



Ballona Wetlands Restoration: Community Iceplant Removal Project

Final Report

December 2016

Prepared for the Southern California Wetlands Recovery
Project and the California Department of Fish and Wildlife



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Final Report

Ballona Wetlands Restoration: Community Iceplant Removal Project

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Project Summary

The Bay Foundation (TBF), in partnership with California Department of Fish and Wildlife (CDFW), Friends of Ballona Wetlands (FBW), Loyola Marymount University, and community volunteers are conducting a project to remove invasive vegetation while broadening public involvement and stewardship at the Ballona Wetlands Ecological Reserve (Reserve). This report serves as the final product for the first phase, or the “*Ballona Wetlands Restoration through Community Partnership*” project, funded by the Southern California Wetlands Recovery Project’s Community Wetland Restoration Grant Program (Grant #2015-001). This report summarizes restoration events conducted from 1 September through 30 November, 2016 and additional project activities through 22 December, 2016. Post-restoration project monitoring and additional community restoration events will be continued in 2017 through supplemental matching funding from various sources. Additionally, though this grant focused on an approximately 1-acre area, the full restoration area and permitting for the entire project (subsequent phases) cover an area of approximately 3 acres, which will be continued in future years when additional funding becomes available.

The project focused on the removal of *Carpobrotus spp.*, or iceplant, from a targeted area within Area B of the Reserve. Removing iceplant and other non-native vegetation on site will help protect the remaining native flora that will be critical to the revegetation of the Reserve for the larger multi-year restoration effort. Iceplant is a creeping, mat-forming group of species that form dense monocultures, causing a reduction in biodiversity and competing directly with native wetland species. Its removal will provide an increase in the health and condition of the wetland habitats at the Reserve in Area B – south of Culver, and has allowed for community engagement in hands-on restoration efforts. Pre- and post-restoration monitoring will evaluate the success of the project over time and will provide recommendations for additional community-level restoration opportunities on site and at other, similarly-impacted urban wetland systems throughout Southern California.

Two iceplant removal methods were implemented by project participants and are compared in this report for effort and effectiveness to inform future community-based hands-on restoration projects. The first method involved traditional hand-restoration through pulling out iceplant mats by the roots, shaking them to remove dirt and debris, and removing them from the site to be green-waste processed or composted. The second method involved covering areas affected by iceplant monocultures with large plastic tarps to eliminate radiant sunlight and leaving the desiccated iceplant in place as mulch.

We are grateful for the help of the many volunteers who participated in this restoration project, and appreciate all of their efforts and donated time. We also want to acknowledge and thank our partners, Friends of Ballona Wetlands, CDFW, and Loyola Marymount University. Additionally, we are especially grateful to the staff of E. Read and Associates for donating so much of their time to help the project succeed. We would not have been able to complete this project without them.

Appendix A follows this report and provides summary statistics and summary project information, including relevant online links. Appendix B provides additional photographs of the restoration areas.

Monitoring Methods Summary

Ornithologists performed pre-restoration bird surveys to confirm a lack of identified presence of bird nesting in the restoration areas and in the immediate vicinity of the project area. The final bird survey was conducted on 29 August, 2016, timed purposefully as close to the start of the restoration events as possible. No Belding's savannah sparrows were observed and no indication of nesting was detected for any bird species observed. Three additional pre-restoration monitoring survey days were conducted on 9, 18, and 23 August, 2016, with participation from CDFW, FBW, and several internship student volunteers. Additionally, a Cultural Resource Protocol was written and submitted to CDFW and the Native American monitor for approval. Once approved, a pre-restoration site visit was coordinated and specific strategies were finalized.

Weekly site checks were performed throughout the duration of the tarp deployment. Post-restoration surveys were conducted on 15, 18, and 29 November, 2016. Surveys conducted both pre- and post-restoration included vegetation cover, vegetation mapping, geo-referenced photo-point, wildlife presence and behavior, and cultural resources, in accordance with the Implementation and Monitoring Plan (June 2016), approved by CDFW and the Coastal Commission. For protocol and sampling frequency specifics, refer to the Implementation and Monitoring Plan.

Outreach and Public Engagement

A concerted effort was made before and throughout the implementation of this project to engage the community in a diverse number of ways. For example, before the project began, TBF discussed the project at several public meetings, facilitated a media article in the local paper, discussed the project with several stakeholder groups, and went through a public permitting process through the California Coastal Commission (Permit No. 5-15-1427). Additionally, a public website was created and maintained, including general information about the project, several photographs of the site, project documents, links to permit information and the Implementation and Monitoring Plan, and clickable interactive links to volunteer for an event: <http://www.santamonicabay.org/community-iceplant-removal-project/>. The website was updated frequently and will include future restoration opportunities through the continuation of the project, as funding becomes available.

