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I. INTRODUCTION

A. Background

This project was funded by the United States Forest Service (USFS) through the Resource Advisory Council for the communities of Wrangell, Petersburg and Kake. The purpose of this project is to provide private and local government landowners the information to manage invasive plants for the protection of Alaska ecosystems. The USFS is actively working to control invasive plants on National Forest System lands but is limited in the complete eradication of these plants without their neighboring land owners also controlling them. With participation in integrated weed management from all land owners, the USFS is hopeful that the National Forest's ecological integrity will be maintained for the benefit of all, since the natural resources derived from federal lands has direct impacts on the livelihoods of communities, such as Petersburg. This plan provides information to the people, organizations, and the Petersburg Borough on the type of weeds that occur within and around their community and the opportunities for managing them. A community-wide strategy for this plan is also suggested by providing a prioritization ranking for the invasive plants found within the Petersburg area.

B. Summary

Petersburg's isolation from Alaska's road system helps to shield it from the importation and establishment of many harmful invasive plants. However, construction projects, road maintenance, ferry traffic, and home gardeners are among potential vectors for introduction of invasive plants. Petersburg has many small infestations of highly invasive plants and their eradication should be the community's highest priority. Establishing best management practices in construction and maintenance projects will go a long way toward controlling invasive plants in Petersburg. Community outreach and education will give residents tools to identify and control harmful weeds, and can reduce the strain on agency or corporation budgets. This document outlines the effects of invasive plants, control methods, and includes a prioritized list of invasive plants of concern in Petersburg.

C. Study Area

This management plan covers non-federal lands on Mitkof Island and the town of Kupreanof on Kupreanof Island (Figure 1).

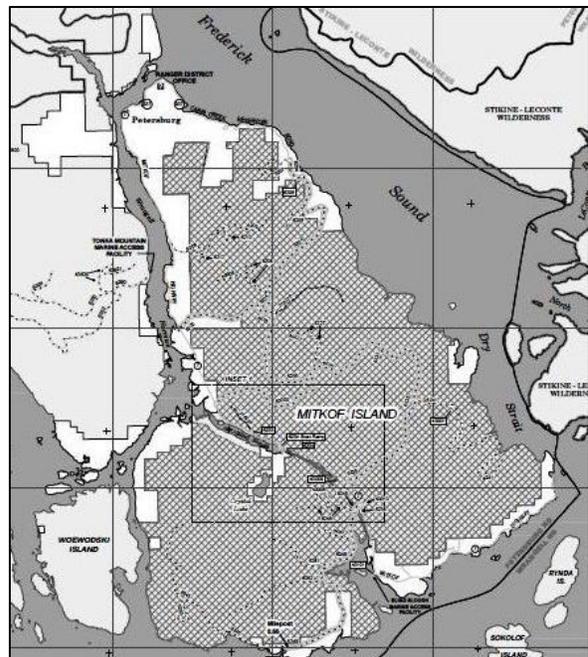


FIGURE 1 Mitkof Island, White areas are Non-Federal lands. Image taken from USFS Tongass National Forest Petersburg Ranger District Motor vehicle use map. 2013.

II. INVASIVE PLANT MANAGEMENT

A. What Plants are Considered to be Invasive?

Non-native (or “exotic”) plants are plants that do not naturally occur in an ecosystem. Not all non-native plants are considered invasive (consider, for example, broccoli planted in a garden). An invasive plant is a non-native species that was intentionally or inadvertently introduced into an area where it did not evolve and thus has no natural enemies to reduce its spread. Invasive plants reproduce in large numbers and have the potential to establish and spread into natural areas. Invasive plants are serious and pervasive threats to native species and ecosystems of Alaska. The greatest negative impact of invasive plants is the invasion of undisturbed native ecosystems.

B. What are the Effects of Invasive Plants?

Invasive species have been shown to dominate entire ecosystems, cause economic losses in locations all over the world and push rare species to the brink of extinction. Millions of acres of land in the coterminous United States and Hawaii have been irreparably altered or harmed by invasive plants. In most cases, once an invasive organism becomes widespread, reversal of its spread is nearly impossible. In the United States, economic losses caused by invasive species have been estimated to exceed \$120 billion each year. In terms of ecological losses, 400 of the 958 species that are listed as threatened or endangered under the Endangered Species Act are considered to be at risk primarily because of competition with non-indigenous species (Pimentel 2004). Second only to direct loss of habitat, invasion of non-native species into intact ecosystems is the primary cause of biodiversity loss (Carlson et.al.).

Direct impacts of invasive plants include competition for space, soil, light, or water with native plants, which can lead to reductions in populations of native species or even elimination of entire populations of rare plants. In addition to displacing native plants and wildlife, weeds disrupt ecosystem patterns and processes, such as hydrology, nutrient cycling, natural succession, and soil erosion. Displacement of native plant communities can lead to loss of food sources and habitat for wildlife. Other impacts include pollination competition, loss of stream bank stabilization, changes in nitrogen input from nitrogen fixing native species, and a reservoir for plant disease and alternative hosts for insects (Carlson et.al.).

Some invasive plants produce copious amounts of nectar and can be more desirable to native pollinators, resulting in a disruption of native plant/pollinator relationships.

Plants that flourish in wet environments can have extensive roots system that hold sediment in place and can change the characteristics of the stream. This could affect salmon spawning beds.

C. Steps for Effective Invasive Plant Management

The threat of invasive plants can be reduced significantly with quick action against the most potentially detrimental species. There are proven steps for effective invasive plant management. In other areas of Alaska, various groups, individuals and agencies have joined together to fight the threat of invasive plants.

Cooperative weed management areas (CWMAs) are an effective way for agencies, organizations, and individuals who are concerned with invasive plant management to work together for a more effective approach on a regional level. A CWMA creates a basis for participants to cooperate, coordinate activities, and share resources necessary for public education and for the prevention and control of invasive plants on public, private, and tribal lands across ownership or management boundaries. A CWMA establishes a framework that promotes cooperation among participants to accomplish mutually beneficial projects and activities. Each participant will benefit from a unified strategy, combined expertise, shared resources, consistency of methods, and collective results.

There are many resources available about invasive plants in Alaska. Refer to Appendix B for a list of organizations concerned with invasives plant in Alaska.

There are four steps for any community to follow to fight invasive plants:

- Inventory
- Prevention
- Early Detection and Rapid Response (EDRR)
- Control
 - Manual (hand pulling, digging)
 - Barrier (tarps, mulching)
 - Mechanical (mowing, tilling)
 - Cultural (burning, flooding, fertilizing)
 - Biological
 - Chemical (herbicides)

1. Inventory

It is first necessary to know which invasive plants are in the region. Invasive plant infestations must be positively identified to the species level, and data must be collected on the location and size of the infestation. If the plant cannot be positively identified by persons on the ground, samples can be sent to the Alaska Natural Heritage Program (AKNHP) of the University of Alaska Anchorage, or to a regional office of the University of Alaska Fairbanks Cooperative Extension Service for positive identification. Local USFS offices may also have the necessary expertise to accurately identify unknown plants.

The Alaska Natural Heritage Program collects, synthesizes and validates information on Alaska's invasive animal and plant species of concern and their habitats. The information in their database is a result of ongoing cooperation among many federal and state agencies in support of the Alaska Committee for Noxious and Invasive Plants Management (CNIPM) as well as contributions from individuals and organizations concerned about invasive plants in Alaska. The information collected and validated by AKNHP is entered into the Alaska Exotic Plants Information Clearinghouse (AKEPIC). AKEPIC is a database and mapping application that provides geospatial information for non-native plant species in Alaska and neighboring Canadian Territories.

(<http://aknhp.uaa.alaska.edu/botany/akepic>). This database ranks non-native plants by their invasiveness, using the Invasiveness Ranking System for Non-Native Plants of Alaska.

The Invasiveness Ranking System for Non-Native Plants of Alaska was developed by experts from state and federal agencies to evaluate the potential impacts of non-native plants to natural areas in Alaska so that the limited resources available for managing invasive species may be directed towards the most threatening species. This system ranks species using a series of questions in four broad categories: ecosystem impacts, biological attributes, distribution, and control. In addition, species that are not known to occur in Alaska undergo a climate screening procedure, which evaluates the potential for species to establish in the three ecogeographic regions of Alaska: Arctic-alpine, Interior boreal and Pacific maritime. Species are then assigned a rank between 0 and 100, where the rank of 100 indicates an extremely invasive species. AKEPIC collects information for the entire state of Alaska. Some plants may be more of a problem in certain regions of the state.



FIGURE 1 AKEPIC image of locations of invasive plants covered in this plan. Each color represents a different plant species.

There are many books and reference materials to help identify invasive plants and many useful websites concerning invasive plants. Appendix A provides a list of useful resources concerning invasive plants.

Some scouting has been done within the Petersburg Borough and most invasive plant populations in town are documented in the AKEPIC database. Additional surveys are needed, and many infestations have increased in size since they were last documented. Monitoring efforts are also needed to continue to update the database and to track changes in invasive plant infestations.

2. Prevention of Invasive Plants

Preventing unwanted plants from establishing can be accomplished through public awareness and by developing practices that minimize the introduction and spread of non-native plants, particularly through construction and maintenance practices by private and public entities, and transportation of invasive plants by vehicles, animals, and people.

