ISLAND PONDS MITIGATION
MONITORING AND REPORTING
YEAR 7 – 2012

Prepared by

Santa Clara Valley Water District
U.S. Fish and Wildlife Service - Don Edwards National Wildlife Refuge

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EXECUTIVE SUMMARY

The Santa Clara Valley Water District (District) and the U.S. Fish and Wildlife Service Don Edwards National Wildlife Refuge (Refuge) implemented the Island Ponds Restoration Project to fulfill two goals: 1) to initiate ecological restoration activities as described in the South Bay Salt Pond Initial Stewardship Plan (ISP), and 2) to satisfy the tidal marsh mitigation needs of both the Refuge for the ISP, and the District for the Stream Maintenance Program and the Lower Guadalupe River Project.

Breaching of the Island Ponds (Ponds A19, A20, and A21) occurred in March 2006. Five breaches were cut to allow tidal waters to inundate the ponds and begin the process of restoration. In the Restoration and Mitigation Monitoring Plan for the Island Pond Restoration Project (RMMP), the District and the Refuge agreed to conduct monitoring to track the progress of the restoration. This report presents the Year 7 (2012) monitoring results for both the District and the Refuge.

The following is a summary of the monitoring results:

Seven years after breaching, sediment is continuing to accumulate in all three Ponds. Vegetation growth has shown a rapid expansion. In fall 2006, 5.75 acres was documented in the ponds exclusively on the in-board side of the levee, adjacent to the borrow ditches. Currently 62.25 acres of native vegetation has established collectively in the three Ponds, with the majority (> 48 acres) colonizing in Pond A21. On average there is 54% total native vegetative cover in patches that are larger than 2 acres in size. Pond A20 has the highest total vegetative cover of the Ponds with a 76% average, while Pond A19 had the lowest at 28% cover.

No California clapper rail were detected near Pond A21 during the Refuge's spring call-count surveys. However, one clapper rail was detected audibly further upstream within the Coyote Creek bypass channel during surveys by the District in March 2012.

Data collected from 2008 through 2012 indicates that deterioration along the inboard slope of the southeast levee of Pond A21 is still occurring. At this time, the levee doesn't appear to be at risk of failure however, future evaluations and measurements are planned until the data indicates that the levee width has stabilized.

1.0 INTRODUCTION

1.1 PROJECT BACKGROUND

In March 2006 the Santa Clara Valley Water District (District) and U.S. Fish and Wildlife Service (USFWS) Don Edwards National Wildlife Refuge (Refuge) restored tidal inundation to the 475-acre Island Pond Complex (the ponds). Five breaches were cut by an amphibious excavator along the south side of the ponds to allow tidal waters to inundate the ponds and begin the process of restoration. Two breaches (west and east) were cut in Pond A19 on March 7, 2006. A single breach was cut in Pond A20 on March 13, 2006. Two breaches (west and east) were cut in Pond A21, on March 21 and March 29, 2006, respectively.

This restoration approach is a minimally engineered, passive design, which relies on the natural sedimentation processes to restore the ponds to tidal marsh habitat and meet the project goals and objectives. The overall restoration goal is to successfully reestablish vegetation, promote re-colonization by benthic organisms and provide habitat for various wildlife species.

Restoration of the Island Ponds is a component of the Initial Stewardship Plan (ISP) for the larger South Bay Salt Pond Restoration Project (Life Science!, 2003). The District and the Refuge implemented the Island Ponds Restoration Project to fulfill two goals:

1. To initiate ecological restoration activities as described in the South Bay Salt Pond ISP
2. To satisfy the tidal marsh mitigation needs of both the Refuge for the ISP and the District for the Stream Maintenance Program (SMP) and Lower Guadalupe River Project (LGRP).

In the Restoration and Mitigation Monitoring Plan for the Island Pond Restoration Project (RMMP), the District and the Refuge agreed to conduct long-term monitoring to track the progress of the restoration and to evaluate whether there were adverse effects from the project (USFWS et al., 2006). Mitigation monitoring activities were anticipated to continue for 15 years. This report presents the Year 7 (2012) monitoring results.

1.2 PROJECTS WHICH REQUIRED MITIGATION

Initial Stewardship Plan (ISP)

The ISP was created as an interim step to manage the ponds while a long-term plan was developed for the entire South Bay Salt Pond area. The main objectives of the ISP are to:

- cease commercial salt operations,
- introduce tidal hydrology to the ponds where feasible,
- maintain existing high quality open water and wetland wildlife habitat, including habitat for migratory and resident shorebirds and waterfowl,
- assure ponds are maintained in a restorable condition to facilitate future long-term restoration,

- minimize initial stewardship management costs,
- meet all regulatory requirements, especially discharge requirements to maintain water quality standards in the South Bay.

Taking into account the environmental effects of implementing the ISP based on the assessment in the EIR/EIS (Life Science!, 2004) and the associated permit requirements, the Refuge has agreed to restore unimpeded tidal inundation to approximately 475 acres at the Island Ponds and restore nine acres of tidal marsh specifically at Pond A21.

The permit file number for ISP activities which require tidal wetland mitigation is the San Francisco Bay Regional Water Quality Control Board - Order # R2-2004-0018.

Stream Maintenance Program (SMP)

The SMP allows the District to implement routine stream and canal maintenance projects to meet the District's flood protection and water supply mandates in a feasible, cost-effective, and environmentally-sensitive manner. This program is also intended to assist the District in obtaining multi-year permits for these activities, which have currently been issued through 2012. The SMP applies to all of the District's routine stream maintenance, including three major types of activities: sediment removal, vegetation management, and bank protection. SMP activities commenced soon after the District received its final SMP permit in August 2002.

The SMP compensatory mitigation package includes mitigation for impacts to 30 acres of tidal wetlands; 29 acres from sediment removal activities and one acre from vegetation management activities. Taking into account the assessment in the EIR/EIS and the associated permit requirements, the District has agreed to restore 30 acres within the Island Ponds to tidal marsh habitat as mitigation for implementation of the SMP.

