



Western Alaska Landscape Conservation Cooperative

Dear Readers,

10 April, 2015

We are pleased to provide you with the results of our Cooperative's sponsored project to assess the vulnerability of Bristol Bay ecosystems to non-native plant invasions. This report provides some important information about the current status of invasive plants in the Bristol Bay region and identifies where we may have vectors for spreading these non-native plants to other parts of the region. Unfortunately, due to a change in principal investigator late in the project and other unexpected changes, the report does not include all the details that would be appropriate in a final report to the Western Alaska LCC. Nevertheless, this work significantly contributes to our understanding of invasive plant distribution in the Bristol Bay communities. Partners in the cooperative who are interested in understanding our policy for final reports should visit our "PI Resources" page at: <http://westernalaskalcc.org/projects/SitePages/piresources.aspx>

As staff of the LCC, we thank our partners on this project, including the residents of the communities surveyed for invasive plants, Jennifer Robinette, The Alaska Association of Conservation Districts, Bristol Bay Native Association and the Ekuk Village Council.

Sincerely,



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Assessing the Vulnerability of Western Alaska Ecosystems and Subsistence Resources to Non-native Plant Invasion

Western Alaska Landscape Conservation Cooperative Project WA22011_11

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Introduction:

It is important to find out the changes people are witnessing in their lifetime to determine how the people of Bristol Bay can navigate the future. The changes we set out to learn about from Traditional Ecological Knowledge was when a non-native invasive plant species first arrived in a community and how they arrived. However, these questions didn't get much of a response because there simply wasn't enough knowledge about invasive plants and there are far fewer nonnative plants than native plants in the Bristol Bay region. The initial purpose of this project was to determine what non-native plants were present in the Bristol Bay region, but after preliminary investigation it was realized that there are few non-native plants in the region and very little knowledge about invasive plants. But many people had experienced vegetation change in their community within their lifetime and felt that it had an impact on their lives. So in addition to looking for invasive plants within the communities another question was added; what were the major vegetation changes observed by the people in the Bristol Bay Region?

The goals of this project were to survey villages in the region for invasive plants, conduct outreach and education about invasive plants in those villages and to record the traditional ecological knowledge on vegetation changes in the region, and ask about additional vegetation changes observed in the communities.

Methods:

Surveying Villages in South West Alaska for non-native plants:

For this project the University of Alaska Anchorage Natural Heritage Program, Alaska Exotic Plants Information Clearinghouse (AKEPIC) website was utilized extensively. AKEPIC is a database and mapping application that provide geospatial information for non-native plant species in Alaska. AKEPIC contains plant species biographies that were used to confirm in the field identification. In addition this program developed The Invasiveness Ranking System for Non-Native Plants of Alaska. All invasive species infestations located during field surveys were submitted to AKEPIC to be uploaded to the mapping database. (<http://aknhp.uaa.alaska.edu/botany/akepic/>)

Upon arriving to a village there would be a short meeting with the village Environmental Coordinator or their assistant to plan where to scout for invasive plants. Travelling by truck or four wheeler all landfills, boat launches, airports, schools and newest roads or construction sites were surveyed for invasive plants. If there wasn't anyone available to be a guide verbal directions were given to walk or drive to those aforementioned areas. If there were long stretches of roads to landfills, airports, and boat launches all invasive plants along the way were recorded. If no invasive plants were being viewed from the vehicle, the roadside was walked every mile for 200 foot stretches to assure that no invasive plant populations were being missed. When this was done very few invasive plant infestations were found, so the scouting by vehicle was pretty accurate. Neighborhoods within the village were often surveyed on foot. Using a Garmin e-trex GPS and a camera the location documented and the populations of non-native plants was recorded on an Alaska Exotic Plant Information Clearinghouse form.

Almost all public human disturbances were scouted, but some were inadvertently missed or not scouted out of fear of walking into a bear, afraid the vehicle would get stuck or because there were "No Trespassing" signs.