Public outreach brings awareness to the community about invasive plants and their ecological and economic impacts on the community. The USFS and other groups have produced many pamphlets and field guides to educate the public. Displays in public areas help to spread the word. Boot washing stations and signs at trailheads will help both publicize the issue and have a physical effect to stop the spread of invasive plants. For example, the community of Metlakatla has installed a vehicle washing system at their ferry terminal to prevent vehicles entering by ferry from bringing invasive plants onto their island.

Alaskans value the natural beauty of our state. Many are willing participants in efforts to keep their community free of weeds that out-compete native plants. Presentations in local schools or to service organizations or having a booth with information and handouts at community events are easy, low-cost methods of disseminating information. Encourage volunteer activities such as community weed pulls. Work with local gardening groups to discourage growing invasive plants, and offer alternatives that do not have invasive characteristics. Agree on a local coordinator to take calls when people spot new infestations of invasive plants, and establish a method for reporting to the AKEPIC database. The opportunities for enlisting the community are endless and limited only by imagination. The Southeast Alaska Soil and Water Conservation District can assist, as can Cooperative Extension, Alaska Association of Conservation Districts, and many federal agencies.

The State Department of Transportation and Public Facilities have been working with the University of Alaska Fairbanks Cooperative Extension Service to develop “best management practices” to prevent the importation or spread of weeds in State rights-of-way. Some public contracts include provisions establishing procedures to minimize weed importation (power-washing heavy equipment before bringing it into a community, for example). Gravel pits can be certified as weed-free, and many contracts require the use of certified weed-free seeds and straw (used in wattles for erosion control). The USFS has also instituted similar weed best management practices and is actively using them on federal lands.

Best Management Practices can be established requiring that any project includes the following:

- Minimize soil disturbance
- Stabilize soil and re-vegetate with non-invasive and preferably native plants
- Assure that fill, topsoil, riprap, and gravel are free of weeds
- Clean equipment
- Assure that staging areas are free of weeds

The first step in any construction project is to scout for any invasive plants. If the project is to take place in the winter or early spring, inspection of the site should happen the summer before activity begins. If a high ranking invasive plant is identified, steps should be taken to minimize the chance of spread.

Prior to activities, scout for invasive plants and document species infestations. If an invasive plant is found, first consider the need for action based on: 1) the degree of invasiveness; 2) the severity of the infestation; 3) habitat at risk; and 4) feasibility of control.

Stabilize disturbed soils as soon as possible. Revegetate the area as soon as possible with non-invasive, weed-free seed--preferably native seed mix.

Establish procedures that prevent the spread of weeds by ensuring that invasive plants are mowed when the plant is in or nearing flowering to prevent seeds from being dispersed and set before construction activity. This is also effective in slowing the spread of weeds due to roadside mowing by ensuring that roadsides are mown before seed has set.

If soil is removed that is known to contain an invasive weed, those soils should be separated from other piles to assure that it is not moved to contaminate other areas.

Assure that all equipment and materials that are involved in a project do not contain weed seeds or other propagules (root, stem or other). Prior to moving equipment into an uninfested area, assure the equipment is clean and there are no plant parts or seeds on tires and exterior surfaces. Use only soil, gravel, fill, and hay bales/waddles that are weed-free. If the soil or gravel comes from a local source, encourage or require the pit to be inspected to assure that products are weed free. If a local certified inspector is not available, another approach is to treat the pit with herbicides twice a year, killing all non-native plants.

With any weed control treatment, disposal of pulled plant material is essential. Many plants can flower and go to seed after being pulled or cut. Always place weeds in garbage bags if disposed of in a land fill. Burying the plant material two feet underground or burning the plants in a contained area are also effective measures to assure the plant does not spread.

3. Early Detection and Rapid Response

As the name implies, early detection and rapid response (EDRR) is a method proven successful in identifying and then containing or eradicating new populations of invasive plants. Scouting regularly often results in an infestation being found quickly while it is still eradicable. With public outreach, many people become aware of what plants to watch for that could harm the local ecosystem. Having many eyes looking for these plants increases the opportunities for rapid control measures. By finding an infestation early, the plant can be more easily and quickly eradicated or controlled, while the infestation is still small and control methods with less impact can be performed.

4. Control

The control method used on an infestation depends on the plant species, size of the infestation and location. The physical characteristics of the plant are very important to the choice of control. Many of Alaska's highest ranking invasives have large, extensive roots systems and many are able to propagate from the smallest of root fragments, requiring that all roots pieces be removed from site in order to prevent spread or re-infestation. The size of the infestation also comes into play. Some methods, such as hand digging or tarping, may not be economically feasible if an infestation is a half acre or larger. Another factor is the location of an infestation. For example, an infestation located on a highly erodible slope may prohibit hand pulling if the removal of the plant causes soil instability. A location near water may prohibit or complicate the use of an herbicide, although there are herbicides formulated for use in aquatic habitats.

Methods of control include:

- **Manual** (hand pulling, digging). Manual controls can be effective on small infestations (< 0.1 acre) and on some annual plants with small root systems. Some plants can re-sprout from root fragments, so it is very important to remove all root pieces. Dispose of roots and cut material to ensure that they do not re-infest the area or infest a new area. In addition the flowers of some plants can produce seeds after they have been cut from the plant. Some methods to assure removed plant material does not infest new areas are: double-bag weeds and place in refuse transfer station, burn plant material or bury in ground at least two feet.
- **Barrier** (tarping, mulching). Using a landscape fabric or natural mulch can often be the only alternative when herbicides cannot be used and hand pulling is not feasible. The goal of this technique is to exclude sunlight and increase soil temperature to kill the plants. Many locations are not suitable for the use of tarps. The area needs to be relatively level and located where high winds cannot disturb the tarp. For most plants the tarp must be left in place for at least three years and some hardier plants will take over five years. The tarp must extend 3 to 5 feet beyond the boundary of the infestation and the site must be monitored to assure that no shoots emerge from edge of tarp. A drawback to this treatment is that all vegetation under the tarp is killed and the site must be re-planted with desired plants.
- **Mechanical** (mowing, tilling). Mowing can be useful in three ways. First, if the plant is an annual and will not resprout, this method can be used to kill the plants. Second, if a plant cannot be removed that season, mowing can be used to prevent flowering and eliminate seed production. Finally, mowing can be used in combination with another control effort to make the control more effective. For example, mowing before an herbicide application will weaken the plant, making the herbicide application more effective. Tilling is usually not a feasible method with invasive plants outside of agricultural settings.
- **Cultural** (burning, flooding, fertilizing). Burning with a brush burner has the same effect as mowing, and has the benefit of destroying any flowers so they cannot go to seed after treatment. Another cultural method is fertilizing. In lawns and some fields, an invasive plant can thrive with low nutrient levels that many other plants cannot. With correct fertilizing, a lawn can out-compete an invasive plant, and if the lawn or grass field is healthy, it will inhibit

the invasion of another plant. Flooding will work to control some plants, but at this time, there are few sites in Petersburg where this is feasible.

- **Biological.** Classic biological control of weeds is achieved by the introduction of a natural enemy of the invasive plant to suppress its population. Most invasive plants in our region arrived without the organisms that keep their populations in check in their native region. For biological control to work the natural enemies must be very specific to that plant and the infestation must to be large enough to sustain the population of enemies. Use of biological controls must undergo a rigorous regulatory process by APHIS (Animal and Plant Health Inspection Service). At this time, there are no biological agents that are being considered for this control method in the state of Alaska.
- **Chemical** (herbicides). For many infestations, chemical control is the most appropriate method. Like all control methods, there is a time and place for the use of an herbicide. With an annual plant, hand pulling or mowing is almost always the best method. For larger infestations of a plant with an extensive root system, herbicides may be the only effective method.

Herbicides vary in their mode of action and target species. There are selective and non-selective herbicides. Selective herbicides will affect either grasses (monocots) or broadleaf plants (dicots). Selective herbicides can be very useful when controlling a broadleaf weed because they will not kill grasses, thus allowing the grasses to quickly establish in the treated area. Non-selective herbicides kill all plants.

Herbicides can be applied using different methods; the most common is spraying with a backpack sprayer. Wiping is an application method where the herbicide is applied with a sponge or brush. This method limits the chance of damage to non-target plants and greatly reduces drift. Stem injection is another method which limits drift and will be explained better in the section on knotweeds (Section III, page 17).

Timing is very important with an herbicide application. Some plants are more susceptible to herbicides during certain times of the growth stage, and less or not at all susceptible during others. Many herbicides and sites require application by a certified pesticide applicator. Some herbicides cannot be used near water while other herbicides are formulated specifically for applying to water or wet conditions. Weather conditions affect the safety and effectiveness of herbicides. University of Alaska Fairbanks Cooperative Extension Agents can provide information on herbicides and timing of application for the control of an invasive species. The USFS is also a good source of information for effective use of herbicides. Always follow the label and use required safety equipment.

III. PRIORITY SPECIES FOR PETERSBERG

The criteria used to develop this prioritization were: the AKPEIC ranking, the size of the infestation, and the difficulty of control of the species. In this report a 'High' AKEPIC ranking is 70-100, 'Medium' is 40-70. The plants are divided into four categories:

Category A:

Invasive plants with high or medium AKEPIC ranking and small population levels (less than 0.1 acre) that have been documented in Petersburg. Some of these plants have been controlled and may be eradicated but the sites should be re-visited to assure that plants have been eradicated.

