



## United States Department of the Interior

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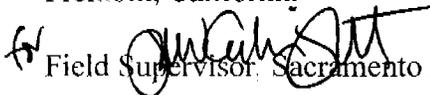


In Reply Refer To:  
08ESMF00-2012-F-0584-1

**AUG 21 2012**

### Memorandum

To: Refuge Manager, San Francisco Bay National Wildlife Refuge Complex (Refuge),  
Fremont, California

From:  Field Supervisor, Sacramento Fish and Wildlife Office, Sacramento, California

Subject: Formal Consultation for the Proposed San Francisco Estuary (Estuary) Invasive  
*Spartina* Project: *Spartina* (ISP) Control Program and Restoration for 2012 on  
188 sites; Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa  
Clara, Solano, and Sonoma Counties, California

This memorandum is in response to your request for intra-U.S. Fish and Wildlife Service (Service) consultation on the California State Coastal Conservancy's (Conservancy) proposed Estuary ISP *Spartina* Control Program and Restoration for 2012 at 188 sites, in Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties, California. At issue are the effects of the proposed action on the endangered California clapper rail (*Rallus longirostris obsoletus*), endangered salt marsh harvest mouse (*Reithrodontomys raviventris raviventris*), endangered soft bird's-beak (*Chloropyron molle ssp. molle*) and its critical habitat. This biological opinion is issued under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act).

This document is based on: (1) the Estuary ISP *Spartina* Control Program and Habitat Restoration for 2012, Biological Assessment for the California Clapper Rail, Salt Marsh Harvest Mouse, and Soft Bird's Beak, (2) other electronic mail and telephone conversations between the Conservancy, ISP, H. T. Harvey & Associates, and the Service; and (3) other information available to the Service.

### CONSULTATION HISTORY

November 8, 2011 The Service received a memorandum from the Conservancy regarding revegetation sub-areas, planting at untreated sub-areas, timing of planting,

timing of maintenance, and funding assurances as they pertain to 2011 and 2012 biological opinions.

- November 30, 2011: The Service issued comments on the San Francisco Estuary Invasive *Spartina* Revegetation and Monitoring Plan regarding plan goals, success criteria for monitoring, and treatment at sub-areas with high California clapper rail densities. The comments included the criteria that one floating island and one permanent high tide habitat area be installed for every two California clapper rails harmed by *Spartina* treatment, and that full treatment of all sub-areas cannot occur until the Bay-wide California clapper rail population has increased by an average of 80 California clapper rails over 2010 numbers for three consecutive years.
- December 20, 2011: The Service met with the Conservancy, ISP, and H. T. Harvey & Associates to discuss the submission of consultation materials, including maps of each treatment site, for the 2012 biological opinion.
- January 25, 2012: The Service met with the Conservancy, ISP, and H. T. Harvey & Associates to discuss progress on activities related to revegetation and floating island installation, and to discuss proposed treatment at the 26 sub-areas with California clapper rails that were not treated in 2011.
- February 9, 2012: The Service received figures and a table showing proposed ISP treatment activities at the 26 sub-areas that were not approved by the Service for treatment in 2011 (i.e., “26-site table”). The 26-site table included take assessments for California clapper rails and proposed habitat enhancements to compensate for the loss of California clapper rail habitat.
- March 1, 2012: The Service received maps and a table showing proposed ISP treatment activities for the 63 ISP treatment sub-areas that supported California clapper rails in 2011 and were authorized for treatment in 2011 by the Service (i.e., “63-site table”). The 63-site table included take assessments for California clapper rails and proposed habitat enhancements to compensate for the loss of California clapper rail habitat.
- March 7, 2012: The Service provided comments on the 26-site table. The communication indicated that the creation of more earthen mounds would be required to offset impacts due to invasive *Spartina* treatment and that only seed suppression would be allowed at eight of the sub-areas. Full chemical treatment at these sub-areas would be allowed only after the average number of California clapper rails increased by 80 over 2010 numbers for three consecutive years.
- March 9, 2012: The Service participated in a phone conference with the Conservancy and H. T. Harvey & Associates to discuss take estimates provided on March 7.

- March 21, 2012: The Service participated in a meeting with the Conservancy, ISP, and H. T. Harvey & Associates to discuss the effects of seed suppression on California clapper rail habitat and splitting of seed suppression sub-areas so that full treatment could occur in areas without California clapper rail detections. The Service confirmed that revegetation or other proposed habitat enhancements cannot be in lieu of earthen islands.
- March 27, 2012: The Service received revised figures depicting seven seed suppression sub-areas with proposed split boundaries discussed in the March 19 meeting.
- March 29, 2012: The Service provided comments on the 63-site table. The Service indicated that treatment would be approved at the 63 sub-areas but the requested entry dates for 31 of the sub-areas would be delayed until September 2 to avoid the California clapper rail nesting season. The Service determined the 2012 California clapper rail data would need to be reviewed before allowing invasive *Spartina* treatment in 2012.
- April 5, 2012: The Service received a request from the ISP to allow earlier treatment at the 31 sub-areas with delayed entry dates, to facilitate treatment and avoid seed-set of invasive *Spartina*.
- April 19, 2012: The Service provided comments on the 63-site table and approved earlier entry dates at 10 of the 31 where the entry date was previously delayed. The Service approved splitting of three other sub-areas in order to treat the portions of the sub-areas without California clapper rail detections prior to September 2. The Service declined to allow seed suppression to occur at any site because of its detrimental effect on health and vigor of marsh vegetation.
- April 23, 2012: The Service participated in a conference call with the Conservancy, ISP, and H. T. Harvey & Associates to discuss requested site entry dates and seed suppression. The Service determined that seed suppression would reduce vigor of vegetation to a degree that would result in take of California clapper rails. The Service allowed the ISP to choose which sub-areas would be left untreated, but did not approve full treatment of all sub-areas until the California clapper rail population increases by 80 California clapper rails over 2010 numbers. The Service allowed an entry date of August 12 at sub-areas south of the San Mateo Bridge.
- May 16, 2012: The Service received three updated tables and figures for all ISP treatment sub-areas that included 2012 California clapper rail survey data, with the exception of 13 sub-areas that were surveyed by Point Reyes Bird Observation (PRBO) Conservation Science for which data were not yet available. The tables and figures also included revised site boundaries for proposed "split sub-areas" where invasive *Spartina* could be treated while avoiding areas with California clapper rail detections.

- June 5, 2012: The Service received a table of ISP-surveyed sub-areas summarizing the number of California clapper rail detections in 2009, 2010, 2011, and 2012 demonstrating variability in rail detections by site and region.
- June 7, 2012: The Service provided comments on the tables submitted on May 16, 2012 and provided revised take estimates on the 26-site table.
- June 12, 2012: The Service provided comments on the 26-site table and the 63-site table regarding entry dates for treatment at those sites. A June 1 entry date was authorized to treat *S. densiflora* at Creekside Park (04g), Muzzi and Martas Marsh (23e), CMC-Mouth North Bank (04j.1) and all non-rail sites. The Service declined to allow June 1 entry dates at several other rails sites with *S. densiflora* infestations.
- June 25, 2012: The Service received the *San Francisco Bay Estuary ISP: Spartina Control Program and Habitat Restoration for 2012, Biological Assessment for the California Clapper Rail, Salt Marsh Harvest Mouse, and Soft Bird's Beak*.

## **Project Description**

### Project Background

The Conservancy and the Service propose to implement the ISP *Spartina* Control Program and Habitat Restoration for 2012 (2012 Program) at 188 marsh sites throughout the Estuary. The purpose of the program is to eradicate four species of non-native, invasive perennial cordgrass (*Spartina alterniflora*, *S. anglica*, *S. densiflora*, and *S. patens*) in tidal marshes and intertidal mudflats of the Estuary. The Conservancy and the Service initiated the ISP in 2000 to curtail the invasion of non-native *Spartina* in the Estuary and prevent invasive *Spartina*, including hybrids of *S. alterniflora* and native *S. foliosa*, from invading newly restored tidal marshes. The ISP is a regionally coordinated effort of Federal, State, and local agencies, private landowners, and other interested parties. The geographic focus of the ISP includes approximately 50,000 acres of tidal marsh and tidal flats on the shores of nine San Francisco Bay Area counties, including Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma counties.

Work conducted by the ISP includes the Estuary-wide coordination of landowners and partners for *Spartina* treatment, monitoring, and habitat enhancement. In addition to treatment of invasive *Spartina*, the ISP and the Conservancy have been coordinating with the Service on the revegetation of areas where non-native cordgrass has been successfully controlled. This effort has been undertaken to accelerate natural vegetative succession in treated marshes and restore nesting habitat and high tide refugia for California clapper rails. Revegetation efforts began in 2006 and will continue through 2016; the revegetation efforts from 2011 onward are described in detail in the *California Clapper Rail Habitat Enhancement and Monitoring Plan* (Olofson 2012a). In addition to the continuation of revegetation efforts, the ISP will implement other measures to offset impacts to California clapper rails related to habitat degradation and loss as a

result of 2012 treatment activities. These other measures include the installation of artificial floating islands to provide temporary nesting habitat and high-tide refugia for California clapper rails, and the creation of earthen islands designed to provide long-term nesting habitat and high-tide refugia for California clapper rails.

In 2003, the Service and the Conservancy produced a Programmatic Environmental Impact Statement (EIS)/Environmental Impact Report (EIR) which analyzed various outcomes associated with *Spartina* control or lack thereof. Since then, the Service issued a Programmatic Biological Opinion (Programmatic BO) and five tiered BOs for section 7 of the Act, beginning with programmatic intra-Service consultation in 2003. The 2003 Programmatic BO determined the project would have no effect on a suite of federally-listed species with distributions outside where non-native *Spartina* invasions occur, and thus those species were not addressed in subsequent tiered BOs. The Programmatic BO assessed the effects of the ISP on the federally-endangered California sea-blite (*Suaeda californica*), Suisun thistle (*Cirsium hydrophilum* var. *hydrophilum*), soft bird's-beak, Sacramento splittail (*Pogonichthys macrolepidotus*; since delisted), California clapper rail, California least tern (*Sternula antillarum browni*), salt marsh harvest mouse, the federally-threatened delta smelt (*Hypomesus transpacificus*) and its critical habitat, and western snowy plover (*Charadrius alexandrinus nivosus*) and its critical habitat. Incidental take of listed species was not authorized by the Programmatic BO; instead the site-specific information, in the form of Site-specific *Spartina* Control Plans (SSPs) was provided to the Service for subsequent tiered consultations relative to the scope of treatment in each SSP. Tiered BOs were issued for the 2004, 2005 – 2007, and 2008 – 2010 SSPs.

In March 2011, the ISP submitted SSPs to the Service for proposed treatment from 2011 to 2015 at 170 sites. Because the Service expressed concerns about the apparent decline in California clapper rail populations in the Estuary, and the potential for extensive take of California clapper rails due to the proposed *Spartina* treatment in the 2011 – 2015 SSPs, the Service worked with the Conservancy and ISP to revise the SSPs to reflect one year of treatment at a smaller number of sites. Additionally, habitat enhancements to benefit California clapper rails were incorporated into the project (see *Revegetation and Revegetation Monitoring Activities* below) to offset habitat impacts associated with *Spartina* treatment. As a result, the Service issued two BOs for 2011, one for 68 treatment sites with negative California clapper rail survey results and one for 95 treatment sites with few California clapper rails or with abundant high-tide refugia other than non-native *Spartina*. Twenty-six sites with high densities of California clapper rails and extensive non-native *Spartina* were left untreated in 2011.

### 2012 Invasive *Spartina* Treatment Activities

The 188 ISP treatment sites (i.e., “sub-areas”) are components of 24 larger site complexes. Tables 1 and 2 include 93 treatment sites where California clapper rails were detected during surveys in winter and early spring 2012 (i.e., “rail sites”). Table 1 includes rail sites that were not permitted for treatment in 2011 due to relatively high densities of California clapper rails and large remaining stands of invasive *Spartina* at those sites; treatment did not occur at these sites in 2011 to avoid take of California clapper rails. Table 2 includes rail sites that were approved by the Service for treatment in 2011. The sites listed in Table 2 generally have relatively low densities of California clapper rails and/or smaller remaining stands of invasive *Spartina*, thus

impacts to California clapper rails are expected to be minimal. Table 3 includes sites where California clapper rail surveys were negative in 2012 (i.e., “non-rail sites”); invasive *Spartina* treatment occurred at all non-rail sites in 2011. Sites that were formerly non-rail sites in 2011 but where California clapper rails were detected in 2012 are now included in Table 2.

Site numbers, site names, and associated figure numbers for each of the 188 treatment sites are listed in Tables 1, 2 and 3. In these tables, “California clapper rail habitat” refers to the total acreage of marsh habitat that may be considered suitable for California clapper rails (and, potentially, salt marsh harvest mice) based on assessments by ISP biologists; this area excludes unvegetated areas or otherwise unsuitable habitat (e.g., rip-rap, open mudflats). This area of marsh, where treatment could potentially occur, totals 24,821 acres, and includes 18,832 acres at rail sites and 6689 acres at non-rail sites. Within these sites, the extent of invasive *Spartina* was estimated during inventory monitoring activities in 2011 (see *Inventory and Treatment Monitoring* below). The extent of this area is listed under “*Spartina* Cover” in Tables 1, 2, and 3, and totals approximately 114 ac, with 105 acres occurring in rail sites and 9.1 acres occurring in non-rail sites. These areas of *Spartina* coverage are intended to provide an estimate of the acreage that will be affected by treatment; however, the actual treatment area will likely be smaller at most sites, as most sites were treated in 2011 (with the exception of sites in Table 1) and thus a smaller acreage of invasive *Spartina* likely remains at most sites.

The 2012 Program will include the treatment of invasive *Spartina* at the sites listed in Tables 1, 2, and 3. The general approach and processes for treating non-native *Spartina* are described in the ISP’s Programmatic EIS/EIR. Detailed descriptions of treatment activities specific for each site to be treated as part of the 2012 Program are described in the *San Francisco Estuary Invasive Spartina Project Site-specific Spartina Control Plans 2012-2013*. The ISP proposes to continue to use the herbicide Imazapyr; this herbicide has been used by the ISP since 2005. Imazapyr is absorbed by the leaves and roots of *Spartina* and accumulates in the actively growing portions of the plants (i.e., the meristem). The plants die slowly and the dead-standing material can remain in place for many months. For instance, the structure of plants treated with the herbicide in 2012 could remain in place until the winter of 2013/2014. The herbicide will be applied almost entirely through ground-based applications, including backpack sprayers, trucks, and airboats. One site, Calaveras Marsh (05a.2; Table 1), will be partially treated using a Marsh Master, a tracked-amphibious vehicle, due to the difficulty accessing this site via other methods. No aerial applications will occur except at B2 North Quadrant East (02c.1b; Table 1), where a helicopter will be utilized for a “seed suppression” application (e.g., “chemical mowing”), in which a generally sub-lethal dose of Imazapyr will be used to prevent invasive *Spartina* from producing seeds and spreading beyond its current distribution at that site.

Treatment activities will occur in some areas as soon as the Service issues a biological opinion for 2012 activities, and thus may commence as early as July 2012. Treatment will continue at other locations through December 2012; specific dates defining the start of the 2012 treatment window at each site are listed in Tables 1, 2, and 3. June entry dates are associated with three sites with *S. densiflora* infestations (Creekside Park [04g], Muzzi and Martas Marsh [23e], CMC-Mouth North Bank [04j.1]), as this species seeds earlier than other *Spartina* species and thus requires earlier treatment to prevent the spread of *S. densiflora* seed or pollen to other sites. Sites with moderate or high densities of California clapper rails will generally be treated

beginning in August or September to avoid disturbing breeding rails. All areas without rail detections in 2012 will be treated beginning in July, or as soon as the Service issues a biological opinion for the 2012 Program. In addition to the treatment sites in Tables 1, 2, and 3, invasive *Spartina* treatment will occur within a three-meter buffer around existing revegetation and new earthen islands at sites that will not be fully treated in 2012 (Table 4) – B2 North Quadrant East (02c.1b), Arrowhead East (17c.2), MLK New Marsh (17h) and Cogswell C (20o.1). These sites will be treated after September 1 to avoid the clapper rail breeding season.

During the treatment periods, the ISP will use treatment windows during low or receding tides to maximize the dry time and cuticle penetration of the herbicide, and restrict all applications to periods when winds are below 10 mph. Conservation measures, listed under *Conservation Measures Incorporated into the Project* below, will be implemented to reduce impacts to marsh habitats and listed species during treatment. Measure 16 has been incorporated specifically to minimize adverse effects associated with ISP treatment activities.

#### *Inventory and Treatment Monitoring*

Two types of *Spartina* monitoring will occur as part of the ISP: inventory monitoring and treatment monitoring. The monitoring methods have been established by the Estuary Institute and the ISP and modified by the ISP, as described in the Monitoring Program Quality Assurance Document (Hogle et.al. 2008).

Inventory monitoring is a process that assesses the current distribution and acreage of invasive *Spartina* at treatment sites. It will be conducted at all rail and non-rail sites listed in Tables 1, 2, and 3, as well the 11 sites in Table 4 that will not be treated in 2012. Inventory monitoring will also occur in other areas in the Estuary and outer coast that have the potential to be colonized by invasive *Spartina*; this area totals approximately 46,000 ac, although only a subset of this area will be subject to monitoring. Inventory monitoring will be conducted June through October, when plants exhibit full growth, in order to provide ISP program managers with current information on where treatment is needed and to minimize footprint of contracted crews during treatment season. Invasive *Spartina* infestations are identified and mapped by trained biologists. Inventory methods are dependent upon the extent of the invasion in a given marsh. Monitoring in a site may be conducted by foot, kayak, motorboat, or helicopter, depending on efficacy and the method that would result in the least impact on marsh habitats, clapper rails, and other resources in the marsh. When necessary, the ISP biologists collect plant samples for genetic analysis to verify species identity for treatment and mapping purposes.

Treatment monitoring is conducted during or immediately after treatment activities (i.e., in the June to December 2012 timeframe). Treatment monitoring in 2012 will occur at all sites listed in Tables 1, 2, and 3. The timing of treatment monitoring will correspond to the entry dates listed in those tables. During treatment monitoring, ISP staff leads contracted treatment crews to sites with invasive *Spartina*, as identified during inventory monitoring, and records treatment areas with GPS dataloggers. Recording treatment areas ensures that any missed patches of invasive *Spartina* are targeted in subsequent treatment events. At rail sites, the ISP assigns a minimum of one Service-approved California clapper rail biologist, trained in rail habitat and rail call identification, and directs treatment crews around sensitive clapper rail habitat and known call centers. Conservation measures, listed under *Conservation Measures Incorporated into the*

*Project* below, will be implemented to reduce impacts to marsh habitats and listed species during treatment monitoring. Measure 17 listed below has been incorporated specifically to minimize adverse effects associated with ISP monitoring activities.

#### *California Clapper Rail Survey Monitoring*

The ISP will conduct protocol-level California clapper rail surveys during the 2013 breeding season as part of the annual monitoring program, and as required in Conservation Measure 10 and 11 described below in *Conservation Measures Incorporated into the Project*. Surveys are conducted by Service-approved biologists permitted under section 10(a)(1)(A) of the Endangered Species Act (permit number TE-118356). Surveys will be conducted by Service-approved clapper rail biologists between January and April in 2013. Surveys are initiated after January 15, and a total of three surveys are conducted at least two weeks apart by mid-April. Surveys are conducted at either dawn or dusk. Dawn surveys are conducted from 1 hour before sunrise to 1 hour after sunrise and dusk survey are conducted from 1 hour before sunset to 1 hour after sunset. Surveys consist of recording rail calls for 10 minutes at each survey station; survey stations are spaced approximately 200 meters (m) apart. At sites where clapper rails have been recorded during the past two years, surveys are passive during the first two rounds and call playback is used during the third round if no rails were detected during the first two rounds. At sites where there is a low probability of rail occurrence, call playback is used during all three survey rounds unless a rail is detected, at which time call playback is stopped. At Arrowhead Marsh, observers are present at each station for an entire 1.5-hour period and no playback is used. Observers record the bearing and distance of all clapper rail vocalizations and note the estimated locations on a map and on a datasheet. All data are entered into a GIS database for mapping and then reviewed for quality control. Surveys are not conducted if wind velocities are predicted to exceed 10 mph (or if wind gusts are predicted to exceed 12 mph), when moderate to heavy rains are predicted, or during full moon periods. All surveys are conducted when local tides are less than 4.5 feet (ft) NGVD (as predicted at the Golden Gate). The call counts provide an indication of the abundance of rails at each site and help determine where rail territories are in the marsh. A detailed description of ISP California clapper rail survey methods and results are provided in *California clapper rail survey for the San Francisco Estuary Invasive Spartina Project 2011*. Conservation measures, listed under *Conservation Measures Incorporated into the Project* below, will be implemented to reduce impacts to marsh habitats and listed species during clapper rail surveys.

#### *Revegetation and Revegetation Monitoring Activities*

The ISP developed the *California Clapper Rail Habitat Enhancement and Monitoring Plan* (Olofson 2012a) to establish habitat features that will benefit California clapper rails where removal of invasive *Spartina* has caused decreases in local California clapper rail populations. The habitat enhancement activities are also an effort to begin the introduction of *S. foliosa* into areas where it has been significantly reduced or extirpated by the hybrid *S. alterniflora* x *foliosa*. The objectives of the program are to deploy artificial floating islands to provide short-term nesting habitat and high-tide refugia for California clapper rails, evaluate high-tide refugia projects to benefit California clapper rails, coordinate predator control efforts for land mammals, and initiate intensive planting of *Grindelia stricta*, *S. foliosa*, and other native vegetation that provide nesting habitat, cover, and high tide refugia for California clapper rails.

As part of these efforts, the Conservancy has provided funding for the deployment of 75 artificial floating islands at Whale's Tail North (13d), Eden Landing – Mt. Eden Creek (13j), Citation Marsh South (20d.1), Citation Marsh North (20d.2), North Marsh North (20f.1), North Marsh South (20f.2), Bunker Marsh (20g), San Lorenzo Creek & Mouth North (20h.1), Cogswell Marsh Quadrant A (20m), Cogswell Marsh Quadrant B (20n), and Cogswell Marsh Quadrant C North (20o.1). These islands are being deployed as part of pilot studies conducted by the U.S. Geological Survey to assess their use by clapper rails. The ISP has also initiated revegetation efforts at numerous sites, including AFCC – Mouth, Lower, and Upper (01a,b,c); B2 North Quadrant East (02c.1b); Greco Island North (02f), Creekside Park (04g); Oro Loma East (07a); Oro Loma West (07b); OAC – Island (13b); Whale's Tail North (13d); Whale's Tail South (13e); Eden Landing – Mt. Eden Creek (13j); Arrowhead Marsh West (17c.1); Cogswell Marsh Quadrant A (20m); Eden Landing Reserve South – North Creek Marsh (13k); Elsie Roemer (17a); Colma Creek (18a); San Bruno Marsh (18g); and Cogswell Marsh Quadrant C North (20o.1). In addition, restoration partner Save The Bay implemented revegetation of upland transition zone habitat at a number of sites including Ravenswood Open Space Preserve/SF2 (02j), Palo Alto Baylands (08), Faber/Laumeister Marsh (15b), East Creek Slough (17d.3), Damon Marsh (17d.4), MLK Restoration Marsh (17h), Bothin (23j), and Eden Creek Marsh (13l). ISP habitat enhancements, including numbers and species of native plantings, are provided in Tables 1, 2, 3, and 4, and the approximate locations of these enhancements are depicted in corresponding figures as indicated in the tables. Revegetation efforts as part of this program will continue in the winter of 2012/2013 and continue through 2016 as part of a five-year planting plan as described in the *California Clapper Rail Habitat Enhancement and Monitoring Plan*. Progress on revegetation to date is described in the *May 2012 ISP Revegetation Progress Report* (Olofson 2012b). The sites where further revegetation efforts will be undertaken in 2012/2013 will be a subset of those described in the plan as well as additional sites identified during the section 7 consultation process. These sites will be determined by ISP and Conservancy staff, with input from the Service and members of the Technical Advisory Committee for California clapper rail enhancement.

Monitoring of revegetation efforts will include photopoint monitoring, survivorship monitoring, planting method assessment monitoring, and habitat assessment monitoring. Photopoint monitoring includes annual photo documentation of revegetation sites at established locations using the same camera angle each year. Survivorship monitoring will inform subsequent planting efforts by assessing the percent survivorship of planted vegetation annually for three years following plantings. Planting method assessment monitoring will be used to assess the efficacy of revegetation methods. Plant survivorship, cover, density, size, and phenology will be assessed annually at monitoring plots. Habitat assessment monitoring will involve vegetation and habitat structure assessments within study plots associated with a subset of revegetation sites every three to five years. All monitoring activities that occur at clapper rail-occupied sites will be conducted by small crews (i.e., 2 – 5 individuals) supervised by Service-approved clapper rail biologists in late summer and early fall, typically between the months of August and October. Details on specific monitoring activities are described in the *California Clapper Rail Habitat Enhancement and Monitoring Plan*. Conservation measures, listed under *Conservation Measures Incorporated into the Project* below, will be implemented to reduce impacts to marsh habitats and listed species during revegetation and revegetation monitoring. Measures 18 – 20

listed below have been incorporated specifically to minimize adverse effects associated with ISP revegetation activities.

