Invasive Plants of Alaska

PRODUCED IN COOPERATION WITH
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Introduction

About this Book

This guide is intended for use by anyone interested in learning more about the invasive non-native plants moving into Alaska. Some of the plants described have been here for many years; some are common, others are rare and just now spreading, and still others have not yet shown up here but are likely to arrive soon. Some species in this guide are known to be serious problems in Alaska and elsewhere, while others are quite ubiquitous except in remote places.

It is our hope that as people use this guide, they will help control these species so as to retain the intact ecosystems that make Alaska unique. Many ecosystems in other states have been severely degraded due to the establishment and spread of invasive plants. By acting quickly to find and eliminate new invasive plant populations, we can prevent these species from escaping and permanently altering our Alaskan ecosystems.

Organization of this Book

Non-native invasive species come from across the globe; for this reason, detailed descriptions are used instead of regional botanical keys. Plants are organized by plant family and, within each family, alphabetically by scientific name since there are often numerous common names. A red bar at the top of a description indicates a species of greatest concern for Alaska, while other species have a black bar. All maps are derived from the University of Alaska Museum Herbarium database and the Alaska Exotic Plant Information Clearinghouse database; maps are omitted for species with too little distribution information or too few collections and those not yet present in Alaska.

Introduction

In recent years, biologists, ecologists, and land managers have become acutely aware of the global threats posed by invasive species. Invasive species can include plants, animals, fungi, insects, and other organisms that have overcome previously limiting geographical barriers through deliberate or inadvertent human activity. Simply stated, an invasive species is a species introduced into an area where it did not evolve and thus has no natural enemies to reduce its spread (Westbrooks 1998). Various theories explain why these species flourish, including exploitation of unused ecological niches, lack of natural predators and parasites, and competitive ecological advantages over native species in a particular area. Regardless of the reasons behind their proliferation, invasive species are now recognized as the second greatest threat to global biodiversity, superceded only by habitat destruction.

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 (Myers and Bazely 2003). 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, four hundred 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).

Alaska remains one of the most pristine landscapes in the world, renowned for its lush forests, open tundra, abundant wildlife, and vast expanses of wilderness. Alaska's cool climate and remote location were long considered sufficient barriers to invasion by non-native species. However, recent inventories have revealed new, rapidly expanding populations of invasive species throughout the state. Right now, Alaskans have a unique opportunity to protect our wild lands from the damage that will be caused by unchecked invasive species proliferation. Meanwhile, Alaska's increasing development, including mining, oil and gas extraction, construction, international trade, and a booming tourism industry, provides many opportunities for invasive plant introduction and spread.

While people have been managing unwanted weeds since the development of agriculture, concern about non-native plants that threaten natural ecosystems has only become widespread in the twentieth century (Mooney and Hobbs 2000). A growing community of concerned citizens in Alaska is now mounting a defense against further establishment and spread of invasive species in the state. A database called the Alaska Exotic Plant Information Clearinghouse (AKEPIC) has been established to track the distributions of all non-native plants in the state (http://akweeds.uaa.alaska.edu/). The Committee for Noxious and Invasive Plants Management (CNIPM) is a statewide working group that unites concerned agencies, organizations, and individuals to collaborate on invasive plant management in Alaska (http://www.cnipm.org/). Inventory and monitoring efforts, control work, and educational programs have received more support and funding each year from various state, federal, and local sources. Efforts are also underway to monitor other organisms in Alaska, including aquatic nuisance species, invasive mammals, plant diseases, and insect pests. All of these efforts and more will be required to turn the tide.

While definitions vary from one source to another, a few terms are helpful to frame a discussion of invasive plants in our state.

- **Native** plants are those that live or grow naturally in a particular region.

- **Exotic, alien, non-native,** or **non-indigenous** plants are plants whose presence in a given area is due to accidental or intentional introduction by humans. The majority of non-native plants are beneficial to society, including staple crops and ornamental plants.

- **Naturalized** plants are exotic plants that reproduce consistently in their new environment and sustain populations over many life cycles without direct intervention by humans.

- **Invasive plants** are exotic plants that produce viable offspring in large numbers and have the potential to establish and spread in natural areas. Some references define invasive species as exotic plants that have a negative effect on ecosystems or cause economic losses or harm to human health.

- A **weed** is any plant, native or exotic, whose presence is undesirable to people in a particular time or place.

- A **noxious weed** is a plant species that has been defined as undesirable by legal statute.

The species presented in this book include both plants considered to be invasive in Alaska and lower priority exotic plants. It is not always obvious what impact a particular species will have in a new environment, and so most land managers agree that it is best to assume that no plant will be harmless outside of its native range.

The species in this book have been broadly categorized into three groups. The most information is given for those that are already demonstrating their invasive potential in Alaska or those that have recently arrived or are likely to arrive in the future and are considered invasive elsewhere. These are the species of greatest concern, indicated by a red bar at the top of a description. Species of lesser concern, indicated by a black bar and less information presented, are included for the sake of inventory and control efforts in remote portions of the state. While these species may be less invasive than the others, they can still impact natural ecosystems. A special section is devoted to trees and shrubs that may or may not be invasive in Alaska but could have profound impacts in the worst-case scenario.

Impacts

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 or endangered species.

Indirect effects are harder to quantify as they are based on the ways in which a plant interacts with other organisms, the greater plant community, and physical processes in the system. Often, these impacts are only discovered after the species is well established and widespread or through careful experimental analysis. Competition by invasive plants can prevent the establishment of native trees and shrubs after a disturbance event like a fire or flood, disrupting the natural successional processes of grassland, shrubland, or forest development. Displacement of native plant communities can lead to loss of food sources and habitat for wildlife. Invasive plants can also induce drastic changes in ecosystem function by affecting critical elements like soil chemistry, groundwater tables, or the frequency and intensity of wildfires.

A few examples of indirect impacts for particular species include:

- Ornamental jewelweed (*Impatiens glandulifera*) produces large quantities of nectar, drawing pollinator bees away from native plants and thereby reducing the ability of the native species to reproduce.

- White sweetclover (*Melilotus alba*) and scotchbroom (*Cytisus scoparius*) can disrupt nutrient cycling processes by fixing nitrogen in the soil. Native species previously occupying the site may have been well adapted to nitrogen-poor soil. Once nutrient levels are raised, the native species loses its advantage over competing species.

- Japanese knotweed (*Polygonum cuspidatum*) is believed to affect insect populations by adding litter (fallen leaves and other plant parts) to rivers or streams at different times of the year and in greater quantities than usual. This could change the composition and populations of insect communities in streams and possibly affect salmon that feed on those insects.

- Kudzu (*Pueraria montana*) and Japanese knotweed alter soil structure with their dense growth of roots. Some researchers suspect that kudzu actually accelerates soil erosion by loosening the soil and hides the erosion from view with its dense cover of foliage.

- Invasive plants can act as reservoir of plant diseases, especially plant viruses that spread to crops and cause losses for growers. They may also act as alternative hosts for sap-sucking insects that can spread diseases from plant to plant. When a host species is widespread or found along highway corridors, it can act as a rapid conduit for the spread of plant diseases among croplands.

Economic impacts of invasive plants are widespread in today's society. The most obvious case occurs through competition with crop plants used for food or forage, for the worst agricultural weeds in the United States are non-native (Pimentel et al. 2004). Other adverse effects of invasive plants include livestock poisoning, structural damage, clogged waterways, and losses to sport and commercial fisheries.

Predicting Impacts

Many species appear to be in the early stages of introduction into Alaska. How do we determine the level of threat that a species poses? Unfortunately, the potential impacts of many species remain matters of speculation, and our knowledge of their effects often comes too late, when the damage done becomes all too obvious. Although the threats posed by invasive species in Alaska continue to be debated, if we wait until their impacts are known before trying to control their introduction and spread, we will be too late.

The behavior of an invasive species in other parts of the world, especially those with a similar climate, can be a strong predictor of its potential effects in a new location. This approach, while limited by the fact that the plant may not behave exactly in Alaska as it has in other places, remains our best predictor of probable future effects when a species has not yet become established here. Close examination of recently established invasive plant populations can also provide us with important information. For instance, a small population of orange hawkweed (*Hieracium aurantiacum*) rapidly took over a meadow on Kodiak Island after being accidentally introduced there. The meadow contains a species composition typical of meadows found in many other areas around the state, and so we hypothesize that the orange hawkweed could invade meadows elsewhere in Alaska.

A more systematic approach is used by the Invasive Plant Ranking Project, a cooperative project led by the University of Alaska Natural Heritage Program (refer to http://akweeds.uaa.alaska.edu/akweeds_ranking_geo.htm). Species are objectively ranked for a series of ecological and physiological factors that contribute to invasive potential. From this, the degree of invasiveness each species poses is predicted for each of Alaska's three major eco-geographic regions: South Coastal, Interior, and Arctic. The resultant numbered ranking system can be used to prioritize species for strategic management.

How to Identify Plants

Plant species are primarily described by botanists in terms of flower and fruit structure, because these characteristics tend to be less variable within a genus or family than the vegetative characteristics of leaves, stems, and roots. Most guidebooks also include vegetative features as a secondary aid for identification.

Many excellent books are available for plant and weed identification for our region. A number of titles are listed in Appendix C. The most comprehensive include ***Flora of Alaska and Neighboring Territories*** (Hultén 1968) for the entire state and ***Plants of the Pacific Northwest Coast*** (Pojar and MacKinnon 1994) for Southeast Alaska. These books contain information on how to identify plants and features helpful for distinguishing particular plant families. They also present many native plant species that could potentially be confused with the non-native species in this guide.

Besides identification guide books, two tools that are helpful are a 10X magnifying glass or hand lens and a 6" flexible plastic ruler graduated in inches and centimeters. A photograph or physical specimen is helpful for later reference and consultation with experts if a positive identification cannot be made in the field. A Global Positioning System unit is valuable for pinpointing exact plant locations, so that the site can be easily found in the future.

What can I do?

There are many things you can do to prevent the introduction and spread of invasive plants in Alaska:

- Learn about invasive species that may be found in your area and report new findings. The distribution maps in this book show the currently known ranges of these plants. If you find a species in a location not included in the map, contact your nearest University of Alaska Cooperative Extension Service office. Those interested in submitting data on invasive plant locations can get instructions from the AKEPIC website (http://akweeds.uaa.alaska.edu/).

- Clean shoes, vehicles, recreational gear, ground-disturbing tools, and heavy equipment before traveling out of an area infested with invasive plants or into an area free of them. Use particular care when returning from out of state.

- Use only certified weed-free hay and mulch.

- Help with local community weed control efforts or organize a community weed pull yourself.

- Plant only native species or non-invasive exotic species. Consult the Voluntary Codes of Conduct for Gardeners published by the Cooperative Extension Service for further guidelines. Use only certified grass seed mixes and beware of "wildflower" seed mixes. A directory of Alaska native plant sources is maintained by the Department of Natural Resources Division of Agriculture (http://www.dnr.state.ak.us/ag/NEWnative_directory.htm).

- Spread the word! Alaska doesn't need the problems brought by invasive species, but they can only be prevented by vigilance and collaboration.

Management

In Alaska, we are in the enviable position of being able to focus our attention on the early stages of plant invasions when the chance of management success is greatest.

Prevention is the most effective method for protecting against biological invasion. Prevention tools include education, legislation, and the use of best management practices. Education about the threats posed by invasive plants and the irreversible nature of their impacts will provide the most lasting resistance for Alaska. While leaps and bounds have been made in the last few years on this front, Alaskans remain less informed about this problem than residents of other states and, as a result, inadvertently promote these plants rather than confronting them. Without education, invasive plant management efforts are more likely to meet with apathy or resistance than support.

Currently, Alaska has a limited noxious weed law that addresses few of the species presented herein and focuses on agricultural weeds rather than invasive plants that threaten ecosystems. Many other states have revamped their laws to be inclusive of both agriculture and wildland invasive plant threats by prohibiting the cultivation, sale, and transport of invasive plants.

Best management practices include many steps that can be taken to prevent spreading or promoting invasive plants. One very effective deterrent is to wash vehicles and equipment before leaving infested areas or entering uninfested areas. Hikers are similarly advised to wash mud off of footwear, clothing, and gear before entering natural areas. Fill materials for construction projects should be obtained from weed-free sources or processed to remove or destroy any invasive plant materials. Mowing and trimming should be timed while invasive plants are flowering so that they do not have the opportunity to produce and spread seeds. Plant materials sold in nurseries or imported from outside of Alaska are increasingly likely to be contaminated by invasive plant material and seeds. Voluntary codes of conduct for gardeners and nurseries have been developed in Alaska to provide guidance on best management practices for plant cultivation. Farmers, gardeners, livestock owners, and dog mushers have the option of using certified weed-free mulch and hay through a certification program recently initiated in Alaska. Floatplanes and boats that move from one body of water to another should be cleaned if aquatic invasive species are present. These are just a few of the best management practices that will inhibit the spread of invasive species in Alaska.

Finding Infestations

Many agencies and individuals contribute data annually to the Alaska Exotic Plant Information Clearinghouse (AKEPIC), a database for reporting locations of non-native plants found throughout the state. Cooperators search for non-native plants and record their locations, along with information about the size and density of infestations. AKEPIC should be the first stop for anyone working to combat invasive plants in Alaska. The database can help you see what other people working in your area have found in the past and identify places where further scouting may be necessary. Current data are available for download and can be used to generate maps for your particular area.

Scouting an area as large and undeveloped as Alaska presents many challenges. We obviously cannot comb every square foot of the state looking for the next problem. Instead, we must use a combination of strategy and intuition to find invasive plants. Some concepts can help us narrow down the areas where we should look for invasive plants:

- Invasive plants usually first establish in areas disturbed by human activity. Therefore, cities, towns, and settlements are good places to begin scouting.
- Invasive plants often spread into new areas along disturbance pathways such as roads, trails, railroads, pipelines, and rivers.
- Intersections of pathways, such as a bridge across a river, are among the most effective places to find and treat incipient problems.
- Areas disturbed by natural processes are also at risk, including shorelines, floodplains, avalanche chutes, receding glaciers, burned lands, and windthrown forests.

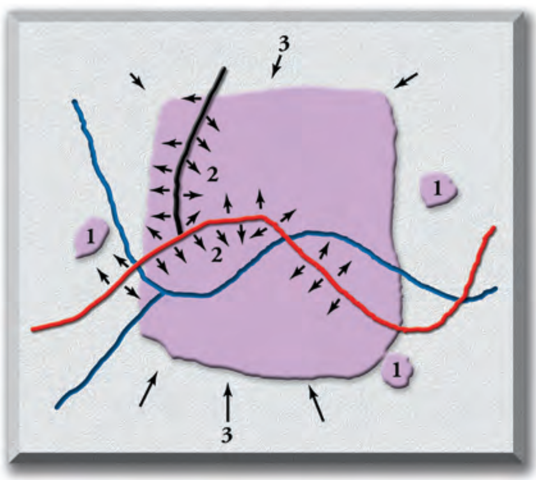
Assessing Infestations

Once an infestation has been found, it is helpful to determine its size, density, and change in distribution over time. An infestation can be quantified by estimating the area of infestation as well as the percent cover and/or stem count of the species of concern. Record as much data as possible, as it will be helpful in sharing information with cooperators, getting advice from experts, and giving workers guidance for managing the problem.

It is possible to use visual cues to quickly estimate the size and density of invasive plant infestations with a little practice. See guidelines for estimation methods in the AKEPIC database manual, available at the AKEPIC website (http://akweeds.uaa.alaska.edu).

Methods used to more accurately determine the density and rate of change of a plant population involve careful measurement and statistical analysis. For more information on these methods, consult ***Measuring and Monitoring Plant Populations*** (by Elzinga et al. 1998, BLM Technical Reference 1730-1, Bureau of Land Management, Denver, CO) or the "Weed Mapping Handbook" (by Roberts et al. 1999. Montana Noxious Weed Survey and Mapping System, Montana State University, Bozeman, MT).

Another aspect of sizing up an infestation is a realistic assessment of the resources available to combat an infestation as well as potential obstacles to successful management. What tools and methods will be most effective? What are potential sources of funding? Who are the landowners? Is the local community supportive of the effort? Do the terrain and vegetation impede access for management efforts?



Finally, there are spatial considerations. The illustration above shows several patches of invasive plants (in purple) that have established in a meadow with a road (traversing left to right), stream (in blue), and trail (in black). The road and trail are believed to be acting as pathways for the species to spread. **The first priority should be to attack the outlying populations** (labeled 1). They represent the fastest moving part of the overall population, and because of their small size they can be managed more quickly and less expensively than the larger population. Areas adjacent to the road and trail should receive the next priority for treatment, in order to keep the plants away from vehicles or hikers that could inadvertently transport seed into other areas. The lowest priority would go to the main population, which could only be managed with substantial resource inputs.

To summarize, here are some general rules for managing populations:

- Tailor your efforts to the amount of resources available to combat an infestation.
- Target outlying populations first.
- Target potential pathways for spread, like roads, rivers, and trails.
- Work from the outside of an infestation towards its center.

Treatment Considerations

Just as a farmer needs to understand the biology of a crop, weed managers need to understand the biology of the plants they are trying to control. It is important to know the answers to questions such as: What kind of soil favors the plant's growth? What conditions favor seed germination? How fast does the plant grow? Is its life cycle annual, biennial, or perennial? How long do seeds remain capable of germination in the soil? What sort of root system does the plant have? How do its seeds disperse? Does it reproduce vegetatively by stolons, runners, or rhizomes? What animals feed on the plant? What are the diseases and insects that affect the plant? Is the plant adapted to grazing? Does the plant tolerate drought, shade, full sun, or extreme cold?

As we begin to answer these questions, we start to see weaknesses in the plant's life cycle that give us an advantage in treatment. Sometimes we can even turn the plant's advantage into our own advantage. For example, a group trying to manage garlic mustard (*Alliaria petiolata*) had difficulty controlling the plant because it grew amidst dense thickets of thimbleberry, salmonberry, and cow parsnip. But garlic mustard, like many exotic plants, begins growing several weeks earlier in the spring than native herbs and shrubs. This generally gives it a head start over other plants. By pulling garlic mustard in the early spring before leaves formed on the shrubs and trees, workers were able to move through the area and see and pull up the garlic mustard with ease.

This is an example of an adaptive management strategy. Adaptive management involves formulating a strategy and tactics based on known facts, implementing them, and then following up and refining the strategy based on its successful and unsuccessful elements.

Knowledge of the timing of events in a plant's life cycle is crucial to forming an effective management strategy. For instance, it is best to execute manual and mechanical controls before seed set. Control of perennial species, and especially foliar spray herbicide applications, is most effective during the period in the plant's life cycle when resources are being translocated from leaves to the root system. This often occurs prior to a dormant period.

Use caution in handling plants that are setting seed and soil that may be contaminated with seeds. Wash stations are recommended for removing all soil and plant debris from workers' clothing and footwear in such cases. Working before seed set can minimize contamination, but it is always necessary to take steps to avoid movement of soil or seed to unaffected areas.

Treating plants after seed set may sometimes be necessary. If a small population is discovered that is in the midst of producing seeds in an isolated location that may not be visited in the following year, why not put a bag over it and cut it down? Even if a few seeds escape, it is better management than permitting thousands of seeds to disperse.

Treatment Prioritization

Given limited resources and an abundance of invasive plant problems in an area, weed managers must institute some form of prioritization.

The process is similar to the triage procedure in an overworked battleground hospital. The threat that a plant places to ecological, economic, or aesthetic values must be balanced against the likelihood of treatment success. It would be counterproductive to continue to pour resources into an effort that is doomed to fail while smaller, more manageable populations grow and disperse. Plant populations can recover lost ground quickly if they are substantially reduced but not completely eliminated.

A worksheet to aid managers in prioritizing weed infestations is included in Appendix B.

Prevention, early detection, and rapid response for new infestations are more likely to succeed than a major assault on a well-established or widespread population. Methodology also needs to be tailored to the scale of an infestation. Hand pulling can work well for small, isolated populations, while herbicides work well on the scale of a few square yards up to a few acres and infestations of thousands of acres can only be reasonably managed with the use of biocontrol agents.

One of the most important criteria for treatment prioritization is the degree of threat posed by a particular species in a given area. This element has been addressed separately by the Alaska Invasive Plant Ranking Project; for more information, refer to the website listed among additional sources of information in Appendix D.

Control Options

Manual Methods

Hand pulling, either directly, using hand tools, or in association with digging, can be a very effective means of eliminating small populations of invasive plants. The amount of below-ground material that must be removed for successful control, however, varies by species. Some plants may be controlled by removing only the above-ground material, while below-ground material must be removed for others, especially perennial plants and those that reproduce vegetatively. For certain species or large infestations, manual control may not be effective at all. For species-specific information, see the accounts provided in the "Management" section of each species description.

Manual control is the most selective control method and is especially useful when a target plant species is interspersed with non-target species. Leaving the non-target species untouched minimizes the need for site restoration and the likelihood that the target species will return. Workers require minimal training for manual control, and most people have had some experience pulling weeds. Hand pulling "parties" are a great way to involve the community in invasive plant management.

Hand pulling forces us to get up close and personal with the infestation, and by getting down on our hands and knees, we can gain insights about the plant's habits that otherwise may escape us. If volunteer pullers can be recruited on a regular basis, hand pulling is very economical and can help pay back a weed control program if volunteer time can be leveraged as cost-sharing for grant money.

The main disadvantage of manual control is the time and effort involved. Tackling an infestation larger than a few acres by hand pulling is generally not worthwhile, and the cost of paying workers to hand pull weeds can add up quickly. However, a motivated group can often exceed expectations. If in doubt about the potential effectiveness of manual control for a given infestation, perform a pilot project by pulling for a few hours with a small crew in an area that is representative of the overall infestation in terms of weed density, terrain, and vegetation. Return soon thereafter and evaluate the results.

Barriers

On a small scale, barriers such as black polyethylene and landscape fabric may be used either alone or in conjunction with other methods. Barriers may be used as a means of killing plants or to aid restoration by preventing regrowth of weeds. Use of these materials is more practical in landscaped areas than in wildlands, particularly because synthetic barriers would be remain as litter in a natural setting. Some workers have experimented with using clear plastic to heat up soil to kill plants, which would be worth trying in interior parts of Alaska during hot weather. Burying plants under several feet of soil may have some use, as noted above, either as a means of killing weeds or disposing of them after removal from a site.

Herbicides

A wide variety of herbicides are available today, and new ones regularly become available. Newer chemicals and formulations are improving worker safety, environmental safety, selectivity, and effectiveness. Generally, they are the recommended control option for large infestations of tenacious species. But herbicides are not a simple solution, with many considerations needed to ensure safety and effectiveness.

Herbicides have traditionally been developed in an agricultural context where target and non-target species are arranged in an orderly pattern in a highly managed landscape. In natural areas, off-target effects result from lack of selectivity in application. If weeds are interspersed with desirable native vegetation, steps must be taken to avoid killing the desirable plants or the desirable vegetation must be written off as necessary collateral damage and replanted later.

Herbicide application may result in a variety of unintended consequences. If an herbicide is ineffective against the target plant, it may actually encourage the target plant by removing competing vegetation. Applications performed during the wrong stage in the plant's life cycle are ineffective. As a rule of thumb, applications performed while the plant is translocating photosynthetic products from the foliage to the roots are most effective. Many chemicals are only effective if applied when the plant is actively growing rather than in a dormant state as can occur in extremely cool, hot, or dry weather.

Foliar sprays are the quickest, easiest, and often most effective way to apply herbicides, but a variety of other methods exist. Herbicides may be applied by wiping a plant with a wick, roller, or brush or by injection directly into a plant. Non-target plants may be shielded from spray with some kind of barrier. Small trees may be protected by use of tube shelters that are often employed to prevent wildlife browsing. Spray applications should be done when winds are calm, using tanks, pumps, and nozzles designed specifically for herbicide application that dispense the product at low pressure with a large droplet size to minimize drift.

The herbicide label, a document which outlines the use of the product, will give instructions for safe handling, use, and disposal of the chemical. Persons using herbicides or directing others should be aware of state and federal laws governing the use of herbicides before doing so and keep in mind that the **directions on the label are legally binding**. Follow the label!

In Alaska, training and certification by the Department of Natural Resources is required by state law for the commercial use of pesticides (herbicides included) or any use of restricted-use pesticides.

It is important to select herbicides that are safe for non-target organisms and have a short lifespan in the environment. Some chemicals, especially those that are active in the soil, may persist for long periods of time and result in unintended consequences. By following the directions for application on the label, you will minimize the harm to other species. For specific herbicide recommendations contact your nearest Cooperative Extension Service office.

Mechanical Methods

Cutting plants with shears, trimmers, or mowers can be a very cost-effective way to treat large infestations of certain species. Many species, however, will readily resprout after being cut, rendering the treatment ineffective. For species that can be controlled by cutting, these activities should always be timed before the target plants set seed and may need to be repeated multiple times in a given season. Plants should be cut close to the ground.

In some cases, heavy equipment can be used to eliminate an invasive plant infestation and can often be commissioned in conjunction with existing projects. In Washington, for example, land managers were decommissioning a road in a watershed where use of herbicides was precluded. A large patch of Japanese knotweed (*Polygonum cuspidatum*) grew adjacent to the road. By adding a small change to the scope of the project they were able to remove the top two feet of soil containing the knotweed root system and dispose of the soil by burying it in an abandoned gravel pit under several feet of overburden. In Alaska, Japanese knotweed is now removed from state Department of Transportation and Public Facilities projects and buried in a similar way. Advantages of heavy equipment include the ability to easily move tons of contaminated soil in a short period of time and avoidance of herbicides. Disadvantages include high costs and the need for a complete restoration of the area from which all topsoil has been removed.

Cultural Methods

Fire has been successfully used to control populations of invasive plants outside of Alaska. However, there is always a risk that the resulting disturbance will leave an area open to further invasion. In addition, controlled burns require extreme care on the part of land managers to ensure that they do not result in a wide variety of unintended consequences. Nevertheless, burns performed as a part of an overall ecosystem management plan have the ability to help control invasive plant species.

In areas where water levels may be manipulated, it can be possible to kill invasive plants by flooding. As with fire, this may bring into play a number of other consequences that should be considered before instituting this kind of control.

Biocontrol

Biocontrol, short for biological control, involves introducing herbivorous or parasitic organisms from an organism's host environment to control an undesirable species. Biocontrol may be the only viable control option for invasive species that occupy thousands of acres. In order for a biocontrol agent to be effective, the target plant must be well-established already, with a large enough population size to support the pest population. There are very few species in Alaska that would meet this condition at the time of writing, and so biocontrol remains an option for the future.

Biocontrol strategies require thorough investigation of the target plant's biology, genetics, native range, and ecological interactions. The process of developing a biocontrol agent is lengthy and complicated. Rigorous testing is required before a foreign biocontrol agent can be used, in order to ensure that off-target effects do not occur. Many agents are expensive to develop and to rear in quantities sufficient to be effective against the target plant. Establishing and maintaining a viable population of the biocontrol agent can be difficult.

Monitoring

Controlling plants without monitoring may waste the time, labor, and money used in the control effort. Generally, upon returning to a site that was treated once, there will be at least a few individuals re-establishing. Without monitoring, these plants can swiftly grow in population size to former levels. Monitoring frequency should be at least annual for the first few years after the treatment and several times per season for those species that can flower more than once per year. The duration of monitoring should be tailored to the lifespan of seeds in the soil, which varies by species.

Monitoring is the way to determine which control options are most effective for the infestations and species of concern, information that should be used to update management methods and shared with others. Not only target plants but also native plants colonizing the site after treatment should be monitored to evaluate restoration success.

Restoration

Before beginning any weed control effort, it is important to consider which plant species are likely to colonize an area after management and whether it is necessary to reseed the area with native plants or if it is possible to allow the area to be revegetated through natural processes. Generally, the plant species most likely to successfully establish and resist weeds at a disturbed site are those native species that are commonly found in disturbed areas. These are the vigorous pioneer species that characterize the beginning stages of succession but give way to late-successional species without repeated disturbance. It may be desirable to encourage germination of the invasive plant seed bank in order to more rapidly exhaust the seed reserves.

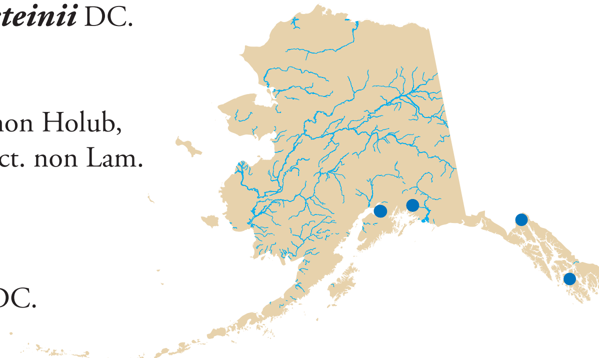
This summary of management considerations only brushes the surface of existing knowledge about invasive species management. Refer to each species' "Management" section herein for more specific information or contact your local Cooperative Extension Service office for further guidance.

Plant Families

Asteraceae
(Sunflower Family)

Spotted Knapweed

Centaurea biebersteinii DC.



Synonyms

Acosta maculosa auct. non Holub,
Centaurea maculosa auct. non Lam.

Related Species

Russian Knapweed
Acroptilon repens (L.) DC.

Description

Spotted knapweed is a biennial to short-lived perennial plant. Seedling cotyledons are ovate, with the first leaves lance-shaped, undivided, and hairless. Young seedlings can appear grass-like. Stems grow 1–4 feet tall, and are many-branched, with a single flower at the end of each branch. Rosette leaves are indented or divided about half-way to the midrib. Stem leaves are alternate and pinnately divided and get increasingly smaller toward the tip of each branch. Flower heads are urn-shaped, up to 1 inch wide, and composed of pink, purple, or sometimes white disk flowers. A key characteristic of spotted knapweed is the dark comb-like fringe on the tips of the bracts, found just below the flower petals. These dark-tipped bracts give this plant its "spotted" appearance.

XID Services photo by Richard Old

Spotted knapweed flower.

Russian knapweed is a creeping perennial plant that is extensively branched, with solitary urn-shaped pink or purple flower heads at the end of each branch. Similar in appearance to spotted knapweed, Russian knapweed can be distinguished by its slightly smaller flower heads, flower head bracts covered in light hairs, with papery tips, and scaly dark brown or black rhizomes, which have a burnt appearance.

Leaves and stems of both spotted and Russian knapweeds are covered in fine hairs, giving the plants a grayish cast.

Similar Species

Knapweeds can be distinguished from thistles (*Cirsium* spp.) by their lack of spiny leaves. Spotted and Russian knapweeds could be confused with several other invasive knapweed species that are not yet found in Alaska but have the potential to grow here. Diffuse or spreading knapweed (*Centaurea diffusa* Lam.) is distinguished from spotted knapweed by its spine-tipped floral bracts. Yellow star thistle (*C. solstitialis* L.) also has spine-tipped floral bracts as well as yellow flowers.

Ecological Impact

Spotted knapweed often forms dense stands in natural communities outside of Alaska. It reduces native plant vigor, diversity, and forage quality and degrades wildlife habitat. For example, winter-ranging elk may avoid foraging in infested communities (Rice et al. 1997). Knapweeds are allelopathic, inhibiting the establishment and growth of surrounding plants (Whitson et al. 2000). Erosion of topsoil has been shown to increase after spotted knapweed invasion. Sediments in surface runoff from sites dominated

UAF Cooperative Extension Service photo by Michael Rasy

Spotted knapweed infestation along Turnagain Arm.

by spotted knapweed were found to be approximately three times greater than the amount of sediments from native bunchgrass sites (Rice et al. 1997).

Russian knapweed is extremely competitive, and dense patches will totally exclude other vegetation. The allelopathic compound cnicin is contained in the leaves and is released into the soil after leaves fall. Grazing animals generally avoid Russian knapweed due to the bitter taste, and it can cause chewing disease in horses.

Biology and Invasive Potential

Spotted knapweed reproduces entirely by seed. Large plants may produce over 20,000 seeds (Royer and Dickinson 1999), and 30% of seeds can remain viable after 8 years of burial (Mauer et al. 1987). Anthropogenic disturbances, including overgrazing and mechanical soil disturbance, accelerate its invasion. Other soil disturbances, such as frost heave, small mammal burrowing, or trampling and grazing by native ungulates, can also facilitate spotted knapweed invasion (Tyser and Key 1988). Seeds lack pappus but have been reported to be dispersed by wind as well as by rodents and livestock (Mauer et al. 1987). Humans are the primary vector for spotted knapweed movement, through

Photo by Ron Broda

Russian knapweed.

Spotted knapweed rosette.

seed dispersal on vehicles, machinery, and aircraft as well as the contamination of hay, commercial seed, and floral arrangements (Mauer et al. 1987). Spotted knapweed seeds germinate over a wide range of soil depths, moisture levels, and temperature regimes. Seedlings that emerge early in spring have a high probability of survival and reproduction in the following year. Those emerging later (June to July) experience reduced survival and fail to produce stems frequently the following season (Schirman 1981). Spotted knapweed grows well in porous, well-drained soils characterized by high pH and high nutrient availability. Although spotted knapweed tolerates both dry and moist conditions, it is particularly adapted to warm summers (Beck 2003). It is listed as a noxious weed in 15 of the United States and four Canadian provinces.

Russian knapweed reproduces both by seed and by vegetative root buds, although it is a poor seed producer and germination rarely occurs in the field (Selleck 1964). Plants grow radially, and a patch can cover over 100 square feet within two years. Russian knapweed is most frequently found on moist soils, but is tolerant of a wide range of soil moistures (Roche and Roche 1991). It is also drought-tolerant, surviving on sites that receive as little as 10 inches of annual precipitation (Watson 1980). Russian knapweed is listed as a noxious weed in four Canadian provinces and 25 of the United States, including Alaska (Alaska Administrative Code 1987).

Distribution and Abundance

Spotted knapweed establishes primarily along highways, waterways, railroad ways, and pipelines. Semi-arid grasslands and open forests have been invaded in Montana, Idaho, Colorado, Massachusetts, and North Dakota (Lym and Zollinger 1992, Rice et al. 1997). Overall this species has infested hundreds of thousands of acres in the northwestern United States and at least 8,500 acres of rangeland in British Columbia (Royer and Dickinson 1999). In Alaska, it has been found in Skagway and Valdez, on Prince of Wales Island, and along the Seward Highway between Anchorage and Girdwood. Available data suggest that this species was only recently introduced to Alaska, as it was first reported in 2001 (ALA 2004). Spotted knapweed is native to central and southeastern Europe and has also invaded northern Europe, Asia, and Australia.

Russian knapweed is now widespread in the United States and especially common in the semi-arid portions of the western states and adjacent Canadian provinces. It invades disturbed grasslands, shrublands, and riparian woodlands, accounting for a total of 1,500,000 acres infested in North America in 2000 (Zouhar 2001a). It has not been documented in Alaska as of early 2005 but could arrive at any time. Russian knapweed is native to Asia, and it was initially introduced to North America in the early 1900s, primarily as a seed contaminant. Its spread from these locations is linked to the distribution of infested hay.

Management

Long-term control of large knapweed infestations requires a combination of grazing management, herbicide use, biological control, and vegetative suppression. Hand-pulling can be effective if new infestations are small and control efforts are persistent. Areas must be monitored until the seedbank is exhausted. Most knapweed control has been conducted in agricultural settings, with less information available on the use of herbicides in native plant communities (Lym and Zollinger 1992, Rice et al. 1997). A number of herbicides effectively control spotted knapweed on rangeland (Davis 1990). For long-term control, herbicides must be applied annually until the seed bank is exhausted, and a revegetation program is necessary to resist reinvasion. In order to suppress knapweeds, other plant species must remove a significant amount of moisture from the soil during periods when knapweeds are in the vulnerable seedling stage. However, vegetative suppression alone will not provide lasting knapweed control (Stannard 1993). A number of biological control agents have been moderately successful in Montana and other western states (Rees et al. 1996). The populations of knapweed in Alaska have been small, and in most cases they have been eradicated or controlled via hand pulling.

Notes

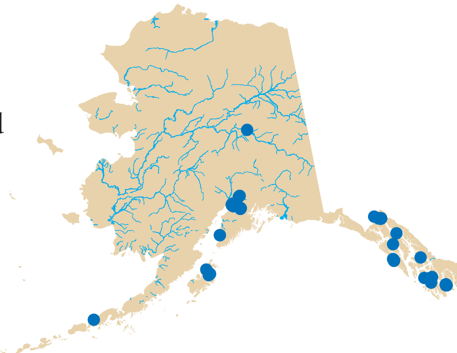
Knapweeds originated in central Asia and are now found on all continents except Antarctica.

USDA Forest Service photo by Michael Shephard

Spotted knapweed spreading along a roadside.

Canada Thistle

Cirsium arvense (L.) Scop.



Alternate Names
Creeping thistle, field thistle, cursed thistle, corn thistle, small-flowered thistle, green thistle

Synonyms
Cirsium incanum (Gmel.) Fisch., *Cirsium setosum* (Willd.) Bess. ex. Bieb., *Serratula arvensis* L.

XID Services photo by Richard Old

Male flower heads.

Description
Canada thistle is a perennial plant that can form new shoots from deep and extensive horizontal roots. Stems are generally 1–4 feet tall, branching above. Leaves are alternate, lacking petioles, shallowly to deeply pinnatifid or merely lobed, with spiny margins. The leaf underside is covered with soft, woolly hairs. Flowers are purple in heads measuring ½–¾ of an inch in diameter. Male and female flowerheads occur on separate plants. Flowers are mostly insect-pollinated. Fruits are brownish, with a tuft of hair at the top.

Similar Species
There are three native species of thistle whose ranges barely extend into the southern and northern portions of southeast Alaska as well as the western Aleutians (Hultén 1968): edible thistle (*Cirsium edule* Nutt.), Drummond's thistle (*C. foliosum* (Hook.) DC.), and Kamchatka thistle (*C. kamtschaticum* Ledeb. ex DC.), respectively. Canada thistle is one of

XID Services photo by Richard Old

Seed heads of female plants.

two species of exotic thistle in Alaska—the other being bull thistle (*C. vulgare* (Savi) Ten., included in this book)—and is the only thistle found in Alaska with narrow flowerheads. The edible thistle (*Cirsium edule* Nutt.) is found in the southern portion of southeast Alaska and is included in the Forest Service's Regional Forester's List of Sensitive Species. It has much larger flowerheads than Canada thistle.

Ecological Impact

Canada thistle threatens natural communities by directly competing for water and nutrients and displacing native vegetation, which often leads to a decrease in species diversity. It also produces allelopathic chemicals which assist in this displacement (Evans 1984, Hayden 1934). Pollinating insects appear to be drawn away from native species to visit Canada thistle (Zouhar 2001b). This species has been reported to accumulate nitrates that cause poisoning in animals upon ingestion. It is a host for several pests, including bean aphids, stalk borers, and sod-web worms (Nuzzo 1997). Canada thistle can increase fire frequency and severity due to its abundant and flammable litter (Zouhar 2001b). It is an aggressive agricultural weed and has the potential to reduce crop yields by 100% (Royer and Dickinson 1999).


XID Services photo by Richard Old

Biology and Invasive Potential

Canada thistle readily propagates from stem and root fragments. It reproduces by seeds but mostly spreads by sending up new shoots each year from lateral roots. An individual plant may produce over 40,000 seeds per year (Royer and Dickinson 1999). Canada thistle has been observed in natural areas around ponds and wetlands, areas of soil erosion, and gopher mounds. It apparently cannot become established or spread in undisturbed lands or in good to excellent pasture conditions (Zouhar 2001b, Bossard et al. 2000, Evans 1984), while soil disturbance increases thistle densities (Hayden 1934). The pappus breaks off easily from Canada thistle seeds, thereby leaving most seeds landing near the parent plant. However, a small proportion of seeds (0.2%) will disperse 1 km or more from the parent plant (Nuzzo 1997, Bostock and Benton 1979). The seeds float and are easily distributed by water, ducks, and other waterfowl (Hayden 1934). They can also be dispersed in dung. Canada thistle also spreads as a contaminant of nursery rootstock, crop seed, hay, and packing material and in mud attached to vehicles and farm equipment (Nuzzo 1997). Seeds germinate best in the top half-inch of soil with abundant soil moisture and temperatures averaging between 68° and 86°F. New seeds will germinate in bright light. Approximately 90% of seeds germinate within one year, but some seeds can remain viable in the soil for up to 20 years (Hutchison 1992). Canada thistle can grow on a variety of soil types, including clay, loam, silt, gravel, and chalk, and is shade-intolerant (Nuzzo 1997). It has been declared noxious by six Canadian provinces and 35 of the United States, including Alaska (Alaska Administrative Code 1987), and is considered a serious pest in 37 countries (Zouhar 2001b).


