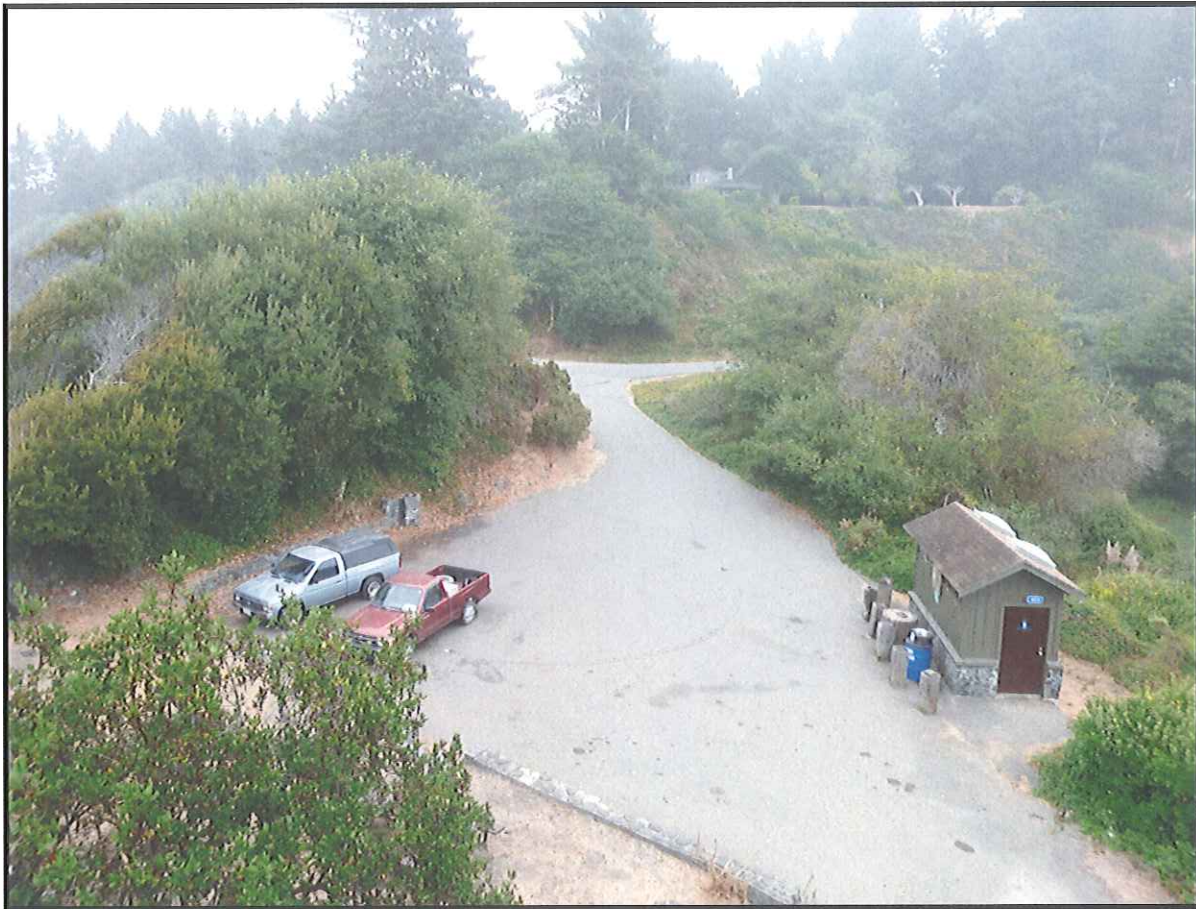


# Luffenholtz County Park Invasive Ivy Removal and Native Species Planting

Eradication of Invasive English Ivy (*Hedera helix*) to Create Open Habitat and  
Encourage the Growth and Survival of Native Perennial Species Such as the  
Endangered Wolfs Evening Primrose (*Oenothera wolffi*)



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## Introduction

Invasive plants are quickly becoming a world-wide problem. The Nature Conservancy estimates that "the estimated damage from invasive species worldwide totals more than \$1.4 trillion – five percent of the global economy." (Nature Conservancy, 2011) The Society for Ecological Restoration has defined an exotic species as "one that was introduced into an area where it did not previously occur through relatively recent human activities" (SER Primer, 2004). Not all exotic species are invasive but many of them do reproduce prolifically and contribute to problems with ecological health. The Aldo Leopold Wilderness Research Institute surveyed 68 of the 70 wilderness areas in the United States and found that in 26% of the wilderness areas in the lower 48 states, invasive plants were a management concern (Tempel et al., 2004). In many ecosystems the invasive exotic species compete and replace native species (SER Prime, 2004). Daniel Simberloff claims that there are thousands of invasive plants that have made their way into the United States but only about 15% of these are invasive plants that cause problems economically and ecologically. Competition, hybridization, disease, and ecosystem domination are all problems that stem from invasive plants (Simberloff, 2011).