Site preparation and maintenance activities will be conducted at selected sites (i.e., upland/transition zone and/or higher elevation interior marsh islands and berms) to support revegetation efforts. These sites include Creekside Park (04g), Oro Loma West (07b), Whale's Tail South (13e), Eden Landing – Mt. Eden Creek (13j), Elsie Roemer (17a), Citation Marsh North (20d.2), North Marsh North (20f.1), North Marsh South (20f.2), Bunker Marsh (20g), Cogswell Marsh Quadrant A (20m), Cogswell Marsh Quadrant B (20n), and Cogswell Marsh Quadrant C (20o). Site preparation will include non-native weed removal from marsh interior islands and berms to be revegetated at selected sites in 2012/2013. Maintenance of previously revegetated areas will be conducted annually to improve the success of plantings by preventing out-competition by invasive species. Maintenance will primarily involve weeding and will be conducted periodically throughout the growing season, as needed, subsequent to fall/winter planting and/or broadcast seeding at a site. Weeding activities will be timed to maximize potential for weed identification (e.g., during flowering) yet prior to seed set, to reduce continued spread of the weed. Watering of plantings may occur depending on the amount of rainfall after planting. Site preparation and maintenance techniques may include:

- Manual hand removal of weeds, including pulling, cutting/lopping, digging, sawing
- Seasonal mowing of larger weed patches with a gas-powered hand mower
- Solarization by installing a black plastic tarp over the weedy area
- Mulching by placing cardboard or newspaper over the weedy area, then covering with 5 or more inches of mulch
- Spot treatment with herbicide
- Watering by hand, back pack or hose

Details on specific monitoring activities are described in the *California Clapper Rail Habitat Enhancement and Monitoring Plan*. Conservation measures, listed under *Conservation Measures Incorporated into the Project* below, will be implemented to reduce impacts to marsh habitats and listed species during revegetation and revegetation monitoring. Measures 18 – 20 listed below have been incorporated specifically to minimize adverse effects associated with ISP revegetation and monitoring activities.

#### *2012 Program California Clapper Rail Habitat Enhancements*

In addition to revegetation and other habitat enhancement efforts described in *Revegetation and Revegetation Monitoring Activities* above, the ISP will implement other habitat enhancements for California clapper rails to offset the potential effects of 2012 invasive *Spartina* treatment. Treatment of marshes where there are high densities of California clapper rails and larger areas of invasive *Spartina* (mainly the sites listed in Table 1) appears to result in displacement of California clapper rails due to a loss in potential nesting habitat and high-tide refugia. *Spartina* stands treated in 2012 are expected to continue to provide habitat through the 2013 breeding season but in the absence of alternative nesting sites and high-tide refugia, California clapper rails may be lost from these sites when treated plants degrade, likely in the winter 2013/2014.

To minimize the impacts of habitat loss for California clapper rails due to 2012 treatment and to provide alternative features that can allow California clapper rails to remain in the treatment areas, the ISP proposes to install artificial floating islands and create earthen islands at sites where California clapper rails are utilizing invasive *Spartina* for nesting and refuge. The artificial floating islands and the earthen islands are designed to provide temporary and long-term nesting and high-tide refugia for California clapper rails, respectively. The islands are modeled after those successfully deployed in Southern California for conservation of the endangered light-footed clapper rail (*Rallus longirostris levipes*), and will be approximately 20 x 28 inches in size and constructed with a PVC frame and commercially-available palm leaf or similar materials. The dimensions of the earthen islands will be approximately 2 x 6 ft, and they will be constructed approximately 6 inches above the high-tide line. The islands will be constructed with soil excavated on-site and planted with *Grindelia stricta* and other native vegetation, which will provide nesting and high-tide refugia for rails when mature. Twenty-two earthen and artificial islands will be installed at 15 sites; these sites and the number of islands at each location are listed in Tables 1 and 2. The 22 artificial floating islands will be installed prior to the 2013 clapper rail breeding season (i.e., from 1 September through 1 February) and the majority of the earthen islands will be installed after the 2013 clapper rail breeding season and before the 2014 breeding season (i.e., before 1 February 2014). Between 1 September 2012 and 1 February 2013, a pilot effort will be initiated to install 12 earthen islands at several sites, including Belmont Slough South (02a.1a), Bird Island (02a.3), B2 North Quadrant West (02c.1a), B2 North Quadrant East (02c.1b), MLK New Marsh (17h), and Seal Slough (19p.1). A conceptual plan describing the earthen island design, construction techniques, and pilot locations has been prepared. Conservation measures will be implemented to reduce impacts to marsh habitats and listed species during revegetation and revegetation monitoring. Measures 18 – 20 listed below have been incorporated specifically to minimize adverse effects associated with artificial and earthen island installation.

In addition to the installation of artificial floating islands and creation of earthen islands, the ISP has identified other habitat enhancements designed to increase California clapper rail populations by increasing reproductive success and/or survivorship of California clapper rails. The enhancements include removing raptor perches, cutting berms from the shoreline to reduce mammalian predator access to marshes, trapping mammalian predators, installing raptor deterrence, and planting native plants such as *Grindelia stricta* in areas where high-tide refugia may be limited. These additional enhancements are listed in Table 1. The enhancements will be further designed and implemented contingent on funding and if land-owner permission is granted. Conservation measures will be implemented to reduce impacts to marsh habitats and listed species during installation of habitat enhancements.

### **Conservation Measures**

The Conservancy proposes to implement the Conservation Measures in the Programmatic BO and the Biological Resources Mitigation Measures in the Programmatic EIS/EIR. In addition, the following measures will be implemented.

*Conservation Measures for all work in the marsh:*

1. *Minimize disturbance.* While traversing through the marsh, noise will be kept to a minimum. Workers will avoid using multiple pathways through the marsh, and will use berms, boardwalks, or roads if they exist. Routes will be planned and mapped prior to entry in the marsh to minimize time spent in the marsh and to reduce the chance of running into hazards/barriers such as large channels. Workers will be observant of their environment to minimize disturbance.
2. *Avoid potential nesting habitat.* Workers will avoid traversing through thick vegetation or areas where the ground is not visible, as well as thick wrack areas where salt marsh harvest mice may nest. Workers will be trained to identify suitable California clapper rail nesting substrate, and will minimize disturbance of these areas (e.g., stands of *Grindelia* and tall pickleweed).
3. *Minimize activities along channels.* When looking for a suitable place to cross a channel, such as an area of sparse vegetation, workers will avoid traveling along the edge of the channel/slough because these areas provide nesting habitat for California clapper rails. To find an alternate channel crossing site, workers will move away from the channel to a distance where vegetation is lower in height and where visibility of the ground surface is greater, then travel parallel to the channel (e.g., avoid *Grindelia*).
4. *Avoid extreme high tides.* Activities will be scheduled to avoid work during extreme high tides when areas of tidal marsh vegetation are inundated. These are periods when California clapper rails and salt marsh harvest mice are at greatest risk (e.g., of predation). If work during an extreme high tide is necessary (e.g., for boat access to a site), activities will not occur in or near high marsh vegetation or upland/marsh transitions potentially used by California clapper rails and salt marsh harvest mice as high tide refugia.

*Additional Conservation Measures for all work during western snowy plover breeding season (March 1 - September 14):*

5. To avoid the loss of individual western snowy plovers, no activities will be performed within at least 600 ft of an active western snowy plover nest during the western snowy plover breeding season, March 1 through September 14 (or as determined through surveys). Vehicles driving on levees and pedestrians walking on boardwalks or levees should remain at least 300 ft away from western snowy plover nests and broods. In addition, personnel that must stop at a specific site for brief inspections, maintenance, or monitoring activities should remain 600 ft away from western snowy plover nests and broods. Exception: Only inspection, maintenance, research, or monitoring activities may be performed during the western snowy plover breeding season in areas within or adjacent to western snowy plover breeding habitat with approval of the Service and California Department of Fish and Game (CDFG) under the supervision of a Service-approved biologist. If western snowy plover chicks are present and are foraging along any levee that will be accessed by vehicles, vehicle use will be under the supervision of a Service-approved biologist (to ensure that no chicks are present within the path of the vehicle).

*Additional Conservation Measures for all work during California least tern breeding season (April 15- August 15):*

6. No activities will be performed within 300 ft of an active California least tern nest during the California least tern breeding season, April 15 to August 15 (or as determined through surveys). Exception: Only inspection, maintenance, research, or monitoring activities may be performed during the California least tern breeding season in areas within or adjacent to California least tern breeding habitat with approval of the Service and CDFG under the supervision of a Service-approved biologist.

*Additional Conservation Measures for all work during clapper rail breeding season (February 1 – August 31):*

7. *Bird Behavior.* If a California clapper rail vocalizes or flushes within close range (e.g., < 10m), it is possible that a nest or young are nearby. If an alarmed bird or a nest is detected, work will be stopped, and workers will leave the immediate area carefully and quickly. An alternate route will be selected that avoids this area, and the location of the sighting will be recorded to inform future activities in the area.
8. All biologists accessing the tidal marsh will be trained in California clapper rail biology and vocalizations, and familiar with California clapper rails and their nests.
9. All crews working in the marsh during the California clapper rail breeding season will be trained and supervised by a California clapper rail biologist.
10. At sub-areas where California clapper rail habitat and/or California clapper rail are potentially present and where any activities may need to be conducted during California clapper rail breeding season, call counts will be conducted to determine rail locations and rail territories.
11. If any activities will be conducted during the California clapper rail breeding season in California clapper rail occupied marshes, biologists will have maps or GPS-locations (where available) of the most current clapper rail occurrences at the site, and will proceed cautiously and minimize time spent in areas where clapper rail were detected.
12. All personnel walking in the marsh will be required to limit time spent within 50 meters of an identified California clapper rail calling center to half an hour or less.

*Conservation Measures specific to Soft bird's beak*

13. Pre-project surveys for soft bird's beak shall be conducted at Southampton Marsh during the same year as eradication work at treatment sub-areas. GPS locations of sensitive plant populations shall be recorded, and field crews on foot or in vehicles shall be instructed to avoid and protect sensitive populations to the extent practicable. A Service-

approved biologist shall be required on-site if sensitive plants occur in the vicinity of eradication work.

14. Subsequent to *S. patens* eradication efforts at Southampton Marsh, the ISP will work with Brenda Grewell, Ph.D. of the USDA-ERS to implement a revegetation plan for soft bird's beak and its host plants. The revegetation efforts will be approved by Dr. Grewell and implemented per her direction. Revegetation efforts will include planting of soft bird's beak host plants immediately after tarp removal in 2013 and the seeding of soft bird's beak the following in 2014.
15. At the end of 2012 growing season, soft bird's beak seeds will be collected to store for reseeded of the tarped areas and some will possibly be banked. Prior to January 15, 2014, cuttings of appropriate native marsh soft bird's beak host plants (*Sarcocornia pacifica*, *Distichlis spicata*, *Jaumea carnosa*, *Frankenia salina*) will be collected on site and planted in areas that had a high cover of *S. patens* prior to treatment and/or where tarping occurred. Plant selection will be based on the plants already established in the area immediately surrounding the treatment area and will be guided by the hydrologic gradient as to those most likely to thrive. The establishment of these plantings will be monitored and enhanced with more transplants if necessary based on survivorship, adequate growth, or a desire for higher density of the potential host plants. Treatment areas will be monitored in spring 2013 and beyond for secondary invasion by non-native plants such as *Lepidium latifolium*, *Atriplex prostrata*, *Apium graveolens*, and *Polypogon monspeliensis*, that are already present at Southampton Marsh. These or any other non-natives will be removed from previously treated areas by hand at first detection. In autumn 2014, the seeds of soft bird's beak collected in 2012 will be sown into the revegetation areas if the potential host plants have established to a satisfactory degree. Otherwise, more host plants will be added to these zones before reseeded.

*Conservation Measures specific to Spartina treatment activities:*

In addition to conservation measures 1-13, to reduce adverse effects on listed species from *Spartina* treatment activities, the Conservancy proposes the following measure:

16. Pre-treatment *Spartina* and clapper rail monitoring data will be used to inform treatment crews operating within the marsh. GPS-mapped *Spartina* and clapper rail locations will be provided to treatment crews to avoid rail disturbance and minimize the *Spartina* search footprint during treatment work.

*Conservation Measures specific to Spartina inventory activities:*

In addition to conservation measures 1-13, the following conservation measure will be implemented to ensure that inventory monitoring activities result in minimal disturbance to listed species:

17. Prior to beginning monitoring, the prior year's site map will be examined and a route will be determined which will minimize the amount of foot traffic in the marsh and maximize the use of existing roads, trails, and boardwalks.

*Conservation Measures specific to revegetation activities:*

Revegetation activities include site preparation, planting, monitoring, maintenance, and plant and seed collection. In addition to conservation measures 1-13, the following additional conservation measures will be implemented in order to ensure that revegetation activities cause as little disturbance to listed species as possible:

18. At least one permitted California clapper rail biologist will advise and/or review the development of plans for revegetation, revegetation management, seed collection, and revegetation monitoring.
19. Revegetation activities at sub-areas with California clapper rails will be scheduled outside of the clapper rail breeding season (after September 1 and prior to January 31) to the extent feasible.
20. When digging holes for planting or removing non-native vegetation, effects to existing native vegetation will be minimized.

*Conservation Measures specific to floating and earthen island installation:*

Habitat enhancement activities associated with the 2012 Program include the installation of artificial floating islands and creation of earthen islands at sites where rails are utilizing invasive *Spartina*. In addition to conservation measures 1-13, the following additional conservation measures will be implemented in order to ensure that island installation will cause as little disturbance to listed species as possible:

21. At least one permitted California clapper rail biologist will accompany the crew during artificial island and earthen island installation.
22. Island installation will be scheduled outside of the clapper rail breeding season (after September 1 and prior to January 31) to the extent feasible.
23. When placing artificial islands and excavating materials for earthen islands, effects to existing native vegetation and channel hydrology will be minimized.

### **Analytical Framework for the Jeopardy Analysis**

In accordance with policy and regulation, the jeopardy analysis in this biological opinion relies on three components: (1) the *Status of the Species*, which evaluates the salt marsh harvest mouse's, California clapper rail's, and soft bird's beak's range-wide conditions, the factors

responsible for that condition, and their survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of these listed species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of these listed species; (3) the *Effects of the Proposed Project*, which determines the direct and indirect effects of the proposed Federal action and the effects of any interrelated or interdependent activities on these species; and (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on them.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the salt marsh harvest mouse's, California clapper rail's, and soft bird's beak's current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of these listed species in the wild.

The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the salt marsh harvest mouse, California clapper rail, and soft bird's beak and the role of the action area in the survival and recovery of these listed species as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

#### **Adverse Modification Determination**

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat 50 Code of Federal Regulations (CFR) 402.02. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to critical habitat.

In accordance with policy and regulation, the adverse modification analysis in this biological opinion relies on four components: (1) the *Status of Critical Habitat*, which evaluates the range wide condition of designated critical habitat for soft bird's beak in terms of Primary Constituent Elements (PCEs), the factors responsible for that condition, and the intended recovery function of the critical habitat at the provincial and range-wide scale; (2) the *Environmental Baseline*, which evaluates the condition of the critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the PCEs and how that will influence the recovery role of affected critical habitat units; and (4) *Cumulative Effects* which evaluates the effects of future, non-Federal activities in the action area on the PCEs and how that will influence the recovery role of affected critical habitat units.

For purposes of the adverse modification determination, the effects of the proposed Federal action on soft bird's beak critical habitat are evaluated in the context of the range-wide condition of the critical habitat at the provincial and range-wide scales, taking into account any cumulative effects, to determine if the critical habitat range-wide would remain functional (or would retain the current ability for the PCEs to be functionally established in areas of currently unsuitable but capable habitat) to serve its intended recovery role for soft bird's beak.

The analysis in this biological opinion places an emphasis on using the intended range-wide recovery function of soft bird's beak critical habitat and the role of the action area relative to that intended function as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the adverse modification determination.

### **Action Area**

The Service defines the action area as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action” 50 CFR. For the purposes of the effects assessment, the action area for the Estuary Invasive *Spartina* Project includes approximately 50,000 acres of the Estuary. This cumulative acreage includes all the tidally-influenced areas where *Spartina* treatment may occur across 188 treatment sites or “sub-areas”, although the actual treatment area (i.e., invasive *Spartina* cover) is substantially less. The treatment sites include areas of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma counties.

### **Status of the Species**

#### Salt Marsh Harvest Mouse

The status of the salt marsh harvest mouse and information about its biology, ecology, distribution, and current threats is available in the *Draft Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California* (Draft Recovery Plan; Service 2010a). The Draft Recovery Plan is scheduled to be finalized in 2012. The Draft Recovery Plan features the salt marsh harvest mouse along with four other endangered species. Supplemental or updated information is provided in the Service's February 2010 five-year review for the salt marsh harvest mouse (Service 2010b). The five-year review recommended the salt marsh harvest mouse remain listed as endangered due to the continuation of threats from habitat loss due to filling, diking, subsidence, changes in water salinity, non-native species invasions, sea level rise associated with global climate change, and contamination. Habitat suitability of many marshes is further limited by small size, fragmentation, and lack of other vital features such as sufficient refugial habitat. None of the recovery units have met the Draft Recovery Plan's down listing criteria for the protection, management, and restoration of suitable tidal marsh habitat.

#### California Clapper Rail

**Listing Status:** The California clapper rail was listed as endangered on October 13, 1970 (35 **FR** 16047). Critical habitat has not been designated for this species. The California clapper rail is a Fully Protected Species under California law (See CDFG Code Section 3511).

**Description:** This subspecies is one of three subspecies in California listed as endangered under the Act. The other subspecies include the light-footed clapper rail, which is found in tidal marshes in southern California and northwestern Baja California, and the Yuma clapper rail,

which is restricted to the Colorado River basin. The California clapper rail is distinguishable from other clapper rails by its large body size of 13 to 19 inches from bill to tail, and weighs approximately 8.8 to 12.3 ounces. It has an orange bill, a rufous breast, black and white barred flanks, and white undertail coverts (Albertson and Evens 2000). Clapper rails are sexually dimorphic; the males are slightly larger than females (Garcia 1995). Juveniles have a pale bill and dark plumage. Clapper rails are capable of producing several vocalizations, most common of which are a series of keks or claps (Massey and Zembal 1987).

**Natural History and Distribution:** The California clapper rail is endemic to tidally influenced salt and brackish marshes of California. Historically, the California clapper rail occurred in tidal marshes along California's coast from Morro Bay, San Luis Obispo County, to Humboldt Bay, Humboldt County. Currently, California clapper rails are known to occur in tidal marshes in the Estuary (San Francisco, San Pablo, Grizzly, Suisun and Honker bays) (Olofson Environmental, Inc. 2011; CDFG 2011). California clapper rails are typically found in the intertidal zone and sloughs of salt and brackish marshes dominated by pickleweed, Pacific cordgrass, *Grindelia*, saltgrass, *Jaumea*, and adjacent upland refugia. They may also occupy habitats with other vegetative components, which include, but are not limited to, bulrush, cattails, and Baltic rush.

In northern San Francisco Bay, California clapper rails also occur in tidal brackish marshes that vary significantly in vegetation structure and composition, ranging from salt-brackish marsh to fresh-brackish marsh transitions (Service 2010a). Use of brackish marshes by California clapper rails is largely restricted to major sloughs and rivers of San Pablo Bay and western Suisun Marsh, and along portions of Coyote Creek in the South Bay (Service 2010a). California clapper rails were also found in nearly pure stands of alkali bulrush along Guadalupe Slough in 1990 and 1991 (H. T. Harvey & Associates 1990a, 1990b and 1991). On rare occasions, California clapper rails have been recorded even further upstream, in brackish/freshwater transition marshes, particularly during the non-breeding season. Although it has been suggested that habitat quality may be lower in brackish marshes than in salt marshes (Shuford 1993), further studies comparing reproductive success in different marsh types are necessary to determine the value of brackish marshes to California clapper rails.

The breeding period of the California clapper rail is prolonged. Pair bonding and nest building are generally initiated by mid-February. Nesting may begin as early as late February or early March (Evens and Page 1983), and extend through July in the South Bay, and into August in the North Bay (DeGroot 1927, Service unpubl. data). The end of the breeding season is typically defined as the end of August, which corresponds with the time when eggs laid during re-nesting attempts have hatched and young are mobile.

California clapper rails require an intricate network of sloughs to provide abundant invertebrate populations (Grinnell *et al.* 1918, DeGroot 1927, Harvey 1988, Collins *et al.* 1994) and escape routes from predators, particularly for vulnerable flightless young (Taylor 1894, Adams 1900, DeGroot 1927, Evens and Page 1983, Foerster *et al.* 1990, Evens and Collins 1992). In addition, the small natural berms along tidal channels with relatively tall vegetation, such as *Grindelia stricta*, provide elevated nesting substrate. Harvey (1988) and Foerster *et al.* (1990) reported mean clutch sizes of 7.27 and 7.47 eggs for California clapper rails, respectively. The California clapper rail builds a bowl shaped platform nest of marsh vegetation and detritus (DeGroot 1927;

Harvey 1988; Foerster *et al.* 1990). The California clapper rail typically feeds on benthic invertebrates, but its diet is wide ranging, and includes seeds, and occasionally small mammals such as the salt marsh harvest mouse.

Dispersal or movements by clapper rails in California occurs between and outside of marshes (Orr 1939; Zembal *et al.* 1985; San Francisco Bay Bird Observatory 1986; Page and Evens 1987; Albertson 1995). Post-breeding dispersal has been documented during the fall and early winter (Lindsdale 1936, Orr 1939, Service unpubl. data, Albertson 1995). There is no clear evidence of migratory behavior in the California clapper rail. However, infrequent long distance dispersal does occur.

**Threats:** An estimated 40,191 acres of tidal marshes remained in 1988 of the 189,931 acres of tidal marsh that historically occurred in the Estuary; this represents a 79 percent reduction from historical conditions (Goals Project 1999). The suitability of many remaining marshes for California clapper rails is limited, and in some cases precluded, by their small size, fragmentation, and lack of tidal channel systems and other micro-habitat features. These limitations render much of the remaining tidal marsh acreage unsuitable or of low value for the species. Habitat loss has dramatically slowed since the California clapper rail was listed in 1970, but ongoing disturbance and degradation precludes or reduces occupation of much of the remaining potential habitat by California clapper rails. Remaining habitat has been fragmented by levee systems that reduce and isolate patches of habitat, reduce/eliminate high marsh and refugial habitat, and make habitat accessible to predators and human disturbance. Habitat has been filled, subjected to many contaminants, converted to less suitable vegetation conditions by fresh wastewater discharges, and submerged by land subsidence caused by agricultural practices and groundwater overexploitation.

Loss of upper marsh vegetation has greatly reduced available habitat throughout the range of the California clapper rail. Most marshes in the South Bay are adjacent to steep earthen levees that have all but eliminated upper marsh vegetation and reduced available cover for California clapper rails during winter flood tides. In Suisun Marsh, high marsh vegetation has been eliminated by diking and livestock grazing. In addition to the problems associated with landscape alteration caused by development, California coastal wetlands are expected to be subject to the effects of global sea level rise and climate change due to global warming. The effects of past subsidence of marsh plain relative to mean tidal level, particularly in the South Bay (Atwater *et al.* 1979), are likely to be amplified by rising tidal levels.

Other than outright habitat loss due to marsh reclamation, significant historic degradation to California clapper rail habitat quality in remaining tidal marshes is caused by numerous human-caused physical and biological changes in the Estuary tidal marshes, including: construction and maintenance of dikes in tidal wetlands; replacement of tidal refugia along landward marsh edges with unbuffered urban edges; conversion of salt marsh to brackish-fresh marsh by urban fresh wastewater discharges; structural habitat change caused by non-native plant invasions (such as perennial pepperweed (*Lepidium latifolium*), ice plant, and mustard in high marsh); increased predation by avian and mammalian predators attracted by the availability of man-made structures (e.g., electrical towers, buildings, and boardwalks); increased disturbance from recreational access, including humans and dogs; reduced habitat quality and increased predation pressure

from litter and debris; and contamination of marsh sediments, which may impact California clapper rails directly or indirectly (potential direct effects include toxicity to adults, chicks, or embryos, and potential indirect effects include reduced prey quality, quantity, and availability, and altered vegetation structure/composition for nesting and sheltering). Few of these causes of habitat degradation are independent of one another; they interact and mutually amplify (Service 2010a).

Wastewater discharges that alter natural salinity levels in tidal waters can adversely affect California clapper rail populations and other species. Since about 1970, freshwater discharges on the order of 120 million gallons per day from the San Jose Water Pollution Treatment Plant, have led to the conversion of approximately 300 acres of former salt marsh to fresh and brackish marsh at the southern end of San Francisco Bay along Coyote Creek and adjoining sloughs of the Santa Clara Valley (H.T. Harvey and Associates 1997). Marsh conversion may lower the habitat quality and carrying capacity of tidal marshes to support California clapper rails, as evidenced by lower population and nesting densities recorded in brackish marshes than salt marshes (H.T. Harvey and Associates 1989).

California clapper rails vary in their sensitivity to human disturbance, both individually and between marshes. California clapper rails have been documented nesting in areas with high levels of disturbance, including areas adjacent to trails, dikes, and roads heavily used by pedestrian and vehicular traffic (J. Didonato pers. comm., Baye *in litt.* 2008). In contrast, Albertson (1995) documented a California clapper rail abandoning its territory in the Laumeister Tract, shortly after a repair crew worked on a nearby transmission tower.

