Marsh - West	17c	17c	17c.1						
Arrowhead Marsh - East			17c.2						
Airport Channel - Fan Shore	17d	17d.1							
Airport Channel - South		17d.2							
MLK Regional Shoreline - North		17d.3							
MLK Regional Shoreline - Damon		17d.4							
MLK Regional Shoreline - South		17d.5							
San Leandro Creek - North	17e	17e.1							
San Leandro Creek - South		17e.2							
MLK New Marsh	17h	17h							
Fan Marsh Wings	17j	17j							17j.1
Fan Marsh Main									17j.2
Confluence Marsh	18f	18f							
SFO	19h	19h							
Seal Slough - West	19p	19p.1							
Seal Slough - East		19p.2							
Citation Marsh South	20d	20d	20d.1						
Citation Marsh North Channels			20d.2						20d.2a
Citation Marsh North Main									20d.2b
North Marsh	20f	20f							
Bunker Marsh	20g	20g							
San Lorenzo Creek - North	20h	20h.1							
San Lorenzo Creek - South		20h.2							
Cogswell - Sec B Bayfront	20n	20n							20n.1
Cogswell - Sec B South									20n.2
Cogswell - Sec B Main									20n.3
Cogswell - Sec C	20o	20o							
San Pablo Marsh - North	22b	22b.1							
San Pablo Marsh - South		22b.2							

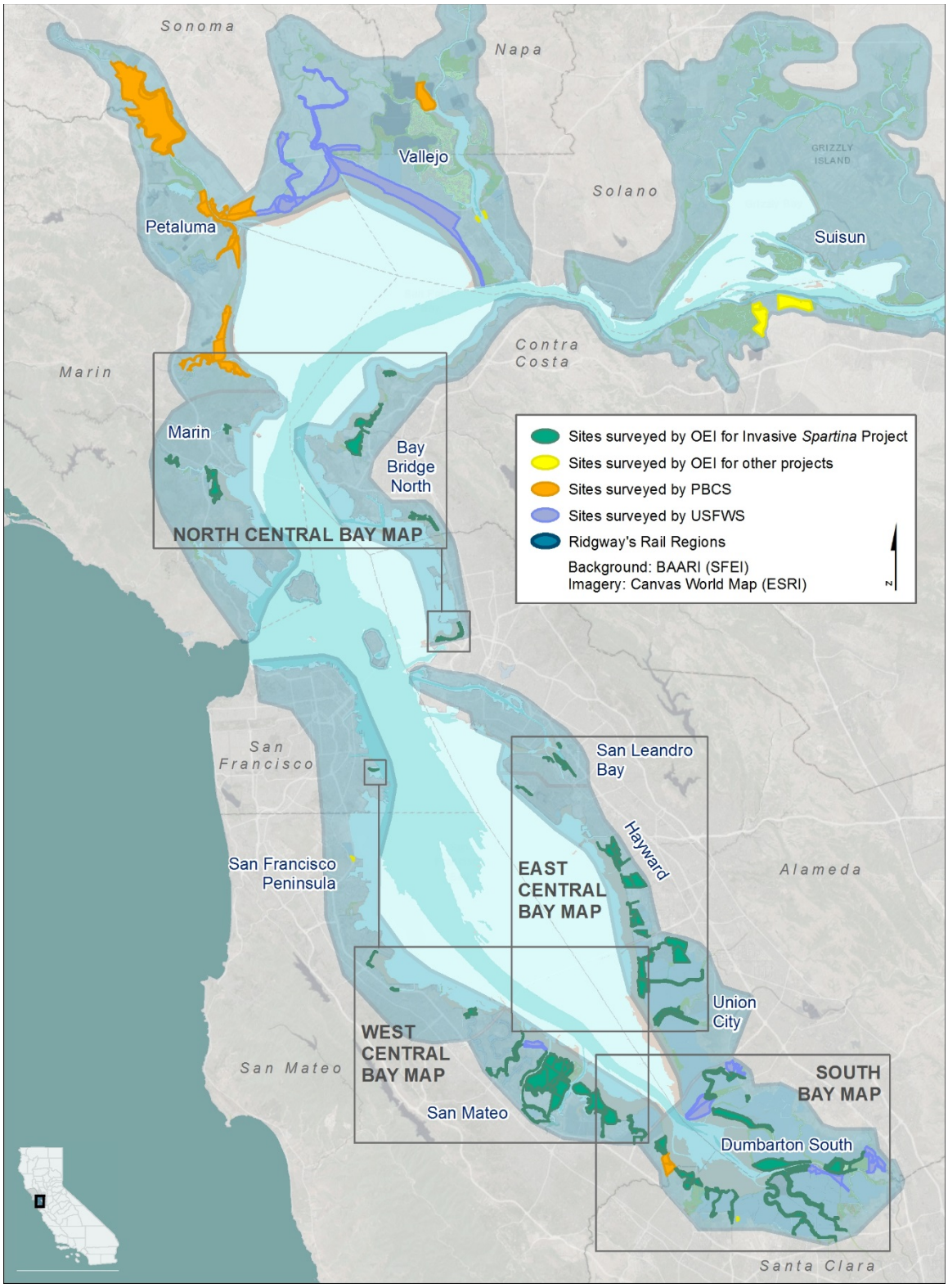

Figure 1. Regional boundaries of ISP sites surveyed for California Ridgway's rail by OEI and others in 2018.

This page is intentionally left blank.

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 an Access database and analyzed according to recommendations in the NAm Protocol.

3.1 Field Methods

California Ridgway's rail surveys were conducted at 98 ISP sub-areas between January 15 and April 15, 2018, using the NAm 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, Anastasia Ennis, Simon Gunner, Kevin Eng, Nate Deakers, Pim Laulikitnont, Brian Ort, and Kevin Sherrill.

The NAm Protocol is a transect point count survey with broadcast of vocalizations of two species of rail (black rails and Ridgway's rails) on every survey round and at every survey station. The NAm Protocol is part of the FWS Site-specific Survey Protocol (Wood, 2016) and is based on the North American Marsh Bird Monitoring Protocol. The NAm Protocol was developed to increase standardization and decrease the variance in survey results. It was first implemented in 2017 and is the standard call-count survey protocol.

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 a multi-organization shared Access database developed by Point Blue and the National Wildlife Refuge in support of the NAm Protocol. By using a shared database with common tables and field headings, results can be readily shared and analyzed by partner organizations. The organization of the shared Marsh Bird Database is outlined in the SOP 2 of the Site-specific Protocol for Monitoring Marsh Birds (Wood et al, 2016).

Each observer entered their own data into the Marsh Bird Database and then reviewed their data for quality and accuracy. Once all data from all observers were entered into the Access database, 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 Ridgways' 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 metrices 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 m of a survey point (either within or outside of the survey time) is calculated. The maximum 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.

For 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 6 rails/(7 points*12.57 ha) = 0.0682 rails/ha. This is considered a minimum density index because we know that detection probability is <1, which means the true abundance could be >6 birds. Each unique bird is only counted once (e.g., the same bird heard from two different survey points would only be counted once). Unique birds detected while moving to or from transects in a study area or between points (outside of the official survey time) would not be included unless they were detected within 200 m of a survey point. The area surveyed at each point is adjusted accordingly if there is less than 100% rail habitat within the 200 m radius.

Index of one-year rate of change for the total highest minimum count (summed across all transects) 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*100%)= 6.06%.

Index of annual average 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:

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

where *p*1 is the total highest minimum count for the first year, *p*2 is the total highest minimum count for the last year, *t*1 is the start year, *t*2 is the end year (*t*2 - *t*1 = 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]*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.

This page is intentionally left blank.

4. 2018 Survey Results

OEI detected 984 California Ridgway's rails at 76 of the 98 sub-areas surveyed by OEI for the ISP in 2018. This represents a 15% annual rate of change and a 14% average annual change since 2013 (note that the analysis excludes Arrowhead Marsh, which was surveyed using NAm Protocol for the first time in 2018). The average relative density at all sub-areas where rails were present was 0.74 Ridgway's rails per hectare. 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 nine sub-areas in the Marin Region in 2018 (**Table 2**). Typically, PBCS conducts surveys at four transects in the Marin Region, spanning six ISP sub-areas (04a, 04c, 04d, 04k, 23e, and 23j). However, PBCS was forced to reduce survey effort in 2018 due to lack of funding and did not survey any sub-areas within the Marin Region in 2018. By reducing survey effort elsewhere, OEI was able to survey two transects typically surveyed by PBCS: MUZZ and HEER. However, several transects in Marin were not surveyed in 2018 (CMCM-T1, PIPE, THF).

OEI detected a total of 77 Ridgway's rails in the Marin Region in 2018. This represents a 14% increase over 2017 detections and a 7% increase since 2013 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 five sub-areas in this Region in 2018, two of which were determined to be occupied by Ridgway's rails. A total of five rails were detected in the San Francisco Peninsula Region in 2018, two fewer than detected in 2017 and one fewer than detected in 2013. Rails were detected at Seal Slough for the first time since 2013. Trends are difficult to identify at these low densities and 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 a 20 sub-areas within the San Mateo Region in 2018. DENWR conducted surveys at an additional sub-area, Redwood Shores (02a.3).

This region contains one of the previously restricted sub-areas where full treatment is once again permitted. Due to restrictions placed by the 2012 Biological Opinion, B2 North Quadrant West (02c.1a) has been treated with a sub-leathal dose of herbicide for the past six years. This season marks the first year since 2012 that B2 North Quadrant West (02c.1a) will be treated with full-stregth herbicide.

OEI detected a total of 203 Ridgway's rails in the San Mateo Region in 2018 (**Table 2**). This represents a 51% increase over 2017 detections and an 8% increase since 2013 at the same subset of sub-areas.

The Dumbarton South Region includes all marshes south of the Dumbarton Bridge, from Newark to Mountain View (**Figure 4**). In 2018, OEI conducted surveys at 15 sub-areas in the Dumbarton South Region, including Palo Alto Baylands and Palo Alto Harbor (08), two transects that are typically surveyed by PBCS. DENWR also surveyed six sub-areas (05b, 05d, 05e, 05f, 05g, and 15a.5) and PBCS surveyed one additional sub-area (15b).

OEI detected a total of 241 Ridgway's rails in the Dumbarton South Region in 2018. This represents a 5% increase over 2017 detections and an 18% increase since 2013 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.

The Union City Region in Alameda County extends from the San Mateo Bridge to the Dumbarton Bridge (**Figure 5**).

OEI surveyed twelve sub-areas in the region in 2018. Typically, DENWR surveys seven sub-areas in the region, however staff limitations required a reduction in survey effort. OEI was able to survey three of these sub-areas, but with a reduced number of survey stations (every other station along two transects at AFCC). Additionally, to accommodate the increased level of effort to cover DENWR surveys, OEI dropped a transect from OAC (OAC-T1). AFCC Upper (01c), and Ideal Marsh North (21a) and South (21b) were not surveyed in 2018.

OEI detected a minimum of 22 Ridgway's rails (**Table 2**). This represents a 19% decrease from 2017 detections but no change (0%) from 2013 numbers at the same subset of sub-areas. The trend may be a result of the reduced survey effort rather than an actual change in rail occupancy. OEI surveyed every other station at AFCC Mouth (01a), AFCC Lower (01b), and AFCC Pond 3 (01f) and surveyed two of the three transects along OAC (13a, b, c). Although not as many rails were detected in 2018, the reduced survey effort is a more efficient way to survey the lower density rails in the region and the recommended level of effort in future years.

The Hayward Region in Alameda County extends from the Oakland International Airport south to the San Mateo Bridge (**Figure 5**). OEI surveyed 19 sub-areas in the Hayward Region. Cogswell Section B (20n) and Citation Marsh North (20d.2) were divided into five new sub-areas in 2018 so that portions of each marsh could be fully treated. Treatment is now permitted at six previously restricted sub-areas (20d.2a, 20g. 20h.1, 20n.1, 20n.2, and 20o) and seed-suppression is now allowed at two additional sub-areas (20f and 20n.3). Not all permitted treatment will occur in 2018 due to limited funding. Full treatment at Bunker Marsh (20g) and seed-suppression at North Marsh (20f) and Cogswell Section B Main (20n.3) will not occur until 2019.

OEI detected 222 Ridgway's rails in 2018. This represents a 14% increase over 2017 detections and a 26% increase since 2013 at the same subset of sub-areas.

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 eight sub-areas within the region, including the two new split sub-areas of Fan Marsh (17j.1 and 17j.2). the 2018 BO authorized treatment at two previously-restricted sub-areas within the region: Damon Marsh (17d.4) and

Fan Marsh Wings (17j.1). 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).

OEI detected 145 Ridgway's rails in San Leandro Bay in 2018. Arrowhead was surveyed for the first time using the NAm protocol this season. Excluding Arrowhead from the analysis, rail detections in the region have increased by 17% since 2017 and 28% since 2013 at the same subset of sub-areas.

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 ten sub-areas in 2018. Two of the transects surveyed by OEI (WIMA and RIF) are typically surveyed by PBCS. EBRPD surveyed one additional sub-area: Giant Marsh.

OEI detected 69 Ridgway's rails in the region in 2018, the same result as 2017 (0% annual change) and a 2% annual increase since 2013 at the same subset of sub-areas.

Table 2. Summary of survey results at all sub-areas surveyed by OEI for ISP in 2018, grouped by Region. 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.