Common Name	Scientific Name	AKEPIC Ranking	Page #
White sweetclover	<i>Melilotus alba</i>	81	12
Canada thistle	<i>Cirsium arvense</i>	76	13
Birdsfoot trefoil	<i>Lotus corniculatus</i>	63	14
Common tansy	<i>Tanacetum vulgare</i>	60	15
Common St. Johnswort	<i>Hypericum perforatum</i>	44	16

Category B:

Invasive plants with high or medium AKEPIC ranking and with population levels less than 5 acres that are feasible to eradicate.

Common Name	Scientific Name	AKEPIC Ranking	Page #
Bohemian knotweed	<i>Fallopia x bohemica</i>	87	17
Fall dandelion	<i>Leontodon autumnalis</i>	51	19
Hairy cat's ear	<i>Hypochaeris radicata</i>	44	20

Category C:

Landscape plants found in Petersburg that have the potential to escape.

Common Name	Scientific Name	AKEPIC Ranking	Page #
Yellow flag iris	<i>Iris pseudacorus</i>	66	21
Scotch broom	<i>Cytisus scorparius</i>	60	22
European mountain ash	<i>Sorbus aucuparia</i>	59	23
Lady's mantle	<i>Alchemilla mollis</i>	56	24

Category D:

Invasive plants with a high AKEPIC ranking, are difficult to control, and are prevalent in Petersburg. Measures must be taken to keep them out of areas where they do not exist. Further monitoring and scouting must be done to find and protect zones free of these plants.

Common Name	Scientific Name	AKEPIC Ranking	Page #
Reed canarygrass	<i>Phalaris arundinacea</i>	83	25
Orange hawkweed	<i>Hieracium aurantiacum</i>	79	26
Meadow hawkweed	<i>Hieracium caespitosum</i>	79	27

Category E:

These are plants that have not been found in Petersburg. Many of these plants are found in other Southeast Alaskan communities and have a good probability of arriving on the island. These are EDRR candidates.

Common Name	Scientific Name	AKEPIC Ranking	Page #
Spotted knapweed	<i>Centaurea stoebe</i>	86	28
Ornamental jewelweed	<i>Impatiens glandulifera</i>	82	29
Himalayan blackberry	<i>Rubus discolor</i>	77	30
Perennial sowthistle	<i>Sonchus arvensis</i>	73	31
Herb Robert	<i>Geranium robertianum</i>	67	32
Tansy ragwort	<i>Senecio jacobea</i>	63	33
Bull thistle	<i>Cirsium vulgare</i>	61	34

For a list of all other documented invasive plants in Petersburg not included in this report refer to Appendix C.

White Sweetclover, *Melilotus alba*

AKEPIC Invasiveness Ranking: 81, Category A.

Description: White sweetclover is a biennial plant (lives for 2 years) that grows from 2 to 5 feet tall. Stems are erect and branched. Leaves are trifoliate, alternate, and .5 to 2.5 inches long. The flowers are white, fragrant and very small. They are spread out and arranged all around the stem. Plants flower from June to October during their second year of growth and then die. Pods are black to grey with a single seed each (ANHP 2011). There is a yellow flowered species of this plant (*M. officinalis*) that is identical to white sweetclover except the flowers are yellow and is thought to be a less aggressive plant.

Impacts: Each plant is capable of producing up to 350,000 seeds that can remain viable in the soil for up to 80 years. White sweetclover readily invades open areas, and has established extensively along early succession river bars on a number of river systems in Alaska.



White sweetclover
Photo by Dana White



White sweetclover flowers
Photo by Dana White

This plant degrades natural plant communities by overgrowing and shading native species. The flowers are very desirable to native pollinators and may affect the pollination of native plants. It also could alter soil conditions by fixing nitrogen (ANHP 2011).

Control recommendations: This plant is relatively easy to hand pull. Pulling should be done before the plant goes to seed. Very small seedlings can be burned with a brush burner. Since the seed viability can be over 50 years, treated sites must be monitored for many years.

There are records that this plant was found along the road at the intersection of Papkes Landing Road and the Mitkof Highway and approximately 1 mile further south along the Mitkof Highway. This site should be monitored for the next few years and any plants should be pulled before they go the seed (See Appendix D).

Canada Thistle, *Cirsium arvense*

AKEPIC Invasiveness Rank: 76, Category A.

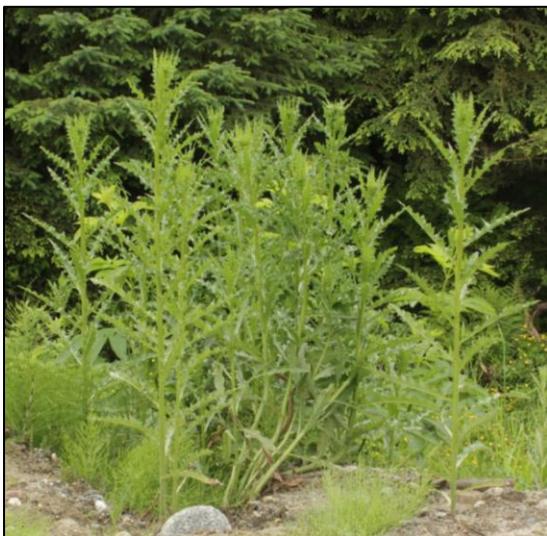
Description - Canada thistle is a perennial plant with a deep and extensive horizontal root system that can form new shoots. Stems usually grow to 1 to 4 feet tall and branch on the upper portion. The leaves are arranged alternately and are shallowly lobed with sharp spines at the margins. The flowers measure ½ to ¾ inches and are light purple. Seeds are brownish with a tuft of short white hairs (AKNP 2011).

Impacts - Canada thistle can displace native vegetation by competing for water and nutrients resulting in a decrease of species diversity. Canada thistle performs allelopathy, a process in which the plant's roots release toxic chemicals into the soil that inhibit growth of other plants. The sharp spines on the leaves make it a nuisance (AKNP 2011).



Canada thistle flowers and buds
Photo by Brian Maupin

Control recommendations - Canada thistle is very difficult to control once it has established. A combination of mechanical, cultural, and chemical control methods are more effective than any single control method alone. Hand pulling is ineffective because it fails to remove the deep lateral roots. Mowing can be effective only when repeated multiple times per season for several years. There are a few selective and non-selective herbicides that are very effective when applied when plants are beginning to create flower buds. Herbicide applications are most effective when the plants are first mowed and herbicide is applied to the newly emerged shoots. Dosage and timing is essential. Best results are achieved when herbicides are applied when plants are just beginning to create flower buds.



Canada thistle plants pre-bloom
Photo by Brian Maupin

There are two sites where Canada thistle has been documented on Mitkof Island: in town near the senior center and at mile 8.5 of the Mitkof Highway. The site at the senior center seems to have been eradicated but the area should be scouted to assure that there are no plants in the area. No plants were found along the Mitkof Highway.

Birdsfoot Trefoil, *Lotus corniculatus*

AKEPIC Invasiveness Ranking: 65, Category A.

Description - Birdsfoot trefoil is perennial plant that grows from a deep taproot. Stems are erect to trailing, branched, hairy, and are 4 to 30 inches long. Leaves are alternate and have 5 leaflets that are arranged in way that gives them the appearance of the foot of a bird. The leaflets are asymmetrical, broader at the tip than the base. The leaflets are on average ½ inches long by ⅓ inches wide with the lowest pair of leaflets somewhat reduced in size. Every leaflet has a pointed tip and is minutely toothed at the margins. The flower stems are stout and arise from the axis of leaves. The flowers are arranged somewhat in a circle in groups of 2 to 8. Flowers are yellow and consist of 5 petals with the lower 2 joined together. Seed pods are narrowly cylindrical and contain 10 to 25 seeds each. Seeds are very small and are green-yellow to dark brown (AKEPIC 2011).



Birdsfoot trefoil flowers
Photo by David Cappaert

Impacts - This plant can form dense stands that crowd native plants. Birdsfoot trefoil can fix atmospheric nitrogen, thus can alter the soil ecosystem. It is very attractive to pollinators and could disrupt native plant pollinator interactions (AKEPIC 2011).

Management Recommendation - Small patches of this plant can hand pulled, but since all root fragment must be removed this is not practical for larger patches. Many mowings per season will deplete the plant reserves and it will die. Many selective herbicides are effective in controlling this plant.

In Petersburg there is only one known infestation of birdsfoot trefoil: at approximately mile 22.5 on the Mitkof Highway. No plants were found at the site during the summer of 2012 but this area should be monitored and if any plants are found they should be dug up.



AKEPIC map showing location of Birdsfoot Trefoil.

Common tansy, *Tanacetum vulgare*

AKEPIC Invasiveness Ranking: 60, Category A.

Description - Common tansy is a perennial plant that grows to a height of 15 inches to 5 feet. Stems are erect, branching at the top, often grow in clusters and are reddish-brown. The leaves are alternately arranged on the stem and are heavily lobed with toothed margins giving the leaves a feathery appearance. The flower heads are yellow and button-like and are borne in compact clusters of 20 to 200 at the ends of the stems. The flower heads are less than a ½ inch in diameter (ANHP 2011, KCBW 2013).