Permit file numbers for SMP activities which require tidal wetland mitigation are:

- San Francisco Bay Regional Water Quality Control Board - Order # R2-2002-0028
- U.S. Army Corp of Engineers - Permit # 22525S
- California Department of Fish and Game – 1601 Lake and Streambed Alteration Agreement # R3-2001-0119
- U.S. Fish and Wildlife Service – Biological Opinion 1-1-01-F-0314

Lower Guadalupe River Project (LGRP)

The LGRP was constructed to convey design flood flows in the Lower Guadalupe River between Interstate 880, in downtown San Jose, and the Union Pacific Railroad Bridge in Alviso. The project was designed to balance the needs for flood-control structures and channel maintenance with the goal of

protecting and enhancing environmental conditions and public access. LGRP construction began in April 2003.

The LGRP compensatory mitigation package includes mitigation for both temporary and permanent impacts to wetland vegetation. Taking into account the assessment in the EIR/EIS and the associated permit requirements, the District has agreed to restore 35.54 acres to tidal marsh within the Island Ponds to mitigate for LGRP impacts.

Permit file numbers for LGRP activities which require tidal wetland mitigation are:

- San Francisco Bay Regional Water Quality Control Board - Order # R2-2002-0089
- U.S. Army Corp of Engineers - Permit # 24897S
- California Department of Fish and Game – 1601 Lake and Streambed Alteration Agreement # R3-2002-0732

1.3 ISLAND PONDS MITIGATION SITE

Site Description

The Island Ponds (Ponds A19, A20, and A21) are located at the extreme southern extent of the San Francisco Bay within Coyote Creek. The ponds are in Alameda County immediately north of the Santa Clara County line, in the City of Fremont (Figure 1). These ponds are part of a larger 25-pond system known as the Alviso Complex. Prior to their 2006 breaching, this complex contained 7,364 acres of pond habitat, 420 acres of saltmarsh outboard of the pond levees, 896 acres of brackish marsh in the adjacent sloughs and creeks, as well as associated upland (levee) and subtidal habitats (HTH et al., 2005).

Solar salt production began at the Alviso Complex in 1929 and continued until the ponds were purchased by State and Federal Agencies in 2003. The Island Ponds were middle stage salt evaporator ponds with intermediate salinity levels. In March 2006, the District and the Refuge cut five breaches on the south side of the ponds to allow full tidal inundation and permit the ponds to passively restore to tidal marsh habitat.

Mitigation Monitoring

The District and the Refuge agreed to conduct a long-term monitoring program to track the progress of the Island Ponds restoration. The RMMP details the monitoring activities which are designed to track mitigation performance over a 15-year period (USFWS et al., 2006). The monitoring data will be compared from year to year to determine if the project is meeting performance criteria, permit requirements, and to provide data for adaptive management actions, if necessary.

Table 1-1 describes the monitoring schedule for the Island Ponds, including monitoring duration, frequency and timing. Table 1-1 also depicts the division of monitoring responsibilities between the District and the Refuge.

Table 1-1. Mitigation Monitoring Schedule for the Island Ponds – Responsible Party, Monitoring Duration, Frequency and Timing.

Responsible Party	Monitoring Activity	Year(s) for Each Monitoring Activity [1]	Frequency	Seasonal Timing
On-Site Monitoring				
District	Inundation regime	Years 1, 2, 3, 5, 10, and 15 (or until two monitoring cycles indicate that full tidal exchange has been achieved)	Completed Task 2006 - 2007	---
	Substrate development	a) Years 1 and 2	Completed Task 2006-2007	---
		b) Years 3 to 5	Completed Task 2010	---
		c) Year 6 to 30 acres of vegetation	30 acres of Vegetation Established in 2010-Task complete	---
	Levee breach and outboard marsh channel geometry[3]	Years 1, 2, 3, 5, 10, and 15	Annual	With aerial
	Aerial photo	a) Year 1 to 5, 10, and 15	Annual	Jul - Aug
		b) Year 7, 9, 11 … to end	Biennial	Jul - Aug
Refuge	Channel network evolution[3]	Years 1, 2, 3, 5, 10, and 15	Annual	With aerial
	Vegetation mapping[3]	Until mitigation achieved	Biennial	Jul - Aug[2]
	Ground-based quantitative vegetation sampling **(SCVWD agreed to perform this sampling for the first year- 2012)**	Once 30 acres of vegetated area is established until 75 acres of 75% vegetation cover is achieved	Biennial	Jul - Aug[2]
	Invasive *Spartina* monitoring and control	Year 1 to 75% native vegetation cover	Annual	Sept - Nov
	Wildlife use (CLRA)	Begin when 30 acres native vegetation to detection	Annual	Jan - Apr 15
	Wildlife use (SMHM)	Begin at five acres contiguous suitable habitat, end at SMHM detected	Once every 5 years	Jun - Aug
	Wildlife use (shorebirds & waterfowl)	Years 1 to 5	Completed Task 2010	---

Off-Site Monitoring				
District	Rail bridge pier scour[4]	a) Years 1 to 5	Completed Task 2006-2008	---
		b) Years 1 to 5	Completed Task 2010	---
		c) Begin at implementation of corrective measures, end five years after	N/A	---
	Fringing marsh scour in Coyote Creek[3]	a) Years 1 to 5, Final year	Annual	With aerial
	Scour of levees opposite breaches[3]	a) Years 1 to 3	Completed Task 2006 – 2008	---
		b) If outboard marsh retreats to levees opposite breach, then three additional years from occurrence	N/A	---
	Rail line erosion	a) Years 1 to 5	Completed Task 2010	---
		b) Years 1 to 5	Completed Task 2010	
	Deterioration of Town of Drawbridge structures	a) Years 1 to 5	Completed Task 2010	---
Refuge	Water Quality	a) Adjacent to breaches – Year 1	Completed Task 2006	---
		b) Upstream & downstream of ponds – Year 1	Completed Task 2006	---

* (Grayed out tasks above are considered complete)

[1] Projected time estimates to achieve performance criteria. Actual duration is dependent upon performance criteria and may vary.

[2] If CLRA are detected, on-site vegetation monitoring is only allowed from Sept 1 to Jan 31.

[3] Monitoring to use aerial photograph.