As a state, California boasts the greatest amount of natural botanical diversity of any state in the U.S., with nearly 5000 native plant species (UC Davis). California also has a lot of problems with invasive exotic plants. The California Invasive Plant Inventory has identified 212 exotic invasive plants within the state. They have 41 of them listed as high risk and ninety-four listed as a moderate risk (Reichard, 2006). Many of these

species are actively managed but due to a variety of reasons their hold on California's landscape is well established. Simberloff shows that there are three different ways of controlling invasive plants; these are biological controls, mechanical controls, and through the use of herbicides/pesticides (chemical controls) (Simberloff, 2011). The use of these methods varies from species to species and they all have their benefits and associated problems. Some species of plants don't have an easily utilized natural biological predator, while some may not be easy to remove unless large machinery is utilized. In some areas of the country herbicides are so controlled that their use in management may be more trouble than it's worth. The United States Department of Agriculture identifies 242 noxious weeds in California (Invasive and Noxious Weeds, 2011). The noxious weed database provides growth and control information for many of the plants listed on their website. Identifying your targeted species and finding the ideal management strategy is a critical part of an ecosystem wide restoration process.

Ecological restoration, as defined by the Society for Ecological Restoration, is "the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed" (SER Primer 2). There are many different agencies and groups working to restore areas across our country that have been damaged by invasive species. The California Department of Fish and Game has declared that invasive plants are one of the largest ecosystem stressors. That agency has taken the position that "removing or preventing the establishment of invasive species will support the integrity and function of an ecosystem" (Reducing Existing Stressors: Invasive Species Management, 2011). In Humboldt County there have been numerous publicized

invasive species management programs. One example is a one million dollar invasive *Spartina* removal program that focused on taking this exotic plant out of local refuge areas (Humboldt Bay NWRC: Invasive *Spartina*, 2011). Friends of the Dunes are a local non-profit that has had success with its community outreach and educational restoration work. They work to restore native dune habitat and are focused on removing several different invasive plant species (Friends of the Dunes Restoration, 2011).

### **Project Background**

#### *Site Conditions*

Luffenholtz Beach and County Park is located south of the town of Trinidad, near the smaller town of Westhaven in northern California. The average temperatures of this coastal area range from 45-60 degrees Fahrenheit and the monthly average precipitation ranges from half an inch in the summer to 8 inches in the winter. Being on the Pacific north coast, the site is often foggy and has 70-90% cloud coverage for most of the year, and plenty of sun during the summer on south-facing slopes (city-data.com, 2011). The project site is located near Houda Point (Figure 1) and surrounds the public parking lot. Local geology consists of the highly erodible Franciscan Formation with a combination of uplifted marine sediments and alluvial deposits. Steep, vertical slopes surround the site with rocky outcrops on the northern and western side of the location. The plant community present is one that can tolerate persistent winds and salt-spray. Natives such as the grass *Calamagrostis nutkaensis* (Pacific reedgrass) grow well on the northern slope; *Alnus rubra* (red alder) provides the overstory along the outcrop

and in the main project area and helps to shade native blackberry and ferns that are trying to grow on the south-face and plateau of the outcrop.

English Ivy (*Hedera helix*) is an invasive ground cover plant that quickly colonizes disturbed areas and moves to establish itself as a monoculture. It can quickly out-compete native vegetation, climb into trees and strangle woody plants, and the vines that it grows with root at multiple spots. English ivy needs a minimal amount of sunlight to thrive. *H. helix* also reproduces through seed as well as vegetatively, with segments as short as one inch able to root and form a new plant, which can make removal especially challenging (*Hedera helix*, USFS, 2011). Management practices have established and maintained the ivy to the detriment of native vegetation. Wolf's evening primrose, *Oenothera wolfii*, is an endangered native perennial that needs open space and sunlight in order to establish itself. There is an abundance of existing suitable primrose habitat on our site with sandy exposed soils, but what was seen as ideal habitat currently being occupied by *H. helix*. Many of the aforementioned plant species grow within our project area (Figure 1, Appendix I). These species are currently competing with the ivy and losing habitat space quickly. Elimination of invasive *Hedera helix* species will begin by prioritizing and identifying ideal places for native plants. Ideal habitats have light, stable soil, and open space where competition is minimal. Many of the native plant species, including the endangered primrose, should establish themselves quickly and also take well to transplanting. English ivy is so pervasive however that transplanting and seeding without a major ivy removal first would be futile.

### *Previous Restoration Plan*

The Luffenholtz County Park Enhancement Plan was completed in the spring of 2011 in order to begin removing the English ivy and allow native plants to return to this location. This plan was written by students in the Humboldt State University Environmental Sciences Practicum class that is taught and overseen by Professor Richard Hansis. Manual removal was highlighted as the best and most efficient management practice for dealing with the ivy in a small contained area. The restoration plan claimed that by eliminating the English ivy from this location native species could be planted and biodiversity improved on-site (Luffenholtz County Park Enhancement Plan, 2011). Parks and Recreation of Humboldt County have the resources only to contain the ivy as it is on the site but a determined effort to remove the ivy needs to be undertaken. Changes to the public parking and sewer system will most likely be undertaken in the future leading to more disturbances which will open area for the ivy to colonize. The park service hopes that through the intervention by Humboldt State students and other organizations the ivy can be removed before the construction disturbs more soil. Our work will be done during the fall of 2012 and will consist of baseline data collection, coordination of volunteer workdays to manually pull English ivy, re-planting of disturbed areas with native plant species and a post-restoration plant cover and species survey. Ideally the work can be taken up again in the spring as volunteers are needed to take over the project and continue it on a yearly or twice yearly basis.

