

# Crestridge Ecological Reserve 2016 Annual Management Report



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## Introduction

In early 2016, the California Wildlife Foundation, at the request of the California Department of Fish and Wildlife (CDFW), provided funding to the Endangered Habitats Conservancy (EHC) to implement priority management activities on the Crestridge Ecological Reserve (CER). These activities have continued throughout calendar year 2016 working in collaboration with the Earth Discovery Institute (EDI), the Conservation Biology Institute (CBI), and a number of consultants, contractors, and volunteers. This progress report summarizes the major tasks performed and accomplishments attained at CER during 2016. The report is organized around the major areas of management activity identified in prior years:

- Biological Management and Monitoring
- Property Management
- Community Outreach and Education

## Biological Monitoring and Management

In 2016, biologists from the Conservation Biology Institute (CBI), with assistance from EHC staff and volunteers with the Earth Discovery Institute (EDI), conducted the following biological monitoring and management activities on CER:

- MSP<sup>1</sup> priority plant species monitoring and management
- Management and monitoring of the invasive grass *Brachypodium distachyon*
- Lakeside ceanothus photomonitoring

In addition, EHC land managers conducted invasive plant control, habitat enhancement and restoration, and wildlife surveys separate from the above-mentioned activities. Each task is summarized below.

## MSP Priority Plant Species

### Monitoring

In 2016, rare plant monitoring focused on two plant species identified as priorities by the San Diego Management and Monitoring Program (SDMMP 2013): San Diego thornmint

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<sup>1</sup> MSP = Management Strategic Plan. The MSP for western San Diego County was developed by the San Diego Management and Monitoring Program (SDMMP 2013) and identifies regional priorities for monitoring and management.

(*Acanthomintha ilicifolia*) and San Diego goldenstar (*Bloomeria clevelandii*). Both species are MSCP covered species and have been monitored previously on CER.

We used the SDMMP rare plant monitoring protocol (SDMMP 2014), which was developed to ensure data collection consistency in support of regional monitoring per the SDMMP's Management Strategic Plan (MSP) (SDMMP 2013). Per MSP monitoring protocols, monitoring forms were completed for both species and have been submitted to SDMMP.

Table 1 summarizes survey results, identifies threats, and provides management recommendations. San Diego thornmint was not detected in 2016, despite suitable climatic conditions. Lack of detection may be due to a diminishing seed bank, invasive plants, and erosion. A small number of Cleveland's goldenstar (6 individuals) was detected in 2016. Threats at this population included invasive plants and dumping/trash. Refer to Table 2 for invasive plants identified as potential threats to these species. Invasive plant control should focus on species that may result in detrimental impacts to MSP species or habitats (e.g., altered resource allocation, vegetation structure, recruitment, or competitive exclusion) (CBI et al. 2012).

## Management

CBI conducted targeted invasive plant management (clipping invasive species per Best Management Practices, CBI 2014) at the occupied San Diego thornmint location on CER. This task required knowledge of all species within the treatment area to ensure that only invasive species were removed.

Although San Diego thornmint was not detected at this location in 2016, we recommend continued management to control invasive species and enhance thornmint habitat. Long-term monitoring that encompasses a range of climatic conditions will determine whether or not San Diego thornmint persists at this location. The species was detected here in 2000 and 2010-2012.

## *Brachypodium* Management and Monitoring

CBI continued to manage the invasive grass *Brachypodium distachyon* (*Brachypodium*) in experimental treatment areas to restore habitat for San Diego thornmint (observed in this location in 2000 and 2003) and maintain progress made over the last several years. An estimated 10 acres of previously-treated *Brachypodium*-infested habitat were treated in 2016. Treatments were conducted by Recon Environmental, Inc. (Recon). Recon applied the grass-specific herbicide Fusilade II to *Brachypodium* and other nonnative grasses in experimental treatment plots on February 22-25, 2016. Recon applied Glyphosate to treat early-germinating nonnative forbs in treatment plots on February 25, 2016 and again on April 4 and April 15, 2016 to treat later-germinating nonnative forbs. Examples of 2016 *Brachypodium* treatment plots on CER are depicted in Figure 1.