[4] Bridge pier scour will continue to be monitored twice a year by the Union Pacific Railroad staff instead of additional monitoring being performed by this Project. (See Year 3-2008 monitoring report for additional details.)

This report presents the monitoring results collected during the Year 7 (2012) monitoring period. The data are presented in detail and are compared to the prior years' results as well as the overall project performance criteria identified in the RMMP (USFWS et al., 2006).

Performance Criteria

The performance criteria for the Island Ponds are specific to the mitigation needs of the Refuge and the District.

The performance criteria for the ISP mitigation are:

- Restore unimpeded tidal action to approximately 475 acres,
- Restore nine acres of vegetated tidal marsh located within a larger marsh area in Pond A21,

- Vegetation covers no less than 75% of the nine acres,
- Plant species composition consists of native tidal marsh species appropriate to the salinity regime,
- Targets achieved within 15 years following levee breach.

The performance criteria for the SMP mitigation are:

- Restore 30 acres of vegetated tidal marsh located within a larger marsh area on the three Island Ponds,
- Vegetation covers no less than 75% of the 30 acres,
- Plant species composition consists of native tidal marsh species appropriate to the salinity regime,
- Presence of California clapper rail at the Island Ponds as detected by a positive response to rail call counts using USFWS Endangered Species Office approved survey protocols. (This performance criterion for the clapper rail mitigation requirement was established by the District through negotiations with the USFWS Endangered Species Office in December 2005.)
- Targets achieved within 15 years following levee breach.

The performance criteria for the LGRP mitigation are:

- Restore 35.54 acres of vegetated tidal marsh located within a larger marsh area on the three Island Ponds,
- Vegetation covers no less than 75% of the 35.54 acres,
- Plant species composition consists of native tidal marsh species appropriate to the salinity regime,
- Targets achieved within 15 years following levee breach.

1.4 CONTACTS

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2.0 MONITORING METHODS

This section describes the methods used to carry out the Year 7 monitoring activities for both the District and the Refuge.

2.1 ON-SITE MONITORING

2.1.1 Aerial Photography (District)

Per the Adaptive Management Teams recommendations from 2010, satellite photographs were obtained for use in the Year 7 monitoring activities. The images were taken using the GeoEye-1 satellite which captures sub-half meter, high resolution, commercial satellite imagery. The satellite achieves this accuracy by simultaneously acquiring 0.41-meter panchromatic and 1.65-meter multispectral imagery. Images were captured at approximately 10:30 am at low tide on August 20, 2012. Images were acquired in both color and infrared. The spatial extent of the images included all three Island Ponds as well as the northern and southern banks of Coyote Creek. For 2012, these images were used exclusively for the aerial photography vegetation mapping task (see Section 2.1.2 below).

2.1.2. Biennial Aerial Photography Vegetation Mapping (Refuge)

The RMMP states, “Vegetation monitoring will solely consist of biennial examinations of ortho-rectified aerial photographs until a minimum of 30 acres of vegetation has established in the project area.” This biennial requirement was last done in 2010 (Year 5) when > 30 acres of vegetation was mapped within the Ponds. For Year 7 (2012), quantitative ground based vegetation sampling was initiated in addition to the aerial photo mapping (see Section 2.1.3 below).

Satellite photography utilized for this task was captured in August 2012 (see section 2.1.1 above). Color infrared photographs were examined by Refuge staff using GIS software to delineate and digitize the locations of plant colonization at the Island Ponds.

2.1.3 Ground-Based Quantitative Vegetation Sampling (District)

The RMMP states,” Once a minimum of 30 acres of vegetation establishes in the study area, biennial quantitative sampling will be initiated coincident with the aerial photo mapping”. The Year 5 (2010) results showed that > 30 acres of vegetation had established within the ponds. Therefore, for Year 7 (2012) the Refuge continued the aerial photo mapping and the District agreed to conduct the first year of ground based vegetation sampling to further refine the techniques discussed in the RMMP.

Per the RMMP, sampling occurred in native-dominated vegetation patches of 2 acres in size or larger with a minimum of 50% total vegetative cover (referred to as “qualifying patches”). Based on the 2010 vegetation mapping there were not enough qualifying patches to stratify the sampling as prescribed in the RMMP, therefore all patches which met the criteria were sampled. This included 3 qualifying patches on

the ponds surface in Pond A21. Ponds A20 and A19 did not have any vegetation patches on the ponds surface that were large enough to meet the criteria, however the in-board slopes adjacent to the borrow ditches within each of these ponds were large enough and therefore deemed qualifying patches. Some of the in-board patches in Pond A19 and the patches on the surface of Pond A21 didn't meet the 50% cover threshold, but were sampled anyhow to determine how things were progressing at the site. In total 95 quadrats were sampled throughout the ponds.

Sampling was performed at low tide using a 1 meter square quadrat in July 2012. A minimum of 5 quadrats and a maximum of 15 quadrats were sampled within each "qualifying patch" dependent on the size of the patch, diversity of species and variation in recorded percent cover. Total vegetative cover was measured and cover of each species present was documented to the nearest 5% cover category within each quadrat. Maximum vegetation height was also measured.

According to the RMMP, ground based vegetation monitoring is anticipated to continue on a biennial schedule until the success criterion is met (i.e., 75 acres at 75% vegetative cover) or sooner if, as the marsh develops, the sampling is deemed unnecessary (e.g., the aerial mapping is accurate enough), unsafe, or infeasible by the adaptive management team

2.1.4. Wildlife Monitoring (Refuge)

The Wildlife Monitoring Task for the Island Ponds is described in the RMMP as follows: "The Initial Stewardship Project anticipates that restoration of the Island Ponds to tidal marsh will provide long-term ecological benefits to native birds (particularly California clapper rails) and mammal species (particularly salt marsh harvest mice). In addition, the District has chosen presence of California clapper rail as a performance criterion to measure success of their SMP mitigation requirements. Although there are no performance criteria or success criteria associated with the presence of other wildlife species, the project partners agreed it was prudent to incorporate a wildlife component into this monitoring program. Monitoring for bird and mammal species will reveal whether restoration of tidal exchange at the Island Ponds produce the anticipated benefits to native wildlife species."