				RIRA Indices				Occupancy		
Sub-Area Name (Code)	Transect	Site Area (HA)	% of Site Surveyed	Highest Count	Relative Density	One year Δ	Five year Δ	BLRA	SORA	VIRA
Marin Region										
CMC Marsh Reserve (04a)	HEER	31.2	96%	17	0.57	-23%	-7%	0	0	0.17
College of Marin (04b)	UCMC-T1	1.8	34%	0	0.00	→	→	0	0	0
Creekside Park (04g)	CSPK-T1	8.4	100%	8	0.95	64%	17%	0	0	0
CMC - Upper (04h)	UCMC-T1	5.5	93%	6	1.17	146%	20%	0	0	0
CMC - Mouth (04j.2)	HEER	4.9	15%	0	0.00	-100%	-100%	0	0	0
Pickleweed Park (09)	PIPK-T1	5.7	100%	5	0.17	-55%	↑	0	0	0
San Rafael Canal Mouth (23d) - split into two sub-areas in 2011								0	0	0
San Rafael Canal Mouth East (23d.1)	PIPK-T1	1.5	100%	0	0.00	-100%	→	-	-	-
San Rafael Canal Mouth West (23d.2)	PIPK-T1	1.3	100%	1	0.80	↑	-4%	-	-	-
Muzzi and Martas Marsh (23e) - grouped into one sub-area by ISP control program								0	0	0
Martas Marsh (23e)	MUZZ	8.0	99%	10	0.16	64%	33%	-	-	-
Muzzi Marsh (23e)	MUZZ	56.0	55%	30	0.98	64%	10%	-	-	-
San Clemente Creek (23e)	MUZZ	7.6	50%	0	0.00	→	-100%	-	-	-

Sub-Area Name (Code)	Transect	Site Area (HA)	% of Site Surveyed	RIRA Indices: Highest Count	RIRA Indices: Relative Density	RIRA Indices: One year Δ	RIRA Indices: Five year Δ	Occupancy: BLRA	Occupancy: SORA	Occupancy: VIRA
SF Peninsula Region										
Pier 98/Heron's Head (12b)	HEHE-T1	4.4	93%	0	0.00	→	-100%	0	0	0
SFO (19h)	SFO-T1	10.2	65%	4	0.61	-43%	10%	0	0	0
Sanchez Marsh (19k)	SANC-T1	6.1	100%	0	0.00	→	→	0	0	0
Seal Slough (19p) – split into two sub-areas in 2011								0	0	0
Seal Slough Central (19p.1)	SEAL-T1	15.3	85%	1	0.08	↑	-4%	-	-	-
Seal Slough Peripheral (19p.2)	SEAL-T1	12.5	75%	0	0.00	→	→	-	-	-
San Mateo Region										
Belmont Slouth (02a) - split into three sub-areas in 2011 and 2012								0	0	0
Belmont Slough Mouth (02a.1a)	BELM-T1	20.7	75%	2	0.13	-67%	-4%	-	-	-
Belmont Slough South (02a.1b)	BELM-T1	7.2	81%	7	1.20	0%	14%	-	-	-
Belmont Slough to Steinberger (02a.2)	BELM-T1	44.3	14%	2	0.33	100%	↑	-	-	-
Corkscrew Slough (02b.1)	CORK-T1	92.0	36%	17	0.48	55%	1%	0	0	0
Steinberger Slough (02b.2)	RESH-T2	42.7	38%	2	0.12	↑	↑	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	60.9	47%	15	0.35	146%	44%	-	-	-
B2 North Quadrant East (02c.1b)	OBEN-T1	59.0	47%	21	0.61	72%	0%	-	-	-
B2 North Quadrant South (02c.2)	OBEN-T1	91.9	26%	2	0.04	-45%	-11%	-	-	-
B2 South Quadrant (02d) - split into three sub-areas in 2011 and 2012								0	0	0
B2 South Quadrant West (02d.1a)	OBES-T1	15.5	75%	9	0.77	269%	4%	-	-	-
B2 South Quadrant East (02d.1b)	OBES-T1	9.4	45%	0	0.00	→	-100%	-	-	-
B2 South Quadrant 2 (02d.2)	OBES-T1	23.8	73%	8	0.46	556%	6%	-	-	-
B2 South Quadrant 3 (02d.3)	OBES-T1	27.5	22%	0	0.00	→	→	-	-	-
West Point Slough - NW (02e)	WPSN-T1	2.1	100%	0	0.00	→	-100%	0	0	0
Greco Island - North (02f)	GRIN-T1	206.8	27%	19	0.18	73%	21%	0	0	0
West Point Slough - SW / E (02g)	WPSS-T1	16.1	65%	4	0.38	↑	↑	0	0.25	0
Greco Island - South (02h)	GRIS-T1	96.3	42%	39	0.94	28%	8%	0	0	0
Ravenswood Slough (02i)	RAV-T1	47.7	58%	28	1.01	44%	63%	0	0	0

Sub-Area Name (Code)	Transect	Site Area (HA)	% of Site Surveyed	RIRA Indices				Occupancy		
				Highest Count	Relative Density	One year Δ	Five year Δ	BLRA	SORA	VIRA
San Mateo region (continued)										
Greco Island - South (02h)	GRIS-T1	96.3	42%	39	0.94	28%	8%	0	0	0
Ravenswood Slough (02i)	RAV-T1	47.7	58%	28	1.01	44%	63%	0	0	0
Deepwater Slough (02k) - grouped into one sub-area by ISP control program								0	0	0
Middle Bair N (02k)	MBE-T1	89.7	44%	26	0.54	25%	-2%	-	-	-
Middle Bair SE (02k)	MBE-T1	81.0	48%	2	0.05	-18%	-25%	-	-	-
Inner Bair Island Restoration (02l)	IBI-T1	24.1	64%	0	0.00	→	→	0	0	0
Pond B3 Bair Island Restoration (02m)	OBW-T1	166.7	22%	0	0.00	NA	→	0	0	0
Dumbarton Region										
Mowry Marsh North (05a.1)	MOWN-T1	168.9	29%	25	0.41	67%	15%	0	0	0
Calaveras Point (05a.2)	CAPT-T1	184.4	15%	31	1.13	-26%	6%	0	0	0.14
Newark Slough (05c) - split into two sub-areas in 2011								0	0	0
Newark Slough West (05c.1)	NEWS-T1	49.1	21%	7	0.68	40%	42%	-	-	-
Newark Slough East (05c.2)	NEWS-T1	29.6	37%	10	0.55	-23%	10%	-	-	-
Coyote Creek - Mud Slough (05f)	A21-T1	85.1	41%	2	0.00	-50%	↑	0	0	0
Plummer Creek Mitigation (05h)	PLCM-T1	6.7	97%	1	0.15	↑	↑	0.33	0	0.67
Island Ponds - A21 (05i)	A21-T1	64.4	50%	3	0.09	-67%	↑	0	0	0.13
Palo Alto Baylands (08) – grouped into one sub-area by ISP control program								-	-	-
Palo Alto Baylands (08)	PAB	47.0	76%	29	0.81	4%	15%	0.29	0.14	0.43
Palo Alto Harbor (08)	PAHA	51.9	69%	60	1.29	20%	27%	0	0	0
Charleston to Mountain View Sl (15a.1) - grouped into one sub-area by ISP control program								0	0	0
Charleston Slough (15a.1)	MVSL-T1	14.7	60%	3	0.34	-18%	-4%	-	-	-
Mountain View Slough (15a.1)	MVSL-T1	29.9	30%	1	0.11	↑	-4%	-	-	-
Stevens Creek to Long Point (15a.2)	STEV-T1	23.0	63%	4	0.28	100%	27%	0	0.33	0.33
Guadalupe Slough (15a.3)	GUSL-T1	128.0	28%	4	0.03	-60%	↑	0	0.13	0
Alviso Slough (15a.4)	ALSL-T2	176.6	17%	21	0.33	44%	42%	0	0	0.25
Stevens Creek (15c)	STEV-T1	11.3	75%	3	0.36	-25%	↑	0	1.00	1.00
Cooley Landing (16) - split into two sub-areas in 2011								0	0	0
Cooley Landing Central (16.1)	COLA-T1	17.0	93%	14	0.88	-4%	3%	-	-	-
Cooley Landing East (16.2)	COLA-T1	53.9	57%	23	0.75	57%	26%	-	-	-

Sub-Area Name (Code)	Transect	Site Area (HA)	% of Site Surveyed	RIRA Indices: Highest Count	RIRA Indices: Relative Density	RIRA Indices: One year Δ	RIRA Indices: Five year Δ	Occupancy: BLRA	Occupancy: SORA	Occupancy: VIRA
Union City Region										
AFCC - Mouth (01a)	AFCP-T1	9.5	60%	0	0.00	-100%	-100%	0	0	0
AFCC - Lower (01b)	AFCP-T1	54.8	39%	3	0.14	↑	20%	0	0	0
AFCC - Pond 3 (01f)	AFCP-T1	53.0	69%	0	0.00	-100%	-100%	0	0	0.14
OAC - North Bank (13a)	OAC-T2	10.9	67%	4	0.14	300%	27%	0	0	0
OAC - Island (13b)	OAC-T2	37.9	68%	4	0.08	-56%	-8%	0	0	0.06
OAC - South Bank (13c)	OAC-T2	9.7	61%	2	0.34	↑	↑	0	0	0
Whale's Tail - North (13d)	WTN-T1	56.9	47%	0	0.00	-100%	-100%	0	0	0
Whale's Tail - South (13e)	WTS-T1	60.4	51%	6	0.19	-14%	0%	0	0	0
Cargill Mitigation Marsh (13f)	WTS-T1	19.1	79%	1	0.07	-75%	↑	0	0	0
Eden Landing - Mt Eden Creek (13j)	EDEN-T1	50.5	49%	2	0.04	↑	↑	0	0	0
Eden Landing Reserve - South (13k)	ELRS-T1	97.0	36%	0	0.00	→	→	0	0	0
Eden Landing Reserve - North (13l)	ELRS-T1	93.0	17%	0	0.00	→	→	0	0	0
Hayward Region										
Oro Loma - East (07a)	ORLW-T1	79.7	54%	0	0.00	→	-100%	0	0	0
Oro Loma - West (07b)	ORLW-T3	52.9	55%	3	0.10	146%	-4%	0	0	0
Dog Bone Marsh (20c)	NORT-T1	2.8	58%	1	0.61	↑	↑	0	0	0
Citation Marsh (20d) - - split into three sub-areas in 2012 and 2018								0	0.43	0.14
Citation Marsh South (20d.1)	CITA-T1	18.0	44%	1	0.13	-59%	↑	-	-	-
Citation Marsh North Channels (20d.2a)	CITA-T1	3.1	100%	8	1.64	↑	↑	-	-	-
Citation Marsh North Main (20d.2b)	CITA-T1	24.1	69%	42	1.80	8%	77%	-	-	-
East Marsh (20e)	SLRZ-T1	15.0	26%	5	0.26	↑	33%	0	0	0
North Marsh (20f)	NORT-T1	36.0	94%	65	1.34	-8%	61%	0	0.67	0.17
Bunker Marsh (20g)	BUNK-T1	14.5	95%	21	0.66	1%	28%	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	3.3	97%	2	0.63	-18%	10%	-	-	-
San Lorenzo Creek South (20h.2)	SLRZ-T1	3.3	91%	0	0.00	→	→	-	-	-
Cogswell - Sec A (20m)	COGS-T1	14.1	100%	7	0.07	75%	42%	0	0	0
Cogswell - Sec B (20n) – split into three sub-areas in 2018								0	0.14	0.14
Cogswell - Sec B Bayfront (20n.1)	COGS-T3	4.4	88%	5	0.78	67%	33%	-	-	-
Cogswell - Sec B South (20n.2)	COGS-T3	13.7	95%	16	1.00	45%	27%	-	-	-
Cogswell - Sec B Main (20n.3)	COGS-T3	22.4	91%	26	0.98	-4%	9%	-	-	-
Cogswell - Sec C (20o)	COGS-T2	20.1	100%	17	0.80	31%	69%	0	0	0

Sub-Area Name (Code)	Transect	Site Area (HA)	% of Site Surveyed	RIRA Indices				Occupancy		
				Highest Count	Relative Density	One year Δ	Five year Δ	BLRA	SORA	VIRA
Hayward Region (continued)										
Oakland Airport (20r)	OAKA-T1	7.7	68%	0	0.00	→	→	0	0	0
HARD Marsh (20s)	HARD-T1	26.7	80%	3	0.14	↑	↑	0	0	0
Triangle Marsh - Hayward (20w)	TRMA-T1	5.0	35%	0	0.00	→	→	0	0	0
San Leandro Region										
Arrowhead Marsh (17c) - split into two sub-areas in 2011								0	0	0
Arrowhead Marsh West (17c.1)	ARHE-T2	8.6	96%	11	0.98	N/A	N/A	-	-	-
Arrowhead Marsh East (17c.2)	ARHE-T2	9.2	90%	30	3.39	N/A	N/A	-	-	-
MLK Regional Shoreline - Damon (17d.4)	MLKS-T1	4.3	100%	15	1.87	275%	44%	0	0	0
San Leandro Creek (17e) - split into two sub-areas in 2011								0	0	0
San Leandro Creek North (17e.1)	MLKR-T1	0.8	100%	0	0.00	→	→	-	-	-
San Leandro Creek South (17e.2)	MLKR-T1	2.2	17%	0	0.00	→	→	-	-	-
MLK New Marsh (17h)	MLKR-T1	13.9	100%	58	4.19	-3%	18%	0	0.29	0.14
Fan Marsh (17j) – split into two sub-areas in 2018								0	0.67	0
Fan Marsh Wings (17j.1)	FANM-T1	1.0	55%	2	3.77	↑	↑	-	-	-
Fan Marsh Main (17j.2)	FANM-T1	4.1	100%	29	7.09	16%	64%	-	-	-
Bay Bridge North Region										
Emeryville Crescent - East (06a)	EMCR-T1	21.9	7%	0	0.00	→	→	0	0	0
Emeryville Crescent - West (06b)	EMCR-T1	12.8	99%	2	0.16	↑	10%	0	0	0
Whittel Marsh (10a)	PTPN-T1	18.2	96%	6	0.35	146%	20%	0.25	0	0
Wildcat Marsh (22a)	WIMA	131.6	41%	22	0.32	-10%	1%	0	0.13	0.13
San Pablo Marsh (22b) - split into two sub-areas in 2011								0	0	0.40
San Pablo Marsh East (22b.1)	RIF	12.8	78%	8	0.80	-38%	-1%	-	-	-
San Pablo Marsh West (22b.2)	RIF	52.8	60%	14	0.32	-36%	42%	-	-	-
Rheem Creek Area (22c)	RCRA-T1	10.0	78%	3	0.38	-51%	-26%	0.25	0	0
Stege Marsh (22d) – grouped into one sub-area by ISP control program								0	0	0
Meeker Slough (22d)	STEG-T1	11.5	92%	8	0.75	↑	17%	-	-	-
Stege Marsh (22d)	STEG-T1	11.5	93%	4	0.38	228%	-16%	-	-	-
Hoffman Marsh (22e)	STEG-T1	14.6	93%	2	0.15	↑	10%	-	-	-

This page is intentionally left blank.