California clapper rail reactions to disturbance may vary with season; however, both breeding and non-breeding seasons are critical times. California clapper rail mortality is greatest during the winter, primarily due to predation during extreme winter high tides (Eddleman 1989; Albertson 1995). Human-related disturbance may increase the California clapper rail's vulnerability to predators. During high tides, California clapper rails and other wildlife hide within any available cover in the transition zone and high marsh. As people approach, the birds may flush and attract predators. The presence of people and their pets in or near the high marsh plain or upland areas during marsh inundation may even prevent California clapper rails from leaving the lower marsh plain to seek cover, which also leaves them vulnerable to predation (Evens and Page 1983; Evens and Page 1986). Public trails that run along a narrow marsh transition zone may be particularly hazardous to California clapper rails that depend on this habitat for refuge during high tides.

Throughout the Estuary, the remaining California clapper rail population is impacted by a suite of mammalian and avian predators. At least 12 native and three non-native predator species are known to prey on various life stages of the California clapper rail (Albertson 1995). Artificially high local populations of native predators, especially raccoons, skunks, and common ravens occur due to the presence of landfills and other sources of human food waste adjacent to marshes. Feral cats also represent another predation threat on adult and young California clapper rails near residential areas and landfills (Albertson 1995). Non-native Norway rats have long been known to be effective predators of California clapper rail nests (DeGroot 1927; Harvey 1988; Foerster *et al.* 1990). According to Harvey (1988) and Foerster *et al.* (1990), predators,

especially rats, accounted for California clapper rail nest losses of 24 to 29 percent in certain South Bay marshes. Placement of shoreline riprap, levees, buildings, and landfills favor rat populations, which results in greater predation pressure on California clapper rails in certain marshes. Encroaching development displaces lower order predators from their natural habitat and adversely affects higher order predators, such as coyotes, which will normally limit population levels of lower order native and non-native predators, especially red foxes (Albertson 1995).

These predation impacts are exacerbated by a lack of high marsh and natural high tide cover in most remaining marshes. DeGroot (1927) noted that clapper rails were extremely vulnerable to predation by raptors during high tide events when they were forced to seek refuge in exposed locations. Similarly, Johnston (1956 and 1957) and Fisler (1965) observed heightened predator activity in marshes coinciding with extreme high tides. Evens and Page (1986) also documented the susceptibility of California black rails to predation during extreme high tides. More recently, California clapper rail predation was noted in west Marin during extreme high tides in 2005 (G. Block, pers. comm.). There is an abundance of falcons, raptors, egrets, and herons during high tides that opportunistically take advantage of prey during this vulnerable period.

The proliferation of non-native red foxes into tidal marshes of the South Bay since 1986 has had a profound effect on California clapper rail populations. As a result of the rapid decline and almost complete elimination of California clapper rail populations in certain marshes, the Don Edwards San Francisco Bay National Wildlife Refuge implemented a predator management plan in 1991 (Foerster and Takekawa 1991) with an ultimate goal of increasing California clapper rail population levels and nesting success through management of red fox predation. This program was successful in increasing the South Bay California clapper rail populations from an all-time low.

Mercury accumulation in eggs is perhaps the most significant contaminant problem affecting California clapper rails in the Estuary, with the South Bay containing the highest mercury levels. Mercury is extremely toxic to embryos and has a long biological half-life. Schwarzbach *et al.* (2006) found high mercury levels and low hatching success (due both to predation and, presumably, mercury) in California clapper rail eggs throughout the Estuary. California clapper rail habitat is also at risk of contamination due to oil spills (Baker *et al.* 2009).

The population viability analysis for California clapper rails identified changes in adult survivorship as the factor with the largest influence on population growth rates (M. Johnson, pers. comm.). Another model also indicates that adult survivorship of California clapper rails is the primary demographic variable for maintaining a stable population or causing the population to either increase or decline (Foin *et al.* 1997). These models indicate that survival of adult birds has the strongest effect on the perpetuation or extinction of the overall population.

**Population Status and Trends:** The California clapper rail population was first estimated at 4,200 to 6,000 birds between 1971-1975, of which 55 percent occurred in the South Bay and 38 percent in the Napa Marshes (Gill 1979). Although the population was estimated at only 1,500

between 1981-1987 (Harvey 1988), the difference between these two estimates is believed to be partially due to survey intensity. Breeding season density data indicate that populations remained stable during the 1970s (Gill 1979, Harvey 1980), but reached an estimated all-time historical low of about 500 birds in 1991, with about 300 California clapper rails in the South Bay (Harding *et al.* 1998). California clapper rail numbers have rebounded between 1990s and 2007. However, substantial increases in population may be difficult to achieve due to the current disjunct distribution of their habitat (Albertson and Evens 2000).

Bay-wide California clapper rail numbers have been declining overall since 2007, and the decline is highly correlated with efforts to eradicate invasive *Spartina* in the Estuary. U.S. Geological Survey data suggest that Bay-wide California clapper rail call count numbers declined by as much as 50 percent between 2007 and 2011. PRBO Conservation Science conducted Estuary-wide surveys of the San Francisco Bay for California clapper rail between 2005 and 2010. Results of the 2008 survey indicated only 543 rails, compared to 938 rails detected in 2007 (PRBO Conservation Science 2009a). In both years, the South Bay accounted for the majority of California clapper rails. Between 2005 and 2008, the estimated Estuary-wide total population of California clapper rails decreased by about 21 percent (Liu *et al.* 2009). The South Bay population of California clapper rails decreased by 54 percent between 2007 and 2008 (Liu *et al.* 2009). Invasive *Spartina* Project California clapper rail survey data collected at 30 sites from 2004-2010 also shows an overall decline in California clapper rails. The population increased by 25 percent between 2005 and 2006 and by 25 percent again between 2006 and 2007. Then count numbers decreased by 35 percent between 2007 and 2008, by 32 percent from 2008 to 2009 and by 13 percent from 2009 to 2010.

Data collected by ISP from 2004 to 2010 at 30 sites within the San Leandro Bay, the Hayward region, the San Francisco Peninsula, and the Newark region, showed a decline in California clapper rail numbers from 519 in 2007 to 202 in 2010. U.S. Geological Survey data suggests that, Estuary-wide California clapper rail call count numbers declined by approximately 50 percent between 2007 and 2011. According to the *California Clapper Rail Population Monitoring Report: 2005-2008*, the Estuary-wide California clapper rail population showed an overall negative trend (-20.6 percent,  $P < 0.0001$ ) from 2005 to 2008, which can be mostly attributed to the 57 percent decline seen in the South Bay from 2007 to 2008 (PRBO Conservation Science 2009b). This decrease in the population of California clapper rails in 2008 is highly correlated with large scale *Spartina* eradication during this period which resulted in the loss of cover. No new cover was created or enhanced for California clapper rail to offset this loss. In 2010, PRBO Conservation Science detected an increase of California clapper rails in San Pablo Bay and South San Francisco Bay, while ISP detected a decline at other locations. This difference suggests that mature marshes (surveyed by PRBO Conservation Science) which received a high degree of hybrid *Spartina* control still provided enough native habitat to support stable California clapper rail population, while young marshes (surveyed by ISP), where hybrid *Spartina* was a more significant component of marsh vegetation cover, no longer provided habitat for California clapper rails because California clapper rails in these marshes were dependent on the hybrid *Spartina* for cover. It is unknown if the increased number of California clapper rails detected at some locations is due to high breeding success or is a result of immigration from marshes where *Spartina* treatment resulted in a loss of high tide refugia habitat.

In addition, high tide surveys conducted by East Bay Regional Parks District showed decreases in California clapper rail numbers in San Leandro Bay since 2007. An extreme decline on East Bay Regional Parks District land occurred at Arrowhead Marsh which decreased from 112 California clapper rails in 2007 to 35 in 2010. In 2011, surveys conducted by ISP suggest that California clapper rail numbers are still declining. The 2011 California clapper rails surveys detected a 9 percent reduction (loss of 35 rails) from 2010 (293-384 in 2010 and 267-349 in 2011) at sites surveyed by ISP.

**Recovery Actions:** The *Draft Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California* (Draft Recovery Plan; Service 2010a) is an expansion and revision of *The California Clapper Rail and Salt Marsh Harvest Mouse Recovery Plan* (Service 1984). The Draft Recovery Plan is scheduled to be finalized in 2012. The Draft Recovery Plan features the California clapper rail along with four other endangered species. The Draft Recovery Plan identifies high priority areas for tidal marsh and ecotone restoration including restoring tidal action to many of the salt ponds and other diked baylands along San Francisco Bay. Thousands of acres of former salt ponds and other diked baylands along San Francisco Bay have been restored or are proposed to be restored to tidal action (Service file number 81420-2008-F-0621; Service 2008); however, it may take decades before many of the heavily subsided areas within the former salt ponds accumulate enough sediment to become suitable tidal marsh habitat for California clapper rails.

The Don Edwards San Francisco Bay National Wildlife Refuge with assistance from the U.S. Department of Agriculture Wildlife Services currently manages mammalian and avian predators within California clapper rail habitat on its refuge lands in the South Bay and on CDFG lands; however, the Predator Management Program is underfunded.

### Soft Bird's Beak

The status of the soft bird's beak and information about its biology, ecology, distribution, and current threats is available in the *Draft Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California* (Draft Recovery Plan; Service 2010a). The Draft Recovery Plan is scheduled to be finalized in 2012. The Draft Recovery Plan features the soft bird's beak along with four other endangered species. Supplemental or updated information is provided in the Service's January 2009 five-year review for the soft bird's beak (Service 2009). The five-year review recommended soft bird's beak remain listed as endangered due to the continuation of threats from muting (damping) of tides and salinity, invasive non-native plants, seed predation, sea level rise predicted to result from global climate change, mosquito abatement, oil spills, and (for these small populations) random events. None of the recovery units have met the Draft Recovery Plan's down listing criteria for the protection, management, and restoration of suitable tidal marsh habitat.

### Soft Bird's Beak Critical Habitat

The Service designated critical habitat for soft bird's beak on April 12, 2007 (U.S. Fish and Wildlife Service 2007). The Service is required to list the known PCEs together with the critical habitat description.

The PCEs defined for soft bird's beak were derived from its biological needs. Based on our current knowledge of the life history, biology, and ecology of the species, and the habitat requirements for sustaining the essential life-history functions of the species, the Service determined that the PCEs essential to the conservation of the soft bird's beak are:

- (1) Persistent emergent, intertidal, estuarine wetland at or above the mean high-water line (as extended directly across any intersecting channels);
- (2) Rarity or absence of plants that naturally die in late spring (winter annuals); and
- (3) Partially open spring canopy cover (approximately 790 nMol/m<sup>2</sup>/s) at ground level, with many small openings to facilitate seedling germination.

Five units have been designated as critical habitat for soft bird's beak in Contra Costa, Napa, and Solano Counties, California. Contra Costa, Napa, and Solano Counties have approximately 22 acres, 384 acres, and 1,870 acres of critical habitat, respectively. Common threats that may require special management considerations or protections of the PCEs for soft bird's beak in all five units include: (1) mosquito abatement activities (ditching, dredging, and chemical spray operations), which may damage the plants directly by trampling and soil disturbance, and indirectly by altering hydrologic processes and by providing relatively dry ground for additional foot and vehicular traffic; (2) general foot and offroad vehicle traffic through soft bird's beak populations that could result in their damage and loss in impacted areas; (3) increases in the proliferation of nonnative invasive plants from human-induced soil disturbances leading to the invasive outcompeting soft bird's beak; (4) control or removal of nonnative invasive plants, especially *Lepidium latifolium*, which, if not carefully managed, can damage soft bird's beak populations through the injudicious application of herbicides, by direct trampling, or through the accidental transport of invasive plant seeds to new areas; and (5) presence of *Lipographis fenestrella* (a moth) larvae that could reduce the reproductive potential of soft bird's beak through flower, fruit, and seed predation. Please refer to the final designation of critical habitat for soft bird's beak for additional information (72 FR 18518).

## **Environmental Baseline**

### Salt Marsh Harvest Mouse

The action area is located within the Draft Recovery Plan's San Pablo Bay and Central/South San Francisco Bay Recovery Unit (Service 2010a). Suitable salt marsh harvest mouse habitat occurs on all proposed treatment sites. Comprehensive surveys for salt marsh harvest mice have not been conducted within all of the treatment sites; however, the California Natural Diversity Database (CNDDB) occurrences of the salt marsh harvest mouse have been documented

throughout the San Francisco Bay. The salt marsh harvest mouse is assumed to be present in most tidal marshes around the San Francisco Bay. Therefore, given the biology and ecology of this animal, the presence of suitable habitat adjacent to and in the action area, and records of observations of this listed species, the salt marsh harvest mouse likely inhabits the action area. Salt marsh harvest mice use primarily pickleweed habitat, but will use *Grindelia* and *Spartina* as high tide refugial habitat, when these higher plants are the only remaining structure that is above the water level.

### California Clapper Rail

The action area is located within the Draft Recovery Plan's San Pablo Bay and Central/South San Francisco Bay Recovery Unit (Service 2010a). The Central/South San Francisco Bay Recovery Unit supports the majority of the entire California clapper rail populations. Populations in the Central/South San Francisco Bay Recovery unit are widely separated from northern ones, but there may be occasional dispersal between the areas. Suitable California clapper rail salt marsh habitat occurs at most of the 188 sites within the action area. Extensive surveys have been conducted by ISP in the Action Area; Table 1 presents the results of these surveys. Thus, the California clapper rail is assumed to be present in all suitable salt marsh habitat within the action area.

### Soft Bird's Beak

Southampton Marsh is the only ISP treatment area where soft bird's beak occurs. At this site, soft bird's beak can be found along some of the smaller channels in the southern portion of the site, scattered across the marsh plain, and in some of the high marsh areas in the north. In 2010, Grewell (2010) mapped 300 sub-population patches at Southampton Marsh in 2010, occupying approximately 1.94 acres of marsh. However, because soft bird's beak is an annual plant, and thus the population numbers and patch size are variable from year to year.

### Soft Bird's Beak Critical Habitat

The portion of the action area in Southampton Marsh, in Solano County is within critical habitat Unit 5 Southampton Marsh for soft bird's beak. This unit consists of approximately 164 acres of State-owned land managed by the California Department of Parks and Recreation (CDPR) as a wetland natural preserve. The unit is located in the Benicia State Recreational Area along Interstate Highway 780 and just northwest of the City of Benicia. Soft bird's beak occupied the unit at the time of listing as identified in the final listing rule (62 FR 61916; November 20, 1997) and contains the features essential to the conservation of soft bird's beak. The unit receives tidal inundations on a regular-to-irregular basis (PCE #3) (NWI 2005) from natural and artificial (dredged) tidal channels within the unit. Additional special management considerations or protection of the PCEs beyond those discussed above may be required to minimize the impact of residential encroachment from the north that could increase stormwater and wastewater runoff into the unit.

## **Effects of the Proposed Action**

General effects of the proposed action are detailed in the EIS/EIR and in the Programmatic BO, and are hereby incorporated by reference. Effects specifically associated with the 2012 treatment sites are discussed below.

### Salt Marsh Harvest Mouse

Up to 24,821 acres of tidal marsh and upland refugia habitat for the salt marsh harvest mouse will be disturbed and restored by the proposed project. Salt marsh harvest mouse habitat will be lost due to spraying and disturbance by workers while they are accessing sites during treatment, monitoring, and planting.

The proposed project will restore tidal marsh and upland refugia habitat for the salt marsh harvest mouse by planting of native plant species. Small earthen islands will also be created to provide upland refugia habitat. Planting with native species such as *Grindelia* will provide an area where salt marsh harvest mice could hide during extreme high tide events and avoid getting eaten by predators such as egrets, herons, raptors foraging in the marsh or mammals such as foxes.

Harassment or harm of salt marsh harvest mice or suitable habitat during the treatment, monitoring, and planting is possible as some areas of pickleweed and saltgrass could be affected by workers moving through the marsh. The treatment of *Spartina* with Imazapyr herbicide will kill vegetation in which salt marsh harvest mouse may be nesting, foraging or using for refuge. Loss of this vegetation may make salt marsh harvest mouse more susceptible to predation. Once the *Spartina* is initially sprayed, this dead plant will continue to provide habitat until the plant breaks down. Once the plant degrades, salt marsh harvest mice will have a reduction in available upland refugial habitat. The earthen islands and plantings will provide habitat in the long term, but these areas may not be immediately available to salt marsh harvest mice. Accessing treatments sites on foot or using tracked vehicles may crush vegetation which salt marsh harvest mouse may be using for foraging, nesting or refuge, thereby possibly injuring or killing salt marsh harvest mice. Thus, conservation measures will be implemented to protect the salt marsh harvest mouse during treatment, monitoring, and planting. Conservation measures incorporated into the project description minimize the risk of mortality and the extent of disturbance from workers and vehicles. Through measures such as avoiding walking through areas of dense pickleweed. Other conservation measures such as environmental awareness training of all treatment and planting personnel, and use of Service-approved biological monitors during treatment, planting and monitoring activities which occur in the marsh also will minimize harassment, habitat disturbance, and mortality of salt marsh harvest mice.

### California Clapper Rail

Tidal marsh and upland refugia habitat for the California clapper rail will be disturbed, permanently lost, or restored by the proposed project. About 24,821 acres of California clapper rail habitat will be disturbed by treatment activities.

#### *Treatment Effects*

Based on our experience with *Spartina* control to date, we anticipate that the change in

vegetative structure following treatment will affect California clapper rails. In past treatments, at most locations where California clapper rail were residing in the non-native *Spartina*, local populations decreased during treatment, sometimes notably, likely due to removal of protective cover provided by the cordgrass. A few sites showed significant clapper rail declines as they had both a high density and cover of non-native *Spartina* hybrids and high rail populations. This loss is expected to continue due to the delayed effect of treatment on California clappers rails. Prior to the establishment of the non-native *Spartina*, these areas previously had no, or little, tall vegetative cover, and the clapper rail populations had appeared or increased rapidly in response to the new, introduced habitat. Where an established native marsh was subsequently invaded by non-native *Spartina*, clapper rail numbers show greater resilience to the removal of the vegetative structure provided by non-native *Spartina*. Although this has not been quantitatively studied, it is possibly due to underlying channel and hydrological complexity, native plant presence (even at a low level beneath the non-native *Spartina* canopy) and consequent availability to recolonize the treated site and a developed food web that could rebound after the removal of the non-native *Spartina*.

Spraying of Imazapyr herbicide in salt marsh habitats during the nesting season has the potential to result in disturbances to nests. The Conservancy has agreed to conduct treatment, monitoring and the restoration efforts at a time during the year when the California clapper rails would not be expected to be nesting. A breeding survey for California clapper rail would be conducted prior to any work planned during the nesting season. The results of the survey would be provided to the Service to determine if the activity should be rescheduled to prevent disturbance to nesting California clapper rails located in proximity to planned operations. As suitable nesting habitat for California clapper rail exists adjacent or on many sites, movement of vehicles to the site during the nesting season could also result in disturbance to nesting California clapper rails if present in these areas. In addition to the requirement for breeding season surveys related to work conducted during the nesting season, other conservation measures will be implemented to protect the California clapper rail during the treatment such as environmental awareness training of all construction personnel and use of Service-approved biological monitors during all activities near or in the marsh.

Noise and other disturbances could disrupt nesting and breeding activity, as well as other behaviors associated with foraging, reproduction, and other essential activities engaged in by individuals of the species. Accessing treatment sites on foot or using tracked vehicles may crush vegetation which California clapper rails may be using for foraging, nesting or refuge. Tracked vehicles are used in marshes for various purposes, including materials and personnel transport, as a base for backpack or hose-based treatment strategies, or for direct treatment from the vehicle. Tracked amphibious vehicles enable access to portions of the marsh plain that are otherwise difficult to access, such as wide marsh expanses or soft mud substrates. Thus, conservation measures will be implemented to protect the California clapper rails during treatment, monitoring, and planting.

People working in the marsh may disturb adult clapper rails. Human-related disturbance of clapper rails in the winter, particularly during high tide and storm events, may increase the bird's vulnerability to predators. To minimize this effect, the project has proposed to not enter the marshes during high tides or during storm events. This should provide the rails access to larger

amounts of habitat for refuge if disturbed by the revegetation efforts.

Conservation measures incorporated into the project description that minimize the extent that California clapper rails will be harassed, harmed, or killed by the project include measures such as avoiding walking through areas of dense vegetation, environmental awareness training of all treatment and planting personnel, and use of Service-approved biological monitors during treatment, planting and monitoring activities which occur in the marsh.

#### *Post treatment habitat loss*

Application of herbicide in salt marsh habitats will result in loss of nesting, foraging, and refuge habitat for California clapper rails. Imazapyr kills plants which California clapper rails use for nesting, foraging and refuge. The proposed project will revegetate tidal marsh and create upland refugia habitat for the California clapper rail by planting native species such as *Grindelia* where California clapper rails could hide during extreme high tide events and avoid getting eaten by predators foraging in the marsh. Floating refuge and nesting islands will also be placed around the Estuary to provide temporary habitat for California clapper rails that are using marshes that are being treated for *Spartina*. Floating islands at Arrowhead Marsh have been proven to be used by California clapper rails for both high tide refugia and for nesting. Two nests were observed using camera traps in 2010. Photographs documented at least one chick hatching (Overton, pers. comm.).

Because California clapper rails use stands of non-native *Spartina* for both cover and breeding, the proposed project will result in a loss of habitat for the California clapper rails. Sometimes after spraying, the dead, vegetative portion of *Spartina* remains on site to provide some cover over the winter months. However, over the course of a year, the tidal action will break about the wracks of dead *Spartina* leaving bare areas. Recolonization of the site by native plants such as gumplant and pickleweed will occur at the right elevations; however, there will be a temporal loss of habitat for rails until this habitat grows large enough to provide cover and nesting substrate for the rails. It is likely that the habitat will become available to California clapper rails many years after treatment.

#### *Post treatment restoration and monitoring efforts*

Planned restoration of the treated areas has the potential to affect the California clapper rail. California clapper rails require upland refugial sites on levees or other higher ground where individuals can seek cover during extreme high tide events and escape predation from predators such as raptors or foxes. The project plan proposes restoration of treated areas and creation of high tide refuge habitat. This effort will improve conditions for the California clapper rail by providing a place for California clapper rails to hide during high tide events.

Noise and other disturbances could disrupt nesting and breeding activity, as well as other behaviors associated with foraging, reproduction, and other essential activities engaged in by individuals of the species. Accessing restoration sites on foot or using tracked vehicles may crush vegetation which California clapper rails may be using for foraging, nesting or refuge. Tracked vehicles are used in marshes for various purposes, including materials and personnel transport, as a base for backpack or hose-based treatment strategies, or for direct treatment from the vehicle. Tracked amphibious vehicles enable access to portions of the marsh plain that are

otherwise difficult to access, such as wide marsh expanses or soft mud substrates. Thus, conservation measures will be implemented to protect the California clapper rails during treatment, monitoring, and planting.

People working in the marsh may disturb adult clapper rails. Human-related disturbance of clapper rails in the winter, particularly during high tide and storm events, may increase the bird's vulnerability to predators. To minimize this effect, the project has proposed to not enter the marshes during high tides or during storm events. This should provide the rails access to larger amounts of habitat for refuge if disturbed by the revegetation efforts.

Two types of control-related monitoring will occur as part of the ISP: inventory monitoring and treatment efficacy monitoring. Almost all inventory mapping in 2012 will be done via ground-based GPS surveys. The exception will be the use of helicopters to survey particularly inaccessible marsh areas. Treatment monitoring is conducted to assess efficacy of different control methods in marshes. Because monitoring transects would occur in California clapper rail habitat, these activities could result in the harassment of California clapper rails. California clapper rails vary in their sensitivity to human disturbance, both individually and between marshes. California clapper rails disturbed by monitoring activities could be subjected to predation if they increase their movements within the marshes or disperse to other nearby or distant tidal wetlands. If nesting California clapper rails are determined to be present near a randomly selected data point, the data point would be relocated to avoid nests or California clapper rails. Treatment monitoring would result in harassment of California clapper rails from workers walking in the marsh and possibly harassing individuals.

### Soft Bird's Beak

Individual soft bird's beak plants at Southampton Marsh could be lost due to inadvertent trampling during treatment and monitoring activities. However, pre-activity surveys will reduce the potential for inadvertent trampling of individual plants. Overspray of Imazapyr during treatment of *S. alterniflora* could also affect soft bird's beak, although this is unlikely because distributions of these species are not immediately adjacent at Southampton Marsh. Approximately 1017 ft<sup>2</sup> of marsh area infested with stands of *S. patens* will be treated with tarping and approximately 683 ft<sup>2</sup> are expected to be occupied by soft bird's beak; thus individual soft bird's beak plants will be lost due to treatment. To compensate, for loss of individual plants, revegetation of soft bird's beak and its host plants will be implemented.

Treatment of *S. patens* using tarps will result in the temporary loss of 0.02 acre of marsh area that could potentially be occupied by soft bird's beak. Because tarps will be installed in 2012 and remain in place for approximately one year, potential habitat for the species will be unavailable during that time. However, after removing the tarps in the autumn of 2013, soft bird's beak host plants, such as pickleweed, will be planted in the tarped areas and soft bird's beak will be seeded after host plants are established. Therefore, the temporal loss of potential habitat for soft bird's beak will be minimal in duration and would not be expected to reduce the overall population numbers or long-term distribution of this species at Southampton Marsh. Soft

bird's beak may also benefit from the removal of *Spartina* because soft bird's beak requires a partially open canopy.

#### Soft Bird's Beak Critical Habitat

The proposed action will result in the temporary loss of 0.02 acre of critical habitat in Unit 5 – Southampton Marsh. The 0.02 acre of critical habitat to be temporarily affected by the proposed action is equivalent to less than one percent of the area included in the 164 acres in Unit 5. The temporary loss of less than one percent of critical habitat within Unit 5 is not expected to appreciably diminish the value or function of soft bird's beak designated critical habitat. Therefore, PCEs in this unit will remain intact, and PCE #3, a partially open spring canopy cover, may increase as a result of the proposed action.