UAF Cooperative Extension Service photo by Michael Rasy

Distribution and Abundance

Canada thistle was introduced to North America in the early 17th century and was first declared a noxious weed by the state of Vermont in 1795 (Nuzzo 1997). It is found throughout Canada and the northern half of the United States (NRCS 2005). It has been found in many locations in southeast and southcentral Alaska, as well as Fairbanks, Delta Junction, Afognak Island, and Cold Bay. The first recorded occurrence in Alaska was in Palmer in 1946 (ALA 2004). Outside of Alaska, it is common on roadsides, railway embankments, lawns, gardens, abandoned fields, agricultural fields, and pastures. Susceptible natural areas include prairies and wet grasslands in Canada and the Dakotas and sedge meadows in Wisconsin and Illinois. In eastern North America, it occurs in sand dunes, stream banks, lakeshores, swamps, and ditches (Nuzzo 1997). It is native to southeastern Europe, western Asia, and northern Africa.

Management

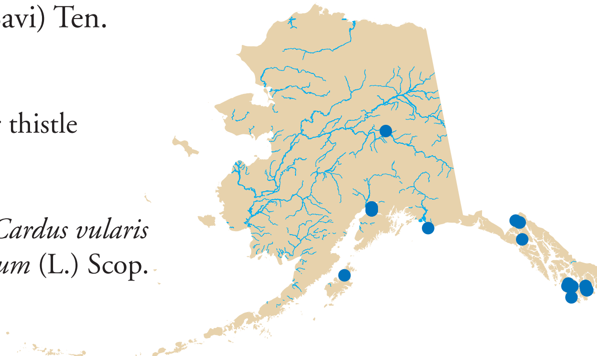
Canada thistle is very difficult to control once established. Hand-pulling is ineffective because it fails to remove the lateral roots. A combination of mechanical, cultural, and chemical methods are more effective than any single method alone. Mowing is effective only if repeated monthly for several years. When using herbicides, proper timing and dosage are essential; otherwise the plants thrive because competing vegetation was killed. Mature thistle plants will not absorb herbicide well enough be completely killed, but after a mid- to late-summer mowing, they will readily absorb herbicides as rosettes. For best results, mow plants in mid- to late-summer and then apply herbicide in the early fall when photosynthate is being transported to the roots.

Notes

Despite its common name, Canada thistle was introduced from central Eurasia as a contaminant of crop seed. It has achieved nearly global distribution, excluding Antarctica.

Bull Thistle

Cirsium vulgare (Savi) Ten.



Alternate Names

Common thistle, spear thistle

Synonyms

Cardus lanceolatus L., *Cardus vularis* Savi, *Cirsium lanceolatum* (L.) Scop.

Description

Bull thistle is a biennial plant with a short, fleshy taproot. The stem is 2–5 feet tall, conspicuously winged and bearing many spreading branches. It is green to brownish and sparsely hairy. Leaves are pinnately lobed, hairy and prickly on the upper side, and cottony underneath. Leaf blades extend down the petiole and along the stem to form long, prickly wings. Flowerheads are 1–2 inches wide with deep purple flowers. The bristles on the pappus are feathery. Flowering occurs from July through September.

XID Services photo by Richard Old

Similar Species

There are three native species of thistle whose ranges barely extend into Alaska—see the Canada thistle account for more information. Bull thistle is the only large-headed thistle in Alaska with a prickly, winged stem. Edible thistle (*Cirsium edule* Nutt.) is found in the southern portion of southeast Alaska and is included in the Forest Service's Regional Forester's List of Sensitive Species. It lacks the winged stem of bull thistle.

Ecological Impact

Bull thistle competes with native species for water, nutrients, and space, displaces native plants, and decreases forage quality for grazing animals.

Biology and Invasive Potential

Bull thistle reproduces only by seeds, and cross-pollination is required. A wide variety of insects pollinate this species. Average fruit production is nearly 4,000 per plant. Seed viability is high (up to 90% may germinate within a year), but bull thistle is not known to form persistent seedbanks (Klinkhamer and DeJong 1988). Disturbance of soil and vegetation increases seedling emergence and establishment. Most seeds fall within 3 feet of the parent plant, but up to 10% may travel greater distances with little wind (Klinkhamer et al. 1988). Bull thistle is also spread by the movement of livestock, vehicles, farm machines, seed, and hay. Germination is stimulated by soil moisture and light, and seeds have no innate dormancy. Bull thistle is most common on soils with intermediate moisture, and it tolerates a wide pH range. It is listed as a noxious weed in Colorado, Iowa, Kansas, Maryland, Michigan, Minnesota, New Mexico, Oregon, Pennsylvania, and Washington and in Manitoba and Ontario.


XID Services photo by Richard Old

Distribution and Abundance

Bull thistle is most common in recently or repeatedly disturbed areas such as pastures, rangelands, roads, and ditches. It can also colonize areas in relatively undisturbed grasslands, meadows, and forest openings. It is native to Europe, western Asia, and northern Africa. It is now naturalized and widespread throughout the United States and southern Canada and present on every continent except Antarctica. In Alaska, bull thistle has been found in Ketchikan, Prince of Wales Island, Juneau, Haines, Gustavus, Cordova, Kodiak, Anchorage, and Fairbanks. The first documented occurrence in the state was from Cape St. Elias on remote Kayak Island in 1978 (ALA 2004). It was probably introduced to North America as a contaminant of seed or ballast in the late 1800s.

Management

Bull thistle plants are easily pulled up by hand, but be sure to wear stout leather gloves to protect against the spines. It does not withstand cultivation, and mechanical cutting of plants at the soil surface is also an effective method of control. Control programs should be maintained for at least four years. Herbicides are often most effective when applied to rosette stage plants. Rosettes can be induced by mowing several weeks before the application. A variety of natural seed predators are present in the Netherlands, and so biological control may become an option in the future (Klinkhamer et al. 1988).

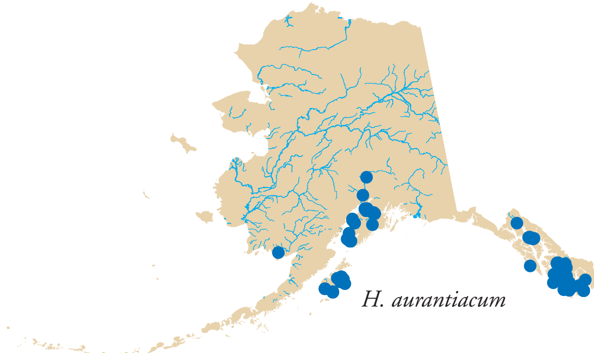
USDA Forest Service photo by Michael Shephard

Notes

Horses will eat bull thistle flowerheads, carefully avoiding ingesting the spines, because they are attracted by the sugary nectar found at the base of each floret.

Orange Hawkweed and other hawkweeds

Hieracium aurantiacum L.

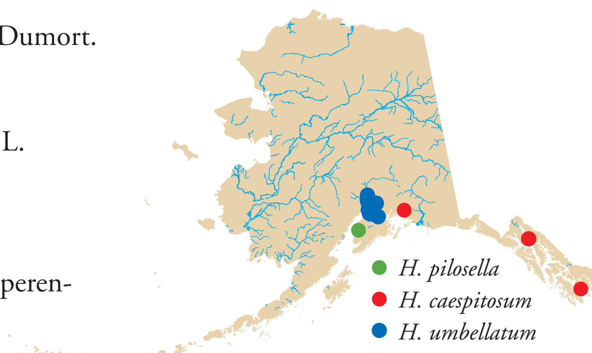


Alternate Names
Devil's paintbrush, king-devil

Related Species
Hieracium pilosella L.
Mouseear hawkweed

Hieracium caespitosum Dumort.
Meadow hawkweed

Hieracium umbellatum L.
Narrowleaf hawkweed



Description
Orange hawkweed is a perennial plant with shallow, fibrous roots, stolons, and well-developed basal rosettes. Leaves are oblanceolate to narrowly elliptic, up to 5 inches long, almost exclusively basal, and darker on the upper surface than on the lower surface. Leaves are covered with soft white hairs and stems are covered with shorter


National Park Service photo by Jeff Heys

Orange hawkweed.


UAF Cooperative Extension Service photo by Jamie Snyder

Roadside infestation of orange hawkweed.

dark-colored hairs. Stems and leaves exude milky latex when cut or broken. Stems reach a height of 12 inches and bear up to 30 flowerheads greater than ½ of an inch wide near the top. Flowerheads are dark red on the edges and orange in the center and consist of ray florets with notched upper margins. Each floret produces a single-seeded fruit. In Alaska, orange hawkweed produces flowers from mid-July through October. When flowers are absent, look for clumps of serrated leaves covered with downy white hairs. Seeds are oblong, purplish black, and 1/16 –⅛ of an inch long.


XID Services photo by Dan Tenaglia

Mouseear hawkweed.

Similar Species

Seven *Hieracium* species are found in Alaska, including three native species and four exotic species. All have yellow flowers except for orange hawkweed and white hawkweed (*H. albiflorum* Hook.), and no other composite species in Alaska has dark orange to red flowerheads. The native hawkweeds can be distinguished from the other exotic species by their smaller flowerheads, less than ⅜ of an inch wide.

Several characteristics can be used to differentiate the other exotic hawkweeds. Meadow hawkweed (*H. caespitosum* Dumort.) forms short, stout rhizomes and long, leafy stolons. Stems are erect and solitary with glandular, starlike hairs. Basal leaves are oblanceolate to spoon-shaped and toothed. Stems bear up to 30 flowerheads greater than ½ inch wide near the top. Ray florets are yellow. Mouseear hawkweed (*H. pilosella* L.) has a basal rosette and stolons and produces only one yellow flowerhead on a single stem. The stem and leaves are covered with dense wooly hair. Narrowleaf hawkweed (*H. umbellatum* L.) has a stem with leaves but does not form a basal rosette and has no stolons. Most published literature suggests that the exotic hawkweeds are similar in biology and management, and so the following information will generally apply to all four species.

Ecological Impact
Orange hawkweed forms a dense mat of plants in which no other species can grow, thereby lowering species diversity and reducing the forage value of grasslands for grazing animals. It is a successful allelopathic competitor that crowds out native, pasture, and range species. It hybridizes freely with native and exotic hawkweeds. It likely reduces soil moisture and nutrient availability (J. Snyder, pers. comm. 2004). Orange hawkweed can invade undisturbed sites and is considered one of the worst nuisance species in agricultural and natural areas.

Biology and Invasive Potential
Orange hawkweed typically produces 12–30 seeds per flower, for about 50–600 per plant, and sends out 4–8 stolons each season. It can resprout from any fragments left in the soil. Seeds are viable for up to seven years, and infested areas can have extensive seed banks. Orange hawkweed readily grows in cleared areas in forests. Mowing promotes flowering and the spreading of stolons. Fruits are adapted to wind dispersal. Seeds are carried by vehicles, animals, and clothing. It is common in urban areas due to its use as an ornamental. Orange hawkweed is listed as noxious in Colorado, Idaho, Minnesota, Montana, and Washington.

Distribution and Abundance
Orange hawkweed was introduced to North America for use as an herbal remedy and ornamental before 1818. It is native to the alpine and hillside meadows of Europe and has now established across Eurasia, as well as from coast to coast in North America as far south as Indiana and West Virginia. It prefers well-drained soils, growing in permanent meadows, grasslands, rangelands, and pastures, and thrives in nutrient-poor, uncultivated, or disturbed soils. In Alaska, the first documented occurrence was from the Juneau area in 1961

USDA Forest Service photo by Tom Heutte

Meadow hawkweed.

(ALA 2004). Orange hawkweed is abundant in communities throughout southeast and southcentral Alaska and has been found in the remote community of Dillingham. It has also been found in undisturbed meadows of the Kodiak National Wildlife Refuge, where control measures are underway.

Management

Mechanical methods such as mowing, cutting, and digging will not eliminate hawkweed. Treatment with selective herbicides is most effective. Hand-pulling can be effective for small infestations if care is taken to remove as much of the root as possible. Mowing is ineffective because rosettes are so close to the ground. Effective hawkweed management will depend on a program that integrates control methods with restoration techniques to increase the competitive ability of desired species. Hawkweed can be controlled with herbicides.However, proper use of surfactants is necessary to increase the adherence of herbicides to the hairy leaves and stems. Plants should generally be treated when they are in the rosette stage. There are no biological controls currently available.

Narrowleaf hawkweed.

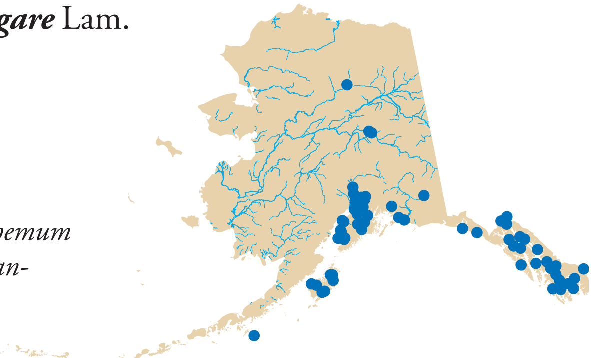
Notes

There are over 700 species in the taxonomically complex *Hieracium* genus, mostly native to Europe and South America, although there are a few native North American species. The genus name *Hieracium* was derived from the Greek *hierax*, "a hawk." Orange and yellow hawkweeds are considered the worst invasive plant species in New England. Mouseear hawkweed is one of the smallest of all the hawkweeds.

Narrowleaf hawkweed.

Oxeye Daisy

Leucanthemum vulgare Lam.



Alternate names
White daisy

Synonyms
Chrysanthemum leucanthemum L., *Chrysanthemum leucanthemum* L. var. *boecheri* Boivin, *Chrysanthemum leucanthemum* L. var. *pinnatifidum* Lecoq & Lamotte, *Leucanthemum leucanthemum* (L.) Rydb., *Leucanthemum vulgare* Lam. var. *pinnatifidum* (Lecoq & Lamotte) Moldenke

National Park Service photo by Penny Bauder

Description
Oxeye daisy is a shallow-rooted perennial plant with numerous stems from 1–3 feet tall. Stalked basal leaves are spatula-shaped, broadly and irregularly lobed, 2–5 inches long, and 2 inches wide. The stem leaves are alternate, smooth, and glossy, becoming progressively smaller towards the top. The leaf stalks are short and clasp the stem. Solitary flowerheads at the ends of stems are 1–2 inches in diameter and composed of white ray florets and yellow disc florets. Seeds have no pappus.

Similar Species
In Alaska, the native arctic daisy (*Dendranthema arcticum* (L.) Tzvelev) could be confused with oxeye daisy but is confined to rocky seashores and estuaries throughout coastal Alaska and is more low-growing, with wedge-shaped rather than spatula-shaped basal leaves. Shasta daisy (*Leucanthemum maximum* (Ramond) DC.) is a commonly cultivated garden flower that has lanceolate leaves up to 9 inches long with shallow teeth along the margins. All other

Alaskan composite species with white ray florets have either entire leaves or highly dissected leaves.

Ecological Impact

Seemingly an innocuous wildflower, oxeye daisy is invasive in natural habitats in many locations. Often included in wildflower seed mixes, it is widely planted and easily escapes cultivation, out-competing and displacing native species. It can form dense colonies, decreasing overall vascular plant diversity, and can quickly replace up to 50% of the grass species in pastures (Royer and Dickinson 1999). The entire plant has a disagreeable odor, grazing animals avoid it, and it contains chemicals that are highly toxic to most insect herbivores. Oxeye daisy can host various plant diseases, including chrysanthemum stunt, aster yellows, tomato aspermy viruses, and several nematode species (Royer and Dickinson 1999). Dense infestations increase the potential for soil erosion.

Biology and Invasive Potential

Oxeye daisy is a perennial plant that flowers in the second year and can spread both vegetatively and by seed. It is primarily insect-pollinated by insects from a number of orders. A single plant normally produces 1,300 to 4,000 fruits (Howarth and Welliams 1968). Estimates of the duration of seed viability vary widely, but most exceed 20 years. Fruits lack the elongated pappus necessary for wind dispersal but can be transported in dung, with timber products, in contaminated forage grass, and in legume seed batches. Seedling germination is greatest in high moisture conditions and is inhibited by continuous darkness. Dense groundcover can prevent establishment,

USDA Forest Service photo by Tom Heutte

while chilling and drought appear to have no effect on germination rates. No cold-stratification is required for germination, and it withstands temperatures to –28°F. It requires 130 frost-free days for reproduction (GRIN 2004). Oxeye daisy is adapted to coarse and medium textured soils with pH levels ranging from 5.2 to 7.0. Cutting, mowing, trampling, and grazing promote establishment. Oxeye daisy continues to be used as a component in wildflower seed mixes, despite its listing as a noxious weed in eight states and four Canadian provinces.

Distribution and Abundance

Introduced from Europe as an ornamental, oxeye daisy has escaped cultivation and is now common outside of Alaska in native grasslands, pastures, beach meadows, waste areas, and roadsides. It is a serious weed of 13 crops in 40 countries and is found in every state in the United States. It was introduced to the Pacific Northwest in the late 1800s from its native range in Europe (Mediterranean to Scandinavia) and Siberia. Populations have established in eastern Asia, Iceland, Greenland, North and South America, Hawaii, Australia, and New Zealand (Hultén 1968). The first documented occurrence in Alaska was near Ketchikan in 1963 (ALA 2004). It is now common around communities in southeast and southcentral Alaska and has been found in Fairbanks, McCarthy, and Afognak in addition to a number of remote locations around the state (AKEPIC Database 2004).

XID Services photo by Richard Old

Management

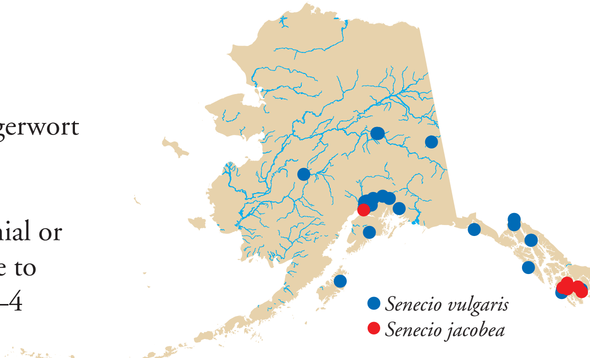
Hand-pulling and mechanical control can be effective for small infestations if repeated over multiple years, and treatments should be completed before seed production and regularly monitored afterward. For lawns or other level ground, regular mowing will control this species. Several herbicides will control oxeye daisy, but they are not selective. In eastern Washington, application of nitrogen fertilizer was found to be almost as effective as herbicide application for reducing its canopy cover in mountain meadows (NWCB 2000). No effective biological control agents have been identified for oxeye daisy.

Notes

Taxonomists have placed oxeye daisy in the genus *Leucanthemum* and *Chrysanthemum* at different times. Its seeds can remain viable after passing through the digestive tracts of animals. The plant has been employed successfully in the treatment of whooping cough, asthma, and "nervous excitability."

Tansy Ragwort

Senecio jacobaea L.



Alternate Names
Common ragwort, staggerwort

Description
Tansy ragwort is a biennial or perennial plant with one to several stems growing 1–4 feet tall from a taproot. Leaves are deeply cut. Basal leaves have stalks and are 2–8 inches long. Ascending the stem, leaves become smaller and stalks become shorter. Leaves are alternate, equally distributed, and generally 2–3 times pinnately lobed with the terminal lobe larger than the lateral ones. Flowerheads are borne in terminal clusters and consist of yellow ray and disc florets. There are 10–13 ray florets per flowerhead that are ¼–½ of an inch long. The fruits of the disk florets are minutely hairy, while those of the ray florets are hairless.

Tansy ragwort.

UAF Cooperative Extension Service photo by Michael Rasy

Similar Species
Hultén (1968) describes 19 Senecio species in Alaska, most of which are native, with the exception of common groundsel (*S. vulgaris* L.) and desert ragwort (*S. eremophilus* Phil.). Common groundsel is an annual weed reported from multiple regions of Alaska and can be differentiated from other species by its deeply pinnatifid leaves that lack the feathery appearance of tansy ragwort leaves. Desert ragwort can be distinguished from other species by the presence of leaves that are shallowly pinnatifid and not reduced upward. Sticky ragwort (*S. viscosus* L.) is another species

that may show up in Alaska in the future and is similar to common groundsel but sticky-haired throughout, whereas common groundsel is hairless. Common tansy leaves (*Tanacetum vulgare* L., included in this book) resemble those of tansy ragwort, but the ray florets are either minute or absent.


XID Services photo by Richard Old

Tansy ragwort.

Ecological Impact

Tansy ragwort is poisonous to livestock. The plant contains a toxic alkaloid that reacts with enzymes to cause cumulative liver damage. Ingestion of the plant causes livestock to stagger, hence the common name staggerwort. It is estimated that the state of Oregon has lost four million dollars a year to livestock poisoning by this species.

Biology and Invasive Potential

Tansy ragwort usually germinates in fall or early winter, lives through the next year as a rosette, and then dies the following year after producing flowers and seeds. A single large plant may produce up to 150,000 seeds that can lie dormant in the soil for as long as 15 years. The fibrous root system can produce small adventitious shoots when stimulated by mechanical destruction or pulling (King County DNR 2004a). Seeds are tiny and are tipped by hairlike plumes that can carry seeds in the wind over long distances. Tansy ragwort is listed as a noxious weed in Washington, Idaho, and British Columbia.


KULAK photo by Paul Busselen

Sticky ragwort.

Distribution and Abundance

Tansy ragwort is native to Eurasia and is now widespread in California, Oregon, Washington, and British Columbia, infesting millions of acres of range and pasture land. In Alaska, this species has been found in Ketchikan, on Annette Island, on Prince of Wales Island, and in Anchorage. It was first reported in North American seaports in the early 1900s and is often spread in contaminated hay.

Management

Hand-pulling tansy ragwort before seed set can be effective. Herbicide application is effective for controlling large infestations, although follow-up treatments may be necessary. Biological control agents, including seedhead flies, root and defoliating beetles, and a defoliating moth, provide fair to excellent control for very large infestations (Callihan and Miller 1999). Seeding disturbed areas with perennial grasses may help to prevent reestablishment.

Notes

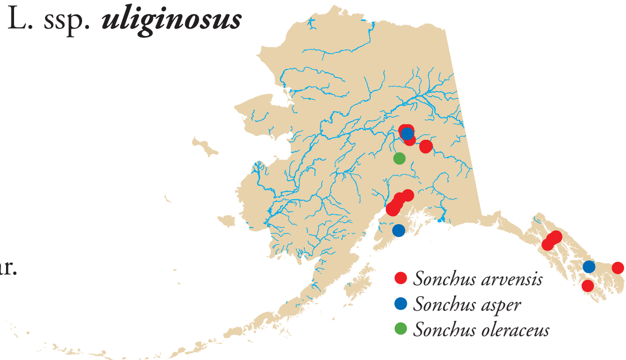
Tansy ragwort is extremely poisonous to horses, while at least 30 species of invertebrates are totally dependent on it for food in Europe.

XID Services photo by Richard Old

Common groundsel.

Perennial Sowthistle

Sonchus arvensis L. ssp. ***uliginosus*** (Bieb.) Nyman



Alternate Names

moist sowthistle

Synonyms

Sonchus arvensis L. var. *glabrescens* Guenth., Grab. & Wimmer
Sonchus uliginosus Bieb.

Description

Despite the common name, sowthistles resemble dandelions more than they do the true thistles. Perennial sowthistle usually grows 2–4 feet high and has an extensive horizontal root system that grows up to 10 feet deep. All parts of the plant contain a milky white juice. Early in the season, the plant is a basal rosette that could be mistaken for dandelion. Leaves are alternate, lanceolate, and 2½–16 inches long, with a clasping base and soft prickly margins that vary from deeply toothed to nearly entire. The flowerhead is bright yellow and 1–2 inches wide. The floral bracts are green with white margins. Seeds are dark brown and prominently ridged and wrinkled, with a tuft of soft white pappus bristles. Subspecies *uliginosus*, found in Alaska, lacks the glandular hairs on floral bracts and flower stalks that are generally present on perennial sowthistle.

UAF Cooperative Extension Service photo by Michael Rasy

Perennial sowthistle flowers.

UAF Cooperative Extension Service photo by Michael Rasy

Perennial sowthistle flowers.

Similar Species

Annual sowthistle (*S. oleraceus* L.) is another exotic species in Alaska. It can be distinguished from perennial sowthistle by the presence of a short taproot rather than long horizontal roots.

Ecological Impact

At high densities perennial sowthistle can drastically reduce water resources and possibly decrease native plant diversity (Butterfield et al. 1996). It is also host to a number of plant pests. This species is acceptable feed for rabbits and other foraging animals (NWCB 2003). Perennial sowthistle may modify or retard the successional establishment of native species (Butterfield et al. 1996).

Biology and Invasive Potential

Perennial sowthistle reproduces by seed and horizontal roots. Each plant can produce 4,000 to 13,000 seeds that can remain dormant in the soil for up to six years. Viability is commonly under 40% (Royer and Dickinson 1999). Spreading rootstocks are the primary means of invasion into new areas as plants are capable of producing new plants from buds on the rhizome up to 2 feet in depth.

UAF Cooperative Extension Service photo by Michael Rasy

Roadside infestation of perennial sowthistle.

(Royer and Dickinson 1999, Rutledge and McLendon 1996). Perennial sowthistle seeds possess hairs and are spread by wind or may become attached to animals (Butterfield et al. 1996). Seeds can also be moved on vehicles and farm equipment and may contaminate commercial seeds and hay (NWCB 2003, Butterfield et al. 1996). Seeds germinate at ¼–1¼ inches deep, and the optimal temperature is between 77° and 86°F. Plant cover and litter promote germination. Although perennial sowthistle is adapted to a variety of soils, it prefers rich, non-compacted, moist, and fine-textured soil with pH levels ranging from 5.2 to 7.2. This plant can survive temperatures to 3.2°F (Butterfield et al. 1996, Rutledge and McLendon 1996). Perennial sowthistle is listed as a noxious weed in 20 of the United States and five Canadian provinces. It has also been declared a federal noxious weed in the United States and Canada and a prohibited noxious weed in Alaska (Alaska Administrative Code 1987).

XID Services photo by Richard Old

Annual sowthistle.

Distribution and Abundance

Perennial sowthistle is common in gardens, cultivated crops, roadsides, and fertile waste areas. It may also occur on disturbed sites of prairies, woods, meadows, lawns, streams, and lake shores (NWCB 2003, Butterfield et al. 1996, Gubanov et al. 1995). This species is native to Europe, western Asia, and Iceland. It has spread widely throughout the northern United States and southern Canada and has also established in South America, Australia, and New Zealand. The first report of perennial sowthistle in North America was from Pennsylvania in 1814 (Butterfield et

XID Services photo by Richard Old

Annual sowthistle.

al. 1996). Its first known occurrance in Alaska was reported in Hoonah in 1979 (ALA 2004). It has since been found in Fairbanks, Delta, Anchorage, Juneau, and Prince of Wales Island (AKEPIC Database 2004).

Management

Biological, chemical, manual, and mechanical control methods all have been used on perennial sowthistle. Mowing or cutting to reduce seed production and root reserves should be done a few times per season for several years. When hand-pulling, use a shovel and take care to get as much of the root as possible. Tillage may increase numbers by breaking up the rhizomes into separate pieces that can grow into new plants, while tillage that buries all root fragments more than a foot deep is reported to be effective. This weed is relatively resistant to many, but not all, common broadleaf herbicides (Butterfield et al. 1996, Rutledge and McLendon 1996). Annual sowthistle may be controlled through hand-pulling or cutting prior to flowering. Herbicide application is unnecessary except for large infestations.

XID Services photo by Richard Old

Leaf and stem of perennial sowthistle.

Notes

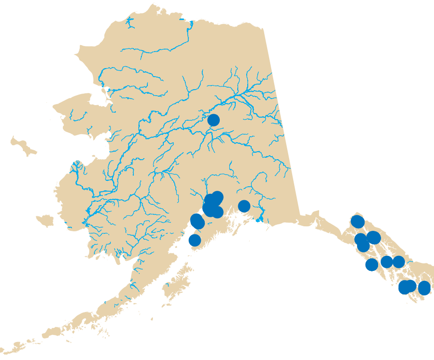
Perennial sowthistle is a relative of chicory, and its roots have been used to make a coffee-like beverage. Because of the high hydrocarbon content of its milky sap, it has been investigated as a source of oil for manufacture of plastics and pharmaceuticals.

XID Services photo by Richard Old

Leaf and stem of annual sowthistle.

Common Tansy

Tanacetum vulgare **L.**



Alternate Names

golden buttons, garden tansy, bitter buttons, hind-head, parsley-fern, ginger-plant

Synonyms

Chrysanthemum uliginosum Pers., *Chrysanthemum vulgare* (L.) Bernh., *Tanacetum vulgare* L. var. *crispum* DC.

Description

US Geological Survey photo by Chris McKee

Common tansy is a rhizomatous perennial plant that grows 1½–6 feet high. The stems are often purplish-red at the base. Leaves are alternate, 2–10 inches long, 1½–3 inches wide, and deeply divided into numerous, toothed segments, giving the plant a feathery appearance. Common tansy produces a strong odor reminiscent of creosote. Stems have 20–200 yellow flowerheads without ray florets. Each flowerhead is button-like and ¼–½ of an inch wide. Seeds are yellowish-brown without pappus or with short 5-toothed crowns.

Similar Species

Common tansy resembles tansy ragwort (*Senecio jacobaea* L., included in this book), but tansy ragwort has ray florets and seeds with pappus. Lake Huron tansy (*Tanacetum bipinnatum* (L.) Schultz-Bip.) is native to Alaska and can be distinguished from common tansy by the presence of solitary to several flowerheads and the lack of odor.

Ecological Impact

Common tansy has been reported as unpalatable and somewhat poisonous to humans and livestock. It is also an alternate host for plant viruses (Royer and Dickinson 1999). It can grow along irrigation ditches and streams and restrict water flow (CWMA 2004).

Biology and Invasive Potential

Common tansy reproduces vigorously by both seed and rootstalks. Each plant is capable of producing over 50,000 seeds (Whitson et al. 2000, Royer and Dickinson 1999) and spreading quite aggressively by vegetative means (Plants for a Future 2002). It is generally restricted to

USDA Forest Service photo by Michael Shephard


XID Services photo by Richard Old

disturbed sites, although it has been observed growing in undisturbed beach meadows in Haines, Alaska (M. Shephard, pers. comm. 2004). Plants lack a well developed pappus and therefore are unlikely to be wind dispersed. Common tansy has been used and distributed as an ornamental and medicinal remedy, and it has escaped and become widely established. It is also a potential seed contaminant (CWMA 2004, GRIN 2004). It is known to germinate in vegetated areas (SWEPIC 2004) and is adapted to all soil textures. It requires well-drained moist soil but can tolerate acidic, neutral, and basic soils. It is not shade-tolerant (Plants for a Future 2002). Common tansy is listed as a noxious weed in Colorado, Minnesota, Montana, Washington, Wyoming, Alberta, British Columbia, and Manitoba.

Distribution and Abundance

Common tansy is a native of Europe and Western Asia and has become established in almost all of the United States and Canadian provinces. It has been reported from multiple locations in southcentral and southeast Alaska (AKEPIC Database 2004). This plant is generally found along roadsides, waste areas, streambanks, and pastures outside of Alaska (Whitson et al. 2000) and has established in beach meadows of Haines, Alaska.

Management

Common tansy is an aggressive weed that is difficult to control (CWMA 2004, Plants for a Future 2002). Hand-pulling without a shovel can be difficult due to the extensive rhizomes. This method will not eradicate an infestation but may prevent its spread. Mowing several times per year also aids in prevention but will not eradicate. Gloves and protective clothing should be used to keep the plant's toxins off of skin. Herbicide application is generally recommended and is most effective between the early flower bud and full bloom stage.

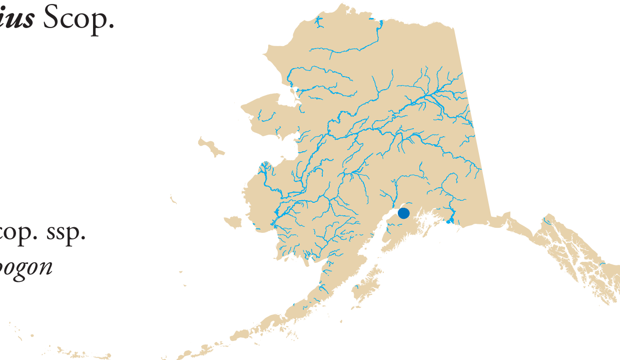
Notes

Common tansy has been used for a wide variety of medicinal remedies and as an insect repellent. It is toxic to humans and livestock when consumed in large quantities. Before the invention of embalming, tansy was used to line coffins before burying the dead because of its ability to repel vermin. More recently, chemical analysis has shown that common tansy contains compounds that can repel insects and inhibit growth of bacteria and fungi.

US Geological Survey photo by Chris McKee

Western Salsify

Tragopogon dubius Scop.



Alternate names
yellow salsify

Synonyms
Tragopogon dubius Scop. ssp. *major* (Jacq.), T*ragopogon major* Jacq.

Description
Western salsify is a large, taprooted biennial plant that grows 1–3 feet high. All parts of the plant contain a milky white juice. Leaves are up to 12 inches long, clasping, alternate, narrow, grass-like, somewhat fleshy, hairless, and light green to bluish-green. Flowerheads, composed of yellow ray florets, measure 1–2½ inches across and form at the end of long, hollow stalks. There are 10–14 bracts subtending each head that are 1–2 inches long and extend beyond the ray florets. Leaves from the previous year are often found at the base of the plant. The fruiting head of western salsify is globe-shaped, 2½–4 inches across, and composed of pappus-bearing achenes.

USDA Forest Service photo by Dave Powell, image 1205020 (www.invasive.org)

XID Services photo by Richard Old

Similar Species
Western salsify seedlings can be mistaken for small grass plants. Meadow salsify (*T. pratensis* L.), found throughout Canada, does not have a swollen stem below the flowerhead and has 8 or 9 floral

bracts below the flower. No other yellow-flowered composites with milky juice in Alaska have long, narrow bracts or grow as tall as western salsify.


XID Services photo by Richard Old

Ecological Impact

Western salsify establishes in sparse herbaceous communities and creates a new vegetation layer. High densities of plants are likely to inhibit growth and recruitment of native forbs and grasses. This species is unpalatable to grazing animals and attractive to many types of pollinating insects (M. Carlson, pers. comm. 2004).

Biology and Invasive Potential


USDA Forest Service photo by Michael Shephard

Western salsify reproduces only by seed. Each plant is capable of producing up to 500 seeds (Royer and Dickinson 1999). It occurs in disturbed sites, including steep slopes and landslides, and can also establish in intact to moderately grazed prairies in Oregon. Seeds have pappus composed of feathery, webbed hairs that are easily and widely dispersed by wind (Royer and Dickinson 1999). This species is a potential seed contaminant (GRIN 2004) and is known as a contaminant in seed mixes for road construction. Western salsify is adapted to pH levels ranging from 6.5 to 7.5 and to all soil textures. It has low fertility and moisture requirements. It is shade-intolerant and withstands temperatures to –28°F. It does not require cold-stratification for germination (GRIN 2004). Western salsify is listed as an invasive weed in Kentucky, Nebraska, Tennessee, Manitoba, and Ontario.

Distribution and Abundance

Western salsify is native to Eurasia and has become established over much of temperate North America. It has been collected from only one site in southcentral Alaska, along Turnagain Arm between Anchorage and Girdwood (ALA 2004). Thousands of plants are now found in this area. Outside of Alaska, it is a common weed of cultivated crops, roadsides, and waste areas.

Management

According to Rutledge and McLendon (1996), western salsify is not an aggressive weed and control is seldom necessary. However, in southcentral Alaska, multiple years of hand-pulling have been unsuccessful for eradication.

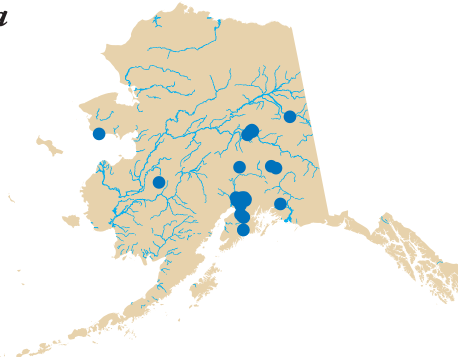
Notes

Western salsify was introduced from Europe for its large, edible roots. Other common names include oysterplant, goatsbeard, noonflower, and Jerusalem star. Noonflower refers to the showy flowers that open in the morning and close by noon.

USDA Forest Service photo by Michael Shephard

Scentless False Mayweed

Tripleurospermum perforata
(Merat) M. Lainz



Alternate Names
Scentless mayweed
German chamomile

Synonyms
Chamomilla inodora (L.) Gilib., *Matricaria inodora* L., *Matricaria maritime* L. var. *agrestis* (Knaf) Wilmott, *Matricaria maritima* L. ssp. *inodora* (L.) Clapham, *Matricaria perforata* Merat, *Tripleurospermum inodorum* (L.) Schultz-Bip.

XID Services photo by Richard Old

Description
Scentless false mayweed is an annual to perennial forb with an extensive fibrous root system. Stems are highly branched and normally over 3 feet tall. Leaves are alternate, 1–3 inches long, and divided into numerous narrow, thread-like, branched segments. Leaves are more or less odorless when crushed. Numerous flowerheads are produced from June to September. The flowerhead disc measures 1–1½ inches in diameter and is yellow, with white ray florets that are ⅜–1½ inches long. Both types of florets are capable of producing seed. The mature seeds have three distinctive ridges.

XID Services photo by Richard Old

Similar Species
False mayweed (*T. maritima* (L.) W.D. J. Koch ssp. *phaeocephalum* (Rupr.) Hamet-Ahti) is native to

the shores of the Bering and Beaufort Seas in Alaska. The involucral bracts of the native species have dark brown margins while those of the introduced species have light brown margins. Scentless false mayweed could also be confused with two other exotic species, stinking mayweed (*Anthemis cotula* L.) and wild chamomile (*Matricaria recutita* L.), but can be distinguished by its lack of strong odor.

Ecological Impact

Scentless false mayweed seedlings can form very dense stands upon emerging in the spring, thereby reducing seedling growth among other species (NAPPO 2003). This plant is unpalatable to animals, and thus reduces the quality of forage sites in dense stands (Parchoma 2004, CWMA 2000). Scentless false mayweed is pollinated by bees and flies (Harris and McClay 2003). It is likely to alter soil moisture and nutrient availability for other species.

Biology and Invasive Potential

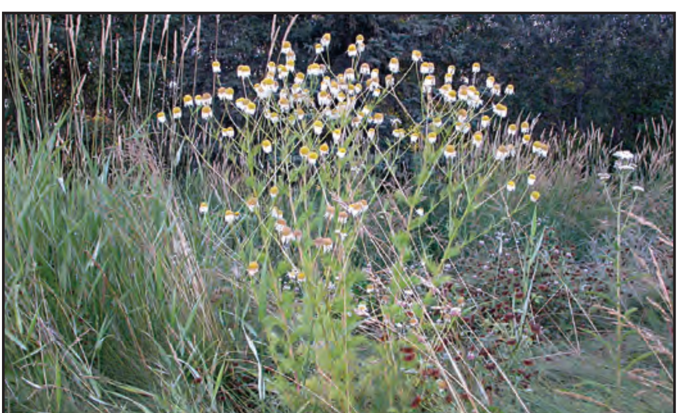
Scentless false mayweed reproduces entirely by seeds. Solid stands of scentless false mayweed can produce 1,800,000 seeds per square meter. Seedbanks can be long-lived, with buried seeds remaining viable for at least 15 years (Juras et al. 2004). Scentless false mayweed is often associated with disturbed habitats where there is little competition from

XID Services photo by Richard Old

established vegetation. Periodic disturbance by cultivation, livestock trampling, or flooding promotes the establishment of scentless false mayweed (Juras et al. 2004). Seeds lack pappus or other morphological adaptations for long-distance dispersal but can spread by wind, water, and drifting snow (Juras et al. 2004, Parchoma 2004). Up to 26% of seeds remain viable in dung (NAPPO 2003, Rutledge and McLendon 1996). Seeds are transported with vehicles, contaminated forage, and grain and grass seed (Juras et al. 2004, Parchoma 2004). Seeds are able to germinate under a wide range of temperature and moisture conditions. Most germination occurs at daily temperature from 36.5° to 104°F. Seeds floating on water germinate readily. Germination occurs better under a canopy than on barren soil (Juras et al. 2004). This weed is found in a range of soils including clay, loam, and sand with pH levels ranging from 5.5 to 7.9. It prefers moist organic soils and does not tolerate calcareous soils (Rutledge and McLendon 1996). Scentless false mayweed is listed as noxious in Washington and Saskatchewan. It is considered a weed in Alberta, British Columbia, Manitoba, and Quebec.