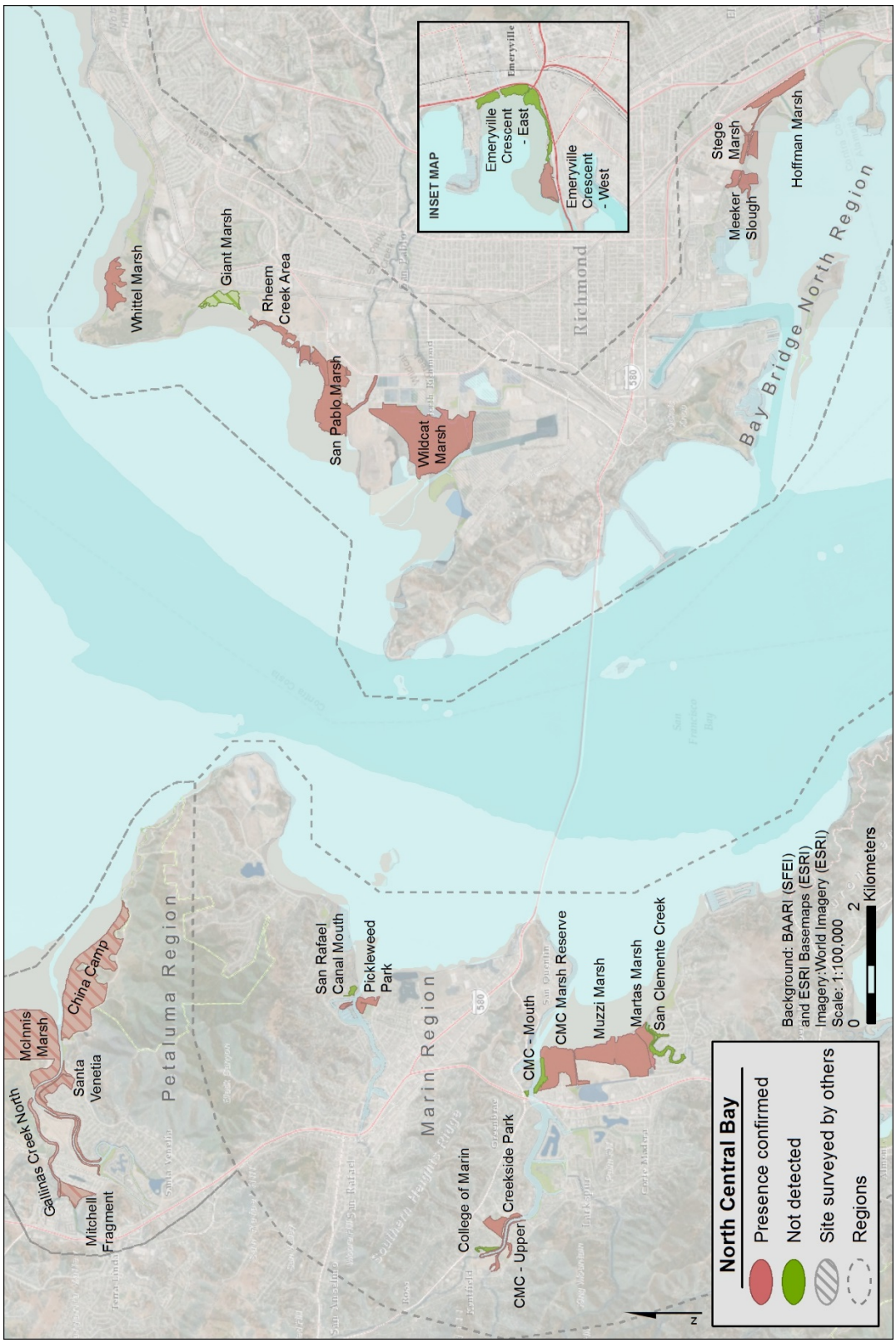

Figure 2. Overview map of North Central Bay, showing summary results at sub-areas in the Bay Bridge North and Marin Regions. To see survey stations and rail locations, view the map attachment named North Central Bay (scaled to 1:24,000 on a 24x36 poster).

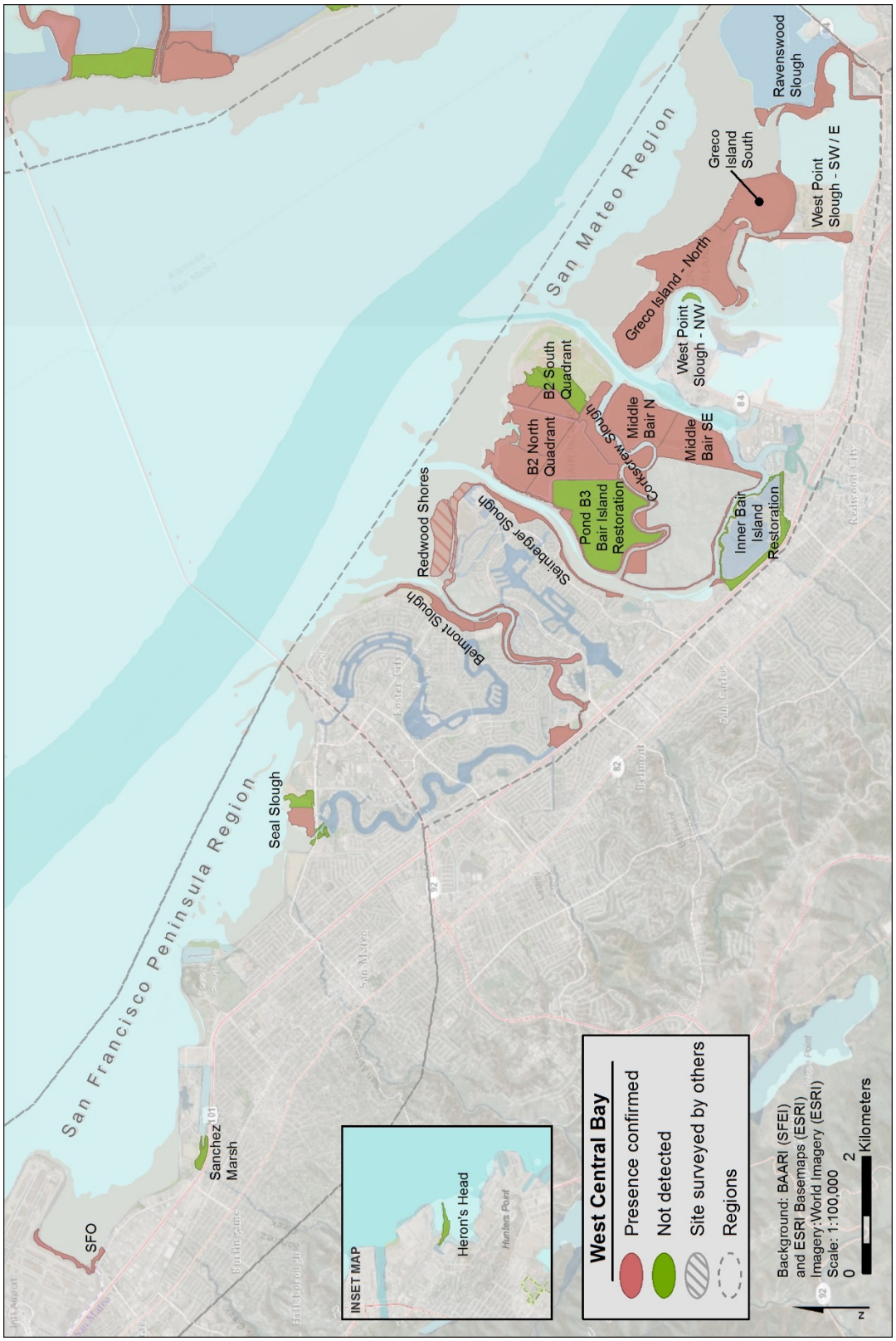

Figure 3. Overview map of West Central Bay, showing summary results at sub-areas in the SF Peninsula and San Mateo Regions. To see survey stations and rail locations, view the map attachment named West Central Bay (scaled to 1:24,000 on a 24x36 poster).

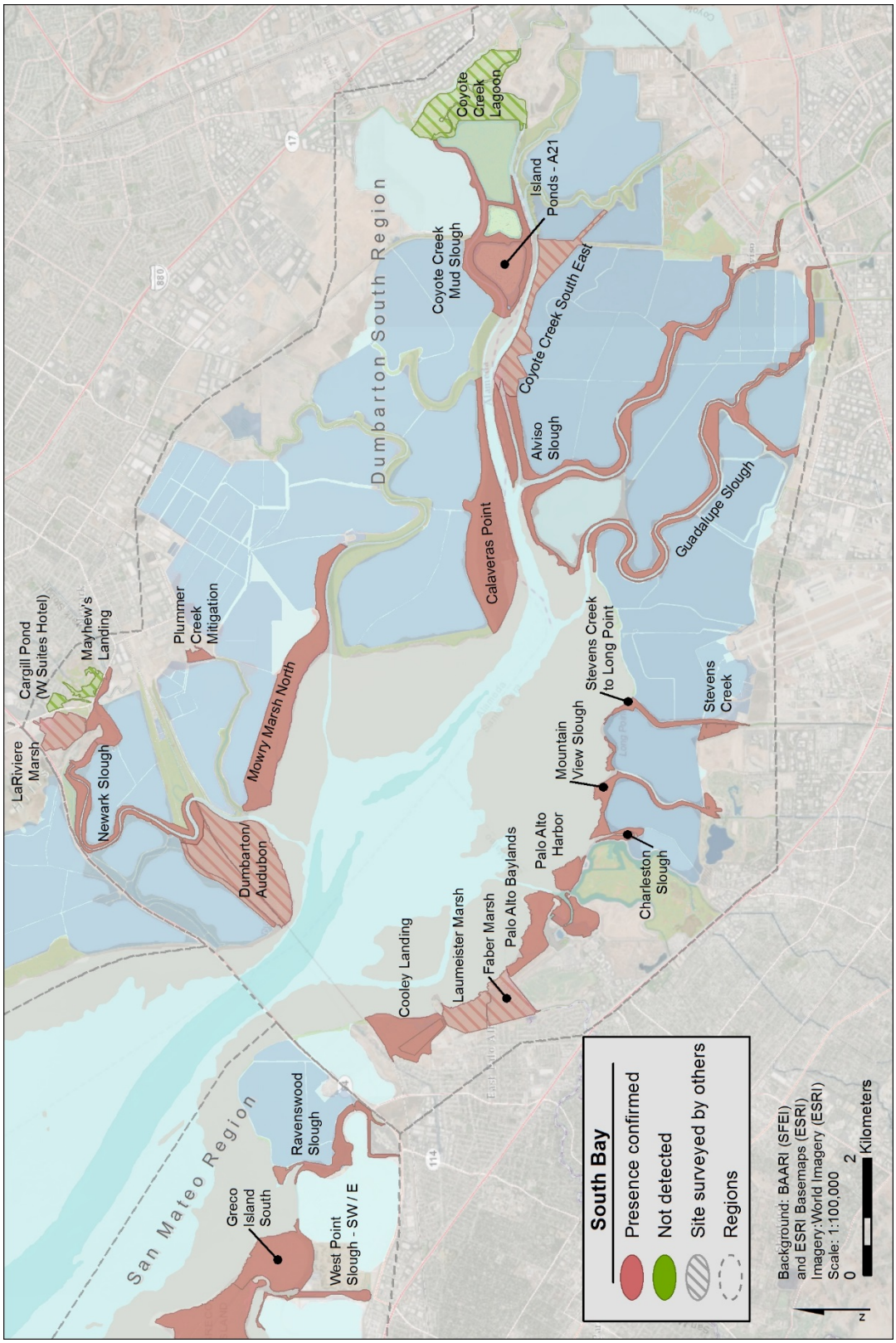

Figure 4. Overview map of South Bay, showing summary results at sub-areas in the Dumbarton South Region. To see survey stations and rail locations, view the map attachment named South Bay (scaled to 1:24,000 on a 24x36 poster).

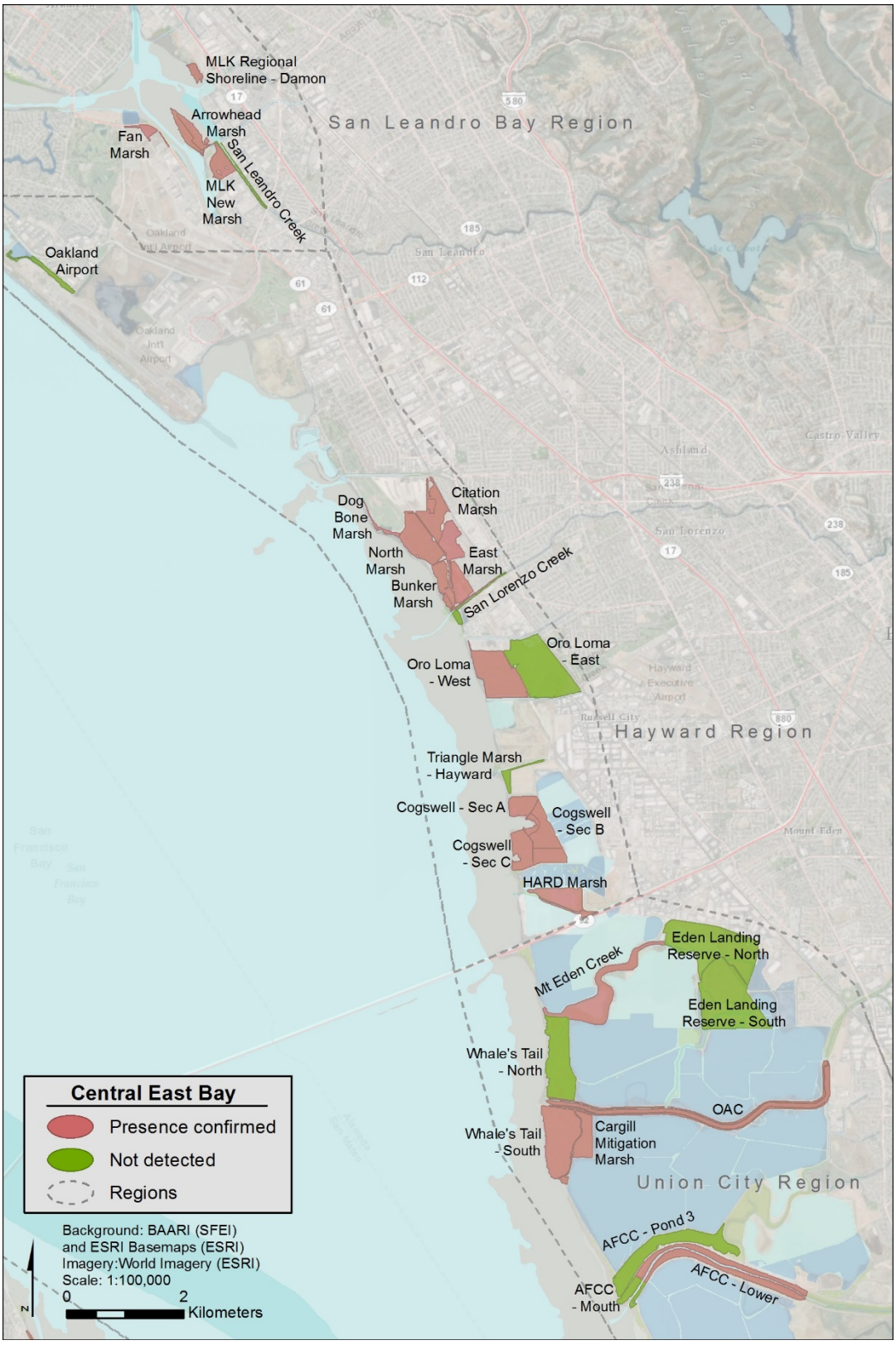

Figure 5. Overview map of East Central Bay, showing summary results at sub-areas in the Union City, Hayward, and San Leandro Bay Regions. To see survey stations and rail locations, view the map attachment named East Central Bay (scaled to 1:24,000 on a 24x36 poster).

5. Discussion

California Ridgway's rail detections are continuing to increase at the subset of sub-areas surveyed by OEI. The trend is consistent in sub-areas where non-native *Spartina* has been treated (16% annual change, 9% 5-year change) and in sub-areas where *Spartina* treatment had been restricted since 2011 (13% annual change, 29% 5-year change). Rail densities are much greater at the sub-areas where *Spartina* treatment had been restricted since 2011 (1.98 rails per hectare) than in sub-areas where Spartina treatment has been on-going. It is worth noting that the subset of sites that are surveyed by OEI for the ISP are focused on sites with a non-native *Spartina* component (past or present), skewing the results of this report toward the evaluation of the sites with the greatest impacts from non-native *Spartina*.

The resumption of *Spartina* treatment at sub-areas that were previously restricted will result in local declines to rail numbers. 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 these sub-areas will also stem declines as the habitat converts from invasive *Spartina* meadows to native marshes. However more extreme solutions, such as translocation, should be considered in future phases of *Spartina* treatement, particularly at sites where the native condition cannot support the number of rails currently present.