#### **Cumulative Effects**

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions unrelated to the proposed project are not considered in this section, because they require separate consultation pursuant to section 7 of the Act.

The global average temperature has risen by approximately 0.6 degrees Centigrade during the 20th Century (International Panel on Climate Change [IPCC] 2001, 2007a, 2007b; Adger *et al.* 2007). There is an international scientific consensus that most of the warming observed has been caused by human activities (IPCC 2001, 2007a, 2007b; Adger *et al.* 2007), and that it is "very likely" that it is largely due to man-made emissions of carbon dioxide and other greenhouse gases (Adger *et al.* 2007). Ongoing climate change (Inkley *et al.* 2004; Adger *et al.* 2007; Kanter 2007) likely imperils the salt marsh harvest mouse, California clapper rail, and soft bird's beak and the resources necessary for their survival, since climate change threatens to disrupt annual weather patterns, it may result in a loss of their habitats and/or prey, and/or increased numbers of their predators, parasites, diseases, and non-native competitors. Where populations are isolated, a changing climate may result in local extinction, with range shifts precluded by lack of habitat. Rising sea levels are likely to inundate much of the remaining salt marsh habitat available for the salt marsh harvest mouse, California clapper rail, and soft bird's beak. Without upland habitat buffers available for the landward transgression of the marsh, the amount of suitable salt marsh habitat is likely to decrease with rising sea levels.

#### **Conclusion**

After reviewing the current status of the salt marsh harvest mouse, the California clapper rail, and soft bird's beak, the environmental baseline for the action area, the effects of the proposed action and cumulative effects, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of these species. We base this conclusion on the following: (1) the restoration of tidal marsh and the creation of high tide refugia (floating and earthen islands) and; (2) the implementation of avoidance and minimization measures which will reduce the potential for disturbance and mortality of the salt marsh harvest mouse and the California clapper rail during treatment, monitoring, and plantings.

The project is located within critical habitat for soft bird's beak; however the proposed action will not result in its adverse modification or destruction. We based this conclusion on the following: (1) only a small percentage of critical habitat Unit 5 for soft bird's beak would be affected by the proposed action and these effects are only temporary; (2) the PCEs that are essential to the conservation value of proposed critical habitat Unit 5 will remain and continue to contribute to the conservation function of the unit as a whole; and (3) range-wide critical habitat for soft bird's beak would remain functional.

### **INCIDENTAL TAKE STATEMENT**

Section 9 of the Endangered Species Act and Federal regulations pursuant to section 4(d) of the Act, prohibit take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. The Service defines harassment as an intentional or negligent act or omission that creates the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. The Service defines harm to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), take that is incidental to and not intended as part of the agency action is not considered to be prohibited, provided such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Sections 7(b)(4) and 7(o)(2) of the Act do not apply to listed plant species. However, protection of listed plants is provided to the extent that the Act requires a Federal permit for removal or reduction to possession of endangered and threatened plants from areas under Federal jurisdiction, or for any act that would remove, cut, dig up, damage, or destroy any such species on any other area in knowing violation of any regulation of any State or in the course of any violation of a State criminal trespass law.

The measures described below are nondiscretionary, and must be implemented by the Refuge so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption under section 7(o)(2) to apply. The Refuge has a continuing duty to regulate the activity that is covered by this incidental take statement. If the Refuge: (1) fails to require the applicant or any of its contractors to adhere to the terms and conditions of the incidental take statement through enforceable terms, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

#### **Amount or Extent of Take**

Conservation measures proposed and described above in the *Project Description* section will reduce, but do not eliminate, the potential for incidental take of California clapper rails and salt

marsh harvest mice. The Service anticipates incidental take of individual salt marsh harvest mice will be difficult to detect or quantify because of the variable, unknown size of any resident population over time, and the difficulty of finding killed or injured small mammals. The level of take of individual salt marsh harvest mice can be anticipated by the amount of available habitat lost from the proposed action. The Service expects that incidental take of the California clapper rail will be difficult to detect because of the reclusive nature of this species. The Service considers the number of salt marsh harvest mice and California clapper rails subject to harassment from noise and human activities to be difficult to estimate. The Service, therefore, anticipates the following levels of take as a result of implementation of the proposed action.

Incidental take of California clapper rails and salt marsh harvest mice is expected in the form of:

1. Forty-three (43) California clapper rails would be harmed due to loss of cover and nesting habitat and use of tracked amphibious vehicles during *Spartina* control. This number is broken down by treatment site and described in Table 1.
2. All California clapper rails inhabiting the 188 sites (24,821 acres of marsh) will be harassed due to ground-based control, inventory and treatment monitoring, and revegetation.
3. All salt marsh harvest mice inhabiting the 188 sites (24,821 acres of marsh) may be harassed due to loss of cover and nesting habitat and as a result of tracked amphibious vehicle use during *Spartina* control.

### **Effect of the Take**

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the salt marsh harvest mouse or California clapper rail.

### **Reasonable and Prudent Measures**

1. The Refuge will implement the Conservation Measures in the *Project Description* in this biological opinion.
2. The Refuge will ensure compliance with this biological opinion.

### **Terms and Conditions**

In order to be exempt from the prohibitions of section 9 of the Act, the Refuge must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. The following Terms and Conditions implement Reasonable and Prudent Measure Number One (1):

- a. The Refuge shall minimize the potential for harm, harassment, injury, and killing of the salt marsh harvest mouse and California clapper rail resulting from project-related activities by implementation of the Conservation Measures in this biological opinion.
  - b. The Refuge shall install 22 earthen and 22 artificial islands at 15 sites (Tables 1 and 2). 22 artificial floating islands will be installed prior to the 2013 California clapper rail breeding season (from 1 September through 1 February) and the 22 earthen islands will be installed after the 2013 clapper rail breeding season and before the 2014 breeding season (before 1 February 2014).
  - c. The Refuge shall continue revegetation efforts in the winter of 2012/2013 and continue through 2016 as part of a five-year planting plan as described in the California Clapper Rail Habitat Enhancement and Monitoring Plan (Olofson 2012a).
2. The following Term and Condition implements Reasonable and Prudent Measure Number Two (2):
    - a. The Refuge shall comply with the reporting requirements of this biological opinion, including a post-construction report outlining how the Conservation Measures were implemented for this project.

### **Reporting Requirements**

The Service must be notified within 24 hours of the finding of any injured or dead salt marsh harvest mouse or California clapper rail, or any unanticipated damage to their habitats associated with the proposed project. Injured salt marsh harvest mice and California clapper rails shall be cared by a licensed veterinarian or other qualified person, such as the Service-approved biologist for the proposed action. Notification must include the date, time, and precise location of the specimen/incident, and any other pertinent information. Dead animals should be sealed in a zip lock bag containing a piece of paper indicating the location, date and time when it was found, and the name of the person who found it; and the bag should be frozen in a freezer in a secure location. The Service contact persons are Coast Bay/Forest Foothills Division Chief, Endangered Species Program, at the Sacramento Fish and Wildlife Office at telephone (916) 414-6600 and Resident Agent-in-Charge of the Service's Law Enforcement Division at telephone (916) 414-6660.

The applicant shall submit a post-construction compliance report prepared by the on-site biologist to the Sacramento Fish and Wildlife Office within sixty (60) calendar days of the date of the completion of treatment. This report shall detail (i) dates that construction occurred; (ii) pertinent information concerning the success of the project in meeting the avoidance and minimization measures; (iii) an explanation of failure to meet such measures, if any; (iv) known project effects on the salt marsh harvest mouse and California clapper rail, if any; (v) occurrences of incidental take of these listed species, if any; (vi) documentation of employee environmental education; and (vii) other pertinent information.

### **CONSERVATION RECOMMENDATIONS**

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities that can be implemented to further the purposes of the Act, such as preservation of endangered species habitat, implementation of recovery actions, or development of information and databases. For the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations. We propose the following conservation recommendations:

1. Assist the Service in implementing recovery actions identified within most current recovery plans for the salt marsh harvest mouse, California clapper rail, other federally listed species, and their critical habitat areas.
2. Encourage or require the use of appropriate California native species in revegetation and habitat enhancement efforts associated with projects authorized by the Service.
3. Restore upland refugial habitat for the salt marsh harvest mouse and California clapper rail near suitable salt marsh habitat for these species.
4. Assist in the management of predators within salt marsh habitat and adjacent upland refugia occupied by the salt marsh harvest mouse and California clapper rail.
5. Decommission trails or require that dogs be kept on a leash near breeding habitat for the California clapper rail.
6. Sightings of any listed or sensitive animal species should be reported to the CNDDDB of the CDFG. A copy of the reporting form and a topographic map clearly marked with the location the animals were observed also should be provided to the Service.

#### **REINITIATION - CLOSING STATEMENT**

This concludes formal consultation on the Proposed Estuary Invasive *Spartina* Project: *Spartina* Control Program and Restoration for 2012 on 188 sites; Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties, California. As provided in 50 CFR 402.16, reinitiating of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must immediately cease, pending reinitiating.

If you have any questions regarding this opinion on the Proposed Estuary Invasive *Spartina* Project: *Spartina* Control Program and Restoration for 2012 on 188 sites; Alameda, Contra

Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties, California, please contact Ryan Olah, Coast Bay/Forest Foothills Division Chief, at the letterhead address, telephone (916) 414-6600, or electronic mail at [Ryan\\_Olah@fws.gov](mailto:Ryan_Olah@fws.gov).

cc:

Greg Martinelli, California Department of Fish and Game, Yountville, California  
Marilyn Latta, State Coastal Conservancy, Oakland, California

## LITERATURE CITED

- Adams, E. 1900. Notes on the California clapper rail. *Condor* 2(2):31-32.
- Adger, P., Aggarwal, S. Agrawala, J. Alcamo, A. Allali, O. Anisimov, N. Arnell, M. Boko, O. Canziani, T. Carter, G. Cassa, U. Confalonieri, R. Cruz, E.de Alba Alcaraz, W. Eastreling, C. Field, A. Fischlin, B. Fitzharris, C.G. Garcia, C. Hanson, H. Harasawa, K. Hennessy, S. Huq, R. Jones, L. K. Bogataj, D. Karoly, R. Kliein, Z. Kundzewicz, M. Lal, R. Lasco, G. Love, X. Lu, G. Magrin, L.J. Mata, R. McLean, B. Menne, G. Midgley, N. Mimura, M.Q. Mirza, J. Moreno, L. Mortsch, I. Niang-Diop, R. Nichols, B. Novaky, L. Nurse, A. Nyon, M. Oppenheimer, J. Palutikof, M. Parry, A. Patwardhan, P. R. Lankao, C. Rosenzweig, S. Schneider, S. Semenov, J. Smith, J. Stone, J van Ypersele, D. Vaughan, C. Vogel, T. Wilbanks, P. Wong, S. Wu, and G. Yohe. 2007. Working Group II Contribution to the Intergovernmental Panel on Climate Change Fourth Assessment Report. *Climate Change 2007: Climate change impacts, adaptation and vulnerability*. Brussels, Belgium.
- Albertson, J.D. 1995. Ecology of the California Clapper Rail in South San Francisco Bay. Unpublished Master's Thesis. San Francisco State University. San Francisco, California. 199 p.
- Albertson, J.D and J.G. Evens. 2000. California Clapper Rail (*Rallus longirostris obsoleuts*). In: Olofson P, editor. Goals Project. Baylands Ecosystem Species and Community Profiles: Life Histories and Environmental Requirements of Key Plants, Fish and Wildlife. San Francisco Bay Area Wetlands Ecosystem Goals Project. San Francisco Bay Regional Water Quality Control Board. Oakland, California. pp. 332-340.
- Atwater, B.F., S.G. Conard, J.N. Dowden, C.H. Hedel, R.L. MacDonald, and W. Savage. 1979. History, landforms and vegetation of the estuary's tidal marshes *in*: Conomos, T.J. (ed.) San Francisco Bay: The Urbanized Estuary. Proc. 58th Ann. Mtg. Pacific Division of the American Association of the Advancement of Science. California Academy of Sciences.
- Baker, G., A. Donner, and S. Hampton. 2009. Natural Resource Damage Assessment and Restoration Planning for the *Cosco Busan* Oil Spill: UPDATE. October. [http://www.fws.gov/contaminants/pdf/04\\_Cosco\\_Busan\\_NRDA\\_factsheet\\_Oct\\_2009.pdf](http://www.fws.gov/contaminants/pdf/04_Cosco_Busan_NRDA_factsheet_Oct_2009.pdf) Accessed July 6, 2011.
- Bias, M.A., and M.L. Morrison. 1993. Final report: salt marsh harvest mouse on Mare Island Naval Shipyard, 1989-1992. Unpubl. rpt. to Natural Resources Mgmt. Branch, Western Div., Naval Facilities Engineering Command. San Bruno, CA. 223. pp.

Refuge Manager

California Department of Fish and Game (CDFG). 2011. California Natural Diversity Database. RareFind version 3.1.1. February 27, 2011. Natural Heritage Division. Sacramento, California.

Callander Associates Landscape Architecture, Inc. 2010. Vision Plan, Cooley Landing, East Palo Alto, California. Prepared for City of East Palo Alto. July 15, 2010.

Clark, D.R., K.S. Foerster, C.M. Marn, and R.L. Hothem. 1992. Uptake of environmental contaminants by small mammals in pickleweed habitats at San Francisco Bay, California. Archives of Environmental Contamination and Toxicology 22:289-396.

Collins, J.N., J.G. Evens, and B. Grewell. 1994. A synoptic survey of the distribution and abundance of the California clapper rail *Rallus longirostris obsoletus* in the northern reaches of the San Francisco Estuary during the 1992 and 1993 breeding seasons. Final report to California Department of Fish and Game. Yountville, California. 22 pp. plus appendix.

DeGroot, D.S. 1927. The California clapper rail: it's nesting habitats, enemies, and habitat. Condor. 29:259-270.

Eddleman, W.R. 1989. Biology of the Yuma clapper rail in the southwestern U.S. and northwestern Mexico. Final report to the U.S. Bureau of Reclamation and U.S. Fish and Wildlife Service. Sacramento, California. 127 pp.

Evens J., and J.N. Collins. 1992. Distribution, abundance, and habitat affinities of the California clapper rail (*Rallus longirostris obsoletus*) in the northern reaches of the San Francisco Estuary during the 1992 breeding season. Final report to California Department of Fish and Game, Yountville, CA. Avocet Research Associates, Point Reyes, CA. 26 pp.

Evens, J. and G. Page. 1983. The ecology of clapper rail populations at Corte Madera Ecological Preserve with recommendations for management. Report prepared for Marin Audubon Society. 62 pp.

\_\_\_\_\_. 1986. Predation on black clapper rails during high tides in salt marshes. Condor 88:107-109.

Fisler, G.F. 1965. Adaptations and speciation in harvest mice of the marshes of San Francisco Bay. Unpubl. Ph.D. dissertation. University of California. Berkeley, California. 108 p.

## Refuge Manager

- Foerster, K.S and J.E. Takekawa. 1991. San Francisco Bay National Wildlife Refuge predator management plan and final environmental assessment. U.S. Fish and Wildlife Service. Newark, California.
- Foerster, K.S, J.E. Takekawa, and J.D. Albertson. 1990. Breeding density, nesting habitat, and predators of the California Clapper Rail. Fremont, CA: Unpubl. Rep. No. REFUGE-116400-90-1, San Francisco Bay Wildlife Refuge. Newark, California. 21+ p.
- Foin, T.C, E.J. Garcia, R.E. Gill, S.D. Culberson, and J.N. Collins. 1997. Recovery strategies for the California clapper rail (*Rallus longirostris obsoletus*) in the heavily-urbanized San Francisco estuarine ecosystem. *Landscape and Urban Planning* 38(3):229-243.
- Garcia, E.J. 1995. Conservation of the California clapper rail: An analysis of survey methods and habitat use in Marin County, California. Master Thesis. University of California. Davis, California. 135 pp.
- Gill, R., Jr. 1979. Status and distribution of the California clapper rail (*Rallus longirostris obsoletus*). *Calif. Fish and Game* 65:36-49.
- Goals Project. 1999. Baylands Ecosystem Habitat Goals. A report of habitat recommendations prepared by the San Francisco Bay Area Wetlands Ecosystem Goals Project. First Reprint. U.S. Environmental Protection Agency/San Francisco Bay Regional Water Quality Control Board. San Francisco and Oakland, California. 209 p.
- Grewell, B. 2010. *Lepidium latifolium* Management for endangered species and tidal marsh recovery, Benicia State Recreation Area, Southampton Bay Natural Preserve, San Francisco Estuary 2010 Progress Report.
- Grinnell, J., H.C. Bryant, and T.I. Storer. 1918. California clapper rail. *Gamebirds of California*: 283-291. U.C. Press, Berkeley.
- Hogle, I., D. W. Kerr, P. R. Olofson, and J. T. McBroom. 2008. ISP Monitoring Program Quality Assurance Document. San Francisco Estuary Invasive *Spartina* Project. Prepared for the California State Coastal Conservancy. Oakland, California. 192 pp.
- H.T. Harvey and Associates. 1989. California Clapper Rail breeding survey, South San Francisco Bay. Alviso, CA. Prepared for CH2M Hill.
- \_\_\_\_\_. 1990a. San Jose Permit Assistance Program California Clapper Rail 1990 Breeding Survey. Prepared for CH2M Hill. Report nr 477-07. Los Gatos, California.

## Refuge Manager

- \_\_\_\_\_ 1990b. San Jose Permit Assistance Program California Clapper Rail 1990 Winter Pilot Survey. Prepared for CH2M Hill. Report nr 477-06. Los Gatos, California. 19 p.
- \_\_\_\_\_ 1991. Sunnyvale Permit Assistance Program California Clapper Rail Breeding Survey 1990 and 1991, Guadalupe Slough. Prepared for EOA, Inc. Report nr 577-01. Los Gatos, California. 19 p.
- \_\_\_\_\_ 1994. Marsh Plant Associations of South San Francisco Bay: 1994 Comparative Study. Project No. 477-14. Los Gatos, California.
- \_\_\_\_\_ 1997. Marsh plant associations of South San Francisco Bay: 1996 comparative study including Alviso Slough, Unpubl. report, 22 January, 1997. Project No. 477-18. Prepared for the City of San Jose, CA. Los Gatos, California. 117 p.
- \_\_\_\_\_ 1998. Marsh Plant Associations of South San Francisco Bay: 1997 Comparative Study. Project No. 477-19. Prepared for the City of San Jose. Los Gatos, California.
- \_\_\_\_\_ 1999. Marsh Plant Associations of South San Francisco Bay: 1998 Comparative Study. Project No. 477-20. Prepared for the City of San Jose. Los Gatos, California.
- \_\_\_\_\_ 2000. Marsh Plant Associations of South San Francisco Bay: 1999 Comparative Study. Project No. 477-21. Prepared for the City of San Jose. Los Gatos, California.
- \_\_\_\_\_ 2001. Marsh Plant Associations of South San Francisco Bay: 2001 Comparative Study. Project 477-22. Prepared for the City of San Jose. Los Gatos, California.
- \_\_\_\_\_ 2002. Marsh Plant Associations of South San Francisco Bay: 2002 Comparative Study. Project No. 477-22. Prepared for the City of San Jose. Los Gatos, California.
- \_\_\_\_\_ 2003. Marsh Plant Associations of South San Francisco Bay: 2003 Comparative Study. Project No. 477-25. Prepared for City of San Jose. Los Gatos, California.
- Harding, E.K., D.F. Doak, J. Albertson, and J.E. Takekawa. 1998. Predator management in San Francisco Bay wetlands: past trends and future strategies. Final Report prepared for U.S. Fish and Wildlife Service, Sacramento, California.
- Harvey, T.E. 1980. A breeding season study of the California clapper rail in south San Francisco Bay, California. Unpubl. Final Report prepared for San Francisco Bay National Wildlife Refuge, Newark, California. 45 pp.

Refuge Manager

\_\_\_\_\_. 1988. Breeding biology of the California Clapper Rail in South San Francisco Bay. *Transactions of the Western Section of the Wildlife Society* 24:98–104.

Huffman-Broadway Group, Inc. (HBG). 2011. Cooley Landing Project Biological Assessment. May. Prepared by Huffman-Broadway Group, Inc., San Rafael, California, for the City of East Palo Alto, East Palo Alto, California.

Inkley, D.B., M.G. Anderson, A.R. Blaustein, V.R. Burkett, B. Felzer, B. Griffin, J. Price, and T.L. Root. 2004. Global climate change and wildlife in North America. *Wildlife Society Technical Review* 04-2.

International Panel on Climate Change (IPCC). 2001. *Climate Change 2001: The Scientific Basis. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change* (Houghton, J.T., Y. Ding, D.J. Griggs, M. Noguer, P.J. van der Linden, X. Dai, K. Maskell, and C.A. Johnson [editors]). Cambridge University Press, Cambridge, United Kingdom and New York, New York. 881 pp. Available at <http://www.ipcc.ch/>.

\_\_\_\_\_. 2007a. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Core Writing Team, Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.). Cambridge University Press, New York, New York, 996 pp. [http://www.ipcc.ch/publications\\_and\\_data/publications\\_ipcc\\_fourth\\_assessment\\_report\\_wg1\\_report\\_the\\_physical\\_science\\_basis.htm](http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg1_report_the_physical_science_basis.htm). Accessed on September 25, 2009.

\_\_\_\_\_. 2007b. *Climate Change 2007: The Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Core Writing Team, R.K. Pachauri and A. Reisinger (eds.). IPCC, Geneva, Switzerland, 104 pp. [http://www.ipcc.ch/publications\\_and\\_data/publications\\_ipcc\\_fourth\\_assessment\\_report\\_synthesis\\_report.htm](http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm). Accessed on September 25, 2009.

Johnston, R.F. 1956. Predation by short-eared owls in a *Salicornia* salt marsh. *Wilson Bulletin* 68: 91-101.

\_\_\_\_\_. 1957. Adaptation of salt marsh mammals to high tides. *Journal of Mammalogy* 38: 529-531.

## Refuge Manager

- Josselyn, M. 1983. The ecology of San Francisco Bay tidal marshes: a community profile. FWS/OBS-83/23. U.S. Fish and Wildlife Service, Division of Biological Services, Washington, DC.
- Kanter, J. 2007. Scientists detail climate changes, Poles to Tropics. New York Times. April 10, 2007.
- Kleinfelder, Inc. 2006. Preliminary Biological Site Evaluation, Cooley Landing, City of East Palo Alto, San Mateo County, California. Prepared for City of East Palo Alto. December 19, 2006.
- Lindsdale, J.M. 1936. Occurrence of the California clapper rail away from marshes. Condor 38:216.
- Liu, L., J. Wood, N. Nur, D. Stralberg, and M. Herzog. 2009. Clapper rail population monitoring: 2005-08. Presented December 7, 2010. PRBO Conservation Science, Petaluma, California.
- Massey, B.W., and R. Zembal. 1987. Vocalizations of the Light-footed Clapper Rail. Journal of Field Ornithology 58(1):32-40.
- Meanley, B. 1985. The marsh hen: A natural history of the clapper rail of the Atlantic coast salt marsh. Tidewater Publ., Centreville, Maryland.
- Ninyo and Moore. 2010. Remedial Action Plan, Cooley Landing, 2100 Bay Road, East Palo Alto, California. Prepared for Callander Associates. December 20, 2010.
- NWI (National Wetlands Inventory). 2005. National wetland inventory geospatial data by USGS 24K quadrangles for Contra Costa, Napa, and Solano Counties, CA. Accessed July 6, 2005. <http://www.nwi.fws.gov/>.
- Olofson Environmental, Inc. 2008. 2008 California Clapper Rail Surveys for the San Francisco Estuary Invasive Spartina Project. June. Prepared for the State Coastal Conservancy, Oakland, California. [http://spartina.org/project\\_documents/clapper\\_rails/project-clra2008.htm](http://spartina.org/project_documents/clapper_rails/project-clra2008.htm). Accessed on May 11, 2011.
- \_\_\_\_\_. 2009. 2009 California Clapper Rail Surveys for the San Francisco Estuary Invasive Spartina Project. November. Prepared for the State Coastal Conservancy, Oakland, California. [http://spartina.org/project\\_documents/clapper\\_rails/project-clra2009.htm](http://spartina.org/project_documents/clapper_rails/project-clra2009.htm). Accessed on May 12, 2011.