## **Problem Statement**

An invasive species, *Hedera helix*, is covering potential native species habitat in the area surrounding Luffenholtz parking lot at Houda Point and threatening to form a plant monoculture without control.

## **Goals:**

1. Increase available habitat for Wolf's evening primrose.
2. Increase cover and abundance in measured plots of native species.
3. Increase growth and survivorship of Red Alder (*Alnus Rubra*).
4. Improve the aesthetics of the area surrounding Luffenholtz Beach.
5. Improve ecological resilience of the site through increase in diversity of native species.
6. Spread community awareness of the extent of the ivy invasion and the danger to the endangered native primrose.

## **Objectives:**

1. Decrease abundance of invasive ivy (*Hedera helix*) by 50% in measured plots.
2. Encourage growth of alders on site by lowering the current level of space and canopy competition.
3. Prevent increases in erosion (as compared to normal levels) due to restoration activities.
4. Increase the frequency in measured plots of native plants by 100% as compared to the results of pre-restoration monitoring.

5. Use the site as an example of the positive ecological benefits that a restored site will have for a community.

### **Alternative solutions**

#### *Herbicide*

Herbicide use is a tool used to control invasive plants that has been effective in many areas. When properly used herbicides are effective against invasive plants. One issue with using chemicals to control exotic plants on our site is that Humboldt County in general has not been very receptive of land management plans that use dangerous herbicides to control invasive plants. In addition to a long standing ban on herbicides on county roads in 1997 the Humboldt County Board of Supervisors voted to extend that ban to state roadways within the county. This removed about 310 miles of roads that herbicides had been used on previously (Blackberry, 2011). In 2007 Californians for Alternatives to Toxics sued the Humboldt County Agricultural Commissioner and California Department of Parks and Recreation when herbicides were used to control an invasive plant along the Eel River. This Eureka, CA based group sued these entities on the claim that there had not been enough public comment time (Beyond Pesticides, 2007).

If an herbicide was found and the obstacles facing its use in Humboldt County were overcome then we would have tried to use a systemic herbicide. These chemicals have been found to be the best possible choice for controlling English ivy. Systemic herbicides are absorbed through plant tissues and then into the roots, effectively killing the plant in a matter of days. Systemic herbicides like triclopyr (Garlon 3A and Garlon 4)



and glyphosate (Roundup, Rodeo) have been used successfully with multiple applications (Alien Plant Working Group, 2009). Glyphosate is non-selective and works by stopping amino acid synthesis in plants. Care would have to be taken to not allow it near the native plants that we are working to improve habitat for (How herbicides work, 1999). The method that seems to have worked best is to remove green tissue and apply to openings in roots or stems. For the large woody stems that have wrapped themselves around trees they should be girdled then herbicide applied directly to the open cut (English Ivy, 2011). For the large mat that tends to form on the ground using a weed whacker to remove the waxy foliage then spraying glyphosate directly onto the cut stems has been shown to be effective (English Ivy MC, 2011).

Herbicide use would be a tough thing because of the reception it would receive from the general public. Our site is located at a public location and has several steep slopes that may encourage runoff and sediment transport during the rainy season and from recreational use. Since there is a native endangered species that grows on the site the use of herbicides would have to be done carefully and away from the native primrose, *Oenothera wolfii*. Another problem with using herbicides would have been the need for a certified applicator to apply the dangerous chemicals in a safe and controlled manner.

### *Burning*

Burning is another method that has been shown to have some success in controlling invasive English ivy. One method was to use a weed torch to burn the ivy as it begins to develop seeds. Once the plant has put energy into seed development it is

vulnerable. Repeated treatments are needed to ensure that the plant cannot regrow or re-sprout from the burned tissues (Reichard, 2006). A study done in Spain where fire was used to control ivy concluded that because of the relatively short lifespan of English ivy seed and its lack of a hard seed coat, "there was no evidence of rapid post-fire establishment of english ivy from the seed bank" (*Hedera helix*, 2011). Unfortunately there is very little in the way of published scientific studies that show the success of using fire on English ivy.

Unfortunately it does not seem that burning would be a legitimate management tool on our site. While it seems that the biomass is there and there would definitely not be a lack of fuels, the limited amount of data showing fire as an effective tool on ivy limits our understanding of its benefits. While it has been shown to be a very effective vegetation removal technique we are not looking to remove all vegetation from the small site we worked on. Since our goal was to remove the ivy to protect the other native species present, removing all native and non-native species through burning would have not accomplished our goal. Removing all the vegetation would also destabilize the soil that was held in place by the root systems, which is crucial on our site due to the steepness of the slope. The site is also located on the beach, an area that is far too windy to get a burn permit for in any short amount of time. One last major concern would be the potential of ivy to act as a ladder fuel and damage or destroy the alders that are growing on the site.