Additionally, throughout the duration of the project, multiple social media and blog posts documenting community restoration and field survey events, as well as volunteer opportunities, were featured on TBF's facebook and twitter accounts. A total of 10 posts related to the project were posted on TBF's facebook page (<https://www.facebook.com/TheBayFoundation/>), which has nearly 2,700 followers, and twitter page (<https://twitter.com/SMBRF>), which has 954 followers (Figure 1). Additional online outreach to engage community volunteers included posting opportunities on www.volunteermatch.org. The Friends of Ballona Wetlands (<http://www.ballonafriends.org/>) conducted additional outreach focused on engaging school groups to attend restoration events. Other supporters and partner groups such as Heal the Bay and Loyola Marymount University's Center for Urban Resilience also conducted outreach for the project.



Figure 1. Screenshots of iceplant project-related posts on TBF social media.

Lastly, effort was made to help facilitate local media articles about the project. TBF released one formal media press release on 11 March, 2016, and interviewed for multiple newspaper articles. Several notable articles were published on 2 March, 2016, by the Argonaut Newspaper, and on 13 March, 2016 by the Daily Breeze – both local Los Angeles papers highlighting the need for restoration and information about iceplant. Additionally, Dr. Katherine Pease, staff scientist for Heal the Bay, wrote an inspiring article on the importance of restoration at Ballona. For a full list of related media for this project and links to online articles, see Appendix A.

Restoration Events

Following the Coastal Commission permit conditions (Permit No. 5-15-1427), restoration events began on 1 September, 2016. To maximize the potential sunlight availability and to increase the effectiveness of the tarping method, double restoration events were held on the first three restoration days. This allowed for the full deployment of all tarps to occur by 8 September, 2016. Table 1 provides summary details of all restoration events held from 1 September through 30 November, 2016 and includes statistics on the number of volunteers, number of hours, restoration activities, and site details. **Over 15 tons of iceplant (more than 200 cubic yards) were removed from the restoration area to a green waste dumpster for composting.** Weight was calculated by the dumpster rental company before processing the invasive vegetation waste and cubic yard area was estimated by the total dumpster space used throughout the duration of the project.

Exact total acreages of both the hand-restored and tarped restoration areas were calculated using a Trimble Geo7x GPS and mapped using GIS (Figure 2). Acreages are summarized in Table 2. Hand restoration efforts alone resulted in a restoration area of 0.39 acres (1,585 m²), and the total tarped restoration area was 0.36 acres (1,460 m²). Additionally, some of the tarped area also had to be hand-restored through additional restoration events in an area of 0.13 acres or 510 m². Collectively, hand-restored and tarped restoration areas covered a total of 0.88 acres (3,555 m²).

Table 1. Summary of restoration event statistics through 1 December, 2016.

Event Date / Time	Site / Area	# Volunteers	# Hours	Restoration Method
1 Sept – AM	Site 1	9	27	Tarping + Hand-restored
1 Sept – PM	Site 1	9	27	Tarping + Hand-restored
6 Sept – AM	Site 2	11	25.5	Tarping + Hand-restored
6 Sept – PM	Site 2	13	39	Tarping + Hand-restored
8 Sept – AM	Site 3	9	19.5	Tarping + Hand-restored
8 Sept – PM	Site 3 + 1	8	24	Hand-restored
13 Sept – AM	Site 1 + 2	9	16.5	Hand-restored
16 Sept – AM	Site 1 + 2	5	15	Hand-restored
20 Oct – AM	Site 1	10	22.5	Hand-restored
10 Nov - AM	Site 1	2	6	Hand-restored
15 Nov – AM	Site 1 + 2	60	240	Hand-restored
18 Nov – AM	Site 1	36	63	Hand-restored
Subtotal	----	181	525	----

Table 2. Summary of restoration areas and acreages through 1 December, 2016.

Restoration Activity	Area (m ²)	Area (Acres)
Hand-Restored	1,585	0.39
Tarp Cover	1,460	0.36
Tarp Cover + Hand-Restored	510	0.13
Total	3,555	0.88



Figures 3 and 4 are composed of aerial imagery pulled from Google Earth prior to the implementation of the project and during the implementation of the project. The time series includes both restoration sites when covered in invasive iceplant (left) and after several tarping and hand-restoration events (right). The right-hand side photographs were taken right before the tarps were removed from site.



Figure 3. Site 1 and 3: pre-restoration before project implementation (left, 8 February, 2016) and after tarp installation and several restoration events (right, 2 October, 2016) (Google Earth).



Figure 4. Site 2: pre-restoration before project implementation (left, 8 February, 2016) and after tarp installation and several restoration events (right, 2 October, 2016) (Google Earth).

Overall, restoration events were highly successful, with small but enthusiastic groups of engaged community members, local residents, and student participants. At the start of each event, an informational safety and cultural resource speech was given that also included a brief history of the Reserve, and the importance of healthy wetlands. All participants signed-in and turned in a waiver to track participation over time. Figures 5, 6, and 7 highlight some of the group activities and events. Appendix B highlights several additional photographs from each of the restoration areas.