## Refuge Manager

- \_\_\_\_\_. 2011. 2010 California Clapper Rail Surveys for the San Francisco Estuary Invasive *Spartina* Project. February. Prepared for the State Coastal Conservancy, Oakland, California. [http://spartina.org/project\\_documents/clapper\\_rails/project-clra2010.htm](http://spartina.org/project_documents/clapper_rails/project-clra2010.htm). Accessed on May 12, 2011.
- \_\_\_\_\_. 2011. California clapper rail surveys for the San Francisco Estuary Invasive *Spartina* Project. December 2011. Prepared for the State Coastal Conservancy, Oakland, California.
- \_\_\_\_\_. 2012a. California clapper rail habitat enhancement, restoration and monitoring plan. February 2012. Prepared for the State Coastal Conservancy, Oakland, California.
- \_\_\_\_\_. 2012b. California clapper rail habitat enhancement progress report May 2012. Prepared for the State Coastal Conservancy, Oakland, California.
- Orr, R.T. 1939. Fall wanderings of clapper rails. *Condor* 41(4):151-152.
- Page, G.W. and J.G. Evens. 1987. The sizes of clapper rail populations at Corte Madera Ecological Preserve, Muzzi Marsh, San Clemente Creek, and Triangle Marsh. Report to Marin Audubon Society from Point Reyes Bird Observatory. 10 pp. plus figures.
- PRBO Conservation Science. 2009. 2008 Annual Report: California Clapper Rail (*Rallus longirostris obsoletus*). TE-807078.
- San Francisco Bay Bird Observatory. 1986. California clapper rail study, 1983-1986. Report submitted to California Department of Fish and Game. Yountville, California. 23 pp. plus appendix.
- San Francisco Bay National Wildlife Refuge Complex. 2010. Intra-Service Section 7 Consultation on Implementation of the Proposed Cullinan Ranch Restoration Project, Napa and Solano Counties, California. U.S. Fish and Wildlife Service, San Francisco Bay National Wildlife Refuge Complex, Newark, California.
- Schwarzbach, S.E., J.D. Albertson, and C.M. Thomas. 2006. Effects of predation, flooding, and contamination on the reproductive success of California clapper rails (*Rallus longirostris obsoletus*) in San Francisco Bay. *Auk* 123:45-60.
- Shellhammer, H.S. 1982. *Reithrodontomys raviventris*. *Mammalian Species* 169(1-3).
- \_\_\_\_\_. 2000. Salt marsh harvest mouse. *in*: Olofson, P.R. (ed.). *Baylands Ecosystem Species and Community Profiles: life histories and environmental requirements of key plants, fish, and*

## Refuge Manager

- wildlife. Goals Project (Baylands Ecosystem Habitat Goals), San Francisco Bay Regional Water Quality Control Board, Oakland, California.
- Shellhammer H.S. and R. Duke. 2004. Salt Marsh Harvest Mouse Habitat of the South San Francisco Bay: an analysis of habitat fragmentation and escape cover. San Francisco Estuarine Institute:26 + maps.
- Shellhammer, H.S, R. Duke, H.T. Harvey, V. Jennings, V. Johnson, and M. Newcomer. 1988. Salt marsh harvest mice in the diked salt marshes of southern San Francisco Bay. *Wasmann Journal of Biology* 46(1/2):89-103.
- Shellhammer, H.S, R. Jackson, W. Davilla, A.M. Gilroy, H.T. Harvey, and L. Simons. 1982. Habitat preferences of salt marsh harvest mice (*Reithrodontomys raviventris*). *Wasmann Journal of Biology* 40(1/2):102-114.
- Shuford, W.D. 1993. Clapper Rail. In: Shuford WD, editor. *The Marin County Breeding Bird Atlas: A Distributional and Natural History of Coastal California Birds*. California Avifauna Series 1. Bolinas: Bushtit Books, Bolinas, California. p 166-169.
- Taylor, H.R. 1894. Among the California clapper rail. *Nidologist* 1(10-11):153-155.
- Terres, J. 1980. *The Audubon Society: Encyclopedia of North America Birds*. The Audubon Society, New York.
- U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, and California Department of Fish and Game. 2010. *Habitat Management, Preservation, and Restoration Plan for the Suisun Marsh Draft Environmental Impact Statement/Environmental Impact Review*. U.S. Department of Interior Bureau of Reclamation, Mid-Pacific Region, Sacramento, California.
- U.S. Fish and Wildlife Service. 1984. *Salt marsh harvest mouse and California Clapper Rail Recovery Plan*. Portland, Oregon. 141 pp.
- \_\_\_\_\_. 2007. Endangered and threatened wildlife and plants; designation of critical habitat for *Cirsium hydrophilum* var. *hydrophilum* and *Cordylanthus mollis* ssp. *mollis*. Final rule. *Federal Register* 72:18517-18553.
- \_\_\_\_\_. 2008. *Biological Opinion for the South Bay Salt Pond Restoration Project Long-term Plan and Project-level Phase 1 Actions, Alameda, Santa Clara, and San Mateo Counties,*

Refuge Manager

California. Service file number 81420-2008-F-0621. Sacramento Fish and Wildlife Office, Sacramento, California.

\_\_\_\_\_ 2009. *Cordylanthus mollis* ssp. *mollis* (Soft Bird's-Beak) 5-Year Review Summary and Evaluation. January. Sacramento Fish and Wildlife Office, Sacramento, California.

\_\_\_\_\_ 2010a. Draft Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California. Sacramento, California. xviii + 636 pp.

\_\_\_\_\_ 2010b. Salt Marsh Harvest Mouse (*Reithrodontomys raviventris*) 5-Year Review Summary and Evaluation. February. Sacramento Fish and Wildlife Office, Sacramento, California.

\_\_\_\_\_ in prep. Draft biological opinion for the Runnymede Storm Drain Phase II Project, City of East Palo Alto, San Mateo County, California. U.S. Fish and Wildlife Service file number 81420-2011-F-0103. Sacramento Fish and Wildlife Office, Sacramento, California.

Zemba, R., J.M. Fancher, C.S. Nordby, and R.J. Bransfield. 1985. Intermarsh movements by light-footed clapper rails indicated in part through regular censusing. California Fish and Game 71(3): 164-171. Yountville, California.

#### ***In Litt.* References**

Albertson, Joy. 2010. Electronic mail from Supervisory Wildlife Biologist, Don Edwards San Francisco Bay National Wildlife Refuge, Fremont, California, to Lily Lee, City of East Palo Alto, East Palo Alto, California, dated October 14, 2010. Subject: California clapper rail occurrences near Cooley Landing.

Baye, Peter. 2008. Marsh Ecologist. Annapolis, California. Electronic mail from Peter Baye to Valary Bloom on November 13, 2008.

#### **Personal Communications**

Albertson, Joy. Supervisory Wildlife Biologist, Don Edwards San Francisco Bay National Wildlife Refuge, Fremont, California.

Barthman-Thompson, Lauren. Associate Wildlife Biologist, California Department of Fish & Game, Stockton, California. Electronic mail to Andrew Raabe, U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California, dated February 3, 2009.

## Refuge Manager

Baye, Peter. Marsh Ecologist. Annapolis, California.

Block, Giselle. Biologist, Region 8, U.S. Fish and Wildlife Service, Sacramento, California.  
Formerly with San Pablo Bay National Wildlife Refuge, Petaluma, California.

Didonato, Joe. East Bay Regional Park District, Hayward, California.

Garcia, John. Principal and Aquatic Systems Ecologist, Garcia and Associates, San Anselmo, California.

Helton, Melisa. Wildlife Refuge Specialist, Don Edwards San Francisco Bay National Wildlife Refuge, Fremont, California.

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**Table 1. Proposed 2012 *Spartina* Treatment at Rail Sites Not Permitted for 2011**

Site #	Site Name	Figures	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (Acres)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date	Existing High-tide Refugia (other than Non-native <i>Spartina</i> )	Treatment Methods <sup>4</sup>	Estimated Take of CLRA Through Harm <sup>5,6</sup> (with justification)	Proposed Enhancements <sup>7,8</sup>
02a.1a	Belmont Slough	1A, 1B	53.99	1.27	0	1-2	Aug. 12	<ul style="list-style-type: none"> <li>High-quality refugia along established berms vegetated extensively with dense, mature <i>Grindelia</i></li> </ul>	Airboat	1 <ul style="list-style-type: none"> <li>Treatment of <i>Spartina</i> will occur near the rail detection; treatment may reduce habitat quantity and quality such that one bird may leave the site</li> </ul>	<ul style="list-style-type: none"> <li>Install one artificial floating island</li> <li>Install one earthen island planted with <i>Grindelia</i></li> <li>Cut off two berms from shore to reduce mammalian predator access and create islands by making multiple cuts in berms</li> <li>Remove four raptor perches (posts and trees) adjacent to slough</li> </ul>
02a.1b	Belmont Slough South	1A, 1B	14.25	0.60	4-6	2	Aug. 12	<ul style="list-style-type: none"> <li>Vegetation, including mature <i>Grindelia</i>, on Belmont Slough levee</li> </ul>	Airboat	2 <ul style="list-style-type: none"> <li>Treatment of <i>Spartina</i> will occur in the vicinity of two rail detections; this may reduce habitat quantity and quality such that they leave the site</li> </ul>	<ul style="list-style-type: none"> <li>Install one artificial floating islands</li> <li>Construct one earthen islands planted with <i>Grindelia</i></li> </ul>
02a.3	Bird Island	2A, 2B	91.35	0.70	1-2	2-4	Aug. 12	<ul style="list-style-type: none"> <li><i>Grindelia</i> on berm on west side of Bird Island</li> <li>Vegetation around dredge lock immediately adjacent on mainland (this is where rails are often seen during king tides)</li> </ul>	Airboat	2 <ul style="list-style-type: none"> <li>A small portion of the treatment area will be near one rail detection, thus up to a pair of rails could be lost from the site</li> <li>Existing high-tide refugia (including dredge lock south of Bay Slough) and nesting habitat after treatment will be sufficient to support up to two other rails</li> </ul>	<ul style="list-style-type: none"> <li>Install one artificial floating islands</li> <li>Construct one earthen islands planted with <i>Grindelia</i></li> <li>Remove raptor perches (many poles)</li> <li>Plant <i>Grindelia</i> along channels</li> <li>Construct one earthen island planted with <i>Grindelia</i></li> </ul>
02c.1a	B2 North Quadrant West	3A, 3B	147.57	5.46	0	2	Aug. 12	<ul style="list-style-type: none"> <li>Mature <i>Grindelia</i> on adjacent berms</li> <li><i>Grindelia</i> and upland transition plantings (1150 plants); planted in 2012, will provide cover by winter 2013/2014</li> </ul>	Airboat	2 <ul style="list-style-type: none"> <li>The 2012 plantings will not provide additional cover for rails until 2013/2014</li> <li>The native <i>Spartina foliosa</i> that is present throughout the site may provide suitable nesting habitat for the small number of rails that may be present, but rails could disperse to another location, such as adjacent B2 North Quadrant East, after treatment</li> </ul>	<ul style="list-style-type: none"> <li>Install one artificial floating islands</li> <li>Construct one earthen islands planted with <i>Grindelia</i></li> </ul>
02c.1b	B2 North Quadrant East	3A, 3B	136.04	15.96	16	11	Aug. 1	<ul style="list-style-type: none"> <li>Mature <i>Grindelia</i> on adjacent berms</li> </ul>	Helicopter (seed suppression only)	4 <ul style="list-style-type: none"> <li>Only seed suppression will occur on the site, thus impacts to rail habitat are expected to be very minimal (i.e., 25% at most)</li> <li>The native <i>Spartina foliosa</i> that is present throughout the site will continue to provide suitable nesting habitat for most of the rails without additional enhancements</li> <li>The limited cover on adjacent berms will continue to support some rails</li> <li>However, up to four rails could be lost from the site</li> </ul>	<ul style="list-style-type: none"> <li>Install two artificial floating islands</li> <li>Construct two earthen islands planted with <i>Grindelia</i></li> <li>Provide additional <i>Grindelia</i> plantings</li> </ul>

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Site #	Site Name	Figures	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (Acres)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date	Existing High-tide Refugia (other than Non- native <i>Spartina</i> )	Treatment Methods <sup>4</sup>	Estimated Take of CLRA Through Harm <sup>5,6</sup> (with justification)	Proposed Enhancements <sup>7,8</sup>	
02d.1a	B2 South Quadrant West	4A, 4B	38.28	8.44	6	3-4	Aug. 12	<ul style="list-style-type: none"> <li>Some mature <i>Grindelia</i>, weedy vegetation along upland edge in NE corner and adjacent berms</li> </ul>	Airboat	4	<ul style="list-style-type: none"> <li>The limited cover on adjacent berms would likely provide high-tide refugia for a small proportion of the existing rail population</li> <li>However, rail detections are located in dense stands of invasive <i>Spartina</i> and a high proportion of the marsh will be treated, thus up to four rails may be lost after treatment</li> </ul>	<ul style="list-style-type: none"> <li>Install two artificial floating islands</li> <li>Install two earthen islands planted with <i>Grindelia</i></li> <li>Plant <i>Grindelia</i> on berms and along upland edge to NE (in cages to prevent browsing by jackrabbits)</li> <li>Remove red fox via trapping by USDA</li> </ul>
02d.1b	B2 South Quadrant East	4A, 4B	23.19	1.33	0	0	June 1	<ul style="list-style-type: none"> <li>Some mature <i>Grindelia</i>, weedy vegetation along upland edge in eastern corner and adjacent berms</li> </ul>	Airboat	0	<ul style="list-style-type: none"> <li>No rails were detected in 2012, thus take is not expected to occur</li> </ul>	<ul style="list-style-type: none"> <li>Plant <i>Grindelia</i> on berms and along upland edge to north (in cages to prevent browsing by jackrabbits)</li> <li>Remove red fox via trapping by USDA</li> </ul>
02e	West Point Slough NW	5A	4.92	0.80	2	0	June 1	<ul style="list-style-type: none"> <li>USGS floating islands (25) at adjacent Greco Island</li> </ul>	Airboat	0	<ul style="list-style-type: none"> <li>No rails were detected in 2012, thus take is not expected to occur</li> </ul>	None
02i	Ravenswood Slough & Mouth	6A, 6b	117.65	2.50	9-12	1-2	Aug. 12	<ul style="list-style-type: none"> <li>Extensive, mature <i>Grindelia</i> along toe of levee and present along small channels in numerous areas along slough</li> </ul>	Airboat	0	<ul style="list-style-type: none"> <li>Extensive <i>Grindelia stricta</i> and <i>Spartina foliosa</i> throughout the site will continue to provide suitable high-tide refugia and nesting habitat for the one or two rails on the site</li> <li>The rail detections generally occur away from treatment areas, reducing the probability of take</li> <li>Additional enhancements, such as earthen islands are not necessary at this site because of the extensive mature <i>Grindelia</i> along the tidal channels</li> </ul>	<ul style="list-style-type: none"> <li>Install raptor deterrents on poles</li> </ul>
04j.1	CMC-Mouth North Bank	7A, 7B	5.96	0.15 (of which 0.05 ac is <i>S. densiflora</i> )	4	2-4	June 1 to treat <i>densiflora</i>  Aug. 12 to treat <i>alterniflora</i>	<ul style="list-style-type: none"> <li>An island and several berms with mature <i>Grindelia</i>, <i>Frankenia</i>, and other native marsh vegetation</li> </ul>	Backpack, digging <i>densiflora</i> S.	4	<ul style="list-style-type: none"> <li>Existing high-tide refugia and native stands of <i>Spartina foliosa</i> may continue to support the existing rail population, but rails could be displaced due to removal of <i>Spartina</i> nesting habitat</li> <li>Extensive high-quality marsh also exists to the south, thus providing an alternative site for the rails that may be temporarily displaced by the loss of <i>Spartina</i></li> <li>The few rails occupying the site are not using the small <i>densiflora</i> stands for nesting near the inland portion of the site, and treatment of <i>densiflora</i> will occur very quickly. Thus, treatment of <i>densiflora</i> beginning June 1 would not impact nesting rails.</li> </ul>	<ul style="list-style-type: none"> <li>Install two artificial floating islands</li> <li>Construct two earthen islands planted with <i>Grindelia</i></li> </ul>

Site #	Site Name	Figures	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (Acres)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date	Existing High-tide Refugia (other than Non-native <i>Spartina</i> )	Treatment Methods <sup>4</sup>	Estimated Take of CLRA Through Harm <sup>5,6</sup> (with justification)	Proposed Enhancements <sup>7,8</sup>	
05a.2	Calaveras Marsh	8A, 8B	451.91	2.10	not surveyed in 2011	37-46	Aug. 12	<ul style="list-style-type: none"> <li>Extensive <i>Grindelia</i> on toe of levees; many acres of thick bulrush stands throughout center of marsh <i>Grindelia</i> and bulrush along channels</li> <li>PG&amp;E boardwalk</li> </ul>	Airboat, Marsh Master	6	<ul style="list-style-type: none"> <li>Most rails will continue to use the marsh after treatment because of the extremely small treatment area relative to the size of the extensive marsh area (i.e., &lt;1%) and because even very high tides do not fully inundate this high marsh</li> <li>Extensive high-tide refugia and native <i>Spartina foliosa</i> throughout the site will continue to support most of the existing rail population because most rails are not associated with the non-native <i>Spartina</i></li> <li>However, because a small amount of treatment, resulting in a commensurate amount of habitat loss, will occur where rails were detected at the edge of the marsh, up to three rails could be lost from the site</li> </ul>	<ul style="list-style-type: none"> <li>Install three artificial floating islands</li> <li>Construct three earthen islands planted with <i>Grindelia</i></li> </ul>
15a.4	Alviso Slough	9A, 9B	412.80	1.81	4-6	1-2	Aug. 12	<ul style="list-style-type: none"> <li>Extensive <i>Grindelia</i> mixed with tall bulrush on west side of slough, at toe of levees, and along channel, with extensive bulrush and <i>Lepidium</i> just upstream from 2011 rail locations</li> <li>PG&amp;E boardwalk</li> </ul>	Airboat	2	<ul style="list-style-type: none"> <li>The small treatment area and extensive high-tide refugia and native <i>Spartina foliosa</i> throughout the site will likely support the small number of rails that occupy the site</li> <li>However, one rail detection occurs in the vicinity of a treatment area, thus one rail may be lost from the site</li> </ul>	<ul style="list-style-type: none"> <li>Install one artificial floating island</li> <li>Install one earthen island planted with <i>Grindelia</i></li> </ul>
16.1	Cooley Landing Central	10A, 10B	41.95	1.30	2-4	1-2	Aug. 12	<ul style="list-style-type: none"> <li>Some <i>Grindelia</i> in southwest corner, more extensive <i>Grindelia</i> in marsh immediately to west</li> <li>Extensive <i>Grindelia</i> in adjacent Laumeister Tract</li> <li>PG&amp;E boardwalk</li> </ul>	Truck, Airboat	2	<ul style="list-style-type: none"> <li>Extensive high-tide refugia and existing stands of <i>Spartina foliosa</i> on the site, as well as adjacent sites, would be expected to provide habitat for rails after treatment</li> <li>However, a portion of the treatment area occurs where a rail detection occurred, thus a pair of rails could be lost from the site</li> </ul>	<ul style="list-style-type: none"> <li>Install one artificial floating islands</li> <li>Construct one earthen islands planted with <i>Grindelia</i></li> <li>Plant <i>Grindelia</i> on "island" of cut-off outer levee (to the east of the sub-area boundary)</li> </ul>
17c.1	Arrowhead Marsh West	11A	20.17	4.37	4	0	Sep. 1	<ul style="list-style-type: none"> <li><i>Grindelia</i> and <i>Triglochin</i> plantings (1800 plants in 2011)</li> <li>USGS artificial islands (35) between 17c.1 and 17c.2</li> </ul>	Airboat	0	<ul style="list-style-type: none"> <li>The boundary of the Arrowhead Marsh West site (17c.1) has been revised to avoid all 2012 clapper rail detections</li> <li>Therefore, no take through harm is expected to occur</li> <li>Existing artificial floating islands will continue to provide high-tide refugia and nesting habitat for rails after treatment</li> </ul>	None

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Site #	Site Name	Figures	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (Acres)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date	Existing High-tide Refugia (other than Non-native <i>Spartina</i> )	Treatment Methods <sup>4</sup>	Estimated Take of CLRA Through Harm <sup>5,6</sup> (with justification)	Proposed Enhancements <sup>7,8</sup>
17d.1	MLK Regional Shoreline-Fan Marsh Shore	12A	2.91	0.10	2	0	June 1	<ul style="list-style-type: none"> <li><i>Grindelia</i> and weedy vegetation along shore</li> </ul>	Airboat	0 <ul style="list-style-type: none"> <li>No rails were detected in 2012, thus take is not expected to occur</li> </ul>	None
17e.1	San Leandro Creek North	13A	2.04	0.02	1-2	0	June 1	<ul style="list-style-type: none"> <li>Extensive <i>Grindelia</i> and other vegetation along channel</li> </ul>	Backpack	0 <ul style="list-style-type: none"> <li>No rails were detected in 2012, thus take is not expected to occur</li> </ul>	None
18f	Confluence Marsh	14A	7.21	0.06	2	0	June 1	<ul style="list-style-type: none"> <li><i>Grindelia</i> and <i>Baccharis</i> along the toe of the levee and across creek to north where existing berms are proposed for enhancing</li> </ul>	Airboat	0 <ul style="list-style-type: none"> <li>No rails were detected at this site in 2012, thus take is not expected to occur</li> </ul>	None
19h	SFO shoreline	15A	25.15	0.90	2-4	4	Sep. 1	<ul style="list-style-type: none"> <li>Invasive <i>Spartina</i> accounts for the majority of high-tide refugia and nesting habitat at this location.</li> </ul>	Airboat	4 <ul style="list-style-type: none"> <li>After senescence of the treated <i>Spartina</i>, a pair of clapper rails may continue to persist at this site in the <i>Grindelia</i> lined levee and extensive <i>Spartina foliosa</i> meadow</li> <li>However, it is unlikely that rails will successfully reproduce in the remaining habitat over the long term, thus up to four rails could be lost from the site</li> </ul>	None. SFO shoreline is unsuitable for enhancements, thus two earthen islands and two artificial islands will be installed in another location. The location will be approved by the USFWS.
19p.1	Seal Slough Mouth-Central Marsh	16A, 16B	37.75	3.70	3-4	0 (3-4 rails detected during other surveys)	Sep. 1	<ul style="list-style-type: none"> <li><i>Grindelia</i> along shore, north/south berm and PG&amp;E boardwalk</li> </ul>	Airboat	4 <ul style="list-style-type: none"> <li>High-tide refugia is limited at this site and will not likely support all rails present in the marsh after treatment</li> <li>However, there is enough existing high-tide refugia and nesting habitat to support approximately two rails, therefore up to two rails could be lost from the site</li> </ul>	<ul style="list-style-type: none"> <li>Install two artificial floating islands</li> <li>Construct two earthen islands planted with <i>Grindelia</i></li> <li>Cut berm to create several raised berms</li> <li>Plant berms/islands with <i>Grindelia</i> and other plants</li> </ul>

Site #	Site Name	Figures	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (Acres)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date	Existing High-tide Refugia (other than Non-native <i>Spartina</i> )	Treatment Methods <sup>4</sup>	Estimated Take of CLRA Through Harm <sup>5,6</sup> (with justification)	Proposed Enhancements <sup>7,8</sup>
20d.1	Citation Marsh South	17A, 17B	44.35	0.03	2	1-2	Sep. 1	<ul style="list-style-type: none"> <li>▪ Three islands and berms with dense weedy vegetation</li> <li>▪ Fairly extensive <i>Grindelia</i> along some channels</li> <li>▪ Tidal action is muted, so even at king tides, extensive high-tide refugia are available</li> </ul>	Truck	0 <ul style="list-style-type: none"> <li>▪ The extremely small treatment area (i.e., &lt;1% of the marsh) suggests the 1-2 rails in the marsh will not be impacted</li> <li>▪ The rail detection is strongly associated with dense <i>Grindelia</i> on the site and not with invasive <i>Spartina</i></li> <li>▪ Extensive vegetated islands and berms provide significant high-tide refugia, particularly given the marsh is muted, such that extensive refugia are available even during extreme high tides, thus no rails will be lost from this site</li> </ul>	<ul style="list-style-type: none"> <li>▪ Nine artificial floating islands, funded by the Coastal Conservancy, have been installed between sites 20f.1 and 20f.2</li> </ul>
22b.1	San Pablo Marsh East	18A, 18B	20.62	0.60	9-10	6-10	Sep. 1	<ul style="list-style-type: none"> <li>▪ Extensive <i>Grindelia</i> and other tall vegetation in northeast and south-central areas and along the tidal channels</li> </ul>	Airboat	4 <ul style="list-style-type: none"> <li>▪ The rail detections are scattered throughout the marsh and are not clustered in the <i>Spartina</i> treatment areas, thus most rails are not likely to be impacted by treatment activities</li> <li>▪ The extensive <i>Grindelia</i> and other tall vegetation at the site provides substantial high-tide refugia and nesting habitat for rails</li> <li>▪ Extensive native <i>Spartina foliosa</i> provides suitable nesting habitat throughout the marsh</li> <li>▪ However, some rail detections are associated with treatment areas, thus up to four rails could be lost</li> </ul>	<ul style="list-style-type: none"> <li>▪ Install two artificial floating islands</li> <li>▪ Construct two earthen islands planted with <i>Grindelia</i></li> </ul>

**Key**

- 1 California clapper rail habitat area calculated from heads-up digitizing in GIS of site/sub-area boundaries by clapper rail biologists experienced with site-specific conditions, with exclusion of unvegetated areas or habitat unsuitable for clapper rail use (e.g., open mudflats, rip rap).
- 2 *Spartina* Cover is based on extent of hybrid *Spartina* in 2011, and is provided as a proxy for "2012 Treatment Area". The actual 2012 treatment area is unknown. Sites with *Spartina densiflora* and *Spartina alterniflora* (and its hybrids) infestations have separate acreages associated with each species.
- 3 Based on California clapper rail surveys conducted by OEI, PRBO, FWS and others in 2011 and 2012, and best professional judgment by the surveyors regarding the potential for single detections to represent a single bird vs. a pair.
- 4 Backpack spraying accompanies all airboat, truck, and Marsh Master use where that method is more efficient and/or more sensitive, and thus backpack spraying is noted here only when no other treatment method is proposed.
- 5 Take estimates (harm) are based on the estimated number of California clapper rails that may be lost from the sub-area after invasive *Spartina* is treated, and after the treated *Spartina* disappears (which will likely not occur until the winter of 2013/2014).
- 6 Take estimates are based on best professional judgment; although a range may be more accurate (i.e., a range would more likely encompass the actual number of rails taken), a specific take number was chosen in order to determine the appropriate level of habitat enhancement (such as number of artificial floating islands) at each site.
- 7 Exact positioning of artificial floating islands will be determined at the time of deployment based on habitat conditions, channel morphology, and other factors assessed by biologists experienced with clapper rail ecology. The exact positioning of earthen islands will also be determined at a later date based on factors described above. Approximately 12 "pilot islands" will be installed during the fall/winter of 2012; the remainder of the islands will be installed in the fall/winter of 2013. Proposed locations of the pilot islands will be provided to the USFWS prior to installation.
- 8 Proposed restoration opportunities (e.g., berm excavation, *Grindelia* plantings) are preliminary and will be further designed contingent on funding and if land-owner permission is granted. These additional restoration opportunities are not required by the USFWS (unlike floating and earthen islands) but may be initiated in an effort to increase California clapper rail populations.