Traditional Ecological Knowledge:

During the initial outreach to the local Environmental office it was determined who the local plant expert is for the community. If the person mentioned was in town a meeting was arranged. Initially the method was to ask the expert when he or she first saw that such and such invasive plant had showed up, but few people were able to respond to that question. The goal for this method was to find out what was the major vector factor in each village. It only took two villages visits for the question to be changed from the one above to: What are the major plant changes you've seen in your lifetime?

Results

In total 20 invasive plant species were encountered by surveying 18 communities. Of these only 1 species is considered by The Invasiveness Ranking System for Non-Native Plants of Alaska as very threatening to Alaskan ecosystems and 3 species are considered to pose a serious risk. The ranking system evaluates invasive plant species by ecosystem impacts, biological attributes, distribution, and difficulty of control and then assigns a rank of 0 to 100 based on the plants potential to threaten Alaskan ecosystems. Species with scores ≥ 80 are categorized as 'Extremely Invasive' and species with scores 70-79 as "Highly Invasive;" plants in these categories are estimated to be very threatening to Alaska. Scores of 60-69 are considered "Moderately Invasive" and scores of 50-59 represent "Modestly Invasive" species: both of these groups still pose a threat to Alaskan ecosystems. Species with scores of 40-49 are "Weakly Invasive", and < 40 are considered "Very Weakly Invasive." These last two groups have not shown to significantly alter natural ecosystems.

Of the 20 species found none are considered "Extremely invasive" and only the rugosa rose, *Rosa rugosa* is considered "Highly Invasive" by the ranking system. Three species were found that are "Moderately invasive": Birds foot trefoil *Lotus corniculatus*, Crownvetch *Coronilla varia*, and oxeye daisy, *Leucanthemum vulgare*. There are Eight found as "Modestly Invasive" and the remaining 8 are considered "Weakly" and Very "Weakly" invasive.

Table 1 shows the invasive plants documented through this project for each community and the vegetation change topics that were raised by community members.



Image 1. Crown vetch found in Naknek.