### *Grazing - Goats*

Using animals to control invasive plants is an idea that is gaining popularity in range management and restoration work. A study published by the Weed Science Society of America looked at using goats to remove English ivy on plots in the Willamette Valley of Oregon. At the end of the study researchers concluded that “English ivy cover declined significantly in samples browsed once or twice compared with untreated samples” and that there was a change in species composition from ivy to native ferns (Ingham and Borman, 2010). Another study also in Oregon showed that ivy was reduced from near 100% cover to 23% cover after one year of grazing and cover was further reduced to a total of 4% after 2 years of browsing (Hedera helix, 2011). There have also been businesses that have jumped on the goat bandwagon. A Seattle based newspaper looked at companies that were renting goats to landowners and billing them as a chemical free, cheap way of removing vegetation. They have been used in forested areas to clear trails and in Seattle proper in residential areas that have been overrun with ivy and invasive blackberry (McDonald, 2011). There have been limited reports that the ivy leaves are toxic to goats but it seems that if that is true, the level of toxicity is not a problem.

Based on the evidence, it seems that using goats in small confined areas would have been the second best way to manage the ivy, behind hand pulling. Using cheap solar powered electric fences would have kept the goats in the areas that we wanted them to target, and the goats wouldn't have been very expensive to use in the area. Local goat farms could be contacted to see if they would be willing to contribute a few

to a cause such as ours. Coordinating transport and ensuring that there was someone there that could keep an eye on them would be the biggest obstacles. We think that one of the best ways to control the ivy on the site would be through an initial purge using several goats as a biological control, and then using limited amounts of glyphosate on the exposed roots and stems.

#### **Implementation Plan w/ Hours Spent**

1. Initial contact with Humboldt County Parks to assess available resources and their ideas for the site. Establish who we are, who we represent, and what we hope to accomplish with the help of local land managers. (Completed Sept. 13 2011; full group conference call w/ Hank Seeman)
2. Initial site visit to familiarize ourselves with the area and meet the Humboldt County Parks staff. Propose our ideas for implementation and work with them to find work days that will be agreeable for us and for the park staff. (Completed on Sept. 19 2011; in person meeting with our group and park staff; 1.5 hours)
3. Take a vegetation survey using a random number table and 1x1 m quadrats measuring ground cover of the plants in the area for baseline data. Also indicate the location of any primrose on the site and flag it. (Completed Oct. 1 2011; full group; 2 hours)
4. Identify photo points and take photos of the site pre-restoration activities. These will be used later for monitoring and evaluation of project success. (Completed Oct. 1 2011; full group; 1 hour)

5. Advertise 2 volunteer work days for the community to come out and remove ivy. Flyers (Figure 2, Appendix I) were posted at the project site, on HSU campus, and at grocery stores in Arcata. In addition, Elaine Weinreb of the McKinleyville Press wrote a small article about our event on October 7 (Figure 3, Appendix I) and printed a group photo taken after our first work day on the cover of the Press on October 26 (Figure 4, Appendix I). We will encourage citizens to come by providing food that we got through donations from local stores. (Weeks of Oct. 3 - Oct. 17 2011; posted flyer's and notified local restoration groups; full group; 1 - 2 hours)
6. Write and deliver donation request letters to local businesses asking for food or other donations that will benefit project. Follow those up with thank you letters for businesses that were able to donate. (First round of letters delivered Sept. 29, second round of letters delivered Oct. 11)
7. Remove as much ivy as possible from the target area on the side of the parking lot opposite the bathrooms and just behind the bathrooms using hand tools and hand removal. (Completed Oct. 8 and Oct. 22 2011; full group, park staff, and volunteers, 12 hours total)
8. Stabilize exposed soil using layers of cardboard, mulch and straw. (Completed Nov. 5 2011; full group 2 hours)
9. Seed the area with Wolff's evening primrose seed and other native plant seedlings and live plants. (1st visit completed Nov. 5 2011; Second visit November 17 2011; planted *Fragaria chiloensis* and *Calamagrostis nutkaensis*; 3 Hours total.)

10. Take another vegetation survey to document the amount of ivy removal so that a return rate can later be measured. Take photos from same photo points for comparison.

(December 4, replicate vegetation survey as baseline survey, photos taken from same photo points, 3 hours)

11. Communications with stakeholders via email, phone, or in person occurred on a regular basis throughout the process. There was collaboration on a host of issues, including organizing work days, plant identification, project development and implementation, data collection (Sept. – Dec., ongoing communications, approx. 25-40 hours).

## **Method**

### *Sampling – Pre and Post Restoration Strategy*

We used a 1 by 1 meter plastic sampling frame, two 200 foot measuring tapes, and a random number table that had numbers between 1 and 100. Our transect is shown by the pink line underneath our study area in Figure 1 of the appendix. Our transect was 22 meters long. Points were selected every two meters along the transect. The second tape measure was used to measure a randomly determined distance into our study area. (See appendix) To stay within the boundaries of our selected sites distances over 50 feet were not used and the next number on the number table was selected. At the end of our randomly determined distance a pin flag was placed in the ground. This was the middle point for our sampling frame. Every plant inside the frame was accounted for by species and we determined percent cover up to 100% for each

sample. If a plant was not identified on the spot then a sample was taken to be identified later. We completed eleven of these plots within our study area.

### *Removal Day 1*

Damien went to the library circle at 8:00 to pick up volunteers that needed a carpool to the site. Quinn and Britney were already at the site setting up tables for the breakfast that we were providing and meeting people that went straight to the beach. At 8:30 the carpool left the library circle and met the rest of the group at the Luffenholtz beach parking area, below the study site marked in red on Figure 1. At 9:00 an orientation session began, with the purpose of the project being announced and the Parks and Recreation staff talking about safety while working. There were more than 20 people present for this workday.