School Group Participation

The restoration event held on 10 November, 2016 was comprised of TBF staff and two students from Santa Monica Community College. The students signed up for the event on www.volunteermatch.com to fulfill part of a community service requirement for an extra-curricular college group.

The restoration event held on 15 November, 2016 was dedicated to hosting a high school group from Palisades Charter High School. The high school group was composed of 60 students from two Urban Ecology classes, a course elective offered by the school. Aside from pulling an enormous amount of invasive iceplant, the teacher further engaged the students by additional in-class preparation and assigning a worksheet for the students to complete while on-site. The teacher took advantage of the restoration opportunity by focusing on topics including: the role of wetlands in an urban setting, invasive plants and the problems they cause, and the challenges of restoration. The students spent approximately four hours on-site, pulling iceplant from Sites 1 and 2, and completing their lessons. In-class hours were not counted towards contributed restoration volunteer time.

The restoration event held on 18 November, 2016 was composed of both community volunteers as well as an elementary school group composed of 30 fifth graders. The students received a tour of the Reserve by Friends of Ballona Wetlands and TBF, learning about native salt marsh species and the importance of healthy wetlands, and then dedicated the remainder of their time to pulling iceplant from Site 1 to clean up some of the tarped areas that still had some live iceplant.



Figure 5. Photographs of volunteers and students during restoration events at the Ballona Wetlands Ecological Reserve.



Figure 6. Photographs of student volunteers during restoration events at the Ballona Wetlands Ecological Reserve.



Figure 7. Photographs of volunteers during restoration events at the Ballona Wetlands Ecological Reserve.

Monitoring Results

A summary of the pre- and post-restoration monitoring results is included below. Note that species lists are not meant to be exhaustive, they are just identifications of the variety of flora and fauna that were seen on project surveys and monitoring days. In summary, both restoration methods were successful at removing iceplant and engaging the community and local school groups, and no wildlife were harmed as part of this restoration project.

Vegetation Cover

Vegetation transect data from Site 1 show a within-restoration area transition from 100% live iceplant pre-restoration to 100% dead iceplant and detritus post-restoration (Figure 8). No new seedlings had come in at the time of the final post-restoration survey (29 November 2016). The habitats surrounding Site 1 had a high diversity, including a depression area with freshwater input during the wet season that had a mix of native brackish and salt marsh species, non-tidal salt marsh, and adjacent sandy-soil habitats. Therefore, the adjacent “control” data show a wide diversity of native and non-native vegetation surrounding the project area both pre- and post-restoration. These included common native species such as saltgrass (*Distichlis spicata*), pickleweed (*Salicornia pacifica*), alkali weed (*Cressa truxillensis*), common rush (*Juncus patens*), and alkali heath (*Frankenia salina*). Additionally, several non-native species were found adjacent to the restoration area, including iceplant, Australian saltbush (*Atriplex semibaccata*), and castor bean (*Ricinus communis*).

Vegetation transect data from Site 2 also showed a within-restoration area transition from 100% live iceplant pre-restoration to 100% dead iceplant and detritus post-restoration (Figure 9). Additionally, the tarped portion of Site 2 that was covering Australian saltbush also showed a 100% conversion from live saltbush to dead saltbush. No new seedlings had come in at the time of the final post-restoration survey (29 November 2016). Two shallow muted tidal channels and areas of non-tidal salt marsh surround the edges of Site 2 and are dominated by primarily native vegetation, including pickleweed, alkali heath, saltgrass, and alkali weed. Site 2 also has patchy iceplant remaining to the north and east of the project area, which will need to be removed in future restoration events. This area was not targeted during this phase of the project due to time constraints, but will be restored in 2017.

No vegetation transects were conducted within Site 3 due to its size, but mapping data are included below (see “Tarping Efficiency”). Further surveys will indicate whether native seedlings recruit into the restoration areas over time and to conclusively evaluate the effectiveness of the two types of restoration methods.



Figure 8. Transect 5 before restoration (top) and after tarping and some iceplant removal (bottom).



Figure 9. Transect 4 before restoration (top) and after tarping (bottom).

Tarping Efficiency

Following the removal of the tarps, it became apparent that Site 1 was not as successful in terms of overall iceplant solarization as Sites 2 and 3. Challenges included the early-onset rains and the overly-restrictive timing on the permit conditions, forcing the tarps to be pulled prior to the full desiccation of the iceplant in some areas. A post-tarp survey was conducted using a Trimble Geo7x GPS device and the efficacy of iceplant desiccation on Site 1 was thoroughly documented (Figure 10; Table 3). The success of desiccation was ranked as a percentage (estimated to the nearest 10%) ranging from 0% to 100% desiccation. All tarped areas had at least 10% desiccation, and most areas had much more success.