Impacts - Common tansy can establish in existing herbaceous layer and form dense stands the can displace native plant species. This species is mildly poisonous. Each plant can produce 50,000 seeds but it is thought seed viability is only 1 or 2 years (ANHP, 2011).

Management recommendations - Small infestations such as the one in Petersburg can be controlled by manually pulling the plants being sure to remove as much root as possible. Wear gloves to avoid coming in contact with plant sap, which can cause skin irritation. It is also effective to mow this multiple times a year before seeding, repeating for 2 to 3 years.

There are three documented infestations of common tansy in Petersburg: on the gravel road off of Haugen Drive near the Ravens Roost trailhead, just past mile 7 of the Mitkof Highway, and at mile 22.5 of the Mitkof Highway (See Appendix E).



Mature common tansy plants
Photo by Dana White



Flower close-up
Photo by Dana White

Common St. Johnswort, *Hypericum perforatum*

AKEPIC Invasiveness Ranking: 52, Category A.

Description - Common St. Johnswort is a perennial herb that grows from 1 to 3 feet tall. Stems are smooth, rust colored, and somewhat two-sided. The stems are woody at the base, with numerous branches above. The leaves are arranged oppositely, borne directly to stem without a stalk. They are oblong or oval, less than an inch long and are smooth. The leaves have transparent spots throughout and black dots along margin. The flowers are ¼ inch in diameter, bright yellow and numerous. Each flower has five petals and numerous stamens. This plant reproduces by short rhizomatous roots and prolifically by seed. Each plant can produce 15,000 to 30,000 seeds per year and these seeds can remain viable in the soil for 6 to 10 years. Seeds also have gelatinous seed coats that stick to moving objects or animals facilitating dispersal (ANHP 2010).

Impacts - Although this plant is not overly aggressive, it can establish in disturbed areas and slow the transition to native plant communities. This plant is toxic to animals if consumed (ANHP 2010, KCNW 2013).

Management recommendation – Once established this plant is very difficult to control. Hand pulling can be effective if done multiple times throughout the season and care is taken to remove as much roots as possible. Mowing is also effective if performed a few times per season and before the plant has gone to seed (KCNW 2013).



Common St. Johnswort
Photo by Brian Maupin

This plant is documented along the Mitkof Highway at approximately mile 23. The size of this infestation is unknown but thought to be very small. Although this is not an overly aggressive plant, it is relatively easy to control and could be eradicated from the Island (See Appendix F).

Bohemian Knotweed, *Fallopia x bohemica*

AKEPIC Invasiveness Ranking: 87, Category B.

Description - Bohemian knotweed is a large perennial plant that has stems similar to those of bamboo and large elephant ear shaped leaves. This plant has thick, extensive rhizomes that can grow up to 20 feet long. Stems are stout, hollow and can be reddish-brown in color. They are swollen at the nodes giving a bamboo-like appearance and are 4 to 9 feet tall. Stems branch many times and have a zigzag appearance. Leaves are arranged alternately on stems and are 2 to 6 inches long. They are oval shaped with a pointed tip and a flat base with a very short leaf stem. The inflorescence is composed of many small white flowers (AKEPIC 2011, KCNW 2008). **Note:** this plant is identified as Japanese knotweed, *F. japonica* in the AKEPIC database.

Impacts - Bohemian knotweed can establish in natural area with little or no disturbance. Once established, knotweeds form dense monocultures that reduce plant diversity by shading native vegetation. It colonizes stream banks and can clog waterways, and lowers the quality of habitat for wildlife and fish. Knotweeds increase the risk of soil erosion. Dead stems and leaf litter decompose very slowly and form a deep organic layer that prevents native seeds from germinating (AKEPIC 2011).

Management Recommendations - Non-chemical control of this plant is expensive and time consuming. Hand pulling or digging can be effective for small populations if care is taken to remove all rhizomes. USE CAUTION WHEN MOVING ROOT FRAGMENTS as very small pieces can germinate and infest new areas. Covering the plants with tarp is also effective for smaller populations. The plants should be mowed first to facilitate placement of tarp and the tarp should extend at least 6 feet from plants. This tarp will have to be left in place for at least 5 years. Mowing is also effective; plants should be mowed twice a month being sure to cut as low as possible. Rake and pile up cut stem where they will dry out because stem fragments can sprout and reinfest the area. Make sure fragments are not moved from the infested area, as they may establish in new areas.



Young knotweed shoots and old dried stems
Photo by Dana White

Chemical control is very effective and there are different methods that should be considered depending on the site and size of infestation. The ideal time to make an herbicide application to most deep-rooted perennials is when they are in bud to early flowering stage. But because the knotweed may be 15 feet tall at this time, spraying may very difficult. Spraying taller plants increases the chance of pesticide drift. The best time technically to spray would be when the plant is less than 3 feet tall but under normal conditions, when the plant is still this short it may not have the leaf area to sufficiently absorb and

translocate enough chemical to be effective. Field data analysis suggests treatments done in spring are not as effective as those done in late summer. By combining other techniques this height issue can be negated. One method is to cut the stem and follow with a foliar spray. Cutting the stem 3 to 4 weeks before a foliar spray will work in two ways: the plant is short enough to spray and having to re-grow its above ground area will help to deplete the root stores. Another method found to be highly effective is to first bend the stem over so they lie on the ground then spray 3 to 4 weeks later. A glyphosate product such as Round Up is found to be effective. If applying near water the aquatic use formulation of glyphosate will have to be used (AKEPIC 2011, KCNW 2008).

Stem injection is very effective, with 90% or more controlled the first year, but also very time consuming. Use a stem injection gun or similar tool and a concentrated glyphosate herbicide. Follow the directions for the equipment. Inject the stem between the 2nd and 3rd node. Every large stem must be injected. Advantages to this method are that there is no possibility of drift; the treatment can take place in almost any weather conditions, and there are no cut stems to deal with. The disadvantages are that it is very time consuming and stems under ½ inches in diameter cannot be injected. This method is best for small or medium size infestations.

“Cut and pour” is good for small patches and greatly reduces drift. Cut stem between the lowest 2 nodes, then put 3 ml undiluted glyphosate into the stem cavity. Cut stems must be removed to an area where they will dry out.

There are less than 3 acres total of Bohemian knotweed on Mitkof Island. There are a few plantings in yards in town, and a few medium sized infestations entered around Scow Bay Loop Road and down the Mitkof Highway to approximately mile 6 (See appendices G and H). It is possible to eradicate this plant from the Island with an outreach campaign to homeowners to provide information on how to control this plant in their yards and bring awareness not to spread this plant. Because many of the infestations are along the highway on state land, an organization or group could seek funding through grants to control these infestations with herbicide applications.



Knotweed in bloom
Photo by Dana White

Fall Dandelion, *Leontodon autumnalis*

AKEPIC Invasiveness Ranking: 51, Category B.

Description - Fall dandelion is a perennial herb that grows 6 to 30 inches tall. Stems are single or few, solid and branched above. Leaves are basal, long slender and deeply lobed. They are 2 to 12 inches long and are ¼ to 1 ½ inches wide. Flower stalks have scale-like bracts near the bright yellow flower heads. This plant blooms very late in the season (AKEPIC 2011).

Impacts - Fall dandelion is an early colonizer of disturbed areas and open grassy areas such pastures and lawns. It reduces resources available to co-occurring species in disturbed sites and likely affects native plant-pollinator interactions. This plant spreads rapidly in hay fields in South-Central Alaska (AKEPIC 2011).

Management recommendation – It is difficult to eradicate fall dandelion by hand pulling because small root fragments left in the ground can sprout new plants. The plant grows too low to be killed by mowing, but mowing can be effective at controlling seed production if mowing is timed when plants are about to flower. Many common selective herbicides are very effective at controlling this plant if applied before flowering. There are two large patches of fall dandelion on the shoulder of the Mitkof Highway approximately at mile 8.5 and mile 12. These infestations are too large for hand pulling and covering with a tarp at this location may not be feasible. An herbicide application may be the only method applicable to control this plant on Mitkof Island.



Fall dandelion
Photo by Brian Maupin



Fall dandelion infestation along Mitkof Highway
Photo by Brian Maupin

Hairy Cat's Ear, *Hypochaeris radicata*

AKEPIC Invasiveness Ranking: 44, Category B.

Description - Hairy cat's ear is a perennial plant that somewhat resembles common dandelion. Each plant produces one to fifteen erect, leafless, stems. Leaves are basal, coarsely toothed, and wider at the end than the base. They are 2 to 12 inches long and ¼ to 1 inch wide, and are coarsely hairy. Yellow flowers are very similar to common dandelion. Florets are strap-shaped, yellow and are ¼ to ¾ inch long. This plant spreads by seed and each plant can produce up 6,000 seeds. Multiple rosettes can be produced from a single taproot (ANHP 2010).

Impacts - Hairy cat's ear usually only invades disturbed areas and can outcompete native plants for water and nutrients. This plant can become a pest in lawns and is difficult to get rid of once established (ANHP 2010).

Control recommendation - This plant can be easily controlled by hand pulling the woody crown. Small root fragments do not re-grow. Many selective herbicides are known to be effective on hairy cat's ear.