Distribution and Abundance

Outside of Alaska, scentless false mayweed is found in perennial forage crops, pastures, lawns, gardens, and waste areas and also along roadsides, irrigation ditches, shorelines, streams, and pond edges (Juras et al. 2004, Parchoma



USDA Forest Service photo by Michael Shephard

2004). In Alaska, it appears to be restricted to areas with recent anthropogenic soil disturbance and little organic soil. The species is native to northern and central Europe and has been introduced to North America and Asia. It can be found in 26 of the northern United States and in all Canadian provinces (NRCS 2005, Juras et al. 2004, NAPPO 2003).

Management

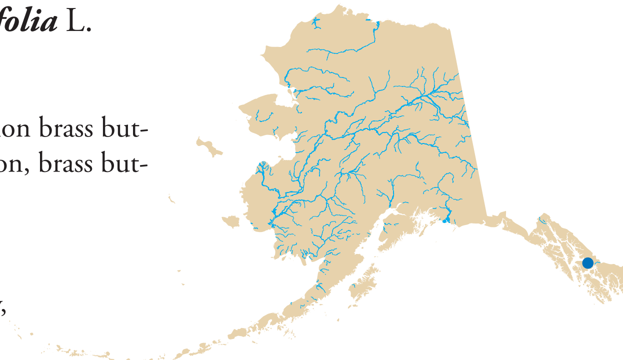
Scentless false mayweed is tolerant of many herbicides. A combination of mowing, tillage, and hand-pulling can be used to control this plant. Biological agents have been released in British Columbia to control this species (Juras et al. 2004, Parchoma 2004), but the presence of a native plant in Alaska of the same genus limits the probability of biological control here. According to Harris and McClay (2003), this species tends to occupy recently disturbed sites and does not persist without further disturbance, suggesting that control is seldom necessary.

Notes

Scentless false mayweed originated in Europe. It is found in nearly all crops and particularly cereals. Studies of lentil, mustard, and wheat grain suggest that contaminated grain may be an important dispersal mechanism for this weed.

Brassbuttons

Cotula coronopifolia L.



Alternate Names

waterbuttons, common brass buttons, bachelor's button, brass buttons, buttonweed

Description

Brassbuttons is a low, decumbent perennial plant in its native subtropical environment. In Europe, the species behaves as an annual plant, dying in the first autumn frost. Plants grow up to 12 inches tall and are aromatic, hairless, and highly branched from the base. Stems are often trailing and root at the nodes. Leaves are 1–2½ inches long, oblong, pinnately lobed to entire, and sessile, and the base is sheathed around the stem. Flowerheads are yellow, solitary, and composed only of disc florets. Heads are borne on naked stalks and the involucral bracts are lanceolate or oblong and yellowish.

USDA NRCS photo by William and Wilma Follette

Similar Species

Common tansy (*Tanacetum vulgare* L., included in this book) and pineapple weed (*Matricaria discoidea* DC., included in this book) have similar flowerheads, but brassbuttons is smaller than the former and found in coastal habitats, unlike the latter. Arctic daisy (*Dendranthema arcticum* (L.) Tzvelev) is a native plant that also occurs along seashores but has white ray florets and wedge-shaped leaves.

Management

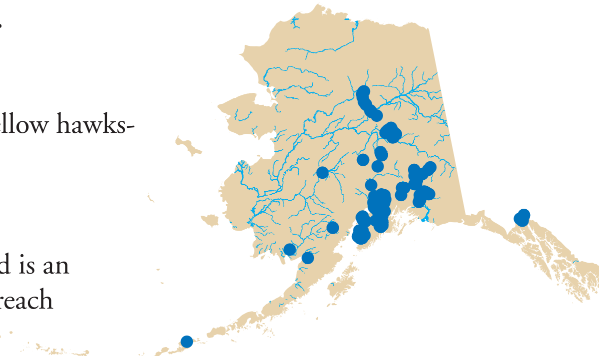
Brassbuttons can be controlled by hand-pulling or mechanical methods, although it can grow on very soft, deep mud, making infestations nearly inaccessible by foot or boat. Use of herbicides under local conditions has not been investigated.

Notes

A brassy gold dye can be obtained from the whole plant. Cotula comes from the Greek word *kotule*, meaning “a small cup” and referring to a hollow at the base of the leaves.

Narrowleaf Hawksbeard

Crepis tectorum L.



Alternate Names
annual hawksbeard, yellow hawksbeard

Description
Narrowleaf hawksbeard is an annual plant that can reach a height of 3 feet. The mature plant has a single stem that is branched, erect, hairless, and leafy and grows from a taproot. Basal leaves are stalked, lance-shaped, 4–6 inches long, and 1½ inches wide. Stem leaves are alternate and less than ½ of an inch wide, and they clasp the stem. Leaf margins often roll under towards the midrib. Involucral bracts are smooth, lacking hairs or fuzz. Flowerheads are ½–¾ of an inch wide and composed of 30–70 yellow ray florets. The seedheads look like small dandelion seedheads, with a white pappus of numerous white bristles on each seed.

USDA Forest Service photo by Michael Shephard

Narrowleaf hawksbeard flowers.

Similar Species
Invasive narrow-leaved hawkweed (*Hieracium umbellatum* L., included in this book) is often confused with narrowleaf hawksbeard. Narrow-leaved hawkweed is an erect perennial plant with numerous yellow flowerheads up to 1 inch across. The floral bracts are dark green to black. Seeds are about ⅛ of an inch long and have a brownish or tawny pappus. Smooth hawksbeard (*Crepis capillaris* (L.) Wallr.) is another exotic species in Alaska that can only be differentiated from narrowleaf hawksbeard by magnification. The two native *Crepis* species can be distinguished from the exotics by their smaller stature, often growing less than 1 foot high.

Ecological Impact

Narrowleaf hawksbeard is a weed of forage crops, pastures, roadsides, and waste areas. It is occasionally a serious weed in fall-sown crops (Royer and Dickinson 1999). Aesthetic impacts are significant because the plants are showy and conspicuous when in flower.

KULAK photo by Paul Busselen

Smooth hawksbeard.

Biology and Invasive Potential

Each narrowleaf hawksbeard plant is capable of producing over 49,000 seeds (Royer and Dickinson 1999), and it readily colonizes disturbed sites and open areas (Densmore et al. 2001). Seeds are wind-dispersed and no dormant period is required for germination. It is listed as noxious in Minnesota, Alberta, and Manitoba.

Distribution and Abundance

Narrowleaf hawksbeard is primarily limited to cultivated fields, roadsides, and waste areas. It is native to Europe and temperate Asia. The species is now found throughout Canada and the northern part of the United States (Royer and Dickinson 1999), including a number of locations across Alaska. The first documented occurrence in the state was near Fairbanks in 1974 (ALA 2004).

USDA Forest Service photo by Michael Shephard

Narrowleaf hawksbeard.

Management

Narrowleaf hawksbeard is easily pulled up by hand, although several weedings may be necessary to eliminate plants overlooked when they were in the small rosette stage or not yet flowering (Densmore et al. 2001). It can also be controlled by mechanical or chemical methods.

Notes

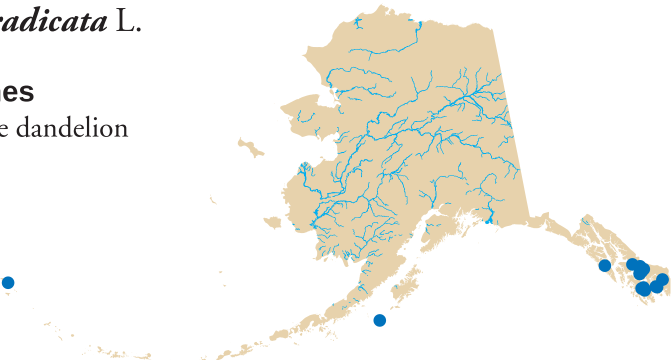
The genus name *Crepis* comes from the Greek krepis, "a sandal," and is an ancient plant name. The species name *tectorum* means "of roofs."

UAF Cooperative Extension Service photo by Michael Rasy

Narrowleaf hawksbeard.

Spotted Catsear

Hypochaeris radicata L.



Alternate names

hairy catsear, false dandelion

Description

Spotted catsear is an herbaceous perennial plant with a basal rosette of dandelion-shaped leaves that are 2–8 inches long. Leaves are densely hairy on both sides. There are no leaves on the stems, which can be several simple or sparsely branched and grow 6–4 inches high. Flowers have yellow heads, 1–1½ inches in diameter, and often have several heads per stem.

KULAK photo by Paul Busselen

Similar Species

Spotted catsear looks similar to other dandelion tribe members, including two other exotic species included in this book: common dandelion (*Taraxacum officinale* G.H. Weber ex Wiggers ssp. officinale) and hawkbit (*Leontodon autumnalis* L.). Spotted catsear can be distinguished from dandelion by the presence of flowerheads that appear in groups of 3–4 at the ends of stems. Hawkbit can be distinguished by the presence of leaves that are smooth and shiny rather than heavily hairy like those of spotted catsear.

XID Services photo by Richard Old

Management

It is effective to remove scattered spotted catsear plants with a spade below the rootcrown in early spring as soon as the leaves appear, to a depth of several inches. Badly infested fields should be cultivated for one to two years before reseeding. Herbicide treatment provides effective control of this species.

Notes

Spotted catsear is originally from Europe and is very abundant in California. It is also known as gosmore, flatweed, and coast dandelion. The common name comes from the leaves that resemble a cat's ears.

XID Services photo by Richard Old

Prickly Lettuce

Lactuca serriola L.

Alternate names
wild lettuce, compass plant, milk thistle, horse thistle, wild opium

Synonyms
L. scariola L.

Description
Prickly lettuce is a biennial plant with a pappus of simple bristles. Stem leaves lack a clasping base. Achenes are beak-shaped. Plants are 2–4 feet tall from a large taproot. Stems branch only in the flowering portion and bear numerous yellow flowerheads. Prickles cover the leaf teeth, the back side of the midvein, and the lower half of the stem. Leaves are twisted at the base to lie in a vertical plane, clasping the stem with two ear-like lobes.

XID Services photo by Richard Old

Similar Species
Prickly lettuce can be differentiated from several similar species in Alaska by its prominent prickles along the underside of the leaf mid-vein, which the others lack.

Management
Isolated individuals can be dug up or pulled by hand.

Notes
Cultivated lettuce also belongs to this genus, of which there are over 100 species, but only a few of them are native to the Americas. Another common name for prickly lettuce is compass plant, because the bluish-green leaves often twist slightly at their clasping base so that they mainly

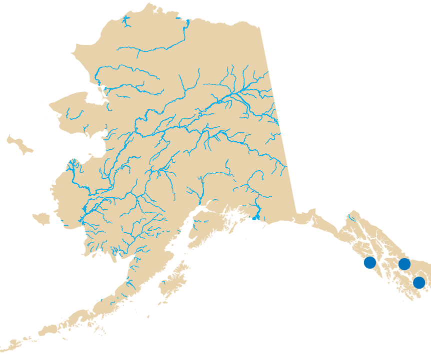
face east and west, their edges pointing approximately north and south.

XID Services photo by Richard Old

XID Services photo by Richard Old

Nipplewort

Lapsana communis L.



Description

Nipplewort is an annual plant with branched leafy stems. Leaves are alternate, stalked, and broadly egg-shaped with toothed to lobed margins. Upper leaves lack stalks. Plants are sparsely hairy to hairless and contain milky sap. Flowers are yellow with only ray florets. Achenes are sausage-shaped, curved, hairless, and $\frac{1}{8}$–$\frac{3}{16}$ of an inch long with no pappus.

KULAK photo by Paul Busselen

Similar Species

Wild lettuce species (*Lactuca* spp.) can be differentiated from nipplewort by the presence of a crown of bristles or scales (pappus) at the summit of the achene.

Management

Hand-pulling is effective, especially when the plants are young.

XID Services photo by Richard Old

Notes

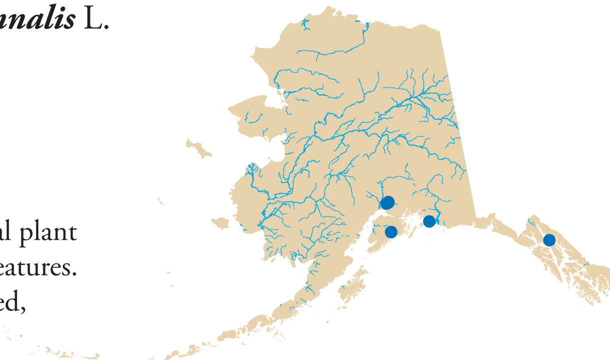
Nipplewort was at one time cultivated as a vegetable. The bracts surrounding the small heads of yellow ray florets are erect and hairless and form the "nipple" in the common name.

KULAK photo by Paul Busselen

Leaves are alternate and broadly egg-shaped.

Hawkbit

Leontodon autumnalis L.



Alternate Names
Fall dandelion

Description
Hawkbit is a perennial plant with dandelion-like features. Leaves are deeply lobed, arising from a basal rosette. Flowers are yellow with reddish streaks on the underside of outer florets. The pappus has a single row of leathery hairs.

Norwegian Botanical Association photo by Norman Hagen

Similar Species
The tough flowering stem with scale-like leaves distinguishes hawkbit from common dandelion (*Taraxacum officinale* G.H. Weber ex Wiggers ssp. *officinale*, included in this book), with its hollow flower stem. The flower stalks of spotted catsear (*Hypochaeris radicata* L., included in this book) are also branched and have small scale-like bracts, but the leaves are densely hairy, not smooth and shiny like those of hawkbit.

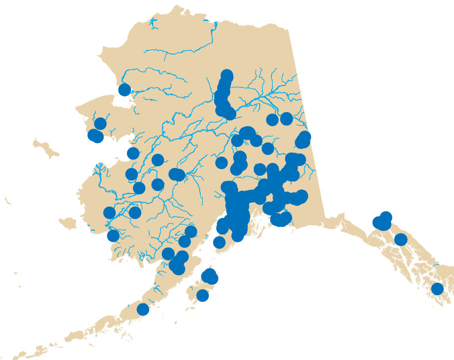
Management
Little information is available concerning control methods for hawkbit. Refer to other members of the Asteraceae family for possible options.

USDA Forest Service photo by Tom Heutte

Notes
Hawkbit is native to Europe.

Pineapple Weed

Matricaria discoidea DC.



Alternate Names

Disc mayweed

Synonyms

Artemisia matricariodes auct. non Less, *Chamomilla suaveolens* (Pursh) Rydb., *Lepidanthus suaveolens* (Pursh) Nutt., *Lepidotheca suaveolens* (Pursh) Nutt., *Matricaria matricariodes* (Less.) Porter, *Matricaria suaveolens* L., *Tanacetum suaveolens* Hook.

National Park Service photo by Penny Bauder

Description

Pineapple weed is a low-branching annual plant with leafy stems up to 1 foot tall but generally less than 6 inches tall. The plant gives off a chamomile scent when crushed. Leaves are alternate and divided several times into narrow segments. Small yellow disc florets are arranged in a cone-shaped head, 3⁄16–3⁄8 of an inch wide. Ray florets are absent. Each head is surrounded by several overlapping bracts with papery margins. Plants bloom from early spring to autumn.

Similar Species

There are no other diminutive, rayless composite species that may be confused with pineapple weed in Alaska.

Management

Pineapple weed plants are easily pulled up, although several weedings may be necessary (Densmore et al. 2001). Some herbicides are effective.

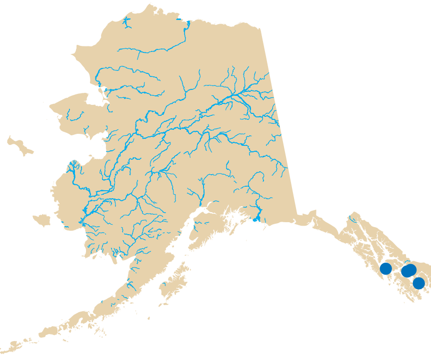
Notes

Pineapple weed has been used in a decoction for graying hair, in an infusion against spasms and disorders of the stomach, and externally as an antiseptic and vulnerary. The genus name comes from the Latin matrix, meaning "the womb," because these plants were also used to soothe discomforts associated with menstruation or pregnancy.

XID Services photo by Richard Old

Wall Lettuce

Mycelis muralis (L.) Dumort



Synonyms

Lactuca muralis (L.) Fresen.

Description

Wall lettuce is a slender, glabrous, herbaceous plant that can behave as an annual plant on frequently disturbed substrates or as a biennial on more stable substrates. Stems are erect, 2–3 feet tall, and branched above and may arise singly or multiply from a fibrous root. The stem surface is glabrous and often glaucous, and it exudes milky juice when broken. Basal and lower stem leaves are 2½–7 inches long, 1–3 inches wide, glabrous and pinnatifid, with broad, terminal segments and earlike, clasping projections at the leaf base. There are few middle and upper stem leaves, and they are reduced in size. Each flowerhead is comprised of 5 yellow, strap-shaped ray florets. Achenes are approximately ⅛ of an inch long, several-nerved, and black or brown with white pappus. The plant dies back after flowering but produces an overwintering rosette.

KULAK photo by Paul Busselen

Similar Species

Three other lettuce species—prickly lettuce (*Lactuca serriola* L.), included in this book), tall blue lettuce (*L. biennis* (Moench) Fernald), and blue lettuce (*L. tatarica* C.A. Mey.)—are known to occur in Alaska. Prickly lettuce has yellow ray florets like wall lettuce, but they consist of 5–12

KULAK photo by Paul Busselen

florets and the leaves are prickly. Tall blue lettuce and blue lettuce can be easily distinguished from both species by their bluish to white flowers.

Management

Control options have not been investigated. Wall lettuce may be susceptible to grazing. Kellman (1974) suggested that wall lettuce will not persist on sites with established perennials.

Notes

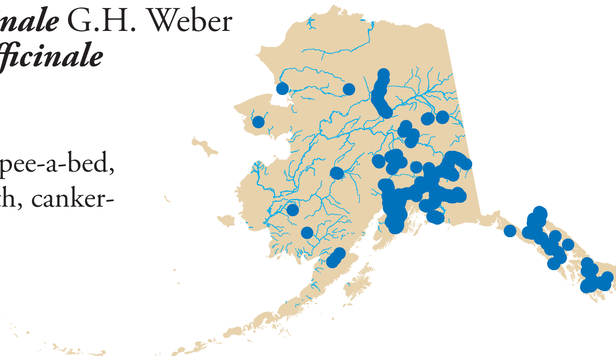
The raw leaves of wall lettuce are edible and used in salads. It is native to the Mediterranean and western Asia.


KULAK photo by Paul Busselen

The stem leaves of wall lettuce.

Common Dandelion

Taraxacum officinale G.H. Weber ex Wiggers ssp. ***officinale***



Alternate names

blow ball, faceclock, pee-a-bed, wet-a-bed, lion's-tooth, cankerwort, Irish daisy

Synonyms

Taraxacum atroglaucum M.P. Christens., *Taraxacum campylodes* Hagl., *Taraxacum croceum* auct. non Dahlst., *Taraxacum curvidens* M.P. Christens., *Taraxacum cyclocenrtrum* M.P. Christens., *Taraxacum dahlstedtii* Lindb. f., *Taraxacum davidssonii* M.P. Christens., *Taraxacum devians* Dahlst., *Taraxacum dilutisquameum* M.P. Christens., *Taraxacum firmum* Dahlst., *Taraxacum islandiciforme* Dahlst., *Taraxacum kok-saghyz* auct. non Rodin, *Taraxacum officinale* G.H. Weber ex Wiggers var. *palustre* (Lyons) Blytt p.p., *Taraxacum pleniflorum* M.P. Christens., *Taraxacum retroflexum* Lindb. f., *Taraxacum rhodolepis* Dahlst., *Taraxacum undulatum* Lindb. f. & Marklund, *Taraxacum vegans* Hagl., *Taraxacum xanthostigma* Lindb. f.

US Geological Survey photo by Chris McKee

Description

Common dandelion can grow from 2–20 inches high. Leaves are 2–16 inches long, ½–4 inches broad, and pinnately-lobed to pinnatifid with a large, rounded terminal lobe. Leaves are stalkless. The midrib of the leaf is often hollow and winged near the base. Yellow flowerheads are composed only of ray florets and rise from the basal leaves on hollow stalks. Heads measure 1–2 inches across and are surrounded by two rows of floral bracts. The whole plant contains a white milky juice.

Similar Species

The genus *Taraxacum* is a taxonomically confusing group, due to asexual reproduction and local diversification, and has been subject to many divergent interpretations, with hundreds of specific names published. Current taxonomic treatments describe *T. officinale* as encompassing three subspecies, two introduced in Alaska (ssp. *officinale* and ssp. *vulgare* (Lam.) Schinz & R. Keller) and one native (ssp. *ceratophorum* (Ledeb.) Schinz ex Thellung) in the state (NRCS 2005). The exotic subspecies lack horns on the involucral bracts and have substantially larger heads than all native subspecies and species of Alaskan dandelions. The native subspecies *ceratophorum* often grows in disturbed sites with the introduced subspecies but has horns on the involucral bracts. There are other native *Taraxacum* species that lack horns on involucral bracts, but they are found primarily in undisturbed herbaceous meadows, especially in the alpine zone.

National Park Service photo by Penny Bauder

Management

Hand-pulling is only effective for dandelion control if all rootcrowns are removed, which can be accomplished using an inexpensive, prong-shaped tool (available at garden supply stores) to extract several inches of subsurface material. Dandelion can be easily controlled using herbicides.

Notes

One of the most common weeds in North America, common dandelion has edible leaves, it can be used to make wine, and the milky juice of the roots has medicinal value. Bees use the nectar to make honey, and songbirds eat the seeds.

National Park Service photo by Penny Bauder

Close-up of the involucral bracts of the exotic subspecies; note the absence of horns on upper bracts and the downward-pointing lower bracts.

Brassicaceae
(Mustard Family)

Garlic Mustard

Alliaria petiolata (Bieb.) Cavara & Grande

Alternate Names
Sauce-alone, jack-in-the-hedge, poor man's garlic

Synonyms
Alliaria alliaria (L.) Britt., *Alliaria officinalis* Andrz ex. Bieb., *Erysimum alliaria* L., *Sisymbrium alliaria* (L.) Scop.

Description

USDA Forest Service photo by Tom Heutte

Garlic mustard is a taprooted, herbaceous biennial plant with an erect stem that is unbranched below the inflorescence. It can grow to over 3 feet tall but is generally between 12 and 18 inches tall. First year plants are rosettes of dark green, kidney-shaped leaves up to 4 inches in diameter with distinct leaf veins and scalloped edges. Second year plants have basal leaves that are kidney-shaped and slender-stalked; the stem leaves are 2½–4 inches wide, heart-shaped, and alternate and gradually decrease in size. Second year plants have few- to several-branched stems, which are sparsely hairy below. Garlic mustard has short racemes of white, 4-petaled flowers, ½ of an inch in diameter. Plants flower in April-June with siliques produced in June-August. This species gives off a strong garlic odor when crushed and is tolerant of cool temperatures.

Similar Species

There are a number of white-flowered mustards in Alaska, but no others have large, well-developed, and toothed stem leaves or are garlic-scented. Large-leafed avens (*Geum macrophyllum* Willd.) is a native species that is commonly mistaken for garlic mustard rosettes. Avens can be distinguished by their highly dissected leaves divided all the way to the petiole base.

USDA Forest Service photo by Tom Heutte

Garlic mustard rosette.

Ecological Impact

Garlic mustard can dominate the understory of forested areas and out-compete native species for light, moisture, nutrients, and space. It readily spreads into undisturbed forests and species-rich sites in the midwestern and northeastern United States, where many impacted species are threatened or endangered. Garlic mustard appears to alter habitat suitability for native birds, mammals, and amphibians and may affect populations of these species (Nuzzo 2000). For example, it reduces foraging sites for deer and other large herbivores. Garlic mustard also produces allelopathic chemicals that may interfere with the growth of native species. Garlic mustard is regarded as one of the worst invasive plants in many states because of its ability to colonize natural areas.

Biology and Invasive Potential

Garlic mustard flowers readily self-fertilize in the absence of insect visitation, but can also be cross-pollinated by a variety of insects. Its seeds are shiny-black and cylindrical with 8–10 per pod; an individual plant can produce up to 8,000 seeds. Seeds may remain viable for 4–5 years in the soil (Nuzzo 2000, Byers and Quinn 1998). Continued disturbance promotes greater seed production, which in turn promotes larger populations. In the absence of disturbance, garlic mustard gradually declines to a low, stable level, although it can rapidly become more abundant with renewed disturbance (Blossey 2003, Nuzzo 2000). It can resprout after removal of the aboveground material (WDNR 2004b). Wind dispersal is limited, and seeds do not float well, although they readily attach to moist surfaces. Garlic mustard may be dispersed by rodents, birds, and deer (Nuzzo 2000). The small seeds are also transported by boots and clothing, as well as by roadside mowing, automobiles, and trains (Rowe and Swearingen 2003). Garlic mustard is adapted to sand, loam, and clay soil textures, and it frequently grows in well-fertilized sites with pH levels ranging from 5.0 to 7.2. It is successful in many habitat types, however it is usually associated with calcareous soils and does not tolerate high acidity. Garlic mustard prefers moist shaded soils, but can do well in open areas. A cold-stratification period is required for germination. Garlic mustard is listed as a noxious weed in Alabama, Minnesota, Vermont, and Washington and is considered to be "ecologically invasive" in Wisconsin.


Photo by Elizabeth Czarapata,** Invasive Plants of the Upper Midwest,* ***University of Wisconsin Press.

Garlic mustard infestation.

Distribution and Abundance

Garlic mustard was introduced to the United States for food and medicinal purposes and later escaped from cultivation. Currently, it is distributed from Maine to South Carolina and west through the midwestern states to Washington and Oregon. Garlic mustard is a plant of roadsides, yards and gardens, abandoned fields, river floodplains, forests, forest openings, and wet meadows. As of early 2005, it has only been found in two locations in Alaska, both in Juneau. Garlic mustard is native to Europe and has also been introduced to North Africa, India, and New Zealand.

Management

Hand-pulling, cutting, burning, and herbicide treatments can be successful in controlling or eliminating garlic mustard. During control events, extreme care should be taken to prevent seeds from being moved from the site. Hand-pulling is effective if the entire root is removed through careful pulling; if the upper half of the root remains in the soil, plants will resprout. Hand-pulling is best done in early spring before other plants overgrow a site and make access difficult. Exercise care when using non-selective herbicides that will harm native species. Damage can be reduced by applying herbicides early in the growing season before other plants have sprouted or by using a sponge or wick applicator rather than broadcast spraying. In Southeast Alaska, garlic mustard remains alive and green through the winter, growing immediately after snowmelt. It is essential that an area be monitored for at least 5 years after initial control efforts due to recruitment from the seed bank. Studies are underway to determine effective biological control agents, which may include weevils or flea beetles. If approved by the USDA, these biological control agents may become an option by 2007 (Blossey et al. 2002).

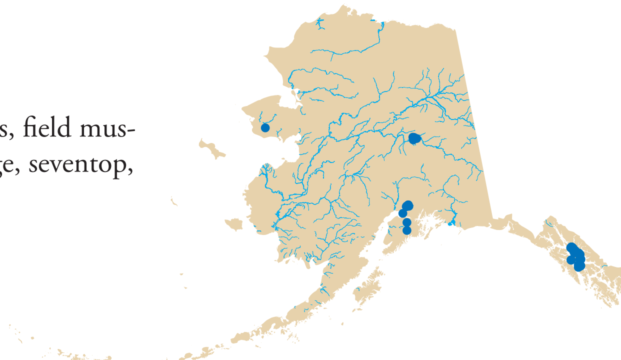
Notes

Juneau residents are fighting an uphill battle (literally) to eradicate garlic mustard from Alaska. There are several infestations near the governor's mansion in Juneau that have been hand-pulled several times a year for the last three years. The plant is edible and was traditionally used in soups and salads.

USDA Forest Service photo by Michael Shephard

Birdsrape Mustard

Brassica rapa L.



Alternate Names
Turnip, turnip greens, field mustard, Chinese cabbage, seventop, shogun, turnip rape

Synonyms
Brassica campestris L.

Description


KULAK photo by Paul Busselen

Birdsrape mustard is a biennial rootcrop (turnip) that functions as an annual plant when cultivated. This species has stems up to 4 feet tall growing from a taproot. The stems and foliage are smooth. Upper and lower leaves clasp the stem and lack stalks, and the lower leaves are deeply lobed and undivided. Each flower has 4 yellow petals. Seed pods are 1–4 inches long, and the seeds are 1⁄32–1⁄16 of an inch in diameter and can be blackish, reddish-brown, or mottled yellow.

Similar Species


KULAK photo by Paul Busselen

Canola (*Brassica napus* L.) is another cultivated plant that has yellowish-green rather than green leaves and flowering stems that do not lengthen during flowering, unlike birdsrape mustard, which can also be distinguished by its nearly hairless stems and clasping stem leaves.

Management
Birdsrape mustard can be controlled by hand-pulling.

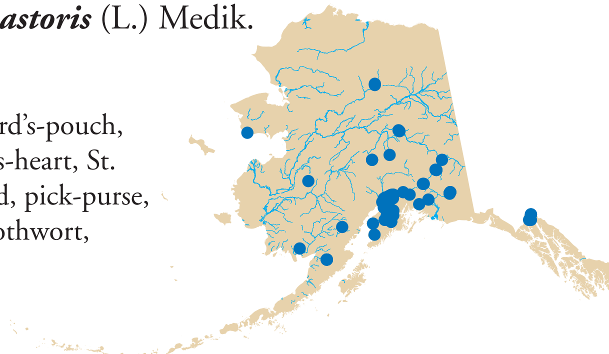
Notes

Birdsrape mustard has been found growing in large and dense patches along beach fringes in southeast Alaska (AKEPIC Database 2004). It has been cultivated in Europe for over 4,000 years and is probably native to central and southern Europe; it now occurs throughout the world.

KULAK photo by Paul Busselen

Shepherd's Purse

Capsella bursa-pastoris (L.) Medik.



Alternate Names

Pepper plant, shepherd's-pouch, pick pocket, mother's-heart, St. James weed, caseweed, pick-purse, witches'-pouches, toothwort, shovel-plant

Description

Shepherd's purse is an annual plant that can grow 4–20 inches high. It has a rosette of basal leaves 1–8 inches long and a thin, branching taproot. Stem leaves are alternate and clasping. Flowers are white and small, with petals 1⁄16–3⁄16 of an inch long. Seedpods are 1⁄8–3⁄8 of an inch long and distinctively heart-shaped. The fruiting stem elongates as the fruit matures.

National Park Service photo by Jeff Heys

Shepherd's purse basal leaves.

Similar Species

A native mustard, lyrate rockcress (*Arabis lyrata* L.), has white flowers and is commonly found in dry, open areas. It can be distinguished from shepherd's purse by the shape of its fruit, which is narrow, ½–1½ inches long, and 1⁄32–1⁄16 of an inch wide.

Management

Shepherd's purse is easily pulled up by hand, although several weedings may be necessary to eliminate plants germinating from buried seeds (Densmore et al. 2001), which can remain viable for longer than 20 years (J. Conn, pers. comm. 2005).

Notes

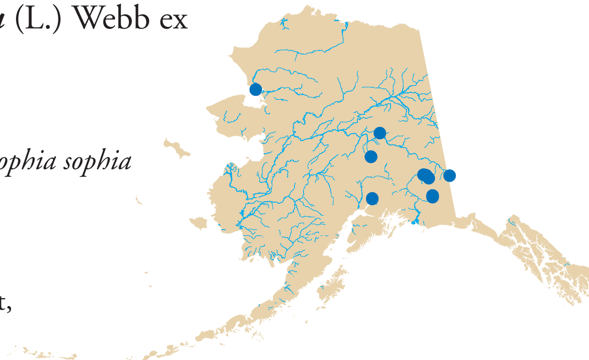
Shepherd's purse originated in Europe and is often one of the first plants to flower in the spring. It is the only mustard in North America with triangular fruits.

National Park Service photo by Penny Bauder

Shephard's purse flowers and fruits.

Flixweed

Descurainia sophia (L.) Webb ex Prantl.



Synonyms

Sisymbrium sophia L., *Sophia sophia* (L.) Britt.

Description

Flixweed grows to 3 feet, often branching above. Stems and leaves have star-shaped hairs, giving the plant a grayish green color. Leaves are alternate, stalked, 1–4 inches long, and divided 2–3 times into narrow segments. The pale yellow flowers are borne in a terminal cluster. The fruit is a narrow pod, ½–1¼ inches long with a long stalk.

US Geological Survey photo by Chris McKee

Similar Species

Flixweed can be confused with a number of other pinnately leaved, yellow-flowered native mustards in Alaska. However, this species has star-shaped and not glandular hairs on the stem, which are visible under 5-10X magnification. Unlike flixweed, the native northern tansymustard (*Descurainia sophioides* (Fisch. ex Hook.) O.E. Schulz) has long stalks and fruits that extend beyond the flower. Mountain tansymustard (*Descurainia incana* (Bernh. ex Fisch. & C.A. Mey.) Dorn ssp. *incana*) has short fruit stalks that are strongly ascending and 4–8 seeds in each fruit, rather than flixweed's longer, spreading stalks and 10–20 seeds per fruit. *Erysimum* and *Sisymbrium* species are superficially similar to flixweed, but members of *Erysimum* have closely appressed, straight, 2- to 3-pronged hairs, and those of *Sisymbrium* have unbranched hairs.

Management

Flixweed does not normally persist without disturbance and so may not require direct control measures (Densmore et al. 2001), although it is easily controlled using herbicide.

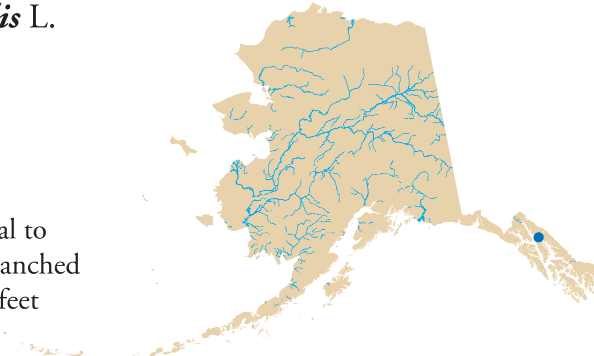
Notes

This plant was introduced from Europe. The common name flixweed comes from its formerly supposed remedy for flux, another word for dysentery. In 1742, "flux" first appeared in print in the English language in the 4th edition of London and Country Brewer in the form of flux ale, rumored to cause dysentery, while a flixweed concoction was recommended to cure it.

XID Services photo by Richard Old

Sweetrocket

Hesperis matronalis L.



Alternate Names
Dames rocket

Description
Sweetrocket is a biennial to perennial plant with branched stems growing up to 4 feet tall from fibrous roots. Leaves are ovate-lanceolate shaped and slightly toothed. Leaves decrease in size as they ascend the stem. Flowers are showy, 4-petaled, and purple to pink or white in color. Seeds are borne in long, narrow siliques.

USDA Forest Service photo by Tom Heutte

Similar Species
Sweetrocket resembles a native fireweed (*Epilobium luteum* Pursh) but does not have clefted flower petals.

USDA Forest Service photo by Tom Heutte

Management

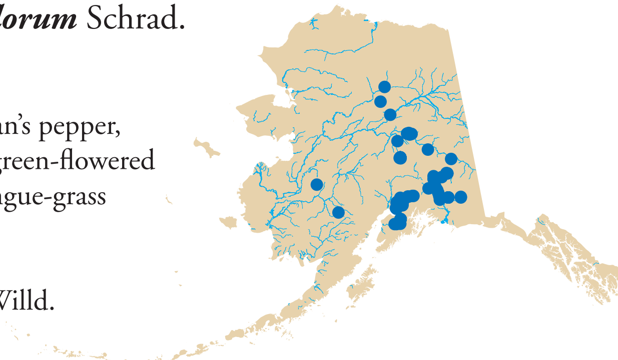
Small populations can be pulled to prevent seed production. There has been no extensive documentation of control efforts for this species, but it is likely that larger populations would require a major effort over a span of 5–10 years or more in order to exhaust the seed bank (Invasive Plants of Wisconsin 2004).

Notes

Sweetrocket is grown by gardeners for its fragrance. It is often a component of wildflower or meadow seed mixes.

Common Peppergrass

Lepidium densiflorum Schrad.



Alternate Names
Peppergrass, poor man's pepper, prairie peppergrass, green-flowered peppergrass, wild tongue-grass

Synonyms
Lepidium apetalum Willd.

Description
Common peppergrass is an annual plant with a basal rosette of toothed leaves that are 1–4 inches long and ¾–1¼ inches wide, growing from a short taproot. The flowering stem usually has numerous branches and is 4–20 inches high with alternate leaves. The flowers are small and inconspicuous. Seed pods are 1⁄16 to ⅛ of an inch long, with 9–15 pods produced for every half-inch of flowering stem. The high density of pods gives the plant a distinctive appearance that facilitates field identification.

US Geological Survey photo by Chris McKee

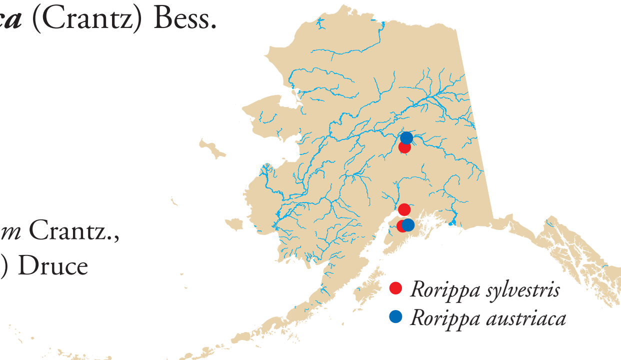
Similar Species
Common peppergrass can be distinguished from other *Lepidium* species in Alaska by having reduced or absent petals. Garden cress (*L. sativum* L.) is another exotic species that is closely related to common peppergrass, but the leaves of garden cress are dissected into narrow segments, its petals are reddish-white and twice as long as the sepals, and its pods are 3⁄16–5⁄16 inches long with a deep notch at the top.

Management
Common peppergrass plants are easily pulled up by hand, although several weedings may be necessary to eliminate plants germinating from buried seeds (Densmore et al. 2001). Multiple herbicide applications can also provide effective control.

Notes
The immature seedpods have a pungent, peppery taste, giving the plant its common name. The leaves have been chewed for the treatment of headaches. An infusion of common peppergrass has been used in the treatment of kidney problems.

Austrian Yellowcress

Rorippa austriaca (Crantz) Bess.



Alternate Names
Creeping fieldcress

Synonyms
Nasturtium austriacum Crantz.,
Radicula sylvestris (L.) Druce

Related Species
Creeping yellowcress
Rorippa sylvestris (L.) Bess.


USDA Forest Service photo by Elizabeth Bella

Austrian yellowcress flowers.

Description
Austrian yellowcress is a perennial plant with aggressive, creeping roots and persistent stems that grow to 3 feet tall from a deep, fleshy taproot. Stems are ascending to nearly erect and branched near the top. Leaves are dull bluish-green, hairless, narrowly oblong to oblanceolate, 1–4 inches long, and entire to irregularly toothed. Upper stem leaves narrow to a stalk-like base that clasps the stem. Rosette leaves are covered with short unicellular hairs. Flowers are yellow and 4-petaled in short terminal and axillary racemes. Fruits are ovoid silicles, ⅛ of an inch long, with lower stalks ¼–⅝ of an inch long.

Creeping yellowcress is a rhizomatous perennial plant with erect, branched stems growing up to 20 inches long. Leaves are 2–4 inches long and pinnately divided into narrow, sharply toothed lobes. Flowers are yellow with 4 petals that are ⅛–3/16 of an inch long. Fruits are linear and 5/16–7/16 of an inch long with a short beak. Fruits spread at ascending angles to the stem.