Sites 2 and 3 were fully successful, with 100% desiccation following tarp removal. The exception was sporadic and very small clumps of live iceplant along the edges of the tarp, which were subsequently hand-removed with very little effort. However, post-tarp surveys of iceplant desiccation at Site 1 showed that only 28.3% of the covered area of iceplant was completely desiccated (with a 100% efficiency of solarization), but more than 75% of the site had 50% or greater efficiency of solarization (Table 3). The areas in the middle of Site 1 with 30% and 50% efficiency had extremely thick mats of iceplant; in some areas, the iceplant was almost half a meter (approximately 1.5 feet) deep.

With the successful desiccation of Sites 2 and 3, and only partial desiccation of Site 1, a total of 86.7% of all tarped areas had a desiccation success rate of 50% or greater. Following the post-tarp surveys at Site 1, the remaining live iceplant was hand pulled during two community restoration events. While this involved some extra effort, the solarization still contributed significantly to the reduction in both effort and disturbance in all restoration areas.

While the Site 1 tarp area was only partially successful, Sites 2 and 3 showed complete success. The variability in tarping success likely occurred based on the depth of the iceplant mat within each restoration area, soil conditions, and other factors not explored as part of this project. Site 1 would have likely had greater success if the tarps were initially put out earlier in the summer. In the future, TBF recommends extending the tarping period to be able to have a start implementation date earlier in the summer, on or around 1 August 2016.

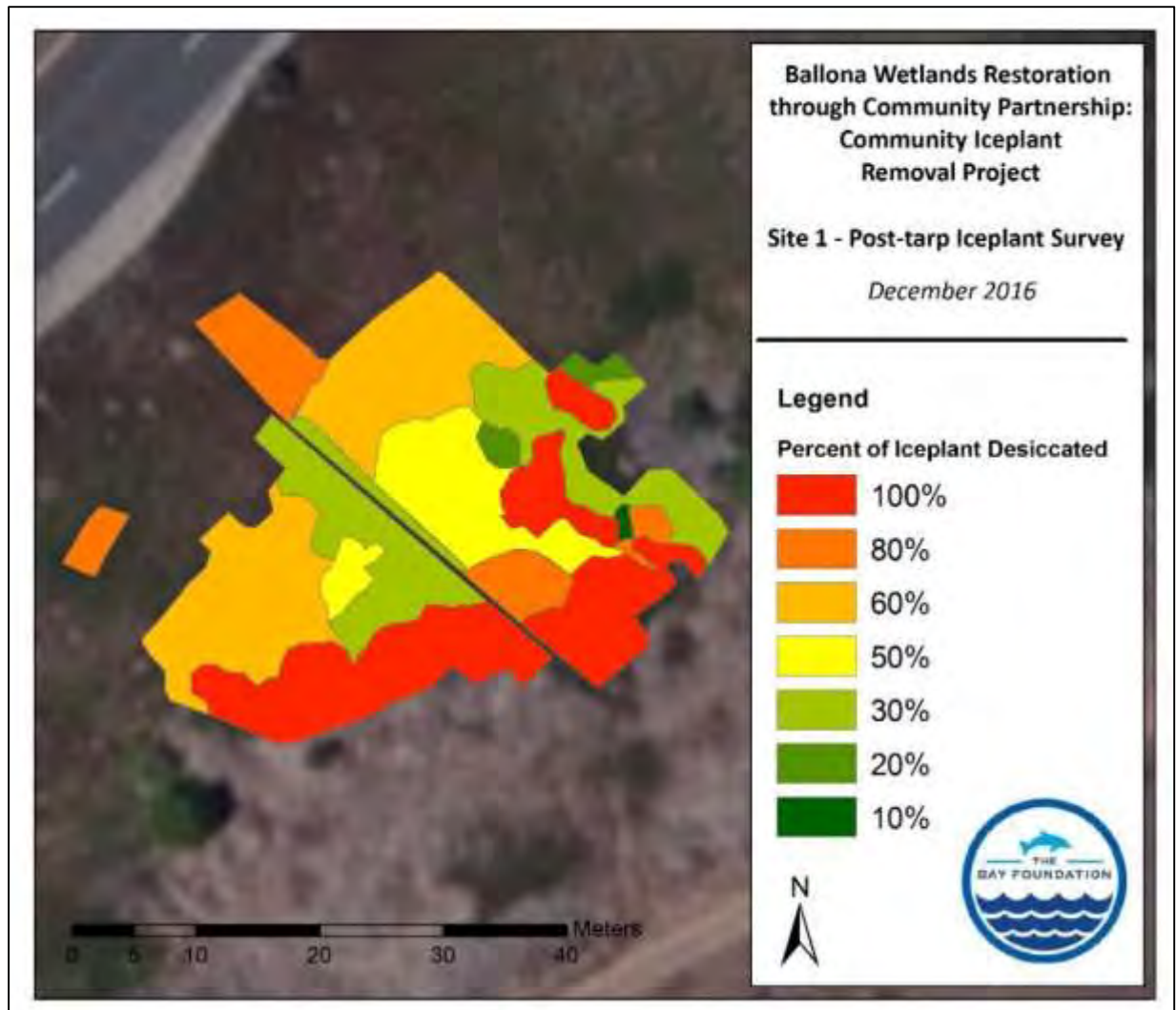


Figure 10. Site 1 only: Post-tarp iceplant survey documenting percent iceplant desiccated.