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. Approximately 60 islands have been installed to date. The efficacy of these enhancements for Ridgway's rails remains to be determined. Currently PBCS is working on a multi-year analysis of call-count data to identify the response of rail populations at sites with habitat enhancements. However, it will take several more years before the magnitude of the rail response can be identified.

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.

This page is intentionally left blank.

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.

This page is intentionally left blank.

7. References

Conway, C. J. and M. E. Seamans. 2016. National Wildlife Refuge System Protocol Framework for Inventory and Monitoring of Secretive Marsh Birds. Inventory and Monitoring, National Wildlife Refuge System, U.S. Fish and Wildlife Service, Fort Collins, CO.

Liu, L., Wood, J., Nur, N., Salas, L., & Jongsomjit, D. 2012. California Clapper Rail (Rallus longirostris obsoletus) Population monitoring: 2005-2011 *PRBO Technical Report to the California Department of Fish and Game*. Petaluma, CA: PRBO Conservation Science.

Nur, N., L. Salas, J.K. Wood, and M. Elrod. 2016. An Evaluation of Two Secretive Marsh Bird Survey Protocols in San Francisco Bay. Final Report to the U.S. Fish and Wildlife Service, Pacific Southwest Region Refuge Inventory and Monitoring Initiative. Point Blue Conservation Science. Petaluma, CA.

SFEI (San Francisco Estuary Institute). 2002. Bay Area EcoAtlas 1.50 beta 4 (http://www.sfei.org).

Wood, J.K., Nur, N., Salas, L. and O.M.W. Richmond. 2016. Site-specific Protocol for Monitoring Marsh Birds: Don Edwards San Francisco Bay and San Pablo Bay National Wildlife Refuges. Prepared for the U.S. Fish and Wildlife Service, Pacific Southwest Region Refuge Inventory and Monitoring Initiative. Point Blue Conservation Science. Petaluma, CA.

U.S. Fish and Wildlife Service. 2013. Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California. Sacramento, California. xviii+ 605 pp. (http://www.fws.gov/sacramento/es/Recovery-Planning/Tidal-Marsh/Documents/TMRP_Volume1_RP.pdf)

This page is intentionally left blank.

Appendix I: Complete List of 2018 *Spartina* Treatment Sub-Areas and Ridgway's Rail Survey Plans

KEY to Survey Organizations:

- **ARA** = Avocet Research Associates (contact Jules Evens)
- **CDFW** = Calfornia 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 2018 *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	Typically surveyed by DENWR
AFCC - Lower (01b)	ISP	NAm	AFCP-T1; AFCP-T2	Typically surveyed by DENWR
AFCC - Upper (01c)	none	none	none	Not surveyed
AFCC - to I-880 (01d)	none	none	none	Not surveyed
AFCC - Strip Marsh (01e)	none	none	none	Insufficient habitat (2017)
AFCC - Pond 3 (01f)	ISP	NAm	AFCP-T1; AFCP-T2	Typically surveyed by DENWR
Area 02: Bair and Greco Complex in San Mateo Region				
Belmont to Steinberger Slough (02a)	-	-	-	Split into five sub-areas in 2011 and 2012
Belmont Slough Mouth (02a.1a)	ISP	NAm	BELM-T1	
Belmont Slough South (02a.1b)	ISP	NAm	BELM-T1	
Belmont Slough to Steinberger (02a.2)	ISP	NAm	BELM-T1	
Redwood Shores (02a.3)	DENWR	NAm	RESH-T1	
Redwood Shores Mitigation Bank (02a.4)	none	none	none	Insufficient habitat (2017)
Steinberger to Redwood Creek (02b)	-	-	-	Split into three sub-ares in 2011
Corkscrew Slough (02b.1)	ISP	NAm	CORK-T1	
Steinberger Slough (02b.2)	ISP	NAm	RESH-T2	
Redwood Creek (02b.2)	none	none	none	Not surveyed
B2 North Quadrant (02c)	-	-	-	Split into three sub-areas in 2011 and 2012
B2 North Quadrant West (02c.1a)	ISP	NAm	OBEN-T1	
B2 North Quadrant East (02c.1b)	ISP	NAm	OBEN-T1	
B2 North Quadrant South (02c.2)	ISP	NAm	OBEN-T2	
B2 South Quadrant (02d)	-	-	-	Split into four sub-areas in 2011 and 2012
B2 South Quadrant West (02d.1a)	ISP	NAm	OBES-T1	
B2 South Quadrant East (02d.1b)	ISP	NAm	OBES-T1	
B2 South Quadrant 2 (02d.2)	ISP	NAm	OBES-T1	
B2 South Quadrant 3 (02d.3)	ISP	NAm	OBES-T1	
West Point Slough - NW (02e)	ISP	NAm	WPSN-T1	
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
Middle Bair N (02k)	ISP	NAm	MBE-T1	
Middle Bair SE (02k)	ISP	NAm	MBE-T1	
Inner Bair Island Restoration (02l)	ISP	NAm	IBI-T1	
Pond B3 Bair Island Restoration (02m)	ISP	NAm	OBW-T1	
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	Typically surveyed by PBCS
College of Marin (04b)	ISP	NAm*	UCMC-T1	*surveyed from adjacent site
Piper Park - East (04c)	none	none	none	Not surveyed (presense assumed)
Piper Park - West (04d)	none	none	none	Not surveyed
Larkspur Ferry Landing Area (04e)	none	none	none	Insufficient habitat (2017)
Riviera Circle (04f)	none	none	none	Insufficient habitat (2017)
Creekside Park (04g)	ISP	NAm	CSPK-T1	
CMC - Upper (04h)	ISP	NAm	UCMC-T1	
CMC - Lower (04i)	none	none	none	Not surveyed
CMC - Mouth (04j)	-	-	-	Split into two sub-areas in 2011
CMC - Mouth North (04j.1)	none	none	none	Not surveyed
CMC - Mouth South (04j.2)	ISP	NAm*	HEER	*surveyed from adjacent site
Boardwalk No. 1 (04k)	none	none	none	Not surveyed
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)	DENWR	NAm	MALA-T1	
Coyote Creek - Alameda County (05f)	-	-	-	Grouped into one sub-area by ISP control program
Coyote Creek - Mud Slough (05f)	ISP	NAm*	A21-T1	*surveyed from adjacent site
Coyote Creek - North (05f)	none	none	none	Not surveyed
Coyote Creek Lagoon (05f)	DENWR	NAm	CCL-T1	
Cargill Pond (W Suites Hotel) (05g)	DENWR	NAm	MALA-T1	
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

Sub-area Name (ID)	Survey Organization	Survey Type	Transect	Notes
Area 06: Emeryville Crescent in Bay Bridge North Region				
Emeryville Crescent - East (06a)	ISP	NAm	EMCR-T1	
Emeryville Crescent - West (06b)	ISP	NAm	EMCR-T1	
Area 07: Oro Loma in Hayward Region				
Oro Loma - East (07a)	ISP	NAm	ORLW-T1	
Oro Loma - West (07b)	ISP	NAm	ORLW-T3	
Area 08: Palo Alto Baylands in Dumbarton South Region				
Palo Alto Baylands (08)	-	-	-	Grouped into one sub-area by ISP control program
Palo Alto Baylands (08)	ISP	NAm	PAB	Typically surveyed by PBCS
Palo Alto Harbor (08)	ISP	NAm	PAHA	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	A	unknown	
Breuner Marsh Restoration (10d)	none	none	none	Insufficient habitat (2017)
Area 11: Carquinez Straits in Vallejo Region				
Southampton Marsh (11)	ARA	G	unknown	
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	
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
Charleston Slough (15a.1)	ISP	NAm	MVSL-T1	
Mountain View Slough (15a.1)	ISP	NAm	MVSL-T1	
Stevens Creek to Guadalupe Slough (15a.2)	-	-	-	Grouped into one sub-area by ISP control program
Stevens Creek to Long Point (15a.2)	ISP	NAm	STEV-T1	
Guadalupe to Stevens Bayfront (15a.2)	none	none	none	Not surveyed
Guadalupe Slough (15a.3)	ISP	NAm	GUSL-T1	
Alviso Slough (15a.4)	ISP	NAm	ALSL-T2	
Coyote Creek to Artesian Slough (15a.5)	-	-	-	Grouped into one sub-area by ISP control program
Coyote Creek South East (15a.5)	DENWR	NAm	COYE-T1	
Coyote Creek South Tributary Marsh (15a.5)	none	none	none	Not surveyed
Artesian Slough (15a.5)	none	none	none	Not surveyed
Knapp Tract (15a.6)	none	none	none	Insufficient habitat (2017)
Pond A17 (15a.7)	none	none	none	Not surveyed
Faber/Laumeister (15b)	-	-	-	Grouped into one sub-area by ISP control program
Faber Marsh (15b)	PBCS	NAm	FABE-T1	
Laumeister Marsh (15b)	PBCS	NAm	LAUM-T1	
Stevens Creek (15c)	ISP	NAm	STEV-T1	
Area 16: Cooley Landing in Dumbarton South Region				
Cooley Landing (16)	-	-	-	Split into two sub-areas in 2011
Cooley Landing Central (16.1)	ISP	NAm	COLA-T1	
Cooley Landing East (16.2)	ISP	NAm	COLA-T1	
Area 17: San Leandro Bay in San Leandro Bay Region				
Elsie Roemer (17a)	none	none	none	Insufficient habitat (2017)
Bay Farm Island (17b)	none	none	none	Insufficient habitat (2017)
Arrowhead Marsh (17c)	-	-	-	Split into two sub-areas in 2012
Arrowhead Marsh West (17c.1)	ISP	NAm	ARHE-T2	
Arrowhead Marsh East (17c.2)	ISP	NAm	ARHE-T2	
MLK Shoreline (17d)	-	-	-	Split into five sub-areas in 2011
Airport Channel - Fan Shore (17d.1)	none	none	none	Insufficient habitat (2017)
Airport Channel - MLK Shoreline (17d.2)	none	none	none	Insufficient habitat (2017)
East Creek - MLK Shoreline (17d.3)	none	none	none	Insufficient habitat (2017)
MLK Regional Shoreline - Damon (17d.4)	ISP	NAm	MLKS-T1	
Elmhurst Creek - MLK Shoreline (17d.5)	none	none	none	Insufficient habitat (2017)
San Leandro Creek (17e)	-	-	-	Split into two sub-areas in 2011
San Leandro Creek North (17e.1)	ISP	NAm*	MLKR-T1	*surveyed from adjacent site
San Leandro Creek South (17e.2)	ISP	NAm*	MLKR-T1	*surveyed from adjacent site
Oakland Inner Harbor (17f)	none	none	none	Insufficient habitat (2017)
Coast Guard Is (17g)	none	none	none	Insufficient habitat (2017)
MLK New Marsh (17h)	ISP	NAm	MLKR-T1	
Coliseum Channels (17i)	none	none	none	Insufficient habitat (2017)

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

Sub-area Name (ID)	Survey Organization	Survey Type	Transect	Notes
Bunker Marsh (20g)	ISP	NAm	BUNK-T1	
San Lorenzo Creek (20h)	-	-	-	Split into two sub-areas in 2012
San Lorenzo Creek North (20h.1)	ISP	NAm	SLRZ-T1	
San Lorenzo Creek South (20h.2)	ISP	NAm	SLRZ-T1	
Bockman Channel (20i)	none	none	none	Insufficient habitat (2017)
Sulphur Creek (20j)	none	none	none	Insufficient habitat (2017)
Hayward Landing (20k)	none	none	none	Insufficient habitat (2017)
Johnson's Landing (20l)	none	none	none	Insufficient habitat (2017)
Cogswell - Sec A (20m)	ISP	NAm	COGS-T1	
Cogswell - Sec B (20n)	-	-	-	Split into three sub-areas in 2018
Cogswell - Sec B Bayfront (20n.1)	ISP	NAm	COGS-T3	
Cogswell - Sec B South (20n.2)	ISP	NAm	COGS-T3	
Cogswell - Sec B Main (20n.3)	ISP	NAm	COGS-T3	
Cogswell - Sec C (20o)	ISP	NAm	COGS-T2	
Hayward Shoreline Outliers (20p)	none	none	none	Insufficient habitat (2017)
San Leandro Shoreline Outliers (20q)	none	none	none	Insufficient habitat (2017)
Oakland Airport (20r)	ISP	NAm	OAKA-T1	
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)	none	none	none	Not surveyed
Ideal Marsh - South (21b)	none	none	none	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
San Pablo Marsh East (22b.1)	ISP	NAm	RIF	Typically surveyed by PBCS
San Pablo Marsh West (22b.2)	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
Stege Marsh (22d)	ISP	NAm	STEG-T1	
Meeker Slough (22d)	ISP	NAm	STEG-T1	
Hoffman Marsh (22e)	ISP	NAm	STEG-T1	
Albany Shoreline (22f)	none	none	none	Insufficient habitat (2017)
Area 23: Marin Outliers in Marin and Petaluma Regions				
Brickyard Cove (23a)	none	none	none	Insufficient habitat (2017)
Beach Drive (23b)	none	none	none	Insufficient habitat (2017)
Loch Lomond Marina (23c)	none	none	none	Insufficient habitat (2017)
San Rafael Canal Mouth (23d)	-	-	-	Split into two sub-areas in 2011
San Rafael Canal Mouth East (23d.1)	ISP	NAm	PIPK-T1	
San Rafael Canal Mouth West (23d.2)	ISP	NAm	PIPK-T1	