**Table 1.** MSP Priority Plant Species: Monitoring Results and Recommendations.

Species	Population Size by Year	Occupied Habitat (acres) <sup>1</sup>	Threats	Management Recommendations
San Diego thornmint ( <i>Acanthomintha ilicifolia</i> )	2016 – 0 2015 – 0 2014 – 0 2012 – 6 2011 – 1 2010 – 17 2000 – 55	0.001 <sup>2</sup>	<ul style="list-style-type: none"> <li>- Invasive Plants</li> <li>- Erosion</li> <li>- Small Population</li> </ul>	<p><u>Weed control.</u> Hand weed annually to control weeds unless monitoring indicates less frequent weeding is appropriate.<sup>3</sup></p> <p><u>Monitoring.</u> Monitor annually between 2017-2021 to assess population status and threats.</p> <p><u>Surveys.</u> Continue to survey for plants in suitable habitat on Thornmint Hill in years of average or above-average rainfall.</p>
San Diego goldenstar ( <i>Bloomeria clevelandii</i> )	2016 – 0 2015 – 0 2010 – 2,000 <sup>4</sup>	NA <sup>5</sup>	<ul style="list-style-type: none"> <li>- Invasive Plants</li> <li>- Dumping/Trash</li> </ul>	<p><u>Access control.</u> Consider fence and signage installation along dirt road adjacent to population.</p> <p><u>Monitoring.</u> Monitor biennially after 2016 to assess population status, threats, and treatment success (e.g., 2018, 2020, 2022).</p>

<sup>1</sup> Refers to habitat occupied in 2016 (acres) or, if species was not present in 2016, habitat occupied during the last survey period when the species was located.

<sup>2</sup> Occupied acreage refers only to ‘small’ location on west-facing slope just east of Rios Canyon Road.

<sup>3</sup> See CBI 2014 for Best Management Practices for hand weeding within *Acanthomintha ilicifolia* populations.

<sup>4</sup> Although 2010 onsite population was approximately 2,000 plants, an additional 7,000-8,000 plants were observed just offsite.

<sup>5</sup> NA = not applicable. No plants were detected in 2015, and previous data include point data only, so previous occupied acreage cannot be calculated.

**Table 2.** Invasive Plants.

MSP Priority Plants	Invasive Plants	
	Common Name	Scientific Name
San Diego thornmint ( <i>Acanthomintha ilicifolia</i> )	Purple false brome	<i>Brachypodium distachyon</i>
	Foxtail brome	<i>Bromus madritensis</i>
	Tocalote	<i>Centaurea melitensis</i>
	Red-stem filaree	<i>Erodium cicutarium</i>
	Short-podded mustard	<i>Hirschfeldia incana</i>
	Smooth cat's-ear	<i>Hypochaeris glabra</i>
	Scarlet pimpernel	<i>Lysimachia arvensis</i>
	Prickly sow thistle	<i>Sonchus asper</i>
San Diego goldenstar ( <i>Bloomeria clevelandii</i> )	Purple false brome	<i>Brachypodium distachyon</i>
	Ripgut grass	<i>Bromus diandrus</i>
	Foxtail brome	<i>Bromus madritensis</i>
	Tocalote	<i>Centaurea melitensis</i>
	Red-stem filaree	<i>Erodium cicutarium</i>
	Rattail sixweeks grass	<i>Festuca myuros</i>
	Short-podded mustard	<i>Hirschfeldia incana</i>
	Smooth cat's-ear	<i>Hypochaeris glabra</i>
	Narrowleaf cottonrose	<i>Logfia gallica</i>
	Common catchfly	<i>Silene gallica</i>

CBI biologists collected cover and species richness data in *Brachypodium* treatment plots established under a SANDAG Environmental Mitigation Program grant. Data collected in 2016 will be analyzed by CBI in early 2017.