Table 3. Post-tarp efficiency survey results for Site 1 only.

Percent Desiccated	Area (%)
100%	208 m ² (28.3%)
80%	75 m ² (10.2%)
60%	201 m ² (27.3%)
50%	89 m ² (12.0%)
30%	147 m ² (20.0%)
20%	13 m ² (1.8%)
10%	2 m ² (0.3%)

Avifauna

Avifauna were identified through ornithological surveys conducted by Cooper Ecological Monitoring, Inc. and as part of wildlife observation and monitoring days conducted by TBF and the Friends of Ballona Wetlands. Table 4 includes a list of all species identified as part of these monitoring surveys. It should be noted that this is not intended as a comprehensive or exhaustive list of bird species using the restoration area and adjacent habitats; several other species were visually observed by community members during restoration events. No Belding's savannah sparrows were identified during the pre-restoration survey, and the ornithologist concluded that use of the restoration area by this species during the project was very unlikely to occur.

Frequently observed bird species included black phoebe, American crow, and pigeon. Many of the birds identified in Table 4 were seen in the clump of willows immediately adjacent to the project area, which was incidentally the result of the last iceplant removal / tarping project conducted in 2009. Several raptor species were observed hunting or foraging adjacent to or above the project site, such as red tailed hawk, red shouldered hawk, Cooper's hawk, and American kestrel. One osprey was observed hunting (flying) above the tide channel adjacent to Site 2.

In Table 4, "Other" includes both native habitats outside the restoration area or other adjacent habitats (native or non-native) not included as part of the restoration project. Wildlife and birds were counted adjacent to the project area to identify wildlife with the likely potential to use the restoration area. The category "Mixed Nativity" includes some areas that were hand-restored, but not tarped.

Table 4. Avifauna present during monitoring survey days.

Common Name	Iceplant	Other *	Mixed Nativity **	Notes / Habitat
Allen's hummingbird		X		willow clump
American crow		X	X	flying
American kestrel		X		telephone pole along Culver Blvd
Anna's hummingbird		X		willow clump
Barn swallow		X		
Black phoebe	X	X	X	only one seen in iceplant - perched on an extended stick
California towhee		X		
Common yellowthroat		X		willow clump
Cooper's hawk		X		flying (chasing pigeon)
Great egret		X		tide channel
House wren		X		willow clump and myoporum
Marsh wren		X		
Mourning dove		X		euphorbia and flying
Osprey		X		flew above tide channel
Pigeon		X		
Red tailed hawk		X		above eucalyptus (3)
Red-shouldered hawk		X		base of bluffs
Savannah sparrow		X		pickleweed - across channel from project site; possibly Belding's savannah sparrow (2)
Scrub jay		X		
Song sparrow		X		willow clump, myoporum, <i>Euthamia</i> , mulefat
Yellow warbler		X		eucalyptus

* Note: "Other" includes native habitats outside the restoration area or other adjacent habitats not included in the restoration. Wildlife and birds were still counted adjacent to the project area.

** Note: "Mixed Nativity" includes some areas that were hand-restored, but not tarped.

Wildlife Presence

Wildlife was identified during pre-monitoring surveys, as part of several restoration events, and during post-restoration surveys (Table 5). Commonly observed species included California ground squirrels, Western fence lizards, and wandering skipper. Western fence lizards were ubiquitous in every habitat type. Cottontail rabbits were frequently seen along the bluffs adjacent to the project area.

No wildlife mortality was observed under the tarps. In fact, several reptiles (Western fence lizards, an alligator lizard, and a juvenile gopher snake; Figures 11 and 12) and several amphibians (Pacific tree frogs, Figure 13) were identified and moved during restoration events because they were on, under, or immediately adjacent to the tarps. They were moved to native salt marsh habitats immediately adjacent to the restoration area so as to avoid disturbance during events.

The only mortality that was observed included several California ground squirrels and one cottontail rabbit killed through predation, each likely from a coyote or feral cats, which are both known to frequent the area. One dead raccoon was identified along Culver Boulevard, likely as a result of collision with a vehicle. These observed mortalities had nothing to do with the restoration project.

Table 5. List of wildlife (non-avifauna) identified during monitoring surveys.

