# <u>Exotic Plant Management in Sitka National Historical Park</u>

# Sitka, Alaska

# Summer 2008 Field Season Report

**Figure 1-Southeast Alaska Guidance Association (SAGA) at coastline of**

**Sitka National Historical Park**


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## Abstract

For the fifth consecutive year, the Exotic Plant Management Team (EPMT) worked in Sitka National Historical Park (SITK) to document the distribution and percent cover of non-native plant species and to control these species. In 2008, the focus of effort in SITK continued the 2007 goals of control work and inventory. Within the 7.09 acres of the park surveyed in 2008, total count of non-native species observed dropped from 30 to 29: Perennial sow thistle (*Sonchus arvensis*) was not observed in 2008. Creeping buttercup (*Ranunculus repens*) was still the most widespread species throughout the park in both sunny and shaded areas, which makes its control a management priority since it continues to aggressively displace native herbaceous species. European mountain ash *(Sorbus aucuparia)* continues to spread within SITK, propagating along edge habitats, including roads, shoreline, riverbanks, and trails. SITK is the only Alaska Region NPS unit with Japanese knotweed *(Polygonum cuspidatum),* an extremely aggressive species. As of 7/15/2008, there were nine small (<5 inch high) seedlings removed in or near the two locations in which they've been monitored the past five years. Through persistent removal by Geoffrey Smith (SITK Biologist) and the EPMT team over many years, this species seems to be under control. With the assistance of Southeast Guidance Association (SAGA) and SITK staff 275 person-hours (5hrs/day for 5 days w/11 people) were spent during the EMPT visit (June 23-27, 2008) controlling invasive plants. During this focused effort, more than 150 kg (330 lbs) of exotic plant material were removed, primarily creeping buttercup *(Ranunculus repens),* and common dandelion *(Taxaxacum officinale*). In addition, park volunteers collected over 7.7 kg (17 lbs) during the Weed Pull 2008 event. Additional control work was performed in SITK through early August by Kristi Link (SITK biotechnician) because of their small infestations: perennial cornflower (*Centaurea montana*), mouse-ear chickweed (*Cerastium fontanum*), oxeye daisy (*Leucanthemum vulgare*), foxglove (*Digitalis purpurea*), common sheep sorrel (*Rumex acetosella*), and European mountain-ash (*Sorbus aucuparia*). In subsequent years, monitoring should be continued to determine rate of spread of species already present, the effectiveness of control efforts, and whether new species are colonizing. Control work should continue to focus on removing small, disjunct infestations, populations in areas less disturbed by human activity, along primary human travel corridors where humans and pets will likely spread seeds and along the Indian River banks. While work crews, volunteers and staff continued active eradication of invasive plants in view of visitors on park trails, education through impromptu interpretation increased this summer. More specific questions were asked of the SAGA crew and park staff regarding invasive plants and there seemed to be more of a 'visitor audience' when the eradication was going on.

## Introduction

Since 2001, baseline surveys for non-native plant species have been carried out on National Park Service (NPS) lands in Alaska. These surveys provide the baseline data used in formulating long-term monitoring and control plans for exotic plant species in Alaska's NPS units. Exotic plant species are a concern to resource managers because they threaten the genetic integrity of native flora through hybridization (D'Antonio et al. 2001), can out-compete resident plant species for limited resources, and can change the structure and function of ecosystems through alternations of geochemical and geophysical processes (Ruesnik et al. 1995, Gordon 1998). Already, 1.1 million ha (2.6 million acres) or over 3% of the 34 million ha (83 million acres) managed by the NPS nationwide are infested with non-native plant and animal species (Drees 2004). Conservative estimates of the economic costs of biotic invasions are $137 billion in the United States annually (Pimental et al. 2004).

In Alaska, NPS lands have thus far avoided invasion by many pernicious exotic species found in the lower 48 states (Westbrooks 1998). Several factors have contributed to this. The first is climate. Circumboreal flora is adapted to a wide range of climatic conditions that exotic plants cannot tolerate. In addition, many parklands in Alaska have remained relatively free of anthropogenic disturbances, such as livestock grazing, wildfire suppression, and altered hydrological regimes that encourage the introduction of exotic species, and parks in Alaska still retain all of their major floral and faunal ecosystem components (Densmore et al. 2001). Despite these protective factors, the threat of exotic plant invasion is increasing due to factors including global warming, increases in construction-related disturbance, and tourism. Throughout Alaska over 170 non-native plant species have been documented, accounting for approximately 10% of the flora (Carlson et al. 2005). Fortunately, the NPS has the opportunity to stay ahead of exotic plant introductions in Alaska before they become a problem, but research and active management must begin now (Spencer 2001).

Sitka National Historical Park (SITK) is unique among Alaska NPS units in its very small size and urban setting, being surrounded by the city of Sitka. Exotic plant introductions are encouraged by the influx of summer visitors, the escape of planted ornamentals from Sitka lawns and gardens, and ongoing park maintenance, which create new areas of disturbances that can facilitate the establishment of exotic species. Fortunately, the park's small size makes it relatively easy to monitor and control incoming plant species, but park managers must remain vigilant. EPMT work has occurred in SITK annually since 2004. Unlike 2004 and 2005 efforts that primarily focused on inventorying the park, the purpose of the 2006 and 2007 efforts in SITK were to 1) re-treat creeping buttercup along the trails between the footbridge and the outhouse; 2) control dandelions along the shoreline; 3) monitor the areas surveyed in 2004 and 2005 to detect changes; and 4) look for invasive species new to the park.