Tools were provided by Parks and Recreation. Hand clippers, long handled loppers, and brush saws were provided. Gloves were provided to people that hadn't been able to bring their own. Groups of people began working around the base of the slopes and at the bases of the alders. Working in teams, the stems climbing the alders were cut and pulled away from the trees. By rolling the ivy up and pulling it from the ground volunteers were able to get at the roots. Parks and Recreation provided a large truck that we loaded with ivy and they delivered it to Wes Green Landscaping, off of West End Road in Arcata. One volunteer brought a small chainsaw and that was used to cut the largest vines that had made it into the trees.

Due to donations and purchases by us as a group we were able to provide lunch for the volunteers that worked throughout the day. After lunch more work was done on

the ivy that remained and another large load of ivy was removed from the premise. At roughly 1:30 pm the ivy that had been cut was removed from the work site and cleanup took place. At 2:00-2:15 volunteers began to leave the site. Most of the trash that had been collected during the ivy removal was thrown away on site, but a large amount of hypodermic needles had been found. Parks and Recreation staff disposed of those properly.

### *Removal Day 2*

Again a carpool left from the library circle at roughly 8:30. We had fewer volunteers this time, with 14 at the beginning of the workday. There was another short orientation period and then more work was done to remove the ivy from the study area. This time there was a larger focus on removing roots that remained so as to limit the potential for re-sprouts. One of the Parks and Recreation staff had to leave the workday when a large cobblestone fell on his foot, breaking one of the bones. Work continued until lunch, again provided through donations and group purchases.

The same vehicle that had been provided to us for the first work day was there on the second, and due to the volume of ivy removed a small trailer was also there for our use. Both of those were filled in short order. While the ivy was removed to Wes Green Landscaping volunteers piled it in the parking area. We were able to remove much of the ivy biomass that remained in the mid to upper branches of the alders on the site, giving them more room for secondary branching and lowering the weight load that they were holding up. Large amounts of ivy were removed during this day.



Volunteers began to disperse around 2:00 pm again and the Parks and Recreation staff agreed to provide our group with straw to cover the exposed soils.

Eucalyptus-free mulch had been collected from several free mulch piles in Humboldt County, primarily the one maintained by Caltrans at the end of G Street in Arcata, CA. The piles could not have Eucalyptus in particular; the non-native is often trimmed locally and mixed in with other woody species in the mulch. The litter and tissues of Eucalyptus have water-soluble toxins that inhibit the growth of other plants (Moral, 1970). The mulch was used to cover a large exposed slope on the eastern side of the work area and to the south of the site near the bathroom where an ivy-choked stump was removed. These areas had a high potential for erosion and ivy regrowth, thus our mulching efforts were concentrated there. We also decided to dedicate large amounts of the mulch to go around the base of the tree trunks to ensure that the ivy would not grow back up the trunk.

#### *Seeding, Transplants, and Erosion Control*

On November 5th 2011 our group took native primrose seed to our site. The seed was ready to be scattered and had been provided by Dave Imper of the United States Fish and Wildlife Service. With the primrose going to seed and an increase in potential habitat, it was a good opportunity to assist the endangered primrose population. We had been advised to spread the seed from the top slopes and toss it downhill. Disturbed and sunny areas near the edge of our work-site had been identified as the best habitat for the seed. Almost half a small sandwich bag full of tiny primrose

seed was scattered around the perimeter of the work-site, on the slopes, and near the top edges.

The native *Fragaria chiloensis*, beach strawberry, was transplanted on rocky south-facing slopes near the water tower. The plants were donated by and collected at the native plant garden of the Trinidad Museum. Another native plant that was donated by Humboldt Fish Action Council is *Calamagrostis nutkaensis*, Pacific reedgrass. The seed was collected from Luffenholtz and grown out in their nursery prior to the project. Twelve of these bunchgrasses were transplanted strategically along the outcrop, near the edge and under dappled alder canopy. Some were placed near already established reedgrass that had been choked by the ivy.

Erosion control was implemented using mulch, as mentioned before, and straw. Straw bales that had been purchased by the Parks staff were left at the site for our use. Using 5 of them we built a wall at the bottom of the steepest slope where we expected the most erosion. The rest of the straw bales were taken to the top of the site and spread out over the entire surface. We were able to cover the entire site except for the two steepest slopes, one of which had already been mulched and seemed to have sufficient groundcover.

#### *Post-restoration monitoring*

Using the same method that was used when collecting our baseline data, we repeated the distances originally generated from the random number table so that we were surveying the same plots. By measuring the same area we were able to make a

more accurate comparison of before and after and eliminate the possibility of random chance that the ivy composition was different due to different location.

## **Results**

### *Sampling - Pre Restoration Monitoring*

We found *Hedera helix* in every single one of the plots that we surveyed. Percent cover of this invasive in our plots ranged from 5% to 95%. Average percent cover of the entire site was estimated to be 47.91%. Ivy was easily the most abundant species and frequently encountered species (Table 1, Appendix I). *Rubus ursinus* (California Blackberry) was the second most frequently encountered species, occurring in 7 of the 11 plots (baseline data, Appendix III). We found three different native fern species; *Polypodium glycyrrhiza* (licorice fern), *Polystichum munitum* (sword fern), and *Pteridium aquilinum* (brackenfern) (see species list, Appendix III). Wolf's evening primrose was not found in any of the sampled locations; however, there were 11 of them around the parking lot in various stages of bolting and fruiting. Of all the plants sampled, only the ferns seemed to be holding their own ground against the ivy.