Common Name	Iceplant	Other *	Mixed Nativity **	Notes
Cottontail rabbits		X		along bluff and base of bluff
CA ground squirrel	X	X	X	bluff and base of bluff; one in iceplant
South Coast marsh vole		X		pickleweed; adjacent to restoration area (1)
<hr/>				
Western fence lizard	X	X	X	throughout restoration area and adjacent habitats
Alligator lizard	X	X		sunbathing on top of tarp (see photo)
Gopher snake	X	X		one juvenile found under tarp edge
Pacific tree frog	X	X	X	adjacent to tarps and on tarps (in rain puddles)
<hr/>				
Wandering skipper	X	X	X	many found on surveys; primarily in saltgrass and heliotrope
Monarch butterfly		X		eucalyptus and flying/adjacent
Cabbage butterfly		X	X	mixed saltgrass and iceplant
Grey hairstreak		X		heliotrope
Common buckeye		X		heliotrope and saltgrass



Figure 11. Juvenile gopher snake found under the edge of one of the tarps on 16 September, 2016.



Figure 12. Alligator lizard found sunbathing on top of tarp during tarp-removal on 8 November, 2016.



Figure 13. Pacific tree frog found on top of a tarp during a restoration event on 10 November, 2016.

Photograph Series (Photo-Point)

A series of geotagged photo-points were established to document change over time at the restoration site. The following photos provide before and after visual representations of tarped and hand-pulled restoration activities. Figure 14 shows an example close up of a hand restoration site where iceplant was carefully removed around native saltgrass and alkali weed. Figures 15 through 17 document before and after tarping and hand-restoration at various points within the project area.



Figure 14. Photo point of pre-restoration square meter area of iceplant with intermixed native salt marsh species (top) and post-restoration photograph of the same square meter area after hand-pulling (bottom).



Figure 15. Photo point of Site 1 and 3 pre-restoration on 9 August 2016 (top) and post-restoration on 29 November 2016 (bottom).



Figure 16. Photo point of Site 1 and 3 pre-restoration on 1 September 2016 (top) and post-restoration on 29 November 2016 (bottom). Site 3 can be seen at the base of the bluff hill.



Figure 17. Photo point of Site 2 pre-restoration on 9 August 2016 (top) and post-restoration on 29 November 2016 (bottom).

Challenges

The primary challenges associated with this project came from a misunderstanding of the impacts of the tarp restoration method on iceplant and associated wildlife both from the public and from the Coastal Commission. There was unanimous consensus from the scientific community surveyed prior to the implementation of this project that the tarping method was a successful, low-impact, and cost-effective eradication method for iceplant. However, some community members still felt that there might be wildlife mortality under the tarps. Conclusions drawn from the implementation of this project support the scientific evaluations for similar projects throughout southern California; notably, that there was no wildlife mortality underneath the tarps. In fact, western fence lizards, alligator lizards, and Pacific tree frogs were numerous in and around the restoration area. No wildlife mortality was caused by the tarping restoration method. Conversely, it seemed as though reptiles, amphibians, mammals, invertebrates, and birds were all actively using the site and surrounding habitat areas similarly to activities seen on the pre-restoration surveys. Some reptiles and amphibians were found on top of or underneath the tarps, sunbathing or warming from the tarp heat.

Another challenge of this project was the initial lack of 100% success using the tarping method. The early-onset rains and the overly-restrictive timing on the permit conditions forced the tarps to be pulled prior to the full desiccation of the iceplant in several areas. While much of the site still had significant desiccation, an extension of the duration of tarp placement would solve the problem. Thus, a higher percentage of desiccated area could be easily solved for future projects by extending the tarping cover permit to be able to have a start implementation date earlier in the summer, on or around 1 August, 2016.

Conclusions

Iceplant is a ground-hugging succulent that can grow deep, nearly impenetrable mats several feet thick which dominate resources along a range of soil moisture and nutrient conditions. Iceplant provides little protection or useable habitat for native birds and wildlife. Additionally, its shallow, fibrous root network consumes large quantities of available water year-round, further impeding the growth of native species with the largest impact occurring during times of drought. Most significantly, the highly competitive characteristics of iceplant for available nutrients, water, light, and space allows it to suppress the growth of native seedlings and often results in the growth of large, monospecific stands providing minimal habitat value. Iceplant also alters soil conditions, making the influx of native vegetation species difficult.

The importance of iceplant removal at a site like the Ballona Reserve should not be understated. It is an invasive species that has increased in area on the Reserve by approximately 20% since the mid-2000's, covering approximately 30 acres of the Reserve (before the implementation of this project). While this project was focused on a relatively small area, it will serve to inform future hand-restoration efforts

both at the Reserve and throughout southern California. Additionally, it is an important way to engage the community and have a positive environmental impact. Many of the participants were incredibly enthusiastic and hard working, and the student participants were able to further integrate hands-on restoration activities with in-classroom learning.