### Lakeside Ceanothus Photomonitoring

CBI and EDI continued long-term photomonitoring of Lakeside ceanothus (*Ceanothus cyaneus*), which is a MSCP covered species. Volunteers conducted photomonitoring under the direction of Cathy Chadwick of EDI according to protocols established by CBI and used in 2010-2015. EDI volunteers contributed 36 hours to photomonitoring and EDI staff prepared/organized the resulting images and then transmitted to CBI.

CBI labeled and formatted photographs, reviewed and analyzed 2016 photodocumentation, and assessed changes between years. This effort is described below; refer to Appendix A for the six-year photo record and Appendix B for 2016 photodocumentation.





**Figure 1.** *Brachypodium* Treatment Plots.



In 2010, photopoints were established within eight Lakeside ceanothus stands; each photopoint and related stand were given a unique identifier (e.g., CECY-1, CECY-2) (CBI 2011). Photopoints were originally sited to provide an advantageous view of the plant population or stand of interest, and each photopoint was marked permanently. Multiple photos from a single photopoint are further identified as follows: CECY-1 = CECY-1.3, CECY-1.4, CECY-1.5.

In 2016, photomonitoring was conducted on May 4 (CECY-1-3), May 6 (CECY-4), and May 25 (CECY-5-7). Additional photomonitoring was conducted on March 31 at CECY-2 and 3 due to reports of early flowering (note: no photo was taken at CECY-2.2 during the March monitoring period). Refer to Appendix A for all 2016 photos; however, only the May photos for CECY-2 and 3 are included in the long-term photo record (Appendix B) because these dates correspond most closely with previous monitoring dates. Photomonitoring was conducted by Cathy Chadwick and EDI volunteer Mary Duffy using a Canon Powershot SX170-IS camera.

The 2016 time-series results are similar to 2015 results in phenological differences and flowering between years (Appendix B). More flowering was observed in 2010-2012 versus later years, likely due to climate. We noted increased vegetative growth and some recovery from 2015 die-back, possibly due to the cooler temperatures and higher rainfall in 2016. These same conditions may have been responsible for the increase in nonnative species at some locations.

Table 3 summarizes conditions at each Lakeside ceanothus stand. The major observations from 2016 were (1) minimal flowering throughout the population, (2) comparable levels of Lakeside ceanothus die-back to 2015, but an overall increase in vegetative growth in these same areas, and (3) a localized increase in invasive species.

**Table 3.** Summary of Lakeside Ceanothus Stands.

Ceanothus (CECY) Stand Number	Minimal flowering	Die-back or Sparse Foliage <sup>1</sup>	Increase in Nonnative weeds
CECY-1	X	---	---
CECY-2	X	X	X
CECY-3	X	X	X
CECY-4	X	X	---
CECY-5	X	X	X
CECY-6	X	X	X
CECY-7	X	X	---

<sup>1</sup> Indicates presence of die-back or sparse foliage. Despite observed die-back, vegetative growth at many of these stands was greater in 2016 than in 2015.

Based on 2016 results and the 6-year time-series, we recommend the following actions:

1. Continue Lakeside ceanothus photomonitoring at 5-year intervals, with more frequent photomonitoring if warranted (e.g., catastrophic event, high rainfall year, marked increase in invasive species).
2. Monitor at the same time each year ( $\pm 7$ -10 days). Recommended baseline monitoring periods are May 1-10 for CECY-1-3, and May 24-June 2 for CECY 4-7. If monitoring in multiple years of average or above-average rainfall indicates low or no flowering during the baseline monitoring period, then *additional* photomonitoring earlier in the year may be warranted to determine if these changes are due to shifts in phenology.
3. Treat the invasive long-flowered veldt grass (*Ehrharta longiflora*) at CECY-2. Initiate treatment (hand-pulling and/or herbicide treatment) in 2017 and continue until controlled. This species has the potential to expand rapidly to the detriment of native species and habitat.
4. Treat invasive forbs and grasses in the vicinity of CECY-3, 5, and 6. Initiate treatment in 2017 and continue as necessary. Particular care will be required at these sites to avoid native species.

