

## Final Report- TNEMP FY11

Submitted By: Chris Redfern, San Diego Audubon Society, (858) 273-7800  
[redfern@sandiegoaudubon.org](mailto:redfern@sandiegoaudubon.org)

Project Name: Mission Bay Park  
Grant Number: 5001967  
Grant Period: April 6, 2012 – June 1, 2015

### Expended Grant Funds, Matching Funds, and Accomplishments by Task

#### **Task 1: Mission Bay Habitat Assessment and Conservation Action Plan**

Expended grant funds: None for this task  
Matching funds: \$5,969 (Audubon California)

Expected results for this task included in original application and/or grant agreement	Achieved? (Notes)
<ul style="list-style-type: none"><li>• IBA assessment of 4,600 acres of target habitats in Mission Bay Park</li></ul>	Yes (see description below).
<ul style="list-style-type: none"><li>• Development of Mission Bay Conservation Action Plan, inclusive of stakeholder recommendations</li></ul>	Yes (see Appendix A).

San Diego Audubon completed a habitat assessment of Mission Bay Park through the Important Bird Area (IBA) Assessment protocol, which is a rigorous conservation planning effort based on the Open Standards for the Practice of Conservation. The Open Standards method is an adaptive management and planning tool utilized by a consortium of conservation organizations including The Natural Conservancy, Conservation International, and National Audubon Society. During 2011 and 2012, San Diego Audubon engaged in this conservation planning for Mission Bay in collaboration with Audubon California, SeaWorld San Diego, California Native Plant Society, San Diego River Park Foundation, City of San Diego, California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and several independent biologists. Overall, 38 people representing 28 organizations participated. The effort consisted of two day-long workshops, the formation of target-specific working groups, and several working group-specific meetings.

The planning process identified conservation targets in the Mission Bay IBA, the key ecological attributes (KEAs) of each target, and their associated threats. The threats were classified as high, medium, or low using a threats assessment matrix. Seven initial conservation targets were selected: California least tern, light-footed clapper rail, salt marsh, coastal dunes/sandy beach, Nuttall's lotus, migratory birds/mud flats, and eelgrass. Practical and measurable indicators were determined for each target, the threats were

ranked by scope, severity, and permanence, and the capacity to engage in conservation actions was analyzed. Of the initial seven conservation targets, there was enough interest from stakeholders involved in the planning process to establish Working Groups for three targets: California least tern (CLTE), light-footed clapper rail (LFCR), and Nuttall's lotus (NULO). These three targets were also chosen over the other four for initial consideration because workshop participants concluded that actions implemented to help CLTE, LFCR, and NULO would benefit the other targets as well.

The result of this conservation planning effort was a 24-page Mission Bay "Conservation Action Plan", or CAP, which has helped to guide conservation efforts in Mission Bay since its creation. The final CAP, which was the synthesis of the results from the planning workshops and the resulting working groups, was presented to planning participants at a 2012 luncheon held at the Hubbs SeaWorld Research Institute.

In addition to the CAP, the overall planning process directly led to formation of a Wetlands Working Group focused on wetlands restoration in the northeast corner of Mission Bay. Led by San Diego Audubon, this working group was awarded \$485,000 from the California State Coastal Conservancy and the U.S. Fish and Wildlife Service to conduct a three-year feasibility study for the restoration of estuarine habitats in northeast Mission Bay. That effort, now called ReWild Mission Bay, is currently underway.

***The full Mission Bay Conservation Action Plan is attached (Appendix A).***

## Task 2: Pre-project monitoring

Expended grant funds: None for this task

Matching funds: \$10,338 (National Audubon Society/National Science Foundation)

Expected results for this task included in original application and/or grant agreement	Achieved? (Notes)
<ul style="list-style-type: none"><li>Develop monitoring protocols in collaboration with SDSU's IEMM</li></ul>	Yes (See Appendices B and C).
<ul style="list-style-type: none"><li>Utilize citizen science to collect baseline vegetation data</li></ul>	Yes (see description below).