Table 1. Survey Results

Village	Date surveyed	Invasive Species Found – AKEPIC ranking	Vegetation changes and impacts
Togiak	8/16/2012	<i>Chenopodium album</i> , lambsquarters - 37 <i>Leontodon autumnalis</i> , fall dandelion - 51 <i>Matricaria discoidea</i> , pineapple weed - 32 <i>Polygonum aviculare</i> , prostrate knotweed - 45 <i>Stelleria media</i> , common chickweed - 42 <i>Taraxacum officinale</i> , common dandelion - 58	Larger shrubbery moving up mountain sides/ no impact perceived by community.
Kokhanok	8/23/2012	<i>Crepis tectorum</i> , narrowleaf hawksbeard - 56 <i>Matricaria discoidea</i> , pineapple weed - 32 <i>Poa pratensis</i> , Kentucky bluegrass - 52 <i>Stelleria media</i> , common chickweed - 42 <i>Taraxacum officinale</i> , common dandelion - 58	Tree growth, no impacts.
Naknek	8/23/2012	<i>Coronilla varia</i> , Crownvetch - 68 <i>Crepis tectorum</i> , narrowleaf hawksbeard - 56 <i>Galeopsis bifida</i> , splitlip hempnettle - 50 <i>Leucanthemum vulgare</i> , oxeye daisy - 61 <i>Lotus corniculatus</i> , bird's-foot trefoil - 63 <i>Matricaria discoidea</i> , pineapple weed - 32 <i>Poa pratensis</i> , Kentucky bluegrass - 52 <i>Polygonum aviculare</i> , prostrate knotweed - 45 <i>Rumex crispus</i> , curly dock - 48 <i>Senecio vulgaris</i> , common groundsel - 36 <i>Stelleria media</i> , common chickweed - 42 <i>Taraxacum officinale</i> , common dandelion - 58	Increases in Alder that it is out competing salmon berry habitat.
South Naknek	8/24/2012	<i>Leucanthemum vulgare</i> , oxeye daisy - 61 <i>Matricaria discoidea</i> , pineapple weed - 32 <i>Poa pratensis</i> , Kentucky bluegrass - 52 <i>Polygonum aviculare</i> , prostrate knotweed - 45 <i>Rumex acetosella</i> , common sheep sorrel - 51	Increase in alder that it is out competing every berry habitat.
Perryville	9/3/2012	<i>Galeopsis bifida</i> , splitlip hempnettle - 50 <i>Leucanthemum vulgare</i> , oxeye daisy - 61 <i>Rosa rugosa</i> , rugosa rose - 72 <i>Taraxacum officinale</i> , common dandelion - 58	100 years ago there were no alders or shrubs, now are invading berry habitat and creating safety issue with bears and wolves.
Chignik Lake	9/5/2012	<i>Leucanthemum vulgare</i> , oxeye daisy - 61 <i>Matricaria discoidea</i> , pineapple weed - 32 <i>Phleum pratense</i> , timothy - 54 <i>Plantago major</i> , common plantain - 44 <i>Poa pratensis</i> , Kentucky bluegrass - 52 <i>Rumex crispus</i> , curly dock - 48 <i>Taraxacum officinale</i> , common dandelion - 58	The alders are thick and out competing berry habitat, impedes village safety.
Clarks Point	8/14/2013	<i>Galeopsis bifida</i> , splitlip hempnettle - 50 <i>Matricaria discoidea</i> , pineapple weed - 32 <i>Stelleria media</i> , common chickweed - 42	Beach grass and alder growth in the new village is nuisance to gardening
Ekuk	8/14/2013	<i>Matricaria discoidea</i> , pineapple weed - 32 <i>Stelleria media</i> , common chickweed - 42 <i>Taraxacum officinale</i> , common dandelion - 58	Willows transplanted in the north end of the village were spreading and blocking view.