Sub-area Name (ID)	Survey Organization	Survey Type	Transect	Notes
Muzzi and Martas Marsh (23e)	-	-	-	Grouped into one sub-area by ISP control program
Martas Marsh (23e)	ISP	NAm	MUZZ	Typically surveyed by PBCS
San Clemente Creek (23e)	ISP	NAm	MUZZ	Typically surveyed by PBCS
Muzzi Marsh (23e)	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)	none	none	none	Not surveyed
Sausalito (23k)	none	none	none	Insufficient habitat (2015)
Starkweather Park (23l)	none	none	none	Insufficient habitat (2016)
Novato (23m)	-	-	-	Grouped into one sub-area by ISP control program
Hamilton South (23m)	PBCS	NAm	MIN	
Mitchell Fragment (23m)	PBCS	NAm	MIF	
Santa Venetia (23m)	PBCS	NAm	STVE	
Gallinas Creek North (23m)	PBCS	NAm	GACRN	
McInnis Marsh (23m)	PBCS	NAm	MIM	
Novato Creek Mouth (23m)	PBCS	NAm	NCRM	
Gallinas Creek South (23m)	none	none	none	Not surveyed
Hamilton North (23m)	none	none	none	Not surveyed
Novato Creek Mid Reach (23m)	none	none	none	Not surveyed
Triangle Marsh - Marin (23n)	none	none	none	Insufficient habitat (2017)
China Camp (23o)	PBCS	NAm	CCM	
Petaluma River - Upper (24a)	none	none	none	Not surveyed
Grey's Field (24b)	none	none	none	Not surveyed
Area 24: Petaluma River in Petaluma Region				
Petaluma Marsh (24c)	-	-	-	Grouped into one sub-area by ISP control program
Tule Slough (24c)	PBCS	NAm	TUSL	
False Slough (24c)	PBCS	NAm	TUSL	
Lakeville Marina (24c)	PBCS	NAm	TUSL	
Ellis Creek (24c)	none	none	none	Not surveyed
Petaluma Marsh Expansion Project (24c)	none	none	none	Not surveyed
San Antonio Creek (E) (24c)	none	none	none	Not surveyed
Petaluma River (C) (24c)	none	none	none	Not surveyed
San Antonio Creek (A) (24c)	none	none	none	Not surveyed
Mira Monte Slough (B) (24c)	none	none	none	Not surveyed
Mud Hen Slough (D) (24c)	none	none	none	Not surveyed
Schultz Slough (24c)	none	none	none	Not surveyed
Gambini Marsh (24c)	none	none	none	Not surveyed
Woloki Slough (24c)	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)	PBCS	NAm	DAIS	
Petaluma River - West Side (24d)	PBCS	NAm	GRPT	
Carl's Marsh (24d)	PBCS	NAm	PRM	
Green Point Area Marshes (24d)	PBCS	NAm	GRPT	
Sonoma Marina (24d)	PBCS	NAm*	RMA	*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	
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)	none	none	none	Not surveyed
Pond 2A Restoration (26a)	none	none	none	Not surveyed
Napa Centennial Marsh (26a)	none	none	none	Not surveyed
Bull Island (26a)	none	none	none	Not surveyed
Napa Plant Site Restoration (26a)	none	none	none	Not surveyed
Skaggs Island Bridge / Napa Slough (26a)	none	none	none	Not surveyed
Dutchman Slough Mouth (26a)	none	none	none	Not surveyed
Napa Tract Salt Pond 7 (26a)	none	none	none	Not surveyed
Napa Tract Intake Pond 1A (26a)	none	none	none	Not surveyed
Hudeman Slough (26a)	none	none	none	Not surveyed
Napa Tract Intake Pond 1 (26a)	none	none	none	Not surveyed
Napa Tract Salt Pond 6A (26a)	none	none	none	Not surveyed
Napa Tract Salt Pond 6 (26a)	none	none	none	Not surveyed
Guadacanal Village (26a)	none	none	none	Not surveyed
Dutchman Slough (26a)	none	none	none	Not surveyed
Napa Tract Salt Pond 2 (26a)	none	none	none	Not surveyed
Napa Tract Salt Pond 3 (26a)	none	none	none	Not surveyed
Napa Tract Salt Pond 7A (26a)	none	none	none	Not surveyed
China Slough (26a)	none	none	none	Not surveyed
Devil's Slough (26a)	none	none	none	Not surveyed
Cullinan Ranch (26a)	none	none	none	Not surveyed

Sub-area Name (ID)	Survey Organization	Survey Type	Transect	Notes
San Pablo Bay NWR Shoreline (26b)	none	none	none	Not surveyed
Sonoma Creek (26c)	SPBNWR	NAm	SC-T1,T2	
Sonoma Baylands (26d)	-	-	-	Grouped into one sub-area by ISP control program
Lower Tubbs Island (26d)	SPBNWR	NAm	LTI-T1,T2,T3	
Tolay Creek (26d)	SPBNWR	NAm	TC-T1	
Tubbs Island Restoration (26d)	SPBNWR	NAm	TS-T1	
Petaluma River Mouth (26d)	PBCS	NAm	RMA	
Sonoma Baylands Restoration (26d)	PBCS	NAm	SBR-T1	
Sonoma Baylands East (26d)	SPBNWR	NAm	SMW-T1,T2	
Area 27: Suisun Marshes in Suisun Region				
Point Buckler (27a)	none	none	none	
MOTCO Islands (27b)	none	none	none	
Honker Bay (27c)	none	none	none	

Appendix II: 2018 Survey Station Coordinates in UTM (NAD83, Zone 10)

This page is intentionally left blank.

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

Sub-Area Name (ID)	Transect	Station ID	X-coordinate	Y-coordinate
MARIN REGION				
Creekside Park (04g)	CSPK-T2	CRPA01	540284	4200157
Creekside Park (04g)	CSPK-T2	CRPA04	540477	4200115
Creekside Park (04g)	CSPK-T2	CRPA05	540583	4199940
Creekside Park (04g)	CSPK-T2	CRPA06	540535	4200305
CMC - Upper (04h)	CSPK-T2	UCMC01	539765	4200265
CMC - Upper (04h)	CSPK-T2	UCMC02	539978	4200186
CMC - Upper (04h)	CSPK-T2	UCMC03	540142	4200079
CMC Marsh Reserve (04a)	HEER	CEF01	543102	4199205
CMC Marsh Reserve (04a)	HEER	CEF03	543330	4199066
CMC Marsh Reserve (04a)	HEER	CEF05	543015	4198956
CMC Marsh Reserve (04a)	HEER	CEF13	543351	4199248
CMC Marsh Reserve (04a)	HEER	CEF16	542823	4199275
CMC Marsh Reserve (04a)	HEER	CEF20	543437	4199425
Muzzi Marsh (23e)	MUZZ	MUZZ02	543270	4198714
Muzzi Marsh (23e)	MUZZ	MUZZ04	543198	4198296
Muzzi Marsh (23e)	MUZZ	MUZZ06	543162	4198086
Muzzi Marsh (23e)	MUZZ	MUZZ08	543187	4197605
Muzzi Marsh (23e)	MUZZ	MUZZ09	543380	4197655
Muzzi Marsh (23e)	MUZZ	MUZZ10	543569	4197718
Muzzi Marsh (23e)	MUZZ	MUZZ11	543740	4197849
Muzzi Marsh (23e)	MUZZ	MUZZ12	543657	4197566
Pickleweed Park (9)	PIPK-T1	PIPK01	544265	4202286
Pickleweed Park (9)	PIPK-T1	PIPK02	544239	4202484
Pickleweed Park (9)	PIPK-T1	PIPK03	544183	4202641
San Rafael Canal Mouth (23d)	PIPK-T1	SRCM01	544244	4202876
San Rafael Canal Mouth (23d)	PIPK-T1	SRCM02	544370	4202758
SAN FRANCISCO PENINSULA REGION				
Pier 98/Heron's Head (12b)	HEHE-T1	HEHE01	555235	4176946
Pier 98/Heron's Head (12b)	HEHE-T1	HEHE02	555429	4176923
Sanchez Marsh (19k)	SANC-T1	PAF01	556703	4160468
Sanchez Marsh (19k)	SANC-T1	SANC03	557028	4160398
Sanchez Marsh (19k)	SANC-T1	SANC04	557215	4160382
Sanchez Marsh (19k)	SANC-T1	SANC05	556844	4160430
Seal Slough (19p)	SEAL-T1	SEAL01	562560	4158484
Seal Slough (19p)	SEAL-T1	SEAL03	562728	4158450
Seal Slough (19p)	SEAL-T1	SEAL04	562857	4158548
Seal Slough (19p)	SEAL-T1	SEAL05	562861	4158725
Seal Slough (19p)	SEAL-T1	SEAL07	562432	4158448
SFO (19h)	SFO-T1	SFO04	555438	4163237
SFO (19h)	SFO-T1	SFO05	555203	4162889
SFO (19h)	SFO-T1	SFO06	555111	4162711
SFO (19h)	SFO-T1	SFO07	555019	4162530

Sub-Area Name (ID)	Transect	Station ID	X-coordinate	Y-coordinate
SAN MATEO REGION				
Belmont Slough (02a)	BELM-T1	BELM01	566369	4156426
Belmont Slough (02a)	BELM-T1	BELM02	566069	4156168
Belmont Slough (02a)	BELM-T1	BELM03	565966	4155996
Belmont Slough (02a)	BELM-T1	BELM04	565882	4155814
Belmont Slough (02a)	BELM-T1	BELM05	565895	4155614
Belmont Slough (02a)	BELM-T1	BELM06	565938	4155419
Belmont Slough (02a)	BELM-T1	BELM07	566028	4155239
Belmont Slough (02a)	BELM-T1	BELM08	565828	4155213
Corkscrew Slough (02b)	CORK-T1	CORK01	569367	4153611
Corkscrew Slough (02b)	CORK-T1	CORK02a	569244	4153305
Corkscrew Slough (02b)	CORK-T1	CORK03	568904	4152988
Corkscrew Slough (02b)	CORK-T1	CORK04	568894	4152635
Corkscrew Slough (02b)	CORK-T1	CORK05	568642	4152904
Corkscrew Slough (02b)	CORK-T1	CORK06	568356	4153005
Greco Island - North (02f)	GRIN-T1	GRIN11	570647	4153106
Greco Island - North (02f)	GRIN-T1	GRIN12	570811	4152993
Greco Island - North (02f)	GRIN-T1	GRIN13	570976	4152877
Greco Island - North (02f)	GRIN-T1	GRIN14	571140	4152762
Greco Island - North (02f)	GRIN-T1	GRIN15	571306	4152647
Greco Island - North (02f)	GRIN-T1	GRIN16	571471	4152533
Greco Island - North (02f)	GRIN-T1	GRIN17	571635	4152418
Greco Island - North (02f)	GRIN-T1	GRIN18	571800	4152305
Greco Island - South (02h)	GRIS-T1	GRIS01	573018	4150394
Greco Island - South (02h)	GRIS-T1	GRIS02	573016	4150596
Greco Island - South (02h)	GRIS-T1	GRIS03	573015	4150799
Greco Island - South (02h)	GRIS-T1	GRIS04	573014	4150998
Greco Island - South (02h)	GRIS-T1	GRIS05	572969	4151193
Greco Island - South (02h)	GRIS-T1	GRIS06	572825	4151345
Inner Bair Island Restoration (02l)	IBI-T1	IBI11	567713	4150454
Inner Bair Island Restoration (02l)	IBI-T1	IBI13	567298	4150636
Inner Bair Island Restoration (02l)	IBI-T1	IBI15	567004	4150939
Inner Bair Island Restoration (02l)	IBI-T1	IBI17	566763	4151267
Deepwater Slough (02k)	MBE-T1	MBE01	569714	4153286
Deepwater Slough (02k)	MBE-T1	MBE02	569544	4153178
Deepwater Slough (02k)	MBE-T1	MBE03	569366	4153061
Deepwater Slough (02k)	MBE-T1	MBE04	569249	4152883
Deepwater Slough (02k)	MBE-T1	MBE05	569153	4152697
Middle Bair SE (02k)	MBE-T1	MBSE02	568726	4151546
Middle Bair SE (02k)	MBE-T1	MBSE04	568800	4151947
Middle Bair SE (02k)	MBE-T1	MBSE06	568955	4152326
B2 North Quadrant (02c)	OBEN-T1	OBE12	569256	4154869
B2 North Quadrant (02c)	OBEN-T1	OBE14	569206	4154429
B2 North Quadrant (02c)	OBEN-T1	OBE16	568775	4154924
B2 North Quadrant (02c)	OBEN-T2	OBE06	569311	4154036
B2 North Quadrant (02c)	OBEN-T2	OBE09	568814	4154381
B2 North Quadrant (02c)	OBEN-T2	OBE11	568471	4154620
B2 North Quadrant (02c)	OBEN-T2	OBE19	568408	4155098
B2 South Quadrant (02d)	OBES-T1	OBE04	569963	4154250

Sub-Area Name (ID)	Transect	Station ID	X-coordinate	Y-coordinate
SAN MATEO REGION (continued)				
B2 South Quadrant (02d)	OBES-T1	OBE22	569611	4154402
B2 South Quadrant (02d)	OBES-T1	OBE23	569663	4154619
B2 South Quadrant (02d)	OBES-T1	OBE25	569779	4155053
B2 South Quadrant (02d)	OBES-T1	OBE26	569843	4154667
B2 South Quadrant (02d)	OBES-T1	OBE27	569990	4154545
B2 South Quadrant (02d)	OBES-T1	OBES24	569733	4154871
Pond B3 Bair Island Restoration (02m)	OBW-T1	OBW01	567882	4154015
Pond B3 Bair Island Restoration (02m)	OBW-T1	OBW02	567997	4154227
Pond B3 Bair Island Restoration (02m)	OBW-T1	OBW03	568180	4154348
Pond B3 Bair Island Restoration (02m)	OBW-T1	OBW04	568467	4154287
Pond B3 Bair Island Restoration (02m)	OBW-T1	OBW05	568469	4154054
Pond B3 Bair Island Restoration (02m)	OBW-T1	OBW06	568470	4153817
Pond B3 Bair Island Restoration (02m)	OBW-T1	OBW07	568471	4153575
Pond B3 Bair Island Restoration (02m)	OBW-T1	OBW08	568471	4153347
Ravenswood Slough (02i)	RAV-T1	RAV02	575826	4149650
Ravenswood Slough (02i)	RAV-T1	RAV03	575665	4149768
Ravenswood Slough (02i)	RAV-T1	RAV04	575468	4149813
Ravenswood Slough (02i)	RAV-T1	RAV05	575260	4149863
Ravenswood Slough (02i)	RAV-T1	RAV06	574884	4150110
Ravenswood Slough (02i)	RAV-T1	RAV09	574950	4149885
Ravenswood Slough (02i)	RAV-T1	RAV10	574806	4150724
Steinberger Slough (02b)	RESH-T2	RESH13	567756	4154757
Steinberger Slough (02b)	RESH-T2	RESH14	567816	4154983
Steinberger Slough (02b)	RESH-T2	RESH15	567780	4154559
Steinberger Slough (02b)	RESH-T2	RESH16	567956	4155133
Steinberger Slough (02b)	RESH-T2	RESH17	568105	4155282
Steinberger Slough (02b)	RESH-T2	RESH18	568239	4155444
West Point Slough - NW (02e)	WPSN-T1	WPSN03	571586	4151985
West Point Slough - SW / E (02g)	WPSS-T1	WPSS09	572707	4150059
West Point Slough - SW / E (02g)	WPSS-T1	WPSS10	572706	4149686
West Point Slough - SW / E (02g)	WPSS-T1	WPSS11	572704	4149455
West Point Slough - SW / E (02g)	WPSS-T1	WPSS12	572561	4149237
DUMBARTON SOUTH REGION				
Island Ponds - A21 (05i)	A21-T1	A21-1	589676	4146880
Island Ponds - A21 (05i)	A21-T1	A21-2	589848	4146987
Island Ponds - A21 (05i)	A21-T1	A21-3	590549	4147430
Island Ponds - A21 (05i)	A21-T1	A21-4	589991	4147127
Island Ponds - A21 (05i)	A21-T1	A21-5	590110	4147286
Island Ponds - A21 (05i)	A21-T1	A21-6	590276	4147430
Island Ponds - A21 (05i)	A21-T1	A21-7	590658	4147236
Island Ponds - A21 (05i)	A21-T1	A21-8	590646	4147026
Alviso Slough (15a)	ALSL-T2	MAL01	586761	4146451
Alviso Slough (15a)	ALSL-T2	MAL02	586668	4146281
Alviso Slough (15a)	ALSL-T2	MAL04	586898	4145918
Alviso Slough (15a)	ALSL-T2	MAL06	586942	4145527
Alviso Slough (15a)	ALSL-T2	MAL07	587021	4146548
Alviso Slough (15a)	ALSL-T2	MAL08	587328	4146607
Alviso Slough (15a)	ALSL-T2	MAL09	587646	4146656
Alviso Slough (15a)	ALSL-T2	MAL10	587905	4146704