### *Removal*

A total of 7 truckloads of invasive ivy were taken away from the site. The truck bed was 10 feet long by 6 feet wide with 3 foot high walls. This is roughly 1,260 cubic feet of invasive English ivy. The material was taken to Wes Green Landscaping for no charge. One tree that was dead and seemed to just be supporting a large amount of ivy was cut down at ground level and removed from the site.

### *Sampling – Post Restoration Monitoring*

*Hadera helix* was found to be negligible in our 11 plots, with less than 1% occurring in one plot (Table 2, Appendix I). The majority of the ground cover is litter (monitoring data, Appendix III) not only due to the ivy removal, but also because the alder leaves are senescing. We counted 16 pre-established Wolf's evening primrose to be growing around the parking lot at our site. This is an increase in the number of rosettes by 31%. Approximately 5% of our total strawberry transplants survived. Perhaps the steepness and sandy soils on the outcrop near the water tower was unsuitable. We also found evidence that some wildlife had inhabited the area that we planted strawberries, which uprooted many of our transplants. The area they took hold was near the bottom of the hill on an exposed southern face. All Pacific reedgrass transplants were healthy; including a couple that was slightly browsed.

### **Conclusion and Discussion**

This project was very successful in the eyes of our group. We successfully completed a vegetation survey that showed that there was a large amount of invasive plant material. In addition we planned and coordinated two volunteer workdays, arranged these days and our implementation plans with County Parks, and we were able to replant native species on the site. The native species were given to us by local groups that were very interested in the work that we were doing on the site. After completing the second vegetation survey that showed a massive decrease in invasive ivy it seems like we were able to meet most of our goals. Our work was featured on the cover of the McKinleyville Press, which helped in our goals of raising awareness of the English ivy

problem. The amount of material that we removed from the site showed many of the volunteers what a determined group could accomplish. Since the Parks staff admitted that they have only been able to contain the ivy as it was, hopefully they can apply that same mindset to maintaining the site now that much of the ivy has been removed.

Working with Humboldt County Parks and Recreation was a very rewarding experience. They showed to be capable, willing, and interested in taking care of this beautiful area. The lack of management control on the site is not due to a lack of interest by the employees, but due to funding, time, and lack of manpower. The two person crew that works the stretch of Humboldt County beaches was present on both workdays and was the reason that we were able to take the plant material to Wes Green Landscaping.

#### **Additional considerations**

There are several variables that should be considered when analyzing the outcome of this study. The greatest constraint in our project was time. The effectiveness of the removal cannot truly be judged until the ivy has been given a full growing season to re-sprout. The second vegetation survey was taken on December 4<sup>th</sup> and the first taken on October 1<sup>st</sup>. This meant that our surveys were taken in very different points in the growing season and before the rainy season had really started. The straw bales that were donated by the parks to spread in order to prevent soil erosion were thought to be sterile, but they contained seed of some unknown grass that sprouted once some precipitation was received on the site. The grass seed altered the vegetation survey because it introduced a species that possibly would not have

otherwise been present on the site, and by spreading the straw all over the top of the hill that was our study area, the grass seed was distributed over a much wider range than it would have naturally inhabited over a period of 9 weeks. This is unfortunate but we are interested in seeing whether it will be shaded out and die once the alders produce leaves again in the spring of 2012. Our group had also hoped to be able to create some informational signs that could be placed near the site. Information on the restoration that took place, native species present, and the damage that the ivy had caused would have been on these signs. Again, due to time constraints and the crunch of the latter half of the fall semester we were unable to accomplish this.

### **Acknowledgements**

HSU Professor Dick Hansis, Brian Bresee and Geoffrey Hoopes of Humboldt County Parks, Dave Imper and Andrea Pickart of USFWS, Carol Ralph of California Native Plant Society, Kim and Stan Binnie of the north coast's unofficial No-Ivy League, Elaine Weinreb of the McKinleyville Press, Suzanne Isaacs of Humboldt Fish Action Council, Steen Trump of Trinidad Coastal Land Trust, HSU Natural Resources Club, Ingrid Haven of Trinidad Museum Society, fellow students and community members, family and friends, Safeway of Eureka, Wildberries, Northcoast Co-op of Arcata

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Appendix I

I. Figures



Figure 1 . Luffenholtz Beach County Park; site area outlined in red, transect in salmon pink (Damien Hawley-Jones 2011; Google earth map).

# Destroy! Smash! Kill!

## Invasive Ivy Pull

*Where?*

*Luffenholtz  
Beach Parking  
Area*



*When?*

*October 8<sup>th</sup> and  
22<sup>nd</sup>  
9:00 am -  
2:00 pm*

Bring: Long Sleeves, pants, good shoes, gloves and water.  
Some tools will be provided but bring them if you have them.



FREE FOOD!