## Invasive Plant Control

EHC land managers, subcontractors, and volunteers implemented targeted invasive plant control actions at several locations in 2016. Target invasive species were identified as part of the overall invasives control plan for CER (CBI 2011) or are associated with grassland restoration near the Horsemill Road entrance to CER. Control activities are summarized below and in Table 4.

- EHC staff and subcontractors applied herbicide at the following locations:
  - Treated nonnative grasses and forbs at the Horsemill Road entrance (including trails, shade house, mulch pile, grassland restoration areas, and existing house).
  - Treated long-flowered veldt grass in the Horsemill Road oak grove.
  - Treated nonnative forbs at Vista de Montemar Road, Rattlesnake Point, and Rios Canyon Trail.
- EHC staff and subcontractors conducted mechanical control (line-trimming) near the mulch pile near the Horsemill Road entrance, and along Vista de Montemar.
- EHC staff and CalFire crews worked over 300 person hours to remove several acres of black mustard in the grassland restoration area near the Horsemill Road entrance. Material was removed from the site via dumpster.
- EHC staff, subcontractors, and volunteers conducted hand-weeding at all invasive plant control locations, including (but not limited to) the Horsemill Road riparian area, grassland restoration area, and oak grove.

**Table 4.** Invasive Plant Control Activities.<sup>1</sup>

Month	Activity	Area <sup>2,3</sup>	Hours	Active Ingredients <sup>4</sup>	Concentration (%)	Quantity (gallons)
January	---	---	---	---	---	---
February	Herbicide	HM: GL	---	Glyphosate	2.00	52
March	Herbicide	HM: GL	---	Glyphosate	2.00	36
April	Herbicide	HM: GL	---	Glyphosate	2.00	60
May	Herbicide	HM: GL	---	Glyphosate	2.00	24
June	---	---	---	---	---	---
July	Post-rain inspections Hand-pulling weeds		---	---	---	---
August	---	---	---	---	---	---
September	Mechanical removal		---	---	---	---
October	Mechanical removal	GL, Rios	---	---	---	---
November <sup>5</sup>	Mechanical removal	GL, Rios	---	---	---	---
December <sup>5</sup>	---	---	---	---	---	---

<sup>1</sup> Excludes *Brachypodium* control conducted as part of SANDAG Environmental Mitigation Program grant.

<sup>2</sup> Areas: HM = Horsemill Road entrance; listed activities are in vicinity of this entrance. VM = Vista de Montemar entrance; listed activities are in vicinity of this entrance.

<sup>3</sup> GL = Grassland restoration area near Horsemill Road entrance

<sup>4</sup> Fusilade II is trade name; active ingredient = Fluazifop-butyl.

<sup>5</sup> Planned activities are listed for November and December, and are in the process of being implemented.

- Invasive control subcontractors and staff monitored for weed germination at all invasive plant control locations.
- EHC staff and volunteers expended an estimated 400 hours treating invasive plants; efforts included hand pulling weeds, weed whipping, and spraying to control black mustard (*Brassica nigra*), London rocket (*Sisymbrium irio*), Italian thistle (*Carduus pycnocephalus*), Russian thistle (*Salsola tragus*), horehound (*Marrubium vulgare*), longbeak stork's bill (*Erodium botrys*), fountain grass (*Pennisetum setaceum*), wild oat (*Avena fatua*), and long-flowered veldt grass.

## Habitat Enhancement and Restoration

Habitat enhancement and restoration included volunteer efforts in the grassland restoration area and oak grove, as well as outplantings and irrigation maintenance by EHC staff. The following species were outplanted this year: Engelmann oak (*Quercus engelmannii*), coast live oak (*Quercus agrifolia*), California scrub oak (*Quercus berberidifolia*), California fuchsia (*Epilobium canum*), Cleveland's sage (*Salvia clevelandii*), and nodding needlegrass (*Stipa* [*Nassella*] *cernua*) (Figure 2).