In 2008, efforts in SITK were to: 1) re-treat creeping buttercup along the trails between the footbridge and the outhouse, as well as those trails that extend out from this heavily used area;

2) a more thorough monitoring of Japanese Knotweed (along Indian River banks and a greater perimeter around the two sites already being monitored); 3) eradication of dandelions in the two intertidal meadow areas missed in 2007; 4) spend more time informing visitors of EPMT objectives and leave them with a take-home message about invasive plants; 5) look for invasive species new to the park. Information on the status and number of exotic plant species in SITK will be used to help prioritize areas in the park and state for long-term monitoring and control of these species on Alaska NPS lands.

## Methods and Materials

EPMT fieldwork at Sitka National Historical Park occurred intermittently from June 2 through August 8, 2008 following the 2008 Alaska EPMT data collection protocol. Areas monitored included the most frequently used trails, the visitor center area, the coastline and part of the banks of the Indian River. Like 2006 and 2007, more time was spent controlling invasive species in 2008 than in previous years and efforts were focused near the footbridge, visitor center area, walking trails and coastline. More digital photos were taken this year of problem areas and crews working. A SAGA (Southeast Alaska Guidance Association) crew worked in SITK from June 23-27, 2008 concentrating on creeping buttercup as the prime invasive species.

Figures 2 and 3: SAGA crew eradicating creeping buttercup near the park visitor center.

A Trimble Pro XRS with a Ranger datalogger was used for all data collection during monitoring and control events. Equipped with the Alaska EPMT standardized data dictionary (Table 1), the Pro XRS can achieve submeter accuracy and ensure data integrity. Areas with and without non-native species were inventoried at a resolution to allow inter-annual comparisons of plant distributions. The data dictionary provides sufficient detail for describing the size, diversity, and severity of exotic plant infestations and for population of two distinct databases: APCAM (Alien Plant Control and Monitoring - a nationwide NPS database for exotic plant data) and AKEPIC (Alaska Exotic Plant Information Clearinghouse - a collaborative, interagency, web-based database for tracking Alaska weeds).

Figures 4 above and 5 below: Volunteers hard at work at the Community Weed Pull 2008

Smaller but cheerful volunteers at the Community Weed Pull 2008

Table 1. Fields used in GPS data dictionary and GIS shapefile for exotic plant surveys, summer 2008.

| | |
|---|---|
| Location Name | Location ID (sitka nps, sitka outside nps) |
| Disturbance Type | Because most of Alaska's exotic plants grown only on disturbed sites, we are tracking what disturbance types are being invaded by what species in NPS units. Disturbance Type (fill importation, material extraction, coastal, stream, river, glacier, trampling, wind throw, slide, animal, ORV disturbance, mowing, wildfire, logging, mining, grazing, plowing, brush cutting, herbicide, wind, thermal, volcano, abandoned homesite, or other).. |
| Site Description | Description of location, including remoteness, proximity to water, etc. |
| Buffer Distance M | Buffer distance (in meters) to convert points and lines to polygons. |
| Taxon | This is the dominant exotic plant species of a particular infestation. All species that have been reported from Alaska NPS units are on this list. "Other" is used for species either unidentified OR not previously recorded with a description in the Remarks field. If the mapped area is free of exotic plants, "None" is used. Species ranked greater than 50 need to be recorded precisely rather than as part of another species' infestation. |
| Phenology | The dominant phenology of exotic species (rosette, no flower, full flower, in seed, stand, dead, or none). If monitoring a location for a species and it's not redetected, put the name of the species being searched for in Taxon and select 'not detected' in this category to better track eradications. |
| %_Cover | Cover class percentage of dominant exotic species. (0, 1, 5, 10, 20, 30, 40, 50, 60, 70, 80, 90, 95, 100) Accurately record extent & density! |
| Stem Count | The stem count of the dominant species. A blank field indicates the number of plants was not counted. Zero should be used if there are no plants, only. |
| Action | "Inventory" is the first documentation of a particular infestation, whereas "Monitor" is a follow-up visit to a previously inventoried site from this year or previous years. "Treatment" is the first control effort for a particular infestation and "Retreatment" applies to any subsequent control efforts in either the same or successive years. "Manual" involves pulling or digging. "Mechanical" involves actions like mowing, weed-whacking, chain-sawing, etc. "Chemical" involves the use of herbicides. |
| % Treated | Percentage of area treated -0, 1-25%, 26-50%, 51-75%, 76-95%, 95-100%. |
| Cntrol_per_hrs | Default: -9(no data). # of people x hrs spent controlling. (for 1st taxon only) |
| CntrolEffrt | Projected/actual control effort (low<1 hour, medium 1-8 hours for one person, high>8 hours for multiple people or multiply days to control. |
| Is Exhaustive | "Yes" if all the exotic plants encountered were recorded. "No" if only a subset of species are recorded. |
| Comments | Any additional remarks. |
| Park Unit | Associated park (SITK) |

