Surveys of selected marshlands in the San Francisco Estuary California Clapper Rail (*Rallus longirostris obsoletus*): Invasive Spartina Project, 2007

Draft Final Report

to:

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July 9, 2007

Introduction

Avocet Research Associates (ARA) conducted surveys of 24 marshes or marsh parcels in the San Francisco Bay estuary to determine the presence or absence of the federally-endangered California Clapper Rail during the 2007 nesting season (January 15-April 15). These field studies were conducted under contract with Olofson Environmental, Inc. as part of the larger Invasive Spartina Project (ISP). Additionally, ARA in cooperation with Point Reyes Bird Observatory Conservation Science (PRBO), the U.S. Fish and Wildlife Service (USFWS), and the California Department of Fish and Game (CDFG) has been conducting protocol-level surveys of clapper rails annually since 2004 in an ongoing effort to monitor the size and distribution of this endangered population. Although the final results of those surveys are not currently available, the results of this study will augment and amplify the findings of that baywide effort.

The purpose of the 2007 ISP rail surveys was to assess the value of marshes as clapper rail habitat that have been selected for *Spartina* control. The information provided by these surveys will be used to inform ISP staff in the planning, permitting, and execution of the ongoing effort to control this non-native, invasive marsh plant and to reduce or minimize impacts of the control program on the rail population.

Methods

The sites surveyed in 2007 are listed in Table 1, below. Several of those sites (San Bruno Marsh complex, Wildcat Marsh, Creekside Marsh) were covered as part of other research efforts, but the preliminary results are included here.

Because the California Clapper Rail is a federally-endangered species, survey methods are prescribed by the U.S. Fish and Wildlife Service (USFWS 2000), three different survey methods were employed in the course of these surveys. These were designed to conform to USFWS protocols, to optimize efficiency of coverage within seasonal and environmental constraints, to optimize rail detection, and to minimize rail disturbance.

The nature of the sites and the probability of rail presence/absence dictated the methods used. The determination as to which method to use at each site was based on remote sensing, ground truthing, and the professional judgment of the principal investigator of ARA. The three methods and their applications were:

1) Reconnaissance visit: an initial site assessment to determine habitat quality based on known characteristics of rail habitat (Evens and Collins 1992, Albertson and Evens 2000, Evens *et al*. 2004). Corresponds to ISP “Type-F” survey.
2) Passive survey: as prescribed by USFWS (2000), an observer occupying listening stations distributed around the site during periods of peak rail vocalization. No taped-playback of rail vocalizations is used. Three censuses are required to confirm absence and only after three “silent” (non-detection) surveys are tapes broadcast. Corresponds to ISP “Type-A” survey.
3) Active survey: same methodology as a passive survey, however taped playback of vocalizations are used to elicit responses from rails. Active surveys are employed only at sites where no rails have been detected previously. Corresponds to ISP “Type-C” survey.

Reconnaissance surveys involved a site visit, a subjective evaluation of the site based on prior knowledge of clapper rail habitat requirements (*after* Evens and Collins 1992, Albertson and Evens 2000), notations of physical parameters of the site (size and shape of marsh, hydrological patterns, substrate gradient, condition of upland edge), qualitative description of the vegetative community structure, and proximity to known source population of rails. Following the reconnaissance visit, it was decided if viable habitat was present and if additional protocol-level surveys were needed.

Surveys were conducted on low- or moderate tides (≤4.0' above MLLW) within 2 hours of dawn or dusk. At sites where multiple surveys were conducted, we attempted to include at least one dawn and one dusk coverage, however environmental constraints (tide, wind, etc.) sometimes eliminated this possibility. Listening stations were distributed at approximate 200-m intervals around the periphery of the marsh with and attempt to aurally cover the entire marsh parcel. Each station was occupied by an observer for 10 minutes. During passive surveys, no tape was broadcast. During active surveys, a tape of clapper rail vocalizations was broadcast (90 dB @ 1 m) at the beginning of the 10-min listening period. The tape consisted of 1 minute of “clatter” calls in continuous sequence. At each station, the total number of rail vocalizations, type of vocalization, direction and distance from the observer was recorded and the location plotted on a field map (1:12000 scale or recent aerial photograph). At the end of the census, a minimum and

maximum number of rails detected in the marsh parcel was estimated based on distribution of the plotted calls; the observer's best judgment was used to eliminate redundant detections. Duetting clatter calls or multiple calls issued simultaneously may mask one another. If the observer was uncertain of the number of birds calling, he or she would estimate the number of possible detections, e.g. "2 - 4 birds." The minima and maxima for the survey site were based on the sum of the range of estimates. Each observer also noted other species of birds and evidence of potential predators.

On all surveys temperature and wind speed were measured and time of survey, tidal regime (low, medium, high; slack, rising, falling), and condition of the sky were recorded. These data are archived with ARA.

Additional information on the Invasive Spartina Project and the California Clapper Rail can be found through the following sources: www.spartina.org, Evens *et al.* 2004, and Spautz *et al*. 2006,

Results

The Piper Park-Boardwalk (Arkites) complex (Sites 04c, 04d, and 04k)

Coverage: All three ISP sites were covered on three passive (Type A) surveys during peak calling hours (Table 3). Because of short distances between these contiguous parcels, and because of multiple detections, the sites were covered thoroughly. On the first survey (1/18/07) two pairs were counter-calling from discrete portions of the marsh, as detected from PIPAE03 (Table 2, 3). This initial detection was the best evidence to date of the presence of two distinct pairs.

Evaluation: The structure of the channels and the marsh vegetation look excellent here, We had no detections in 2005; in 2006 we estimated one-two pair resident in this marsh. In 2007 we detected two distinct pairs present and possibly a third pair or unmated individual. Activity was concentrated in the eastern portions of the marsh, especially in the vicinity of Stations 2, 3 & 4.

Status: Occupied (Table 3); 2 pair minimum (Table 4).

Other species: Canada Goose, Mallard, Greater Scaup, Lesser Scaup, Canvasback, Bufflehead, Western Grebe, Great Egret, Green Heron, Snowy Egret, Black-crowned Night Heron, American Avocet, Black-bellied Plover, Killdeer, Wilson's Snipe, Black-necked Stilt, Greater Yellowlegs, Willet, American Coot, Western Gull, California Gull, **Vaux's Swift**, Anna's Hummingbird, Morning Dove, Barn Swallow, Black Phoebe, Common Raven, American Crow, Northern Mockingbird, Marsh Wren, Bushtit, Water Pipit, Ruby-crowned Kinglet, Yellow-rumped Warbler, Townsend's Warbler, California Towhee, Song Sparrow, White-crowned Sparrow, Golden-crowned Sparrow, American Goldfinch, European Starling.

Notes: The heavy presence of Canada Goose in the marsh, apparently nesting, is a new development, perhaps. The effect on rail nesting is unknown, but we expect that geese would cause displacement of rails from portions of the marsh plain. Other disturbances included a young boy in the marsh, feral cat, and off-leash dog.

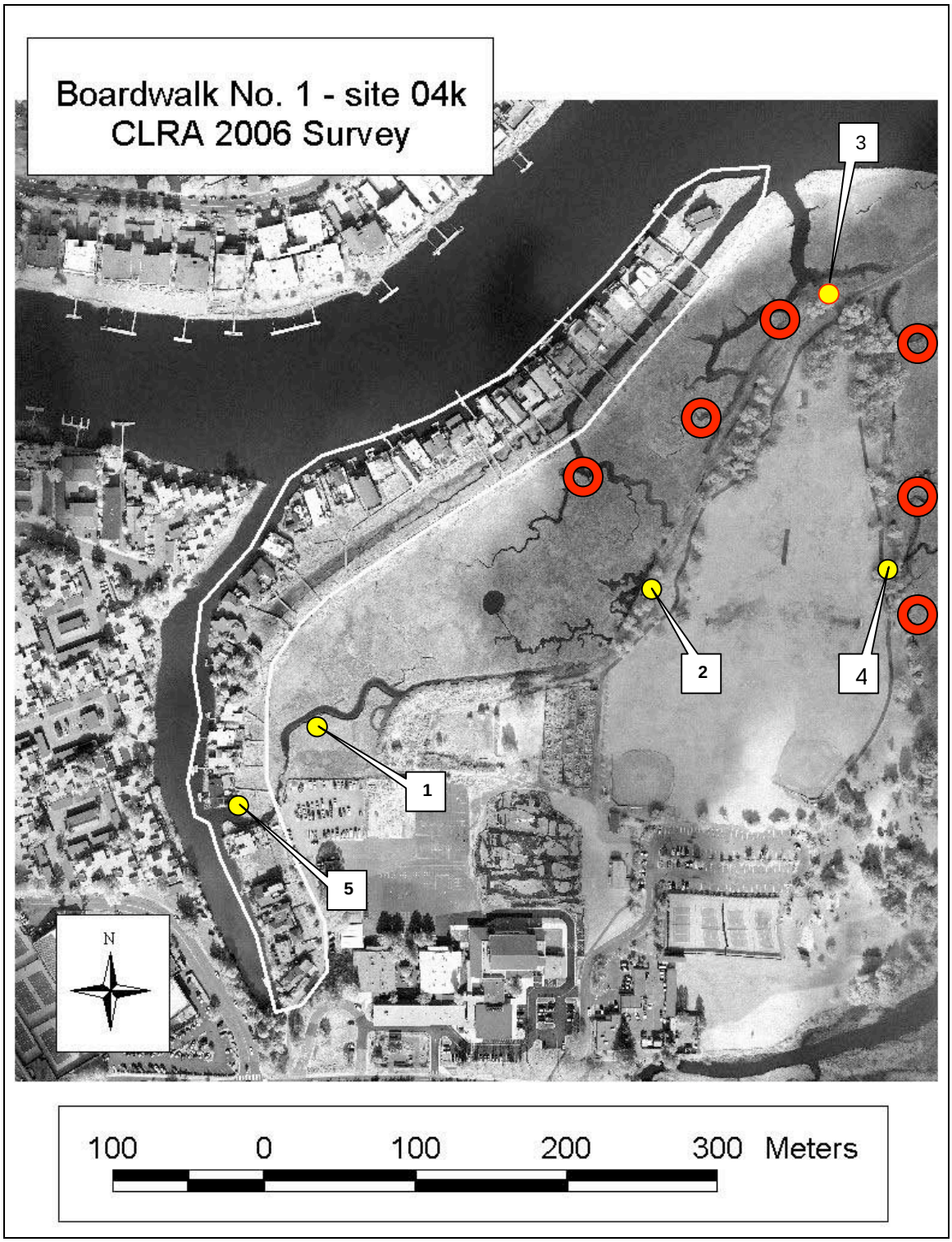

Figure 1. Piper Park-Boardwalk complex: Corte Madera Creek. Yellow circles represent listening stations; red circles indicate locations of rails detected.

Upper Corte Madera Creek (above Bon Aire Road), east bank, including Creekside Park (Sites ISP04b, -g and -h)

Creekside Park and College of Marin Ecological Reserve

Coverage: We conducted three passive (Type A) surveys at five stations along the north bank of Corte Madera Creek (Figure 2, below) as part of a baywide study: 1/23/07, 3/21/07, 4/10/07.

Evaluation: A total of 27 detections at the site (average 9.0/survey) in 2007 compared favorably to the 2006 findings (avg. 7.6/survey).The high count totaled 12 detections on the March 21 census representing "possibly 6-7 pair" (R. Stallcup, pers. comm.). All detections were in Creekside Marsh (Stations CRPA01,-02,-03), with several sightings along the bank of the main stem of Corte Madera Creek. Rails were also seen foraging on the opposite bank Corte Madera Creek, across from Creekside. No rails were detected farther upstream in COM Ecological Reserve (Stations CMER01, -02), however anecdotal reports from 2006 and earlier indicate that adults and their broods forage upstream along the bank of the creek (2006 report).

Creekside is a broad marsh parcel that has been occupied by CLRAs for more than 20 years. Although it has restricted tidal flow, it has a well-developed channel system and other characteristics suitable for occupancy by CLRAs. In 2006 we estimated a minimum of nine birds present in Creekside Marsh, representing 4-5 territories; in 2007 the estimate increased to 11-12 birds representing 6-7 territories. These birds regularly venture through the culverts to forage on the bank along the mainstem of Corte Madera Creek.

Status: Occupied: 6-7 pair (Table 3 & 4).

Notes: A passable (unvegetated) corridor where birds were detected in 2006 has been colonized by salt grass (Distichlis) over the intervening year and may have reduced habitat availability in the vicinity of Station 03. Rails are very visible here, apparently habituated to human activity. This situation is analogous to Muzzi Marsh. Perhaps the suburban environment with a foot path and continuous presence of people and dogs reduces predation pressure by mesopredators (e.g. fox)?

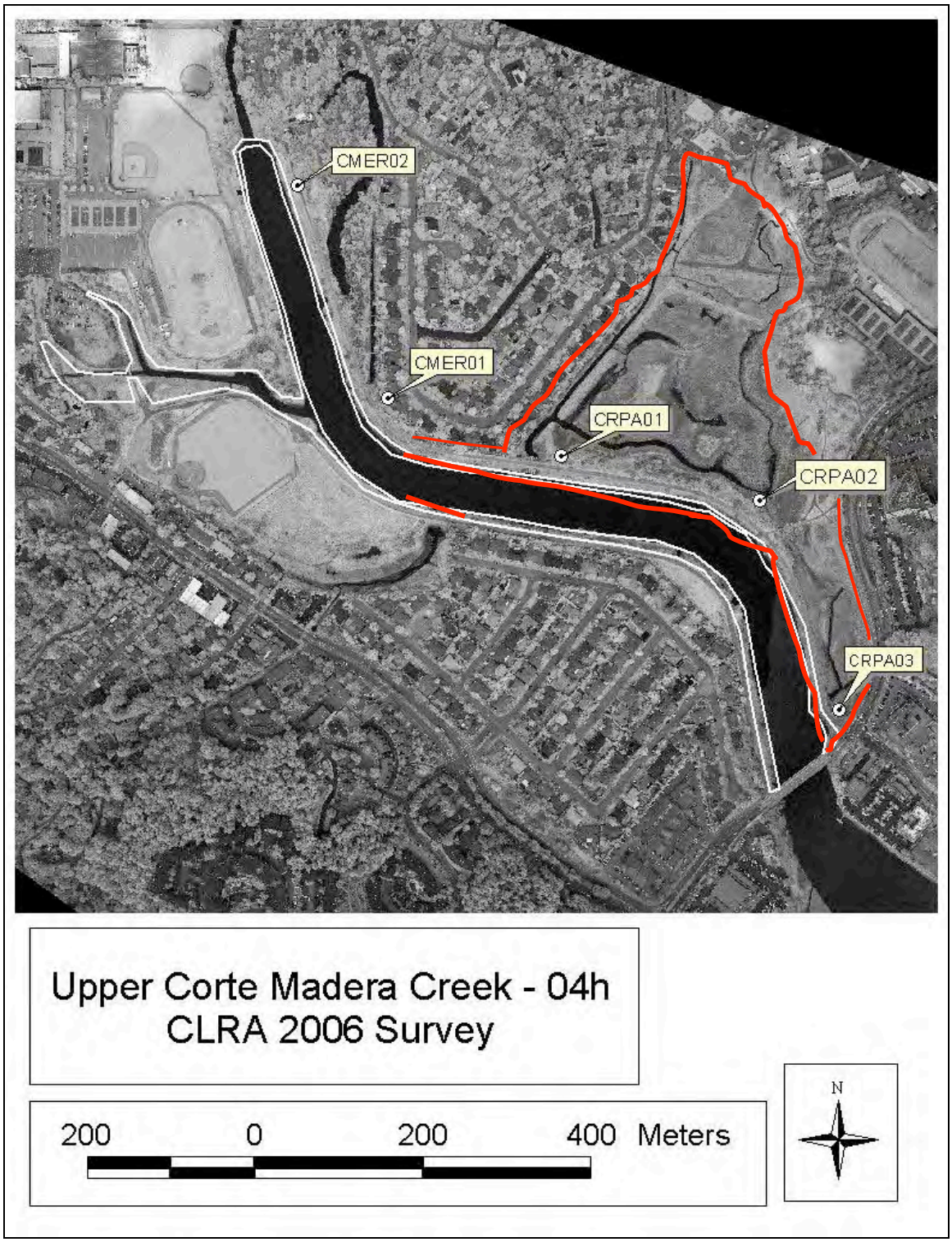

Figure 2. Corte Madera Creek north of Bon Aire Rd., east bank
Red outline surrounds areas within which clapper rails were detected on this set of 2006 and 2007 surveys.