Portage Creek	8/24/2013	<i>Crepis tectorum</i> , narrowleaf hawksbeard - 56 <i>Leucanthemum vulgare</i> , oxeye daisy - 61 <i>Matricaria discoidea</i> , pineapple weed - 32	None.
Chignik Lagoon	8/28/2013	<i>Leucanthemum vulgare</i> , oxeye daisy - 61 <i>Matricaria discoidea</i> , pineapple weed - 32 <i>Polygonum aviculare</i> , prostrate knotweed - 45 <i>Plantago major</i> , common plantain - 44 <i>Rosa rugosa</i> , rugosa rose - 72 <i>Stelleria media</i> , common chickweed - 42 <i>Taraxacum officinale</i> , common dandelion - 58 <i>Trifolium hybridum</i> , alsike clover - 57 <i>Trifolium pratense</i> , red clover - 56	Alder growth, concerns for safety and high bush salmon berry growth.
Chignik Bay	8/29/2013	<i>Crepis tectorum</i> , narrowleaf hawksbeard - 56 <i>Leucanthemum vulgare</i> , oxeye daisy - 61 <i>Matricaria discoidea</i> , pineapple weed - 32	Alder growth, concerns are safety and competition with high bush salmon berries.
Pedro Bay	8/31/2013	<i>Leucanthemum vulgare</i> , oxeye daisy - 61 <i>Matricaria discoidea</i> , pineapple weed - 32 <i>Plantago major</i> , common plantain - 44 <i>Rumex acetosella</i> , common sheep sorrel - 51 <i>Taraxacum officinale</i> , common dandelion - 58 <i>Trifolium hybridum</i> , alsike clover - 57	Tree growth increase.
Newhalen	8/22/2014	<i>Matricaria discoidea</i> , pineapple weed - 32 <i>Poa pratensis</i> , Kentucky bluegrass - 52 <i>Taraxacum officinale</i> , common dandelion - 58	Alders, willows, trees growth.
Iliamna	8/22/2014	<i>Capsella bursa-pastoris</i> , shepherd's purse - 40 <i>Crepis tectorum</i> , narrowleaf hawksbeard - 56 <i>Galeopsis bifida</i> , splitlip hempnettle - 50 <i>Matricaria discoidea</i> , pineapple weed - 32 <i>Plantago major</i> , common plantain - 44 <i>Poa pratensis</i> , Kentucky bluegrass - 52 <i>Polygonum aviculare</i> , prostrate knotweed - 45 <i>Stelleria media</i> , common chickweed - 42 <i>Rumex acetosella</i> , common sheep sorrel - 51 <i>Taraxacum officinale</i> , common dandelion - 58	More shrub growth in lower village, move from shrub growth to tree growth in the upper village. Alders used for smoking in upper village are harder to come by.
Koliganek	8/25/2014	<i>Crepis tectorum</i> , narrowleaf hawksbeard - 56 <i>Leucanthemum vulgare</i> , oxeye daisy - 61 <i>Matricaria discoidea</i> , pineapple weed - 32 <i>Poa pratensis</i> , Kentucky bluegrass - 52 <i>Polygonum aviculare</i> , prostrate knotweed - 45 <i>Stelleria media</i> , common chickweed - 42 <i>Taraxacum officinale</i> , common dandelion - 58	None noted.
New Stuyahok	8/27/2014	<i>Crepis tectorum</i> , narrowleaf hawksbeard - 56 <i>Galeopsis bifida</i> , splitlip hempnettle - 50 <i>Matricaria discoidea</i> , pineapple weed - 32 <i>Poa pratensis</i> , Kentucky bluegrass - 52 <i>Polygonum aviculare</i> , prostrate knotweed - 45 <i>Stelleria media</i> , common chickweed - 42	None.
Manokotak	8/28/2014	<i>Leontodon autumnalis</i> , fall dandelion - 51 <i>Matricaria discoidea</i> , pineapple weed - 32 <i>Plantago major</i> , common plantain - 44 <i>Rumex acetosella</i> , common sheep sorrel - 51 <i>Senecio vulgaris</i> , common groundsel - 36 <i>Stelleria media</i> , common chickweed - 42 <i>Taraxacum officinale</i> , common dandelion - 58	Shrubs moving from lower areas going up the mountain/ harder to find berries in those areas.

Aleknagik	8/29/2014	<i>Achillea ptarmica</i> , sneezeweed - 46 <i>Crepis tectorum</i> , narrowleaf hawksbeard - 56 <i>Galeopsis bifida</i> , splitlip hempnettle - 50 <i>Leontodon autumnalis</i> , fall dandelion - 51 <i>Matricaria discoidea</i> , pineapple weed - 32 <i>Plantago major</i> , common plantain - 44 <i>Poa pratensis</i> , Kentucky bluegrass - 52 <i>Rumex acetosella</i> , common sheep sorrel - 51 <i>Stellaria media</i> , common chickweed - 42 <i>Taraxacum officinale</i> , common dandelion - 58	Concern about Water hemlock will be mistaken for wild celery because younger generations haven't learned to select wild celery.
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Discussion:

When land managers looked at the AKEPIC map (Image 1.) showing populations of invasive plants the primary concern has been focused on the road system. Before this project only a few of the villages in this report had been surveyed for non-native invasive plants and so there was no information available about existing or potential threats to the ecosystems from invasive plants. The most important step here was to inventory what was there and to conduct outreach and education to help prevent spread of invasive plants to these communities. Secondly we sought to learn what was of real concern to these communities with vegetation and subsistence.