Similar Species
This is a large genus that has been revised many times by many authorities. Austrian yellowcress is much larger, more weedy-looking, and generally coarser than the *Rorippa* species native to Alaska, and its nearly spherical fruits make identification straightforward. It has a tall, straight growth habit and doesn't creep or have weak stems. Creeping yellowcress looks more like the native species. It could be mistaken for curvepod yellowcress (*R. curvisiliqua* (Hook.) Bess. ex Britt.) but not bog yellowcress (*R. palustris* (L.) Bess.), because it is smaller than the latter. Curvepod yellowcress has narrow, curved fruits and occurs only rarely in southeast Alaska to the Pacific Northwest and California, whereas creeping yellowcress has been found only in south-central and interior Alaska.

Management
Improving drainage of wet soils on agricultural sites will discourage survival of both species. Some herbicides are effective (CDFA 2005). The effectiveness of hand-pulling is uncertain.

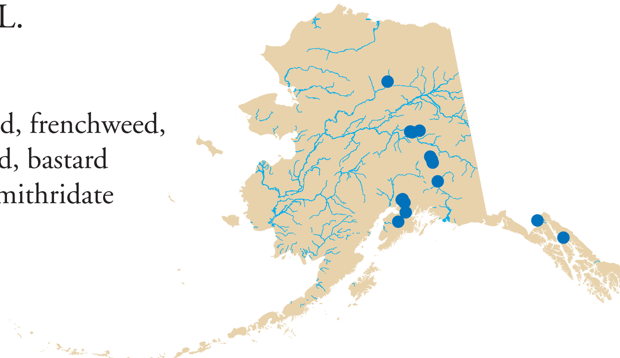
Notes
Austrian yellowcress is a prohibited noxious weed in Alaska (Alaska Administrative Code 1987). The seed is very difficult to clean out of alfalfa seed, which led to the rare situation of this species being listed as a noxious weed in some states prior to its arrival in those states. Creeping yellowcress has become a serious invasive species problem in New Zealand.


USDA Forest Service photo by Elizabeth Bella

Austrian yellowcress.

Field Pennycress

Thlaspi arvense L.



Alternate Names

Pennycress, stinkweed, frenchweed, fanweed, bastardweed, bastard cress, dish mustard, mithridate mustard

Synonyms

Crucifera thlaspi Krause, *Thlaspi collinum* M. Bieb., *Thlaspidea arvensis* Opiz

Description

Field pennycress is an annual plant with a strong odor that grows 6–18 inches high and is hairless and yellowish-green. The stem is mostly simple. Basal leaves are lanceolate, simple, and entire to lobed. Stem leaves have arrowhead-shaped bases. Flowers have 4 white petals and are clustered in racemes at the ends of branches. The fruit is a pod, ⅜–¾ inches long, with a circular outline and a deep notch at the top. Each fruit produces 4–16 seeds and has a broad, papery membrane around its edge.

XID Services photo by Richard Old

Similar Species

Shepherd's purse (*Capsella bursa-pastoris* (L.) Medik., included in this book) is occasionally confused with field pennycress but can be distinguished by its triangular fruit and lack of odor.

Management

Hand-pulling should provide effective control for field pennycress if undertaken prior to seed production and repeated until the seedbank is exhausted, due to its annual habit. Application of herbicide can also be effective.

Notes

This foul-smelling plant was once grown as an oil crop. The odor of field pennycress is the best character for identification even in the seedling stage. It is also known as "fan-weed," with both common names referring to the disk-shaped seed pods.

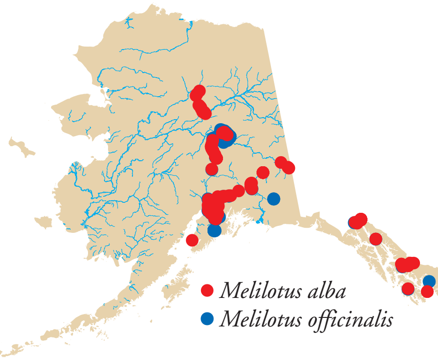
National Park Service photo by Penny Bauder

Field pennycress flowers and fruits.

Fabaceae
(Pea Family)

White Sweetclover

Melilotus alba Medik.



Alternate Names
White melilot, honey clover, honey-lotus, tree clover, white millet

Synonyms
Melilotus albus Medik.

Related Species
Yellow sweetclover
Melilotus officinalis (L.) Lam.

Description
White sweetclover is a biennial plant that can reach 2–5 feet tall and is often branched. Leaves are trifoliate, alternate in arrangement, and ½–2 inches long. The fragrant white flowers are ⅛–¼ of an inch long and arranged in many-flowered terminal and axillary racemes. Plants generally flower and die during the second year of growth. Flowering occurs from June to October. Seed pods are black to dark grey and single-seeded, and the yellow seeds are ovate to kidney-shaped.

UAF Cooperative Extension Service photo by Jamie Snyder

White sweetclover flowers.

Similar Species
White sweetclover is erect, tall, and branching, separating it from all other trifoliate legumes in Alaska except yellow sweetclover. White sweetclover is distinguished from yellow sweetclover by the presence of white rather than yellow flowers, but otherwise they share most botanical characteristics. The information that follows for white sweetclover generally applies to yellow sweetclover as well.

Ecological Impact

Outside of Alaska, white sweetclover degrades natural grassland communities by overtopping and shading native species. If the plant is harvested for hay and is not cured properly, it can contain coumarin, a substance toxic to animals (CUPPID 2003). White sweetclover is visited by introduced honeybees, native solitary bees, wasps, and flies (Eckardt 1987) and associated with 28 plant viruses (Royer and Dickinson 1999). This species alters soil conditions by fixing nitrogen and also has the potential to alter sedimentation rates of river ecosystems (M. Shephard, pers. comm. 2004). White sweetclover has formed large monospecific stands along rivers in southeast, southcentral, and interior Alaska.

USDA Forest Service photo by Michael Shephard

A white sweetclover infestation along Alaska's Stikine River.

Biology and Invasive Potential

Each white sweetclover plant is capable of producing up to 350,000 seeds that can remain viable in the soil for up to 81 years (Klemow and Raynal 1981, Royer and Dickinson 1999). Large seed banks are common, and it can self-pollinate as well as outcross (Eckardt 1987). White sweetclover readily invades open areas. Natural or human-caused

XID Services photo by Richard Old

Trifoliate sweetclover leaf.

fires produce excellent growing conditions by scarifying seeds and stimulating germination. Forest clearings are easily colonized. White sweetclover establishes extensively along early successional river bars in Alaska, while yellow sweetclover may not be as capable of doing so. In mild climates, white sweetclover resprouts readily when cut or grazed. Seeds may be dispersed by water (Eckardt 1987). It is used extensively as a forage crop, soil builder, and nectar source for honeybees (Eckardt 1987, WDNR 2003b). It is a common contaminant of cereal grains and can also be dispersed by vehicle tires (Densmore et al. 2001, Royer and Dickinson 1999). White sweetclover has high seed germination rates, and most germination and development occurs in spring. Temperatures of less than 59°F are optimal for germination. Sweetclover is adapted to pH levels ranging from 5.0 to 8.0 and all soil textures. It is also moderately salt-tolerant. It is shade-intolerant and does not require cold-stratification for germination. It withstands temperatures to –60°F in Alaska and requires 120 frost-free days for reproduction elsewhere. White sweetclover is listed as an "exotic pest" in Tennes-

National Park Service photo by Jeff Heys

Yellow sweetclover.

see, "ecologically invasive" in Wisconsin, and a "weed" in Kentucky and Quebec.

Distribution and Abundance

White sweetclover was brought to North America as early as 1664 as a forage crop. Since then, it has spread from cultivation and thrives in waste places and roadsides. White sweetclover is found in every state in the United States and all but 2 Canadian provinces (Royer and Dickinson 1999). It establishes in aspen woodlands and prairies in Canada and the lower 48 states (Butterfield et al. 1996) and riparian communities in Alaska. Extensive infestations of white sweetclover have been found on the Stikine, Nenana, and Matanuska Rivers, and it and yellow sweetclover are increasingly common and spreading in communities and along roadsides throughout the state, especially in areas of recent construction and road maintenance. White sweetclover is native throughout central Eurasia from the Mediterranean region to Tibet. It has been introduced into South Africa, North and South America, New Zealand, Australia, and Tasmania.

Management

White sweetclover can be managed using mechanical controls such as pulling and cutting, but several treatments will be necessary each year until the seedbank is exhausted. Preliminary results from interior Alaska suggest that cutting second-year (flowering) plants at 1 inch or less in height and pulling first-year plants along with several inches of belowground material would provide effective control (J. Conn, pers. comm. 2005). If first-year plants are cut, they will resprout in the same year and could be cut again at a later time. In Skagway, cutting has not provided effective control. Burning has been used in the midwestern states to stimulate germination, followed by

Photo by Wendy Van Dyk Evans

Leaves and flowers of yellow sweetclover.

a second burn to eliminate seedlings, but attempts to recreate this effect in Alaska have been unsuccessful (J. Conn, pers. comm. 2005). Biological control options have not been investigated because the plant is valued as a forage crop. Due to the long viability of seeds, sites must be monitored for many years following control actions (Eckardt 1987).

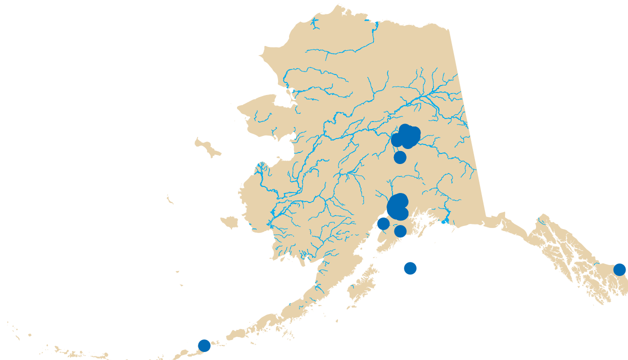
Notes
White and yellow sweetclover are considered valuable honey plants. They are frequently cultivated for animal forage.

UAF Cooperative Extension Service photo by Jamie Snyder

Mature white sweetclover plant.

Bird Vetch

Vicia cracca L.



Related Species
Hairy vetch
Vicia villosa Roth

Alternate Names
Tufted vetch

Description
Bird vetch is a climbing perennial plant with weak stems that climb and cling to structures with coiling tendrils at the end of each leaf. Leaves have 8–10 pairs of narrow leaflets. The bluish-violet flowers are borne on a one-sided, many-flowered raceme. Fruiting pods are narrow and lanceolate.

UAF Cooperative Extension Service photo by Michael Rasy

Bird vetch.

Hairy vetch is an annual or biennial vine. Its stems are climbing and weak, growing up to 6 feet long, and covered in long-spreading hairs. The leaves have 10–20 leaflets, which are linear to narrowly lance-shaped and ¾–1 inch long. Tendrils are well developed. There are 20–60 flowers per inflorescence, generally restricted to one side of the stalk. Flowers are purplish-red and ¾–1 inch long.

Similar Species
There are a number of other climbing, blue-flowered legumes in Alaska. Bird vetch is identifiable by lacking a winged stem, as in *Lathyrus* species, or a stem covered in long-spreading hairs, as in hairy vetch. Bird vetch has entire stipules and a many-flowered, one-sided inflorescence. Hairy vetch can be separated from other Alaskan climbing legumes by its long-spreading hairs and its obliquely at-

tached calyx. Common vetch (*Vicia sativa* L. ssp. *nigra* (L.) Ehrh.) is another exotic plant in Alaska, and it can be distinguished from the other two by the presence of pairs of flowers on short stalks. Giant vetch (*Vicia nigricans* Hook. & Arn. ssp. *gigantea* (Hook.) Lassetter & Gunn.) occurs in Southeast Alaska and can be distinguished from bird vetch by the presence of racemes shorter than the leaves. American vetch (*Vicia americana* Muhl.) occurs sporadically in Alaska and has eight or less pairs of leaflets per leaf. Purple crownvetch (*Coronilla varia* L.), an introduced species, has been planted in the Anchorage area. Purple crownvetch has flowers ranging from pale pink to purple and no tendrils.

Ecological Impact

Both species can overgrow herbaceous vegetation and climb over shrubs like alder and willow (Hultén 1968). They have symbiotic relationships with certain soil bacteria

UAA Alaska Natural Heritage Program photo by Irina Lapina

Bird vetch.

that can alter soil conditions due to the fixation of atmospheric nitrogen (GRIN 2004). They are highly palatable to grazing and browsing animals, although hairy vetch is slightly toxic. Hairy vetch flowers are visited by native bees and may alter pollination ecology in the surrounding area (Aarssen et al. 1986). Removal of dense mats of bird vetch from limbs of conifers has revealed chlorotic needles and limb dieback.


UAF Cooperative Extension Service photo by Michael Rasy

Purple crownvetch, an additional non-native species in Anchorage.

Biology and Invasive Potential

Bird vetch reproduces from copious amounts of seed and by spreading rhizomes. Seeds are viable for many years and large seed banks are common. It establishes in disturbed grassy areas and along roadsides. Seeds are large and not easily dispersed, but they may be carried in the tangled vegetation that clings to maintenance equipment or introduced with topsoil. Bird vetch is adapted to pH levels ranging from 4.9 to 7.0 and all soil textures. It is highly tolerant of fire, drought, and calcium carbonate. It has intermediate shade-tolerance and no cold-stratification is required. Bird vetch withstands the winter temperatures of interior Alaska and requires 110 frost-free days for successful reproduction (GRIN 2004). It is listed as a restricted noxious weed in Alaska (Alaska Administrative Code 1987).

Hairy vetch reproduces entirely by abundant seed. Total seed production likely exceeds 1,000 seeds per square meter for large plants (GRIN 2004). This species persists in cultivated fields but has not been detected in undisturbed sites in Alaska. Seeds are large and not easily dispersed (Welsh 1974). Seeds have a hard dormancy period. This species is adapted to soil pH levels ranging from 6.0 to 7.5 and all soil textures. It is moderately tolerant of drought and calcium carbonate but shade-intolerant. No cold-stratification is required.

Distribution and Abundance

Bird vetch was first planted in Alaska at the Rampart Experiment Station in 1909. It was later planted in Fairbanks and Palmer around 1955 as a potential forage crop and subsequently spread to other areas of the state. It is found in waste places, in old fields, and along roadsides. Originally native to Europe, it now ranges from Alaska and British Columbia east across Canada to Newfoundland and south to Georgia and Alabama (Klebesadel 1980).

Hairy vetch has escaped cultivation outside of Alaska and spread along roadsides, fallow fields, and other disturbed areas (Whitson et al. 2000). It is native to northern Africa, temperate Asia, and Europe (GRIN 2004), was brought to North America to be used as a rotation crop, and now occurs in every state in the United States.

UAF Cooperative Extension Service photo by Jamie Snyder

Bird vetch monopolizes sunlight by climbing and smothering other vegetation.

Management

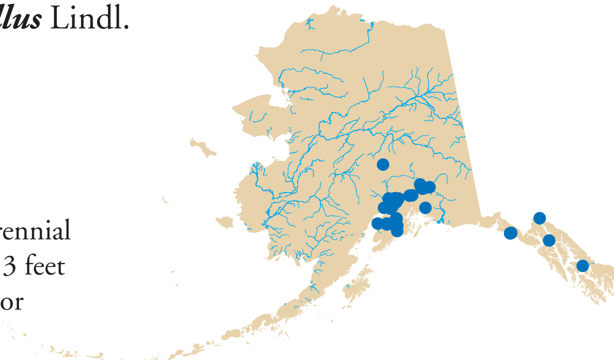
Bird and hairy vetch are difficult to eradicate once established. Hand-pulling can be effective for small infestations, but retreatment will be needed several times per year over the course of several years in order to prevent reproduction and exhaust the seedbank. This also applies to mowing, which would be much more cost-effective for large infestations. Herbicide application is reported to be effective for control of bird vetch.

Notes

In its native Europe, bird vetch is one of the most common flowers of hedgerows, heaths, scrub, and coarse grass, where it is known as tufted vetch due to the large number of flowers.

Bigleaf Lupine

Lupinus polyphyllus Lindl.



Alternate Names
Marsh lupine

Description
Bigleaf lupine is a perennial plant that grows 1 to 3 feet high. Stems are erect or ascending, with few to several growing from the woody base of an otherwise herbaceous stem. Leaves have long stalks and 10–18 oblanceolate to elliptic, acute leaflets. Leaflets are 1½–5 inches long and ¼–1 inch broad. Racemes are 2½–10 inches long. Flowers are blue to purple to deep pink to pale and ½–¾ of an inch long. Pods are 1½–2 inches long and distinctly hairy with 6–10 seeds each.

Photo by Markku Sarela

Similar Species
Bigleaf lupine is distinguishable from native Alaskan lupines by the presence of 10 or more leaflets per leaf.

Management
This species can be eradicated when populations are small by digging up rhizomes, but several weedings may be necessary to eliminate plants resprouting from rhizomes and from the seedbank (Densmore et al. 2001).

Notes
Bigleaf lupine is native to the western United States but not to Alaska (Hitchcock and Cronquist 1973, Hultén 1968).


US Geological Survey photo by Chris McKee

Numerous leaflets (>10) distinguish this species from our native lupine species.

Black Medick

Medicago lupulina **L.**

Alternate Names
trefoil, black clover, none-such, hop medic, spotted burclover, blackseed

Related Species
Alfalfa
M. sativa L.,
Yellow alfalfa
Medicago sativa L. ssp. *falcata* (L.) Arcang.,
Birdfoot trefoil
Lotus corniculatus L.

Photo by James C. Snyder

Flower and fruit of black medick.

Description
Black medick is an annual, biennial, or short-lived perennial plant with hairy prostrate stems growing up to 32 inches long. Leaves are alternate, compound, and composed of 3 ovate, hairy leaflets that are ¼–1¼ inches long. The terminal leaflet is stalked, while the lateral ones are nearly stalkless. Flowers are borne in globe-shaped clusters of 20–50 and are yellow, ⅛–3⁄16 of an inch long, and

Photo by James C. Snyder

Black medick.

composed of 5 united sepals, 5 united petals, 10 stamens, and a single pistil. The fruit is a black, kidney-shaped pod, 1⁄16–1⁄8 of an inch long, that contains a single seed.


USDA Forest Service photo by Michael Shephard

Alfalfa.

Similar Species

Alfalfa (*M. sativa* L.) is another non-native cultivated plant that can be distinguished from black medick by its blue or purple flowers and spirally-coiled pod containing several seeds. It is also found along roadsides. Yellow alfalfa (*Medicago sativa* L. ssp. *falcata* (L.) Arcang.) is very similar to alfalfa but with yellow flowers. It is also showing up in Southcentral Alaska. Birdfoot trefoil (*Lotus corniculatus* L.) is a similar yellow-flowered species, but it has straight seed pods compared to the curved pods of yellow alfalfa.

Management

Hand-pulling provides effective control of black medick. Herbicides are effective when applied immediately after the emergence of leaves.

Notes

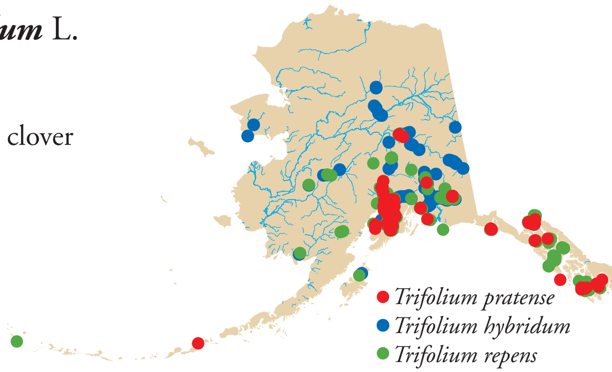
Black medick is native to Eurasia and Africa. Its scientific name comes from *Media*, the country that alfalfa came from, and *lupulina*, Latin for "little hop plant." Both the genus and species were named by Carolus Linnaeus in 1753.


USDA Forest Service photo by Michael Shephard

Birdfoot trefoil.

Alsike Clover

Trifolium hybridum L.



Alternate Names
Ladino clover, Dutch clover

Related Species
White clover
Trifolium repens L.
Red clover
Trifolium pratense L.

Description
Alsike clover is a perennial plant that grows 6–20 inches high with stems that are ascending to erect and do not root at the nodes. Leaves are palmately trifoliate with obovate or ovate to elliptic leaflets. Flowerheads have many flowers that are white to pink to reddish. This is the only white to pink-flowered clover in Alaska that has erect stems and does not root at the nodes.


USDA Forest Service photo by Tom Heutte

Alsike clover.

Red clover is a perennial plant that grows up to 3 feet high and has large, palmately trifoliate leaves with distinctive "chevrons" and large reddish flowerheads.


XID Services photo by Richard Old

Red clover.

White clover is a prostrate perennial plant. The stems are up to 2 feet long, and they root at the nodes. Leaves are alternate and palmately trifoliate with ovate leaflets. Flowers are white to pinkish-white and appear in terminal globe-shaped clusters. Seeds are tiny and round. White clover is the only decumbent white to pink-flowered clover in Alaska.

Similar species

Hultén (1968) describes a number of other introduced *Trifolium* species that occur at isolated locations in Alaska. One native species, *T. wormskjoldii* Lehm., is reported from southern Southeast Alaska and can be distinguished from red clover by the presence of a hairless calyx and umbrella-shaped rather than spherical to egg-shaped flowerheads.

Management

Clover populations are widespread and dense along roadsides in Alaska. It would be virtually impossible to eradicate these species from the state. The priority should be to keep them from colonizing new sites and to report occurrences in undisturbed habitats or remote locations. Hand-pulling can be effective for controlling small infestations, although digging may also be required where plants are well established or for white clover. Several herbicides can be used to control clovers.

Notes

The species name *hybridum* for alsike clover refers to the fact that this species is a cross between white and red clover. All 3 of these species have an extensive list of medicinal uses, although the most common use is as pasture cover or in seed mixes for roadside revegetation.

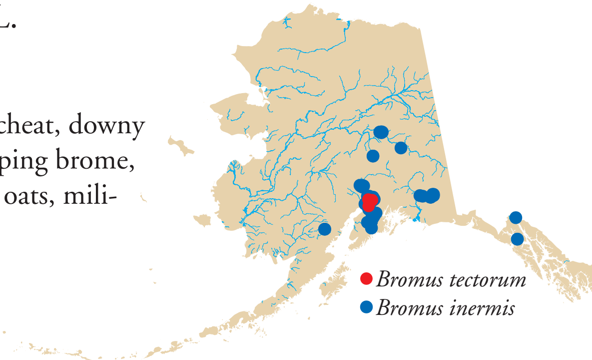
XID Services photo by Richard Old

White clover.

Poaceae
(Grass Family)

Cheatgrass

Bromus tectorum L.



Alternate Names

downy brome, downy cheat, downy chess, early chess, drooping brome, cheatgrass brome, wild oats, military grass

Synonyms

Anisantha tectorum (L.) Nevski

Related Species

Smooth brome
Bromus inermis Leyss. ssp. *inermis*

Description


XID Services photo by Richard Old

Cheatgrass.

Cheatgrass is an annual grass that grows in solitary clumps or tufts. The plant grows 2–28 inches high from a fibrous root system. Stems are smooth, slender, and erect, protruding from a base of many branches. Leaf blades are light green, flat, 2–6 inches long, and covered with soft, white hairs that give the grass its "downy" appearance. As the plant and seed reach maturity, the leaves turn purplish-tan. The panicle is often purple and is 2–6 inches long with several branches dropping to one side. Awns on the lemmas are more than an inch long. Seeds are narrow, about ½ of an inch long, light, and fluffy, and they range from straw-colored to purplish in color. Seedlings are tall with narrow, soft-haired, and twisted first leaves that have a prominent midrib.

Smooth brome is a perennial, rhizomatous grass that grows from an extensive creeping rhizome. Stems are erect, hairless, and up to 5 feet tall. Leaf blades are flat, 6–16 inches long, 3⁄16–5⁄8 of an inch wide, and nearly hairless. Leaf sheaths are closed and have a small V-shaped notch. Auricles are absent. A nodding, open panicle, 2–8 inches long, has 1–4 branches per node. Each branch has several spikelets, each ¾–1¼ inches long and purplish-brown. Seeds are elliptical, pale-yellow to dark-brown, and about ½ of an inch long. A short awn, less than ⅛ of an inch long, may or may not be present.

Similar Species

A number of native and introduced species of *Bromus* are found in Alaska. Cheatgrass is distinct in having very long awns (>1 inch) on the lemmas, drooping heads, and the lower glume with a single, unbranched, ridged vein. Smooth brome grass can be distinguished from other species by its absent to very short awns (<⅛ of an inch) and leaves that have a diagnostic W-shaped crease on the blade. A native Alaskan subspecies, *Bromus inermis* Leyss. ssp. *pumpellianus* (Scribn.) Wagnon, can be distinguished from the exotic subspecies by its pubescent nodes and leaf blades, as well as by awns on the lemmas up to ½ of an inch long.

Photo by Fred Fishel.

Leaf blade and sheath of cheatgrass.

Ecological Impact

Cheatgrass in the intermountain west forms dominant stands in sagebrush, rangelands, and juniper and pine woodlands, displacing native vegetation. It out-competes native species for soil moisture and will invade grasslands and open forests, especially on sandy or gravely soils. The sharp spikelets and rough awns damage the mouth and eyes of native wildlife species. This species, once established, inhibits the survival of seedlings of perennial herbaceous species. Most importantly, it increases the frequency of wildfires. Over 20 diseases of cheatgrass have been reported.

Smooth brome grass is a highly competitive species that forms a dense sod that often excludes other species, thus contributing to the reduction of species diversity in natural areas. Smooth brome is an alternate host for the viral diseases of crops. It has high palatability for grazing animals. In southern Alaska, a hybrid with *B. inermis* ssp. *pumpellianus* occurs (Hultén 1968). Smooth brome grass may inhibit natural succession processes (Densmore et al. 2001, Rutledge and McLendon 1996) and has been observed colonizing a streambank in Alaska with potential impacts on riparian processes.

Biology and Invasive Potential

Cheatgrass grows rapidly and establishes only by seed, producing up to 300 seeds per plant. Seeds remain viable in the soil for 2–5 years (Butterfield et al. 1996). Open ground created by fire or anthropogenic disturbance can be readily colonized by cheatgrass (Carpenter and Murray 2005). Accumulation of leaf and stem litter promotes its germination and establishment. Cheatgrass is spread by wind or attachment to animal fur or human clothing, and it spreads rapidly along transportation corridors such as highways and railroads. It also contaminates grain seed, hay, straw, and soil. Cheatgrass requires fall, winter, or early spring moisture (Mack and Pyke 1983). It germinates best in the dark or in diffuse light and readily germinates under a wide range of temperatures. Rapid spring growth is followed by mature seed production roughly 2 months later. This grass grows in many climatic areas and is most often found on coarse-textured soils; it does not grow well on heavy, dry, or saline soils. Cheatgrass is listed as noxious in Colorado.


XID Services photo by Richard Old

Smooth brome.

Smooth brome reproduces by rhizomes and seeds. The number of seeds produced has a very wide range, from 17 to 10,080 viable seeds per plant (Butterfield et al. 1996, Sather 1987, McKone 1985). Most studies report a range of seed longevity from 2–10 years. This species maintains and readily expands its population base vegetatively and often aggressively. Smooth brome can establish in undisturbed or lightly disturbed areas. Seeds may be transported short distances by wind and ants (Rutledge and McLendon 1996). Often planted as a forage crop or for erosion control, it persists after cultivation and infests surrounding vegetation. Smooth brome can also be transported with contaminated top soil (Densmore et al. 2001). Germination primarily occurs in the early spring but will occur in the early fall if soil moisture is adequate. Adequate soil nitrogen is also necessary for seedling establishment (Butterfield et al. 1996). This species is suited to fine and medium textured soils but not coarse soils. It tolerates pH levels ranging from 5.5 to 8.0 and prefers clays and loamy soils. Smooth brome has low anaerobic-, calcareous-, and saline-tolerance. It grows best in highly fertile soil. It is fire-tolerant, withstands the winter temperatures of interior Alaska, and requires 90 frost-free days for reproduction. It does not require cold-stratification for germination and is not shade-tolerant.


Smooth brome.

The Nature Conservancy photo by John M. Randall

Distribution and Abundance

Cheatgrass is largely a weed of grazed areas and croplands, and it was first identified in the United States in 1861 in New York and Pennsylvania. It now occurs throughout the United States and is especially prevalent on semi-arid lands of the intermountain west. Originally from the Mediterranean region of Eurasia, it has spread throughout Eurasia, North America, Japan, Iceland, Greenland, South Africa, Australia, and New Zealand. In Alaska, cheatgrass has only been found in small patches near Anchorage in disturbed areas such as roadsides (AKEPIC Database 2004).

Smooth brome has escaped from cultivation throughout its range and is often considered to be a highly competitive weed of roadsides, forests, prairies, fields, lawns, and lightly disturbed sites. In Alaska, smooth brome has been widely planted as a pasture and forage crop and as a revegetation grass along roadsides and along the Trans-Alaska Pipeline System corridor (Densmore et al. 2001). It is native to Eurasia and has been introduced throughout the United States and Canada, except in the southeastern states. Smooth brome has been reported from all regions of Alaska, generally confined to roadsides and other disturbed areas (Densmore et al. 2001), although it has been observed colonizing a streambank near the town of McCarthy.


USDA Forest Service photo by Tom Heutte

Typical "nodding" or "drooping" appearance of a cheatgrass inflorescence.

Management

Mechanical methods such as fallows, tillage, and mowing are effective in reducing seed production but do not eliminate plants. Cheatgrass can be controlled with herbicides. No biological control agents are known for use on cheatgrass.

Smooth brome can be a good target for selective control because it often occurs in single stands or grows along with Kentucky bluegrass (*Poa pratensis* L.). Chemical and mechanical control methods have been used with varying levels of success. Most herbicides are not specific for smooth brome. Unfortunately, most current control techniques are not effective in natural communities (J. Conn, pers. comm. 2004).

Notes

Cheatgrass has cost wheat farmers in the United States approximately $350 million in control costs and lost yields each year and has irrevocably altered the ecosystems of native grasslands. Although used by some farmers as feed, it can cause serious damage to livestock's mouth, intestines, nostrils, and eyes; sometimes the intestines are pierced and death results.

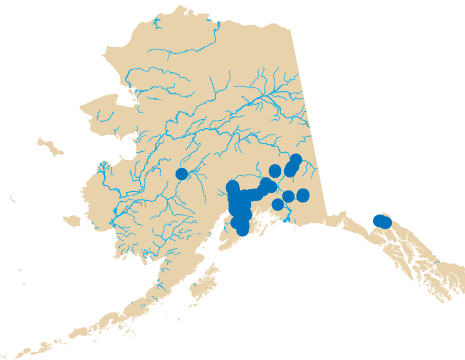
For years many farmers in the midwestern United States believed that some of their wheat kernels turned into smooth brome grass, as it was such a common pest in wheat fields.

XID Services photo by Richard Old

A field of smooth brome.

Quackgrass

Elymus repens (L.) Gould



Alternate Names

Couchgrass, dog grass, quickgrass, scotch, quitch, twitch

Synonyms

Agropyron repens (L.) Beauv., *Elytrigia repens* (L.) Desv. ex B.D. Jackson, *Elytrigia vaillantiana* (Wulfen & Schreb.) Beetle, *Triticum repens* L., *Triticum vaillantianum* Wulfen & Schreb.

National Park Service photo by Penny Bauder

Description

Quackgrass is a strongly rhizomatous perennial plant. The rhizomes are long, highly branched, yellowish-white, sharp-pointed, and somewhat fleshy. Stems are erect and usually 1–3 feet tall. Leaf blades are ¼–½ of an inch wide, flat, and pointed and have small auricles at the junction of blade and sheath. Leaf blades often have a diagnostic slight constriction near the tip and are sparsely hairy above and hairless below. Spikelets are arranged in two long rows and borne flatwise to the stem. The florets are awnless to short-awned. Seeds are elliptical and pale yellow to brown.

Similar Species

A number of *Lolium*, *Agropyron*, and *Elymus* grasses can be confused with quackgrass, but quackgrass can be distinguished by light-colored rhizomes that end in a sharp point. Other identifying characteristics include leaves that are broad, flat, and slightly constricted at the tip and solitary spikelets.

Ecological Impact

Quackgrass is a strong competitor with cultivated crops, native grasses and forbs in fields and grasslands. It can prevent regeneration of native woody species and also hinder the restoration of cropland, rangeland, pasture (in dense stands), and native grasslands. Additionally, it reduces the availability of soil moisture and limiting nutrients. Quackgrass can photosynthesize and grow during early spring, which may suppress species that photosynthesize and grow during the later, warmer part of the growing season. This grass is allelopathic, producing ethylacetate extracts, cyclic hydroxamic acids, and several other chemicals that may be exuded from its shoots and roots and can suppress the growth or reproductive vigor of competing plants (Whitson et al. 2000, Royer and Dickinson 1999, FEIS 1996). Quackgrass may also alter secondary succession following fires, when its cover can dramatically increase (FEIS 1996).

National Park Service photo by Penny Bauder

Roots and rhizome of quackgrass.

Biology and Invasive Potential

Quackgrass is an aggressive perennial grass that reproduces by seed and spreads by a shallow mass of rhizomes. Each stem can produce up to 400 seeds, although 20–40 is common. Seeds may remain dormant in the soil for 2–3 years (Batcher 2002). An individual plant may spread up to 10 feet and give rise to more than 200 new shoots each year (Royer and Dickinson 1999, Whitson et. al. 2000). Quackgrass is unable to resprout (GRIN 2004). It readily colonizes disturbed bare ground but can also invade undisturbed grassy habitats. Seed dispersal mechanisms are unknown, although seeds remain viable after passing through the digestive systems of many domestic animals (Batcher 2002). Many palatable hybrid crosses of quackgrass and other species have been developed and planted for livestock. Seeds germinate either in the fall or spring. Alternating temperatures are required for germination (59° to 77°F daily fluctuations) (Batcher 2002). Quackgrass is adapted to coarse, medium, and fine textured soils with pH levels ranging from 5.2–7.8. It is shade-intolerant, does not require cold-stratification for germination, withstands temperatures to –43°F, and requires only 90 frost-free days per year. Optimum temperatures for growth are between 65° and 80°F. Rhizome growth seems to be favored by low temperatures (<50°F) and long days (>18 hours). Quackgrass is listed as a noxious weed in 5 Canadian provinces and 27 states, including Alaska (Alaska Administrative Code 1987).


UAF Cooperative Extension Service photo by Jamie Snyder

Distribution and Abundance

Introduced from Europe as a contaminant in hay or straw, quackgrass has now been reported from every state in the United States and throughout Canada. This invasive grass is found in both natural grassland communities and agricultural fields. It invades gardens, lawns, roadsides, ditches, and other disturbed, moist areas. Quackgrass can also colonize mixed-grass prairies and open woodlands. It is native from temperate Europe to Central Asia and is now found in North Africa, South America, Australia, New Zealand, and Indonesia (Batcher 2002, Hultén 1968). In Alaska, this plant was first documented in Seward and Haines in 1939 (ALA 2004). More recent records suggest an expanding range, particularly in southcentral Alaska, and it has become a significant agricultural weed in the state. It has been collected from all regions of Alaska (ALA 2004, Densmore et al. 2001, Hultén 1968).

Management

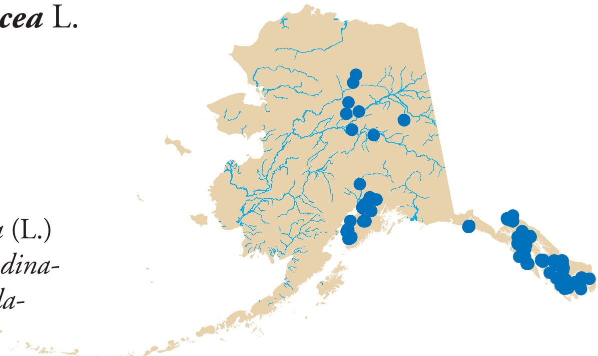
Effective control measures include applying herbicides, burning, tilling, and combinations of these 3 methods. Monitoring for 2 years after treatment is recommended (Batcher 2002).

Notes

Quackgrass rhizomes have been used medicinally since ancient times, possibly for their rich mucilage content. Before World War I, the United States annually imported a quarter-million pounds from Europe for use in products requiring mucilage. A fluid extracted from quackgrass rhizomes was sold as a remedy for kidney and bladder troubles early in the 20th century. The rhizomes, when dried and ground, can also serve as a source of bread flour for human consumption.

Reed Canarygrass

Phalaris arundinacea L.



Alternate Names
Canarygrass

Synonyms
Phalaroides arundinacea (L.) Raeusch., *Phalaris arundinacea* L. var. *picta* L., *Phalaroides arundinacea* (L.) Raeusch. var. *picta* (L.) Tzvelev

Description

USDA Forest Service photo by Michael Shephard

Reed canarygrass is a robust, cool-season, sod-forming perennial plant that produces culms of ½–5 feet in height from creeping rhizomes. Leaf blades are rough, flat, 2–6 inches long, and ¼–½ of an inch wide. Flowers are arranged in dense, branched panicles that are 2¼–7 inches long. Spikelets occur in clusters on short, knobby branches. They are reddish to purplish at the base, become straw colored and compact at first, open at maturity, and become slightly spreading during full bloom. Reed canarygrass is morphologically variable, with more than 10 varieties described. It is unique in having a single flower per spikelet and an open, branched inflorescence rather than a narrow spike as in timothy.

Similar Species
Both Eurasian and native ecotypes of reed canarygrass are thought to exist in the United States. The Eurasian variety is considered more aggressive, but no reliable method exists to tell the ecotypes apart in the field. The vast majority of reed canarygrass in Alaska is believed to be derived from the Eurasian ecotype. However, some northern populations

may be native genotypes. Reed canarygrass also resembles another exotic species, orchard grass (*Dactylis glomerata* L., included in this book), but can be distinguished by its wider blades, a narrower, more pointed inflorescence, and the lack of hairs on glumes and lemmas. The native bluejoint grass (*Calamagrostis canadensis* (Michx.) P. Beauv.) may be mistaken for reed canarygrass, especially in the spring, but the highly transparent ligule on reed canarygrass is helpful in distinguishing it from this and other species.

USDA Forest Service photo by Michael Shephard

Ecological Impact

Reed canarygrass forms dense, persistent, monotypic stands in wetlands that exclude and displace other plants and may also slow stream flow, eliminating the scouring action needed to maintain the gravel river bottoms essential for salmon reproduction. Invasive populations of reed canarygrass are believed to be the result of crosses between cultivated varieties and native North American strains (Merigliano and Lesica 1998). Reed canarygrass grows too densely to provide adequate cover for small mammals and waterfowl. When in flower, it may cause hay fever and allergies. It promotes silt deposition and the consequent constriction of waterways and irrigation canals. Reed canarygrass may alter soil hydrology.

Biology and Invasive Potential

Reed canarygrass reproduces from seed and vegetatively by stout, creeping rhizomes. Invasion is promoted by disturbances such as ditching of wetlands, stream channelization, overgrazing, and alteration of water levels. Furthermore, reed canarygrass has been planted widely for forage and erosion control. Both rhizome fragments and seeds may wash downstream along streams and rivers. Seeds germinate more readily immediately following maturation. Mechanical damage or increased light or oxygen successfully breaks seed dormancy. Reed canarygrass is adapted to fine and medium textured soils with pH levels ranging from 5.5 to 8.0. It is highly tolerant of anaerobic soils, is shade-intolerant, and no cold-stratification is required for germination. It withstands temperatures to –38°F, and requires 120 frost-free days. Reed canarygrass is listed as a noxious weed in Washington and as an invasive weed in Nebraska, Tennessee, and Wisconsin.

Distribution and Abundance

In the United States, the first agronomic trials of reed canarygrass probably began in the 1830s, and it is now widespread in North America. Reed canarygrass is common in stream banks, logging sites, margins of springs, and wet meadows in Alaska, southern Yukon, and northern British Columbia. Elsewhere it has shown the ability to invade and dominate sedge meadows and wet prairies (Henderson 1991). Reed canarygrass is still planted to stabilize soil along roadsides in Alaska. There is no consensus on the nativity of reed canarygrass in North America (Merigliano and Lesica 1998). According to Hultén (1968), it is native to Europe, but some authors view it as native to Asia and North America as well (Welsh 1974). Its present-day range extends throughout Eurasia and North America, where it is found primarily in northern latitudes.

Variegated leaves of an ornamental cultivar of reed canarygrass.