There are a few infestations along the Mitkof Highway at miles 7 and 14. This plant grows among many other invasive plants and would not warrant control unless all other invasives in the area are treated.



Hairy cat's ear Basal rosette
Photo by R. Old

Yellow Flag Iris, *Iris pseudacorus*

AKEPIC invasiveness ranking: 66, Category C

Description – Yellow flag iris is a perennial plant that grows up to five feet tall and is an invader of wetlands. Rhizomes are 1 inch in diameter, pink in color, and branching. Stems are erect, solid and sometimes branching. Leaves are linear and lance-shaped, and usually erect. They are 2.5 to 3.5 feet long and up to 1.5 inches wide and are thickest in the center. Flowers are yellow, 1.5 inches wide and are arranged in groups of 4 to 12 at the end of stalks. The plant produces cylindrical capsules that are up to 1.5 inches long containing 50 to 120 seeds (AKEPIC 2010).

Impacts – Yellow flag iris invades wetland and riparian communities throughout the United States. It has the potential to form extensive monocultures that reduce populations of native species in waterways along shores. Yellow flag iris displaces native plant species in brackish coastal marshes in Oregon (AKEPIC 2010).



Yellow flag iris flower
Photo by Nancy Lowenstein

Control Recommendations – Small infestations can be successfully controlled if the entire rhizome system is removed. Rhizome fragments can re-sprout so care must be taken to properly dispose of plant parts. The site must be revisited to assure all plant parts have been removed.

This is a popular landscape plant in Petersburg and is planted in many yards. There needs to be outreach to homeowners to make them aware of the potential for this plant to escape. If plants are found in native wetlands they should be hand dug before the population becomes too large for mechanical control.

Scotch Broom, *Cytisus scorparius*

AKEPIC Invasiveness Rank: 60, Category C.

Description – Scotch broom is a woody shrub that grows to 8 feet tall with many erect stems. Leaves are composed of 3 oval shaped leaflets. The flowers are showy, yellow, and abundant. They are arranged solitary in leaf axils. The seed pods are flattened, hairy and brown or black (AKEPIC 2011).

Impact – Scotch broom grows rapidly and can quickly produce dense impenetrable monocultures that prevent the establishment of native species. It is slightly toxic and unpalatable for browsing animals. Its seeds can remain viable for over 80 years. This plant is very common in the Puget Sound Area (AKEPIC 2011).



Close-up showing flowers and leaves
Photo by Eric Coombs

Control – Although difficult it can be hand dug. If cut at stem it must be monitored because stumps can re-sprout. Smaller plants can easily be dug or mowed.

This plant was found at the school yard but is not flourishing. It should be watched to assure it does not escape and spread. Scotch broom is spreading in Ketchikan and on Prince of Wales Island.



Scotch broom
Photo by Eric Coombs

European Mountain Ash, *Sorbus aucuparia*

AKEPIC ranking: 59, category C.

Description – European mountain ash is an upright tree that grows from 20 to 40 feet tall. The bark is grey to yellow-green and smooth. The leaves are alternate, pinnately compound and 5 to 8 inches long, with 11 to 15 leaflets per leaf. Flowers bloom in May and are borne in clusters that are 3 to 5 inches across. Flowers are small and white. The fruits are bright orange, small and remain on the tree for some time. Note: there are several native mountain ashes but they can easily be distinguished from European mountain ash because the natives are shrubs, usually less than 20 feet tall, and the fruit clusters on the natives have far fewer berries (>25) (ANHP 2011).

Impacts - This plant's seeds can be transported long distances by birds and establish in undisturbed wilderness. It integrates into and eventually dominates coastal rainforest plant communities. The fruits are highly desirable to birds and may alter their feeding behaviors (ANHP 2011).

Management recommendation – This is a popular landscape tree in Petersburg, and any eradication plan would be unfavorable to the public; but if young seedlings are found in remote areas, they should be hand pulled.



European mountain ash with berries
Photo by Boris Hrasovec

Lady's Mantle, *Alchemilla mollis*

AKEPIC invasiveness ranking: 56, Category C

Description - Lady's mantle is a short, perennial plant that grows 8 to 30 inches tall. Leaves are circular, hairy, gray-green, and up to 4 inches wide. Each leaf has 9 to 11 lobes and each lobe has 15 to 19 inwardly curved, slightly pointed teeth. Flowers are arranged in a loose circle at the end of stems. The flowers lack petals and are yellow-green, star-shaped and are up to ¼ inch wide (AKEPIC 2011).

Impacts – Lady's mantle can form dense monocultures under alder canopies which may prevent the establishment of native plant species. This plant can reproduce asexually by unfertilized seeds and can produce a prolific amount of seeds. Not much is known about the invasiveness of this plant in Alaska, but many invasive plant professionals are worried by its ability to thrive under alder. Lady's mantle is a popular flower garden plant in Southeast Alaska (AKEPIC 2011).

Controls Recommendations - Hand pulling is effective for small patches, taking care to remove all root fragments; however there is little documentation of control methods for this plant.

This plant is not documented in AKEPIC but was observed along the Mitkof Highway at mile 8. Approximately 50 plants were present.

These plants should be hand dug on DOT and Borough land. Educate gardeners about the invasiveness of this plant. Cooperative Extension can suggest non-invasive alternatives to grow in ornamental gardens.



Lady's mantle plant
Photo by Brian Maupin

Reed Canarygrass, *Phalaris arundinacea*

AKEPIC Invasiveness Ranking: 83, Category D.

Description - Reed canarygrass is a robust, sod-forming perennial grass that can grow over 5 feet tall and has a stout, creeping root system that produces new plants. Leaf blades are flat, long, and broad; 6 inches long by ¼ to ½ inches wide. Flowers are arranged in dense, branched panicles. Immature panicles are compact and spike shaped, and then opens to become slightly spreading when mature. Reed canarygrass may be confused with some native grasses but can be distinguished from other grass by its robust height. It is one of the last green grasses (ANHP 2011).

Impacts - Reed canarygrass reproduces sexually by seeds and vegetatively from creeping rhizomes forming dense, persistent, stands in wetlands and on stream banks. These dense, single species stands exclude and displace other plant species and can promote silt deposition and the consequent constriction of rivers, streams, and ditches. This may result in slowing stream flow, eliminating the scouring action needed to maintain the gravel river bottoms essential for salmon reproduction. When in flower, it can cause hay fever and allergies (ANHP 2011).

Management Recommendations - Once established, reed canarygrass is very difficult to control. Mechanical control methods are feasible but are labor intensive and require a long-term investment. The root system is very robust and takes a lot of digging and care to remove all rhizomes. Mowing is not effective by itself but can enhance other methods and when timed properly can eliminate seed set for that year. For small infestations tarping can eradicate reed canarygrass. The tarp must remain in place for at least three years. Mowing before placing the tarp will help. There are effective herbicides but they are not selective and have the potential for injury to native plants. Plants reestablish quickly from seeds after control methods are used, so area must be monitored for several years (ANHP 2001).

Reed canarygrass is very common in Petersburg and found virtually everywhere. Further monitoring should be done in watersheds to determine the full extent of the plant's range and keep it from infesting stream banks.



Open reed canary grass flower head
Photo by Brian Maupin



Reed canarygrass with closed flower heads
Photo by Dana White

Orange Hawkweed, *Hieracium aurantiacum*

AKEPIC Invasiveness Ranking: 79, Category D.

Description - Orange hawkweed is a perennial herb that has shallow, fibrous roots, and stolons (above ground trailing stems). Stems arise from a basal rosette of leaves, grow to a height of 1 foot, and bear up to 30 flower heads. Stems and leaves exude milky latex when cut or broken. Leaves are oblong and lance shaped. They grow up to 5 inches long, are very hairy, and exclusively basal. Flowers are deep orange to red and are ½ inch in diameter. This plant is recognizable as being the only orange flower of its type in Alaska (AKNP 2011).

Impacts - Orange hawkweed is allelopathic, meaning it exudes a chemical from its roots that suppresses the growth of neighboring plants. Because of this orange hawkweed can outcompete and crowd out native plants, many of which can be much larger than the hawkweed. This can result in dense monocultures of orange hawkweed (AKNP 2011).

This plant can reproduce sexually through seeds or vegetatively from stolons, rhizomes, and root fragments. Each plant can produce 50 to 600 seeds that remain viable in the soil up to seven years. In addition each plant sends out 4 to 8 stolons every year. Plants can sprout from any fragment left in the soil. This large reproductive potential and allelopathic ability make this plant very aggressive and a threat to undisturbed ecosystems (AKNP 2011).



Orange Hawkweed
Photo by Brian Maupin



Blooming orange Hawkweed Plants
Photo by Dana White

Management recommendations - This plant is very hard to control. Mowing promotes more root growth and hand pulling is difficult in that any small root fragment left in the soil can produce a new plant. Tarping is effective if care is taken to cover the entire infestation and extend tarp well beyond infestation for a period of no less than 3 years. Selective herbicides can be very effective controlling orange hawkweed if applied early in the season before they bolt

This plant is common in Petersburg and is beyond eradication but because it can invade undisturbed wilderness, efforts should be made to keep it from escaping down roadsides. Further monitoring needs to be done on logging roads and rural roads to assure this plant does not invade natural areas.