The specific project location was chosen to evaluate the difference between tarped iceplant monocultures and adjacent intermixed areas of natives (predominantly a mix of iceplant and saltgrass). Tarping required much less effort and labor costs, though it was more expensive for materials and supplies (e.g. tarps, garden staples, bricks to hold down the edges). Tarping should still be seen as a cost-effective restoration method as the total cost of all supplies was less than \$2,000. The project could be replicated on a larger and even more cost-effective scale. Though tarping was not 100% effective across all restoration areas, it was still highly successful. With the addition of two restoration events, all remaining live iceplant within the tarped areas was removed. Lastly, it should be emphasized that there was no wildlife mortality associated with this method of restoration and it involved less disturbance, overall.

Hand-restoring through removal of iceplant by the roots was also successful, and a good way to avoid most impacts to intermixed native vegetation. There was an additional cost associated with labor, but it was mitigated with a variety of volunteer and student participants. There were small costs associated with materials and supplies for this restoration method too (e.g. gloves, burlap sacks), but more significant costs associated with the green waste dumpsters, especially for the areas with deep, thick iceplant mats that were large and heavy. This method was a great way to engage the community.

Both methods of iceplant removal will provide immediate and long-term ecological benefits to the Reserve. Following the establishment of native vegetation, ecological functions of the restored area will increase by providing habitat, food sources and opportunities for foraging by birds and other wildlife, and protective cover for a variety of native fauna. New vegetation will increase native biodiversity and provide healthier habitat for several endangered and special concern species such as the Belding's savannah sparrow (*Passerculus sandwichensis beldingi*) and South Coast marsh vole (*Microtus californicus stephensi*). The new native vegetation will also increase the ability of local flora and fauna to compete against invaders, increasing the resilience of the restored areas and their ability to respond to urban stressors. Restored areas will continue to be carefully monitored to quantify change over time within and adjacent to the restoration areas and the results will continue to be publically reported.

This project is an incredibly important local example comparison of two types of low-impact restoration methods (tarping and hand-restoration). Continuing scientific monitoring over time will be important to inform future restoration efforts at the Reserve, and this report presents an unbiased dissemination of the results of the restoration project. This report will be published on TBF's project website, and will be submitted to the Coastal Commission.

Appendix A

Final CWRGP Project Information Sheet

PROJECT NAME: Ballona Wetlands Restoration through Community Partnership
(Grant #: 2015-001)

GRANTEE: The Bay Foundation (TBF)

A. Basic Project Information

- 1) *YEAR GRANT AWARDED:* 2015
- 2) *AMOUNT AWARDED:* \$28,000.00
- 3) *YEAR GRANT COMPLETED:* 2016
- 4) *AMOUNT SPENT:* \$27,992.68
- 5) *TOTAL ACRES RESTORED:* 0.88 acres
- 6) *NUMBER OF NATIVE PLANTS PLANTED:* None

This project is allowing for natural recruitment of native vegetation over time to reduce disturbance based on requests from the California Department of Fish and Wildlife and their Native American consultants.

- 7) *NUMBER OF NATIVE TREES PLANTED:* None

However, TBF is exploring the opportunity to supplement native regrowth of vegetation with willow cuttings from the project-adjacent clump of willows in the spring using matching funding. This was recommended by the Native American consultant.

- 8) *CUBIC YARDS OF INVASIVE PLANTS REMOVED:* >200 cubic yards; >15 tons

Over 200 cubic yards of invasive iceplant were removed from site, equating to over 15 tons in weight, measured through weighing of green waste dumpsters. Additionally, solarized (tarpred) iceplant was left in place as mulch for water retention (and to reduce disturbance) on a little less than approximately half of the restored area and is estimated to equate to another 200 cubic yards and 15 more tons of iceplant 'removed' (see full report and Table 2 for details).

- 9) *NUMBER OF INVASIVE TREES REMOVED:* None

- 10) *CUBIC YARDS OF NON-PLANT MATERIAL REMOVED:* Miscellaneous trash pickup; <1 cy

None calculated, though restoration events also included some trash clean-up that occurred with old trash and debris that had been left on site over time (not as part of this project) (see, for example, photograph of an old tire found buried under several layers of iceplant).

- 11) *NUMBER OF VOLUNTEERS USED:* 181 volunteers
- 12) *NUMBER OF VOLUNTEER EVENTS HELD:* 12 events

13) *NUMBER OF VOLUNTEER HOURS CONTRIBUTED*: 525 hours for all events combined.

This number does not include additional staff contributed volunteer time or those from matching funds, or contributed time from expert scientists consulted as part of the project planning.

14) *NUMBER OF EDUCATIONAL SIGNS INSTALLED*: None

However, every volunteer event and school group tour received an informational speech prior to restoration including the history of the Ballona Reserve, the need for restoration and invasive species removal, and safety and cultural resources. Additionally, several teachers facilitated an interactive learning experience for their school groups through worksheets and on-site discussions, including discussions about urban wetlands, invasive plants and their problems, and the challenges of restoration.