Management

Mechanical control methods may be feasible, but the strategy will be quite labor-intensive and require a long-term time commitment. No herbicides are selective enough to be used in wetlands without the potential for injuring native species, although fire has been used, in combination with other treatments, to control reed canarygrass in wetlands. Plants reestablish quickly from seeds after control methods are used, so areas should be monitored for several years after control events. No biological control methods are known that are feasible for use in natural areas.

Notes

Reed canarygrass has been used for roadside revegetation throughout southeast Alaska and appears to be naturalizing in many of the stream systems on various islands. A cultivar called ribbon grass is used by gardeners in Alaska and has green leaves striped with white.

USDA Forest Service photo by Michael Shephard

Smooth Cordgrass

Spartina alterniflora Loisel.

Related Species

Dense-flowered cordgrass
S. densiflora Brongn.
Saltmeadow cordgrass
S. patens (Ait.) Muhl
English cordgrass
S. anglica C.E. Hubbard

Georgia Coastal Ecosystems LTER photo by Steven C. Pennings

Smooth cordgrass.

Description

Smooth cordgrass plants grow 2–4 feet tall. Stems are hairless and 2–8 feet long with dense colorless flowers. Leaf blades are 8–24 inches long, tough, greenish-gray in color, and ¼–⅝ of an inch wide becoming folded at the tip. Plants are deciduous, and stems die back at the end of each growing season. Panicles of many spikes are closely appressed and overlapping. The inflorescence is 16 inches long with 5–20 spike-like branches up to 5 inches long each. Flowers occur only on branch undersides. This plant grows in the intertidal zone between mean high water and mean low water.

Similar Species

There are no native Spartina species in Alaska, but 3 other exotic species now occur on the Pacific coast. Dense-flowered cordgrass (*Spartina densiflora* Brongn.) plants are 1–5 feet tall. Leaf blades are narrow, long, inrolled, tough, grayish-green, and between ¼ and ⅜ of an inch wide. The inflorescence is 2–12 inches long with dense, compact, and colorless flowers. It grows in the upper intertidal zone near mean high water, among glasswort (*Salicornia* spp.) or just below on open mud.

Exotic saltmeadow cordgrass (*Spartina patens* (Ait.) Muhl.) plants are 1–4 feet tall. The hairless leaf blades are 4 to 20 inches long and ⅜–1½ inches wide at the base. When fresh, leaf blades are generally inrolled and have ridges on the upper surface. Flowers occur in 2 to several spikes that are appressed to somewhat spreading. The inflorescence is 2–9 inches long with 1–4 inch spikes that ascend or diverge from the stem. The flowers are colorless. Its habitat includes middle to upper salt marsh zones, dunes, swales, sand flats, and coastal scrublands.

Photo courtesy of NRCS Plant Materials Program

A dense stand of smooth cordgrass.

English cordgrass (*Spartina anglica* C.E. Hubbard) is a hybrid species with highly variable morphology. Plants are stiff and 1–4 feet tall, with stout stems that are 3⁄16 of an inch or more in diameter. Leaves protrude at angles more or less perpendicular to the stem. The leaf blades are flat or inrolled, persistent or falling, green or grayish-green, and 3⁄16–½ of an inch wide. Flowers are in numerous, erect, contracted panicles, consisting of closely overlapping spikelets in 2 rows on one side of the stalk. The inflorescence is 4–16 inches long with 2–12 spikes. Spikes are 6–8 inches long. Flowers are colorless. Habitats include low to high marsh zones.

Ecological Impact

All *Spartina* species are perennial plants that spread by seeds or rhizomes, grow in ring-shaped clones, coalesce into extensive monospecific stands, and lead to the conversion of mudflats and channels into marsh. The loss of mudflat and channel may impact foraging for numerous shorebirds and waterfowl. Increased rates of sedimentation can lead to clogging of sloughs, raising them to the overall elevation of the marsh plain. Cordgrass can displace glasswort (*Salicornia virginica* L.), which provides habitat for a number of bird and animal species, as well as sea grass

(*Zostera marina* L.) and arrow-grass (*Triglochin maritimum* L.). Studies indicate that populations of invertebrates among smooth cordgrass clones are smaller than populations in intertidal mudflats. Juvenile chum salmon may lose access to important food resources and the benefits of other important attributes of mudflat nurseries.

Biology and Invasive Potential

All 4 species are saltwater-loving grasses that colonize tidal marshes. In its native range, smooth cordgrass exhibits varying growth forms in different salt marsh zones. A tall form occurs along creek banks and drainage channels. Landward of the tall form, an intermediate form occurs that grades into a stunted form at the marsh interior.

Distribution and Abundance

There are no cordgrass species in Alaska as of early 2005, but they are included in this book due to their apparent migration northward into British Columbia and the severity of their impacts.

Smooth cordgrass is native to the east coast of the United States. It is now commonly found on the west coast in marshes of San Francisco Bay in California, Siuslaw Estuary and Willapa Bay in Oregon, and Puget Sound and Juan de Fuca Strait in Washington.

English cordgrass is found in San Francisco Bay and Marin County in California and Skagit, Island, Snohomish, San Juan, Kitsap, Jefferson, and King Counties in Washington. It was recently found in British Columbia.

Dense-flowered cordgrass is native to South America. It is now found in Humboldt Bay, San Francisco Bay, and Marin County in California and Grays Harbor in Washington.

Saltmeadow cordgrass is native to the upper reaches of salt marshes on the east coast of the United States. It now occurs in California, Oregon, Washington, British Columbia, China, and the Mediterranean.

Management

Smooth cordgrass can grow on very soft, deep mud, making infestations inaccessible by foot or boat. Hand-pulling or digging of seedlings is suggested for smaller infestations (< 5 acres). Special care must be taken to remove both shoots and roots. Shading small *Spartina* clones with woven geotextile fabric has been successful in Oregon. Mowing or herbicide treatment can reduce growth and limit seed set (Sytsma et al. 2003, Daehler 2000).

Notes

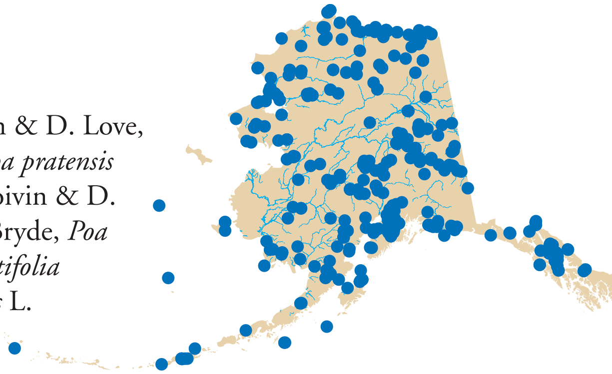
Cordgrass roots are a favorite food of snow geese. *Spartina* species have taken over vast tracts of tidelands along the west coast of the United States, increasing rates of sedimentation and marsh elevation, reducing native biodiversity, and impacting waterfowl habitat. Infestations of cordgrass have irrevocably altered the character of ecosystems in most of these areas. One of the most famous examples of complete alteration by smooth cordgrass comes from San Francisco Bay and its vicinity.

Photo by Jean Everett

Saltmeadow cordgrass.

Kentucky Bluegrass

Poa pratensis L.



Synonyms
Poa agassizensis Boivin & D. Love, *Poa angustifolia* L., *Poa pratensis* L. ssp. *agassizensis* (Boivin & D. Love) Taylor & MacBryde, *Poa pratensis* L. ssp. *angustifolia* (L.) Lej., *Poa pratensis* L. var. *angustifolia* (L.) Gaudin, *Poa pratensis* L. var. *domestica* Laestad., *Poa pratensis* L. var. *gelida* (Roemer & J.A. Schultes) Bocher, *Poa pratensis* L. var. *iantha* Wahlenb.

XID Services photo by Richard Old

Description
Kentucky bluegrass is a strongly rhizomatous, mat-forming perennial grass that ranges from 3 inches to 3 feet tall. Its culms are slender and slightly flattened. Leaf blades are flat to folded and smooth, with a double mid-rib. Leaf tips are prow-shaped as in most *Poa* species. Sheaths are rounded to somewhat keeled, partially closed, and smooth. The inflorescence is a broadly pyramidal compact panicle, and spikelets are coarse and large.

Similar Species
Kentucky bluegrass can be separated from other Alaskan *Poa* species by a combination of traits. It has large anthers, about 1/16 of an inch long, and a tuft of long, cobweb-like hairs at the base of the lemma but not between the keel and marginal nerve. It has normal glumes (short, broad, and rounded), is rhizomatous and mat-forming with flat leaves, and produces a compact panicle with 3 or more branches in the lowest whorl.

Ecological Impact

Kentucky bluegrass is known to compete with native species, which can reduce species diversity and alter plant community composition (Wisconsin DNR 2003a, Rutledge and McLendon 1996, Sather 1996). It can be an important element in the diets of elk, mule deer, and bighorn sheep, and the leaves and seeds are eaten by numerous species of small mammals and songbirds as well as rabbits, wild turkeys, and grouse. Grasslands dominated by Kentucky bluegrass provide habitat for species of small mammals and birds (Uchytil 1993). It is a host for a number of pest insects and diseases (Butterfield et al. 1996). In Alaska, this species is rarely found in undisturbed sites. Kentucky bluegrass may retard or cause long-term alterations to successional patterns (Butterfield et al. 1996), although it does not appear to seriously hamper succession in Alaska.

XID Services photo by Richard Old

Biology and Invasive Potential

Kentucky bluegrass is reproductively aggressive, spreading from both seed and rhizomes. It can produce 200 seeds per panicle in the first year, and a maximum of 560 seeds per square meter has been reported from a pasture in the Netherlands (Sather 1996). Rhizomes can extend the horizontal growth of the plant as much as 18 square feet in 2 years. Kentucky bluegrass readily establishes by seed on disturbed sites. It is commonly planted as a lawn and pasture grass, and over 100 cultivars have been developed (Butterfield et. al. 1996). It has been used in Alaska, Colorado, and Wisconsin for soil stabilization along highway roadsides (FEIS 1996). Kentucky bluegrass germinates in the fall, and freshly harvested seeds require a cold treatment at 41° to 59°F for 10–14 days for germination. This species can germinate from depths as great as 42 inches within the first

4 years after burial (Sather 1996). Kentucky bluegrass is adapted to fine and medium textured soils with pH levels ranging from 5.0 to 8.4. It is shade-intolerant, withstands the winter temperatures of interior Alaska, and requires 90 frost-free days. It has a relatively high nutrient requirement. Optimum temperatures for growth are between 61° and 90°F, and optimum precipitation ranges from 20–50 inches per year (GRIN 2004). Kentucky bluegrass is listed as an invasive weed in Nebraska and Wisconsin.

U.S. Geological Survey photo by Forest and Kim Starr

Distribution and Abundance

Kentucky bluegrass is found in meadows, open woodlands, and prairies outside of Alaska and in disturbed sites throughout the world. In the western United States it frequently occurs as an understory dominant in aspen, ponderosa pine, sagebrush, and riparian habitats (Uchytil 1993). Kentucky bluegrass is generally considered to be exotic to North America, although some botanists argue that populations in remote mountain meadows of the western United States may be native (Gleason and Cronquist 1963). It has naturalized in all states and in Canada from coast to coast and has been introduced into South America, New Zealand, and Australia. Kentucky bluegrass has been collected at many sites from all across Alaska (ALA 2004, Hultén 1968).

Management

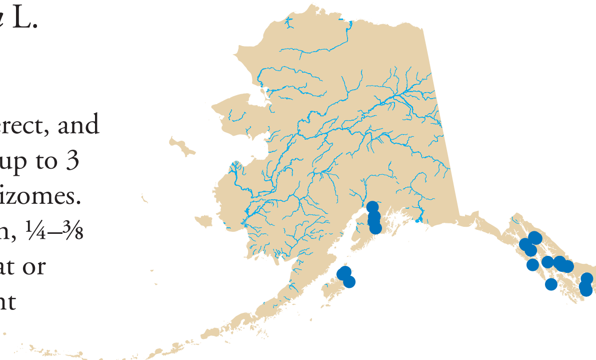
Kentucky bluegrass does not generally grow in pure stands except when planted as a turf grass. Its rhizomatous habit permits it to penetrate areas between plants. Eradication of the grass may not be feasible, since practices that will damage it generally harm co-occurring species (Sather 1996). Herbicide application and burning may be useful. The only realistic management goals may be to reduce vigor and contain its spread (Butterfield et al. 1996, Uchytil 1993).

Notes

Kentucky bluegrass, along with orchard grass, is responsible for the majority of hay fever attacks in the summer in North America. It originally came from Eurasia and northern Africa.

Orchardgrass

Dactylis glomerata L.



Description

Orchardgrass has tall, erect, and hairless stems growing up to 3 feet high from short rhizomes. Leaves are grayish-green, ¼–⅜ of an inch wide, and flat or folded with a prominent rough-textured midrib and rough margins. The inflorescence is a panicle that is 1–8 inches long, with the lower 2–3 branches elongate and upper branches short and appressed. Spikelets are tufted panicles of one-sided clusters at the ends of long, stiff, rough branches.

Photo by Paul L. Redfearn, Jr.

Similar Species

Reed canarygrass (*Phalaris arundinacea* L., included in this book) has wider leaves and a more narrow and pointed inflorescence and is capable of growing in wetter habitats than orchard grass.

Management

Orchardgrass tolerates close mowing and may become a problem in lawns. Since its rootstocks do not spread, pulling out young plants can be an effective control method for small infestations. Generally, mechanical methods will not control orchard grass because it has evolved under cultivation. In some cases, repeated mowing may stimulate tillering. Numerous herbicides provide effective control for orchard grass but are not specific to it.

Notes

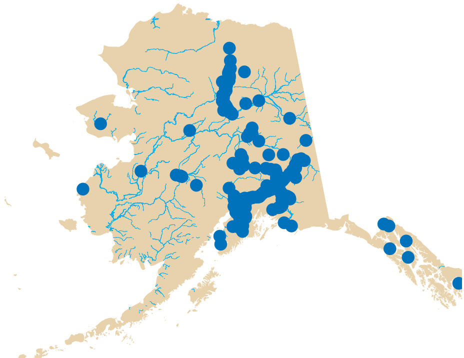
The scientific name of this plant is improbably featured as an album name for the British metal band Candlemass, released in the UK in 1998. This plant is native to Europe and has been in cultivation in the United States for over 200 years. It is a folk remedy for tumors and kidney and bladder ailments.

KULAK photo by Paul Busselen

KULAK photo by Paul Busselen

Foxtail Barley

Hordeum jubatum L.



Alternate Names
squirreltail barley

Description
This annual or biennial grass has pale green to reddish spikes on the inflorescence with numerous bristle-like awns. Culms are erect or decumbent at the base. Leaf blades are usually flat, ⅛ to ¼ of an inch wide, and glabrous. Sheaths are glabrous, and ligules often appear decayed and terminate abruptly at less than 1⁄16 of an inch long. The inflorescence is a terminal spike, erect to nodding, 1–4 inches long, and bristly due to the long, slender, spreading awns of glumes and lemmas. Awns are 1–2½ inches long.

XID Services photo by Richard Old

Similar Species
Two other Hordeum species occur in Alaska. Common barley (*Hordeum vulgare* L.) sometimes escapes cultivation and can be distinguished by its broad, blunt glumes lacking awns. A native grass, meadow barley (*Hordeum brachyantherum* Nevski), looks similar to foxtail barley, but its awns are shorter, about ⅜ of an inch long. Foxtail barley may also be mistaken for quackgrass (*Elymus repens* (L.) Gould, included in this book) before the seedheads are present, but it lacks rhizomes.

USDA Forest Service photo by Elizabeth Bella

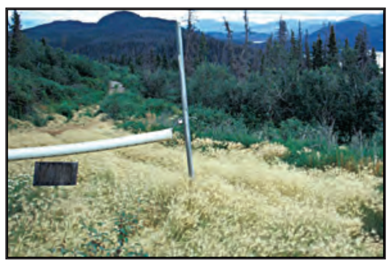
Management

Foxtail barley is thought to be native to Alaska, but it is also considered a potentially invasive weed that readily colonizes areas of anthropogenic disturbance. Planting disturbed areas with desirable plants and controlling water levels is effective in reducing the amount of foxtail barley (Tesky 1992). It can also be controlled with herbicides (MAFRI 2001).

USDA Forest Service photo by Michael Shephard

Notes

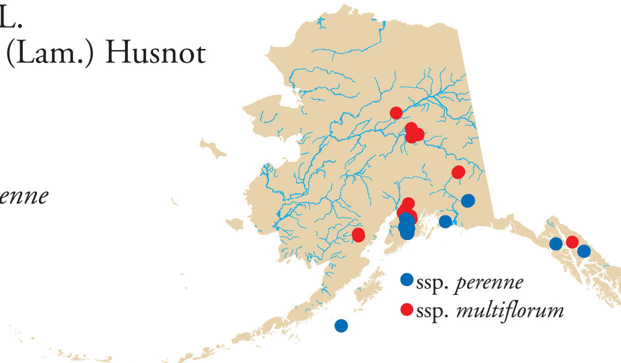
The barbed awns around foxtail barley seeds can work their way into the gums and digestive tracts of animals when eaten, causing irritation and inflammation. This geographically widespread grass could be indicative of Hudson Bay store activity in an area in the past or Northern Store activity in the present, as freighter canoes built in Quebec near Montreal were packed with straw for shipping and foxtail barley seeds were often present in that straw.



National Park Service photo by Jeff Heys

Italian Ryegrass

Lolium perenne L.
ssp. ***multiflorum*** (Lam.) Husnot



Related Species

Perennial ryegrass
L. perenne L. ssp. *perenne*
Darnel ryegrass
L. temulentum L.

Description

Italian ryegrass is a short rhizomatous annual or biennial bunchgrass that grows 1–3 feet high. Culms are generally erect and often purplish at the base. Leaves are dark green, shiny, and prominently veined with flat blades that are ⅛–¼ of an inch wide and have conspicuous auricles. The spikes are distinctive, with alternately arranged spikelets that are arranged edgewise along the flowering stem, giving the spike a flattened appearance. The lemmas are conspicuously awned.


Italian ryegrass.

USDA Forest Service photo by Elizabeth Bella

Similar Species

There are a number of similar looking grasses in Alaska, but *Lolium* species have only one spikelet per node, oriented with the narrow edge towards the main axis of the inflorescence. The red-tinged base of Italian ryegrass, its awned lemmas, and its short glumes distinguish this plant from two other exotic species, perennial ryegrass (*L. perenne* L. ssp.) and darnel ryegrass (*L. temulentum* L.).

Management
Herbicides have been used to control plants in agricultural settings, but Italian rygrass is gaining resistance to several herbicides (Carey 1995). It has not persisted at some sites where it was previously planted in Alaska (Densmore et al. 2000).

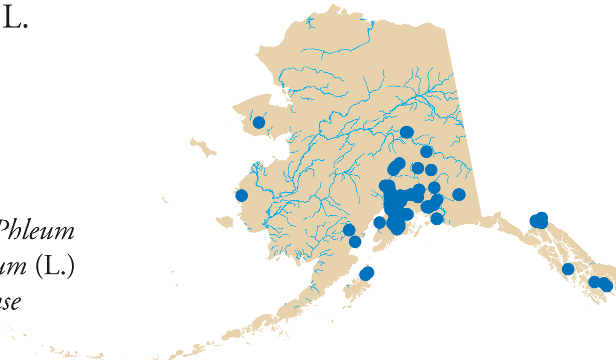
Notes
Italian ryegrass has been used as an emergency grain crop in times of starvation in Europe.


XID Services photo by Richard Old

Perennial ryegrass.

Common Timothy

Phleum pratense L.



Alternate Names
timothy

Synonyms
Phleum nodosum L., *Phleum pratense* L. var. *nodosum* (L.) Huds., *Phleum pratense* L. ssp. *nodosum* (L.) Arcang.

Description
Common timothy is a short-lived perennial bunchgrass with flowers borne in compact, cylindrical panicles that are spike-like, dense, and several times longer than wide. The horned spikelets are distinct. Stems are erect, purple or brown at the nodes, and often bulbous at the base. Leaf blades are flat, ⅛–¼ of an inch wide, and smooth to slightly rough; sheaths are smooth. The spike is 1–5 inches long, very condensed, cylindrical, and ¼–⅜ of an inch thick. Spikelets are one-flowered, compressed, and green or often purple-tipped, and they turn dull brown with age.


USDA Forest Service photo by Dave Powell

Similar Species
Alpine timothy (*Phleum alpinum* L.) is a common native plant at higher elevations in Alaska. The panicle is less than half as long as that of common timothy, and the uppermost leaf sheath is inflated.

Management

Hand pulling can be used for common timothy. Frequent cutting or mowing can weaken overall plant health (Rutledge and McLendon 1996). Common timothy stands also become weak under continuous grazing (GRIN 2004).

Notes

Common timothy comes from Europe but is widely naturalized in North America. It was first introduced into the U.S. in 1720 by Timothy Hansen, giving the plant its common name.


XID Services photo by Richard Old

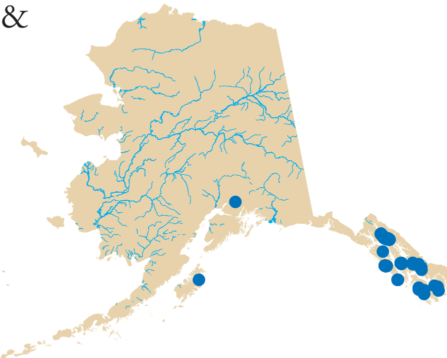
Inflorescence of common timothy.


XID Services photo by Richard Old

Polygonaceae
(Buckwheat Family)

Japanese Knotweed

Polygonum cuspidatum Sieb. & Zucc.



Alternate Names

Japanese bamboo, fleeceflower, Mexican bamboo

Synonyms

Fallopia japonica (Houtt) Dcne, *Plueropterus cuspidatum* (Sieb. & Zucc.) Moldenke, *Plueropterus zuccarinii* (Small) Small, *Polygonum zuccarinii* Small, *Reynourtia japonica* Houtt

USDA Forest Service photo by Brad Krieckhaus

Japanese knotweed.

Related Species

Giant knotweed
Polygonum sachalinense F. Schmidt ex Maxim
Bohemian knotweed
Polygonum x bohemicum (J. Chrtek & A. Chrtkova) P.F. Zika & A.L. Jacobson

Description

Japanese knotweed stems grow up to 10 feet tall and are hollow and bamboo-like, with thickened nodes where the leaf stalks meet the stem. Nodes are surrounded by thin papery sheaths, and stems are angled slightly at each node. Leaves are broadly oval, satiny-textured, and up to 6 inches long with short stalks. Inflorescences are branched sprays of small white to greenish-white flowers in late summer. Giant knotweed has very large leaves, up to 18 inches long. To differentiate the species, look at leaves from the middle of a shoot, not the shoot tip leaves, which are highly variable. Leaves of Japanese knotweed are flat-based, with an acutely tapering tip, whereas leaves of giant knotweed have a deeply notched base with a more gradually tapering tip, and leaves of bohemian knotweed are intermediate between the other two species. Hairs on the midvein on the underside of the leaf are also diagnostic with a 10X handlens. Hairs of giant knotweed are multicellular, kinky, and long, whereas hairs of bohemian knotweed are shorter and unicellular with a broad base. Hairs of Japanese knotweed are reduced to bumps.

USDA Forest Service photo by Tom Heutte

Bohemian knotweed.

Similar Species

Black bindweed (*Polygonum convolvulus* L., included in this book), is a viny species occasionally found in Alaska with smaller leaves and of smaller stature than Japanese knotweed. Bukhara fleeceflower (*P. baldschuanicum* Regel) is found in the Pacific Northwest and has pink-tinted flowers. Cultivated knotweed (*P. polystachyum* Wallich ex Meisn.), found in California and Oregon, is characterized by willow-shaped leaves and often forms dense colonies. All native species of *Polygonum* in Alaska are considerably smaller than Japanese knotweed and do not have broad leaves.

Ecological Impact

Japanese knotweed forms single-species stands that reduce biodiversity by outshading native vegetation. This species clogs waterways and lowers the quality of habitat for wildlife and fish. It also reduces the food supply for juvenile salmon in the spring. Dead stems and leaf litter decompose very slowly and form deep organic layers that prevent native seeds from germinating, thereby altering the succession of native plant species. During dormant periods, dried stems and leaves can create a fire hazard.

Biology and Invasive Potential

Japanese knotweed reproduces primarily by vegetative regeneration of rhizomes and fresh stems. Very small fragments of rhizome, as little as 1⁄40 of an ounce, can produce a new plant. In Alaska seed production is unknown, however thus far in Britain it varies from none when fertile male plants are rare to several hundred seeds nearer to sources of giant knotweed and Bukhara fleeceflower (Beerling et al. 1994). No systematic study of seed longevity has been undertaken, but seeds stored at room temperature retained viability for four years. This species is capable of establishment in native habitats with little or no observable disturbance. Plant fragments washed downstream are capable of producing new colonies. Dispersal across marine waters has also been reported (Beerling et al. 1994). Fruits disperse primarily with wind.


XID Services photo by Richard Old

Japanese knotweed.

Japanese knotweed has been planted as an ornamental in southeast Alaska and in the Anchorage area and commonly escapes from gardens. Transportation of soil containing rhizome fragments on construction equipment is also possible. Germination rates are high either after five months of storage at room temperature or three months at 35° to

40°F. Japanese knotweed has been observed growing in a variety of soil types including silt, loam, and sand, with pH levels ranging from 4.5 to 7.4. It requires high light environments and can tolerate high temperatures, salinity, and drought (Seiger 1991). Japanese knotweed is listed as noxious in California, Oregon, and Washington.

Distribution and Abundance

Japanese knotweed was introduced to North America in the late 1800s. It is now widely found in at least 42 of the United States and most Canadian provinces. Infestations are common around most communities in southeast Alaska (AKEPIC Database 2004). This species is often found near water sources, such as along streams and rivers, in disturbed areas, in utility rights-of-way, in neglected gardens, and around old homesites. It has also been observed growing in the understory of alder thickets in Alaska. In Europe, the northern limit of Japanese knotweed distribution corresponds with the boundary of 120 frost-free days (Beerling et al. 1994). It is native to Japan, North China, Taiwan, and Korea and is now a serious invasive species problem in mainland Europe, the United Kingdom, North America, and New Zealand.

XID Services photo by Richard Old

Japanese knotweed flowers.

Management

For Japanese knotweed, hand-pulling is extremely labor intensive and effective only for small initial populations. Application of herbicide is very effective but is hampered by the height of plants. To get around this problem, one can cut or bend plants over in mid-summer and then spray herbicide on the foliage of regrowing plants before they get too tall to spray. Herbicide application on cut stems is ineffective. Application to foliage with a wick applicator or paintbrush has more limited effectiveness but can minimize damage to desirable vegetation where the knotweed is interspersed with native species. Stem injection devices are commercially available. When performing stem injection, it is necessary to mark which stems have been injected to track progress. Expect to see sparse growth of small, stunted plants one year after treatment. Several years of monitoring and follow-up treatments are recommended for any control method used on Japanese knotweed.

Notes

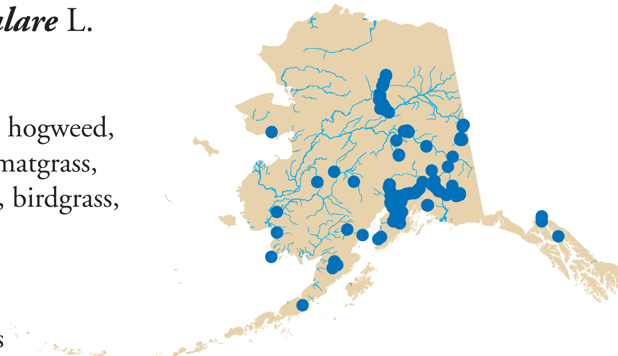
Knotweed is a rapid colonizer of bare soil and has been used to stabilize soil on steep slopes. It has been spread around many of our communities by dumping soil and possibly cut brush along roadsides. Single plants may cover several acres. One clump along the beachfront south of Juneau is over 400 feet long. This species was introduced to England in 1825 for use as an ornamental and was subsequently introduced to the United States for use in ornamental hedges and for erosion control. In Japan, the plant is commonly called "itadori," which means strong plant.

USDA Forest Service photo by Tom Heutte

Bohemian knotweed.

Prostrate Knotweed

Polygonum aviculare L.



Alternate Names
knotweed, wireweed, hogweed, common knotgrass, matgrass, doorweed, pinkweed, birdgrass, stonegrass, waygrass

Description
Prostrate knotweed is an annual plant that grows prostrate and mat-like, with long, spreading branches, small leaves, and tiny flowers in the axils of the leaves. Prostrate stems grow up to 3 feet long. Leaves are alternate, oval, apex-pointed, and hairless. Stipules are pointed and toothed. Stems are tough, wiry, and hairless, with longitudinal grooves and a sheath surrounding the stems at the nodes. Stems generally sprawl over the ground surface but may have an erect habit among other plants. Flowers are small and pink, with 1–5 in axillary clusters.

KULAK photo by Paul Busselen

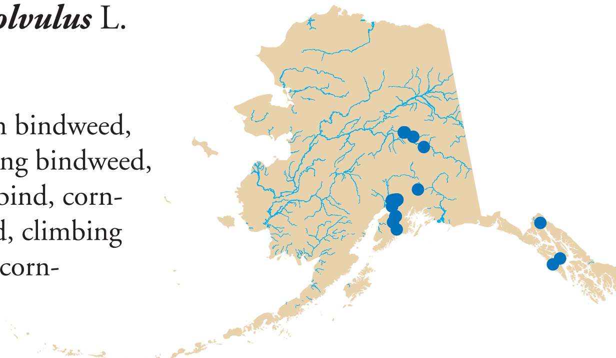
Management
Plants are easily pulled up by hand, although several weedings may be necessary to eliminate plants germinating from buried seeds (Densmore et al. 2001).

Notes
The origin of prostrate knotweed is unknown, but it may have come from Eurasia. Other common names include waygrass and doorweed, reflecting its propensity to grow in firmly packed soils. This plant has been shown to be an important food for partridge chicks and is also a favored food of seed-eating birds.

KULAK photo by Paul Busselen

Black Bindweed

Polygonum convolvulus L.



Alternate Names
wild buckwheat, corn bindweed, ivy bindweed, climbing bindweed, knot bindweed, bearbind, cornbind, black knotweed, climbing buckwheat, dullseed cornbind.

Synonyms
Fallopia convolvulus (L.) A. Love, *Fagopyrum convolvulus* (L.) H. Gross, *Tiniaria convolvulus* (L.) Webb. & Moq., *Bilderdykia convolvulus* (L.) Dumort

XID Services photo by Richard Old

Description
Black bindweed is an herbaceous annual climbing plant with a thin, spindle-formed, deep root, and it is often profusely branched. The stem is slender and 2–100 inches long with long internodes. Leaves are alternate, ¾–2½ inches long, long-petioled, elongate-ovate, pointed, and heart or arrow-shaped. Flowers are small, up to 3/16 of an inch in diameter, and grouped in short axillary clusters of 2–6 flowers or in terminal interrupted or spike-like racemes. The fruit is a triangular achene, ⅛–3/16 of an inch long, minutely pitted, brownish-black, and dull, with an obtuse base and pointed top.

XID Services photo by Richard Old

Similar Species
Superficially resembling field bindweed (*Convolvulus arvensis* L., included in this book), black bindweed can be distinguished by its annual habit, pointed leaves, papery leaf sheaths, and small green flowers. Field bindweed has white to lavender, large, showy, and trumpet-shaped flowers.

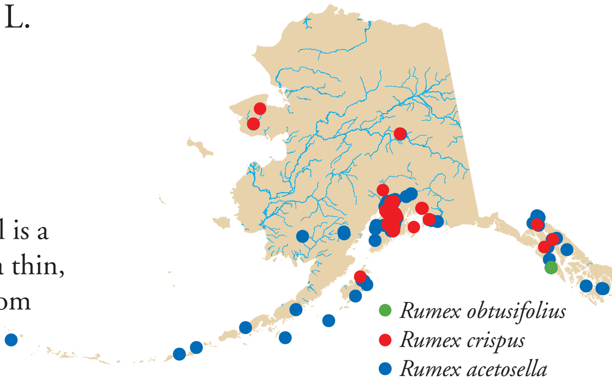
Management
Tillage has limited success for controlling black bindweed because of the large seed bank created by this species (Holm et al. 1991). Hand-pulling provides effective control if supplemented by follow-up monitoring and retreatment. A number of selective herbicides sprayed alone or in mixtures have been used to control black bindweed (Anderson et al. 1986, Fain 1986). One biological control method involves the use of allelopathic chemicals from another weed species to depress germination and seedling growth. In Argentina, a fungus causes sufficient damage to black bindweed to warrant investigation as a biological control agent (Dal-Bello and Carranza 1995).

Notes
Black bindweed is listed as a restricted noxious weed in Alaska (Alaska Administrative Code 1987). Its genus name, *Polygonum*, is derived from the Greek words *polys*, "many," and *gonu*, "knee or joint," hence "many joints" describes the thickened joints on the stem. The species name, *convolvulus*, comes from the Latin word *convolvere*, which means "to twine around."


KULAK photo by Paul Busselen

Common Sheep Sorrel

Rumex acetosella **L.**



Alternate Names

field sorrel, red sorrel

Description

Common sheep sorrel is a perennial plant with a thin, erect stem growing from a slender rootstock. Leaves are long, narrow, and arrowhead-shaped with divergent basal lobes. The inflorescence is loose and reddish or yellowish. Stalks are jointed, and male and female flowers occur on separate plants. The ripe fruit is about 1/16 of an inch long.


XID Services photo by Richard Old

Common sheep sorrel.

Similar or Related Species

There are at least 15 species of Rumex in Alaska. Of these, 7 are exotic to Alaska (Hultén 1968). Curly dock (*R. crispus* L.) and bitter dock (*R. obtusifolius* L.) are two of the more common exotic species found in Alaska. Common sheep sorrel can be differentiated from all of these species by its arrowhead-shaped basal leaves.

Management

If hand-pulling of common sheep sorrel is attempted, the entire root mass and all rhizomes should be removed for effective control. Herbicide treatments can also be effective.

Notes

These plants came from Eurasia. Most of the leaves of this genus are edible and have been cultivated as salad greens.

Common sheep sorrel leaves are famous for their sour taste and have been used to treat inflammations, scurvy, and fevers. Curly dock is used for skin irritations, and its reddish-brown mature fruits can be used in baking. Bitter dock has been used as an astringent, blood purifier, contraceptive, and salve.

KULAK photo by Paul Busselen

Curly dock.

XID Services photo by Richard Old

Curly dock.

XID Services photo by Richard Old

Bitter dock.

Other Families

Apiaceae
(Carrot Family)

Balsaminaceae
(Balsam Family)

Euphorbiaceae
(Spurge Family)

Haloragaceae
(Water Milfoil Family)

Lamiaceae
(Mint Family)

Lythraceae
(Loosestrife Family)

Scrophulariaceae
(Figwort Family)

Giant Hogweed

Heracleum mantegazzianum Sommier & Levier

Norwegian Botanical Association
photo by Rune Aanderaa

Alternate Names

Giant cow parsnip

Description

Giant hogweed is an enormous herbaceous biennial or perennial plant that grows 10–15 feet high. Stems are hollow, from 2–4 inches in diameter with dark reddish-purple spots and bristles. Large compound leaves measure 3–5 feet in width. The inflorescence is a broad flat-topped umbel composed of many small white to light pinkish flowers. Inflorescences can reach a diameter of 2½ feet. The plant produces flat, ⅜ of an inch long, oval-shaped, dry fruits. Most plants die after flowering, while others flower for several years.

Similar Species

Giant hogweed closely resembles cow parsnip (*Heracleum maximum* Bartr.), a plant native to the Pacific Northwest and Alaska that rarely exceeds 6 feet in height, has a flower cluster only 8–12 inches wide, and has palmately lobed rather than dissected leaves.

Norwegian Botanical Association
photo by Norman Hagen

Giant hogweed flowers.

Ecological Impact

Giant hogweed forms a dense canopy, outcompeting and displacing native riparian species. The plant produces a watery sap that contains toxins causing severe dermal injury to humans, birds, and other animals. The flowers of giant hogweed are insect-pollinated (NWCP 2003, Pysek and

Pysek 1995). This plant produces coumarins which have antifungal and antimicrobial properties. Hybrids between giant hogweed and eltrot (*H. sphondylium* L.) occur where the two grow in the same location. There are numerous animals and parasites that feed on giant hogweed. Giant hogweed results in a reduction of native species and an increase in soil erosion along stream banks in winter (NWCP 2003, Tiley and Philp 1992, Wright 1984). Nutrient availability increases in areas infested by giant hogweed due to the large amount of easily decomposed biomass (Pysek and Pysek 1995).

Biology and Invasive Potential

Giant hogweed reproduces by seed with each plant capable of producing up to 50,000 seeds (Tiley et al. 1996, Pysek 1991). Although this species is generally an early colonizer of disturbed communities, it can also invade closed communities such as grasslands (Tiley et al. 1996). The fruits of this species can float in water for up to 3 days and can be transported 6 miles in water courses (Clegg and Grace 1974). It has escaped from gardens and naturalizes readily in Europe and North America. Although its sale is prohibited, giant hogweed is sometimes misidentified and sold by nurseries. Dispersal is also facilitated by the use of seedheads in flower arrangements, and it is spread in topsoil and along right-of-ways (NWCP 2003, Tiley et al. 1996, Clegg and Grace 1974). Seeds germinate well in the surface organic layer, although sufficient soil depth is necessary to allow taproot development. Seed longevity can be greater than 7 years (NWCP 2003). Giant hogweed occurs most frequently on sandy and silty substrates. It is tolerant of saturation and winter flooding and requires moisture for establishment, but once established it also thrives on drier, well-drained sites. It tolerates pH levels ranging from 3.1 to 8.5 (Clegg and Grace 1974, Tiley et al. 1996). Giant hogweed is federally listed as a noxious weed and is also considered noxious by 12 states, including Oregon and Washington.

Distribution and Abundance

Giant hogweed has not yet been found in Alaska, although it has been reported from British Columbia and Washington. It is native to the Caucasus Mountains and southwestern Asia. It is naturalized throughout central Russia and Europe. It has been introduced to Australia, New Zealand, Canada, and the United States. Giant hogweed establishes along river banks, streams, and damp places as well as along roadsides and waste areas.

KULAK photo by Paul Busselen

Giant hogweed foliage.

Management

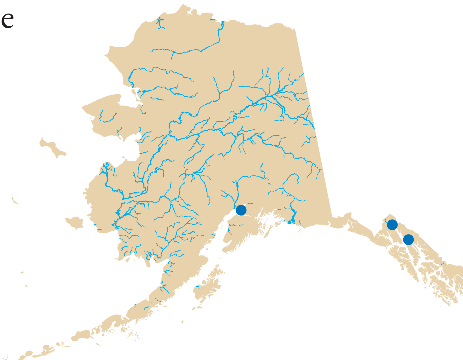
It is important to always wear protective clothing, including gloves, coveralls, and goggles, when handling giant hogweed since the sap from the leaves and stem is highly toxic; contact with the skin can lead to severe scarring, especially after subsequent exposure to sunlight. For manual removal, plants must be dug out entirely or the roots cut at least 3–4 inches below ground level. Cutting or mowing will not immediately kill the plant but may be effective if repeated at regular intervals (3–4 times per season) on the resprouting plants to eventually exhaust the nutrient reserves stored in the root system. Selective herbicides kill foliage but will not kill the roots, while systemic herbicides can be effective if applied in the spring or early summer. A follow-up spray in mid-summer is recommended.

Notes

Giant hogweed is listed in The Guinness Book of World Records as the world's largest weed. The dried fruits of giant hogweed are used as a spice in Iranian cooking known in Farsi as *golpar*. The song "The Return of the Giant Hogweed" was on the album Nursery Cryme by the rock band Genesis.

Ornamental Jewelweed

Impatiens glandulifera Royle



Alternate Names
Himalayan balsam, Policeman's helmet, Touch-me-not, Indian jewelweed

Synonyms
Impatiens roylei Walp.

Description

USDA Forest Service photo by Tom Heutte

Ornamental jewelweed is an herbaceous annual plant growing from 3–6 feet tall. Stems are erect, hollow, smooth, and hairless. Stems are also reddish and multi-branched, with large, swollen nodes. The large, simple, oblong, and ovate to elliptic leaves are oppositely arranged, although occasionally a whorl of three leaves is formed. Leaves are about 6 inches long, 3 inches wide, and sharply toothed. One-inch long flowers are arranged in sparse clusters from the leaf axils and are irregular, having 5 petals of which 2 are fused together. Flower color ranges from white to pink to purple to red. The fruit is a capsule that explodes at touch when ripe, ejecting large, black seeds that are ¼–½ of an inch wide.