San Diego Audubon developed a citizen science effort within Mission Bay Park to conduct pre-project vegetation monitoring to support the coastal dune restoration efforts of this project. In association with Drs. Catherine Tredick, Doug Deutschman, and Rebecca Lewison of SDSU's Institute of Ecological Monitoring and Management (IEMM), San Diego Audubon created a monitoring protocol for vegetation at three California least tern nesting sites in Mission Bay (Mariner's Point, Stony Point and North Fiesta Island). Following the development of these protocols, San Diego Audubon worked with SDSU's Soil Ecology Research Group to incorporate the protocols into two Restoration Plans, one for the California least tern nesting sites, and another for South Shores. Once the Restoration Plans were in place, volunteers implemented vegetation monitoring at the restoration sites to establish a baseline of data for assessing vegetation characteristics throughout the project.

San Diego Audubon also worked with Betsy Miller (City of San Diego, Department of Parks and Recreation- Open Space Division) to obtain aerial imagery and annual monitoring numbers of Nuttall's lotus at South Shores. San Diego Audubon worked with Phil Roullard to train volunteers on photo monitoring techniques and collected baseline photo documentation of South Shores (previously submitted to SANDAG). Nearly 200 hours were donated by more than 49 volunteers to complete the various pre-project monitoring tasks.

***The above-mentioned Restoration Plans, inclusive of monitoring protocols, are both attached (Appendices B and C).***

## Task 3: Restoration and enhancement of priority coastal dune habitats in Mission Bay Park

### 3.1: Invasive Plant Control

Expended grant funds: \$12,045.56  
Matching funds: None for this task

Expected results for this task included in original application and/or grant agreement	Achieved? (Notes)
<ul style="list-style-type: none"><li>Large scale removal of 14 acres of invasive vegetation utilizing herbicide application</li></ul>	Yes, per modification (See Appendix D).
<ul style="list-style-type: none"><li>80-100% removal of iceplant from South Shores</li></ul>	Yes, per modification (See Appendix D).

Following the completion of the Mission Bay CAP and the development of the South Shores Restoration Plan, described in Task 2, the 14-acre site was split into six plots of ~2.5 acres, with two plots treated with active restoration for ice plant removal in support of Nuttall's lotus. One plot was treated with broadcast herbicide application, with ongoing herbicide touchup applications since, while a second plot has been managed via hand-pulling by volunteers, with a goal to test the relative effectiveness of these techniques before applying them across the entire site.

San Diego Audubon conducted this management effort for almost two years and assisted the City of San Diego in collecting rare plant data regarding the Nuttall's lotus to understand the results. Following this effort, on February 18, 2014, staff from San Diego Audubon met with project partners from the San Diego Management and Monitoring Program (SDMMP; Yvonne Moore and Kris Preston) and the City of San Diego Department of Parks and Recreation Open Space Division (Betsy Miller). At this meeting, the group concluded that the herbicide side displayed 85-90% reduction in iceplant while the hand-managed side displayed only 20% reduction. This was due more to the relative difficulty of hand-pulling vs spraying, rather than their relative effectiveness. Additionally, an adjacent City property (No Man's Land) did not fair well following large-scale iceplant removal, so project partners agreed that efforts for the remainder of this project should continue to focus on hand- and spray-managing the two 2.5-acre test plots (rather than expanding out to the entire site).

As of Spring 2015, the hand-managed plots showed less regrowth than sprayed areas, but dead plant debris was similar on both sides. While non-ice plant invasives were removed both opportunistically and also the focus of several targeted spraying efforts, Saharan mustard especially has invaded across the site. This invasion was true in the areas of South Shores not undergoing active restoration by San Diego Audubon as well as

adjacent City land (No Man’s Land), suggesting that San Diego Audubon efforts were not responsible for this expansion.