**Table 2. Proposed 2012 *Spartina* Treatment at Rail Sites Permitted in 2011**

Sub-Area #	Sub-Area Name	Figure	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (unit shown)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date <sup>4</sup>	Existing High-tide Refugia & Nesting Habitat (including Conservancy-Funded Enhancements in 2011/2012)	Treatment Methods <sup>5</sup>	Estimated Take of CLRA Through Harm <sup>6,7</sup> (with justification)	Proposed Enhancements <sup>8</sup>	Estimated Take of CLRA through Harassment
01a	AFCC - Mouth	19	23.59	0.18 ac	1 (rail may have been in Sub-Area 01f)	0	June 1	<ul style="list-style-type: none"> <li>▪ Mature <i>Grindelia</i> on levees adjacent to Alameda Creek Regional Trail</li> <li>▪ <i>Grindelia</i> (200 plants) plantings; planted in 2011/2012, will provide cover by 2013/2014</li> </ul>	Truck	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because no rails were detected in 2012 and because there is a small treatment area</li> </ul>	None	0
01b	AFCC – Lower	19	135.02	2.2 ac	0	6	Aug. 12	<ul style="list-style-type: none"> <li>▪ Mature <i>Grindelia</i> on levees adjacent to Alameda Creek Regional Trail</li> <li>▪ <i>Grindelia</i> (310 plants) and <i>Spartina foliosa</i> (230 plants) plantings; planted in 2011/2012, will provide cover by 2013/2014</li> </ul>	Truck	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because of the small treatment area and high-tide refugia throughout the site</li> <li>▪ Existing high-tide refugia and nesting habitat will continue to support the small number of rails in the channel</li> </ul>	None	0
01c	AFCC - Upper	20	75.30	1 ac	1-2	0	June 1	<ul style="list-style-type: none"> <li>▪ Mature <i>Grindelia</i> on levees adjacent to Alameda Creek Regional Trail</li> <li>▪ <i>Grindelia</i> (290 plants) and <i>Spartina foliosa</i> (170 plants) plantings; planted in 2011/2012, will provide cover by 2013/2014</li> </ul>	Truck	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because no rails were detected in 2012 and because there is a small treatment area</li> </ul>	None	0
01f	AFCC - Pond 3	19	130.93	0.7 ac	1-2	6-8	Aug. 12	<ul style="list-style-type: none"> <li>▪ Mature <i>Grindelia</i> on berms adjacent to Alameda Creek Regional Trail and the north side of the site</li> </ul>	Truck	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because of the small treatment area and high-tide refugia throughout the site</li> <li>▪ Existing high-tide refugia and nesting habitat will continue to support the small number of rails at the site</li> </ul>	None	0
02a.2	Belmont SI to Steinberger SI (2)	21	136.46	3.69 ac	1-2	4-6	Aug. 12	<ul style="list-style-type: none"> <li>▪ Mature <i>Grindelia</i> on adjacent levees and along tidal channels</li> <li>▪ Extensive <i>Spartina foliosa</i></li> </ul>	Airboat	0 <ul style="list-style-type: none"> <li>▪ The rail detections are not located in the core of the <i>Spartina</i> treatment area, reducing the likelihood of rail impacts from treatment activities</li> <li>▪ High-quality refugia and abundant <i>Spartina foliosa</i> along the channel banks will continue to provide cover during high tides and nesting habitat, and thus will continue to support any existing rails</li> </ul>	None	0

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Sub-Area #	Sub-Area Name	Figure	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (unit shown)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date <sup>4</sup>	Existing High-tide Refugia & Nesting Habitat (including Conservancy-Funded Enhancements in 2011/2012)	Treatment Methods <sup>5</sup>	Estimated Take of CLRA Through Harm <sup>6,7</sup> (with justification)	Proposed Enhancements <sup>8</sup>	Estimated Take of CLRA through Harassment	
02b.1	Corkscrew Slough	22, 23	135.83	1.41 ac	12-20	17-20	Aug. 12	<ul style="list-style-type: none"> <li>▪ Mature <i>Grindelia</i> on adjacent levees and along tidal channels</li> <li>▪ Extensive <i>Spartina foliosa</i></li> <li>▪ Extensive tidal channel network with substantial foraging habitat</li> </ul>	Airboat	0	<ul style="list-style-type: none"> <li>▪ Treatment of <i>Spartina</i> will occur in some areas where rails were detected; however, the quality and quantity of remaining habitat will support existing rails at this site</li> <li>▪ High-quality refugia and abundant <i>Spartina foliosa</i> along the channel banks will continue to provide cover and nesting habitat, and will continue to support the remaining rails</li> </ul>	None	6
02b.2	Steinberger Sl to Redwood Crk	22, 23	271.19	3.96 ac	0	0	June 1	<ul style="list-style-type: none"> <li>▪ Mature <i>Grindelia</i> on adjacent levees and along tidal channels</li> <li>▪ Extensive <i>Spartina foliosa</i></li> </ul>	Airboat	0	<ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because no rails were detected in 2012</li> </ul>	None	0
02c.2	B2 North Quadrant (2)	22	208.62	6.08 ac	2-4	4	Aug. 12	<ul style="list-style-type: none"> <li>▪ Mature <i>Grindelia</i> on adjacent berms</li> <li>▪ Extensive <i>Spartina foliosa</i></li> <li>▪ PG&amp;E boardwalk</li> </ul>	Airboat	0	<ul style="list-style-type: none"> <li>▪ Few rails (4) occur in the marsh, and thus no rails will likely be affected by the small amount of treatment relative the large marsh</li> <li>▪ The limited high-tide cover on adjacent berms would support the few rails on the site</li> <li>▪ The native <i>Spartina foliosa</i> that is present throughout the site will continue to provide suitable nesting habitat for the existing rails</li> </ul>	None	2
02d.2	B2 South Quadrant (2)	22	58.75	2.02 ac	0	1	Aug. 12	<ul style="list-style-type: none"> <li>▪ Some mature <i>Grindelia</i>, weedy vegetation along upland edge and adjacent berms</li> </ul>	Backpack	0	<ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because of the low number of rails (i.e., one pair at most) that occur at this site and the presence of high-tide refugia and nesting habitat, including <i>Spartina foliosa</i>, other than invasive <i>Spartina</i> that would continue to support rails</li> </ul>	None	0

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Sub-Area #	Sub-Area Name	Figure	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (unit shown)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date <sup>4</sup>	Existing High-tide Refugia & Nesting Habitat (including Conservancy-Funded Enhancements in 2011/2012)	Treatment Methods <sup>5</sup>	Estimated Take of CLRA Through Harm <sup>6,7</sup> (with justification)	Proposed Enhancements <sup>8</sup>	Estimated Take of CLRA through Harassment
02f	Greco Island - North	24	498.50	6.09 ac	7-12	18-20	Aug. 12	<ul style="list-style-type: none"> <li>▪ Extensive, mature <i>Grindelia</i> throughout the site</li> <li>▪ Extensive <i>Spartina foliosa</i></li> <li>▪ Extensive tidal channel network with substantial foraging habitat</li> <li>▪ <i>Grindelia</i> plantings (2900 plants; 0.16 ac); planted in 2011/2012, will provide cover by 2013/2014</li> <li>▪ USGS floating islands (25)</li> <li>▪ PG&amp;E boardwalk</li> </ul>	Airboat	0 <ul style="list-style-type: none"> <li>▪ Extensive <i>Grindelia stricta</i> and <i>Spartina foliosa</i> throughout the site, and 25 artificial islands, will continue to provide suitable high-tide refugia and nesting habitat for the majority of the rails on the site</li> <li>▪ Most of the rail detections are obviously associated with invasive <i>Spartina</i> and no rails are expected to be lost</li> <li>▪ Plantings will increase cover and increase rail survivorship</li> </ul>	None	8
02g	West Point Slough - SW/E	25	40.90	0.5 ac	1 (two incidental observations)	1-2	Aug. 12	<ul style="list-style-type: none"> <li>▪ USGS floating islands (25) at adjacent Greco Island</li> </ul>	Airboat	0 <ul style="list-style-type: none"> <li>▪ The one rail location is not associated with invasive <i>Spartina</i></li> <li>▪ Any rails present at West Point Slough will move across the slough to Greco Island and survive the treatment process</li> <li>▪ Greco Island (a large, contiguous marsh) is only 150 m across West Point Slough</li> <li>▪ Artificial floating islands (25) have been installed at Greco Island, increasing the carrying capacity of that site</li> </ul>	None	0
02h	Greco Island - South	26	233.02	3.62 ac	22-30	22-30	Aug. 12	<ul style="list-style-type: none"> <li>▪ Extensive, mature <i>Grindelia</i> throughout the site</li> <li>▪ Extensive <i>Spartina foliosa</i></li> <li>▪ Extensive tidal channel network with substantial foraging habitat</li> </ul>	Airboat	0 <ul style="list-style-type: none"> <li>▪ The vast majority of rail detections are from the marsh interior, rather than the perimeter where most treatment of invasive <i>Spartina</i> will occur</li> <li>▪ Extensive high-tide refugia and existing stands of <i>Spartina foliosa</i> on the site, as well as adjacent sites, would support all rails on the site</li> </ul>	None	15

Refuge Manager

Sub-Area #	Sub-Area Name	Figure	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (unit shown)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date <sup>4</sup>	Existing High-tide Refugia & Nesting Habitat (including Conservancy-Funded Enhancements in 2011/2012)	Treatment Methods <sup>5</sup>	Estimated Take of CLRA Through Harm <sup>6,7</sup> (with justification)	Proposed Enhancements <sup>8</sup>	Estimated Take of CLRA through Harassment
02k	Redwood Creek / Middle Bair	22, 23	421.75	5.25 ac	23-37	20-26	Aug. 12	<ul style="list-style-type: none"> <li>▪ Mature <i>Grindelia</i> on adjacent berms</li> <li>▪ Extensive <i>Spartina foliosa</i></li> <li>▪ Upland areas on eastern portion of the site</li> <li>▪ PG&amp;E boardwalk</li> </ul>	Airboat	0 <ul style="list-style-type: none"> <li>▪ Most rail detections are not associated with the <i>Spartina</i> treatment areas, thus rails are not likely to be impacted by treatment activities.</li> <li>▪ The existing <i>Grindelia</i> and other vegetation at the site provides substantial high-tide refugia and nesting habitat for rails</li> <li>▪ Extensive native <i>Spartina foliosa</i> provides suitable nesting habitat throughout the marsh</li> </ul>	None	20
04a	CMC Marsh Reserve	27	77.12	468 ft <sup>2</sup> (25.5 ft <sup>2</sup> of which is <i>densiflora</i> )	45-49	2012 data have not been received from PRBO	Sep. 1	<ul style="list-style-type: none"> <li>▪ An island and berms with mature <i>Grindelia</i> and other native marsh vegetation</li> <li>▪ PG&amp;E boardwalk</li> </ul>	Digging, Backpack	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because of the extremely small treatment area relative to the size of the extensive marsh area (i.e., &lt;1%)</li> <li>▪ Extensive high-tide refugia and nesting habitat will continue to support the existing rail population</li> <li>▪ Rails occupying the site are not using the small <i>densiflora</i> stands for nesting, and treatment will occur very quickly. Thus, treatment beginning June 1 would not impact nesting rails.</li> </ul>	None	0

Refuge Manager

Sub-Area #	Sub-Area Name	Figure	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (unit shown)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date <sup>4</sup>	Existing High-tide Refugia & Nesting Habitat (including Conservancy-Funded Enhancements in 2011/2012)	Treatment Methods <sup>5</sup>	Estimated Take of CLRA Through Harm <sup>6,7</sup> (with justification)	Proposed Enhancements <sup>8</sup>	Estimated Take of CLRA through Harassment
04c	Piper Park - East	28	10.11	191.3 ft <sup>2</sup>  (158 ft <sup>2</sup> of which is <i>densiflora</i> )	6	2012 data have not been received from PRBO	Sep. 1	<ul style="list-style-type: none"> <li>Patches of mature <i>Grindelia</i> along tidal channels and marsh/upland transition zone</li> </ul>	Digging	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site because few rails occur in the marsh, the treatment area is extremely small relative to the size of marsh, and existing high-tide refugia and nesting habitat other than invasive <i>Spartina</i> will continue to support rails</li> <li>Rails occupying the site are not using the small <i>densiflora</i> seedlings for nesting, and treatment will occur very quickly. Thus, treatment beginning June 1 would not impact nesting rails.</li> </ul>	None	0
04d	Piper Park - West	28	13.83	15.6 ft <sup>2</sup> (all of which is <i>densiflora</i> )	7	2012 data have not been received from PRBO	Sep. 1	<ul style="list-style-type: none"> <li>Patches of mature <i>Grindelia</i> along tidal channels and interior of marsh</li> </ul>	Digging	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site because few rails occur in the marsh, the treatment area is extremely small relative to the size of marsh, and existing high-tide refugia and nesting habitat other than invasive <i>Spartina</i> will continue to support rails</li> <li>Rails occupying the site are not using the small <i>densiflora</i> seedlings for nesting, and treatment will occur very quickly. Thus, treatment beginning June 1 would not impact nesting rails.</li> </ul>	None	0

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Sub-Area #	Sub-Area Name	Figure	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (unit shown)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date <sup>4</sup>	Existing High-tide Refugia & Nesting Habitat (including Conservancy-Funded Enhancements in 2011/2012)	Treatment Methods <sup>5</sup>	Estimated Take of CLRA Through Harm <sup>6,7</sup> (with justification)	Proposed Enhancements <sup>8</sup>	Estimated Take of CLRA through Harassment
04g	Creekside Park	29	20.75	0.18 ac  (0.11 ac of which is <i>densiflora</i> )	9-12	12-14	June 1 to treat <i>densiflora</i>  Sep. 1 to treat <i>alterniflora</i>	<ul style="list-style-type: none"> <li>▪ <i>Grindelia</i> plantings (600 plants) planted in 2011/2012, will provide cover by 2013/2014</li> <li>▪ Extensive <i>Spartina foliosa</i> along channels</li> <li>▪ A large island with weedy vegetation</li> <li>▪ Water control structure prevents extreme high tides</li> </ul>	Digging, Backpack	0 <ul style="list-style-type: none"> <li>▪ The extensive <i>Spartina foliosa</i> will continue to provide cover and nesting habitat for rails</li> <li>▪ The vegetated island and existing <i>Grindelia</i> along the shore and the interior of the site will continue to provide cover for approximately half of the rails on the site</li> <li>▪ Plantings will increase cover and increase rail survivorship</li> <li>▪ The remaining <i>Spartina densiflora</i> that needs to be treated are seedlings and currently do not provide substantial refugia or breeding habitat for rails; treatment of <i>densiflora</i> will occur very quickly. Thus, treatment of <i>densiflora</i> beginning June 1 would not impact nesting rails.</li> </ul>	None	8
04h	CMC - Upper	29	13.67	0.07 ac  (494 ft <sup>2</sup> of which is <i>densiflora</i> )	8	3-4	Sep. 1	<ul style="list-style-type: none"> <li>▪ Patches of <i>Grindelia</i> on adjacent berms</li> </ul>	Digging, Backpack	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because of the extremely small treatment area and high-tide refugia throughout the site</li> <li>▪ Existing high-tide refugia and nesting habitat will continue to support the small number of rails in the channels</li> <li>▪ Rails occupying the site are not using the small <i>densiflora</i> stands for nesting, and treatment will occur very quickly. Thus, treatment beginning June 1 would not impact nesting rails.</li> </ul>	None	0

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Sub-Area #	Sub-Area Name	Figure	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (unit shown)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date <sup>4</sup>	Existing High-tide Refugia & Nesting Habitat (including Conservancy-Funded Enhancements in 2011/2012)	Treatment Methods <sup>5</sup>	Estimated Take of CLRA Through Harm <sup>6,7</sup> (with justification)	Proposed Enhancements <sup>8</sup>	Estimated Take of CLRA through Harassment
04j.2	CMC - Mouth South Bank	27	12.20	0.066 ac  (283 ft <sup>2</sup> of which is <i>densiflora</i> )	4	0	June 1	<ul style="list-style-type: none"> <li>▪ Patches of <i>Grindelia</i> along channels</li> <li>▪ Boardwalks</li> <li>▪ Extensive <i>Spartina foliosa</i> along channels</li> </ul>	Digging	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because no rails were detected in 2012 and because there is a small treatment area, and high-tide refugia occurs throughout the site</li> </ul>	None	0
04k	Boardwalk No. 1	28	8.44	470 ft <sup>2</sup>  (465 ft <sup>2</sup> of which is <i>densiflora</i> )	0 04c, 04d, & 04k are functionally the same site (see above for rail numbers at those sites)	2012 data have not been received from PRBO	Sep. 1	<ul style="list-style-type: none"> <li>▪ Patches <i>Grindelia</i> along the channel</li> <li>▪ Boardwalks</li> </ul>	Digging	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because few rails occur in the vicinity of the marsh, because of the extremely small treatment area relative to the size of marsh, and because existing high-tide refugia and nesting habitat other than invasive <i>Spartina</i> will continue to support rails</li> <li>▪ Rails occupying the site are not using the small <i>densiflora</i> stands for nesting, and treatment will occur very quickly. Thus, treatment beginning June 1 would not impact nesting rails.</li> </ul>	None	0
05a.1	Mowry Marsh & Slough	30, 31	821.08	0.36 ac	Not surveyed in 2011	16-24	Aug. 12	<ul style="list-style-type: none"> <li>▪ Extensive mature <i>Grindelia</i> along channels and levees throughout the site</li> <li>▪ Extensive <i>Spartina foliosa</i> along channels and in marsh plain</li> </ul>	Airboat	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from the site because of the extremely small treatment area relative to the extensive marsh area</li> <li>▪ The rail detections do not appear to be associated with invasive <i>Spartina</i></li> <li>▪ Existing high-tide refugia and nesting habitat, including native <i>Spartina foliosa</i>, throughout the site will continue to support the rails in the marsh</li> </ul>	None	0

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Sub-Area #	Sub-Area Name	Figure	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (unit shown)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date <sup>4</sup>	Existing High-tide Refugia & Nesting Habitat (including Conservancy-Funded Enhancements in 2011/2012)	Treatment Methods <sup>5</sup>	Estimated Take of CLRA Through Harm <sup>6,7</sup> (with justification)	Proposed Enhancements <sup>8</sup>	Estimated Take of CLRA through Harassment
05b	Dumbarton/Audubon	32, 33	747.88	2.36 ac	14-21	34-46	Aug. 12	<ul style="list-style-type: none"> <li>▪ Extensive <i>Grindelia</i> throughout marsh and vegetation at upland edge of old railroad tracks</li> <li>▪ Extensive <i>Spartina foliosa</i> along channels and in marsh plain</li> <li>▪ PG&amp;E boardwalk</li> </ul>	Truck, Airboat	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because of the extremely small treatment area relative to the size of the extensive marsh area (i.e., &lt;1%)</li> <li>▪ Clapper rail detections are scattered throughout the marsh and do not appear to be associated with invasive <i>Spartina</i></li> <li>▪ Extensive high-tide refugia and nesting habitat, including native <i>Spartina foliosa</i>, throughout the site will continue to support the existing rail population, and thus no rails are expected to be lost due to treatment</li> </ul>	None	8
05c.1	Newark Slough West	32, 33	140.07	0.17 ac	0	0	June 1	<ul style="list-style-type: none"> <li>▪ Extensive <i>Grindelia</i> along channel edges and on adjacent berms</li> <li>▪ Extensive <i>Spartina foliosa</i> throughout the site</li> </ul>	Airboat	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because no rails were detected in 2012</li> </ul>	None	0
05c.2	Newark Slough East	32, 33	92.14	0.85 ac	5-9	8	Aug. 12	<ul style="list-style-type: none"> <li>▪ Extensive <i>Grindelia</i> along channel edges and on adjacent berms</li> <li>▪ Extensive <i>Spartina foliosa</i> throughout the site</li> </ul>	Airboat	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because of the extremely small treatment area relative to the size of the extensive marsh area (i.e., &lt;1%)</li> <li>▪ The clapper rail detections do not appear to be associated with the densest invasive <i>Spartina</i> treatment area</li> <li>▪ Extensive high-tide refugia and nesting habitat, including native <i>Spartina foliosa</i>, throughout the site will continue to support the existing rail population, and thus no rails are expected to be lost due to treatment</li> </ul>	None	4

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Sub-Area #	Sub-Area Name	Figure	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (unit shown)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date <sup>4</sup>	Existing High-tide Refugia & Nesting Habitat (including Conservancy-Funded Enhancements in 2011/2012)	Treatment Methods <sup>5</sup>	Estimated Take of CLRA Through Harm <sup>6,7</sup> (with justification)	Proposed Enhancements <sup>8</sup>	Estimated Take of CLRA through Harassment
05d	LaRiviere Marsh	32, 33	94.69	0.5 ac	17-22	18-24	Aug. 12	<ul style="list-style-type: none"> <li>Extensive <i>Grindelia</i>, <i>Spartina foliosa</i>, and <i>Bolboschoenus maritimus</i> throughout the site</li> <li>Vegetated berms throughout the marsh</li> </ul>	Backpack	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site because of the extremely small treatment area relative to the size of the marsh area (i.e., &lt;1%)</li> <li>A small number of clapper rail detections occurred in areas where invasive <i>Spartina</i> treatment will occur</li> <li>Extensive high-tide refugia and nesting habitat, including native <i>Spartina foliosa</i>, throughout the site will continue to support the existing rail population, and thus no rails are expected to be lost due to treatment</li> </ul>	None	15
05f	Coyote Creek	34	703.54	<0.01 ac (Not surveyed in 2011; likely a small amount of <i>Spartina</i> remains)	Not surveyed in 2011	0	June 1	<ul style="list-style-type: none"> <li>Extensive <i>Grindelia</i>, <i>Bolboschoenus maritimus</i>, and extensive <i>Spartina foliosa</i> throughout the site</li> <li>Numerous vegetated levees bordering the site</li> </ul>	Airboat	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site because no rails were detected in 2012</li> </ul>	None	0
05h	Plummer Creek Mitigation	33	16.63	0.08 ac	Not surveyed in 2011	0	June 1	<ul style="list-style-type: none"> <li>Extensive <i>Grindelia</i> throughout the tidal channel and along adjacent levees</li> <li>Extensive <i>Bolboschoenus maritimus</i> and <i>Spartina foliosa</i> throughout the site</li> </ul>	Backpack	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from the site because no rails were detected in 2012</li> </ul>	None	0
06a	Emeryville Crescent - East	35	54.20	0.16 ac	Limited survey effort due to proximity of highway; rails are likely present	0	June 1	<ul style="list-style-type: none"> <li>Patches of mature <i>Grindelia</i> along tidal channels and interior of marsh</li> <li>Extensive <i>Spartina foliosa</i> throughout the site</li> <li>Numerous vegetated upland areas in and surrounding the site</li> </ul>	Backpack	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site because no rails were detected in 2012</li> </ul>	None	0
06b	Emeryville Crescent - West	35	31.51	0.04 ac	4-6	0	June 1	<ul style="list-style-type: none"> <li>Numerous vegetated upland areas surround the site</li> </ul>	Backpack	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site because no rails were detected in 2012</li> </ul>	None	0

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Sub-Area #	Sub-Area Name	Figure	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (unit shown)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date <sup>4</sup>	Existing High-tide Refugia & Nesting Habitat (including Conservancy-Funded Enhancements in 2011/2012)	Treatment Methods <sup>5</sup>	Estimated Take of CLRA Through Harm <sup>6,7</sup> (with justification)	Proposed Enhancements <sup>8</sup>	Estimated Take of CLRA through Harassment
07a	Oro Loma - East	36	197.05	0.44 ac	6	4	Sep.1	<ul style="list-style-type: none"> <li>▪ <i>Grindelia</i> plantings (610 plants; 0.03 ac); planted in 2011/2012, will provide cover by 2013/2014</li> <li>▪ Berms vegetated with <i>Grindelia</i> on the interior of the site</li> </ul>	Truck, Airboat	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because of the extremely small treatment area relative to the size of the marsh area (i.e., &lt;1%)</li> <li>▪ The clapper rail detections are not centered in areas where treatment will occur</li> <li>▪ Extensive high-tide refugia and nesting habitat throughout the site will continue to support the existing rail population, and thus no rails are expected to be lost due to treatment</li> <li>▪ Plantings will increase cover and increase rail survivorship</li> </ul>	None	2
07b	Oro Loma – West	37	130.73	1.94 ac	0	1	Sep. 1	<ul style="list-style-type: none"> <li>▪ <i>Grindelia</i> (540 plants) plantings; planted in 2011/2012</li> <li>▪ Berms vegetated with <i>Grindelia</i> on the interior of the site</li> </ul>	Truck, Airboat	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because of the extremely small treatment area relative to the size of the marsh area (i.e., &lt;2%), the low number of rails (i.e., one pair at most) that occur at this site, and the presence of high-tide refugia and nesting habitat, including <i>Spartina foliosa</i>, other than invasive <i>Spartina</i> that would continue to support rails</li> </ul>	None	0