**Figure 2.** Native Species Outplantings in the Grassland Restoration Area.

### Grassland Restoration Area

EDI weekly volunteers spent a total of 76 hours in support of the grasslands restoration area. Activities included preparing areas for student plantings (marking planting areas, digging holes), maintaining plant protectors, irrigating plants, weeding, removing plant protectors from mature plants, and photomonitoring. A community volunteer event (6/2/2016) focused on grassland restoration engaged 22 volunteers for a total of 66 hours. In total, volunteers contributed 142 hours in support of CER native grasslands restoration. In addition, approximately 50 hours were spent installing new polyethylene (poly) tubes and irrigation lines.

## Horsemill Oak Grove

EDI weekly volunteers contributed 56 hours to oak grove restoration by preparing areas for student plantings (marking planting areas, digging holes), assisting with installation and maintenance of the irrigation system, maintaining plant protectors, irrigating plants, and removing plant protectors from mature plants. In January 2016, 22 volunteers attended an acorn planting event at CER, contributing an additional 66 hours to riparian restoration. EDI volunteers also collected acorns in fall 2016 for additional oak plantings during winter 2016-17 in the grove and nearby oak woodland areas. In total, EDI volunteers supported the Horsemill Road oak grove/oak riparian area with 122 hours of work.

## Wildlife Surveys

EHC staff reported an increase in mule deer sightings around the oak grove and meadow; however, there was only one formally recorded sighting of deer tracks on September 14 by an EDI patrol member. Western toad tracks were recorded on the same day and verified by USGS. Western toad is not listed in the 2009 draft of the CER Habitat Management Plan. Refer to Appendix C for 2016 CER data from the San Diego Tracking Team.

In April, EHC, EDI, U.S. Geological Survey (USGS), and North American Field Herpetology Association (NAFHA) volunteers conducted herpetological surveys on CER and the adjacent South Crest Preserve (Figure 3). During this effort, 1 EHC staff member, 2 EDI staff, and 11 NAFHA volunteers contributed 60 hours of survey time on CER.

## Property Management

EHC staff, EDI staff, and volunteers conducted property management activities, as described below.

### Access Control

EHC continued to work with CalFire to monitor lock and gate access issues for fire safety and emergency egress, and to make modifications to gate structure and locks as needed. This year staff replaced locks, chains and signage along Valley View Truck Trail following vandalism.

### Enforcement

Law enforcement coordination was conducted with CDFW wardens, San Diego County Sheriff's Department, CalFire, and San Diego County Animal Services. As of November 2016, 30 incidents were reported by staff (14 reports), volunteer patrol (13 reports), recreational users, and the local fire department (1 report). The 2016 incident reports are summarized in Table 5 (some reports relayed multiple issues so the total number of incidents is larger than the number of reports).





**Figure 3.** Herpetological Surveys with USGS.

**Table 5.** Incident Reports.

Incident	Number of Reports
Bee hive near trail	1
Brush fire	1
Dog off-leash	4
Dumping	2
Gate vandalism	3
Graffiti	2
Homeless person	3
Motorcycle	7
Other motor vehicle	3
Wildlife sighting	2

In February 2016, an EDI patrol member encountered a homeless person entering the west side of CER via the Valley View Truck Trail. The volunteer informed the homeless person that he was trespassing, at which time the person returned back to the west. Previously, this individual had camped, used drugs, and lit small cooking fires in the west-central portion of CER from July through September 2015. In the spring of 2016, this individual returned, establishing a campsite along La Cresta Road in the area of the culvert undercrossing west of Vista de Monte Mar, spanning the culvert to EHC lands (non-CDFW area) on the south side of La Cresta Road. EDI patrol members initially alerted EDI and EHC staff to the presence of the camp. EHC staff met with Sheriff personnel, and CDFW law enforcement was appraised. The individual was apprehended and removed. San Diego County Department of Public Works (DPW) collected the refuse, which included hazardous materials (syringes etc.). EDI volunteers and EHC staff also removed multiple truckloads of debris from the camp. County road crews assisted because of safety issues with traffic on La Cresta Road.