Similar Species
Ornamental jewelweed could be confused with jewelweed (*Impatiens noli-tangere* L.), a common native wildflower. Jewelweed can be distinguished from the exotic species by its yellow flowers, more coarsely serrated teeth on its leaf margins, and much smaller size

Ecological Impact

Ornamental jewelweed is able to reduce the growth of native plant species and eventually replace them through aggressive competition, thereby forming dense stands (King County DNR 2004, Prots and Klotz 2004). The presence of jewelweed alters the composition and behavior of pollinating insects. Pollinators include several species of bumblebee, honeybee, moth, and wasp (King County DNR 2004, Chittka and Schürkens 2001, Beerling and Perrins 1993). Ornamental jewelweed also negatively impacts habitat for wildlife species. High water-insoluble carbohydrate content causes the stems to persist as litter the following spring, which suppresses competing seedlings of other species (Beerling and Perrins 1993). At high densities, this plant can alter water flow, increasing erosion and flooding (King County DNR 2004).


USDA Forest Service photo by Tom Heutte

Ornamental jewelweed infestation on a beach meadow in Southeast Alaska.

Biology and Invasive Potential

Ornamental jewelweed reproduces entirely by seeds. An individual plant can produce from 800 to 2,500 seeds, which are viable for 18 months or more and can geminate underwater (King County DNR 2004). For successful establishment it requires a moderate amount of local disturbance and exposed ground (Beerling and Perrins 1993). The seeds are ejected from mature capsules for up to 20 feet, and they can also be dispersed along waterways and by small mammals (King County DNR 2004). Rate of linear spread in Britain was estimated to be 1 to 3 miles per year (Beerling and Perrins 1993). Ornamental jewelweed is frequently sold or shared as a garden ornamental (King County DNR 2004) and is widely planted in gardens of southcentral and southeast Alaska. The seeds require cold-stratification to break dormancy, and germination usually occurs in late spring. Best germination response occurs when seeds are stored at 41°F (King County DNR 2004, Beerling and Perrins 1993, Mumford 1988). Ornamental jewelweed is tolerant of many types of soil, including fine and coarse stream-deposited sediments, free-draining mineral soils and peats, and both nutrient-rich and nutrient-poor soils. Acceptable soil pH conditions range from 3.4 to 7.7, and it is partially shade-tolerant. Plants of all ages are sensitive to frosts (Beerling and Perrins 1993). Ornamental jewelweed is listed as a noxious weed in British Columbia and Washington.

Distribution and Abundance

Ornamental jewelweed is native to the Himalayan region of Asia. In other areas, it has escaped garden cultivation to invade many areas, predominantly river edges, riparian areas, and wetlands, and can also be found in forests, roadsides, yards, and gardens. It thrives in riparian zones, where seeds spread quickly downstream. In Alaska, patches of ornamental jewelweed have been found outside of cultivation in Juneau and Anchorage, and an acre-sized infestation was documented in a beach meadow in Haines in 2004 (AKEPIC Database 2004). This species is currently distributed throughout southern British Columbia.

USDA Forest Service photo by Michael Shephard

Leaves and stem of ornamental jewelweed.

Management

Mechanical methods such as pulling, mowing, or cutting have been successful in eradicating stands of ornamental jewelweed. Such methods should be completed before seed is set, and care should be taken when cutting plants. Unless the plant is cut below the lowest node, it will regrow and flower later in the season, and so a single cut is only effective if made very close to the soil level. Small infestations can be controlled by hand-pulling as the plant is shallow rooted. Regular mowing will also control this plant even if the cutting level is above the lowest node, provided the frequency is sufficient to prevent the formation of flowers and seeds. Mowing is likely to be effective only in those locations where good access is available and the ground is smooth enough for close mowing. Herbicides have been effective in controlling ornamental jewelweed, especially if applied before flowering. Ornamental jewelweed should be sprayed in the spring before flowering but late enough to ensure that germinating seedlings have grown up sufficiently to be adequately covered by the spray. If working in or near a wetland, make sure to select an herbicide approved for that use. No specific biological control agents are known to control ornamental jewelweed.

Notes

Ornamental jewelweed is considered invasive in the British Isles, where it is naturalizing along river valleys, but in 1938 the famous Irish naturalist Praeger described this plant as rare and cited the shores of Lough Neagh as one of its sites. One of its common names, coined in the 1950s, is "policeman's helmet," which refers to the flower's resemblance to an English police helmet. Recent research by German botanists has shown that it competes successfully with native riverbank species for pollinators like bumblebees, reducing seed set in these other plants. This success can be attributed to abundant nectar production.

USDA Forest Service photo by Tom Heutte

Leafy Spurge

Euphorbia esula L.

XID Services photo by Richard Old

Alternate Names

wolf's-milk, euphorbia, spurge, faitours-grass

Description

Leafy spurge is a long-lived, deep-rooted perennial plant that reproduces by vigorous rhizomes and seed. Stems are hairless and pale green and grow 16–32 inches high in dense patches. Leaves are alternate, narrow, and 1–4 inches long. Flowers are yellowish-green, small, arranged in numerous small clusters, and subtended by paired, heart-shaped, yellow-green bracts. Seeds are oblong, grayish to purple, and contained in a 3-celled capsule, each cell containing a single seed.

Similar Species

There are no native *Euphorbia* species in Alaska. Leafy spurge is closely related to cypress spurge (*E. cyparissias* L.), which is distinguished from leafy spurge by the presence of fewer, pale green leaves. Cushion spurge (*E. epithymoides* L.) is an exotic species of gardens and greenhouses in Alaska and can be distinguished from leafy spurge by its smaller stature (10–18 inches high) and bright yellow flowers.

Ecological Impact

Outside of Alaska, leafy spurge is a highly competitive plant that displaces native vegetation, forming large monospecific stands. As of 1997, it infested nearly 3 million acres in the United States and Canada. It is allelopathic, preventing the growth of other species nearby. A significant reduction in the 5 most common native species was recorded in native mixed grass prairie infested with leafy spurge (Belcher and Wilson 1989). In addition to loss of plant diversity, loss of wildlife forage and habitat are significant impacts of this species. Areas dominated by leafy spurge received much less use by native ungulates when compared to similar uninfested areas (MWCA 2005). Leafy spurge reduces the carrying capacity of infested rangeland for cattle to near zero (Hanson and Rudd 1933).

Biology and Invasive Potential

Each flowering stem of leafy spurge produces an average of 140 seeds, and seed production of a stand ranges from 25 to 4,000 pounds per acre (Best et al. 1980). The seeds of leafy spurge float on water, resulting in dispersal and establishment of plants along rivers and in areas receiving periodic or seasonal flooding. Seeds are also spread in mud on equipment, on vehicles, or on the feet or hair of animals. Crop seed, feed grain, and hay containing leafy spurge seed can spread this weed over long distances. Seeds may remain viable in the soil for up to 8 years and an extensive root system with large nutrient reserves makes control of this species extremely difficult. Large numbers of buds are found on each root to depths of 10 feet or more and each bud is capable of producing a new, independent plant. Leafy spurge has been declared noxious by 6 Canadian provinces and 20 of the United States, including Alaska (Alaska Administrative Code 1987).

Distribution and Abundance

Leafy spurge is native to Eurasia and was brought into the United States as a contaminant of seed around 1827. It is a serious problem in North America, mostly in southern Canada and the north-central United States. It is found primarily in pastures, rangelands, waste areas, and abandoned cropland, along roadsides, and in areas associated with ongoing human development, and it can invade a variety of natural habitats from meadows to woodlands. Leafy spurge has


XID Services photo by Richard Old

An infestation of leafy spurge.

not yet been found in Alaska but has been documented in the Yukon Territory of Canada; its impacts elsewhere suggest that it would be a serious problem should it be introduced to Alaska.

Management

Because of its persistent nature and ability to regenerate from small pieces of root, leafy spurge is extremely difficult to eradicate. Cultivation can be used to control leafy spurge on cropland where few options are available. Timing of cultivation is important, with the most successful efforts begun in the spring, 2 to 4 weeks before plant emergence. Mowing and burning are ineffective, but burning prior to herbicide application can increase visibility of the weed, improving spray coverage by eliminating old stems and ground cover (Winter 1992, Wolters et al. 1994). Annual applications of herbicides can prove effective. Biological control offers a highly promising management tactic for leafy spurge. So far, six natural predators have been imported from Europe.

Notes

Leafy spurge is in the same family as the holiday favorite, poinsettia. First recorded from Massachusetts in 1827, leafy spurge quickly spread westward and reached North Dakota within 80 years.

XID Services photo by Richard Old

Eurasian Watermilfoil

Myriophyllum spicatum L.

University of Florida photo by Alison Fox

Eurasian watermilfoil.

Alternate Names

Spike watermilfoil, spiked watermilfoil

Synonyms

Myriophyllum spicatum L. var. *spicatum* in part [H&C]

Description

Eurasian watermilfoil is a submersed aquatic plant, with stems 3 feet long or more. Leaves are whorled, highly dissected, and composed of 28–48 thread-like divisions. Spikes emerge above the water, and flowers are borne in the axis of bracts. Fruits are 1⁄16–1⁄8 of an inch long.

Similar Species

Northern watermilfoil (*M. sibiricum* Fern.), a closely related native species, is often mistaken for Eurasian watermilfoil. It can be distinguished from Eurasian watermilfoil by its leaves, which have only 12–24 thread-like segments rather than 28–48 (Royer and Dickinson 1999). Eurasian watermilfoil is distinguished from another native species, whorlleaf watermilfoil (*M. verticilliatum* L.), by the presence of 4 rather than five leaves per whorl. Also, whorlleaf watermilfoil has leaves that exceed the length of the internodes.

XID Services photo by Richard Old

A segment of Eurasian watermilfoil.

Ecological Impact

Eurasian watermilfoil forms dense canopies that often shade out native vegetation. Unlike northern watermilfoil, which remains upright and completely submersed, Eurasian watermilfoil grows over the surface of the water, forming dense mats with interlacing leaves on the surface that block most light penetration into the water. Monospecific stands of Eurasian watermilfoil offer poor habitat for waterfowl, fish, and other wildlife. The dense mats of vegetation slow water flow, which can increase sedimentation by allowing suspended sediment to precipitate and can provide good breeding conditions for mosquitoes. Eurasian watermilfoil stands can alter water quality by raising pH, decreasing dissolved oxygen, and increasing water temperature.


XID Services photo by Richard Old

The feathery leaves of Eurasian watermilfoil.

Biology and Invasive Potential

Eurasian watermilfoil reproduces by seed and fragmentation. It thrives in areas that have been subjected to various kinds of natural and anthropogenic disturbances. Fragments may be moved long distances in flowing water. Eurasian watermilfoil is spread from lake to lake on boats, trailers, and floatplanes. Germination requirements are unknown. Eurasian watermilfoil is an extremely adaptable plant, capable of tolerating a variety of environmental conditions. It can grow in still to moderately flowing water and rooted in water depths from 1–10 meters. It can survive under ice and tolerate pH levels ranging from 5.4 to 11.0. Eurasian watermilfoil requires high light and can grow over a broad temperature range. It grows best on fine-textured, inorganic sediments and relatively poorly on highly organic sediments (Jacono and Richerson 2004). Eurasian watermilfoil is listed as a noxious weed in 11 states.

Distribution and Abundance

Typical habitat for Eurasian watermilfoil includes fresh to salty water of ponds, lakes, slow-moving streams, reservoirs, estuaries, and canals. Eurasian watermilfoil is native to Europe, Asia, and northern Africa. It now occurs in North and South America, Australia, Greenland, and southern Africa. It had been found in 32 of the United States and the Canadian provinces of British Columbia, Ontario, and Quebec (Jacono and Richerson 2004). Eurasian watermilfoil was reported to occur in Alaska by Hultén (1968), although as of early 2005, its presence is being investigated.

Management

Once Eurasian watermilfoil becomes well established within a waterbody, it is very difficult or impossible to remove. In smaller waterbodies, there has been some limited success with the use of an aquatic herbicide. Other control methods include harvesting, use of an aquatic rototiller-like device, installation of bottom barriers, and hand-pulling by divers.

Notes

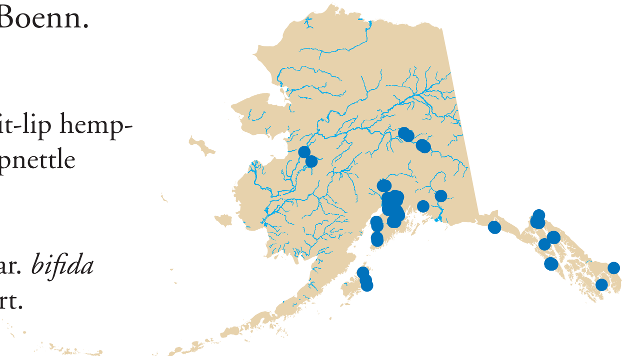
Eurasian watermilfoil could be spread from one lake to another in Alaska by sticking to floatplanes and boats, especially floatplane rudders and outboard motors. It was accidentally introduced into the United States in the late 1800s, probably as an escaped aquarium species or from ballast water.


Photo by Patrick Vandael

An infestation of Eurasian watermilfoil.

Hempnettle

Galeopsis bifida Boenn.



Alternate Names
Bifid hempnettle, split-lip hempnettle, common hempnettle

Synonyms
Galeopsis tetrahit L. var. *bifida* (Boenn.) Lej. & Court.

Related Species
brittlestem hempnettle
Galeopsis tetrahit L.

Hempnettle.

USDA Forest Service photo by Tom Heutte

Description
Hempnettle is an annual plant that grows ½–3 feet high. The stem is erect and simple or branched above. The leaves are 1–5 inches long, short-stalked, opposite, ovate-lanceolate to lanceolate, coarsely serrate, and sparsely pubescent on both sides. The stem is usually swollen below leaf nodes. The flowers are terminal or borne in axillary clusters. Flowers range in color from purple and pink to white and are ½–¾ of an inch long and bilaterally symmetrical. Plants of the two species are quite similar and sometimes are treated as subspecies. The flowers of *G. bifida* are smaller with a split lower lip, while those of *G. tetrahit* are larger with an entire lower lip. Seeds are egg-shaped and mottled grayish-brown.

Similar Species
Native species similar to hempnettle include field mint (*Mentha arvensis* L.), American dragonhead (*Dracocephalum parviflorum* Nutt.), and hairy hedgenettle (*Stachys pilosa* Nutt.). Field mint is easily identified by its strong

mint odor. American dragonhead has serrated leaves similar to hempnettle, but the flowers are crowded in dense heads with sharp spiny bracts. Hairy hedgenettle is a wetland plant that can be distinguished from similar species by its open terminal flowerhead and rounded teeth on the leaves.

Ecological Impact

Hempnettle has been observed primarily in disturbed areas, where it creates a dense mid-forb layer and reduces the cover of grasses and low forbs. It consumes soil moisture and limited nutrients and can delay the establishment of native species in disturbed sites.

USDA Forest Service photo by Michael Shephard

A hempnettle infestation.

Biology and Invasive Potential

Each plant is capable of producing up to 2,800 seeds, which can remain dormant in the soil for several years. Hempnettle does not reproduce vegetatively and generally occurs only in disturbed sites. The seeds are large and do not have any apparent adaptations for long-distance dispersal. This species appears to spread as a contaminant of hay or other agricultural products. Germination occurs at ½–1½ inches deep. Hempnettle has been declared noxious in Quebec, Manitoba, Alberta, and Alaska (Alaska Administrative Code 1987).

Distribution and Abundance

Hempnettle is a plant of disturbed sites, roadsides, gardens, and agricultural lands. Native to Europe and Asia, it is now found throughout Canada and the northeastern quarter of the United States. It has also been introduced into New Zealand and the Canary Islands (GRIN 2004, Hultén 1968). Hempnettle has been reported from southeast, southcentral, interior, and western Alaska, including 2 remote locations in the Yukon River delta (ALA 2004). It is an important weed of both agricultural areas and communities in Alaska.

Management

Hempnettle is difficult to control once established, and so maintaining weed-free areas is of primary importance. Once established, dense cover crops planted early may inhibit hempnettle in agricultural settings. Herbicides are also effective (MAFRI 2001a).

Notes

A drying oil used for polishing leather is obtained from the seed of hempnettle. The genus name *Galeopsis* means "looks like a weasel" as early botanists thought that is what the corolla resembled, and the species epithet *tetrahit* means "four-parted," probably for the ovary of the plant.

Sitka Conservation Society photo by Nanna Borchert

Hempnettle.

Purple Loosestrife


XID Services photo by Richard Old

Lythrum salicaria L.

Alternate Names

Spike loosestrife

Synonyms

Lythrum salicaria L. var. *gracillor* Turcz., *Lythrum salicaria* L. var. *tomentosum* (P. Mill.) DC., *Lythrum salicaria* L. var. *vulgare* DC.

Description

Purple loosestrife is a perennial plant with erect square stems growing 6–8 feet high. Stems have soft hairs. Leaves are simple, entire, opposite or whorled, stalkless, lance-shaped, and slightly hairy. Rose to purple flowers are arranged in long vertical racemes.

Similar Species

Another non-native loosestrife, introduced as a garden ornamental, is garden yellow loosestrife (*Lysimachia vulgaris* L.), which has begun to aggressively colonize the same wetland habitats in North America as purple loosestrife. Garden yellow loosestrife can be distinguished by its bright yellow 5-petaled flowers.

Ecological Impact

Outside of Alaska, purple loosestrife displaces native vegetation through rapid growth and heavy seed production. Important wildlife food plants such as cattails and pondweed are displaced or shaded out by loosestrife. Generally, it becomes a virtually monospecific stand, and native animals avoid nesting and foraging in these stands. It lacks natural enemies in the United States (Blossey 2002) and is able to invade intact wetlands. Purple loosestrife can also invade deeper water and push out floating vegetation by closing out open water species. This species alters biogeochemical and hydrological processes in wetlands by lowering phosphate levels in the summer. Outside of Alaska, purple loosestrife leaves decompose quickly in the fall, resulting in a nutrient flush, whereas leaves of native species decompose in the spring.

Biology and Invasive Potential

Purple loosestrife begins to bloom in July or August and continues until September or October. Seed production is prolific, averaging 120 seeds per capsule for up to 900 capsules per plant (Shamsi and Whitehead 1974). It can spread vegetatively by resprouting from cut stems and regenerating from root and stem fragments (Bender 1987, Royer and Dickinson 1999). Seed dispersal is mainly by wind, but seeds can also be transported by waterfowl or other wetland animals. The seeds and seedlings are buoyant and can be dispersed by water. Minimal levels of light are required for germination (Shamsi and Whitehead 1974). Temperature at the soil surface is a critical factor for germination, with an optimal range of 60°–70°F. Purple loosestrife grows best in highly organic soils, but tolerates a wide range of soil textures including clay, sand, muck, and silt. Generally, the plant is found in full sun, but it can survive in 50% shade. Purple loosestrife is listed as a noxious weed in 25 of the United States and two Canadian provinces.

The Nature Conservancy photo by John M. Randall

An infestation of purple loosestrife.

XID Services photo by Richard Old

Distribution and Abundance

Currently, purple loosestrife is found all over the world except in extremely cold regions. It occurs in wetlands such as cattail marshes, sedge meadows, and open bogs, as well as along streambanks, riverbanks, lake shores, ditches, and other disturbed wet soil areas. Purple loosestrife is native to Eurasia. It has not yet been reported growing wild in Alaska but is grown in Alaska gardens and sold in nurseries and seed catalogs. It is included in this book because of its tremendous destructive potential.

Management

Small infestations can be controlled by removing all roots and underground stems. It is difficult to remove all of the roots in a single digging, and so the area should be monitored for several growing seasons to ensure that purple loosestrife has not regrown from roots or seed. Follow-up treatments are recommended for 3 years after plants are removed. Current control methods for large, dense populations of loosestrife are not totally effective, as mechanical control methods are inefficient and most herbicides are non-selective. Biological control measures are being developed in the western United States.

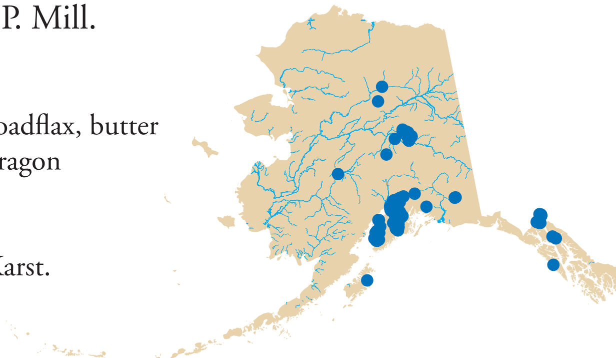
XID Services photo by Richard Old

Notes

Loosestrife cultivars previously thought to be non-invasive as well as cultivars of a native species are now known to cross-pollinate with invasive loosestrife varieties. These plants were introduced from Europe as ornamentals. The Latin species name *salicaria* means willow-like, for the leaves resemble those of willows.

Yellow Toadflax

Linaria vulgaris P. Mill.



Alternate Names
Common toadflax, toadflax, butter and eggs, wild snapdragon

Synonyms
Linaria linaria (L.) Karst.

Related Species
Dalmatian toadflax
Linaria dalmatica (L.) Mill.

Description
Yellow toadflax is a perennial plant, rarely branched, that often grows in clumps up to 2½ feet high. Leaves are numerous, alternate, pale green, narrow, up to 2½ inches long, and pointed at both ends. Flowers are yellow with an orange throat and 1–2 inches long, appearing in dense terminal clusters and resembling snapdragons, with a tube-like structure extending below the lower lip of the corolla. The fruit is an ovate to egg-shaped capsule that is ¼–½ of an inch long. Seeds are flattened, ovate, and winged.

USDA Forest Service photo by Michael Shephard

Yellow toadflax.

Dalmatian toadflax (*L. dalmatica* (L.) Mill.) is another exotic species to look out for that is common in the western United States. This perennial plant is larger than yellow toadflax, growing to 5 feet rather than 2½ feet high, and its leaves are broad and ovate to ovate-lanceolate rather than linear to linear-lanceolate. Dalmatian toadflax has alternate leaves that are 1–2 inches long. Stem leaves are stalkless and clasp the stem. All leaves are bluish-green and hairless. Flowers are large, yellow, and borne in long terminal clusters. A prominent spur, ½–¾ of an inch long, is projected from the back of the petals. Dalmation toadflax is similar in biology and management to yellow toadflax, and so the information below will generally apply to both species.

USDA Forest Service photo by Michael Shephard

An infestation of yellow toadflax.

Similar Species

There are no other yellow, spurred species in Alaska that might be easily confused with the toadflaxes.

Ecological Impact

Yellow toadflax is a persistent and aggressive invader that is capable of forming dense colonies. It can suppress native grasses and other perennials, primarily through intense competition for limited soil and water. This species contains a poisonous glucoside that is reported to be unpalatable and moderately poisonous to livestock. Yellow toadflax is an alternate host for tobacco mosaic virus. It reduces soil moisture and nutrient availability, changes soil texture and composition, and alters local pollination ecology (M. Carlson, pers. comm. 2004).

National Park Service photo by Penny Bauder

Yellow toadflax.

Biology and Invasive Potential

Yellow toadflax reproduces by seeds and creeping rhizomes. Plants cannot self-fertilize and are pollinated by insects. Seed production ranges from

1,500 to 30,000 seeds per individual, but seed viability is generally low. Seeds are winged and can be carried by the wind, and they may remain dormant for a period of up to 10 years. Taproots may penetrate the soil to 3 feet deep and extend 10 feet away from the parent plant. Disturbance promotes invasion and is necessary for establishment to occur. Once established, yellow toadflax readily spreads into adjacent undisturbed areas. It may be dispersed by water and ants and is often found as a contaminant in commercial seed or sold by nurseries. Germination is minimal without a 2 to 8 week period of chilling (J. Gibson, unpubl. data). Vegetative reproduction may begin as soon as 2 to 3 weeks after germination, and this species can establish from root fragments as short as ½ of an inch. Yellow toadflax is listed as noxious in Colorado, Idaho, Nevada, New Mexico, Montana, Oregon, South Dakota, and Washington and a restricted noxious weed in Alaska (Alaska Administrative Code 1987).

Distribution and Abundance

Yellow toadflax was imported into North America in the late 1600s as an ornamental and for folk remedies. It occurs on sandy and gravely soil on roadsides, pastures, lake and beach shores, cultivated fields, meadows, and gardens. It is found throughout the United States and in every Canadian province and territory. It is commonly found throughout southcentral and interior Alaska, particularly near settlements or anthropogenic disturbance. Native to southcentral Eurasia, the present world distribution of yellow toadflax includes most of Europe and Asia, Australia, New Zealand, South Africa, Jamaica, and North and South America.

Management

Cutting, mowing, and tilling are effective ways to eliminate plant reproduction by seed, and hand-pulling can control small infestations if monitored and retreated over many years. Control is most effective in early summer, after flower bud formation but before flowering. Herbicide treatment can significantly reduce plant infestations, especially when used as a follow-up to other methods. Vigorous grasses can be used to compete with toadflax. Several biological agents effective against yellow toadflax have been approved by the USDA. A weevil, *Gymnetron antirrhini*, is the most important agent for biological control in British Columbia and the northwestern United States. Other agents include shoot- and flower-feeding beetles (*Brachypterolus pulicarius*) and root-boring moths (*Eteobalea serratella* and *E. intermediella*) (Carpenter and Murray 1998). Fruits and seeds recently collected in Anchorage had about 20% infestation by an unknown weevil (M. Carlson, pers. comm. 2004).


USDA–Aphis –PPQ photo by R. Hansen

Dalmation toadflax.

Notes

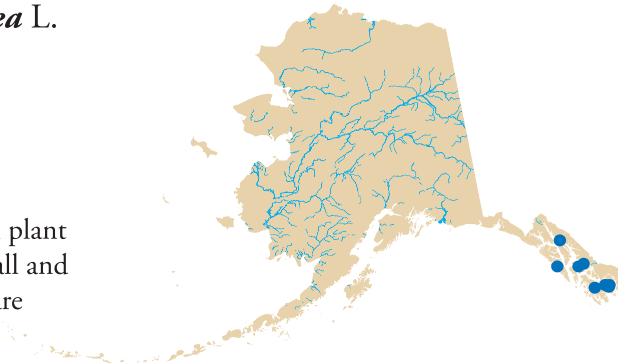
Toadflaxes were brought to North America as ornamentals because they are easy to grow and very hardy. Yellow toadflax was often one of the first flowers planted at mining settlements, and it often still remains in these abandoned townsites and spreads into surrounding wild areas. A mature dalmatian toadflax plant can produce 500,000 seeds in a year.


XID Services photo by Richard Old

An infestation of dalmatian toadflax.

Foxglove

Digitalis purpurea L.



Alternate Names
Purple foxglove

Description
Foxglove is a biennial plant that grows 2–5 feet tall and unbranched. Leaves are soft, hairy, toothed, and lance- to egg-shaped. Basal leaves are up to 12 inches long. Flowers are bell-shaped, very showy, purple with purple mottling on the inside, and borne on a spike. Most foxglove cultivars have flowers arranged on one side of the spike.

USDA Forest Service photo by Tom Heutte

Similar Species
It would be difficult to mistake a native Alaskan plant for foxglove. There are a couple of *Penstemon* species of the same family whose ranges may barely extend into eastern interior Alaska, but their flowers are smaller and bluer than those of foxglove.

Management
Hand-pulling can effectively control foxglove. Herbicides are more effective on large infestations. Control efforts must continue for at least 5 years with site monitoring for at least 10 years due to a long-lived seedbank. Biological controls have not been developed due to the species' horticultural value (Harris 2000). First-year rosettes do not survive interior Alaska winters and usually do not survive southcentral Alaska winters (J. Riley, pers. comm. 2005).

Notes

Foxglove is common in communities throughout southeast Alaska, where it is a popular garden plant that has escaped from cultivation. Potential ecological effects are not known, but it has been observed forming dense stands along roadsides and vacant lots. This plant is the source of the cardiac drug digitalin, which makes the plant highly poisonous. The earliest known name for this plant is the Anglo-Saxon "foxes glofa" (the glove of the fox). The name is derived from the shape of the flowers, which resemble the fingers of a glove, or possibly from a northern legend that bad fairies gave the blossoms to the fox to put on his toes, so that he might soften his tread while he hunted for prey.

USDA Forest Service photo by Tom Heutte

Bell-shaped flowers of foxglove.

Common Eyebright

Euphrasia nemorosa (Pers.) Wallr.

Synonyms

Euphrasia curta (Fries) Wettst., *Euphrasia officinalis* auct. non L. ssp. *nemorosa* Pers, *Euphrasia stricta* auct.

Description

Common eyebright is a small annual plant that usually grows less than 6 inches high. It has small, deep green leaves and tiny white, open, trumpet-shaped flowers with a divided lower lip and a purple tinge to the outside of the petals, deep lines into the throat, and a yellow blotch on the lower lip.

Photo by Andy Horton

Common eyebright flowers.

Similar Species

There are two similar species in this genus that are native to Alaska and found on dry, grassy heaths, beside paths, and in open woods, on chalky and acidic soils. Arctic eyebright (*Euphrasia subarctica* Raup) and subalpine eyebright (*Euphrasia mollis* (Ledeb.) Wettst.) look similar to common eyebright but can be differentiated by the presence of a white corolla with purple lines and a lavender upper lip.

Photo by Andy Horton

Common eyebright.

Management

Little information is available concerning control methods for common eye-bright. Hand-pulling is being conducted at Klondike Gold Rush National Historical Park and has proven moderately effective after repeated treatments.

Notes

Common eyebright is native to Europe. The common name comes from its use to make a tincture to improve vision.

Less Aggressive Species

Boraginaceae
(Borage Family)

Caryophyllaceae
(Pink Family)

Chenopodiaceae
(Goosefoot Family)

Clusiaceae
(Mangosteen Family)

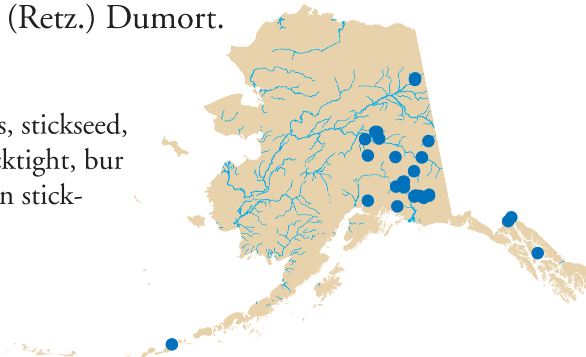
Convolvulaceae
(Morning-glory Family)

Plantaginaceae
(Plantain Family)

Ranunculaceae
(Buttercup Family)

Bluebur

Lappula squarrosa (Retz.) Dumort.



Alternate Names

stick-tights, beggar-ticks, stickseed, sheepbur, European sticktight, bur forget-me-not, European stickweed

Synonyms

Lappula echinata Gilib.,
Lappula myosotis Moench

Description

Bluebur is an annual plant that is profusely branched with stems up to 2 feet tall. The entire plant is covered with stiff, white hairs and has a mousy odor. The hairs usually lie flat against the stems and leaves. Leaves are alternate, ¾–4 inches long, and covered with stiff white hairs on both surfaces. The lower leaves are oblong, stalked, and blunt-tipped, whereas the upper leaves are stalkless. Flowers are blue with a yellow throat, resembling forget-me-not flowers but smaller, about ⅛ of an inch across. They appear near the ends of stems in leafy clusters. Each flower produces 4 small nuts with 2 rows of hooked prickles that have star-shaped tips. Fruit stalks are straight and erect.

Photo by Alexander Mrkvicka

Similar Species

Western bluebur (*L. occidentalis* (S. Wats.) Greene) is a weedy annual plant, native to Alaska, that can be distinguished from bluebur by its nuts. Western bluebur nuts have 1 row of hooked prickles, while the exotic bluebur nuts have 2 rows. Stick-seed (*Hackelia floribunda* (Lehm.) I.M. Johnson) is native to British Columbia and resembles both bluebur species, but the fruiting stalk of stick-seed is curved or bent downwards.

USDA Forest Service photo by Elizabeth Bella

Management

Bluebur plants can easily be pulled up by hand, though several weedings and 5 years of monitoring are necessary to ensure control of plants germinating from buried seed. Diligent care must be taken to remove and dispose of nuts that attach to clothing or gear during control efforts, for this species is commonly introduced to new areas by animal and human dispersal (Densmore et al. 2001).

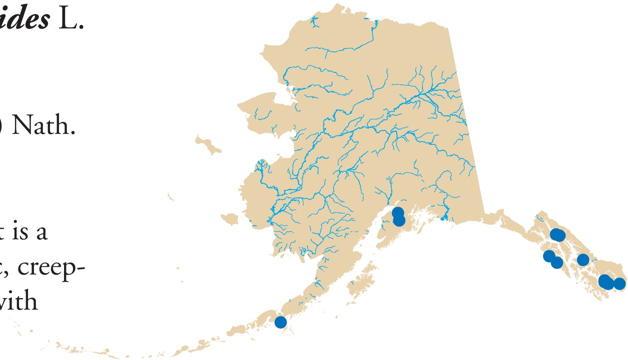
Notes

Bluebur was introduced into the United States from the eastern Mediterranean region before 1700. Now common throughout the northern hemisphere in disturbed areas, it has reached far-flung locations in Alaska since its first documentation in the Matanuska Valley in 1931, likely due to its tendency to hitchhike. It is listed as a restricted noxious weed in Alaska (Alaska Administrative Code 1987).

USDA Forest Service photo by Michael Shephard

Marsh Forget-me-not

Myosotis scorpioides L.



Synonyms

Myosotis palustris (L.) Nath.

Description

Marsh forget-me-not is a rhizomatous, aquatic, creeping perennial plant with a fibrous root system, often forming adventitious roots where the stem meets the soil. Flowers are small, blue, and lobed with the petals fused basally into a bright yellow tube.

USDA Forest Service photo by Tom Heutte

Similar Species

The Alaska state flower, the native forget-me-not (*Myosotis asiatica* (Vesterg.) Schischkin & Sergievskaja), can be differentiated by the teeth of the calyx that are much longer than broad, rather than equally long and broad as for the marsh forget-me-not. Another similar non-native species is the woodland forget-me-not (*Myosotis sylvatica* Ehrh. ex Hoffmann), which is commonly grown in Alaska gardens. This species, which can escape cultivation, can be distinguished by its spreading, hooked calyx hairs.

Management

Control options for marsh forget-me-not have not been investigated.

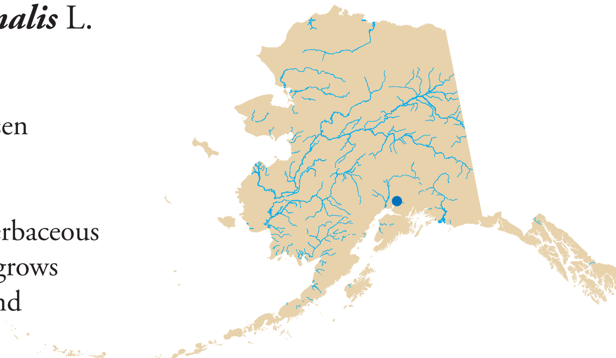
Notes

Folklore says that a concoction made of parts of the forget-me-not will harden steel.

KULAK photo by Paul Busselen

Bouncingbet

Saponaria officinalis L.



Synonyms

Lychnis saponaria Jessen

Description

Bouncingbet is an herbaceous perennial plant that grows 12–35 inches high and produces strong runners. Stems are straight and stiff. Plants are hairless or have few small hairs. Leaves are ovate and entire with 3 prominent veins. Flowers are white to pink and about 1¼ inches across.

XID Services photo by Richard Old

Similar Species

Bouncingbet is unique among Alaskan Caryophyllaceae in having sepals connate for half their length and only 2 stigmas, rather than 3–5 as in *Silene* and *Lychnis* species. It has broader leaves than the native boreal carnation (*Dianthus repens* Willd.), a rare plant in the North American arctic.

Ecological Impact

Bouncingbet can form very large populations and dominate plant communities. Roots and seeds are slightly poisonous to humans and animals (Russell 1997), and animals typically avoid eating this plant.

Biology and Invasive Potential

Bouncingbet has high fruit and seed abundance and moderate vegetative spread capability (OPBWG 2004). It produces an average of 50 seeds per fruit and 30 fruits per plant for a potential of 1,500 seeds per plant. It can resprout when cut or grazed. Hay and other feeds can be contaminated by its seeds or other plants parts, and it can also be a component in wildflower seed mixes. Bouncingbet is adapted to pH levels ranging from 5.0 to 7.0 and coarse and medium textured soils. It is intolerant of saline soils, and no cold-stratification is required. It is highly drought- and fire-tolerant, withstands temperatures to –18°F, and requires 130 frost-free days for reproduction (GRIN 2004). It is listed as a noxious weed in Colorado, an exotic pest in California, and a weed in Kentucky.

XID Services photo by Richard Old

Distribution and Abundance

Bouncingbet has been planted along roadsides in south-central Alaska and has spread into waste areas. The species is native to central and southern Europe but has spread throughout western and northern Europe (Faarlund & Sunding 1992) and become naturalized in northern Europe, originating from ballast and escaped ornamentals (Lid & Lid 1994). It is now present in every state in the United States.

Management

Hand-pulling or cutting young plants can discourage bouncingbet from growing. The use of chemical and biological control methods has not been reported.

Notes

Bouncingbet was brought to the United States from Europe by early colonists.

Photo from KULAK (Katholieke Universiteit Leuven, Campus Kortrijk)

A lather can be produced from the foliage of this plant, because of the saponins in the sap. Even white linens can be washed in the green soap suds. The common name is an old fashioned name for a wash-woman.

Night-blooming Cockle

Silene noctiflora L.

Alternate Names

sticky cockle, night-flowering silene, night-flowering catchfly, clammy cockle

Related Species

White cockle
S. pratensis (Rafn) Godron & Gren.
Bladder campion
S. vulgaris (Moench) Garcke

Photo by British Columbia Ministry of Agriculture, Food, and Fisheries

Night-blooming cockle.

Description

Night-blooming cockle is an annual plant that is hairy throughout with sticky hairs on the upper stems. One to 3 woody stems rise up to 3 feet high from the root. Stem nodes are swollen where the leaves attach. Leaves are opposite and covered with sticky hairs. Basal leaves are stalked, oblong, and 1½–5 inches long. Stem leaves are stalkless, ¾–3¼ inches long, and up to 1½ inches wide. Ascending the plant, leaves become reduced in size and may be alternate near the top of the stem. Flowers are fragrant and occur in terminal clusters of 3 to 8 that open at night. The calyx has 10 prominent, dark green veins and is sticky-haired and about ⅝ of an inch long when the flowers are open. The 5 deeply notched petals, ¾–1⅜ inches long, are white to pink. There are 10 stamens and 3 styles. The fruit is a capsule with 3 compartments, each containing up to 185 seeds, and 10 distinct green veins.

Similar Species

A number of native *Silene* species and two other exotic species occur in Alaska. Exotic white cockle (*S. pratensis* (Rafn) Godron & Gren.) is often confused with night-blooming cockle but can be distinguished by the presence of separate male and female plants. Bladder campion (*S. vulgaris* (Moench) Garcke) is another exotic species similar to night-blooming cockle, but it has flowers in branched clusters of 5 to 30 and a calyx with pinkish-white veins. Unlike any other *Silene* species in Alaska, bladder campion is hairless.

USDA Forest Service photo by Elizabeth Bella

Night-blooming cockle.

Management

Stubble burning and early plowing of grain-fields has been shown to cause a decline in the numbers of night-blooming cockle (Perring 1974). Both it and bladder campion have been shown to be resistant to certain herbicides and susceptible to others (McNeil 1980, Stewart 1969).

XID Services photo by Dan Tenaglia

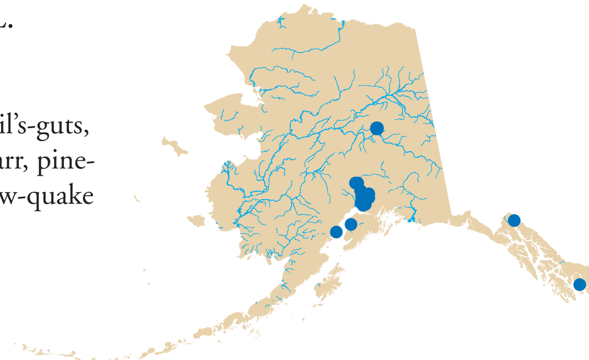
Bladder campion.