Sub-Area Name (ID)	Transect	Station ID	X-coordinate	Y-coordinate
DUMBARTON SOUTH REGION (continued)				
Calaveras Point (05a)	CAPT-T1	CAPT08	586510	4147007
Calaveras Point (05a)	CAPT-T1	CAPT09	586281	4146933
Calaveras Point (05a)	CAPT-T1	CAPT10	586088	4146915
Calaveras Point (05a)	CAPT-T1	CAPT11	585889	4146857
Calaveras Point (05a)	CAPT-T1	CAPT12	585689	4146818
Calaveras Point (05a)	CAPT-T1	CAPT13	585492	4146774
Calaveras Point (05a)	CAPT-T1	CAPT14a	585333	4146717
Cooley Landing (16)	COLA-T1	COLA05	576891	4148770
Cooley Landing (16)	COLA-T1	COLA06	576956	4148944
Cooley Landing (16)	COLA-T1	COLA07	577129	4149051
Cooley Landing (16)	COLA-T1	COLA08	577293	4149164
Cooley Landing (16)	COLA-T1	COLA09	576775	4148568
Cooley Landing (16)	COLA-T1	COLA10	576825	4148373
Cooley Landing (16)	COLA-T1	COLA11	576961	4148238
Cooley Landing (16)	COLA-T1	COLA12	577112	4148090
Guadalupe Slough (15a)	GUSL-T1	GUSL02	587891	4143002
Guadalupe Slough (15a)	GUSL-T1	GUSL03	587773	4143515
Guadalupe Slough (15a)	GUSL-T1	GUSL04	587365	4143596
Guadalupe Slough (15a)	GUSL-T1	GUSL05	586585	4143375
Guadalupe Slough (15a)	GUSL-T1	GUSL06	585318	4144262
Guadalupe Slough (15a)	GUSL-T1	GUSL07	585019	4144717
Guadalupe Slough (15a)	GUSL-T1	GUSL08	585795	4144766
Guadalupe Slough (15a)	GUSL-T1	GUSL09	585184	4144825
Mowry Marsh North (05a)	MOWN-T1	MOSL10	581198	4151329
Mowry Marsh North (05a)	MOWN-T1	MOSL12	581587	4151341
Mowry Marsh North (05a)	MOWN-T1	MOSL14	581968	4151220
Mowry Marsh North (05a)	MOWN-T1	MOSL16	582349	4151098
Mowry Marsh North (05a)	MOWN-T1	MOSL18	582734	4150973
Mowry Marsh North (05a)	MOWN-T1	MOSL20	583117	4150850
Mowry Marsh North (05a)	MOWN-T1	MOSL22	583484	4150697
Mowry Marsh North (05a)	MOWN-T1	MOSL24	583816	4150474
Charleston Slough (15a)	MVSL-T1	CHSL01	580426	4145106
Charleston Slough (15a)	MVSL-T1	CHSL03	580657	4145153
Charleston Slough (15a)	MVSL-T1	CHSL04	580414	4144826
Mountain View Slough (15a)	MVSL-T1	MVSL04	581043	4145153
Mountain View Slough (15a)	MVSL-T1	MVSL05	581422	4145011
Newark Slough (05c)	NEWS-T1	NEW02	581705	4154094
Newark Slough (05c)	NEWS-T1	NEW03	581878	4153982
Newark Slough (05c)	NEWS-T1	NEW04	582059	4153878
Newark Slough (05c)	NEWS-T1	NEW05	582040	4153642
Newark Slough (05c)	NEWS-T1	NEW06	582159	4153474
Newark Slough (05c)	NEWS-T1	NEW07	582333	4153544
Newark Slough (05c)	NEWS-T1	NEW09	581635	4154254
Palo Alto Baylands (8)	PAB	PAB07	578542	4146295
Palo Alto Baylands (8)	PAB	PAB14	578746	4146217
Palo Alto Baylands (8)	PAB	PAB16	579129	4146185
Palo Alto Baylands (8)	PAB	PAB17	579308	4146093
Palo Alto Baylands (8)	PAB	PAB18	579124	4146384
Palo Alto Baylands (8)	PAB	PAB19	578494	4146491
Palo Alto Baylands (8)	PAB	PAB20	578214	4146646

Sub-Area Name (ID)	Transect	Station ID	X-coordinate	Y-coordinate
DUMBARTON SOUTH REGION (continued)				
Palo Alto Harbor (8)	PAHA	PAHA01	579302	4145979
Palo Alto Harbor (8)	PAHA	PAHA02	578898	4145912
Palo Alto Harbor (8)	PAHA	PAHA03	578873	4145418
Palo Alto Harbor (8)	PAHA	PAHA04	579282	4145587
Palo Alto Harbor (8)	PAHA	PAHA05	579627	4145741
Palo Alto Harbor (8)	PAHA	PAHA06	579993	4145586
Plummer Creek Mitigation (05h)	PLCM-T1	PLCM01	583615	4152372
Plummer Creek Mitigation (05h)	PLCM-T1	PLCM02	583484	4152202
Plummer Creek Mitigation (05h)	PLCM-T1	PLCM03	583517	4152021
Stevens Creek to Long Point (15a)	STEV-T1	LONG09	582630	4144724
Stevens Creek to Long Point (15a)	STEV-T1	LONG10	582401	4144385
Stevens Creek to Long Point (15a)	STEV-T1	LONG11	582369	4144019
Stevens Creek (15c)	STEV-T1	STEV01	582431	4143425
Stevens Creek (15c)	STEV-T1	STEV02	582421	4143224
UNION CITY REGION				
AFCC - Pond 3 (01a)	AFCP-T3	AFCP02	576726	4157943
AFCC - Pond 3 (01f)	AFCP-T3	AFCP04	576913	4158254
AFCC - Pond 3 (01f)	AFCP-T3	AFCP06	577134	4158519
AFCC - Pond 3 (01f)	AFCP-T3	AFCP08	577453	4158695
AFCC - Pond 3 (01f)	AFCP-T3	AFCP10	577812	4158729
AFCC - Pond 3 (01f)	AFCP-T3	AFCP12	578156	4158628
AFCC - Pond 3 (01f)	AFCP-T3	AFCP14	578481	4158477
Eden Landing - Mt Eden Creek (13j)	EDEN-T1	EDEN01	576480	4163098
Eden Landing - Mt Eden Creek (13j)	EDEN-T1	EDEN02	576489	4162896
Eden Landing - Mt Eden Creek (13j)	EDEN-T1	EDEN03	576430	4162704
Eden Landing - Mt Eden Creek (13j)	EDEN-T1	EDEN04	576379	4162512
Eden Landing - Mt Eden Creek (13j)	EDEN-T1	EDEN05	576179	4162480
Eden Landing - Mt Eden Creek (13j)	EDEN-T1	EDEN06	575980	4162529
Eden Landing - Mt Eden Creek (13j)	EDEN-T1	WTN11	575778	4162563
Eden Landing Reserve - South (13k)	ELRS-T1	ELRS01	578202	4163533
Eden Landing Reserve - South (13k)	ELRS-T1	ELRS02	578057	4163383
Eden Landing Reserve - South (13k)	ELRS-T1	ELRS03	577994	4163189
Eden Landing Reserve - South (13k)	ELRS-T1	ELRS04	578001	4162988
Eden Landing Reserve - South (13k)	ELRS-T1	ELRS05	578422	4163525
Eden Landing Reserve - South (13k)	ELRS-T1	ELRS06	578540	4163362
Eden Landing Reserve - South (13k)	ELRS-T1	ELRS07	578657	4163200
Eden Landing Reserve - South (13k)	ELRS-T1	ELRS08	578777	4163039
OAC (13a 13b 13c)	OAC-T2	ALCK10	577579	4161047
OAC (13a 13b 13c)	OAC-T2	ALCK11	577774	4161008
OAC (13a 13b 13c)	OAC-T2	ALCK12	577954	4160949
OAC (13a 13b 13c)	OAC-T2	ALCK13	578133	4160880
OAC (13a 13b 13c)	OAC-T2	ALCK14	578290	4160821
OAC (13a 13b 13c)	OAC-T2	ALCK15	578491	4160791
OAC (13a 13b 13c)	OAC-T2	ALCK16	578684	4160842
OAC (13a 13b 13c)	OAC-T2	ALCK17	578837	4160946
OAC (13a 13b 13c)	OAC-T2	ALCK18	578983	4161058
OAC (13a 13b 13c)	OAC-T3	ALCK19	579146	4161152
OAC (13a 13b 13c)	OAC-T3	ALCK20	579342	4161159
OAC (13a 13b 13c)	OAC-T3	ALCK21	579538	4161155

Sub-Area Name (ID)	Transect	Station ID	X-coordinate	Y-coordinate
UNION CITY REGION (continued)				
OAC (13a 13b 13c)	OAC-T3	ALCK22	579723	4161150
OAC (13a 13b 13c)	OAC-T3	ALCK23	579901	4161149
OAC (13a 13b 13c)	OAC-T3	ALCK24	580056	4161217
OAC (13a 13b 13c)	OAC-T3	ALCK25	580098	4161389
OAC (13a 13b 13c)	OAC-T3	ALCK26	580095	4161571
OAC (13a 13b 13c)	OAC-T3	ALCK27	580088	4161744
Whale's Tail - North (13d)	WTN-T1	WTN10	575754	4162376
Whale's Tail - North (13d)	WTN-T1	WTN4	575865	4161341
Whale's Tail - North (13d)	WTN-T1	WTN5	575886	4161530
Whale's Tail - North (13d)	WTN-T1	WTN6	575813	4161676
Whale's Tail - North (13d)	WTN-T1	WTN7	575771	4161849
Whale's Tail - North (13d)	WTN-T1	WTN8	575767	4162027
Whale's Tail - North (13d)	WTN-T1	WTN9	575762	4162212
Whale's Tail - South (13e)	WTS-T1	WTS22	575754	4159900
Whale's Tail - South (13e)	WTS-T1	WTS23	575792	4160057
Whale's Tail - South (13e)	WTS-T1	WTS24	575813	4160265
Whale's Tail - South (13e)	WTS-T1	WTS28	575489	4161055
Whale's Tail - South (13e)	WTS-T1	WTS29	575688	4161029
Whale's Tail - South (13e)	WTS-T1	WTS30	575854	4160992
Whale's Tail - South (13e)	WTS-T1	WTS31	575960	4160824
Whale's Tail - South (13e)	WTS-T1	WTS32	575969	4160626
Whale's Tail - South (13e)	WTS-T1	WTS33	575857	4160461
HAYWARD REGION				
Bunker Marsh (20g)	BUNK-T1	BUNK01	573456	4170331
Bunker Marsh (20g)	BUNK-T1	BUNK02	573507	4170104
Bunker Marsh (20g)	BUNK-T1	BUNK03	573561	4169912
Bunker Marsh (20g)	BUNK-T1	BUNK04	573631	4169725
North Marsh (20f)	BUNK-T1	NORT08	573588	4170397
San Lorenzo Creek (20h)	BUNK-T1	SLRZ01	573737	4169556
Citation Marsh (20d)	CITA-T1	CITA01	573661	4170466
Citation Marsh (20d)	CITA-T1	CITA02	573555	4170639
Citation Marsh (20d)	CITA-T1	CITA03	573435	4170800
Citation Marsh (20d)	CITA-T1	CITA04	573314	4170961
Citation Marsh (20d)	CITA-T1	CITA05	573318	4171265
Citation Marsh (20d)	CITA-T1	CITA06	573316	4171466
Citation Marsh (20d)	CITA-T1	CITA07	573314	4171666
Cogswell - Sec C (20o)	COGS-T2	COGS08	574984	4165788
Cogswell - Sec C (20o)	COGS-T2	COGS09	575124	4165612
Cogswell - Sec C (20o)	COGS-T2	COGS10	575138	4165412
Cogswell - Sec C (20o)	COGS-T2	COGS11	575105	4165165
Cogswell - Sec C (20o)	COGS-T2	COGS12	574791	4165248
Cogswell - Sec C (20o)	COGS-T2	COGS13	574779	4165542
Cogswell - Sec C (20o)	COGS-T2	COGS14	574781	4165740
Cogswell - Sec C (20o)	COGS-T2	JOLA04	574909	4165104
Cogswell - Sec B (20n)	COGS-T3	COGS15	575367	4165223
Cogswell - Sec B (20n)	COGS-T3	COGS16	575572	4165228
Cogswell - Sec B (20n)	COGS-T3	COGS17	575710	4165373
Cogswell - Sec B (20n)	COGS-T3	COGS18	575620	4165538
Cogswell - Sec B (20n)	COGS-T3	COGS19	575531	4165722

Sub-Area Name (ID)	Transect	Station ID	X-coordinate	Y-coordinate
	HAYWARD REGION			
Cogswell - Sec B (20n)	COGS-T3	COGS20	575436	4165912
Cogswell - Sec B (20n)	COGS-T3	COGS21	575340	4166092
Cogswell - Sec A (20m)	COGS-T4	COGS01	574738	4166041
Cogswell - Sec A (20m)	COGS-T4	COGS02	574713	4166250
Cogswell - Sec A (20m)	COGS-T4	COGS03	574862	4166363
Cogswell - Sec A (20m)	COGS-T4	COGS04	575059	4166368
Cogswell - Sec A (20m)	COGS-T4	COGS05	575218	4166336
Cogswell - Sec A (20m)	COGS-T4	COGS06	575158	4166170
Cogswell - Sec A (20m)	COGS-T4	COGS07	575043	4166004
Triangle Marsh - Hayward (20w)	COGS-T4	TRMA02	574714	4166471
HARD Marsh (20s)	HARD-T1	HARD01	575252	4164654
HARD Marsh (20s)	HARD-T1	HARD02	575438	4164560
HARD Marsh (20s)	HARD-T1	HARD03	575619	4164493
HARD Marsh (20s)	HARD-T1	HARD04	575816	4164414
HARD Marsh (20s)	HARD-T1	HARD05	575988	4164619
HARD Marsh (20s)	HARD-T1	JOLA02	575064	4164736
Dogbone Marsh (20c)	NORT-T1	DOGB01	572695	4170847
North Marsh (20f)	NORT-T1	NORT01	573097	4171251
North Marsh (20f)	NORT-T1	NORT02	572949	4171118
North Marsh (20f)	NORT-T1	NORT03	572920	4170920
North Marsh (20f)	NORT-T1	NORT04	572877	4170757
North Marsh (20f)	NORT-T1	NORT05	572997	4170591
North Marsh (20f)	NORT-T1	NORT06	573168	4170488
Oakland Airport (20r)	OAKA-T1	OAKA01	566746	4175486
Oakland Airport (20r)	OAKA-T1	OAKA02	566898	4175357
Oakland Airport (20r)	OAKA-T1	OAKA03	567055	4175234
Oro Loma - East (07a)	ORLW-T1	ORLW16	574840	4168558
Oro Loma - East (07a)	ORLW-T1	ORLW17	574749	4168949
Oro Loma - East (07a)	ORLW-T1	ORLW18	574912	4169047
Oro Loma - East (07a)	ORLW-T1	ORLW19	575313	4169028
Oro Loma - East (07a)	ORLW-T1	ORLW20	575474	4168815
Oro Loma - East (07a)	ORLW-T1	ORLW21	575441	4168567
Oro Loma - East (07a)	ORLW-T1	ORLW22	574705	4168708
Oro Loma - West (07b)	ORLW-T3	ORLW01	574936	4168382
Oro Loma - West (07b)	ORLW-T3	ORLW02	575023	4168204
Oro Loma - West (07b)	ORLW-T3	ORLW03	574972	4168062
Oro Loma - West (07b)	ORLW-T3	ORLW04	574771	4168057
Oro Loma - West (07b)	ORLW-T3	ORLW05	574584	4168057
Oro Loma - West (07b)	ORLW-T3	ORLW06	574382	4168054
Oro Loma - West (07b)	ORLW-T3	ORLW07	574308	4168235
San Lorenzo Creek (20h)	SLRZ-T1	SLRZ03	573943	4169633
San Lorenzo Creek (20h)	SLRZ-T1	SLRZ04	574138	4169774
San Lorenzo Creek (20h)	SLRZ-T1	SLRZ05	574277	4169889
San Lorenzo Creek (20h)	SLRZ-T1	SLRZ07	573896	4169503
San Lorenzo Creek (20h)	SLRZ-T1	SLRZ08	573955	4169323