A) **California clapper rail monitoring –** The Refuge monitored for California clapper rail within the Island Ponds in the spring of 2012 since more than 30 acres of native vegetation had developed within the Ponds. Call-count surveys were performed using USFWS protocol from levees surrounding Pond A21.
B) **Salt marsh harvest mouse monitoring –** The Refuge will monitor for salt marsh harvest mice in the Island Ponds as soon as five acres of contiguous suitable habitat develops. As of Year 7 (2012), there was not enough suitable habitat available for the salt marsh harvest mouse.
C) **Waterfowl and shorebird species** – The avian monitoring task has been completed. Quarterly avian monitoring began in Year 1 (2006) and continued through Year 5 (2010).

2.2 OFF-SITE MONITORING

2.2.1 Accelerated Deterioration of the Town of Drawbridge (District)

The RMMP states that Deterioration of the Town of Drawbridge will be assessed visually and that any evidence of accelerated erosion will be reported. The monitoring activities undertaken for this task consist of monitoring the integrity of the pond levees adjacent to the Town of Drawbridge. This requirement was anticipated to be completed in Year 5 (2010), however, monitoring of the eastern levee of Pond A21 has annually detected signs of levee erosion in this location. Therefore, it was agreed that monitoring in this location would continue until the erosion had stabilized.

In 2008, a benchmark and location stakes were installed in the southeast corner of Pond A21 to enable more accurate tracking of erosion advancement along this levee which has been seemingly caused by wave action and levee overtopping. An elevation was assigned to the benchmark which references the northwest abutment of the Coyote Creek railroad bridge. (The top of the benchmark is 4.55 ft lower than the bridge abutment.) Location stakes were installed to form a series of eight cross sections along the top of the levee and baseline elevations were gathered immediately adjacent to each stake. Annual site visits obtain elevations at each stake and document any changes.

On August 14, 2012, a Civil Engineer from the District performed the surveying work discussed above to collect surface elevation data at the eight cross section locations along the Pond A21 levee.

3.0 MONITORING RESULTS

This section describes the results of both the District and Refuge's 2012 (Year 7) monitoring activities.

3.1 ON-SITE MONITORING

3.1.1 Biennial Aerial Photography Vegetation Mapping (Refuge)

Before the breaching in 2006, the Island Ponds had no established vegetation due to 99% of the total area being covered with a hard salt crust gypsum layer (H.T. Harvey & Associates 2005). The Island Pond Complex had also become subsided since diking, and plant colonization was expected to occur only when sedimentation levels reached the appropriate marsh plain elevation.

Currently, vegetation has established at all three Ponds, with a total of 62.25 acres within the three Ponds (Table 3-1). Pond A21 continues to have the most vegetation (Figure 2). Elevation and sedimentation levels in Pond A21 are now seemingly ideal for complete marsh plain vegetation establishment.

In general, the Ponds continue to show rapid expansion from the baseline of 5.75 acres in 2006. In 2007, vegetation increased 73%, 2008 it increased 33%, 2010 it increased 135%, and in 2012 it increased by 100% (doubling the vegetation acreage from 2010; Table 3-1). A21 has by far the most vegetation and, in 2012, the vegetation there more than doubled the previous amount. Vegetation has expanded to cover most of the center and western portions of A21 and small patches of vegetation are forming in the east (Figure 2). The vegetation in Pond A20 showed a substantial 64% increase and has expanded to include many interior areas of the pond (Figure 3). Finally, Pond A19 had a more modest 35% growth but it also includes small patches in the interior of the pond, which are newly mapped vegetated areas (Figure 4).

Table 3-1. Comparison of Established Marsh Vegetation at the Island Ponds from 2006 – 2012.

Year	Pond	Acreage of Native Salt Marsh Vegetation	Percent Change in Acreage from Previous Year Mapped
2006	A19	2.99	
	A20	1.56	
	A21	1.20	
	total	5.75	
2007	A19	5.10	70.6
	A20	2.20	41.0
	A21	2.65	120.8
	total	9.96	73.2
2008	A19	6.07	19.0
	A20	2.93	33.2
	A21	4.29	61.9
	total	13.29	33.4

2010	A19	6.42	5.77
	A20	3.18	8.53
	A21	21.59	403.3
	total	31.19	134.7
2012	A19	8.65	34.74
	A20	5.21	63.84
	A21	48.39	124.13
	total	62.25	99.58

3.1.2 Ground-Based Quantitative Vegetation Sampling (District)

The vegetation success criteria for the Island Ponds states that "74.54 acres of vegetated tidal marsh habitat must be restored to satisfy the mitigation requirements of the District and the Refuge." In addition it is specified that vegetation should cover no less than 75% of the 74.54 acres and the plant species composition should consist of native tidal marsh species. These success criteria are anticipated to be met within a 15 year timeframe.

The interior of the Island Ponds site is overwhelmingly dominated by native vegetation therefore, the term total cover below refers to total native vegetative cover. Amongst the 95 quadrats which were sampled throughout the 3 Ponds, the average total native vegetative cover was 54% (Table 3-2). The vegetation growing along the in-board slope adjacent to the borrow ditch in Pond A21 typically displayed a higher percent cover category than the vegetation growing on the ponds surface. The in-board slope had more total cover (70% vs. 43% cover), less bare soil (8% vs. 55% bare soil), and more litter (22% vs. 2% litter) than the sampling sites on the surface of Pond A21. Maximum vegetation height, however, was similar between the inboard slopes and the patches on the surface of the pond (~25 inches; Table 3-2).

Comparing the sampling results for the slopes adjacent to the borrow ditches in all three Ponds; Pond A19 displayed the lowest total vegetative cover of all three ponds with an average of 28% cover. Pond A20 had the highest overall cover with 76% total cover and Pond A21 was in the middle with 70% total vegetative cover (Table 3-2).

Annual pickleweed (*Salicornia europaea*), perennial pickleweed (*Sarcocornia pacifica*) and *Spartina foliosa* were the dominant species in all 3 ponds, however Pond A19 had the highest diversity of plant species per quadrat adding *Atriplex triangularis*, *Eleocharis parvula*, *Distichlis spicata*, and *Scirpus robustus* to the list of dominants.