Corte Madera Creek outlier. College of Marin Ecological Study Area (ISP site-04i).

Passive survey: Reconnaissance (F-type) survey conducted 3/17/06 and 2/28/07.

Active survey: NA

Evaluation: There is no appropriate habitat at this site which is isolated from the mainstem of Corte Madera Creek and receives muted tidal influence. The north bank of this (semi-stagnant) watercourse is bound by residential development; the southwest bank is dominated by black *acacia* and other exotic vegetation (See Photo E, below). The only marginally viable habitat is along the main stem of Corte Madera Creek at the southeastern corner of study area. The primary value of the site to birds is as a roost site for Night-Herons.

Status: Not occupied.

Other species: Black-crowned Night Heron, Belted Kingfisher, Black Phoebe, Varied Thrush, Bushtit.

Photograph A. College of Marin Ecological Study Area, looking SW from NE corner. Acacias host a Night-Heron roost.

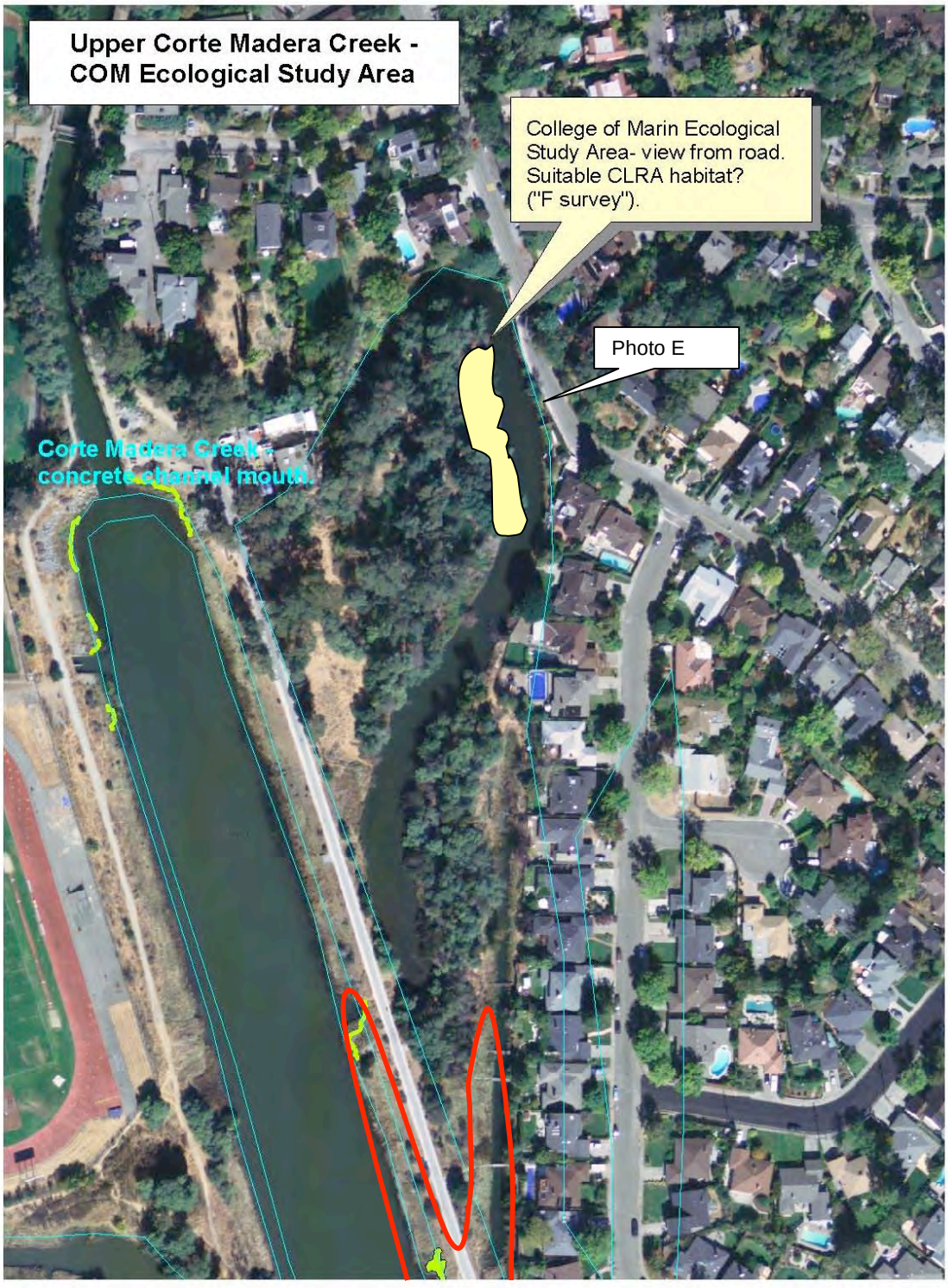

Figure 3. College Of Marin Ecological Study Area. The red line encompasses the only potential clapper rail habitat at the site, and this is only of marginal value receiving little, if any, use. Yellow-shaded area surrounds Night-Heron roost.

Upper Corte Madera Creek, north of Bon Aire Rd., SW bank. (Site ISP04-h)

Coverage: Two passive (Type A) surveys were conducted 2/20/07 (AM) and 3/09/07 (PM).

Evaluation: Clapper rails were detected on the mainbank of Corte Madera Creek during an active survey in 2006 as well as with a visual detection during the Creekside Marsh survey on 4/10/07. These few sightings were in the vicinity of station #3, near the culvert that connects CMC to a small marsh SW of the foot path (see Figure 3, below). Although no detections have come from within that marsh parcel, it is probably used as foraging habitat.

Status: Occupied, in part. Apparently used intermittently as adjunct to Creekside Park

Other species: Pied-billed Grebe, Black-crowned Night-Heron, Mallard, Canvasback, Bufflehead, White-tailed Kite (nesting?), American Coot, American Avocet, Killdeer, Semipalmated Plover, Black-necked Stilt, Greater Yellowlegs, Willet, Ring-billed Gull, California Quail, Anna's Hummingbird, Black Phoebe, American Crow, Ruby-crowned Kinglet, Bushtit, Song Sparrow, Savannah Sparrow, Golden-crowned Sparrow, House Finch, American Goldfinch, Rock Pigeon.

Notes: The 2007 results strengthened the 2006 assessment that this strip of habitat, though marginal, is used by clapper rails. Anecdotal observations suggest that rails have been seen along the shoreline near Station #2.

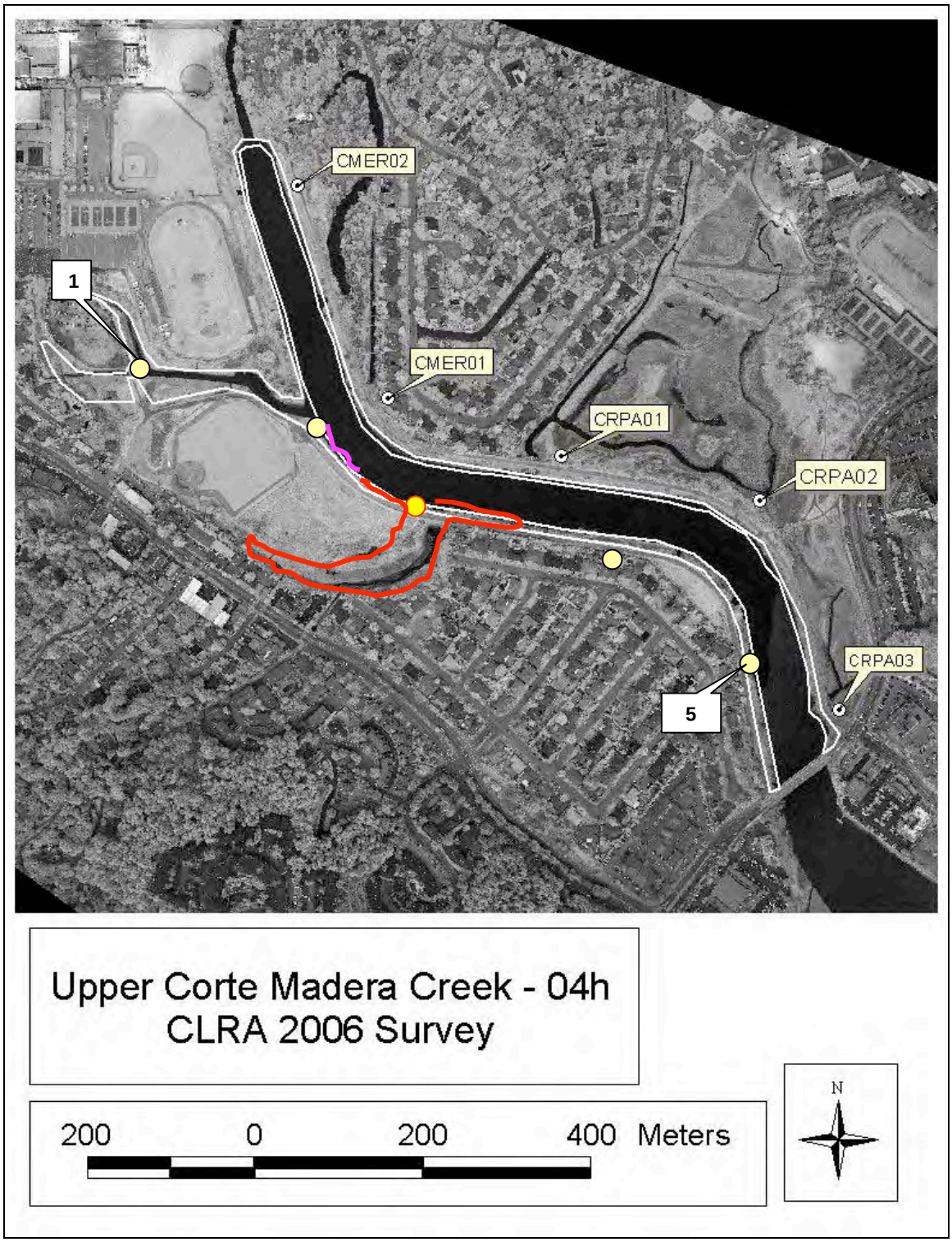

Figure 3. Corte Madera Creek North of Bon Aire Road: SW Bank
Yellow dots represent Stations ISP04h-01, -02, -03,-04,-05 (N-S); red outline indicates observed presence of CLRA, 2/28/06, 4/10/07. Pink line indicates area of use reported anecdotally.

Photograph B. View, looking south, of the section of Corte Madera Creek (SW bank), where clapper rails have been detected on 2006 and 2007 surveys. Red arrow indicates the location of culvert where birds have been observed on two occasions.

Photograph C. View, looking upstream, of the section of Corte Madera Creek (SW bank), where clapper rails have been reported by local residents. This habitat strip provides no upland refugial habitat but may augment more ideal habitat at Creekside Park, on the opposite side of the creek and slightly downstream.

Lower Corte Madera Creek, between Bon Air Rd. and Hwy 101. (Site ISP04i)

Coverage: One active survey 2/28/07 (PM)

Evaluation: No viable habitat patches exist on the north bank of Corte Madera Creek between the Hwy 101 and the Bon Air Rd. bridge. The steep gradient, narrow strip of vegetated shoreline, lack of contiguity with larger marsh parcels, and high human use (because of a public path) are factors that eliminate habitat potential of this site. A flock of about 20 (feral) graylag geese may further reduce habitat viability.

Status: Not occupied.

Other species: Black-crowned Night-Heron, American Avocet, Black-necked Stilt, Killdeer, Least Sandpiper, Anna's Hummingbird, Black Phoebe, American Crow, Varied Thrush, California Towhee.

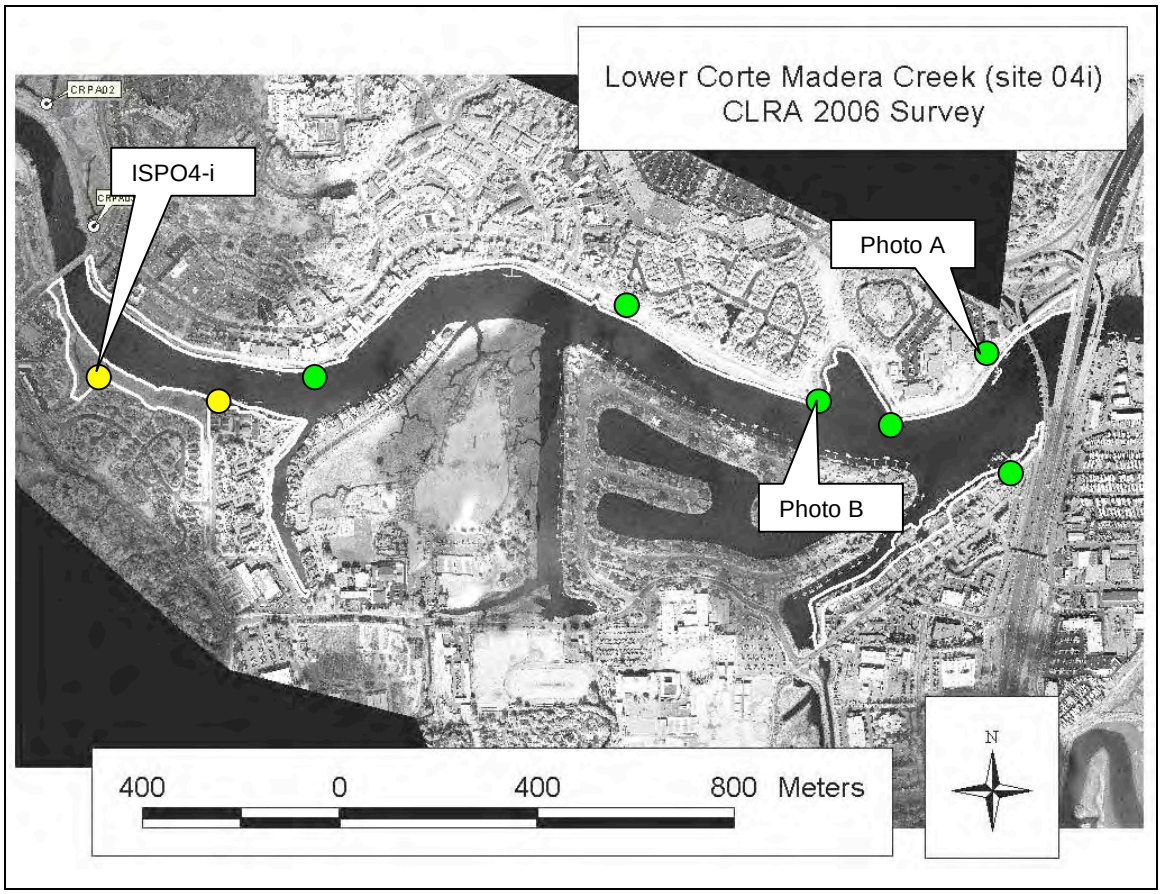

Figure 4. Site ISP04i: Lower Corte Madera Creek (Bon Air Road to Hwy 101). Yellow circles represent stations where active surveys were conducted 2006 and 2007. Green circles represent points where passive (F-type) surveys were conducted in 2006; noviable habitat present. Photo points correspond to the following three photographs.