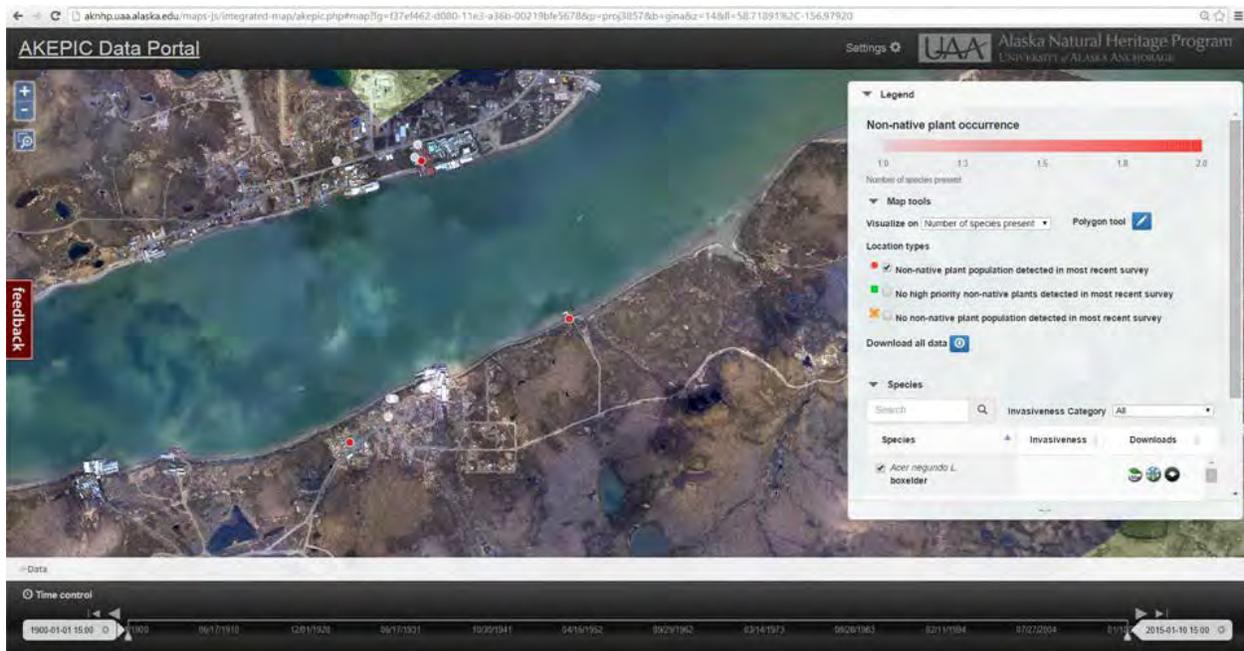


Image 2. Screen shot of AKEPIC image of Naknek, red and white dots signify invasive plant locations.

The good news is that these communities don't have many invasive plant species and the ones that are there do not make much of an impact in non-disturbed or off road (or away from village settings) ecosystems yet. The species that are categorized by the Alaska Invasive plant ranking system as "Highly" and "Moderately invasive" should be the priority for invasive plant control in this region. There are so few plants found in this region that have the ranking "Modestly Invasive" that they may warrant action if the infestations are of manageable size and the communities in which it is found has an enthusiasm to control the plants.

This project has presented an opportunity for more study. The wide distribution in witnessing change with alder and shrub growth is a concern for 11 of the communities. The major causes of concern with shrub growth were to safety, subsistence berry picking, and gardening. One question resulting from the information collected in the project is; can alder and shrub growth be managed? Experts were consulted at UAF who either manage invasive plants or who study alders. No one really knows the answer to that question. Can they be managed in way that protects prime berry picking spots? If there were feasible management strategies the people who live in those communities would benefit.