B. Project Reach and Impact

1) *DID YOUR PROJECT RECEIVE PRESS COVERAGE?*

Yes, TBF released one formal media press release on 11 March, 2016, and interviewed for multiple newspaper articles. Several notable articles were published on 2 March, 2016, through the Argonaut Newspaper, and on 13 March, 2016 for the Daily Breeze – both local Los Angeles papers highlighting the need for restoration and information about iceplant. Additionally, Dr. Katherine Pease, staff scientist for Heal the Bay, wrote an inspiring article on the importance of restoration at Ballona. Media article and blog links are included below:

- 03-02-2016 – Argonaut: <http://argonautnews.com/killing-plants-to-save-the-wetlands/>
- 03-13-2016 – Daily Breeze: <http://www.dailybreeze.com/environment-and-nature/20160313/conservationists-target-ice-plant-invading-ballona-wetlands>
- 03-14-2016 – Maven's Notebook (near bottom): <https://mavensnotebook.com/2016/03/14/news-worth-noting-delta-tunnels-a-poor-investment-for-the-bay-area-westlands-and-mountain-counties-letter-to-governor-brown-in-support-of-biomass-facilities-ballona-wetlands-5-yea/>
- 03-30-2016 – Argonaut opinion blog: <http://argonautnews.com/opinion-power-to-speak-a-win-for-science-in-the-ballona-wetlands/>
- 08-25-2016 – Argonaut: <https://issuu.com/argonautnews/docs/argonaut082516>
- 09-06-2016 – HomeTown News: no link; listed notice for volunteer days and events
- 09-08-2016 – Argonaut: <https://issuu.com/argonautnews/docs/argonaut090816>

Additionally, TBF put together a formal webpage for the project, which also served as a notification center for volunteers about events and ongoing work on the project. The webpage was updated frequently.

- TBF iceplant webpage: <http://www.santamonicabay.org/explore/wetlands-rivers-streams/ballona-wetlands-ecological-reserve/community-iceplant-removal-project/>

2) PLEASE SUBMIT BEFORE AND AFTER PHOTOGRAPHS OF YOUR PROJECT SITE.

See full report for documented photo point locations before, during, and after the project implementation.

3) HAS THERE BEEN AN INCREASED NUMBER OF SPECIES USING THE SITE?

Post-restoration monitoring suggests initial results of reductions in invasive species, and the beginnings of returning of native salt marsh species. Additionally, birds, wildlife, and invertebrates such as butterflies continue to use the restoration areas and adjacent areas. Ongoing monitoring through matching funds will more thoroughly evaluate the return of species to the site over time and the establishment of new vegetation in the restored areas. The next report will be published in mid-summer 2017.

4) DID YOU USE SOCIAL MEDIA TO HELP ACHIEVE PROJECT GOALS? PLEASE LIST ALL RELEVANT WEBSITES, FACEBOOK SITES, INSTAGRAM/TWITTER HANDLES, ETC.

Yes, both TBF and the Ballona Wetlands Restoration Project regularly posted about volunteer events, project progress, photographs, and reporting information. A total of 10 posts related to the project were posted on TBF's facebook page (<https://www.facebook.com/TheBayFoundation/>), which has nearly 2,700 followers, and twitter page (<https://twitter.com/SMBRF>), which has 954 followers. Additional online outreach to engage community volunteers included posting opportunities on www.volunteermatch.org. Additionally, other community partners and participants such as Heal the Bay, Friends of Ballona Wetlands, Center for Urban Resilience, and LMU also shared or posted information about the project on their sites.

TBF and Ballona Restoration links below:

- TBF website: <http://www.santamonicabay.org/>
- Twitter: @SMBRF: <https://twitter.com/smbrf>
- Facebook: @TheBayFoundation: <https://www.facebook.com/pages/Santa-Monica-Bay-Restoration-Foundation/130999036940840>
- Instagram: @thebayfoundation: <https://www.instagram.com/thebayfoundation/>

- Ballona Wetlands Restoration Project website: <http://ballonarestoration.org/>
- Twitter: @restoreballona: <https://twitter.com/restoreballona>
- Facebook: @ballonarestoration: <https://www.facebook.com/ballonarestoration/>

5) ANY OTHER PROGRESS OR STORIES YOU WOULD LIKE TO SHARE?

Please see full report for additional details, photographs, and monitoring data.

Appendix B Site 1 Photographs



Photographs of Site 1 on (A) 28 May 2015; (B) 8 September 2016; (C) 26 October 2016; (D) 10 November 2016; (E) 29 November 2016

Appendix B Site 2 Photographs



Photographs of Site 2 on (A) 9 August 2016; (B) 6 September 2016; (C) 24 October 2016; (D) 15 November 2016; (E) 29 November 2016

Appendix B Site 1 and 3 Photographs



Photographs of Site 1 and 3 on (A) 28 May 2015; (B) 1 September 2016; (C) 13 September 2016; (D) 24 October 2016; (E) 29 November 2016