Photograph D. Corte Madera Creek, south bank looking northwest toward the Bon Aire Bridge.

This is the “best” habitat along the south shore of this middle reach of the creek between rail occupied territory upstream and downstream. It may provide temporal foraging habitat and a functional dispersal corridor, but apparently supports no nesting habitat. The upland transition zone is covered with grasses and bound by a concrete pathway. The small stand of Grindelia is limited to the immediate shoreline of CMC.

Active surveys here on 2/15/06 and 2/28/07 elicited no responses.

Corte Madera Creek outlier—Murphy Creek (ISP04i).

Coverage: Passive, reconnaissance (F-type) surveys conducted 3/17/06 and 2/28/07.

Evaluation: No rail habitat exists at this site that is isolated from the main tributary stems of Corte Madera Creek by College of Marin development and surrounded by residential building. Vegetative community is highly disturbed, as is the substrate.

Other species: Ruby-crowned Kinglet, Northern Mockingbird, E. Starling, Bushtit.

Status: Not occupied.

Photograph E. Site ISP-04i; Murphy Creek, upper Corte Madera Creek, 3/17/06. No habitat.

Figure 5. Murphy Creek, across the street from College of Marin.

Site ISP-04j-Corte Madera Creek Mouth (downstream of Hwy 101)

Coverage: Active surveys (C-type) were conducted on four dates, three on the north shore (2/4, 2/22, 3/12), one on the south shore, the Greenbrae Boardwalk (2/17).
Evaluation: The structure of the marsh adjacent to the ferry terminal, on the north bank of the mouth of Corte Madera Creek, is unusual. The substrate has been highly disturbed and has a heterogenous topography, with small hummocks artificially high relative to the tide. Some of these mounds are covered with iceplant or other non-native invasives. The channel system is relatively well-developed for such a small marsh parcel, however the two largest channel reaches are artificially straight, apparent dredge burrow ditches. The backmarsh is lower with an abundance of wrack, probably deposited during the January '06 floods (see photographs, 2006 report). This marsh does not appear to provide ideal habitat, but perhaps its proximity to the ancient, undiked parcel to the south ("Heerdt Marsh"), which has long supported a healthy rail population, augments this site's value. The site may provide high marsh refugia during flooding. A single pair of rails was present census in the "ferry building marsh" and a single bird was heard farther upstream on the Febuary 22. Most other detections were from across CMC in the vicinity of the Greenbrae boardwalk, with 13-14 birds detected there on the February 17 census. A survey of the entire Heerdt marsh in 2007 estimated documented the large population resident there (Len Liu, PRBO pers. comm.) .

Status: Occupied.

Other species: Pied-billed Grebe, Mallard, Bufflehead, Canvaback, Lesser Scaup, American Coot, Black-bellied Plover, Spotted Sandpiper, Greater Yellowlegs, Willet, Western Gull, Caspian Tern, Common Yellowthroat, Song Sparrow.

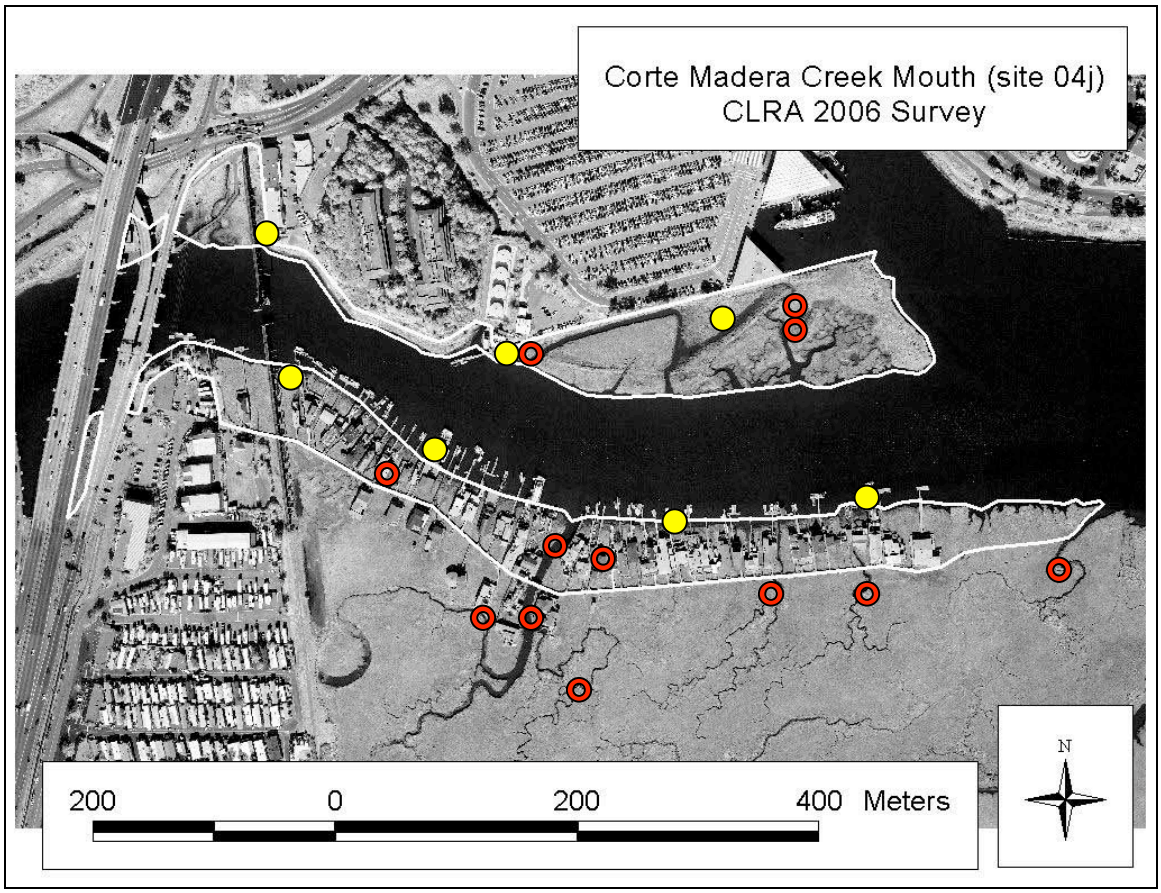

Figure 6. Corte Madera Creek mouth at Larkspur Ferry Terminal and Greenbrea Boardwalk (Site ISP-04j). “Heerdt” Marsh, south of the boardwalk, has long supported a substantial population of clapper rails (Evens and Page 1981, 1987, etc.) as it does currently (PRBO, pers. comm.).

Yellow circle indicates approximate locations of listening stations (ISP04j-01)
Red circles represent locations of clapper rail detections, 2/08/06.

Colma Creek San Bruno Complex (ISP Sites18a & 18b)

Coverage: Colma Creek and Navigable Slough were covered a s single unit and as an adjunct to the large "San Bruno Marsh" complex, downstream. Some Colma Creek stations were covered in coordination with the San Bruno stations (e.g. March 8). Birds were detected on a passive census at Navigable Slough on the 1st round (Feb. 16) so no further coverage was required. Active surveys at selected stations where no birds had been previously detected were conducted on March 8 (COCR04, COCR05).

Evaluation: The narrow strip marshes trimming Colma Creek and Navigable Slough do not appear to provide ideal rail habitat so presence here, especially in relatively high numbers found in 2006. In 2007, numbers were somewhat lower, but birds were still present in Navigable Slough and in Colma Creek downstream from the footbridge (Station COCR01). No birds were heard upstream from COCR03 (Figure X).

Status: Occupied from Navigable Channel downstream.

Other species: Canada Goose, Pied-billed Grebe, Western Grebe, Greater Scaup, Lesser Scaup, Canvasback, Bufflehead, Common Goldeneye, American Coot, American Avocet, Willet, Dowitcher sp., Anna's Hummingbird, Marsh Wren, Black Phoebe, E. Starling, Common Yellowthroat, Amercian Robin, Yellow-rumped Warbler, California Towhee, Song Sparrow (race?), Golden-crowned Sparrow, Red-winged Blackbird.

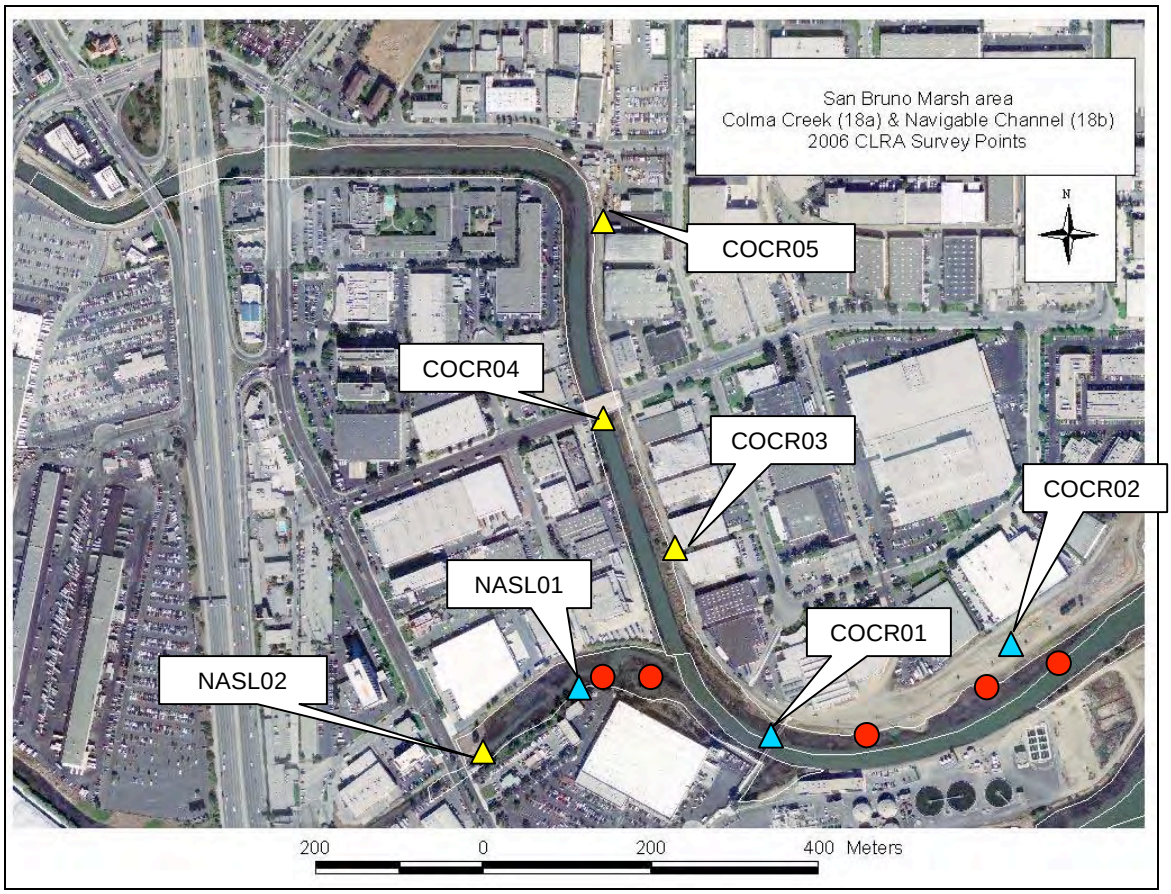

Figure 7. Colma Creek and Navigable Channel (Sites 18a&b)
Blue triangles indicate stations where rails were detected within 100-m in 2007;
Yellow triangles indicate "silent" stations. Red dots indicate clapper rail detections.

ISP 18d-f—Colma Creek San Bruno Complex-"Sam Trans Peninsula"

Coverage: Three rounds of passive (Type-A) surveys were conducted in 2007 (Table 3).

Evaluation: Although numbers were seemingly lower than in previous years, there are still an estimate two dozen birds in the marshes surrounding the Sam Trans Peninsula, including "Confluence Marsh." Our high estimate was 9-12 pair on February 15. Numbers of detections declined on the subsequent two surveys (March 8 and April 11); whether this was due to behavioral variability in the rails or a decrease in the local population is unknown. It is interesting to note that radio telemetry work was conducted during this time period and that emigration, at least of one bird, was documented (ISP Newsletter, Spring 2007). As in the past, birds were concentrated in the SE corner (near SATR06) with 4-6 birds (2-3 pair) there on February 15 (1812 hrs), and in Confluence Marsh, and in the linear marsh fringing the SAMTRANS peninsula. In 2006 we noted "seemingly fewer birds present in area 18d (Inner Harbor) than past years." In 2007 there were no detections from the Inner Harbor or the/Old Marina.

Status: Occupied.

Other species: Canada Goose, Greater Scaup, Lesser Scaup,Canvasback, Bufflehead, Ruddy Duck, Mallard, Blue-winged Teal, Green-winged Teal, Common goldeneye, Eared Grebe, Western Grebe, Pied-billed Grebe, Horned Grebe, Snowy Egret, Great Egret, Peregrine Falcon, American Avocet, Black-bellied Plover, Long-billed Curlew, Whimbrel, Marbled Godwit, Willet, Least Sandpiper, Western Sandpiper, Dunlin, Dowitcher spp., American Coot, Mew Gull, Ring-billed Gull, Caspian Tern, Forester's Tern, **Common Tern**, Common Raven, Anna's Hummingbird, American Crow, Northern Mockingbird, Marsh Wren, Black Phoebe, E. Starling, Common Yellowthroat, Yellow-rumped Warbler, California Towhee, Song Sparrow (race?), White-crowned Sparrow, Western Meadowlark, Red-winged Blackbird.

Note: Feeding stations for feral cats in the CALTRANS yard continue to pose threat to CLRAs here. Also, numbers of Canada Geese are increasing in this marsh complex.