Table 3-2. Quantitative Vegetation Sampling Averages for 2012.

Location	Number of Quadrats	Total % Native Cover	% Bare Soil	% Litter	Max Vegetation Height (inches)
Pond A21- Average of the 3 levee slopes	22	70	8	22	25
Pond A21 – Average for the patches on ponds surface	28	43	55	2	25
Pond A20- Average of the 3 levee slopes	16	76	21	3	36
Pond A19- Average of the 3 levee slopes	29	28	67	4	15
Totals & Averages	**95**	**54**	**40**	**6**	**26**

3.1.3 Wildlife Monitoring (Refuge)

California clapper rail monitoring – The Refuge monitored for California clapper rail within Pond A21 in the spring of 2012 (Figure 5). Call-count surveys were performed using USFWS protocol from levees surrounding the pond on the following dates: 24 January, 24 February, and 4 April. No California clapper rails were heard within Pond A21 or in the surrounding outboard marshes.

One clapper rail however, was detected further upstream from the Island Ponds, within the Coyote Creek bypass channel during surveys conducted by the District in March 2012. The rail was heard calling approximately 600 meters upstream of the confluence with Coyote Creek in the bypass channel.

3.2 OFF-SITE MONITORING

3.2.1 Accelerated Deterioration of the Town of Drawbridge (District)

In 2008, field inspectors noted large amounts of debris and litter on top of a section of the Pond A21 levee in the southeast corner, mostly along the marsh vegetation and outboard slope interface. At that time, inspection staff interpreted the deposition of litter and debris as a sign that wave action and wind related run-up had caused floating trash to transfer from the pond area onto the levee surface. To establish an ability to accurately monitor the changes, in December 2008 a surveyed benchmark was installed to assist with collecting surveying measurements at this levee location.

On August 14, 2012, District staff performed basic surveying work to collect surface elevation data at the 8 cross sections previously identified in December 2008. The data collected is shown in Appendix B-1. A

comparison of the data collected in August 2012, October 2011 and December 2008 shows minor, yet consistent degradation of the height of levee surface, averaging less than 2 inches of lost levee material. Lateral measurements taken at this location show continued loss of earthen material along the inboard slope of Pond A21. This inboard levee slope consists of a vertical edge, approximately 2 - 3 feet in height, with debris, slumped material, and newly growing pickleweed along the toe. The offset measurements taken in this location show an overall reduction in total levee width of a couple of inches to over a foot at one cross section during the last ten months. The total loss of levee width at the eight survey locations since 2008 ranges from one foot to almost 4 feet at one of the cross sections.

These measurements confirm the trend shown in previous surveys that the width of the pond levee is decreasing over time, with most locations experiencing more than two feet of lost girth since 2008. At this time, the levee doesn't appear to be at risk of failure, but future evaluations should continue until the data indicates the situation is stable.

4.0 DISCUSSION

Across all three ponds, sediment is continuing to accumulate and beginning to consolidate and form acceptable substrate for vegetation colonization. Currently 62.25 acres of native vegetation has established collectively in the three Ponds, with the majority (> 48 acres) colonizing in Pond A21.

On average there is 54% total native vegetative cover in patches that are larger than 2 acres in size. The vegetation growing adjacent to the borrow ditch in Pond A21 had a higher percent cover than the vegetation growing on the pond surface. This is likely due to the fact that the vegetation adjacent to the borrow ditch established first and has had a couple more years to develop than the newer vegetation growing on the pond's surface. Pond A20 has the highest total vegetative cover of the Ponds with a 76% average, while Pond A19 had the lowest at 28% cover.

No California clapper rail were detected near Pond A21 during the Refuge's spring call-count surveys. However, one clapper rail was detected audibly further upstream within the Coyote Creek bypass channel during surveys by the District in March 2012 (~ 600 meters upstream of the confluence with Coyote Creek).

Data collected from 2008 to 2012 indicates that deterioration along the inboard slope of the southeast levee of pond A21 is still occurring. While the inboard slope lost almost 4 feet of girth in one location and more than 2 feet on average in other locations, the total levee width is more than 12 feet wide at its narrowest location. Levee height measurements, however, have not changed greatly since 2009, indicating that the top of levee isn't experiencing rapid change. At this time, the levee doesn't appear to be at risk of failure, however, future evaluations and measurements are planned until the data indicates that the width of the levee has become stable.