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08	Palo Alto Baylands	38	217.78	1.01 ac	26	26	Aug. 12	<ul style="list-style-type: none"> <li>Extensive <i>Grindelia</i> throughout the site and on adjacent levees</li> <li>Extensive <i>Spartina foliosa</i> and <i>Bolboschoenus maritimus</i> throughout the site</li> <li>PG&amp;E boardwalk</li> </ul>	Backpack	<p>2</p> <ul style="list-style-type: none"> <li>Although the site the site is densely populated by rails, only two rails are expected to be lost from the site because of an extremely small treatment area relative to the extensive marsh area (i.e., &lt;1%)</li> <li>Existing high-tide refugia and nesting habitat, including native <i>Spartina foliosa</i>, throughout the site will continue to support the rails in the marsh</li> <li>There is a smaller treatment area in 2012 than 2011, when a take estimate of two was applied to this site</li> </ul>	<ul style="list-style-type: none"> <li>Install one artificial floating island</li> <li>Install one earthen island planted with <i>Grindelia</i></li> </ul>	8
09	Tiscornia Park	40	15	453 ft <sup>2</sup> (6 ft <sup>2</sup> of which is densiflora)	8	1-2	Sep. 1	<ul style="list-style-type: none"> <li>Patches of <i>Grindelia</i> along channels</li> <li>Extensive <i>Spartina foliosa</i> throughout the channels and fringe of this site</li> <li>Boardwalks</li> </ul>	Digging, Backpack	<p>0</p> <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site due to <i>Spartina</i> treatment because of the extremely small treatment area relative to the size of the marsh area (i.e., &lt;1%)</li> <li>High-tide refugia and nesting habitat, including native <i>Spartina foliosa</i>, throughout the site will continue to support the existing rail population, and thus no rails are expected to be lost due to treatment</li> </ul>	None	0
10a	Whittell Marsh	41	74.0	1.1 ft <sup>2</sup> , (all of which is densiflora)	0	1	Sep. 1	<ul style="list-style-type: none"> <li>Patches of <i>Grindelia</i> along channels</li> </ul>	Digging	<p>0</p> <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site because of the extremely small treatment area relative to the size of the marsh area (i.e., &lt;1%), the low number of rails (i.e., one pair at most) that occur at this site, and the presence of high-tide refugia and nesting habitat, including <i>Spartina foliosa</i>, other than invasive <i>Spartina</i> that would continue to support rails after treatment</li> </ul>	None	0

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10c	Giant Marsh	42	29.03	0.05 ac	0	1	Sep. 1	<ul style="list-style-type: none"> <li>Patches of <i>Grindelia</i> along channels</li> </ul>	Backpack, Digging	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site due to <i>Spartina</i> treatment because of the extremely small treatment area relative to the size of the marsh area (i.e., &lt;1%) and the low number of rails (i.e., one pair at most) that occur at this site,</li> </ul>	None	0
11	Southampton Marsh	43	163.12	0.05 ac	2-4	0	Sep. 1	<ul style="list-style-type: none"> <li>Patches of <i>Grindelia</i> along channels</li> <li>Extensive <i>Bolboschoenus maritimus</i> and <i>Spartina foliosa</i> throughout the site</li> <li>Extensive transition zone vegetation in the northeast corner of the site</li> </ul>	Digging, Backpack	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site because of the extremely small treatment area relative to the size of the marsh area (i.e., &lt;1%) and the presence of high-tide refugia and nesting habitat other than invasive <i>Spartina</i> that would continue to support rails</li> </ul>	None	0
12b	Pier 98/Heron's Head	44	10.91	0.02 ac	2	1-2	Sep.1	<ul style="list-style-type: none"> <li>Island with sparse vegetation</li> <li>Sparse vegetation along trail</li> </ul>	Digging, Backpack	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site because of the extremely small treatment area relative to the size of the marsh area (i.e., &lt;1%) and the low number of rails (one pair) at this site, and the presence of high-tide refugia and nesting habitat other than invasive <i>Spartina</i> that would continue to support rails</li> <li>The pair of rails that nested in this location last year likely nesting in <i>Grindelia</i>, rather than invasive <i>Spartina</i></li> </ul>	None	2
12f	Candlestick Cove	45	1.85	294.9 ft <sup>2</sup>	1	0	June 1	<ul style="list-style-type: none"> <li>Ruderal and upland vegetation on outer berm</li> </ul>	Backpack	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site because no rails were detected in 2012</li> </ul>	None	0

Refuge Manager

Sub-Area #	Sub-Area Name	Figure	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (unit shown)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date <sup>4</sup>	Existing High-tide Refugia & Nesting Habitat (including Conservancy-Funded Enhancements in 2011/2012)	Treatment Methods <sup>5</sup>	Estimated Take of CLRA Through Harm <sup>6,7</sup> (with justification)	Proposed Enhancements <sup>8</sup>	Estimated Take of CLRA through Harassment
13a	OAC - North Bank	46	27.52	172.2 ft <sup>2</sup>	451.8 ft <sup>2</sup>	1-2	Sep. 1	<ul style="list-style-type: none"> <li>Mature <i>Grindelia</i> and other vegetation on adjacent levees</li> <li><i>Grindelia</i> and <i>Spartina foliosa</i> plantings planted at adjacent 13b will provide cover by 2013/2014</li> </ul>	Truck	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site because of the extremely small treatment area relative to the size of the marsh area (i.e., &lt;1%), the small number of rails that use the marsh, and the presence of high-tide refugia and nesting habitat other than invasive <i>Spartina</i> that would continue to support rails</li> <li>Plantings will increase cover and increase rail survivorship</li> </ul>	None	0
13b	OAC - Island	46	93.74	0.09. ac	2-4	3-4	Sep. 1	<ul style="list-style-type: none"> <li>Mature <i>Grindelia</i> and other vegetation on adjacent levees (along 13a and 13c)</li> <li><i>Grindelia</i> plantings (700 plants), <i>Spartina foliosa</i> plantings (430 plants) planted in 2011/2012 at 13b will provide cover by 2013/2014</li> </ul>	Truck	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site because of the extremely small treatment area relative to the size of the marsh area (i.e., &lt;1%), the small number of rails that use the marsh, and the presence of high-tide refugia and nesting habitat other than invasive <i>Spartina</i> that would continue to support rails</li> <li>Plantings will increase cover and increase rail survivorship</li> </ul>	None	0
13c	OAC - South Bank	46	24.09	215.1 ft <sup>2</sup>	0	0	June 1	<ul style="list-style-type: none"> <li>Mature <i>Grindelia</i> and other vegetation on adjacent levees</li> <li><i>Grindelia</i> and <i>Spartina foliosa</i> plantings planted at adjacent 13b will provide cover by 2013/2014</li> </ul>	Truck	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site because no rails were detected in 2012</li> </ul>	None	0

Refuge Manager

Sub-Area #	Sub-Area Name	Figure	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (unit shown)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date <sup>4</sup>	Existing High-tide Refugia & Nesting Habitat (including Conservancy-Funded Enhancements in 2011/2012)	Treatment Methods <sup>5</sup>	Estimated Take of CLRA Through Harm <sup>6,7</sup> (with justification)	Proposed Enhancements <sup>8</sup>	Estimated Take of CLRA through Harassment
13d	Whale's Tail - North	47	149.34	0.08 ac	8-12	8	Sep.1	<ul style="list-style-type: none"> <li>▪ Mature <i>Grindelia</i> along channels and levees</li> <li>▪ <i>Grindelia</i> plantings (1400 plants), <i>Spartina foliosa</i> plantings (150 plants); 0.01 ac total; planted in 2011/2012, will provide cover by 2013/2014</li> </ul>	Airboat	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because of the extremely small treatment area relative to the size of the marsh area (i.e., &lt;1%), the small number of rails that use the marsh, and the presence of high-tide refugia and nesting habitat other than invasive <i>Spartina</i> that would continue to support rails</li> <li>▪ Plantings will increase cover and increase rail survivorship</li> <li>▪ 22 artificial floating islands</li> </ul>	None	5
13e	Whale's Tail - South	48	149.35	0.1 ac	6	9-10	Aug. 12	<ul style="list-style-type: none"> <li>▪ Mature <i>Grindelia</i> along channels and levees</li> <li>▪ <i>Grindelia</i> and ecotone plantings (5000 plants), <i>Spartina foliosa</i> plantings (260 plants); 0.28 ac total; planted in 2011/2012, will provide cover by 2013/2014</li> </ul>	Truck	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because of the extremely small treatment area relative to the size of the marsh area (i.e., &lt;1%), the small number of rails that use the marsh, and the presence of high-tide refugia and nesting habitat other than invasive <i>Spartina</i> that would continue to support rails</li> <li>▪ Plantings will increase cover and increase rail survivorship</li> </ul>	None	2
13j	Eden Landing - Mt Eden Creek	49, 50	124.83	0.03 ac	2	0	June 1	<ul style="list-style-type: none"> <li>▪ Mature <i>Grindelia</i> along channels and levees</li> <li>▪ <i>Grindelia</i> plantings (510 plants), <i>Spartina foliosa</i> plantings (80 plants); planted in 2011/2012, will provide cover by 2013/2014</li> </ul>	Truck, Airboat	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because no rails were detected in 2012</li> <li>▪ Three artificial floating islands</li> </ul>	None	0

Refuge Manager

Sub-Area #	Sub-Area Name	Figure	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (unit shown)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date <sup>4</sup>	Existing High-tide Refugia & Nesting Habitat (including Conservancy-Funded Enhancements in 2011/2012)	Treatment Methods <sup>5</sup>	Estimated Take of CLRA Through Harm <sup>6,7</sup> (with justification)	Proposed Enhancements <sup>8</sup>	Estimated Take of CLRA through Harassment
15a.1	Charleston Slough to Mt. View Sl	51, 52	97.27	0.1 ac	1-2	8-14	Aug. 12	<ul style="list-style-type: none"> <li>▪ Mature <i>Grindelia</i> along levees</li> <li>▪ Extensive robust <i>Spartina foliosa</i> throughout the site</li> <li>▪ PG&amp;E boardwalk</li> </ul>	Truck	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because of the extremely small treatment area relative to the size of the marsh area (i.e., &lt;1%), the low number of rails, and the presence of high-tide refugia and nesting habitat, including <i>Spartina foliosa</i>, other than invasive <i>Spartina</i> that would continue to support rails</li> </ul>	None	0
15a.3	Guadalupe Slough	53	316.20	0.2 ac	Not surveyed in 2011	1-2	Aug. 12	<ul style="list-style-type: none"> <li>▪ Mature <i>Grindelia</i> along levees</li> <li>▪ Extensive <i>Bolboschoenus maritimus</i> and robust <i>Spartina foliosa</i> throughout the site</li> </ul>	Truck	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from the site because of the extremely small treatment area relative to the extensive marsh area (i.e., &lt;1%)</li> <li>▪ Existing high-tide refugia and nesting habitat along the edges of the site will continue to support the rails in the marsh</li> </ul>	None	0
15a.5	Coyote Ck to Artesian Slough	54	442.42	0.01 ac	Not surveyed in 2011	6-10	Aug. 12	<ul style="list-style-type: none"> <li>▪ Mature <i>Grindelia</i> along levees</li> <li>▪ Extensive <i>Bolboschoenus maritimus</i> and <i>Spartina foliosa</i> throughout site</li> </ul>	Backpack	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from the site because of an extremely small treatment area relative to the extensive marsh area (i.e., &lt;1%)</li> <li>▪ Rail locations are not associated with invasive <i>Spartina</i> treatment areas</li> <li>▪ Existing high-tide refugia and nesting habitat throughout the site will continue to support the rails in the marsh</li> </ul>	None	0
15b	Faber/Laumeister Marsh	55	197.34	0.2 ac	94-118	2012 data have not been received from PRBO	Aug. 12	<ul style="list-style-type: none"> <li>▪ Mature <i>Grindelia</i> and extensive <i>Spartina foliosa</i> throughout the entire marsh and along levees</li> <li>▪ PG&amp;E boardwalk</li> </ul>	Backpack	0 <ul style="list-style-type: none"> <li>▪ Although the site is densely populated with rails, no rails are expected to be lost from the site because of the extremely small treatment area relative to the extensive marsh area (i.e., &lt;1%)</li> <li>▪ Existing high-tide refugia and nesting habitat throughout the site will continue to support the rails in the marsh</li> </ul>	None	10

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Sub-Area #	Sub-Area Name	Figure	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (unit shown)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date <sup>4</sup>	Existing High-tide Refugia & Nesting Habitat (including Conservancy-Funded Enhancements in 2011/2012)	Treatment Methods <sup>5</sup>	Estimated Take of CLRA Through Harm <sup>6,7</sup> (with justification)	Proposed Enhancements <sup>8</sup>	Estimated Take of CLRA through Harassment	
16.2	Cooley Landing East	55	135.85	2.95 ac	1 (incidental observation)	0	June 1	<ul style="list-style-type: none"> <li>Some <i>Grindelia</i> in southwest corner, more extensive <i>Grindelia</i> in marsh immediately to west</li> <li>Extensive <i>Grindelia</i> in adjacent Laumeister Tract</li> <li>PG&amp;E boardwalk</li> </ul>	Truck, Airboat	0	No rails are expected to be lost from this site because no rails were detected in 2012	Plant <i>Grindelia</i> on "island" of cut-off outer levee (depicted in Figure 10B)	0
18b	Navigable Slough	56	3.09	0.05 ac	1	0	June 1	<ul style="list-style-type: none"> <li>Mature <i>Grindelia</i> along channels and levees</li> <li><i>Grindelia</i> and <i>Spartina foliosa</i> plantings in adjacent sites, including San Bruno Marsh (18a) and Colma Creek (18g), planted in 2011/2012 will provide cover by 2013/2014</li> </ul>	Backpack	0	No rails are expected to be lost from this site because no rails were detected in 2012	None	0
20e	East Marsh	57	37.16	0.03 ac	1-2	0	June 1	<ul style="list-style-type: none"> <li>Patches of <i>Grindelia</i> along channels and levees</li> <li>Water control structure prevents extreme high tides</li> </ul>	Truck	0	No rails are expected to be lost from this site because no rails were detected in 2012	None	0
20k	Hayward Landing	58	11.61	133.1 ft <sup>2</sup>	1-2	0	June 1	<ul style="list-style-type: none"> <li>Mature <i>Grindelia</i> along channels and levees</li> </ul>	Airboat	0	No rails are expected to be lost from this site because no rails were detected in 2012	None	0
20m	Cogswell - Sec A	58	35.00	0.53 ac	3-4	0	June 1	<ul style="list-style-type: none"> <li>Two large islands vegetated with dense weedy vegetation</li> <li><i>Grindelia</i> and ecotone plantings (2950 plants; 0.15 ac); planted in 2011/2012, will provide cover by 2013/2014</li> </ul>	Truck, Airboat	0	No rails are expected to be lost from this site because no rails were detected in 2012	None	0
20s	HARD Marsh	59	65.86	318 ft <sup>2</sup>	0	1	Aug. 12	<ul style="list-style-type: none"> <li>Patches of <i>Grindelia</i> along channels and levees</li> </ul>	Airboat	0	No rails are expected to be lost from this site because of the extremely small treatment area relative to the size of the marsh area (i.e., <1%) and the low number of rails (i.e., one pair at most) that occur at this site	None	0
20w	Triangle Marsh - Hayward	58	12.35	2 ft <sup>2</sup>	1-2	0	June 1	<ul style="list-style-type: none"> <li>Patches of <i>Grindelia</i> along eastern levee</li> </ul>	Backpack	0	No rails are expected to be lost from this site because no rails were detected in 2012	None	0

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21b	Ideal Marsh - South	60	131.23	1.54 ac	4	10-16	Aug. 12	<ul style="list-style-type: none"> <li>Mature <i>Grindelia</i> along channels and eastern levee</li> </ul>	Airboat	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site because <i>Spartina</i> treatment will not occur near most call detections (i.e., most of the treatment will occur on the shoreline) and the presence of high-tide refugia and nesting habitat other than invasive <i>Spartina</i> would continue to support rails</li> </ul>	None	0
22a	Wildcat Marsh	61	333.53	0.1 ac	6-7	2012 data have not been received from PRBO	Sep. 1	<ul style="list-style-type: none"> <li><i>Grindelia</i> along channels and levees</li> <li>Extensive <i>Spartina foliosa</i> throughout the site</li> <li>PG&amp;E boardwalk</li> </ul>	Airboat	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site because of the extremely small treatment area relative to the extensive size of the marsh area (i.e., &lt;1%)</li> <li>Existing high-tide refugia and nesting habitat throughout the site will continue to support the rails in the marsh</li> </ul>	None	0
22b.2	San Pablo Marsh West	62	130.53	1.2 ac	19-23	15-18	Sep.1	<ul style="list-style-type: none"> <li>Extensive <i>Grindelia</i>, and other tall vegetation along the tidal channels</li> <li>Extensive robust <i>Spartina foliosa</i> and <i>Bolboschoenus maritimus</i> throughout the site</li> <li>PG&amp;E boardwalk</li> </ul>	Airboat	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site because of the extremely small treatment area relative to the extensive size of the marsh area (i.e., &lt;1%), and because the rail detections are not concentrated in <i>Spartina</i> treatment areas</li> <li>Existing high-tide refugia and nesting habitat, including <i>Spartina foliosa</i>, throughout the site will continue to support the rails in the marsh</li> </ul>	None	6
22c	Rheem Creek Area	62	35.77	0.4 ac	6-8	9-10	Sep.1	<ul style="list-style-type: none"> <li>Patches of <i>Grindelia</i> and other tall vegetation, particularly on the northern portion of the site</li> <li>Extensive <i>Spartina foliosa</i> throughout the site</li> </ul>	Airboat	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site because of the relatively small treatment area compared to the size of the marsh area (i.e., approximately 1%)</li> <li>Existing high-tide refugia will continue to support the rails in the marsh after treatment</li> </ul>	None (note: this is a planned East Bay Regional Park District restoration site)	4

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22d	Stege Marsh	63	52.28	0.01 ac	Not surveyed in 2011	2	Sep.1	<ul style="list-style-type: none"> <li>Large island on northeast portion of the site</li> <li>Patches <i>Grindelia</i> and other vegetation on the marsh edges</li> <li>Extensive <i>Spartina foliosa</i> throughout the site</li> </ul>	Backpack	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site because of the extremely small treatment area relative to the size of the marsh area (&lt;1%), the low number of rails (one pair at most) that use the marsh, and the presence of high-tide refugia and nesting habitat, including <i>Spartina foliosa</i>, other than invasive <i>Spartina</i> that would continue to support rails</li> </ul>	None	0
22e	Hoffman Marsh	64	36.04	0	0 (1 incidental observation by ARA in fall 2011)	0	June 1	<ul style="list-style-type: none"> <li><i>Grindelia</i> and other vegetation on berms and marsh edges</li> <li>Extensive <i>Spartina foliosa</i> throughout the site</li> <li>Upland vegetation along trail</li> </ul>	Backpack	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site because no rails were detected in 2012</li> </ul>	None	0
23d.1	San Rafael Canal Mouth North East	40	3.10	0.03 ac	2	2	Sep.1	<ul style="list-style-type: none"> <li>Patches of <i>Grindelia</i> and upland/ornamental vegetation on marsh edge</li> <li>Extensive <i>Spartina foliosa</i> in the portions of the site that are occupied by rails</li> </ul>	Digging, Backpack	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site because of the extremely small treatment area relative to the size of the marsh area (&lt;1%), the low number of rails (one pair at most) that use the marsh, and the presence of high-tide refugia and nesting habitat, including <i>Spartina foliosa</i>, other than invasive <i>Spartina</i> that would continue to support rails</li> </ul>	None	2
23d.2	San Rafael Canal Mouth Mouth North West	39	3.60	161.5 ft <sup>2</sup> (4.4 ft <sup>2</sup> of which is <i>densiflora</i> )	0	0	June 1	<ul style="list-style-type: none"> <li>Patches of <i>Grindelia</i> and upland/ornamental vegetation on marsh edge</li> <li>Extensive <i>Spartina foliosa</i></li> </ul>	Digging, Backpack	0 <ul style="list-style-type: none"> <li>No rails are expected to be lost from this site because no rails were detected in 2012</li> </ul>		0

Refuge Manager

Sub-Area #	Sub-Area Name	Figure	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (unit shown)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date <sup>4</sup>	Existing High-tide Refugia & Nesting Habitat (including Conservancy-Funded Enhancements in 2011/2012)	Treatment Methods <sup>5</sup>	Estimated Take of CLRA Through Harm <sup>6,7</sup> (with justification)	Proposed Enhancements <sup>8</sup>	Estimated Take of CLRA through Harassment
23e	Muzzi and Martas Marsh	65	177.04	0.14 ac  (29 ft <sup>2</sup> of which is <i>densiflora</i> )	50-62	2012 data have not been received from PRBO	June 1 to treat <i>densiflora</i>  Sep. 1 to treat <i>alterniflora</i>	<ul style="list-style-type: none"> <li>▪ Patches of <i>Grindelia</i> along channels and marsh edge</li> <li>▪ Extensive <i>Spartina foliosa</i> throughout the site</li> <li>▪ Island in west-central portion of the site</li> <li>▪ PG&amp;E boardwalk</li> </ul>	Digging, Backpack	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because of the extremely small treatment area relative to the extensive size of the marsh (i.e., &lt;1%)</li> <li>▪ The rail detections are scattered throughout the marsh and are not clustered in the <i>Spartina</i> treatment areas, thus most rails are not likely to be impacted by treatment activities</li> <li>▪ Existing high-tide refugia and nesting habitat, including <i>Spartina foliosa</i>, throughout the site will continue to support the rails in the marsh</li> <li>▪ Rails occupying the site are not using the small <i>densiflora</i> stands for nesting, and treatment will occur very quickly. Thus, treatment beginning June 1 would not impact nesting rails.</li> </ul>	None	4
23j	Bothin Marsh	66, 67	106.16	312.1 ft <sup>2</sup>	4	2012 data have not been received from PRBO	Sep. 1	<ul style="list-style-type: none"> <li>▪ Patches of <i>Grindelia</i> along channels and berms</li> <li>▪ Extensive <i>Spartina foliosa</i> throughout the site</li> <li>▪ PG&amp;E boardwalk</li> </ul>	Backpack	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because of the extremely small treatment area relative to the size of the marsh area (&lt;1%), the low number of rails (up to four individuals) that use the marsh, and the presence of high-tide refugia and nesting habitat, including <i>Spartina foliosa</i>, other than invasive <i>Spartina</i> that would continue to support rails</li> </ul>	None	0

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23m	Novato	68, 69	1023.51	312.8 ft <sup>2</sup>	129-157	2012 data have not been received from PRBO	Sep. 1	<ul style="list-style-type: none"> <li>▪ Mature <i>Grindelia</i> along extensive network of channels and along levees</li> <li>▪ Extensive <i>Spartina foliosa</i> throughout the site</li> <li>▪ PG&amp;E boardwalk</li> </ul>	Backpack	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because of the extremely small treatment area relative to the extensive size of the marsh (i.e., &lt;1%)</li> <li>▪ The rail detections are scattered throughout the marsh, thus most rails are not likely to be impacted by treatment activities at such a small portion of the site</li> <li>▪ Existing high-tide refugia and nesting habitat throughout the site will continue to support the rails in the marsh</li> </ul>	None	20
23n	Triangle Marsh - Marin	70	19.10	293.4 ft <sup>2</sup> (63.3 ft <sup>2</sup> of which is densiflora)	1 (incidental observation)	0	June 1	<ul style="list-style-type: none"> <li>▪ Patches of <i>Grindelia</i> along channels and berms</li> </ul>	Backpack	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because no rails were detected in 2012</li> </ul>	None	0
23o	China Camp	69	243.53	0 ft <sup>2</sup> (This site will be surveyed in 2012 to confirm no <i>Spartina</i> remains)	24-30	2012 data have not been received from PRBO	Sep. 1	<ul style="list-style-type: none"> <li>▪ Mature <i>Grindelia</i> along extensive network of channels and along levees</li> <li>▪ Extensive <i>Spartina foliosa</i> and <i>Bolboschoenus maritimus</i> throughout the site</li> <li>▪ PG&amp;E boardwalk</li> <li>▪ Large island with upland vegetation on southern portion of the site</li> <li>▪ Three upland areas with vegetation protrude into the marsh</li> </ul>	Backpack	0 <ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because of the extremely small treatment area relative to the extensive size of the marsh (i.e., &lt;1%)</li> <li>▪ The rail detections are scattered throughout the marsh, thus most rails are not likely to be impacted by treatment activities at such a small portion of the site</li> <li>▪ Existing high-tide refugia and nesting habitat, including <i>Spartina foliosa</i>, throughout the site will continue to support the rails in the marsh</li> </ul>	None	0