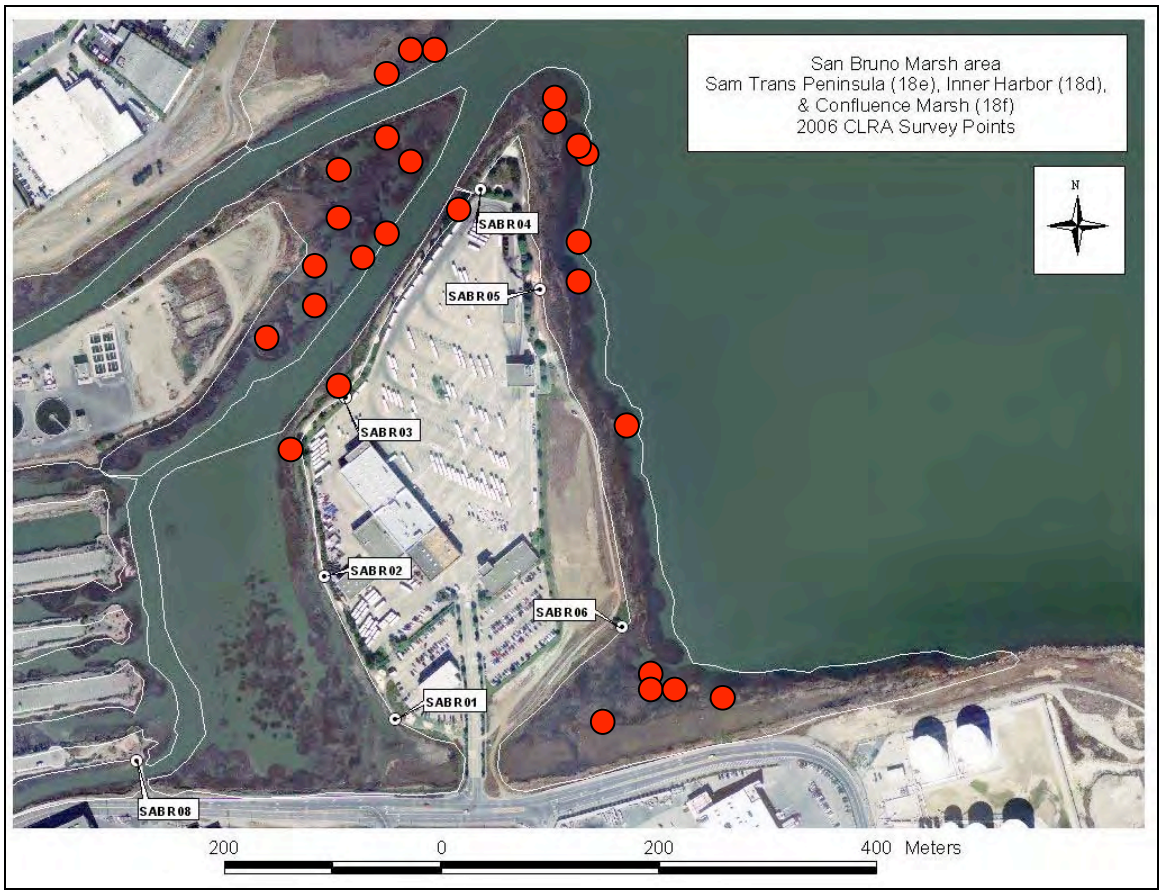

Figure 8. SAMTRANS Peninsula (Site 18d-f.)

Red dots are representative locations of multiple detections from protocol-level surveys done in 2007. Note the paucity of detections in the “Inner Harbor,” contra results from previous years.

Colma Creek San Bruno Complex: San Bruno Marsh, north shore. ISP18g.

Coverage: Three passive (Type-A) surveys conducted February 16, March 7, and April 10, 2007.

Evaluation: As in previous years, the northern portions of San Bruno Marsh support relatively high densities of clapper rails. Our high count of 17 to 19 birds within this portion of the marsh (more heard from Confluence Marsh) occurred on the evening of March 7.

Status: Occupied.

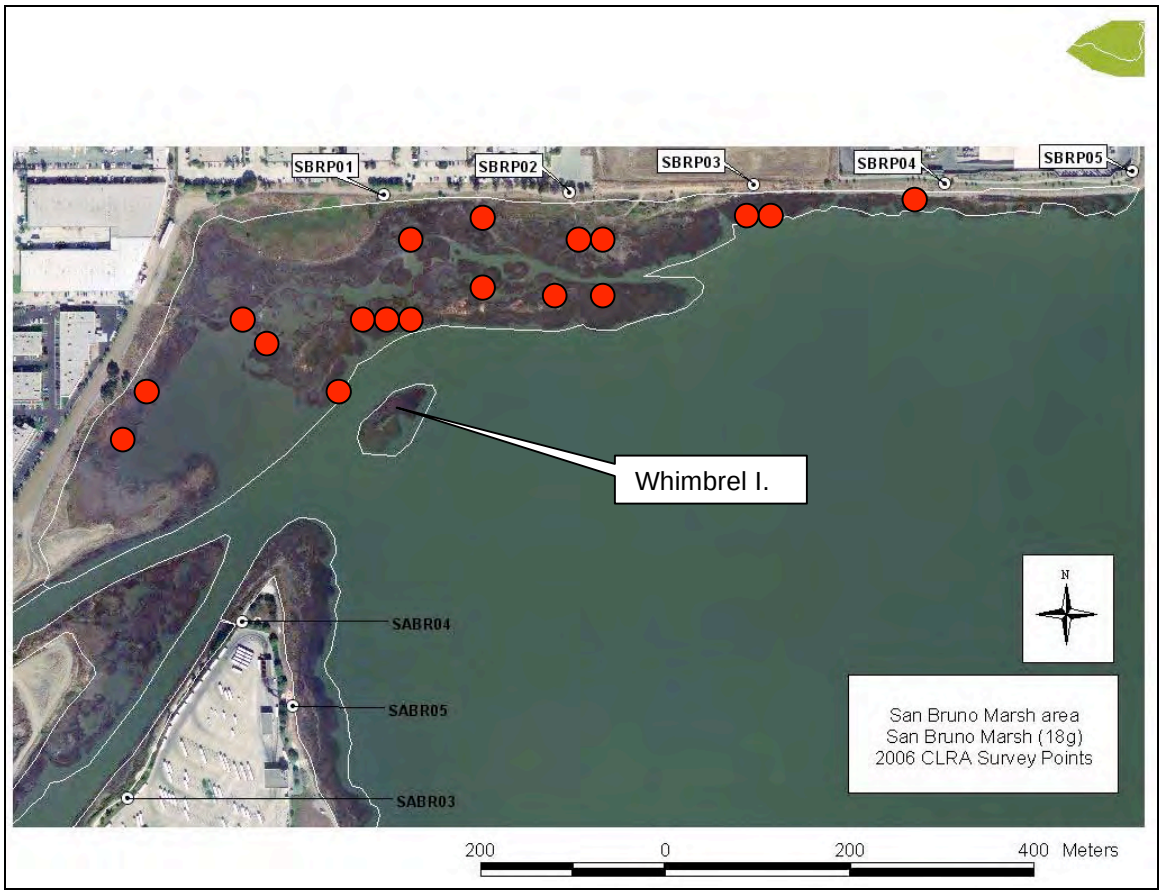

Figure 9. San Bruno Marsh, north shore (Site 18g). Red dots mark rail locations.

ISP site 18h & 18c. San Bruno Creek and Old Marina

Coverage: The Old Marina was covered on the SAMTRAS Peninsula surveys indirectly and with focused, passive survey on February 15. Active surveys were conducted at Stations SABR07 and -08 on several occasions, including March 7 and April 11 (following protocol-level surveys in adjacent habitats).

Evaluation: Low marsh, entirely inundated by high tides, limits habitat value in Old Marina. San Bruno Creek is cut off from direct tidal influence by a tide gate at SABR07 and the habitat is not viable.

Status: **Not occupied.**

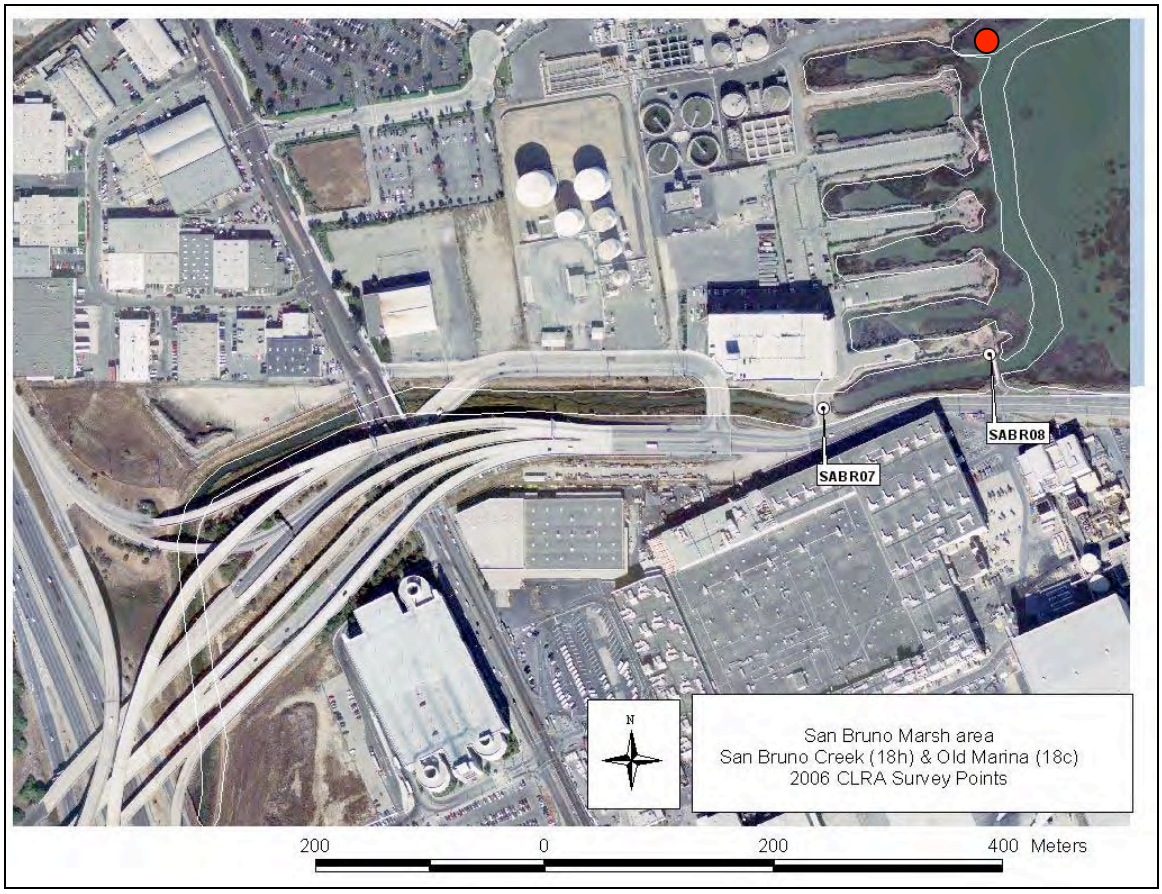

Figure 10. San Bruno Creek (ISP Site 18c) and Old Marina (ISP Site 18h). the red dot indicates the closest detection in 2007.

Wildcat Marsh (ISP site 22a)

Coverage: The Wildcat Marsh complex consists of two somewhat discrete marsh parcels: Castro Cove (Figure X) is on the SW side of Castro Creek; “Wildcat North” (Figure X) is on the opposite side of Castro Creek mouth. In 2007 we conducted four passive (Type A) surveys in the Castro Cove parcel: 2/7, 2/16, 2/23, and 3/2. We conducted three surveys in Wildcat North: 3/6, 3/21, 4/5.

Evaluation: Clapper Rails are widely distributed throughout, but concentrated within the marshlands adjacent to the Castro Creek mouth. (A figure for the entire Wildcat North complex is not available at this writing, but some of the detections from that census area are plotted in Figure X, below). The adjacent upland uses limit viability of habitat on the SW and NE boundaries of the marsh (Chevron refinery immediately to the SW and the West Contra Costa County landfill to the NE.) We have conducted surveys in these marshes intermittently since the late-1980s. The population was fairly robust during the early surveys (approximately 12-18 pairs) but declined precipitously for a period in the early- to mid-1990s, apparently due to red fox predation. Control efforts by responsible agencies have apparently been successful in reducing predation pressure and, based on our results in 2006 and 2007, the rail population seems to be responding favorably. In 2007 we made a conservative estimate of 8-10 pair present in the Wildcat complex (Table 4).

Status: Occupied.

Other species: Canada Goose, Great Blue Heron, Great Egret, Northern Harrier, California Black Rail, Marsh Wren, Common Yellowthroat, “San Pablo” Song Sparrow.

Figure 11. Castro Cove peninsula with locations of clapper rail detections plotted, based on four protocol-level surveys conducted 2/7/07 through 4/15/07. Each yellow pushpin represents either a single bird or a pair. Extrapolated activity centers are enclosed by red ovals. Activity centers may be larger than indicated by these graphics. The detections noted on the right side of the figure are within the Wildcat North parcel. Rails are widely distributed throughout these marshlands.

Marta's Mash (ISP site 23e)

Coverage: All of the Corte Madera-Heerdt-Muzzi Marsh complex, which includes "Marta's Marsh," was covered during the 2006-2007 census periods as part of the baywide clapper rail survey effort. We concentrated our efforts on the Marta's Marsh portion of the marsh on the February 11 survey in 2007, but also covered it on April 6 and April 11.

Evaluation: Marta's Marsh, located just north of San Clemente Creek and adjacent to a restored marsh parcel known as "Muzzi Marsh," was restored to tidal action due to a storm-related levee breach in 1996. Clapper Rails soon recolonized the site and apparently nested shortly thereafter (J. Evens, pers. obs.) Marta's benefits from its proximity to Muzzi Marsh which has supported a robust population of clapper rails since shortly after its restoration in the early 1980s. We have conducted rail surveys in this marsh system intermittently for the past 25 years and have detected clapper rails on every survey. Nesting has been documented. This marsh system supports one of the highest densities of clapper rails in the Central Bay. The entire complex probably benefits from the viability and proximity of "Corte Madera Ecological Preserve" (aka Heerdt Marsh) which is a relatively large, remnant ancient marsh.

Status: Occupied.

Greenwood Beach Road/Harbor Road (ISP Site 23g)

Coverage: Three passive surveys (Type A) were conducted: Feb. 05, Feb. 14, Mar. 01. Deviation from protocol: On Feb. 05, each station was occupied by an observer for 30 minutes. On Feb. 14 each station was occupied for 20 minutes. An active survey was conducted April 15, 2007.

Evaluation: As with Strawberry Point/Island area, the habitat here is marginal; its low quality is added to by its isolation, the disturbed nature of the upland edge, and the limited extent of available habitat.

Status: Not occupied

Other species: Bufflehead, Lesser Scaup, Eared Grebe, Whimbrel, CanvasbackGreat Blue heron, American Avocet, Black-necked Stilt, Greater Yellowlegs, Western Sandpiper, Willet, White-tailed Kite (carrying nesting material), American Crow, Ring-billed Gull, Rock Pigeon, Black Phoebe, House Sparrow, domestic Mallard**.**

Photograph F. Greenwood Cove Harbor (Site ISP-23g) with fringing Spartina bed.

Photograph G. Site 23g-Greenwood Beach Road/ Richardson Bay. (Station: STRA-01) looking south toward Strawberry Island.