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6.0 LIST OF PREPARERS

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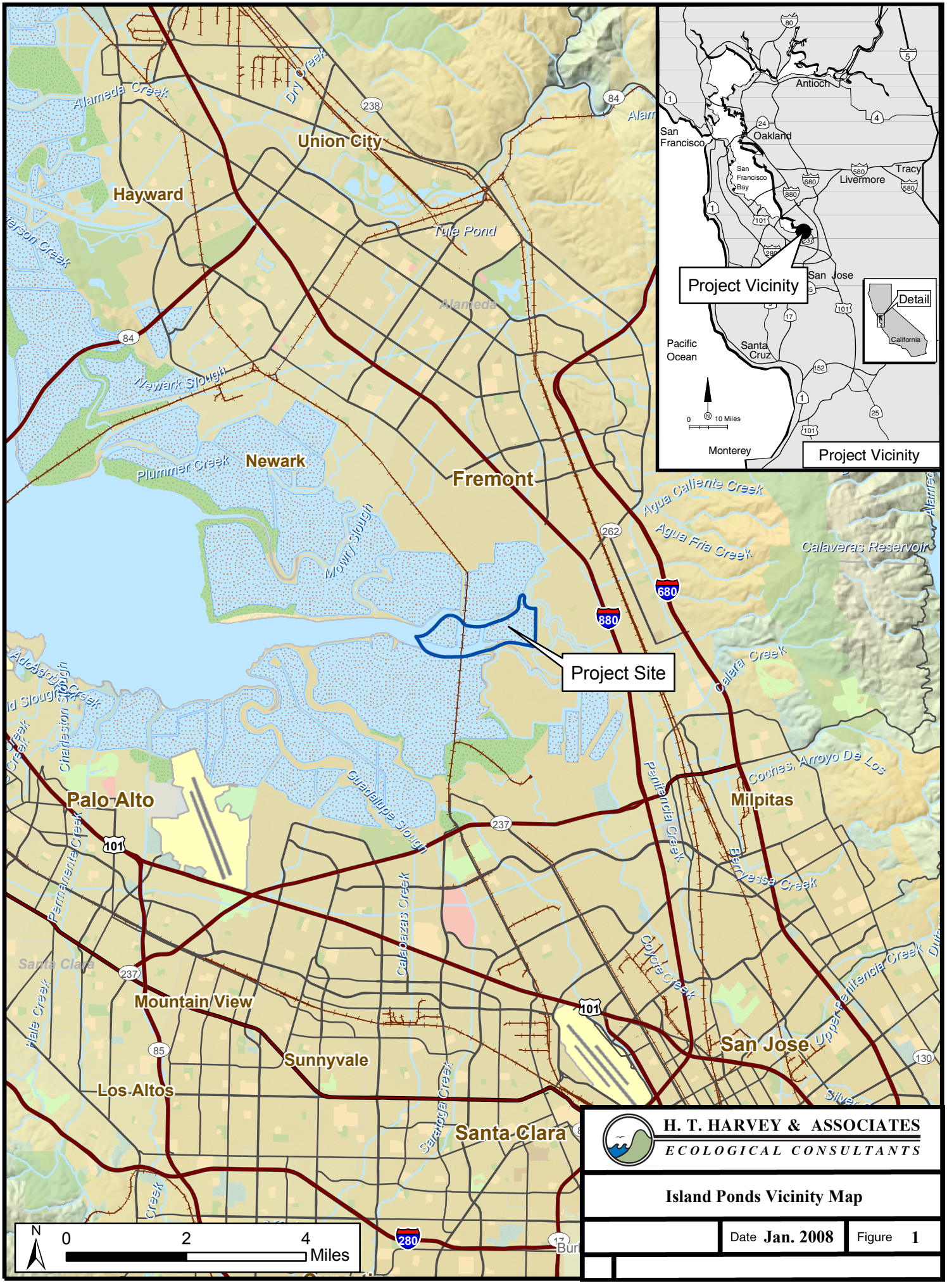
7.0 FIGURES


Project Vicinity
Project Site
Union City
Hayward
Newark
Fremont
Palo Alto
Mountain View
Sunnyvale
Los Altos
Santa Clara
San Jose
Milpitas
Alameda Creek
Dry Creek
Tule Pond
Alameda
Newark Slough
Plummer Creek
Mowry Slough
Agua Caliente Creek
Agua Fria Creek
Calaveras Reservoir
Calera Creek
Coches, Arroyo De Los
Penitencia Creek
Berryessa Creek
Coyote Creek
Upper Penitencia Creek
Guadalupe Slough
Calabazas Creek
Permanente Creek
Hale Creek
Saratoga Creek
Charleston Slough
Adobe Slough
Antioch
San Francisco
Oakland
San Francisco Bay
Livermore
Tracy
San Jose
Pacific Ocean
Santa Cruz
Monterey
Detail
California
0 10 Miles
N
0 2 4 Miles
H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS
Island Ponds Vicinity Map
Date Jan. 2008
Figure 1