Meadow Hawkweed, *Hieracium caespitosum*

AKEPIC Invasiveness Ranking: 79, Category D

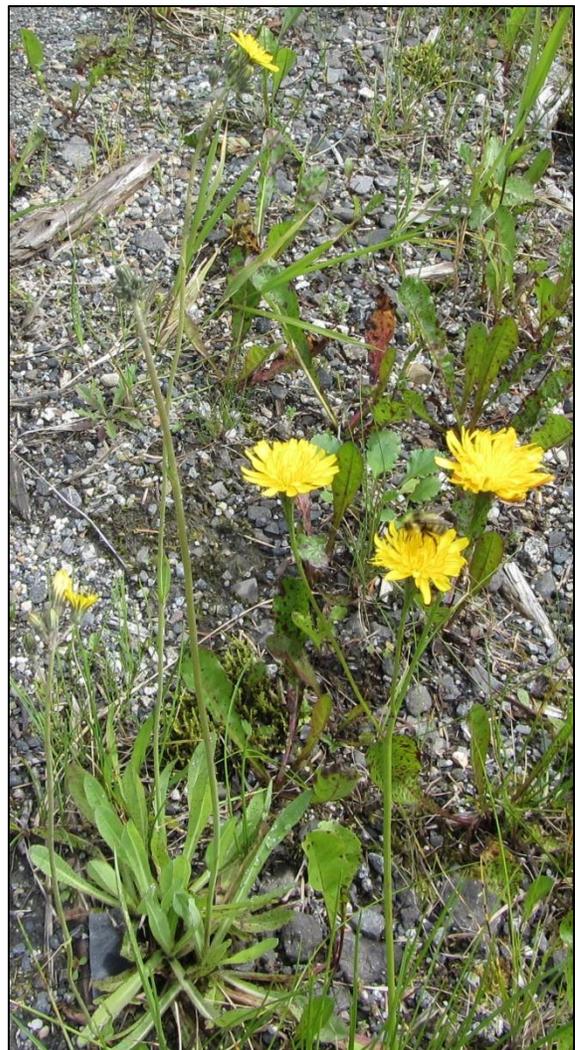
Description – Meadow hawkweed is a perennial herb that looks very similar to orange hawkweed except that it has yellow flowers. Stems are erect, solitary, and up to three feet tall. They are covered in hairs and exude a milky juice when broken. Basal leaves are oblong to spoon shaped, 2 to 10 inches long and less than 1 inch wide. One to three smaller leaves grow up the stem. Up to thirty ½ inch flowers heads are borne near the top of the stem (AKEPIC 2011).

Impacts – Like orange hawkweed this plant is allelopathic and can readily invade meadows, pastures and forest borders.

Management recommendations – Control methods are much like orange hawkweed: mowing promotes root growth and flowering and digging and removing all the root fragments is very difficult. Selective herbicides are the best control method. This plant is very common in Petersburg and eradication is not feasible but keeping this plant from spreading is very important.



Close-up of underside of flowers and black hairs on stem
Photo by Tom Huetter



Meadow hawkweed flowers and basal rosette of
leaves on left
Photo by Brian Maupin

Spotted Knapweed, *Centaurea stoebe* ssp. *micranthos*

AKEPIC ranking: 86, Category E.

Description – Spotted knapweed is a biennial or short-lived perennial plant that grows to a height of 1 to 3 feet tall. Basal leaves have several irregularly-lobed segments. Stem leaves are alternate, mildly hairy, and 2 to 6 inches long. Lower stem leaves are narrowly divided, while upper stem leaves are undivided. The flower heads are 1 inch wide and are composed of bluish-purple disc florets (ANHP 2011).



Spotted knapweed flowers
Photo by Brian Maupin

Impacts – Spotted Knapweed can form dense monocultures that reduce the vigor of native plants and decrease the diversity of native plant communities. Knapweeds are allelopathic, suppressing the growth and establishment of surrounding vegetation. Large infestations have been shown to increase erosion of topsoil. This plant has been found in a few areas in Southeast Alaska and near ferry docks.

Control Methods – This plant is easily hand pulled and is susceptible to multiple mowings per year.



Spotted knapweed along Haines Highway
Photo by Brian Maupin

Ornamental Jewelweed, *Impatiens glandulifera*

AKEPIC Invasiveness Rank: 82, Category E.

Description - Ornamental jewelweed is a single-stemmed annual plant with a reddish tinge to the stem and leaves that grows from 3 to 6 feet tall. Stems are erect, smooth, hollow, and multi-branched with large swollen nodes at the leaf attachment. The leaves are about 6 inches long, 3 inches wide, rounded and sharply toothed, oppositely arranged but sometimes whorled in three leaves. One inch long flowers are arranged in sparse clusters from the leaf axils. The flowers are irregular, having 5 petals with the upper 2 being fused. Flower color varies from pink to purple to red. The plant produces capsules that explode at touch and eject large black seeds (AKEPIC 2011).



Ornamental jewelweed flowers
photo by Dana White

Impacts - Ornamental jewelweed is an aggressive invader of wetlands and streams that can create dense stands that suppress and displace native plant communities. Ornamental jewelweed's strong roots can anchor plants and enable them to establish in swift moving water, which can result in flooding and bank erosion by changing the movement of water. It also competes with native plants for pollinators, such as bumblebees, potentially reducing native plants' ability to set seed (AKEPIC 2011).

Controls Recommendation - This plant is easily hand pulled or killed by low mowing. Seed are short lived and with the elimination of seed production, eradication should only take a couple of years.

This plant has not been documented in Petersburg but has become popular with homeowners in Wrangell. It has not started invading undisturbed ecosystems there, but has great potential to do so. An infestation in Juneau has moved down a watershed and was blanketing a large area. Two years of hand pulling the plants has decreased the infestation by two-thirds. Because this is an attractive plant, home gardeners should be targeted in outreach efforts and strongly discouraged from adding ornamental jewelweed to flower beds. If found on public land this plant should be hand pulled before it flowers.



Ornamental jewelweed infestation in Juneau
Photo by Dana White

Himalayan Blackberry, *Rubus discolor*

AKEPIC ranking: 77, Category E.

Description - Himalayan blackberry is a robust perennial bramble with palatable berries and large, sharp spines. Stems have a reddish tinge, large curved spines, grow up to 30 feet long and can root at the tips. The stems live for 2 to 3 years, and dead stems persist for a couple years. Leaves are made up of five leaflets (sometimes three) that are palmately compound. Leaflets are 2.5 to 5 inches long, somewhat round in shape, and sharply toothed. They are bright green and smooth on top and hairy and grey on underside. Flowers are white to light red in color and up to one inch in diameter. Flowers and fruit are arranged in loose clusters of five to twenty. Fruits turn red to shiny black as they ripen (ANHP 2011, KCNW 2013).



Himalayan blackberry flower
Photo by John Randall

Flowers and fruit are arranged in loose clusters of five to twenty. Fruits turn red to shiny black as they ripen (ANHP 2011, KCNW 2013).

Impacts – Himalayan blackberry forms large, impenetrable thickets in a few years. It can grow to densities as high as 150 stems per square foot and grow tangled upon itself to over 6 feet tall. It blocks out all light and forms a large layer of organic matter, eliminating the growth of almost all other plants. Once established, it will grow over the top of native plants, including small trees. The fruits are eaten by birds and animals and are then spread to other locations. Its dense growth and numerous thorns limit movement by animals and humans. In the Pacific Northwest, this plant is very common in riparian areas, along roadsides and pastures (ANHP 2011, KCNW 2013).



Himalayan blackberries
Photo by John Randall

Controls Methods– This plant is very difficult to control once established. It spreads rapidly through its root system and through stems rooting, and berries can be carried great distances by birds and animals. If found when small, it can be hand-dug, making sure to remove root ball and major side roots. Mowing 4 to 5 times a year will deplete the root system, killing the plant.



Himalayan blackberry Stem
Photo by John Randall

Perennial Sowthistle, *Sonchus arvensis* ssp. *uliginosus*

AKEPIC Invasiveness Rank: 73, Category E.

Description: Perennial sowthistle is a succulent perennial plant that has reddish stems that can grow up to 4 feet tall. It has extensive root systems that grow down to 6 feet deep. All plant parts contain a white milky juice. Leaves are arranged alternately and are lance-shaped with deep lobes. The leaves are 3 to 16 inches long, have prickly margins, and the base clasps the stem. The flower heads are bright yellow and are up to 2 inches wide (AKEPIC 2011).

Impacts: Because of this plant's deep root system, this plant can reduce water resources of other plants. This plant is growing in the beach fringe in Juneau amongst beach rye and beach pea (AKEPIC 2011).

Control: In Juneau hand pulling this plant from the beach fringe has been very successful. Two pulls a year before flowering, with particular care to remove all root fragments, has been found to be effective. Perennial sowthistle is resistant to some broadleaf herbicides, but many others are quite effective.

Note: Annual (*S. arvensis*) and Prickly (*S. asper*) sowthistles are present in Kake and other Southeast Alaskan communities, and could also arrive in Petersburg. Although they both have an AKEPIC invasiveness ranking of 46, they spread rapidly in disturbed areas. They are annual or biennial, and can be differentiated from perennial sowthistle by their lack of a large, rhizomatous root system. The flowers of these plants are smaller (<1.5 inches) and prickly sowthistle has sharp prickles on the leaf margins. Both these plants are relatively easy to hand-pull.