Management Applications/ Implications:

First of all outreach and education can only do so much to prevent invasive plants. The primary focus of education was to village environmental coordinators. These are the people in almost every village who get paid to educate the village on environmental concerns such as invasive plants. Whenever there was a community project going into the village like a new road or a new building there was effort to educate the environmental staff about the potential of invasive plants arriving on equipment, material and contaminated seed used for erosion control. These environmental staff can then educate their councils and others making building designs of the importance of clean equipment, and certified seed. As it became apparent, it doesn't matter how close to heart the environmental staff had that message, how tirelessly they work on educating others, that they don't make the decisions, someone else does. Three villages surveyed this summer have a great potential of getting new invasive plants due to a high level construction happening with the village. Manokotak was visited in 2010 and this message was conveyed. When revisited in 2014 it had just completed a large improvement on the road and as a result the construction had introduced three new invasive plant species. New Stuyahok is about to work on a new road to the new dump. The construction company that had just worked on Manokotak was now being barged to New Stuyahok. In a year from now New Stuyahok will most likely have more invasive plant species to add to its list. Finally, Aleknagik where the environmental coordinator works hard to educate her town about invasive plants and has been on the radio numerous times talking about invasive plants doesn't think the equipment being brought over to complete a bridge will have been cleaned or plant lists checked.

There are opportunities to help communities deal with these introduction vectors. There is now a person responsible for helping villages plan their roads and their work contracts at BBNA. Including invasive plant management into contracts so that the construction zone will be monitored for invasive plants and any new species must be eradicated by contractor could be effective. Ideally, this would ensure that equipment is shipped cleaned, plant materials lists are checked and the responsibility of eradicating invasive plants near the new construction is on the contractor and not left to the community to deal with.

Although this project asked community members about the vegetation changes they are observing, it did not address how those changes impacts their lives. There is an opportunity for resource managers to listen to the issues and the concerns over lifestyle changes perhaps approaches to manage the changes could be developed. Impacts on berry picking and the encroachment of alders and other shrubs are of concern to many of the villages.

Products

- A. Poster presented at Alaska Invasive Species Conference in Anchorage October 30, 2014. Go to link to view poster: https://westernalaskalcc.org/projects/SitePages/WA2011_11.aspx
- B. Information handouts to villages on invasive plant found in village. See Image 3 and 4 for examples.