Strawberry Point/Island (ISP site-23h)

Coverage: We conducted three passive surveys (Type C) from three survey stations (Table 2) on two dates: March 04 and March 22, 2007. On the first survey we covered each point twice at approximately 1.5 hour intervals (i.e. 1st round 0610-0655 hrs; 2nd round 0730-0800 hrs). We deviated from protocol somewhat by selecting survey points (Table 2) based on what we determined was the 'best looking" habitat and concentrating efforts there. (Some points were more than 200-m apart.) The island was accessed and reconnaissance (F-type survey). Reconnaissance was conducted by kayak, although posted signs specifically exclude access by kayaks.

Evaluation: As we reported in 2006, the south end of Strawberry Point supports no viable habitat. The habitat on Strawberry Island supports possible, but not ideal, clapper rail habitat. The site's isolation from other occupied marshes and the limited extent of habitat available diminish its suitability. The closest known occupied habitat is in Bothin Marsh, itself a habitat "outlier." Although the island habitat is fully tidal, the channel system is poorly developed, probably a function of small catchment area (size) and possibly geomorphic history. Outer shore of the island is rocky and rip-rapped. Even best habitat has very little *Spartina*, very steep transition from marsh to tidalflats, and poorly developed channel system.

Status: Not occupied

Other species: Canada Goose (many), Great Blue Heron, Great Egret, Snowy Egret, Spotted Sandpiper, Whimbrel, Spotted Sandpiper, Willet, Anna's Hummingbird, American Crow, Common Raven, Black Phoebe, Yellow-rumped Warbler, "San Pablo" Song Sparrow

Photograph H. South end of Strawberry Point (looking north) is devoid of habitat.

Photograph I. Strawberry Island has potential habitat, but the tidal marsh is limited in extent, highly modified by past human use, has poorly developed channel systems, and supports an abundant colony of Canada Geese. This photograph was taken looking east.

Mill Valley/Bayfront Park/Bothin Marsh (ISP site 23j.)

Coverage: We conducted seven passive (Type A) surveys in 2007 as part of the Bothin Marsh complex as well as for the Marin County Flood Control and Open Space District.

Evaluation: The results of these surveys indicate that clapper rails are resident in Bothin Marsh during the breeding season. Our detections were all outboard (west) of the trail that bisects the marsh (Figure 2), an area also as the "north basin." The low number of detections on our surveys (none heard on the three protocol-level surveys conducted after January 30th) suggests that densities of clapper rails in Bothin Marsh are relatively low. Based on our protocol-level surveys, we estimate 1 to 2 pair in the entire marsh system.

There are other recent reports of clapper rails from Bothin Marsh. A local resident who is also a birder mentioned that he has seen pairs in the vicinity of "both bridges" along the path (John Comstock, pers. comm. 2005). Also, Bill Stagnaro, a biologist with Wetland Research Associates, reported 9-10 individuals seen in the south basin during a winter flood tide (Oct. 10, 2006). These birds were clustered together in emergent vegetation, apparently refugees from the flooded tidal marsh. Regarding Mr. Stagnaro's observation, the number of birds and their location in the south basin suggests several possibilities: (1) our estimate is low and there are 4-5 pairs of clapper rails resident in the Bothin system; (2) the fall-winter population is higher than the breeding population; or, (3) the fall-winter population is higher than the breeding population and birds present earlier in the season are either dying off or emigrating. (Although we formerly assumed Clapper Rails were sedentary during the breeding season, some recent evidence, based radio telemetry studies, shows mid-season dispersal. One bird tagged near the San Francisco Airport disappeared in May 2007 and reappeared 27 miles away, in Corte Madera) (ISP 2007).[1]

To reconcile the high numbers reported by Mr. Stagnero with the lower numbers noted on our surveys: Clapper Rails have high fecundity, laying 4-14 eggs per nest and

[1] This previously unknown behavior may reflect the anomalous nature of the habitat near SFO, a marsh recently colonized by invasive non-native cordgrass (*Spartina alterniflora*). We suspect that these *Spartina* beds are an "attractive nuisance," attracting birds initially, but not providing the viable habitat for successful nesting ,

potentially nesting several times in a season (Eddleman and Conway 1998). Even one successful nest might produce enough birds to account for the group observed by Mr. Stagnero. Also, in sub-optimal habitat like that found at Bothin Marsh under current conditions, annual mortality is likely to be high for a ground-dwelling bird vulnerable to predation and flooding (Albertson and Evens 2000).

Based on the results of our surveys and the observations of others, we infer that clapper rails nest in the outboard marshes, but use the inboard marsh of the south basin for refuge during periods of inundation. Survivorship of rails at the site through the winter period is unknown, but the paucity of refugial habitat is cause for concern. We know of no records, nor did we have any detections in the marsh habitat north of the northern most station in Figure X.

Status: **Occupied: 2 pair present in 2007.**

Other species: Canada Goose, Mallard, Gadwall, Green-winged Teal, American Wigeon, Pintail, Bufflehead, Ruddy Duck, Canvasback, Scaup spp., Common Goldeneye, Black-crowned Night-Heron, Great Blue Heron, Great Egret, Snowy Egret, Turkey Vulture, Red-tailed Hawk, American Avocet, Black-necked Stilt, Killdeer, Spotted Sandpiper, Greater Yellowlegs, Marbled Godwit, Whimbrel, Long-billed Curlew, Willet, Dunlin, Wilson's Snipe, Western Gull, Ring-billed Gull, Mourning Dove, Common Raven, Black Phoebe, Bewick's Wren, American Robin, European Starling, Song Sparrow, American Goldfinch.

Notes: Active surveys for California Black Rails found no evidence of presence in the marsh complex. Several older records suggest that black rail may occur sporadically as a transient in higher elevation marsh vegetation.

Figure 11. Bayfront Park/Bothin Marsh, Richardson Bay, Mill Valley, Marin County. Yellow dots represent locations of listening stations. Red dots indicate location of CLRA detections by ARa, 2006 and 2007. Open red circle represents location of clapper rails reported on high tide survey, October 2006 (Wetland Research Associates, pers. comm..)

Summary

The following sites were **occupied** in 2007:

Corte Madera Ecological Reserve (Muzzi-Heerdt)
Piper Park East
Piper Park West
Larkspur Ferry Landing Arera
Creekside Park
Corte Madera Creek Mouth (Downstream of Highway 101)
Boardwalk #1 (Arkites)
Corte Madera Creek upstream of Bon Aire
Colma Creek (downstream of Navigable Slough)
Navigable Slough
Sam Trans Peninsula
Confluence Marsh
San Bruno Marsh
Wildcat Marsh
Marta's Marsh
Mill Valley STP/Bayfront Park

The following sites were **not occupied** in 2007:

Murphy Creek
McCallister Ave./COM ESA NE
Colma Creek upstream of Navigable Slough
"Old Marina"
"Inner Harbor"
San Bruno Creek
Greenwood Beach Road/Harbor
Strawberry Point

Summary data are provided in Tables 1-4, attached.

Table. 1
Sites surveyed by ARA, 2007

ISP code	ISP Subsite Name	ISP Site/Complex Name	County	2007 ISP survey priority-for all	2007 Survey Type desired	2007 Survey Type conduct
04a	Corte Madera Ecological Reserve (Muzzy/Heerdt)	Corte Madera Creek Complex	Marin	1	A	USFWS
04c	Piper Park East	Corte Madera Creek Complex	Marin	1	A	A
04d	Piper Park West	Corte Madera Creek Complex	Marin	1	A	A
04e	Larkspur Ferry Landing Area	Corte Madera Creek Complex	Marin	1	C	A
04f	Riviera Circle	Corte Madera Creek Complex	Marin	1	C	C
04g	Creekside Park	Corte Madera Creek Complex	Marin	1	A	A
04h		Corte Madera Creek Complex	Marin	1	C	C
04i	Lower Corte Madera Creek (Between Bon Air Road & HWY 101)	Corte Madera Creek Complex	Marin	1	C	A
04i-subarea 1	Murphy Creek	Corte Madera Creek Complex	Marin	1	C	C
04i-subarea 2	McCallister Ave/COM ESA NE	Corte Madera Creek Complex	Marin	1	C	C
04j	Corte Madera Creek Mouth (Downstream of HWY 101)	Corte Madera Creek Complex	Marin	1	C	A
04k	Boardwalk No. 1 (Arkites)	Corte Madera Creek Complex	Marin	1	C	A
04h	CMC-uptream of Bon aire	Corte Madera Creek Complex	Marin	1	A	A
18a	Colma Creek	Colma Creek San Bruno Marsh Complex	San Mateo	1	A	A
18b	Navigable Slough	Colma Creek San Bruno Marsh Complex	San Mateo	1	A	A
18c	"Old Marina"	Colma Creek San Bruno Marsh Complex	San Mateo	1	A	A
18d	"Inner Harbor"	Colma Creek San Bruno Marsh Complex	San Mateo	1	A	A
18e	Sam Trans Peninsula	Colma Creek San Bruno Marsh Complex	San Mateo	1	A	A
18f	"Confluence Marsh"	Colma Creek San Bruno Marsh Complex	San Mateo	1	A	A
18g	San Bruno Marsh	Colma Creek San Bruno Marsh Complex	San Mateo	1	A	A
18h	San Bruno Creek	Colma Creek San Bruno Marsh Complex	San Mateo	1	A	A
22a	Wildcat marsh	Two Points Complex	Contra Costa	3	A	A
23e	Martas Marsh (Marin)	Marin Outliers	Marin	3	A	A
23g	Greenwood Beach Road/Harbor	Marin Outliers	Marin	1	F > C	C
23h	Strawberry Point	Marin Outliers	Marin	1	F > C	C
23j	Mill Valley STP/Bayfront Park	Marin Outliers	Marin	3	A	A

Survey Types

A	Walking transect survey
B	Stationary survey
C	ISP modified transect survey
D	DFNWR survey (Rough density)
USFWS	USFWS (2000) protocol-level survey

Table 2. Site coordinates (NAD83)

ISP code	Marsh parcel	#	ARA code	NAD83	UTM 10S	CLRA
04a	Muzzi/Heerdt Marsh (N)	1	MUZZ01	0543290	4198898	√
04a		2	MUZZ02	0543270	4198714	√
04a		3	MUZZ03	0543233	4198500	√
04a		4	MUZZ04	0543198	4198296	√
04a		5	MUZZ05	0543305	4198234	
04a		6	MUZZ06	0543162	418086	√
04a	Muzzi/Heerdt Marsh (S)	1	MUZZ07	0543002	419778	√
04a		2	MUZZ08	0543187	4197605	√
04a		3	MUZZ09	0543380	4197655	√
04a		4	MUZZ10	0543569	4197718	√
04a	Marta's Marsh (San Clemente Crk)	5	MUZZ11	nd	nd	√
04a		6	MUZZ12	nd	nd	√
04c	Piper Park East	1	PIPAE01	0541484	4199149	√
04c		2	PIPAE02	0541459	4199364	√
04c		3	PIPAE03	0541404	4199588	√
04d	Piper Park West	4	PIPAW04	0541308	4199419	√
04d		5	PIPAW05	0541136	4199313	
04g	Creekside Marsh	1	ISP04g01	0540284	4200157	√
04g		2	ISP04g02	0540520	4200104	√
04g		3	ISP04g03	0540615	4199855	√
04b	COM/Ecological Reserve	1	ISP-04b	0540078	4200226	
04b		2	ISP-04b	0539970	4200478	
04h	CMC S-bank, upstream of BonAir	2	ISPO4M2	0539981	4200199	√
04h		3	ISPO4M3	0540233	4200071	√
04h		4	ISP04M4	0540442	4200016	√
04h		5	ISPO4M5	0540074	4200046	√
04j	Lower CMC (E of 101)-Ferry	1	ISPO4j01	0542499	419951	√
04j		2	ISPO4j02	0542694	4199727	
04j		3	ISPO4j03	0542969	4199628	
04j		4	ISPO4j04	0543169	4199695	√
04j	Lower CMC (E of 101)-boardwalk	1	GBBW01	0542703	4199611	√
04j		2	GBBW02	0542901	4199480	√
04j		3	GBBW03	0543082	4199433	√
04j		4	GBBW04	0543271	4199447	√
04k	Boardwalk/Piper Park	1	ISPO4L01	0541136	4199313	√
04k		2	ISP04L2	0541308	4199419	
04k		3	ISP04L3	0541404	4199588	
Central Bay						
ARA	W. Stege (Meeker)	1	MEEK01	0558258	4196323	√
ARA		2	MEEK02	0558308	4196191	√
ARA		3	MEEK03	0558280	4196127	√
ARA		4	MEEK04	0558463	4196076	√
no Marsh complex						
18a	Colma Creek	1	COCR01	0553022	4166328	√
18a		2	COCR02	0553220	4166367	√
18a		3	COCR03	0552909	4166544	√
18a		4	COCR04	0552803	4166743	
18a		5	COCR05	0552817	4166943	

Table 2. Site coordinates (NAD83)

ISP code	Marsh parcel	#	ARA code	NAD83	UTM 10S	CLRA
18a		6	COCR06	0553465	4166532	√
18b	Navigable Channel	1	NACH01	0552819	4166402	√
18b		2	NACH02	0552647	4166294	√
18c, d	Old Marina/Inner Harbor	7	SABR07	0553233	4165913	√
18c, d		8	SABR08	0553378	4165960	
18e	SAM TRANS Peninsula	1	SABR01	0553616	4165999	√
18e		2	SABR02	0553551	4166130	√
18e		3	SABR03	0553570	4166294	√
18e		4	SABR04	0553717	4166523	√
18e		5	SABR05	0553757	4166338	√
18e		6	SABR06	0553825	4166094	√
18f	Confluence Marsh		covered as part of SAMTRANS Peninsula			
18g	San Bruno Marsh ("Point")	1	SABRPT01	0553847	4166947	√
18g		2	SABRPT02	0554049	4166950	√
18g		3	SABRPT03	0554248	4166959	√
18g		4	SABRPT04	0554455	4166960	√
18g		5	SABRPT05	0554659	4166973	√
18g		6	SABRPT06	0553599	4166863	√
arin Outliers						
23j	Richardson Bay/Bothin Marsh	1	BOMA01	0541700	4194162	
23j		2	BOMA02	0541730	4193948	
23j		3	BOMA03	0542299	4192916	
23j		4	BOMA04	0541851	4193099	√
23j		5	BOMA05	0541818	4193445	
23j		6	BOMA06	0541767	4193698	√
23j		7	BOMA07	0542149	4193320	√
23j		8	BOMA08	0541982	4193531	
23j		9	BOMA09	0542097	4193114	
23j		10	BOMA10	0542024	4192899	
23j		11	BOMA11	0542019	4193285	
23j		12	BOMA12	0542104	4192847	
23g	Greenwood Cove	1	STRA01	0543698	4194343	
23g	Greenwood Beach	2	STRA02	0543810	4194509	
23g	Greenwood Cove	3	STRA03	0543698	4194428	
23h	Strawberry Pt./Is	1	STIS01	0543681	4194076	
23h		2	STIS02	0543706	4193948	
23h		3	STIS03	0543732	4193747	
23i	Strawberry Cove	1	STCO01	0542773	4193604	
23i		2	STCO02	0542616	4193699	
23i		3	STCO03	0542747	4193791	
n Pablo other						
22a	Wildcat Marsh (Castro Crk)	1	WICAS01	0552504	4200799	
22a		2	WICA02	0552660	4200707	
22a		3	WICAS03	0553393	4201029	√
22a		4	WICAS04	552957	4201278	√
22a		5	WICAS05	553122	4201164	√
22a		6	WICAN01	553721	4200986	√
22a		7	WICAN02	553703	4201035	√