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Sub-Area #	Sub-Area Name	Figure	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (unit shown)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date <sup>4</sup>	Existing High-tide Refugia & Nesting Habitat (including Conservancy-Funded Enhancements in 2011/2012)	Treatment Methods <sup>5</sup>	Estimated Take of CLRA Through Harm <sup>6,7</sup> (with justification)	Proposed Enhancements <sup>8</sup>	Estimated Take of CLRA through Harassment	
24a	Petaluma River - Upper	71	138.15	651.1 ft <sup>2</sup>	Not surveyed in 2011 (3-6 detected in 2010)	1-2	Sep.1	<ul style="list-style-type: none"> <li>▪ Patches of <i>Grindelia</i> along channels and throughout the site</li> <li>▪ Extensive <i>Spartina foliosa</i> and <i>Bolboschoenus maritimus</i> throughout site</li> <li>▪ Patches of upland vegetation along the marsh edge</li> </ul>	Airboat	0	<ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because of the extremely small treatment area relative to the size of the marsh area (&lt;1%), the low number of rails (one pair at most) that use the marsh, and the presence of high-tide refugia and nesting habitat other than invasive <i>Spartina</i> that would continue to support rails</li> </ul>	None	0
24c	Petaluma Marsh	72	3514.15	0 ft <sup>2</sup> (This site will be surveyed in 2012 to confirm no <i>Spartina</i> remains)	3-4	2012 data have not been received from PRBO	Sep. 1	<ul style="list-style-type: none"> <li>▪ Patches of <i>Grindelia</i> in the marsh and on the eastern levee bank</li> </ul>	Airboat	0	<ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because of the extremely small treatment area relative to the size of the marsh area (i.e., &lt;1%), the low number of rails (one pair at most) that use the marsh, and the presence of high-tide refugia and nesting habitat other than invasive <i>Spartina</i> that would continue to support rails</li> </ul>	None	0
24d	Petaluma River - Lower	73	1159.38	0 ft <sup>2</sup> (This site will be surveyed in 2012 to confirm no <i>Spartina</i> remains)	58-66	2012 data have not been received from PRBO	Sep. 1	<ul style="list-style-type: none"> <li>▪ Patches of <i>Grindelia</i> along well-developed channel network and along levees</li> </ul>	Airboat	0	<ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because there will be very little, if any treatment in this expansive marsh</li> <li>▪ Existing high-tide refugia and nesting habitat throughout the site will continue to support the rails in the marsh</li> </ul>	None	0
26d	Sonoma Baylands	74	1334.45	0 ft <sup>2</sup>	19-20	2012 data have not been received from PRBO	Sep. 1	<ul style="list-style-type: none"> <li>▪ Extensive areas of <i>Grindelia</i> throughout the marsh</li> <li>▪ Extensive <i>Spartina foliosa</i> has colonized the site since breaching</li> <li>▪ Berms vegetated with <i>Grindelia</i> and <i>Baccharis</i></li> </ul>	Backpack	0	<ul style="list-style-type: none"> <li>▪ No rails are expected to be lost from this site because of the extremely small treatment area relative to the size of the marsh area (i.e., &lt;1%)</li> <li>▪ Existing high-tide refugia and nesting habitat, including <i>Spartina foliosa</i>, throughout the site will continue to support the rails in the marsh</li> </ul>	None	0

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Sub-Area #	Sub-Area Name	Figure	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (unit shown)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	Treatment Date <sup>4</sup>	Existing High-tide Refugia & Nesting Habitat (including Conservancy-Funded Enhancements in 2011/2012)	Treatment Methods <sup>5</sup>	Estimated Take of CLRA Through Harm <sup>6,7</sup> (with justification)	Proposed Enhancements <sup>8</sup>	Estimated Take of CLRA through Harassment
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**Key**

- 1 California clapper rail habitat area calculated from heads-up digitizing in GIS of site/sub-area boundaries by clapper rail biologists experienced with site-specific conditions, with exclusion of unvegetated areas or habitat unsuitable for clapper rail use (e.g., open mudflats, rip rap).
- 2 *Spartina* Treatment Area, based on extent of hybrid *Spartina* in 2011, is provided as a proxy for "2012 Treatment Area". The actual 2012 treatment area will be less at all sites treated in 2011. Sites with *Spartina densiflora* and *Spartina alterniflora* (and its hybrids) infestations have separate acreages associated with each species.
- 3 Based on California clapper rail surveys conducted by OEI, PRBO, FWS and others in 2011 and 2012, and best professional judgment by the surveyors regarding the potential for single detections to represent a single bird vs. a pair.
- 4 Entry date of June 1 is required at sites with *Spartina densiflora* to prevent seeding.
- 5 Backpack spraying accompanies all airboat, truck, and Marsh Master use where that method is more efficient and/or more sensitive, and thus backpack spraying is noted here only when truck or airboat treatment are not proposed.
- 6 Take estimates are based on the estimated number of California clapper rails that will be lost from the sub-area after invasive *Spartina* is treated, and after the treated *Spartina* disappears (which will likely not occur until the winter of 2013/2014).
- 7 Take estimates are based on best professional judgment; although a range may be more accurate (i.e., a range would more likely encompass the actual number of rails taken), a specific take number was chosen in order to determine the appropriate level of habitat enhancement (such as number of artificial floating islands) at each site.
- 8 Artificial floating islands are funding by the Coastal Conservancy and will be deployed by the USGS; exact positioning will be determined at the time of deployment based on habitat conditions, channel morphology, and other factors assessed by biologists experienced with clapper rail ecology.

**Table 3. Proposed 2012 *Spartina* Treatment at Non-rail Sites Previously Permitted in 2011**

Sub-Area #	Sub-Area Name <sup>1</sup>	Figure	Potential CLRA Habitat <sup>2</sup> (Acres)	<i>Spartina</i> Cover <sup>3</sup> (unit shown)	Treatment Date <sup>4</sup>	Treatment Methods <sup>5</sup>	Conservancy- and Conservancy Partner-Funded Enhancements in 2011/2012
01d	AFCC - to I-880*	75	35.79	0.1 ac	June 1	Truck	
01e	AFCC - Strip Marsh	76	15.37	107.6 ft <sup>2</sup>	June 1	Truck	
02d.3	B2 South Quadrant (3)	77	67.86	0.3 ac	June 1	Backpack	
02j	Ravenswood Open Space Preserve*	78	23.63	0.1 ac	June 1	Airboat	
02l	Inner Bair Island Restoration	79	59.64	0.1 ac	June 1	Backpack	
02m	Pond B3 Bair Island Restoration*	80	411.84	0.1 ac	June 1	Airboat	
03a	Blackie's Creek	81	0.55	161.5 ft <sup>2</sup>	June 1	Backpack, Digging	
03b	Blackie's Creek Mouth	81	0.98	0.01 ac	June 1	Backpack, Digging	
04b	College of Marin	82	4.43	<10.8 ft <sup>2</sup>	June 1	Digging	
04e	Larkspur Ferry Landing Area	83	1.03	0.01 ac	June 1	Backpack, Digging	
04f	Riviera Circle	84, 85	3.85	0.02 ac	June 1	Backpack, Digging	
04i	CMC – Lower*	84, 85	15.91	0.1 ac	June 1	Backpack, Digging	
04l	Murphy Creek	86	4.53	53.8 ft <sup>2</sup>	June 1	Backpack, Digging	
05e	Mayhew's Landing*	87	27.94	0.3 ac	June 1	Backpack	
05g	Cargill Pond (W Suites Hotel)	87	18.19	0.03 ac	June 1	Backpack	
10b	Southern Marsh*	88	7.63	0.05 ac	June 1	Backpack, Digging	
12a	Pier 94	89	4.16	0.01 ac	June 1	Backpack, Digging	
12c	India Basin	90	2.10	<10.8 ft <sup>2</sup>	June 1	Backpack, Digging	
12d	Hunters Point Naval Reserve	91	1.25	<10.8 ft <sup>2</sup>	June 1	Truck	
12e	Yosemite Channel	92	3.31	0.02 ac	June 1	Backpack	
12g	Crissy Field	93	14.24	<32.3 ft <sup>2</sup>	June 1	Digging	
12h	Yerba Buena Island	94	11.05	not surveyed in 2011	June 1	Backpack, Digging	
12i	Mission Creek	95	2.93	21.5 ft <sup>2</sup>	June 1	Backpack, Digging	
13f	Cargill Mitigation Marsh	96	47.18	0.1 ac	June 1	Truck	
13g	OAC - Upstream 20 Tide Gates	97	22.17	0.0 ac (This site will be surveyed in 2012 to confirm no <i>Spartina</i> remains)	June 1	Truck	
13h	Eden Landing - North Creek	98	35.86	43.1 ft <sup>2</sup>	June 1	Truck	
13i	Eden Landing - Pond 10	99	216.12	0.0 ac (This site will be surveyed in 2012 to confirm no <i>Spartina</i> remains)	June 1	Backpack	

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Sub-Area #	Sub-Area Name <sup>1</sup>	Figure	Potential CLRA Habitat <sup>2</sup> (Acres)	<i>Spartina</i> Cover <sup>3</sup> (unit shown)	Treatment Date <sup>4</sup>	Treatment Methods <sup>5</sup>	Conservancy- and Conservancy Partner-Funded Enhancements in 2011/2012
13k	Eden Res So (North Cr Marsh)	100	239.40	0.03 ac	June 1	Truck	<i>Grindelia</i> (500 plants), <i>Spartina foliosa</i> (700 plants), <i>Distichlis spicata</i> (140), <i>Triglochin maritima</i> (190), <i>Frankenia salina</i> (340), <i>Baccharis pilularis</i> (40), <i>Euthamia occidentalis</i> (140), <i>Jaumea carnosa</i> (25) & <i>Limonium californicum</i> (50) plantings; planted in 2011/2012
13l	Eden Res No (Eden Cr Marsh)	100	229.78	0.02 ac	June 1	Truck	
15a.2	Stevens Ck. to Guadalupe Sl*	101	59.52	0.03 ac	June 1	Truck	
15c	Shoreline Regional Park*	102	47.27	0.2 ac	June 1	Backpack	
17a	Elsie Roemer*	103	17.94	0.2 ac	June 1	Truck, Airboat	<i>Spartina foliosa</i> (98 plants) plantings; all planting by Romberg-Tiburon Center
17b	Bay Farm Island*	104	7.59	0.02 ac	June 1	Backpack	
17d.2	Airport Channel - MLK Shoreline	105	4.60	0.1 ac	June 1	Truck, Airboat	
17d.3	East Creek -MLK Shoreline*	106	11.34	0.3 ac	June 1	Truck, Airboat	
17d.5	Damon Sl/Elmhurst Cr - MLK Shoreline*	107	6.38	0.2 ac	June 1	Truck, Airboat	
17e.2	San Leandro Creek South*	108	5.34	0.07 ac	June 1	Argo, Truck	
17f	Oakland Inner Harbor	109, 110	180	0.3 ac	June 1	Truck, Airboat	
17g	Coast Guard Island	110	3.11	0.02 ac	June 1	Truck, Airboat	
17i	Coliseum Channels	111, 112, 113	13.41	0.1 ac	June 1	Argo, Truck	
17k	Airport Channel*	114	4.06	0.03 ac	June 1	Truck, Airboat	
17l	Doolittle Pond*	115	3.30	0.03 ac	June 1	Truck, Airboat	
17m	Alameda Island – East*	116	5.67	0.5 ac	June 1	Truck, Airboat	
18a	Colma Creek*	117	6.93	0.04 ac	June 1	Backpack	<i>Spartina foliosa</i> (220 plants) plantings; all planting by Romberg-Tiburon Center
18c	Old Marina	118	4.71	0.08 ac	June 1	Airboat	
18d	Inner Harbor	118	8.05	0.07 ac	June 1	Airboat	
18e	Sam Trans Peninsula*	118	14.28	0.06 ac	June 1	Airboat	
18g	San Bruno Marsh	119	28.49	0.5 ac	June 1	Airboat	<i>Grindelia</i> (100 plants); planted in March 2012; all planting by Romberg-Tiburon Center
18h	San Bruno Creek	120	5.08	0.05 ac	June 1	Backpack	
19a	Brisbane Lagoon	121,122	10.36	0.04 ac	June 1	Backpack	
19b	Sierra Point	122,123	2.41	0.04 ac	June 1	Backpack	
19c	Oyster Cove	122,123	3.06	312.2 ft <sup>2</sup>	June 1	Backpack	
19d	Oyster Point Marina	124	1.66	86.1 ft <sup>2</sup>	June 1	Backpack	
19e	Oyster Point Park	125	2.37	0.05 ac	June 1	Backpack	
19f	Point San Bruno*	126	4.52	0.04 ac	June 1	Backpack	

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Sub-Area #	Sub-Area Name <sup>1</sup>	Figure	Potential CLRA Habitat <sup>2</sup> (Acres)	<i>Spartina</i> Cover <sup>3</sup> (unit shown)	Treatment Date <sup>4</sup>	Treatment Methods <sup>5</sup>	Conservancy- and Conservancy Partner-Funded Enhancements in 2011/2012
19g	Seaplane Harbor	127	4.12	129.2 ft <sup>2</sup>	June 1	Airboat	
19i	Mills Creek Mouth	128,129	2.75	0.1 ac	June 1	Airboat	
19j	Easton Creek Mouth	130	6.17	0.5 ac	June 1	Airboat	
19k	Sanchez Marsh	130	15.17	0.5 ac	June 1	Airboat, Digging	
19l	Burlingame Lagoon	131	5.34	0.05 ac	June 1	Airboat, Digging	
19m	Fisherman's Park	132	1.32	75.4 ft <sup>2</sup>	June 1	Backpack	
19n	Coyote Point Marina	133	11.99	0.4 ac	June 1	Backpack	
19o	San Mateo Creek	134	3.02	0.01 ac	June 1	Backpack	
19p.2	Seal Slough Mouth-Peripheral Marshes*	135,136	30.81	1.2 ac	June 1	Airboat	
19q	Foster City	137	5.41	204.5 ft <sup>2</sup>	June 1	Backpack	
19r	Anza Lagoon	131	4.39	0.02 ac	June 1	Backpack	
19s	Maple Street Channel	138	0.74	0.01 ac	June 1	Digging	
20a	Oyster Bay Regional Shoreline	139	14.23	0.5 ac	June 1	Truck, Airboat	
20b	Oakland Golf Links	140	1.92	0.1 ac	June 1	Truck	
20c	Dog Bone Marsh*	141,142	7.04	0.02 ac	June 1	Truck	
20h.2	San Lorenzo Cr & Mouth South	143	25.57	0.2 ac	June 1	Truck	
20i	Bockmann Channel	144	2.50	376.7 ft <sup>2</sup>	June 1	Truck	
20j	Sulphur Creek	145	8.37	<10.8 ft <sup>2</sup>	June 1	Truck	
20l	Johnson's Landing	146	10.12	139.9 ft <sup>2</sup>	June 1	Airboat	
20p	Hayward Shoreline Outliers	147,148	3.87	161.5 ft <sup>2</sup>	June 1	Airboat	
20q	San Leandro Shoreline Outliers	141,142	11.58	0.2 ac	June 1	Truck	
20r	Oakland Airport	140	22.53	0.2 ac	June 1	Backpack	
20t	San Leandro Marina	149	9.71	236.8 ft <sup>2</sup>	June 1	Truck	
20u	Estudillo Creek Channel	150	14.36	0.02 ac	June 1	Truck	
20v	Hayward Landing Canal	151	5.63	0.04 ac	June 1	Truck	
21a	Ideal Marsh – North*	152	41.85	0.6 ac	June 1	Truck, Airboat	
22f	Richmond/Albany Shoreline	153-158	34.21	0.2 ac	June 1	Backpack, Digging	
23a	Brickyard Cove	159	1.68	<10.8 ft <sup>2</sup>	June 1	Digging	
23b	Beach Drive	160	8.69	0.06 ac	June 1	Backpack	
23c	Loch Lomond Marina	161	4.60	279.9 ft <sup>2</sup>	June 1	Backpack	
23f	Paradise Cay	162	22.35	96.9 ft <sup>2</sup>	June 1	Backpack, Digging	
23g	Greenwood Beach	163	3.95	75.3 ft <sup>2</sup>	June 1	Backpack, Digging	

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Sub-Area #	Sub-Area Name <sup>1</sup>	Figure	Potential CLRA Habitat <sup>2</sup> (Acres)	<i>Spartina</i> Cover <sup>3</sup> (unit shown)	Treatment Date <sup>4</sup>	Treatment Methods <sup>5</sup>	Conservancy- and Conservancy Partner-Funded Enhancements in 2011/2012
23h	Strawberry Point	164	13.76	<10.8 ft <sup>2</sup>	June 1	Backpack, Digging	
23i	Strawberry Cove	165	10.55	0.05 ac	June 1	Backpack	
23k	Sausalito	166,167	22.66	172.2 ft <sup>2</sup>	June 1	Backpack	
23l	Starkweather Park	168	8.31	<10.8 ft <sup>2</sup>	June 1	Digging	
24b	Grey's Field	169	108.58	0 ft <sup>2</sup> (This site will be surveyed in 2012 to confirm no <i>Spartina</i> remains)	June 1	Airboat	
26a	White Slough/Napa River	170	563.65	0 ft <sup>2</sup> (This site will be surveyed in 2012 to confirm no <i>Spartina</i> remains)	June 1	Backpack	
26b	San Pablo Bay NWR Shoreline*	171	2577.66	0.05 ac	June 1	Backpack, Digging	
26c	Sonoma Creek*	172	1048.11	0.2 ac	June 1	Backpack	

**Key**

- <sup>1</sup> Sites with asterisks indicate the site was considered a "rail site" during the 2011 consultation process but is considered a "non-rail site" for 2012 due to lack of California clapper rail detections during 2011 and 2012 surveys.
- <sup>2</sup> Potential California clapper rail habitat area calculated from heads-up digitizing in GIS of site/sub-area boundaries by clapper rail biologists experienced with site-specific conditions, with exclusion of unvegetated areas or habitat unsuitable for clapper rail use (e.g., open mudflats, rip rap). Note, however, that no rails are known to be present at any of the sites listed here.
- <sup>3</sup> *Spartina* Treatment Area, based on extent of hybrid *Spartina* in 2011, is provided as a proxy for "2012 Treatment Area". The actual 2012 treatment area will be less at all sites treated in 2011, and unknown (but likely greater) for sites not treated in 2011.
- <sup>4</sup> Entry date of June 1 is requested at all non-rail sites in 2012 to facilitate treatment schedule.
- <sup>5</sup> Backpack spraying accompanies all airboat, truck, and Marsh Master use where that method is more efficient and/or more sensitive, and thus backpack spraying is noted here only when truck or airboat treatment are not proposed.

**Table 4. Sites that Will Not Receive *Spartina* Treatment in 2012**

Sub-Area #	Sub-Area Name	Figures	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (Acres)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	2012 ISP Activities	Existing Enhancements	Proposed Enhancements <sup>4</sup>
17c.2	Arrowhead Marsh East (including eastern island)	173	23.74	14.67	27-32	31-40	<ul style="list-style-type: none"> <li>▪ Inventory monitoring</li> <li>▪ California clapper rail surveys</li> </ul>	<ul style="list-style-type: none"> <li>▪ USGS artificial islands (35) between 17c.1 and 17c.2</li> <li>▪ <i>Grindelia</i> and <i>Triglochin</i> on marsh plain (Save the Bay plantings)</li> </ul>	None
17d.4	MLK Regional Shoreline-Damon Marsh	174	10.60	1.00	4	1-2	<ul style="list-style-type: none"> <li>▪ Inventory monitoring</li> <li>▪ California clapper rail surveys</li> <li>▪ Installation and/or maintenance of habitat enhancements</li> </ul>		<ul style="list-style-type: none"> <li>▪ Plant <i>Grindelia stricta</i> along channel edges and</li> </ul>
17h	MLK New Marsh	175	34.32	8.00	13-14	18	<ul style="list-style-type: none"> <li>▪ Inventory monitoring</li> <li>▪ California clapper rail surveys</li> <li>▪ Revegetation monitoring</li> <li>▪ Installation and/or maintenance of habitat enhancements</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Grindelia</i>, <i>Baccharis</i>, <i>Triglochin</i>, and other ecotone natives along edge of marsh (Save the Bay plantings)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Plant <i>Grindelia</i> along edges of the eastern island</li> <li>▪ Install three earthen islands during 2012 pilot program</li> </ul>
17j	Fan Marsh	176	13.23	0.50	8-10	2	<ul style="list-style-type: none"> <li>▪ Inventory monitoring</li> <li>▪ California clapper rail surveys</li> </ul>		

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Sub-Area #	Sub-Area Name	Figures	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (Acres)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	2012 ISP Activities	Existing Enhancements	Proposed Enhancements <sup>4</sup>
20d.2	Citation Marsh North	177	67.07	1.77	19-22	5-6	<ul style="list-style-type: none"> <li>▪ Inventory monitoring</li> <li>▪ California clapper rail surveys</li> <li>▪ Installation and/or maintenance of habitat enhancements</li> </ul>	<ul style="list-style-type: none"> <li>▪ Eight artificial floating islands, funded by the Coastal Conservancy, have been installed between sites 20d.1 and 20d.2</li> </ul>	<ul style="list-style-type: none"> <li>▪ Enhance existing berms/islands with <i>Grindelia</i></li> </ul>
20f.1	North Marsh North	178	26	0.23	2	2	<ul style="list-style-type: none"> <li>▪ Inventory monitoring</li> <li>▪ California clapper rail surveys</li> <li>▪ Installation and/or maintenance of habitat enhancements</li> </ul>	<ul style="list-style-type: none"> <li>▪ Two artificial floating islands, funded by the Coastal Conservancy, have been installed</li> </ul>	<ul style="list-style-type: none"> <li>▪ Enhance existing islands with <i>Grindelia</i></li> </ul>
20f.2	North Marsh South	178	62.94	0.92	12-18	6-8	<ul style="list-style-type: none"> <li>▪ Inventory monitoring</li> <li>▪ California clapper rail surveys</li> <li>▪ Installation and/or maintenance of habitat enhancements</li> </ul>	<ul style="list-style-type: none"> <li>▪ Six artificial floating islands, funded by the Coastal Conservancy, have been installed</li> </ul>	<ul style="list-style-type: none"> <li>▪ Enhance existing islands with <i>Grindelia</i></li> </ul>
20g	Bunker Marsh	179	35.81	0.80	8-10	8	<ul style="list-style-type: none"> <li>▪ Inventory monitoring</li> <li>▪ California clapper rail surveys</li> <li>▪ Installation and/or maintenance of habitat enhancements</li> </ul>	<ul style="list-style-type: none"> <li>▪ Six artificial floating islands, funded by the Coastal Conservancy, have been installed</li> </ul>	

Refuge Manager

Sub-Area #	Sub-Area Name	Figures	CLRA Habitat <sup>1</sup> (Acres)	<i>Spartina</i> Cover <sup>2</sup> (Acres)	Number of CLRA Detected in 2011 <sup>3</sup>	Number of CLRA Detected in 2012 (Draft) <sup>3</sup>	2012 ISP Activities	Existing Enhancements	Proposed Enhancements <sup>4</sup>
20h.1	San Lorenzo Cr & Mouth North	180	8.00	0.10	4-6	2-4	<ul style="list-style-type: none"> <li>▪ Inventory monitoring</li> <li>▪ California clapper rail surveys</li> <li>▪ Installation and/or maintenance of habitat enhancements</li> </ul>	<ul style="list-style-type: none"> <li>▪ Three artificial floating islands, funded by the Coastal Conservancy, have been installed</li> </ul>	
20n	Cogswell Marsh, Quadrant B	181	100.16	4.80	9-12	17-20	<ul style="list-style-type: none"> <li>▪ Inventory monitoring</li> <li>▪ California clapper rail surveys</li> <li>▪ Installation and/or maintenance of habitat enhancements</li> </ul>	<ul style="list-style-type: none"> <li>▪ 16 artificial floating islands, funded by the Coastal Conservancy, have been installed at this site</li> </ul>	<ul style="list-style-type: none"> <li>▪ Install raptor deterrents on poles and fences</li> <li>▪ Remove red fox via trapping by USDA</li> <li>▪ Plant <i>Grindelia</i> on edges of islands</li> </ul>
20o.1	Cogswell Marsh, Quadrant C	182	49.78	0.9	2-4	8-12	<ul style="list-style-type: none"> <li>▪ Inventory monitoring</li> <li>▪ California clapper rail surveys</li> <li>▪ Revegetation monitoring</li> <li>▪ Installation and/or maintenance of habitat enhancements</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Grindelia</i> and <i>Triglochin</i> plantings (1170 plants)</li> <li>▪ Four artificial floating islands, funded by the Coastal Conservancy, have been installed</li> </ul>	<ul style="list-style-type: none"> <li>▪ Plant <i>Grindelia</i> on edges of island</li> </ul>

**Key**

- 1 California clapper rail habitat area calculated from heads-up digitizing in GIS of site/sub-area boundaries by clapper rail biologists experienced with site-specific conditions, with exclusion of unvegetated areas or habitat unsuitable for clapper rail use (e.g., open mudflats, rip rap).
- 2 *Spartina* Cover is based on extent of hybrid *Spartina* in 2011, and is provided as a proxy for "2012 Treatment Area". The actual 2012 treatment area is unknown. Sites with *Spartina densiflora* and *Spartina alterniflora* (and its hybrids) infestations have separate acreages associated with each species.
- 3 Based on California clapper rail surveys conducted by OEI, PRBO, FWS and others in 2011 and 2012, and best professional judgment by the surveyors regarding the potential for single detections to represent a single bird vs. a pair.
- 4 Proposed restoration opportunities (e.g., berm excavation, *Grindelia* plantings) are preliminary and will be further designed contingent on funding and if land-owner permission is granted. These additional restoration opportunities are not required by the USFWS (unlike floating and earthen islands) but may be initiated in an effort to increase California clapper rail populations.

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