In September 2016, EHC staff also responded to reports of a full-sized vehicle trespassing within the property boundary of CER. Numerous roadway gates along the Valley View Truck Trail were vandalized leading staff to replace locks, chains and signage.

## Trails

EHC regularly maintains trails, water bars, and signage along trails. EHC and EDI staff and volunteers continue to improve the trail system. EDI volunteers assisted EHC staff with trail maintenance and repairs throughout CER for a total of 39 hours. This year these activities included:

- The San Diego Mountain Biking Association invested over 150 volunteer hours maintaining/repairing trails including Redtail, Den, and the upper and lower kiosk loops.
- EHC staff closed and posted trail closure signs at the upper “moto track” trail, upper Rios Canyon (northern redundant trail), and at the redundant Redtail trail. The latter has an ongoing issue with an unknown user who continues to destroy barriers.
- Erosion control measures continue on the Lakeview Lane dirt road into the oak grove.

In 2016, it was determined that EHC will not maintain the trail from Flinn Springs Park into CER. The existing trail (an old road) is not engineered to be sustainable and is constrained by a steep hill and canyon on either side.

## Trash Removal and General Maintenance

### Trash Removal

Trash removal activities focused on clean-up of the homeless encampment near La Cresta Road discussed in the “enforcement” section above. San Diego County DPW collected the refuse, which included hazardous materials (syringes etc.). EDI volunteers and EHC staff also removed multiple truckloads of debris from the camp.

### Road Maintenance

EHC contracted Luke Gibson for road grading and water bar installation from the Horsemill Road gate past the residence drive. EHC senior land manager, Chris Manzuk owns and operates a grader and loader, which has also been used for road repair, maintenance, and water bar installation. CalFire crews graded and brushed the Valley View Truck Trail and brushed Lakeview Lane.

### Graffiti Removal

Approximately 50 staff and volunteer hours were invested in graffiti removal on boulders west of the oak grove along the riparian corridor in July (Figure 4).

## Fire Management

EHC land managers maintain fire/brush management zones for several properties adjacent to CER. EHC staff continued coordinating with fire agencies and implemented the following fire management actions:

- EHC staff and CalFire crews invested 100+ person hours in annual maintenance at Rios Canyon including brushing, clearing, and chipping. Rios Canyon runs through the central portion of the preserve and is in proximity to Rios Canyon Elementary School and mobile home parks.





**Figure 4.** Graffiti Removal by Volunteers

- EHC staff, EDI volunteers, and CalFire crews modified fuel and removed vegetation along the urban-preserve boundary east of the Horsemill Road entrance, where two rural residences border the preserve (Figure 5). Two 40-yard dumpsters contained the removed material. Annual herbicide treatment will be used to maintain the brush management zone at these properties.

Volunteers contributed 45 hours to vegetation management for fire safety purposes, while CalFire crews spent 536 hours clearing brush and managing weeds at CER.

On October 24<sup>th</sup>, a brushfire broke out proximal to CER west of the Walmart on Los Coches Road and was contained in short order.



**Figure 5.** Brush Management Zone Near Horsemill Road.



## Pest and Pathogen Management

### Gold Spotted Oak Borer (GSOB)

Several trees in the Horsemill Road oak grove have the small “D” shaped entrance holes indicative of gold-spotted oak borer (GSOB) and are exhibiting other trunk and foliar symptoms. Four trees have succumbed to mortality thus far (Figure 6). The presence of GSOB will be confirmed by Bret Hutchenson in early 2017. The scope of the infestation will be assessed and a preventative treatment strategy proposed at that time. Typically, GSOB protocol removal for a large tree is approximately \$2,000. Preventative treatment for the oak grove is estimated to cost \$15,000-\$20,000 (approximately \$300/tree) and will be implemented in the spring of 2017.