| | |
|---|---|
| Is Inside Park | "Yes" if the area mapped is located on park land. "No" if it lies outside of the park boundary or on inholdings. |
| Recorder Name | Recorder (KLL = Kristi Link) |
| Team Name | AKEPMT = Alaska Exotic Plant Management Team. Use 'Other' if volunteer or other park staff. |
| 2Taxon, 3Taxon...<br>2Phenology, 3Phenolgy...<br>2%_Cover, 3%_Cover...<br>2StemCount, 3StemCount...<br>2Action, 3Action...<br>2Control_Effort, 3Control_Effort... | Additional fields for 9 other exotic species for each unique site including fields for Phenology, Percent Cover, Stem Count, Action, and Control Effort. |
| Spatial Accuracy Fields | Range of attributes to describe spatial information and precision |
| Date/Time | When the record was collected. |
| Acres | GIS-calculated acreage of each area. |

The data collected using the GPS was differentially corrected using the closest base station (usually CORS, Level Island, Gustavus (GUS2), AK) and edited in Trimble GPS Pathfinder Office (version 4.0). The corrected files were exported as shapefiles for use in ArcGIS (ESRI, version 9.1). The permanent dataset is a multiyear, multipark geodatabase maintained by the Alaska Region EMPT.

## Results and Discussion

Following the intensive inventory efforts of 2004 and 2005, a relatively cursory inventory of SITK was conducted in 2006, 2007 and again in 2008 to rapidly assess the park for new species or expansion of existing species. Within the relatively small subsection of the park (7.09 acres) monitored, no new species were observed. The most recent invasive species noted in 2007, perennial sow thistle (*Sonchus arvensis*) was noticeably absent this summer. The most visible of invasive species, perennial cornflower (*Certaurea montana)* was found blooming near the visitor center but was temporarily controlled and will be closely monitored. Most of the species identified from previous years were relocated in similar locations but slightly increased distributions. The cool, wet spring that arrived two weeks later than usual and the cool, wet summer may have been factors in the initial observation of invasive species; they may be more visible and set seed later in the summer.

The majority of the 2008 EMPT summer was spent inventorying new areas, re-monitoring and remapping the park area with the Trimble unit for changes in distribution, informing visitors about the EPMT program and invasive plants and lastly, controlling exotic species. Through the combined efforts of the nine-person SAGA crew and the two crew leaders, 275 person-hours were spent removing over 150 kg (330 lbs.) of creeping buttercup (*Ranunculus repens*). The primary control areas were 1) the visitor center area nearest the shoreline, 2) the area between the foot bridge and the outhouse along the main trail, and trail junctions leading away from the bridge (towards Sawmill Creek). The targeted species in all areas worked was creeping buttercup. All sites were selected based on the high density of species and the lower likelihood of control activities trampling desired native vegetation. Kristi Link worked to control seed dispersal in early June by completely removing dandelions in the two intertidal meadows that were not worked on in 2007. The SAGA crew returned to the south beach site (old battle site) in late June where beheading dandelions occurred in early June 2007, but all plants had already gone to seed so no 'beheading' of dandelions occurred in this area in 2008. This is an area that needs to be constantly monitored earlier in the spring with control measures beginning as early as possible. All visible Japanese knotweed plants near the bridge (two sites) were removed. The spread of this plant increased and more seedlings were removed this summer. The 2007 concerted effort to eradicate large patches of white clover around some of the totem poles near the shore paid off as there were very few, if any, returning plants. Other exotic species were removed opportunistically during the monitoring and control work. Kristi Link worked through August 8th to continue to map, monitor and control exotic plants throughout SITK.

Non-native species previously identified within SITK that were **not relocated** in 2008 included black bindweed, shepherd's purse, lambsquarters, annual bluegrass, Kentucky bluegrass, red clover, curly dock, common timothy, reed canarygrass, bitter dock, bird's-eye pearlwort and yellow toadflax. Most of these species are likely still present within or near SITK; however, due to the time of year and field staffing, they were not documented in 2008. For instance, the bluegrasses are still the dominant grass species in lawn areas of SITK; however, effort was not made to document them in 2008: construction all around the visitor center area prevented monitoring this year. The shapefile generated from the field inventory may be used in GIS to access additional information, including the assessment of invasive plant densities and the estimated control effort needed to eradicate these infestations.

Before the 'Sitka Community Weed Pull' on June 25, Kristi presented a brief program to interested community members and distributed informational materials. During the two months of the cooler summer in SITK while monitoring/mapping and controlling invasives, there was an increase in the number of cruise ships (seven days/week instead of five days/week in 2007), thus more visitors on the trails. I was personally approached by visitors on a daily basis to explain use of the Trimble unit and point out specific invasive plants to them. There seemed to be a higher awareness of the danger of invasives from visitors this summer.