Contact:

Damien - [drh33@humboldt.edu](mailto:drh33@humboldt.edu)

Brittney - [bln8@humboldt.edu](mailto:bln8@humboldt.edu)

Quinn - [sgm2@humboldt.edu](mailto:sgm2@humboldt.edu)



Figure 2 . Advertisement for work days.

## Ivy bash planned on Scenic Drive

*By Elaine Weinreb  
PRESS STAFF WRITER*

Would you like to work out some aggression, get some exercise, look at the ocean, and be socially productive all at the same time?

You are invited to come to Scenic Drive in Trinidad and pull out ivy, which is gradually taking over

many of our local county parks. The first ivy-bash will occur on Saturday, October 8, between 9 a.m. and 2 p.m.

Meet at the parking lot just south of Luffenholtz Beach, near the restrooms and the overlook.

The event is being organized by a group of HSU students, as part of their senior project. They are work-

ing with the cooperation of the County Parks Department.

Bring appropriate garden tools if you have them, work gloves, and wear sturdy shoes. The students have promised to provide food.

For further information, email Damien Hawley-Jones at [drh33@humboldt.edu](mailto:drh33@humboldt.edu)

Figure 3. Advertisement prior to first work day (Elaine Weinreb, McKinleyville Press).



Figure 4. End of first work day, front page (Elaine Weinreb, McKinleyville Press).

II. Tables

Table 2. Baseline vegetation data: average percent cover by species (Quinn McWatters 2011).

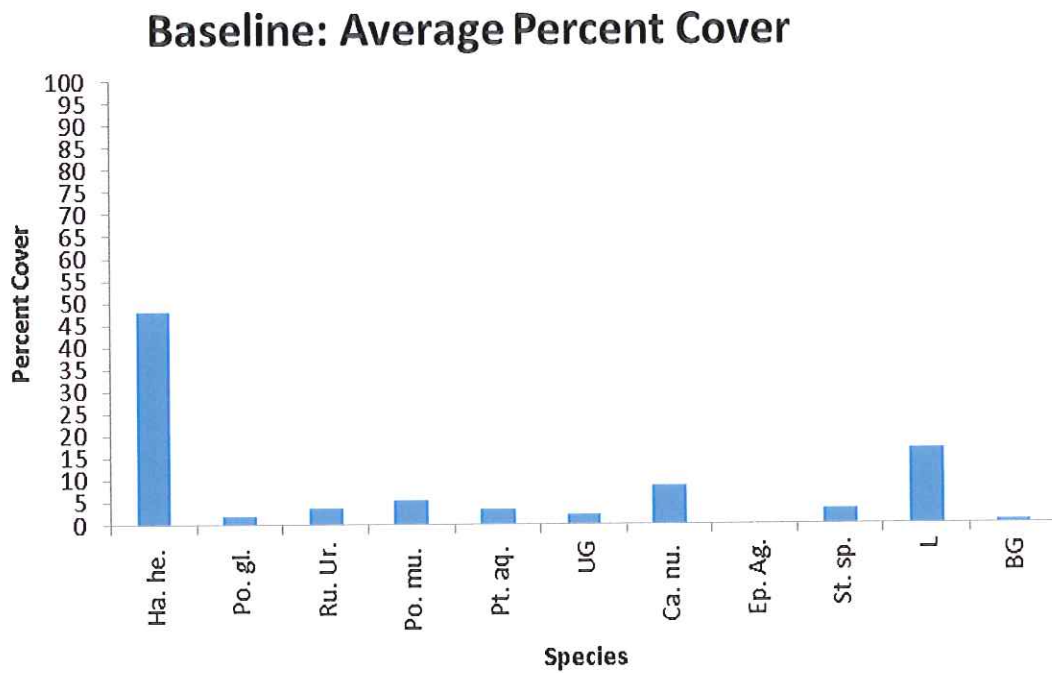
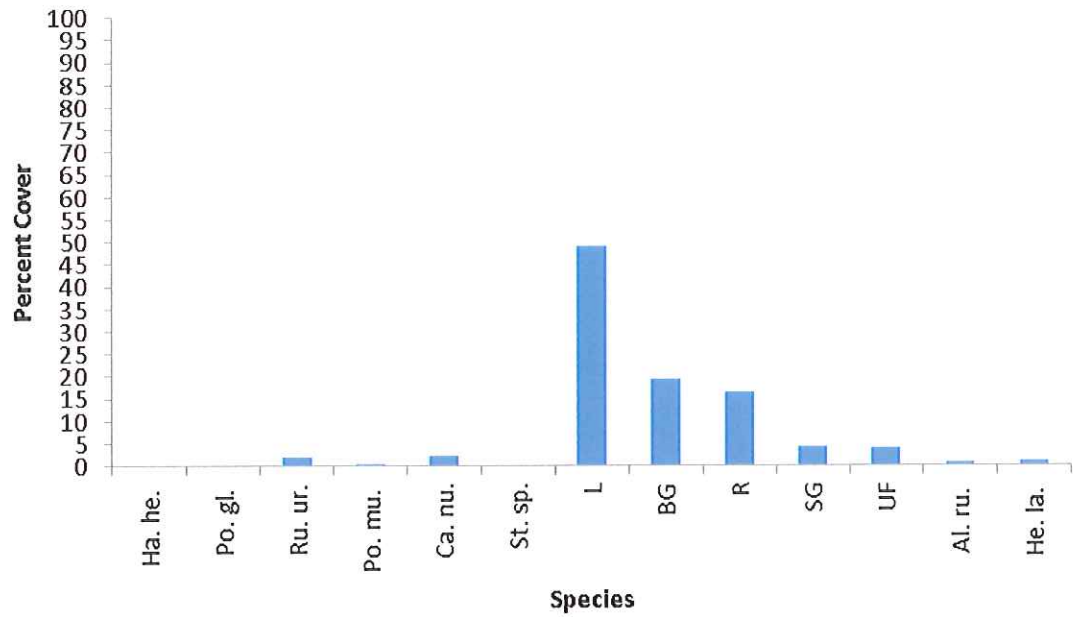