**Figure 6.** Impacts of GSOB Infestation on Coast Live Oak. The tree on the left has been killed and the tree to the right is exhibiting sings of infestation.



## Polyphagous Shot Hole Borer

Polyphagous shot hole borer (PSHB) has infested the majority of mature California sycamore's in Flinn Springs County Park, adjacent and north of CER. No trees at CER appear to be infested at this time. CER land managers are coordinating with County Park staff to monitor the progress of the infestation.

## Experimental Treatment of Stressed Trees

EHC tested an experimental organic nutrition treatment on several infested and/or stressed trees. The treatment includes a root zone injection and foliar spray of a worm casting solution, with two to three treatments applied over several weeks. The cost of treatments is several hundred dollars depending on tree size. Although definitive conclusions cannot be drawn at this time, there are indications that the treatment is beneficial, including the development of new growth on a GSOB infested tree (Figure 7).



**Figure 7.** New Growth on a Coast Live Oak After Treatment.

## Community Outreach/Education

EDI continued to implement a diverse community outreach and education program on CER. Major accomplishments are listed below by category. Refer to Table 6 for a summary of 2016 volunteer hours.

**Table 6.** Summary of Volunteer Hours.

Volunteer Activity	Volunteer Hours
Photomonitoring	36
Hand Weeding	21
Grasslands Restoration	142
Oak Grove Restoration	122
Vegetation Management	45
Trail Maintenance	39
Herpetological Surveys with USGS	60
Reserve Ranger Patrol Training	50
Student Habitat Restoration	417
Patrol	13
Graffiti Removal	48
Weekly Volunteers (other work)	279
Total Hours	<b>1272</b>

## Outreach and Interpretive Events

In 2016, EDI conducted 3 interpretive events on CER totaling 218 interpretive hours:

- One co-hike with the San Diego Natural History Museum Canyoneers, which was attended by 50 people.
- One Birds and Blooms hike supported by CBI and USFWS, which was attended by 11 people.
- One composting workshop conducted by the Solana Center for Environmental Innovation, which was attended by 20 people.

EDI also worked with USGS to conduct herpetological surveys in CER and the adjacent South Crest Preserve with North American Field Herpetology Association volunteers (Figure 3). On CER, volunteers and staff contributed 60 hours.

In support of covered species, EDI maintained a poster display regarding Hermes copper, Quino checkerspot, and Monarch butterflies at the Horsemill Road entrance information kiosk.

## Reserve Ranger Program

The Crestridge Reserve Ranger Volunteer Patrol was established by EDI in 2011. In 2016, 20 participants attended 3 reserve ranger volunteer patrol trainings covering trail building/erosion prevention, invasive plants, and native ants for a total of 50 patrol training hours.

## Education

In 2016, EDI instructors led 17 guided school visits to CER, involving 1,011 students from 34 4th and 5th grade classes from 9 different elementary schools in 2 school districts as part of EDI's service-learning environmental education program. Students participating in field trips were taught natural science curriculum and assisted with restoration activities (Figure 8). Student volunteers planted 834 purple needlegrass (*Stipa pulchra*) plants. Students performed a total of 417 hours of volunteer habitat restoration labor at CER in 2016.

## Weekly Volunteers

In addition to photomonitoring and restoration activities described in previous sections, weekly volunteers under the direction of EDI assisted with clean-up of dump sites, an annual plant sale, seed collection, and maintenance of the native plant demonstration garden. These volunteers contributed a total of 279 hours of additional time.





**Figure 8.** Educational Activities.



## References

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## Photograph Acknowledgements

- Cover photo: CBI
- Figure 1: CBI
- Figure 2: EHC
- Figure 3: EDI
- Figure 4: EDI
- Figure 5: EHC
- Figure 6: EHC
- Figure 7: EHC
- Figure 8: EDI