## Species Summaries

The lack of identifying any new exotic species within SITK this year may have been due to the focus on the eradication of the two most invasive species (creeping buttercup and Japanese Knotweed) and the late spring arrival. Just because new species were not noted in 2008 doesn't mean they aren't there. Continued and consistent monitoring, mapping and control to protect the native plant communities is still an urgent priority. In the open areas, including mowed lawns, common dandelion, white clover, common plantain, creeping buttercup and mouse-ear chickweed are ubiquitous. In shadier wooded areas, creeping buttercup and European mountain ash continue to prevail. Escaped ornamental garden plants in the western corner of the park and near the Visitor Center are becoming more widely dispersed. Since there has been minimal control done on the east park boundary, adjacent to Sawmill Creek Road, new invasive plants are likely to appear and be noted in the park soon.

### Perennial Cornflower - *Centaurea montana*

In 2008, more patches of perennial cornflower, an escaped ornamental species, were found growing along the sidewalk of Lincoln Street as well as creeping down onto the edge of the understory towards Merrill Rock. This species is persistent and continues to spread vegetatively rather than by seed. Control might be possible but labor intensive. Plant clumps and all roots would have to be dug out by hand. There may be time in 2008 to control plants in this area before the season ends.

### Mouse-ear Chickweed – *Cerastium fontanum*

*C. fontanum* is prevalent outside the park and in open areas within the park. It is a small inconspicuous plant that needs sufficient light in disturbed areas or along the coast or tucked into old logs and on the sides of trails intermittently. Controlling this species would be time consuming but would produce results and would be worth the effort in 2009 since it has yet to invade other habitats. The historic battle site area has a large but dispersed population and should be monitored and controlled whenever possible.

Figure 6 - Mouse-ear Chickweed. Photo by **Carol Gracie**

The New York Botanical Garden
Southern Boulevard
Bronx, NY 10458

## Snow in Summer – *Cerastium tomentosum*

In 2006, this species was first identified growing in the rocks separating the shoreline and the sidewalk of Lincoln Street and continues to spread vegetatively but not by seed. There may be time in the 2008 season to control this species but if not, future EPMT efforts should determine 1) if there are sensitive areas of the park for management and 2) what can be done in these areas. This is the only known area this species has been observed. There are numerous invasive garden plants directly across the street from this area.

Figure 7 above, Snow in Summer on SITK park shoreline.

Figure 8 below, a closer view of flower..

## Foxglove - *Digitalis purpurea*

Foxglove is a popular garden ornamental that continues to spread and thrive throughout Sitka. This year there were very few plants within the Totem Park portion of SITK but this should continue to be monitored as seedlings persist for more than five years (personal experience). They are easily identified and removed thus it is feasible to control this species on an annual basis. The area surrounding the Russian Monument, the parking lots (both sides) and the east park sidewalk, bordering Sawmill Creek Road should be monitored closely at the beginning and end of the summer.

Figure 9 - Spring leaves of Foxglove.

Figure 10 – August blooms of Foxglove

Figure 11 - Oxeye Daisy in bloom, late August.

## Oxeye Daisy - *Leucanthemum vulgare.*

This species was not inventoried nor controlled in 2006 because it was too early in the season for flowers to appear. In 2007, many seedlings were removed and those in full bloom were easily controlled. In 2008, the cool late spring prevented maximum control except in the most obvious sites such as Merrill Rock and in scattered sites throughout the park. *L. vulgare* is very common outside the park boundary; in fact it's a species preferred by many Sitkans. Most of the people I talked with were unaware that this species is the carrier of viruses that easily spread to other garden plants. Continued education and monitoring is necessary to ensure the species does not become. established in other locations

## Yellow Toadflax - *Linaria vulgaris*

Yellow Toadflax (also referred to as butter and eggs) was found outside the park in 2006 (not in 2007 or 2008) in a parking lot of Sheldon Jackson College. It should continue to be monitored in this area however. It is a species not likely to spread into the adjoining parkland since the dense, shade-producing canopy will preclude its establishment but seeds could be transported by people or animals to habitats with more available light. Once established, this species is very difficult to remove.

## Unidentified *Lychnis/Silene*

Although not positively identified in 2005, this plant with a white flower and silver foliage is likely a garden escapee since there are multiple other garden cultivars growing along the roadside near Merrill Rock. Upon positive identification, this species should be removed.

## Apple - *Malus pumila*

A domestic apple tree is still growing near the WWII bunkers in the vicinity of the Fort Site. Tree ring analysis suggests the tree to be from around WWII (Griffen pers. comm.). In the area are other *Malus* trees that appeared more likely to be native crabapples. None of the trees are thriving in their understory habitats, and the effect to the native ecosystem seems minor. Since the apple tree may serve as a valuable cultural link to WWII, it is recommended that the tree be allowed to continue to grow at this time.

## Pineapple Weed – *Matricaria discoidea*

Although previously identified from around the Visitor Center, this species was found only at the eastern boundary of the park in 2005. In 2007, it was discovered in the upper Visitor Center parking lot and near the Russian Memorial (small distribution). In 2008, this species was not observed but should be monitored closely next year. The Alaska Natural Heritage Program has ranked many non-native species based on the species' observed threat to invade native communities and the subsequent difficulty of their removal. The scale is from 1-100 with a higher number indicating a greater threat. Combining pineapple weeds' relatively low ranking (33 – Appendix A) and its limited distribution, the threat of this species to the native flora of SITK is low.

