Survey and Control of *Chromolaena odorata* in the Kahuku Training Area, O‘ahu, Hawai‘i

Annual Progress Report
October 1, 2017—September 30, 2018

*Rappelling to remove plants from steep slopes at Kahuku Training Area.*
Summary of Project Objectives:
The aim of this project is to contain or eradicate Chromolaena odorata, commonly called devil weed, from the Kahuku Training Area (KTA). Eradication at KTA will reduce the threat of this species spreading to natural areas that may contain protected species. With other funds, control operations with the aim of eradication are taking place at locations outside of KTA where C. odorata has been found.

Chromolaena odorata, commonly known as devil weed, is a state-listed noxious weed that is toxic to livestock, people and other plants. It is a weed of concern in Guam, other Pacific Islands, Australia and several African countries. It poses a threat to natural and agricultural systems due to its ability to form dense thickets and crowd out native plants. It is a threat to ranching because of its toxicity to livestock. C. odorata is currently known from three locations on O‘ahu: the Kahuku Training Area, Kahana State Park and Camp H.M. Smith in ‘Aiea. Individual plants have been found in Mākaha and Lānikai watersheds.

Between 2006 and 2009, botanical surveys of all publicly accessible roads on O‘ahu were conducted by OISC’s O‘ahu Early Detection program. C. odorata was not found during these surveys. This means that it is unlikely C. odorata was introduced somewhere else and dispersed onto KTA. C. odorata is a widely dispersed pest on the island of Guam, and units from Hawai‘i sometimes train in Guam. The seeds are wind dispersed and readily attach to clothing. One plant can produce approximately 800,000 seeds a year. Given these factors, it is highly likely the pathway of introduction was military activities. The Biological Opinion for military activities on O‘ahu requires the Army to respond immediately to incipient weeds brought in via training operations. What is currently known about C. odorata supports the assumptions that the center of the population is the Kahuku Training Area (KTA) and that C. odorata was introduced to KTA because of military activities.

At KTA, OISC conducts sweeps of designated subunits and flags patches with a high density of plants that are most efficiently treated with a power or aerial spray. These patches are called hotspots and are treated at a later date by Army Natural Resources Program. This method allows consistent monitoring of devil weed treatments to ensure that areas that may need re-treatment are noted and any new infestations mapped. OISC’s responsibilities are:

- Surveying and monitoring treatment of subunits 3,4,7,8 and 10 within the Alpha 1 Range of Kahuku Training Area (KTA). This includes state land leased by the military and used by
the public as a motorcross recreational area on the weekends. Figure 1 shows where the subunits are within KTA.

- Flagging areas as “hotspots” for follow-up treatment by Army Natural Resources Program. Hotspots are defined as areas with more than five mature plants, 150 immature plants or that would be inefficient to treat without a power sprayer or an aerial spray for some other reason.
- Monitoring hotspot treatment and recording amount of re-growth after treatment.
- Removing outlier C. odorata outside of hotspots.
- Treating re-growth inside previously treated hotspots if this can be accomplished without delaying surveying (otherwise area is flagged for follow-up treatment by Army Natural Resources Program).
- Communicating results of all monitoring through a Google Docs spreadsheet.

**Project Accomplishments: October 1, 2017—September 30, 2018.**

OISC conducted four multi-day trips to control C. odorata. During the worktrips the crew:

- Conducted survey sweeps over 1,199 acres.
- Marked hotspots, defined as more than five mature plants or more than 150 immature plants, with flagging or something equivalent for later aerial or ground treatment by Army Natural Resources Program staff.
- Treated a total of 265 mature and 3,002 immature plants. It should be noted that these numbers are not a reflection on the total amount of plants detected or that actually exist within the subunits OISC and Army Natural Resources Program manage, just the total that were treated by OISC staff.
- Mapped monotypic fields of guinea grass for possible alternate survey techniques since these areas have a lower confidence level due to low visibility.
- Mapped areas that are safe to sweep along vegetated slopes of Kaunala Gulch and mapped access points in order to hike directly to hotspots in areas deemed unsafe.
- Scouted steep areas that could be done by rappelling and implemented a successful rappel operation down a 150-ft waterfall that resulted in being able to remove 7 plants from along the waterfall.

OISC continued to work with Army Natural Resources Program staff to take GigaPan (extremely high-resolution panoramic photographs) images of the sides of Kaunala Gulch. Visibility on the gulch sides is low because of the thick, overhead vegetation. The low visibility makes other hazards such as drop-offs, ledges and bees more dangerous. With GigaPan images, OISC can find
plants using the imagery and hike directly to them, rather than having to do complete sweeps of the hillside. OISC personnel reviewed GigaPan images on days field ops were cancelled due to weather and recorded points in GPS units for later ground truthing.

Data Management and Coordination:
During the reporting period, OISC staff entered observations for each hotspot into the Google Docs Hotspot Spreadsheet. The GIS Specialist quality controlled data from the field entered into the database and the spreadsheet. She also worked with Army Natural Resources Program staff to ensure the hotspot spreadsheet makes sense to both organizations.

Challenges:
As mentioned above, Kaunala Gulch is a challenging area as there are many ledges hidden under the vegetation that also tend to be full of beehives. However, OISC worked with Army Natural Resources to find a solution. OISC will hike directly to hotspots and Army Natural Resources will aerially spray more of the gulch sides. OISC mapped the areas of the gulch sides that they feel are safe to sweep and will hike directly to hotspots that are outside of the safe area.