Based on the results of the restoration test conducted in the two 2.5-acre plots, going forward, hand management may have higher success rate in terms of limiting regrowth but the labor-intensity needs to be considered as a limiting factor. While the test plots did show 80-90% reduction in ice plant (see Appendix E and F for a GIS map of 2015 vs 2012 iceplant extent [E] and a map of the restoration test plots [F]), annual non-natives, rather than just iceplant, will need to be a significant focus of management efforts going forward.

Overall, 184 volunteers donated 552 hours of time to hand-pulling and herbicide was applied on five separate occasions over the course of the project.

***For a full description of the South Shores effort, see the “South Shores- Executive Summary” (Appendix D). Also attached are a GIS map of the 2015 vs 2012 iceplant extent (Appendix E) and an overall site map showing test plot boundaries (F).***

### 3.2: Community Based Habitat Restoration

Expended grant funds: \$43,314.64

Matching funds: \$14,000

Expected results for this task included in original application and/or grant agreement	Achieved? (Notes)
<ul style="list-style-type: none"> <li>A minimum 30 events held to restore priority habitat within Mission Bay</li> </ul>	Yes, exceeded: 47 events held
<ul style="list-style-type: none"> <li>A minimum 3,800 volunteer hours spent on project implementation</li> </ul>	Yes, exceeded: 3,870 hours donated on this subtask alone
<ul style="list-style-type: none"> <li>Restoration and/or enhancement of 184 acres of coastal dune habitat to support Nuttall’s lotus, CA least tern, Silver Beach Bur, and Pink Sand Verbena</li> </ul>	Yes, partially. Acreage reduced to priority habitat sites, but each actively enhanced. Populations of all target species strengthened.
<ul style="list-style-type: none"> <li>Approximately 2,000 native coastal dune plants planted, pending consistency with Mission Bay CAP</li> </ul>	N/A. Not identified as a priority action during the IBA Assessment.

To conduct community-based habitat restoration at priority coastal dune habitat sites in Mission Bay, San Diego Audubon coordinated closely with Park Rangers with the City of San Diego’s Department of Parks and Recreation- Developed Regional Parks

Division (most recently, Senior Park Ranger Karolynn Estrada and her staff). Together with additional partners at the U.S. Fish and Wildlife Service (especially Sandy Vissman for FAA Island, which was added to this project in 2014), 47 events were held in Mission Bay in support of this project. Over the course of this project, over 1,260 volunteers, including 773 first time volunteers, donated more than 3,870 hours of time to community based restoration efforts in support of coastal dune habitat management in Mission Bay. This effort occurred across 47 separate events at 4 California least tern nesting sites (Mariner's Point, Stony Point, FAA Island, and North Fiesta Island).

To support day-of volunteers at these events, San Diego Audubon developed a "Conservation Team Leaders" program, whereby trained volunteers would lead new volunteers in the field. Initiated in 2014, so far 23 people have completed the program and its requirements. Requirements of this application-based program include an 8-hour training session (4 hours office, 4 hours field), knowledge of local native and invasive plants, and attendance at 1/3 of the restoration events each spring. This program has greatly increased the capacity of the Conservation Program at San Diego Audubon and will be an asset to the program for years to come (See Appendix G for a PDF of the Conservation Team Leaders training PowerPoint).

Each year, community restoration events occurred from September-April, following vegetation monitoring in the fall and precedent to vegetation monitoring in the spring. Volunteer efforts ramped up in the spring following winter rains and were timed to coincide with local plant growth seasons. During the spring "restoration season", events were held almost every weekend at one or more of the four sites in Mission Bay. Volunteer actions at these habitat restoration events included, but was not limited to:

- Invasive vegetation removal
- Native vegetation thinning (when appropriate)
- Chick fencing replacement and repair
- CLTE decoy deployment
- Placement of protective chick structures
- Installation of PVC pipe grid across site (to aid in nest monitoring)

For the first half of this project, volunteer efforts were focused in restoration test plots at North Fiesta Island and Stony Point, and across the site at Mariner's Point. Following the early termination of this restoration experiment (per City of San Diego's accidental destruction of the test plots), the restoration efforts shifted in focus. The events leading up to and following this scraping incident were outlined in detail in the Summary of Deliverables (dated 1/21/14) and included with invoice number TNEMP12-06 for this project. After this adjustment, community based restoration efforts at North Fiesta Island were shifted instead to Stony Point, where a larger portion of the site came under San Diego Audubon management and FAA Island was added to the project.