## Forget-Me-Not – *Myosotis scorpiodes*

Although the forget-me-not (*M. alpestris ssp. asiatica)* is Alaska's state flower, it is rare to find it growing naturally in Southeast Alaska. In contrast, a European forget-me- not *(M. scorpioides)* is prevalent and frequently planted. It is also possible that the native population of the European species of forget-me-not was found and removed in 2006 growing near the Russian Memorial. Several populations of blue, pink, and white flowering forget-me-nots were removed in the Merrill Rock area in 2008.

## Reed Canarygrass – *Phalaris arundinacea*

Sawmill Creek Road is the only known location of *P. arundinacea* but it has great potential to spread and displace native species (Ranking 83 – Appendix A), particularly in riparian habitats. Annual monitoring of the species should continue throughout SITK. If this plant is detected, the entire plant with root system needs to be removed since regrowth from rhizomes is probable.

**Figure 12 - Reed Canary Grass *(Pharlaris arundinacea L.)***

**Figure 13 left - Sawmill Creek Road on right, park boundary on left**
**Figure 14 right - Phleum pratense L.**

## Common Timothy – *Phleum pratense*

This plant is currently restricted in its distribution to areas outside the park since the removal of a small population in 2005 from the Totem trail. Since it is common along the Sawmill Creek Road sidewalk, it is possible that seeds will be transported into the park by animals or people, thus annual monitoring should continue. Monitoring should begin earlier in the year, before that area becomes overgrown.

## Common Plantain – *Plantago major*

*P. major* does well in highly disturbed habitats and rarely spreads into less-disturbed areas. Removal is relatively easy making it possible to remove the smaller populations such as along the Indian River and near the bench on the Totem Trail. Very little control of this species was done in 2007 and 2008.

## Japanese Knotweed – *Polygonum cuspidatum*

Removal of this persistent species has occurred since 2001 yet it continues to re-sprout from the same two locations it has been ‘removed’. Previous removal of it has reduced the vigor of these

populations, both near the footbridge. The park biologist, Geoffrey Smith has continued to remove shoots since 2005. With continued monitoring and removal, this highly aggressive species (Ranking 87 – Appendix A) will likely remain under control and eventually the energy reserves in the root system will be depleted and the species could be eradicated. In 2007, there were two strong populations of this plant across the street (on private property) from the Visitor Center and Merrill Rock area which were partially removed early in 2008 by the owners but there were numerous seedlings further away from one of the two locations near the footbridge in the park. Diligent monitoring of this part of the park should continue to be a priority since once this plant gets a hold, it's very difficult to remove. In 2008, much time was spent scouting out this species, including some of the Indian River banks. Continued autumn monitoring should occur as well.

## Sweet Cherry – *Prunus avium*

One cherry tree is still growing along the beach at the southern tip of the park since its discovery in 2005. The fruits are palatable, and park staff continues to promise to control the fruits annually. The tree should be monitored to determine if seedlings are appearing in the vicinity, however. If the tree does begin to spread, all plants should be removed.

## Creeping Buttercup – *Ranunculus repens*

*R. repens* has the most widespread distribution of all non-native species within the park, including both open and shaded habitats. It is common along trails and in mowed lawn areas and appears capable of displacing the native forest understory herbaceous species, including deer heart *(Maianthemum dilatatum)*, small-flowered buttercup *(R. uncinatus)*, and large-leaved avens *(Geum macrophyllum)*, in areas without disturbance. Areas with extensive slug herbivory on native species showed relatively little damage of *R. repens*, suggesting this species may be unpalatable or possibly even toxic. Since no habitat in the park seems immune to *R. repens* invasion, this continues to be the priority control species. Recruiting volunteers for control activities in late June to mid-July in normal spring conditions while the plants are in full flower will ensure easier identification and removal. The cool wet summer of 2008 produced creeping buttercup rosettes approximately two weeks later, making identification more difficult. In both 2006, 2007 and 2008, efforts were focused on removal of this species from the area east of the footbridge, near the battle site and near the shore side of the visitor center. Focus should continue on removal of small blocks of this plant, especially where it's threatening native species. To insure that more of the root system is removed, soil knives may be used by EPMT staff in the future.

## Rugosa Rose – *Rosa rugosa*

Locally referred to as the Sitka rose, this plant, native to China, Japan, and Korea, has been well documented to escape cultivation and efficiently naturalize. The origin of the 'Sitka' rose likely

dates back to the establishment in Sitka of the Alaska Agricultural Experimental Station and its first superintendent Charles Georgeson who introduced this species between 1903 -1921 and later sent it to other areas of Alaska for cultivation (Holloway 2006). The 2007 planting of rugosa roses near the Visitor Center is effectively limiting foot traffic on the hills since the plants have thorns. If the plants are maintained and monitored to prevent spreading vegetatively, they are not likely to naturalize.

## Common Sheep Sorrel – *Rumex acetosella*

First identified in 2005, sheep sorrel continues to slowly invade the eastern corner of the park from the neighboring Arrowhead Trail Park. Since its distribution is currently restricted to the shore's banks, the species can be easily controlled at this time if eradicated early enough. Once it spreads, control will be exponentially more difficult.