This year the crew has also began finding more range debris and possible UXO after large training events. We worked with ANRP to implement a system whereby ANRP contracted EOD specialists could quickly determine the hazard so that Range Control was not called out for items that do not have explosive potential.

We also had two camping trips cut short due to weather. In one instance the field crew lost a day of work due to lightning and thunderstorms in the area and in the other a tropical storm warning was issued and we had to recall the crew back to the baseyard. This has put us behind in our survey schedule. We have not yet completed a full sweep of Subunits 8 and 9. We were also unable to groundtruth our GigaPan points.

Table 1: OISC *Chromolaena odorata* Work Effort Summary at Kahuku Training Area
October 1, 2017—March 31, 2018

<table>
<thead>
<tr>
<th>Location</th>
<th>Acres Surveyed</th>
<th>Mature Plants Treated</th>
<th>Immature Plants Treated</th>
<th>Total Plants Treated</th>
<th>Effort (Hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>KTA Subunits 3, 4, 7, 8, 10</td>
<td>1,199</td>
<td>265</td>
<td>3,002</td>
<td>3,267</td>
<td>2,060*</td>
</tr>
</tbody>
</table>

*This number is higher than the time summary spreadsheets; 14 hours contributed by Army Natural Resources Program staff to take Gigapan photos and 14 hours of OISC staff time for the same was not counted in the monthly time report. A mistake in the amount of 8 cumulative hours was made in the amount of work done in November, December and January. 80 hours was not counted in August when the crew went camping for 4 days instead of 3.*
Figure 1: OISC *Chromolaena odorata* Work Effort in Kahuku Training Area
October 1, 2017 – September 30, 2018

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**C. odorata** activities Supported with Other Funds:

**Surveys and Control for *C. odorata* outside of the Kahuku Training Area (KTA)**

OISC conducted 602 acres of ground surveys in ʿAiea, removing 728 immature and 23 mature plants. Unfortunately, much of the surveys need to be done on private property and acquiring access permission is time-consuming, therefore there are still areas that may contain *C. odorata* but have not been surveyed.

In Kahana Valley, the crew surveyed 27 acres, removed 27 mature plants and 834 immature plants. This area is most efficient to spray by helicopter and one is scheduled for October 2018.

The field crew also found an immature plant at the Kahuku Wind Farm, which is significant because it is the first time a plant has ever been found at this location. OISC began checking this location in 2015, because we thought there might be spread from the other wind farm in Keamanea watershed where the species has been controlled by OISC in the past.

A member of the public posted a photo of a flowering *C. odorata* that he had found in Mākaha Valley in December. In response, OISC conducted 2 aerial surveys and five days of ground surveys with the entire crew and did not see any additional plants. This is a very significant range extension.
as *C. odorata* has never been seen in this valley before. The plant was along an unofficial trail. Two more additional plants have been found at other parts of the valley by OISC partners. We will continue to monitor the situation and conduct additional surveys if time allows.

OISC also surveyed a parcel of private property in Malaekahana Watershed, adjacent to Kahuku Training Area because the Army Natural Resources Program reported seeing the species close to the property boundary line. The area has thick patches of *C. odorata*. We are working with the landowner to implement control operations without disturbing his business.

**Table 2: OISC *Chromolaena odorata* Work Effort Summary on non-KTA lands. October 1, 2017 – March 31, 2018:**

<table>
<thead>
<tr>
<th>Watershed</th>
<th>Aerial Acres Surveyed</th>
<th>Ground Acres Surveyed</th>
<th>Mature Plants Treated</th>
<th>Immature Plants Treated</th>
<th>Total Plants Treated</th>
<th>Effort (Hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Aiea</td>
<td>0</td>
<td>602</td>
<td>20</td>
<td>654</td>
<td>674</td>
<td>412</td>
</tr>
<tr>
<td>Hālawa</td>
<td>0</td>
<td>.08</td>
<td>0</td>
<td>100</td>
<td>100</td>
<td>10</td>
</tr>
<tr>
<td>Kaʻelepulu (Lanikai Road Surveys)</td>
<td>0</td>
<td>69</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>24.25</td>
</tr>
<tr>
<td>Kahana Valley</td>
<td>0</td>
<td>27</td>
<td>27</td>
<td>834</td>
<td>834</td>
<td>138</td>
</tr>
<tr>
<td>Keamanea</td>
<td>0</td>
<td>90</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>70</td>
</tr>
<tr>
<td>Mākaha</td>
<td>439</td>
<td>380</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>406</td>
</tr>
<tr>
<td>Malaekahana</td>
<td>0</td>
<td>45</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>42</td>
</tr>
<tr>
<td>‘Ōiʻo (Haleʻiwa)</td>
<td>0</td>
<td>79</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>Non-KTA Paumalu</td>
<td>0</td>
<td>113</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>95</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>439</strong></td>
<td><strong>1,405</strong></td>
<td><strong>47</strong></td>
<td><strong>1,591</strong></td>
<td><strong>1,611</strong></td>
<td><strong>1261.25</strong></td>
</tr>
</tbody>
</table>

**Compliance:**

OISC is a project of the Pacific Cooperative Studies Unit through the Research Corporation of the University of Hawai‘i, an equal opportunity employer. OISC utilizes RCUH and PCSU standard operating procedures and employee guidelines. OISC employees are trained in wilderness first aid, off-trail hiking safety and pesticide safety.

Removing flowering heads from mature *C. odorata* to prevent further seed dispersal