Notes

Night-blooming cockle was initially reported in North America in Ontario, Canada in 1862 and spread to the Canadian prairies by 1883. It is often an impurity in clover and forage seed. *Silene* probably comes from the Greek word "sialon," referring to a gummy substance on the stems, or from Silenus, the intoxicated foster-father of Bacchus, god of wine, who was often covered with foam, like the glandular secretions of many species of this genus.

Corn Spurry

Spergula arvensis L.



Alternate Names

stickwort, starwort, devil's-guts, sandweed, pickpurse, yarr, pine-cheat, poverty-weed, cow-quake

Description

Corn spurry is an annual plant that is much branched at the base, with ½–2 foot long branches that are erect or spreading and yellowish-green in color. Thread-like leaves occur in whorls of 6 at the nodes with long upper internodes between them. Flowers are less than ¼ of an inch wide, white, and grouped in loose clusters at the ends of branches.

KULAK photo by Paul Busselen

Similar Species

Knawel (*Scleranthus annuus* L.) is often confused with corn spurry because of its growth habit. Present in British Columbia but not yet in Alaska, it is distinguished by awl-shaped leaves that appear in pairs at stem nodes. The seedling of Russian thistle (*Salsola kali* L.), the introduced tumbleweed of the American West, is often mistaken for the seedling of corn spurry. However, in Russian thistle, the leaves are spine-tipped.

Management

Hand-pulling can provide effective control for corn spurry if undertaken prior to seed production and repeated until the seedbank is exhausted, due to its annual habit. Application of a selective herbicide can also be effective.

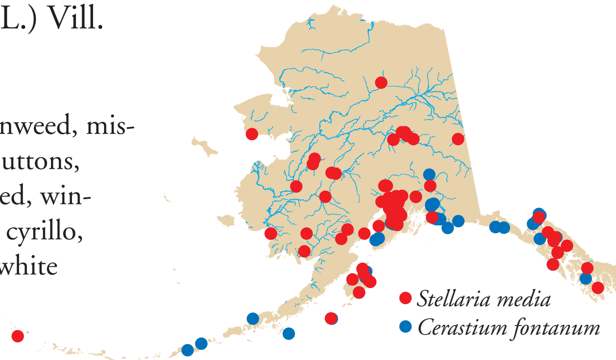
Notes

Corn spurry is considered an invasive species in New Zealand. It is a troublesome agricultural weed on Kodiak Island and the Kenai Peninsula and was recently found in Anchorage gardens. The seed can be dried and ground into a meal and then used with flour for making bread, but only as a famine food. The seeds contain saponins, which are mildly toxic unless cooked.

XID Services photo by Dan Tenaglia

Common Chickweed

Stellaria media (L.) Vill.



Alternate Names

chickwhirtles, cluckenweed, mischievous Jack, skirt buttons, tongue-grass, star-weed, winter seed, satin flower, cyrillo, starwort, bindweed, white bird's-eye.

Related Species

Mouse-ear chickweed
Cerastium fontanum Baumg.

Description

Common chickweed is an annual plant with creeping stems that root at the nodes on one side. Stems have a conspicuous line of hairs on one side. Leaves are up to 1½ inches long, and upper leaves lack stalks while lower leaves are hairy toward the base. Flowers are white and measure ¼ of an inch across.

XID Services photo by Dan Tenaglia

Common chickweed.

Similar Species

There are several native species of *Stellaria* in Alaska, including northern starwort (*S. calycantha* (Ledeb.) Bong.) and curled starwort (*S. crispa* Cham. & Schlecht.), but only common chickweed has lower leaves with stalks. Mouse-ear chickweed (*Cerastium fontanum* Baumg.) is an exotic species that is similar in appearance to common chickweed, but its flowers have notched petals.

XID Services photo by Richard Old

Common chickweed.

Management

Hand-pulling can be effective for small populations of either species. Herbicide treatments are effective when applied before seedlings emerge or during active growth.

KULAK photo by Paul Busselen

Mouse-ear chickweed.

Notes

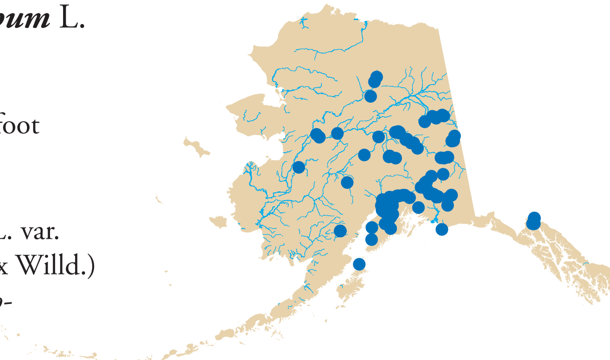
Externally, salves of common chickweed relieve itching and inflammation and are generally soothing and moisturizing. It can be used for minor skin infection or irritation and is an ingredient in a number of commercial skin care products. This plant probably originated in Europe but is now found across the world.

KULAK photo by Paul Busselen

Mouse-ear chickweed.

Lambsquarters

Chenopodium album **L.**



Alternate Names
Pigweed, white goosefoot

Synonyms
Chenopodium album L. var. *lanceolatum* (Muhl. Ex Willd.) Coss & Germ., *Chenopodium album* L. var. *polymorphum* Aellen, *Chenopodium amaranticolor* Coste & Reyn., *Chenopodium gigantum* D. Don, *Chenopodium lanceolatum* Muhl. Ex Willd., *Chenopodium suecicim* J. Murr.

USDA Forest Service photo by Elizabeth Bella

Description
Common lambsquarters is an extremely variable plant that ranges in height from 2 inches to 3½ feet tall. It is an annual plant with bluish green stems that are branched, grooved, and sometimes blotched with red or purple. Its leaves are alternate, simple, green above, and mealy-white below. Leaf shape may be triangular, diamond-shaped, or lance-shaped. Flowers are minute and clustered into dense panicles. It blooms from June to September.

Similar Species
Common lambsquarters is distinct from other native and exotic Alaskan *Chenopodium* species in having a combination of smooth seeds and broad, green leaves. It can only be differentiated from the native Zschack's goosefoot (*Chenopodium berlandieri* Moq.) by smooth, rather than reticulated, seed coats.

Management
Common lambsquarters can be controlled by mechanical and chemical methods. It is resistant to some common herbicides and susceptible to others, although it does not normally persist at a site without repeated disturbance.

Notes
Common lambsquarters was introduced from Europe as an edible herb and is still grown and gathered as a salad green.

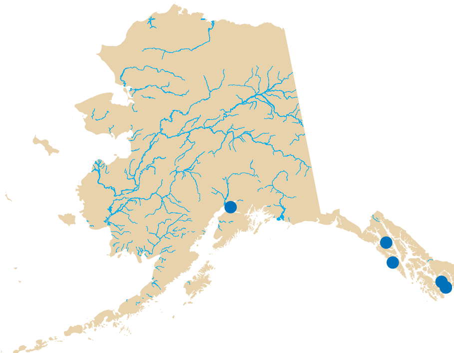

XID Services photo by Richard Old

Varied leaves of lambsquarters.


XID Services photo by Richard Old

Common St. Johnswort

Hypericum perforatum L.



Alternate Names
Klamath weed

Description
Common St. Johnswort is a perennial plant with numerous erect stems growing from a stout taproot. Leaves are opposite, up to 1 inch long, and lack stalks. Tiny transparent dots are visible when the leaves are held up to a bright light. Flowers have 5 bright yellow petals, each ½ of an inch long, with deep purple dots along the petal margins and showy yellow stamens with purple tips.

Similar Species
Many species of St. Johnswort are found in the United States, but none are native to Alaska.

Management
Tillage may be employed to eliminate common St. Johnswort, and biological control by beetles of the genus *Chrysolina* has also been successful. Application of herbicides is most effective before blossoms open, preferably on new seedlings just after germination.

UAF Cooperative Extension Service photo by Jamie Snyder

Flower and fruits of common St. Johnswort.

XID Services photo by Richard Old

"Perforated" leaf of common St. Johnswort.

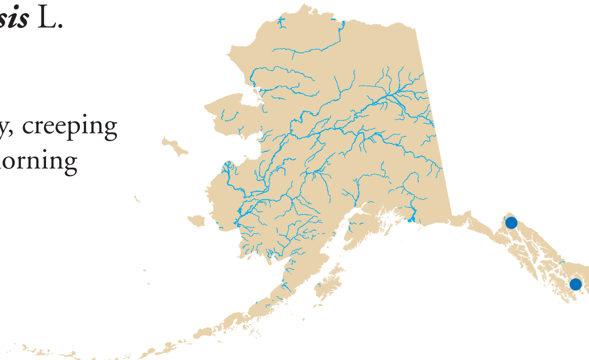
Notes

Common St. Johnswort is used medicinally to relieve nervous disorders, but it also contains a phototoxin that causes sensitive persons to become susceptible to skin burns, especially after exposure to sunlight. The Latin species name *perforatum* means holes, which refers to the transparent dots on the leaves.

UAF Cooperative Extension Service photo by Jamie Snyder

Field Bindweed

Convolvulus arvensis L.



Alternate Names

Perennial morning-glory, creeping jenny, small-flowered morning glory

Synonyms

Convolvulus ambigens House, *Convolvulus incanus* auct. non Vahl, *Strophocaulos arvensis* (L.) Small

Description

KULAK photo by Paul Busselen

Field bindweed.

Field bindweed is a perennial, weak-stemmed vine growing from extensive underground roots and rhizomes. This species forms prostrate mats or is supported by other plants and objects such as fence posts or utility poles. Leaves are highly variable, ¾–2½ inches long, and arrowhead-shaped to round, ovate, and sometimes linear. The veins on a mature leaf are pale green, depressed on the upper surface and raised on the lower surface. Flowers have 5 fused petals forming a 1-inch-long, funnel-like corolla, white to pale pink.

Similar Species

KULAK photo by Paul Busselen

Black bindweed (*Polygonum convolvulus* L., included in this book) has similar habit and vegetative features, but its arrowhead-shaped leaves are less variable than field bindweed, and it lacks the distinct, large, funnel-shaped flowers of field bindweed. Out of flower, black bindweed has a papery sheath surrounding each leaf node.

KULAK photo by Paul Busselen

Management

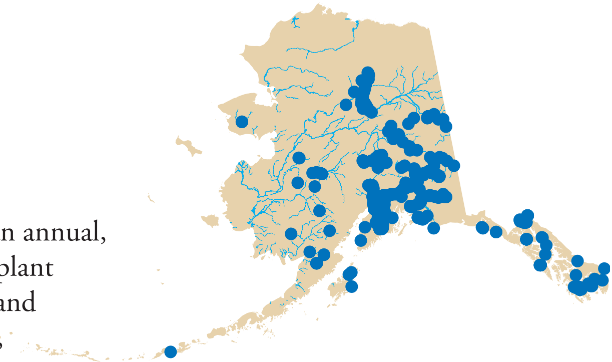
Field bindweed is best managed by a combination of above-ground biomass removal and competition from desirable vegetation. Field bindweed will not grow under dense shade. Strategies that focus on exhausting biomass stored in belowground root systems are advised. Extensive use of tillage is effective in agricultural settings. Drought decreases the effectiveness of herbicide treatments (Lyons 1998).

Notes

Field bindweed is listed as a prohibited noxious weed in Alaska (Alaska Administrative Code 1987) and is found at a number of sites across the Kenai Peninsula (E. Bella, pers. comm. 2005). The genus name is derived from the Latin *convolvere*, to entwine. A closely related genus is *Ipomoea*, the sweet potato. Because of its wide distribution and economic impact, field bindweed has been considered one of the "world's 10 worst weeds" (Holm et al. 1977).

Common Plantain

Plantago major L.



Alternate Names

common plantain

Description

Common plantain is an annual, biennial, or perennial plant with a thick rootstalk and extensive fibrous roots, up to 3 feet deep and wide. Flowering stalks can grow to 2 feet tall but are generally 6–8 inches tall. Common plantain is hairless except for a few hairs on the undersides of leaves. It has a basal rosette of stalked, ovate to cordate leaves with smooth margins. The leaves are 2–12 inches long and up to 4 inches wide and are strongly 3–5-ribbed. The flowers are borne on 1 to many spikes from a leafless stalk. It has numerous small, greenish-white flowers that fade to brown. Flowers are wind- and fly-pollinated and self-compatible, and the fruit is an ovate capsule that splits around the middle and contains 5–30 seeds. The seeds are brownish-black, small, and elliptic to 4-sided. Plantain is very morphologically variable, and many subspecific forms have been recognized.

National Park Service photo by Jeff Heys

Similar Species

Six other *Plantago* species are known in Alaska, 4 of which are native. Common plantain can be distinguished from these species by the presence of broad, nearly hairless leaves and more than 6 seeds per capsule.

Management

Common plantain can be pulled with relative ease, although several weedings may be necessary to eliminate plants germinating from buried seeds and root fragments (Densmore et al. 2001). It is easily controlled through herbicide application.

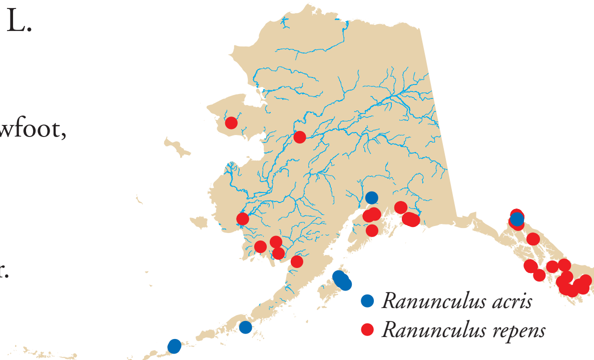
US Geological Survey photo by Chris McKee

Notes

Dried plantain leaves are used in anti-smoking herbal tonics. This plant is originally from Europe, and Native Americans observing its spread named it "white man's footprint" or "Englishman's foot." Europeans saw the same resemblance to feet or affinity for paths; the genus name *Plantago* is a Latin word meaning "sole of the foot." Common plantain is now naturalized throughout the United States.

Creeping Buttercup

Ranunculus repens L.



Alternate Names
buttercup, creeping crowfoot, meadow buttercup

Synonyms
Ranunculus repens L. var. *degeneratus* Schur, *Ranunculus repens* L. var. *erectus* DC., *Ranunculus repens* L. var. *glabratus* DC., *Ranunculus repens* L. var. *linearilobus* DC., *Ranunculus repens* L. var. *pleniflorus* Fern., *Ranunculus repens* L. var. *typicus* G. Beck, *Ranunculus repens* L. var. *villosus* Lamotte

XID Services photo by Richard Old

Leaves and flowers of creeping buttercup.

Related Species
Tall buttercup
Ranunculus acris L.

Description
Creeping buttercup is an herbaceous perennial plant with stems up to 3 feet long and slender fibrous roots. Decumbent stems root freely at their nodes and are often slightly hollow with long spreading hairs. Basal leaves are ½–3½ inches long, up to 4 inches wide, egg-shaped to triangular, and trifoliate with toothed margins. Stem leaves are alternate and the lower long-stalked leaves transition upward to simple to 5-parted bracts. Flower stems are long and erect, and flowers are few and showy with 5 yellow petals. Spherical seedheads have about 12 flattened and rounded fruits, each with a short backward-turned beak. The plant overwinters as a rosette with small green leaves.

KULAK photo by Paul Busselen

Tall buttercup.


Norwegian Botanical Association photo by Norman Hagen

Tall buttercup leaf.

Tall buttercup is an herbaceous biennial or short-lived perennial plant that grows from a cluster of fibrous roots. Erect stems are up to 3 feet tall, smooth, hollow, leafy below, and branched above. Basal leaves are long-stalked, divided deeply into 3 to 7 coarsely lobed segments, and persistent. Stem and basal leaves have soft hairs on both sides. Long-stalked flowers are composed of 5 shiny golden-yellow petals and 5 sepals. Seeds are disc-shaped and reddish brown with a short hook.

Similar Species

Creeping buttercup can be distinguished from native buttercup species by its horizontal growth habit, creeping stems that root at the nodes, spherical head of achenes, and markedly long petals (¼–⅜ of an inch). Exotic tall buttercup can be distinguished from native buttercup species by its upright growth habit and deeply lobed and toothed leaves.


Norwegian Botanical Association photo by Norman Hagen

Tall buttercup flower.

Management

If hand-pulling is used for control of creeping buttercup, all of the rooted branches must be tracked down and removed (Densmore et al. 2001). This species is very resistant to certain herbicides. However, herbicide application is generally recommended as the best control method for buttercups.

Notes

Tall buttercup was introduced from Europe and is poisonous to cattle. Creeping buttercup, also from Europe, was introduced to North America as an ornamental. It is a very common lawn weed in southeast Alaska. In some cases it is the lawn.

Trees and Shrubs to Watch

Caprifoliaceae
(Honeysuckle Family)

Thymeliaceae
(Mezereum Family)

Fabaceae
(Pea Family)

Pinaceae
(Pine Family)

Rosaceae
(Rose Family)

Bush Honeysuckle

Lonicera tatarica L.

XID Services photo by Richard Old

Alternate Names
Tatarian honeysuckle

Description
Bush honeysuckle is a bushy, finely branched shrub that grows up to 10 feet in height. The trunk has grayish-brown bark in long, thin scales. Branches are thin and flexible and brown to greenish-brown, and older stems are often hollow. Leaves are hairless, opposite, ovate to oblong, and 1–2½ inches long, with entire margins, obtuse to acute tips, and rounded bases. The flowers are pink or white, less than 1 inch long, and tubular, and they occur in pairs. The fruit is an orange to reddish-orange rounded berry, 3⁄16–5⁄16 inches wide, that has several seeds. Seeds are oval, flattened, and yellow.

Similar Species
In fruit, the orange or red berries of the exotic honeysuckle distinguish it from the purplish-black-berried native bearberry honeysuckle (*Lonicera involucrata* Banks ex Spreng.) which is found in Haines and southern Southeast Alaska.

Ecological Impact
Bush honeysuckle forms a dense shrub layer that shades out native vegetation in the woodland understory. It reduces the richness and cover of herb communities and delays establishment of new seedlings. Bush honeysuckle can alter habitats by decreasing light availability and depleting soil moisture and nutrients (Virginia DCR 2004). It can also reduce tree regeneration in early to mid-successional forests (Batcher and Stiles 2000).

Biology and Invasive Potential
Bush honeysuckle has high seed production and can spread vegetatively (Batcher and Stiles 2000, Charles 2001,

Hoppes 1988). Outside of Alaska, it has been shown to invade disturbed sites as well as intact forests (Batcher and Stiles 2000), although areas with disturbance are most vulnerable to invasion (WDNR 2003). The fruits are distributed by birds and small mammals (Butterfield et al. 1996). Many state and private nurseries still sell bush honeysuckle (Batcher and Stiles 2000). Germination occurs shortly after dispersal. Seeds can remain viable for 2 or more years. Seedlings establish most readily on open ground or in areas with sparse understory (Butterfield et al. 1996). Bush honeysuckle grows in a wide variety of soils, soil moisture regimes, environmental conditions, and on all slope exposures. It can withstand periodic flooding, drought, shade, and temperatures of –58° to 113°F (Butterfield et al. 1996). Bush honeysuckle is listed as noxious in Vermont and has been declared an invasive weed in Wisconsin.

XID Services photo by Richard Old

XID Services photo by Richard Old

Distribution and Abundance

Bush honeysuckle was first reported in Alaska in 1969 from Fairbanks and now is a cultivated ornamental in southcentral Alaska. In other states it has spread to lakes, river banks, marshes, roadsides, pastures, and wooded hillsides. Bush honeysuckle occurs along forest edges in Iowa, where it has the potential to modify existing native plant communities (Butterfield et al. 1996) and has invaded the understory of woodlands and marshes in Ohio (ODNR 2004). Bush honeysuckle is native to Europe and eastern Asia. It has not yet been found growing in wild or riparian areas but is widely planted in Fairbanks and southcentral Alaska.

Management

Mechanical methods, including hand-pulling and cutting, must remove all root fragments in order to be effective. Mechanical and chemical control methods can be used in combination for control by cutting off the stem just above the ground and applying herbicide with a foam paint brush. Treatment must be repeated for at least 3–5 years in order to control new plants emerging from the seed bank (WDNR 2004, Batcher and Stiles 2000, Butterfield et al. 1996).

Notes

Birds consume the red berries of bush honeysuckle and spread the seeds into forests and woodlands where the plants readily establish. Another common name is "twin sisters" due to the paired fruits and flowers.

XID Services photo by Richard Old

Spurge Laurel

Daphne laureola L.

KULAK photo by Paul Busselen

Description
This species is an evergreen shrub growing up to 3 feet tall. Leaves are crowned around the twigs and are oblong-lance shaped, 1¼–5 inches long and ½–1¼ inches wide, dark glossy and green above, lighter beneath, and narrow at the base. Flowers are yellowish-green, ¼–⅓ of an inch long, and occur in dense axillary clusters in early spring. Fruits are oval and black.

Similar Species
It is unlikely that spurge laurel would be confused with another species in Alaska. This species is not yet in Alaska but is now widespread in coastal British Columbia.

Management
Hand-pulling followed by planting of native species has been recommended in forest habitats, while areas of less dense vegetation should be targeted for immediate uprooting and clipping (Percival 1997).

Notes
The Latin name of this plant is the title of a play from 1977 in Britain. This plant originated in Eurasia. While considered very poisonous, it contains various compounds that are being investigated for anti-leukemia effects.

UAB, Unitat de Botanica

KULAK photo by Paul Busselen

Siberian Peashrub

Caragana arborescens
Lam.

UAF Cooperative Extension Service
photo by Jamie Snyder

Alternate Names

pea shrub, pea tree

Description

Siberian peashrub is a shrub to small tree reaching up to 20 feet in height under favorable growing conditions, with yellow-green bark on young twigs and gray to olive-green bark on mature branches and trunks. It is typically multistemmed with erect to spreading branches originating from a dense, spreading root system. Leaves are alternate or whorled, 2–4 inches long, and pinnately compound with 8–12 leaflets in pairs. The leaflets are about ½–1 inch long, entire, and elliptic to broadly oblanceolate with a short point at the top; they are short, silky, and hairy when young and later almost hairless. The stipules are narrow and often persist as spines. Flowers are borne singly or in small groups; they are long-stalked, yellow, and about 1 inch long. Pods are ½–2½ inches long and about ⅛ of an inch wide. They are linear-lanceolate, green, and strongly flattened, becoming more cylindrical and brownish at maturity. The pods disperse seeds by opening explosively.

UAF Cooperative Extension Service
photo by Jamie Snyder

Similar Species

This is the only yellow-flowered, pinnately leaved shrub in the pea family in Alaska, except for other *Caragana* species that are occasionally grown as ornamental plants.

Ecological Impact
Siberian peashrub has recently been observed moving into natural areas in Alaska, particularly forests and riparian areas, with the potential for alteration of plant community structure and species composition. It has a symbiotic relationship with nitrogen-fixing bacteria and can therefore alter soil nutrient levels (GRIN 2004), which could also affect native plant species.

Biology and Invasive Potential
Siberian peashrub produces 4 to 6 seeds per pod and many pods per plant. It can also be propagated by bare roots, root cuttings, and layering (Duke 1983, GRIN 2004). The seeds are large and do not have any apparent adaptations for long-distance dispersal. Siberian peashrub is cultivated as an ornamental and food plant (Welsh 1974). It is widely planted in the United States and Canada for windbreaks, hedges, and outdoor screening, and in arctic and subarctic regions it has also been used as supplementary fodder for reindeer herds (Duke 1983). Cold-stratification is required for germination, which takes 2 to 3 weeks (Plants for a Future 2002). Siberian peashrub can grow in all soil textures with pH levels ranging from 5.0 to 8.5. It is highly tolerant of nutrient-poor soils, drought, and cold temperatures and prefers full sun and light, sandy, dry soils. Siberian peashrub favors continental climates with long summers and cold, fairly dry winters (Plants for a Future 2002).


UAF Cooperative Extension Service photo by Jamie Snyder

Distribution and Abundance
Siberian peashrub is cultivated in the northern United States and Canada, including introductions to arctic regions (Isely 1993, Duke 1983). It is known as an invader

of forested areas in Wisconsin (WDNR 2003). It is native to Siberia, Kazakhstan, Mongolia, and China. Now its range extends across Europe and North America as well (GRIN 2004). In Alaska, it has been grown in Anchorage, Fairbanks, Seward, and the remote community of Iditarod (ALA 2004).

Management

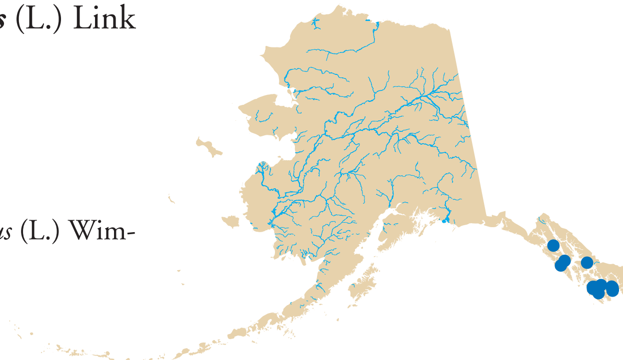
Control options have not been investigated. Siberian peashrub can resprout after cutting (GRIN 2004), suggesting that a combination of mechanical and chemical methods may be necessary for effective control of this species.

Notes

Siberian peasants reportedly overwintered their chicken flocks by feeding them the seeds of this plant. The leaves yield an azure dye.

Scotchbroom

Cytisus scoparius (L.) Link



Alternate Names
Englishbroom

Synonyms
Sarothamnus scoparius (L.) Wimmer ex Koch

Description
Scotchbroom is a woody shrub that grows up to 10 feet tall with many erect branches that are angled and dark green. Leaves are mostly 3-parted with entire leaflets. Leaflets are obovate to oblanceolate, ¼ to ½ of an inch long. Flowers are showy, yellow, and abundant, and are usually borne solitarily in axils. Pods are flattened and brown or black with white hair on the margins.

The Nature Conservancy photo by Barry A. Rice

Similar Species
There are several weedy species of the genus *Cytisus* that grow on the Pacific Coast and Cascade Mountians, but none are native to Alaska (Whitson et al. 2000). Gorse (*Ulex europaeus* L.) is another invasive shrub not yet known to occur in Alaska with yellow pea-like flowers and dense sharp spines, while Siberian peashrub (*Caragana arborescens* Lam., included in this book) has pinnate leaves. Spanish broom (*Spartium junceum* L.)

UAF Cooperative Extension Service photo by Jamie Snyder

Scotchbroom tagged for removal.

is another exotic plant not yet in Alaska and can be distinguished from Scotchbroom by its fragrant flowers and rounded, bright green stems.


USDA Forest Service photo by Tom Heutte

Management

Hand-pulling, cutting, or mowing can be used for Scotchbroom control. Herbicides are also effective. Root pieces that remain in the soil will resprout to form new plants, and so monitoring is needed after treatment (Hoshovsky 1986). Use of a brush chipper may be desirable to dispose of cut or pulled plants. Biological control may become a future option, given that there are several Scotchbroom-feeding insects from Europe.

Notes

Scotchbroom was introduced as an ornamental to the Pacific Northwest, where it escaped cultivation. The Latin genus name *Cytisus* may be corruption of the name of a Greek island, Cythnus, where a broom species abounded and was written about by Pliny.


USDA Forest Service photo by Tom Heutte

Lodgepole Pine

Pinus contorta Dougl. ex Loud. var. ***latifolia*** Engelm. ex S. Wats.

Kreekphoto by Jaap de Kreek

Alternate Names

tamarack pine

Description

Lodgepole pine is a small to large resinous evergreen tree typically growing 50 to 75 feet tall, with 8 to 12 inch trunk diameter and a narrow crown. Needles are relatively long (1 to 2¼ inches), stiff, often twisted, and clustered in bundles of two with a sheath at the base. Twigs are orange when young, becoming gray brown, rough, and stout with age. Bark is gray to dark brown and scaly. Cones are 1¼ to 2 inches long, egg-shaped, almost stalkless, and pointing outward. Typically cones do not open and release seeds until after a forest fire, however some open at maturity in Alaska. Seeds are brown and small with a long broad wing.

Similar Species

This species includes 2 geographic varieties in Alaska. The native coastal form, shore pine (*Pinus contorta* Dougl. ex Loud. var. *contorta*), grows in peat bogs and is generally a low spreading or scrubby tree with cones pointing towards the trunk that open at maturity but remain attached. The inland form, lodgepole pine (*Pinus contorta* Dougl. ex Loud. var. *latifolia* Engelm. ex S. Wats.), differs from shore pine in being taller with a narrow crown and thinner scaly, unfurrowed bark, and it has closed cones pointing outward.

Ecological Impact

Lodgepole pine forms dense thickets, replacing or overtopping the natural canopy (Richardson et al. 1994). Many birds and small mammals consume lodgepole pine seeds, and snowshoe hare, red squirrel, porcupine, and several vole species feed on seedlings. Moose browse on pine during the winter. The well-developed canopy likely attracts forest canopy birds and might influence the abundance of species that utilize open habitats (Hansson 1985, Sjöberg and Danell 2001, Sullivan and Sullivan 1982). Invasion by lodgepole pine can convert grassland and shrubland to forest. Increases in above-ground biomass that accompany these conversions cause increases in evapotranspiration and reduction in streamflow from catchment areas (Le Maitre et al. 1996, Richardson et al. 1994).

Biology and Invasive Potential

Lodgepole pine propagates by seeds, bare roots, and cuttings. The plant is capable of producing over 17,000 seeds per year. Some trees produce seed at less than 10 years of age (Ledgard 2001). Usually, lodgepole pine requires moderate disturbance to facilitate seedling recruitment, such as grazing, browsing, trampling, or mechanical clearing. It can also spread into areas with naturally occurring disturbances such as slope instability, fire, and flooding (Richardson et al. 1994). Although most seeds are deposited within a few meters of the parent tree, the seed wing allows long distance dispersal by wind (Despain 2001, Ledgard 2001). Small mammals, especially rodents, are also potential agents of long-distance dispersal and establishment (Despain 2001, Sjöberg and Danell 2001). Germination occurs in early spring, shortly after snowmelt; mineral soils provide optimal germination sites and moisture is required in the first year of establishment (Stuart et al. 1989). Lodgepole pine is adapted to soil textures ranging from coarse to fine and pH levels ranging from 6.2 to 7.5. This species is shade-intolerant and prefers soils with medium fertility and moisture. It requires a minimum of 100 frost free days for reproduction but can tolerate temperatures to –70°F. It has low anaerobic-, drought-, and fire-tolerance (GRIN 2004). Because of its economic importance, lodgepole pine has been introduced to areas outside its natural range. Sixteen different pine species have spread from planting sites to invade natural or seminatural vegetation in the southern hemisphere (Richardson et al. 1994).

Distribution and Abundance

The variety of lodgepole pine of concern is native to North America, occurring naturally from southeast Alaska east to the headwaters of the Mackenzie River and south through western Alberta and British Columbia and the Rocky Mountains to Colorado and Utah. The native range in Alaska extends to the vicinity of Skagway and Haines in northern southeast Alaska, although it may be expanding northwestward. Lodgepole pine forms stands in the mixed forest with Sitka spruce, western paper birch, and subalpine fir. It has been introduced as a fast growing, hardy tree in the vicinity of Anchorage and Fairbanks, outside of its native range (Viereck and Little 1972) and is a major afforestation species in northern Europe (Hermann 1987). Invasion of natural areas by lodgepole pine has been reported in New Zealand (Ledgard 2001).

Management

No control of lodgepole pine should be undertaken in Southeast Alaska, where two native varieties occur. Different techniques for removal include grazing, burning, hand-pulling, felling, and chemical application. For areas in which lodgepole pine plantings are desired, configuration of lodgepole pine plantations in ways that reduce the spread of the species during seed dispersal is recommended (Engelmark et al. 2001).

Notes

One variety of lodgepole pine, var. *bolanderi* (Parl.) Vasey, the Mendocino Sands shore pine, is rare and endemic to California.

European Bird Cherry

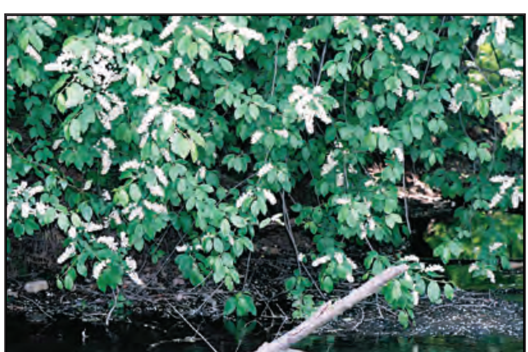
Prunus padus L.


National Park Service photo by Jeff Heys

Alternate Names
Mayday tree, Maybush

Description
European bird cherry is a small deciduous tree that grows to 15 to 30 feet high. Leaves are oval and dark green with 2 glands where the stalk joins the blade and often with a tuft of hair where each vein joins the midrib. Leaves have long stalks, up to 4 inches, and are elliptic to obovate and sharply serrate. Small, strongly aromatic white flowers, ⅛ to ¼ of an inch long, are held in cylindrical spikes at various angles, often drooping. The fruit is a black cherry that is highly prized by birds.

Similar Species
The species most easily mistaken for European bird cherry in Alaska is Canada red cherry, a cultivar of *Prunus virginiana* L. that holds its flower spikes more upright than those of European bird cherry. The two species are easily distinguished once the foliage of Canada red cherry turns red in July. Other species that might be mistaken for European bird cherry in Alaska are sweet cherry (*Prunus avium* L.) and black chokecherry (*Prunus virginiana* L. var. *melanocarpa* (A. Nels.) Sarg.). Sweet cherry is distinguished from European bird cherry by its generally larger size, the larger size of the teeth on the leaf margin, and flowers that are larger and arranged in clusters rather than a raceme. Black chokecherry can


USDA Forest Service photo by Michael Shephard

be distinguished by its leaves that have entire rather than serrate margins.

Ecological Impact

The fruits of European bird cherry are highly desirable to birds. Impacts on ecological processes are unknown, however it is successfully spreading along streams in Anchorage amidst native trees and shrubs, suggesting alteration of riparian community composition. Moose will browse the tree but often do not, further increasing its dominance over the native birch, willow, and cottonwood. The tree seems to germinate readily along riparian corridors and is often the primary, if not the only, species of saplings seen in the understory of greenbelt forests in Anchorage.

USDA Forest Service photo by Michael Shephard

Biology and Invasive Potential

European bird cherry sets seed in most years, with an interval between large seed crops of 1 to 3 years. Seeds are very abundant (GRIN 2004) but viable for less than 1 year. Vegetative reproduction occurs by root suckers. European bird cherry is usually pollinated by flies, although self-pollination occurs regularly if insects fail to visit a plant. Seed viability averages 74% with variable germination rates, and seeds require 2 to 4 weeks of warm weather prior to 18 weeks of temperatures less than 40°F for germination. Seeds are widely distributed by birds that eat the fruits in large quantities. It is suited to coarse and medium textured soils with pH levels ranging from 5.0 to 7.0 and has a low tolerance for anaerobic and saline soils. It can withstand temperatures to –33°F, requires 110 frost-free days for reproduction, and is not drought- or shade-tolerant (GRIN 2004).

Distribution and Abundance
European bird cherry is native to Scotland and northern England and Wales and is the most northerly distributed *Prunus* species in Europe. It is commonly cultivated as an ornamental tree in southern Alaska and is colonizing several streams in Anchorage and the Chena River in Fairbanks (M. Shephard, pers. comm. 2004). It is not widely distributed in North America but also occurs in Illinois, New York, New Jersey, Pennsylvania, Delaware, Ontario, and New Brunswick.

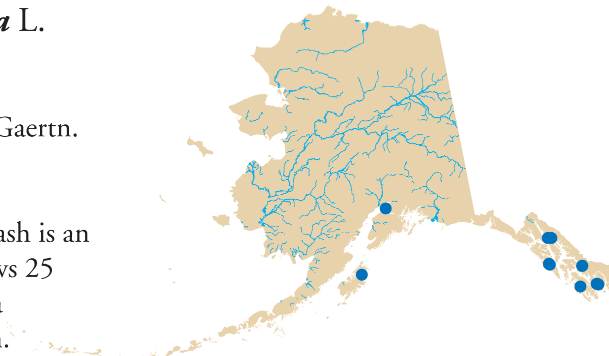
Management
Control methods have not been tested for European bird cherry. One method likely to be effective would be to fell trees with a chainsaw and apply herbicide to cut stumps to prevent regrowth from root and stump suckers. Use only herbicides approved for frill application.

Notes
This small tree is from Europe and is known as *hegg* in Norway, where it is thought to have originated. The bark has been used for traditional fabric dyeing.

USDA Forest Service photo by Michael Shephard

European Mountain Ash

Sorbus aucuparia L.



Synonyms

Pyrus aucuparia (L.) Gaertn.

Description

European mountain ash is an upright tree that grows 25 to 40 feet high with a rounded, open crown. The bark is grayish or yellowish-green and smooth. Leaves are alternate, pinnately compound, and 5 to 8 inches long. There are 11 to 15 leaflets per leaf that are dull dark green above and paler below. Clusters of small white flowers appear in May or June and measure 3 to 5 inches across. Fruits are bright, deep orange to red, small, and fleshy, and they ripen in September and persist on the tree through winter.

XID Services photo by Richard Old

Similar Species

There are 3 native *Sorbus* species in Alaska: Sitka mountain ash (*S. sitchensis* M. Roemer), Cascade mountain ash (*S. scopulina* Greene), and Siberian mountain ash (*S. sambucifolia* (Cham. & Schlecht.) Roem.), a coastal tree, a southern Alaskan shrub, and a western Aleutian shrub, respectively. European mountain ash can be distinguished from the native species by its leaves and fruits. The leaflets are unequal and rounded at the base with more than 11 leaflets per leaf, and the fruits are borne in clusters of many (>25) individual fruits.

Ecological Impact

European mountain ash is able to integrate into coastal rainforest communities in southeast Alaska and dominate (e.g., Sitka National Historical Park). It has also been reported to invade forest communities in Wisconsin (WDNR 2003). Fruits are highly desirable to birds, suggesting the potential for alterations in abundance and composition of avian fauna (Gilman and Watson 1994). European mountain ash hybridizes with the native *S. scopulina* and *S. sitchensis* where their ranges overlap (Pojar and MacKinnon 1994).

U.S. Geological Survey photo by Chris McKee

Biology and Invasive Potential

European mountain ash is a perennial tree that grows rapidly and establishes by seeds, cuttings, or bare root propagation, but it does not spread vegetatively (GRIN 2004). Seeds are numerous and tiny, with many thousands of seeds produced per plant each year. Seeds have a strong innate dormancy that lifts gradually over a few years, and they remain viable in the soil for 5 years or more (Granström 1987). This species germinates well under experimental conditions of multiple years in moist soil (1 inch in soil, under a moss/litter layer) in central Sweden with full light and 68°F (Granström 1987). Cold-stratification is necessary (GRIN 2004). European mountain ash is suited to coarse-textured soils and not to fine soils, and it tolerates pH levels ranging from 5.5 to 7.5. It is unsuited to anaerobic, calcareous, saline, or low moisture soils. It grows in moderately fertile soil and has intermediate shade-tolerance (GRIN 2004). Seeds are spread by birds including thrushes and waxwings and small mammals (Dickinson and Campbell 1991). European mountain ash is widely planted as an ornamental in Southcentral and Southeast Alaska, where

XID Services photo by Richard Old

it has escaped (Welsh 1974). It has been reported to spread as a contaminant of horticultural stock (Hodkinson and Thompson 1997).

Distribution and Abundance

Originally from most of Europe, northern Africa, and western Asia, European mountain ash has naturalized in 27 northern states throughout moist cool regions of North America. It is commonly planted around communities in Southeast, Southcentral, and Interior Alaska, despite a USDA hardiness of zone 2 or less. Its native range in Europe extends from Spain north to Scandinavia and east to the Ural Mountains, and it also occurs in Iceland.

Management

Control measures for European mountain ash are largely untested. It has the ability to resprout after cutting. Frill methods—application of herbicide to exposed cambium—or felling the tree and applying herbicide to cut stumps to prevent resprouting should be effective. Use herbicides labelled for frill application only. Many natural seed predators are present in Scandinavia that likely limit its spread and establishment, but it is unknown if these or similar predators are present in North America.