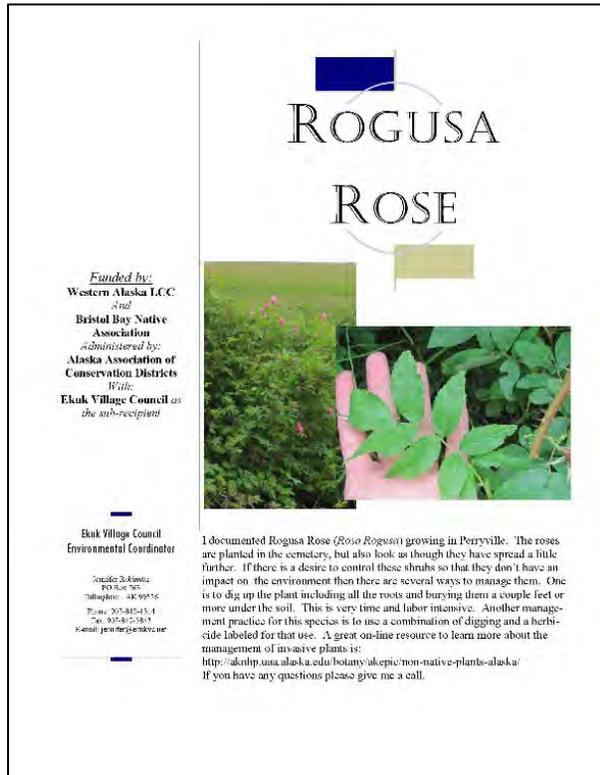


Image 3. Rugosa rose handout for Perryville

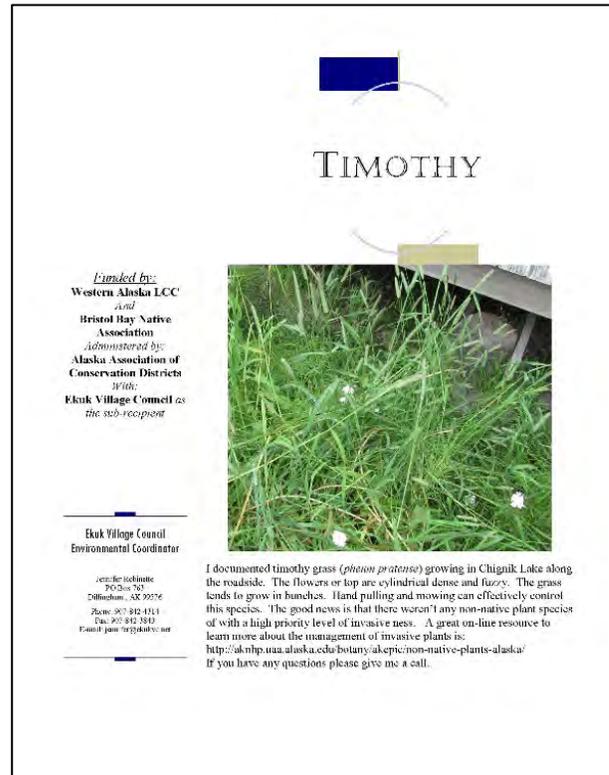


Image 4. Timothy handout to Chignik Lake,

Outreach in Villages

The pocket guide Selected Invasive Plants of Alaska, USDA Forest Service 2007 was handed out to all participants of outreach events as well as anyone of the public that was encountered during surveying. In many of the villages the Environmental coordinator received the *Invasive plants of Alaska*. Carlson, M., Heys, J., Shepard, M., and Snyder, J. 2012, AKEPIC. Table 3 describes the outreach conducted in each village.

Table 3. Outreach to villages

Village	Date	Participants	Comments
Togiak	8/16/2012	16 total. Environmental Coordinator (EC), an AmeriCorps Volunteer, youth interns, and tribal government employees.	Conducted survey with AmeriCorps volunteer and 2 youths. Hand pulled fall dandelion at school.
Kokhanok	8/23/2012	24 total. EC, EC assistant, tribal government administer, two teachers and school classes	Most non-native plants found at skiff landing
Naknek	8/23/2012	7 total. Interacted with village residents at library and during survey.	Village has no EC, so no one to coordinate with. Scouted on foot and driven by local resident.
South Naknek	8/24/2012	3 total.	Village has no EC, so no one to coordinate with. Was showed around by tribal employee.
Perryville	9/3/2012	10 total.	Village has no EC, communicate with village Administrator. Spoke with teacher and gave them invasive plant information
Chignik Lake	9/5/2012	10 total. EC and other village government employees.	EC assisted in survey.
Clarks Point	8/14/2013	7 total. EC and villagers	EC assisted in survey.
Ekuk	8/14/2013	25 total. AKDOT employees and villagers	Wrote article for village newsletter.
Portage Creek	8/24/2013	2 total.	Only two people live in Portage creek
Chignik Lagoon	8/28/2013	14 total. EC and school children and villagers.	EC assisted with survey via four wheeler and arrange outreach at school.
Chignik Bay	8/29/2013	12 total. School children and residents	EC was not available, Tribal administrator assisted in survey.
Pedro Bay	8/31/2013	5 total.	EC assisted in survey.
Newhalen	8/22/2014	6 total.	Met with village administrator. Conducted survey on foot. Village was very skeptical of my presence since it is so close to the Pebble deposit.
Iliamna	8/22/2014	4 total	Could not meet with EC. Village was very skeptical of my presence since it is so close to the Pebble deposit.
Koliganek	8/25/2014	13 total. EC and school children.	EC assisted in survey. Had

			very productive school presentation.
New Stuyahok	8/27/2014	4 total. EC and village residents.	EC assisted in survey
Manokotak	8/28/2014	7 total. EC and village residents.	EC and village health aid assisted in survey
Aleknagik	8/29/2014	5 total. EC and village residents.	EC assisted in survey