Through these community-based habitat restoration events, San Diego Audubon successfully ensured that all California least tern nesting sites in Mission Bay were appropriately managed for nesting and were ready (in terms of land management) in time for nesting season each year. The efforts of these volunteers supported the expansion in native plants at Stony Point. Now established on the site are native plants including *Abronia umbulata* (pink sand verbena), *Ambrosia sp.* (silver beach bur), and *Cammisoniopsis spp.* (beach evening primrose), all of which were either absent from the site or extremely limited in presence prior to San Diego Audubon management. Mariner’s Point has seen a reduction in non-native cover (especially invasive filaree) and an expansion of Nuttall’s lotus cover.

A causal link between this vegetation management and CA least tern nesting productivity can not be determine statistically because this management was not set up to include experimental controls. However, during the period of this project, fledgling productivity in Mission Bay increased from an average of 35 fledges/year (0.24 fledgling per pair ratio) in 2006-2011, to an average of 44.5 fledges/year (0.34 fledgling per pair ratio) in 2013-2014 (the two seasons during which San Diego Audubon managed vegetation and for which nesting productivity is known). (Note: 2006-2013 nesting productivity information gathered from California Department of Fish and Wildlife annual CLTE reports; 2014 information gathered from unofficial nest monitor reports)

Overall, San Diego Audubon’s effort under this project has not only increased the City’s capacity to manage these endangered species nesting sites but has also led to demonstrable benefits to several threatened and endangered species.

***The training presentation given to Conservation Team Leaders is included as Appendix G.***

### **3.3: Post-Project Monitoring**

Expended grant funds: \$13,186.22

Matching funds: None for this task

Expected results for this task included in original application and/or grant agreement	Achieved? (Notes)
<ul style="list-style-type: none"> <li>• Post-project vegetation monitoring carried out throughout project</li> </ul>	<p>Yes (See site maps, Appendix H, and monitoring data, Appendix I)</p>
<ul style="list-style-type: none"> <li>• Quarterly reports to include monitoring findings.</li> </ul>	<p>Yes, partial. Not all data quantitatively analyzed but general monitoring findings included in quarterly reports.</p>

Quantitative vegetation monitoring was conducted every spring and fall during the course of this project, consistent with SDSU’s IEMM protocols. Because vegetation data

could not be obtained during the actual nesting season (due to site-access limitations associated with the federally-listed endangered California least tern) vegetation data were collected as close to the beginning and end of the nesting season as possible. For the first year of data collection, students from IEMM completed the monitoring as part of a citizen science effort. During the second two years, staff from San Diego Audubon worked in coordination with scientific staff from IEMM to conduct monitoring, and during the third year of the effort San Diego Audubon staff conducted the monitoring independent of IEMM (due to an increase in the scientific capacity of San Diego Audubon staff).

Given that the protocols used for data collection called for quarter meter interval data collection from 16 10-meter transects at three sites, fine scale analysis of the resulting data set was not possible within this project itself. However, native vs non-native diversity could be tracked as well as presence-absence information. This information was used throughout the project to ensure that vegetation was managed consistent with known California least tern protocols and to track the efficacy of the volunteer management efforts. While the results from all of the data collection have not been statistically analyzed, the information collected forms an invaluable data set that will inform future management efforts in the area, including San Diego Audubon's TNEMP FY15 Coastal Dune Restoration project.

***For maps of the nesting sites and monitoring transects, see Appendix H. For vegetation monitoring raw data, see Appendix I.***

### **3.4: Grant Administration**

Expended grant funds: \$4,996  
Matching funds: None for this task

San Diego Audubon staff administered all aspects of this grant, including invoicing, reporting, management of subcontractors, and budgeting.