US Geological Survey photo by Chris McKee

Notes

European mountain ash has frequently been planted at remote settlements in southeast Alaska and still remains at many of these sites. Birds enjoy the berries and can carry and spread them over long distances. Although rumor suggests that the berries are toxic, in Europe, where this species is called the rowan tree, the berries are commonly used in jams and jellies.

Glossary

Achene: A small, dry, hard, single-seeded fruit, similar in appearance to a seed, whose outer covering does not burst when ripe.

Acidic: (pertaining to soil) Soil with a pH value of less than 7.

Acute: Ending in a sharp point.

Adventitious: Plant structures or tissues occurring in an abnormal position.

Allelopathy: The biochemical influence or effect of one living plant upon another; often refers to the ability of some plants to transport chemicals into the soil which inhibit the germination or growth of competing species.

Alternate: Leaves occurring one at a node.

Annual: A plant that produces seed and dies within one year of germinating from seed.

Anther: The pollen-bearing organ of a flower, situated at the tip of the stamen.

Anthropogenic: Human-caused.

Apex: The end of a leaf or growing tip of a shoot.

Auricle: A claw-like appendage at the base of the leaf blade or at the apex of the leaf sheath, especially in grasses.

Asexual: Produced by other than sexual processes, as in asexual reproduction.

Awn: A stiff, bristle-like appendage, usually at the end of a structure.

Axil: The angle found between any two organs or structures.

Axillary: In an axil, growing in an axil, as buds.

Basal: Situated at, or pertaining to, the base.

Biennial: A plant requiring two years in which to complete its life cycle.

Biodiversity: The number and variety of organisms found within a specified geographic region, or, the variability among living organisms and the environments to which they belong; including diversity at the genetic, species, population, and ecosystem levels.

Biomass: Weight of all living material in a unit area at an instantaneous time.

Blade: The leaf of a plant, especially grass; the flat or expanded portion of a leaf.

Bract: A modified leaf, growing at the base or on the stalk of a flower. It usually differs from other leaves in shape or color.

Bulbous: Resembling a bulb, especially in roundness.

Calcareous soil: Soil containing carbonate of lime or limestone; chalky or limy.

Calyx: The usually green outer whorl or series of whorls surrounding flower petals.

Carpel: A simple pistil formed from one sporophyll.

Clasping: Wholly or partially surrounding the stem.

Cold-stratification: Cold, moist incubation which is required to break a seed's dormancy period.

Composite: A member of the Asteraceae family.

Compound: Made up of two or more similar parts (e.g., a compound leaf with multiple leaflets).

Connate: The union of like structures.

Corolla: The petals of a flower as a whole.

Cotyledon: The first leaf or leaves of a seed plant.

Crown: Here, the basal part at soil level where roots and stem join and from where new shoots are produced. In forestry, that part of the tree consisting of limbs, branches, twigs, and leaves.

Culm: The stem of a grass plant.

Cultivar: A cultivated variety.

Deciduous: Losing leaves annually at the end of the growing season.

Decumbent: A plant that has its base lying on the ground and a stem that grows upward.

Disc florets: The regular tubular flowers on the heads of the Asteraceae family.

Dispersal: The process or result of the spreading of organisms from one place to another.

Dissected: Deeply divided into many narrow segments.

Distribution: The natural geographic range of an organism.

Disturbance: A natural or human-induced disruption or alteration of an ecosystem. Forest fires, tornadoes, and rock slides are examples of natural disturbances; logging, acid rain, and road-building are examples of human-induced disturbances.

Dormant: Having biological activity suspended; not actively growing but protected from the environment.

Ecotype: A subdivision of a species that survives as a distinct group through environmental selection and isolation and that is comparable with a taxonomic subspecies.

Elliptic: Oval shaped, narrowed to rounded at the ends and widest at about the middle (like a football).

Entire: Having a margin devoid of any indentations, teeth, or lobes.

Eradication: The complete elimination of a population and its progeny.

Fibrous: Composed of or resembling fibers.

Filament: The stalk of a stamen that bears the anther.

Floret: A single flower in a head of many flowers.

Forb: A non-woody (herbaceous) plant that is not a grass.

Germination: The development of a seed into a plant.

Glabrous: Having a smooth, even surface; without hairs.

Glandular: Having or bearing secreting organs or glands.

Glume: A chaffy or membranous bract; a bract at the base of a grass inflorescence or spikelet.

Habit: The characteristic life cycle, growth pattern, or general appearance of a plant.

Habitat: The area or environment where an organism normally occurs.

Herb: Any seed plant whose stem withers away to the ground after each season's growth; a seed plant with a green, non-woody stem.

Herbicide: See Pesticide.

Herbaceous: Having the characteristics of an herb.

Host: An organism that supports a parasite that lives in or upon it.

Inflorescence: A group of flowers borne on a single axis (stem).

Internode: The part of a stem that lies between two nodes or joints on a plant.

Involucral: A secondary involucre.

Involucre: A whorl of distinct or united leaves or bracts just below a flower or inflorescence.

Irregular flowers: With inequality in the size, form, or union of its similar parts; not radially symmetrical.

Keel: A central ridge along the back of any organ of a plant; the lowest, fused petals of a butterfly-shaped flower.

Lanceolate: Shaped like a lance; broadest toward the base and narrowed to the apex, several times longer than wide.

Leaflet: A subdivision of a compound leaf.

Leaf-nodes: A knob or joint of a stem from which leaves may arise. A node will contain one or more buds.

Lemma: The lower, and larger, of two membranous bracts enclosing the flower in grasses.

Ligules: A strap-shaped plant part; the flattened part of the ray corolla in some or all the florets of many members of the Asteraceae family; in grasses and sedges, the membranous appendage arising from the inner surface of the leaf at the junction with the leaf sheath.

Linear-lanceolate: A leaf that is long, narrow and pointed.

Litter: The freshly fallen or only slightly decomposed layer of plant material on the ground. This layer includes foliage, bark fragments, twigs, flowers, and fruits.

Loam: A soil composed of a mixture of sand, silt, and clay that may contain organic matter and is easily worked, with good drainage, water retention, and porosity.

Lobe: A rounded projecting segment, forming part of a larger structure. A lobed leaf is one whose indentations are large.

Midrib: The main or central rib of a leaf.

Monospecific: Consisting of a single species only. When only one species grows in an area to the exclusion of all others, it is called a monospecific stand.

Node: A knob or joint of a stem from which leaves, roots, shoots, or flowers may arise. A node will contain one or more buds.

Oblanceolate: Shaped like a lance point reversed, having the tapering point next to the leafstalk.

Oblong: Elliptical and from two to four times as long as broad.

Obtuse: With a blunt or rounded end.

Obovate: Inversely ovate; having the shape of the longitudinal section of an egg, with the broad end at the top.

Opposite: Leaves or bracts occurring two at a node on opposite sides of the stem. Flower parts that occur one in front of another.

Ornamental: A plant cultivated for aesthetic purposes.

Ovate: Having the shape of a longitudinal section of an egg; egg-shaped and attached by the broader end.

Palmate: Leaves divided into lobes arising from a common center.

Panicle: A branched racemose inflorescence and often applied more widely to any branched inflorescence.

Pappus: A modified calyx seen in the Asteraceae family, forming a crown of awns, scales or bristles at the summit of the achene. For example, the "parachute" of a dandelion seed.

Perennial: Plants that live more than two years.

Pesticide: A chemical or biological agent intended to prevent, destroy, repel, or mitigate plant or animal life and any substance intended for use as a plant regulator, defoliant, or desiccant, including insecticides, fungicides, rodenticides, herbicides, nematocides, and biocides.

Petiole: The slender stalk or stem of a leaf, also called a leaf stalk.

Pinnate: Divided in a feathery manner, having leaflets arranged on each side of central stalk.

Pinnatifid: Pinnately lobed, cleft, or parted, usually halfway in to the midrib or more.

Pistil: The female reproductive unit of a flower.

Pod: A dry dehiscent fruit that is composed of one or more carpels.

Population: A stable group of randomly interbreeding individuals.

Porous: Permeable to fluids.

Propagation: In plants, the production of offspring through seed production or by asexual (vegetative) means such as fragmentation of stolons, root buds, or rhizomes.

Prostrate: Growing on the ground, trailing.

Pubescent: Covered with soft hair or down.

Raceme: An inflorescence with flowers borne along a more or less elongated axis with the younger flowers nearest the top.

Ray floret: The strap-shaped flower in the Asteraceae family; multiple ray florets extend outward from the center of a flower head.

Recruitment: The addition of new members to a population.

Regular: A flower with all the members of each set alike in form, size and color; radially symmetrical.

Rhizome: A subterranean horizontal root-like stem sending out leaves and shoots from its upper surface and roots from its lower surface.

Riparian: Of or relating to or located on the banks of a river or stream.

Rootstalk: See Rhizome.

Rosette: A group of organs, such as leaves, clustered and crowned around a common point of attachment.

Runner: An offshoot of a parent plant that grows horizontally on top of the ground.

Saline: Consisting of or containing salt.

Seedbank: A store of viable seed buried and dormant in the soil or underwater sediments.

Sepals: Any of the leaf divisions of the calyx; the petal-like structures that subtend the petals of most flowers.

Serrate: With sharp teeth directed forward.

Sheath: A protective covering; lower part of leaf enveloping the stem or culm.

Silicle: A short fruit of the mustard family, Brassicaceae, that is usually not more than twice as long as wide.

Silique: The long, narrow pod of plants of the mustard family, Brassicaceae, more than four times long as wide.

Simple: Of only one part, not completely divided into separate segments.

Spatulate: Leaves that are shaped like a spatula or spoon, gradually widening and with a rounded tip.

Spike: A long flower cluster attached directly to the stalk.

Spikelet: A small spike of a large one; a subdivision of a spike; as the spikelets of grasses.

Spine: A stiff, sharp-pointed plant part, such as a modified leaf, leaf part, petiole, or stipule.

Sporophyll: A leaf that bears spore-producing structures.

Spur: A slender, tubelike structure formed by an extension of one or more petals or sepals.

Stamen: The male reproductive organ in a flower; it is situated immediately within the petals and is composed, in most cases, of two parts, the filament and the anther, which is filled with pollen.

Stipules: One of two appendages at the base of the petiole or leaf.

Stolon: A stem which grows horizontally along the surface of the soil; it can take root at the tip and ultimately develop a new plant.

Symbiotic: The intimate living together of two dissimilar organisms in a mutually beneficial relationship.

Taproot: The primary root continuing the axis of the plant downward. Such roots may be thick or thin.

Taxon: A general term for any morphological unit or group such as species, family, or phylum.

Tillering: The formation of sprouts (tillers) from the base of a grass, forming a new plant.

Understory: An underlying layer of vegetation.

Whorled: When three or more leaves are arranged at the same level on a stem.

Wing: Any membranous or thin expansion bordering or surrounding an organ.

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Appendices

Appendix A. Plant Synonym Table

Scientific Name	Family	Plant Synonyms
Acroptilon repens (L.) DC	Asteraceae	*Centaurea picris* Pallas ex Willd., *Centaurea repens* L.
Alliaria petiolata (Bieb.) Cavara & Grande	Brassicaceae	*Alliaria alliaria* (L.) Britt., *Alliaria officinalis* Andrz. Ex Bieb., *Erysimum alliaria* L., *Sisymbrium alliaria* (L.) Scop.
Brassica rapa L.	Brassicaceae	*Brassica campestris* L.
Bromus tectorum L.	Poaceae	*Anisantha tectorum* (L.) Nevski, *Bromus tectorum* L. var. *glabratus* Spenner, *Bromus tectorum* L. var. *hirsutus* Regel, *Bromus tectorum* L. var. *nudus* Klett & Richter
Capsella bursa-pastoris (L.) Medik.	Brassicaceae	*Bursa bursa-pastoris* (L.) Britt., *Bursa bursa-pastori*s (L.) Britt. var. *bifida* Crépin, *Bursa gracili*s Gren., *Capsella rubella* Reut., *Thlaspi bursa-pastoris* L.
Caragana arborescens Lam.	Fabaceae	
Centaurea biebersteinii DC.	Asteraceae	*Acosta maculosa* auct. non Holub, *Centaurea maculosa* auct. non Lam.
Chenopodium album L.	Chenopodiaceae	*Chenopodium album* L. var. *lanceolatum* (Muhl. Ex Willd.) Coss & Germ., *Chenopodium album* L. var. *polymorphum* Aellen, *Chenopodium amaranticolor* Cost & Reyn., *Chenopodium gigantum* D. Don, *Chenopodium lanceolatum* Muhl. Ex Willd., *Chenopodium suecicim* J. Murr.

Common Names	PLANTS code
Russian knapweed, hardheads	ACRE3
garlic mustard, sauce-alone, jack-in-the-hedge, poor man's garlic	ALPE4
birdsrape mustard, turnip, turnip greens, field mustard, Chinese cabbage, seventop, shogun, turnip rape	BRRA
cheatgrass, downy brome, downy cheat, downy chess, early chess, drooping brome, cheatgrass brome, wild oats, military grass	BRTE
shepherd's purse, pepper plant, shepherd's pouch, pick pocket, mother's-heart, St. James weed, caseweed, pick-purse, witches'-pouches, toothwort, shovel-plant	CABU2
Siberian pea shrub, pea shrub, pea tree	CAAR18
spotted knapweed	CEBI2
common lambsquarters, pigweed, white goosefoot	CHAL7

Scientific Name	Family	Plant Synonyms
Cirsium arvense (L.) Scop.	Asteraceae	*Carduus arvensis* (L.) Robson, *Cirsium arvense* (L.) Scop. var. *argenteum* (Vest) Fiori, *Cirsium arvense* (L.) Scop. var. *horridum* Wimmer & Grab., *Circium arvense* (L.) Scop. var. *integrifolium* Wimmer &Grab., *Cirsium arvense* (L.) Scop. var. *mite* Wimmer & Grab., *Cirsium arvense* (L.) Scop. var. *vestitum* Wimmer & Grab., *Cirsium incanum* (Gmel.) Fisch., *Cirsium setosum* (Willd.) Bess. ex Bieb., *Serratula arvensis* L.
Cirsium vulgare (Savi) Ten.	Asteraceae	*Carduus lanceolatus* L., *Carduus vulgaris* Savi, *Cirsium lanceolatum* (L.) Scop., non Hill, *Cirsium lanceolatum* (L.) Scop. var. *hypoleucum* DC.
Convolvulus arvensis L.	Convolvulaceae	*Convolvulus ambigens* House, *Convolvulus incanus* auct. non Vahl, *Strophocaulos arvensis* (L.) Small
Cotula coronopifolia L.	Asteraceae	
Crepis tectorum L.	Asteraceae	
Cytisus scoparius (L.) Link	Fabaceae	*Sarothamnus scoparius* (L.) Wimmer ex Koch
Dactylis glomerata L.	Poaceae	
Daphne laureola L.	Thymeliaceae	
Descurainia sophia (L.) Webb ex Prantl	Brassicaceae	*Sisymbrium sophia* L., *Sophia sophia* (L.) Britt.
Digitalis purpurea L.	Scrophulariaceae	
Elymus repens (L.) Gould	Poaceae	*Agropyron repens* (L.) Beauv., *Agropyron repens* (L.) Beauv. var. *subulatum* (Schreb.) Roemer & J.A. Schultes, *Elytrigia repens* (L.) Desv. ex B.D. Jackson, *Elytrigia repens* (L.) Desv. ex B.D. Jackson var. *vaillantiana* (Wulfen & Schreb.) Prokudin, *Elytrigia vaillantiana* (Wulfen & Schreb.) Beetle, *Triticum repens* L., *Triticum vaillantianum* Wulfen & Schreb.

Common Names	PLANTS code
Canada thistle, creeping thistle, field thistle, cursed thistle, corn thistle, small-flowered thistle, green thistle	CIAR4
bull thistle, common thistle, spear thistle	CIVU
field bindweed, perennial morning-glory, creeping jenny, small-flowered morning glory	COAR4
brass buttons, waterbuttons, common brassbuttons, bachelor's button, buttonweed	COCO7
narrowleaf hawksbeard, annual hawksbeard, yellow hawksbeard	CRTE3
Scotchbroom, Englishbroom, Scotsbroom	CYSC4
orchardgrass	DAGL
spurge laurel	DALA11
flixweed	DESO2
purple foxglove	DIPU
quackgrass, couchgrass, dog grass, quickgrass, scotch, quitch, twitch	ELRE4

Scientific Name	Family	Plant Synonyms
Euphorbia esula L.	Euphorbiaceae	
Euphrasia nemorosa (Pers.) Wallr.	Scrophulariaceae	*Euphrasia americana* auct. p.p., *Euphrasia arctica* Lange ex Rostr. ssp. *borealis* (Townsend) Yeo, *Euphrasia borealis* (Townsend) Wettst., *Wuphrasia canadensis* auct. non Townsend, *Euphrasia curta* (Fries) Wettst., *Euphrasia officinalis* auct. non L., *Euphrasia pectinata* auct. non Ten., *Euphrasia tatarica* auct. non fisch. ex Spreng.
Galeopsis bifida Boenn.	Lamiaceae	*Galeopsis tetrahit* L. var. *bifida* (Boenn.) Lej. & Court.
Galeopsis tetrahit L.	Lamiaceae	
Heracleum mantegazzianum Sommier & Levier	Apiaceae	
Hesperis matronalis L.	Brassicaceae	
Hieracium aurantiacum L.	Asteraceae	*Hieracium scabriusculum* Schwein., *Hieracium scabriusculum* Schwein. var. *perhirsutum* Lepage, *Hieracium scabriusculum* Schwein. var. *saximontanum* Lepage, *Hieracium scabriusculum* Schwein. var. *scabrum* (Schwein.) Lepage
Hordeum jubatum L.	Poaceae	
Hypericum perforatum L.	Clusiaceae	
Hypochaeris radicata L.	Asteraceae	
Impatiens glandulifera Royle	Balsaminaceae	*Impatiens roylei* Walp.
Lactuca serriola L.	Asteraceae	*Lactuca scariola* L.
Lappula squarrosa (Retz.) Dumort.	Boraginaceae	*Lappula echinata* Gilib., *Lappula erecta* A. Nels., *Lappula fremontii* (Torr.) Greene, *Lappula lappula* (L.) Karst., *Lappula myosotis* Moench, *Lappula squarrosa* (Retz.) Dumort. var. *erecta* (A. Nels.) Dorm

Common Names	PLANTS code
leafy spurge, wolf's-milk, euphorbia, spurge, faitours-grass	EUES
common eyebright	EUNE3
splitlip hempnettle, bifid hempnettle	GABI3
brittlestem hempnettle	GATE2
giant hogweed, giant cow parsnip	HEMA17
sweetrocket, dames rocket	HEMA3
orange hawkweed, devil's paintbrush, king-devil	HIAU
foxtail barley, squirreltail barley	HOJU
common St. Johnswort, Klamath weed	HYPE
spotted catsear, hairy catsear, false dandelion	HYRA3
ornamental jewelweed, Himalayan balsam, policeman's helmet, touch-me-not, Indian jewelweed, Washington orchid	IMGL
prickly lettuce, wild lettuce, compass plant, milk thistle, horse thistle, wild opium	LASE
bluebur, stick-tights, beggar-ticks, stickseed, sheepbur, European sticktight, bur forget-me-not, European stickseed	LASQ

Scientific Name	**Family**	**Plant Synonyms**
Lapsana communis L.	Asteraceae	
Leontodon autumnalis L.	Asteraceae	
Lepidium densiflorum Schrad.	Brassicaceae	*Lepidium apetalum* A. Grey
Leucanthemum vulgare Lam.	Asteraceae	*Chrysanthemum leucanthemum* L., *Chrysanthemum leucanthemum* L. var. *boecheri* Boivin, *Chrysanthemum leucanthemum* L. var. *pinnatifidum* Lecoq & Lamotte, *Leucanthemum leucanthemum* (L.) Rydb., *Leucanthemum vulgare* Lam. var. *pinnatifidum* (Lecoq & Lamotte) Moldenke
Linaria vulgaris P. Mill.	Scrophulariaceae	*Linaria linaria* (L.) Karst.
Lolium perenne L. ssp. *multiflorum* (Lam.) Husnot	Poaceae	*Lolium multiflorum* Lam., *Lolium multiflorum* Lam. var. *diminutum* Mutel, *Lolium multiflorum* Lam. var. *muticum* DC., *Lolium perenne* L. var. *aristatum* Willd., *Lolium perenne* L. var. *multiflorum* (Lam.) Parnell
Lonicera tatarica L.	Caprifoliaceae	
Lupinus polyphyllus Lindl.	Fabaceae	
Lythrum salicaria L.	Lythraceae	*Lythrum salicaria* L. var. *gracilior* Turcz., *Lythrum salicaria* L. var. *tomentosum* (P. Mill.) DC., *Lythrum salicaria* L. var. *vulgare* DC.
Matricaria discoidea DC.	Asteraceae	*Artemisia matricarioides* auct. non Less., *Chamomilla suaveolens* (Pursh) Rydb., *Lepidanthus suaveolens* (Pursh) Nutt., *Lepidotheca suaveolens* (Pursh) Nutt., *Matricaria matricarioides* auct. non (Less.) Porter, *Matricaria suaveolens* (Pursh) Buch., non L., *Santolina suaveolens* Pursh, *Tanacetum suaveolens* (Pursh) Hook.
Medicago lupulina L.	Fabaceae	

Common Names	PLANTS code
nipplewort	LACO3
hawkbit, autumn dandelion	LEAU2
common peppergrass, pepper grass, poorman's pepper, prairie peppergrass, green-flowered peppergrass, wild tongue-grass	LEDE
oxeye daisy, white daisy	LEVU
yellow toadflax, common toadflax, toadflax, butter and eggs, wild snapdragon	LIVU2
Italian ryegrass, annual ryegrass	LOPEM2
bush honeysuckle, Tatarian honeysuckle	LOTA
bigleaf lupine, marsh lupine	LUPO2
purple loosestrife, spike loosestrife	LYSA2
pineapple weed, disc mayweed, wild chamomile	MADI6
black medick, trefoil, black clover, none-such, hop medic, spotted burclover, blackseed	MELU

Scientific Name	Family	Plant Synonyms
Melilotus alba Medik.	Fabaceae	*Melilotus albus* Medik., *Melilotus albus* Medik. var. *annuus* Coe
Mycelis muralis (L.) Dumort.	Asteraceae	*Lactuca muralis* (L.) Fresen.
Myosotis scorpioides L.	Boraginaceae	*Myosotis palustris* (L.) Hill
Myriophyllum spicatum L.	Haloragaceae	*Myriophyllum spicatum* L. var. *spicatum* in part (H&C)
Phalaris arundinacea L.	Poaceae	*Phalaroides arundinacea* (L.) Raeusch., *Phalaris arundinacea* L. var. *picta* L., *Phalaroides arundinacea* (L.) Raeusch. var. *picta* (L.) Tzvelev
Phleum pratense L.	Poaceae	*Phleum nodosum* L., *Phleum pratense* var. *nodosum* (L.) Huds., *Phleum pratense* ssp. *nodosum* (L.) Arcang.
Pinus contorta Dougl. ex Loud. var. *latifolia* Engelm. ex S. Wats.	Pinaceae	*Pinus contorta* Dougl. ex Loud. ssp. *latifolia* (Engelm. ex S. Wats.) Critchfield
Plantago major L.	Plantaginaceae	*Plantago asiatica* auct. non L., *Plantago halophila* Bickn., *Plantago major* L. var. *asiatica* auct. non (L.) Dcne., *Plantago major* L. var. *intermedia* (DC.) Pilger, *Plantago major* L. ssp. *intermedia* (DC.) Arcang., *Plantago major* L. var. *pachyphylla* Pilger, *Plantago major* L. var. *pilgeri* Domin, *Plantago major* L. var. *scopulorum* Fries & Broberg
Poa pratensis L.	Poaceae	*Poa agassizensis* Boivin & D. Love, *Poa angustifoli*a L., *Poa pratensi*s L. ssp. *agassizensis* (Boivin & D. Love) Taylor & MacBryde, *Poa pratensis* L. ssp. *angustifolia* (L.) Lej., *Poa pratensis* L. var. *angustifolia* (L.) Gaudin, *Poa pratensis* L. var. *domestica* Laestad., *Poa pratensis* L. var. *gelida* (Roemer & J.A. Schultes) Bocher, *Poa pratensis* L. var. *iantha* Wahlenb

Common Names	PLANTS code
white sweetclover, white melilot, honey clover, honey-lotus, tree clover, white millet	MEAL12
wall lettuce	MYMU
marsh forget-me-not, true forget-me-not	MYSC
Eurasian watermilfoil, spike watermilfoil, spiked watermilfoil	MYSP2
reed canary grass, canarygrass	PHAR3
common timothy, timothy	PHPR3
lodgepole pine, tamarack pine	PICOL
plantain, common plantain	PLMA2
Kentucky bluegrass	POPR

Scientific Name	Family	Plant Synonyms
Polygonum aviculare L.	Polygonaceae	*Polygonum aviculare* L. var. *vegetum* Ledeb., *Polygonum heterophyllum* Lindl., *Polygonum monspeliense* Pers.
Polygonum convolvulus L.	Polygonaceae	*Fallopia convolvulus* (L.) A. Love, *Fagopyrum convolvulus* (L.) H. Gross, *Tiniaria convolvulus* L. Webb. & Moq., *Bilderdykia convolvulus* (L.) Dumort
Polygonum cuspidatum Sieb. & Zucc.	Polygonaceae	*Fallopia japonica* (Houtt.) Dcne., *Plueropterus cuspidatum* (Sieb. & Zucc.) Moldenke, *Plueropterus zuccarinii* (Small) Small, *Polygonum zuccarinii* Small, *Reynourtria japonica* Houtt
Polygonum sachalinense F. Schmidt ex Maxim.	Polygonaceae	*Fallopia sachalinensis* (F. Schmidt ex Maxim.) Dcne., *Reynoutria sachalinensis* (F. Schmidt ex Maxim.) Nakai
Polygonum x bohemicum (J. Chrtek & A. Chrtkova) P. F. Zika & A. L. Jacobson	Polygonaceae	
Prunus padus L.	Rosaceae	
Ranunculus acris L.	Ranunculaceae	
Ranunculus repens L.	Ranunculaceae	*Ranunculus repens* var. *degeneratus* Schur, *Ranunculus repens* var. *erectus* DC., *Ranunculus repens* var. *glabratus* DC., *Ranunculus repens* var. *linearilobus* DC., *Ranunculus repens* var. *pleniflorus* Fern., *Ranunculus repens* var. *typicus* G. Beck, *Ranunculus repens* var. *villosus* Lamotte
Rorippa austriaca (Crantz) Bess.	Brassicaceae	*Nasturtium austriacum* Crantz
Rorippa sylvestris (L.) Bess.	Brassicaceae	*Radicula sylvestris* (L.) Druce

Common Names	PLANTS code
prostrate knotweed, knotweed, wireweed, hogweed, common knotgrass, matgrass, door weed, pinkweed, birdgrass, stonegrass	POAV
black bindweed, wild buckwheat, corn bindweed, ivy bindweed, climbing bindweed, knot bindweed, bearbind, cornbind, black knotweed, climbing buckwheat, dullseed cornbind	POCO10
Japanese knotweed, Japanese bamboo, fleeceflower, Mexican bamboo	POCU6
giant knotweed, Sakhalin knotweed	POSA4
Bohemian knotweed	POBO10
European bird cherry, Mayday tree, Maybush	PRPA5
tall buttercup, meadow buttercup	RAAC3
creeping buttercup, buttercup, creeping crowfoot	RARE3
Austrian yellowcress, Austrian fieldcress	ROAU
creeping yellowcress, creeping fieldcress	ROSY

Scientific Name	Family	Plant Synonyms
Rumex acetosella L.	Polygonaceae	*Acetosella acetosella* (L.) Small, *Acetosella tenuifolia* (Wallr.) A. Löve, *Acetosella vulgaris* (Koch) Fourr., *Rumex acetosella* L. ssp. *angiocarpus* (Murb.) Murb., *Rumex acetosella* L. var. *pyrenaeus* (Pourret) Timbal-Lagrave, *Rumex acetosella* L. var. *tenuifolius* Wallr., *Rumex angiocarpus* Murb., *Rumex tenuifolius* (Wallr.) A. Löve
Saponaria officinalis L.	Caryophyllaceae	*Lychnis saponaria* Jessen
Senecio jacobaea L.	Asteraceae	
Silene noctiflora L.	Caryophyllaceae	*Melandrium noctiflorum* (L.) Fries
Sonchus arvensis L. ssp. *uliginosus* (Bieb.) Nyman	Asteraceae	*Sonchus arvensis* L. var. *glabrescens* Guenth., Grab. & Wimmer, *Sonchus uliginosus* Bieb.
Sorbus aucuparia L.	Rosaceae	*Pyrus aucuparia* (L.) Gaertn.
Spartina alterniflora Loisel.	Poaceae	*Spartina alterniflora* Loisel. var. *glabra* (Muhl. ex Bigelow) Fern., *Spartina alterniflora* Loisel. var. *pilosa* (Merr.) Fern.
Spergula arvensis L.	Caryophyllaceae	*Spergula arvensis* L. var. *sativa* (Boenn.) Mert. & Koch, *Spergula arvensis* L. ssp. *sativa* (Boenn.) Celak., *Spergula sativa* Boenn.
Stellaria media (L.) Vill.	Caryophyllaceae	
Tanacetum vulgare L.	Asteraceae	*Chrysanthemum uliginosum* Pers., *Chrysanthemum vulgare* (L.) Bernh., *Tanacetum vulgare* L. var. *crispum* DC.

Common Names	PLANTS code
common sheep sorrel, field sorrel, red sorrel	RUAC3
bouncingbet	SAOF4
tansy ragwort, staggerwort, stinking willie	SEJA
night-blooming cockle, night-blooming catchfly, sticky cockle, night-flowering silene, night-flowering catchfly, clammy cockle	SINO
perennial sowthistle, field sowthistle, moist sowthistle	SOARU
European mountain-ash, rowan tree	SOAU
smooth cordgrass	SPAL
corn spurry, stickwort, starwort, devil's-guts, sandweed, pickpurse, yarr, pinecheat, poverty-weed, cowquake	SPAR
common chickweed, chickwhirtles, cluckenweed, mischievous Jack, skirt buttons, tongue-grass, starweed, winter seed, satin flower, cyrillo, starwort, bindweed, white bird's-eye	STME2
common tansy, golden buttons, garden tansy, bitter buttons, hind-head, parsley-fern, ginger-plant	TAVU

Scientific Name	Family	Plant Synonyms
Taraxacum officinale G. H. Weber ex Wiggers ssp. *officinale*	Asteraceae	*Taraxacum atroglausum* M. P. Christens., *Taraxacum campylodes* Hagl., *Taraxacum croceum* auct. non Dahlst., *Taraxacum curvidens* M. P. Christens., *Taraxacum cyclocentrum* M. P. Christens., *Taraxacum dahlstedtii* Lindb. f., *Taraxacum davidssonii* M. P. Christens., *Taraxacum devians* Dahlst., *Taraxacum dilutisquameum* M. P. Christens., *Taraxacum firmum* Dahlst., *Taraxacum islandiciforme* Dahlst., *Taraxacum kok-saghyz* auct. non Rodin, *Taraxacum officinale* G. H. Weber ex Wiggers var. *palustre* (Lyons) Blytt p.p., *Taraxacum pleniflorum* M. P. Christens., *Taraxacum retroflexum* Lindb. f., *Taraxacum rhodolepis* Dahlst., *Taraxacum undulatum* Lindb. f. & Marklund, *Taraxacum vagans* Hagl., *Taraxacum xanthostigma* Lindb. f.
Thlaspi arvense L.	Brassicaceae	*Crucifera thlasp*i Krause, *Thlaspi collinum* M. Bieb., *Thlaspidea arvensis* Opiz
Tragopogon dubius Scop.	Asteraceae	*Tragopogon dubius* Scop. ssp. *major* (Jacq.) Voll., *Tragopogon major* Jacq.
Trifolium hybridum L.	Fabaceae	*Trifolium elegan*s Savi, *Trifolium hybridum* L. var. *elegans* (Savi) Boiss., *Trifolium hybridum* L. ssp. *elegans* (Savi) Aschers. & Graebn., *Trifolium hybridum* L. var. *pratense* Rabenh.
Trifolium pratense L.	Fabaceae	*Trifolium pratense* L. var. *frigidum* auct. non Gaudin, *Trifolium pratense* L. var. *sativum* (P. Mill.) Schreb.
Trifolium repens L.	Fabaceae	
Tripleurospermum perforata (Merat) M. Lainz	Asteraceae	*Chamomilla inodor*a (L.) Gilib., *Matricaria inodora* L., *Matricaria maritima* L. var. *agrestis* (Knaf) Wilmott, *Matricaria maritima* L. ssp. *inodora* (L.) Clapham, *Matricaria perforata* Mérat, *Tripleurospermum inodorum* (L.) Schultz-Bip.

Common Names	**PLANTS code**
common dandelion, blow ball, faceclock, pee-a-bed, wet-a-bed, lion's-tooth, cankerwort, Irish daisy	TAOFO
field pennycress, pennycress, stinkweed, frenchweed, fanweed, bastardweed, bastard cress, dish mustard, mithridate mustard	THAR5
western salsify, yellow salsify, goat's beard, wild oysterplant	TRDU
alsike clover	TRHY
red clover	TRPR2
white clover	TRRE3
scentless false mayweed, scentless chamomile, false mayweed	TRPE21

Scientific Name	Family	Plant Synonyms
Vicia cracca L.	Fabaceae	
Vicia villosa Roth	Fabaceae	

Common Names	PLANTS code
bird vetch	VICR
hairy vetch, winter vetch, whoolly vetch	VIVI

Appendix B. Treatment Prioritization Tool

This document was developed as a treatment prioritization tool for exotic and invasive plant species. It is designed for use by private landowners, community groups, cooperative weed management areas, and government agencies as an aid to the consideration of where to expend limited resources on weed management.

This tool is **not** meant to be an invasive species ranking system that addresses which plant species are the most invasive. For instance, given the choice between treating garlic mustard or white sweetclover where the infestations are of similar size, age, habitat invaded, and ease of treatment, the question arises: which one is the worse plant to have in the area? We refer users to the Invasive Plant Ranking Project compiled by the Alaska Natural Heritage Program (AKNHP), which assigns a ranking number between 0 and 100 based on a series of ecological factors (refer to akweeds.uaa.alaska.edu/akweeds_ranking_page.htm).

The process outlined here is similar to the triage process in an overworked battleground hospital.

Let's use the Juneau area as an example. Juneau has large, widespread populations of exotic dandelions. It also has a few isolated populations of white sweetclover, garlic mustard, and perennial sowthistle. It has no Canada thistle. Under this scheme, the highest priority for treatment would be given to a new finding of Canada thistle, medium priority to garlic mustard, white sweetclover, and perennial sowthistle, and low priority to dandelions.

To use this tool, it is recommended that a committee be assembled of people who are knowledgeable about weeds in an area to go over the list that follows and assign a score for each item for all infestations being considered for treatment. Then, when comparing the final scores by infestation, a higher score indicates a higher priority for treatment.

Some flexibility should be used in applying this tool, and groups using it should feel free to modify it by changing the numerical values for certain items, as long as they are used consistently. For example, Section 5 addresses the size of the infestation. A large infestation, greater than five acres in size, is given a lower priority than a small one. The tool is set up this way because large infestations are often difficult to treat successfully, especially where they cross land ownership boundaries. An agricultural community, on the other hand, may have the means to more easily deal with a large infestation on a single, open tract of farmland. In this case, the agricultural community should modify the tool for all infestations in the area that are considered for treatment.

Prioritization for Treatment of Known Infestations

1)Legal mandate or listing by other organizations	**Points**
Species listed on Alaska's "Prohibited or Restricted Noxious Weed Lists"	50__
Species ranked greater than 70 by the AKNHP Ranking Project	50__
Species ranked 50-70 by the AKNHP	30__
Species ranked 30-50 by the AKNHP	10__
Species ranked less than 25 by the AKNHP	5__
This is a rare sighting of the species in the management area or species is a new invader, not yet listed by Alaska weed programs	50__
Species is on a list of species of concern in Alaska, such as the CNIPM list of invasive horticultural perennials, published guidebooks, etc.	30__
Species is considered a "Priority Species of Concern" in your management unit	30__
Species is considered a "Secondary Species of Concern" in your management unit	20__

2) Potential for transport of the infestation **Points**

Soil and plant material from the infested area are likely to be transported to new areas 50__

Species has high potential to spread into adjacent, undisturbed natural communities (as opposed to potentially infesting only disturbed sites) 30__

Infestation is likely to invade adjacent land with different ownership 10__

3) Ecological impacts of infestation **Points**

USE THIS SECTION ONLY IF THERE IS NO RANKING AVAILABLE FROM AKNHP

Species is known to be allelopathic, nitrogen-fixing, or possessing other mechanisms that contribute to habitat alteration 50__

Species is known to be toxic to animals or people (e.g., tansy ragwort) 50__

Species can alter the natural fire regime or are ideally suited for colonization after fire 10__

4) Value of the species or habitat affected **Points**

Presence of threatened, endangered, or sensitive plant or animal species that may be negatively affected by the infestation 50__

Presence of species of special value (e.g., agricultural, horticultural, or medicinal) that may be negatively affected by the infestation 40__

Site is in, adjacent to, or a portal to an area of special importance, such as a designated Wilderness, Botanical Area, city park, cemetery, agricultural research field, or nursery 30__

5) Extent of the infestation and difficulty of treatment	**Points**
Site is one acre or less	20__
Site is one to five acres	15__
Site is greater than five acres and no biological controls are available	10__
Species is resistant to available treatment tools	25__
Re-establishment is likely after more than 5 years of treatment	25__
Physical access is severely limited	10__

6) Social/Political/Human Concerns	**Points**
Existing legal contract with a partner or landowner to treat site	50__
Potential for economic harm is high	40__
Non-binding commitment to partners or other agencies to treat site or site is a specific location of concern to partners	30__
Culturally important sites impacted by infestation	30__
Recreational experiences impaired by infestation	10__
Total Score	___

Appendix C. Recommended Reading

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Appendix D. Websites

Alaska Aquatic Nuisance Species Management Plan, Alaska Department of Fish and Game
http://www.adfg.state.ak.us/special/invasive/invasive.php

Alaska Committee for Noxious and Invasive Plants Management (CNIPM)
http://www.cnipm.org/

Alaska Exotic Plant Information Clearinghouse (AKEPIC)
http://akweeds.uaa.alaska.edu/

Alaska Invasive Plant Ranking Project
http://akweeds.uaa.alaska.edu/akweeds_ranking_geo.htm

Alien Plant Working Group, Plant Conservation Alliance
http://www.nps.gov/plants/alien/

Center for Invasive Plant Management
http://www.weedcenter.org/

Exotic and Invasive Plants of Alaska, Herbarium of the University of Alaska Museum
http://www.uaf.edu/museum/herb/exotic.html

Field Guide to Noxious and Other Selected Weeds of British Columbia
http://www.agf.gov.bc.ca/cropprot/weedguid/weedguid.htm

Global Invasive Species Database, Invasive Species Specialist Group of the World Conservation Union
http://www.issg.org/database/welcome/

Institute for Biological Invasions, University of Tennessee
http://invasions.bio.utk.edu/

Integrated Pest Management Program, University of Alaska – Fairbanks, Cooperative Extension Service
http://www.uaf.edu/ces/ipm/

Integrated Taxonomic Information System
http://www.itis.usda.gov/

INVADERS Database System, University of Montana – Missoula
http://invader.dbs.umt.edu/

Invasive Plants Association of Wisconsin
http://www.ipaw.org/

Invasive Species Information Gateway, National Agricultural Library
http://www.invasivespeciesinfo.gov/

National Invasive Species Council
http://www.invasivespecies.gov/

Noxious Weed Control Program, King County, Washington
http://dnr.metrokc.gov/wlr/lands/weeds/

Plant Materials Center, Alaska Department of Natural Resources, Division of Agriculture
http://www.dnr.state.ak.us/ag/ag_pmc.htm

PLANTS Database, Natural Resources Conservation Service
http://plants.usda.gov/

The Nature Conservancy's Invasive Species Initiative
http://tncweeds.ucdavis.edu/
http://nature.org/initiatives/invasivespecies/

The Noble Foundation Plant Image Gallery
http://www.noble.org/imagegallery/

The Source for Information and Images of Invasive and Exotic Species
http://www.invasive.org/

Weed Science Society of America
http://www.wssa.net/

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Quackgrass
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