Sub-Area Name (ID)	Transect	Station ID	X-coordinate	Y-coordinate
SAN LEANDRO BAY REGION				
Arrowhead Marsh (17c)	ARHE-T2	ARHE01	569510	4177535
Arrowhead Marsh (17c)	ARHE-T2	ARHE04	569262	4177549
Arrowhead Marsh (17c)	ARHE-T2	ARHE05	569146	4177718
Arrowhead Marsh (17c)	ARHE-T2	ARHE06	569063	4177898
Fan Marsh (17j)	FANM-T1	FANM01	568582	4177668
Fan Marsh (17j)	FANM-T1	FANM05	568410	4177818
Fan Marsh (17j)	FANM-T1	FANM03	568635	4177820
MLK New Marsh (17h)	MLKR-T1	MLKR01	569671	4177003
MLK New Marsh (17h)	MLKR-T1	MLKR02	569622	4177196
MLK New Marsh (17h)	MLKR-T1	MLKR03	569706	4177372
MLK New Marsh (17h)	MLKR-T1	MLKR04	569712	4177546
MLK New Marsh (17h)	MLKR-T1	MLKR05	569837	4177413
MLK New Marsh (17h)	MLKR-T1	MLKR06	569948	4177254
MLK New Marsh (17h)	MLKR-T1	MLKR07	570046	4177104
MLK Regional Shoreline (17d)	MLKS-T1	MLKS09	569336	4178901
MLK Regional Shoreline (17d)	MLKS-T1	MLKS10	569456	4178741
MLK Regional Shoreline (17d)	MLKS-T1	MLKS11	569515	4178546
BAY BRIDGE NORTH REGION				
Emeryville Crescent - West (06b)	EMCR-T1	EMCR02	560250	4186896
Emeryville Crescent - West (06b)	EMCR-T1	EMCR03	560177	4186720
Emeryville Crescent - West (06b)	EMCR-T1	EMCR04	560358	4186670
Emeryville Crescent - West (06b)	EMCR-T1	EMCR05	560565	4186723
Emeryville Crescent - West (06b)	EMCR-T1	EMCR06	560742	4186744
Emeryville Crescent - East (06a)	EMCR-T1	EMCR07	560954	4186746
Whittel Marsh (10a)	PTPN-T1	PTPN01	556260	4206711
Whittel Marsh (10a)	PTPN-T1	PTPN02	556460	4206771
Whittel Marsh (10a)	PTPN-T1	PTPN03	556645	4206685
Whittel Marsh (10a)	PTPN-T1	PTPN04	556830	4206771
Rheem Creek Area (22c)	RCRA-T1	RCRA03	555821	4203918
Rheem Creek Area (22c)	RCRA-T1	RCRA04	555895	4204106
Rheem Creek Area (22c)	RCRA-T1	RCRA05	555917	4204343
Rheem Creek Area (22c)	RCRA-T1	RCRA12	555741	4203735
San Pablo Marsh (22b)	RIF	RCRA06	555455	4203421
San Pablo Marsh (22b)	RIF	RIF03	555123	4202989
San Pablo Marsh (22b)	RIF	RIF09	554287	4203087
San Pablo Marsh (22b)	RIF	RIF10	554704	4203067
San Pablo Marsh (22b)	RIF	RIF11	555284	4203315
Hoffman Marsh (22e)	STEG-T1	HOM06	559640	4195672
Hoffman Marsh (22e)	STEG-T1	HOM07	559818	4195374
Hoffman Marsh (22e)	STEG-T1	HOM08	560031	4195055
Stege Marsh (22d)	STEG-T1	MEEK03	558280	4196127
Stege Marsh (22d)	STEG-T1	MEEK04	558463	4196076
Stege Marsh (22d)	STEG-T1	MEEK05	558183	4195946
Stege Marsh (22d)	STEG-T1	MEEK06	558770	4195989
Stege Marsh (22d)	STEG-T1	MEEK07	559080	4195902
Wildcat Marsh (22a)	WIMA	WIMA02	553708	4201035
Wildcat Marsh (22a)	WIMA	WIMA03	553655	4201231
Wildcat Marsh (22a)	WIMA	WIMA04	553598	4201446
Wildcat Marsh (22a)	WIMA	WIMA05	553731	4201639

Sub-Area Name (ID)	Transect	Station ID	X-coordinate	Y-coordinate
BAY BRIDGE NORTH REGION (continued)				
Wildcat Marsh (22a)	WIMA	WIMA06	553891	4201784
Wildcat Marsh (22a)	WIMA	WIMA07	554041	4201921
Wildcat Marsh (22a)	WIMA	WIMA08	554207	4202077
Wildcat Marsh (22a)	WIMA	WIMA09	553759	4200843

This page is intentionally left blank.

Appendix III: 2018 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** = Protocol NAm: North American Secretive Marsh Bird transect survey (AKA Site-specific Protocol and 2-species (2S) survey)
- **Adj*** = Surveyed from an adjacent site and transect

Key to Observer

- **AE** = Anastasia Ennis
- **BO =** Brian Ort
- **JH** = Jeanne Hammond
- **JM** = Jen McBroom
- **KE** = Kevin Eng
- **ND** = Nate Deakers
- **PL** = Pim Laulikitnont
- **SG** = Simon Gunner
- **SC** = Stephanie Chen
- **TR** = Tobias Rohmer

This page is intentionally left blank.

MARIN REGION

Site Name (ID)	Protocol	Round 1					Round 2					Round 3					Notes
		Date	Observer	Temp (°F)	Wind (mph)	# RIRA	Date	Observer	Temp (°F)	Wind	# RIRA	Date	Observer	Temp (°F)	Wind (mph)	# RIRA	
CMC Marsh Reserve (04a)	NAm	2/2/2018	AE	49	0	6	2/20/2018	AE	50	6	14	3/15/2018	KS	45	1.7	**17**	
College of Marin	NAm	2/2/2018	SG	47	0	0	2/20/2018	ND	49	2	0	3/15/2018	PL	41	0	0	Unsuitable habitat, but surveyed as part of UCMC-T1
Creekside Park (04g)	NAm	2/2/2018	SG	47	0	4	2/20/2018	ND	49	2	6	3/15/2018	PL	41	0	**8**	
CMC - Upper (04h)	NAm	2/2/2018	SG	47	0	2	2/20/2018	ND	49	2	0	3/15/2018	PL	41	0	**6**	
CMC - Mouth (04j)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	reduced effort in 2018 (surveyed from adjacent transect [HEER])
CMC - Mouth North (04j.1)	none	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	ISP sub-area split for 2011 BO
CMC – Mouth South (04j.2)	adj*	2/2/2018	AE	49	0	0	2/20/2018	AE	50	6	0	3/15/2018	KS	45	1.7	0	ISP sub-area split for 2011 BO
Pickleweed Park (09)	NAm	1/23/2018	PL	55	2	**5**	2/13/2018	TR	39	1	2	3/6/2018	AE	43	0	1	
San Rafael Canal Mouth (23d)	NAm	1/23/2018	PL	55	2	0	2/13/2018	TR	39	1	**1**	3/6/2018	AE	43	0	0	
San Rafael Canal Mouth East (23d.1)	NAm	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	ISP sub-area split for 2011 BO
San Rafael Canal Mouth West (23d.2)	NAm	-	-	-	-	0	-	-	-	-	1	-	-	-	-	0	ISP sub-area split for 2011 BO
Muzzi/Martas Marsh (23e)	NAm	2/2/2018	-	-	-	34	2/20/2018	-	-	-	12	3/15/2018	-	-	-	**35**	Grouped into one sub-area by ISP control program
Martas Marsh (23e)	NAm	2/2/2018	JH	48	0	**10**	2/20/2018	TR	50	4.8	3	3/15/2018	SC	40	1.2	5	
Muzzi Marsh (23e)	NAm	2/2/2018	JH	48	0	24	2/20/2018	TR	50	4.8	9	3/15/2018	SC	40	1.2	**30**	
San Clemente Creek (23e)	NAm	2/2/2018	JH	48	0	0	2/20/2018	TR	50	4.8	0	3/15/2018	SC	40	1.2	0	

SAN FRANCISCO PENINSULA REGION

Site Name (ID)	Protocol	Round 1					Round 2					Round 3					Notes
		Date	Observer	Temp (°F)	Wind (mph)	# RIRA	Date	Observer	Temp (°F)	Wind (mph)	# RIRA	Date	Observer	Temp (°F)	Wind (mph)	# RIRA	
Pier 98/Heron's Head (12b)	NAm	1/30/2018	BO	57	4	0	2/16/2018	PL	55	0.7	0	4/3/2018	TR	49	3.2	0	
SFO (19h)	NAm	1/19/2018	TR	72	3	1	2/12/2018	AE	48	9	0	3/2/2018	PL	45	1.8	**4**	
Sanchez Marsh (19k)	NAm	1/30/2018	PL	63	0	0	2/15/2018	AE	49	0	0	3/5/2018	PL	39	0	0	
Seal Slough (19p)	NAm	1/15/2018	BO	59	4	0	2/6/2018	BO	53	2	**1**	3/5/2018	AE	31	0	0	
Seal Slough Central (19p.1)	NAm	-	-	-	-	0	-	-	-	-	**1**	-	-	-	-	0	ISP sub-area split for 2011 BO
Seal Slough Peripheral (19p.2)	NAm	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	ISP sub-area split for 2011 BO

SAN MATEO REGION

Site Name (ID)	Protocol	Round 1					Round 2					Round 3					Notes
		Date	Observer	Temp (°F)	Wind (mph)	# RIRA	Date	Observer	Temp (°F)	Wind (mph)	# RIRA	Date	Observer	Temp (°F)	Wind (mph)	# RIRA	
Belmont Slough (02a)	NAm	1/18/2018	AE	52	2	3	2/1/2018	PL	73	2.5	**9**	3/15/2018	BO	52	2.8	2	Split into three sub-areas in 2011 and 2012
Belmont Slough Mourth (02a.1a)	NAm	-	-	-	-	0	-	-	-	-	0	-	-	-	-	2	
Belmont Slough South (02a.1b)	NAm	-	-	-	-	1	-	-	-	-	**7**	-	-	-	-	0	
Belmont Slough to Steinberger (02a.2)	NAm	-	-	-	-	2	-	-	-	-	**2**	-	-	-	-	0	
Corkscrew Slough (02b.1)	NAm	2/5/2018	PL	72	1.1	**17**	3/6/2018	BO	63	2.1	10	3/27/2018	KE	46	2.5	16	
Steinberger Slough (02b.2)	NAm	1/17/2018	AE	55	0	**2**	2/1/2018	BO	65	2.5	1	3/13/2018	BO	62	6.1	**2**	
B2 North Quadrant (02c)	NAm	1/23/2018	TR	59	2.6	28	2/6/2018	SC	71	0	**38**	3/7/2018	BO	58	5	28	Split into three sub-areas in 2011 and 2012
B2 North Quadrant West (02c.1a)	NAm	-	-	-	-	12	-	-	-	-	**15**	-	-	-	-	10	
B2 North Quadrant East (02c.1b)	NAm	-	-	-	-	14	-	-	-	-	**21**	-	-	-	-	17	
B2 North Quadrant South (02c.2)	NAm	-	-	-	-	2	-	-	-	-	**2**	-	-	-	-	1	
B2 South Quadrant (02d.1a)	NAm	2/5/2018	AE	70	5	1	3/6/2018	ND	66	2	4	3/27/2018	PL	48	2.7	**17**	Split into four sub-areas in 2011 and 2012
B2 South Quadrant West (02d.1a)	NAm	-	-	-	-	0	-	-	-	-	2	-	-	-	-	**9**	
B2 South Quadrant East (02d.1b)	NAm	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
B2 South Quadrant 2 (02d.2)	NAm	-	-	-	-	1	-	-	-	-	2	-	-	-	-	**8**	
B2 South Quadrant 3 (02d.3)	NAm	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
West Point Slough - NW (02e)	NAm	1/31/2018	PL	42	1.4	0	2/26/2018	AE	50	9	0	3/19/2018	BO	39	1.7	0	
Greco Island - North (02f)	NAm	2/5/2018	SC	78	0	**19**	3/6/2018	KS	66	3.8	11	3/27/2018	AE	48	4	10	

- **Continued on next page** -

SAN MATEO REGION (continued)

Site Name (ID)	Protocol	Round 1					Round 2					Round 3					Notes
		Date	Observer	Temp (°F)	Wind (mph)	# RIRA	Date	Observer	Temp (°F)	Wind (mph)	# RIRA	Date	Observer	Temp (°F)	Wind (mph)	# RIRA	
West Point Slough - SW / E (02g)	NAm	1/31/2018	PL	42	1.4	3	2/28/2018	AE	30	2	3	3/19/2018	BO	39	1.7	**4**	
Greco Island - South (02h)	NAm	1/16/2018	SC	64	5.2	**39**	2/1/2018	SC	47	0	32	3/30/2018	AE	56	1	38	
Ravenswood Slough (02i)	NAm	1/31/2018	TR	66	4	11	2/14/2018	AE	48	2	6	3/28/2018	KE	71	6.4	**28**	
Deepwater Slough (02k)	NAm	2/5/2018	-	-	-	**27**	3/6/2018	-	-	-	25	3/27/2018	-	-	-	23	Grouped into one sub-area by ISP control program
Middle Bair SE (02k)	NAm	2/5/2018	TR	74	0	1	3/6/2018	JM	62	2	0	3/27/2018	JM	40	2.3	**2**	
Middle Bair N (02k)	NAm	2/5/2018	TR	74	0	**26**	3/6/2018	JM	62	2	25	3/27/2018	JM	40	2.3	21	
Inner Bair Island Restoration (02l)	NAm	1/19/2018	AE	48	0	0	2/9/2018	BO	59	3	0	3/28/2018	BO	70	4.8	0	
Pond B3 Bair Island Restoration (02m)	NAm	1/23/2018	SC	56	3.6	0	2/6/2018	SG	75	0	0	3/7/2018	AE	62	8	0	