Annual sowthistle
Photo Brianne Blackburn



Perennial sowthistle infestation on beach fringe in Juneau
Photo by Dana White

Herb Robert, *geranium robertianum*

AKEPIC Invasiveness Ranking: 67, Category E.

Description - Herb Robert is an annual to short-lived perennial herb. It grows 4 to 20 inches tall from a many-branched taproot. Stems are red and branch at base and have long spreading hairs on the lower portions. Branches lay flat on the ground at their base and grow upright further from the base. Leaves are heavily divided and have 3 to 5 heavily lobed leaflets. Stem leaves are arranged oppositely, are 0.5 to 3.5 inches long, and are sparsely hairy. Flowers are borne in pairs from the leaf axils. Flower petals are 1/8 to 1/2 inch long and pink or purple with white stripes, rounded tips, and soft hairs on the lower portions. Fruits are 5-segmented with a long erect beak on top (AKEPIC 2010).

Impacts- In forests in the Pacific Northwest, this plant can grow at densities of up to 75 plants per square foot, creating dense monocultures. This plant can spread in undisturbed woodlands and can flourish in shady areas, and has the potential to change the understory diversity of Alaskan forests. Herb Robert is not palatable to wildlife and has been documented to alter native plant-pollinator relationships. This species has been documented producing up to 1,550 seeds per plant that are forcibly ejected from the capsules, landing up to 20 feet away. In addition, each seed has a sticky, thread-like fiber that can attach to insects or passing mammals. Seeds can remain viable in soil for up to 6 years (AKEPIC 2010).

Control Methods - Small populations can be controlled with hand-pulling. The root system is shallow and can easily be pulled before it has gone to seed. Herb Robert plants can also be mowed several times a season before they flower. Many broad spectrum herbicides are effective at controlling this plant. This plant has been found on Kupreanof Island.



Herb Robert - flowers and "beaked seed"
Photo by John Randall

Tansy Ragwort, *Senecio jacobea*

AKEPIC Invasiveness Rank: 63, Category E.

Description - Tansy ragwort is a biennial or short lived perennial plant with one to several stems that grows from 1 to 4 feet tall. The stout stems are unbranched to the inflorescence. The leaves are 2 to 8 inches long, alternate, with deeply cut, blunt-toothed lobes and a ragged/ruffled appearance. Clusters of bright yellow flower heads develop on ends of the long leafy stems. The flower heads are composed of disc and ray florets with 10 to 13 ray florets (petals). Its seeds have white hairy tufts that allow them to be wind-carried. Seeds usually germinate in fall or early winter, live through the next year as a rosette of leaves, then flower and die the next year. A single plant can produce up to 150,000 seeds that lie dormant up to 20 years (ANHP 2011).



Tansy ragwort
Photo by Brian Maupin

Impacts - Tansy ragwort contains an alkaloid that is highly toxic to animals including humans and can cause irritation if plant sap comes in contact with skin. Tansy ragwort can easily outcompete native grasses and forbs and hinder the colonization of disturbed areas by native plants (ANHP 2011).



Tansy ragwort Flowers
Photo by Brian Maupin

Management recommendations- Hand pulling is most effective for small to medium sized infestations. Make sure to remove as much of the roots as possible. If plants are in flower when pulled, bag plants because flowers can go to seed after being pulled. Mowing is not recommended because it encourages the plant's fibrous root system to produce adventitious roots and may not die as biennial, but may survive multiple years. Wear gloves and use caution to avoid contact with plant sap.

There is a medium size infestation in Kake and efforts are being made to eradicate it. Before eradication efforts began, it was spreading quickly. This plant is becoming common in Ketchikan.

Bull Thistle, *Cirsium vulgare*

AKEPIC Invasiveness Rank: 61, Category E.

Description - Bull thistle is a biennial plant with hairy leaves that are deeply lobed with prickles at the leaf margins. The plant lives the first year as a short, ground-hugging cluster of leaves with virtually no stem. The second year, the plant bolts to 2 to 5 feet tall and flowers. The stems are conspicuously winged, many-branched, and sparsely hairy. Leaf blades extend down and along the stem, forming long, prickly wings. Flower heads are 1 to 2 inches wide and are deep purple in color. Individual plants can produce up to 4,000 short-lived seeds (ANHP 2011).

Impacts – Bull thistle competes with native species for soil moisture and nutrients. Not a lot is known about this plant’s impact on ecosystem processes. The prickles of the plant are very sharp.

Management recommendations - Bull thistle plants are easily pulled up by hand and can be killed by cutting at the soil surface. Any program must be maintained for at least 4 years (KCNW 2013).



Bull thistle flower
Photo by L. Kok



Bull Thistle
Photo by Dana White

IV. CONCLUSION

Petersburg's isolation creates a unique position to prevent introduction of invasive plants, and the opportunity to eradicate those that exist. To reach this goal, residents need to vigilantly survey for weeds, through both individual and organized efforts.

Public outreach will bring community awareness of the detrimental effects of invasive plants, and bring many new trained spotters into the effort.

Agencies and organizations concerned with invasive plants should incorporate regular survey and treatment into their environmental plans.

Local government should consider methods that will help to prevent introduction of new weeds, such as requiring that heavy equipment transported into the community be power-washed to remove weed seeds and fragments, or installing an undercarriage wash at the ferry station, or requiring or offering a bidder's preference to pits or quarries that are free of invasive plants.

Priority should be given to eradicating new, small populations of invasive plants before they can become established and spread. Staff training and community outreach will help to ensure that appropriate control methods are used to avoid weeds being spread by eradication efforts.

Establishment of a Cooperative Weed Management Area (CWMA) will help to coordinate weed prevention and treatment in Petersburg Borough and surrounding areas. This would be made easier if an agency or organization will step forward to take responsibility for coordinating efforts toward establishing the CWMA. Through the CWMA, community outreach, community weed pulls, fun events (such as a Weed Smackdown), and education efforts will reach more people and have greater effect. Prevention and control efforts are more likely to continue into the future with a CWMA, rather than relying on the interest and energy of a few concerned individuals.

Initial control efforts should focus on the Category A and B plants identified in this document, as the populations are small enough to achieve eradication and thus prevent future ecological and economic consequences of these weeds.

Support for local efforts is available through University of Alaska Fairbanks Cooperative Extension Service, the Southeast Soil and Water Conservation District, the State of Alaska's Division of Agriculture, and many federal agency staff assigned to monitor and control invasive species. More information about individual species is available through the Alaska Natural Heritage Program of the University of Alaska.

V. REFERENCES CITED

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VI. APPENDICES

A. Reference Materials

Websites –

AKEPIC. Alaska Exotic Plant Information Clearinghouse database
Alaska Natural Heritage Program, University of Alaska, Anchorage
(<http://aknhp.uaa.alaska.edu/maps/akepic/>)

University of Alaska Fairbanks, Cooperative Extension Service
www.alaskainvasives.org/

Juneau Cooperative Weed Management Area
<http://www.juneauinvasives.org/>

King County Washington Noxious weeds
<http://www.kingcounty.gov/environment/animalsAndPlants/noxious-weeds.aspx>.

Link to Cooperative weed management cookbook
<http://www.fs.fed.us/invasivespecies/documents/cookbook.pdf>

Books –

Invasive plants of Alaska. Carlson, M., Heys, J., Shepard, M., and Snyder, J. 2012, AKEPIC

Introduction to Common Native & Potential Invasive Freshwater Plant in Alaska. US Fish and Wildlife Service and Alaska Dept. of Fish and Game. 2009.

A Field Guide to Alaska Grasses. Wright, S., Henszey, R., Henszey, J., and Wyman, S. Alaska Department of Natural Resources, Division of Agriculture. 2012.

Flora of Alaska and Neighboring Territories: A Manual of the Vascular Plants, Hultán, Eric. Stanford University Press. 1968.