## Curly Dock – *Rumex crispus*

*R. crispus* is easily confused with the native western dock *(R. aquaticus).* It should be identified and monitored early in the summer before the grasses on the Sawmill Creek Road sidewalk get too tall to monitor. In 2006, it was found growing along this area, outside the park boundary but was not found in the 2007 or 2008 survey due to tall grasses. Bitter dock *(R. obtusifolius)* was observed in the 2000 exotic plant inventory but has not been observed since then. This is a difficult species to monitor as it interbreeds with other docks; identification can be difficult. Monitoring should begin as early as possible for indentification.

## Birdseye Pearlwort – *Sagina procumbens*

This species was seen growing in mowed lawn areas near the Visitor Center, Russian Bishop's House and by Arrowhead Trailer Park in 2006, but was not observed in 2007 or 2008. However, monitoring in these areas should continue

## European Mountain-ash – *Sorbus aucuparia*

This species has been planted widely in Sitka in yards and along the roads. This species' prolific production of red berries, which are consumed by birds and redistributed, has resulted in hundreds of mountain-ash trees within SITK ranging from small (< 0.5 m tall) seedlings to trees exceeding ten meters in height. Although *S. aucuparia* may hybridize with the native *S. sitchensis*, the mountain-ashes in SITK display the characteristics of the non-native species (Table 2). Smaller seedlings are easily pulled from the ground. In 2006, 2007 and 2008, a few seedlings were removed along trails while transiting to other control sites.

These seedlings are growing primarily in open areas, such as along the shoreline, roadside, riverbanks, and trails. The trees seem very tolerant of marginal conditions. For instance, a seedling was growing on a beach log much closer to the salt water than any other woody species,

including Sitka alder *(Alnus viridis* spp. *sinuate*), a relatively salt-tolerant native species. Due to their adaptability and ability to displace other species, all seedlings should be removed when located. Mature European mountain-ash trees are adding structural diversity to the current forest. Many of the mature trees are hosting lichen and moss growth. Trees are likely being used for nesting habitat. Complete removal of all mature trees would create widespread disturbance throughout much of the park, which would increase the likelihood of other non-native plant invasions. In addition, this species is very successful at stump and root sprouting, so cutting trees will likely result in widespread re-growth over many years. Due to these concerns, removal of mature *S. aucuparia* should be performed in stages with experimentation as to how best to kill the tree to eliminate re-growth. (See Figures 15 and 16 below) The selective use of an herbicide, such as a cambium swipe with Garlon 3A on the recently cut stump, would inhibit re-sprouting. Selective use of herbicides in Alaskan National Parks may be a viable option following the Alaska Region Exotic Plant Management Plan Environmental Assessment that is currently being drafted.

Figures 15 & 16: Oh Pioneer!
Opportunistic European mountain-ash at coastline and visitor center area.

Table 2 - Comparison of traits of native and non-native mountain-ash species (Klinkenberg 2004, Hulten 1968). The hair color appears one of the easiest features to distinguish the two species.

| | **European Mountain-ash** ***Sorbus aucuparia*** **(non-native)** | **Sitka Mountain-ash** ***Sorbus sitchensis*** **(native)** |
|---|---|---|
| **Height** | Small tree, 5-15 m | Medium to tall shrub, 1-4 m |
| **Trunk/Stem** | Primarily single stem, grayish, branched | Multi-stem, grayish-red, sparingly branched |
| **Winter buds/young growth** | Grayish soft-hairy | Somewhat rusty-hairy |
| **Leaves** | 11 to 15 (17) leaflets, sharp pointed at the tip, mostly smooth, saw-toothed almost to the base | 7-11 leaflets, rounded to blunt at the tip, sometimes rusty-hairy below, coarsely saw-toothed for not more than ¾ their length |
| **Flowers** | Flat-topped; branches white-hairy; calyces hairy | Half-rounded; branches rusty-hairy; calyces mostly smooth |
| **Fruits** | Globe-shaped; not glaucous | Globe-shaped to ellipsoid; glaucous |
| **Habitat** | Cultivated, and escaped | Woods, up into subalpine region |

## Common Dandelion – *Taraxacum officinale ssp. officinale*

Dandelions are growing in sunny locations, including the mowed lawns near the Visitor Center, Russian Bishop's House, and Fort Site and along the shoreline, riverbanks (inclusive of the tidal meadows), and Sawmill Creek Road. Based on the density of plants and the level of continued disturbance, the focus of dandelion control work should be along the coastline and riverbanks where human disturbance is minimal and native plant community structure is still intact. Areas with extensive human trampling will be more difficult to control over the long term, and the native plant community has already been affected. In 2006 and 2007, control work at the historic battle site focused on removing dandelions from the coastal margin. In 2006, the effort occurred as the plants were distributing seeds, yet a significant difference was achieved. In 2007, many of the seed heads had been removed in early June to prevent seeding and it was difficult to locate those dandelions in the tall grass that had since grown over the area. It would be invaluable to have volunteers assist in the removal of the entire plant earlier in subsequent years if possible, but if this isn't possible, removing the seedheads seems like the only reasonable solution at this time. Either way, repeat control events will be needed in subsequent years to deplete the seed bank in the soil. In 2008, considerable efforts were directed on the removal of all dandelions in the two intertidal meadows that were not worked on in 2007.