DUMBARTON SOUTH REGION

Site Name (ID)	Protocol	Round 1					Round 2					Round 3					Notes
		Date	Observer	Temp (°F)	Wind (mph)	# RIRA	Date	Observer	Temp (°F)	Wind (mph)	# RIRA	Date	Observer	Temp (°F)	Wind (mph)	# RIRA	
Mowry Marsh North (05a.1)	NAm	1/16/2018	JM	62	7.5	11	2/2/2018	ND	48	1	**25**	3/30/2018	BO	75	9.4	20	
Calaveras Point (05a.2)	NAm	2/6/2018	TR	72	2.9	29	2/23/2018	KE	48	5.9	27	3/12/2018	JM	48	0	**31**	
Newark Slough (05c)	NAm	1/30/2018	KE	64	3.1	8	2/15/2018	PL	41	0.8	**17**	3/15/2018	ND	42	3.5	6	Split into two sub-areas in 2011
Newark Slough West (05c.1)	NAm	-	-	-	-	1	-	-	-	-	**7**	-	-	-	-	0	
Newark Slough East (05c.2)	NAm	-	-	-	-	7	-	-	-	-	**10**	-	-	-	-	6	
Coyote Creek - Mud Slough (05f)	adj	2/6/2018	ND	72	6	1	2/23/2018	KS	54	12.7	0	3/12/2018	ND	51	1	**2**	Surveyed from adjacent transect (A21-T1)
Plummer Creek Mitigation (05h)	NAm	1/31/2018	SG	62	4.8	1	2/15/2018	KS	37	2.6	1	3/26/2018	SC	56	9.8	**1**	
Island Ponds - A21 (05i)	NAm	2/6/2018	ND	72	6	1	2/23/2018	KS	54	12.7	1	3/12/2018	ND	51	1	**3**	
Palo Alto Baylands (08)	NAm	1/31/2018	-	-	-	59	2/27/2018	-	-	-	**76**	3/19/2018	-	-	-	75	Grouped into one sub-area by ISP control program
Palo Alto Baylands (08)	NAm	1/31/2018	JH	42	0	29	2/27/2018	KE	58	1.4	16	3/19/2018	TR	61	3.2	29	
Palo Alto Harbor (08)	NAm	1/31/2018	JM	37	0	30	2/27/2018	PL	56	1.4	**60**	3/19/2018	SC	62	2	46	
Charleston Slough to Mountain View Slough	NAm	1/15/2018	-	-	-	0	2/1/2018	-	-	-	**3**	3/19/2018	-	-	-	3	Grouped into one sub-area by ISP control program
Mountain View Slough (15a.1)	NAm	1/15/2018	SC	60	2	0	2/1/2018	PL	48	1.4	**1**	3/19/2018	AE	62	5	0	
Charleston Slough (15a.1)	NAm	1/15/2018	SC	60	2	0	2/1/2018	PL	48	1.4	2	3/19/2018	AE	62	5	**3**	
Stevens Creek to Long Point (15a.2)	NAm	1/17/2018	SG	61	1.9	1	2/16/2018	TR	42	3	1	3/14/2018	AE	55	4	**4**	
Guadalupe Slough (15a.3)	NAm	1/17/2018	KE	54	1	**4**	2/1/2018	KE	65	4.3	2	3/29/2018	ND	77	7.5	1	
Alviso Slough (15a.4)	NAm	1/16/2018	SG	60	4.3	8	2/2/2018	SC	49	0	**21**	3/29/2018	KE	75	7.2	10	
Stevens Creek (15c)	NAm	1/17/2018	SG	61	1.9	2	2/16/2018	TR	42	3	1	3/14/2018	AE	55	4	**3**	
Cooley Landing (16)	NAm	1/30/2018	AE	67	4	27	2/20/2018	PL	31	1	27	3/20/2018	PL	54	0.9	**37**	Split into two sub-areas in 2011
Cooley Landing Central (16.1)	NAm	-	-	-	-	14	-	-	-	-	12	-	-	-	-	**14**	
Cooley Landing East (16.2)	NAm	-	-	-	-	13	-	-	-	-	15	-	-	-	-	**23**	

UNION CITY REGION

Site Name (ID)	Protocol	Round 1					Round 2					Round 3					Notes
		Date	Observer	Temp (°F)	Wind (mph)	# RIRA	Date	Observer	Temp (°F)	Wind (mph)	# RIRA	Date	Observer	Temp (°F)	Wind (mph)	# RIRA	
AFCC - Mouth (01a)	NAm	1/17/2018	KS	59	0	0	2/16/2018	SG	61	9.9	0	3/15/2018	AE	43	3	0	reduced effort in 2018 (every other station)
AFCC - Lower (01b)	NAm	1/17/2018	KS	59	0	**3**	2/16/2018	SG	61	9.9	0	3/15/2018	AE	43	3	0	reduced effort in 2018 (every other station)
AFCC - Pond 3 (01f)	NAm	1/17/2018	KS	59	0	0	2/16/2018	SG	61	9.9	0	3/15/2018	AE	43	3	0	reduced effort in 2018 (every other station)
OAC - North Bank (13a)	NAm	1/15/2018	SG	58	2	**4**	2/1/2018	SG	49	0	3	3/27/2018	SG	66	7.9	1	two transects survey sub-area
OAC - Island (13b)	NAm	1/15/2018	SG	58	2	0	2/1/2018	SG	49	0	**4**	3/27/2018	SG	66	7.9	2	two transects survey sub-area
OAC - South Bank (13c)	NAm	1/15/2018	SG	58	2	**2**	2/1/2018	SG	49	0	0	3/27/2018	SG	66	7.9	0	two transects survey sub-area
Whale's Tail - North (13d)	NAm	1/23/2018	JM	50	4.5	0	2/7/2018	SC	70	4	0	3/7/2018	KS	65	2.5	0	
Whale's Tail - South (13e)	NAm	1/15/2018	JH	60	4	4	2/2/2018	JM	55	1	5	3/30/2018	JH	55	1	**6**	
Cargill Mitigation Marsh (13f)	NAm	1/15/2018	JH	60	4	**1**	2/2/2018	JM	55	1	0	3/30/2018	JH	55	1	0	
Eden Landing - Mt Eden Creek (13j)	NAm	1/23/2018	JH	55	5	**2**	2/7/2018	TR	69	4.8	1	3/7/2018	JM	65	0	1	
Eden Landing Reserve - South (13k)	NAm	1/17/2018	ND	56	0.8	0	2/2/2018	KS	47	2	0	3/26/2018	JH	60	12	0	

HAYWARD REGION

Site Name (ID)	Protocol	Round 1					Round 2					Round 3					Notes
		Date	Observer	Temp (°F)	Wind (mph)	# RIRA	Date	Observer	Temp (°F)	Wind (mph)	# RIRA	Date	Observer	Temp (°F)	Wind (mph)	# RIRA	
Oro Loma - East (07a)	NAm	1/16/2018	JH	60	4.6	0	2/14/2018	KE	44	1.5	0	4/2/2018	KE	48	8.4	0	
Oro Loma - West (07b)	NAm	1/16/2018	KE	54	6.1	**3**	2/14/2018	KS	40	0	**3**	4/2/2018	KS	53	10	0	Reduced survey effort
Dog Bone Marsh (20c)	NAm	1/30/2018	SG	64	2.4	0	2/16/2018	SC	37	1.6	**1**	3/20/2018	KE	50	1.1	0	
Citation Marsh (20d)	NAm	1/30/2018	SC	71	0	42	2/16/2018	JH	38	0	**50**	3/20/2018	JM	48	0	38	Split into three sub-areas in 2012 and 2018
Citation Marsh South (20d.1)	NAm	-	-	-	-	**1**	-	-	-	-	0	-	-	-	-	1	
Citation Marsh North Channels (20d.2a)	NAm	-	-	-	-	7	-	-	-	-	**8**	-	-	-	-	2	Split in 2018
Citation Marsh North Main (20d.2b)	NAm	-	-	-	-	34	-	-	-	-	**42**	-	-	-	-	35	Split in 2018
East Marsh (20e)	adj	1/30/2018	KS	64	1.2	**5**	2/16/2018	ND	40	1	1	3/20/2018	BO	59	1.2	0	
North Marsh (20f)	NAm	1/30/2018	SG	64	2.4	**65**	2/16/2018	SC	37	1.6	53	3/20/2018	KE	50	1.1	45	
Bunker Marsh (20g)	NAm	1/30/2018	ND	65	1	20	2/16/2018	KE	38	0.5	**21**	3/20/2018	ND	55	2	9	
San Lorenzo Creek (20h)	NAm	1/30/2018	KS	64	1.2	**2**	2/16/2018	ND	40	1	0	3/20/2018	BO	59	1.2	0	Split into two sub-areas in 2012
San Lorenzo Creek North (20h.1)	NAm	-	-	-	-	2	-	-	-	-	0	-	-	-	-	0	
San Lorenzo Creek South (20h.2)	NAm	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
Cogswell - Sec A (20m)	NAm	1/29/2018	SG	59	2.2	**7**	2/15/2018	ND	45	1 BWS	1	3/29/2018	KE	50	1.2	0	
Cogswell - Sec B (20n)	NAm	1/29/2018	JM	55	1.2	**46**	2/15/2018	SC	40	0	30	3/29/2018	JH	53	0	45	Split into three sub-areas in 2018
Cogswell - Sec B Bayfront (20n.1)	NAm	-	-	-	-	3	-	-	-	-	4	-	-	-	-	**5**	
Cogswell - Sec B South (20n.2)	NAm	-	-	-	-	**16**	-	-	-	-	11	-	-	-	-	15	
Cogswell - Sec B Main (20n.3)	NAm	-	-	-	-	**26**	-	-	-	-	15	-	-	-	-	24	
Cogswell - Sec C (20o)	NAm	1/29/2018	JH	60	2	**17**	2/15/2018	JM	39	1.9	9	3/29/2018	PL	54	2.7	16	
Oakland Airport (20r)	NAm	1/31/2018	ND	63	1	0	2/16/2018	KS	40	0	0	3/6/2018	KE	48	0	0	
HARD Marsh (20s)	NAm	1/29/2018	AE	58	0	0	2/15/2018	BO	47	1.8	0	3/29/2018	ND	53	2	**3**	
Triangle Marsh - Hayward (20w)	NAm	1/29/2018	SG	59	2.2	0	2/15/2018	ND	45	1 BWS	0	3/29/2018	KE	50	1.2	0	

SAN LEANDRO BAY REGION

Site Name (ID)	Protocol	Round 1					Round 2					Round 3					Notes
		Date	Observer	Temp (°F)	Wind (mph)	# RIRA	Date	Observer	Temp (°F)	Wind (mph)	# RIRA	Date	Observer	Temp (°F)	Wind (mph)	# RIRA	
Arrowhead Marsh (17c)	NAm	1/29/2018	SC	61	2.3	30	2/16/2018	TR	61	6.1	**37**	3/19/2018	JM	40	0.6	36	Split into two sub-areas in 2012
Arrowhead Marsh West (17c.1)	NAm	-	-	-	-	0	-	-	-	-	**11**	-	-	-	-	8	
Arrowhead Marsh East (17c.2)	NAm	-	-	-	-	**30**	-	-	-	-	26	-	-	-	-	28	
MLK Regional Shoreline - Damon (17d.4)	NAm	2/8/2018	SG	70	0	**15**	3/2/2018	JM	42	1.8	10	3/28/2018	ND	50	1	8	
San Leandro Creek (17e)	NAm	1/29/2018	TR	63	0	0	2/16/2018	JM	40	0	0	3/15/2018	JM	38	3.7	0	Surveyed from MLKR-T1; Split into two sub-areas in 2011
San Leandro Creek North (17e.1)	NAm	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
San Leandro Creek South (17e.2)	NAm	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	
MLK New Marsh (17h)	NAm	1/29/2018	TR	63	0	53	2/16/2018	JM	40	0	30	3/15/2018	JM	38	3.7	**58**	
Fan Marsh (17j)	NAm	1/26/2018	JH	48	1	20	2/27/2018	SC	54	5.4	**30**	4/4/2018	PL	52	0.6	23	Split into two sub-areas in 2018
Fan Marsh Wings (17j.1)	NAm	-	-	-	-	2	-	-	-	-	1	-	-	-	-	2	
Fan Marsh Main (17j.2)	NAm	-	-	-	-	18	-	-	-	-	**29**	-	-	-	-	21	

BAY BRIDGE NORTH REGION

Site Name (ID)	Protocol	Round 1					Round 2					Round 3					Notes
		Date	Observer	Temp (°F)	Wind (mph)	# RIRA	Date	Observer	Temp (°F)	Wind (mph)	# RIRA	Date	Observer	Temp (°F)	Wind (mph)	# RIRA	
Emeryville Crescent - East (06a)	NAm	1/31/2018	KE	55	2.7	0	2/16/2018	BO	46	2	0	3/5/2018	BO	62	4.1	0	Reduced survey effort in 2018 (dropped EMCR-T2)
Emeryville Crescent - West (06b)	NAm	1/31/2018	KE	55	2.7	0	2/16/2018	BO	46	2	0	3/5/2018	BO	62	4.1	**2**	
Whittel Marsh (10a)	NAm	1/17/2018	JH	55	3	2	2/5/2018	KE	48	1.5	4	3/15/2018	KE	41	1.2	**6**	
Wildcat Marsh (22a)	NAm	1/19/2018	TR	55	1.9	18	2/5/2018	ND	51	1	**22**	3/5/2018	SC	59	9	17	
San Pablo Marsh (22b.1)	NAm	1/19/2018	JM	42	0	16	2/7/2018	ND	70	3.5	12	3/5/2018	JM	32	2.3	**18**	Typically surveyed by PBCS; Split into two sub-areas in 2011
San Pablo Marsh East (22b.1)	-	-	-	-	-	2	-	-	-	-	3	-	-	-	-	**8**	
San Pablo Marsh West (22b.2)	-	-	-	-	-	**14**	-	-	-	-	9	-	-	-	-	10	
Rheem Creek Area (22c)	NAm	1/18/2018	KS	53	3.7	1	2/14/2018	JM	38	0.7	**3**	3/5/2018	TR	56	4.6	0	
Stege Marsh (22d)	NAm	1/18/2018	-	-	-	10	2/14/2018	-	-	-	7	3/5/2018	-	-	-	**12**	Grouped into one sub-area by ISP control program
Stege Marsh (22d)	NAm	1/18/2018	SC	55	6.2	2	2/14/2018	ND	42	1	2	3/5/2018	KS	60	4.4	**4**	
Meeker Slough (22d)	NAm	1/18/2018	SC	55	6.2	8	2/14/2018	ND	42	1	5	3/5/2018	KS	60	4.4	**8**	
Hoffman Marsh (22e)	NAm	1/18/2018	SC	55	6.2	1	2/14/2018	ND	42	1	**2**	3/5/2018	KS	60	4.4	0	