Table 2 . Monitoring vegetation data (<1 month later): average percent cover by species (Quinn McWatters 2011).

### Monitoring: Average Percent Cover



## Appendix II

### I. Photopoints

#### A. South side of parking lot, west of the bathroom (facing south)



1: Beginning of 2nd work day (OCT 22)



2: After, with mulch

B. Outcrop with water tower on north side of site (north-facing)



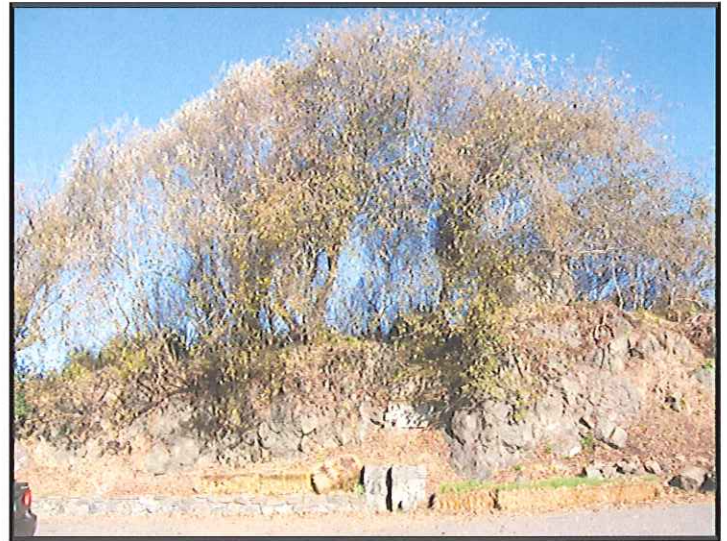
1: Baseline (SEPT)



2: Beginning of 1st work day (OCT)



3: after erosion control



4: monitoring (DEC)

## Appendix III

### I. Species List

Species	Abreviation
Alnus rubra	Al. ru.
Bare Ground	BG
Calamagrostis nutkaensis	Ca. nu.
Hedera helix	Ha. he.
Heracleum lanatum	He. la.
Litter	L
Polypodium glycyrrhiza	Po. gl.
Polystichum munitum	Po. mu.
Rock	R
Rubus ursinus	Ru. ur.
Stachys sp.	St.sp.
Straw Grass	SG
Unknown forb	UF

### II. Baseline Data (% cover)

Plot (m)	Ha. he.	Po. gl.	Ru. Ur.	Po. mu.	Pt. aq.	UG	Ca. nu.	Ep. Ag.	St. sp.	L	BG
2	5	0	7	0	28	0	55	2	0	0	2
4	50	0	5	0	0	0	40	0	0	5	0
6	50	0	0	0	10	0	0	0	0	40	0
8	65	0	0	0	0	0	0	0	0	35	0
10	40	0	4	0	0	0	0	0	36	20	0
12	47	0	0	0	0	0	0	0	0	0	0
14	95	0	5	0	0	0	0	0	0	0	0
16	60	0	0	0	0	0	0	0	0	30	5
18	35	0	5	60	0	0	0	0	0	0	0
20	30	20	5	0	0	0	0	0	0	40	0
22	50	0	10	0	0	25	0	0	0	15	0
Average	47.91	1.82	3.73	5.45	3.45	2.27	8.64	0.18	3.27	16.82	0.64

III. Monitoring Data (% cover)

Plot (m)	Ha. he.	Po. gl.	Ru. ur.	Po. mu.	Ca. nu.	St. sp.	
1	1	0	0	0	0	24	0
2	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0
5	0	0	0	0	0	0	3
6	0	0	5	0	0	0	0
7	0	0	2	0	0	0	0
8	0	0	0	0	0	0	0
9	0	0	0	4	0	0	0
10	0	0	0	0	0	0	0
11	0	2	15	0	0	0	0
Average	0.09	0.18	2.00	0.36	2.18	0.27	

Plot (m)	L	BG	R	SG	UF	Al. ru.	He. la.	
1	75	0	0	0	0	0	0	0
2	9	0	90	1	0	0	0	0
3	0	98	0	2	0	0	0	0
4	96	0	0	4	0	0	0	0
5	0	86	0	1	10	0	0	0
6	34.5	0	60	0.5	0	0	0	0
7	63	0	30	5	0	0	0	0
8	63	0	0	25	12	0	0	0
9	86	0	0	0	0	10	0	0
10	52	28	0	8	0	0	0	12
11	60	0	0	0	23	0	0	0
Average	48.95	19.27	16.36	4.23	4.09	0.91	1.09	