Table 2. Site coordinates (NAD83)

ISP code	Marsh parcel	#	ARA code	NAD83	UTM 10S	CLRA
22a		8	WICAN03	553655	4201231	√
22a		9	WICAN04	553598	4201446	√
22a		10	WICAN05	553731	4201639	√
22a		11	WICAN06	553891	4201784	√
22a		12	WICAN07	554041	4201921	
22a		13	WICAN08	554207	4202077	

Table 3. Census results, station-by-station

ISP code	observer	site name	date	round	station	survey_type	time_start	time	dist_min	dist_max	dir(°)	species	count_min	count_max
18e	JE	Sam Trans Peninsula	2/15/07	1	8	P	16:40	nd	nd	nd	nd	nd	0	0
18e	JE	Sam Trans Peninsula	2/15/07	1	7	P	16:54	nd	nd	nd	nd	nd	0	0
18e	JE	Sam Trans Peninsula	2/15/07	1	1	P	17:07	nd	nd	nd	nd	nd	0	0
18e	JE	Sam Trans Peninsula	2/15/07	1	2	P	17:20	nd	nd	nd	nd	nd	0	0
18e	JE	Sam Trans Peninsula	2/15/07	1	3	P	17:33	17:33	180	180	250	CLRA	2	2
18e	JE	Sam Trans Peninsula	2/15/07	1	3	P	17:33	17:39	68	68	220	CLRA	1	2
18e	JE	Sam Trans Peninsula	2/15/07	1	3	P	17:33	17:39	55	300	300	CLRA	2	2
18e	JE	Sam Trans Peninsula	2/15/07	1	3	P	17:33	17:39	125	340	340	CLRA	2	2
18e	JE	Sam Trans Peninsula	2/15/07	1	3	P	17:33	17:40	15	20	295	CLRA	1	2
18e	JE	Sam Trans Peninsula	2/15/07	1	4	P	17:47	17:55	45	45	210	CLRA	1	1
18e	JE	Sam Trans Peninsula	2/15/07	1	4	P	17:47	17:55	65	65	260	CLRA	2	2
18e	JE	Sam Trans Peninsula	2/15/07	1	4	P	17:47	17:55	65	65	245	CLRA	2	2
18e	JE	Sam Trans Peninsula	2/15/07	1	4	P	17:47	17:56	90	90	245	CLRA	1	1
18e	JE	Sam Trans Peninsula	2/15/07	1	4	P	17:47	17:58	55	55	300	CLRA	1	1
18e	JE	Sam Trans Peninsula	2/15/07	1	5	P	18:01	nd	nd	nd	nd	nd	0	0
18e	JE	Sam Trans Peninsula	2/15/07	1	6	P	18:12	18:12	25	25	110	CLRA	1	1
18e	JE	Sam Trans Peninsula	2/15/07	1	6	P	18:12	18:13	40	50	200	CLRA	2	4
18e	JE	Sam Trans Peninsula	2/15/07	1	6	P	18:12	18:13	90	90	120	CLRA	1	1
18e	JE	Sam Trans Peninsula	2/15/07	1	6	P	18:12	18:17	90	90	120	CLRA	1	1
18e	JE	Sam Trans Peninsula	2/15/07	1	6	P	18:12	18:17	100	100	0	CLRA	1	1
18e	JE	Sam Trans Peninsula	3/8/07	2	6	P	5:54	6:02	65	75	210	CLRA	1	1
18e	JE	Sam Trans Peninsula	3/8/07	2	6	P	5:54	6:02	25	25	90	CLRA	1	2
18e	JE	Sam Trans Peninsula	3/8/07	2	6	P	5:54	6:02	38	38	95	CLRA	2	2
18e	JE	Sam Trans Peninsula	3/8/07	2	5	P	6:09	6:17	>250	>250	300	CLRA	1+	1+
18e	JE	Sam Trans Peninsula	3/8/07	2	5	P	6:09	6:19	25	25	10	CLRA	2	2
18e	JE	Sam Trans Peninsula	3/8/07	2	5	P	6:09	6:19	40	40	0	CLRA	1	1
18e	JE	Sam Trans Peninsula	3/8/07	2	4	P	6:25	6:35	nd	nd	nd	nd	0	0
18e	JE	Sam Trans Peninsula	3/8/07	2	3	P	6:39	6:49	nd	nd	nd	nd	0	0
18e	JE	Sam Trans Peninsula	3/8/07	2	2	P	6:52	7;02	nd	nd	nd	nd	0	0
18e	JE	Sam Trans Peninsula	3/8/07	2	1	P	7:04	7:14	nd	nd	nd	nd	0	0
18e	JE	Sam Trans Peninsula	4/11/07	3	2	P	6:33	nd	nd	nd	nd	nd	0	0
18e	JE	Sam Trans Peninsula	4/11/07	3	3	P	6:45	6:45	80	110	320	CLRA	1	1
18e	JE	Sam Trans Peninsula	4/11/07	3	3	P	6:45	6:46	80	110	320	CLRA	2	2
18e	JE	Sam Trans Peninsula	4/11/07	3	4	P	6:58	6:58	210	210	70	CLRA	1	1
18e	JE	Sam Trans Peninsula	4/11/07	3	4	P	6:58	7:02	20	20	350	CLRA	1	1
18e	JE	Sam Trans Peninsula	4/11/07	3	4	P	6:58	7:02	65	65	320	CLRA	1	1
18e	JE	Sam Trans Peninsula	4/11/07	3	4	P	6:58	7:02	125	125	90	CLRA	1	1
18e	JE	Sam Trans Peninsula	4/11/07	3	4	P	6:58	7:05	50	100	260	CLRA	1	1
18e	JE	Sam Trans Peninsula	4/11/07	3	4	P	6:58	7:07	20	20	350	CLRA	1	1
18e	JE	Sam Trans Peninsula	4/11/07	3	5	P	7:13	nd	nd	nd	nd	nd	0	0
18e	JE	Sam Trans Peninsula	4/11/07	3	6	P	7:27	7:31	15	15	125	CLRA	1	1
18e	JE	Sam Trans Peninsula	4/11/07	3	6	P	7:27	7:34	40	40	140	CLRA	1	1
18e	JE	Sam Trans Peninsula	4/11/07	3	1	P	7:41	nd	nd	nd	nd	nd	0	0
18g,h	JE	SanBrunoN	2/16/07	1	1	P	6:15	nd	nd	nd	nd	nd	0	0
18g,h	JE	SanBrunoN	2/16/07	1	2	P	6:29	6:38	75	75	225	CLRA	2	4
18g,h	JE	SanBrunoN	2/16/07	1	2	P	6:29	6:38	30	30	160	CLRA	2	4
18g,h	JE	SanBrunoN	2/16/07	1	3	P	6:44	6:44	40	40	80	CLRA	1	1
18g,h	JE	SanBrunoN	2/16/07	1	4	P	6:58	nd	nd	nd	nd	nd	0	0

Table 3. Census results, station-by-station

18g,h	JE	SanBrunoN	2/16/07	1	5	P	7:10	nd	nd	nd	nd	nd	0	0
18g,h	JE	SanBrunoN	2/16/07	1	2	P	7:25	7:25	85	85	270	CLRA	1	1
18g,h	JE	SanBrunoN	3/7/07	2	6	P	17:40	17:42	50	50	95	CLRA	1	1
18g,h	JE	SanBrunoN	3/7/07	2	6	P	17:40	17:44	70	70	145	CLRA	1	1
18g,h	JE	SanBrunoN	3/7/07	2	6	P	17:40	17:47	200	200	130	CLRA	2	4
18g,h	JE	SanBrunoN	3/7/07	2	1	P	17:52	17:58	48	48	180	CLRA	1	1
18g,h	JE	SanBrunoN	3/7/07	2	1	P	17:52	17:58	55	55	155	CLRA	1	1
18g,h	JE	SanBrunoN	3/7/07	2	1	P	17:52	17:58	50	50	110	CLRA	1	1
18g,h	JE	SanBrunoN	3/7/07	2	1	P	17:52	17:58	200	200	180	CLRA	5	10
18g,h	JE	SanBrunoN	3/7/07	2	2	P	18:03	18:03	32	32	225	CLRA	1	1
18g,h	JE	SanBrunoN	3/7/07	2	2	P	18:03	18:03	21	21	180	CLRA	1	1
18g,h	JE	SanBrunoN	3/7/07	2	2	P	18:03	18:03	70	100	210	CLRA	2	4
18g,h	JE	SanBrunoN	3/7/07	2	3	P	18:15	18:16	100	100	210	CLRA	1	1
18g,h	JE	SanBrunoN	3/7/07	2	6	P	18:30	18:30	60	60	80	CLRA	2	2
18g,h	JE	SanBrunoN	3/7/07	2	6	P	18:30	18:30	45	45	60	CLRA	1	1
18g,h	JE	SanBrunoN	4/10/07	3	5	P	18:20	nd	nd	nd	nd	nd	0	0
18g,h	JE	SanBrunoN	4/10/07	3	4	P	18:34	nd	nd	nd	nd	nd	0	0
18g,h	JE	SanBrunoN	4/10/07	3	2	P	18:50	18:50	60	60	235	CLRA	2	2
18g,h	JE	SanBrunoN	4/10/07	3	2	P	18:50	18:56	45	45	220	CLRA	1	1
18g,h	JE	SanBrunoN	4/10/07	3	1	P	19:03	19:13	nd	nd	nd	nd	0	0
18a	JE	Colma Crk	2/16/07	1	1	P	7:32	nd	nd	nd	nd	nd	0	0
18b	JE	Navigable	2/16/07	1	1	P	7:45	7:46	55	55	45	CLRA	2	2
18b	JE	Navigable	2/16/07	1	2	P	7:56	nd	nd	nd	nd	nd	0	0
18a	JE	Colma Crk	2/16/07	1	2	P	8:06	nd	nd	nd	nd	nd	0	0
18a	JE	Colma Crk	3/7/07	2	1	P	16:50	16:58	90	90	50	CLRA	2	2
18a	JE	Colma Crk	3/7/07	2	1	P	16:58	17:05	145	145	305	CLRA	1	1
18a	JE	Colma Crk	3/7/07	2	2	P	17:11	nd	nd	nd	nd	nd	0	0
18a	JE	Colma Crk	3/7/07	2	6	P	17:25	17:25	75	75	120	CLRA	1	1
18a	JE	Colma Crk	3/7/07	2	6	P	17:25	17:31	60	60	120	CLRA	1	1
18a	JE	Colma Crk	3/7/07	2	3	P	18:43	nd	nd	nd	nd	CLRA	0	0
22a	MF/JE	Wildcat N	3/6/07	1	1	P	17:15	17:25	nd	nd	nd	nd	0	0
22a	MF/JE	Wildcat N	3/6/07	1	2	P	17:35	17:45	nd	nd	nd	nd	0	0
22a	MF/JE	Wildcat N	3/6/07	1	3	P	17:50	17:53	100	115	250-26(	CLRA	1	1
22a	MF/JE	Wildcat N	3/6/07	1	4	P	18:02	18:08	190	190	350-10	CLRA	1	1
22a	MF/JE	Wildcat N	3/6/07	1	4	P	18:02	18:09	?	?	?	CLRA	2	2
22a	MF/JE	Wildcat N	3/6/07	1	4	P	18:02	18:10	<200	<200	120-14(	CLRA	2	2
22a	MF/JE	Wildcat N	3/6/07	1	4	P	18:02	18:13	38	38	20-30	CLRA	1	1
22a	MF/JE	Wildcat N	3/6/07	1	4	P	18:02		<200	<200	100-11(	CLRA	2	2
22a	MF/JE	Wildcat N	3/6/07	1	4	P	18:02		<200	<200	160-18(	CLRA	2	2
22a	MF/JE	Wildcat N	3/6/07	1	4	P	18:02	:15-18:	140	140	180-20(	CLRA	1	1
22a	MF/JE	Wildcat N	3/6/07	1	ı rou	P	18:24	18:24	100	100	140-16(	CLRA	1	1
22a	MF/JE	Wildcat N	3/6/07	1	5	P	18:26	18:36	nd	nd	nd	nd	0	0
22a	MF/JE	Wildcat N	3/6/07	1	6	P	18:40	18:50	nd	nd	nd	nd	0	0
22a	MF/JE	Wildcat N	3/6/07	1	7	P	18:53	19:03	nd	nd	nd	nd	0	0
22a	MF/JE	Wildcat N	3/6/07	1	8	P	19:08	19:18	nd	nd	nd	nd	0	0
22a	MF/SE	Wildcat N	3/21/07	2	8	P	6:30	nd	nd	nd	nd	nd	0	0
22a	MF/SE	Wildcat N	3/21/07	2	7	P	6:46	nd	nd	nd	nd	nd	0	0
22a	MF/SE	Wildcat N	3/21/07	2	6	P	7:02	7:04	250	300	130-15(	CLRA	1	1
22a	MF/SE	Wildcat N	3/21/07	2	5	P	7:24	nd	nd	nd	nd	nd	0	0
22a	MF/SE	Wildcat N	3/21/07	2	4	P	7:38	nd	nd	nd	nd	nd	0	0
22a	MF/SE	Wildcat N	3/21/07	2	3	P	7:52	nd	nd	nd	nd	nd	0	0
22a	MF/SE	Wildcat N	3/21/07	2	2	P	8:10	nd	nd	nd	nd	nd	0	0
22a	MF/SE	Wildcat N	3/21/07	2	ı rou	P	8:25	8:25	15	25	240-26(	BLRA	1	1