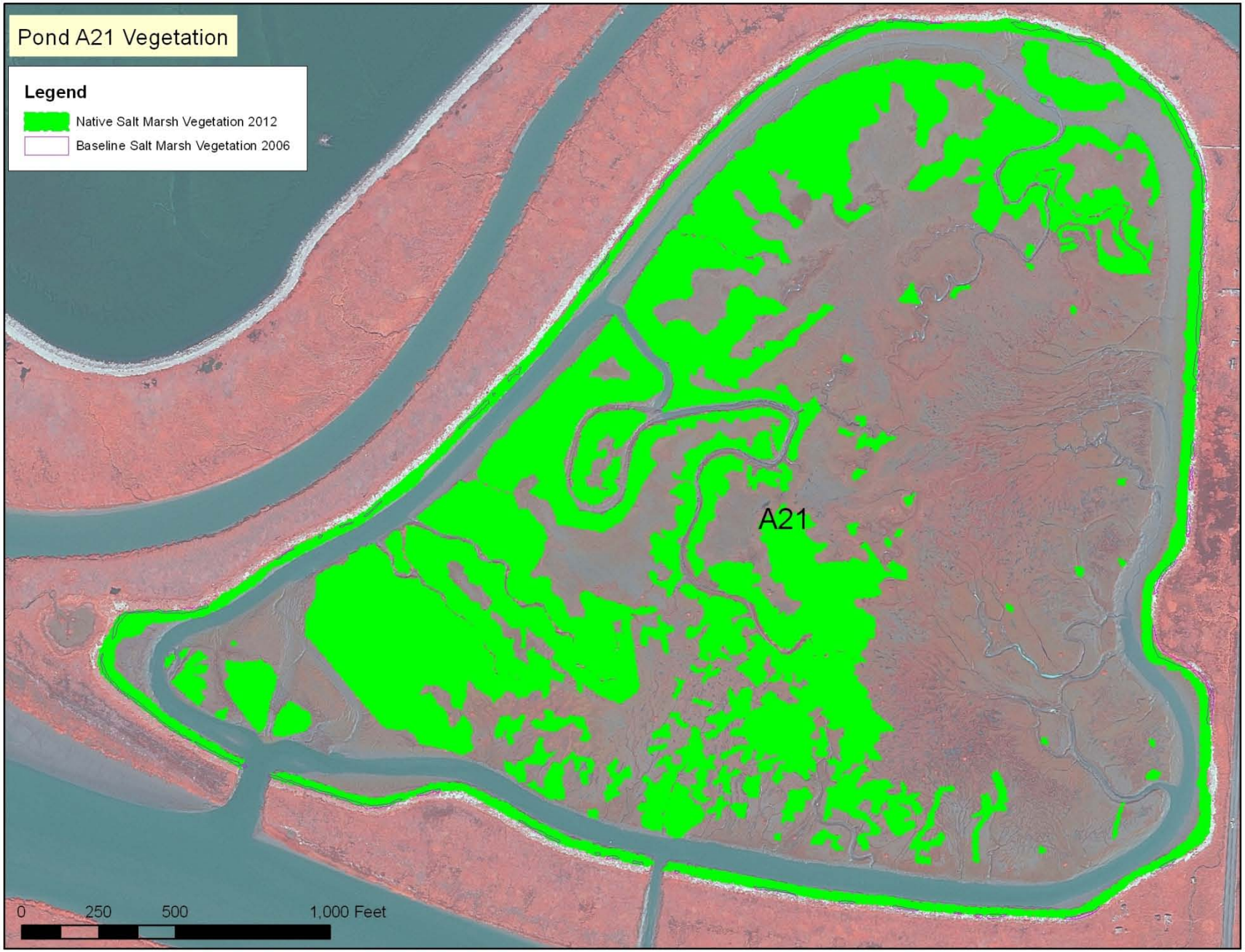


Figure 2. Vegetation Development in Pond A21 for 2012.

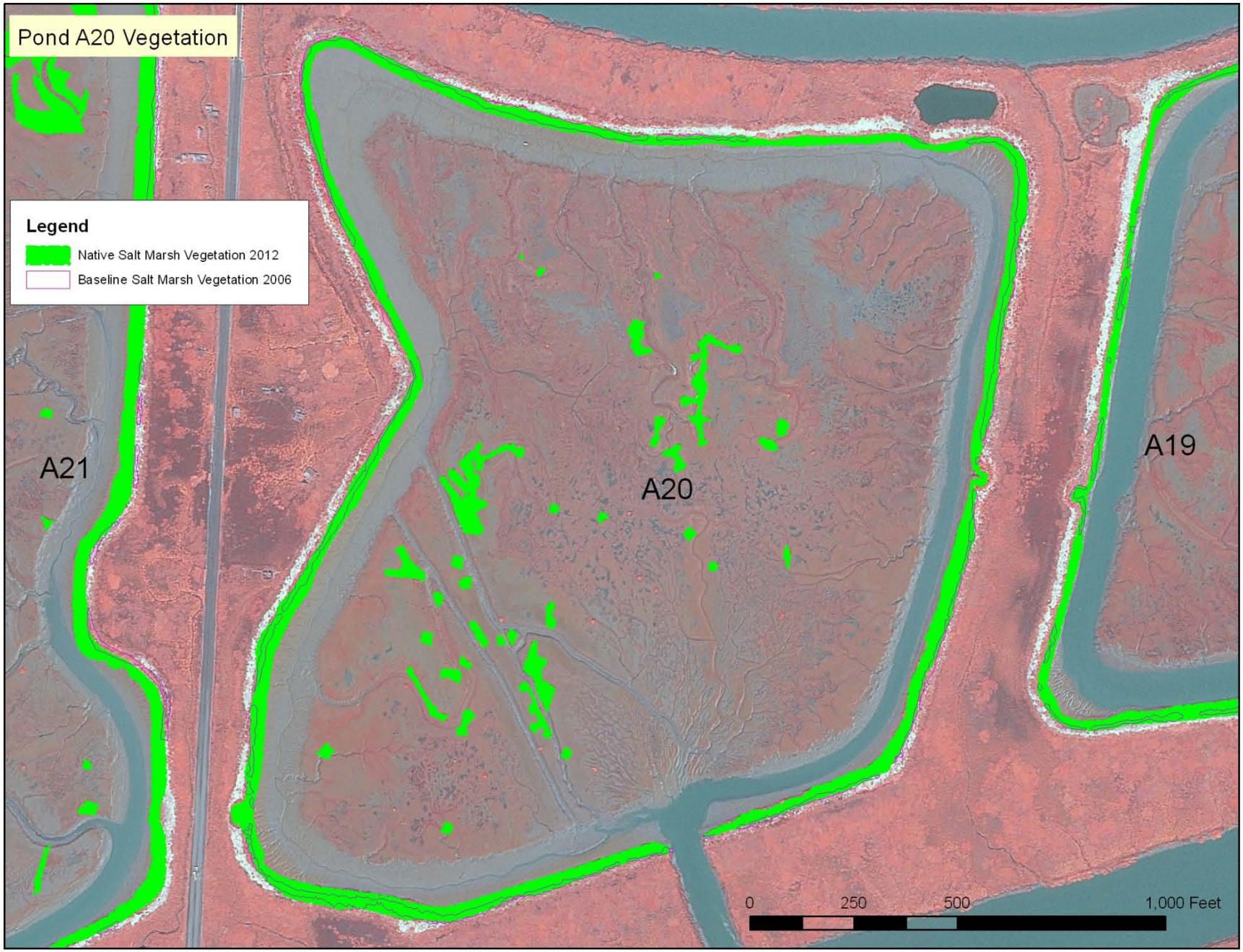


Figure 3. Vegetation Development in Pond A20 for 2012.