B. Contacts of Interested Parties

United States Department of Agriculture Forest Service
Petersburg Ranger District
12 North Nordic Drive
PO Box 1328
Petersburg, AK 99833-1328
District Ranger: Jason Anderson
Phone: 907-772-3871

Alaska Association of Conservation Districts
1700 E. Bogard Rd. Suite 203A
Wasilla, Alaska 99654-6563
Phone: (907) 373-7923
Email: aacd@mtaonline.net
Website: <http://www.alaskaconservationdistricts.org>

Southeast Soil and Water Conservation District
Brian Maupin, Regional Invasive plant Coordinator
PO Box 21788
Juneau, Alaska 99802
Phone: 907-586-6878
Email: invasiveplants@seswcd.org
Website: <http://www.seswcd.org>

Juneau Cooperative Weed Management Area
Website: <http://www.juneauinvasives.org>

University of Alaska Fairbanks Cooperative Extension Service, Juneau
1108 F St., Suite 213, Juneau, AK 99801-1844, Phone 907-796-6221,

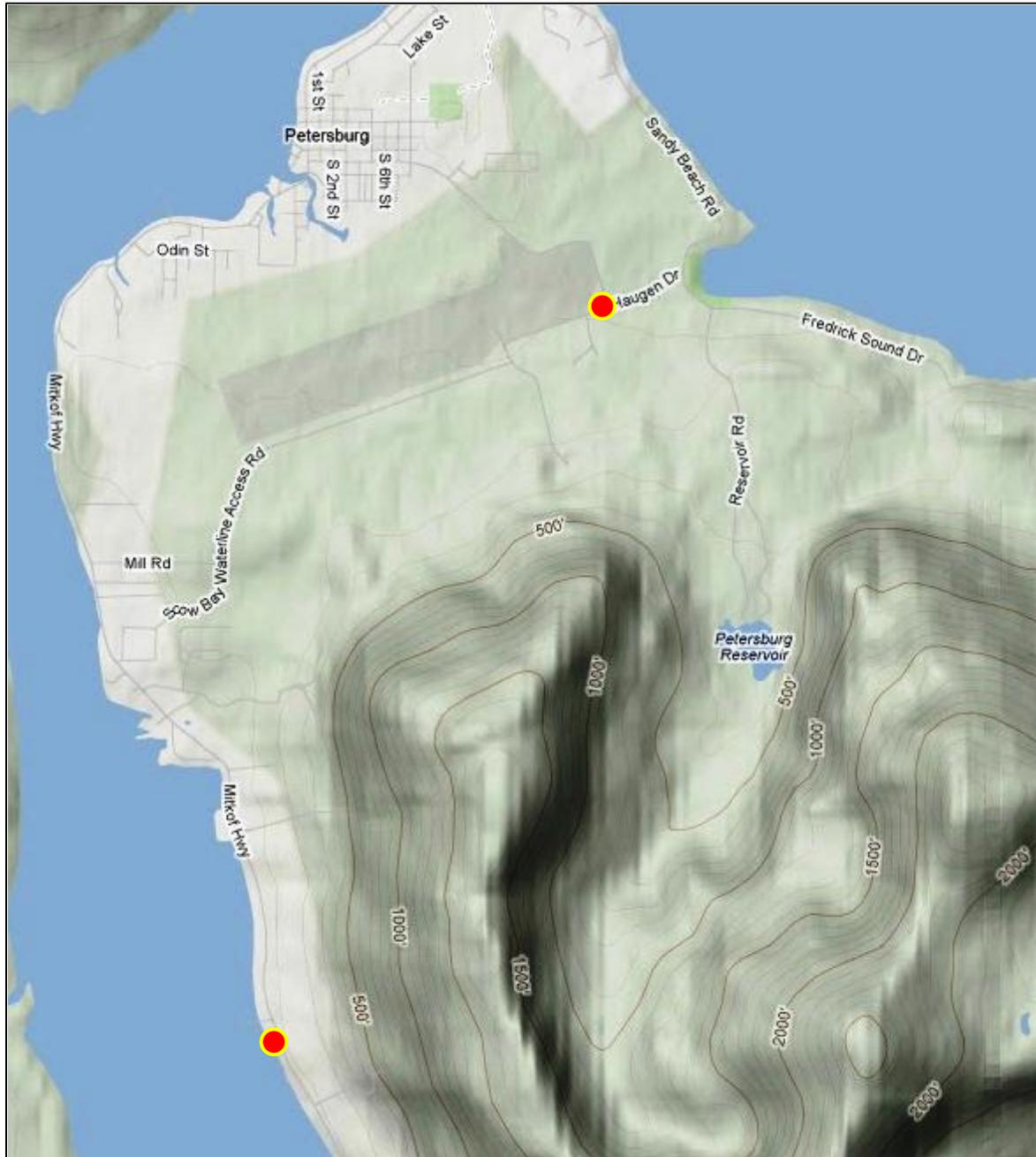
C. List of Invasive plants in AKEPIC that are not covered in Priority Species section

Common Name	Scientific Name	AKEPIC Ranking
Alsike clover	<i>Trifolium hybridum</i>	57
Annual bluegrass	<i>Poa annua</i>	46
Big chickweed	<i>Cerastium fontanum</i>	36
Common chickweed	<i>Stellaria media</i>	42
Common dandelion	<i>Taraxacum officinale</i>	58
Common groundsel	<i>Senecio vulgaris</i>	36
Common plantain	<i>Plantago major</i>	44
Common sheep sorrel	<i>Rumex acetosella</i>	51
Common velvetgrass	<i>Holcus lanatus</i>	55
Creeping buttercup	<i>Ranunculus repens</i>	54
Curly dock	<i>Rumex crispus</i>	48
European forget-me-not	<i>Myosotis scorpioides</i>	54
Kentucky bluegrass	<i>Poa pratensis ssp. pratensis</i>	52
Narrowleaf hawksbeard	<i>Crepis Tectorum</i>	56
Narrowleaf hawkweed	<i>Hieracium umbellatum</i>	51
Orchard grass	<i>Dactylis glomerata</i>	53
Oxeye daisy	<i>Leucanthemum vulgare</i>	61
Perennial ryegrass	<i>Lolium perenne</i>	52
Pineapple weed	<i>Matricaria discoidea</i>	32
Purple foxglove	<i>Digitalis purpurea</i>	51
Red clover	<i>Trifolium pratense</i>	59
Rough bluegrass	<i>Poa trivialis</i>	52
Tall fescue	<i>Schedonorus phoenix</i>	66
Timothy grass	<i>Phleum pratense</i>	54
White clover	<i>Trifolium repens</i>	59

D. AKEPIC image of White and Yellow Sweetclover infestations on Mitkof Highway.



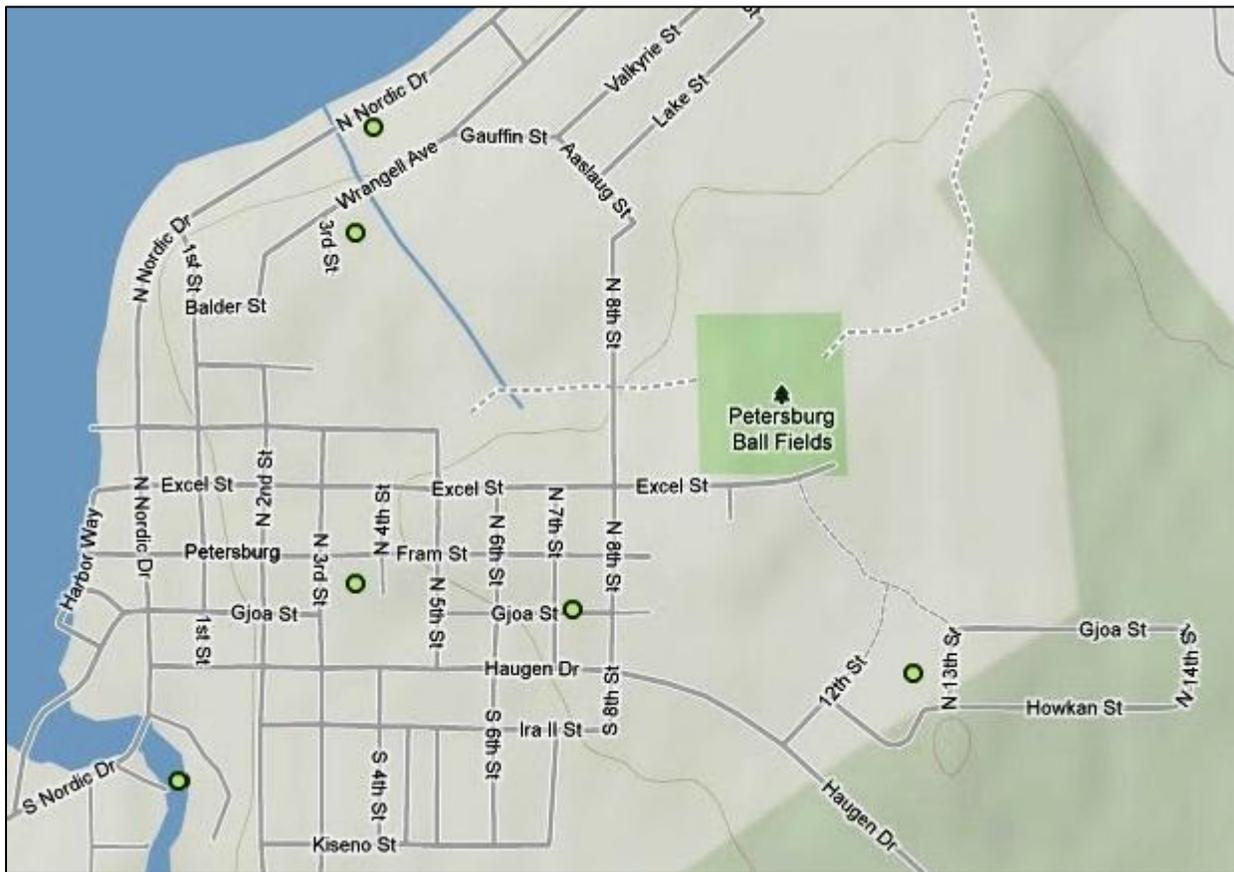
E. AKEPIC image of Common Tansy infestations in Petersburg.



F. AKEPIC image of Common St. Johnswort infestations in Petersburg.



G. AKEPIC image of Bohemian knotweed infestations in town.



H. AKEPIC image of Bohemian knotweed infestation along the Mitkof Highway.