Table 3. Census results, station-by-station

22a	MF/SL	Wildcat N	3/21/07	2	1	P	8:26	nd	nd	nd	nd	nd	0	0
22a	MF/ES	Wildcat N	4/1/07	3	4	P	18:40	18:46	>200	>200	110-12(	CLRA	1	1
22a	MF/ES	Wildcat N	4/1/07	3	3	P	18:56	19:00	>200	>200	110-12(	CLRA	1	1
22a	MF/ES	Wildcat N	4/1/07	3	3	P	18:56	19:00	65	70	120-14(	CLRA	1	2
22a	MF/ES	Wildcat N	4/1/07	3	3	P	19:08	19:08	65	75	130	CLRA	1	2
22a	MF/ES	Wildcat N	4/1/07	3	3	P	19:08	19:12	65	75	130	CLRA	1	2
22a	MF/ES	Wildcat N	4/1/07	3	3	P	19:08	19:13	13	14	180	CLRA	1	1
22a	MF/ES	Wildcat N	4/1/07	3	3	P	19:08	19:15	90	100	90-100	CLRA	1	1
22a	MF/ES	Wildcat N	4/1/07	3	3	P	19:08	19:18	50	75	40-60	CLRA	1	1
22a	MF/ES	Wildcat N	4/1/07	3	2	P	19:22	19:22	110	110	170-18(	CLRA	1	1
22a	MF/ES	Wildcat N	4/1/07	3	2	P	19:22	19:27	110	110	170-18(	CLRA	1	1
22a	MF/ES	Wildcat N	4/1/07	3	2	P	19:22	19:30	50	60	5-15	CLRA	1	1
22a	MF/ES	Wildcat N	4/1/07	3	1	P	19:40	19:55	60	60	10	CLRA	1	1
22a	MF/ES	Wildcat N	4/1/07	3	1	P	19:55	20:00	85	90	210-20(	CLRA	1	1
22a	MF/ES	Wildcat N	4/1/07	3	5	P	20:09	nd	nd	nd	nd	nd	0	0
22a	JE	Wildcat S	2/7/07	1	4	P	16:49	16:49	nd	nd	nd	nd	0	0
22a	JE	Wildcat S	2/7/07	1	5	P	17:10	17:10	40	40	NE	CLRA	1	1
22a	JE	Wildcat S	2/7/07	1	5	P	17:10	17:34	38	38	110	CLRA	1	1
22a	JE	Wildcat S	2/7/07	1	3	P	17:35	17:46	150	150	90	CLRA	1	1
22a	JE	Wildcat S	2/7/07	1	3	P	17:35	nd	200	200	75	CLRA	2	2
22a	JE	Wildcat S	2/16/07	2	4	P	16:45	nd	nd	nd	nd	nd	0	0
22a	JE	Wildcat S	2/16/07	2	4	P	16:56	nd	nd	nd	nd	nd	0	0
22a	JE	Wildcat S	2/16/07	2	4	P	17:07	17:17	250	250	70	CLRA	1	1
22a	JE	Wildcat S	2/16/07	2	bet	P	17:21	17:21	80	80	30	CLRA	1	2
22a	JE	Wildcat S	2/16/07	2	bet	P	17:21	17:21	30	30	40	CLRA	1	1
22a	JE	Wildcat S	2/16/07	2	bet	P	17:21	17:21	170	170	300	CLRA	2	2
22a	JE	Wildcat S	2/16/07	2	bet	P	17:21	17:21	200	200	80	CLRA	2	2
22a	JE	Wildcat S	2/16/07	2	5	P	17:25	17:32	55	55	0	CLRA	2	2
22a	JE	Wildcat S	2/16/07	2	5	P	17:25	17:32	65	65	150	CLRA	1	1
22a	JE	Wildcat S	2/16/07	2	5	P	17:25	17:32	300	300	40	CLRA	2	2
22a	JE	Wildcat S	2/16/07	2	5	P	17:25	17:32	30	30	45	CLRA	1	1
22a	JE	Wildcat S	2/16/07	2	5	P	17:25	17:32	59	59	15	CLRA	1	1
22a	JE	Wildcat S	2/16/07	2	5	P	17:35	17:42	45	45	80	CLRA	1	1
22a	JE	Wildcat S	2/16/07	2	5	P	17:35	17:45	55	55	140	CLRA	1	1
22a	JE	Wildcat S	2/16/07	2	bet	P	17:48	17:48	nd	nd	nd	CLRA	2	4
22a	JE	Wildcat S	2/16/07	2	3	P	17:55	17:55	106	106	220	CLRA	1	1
22a	JE	Wildcat S	2/16/07	2	3	P	17:55	17:56	128	128	260	CLRA	2	2
22a	JE	Wildcat S	2/16/07	2	3	P	17:55	17:58	161	161	350	CLRA	2	2
22a	JE	Wildcat S	2/16/07	2	3	P	17:55	17:59	300	300	70	CLRA	2	2
22a	JE	Wildcat S	2/23/07	3	6	P	17:00	nd	nd	nd	nd	nd	0	0
22a	JE	Wildcat S	2/23/07	3	5	P	17:28	18:02	>300	>300	40	CLRA	2	2
22a	JE	Wildcat S	2/23/07	3	5	P	17:28	18:18	250	250	300	CLRA	2	2
22a	JE	Wildcat S	2/23/07	3	5	P	17:28	18:18	>300	>300	45	CLRA	2	2
22a	JE	Wildcat S	2/23/07	3	5	P	17:28	18:18	150	150	90	CLRA	1	1
22a	JE	Wildcat S	2/23/07	3	5	P	17:28	18:30	50	50	45	CLRA	2	2
22a	JE	Wildcat S	3/2/07	4	7	P	6:10	nd	nd	nd	nd	nd	0	0
22a	JE	Wildcat S	3/2/07	4	7	P	7:00	nd	nd	nd	nd	nd	0	0
22a	JE	Wildcat S	3/2/07	4	3	P	7:15	nd	nd	nd	nd	nd	0	0
04a	RS	Muzzi Marsh	2/11/07	1	1	P	16:45	16:48	140	140	85	CLRA	2	2
04a	RS	Muzzi Marsh	2/11/07	1	2	P	16:45	17:03	nd	nd	nd	nd	0	0
04a	RS	Muzzi Marsh	2/11/07	1	3	P	16:45	17:20	35	35	340	CLRA	2	2
04a	RS	Muzzi Marsh	2/11/07	1	3	P	16:45	17:20	200	200	350	CLRA	2	2
04a	RS	Muzzi Marsh	2/11/07	1	4	P	16:45	17:33	18	18	360	CLRA	1	1

Table 3. Census results, station-by-station

04a	RS	Muzzi Marsh	2/11/07	1	5	P	16:45	17:47	nd	nd	nd	nd	0	0
04a	RS	Muzzi Marsh	2/11/07	1	5	P	16:45	17:47	nd	nd	nd	nd	0	0
04a	RS	Muzzi Marsh	4/6/07	2	6	P	6:56	6:59	90	90	260	CLRA	1	1
04a	RS	Muzzi Marsh	4/6/07	2	5	P		7:14	33	33	220	CLRA	1	1
04a	RS	Muzzi Marsh	4/6/07	2	5	P		7:17	85	85	255	CLRA	2	2
04a	RS	Muzzi Marsh	4/6/07	2	5	P		7:17	120	120	310	CLRA	2	2
04a	RS	Muzzi Marsh	4/6/07	2	5	P		7:20	22	22	90	CLRA	1	1
04a	RS	Muzzi Marsh	4/6/07	2	4	P		7:33	65	65	280	CLRA	1	1
04a	RS	Muzzi Marsh	4/6/07	2	4	P		7:33	115	115	330	CLRA	2	2
04a	RS	Muzzi Marsh	4/6/07	2	4	P		7:35	65	65	265	CLRA	1	1
04a	RS	Muzzi Marsh	4/6/07	2	3	P		7:45	45	45	360	CLRA	1	1
04a	RS	Muzzi Marsh	4/6/07	2	3	P		7:45	95	95	30	CLRA	1	1
04a	RS	Muzzi Marsh	4/6/07	2	3	P		7:50	200	200	350	CLRA	2	2
04a	RS	Muzzi Marsh	4/6/07	2	2	P		nd	nd	nd	nd	nd	0	0
04a	RS	Muzzi Marsh	4/6/07	2	1	P		8:23	175	175	100	CLRA	2	2
04a	RS	Muzzi Marsh	4/6/07	2	1	P		8:23	175	175	140	CLRA	1	1
04a	RS	Muzzi Marsh	4/11/07	3	6	P	18:30	18:30	nd	nd	nd	nd	0	0
04a	RS	Muzzi Marsh	4/11/07	3	5	P		18:46	130	130	330	CLRA	2	2
04a	RS	Muzzi Marsh	4/11/07	3	5	P		18:51	33	33	255	CLRA	1	1
04a	RS	Muzzi Marsh	4/11/07	3	4	P		19:00	70	70	285	CLRA	1	1
04a	RS	Muzzi Marsh	4/11/07	3	4	P		19:00	100	100	380	CLRA	2	2
04a	RS	Muzzi Marsh	4/11/07	3	4	P		19:00	85	85	300	CLRA	1	1
04a	RS	Muzzi Marsh	4/11/07	3	3	P		19:15	nd	nd	nd	nd	0	0
04a	RS	Muzzi Marsh	4/11/07	3	2	P		19:31	nd	nd	nd	nd	0	0
04a	RS	Muzzi Marsh	4/11/07	3	1	P		19:48	85	85	90	CLRA	2	2
04a	RS	Muzzi Marsh	4/11/07	3	1	P		19:53	100	100	90	CLRA	2	2
04c,d	JE	Piper Park	1/18/07	1	1	P	16:22	16:22	nd	nd	nd	nd	0	0
04c,d	JE	Piper Park	1/18/07	1	2	P	16:37	16:37	nd	nd	nd	nd	0	0
04c,d	JE	Piper Park	1/18/07	1	3	P	16:54	16:54	nd	nd	nd	nd	0	0
04c,d	JE	Piper Park	1/18/07	1	4	P	17:10	17:10	nd	nd	nd	nd	0	0
04c,d	JE	Piper Park	1/18/07	1	5	P	17:25	17:25	nd	nd	nd	nd	0	0
04c,d	JE	Piper Park	1/18/07	1	3	P	17:37	17:37	30	30	35	CLRA	2	1
04c,d	JE	Piper Park	1/18/07	1	3	P	17:37	17:37	150	150	225	CLRA	2	1
04c,d	JE	Piper Park	1/18/07	1	3	P	17:37	17:40	25	25	35	CLRA	1	1
04c,d	JE	Piper Park	1/18/07	1	3	P	17:37	17:47	150	150	225	CLRA	1	1
04c,d	JE	Piper Park	3/15/07	2	3	P	6:57	6:57	75	75	210	CLRA	1	1
04c,d	JE	Piper Park	3/15/07	2	3	P		7:02	45	45	210	CLRA	1	1
04c,d	JE	Piper Park	3/15/07	2	4	P		7:20	40	40	300	CLRA	2	2
04c,d	JE	Piper Park	3/15/07	2	5	P		7:24	nd	nd	nd	nd	0	0
04c,d	JE	Piper Park	3/15/07	2	:twe	P		7:38	nd	nd	nd	CLRA	2	2
04c,d	JE	Piper Park	3/15/07	2	2	P		7:40	nd	nd	nd	nd	0	0
04c,d	JE	Piper Park	3/15/07	2	1	P		7:52	nd	nd	nd	nd	0	0
04c,d	JE	Piper Park	3/29/07	3	1	P	18:30	18:37	105	105	350	CLRA	1	1
04c,d	JE	Piper Park	3/29/07	3	1	P		18:38	105	105	350	CLRA	1	1
04c,d	JE	Piper Park	3/29/07	3	1	P		18:38	82	82	0	CLRA	1	1
04c,d	JE	Piper Park	3/29/07	3	2	P	18:42	18:42	65	65	130	CLRA	1	1
04c,d	JE	Piper Park	3/29/07	3	2	P		18:46	90	90	150	CLRA	1	1
04c,d	JE	Piper Park	3/29/07	3	2	P		18:53	100	100	150	CLRA	2	2
04c,d	JE	Piper Park	3/29/07	3	3	P	18:57	nd	nd	nd	nd	nd	0	0
04c,d	JE	Piper Park	3/29/07	3	4	P	19:10	nd	nd	nd	nd	nd	0	0
04c,d	JE	Piper Park	3/29/07	3	5	P	19:24	nd	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	1/30/07	1	8	P	16:50	16:50	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	1/30/07	1	7	P	17:06	17:06	140	160	260	CLRA	1	2

Table 3. Census results, station-by-station

23j	JE	Bothin Marsh	1/30/07	1	7	P		17:12	140	140	265	CLRA	2+	2+
23j	JE	Bothin Marsh	1/30/07	1	9	P		17:25	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	1/30/07	1	4	P		17:40	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	2/5/07	2	9	P	17:07	17:07	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	2/5/07	2	6	P		17:22	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	2/5/07	2	2	P		17:37	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	2/5/07	2	1	P		17:50	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	3/9/07	3	3	P	16:45	17:12	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	3/9/07	3	9	P		17:24	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	3/9/07	3	7	P		17:35	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	3/9/07	3	8	P		17:47	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	3/9/07	3	2	P		18:12	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	3/9/07	3	1	P		18:24	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	3/19/07	4	4	P	17:00	18:10	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	3/19/07	4	10	P		18:23	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	3/19/07	4	4	P		18:40	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	3/19/07	4	3	P		19:02	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	4/2/07	5	4	P	17:50	17:52	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	4/2/07	5	11	P		18:08	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	4/2/07	5	9	P		18:22	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	4/2/07	5	12	P		18:32	nd	nd	nd	nd	0	0
23j	JE	Bothin Marsh	4/2/07	5	13	P		18:40	nd	nd	nd	nd	0	0
04a	RS	Corte Madera/Heerdt	3/16/07	1	1	P	18:40	18:40	110	110	80	CLRA	2	2
04a	RS	Corte Madera/Heerdt	3/16/07	1	1	P		18:41	19	19	350	CLRA	1	1
04a	RS	Corte Madera/Heerdt	3/16/07	1	2	P		18:59	45	45	30	CLRA	2	2
04a	RS	Corte Madera/Heerdt	3/16/07	1	3	P		19:09	nd	nd	nd	nd	0	0
04a	RS	Corte Madera/Heerdt	3/16/07	1	4	P		19:24	160	160	75	CLRA	2	2
04a	RS	Corte Madera/Heerdt	3/16/07	1	5	P		19:39	nd	nd	nd	nd	0	0
04a	RS	Corte Madera/Heerdt	3/16/07	1	6	P		19:54	65	65	100	CLRA	2	2
04a	RS	Corte Madera/Heerdt	3/17/07	1	1	P	6:30	6:36	28	28	330	CLRA	1	1
04a	RS	Corte Madera/Heerdt	3/17/07	1	2	P		6:53	120	120	50	CLRA	2	2
04a	RS	Corte Madera/Heerdt	3/17/07	1	3	P		7:05	140	140	110	CLRA	1	1
04a	RS	Corte Madera/Heerdt	3/17/07	1	4	P		7:13	nd	nd	nd	nd	0	0
04a	RS	Corte Madera/Heerdt	3/17/07	1	5	P		7:31	nd	nd	nd	nd	0	0
04a	RS	Corte Madera/Heerdt	3/17/07	1	6	P		7:44	20	20	165	CLRA	1	1
04a	RS	Corte Madera/Heerdt	3/17/07	1	6	P		7:48	75	75	100	CLRA		
04a	RS	Corte Madera/Heerdt	4/13/07	2	1	P	16:20	16:27	40	40	330	CLRA	1	1
04a	RS	Corte Madera/Heerdt	4/13/07	2	1	P		16:29	90	90	90	CLRA	1	1
04a	RS	Corte Madera/Heerdt	4/13/07	2	1	P		16:29	120	120	90	CLRA	1	1
04a	RS	Corte Madera/Heerdt	4/13/07	2	2	P		16:36	nd	nd	nd	nd	0	0
04a	RS	Corte Madera/Heerdt	4/13/07	2	3	P		16:51	65	65	90	CLRA	2	2
04a	RS	Corte Madera/Heerdt	4/13/07	2	4	P		17:06	nd	nd	nd	nd	0	0
04a	RS	Corte Madera/Heerdt	4/13/07	2	5	P		17:14	nd	nd	nd	nd	0	0
04a	RS	Corte Madera/Heerdt	4/13/07	2	6	P		17:30	85	85	130	CLRA	1	1
04g	RS	Creekside Park	1/23/07	1	1	P		16:10	80	80	40	CLRA	2	2
04g	RS	Creekside Park	1/23/07	1	1	P		16:20	32	32	100	CLRA	1	1
04g	RS	Creekside Park	1/23/07	1	2	P		16:29	28	28	45	CLRA	1	1
04g	RS	Creekside Park	1/23/07	1	3	P		16:48	nd	nd	nd	nd	0	0
04g	RS	Creekside Park	3/21/07	2	1		18:10	18:16	190	190	5	CLRA	2	2
04g	RS	Creekside Park	3/21/07	2	1			18:17	110	110	360	CLRA	2	2
04g	RS	Creekside Park	3/21/07	2	1			18:17	50	50	330	CLRA	2	2
04g	RS	Creekside Park	3/21/07	2	1			18:20	28	28	80	CLRA	1	1
04g	RS	Creekside Park	3/21/07	2	2			18:26	35	35	45	CLRA	1	1