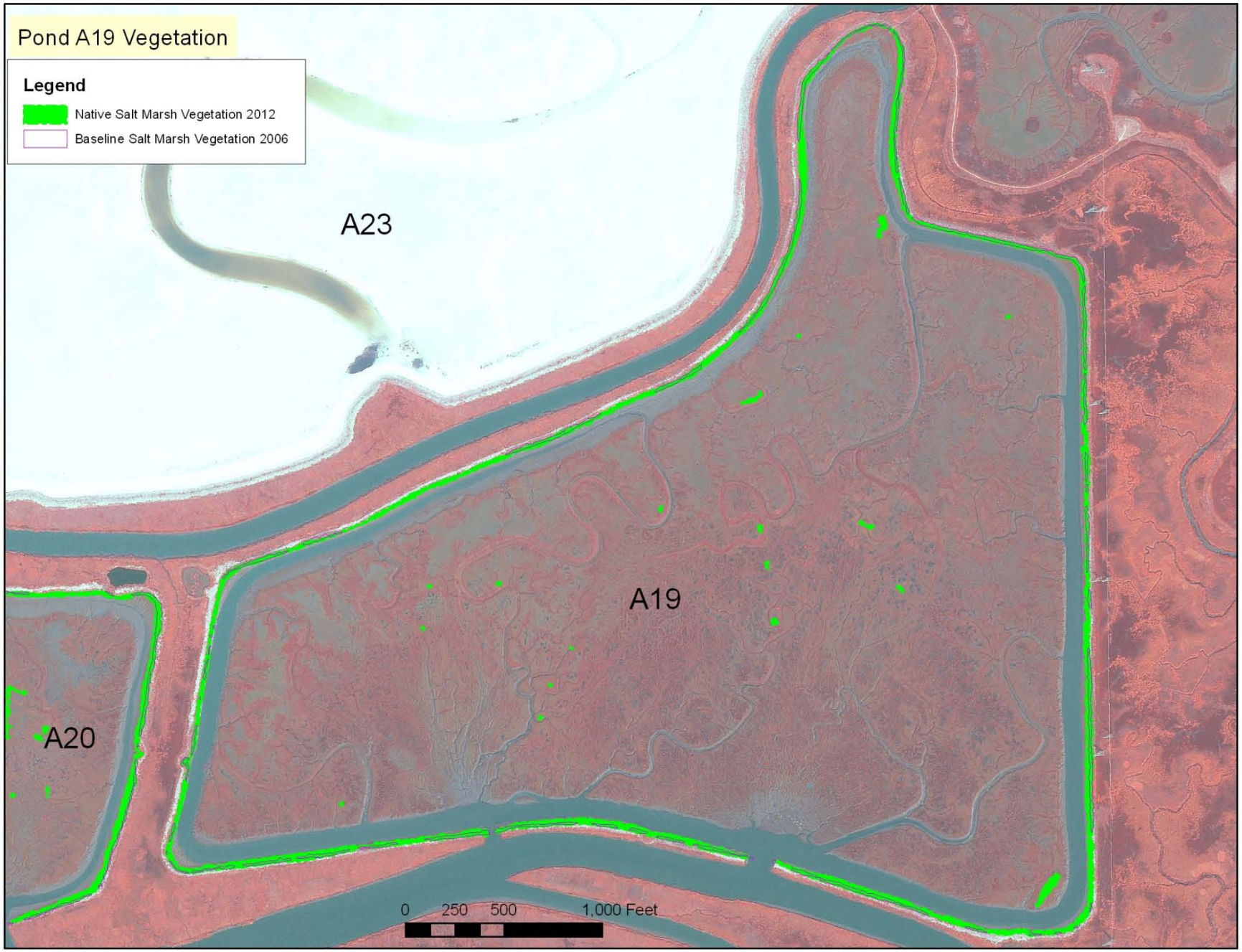


Figure 4. Vegetation Development in Pond A19 for 2012.

Figure 5. Location of clapper rail call count stations along the levee at Pond A21.

APPENDIX. A.
POND A21 LEVEE EROSION DATA & PHOTOGRAPHS

Island Ponds Tidal Mitigation Project

date of offset survey 08/14/2012 survey data by: S. Katric, L. Porcella, J. Bolanos

Notes:

1. spreadsheet represents elevations taken to monitor Pond 21 levee height where wave action appears to be overtopping southeastern corner of pond

2. Eight sections are being monitored, all within 100 +/- feet of each other

3. Wooden stakes (usually 2, 3 at one location) were installed at each section where elevations adjacent to the stakes were taken

4. Measurements were taken between stakes and the pond side edge of levee in order to monitor how quickly the pond side of the levee is eroding.

5. Photos of each section were taken to identify stake locations and section numbers.

6. A benchmark was installed using a metal "T" stake.

7. The T-stake elevation was established by surveying an "X" on the northwest railroad bridge abutment, calling the abutment elevation 10.00 (ten)

8. If RR abutment is elev 10.0, then T-stake benchmark elevation is 5.42 feet

Section #	2008 ground surface elevation adjacent stake near pond	2012 ground surface elevation adjacent stake near pond	change in elevation between 2008 and 2012 for stake near pond	2008 offset between pond and stake nearest pond (ft)	2012 offset between pond and stake nearest pond (ft)	change in offset between 2008 and 2012 for stake near pond	2008 ground surface elevation adjacent middle stake	2012 ground surface elevation adjacent middle stake	change in elevation between 2008 and 2012 for middle stake	2012 offset between pond and middle stake (ft)	2008 ground surface elevation adjacent stake near marsh	2012 ground surface elevation adjacent stake near marsh	change in elevation between 2008 and 2012 for stake near marsh	offset between pond and stake nearest marsh (ft)
1	6.53	6.44	(0.09)	5.25	1.92	(3.33)					5.69	5.69	0.00	13.58
2	6.31	6.28	(0.03)	7.33	3.58	(3.75)					5.61	5.6	(0.01)	16.83
3	6.32	6.19	(0.13)	2.83	1.50	(1.33)	6.43	6.4	(0.03)	8.17	5.54	5.59	0.05	17.33
4	6.39	6.33	(0.06)	5.00	2.67	(2.33)					5.44	5.43	(0.01)	18.67
5	6.39	no data		1.83	no data						5.5	5.55	0.05	13.42
6	6.44	6.35	(0.09)	3.17	2.42	(0.75)					5.45	no data		
7	6.68	6.58	(0.10)	8.00	5.42	(2.58)					5.58	5.52	(0.06)	15.67
8	6.94	6.81	(0.13)	6.00	3.75	(2.25)					5.49	5.4	(0.09)	17.00

NOTES/OBSERVATIONS:

1. all elevations were slightly lower indicating very minor changes in top of levee elevations
2. most offsets indicate additional loss of levee material on pond side with max loss of 1.16 feet at station 1 during the past 10 months
3. we should expect offsets between first stake and pond to continue to decrease from erosion
4. pond stake in section 5 is missing
5. marsh stake in section 6 is missing

2008 photo of Southeast corner of
Pond A21, looking westerly

2008 photo of Benchmark "T-stake"
location lkg northerly

2012 photo looking westerly
along levee towards stations 4, 3, 2, and 1

2012 photo looking northerly
notice extensive vegetation along inboard area