## Red Clover – *Trifolium pratense*

Thus far, red clover has been observed only outside the park along Sawmill Creek Road. Annual monitoring within SITK, particularly in more open areas, will ensure quick detection and rapid removal of this species.

## White Clover – *Trifolium repens*

White clover has successfully invaded many of the sunnier locations within and outside of the park. Due to the creeping nature of this species where it roots at its nodes, controlling it is particularly difficult. Efforts should be made to remove the smaller populations, such as along the shoreline, before they become too widespread.

## Other Species

The 2002 vascular plant inventory identified five other non-native species that were not detected again this year: *Capsella bursa-pastoris, Chenopodium album, Poa annua, Poa pratensis,* and *Polygonum convolvulus.* According to Rob Lipkin of the Alaska Natural Heritage Program (W.Rapp pers. comm. 2005), shepherd's purse was found in the lawn near the visitor's center toward the beach. A single specimen of lambsquarters was found in gravel near the beach at the south end of the park. Identification of lambsquarters to species is now known to be dependent on seed characteristics, so future surveys will need to look for these features. In the lawn at the Fort Site and near the Visitor Center, annual bluegrass was observed. Kentucky bluegrass was seen in three areas: near the southeastern tip of the park south of the mouth of the Indian River on the bank above the riprap; in beach gravels approximately 300 meters southeast of the Visitor Center; and on a log near the mouth of the Indian River. It is likely that the two Poa species were overlooked due to uncertainty in identification. Non-native Poa species, including *P. annua* and *P. pratensis,* are presumably dominant grasses in open, mowed areas, such as the Fort Site, the Visitor Center lawn, and the Russian Bishop's House lawn. Finally, black bindweed was seen in several forested areas along a trail near the Visitor Center. Increases effort to find these species in subsequent years is recommended.

## Other Thoughts

Considering its urban setting, extensive foot traffic by humans, bikes and dogs, and ample sources of non-native seeds/plants in outlying areas, SITK thankfully still has many areas that have not yet been affected by non-native species. Reducing anthropogenic disturbance activities, such as trampling and tree removal, will help maintain a vigorously growing native plant community. Social trails should be minimized to reduce disturbance and the potential for introducing new species. Areas where the forest canopy has been compromised such as areas with wind-thrown trees are more susceptible to invasions, so continued monitoring should be

maintained and restoration plantings encouraged. The maintained landscape of SITK should be a reflection of the local flora and cultural history of the place. The garden in front of the Russian Bishop's House should reflect the Russian occupation of Sitka, Alaska. If species like foxglove and hollyhocks didn't contribute to the Russian culture, they should not be perpetuated in the park. Near the Visitor Center, the landscape should reflect the natural diversity of native species from Baranof Island. The recent addition of native plants to the landscape in front and back of the Visitor Center is a welcome change.

The city of Sitka has numerous groups, organizations, and agencies where partnerships regarding invasive species should be developed. The gardening community and plant retailers should be educated regarding species of concern and encouraged to plant native species. Vegetation related boards of the City of Sitka should be consulted to work cooperatively. Partnerships with non-profit organizations such as the Sitka Conservation Society, Girl Scouts, Boy Scouts, and local schools may provide valuable volunteer resources. Finally, other state and federal agencies with interests in the greater Sitka area can also offer valuable assistance.

## Other Non - Plant Exotic Species

Although no inventory efforts have been made to document other exotic taxa, some incidental observations and conversations have identified some non-native animals. Within Sitka National Historical Park, European starlings *(Sturnus vulgaris)* have been observed near the Visitor Center, feeding in the intertidal zone, and near the mouth of the Indian River. European starlings may be breeding within the park and are displacing native species (Smith pers. comm.. 2006/2007). Red squirrels *(Tamiasciurus hudsonicus)* were introduced to Baranof Island in the 1930's and are now prevalent within the park. During the same time, martens *(Martes americana*) were also introduced to the area; however, it is unknown whether they occupy SITK (Schrader and Hennon 2005). Although not observed within the park, visitors and park staff should be alert for the rough skin newt *(Taricha granulose)* that was accidentally released in Sitka in fall 2004 and has established in the area (Miller 2005). Domestic cats and dogs free roam the park occasionally (Smith pers. comm. 2006/2007). No effort to determine exotic insects or diseases has been made. An invasive species of snail has been increasing in populations at the Starrigaven area of the National Forest. It is an aggressive black slug that preys on native banana slugs and should be monitored as it is not yet been seen in SITK. No additional information is currently available for other species.

## Recommended plans for 2009 field season

Prevention and proactive removal will save time and money in the future with regard to invasive plant issues. Well-trained personnel are essential for monitoring and control efforts. In addition, park projects should use best management practices to avoid introducing or spreading exotic plants. Educational programs for park staff, Sitka residents, and visitors will further develop awareness for the issue. This heightened consciousness will improve recruitment of volunteers for control events. In 2007, there was extensive construction in/on the Sawmill Creek Road and bridge area. In 2008, there was much construction work done all around the main park Visitor Center which may provide more opportunity for other invasives to enter. These areas should be monitored closely in future years. Because of the number of small seedlings found along the shoreline and the Indian River banks, a more thorough inventory and subsequent control is recommended for 2009. A more thorough search of Japanese Knotweed *(Polygonum cuspidatum)* is recommended, especially near or on the Indian River banks. Overall, an earlier detection of all invasives, before early June if possible, is recommended.