Table 3. Census results, station-by-station

04g	RS	Creekside Park	3/21/07	2	2		18:30	75	75	35	CLRA	2	2
04g	RS	Creekside Park	3/21/07	2	2		18:30	55	55	70	CLRA	1	1
04g	RS	Creekside Park	3/21/07	2	3		18:46	40	40	35	CLRA	1	1
04g	RS	Creekside Park	4/10/07	3	1	6:35	6:38	88	88	340	CLRA	1	1
04g	RS	Creekside Park	4/10/07	3	1	6:35	6:38	120	120	360	CLRA	1	1
04g	RS	Creekside Park	4/10/07	3	1	6:35	6:43	170	170	5	CLRA	2	2
04g	RS	Creekside Park	4/10/07	3	2	6:52	6:57	13	13	255	CLRA	1	1
04g	RS	Creekside Park	4/10/07	3	2	6:52	6:58	28	28	315	CLRA	2	2
04g	RS	Creekside Park	4/10/07	3	2	6:52	6:58	150	150	340	CLRA	2	2
04g	RS	Creekside Park	4/10/07	3	2	6:52	7:02	180	180	290	CLRA	1	1
04g	RS	Creekside Park	4/10/07	3	2	6:52	7:02	18	18	355	CLRA	1	1
04g	RS	Creekside Park	4/10/07	3	3	7:16	7:26	nd	nd	nd	CLRA	0	0
23g	MF	Greenwood Beach Roa	2/5/07	1	3	P 6:15	6:45	nd	nd	nd	nd	0	0
23g	MF	Greenwood Beach Roa	2/5/07	1	1	P 7:00	7:30	nd	nd	nd	nd	0	0
23g	MF	Greenwood Beach Roa	2/14/07	2	3	P 6:15	6:25	nd	nd	nd	nd	0	0
23g	MF	Greenwood Beach Roa	2/14/07	2	3	P 7:00	7:10	nd	nd	nd	nd	0	0
23g	MF	Greenwood Beach Roa	2/14/07	2	2	P 6:28	6:38	nd	nd	nd	nd	0	0
23g	MF	Greenwood Beach Roa	2/14/07	2	2	P 7:15	7:25	nd	nd	nd	nd	0	0
23g	MF	Greenwood Beach Roa	2/14/07	2	1	P 6:46	6:56	nd	nd	nd	nd	0	0
23g	MF	Greenwood Beach Roa	2/14/07	2	1	P 7:35	7:45	nd	nd	nd	nd	0	0
23g	MF	Greenwood Beach Roa	3/1/07	3	3	P 17:05	17:15	nd	nd	nd	nd	0	0
23g	MF	Greenwood Beach Roa	3/1/07	3	2	P 17:20	17:30	nd	nd	nd	nd	0	0
23g	MF	Greenwood Beach Roa	3/1/07	3	1	P 17:37	17:47	nd	nd	nd	nd	0	0
23g	MF	Greenwood Beach Roa	3/1/07	3	3	P 17:51	18:01	nd	nd	nd	nd	0	0
23g	MF	Greenwood Beach Roa	3/1/07	3	2	P 18:05	18:15	nd	nd	nd	nd	0	0
23g	MF	Greenwood Beach Roa	3/1/07	3	1	P 18:21	18:31	nd	nd	nd	nd	0	0
23h	MF	Strawberry Point	3/4/07	1	1	P 6:10	6:20	nd	nd	nd	nd	0	0
23h	MF	Strawberry Point	3/4/07	1	2	P 6:25	6:35	nd	nd	nd	nd	0	0
23h	MF	Strawberry Point	3/4/07	1	3	P 6:45	6:55	nd	nd	nd	nd	0	0
23h	MF	Strawberry Point	3/4/07	2	3	P 7:30	7:40	nd	nd	nd	nd	0	0
23h	MF	Strawberry Point	3/4/07	2	2	P 7:45	7:55	nd	nd	nd	nd	0	0
23h	MF	Strawberry Point	3/4/07	2	1	P 7:50	8:00	nd	nd	nd	nd	0	0
23h	MF	Strawberry Point	3/22/07	3	3	P 18:40	18:50	nd	nd	nd	nd	0	0
23h	MF	Strawberry Point	3/22/07	3	2	P 18:50	19:00	nd	nd	nd	nd	0	0
23h	MF	Strawberry Point	3/22/07	3	1	P 19:05	19;15	nd	nd	nd	nd	0	0
23h	MF	Strawberry Point	3/22/07	3	3	P 19:23	19:33	nd	nd	nd	nd	0	0
23h	MF	Strawberry Point	3/22/07	3	2	P 19:37	19:47	nd	nd	nd	nd	0	0
23h	MF	Strawberry Point	3/22/07	3	1	P 19:52	20:02	nd	nd	nd	nd	0	0
04j	MF	CMC mouth-Ferry Side	2/4/07	1	3	P 6:29	6:29	50	100	110	CLRA	1	1
04j	MF	CMC mouth-Ferry Side	2/4/07	1	3	P 6:29	6:32	>200	>200	70-80	CLRA	2	2
04j	MF	CMC mouth-Ferry Side	2/4/07	1	3	P 7:58	8:08	nd	nd	nd	nd	0	0
04j	MF	CMC mouth-Ferry Side	2/4/07	1	4	P 6:43	6:53	nd	nd	nd	nd	0	0
04j	MF	CMC mouth-Ferry Side	2/4/07	1	4	P 8:10	8:20	nd	nd	nd	nd	0	0
04j	MF	CMC mouth-Ferry Side	2/4/07	1	2	P 7:05	7:15	nd	nd	nd	nd	0	0
04j	MF	CMC mouth-Ferry Side	2/4/07	1	2	P 7:42	7:52	nd	nd	nd	nd	0	0
04j	MF	CMC mouth-Ferry Side	2/4/07	1	1	P 7:19	7:29	nd	nd	nd	nd	0	0
04j	MF	CMC mouth-Ferry Side	2/4/07	1	1	P 7:30	7:40	nd	nd	nd	nd	0	0
04j	MF	CMC mouth-Ferry Side	2/22/07	2	1	P 17:00	17:10	nd	nd	nd	nd	0	0
04j	MF	CMC mouth-Ferry Side	2/22/07	2	2	P 17:11	17:21	nd	nd	nd	nd	0	0
04j	MF	CMC mouth-Ferry Side	2/22/07	2	3	P 17:30	17:40	nd	nd	nd	nd	0	0
04j	MF	CMC mouth-Ferry Side	2/22/07	2	4	P 17:45	17:47	70	75	155-165	CLRA	1	1
04j	MF	CMC mouth-Ferry Side	2/22/07	2	4	P 17:45	17:54	200+	200+	?	CLRA	2	2
04j	MF	CMC mouth-Ferry Side	2/22/07	2	4	P 17:55	17:55	35	40	200-210	CLRA	1	1

Table 3. Census results, station-by-station

04j	MF	CMC mouth-Ferry Side	2/22/07	2	4	P	17:55	17:55	130	140	210-22(	CLRA	1	1
04j	MF	CMC mouth-Ferry Side	2/22/07	2	4	P	17:55	17:56	>200	>200	165-17(	CLRA	2	2
04j	MF	CMC mouth-Ferry Side	2/22/07	2	4	P	17:55	17:57	>200	>200	165-17(	CLRA	2	2
04j	MF	CMC mouth-Ferry Side	2/22/07	2	4	P	17:55	17:58	>200	>200	165-17(	CLRA	2	2
04j	MF	CMC mouth-Ferry Side	2/22/07	2	4	P	17:55	18:00	>200	>200	165-17(	CLRA	2	2
04j	MF	CMC mouth-Ferry Side	2/22/07	2	4	P	17:55	18:02	>200	>250	110-13(	CLRA	2	2
04j	MF	CMC mouth-Ferry Side	2/22/07	2	4	P	17:55	18:04	30	35	160-17(	CLRA	2	2
04j	MF	CMC mouth-Ferry Side	2/22/07	2	3	P	18:13	18:23	nd	nd	nd	nd	0	0
04j	MF	CMC mouth-Ferry Side	3/12/07	3	1	P	6:38	6:38	nd	nd	nd	nd	0	0
04j	MF	CMC mouth-Ferry Side	3/12/07	3	2	P		6:52	nd	nd	nd	nd	0	0
04j	MF	CMC mouth-Ferry Side	3/12/07	3	3	P		7:11	nd	nd	nd	nd	0	0
04j	MF	CMC mouth-Ferry Side	3/12/07	3	4	P		7:29	nd	nd	nd	nd	0	0
04j	MF	CMC mouth-Ferry Side	3/12/07	3	1	P		7:50	nd	nd	nd	nd	0	0
04j	MF	CMC mouth-Ferry Side	3/12/07	3	2	P		8:04	nd	nd	nd	nd	0	0
04j	MF	CMC mouth-boardwalk	2/17/07	1	1	P	6:10	6:20	nd	nd	nd	nd	0	0
04j	MF	CMC mouth-boardwalk	2/17/07	1	ו rou	P	6;21	6:21	150	200	130-15(	CLRA	1	1
04j	MF	CMC mouth-boardwalk	2/17/07	1	ו rou	P	6:22	6:22	>200	>200	90-110	CLRA	2	2
04j	MF	CMC mouth-boardwalk	2/17/07	1	ו rou	P	6:27	6:27	?	?	40-50	CLRA	2	2
04j	MF	CMC mouth-boardwalk	2/17/07	1	ו rou	P	6:28	6:28	>200	>200	90	CLRA	2	2
04j	MF	CMC mouth-boardwalk	2/17/07	1	2	P	6:29	6:29	>200	>200	100	CLRA	2	2
04j	MF	CMC mouth-boardwalk	2/17/07	1	2	P	6:29	6:30	>200	>200	100-11(	CLRA	2	2
04j	MF	CMC mouth-boardwalk	2/17/07	1	3	P	6:51	6:52	200	250	100-11(	CLRA	2	2
04j	MF	CMC mouth-boardwalk	2/17/07	1	3	P	6:51	6:53	200	250	100-11(	CLRA	2	2
04j	MF	CMC mouth-boardwalk	2/17/07	1	3	P	6:51	6:57	150	200	210-22(	CLRA	1	1
04j	MF	CMC mouth-boardwalk	2/17/07	1	ו rou	P	6;58	6:58	150	200	100-11(	CLRA	2	2
04j	MF	CMC mouth-boardwalk	2/17/07	1	ו rou	P	6:59	6:58	120	150	250-26(	CLRA	2	2
04j	MF	CMC mouth-boardwalk	2/17/07	1	ו rou	P	6:59	6:59	150	150	150	CLRA	1	1
04j	MF	CMC mouth-boardwalk	2/17/07	1	4	P	7:11	7:11	130	210	210-22(	CLRA	1	1
04j	MF	CMC mouth-boardwalk	2/17/07	1	4	P	7:21	7:28	130	140	250-26(	CLRA	2	2
04j	MF	CMC mouth-boardwalk	2/17/07	1	4	P	7:21	7:28	150	200	130-15(	CLRA	2	2
04j	MF	CMC mouth-boardwalk	2/17/07	1	4	P	7:21	7:37	120	200	240-25(	CLRA	1	1
04j	MF	CMC mouth-boardwalk	2/17/07	1	4	P	7:21	7:37	150	200	110-12(	CLRA	2	2
04j	MF	CMC mouth-boardwalk	2/17/07	2	3	P	7:45	7:58	70	80	20-240	CLRA	1	1
04j	MF	CMC mouth-boardwalk	2/17/07	2	2	P	7:59	8:09	nd	nd	nd	nd	0	0
04j	MF	CMC mouth-boardwalk	2/17/07	2	1	P	8:13	8:23	nd	nd	nd	nd	0	0
04h	MF	CMC-Bon Aire upstrea	2/20/07	1	2	P	17:00	17:10	nd	nd	nd	nd	0	0
04h	MF	CMC-Bon Aire upstrea	2/20/07	1	3	P	17:14	17:24	nd	nd	nd	nd	0	0
04h	MF	CMC-Bon Aire upstrea	2/20/07	1	4	P	17:27	17:37	nd	nd	nd	nd	0	0
04h	MF	CMC-Bon Aire upstrea	2/20/07	1	5	P	17:45	17:55	nd	nd	nd	nd	0	0
04h	MF	CMC-Bon Aire upstrea	3/9/07	2	2	P	5:50	6:00	nd	nd	nd	nd	0	0
04h	MF	CMC-Bon Aire upstrea	3/9/07	2	5	P	6:04	6:14	nd	nd	nd	nd	0	0
04h	MF	CMC-Bon Aire upstrea	3/9/07	2	3	P	6:21	6:31	nd	nd	nd	nd	0	0
04h	MF	CMC-Bon Aire upstrea	3/9/07	2	4	P	6:40	6:50	nd	nd	nd	nd	0	0
04h	MF	CMC-Bon Aire upstrea	3/9/07	2	ו rou	P	7:05	7:05	75	75	360-20(	CLRA	1	1
04i	JE	CMC-Bon Aire downstr	2/28/07	1	4	A	17:00	17:10	nd	nd	nd	nd	0	0
04i(1)	JE	Murphy Creek/McCallis	2/28/07	1	1	A	17:30	nd	nd	nd	nd	nd	0	0

Table 4. Preliminary estimate of rail numbers in selected marshes

Visit_ID	sitename	Site total minlower	Site total mx	pair/min	pair max
18e	Sam Trans Peninsula	18	22	9	13
18g,h	San Bruno Marsh, north shore	12	14	6	7
18a	Colm Creek	4	4	2	2
18b	Navigable Slough	2	4	1	2
22a	Wildcat North	9	12	4	6
22a	Wildcat South	8	8	4	4
04a	Muzzi Marsh south	18	18	9	10
04a	Muzzi Marsh north	10	10	5	5
04c,d	Piper Park	4	6	2	3
23j	Bothin Marsh	2	10	1	4
04g	Creekside Park	6	8	3	4
23g	Greenwood Beach Road	0	0	0	0
23h	Strawberry Point	0	0	0	0
04j	CMC mouth-ferry terminal side	2	6	1	3
04j	CMC mouth-Greenbrae boardwalk*	20	30	10	15
04h	CMC-Bon Aire upstream	1	2	0	1
04i	CMC-Bon Aire donstream	0	0	0	0
04i(1)	Murphy Creek/McCallister	0	0	0	0

* estimate includes detections from adjacent marshes