### May

- Survey for common dandelion when they are in peak bloom, before seeding has begun. Recruit volunteer crew to remove plants, particularly along shoreline, river edge, and intertidal meadow. If this isn't possible, be-head as many dandelions as possible.
- Provide educational programs to interpretative, resource management, and maintenance staff regarding the threat of invasive species.
- Collect specimens absent from herbarium.

### June

- Monitor park to determine distribution of non-native species.
- Remove all European mountain-ash seedlings found.
- Control creeping buttercup.
- Check and control regrowth of Japanese knotweed.
- Provide educational programs for community and visitors.
- Collect specimens absent from herbarium.

### July

- Control creeping buttercup, oxeye daisy, foxglove, and other species. Recruit volunteer crew to help with removal.
- Provide educational programs for the community and visitors.
- Collect specimens absent from the herbarium.

## August

- Continue controlling all species.
- Collect specimens absent from the herbarium.

## September

- Continue controlling all species.
- Complete data processing and report writing.

Collect specimens absent from the herbarium.

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## Appendix A – List of known invasive plants within/near SITK

| *Common Name* | *Taxon* | *Observed inside park?* | *Source of Observation(a)* | *AK Weeds Ranking(b)* |
|---|---|---|---|---|
| shepard's purse | *Capsella bursa-pastoris* | Unknown | 2 | 40 |
| perennial cornflower | *Centurea montana* | Yes | 4, 5, 6, 7 | not ranked |
| mouse-ear chickweed | *Cerastium fontanum* | Yes | 2, 4, 5, 6, 7 | 39 |
| snow-in-summer | *Cerastium tomentosum* | Yes | 5, 6, 7 | not ranked |
| Lambsquarters | *Chenopodium album* | Yes | 2 | 35 |
| Foxglove | *Digitalis purpurea* | Yes | 1, 2, 3, 4, 5, 6 | 51 |
| oxeye daisy | *Leucanthemum vulgare* | Yes | 1, 2, 3, 4, 6, 7 | 61 |
| yellow toadflax | *Linaria vulgaris* | No | 4 | 69 |
| | *Lychnis/Silene* | Yes | 4 | not ranked |
| apple | *Malus pumila* | Yes | 4, 5, 6, 7 | not ranked |
| pineapple weed | *Matricaria discoidea* | Yes | 2, 3, 4, 6 | 33 |
| forget-me-not | *Myosotis scorpiodes* | Yes | 4, 5, 6, 7 | not ranked |
| Reed canarygrass | *Phalaris arundinacea* | No | 4 | 83 |
| common timothy | *Phleum pratense* | Yes | 2, 4 | 56 |
| common plantain | *Plantago major* | Yes | 1, 2, 3, 4, 5, 6, 7 | 44 |
| annual bluegrass | *Poa annua* | Yes | 2 | 46 |
| Kentucky bluegrass | *Poa pratensis* | Yes | 2 | 52 |
| black bindweed | *Polygonum convolvulus* | Yes | 2 | 50 |
| Japanese knotweed | *Polygonum cuspidatum* | Yes | 1, 2, 3, 4, 5, 6, 7 | 87 |
| sweet cherry | *Prunus avium* | Yes | 4, 5, 6, 7 | not ranked |
| creeping buttercup | *Ranunculus repens* | Yes | 1, 2, 3, 4, 5, 6, 7 | 54 |
| rugosa rose | *Rosa rugosa* | Yes | 5, 6, 7 | not ranked |
| common sheep sorrel | *Rumex acetosella* | Yes | 1, 4, 5, 6, 7 | 51 |
| curly dock | *Rumex crispus* | No | 4 | 48 |
| bitter dock | *Rumex obtusifolius* | Unknown | 1 | 48 |
| birdseye pearlwort | *Sagina procumbens* | Yes | 4 | not ranked |
| European mountain-ash | *Sorbus aucuparia* | Yes | 2, 3, 4, 5, 6, 7 | 59 |
| common dandelion | *Taraxacum officinale* spp. | Yes | 1, 2, 3, 4, 5, 6, 7 | 58 |

| *Common Name* | *Taxon* | *Observed inside park?* | *Source of Observation(a)* | *AK Weeds Ranking(b)* |
|---|---|---|---|---|
| | *officinale* | | | |
| red clover | *Trifolium pratense* | No | 2, 4 | 53 |
| white clover | *Trifolium repens* | Yes | 1, 3, 4, 5, 6, 7 | 59 |
| perennial sow thistle | *Sonchus arvensis* | | 6 | |

(a) - 1 =2000 Exotic Plant Inventory, 2 = 2002 AKNHP Vascular Plant Survey; 3 = 2004 Exotic Plant Inventory; 4 = 2005 Exotic Plant Inventory; 5 = 2006 Exotic Plant Inventory; 6 = 2007 Exotic Plant Inventory; 7 = 2008 Exotic Plant Inventory

(b) – Ranking according to threat to native ecosystems in Alaska from low (0) to high (100)

http://akweeds.uaa.alaska.edu/akweeds_ranking_page.htm on 4/10/08