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Invasive Plant Management in Kenai Fjords National Park
Summer 2009 Field Season Report

Kenai Fjords National Park

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Acronyms:
ABRS Aialik Bay Ranger Station
AKDOT Alaska Department of Transportation
EPMT Exotic Plant Management Team
GPRA Government Performance Results Act
GPS Global Positioning System
HIT Harding Icefield Trail
KEFJ Kenai Fjords National Park
NPS National Park Service
PUC Public Use Cabin
RBCA Resurrection Bay Conservation Alliance
SAGA Southeast Alaska Guidance Association
SCA Student Conservation Association
YCC Youth Conservation Corps

Abstract
2009 marks the sixth season that Kenai Fjords National Park has monitored and controlled for nonnative plants according to the Alaska Exotic Plant Management Team protocol. Exotic plant management efforts were focused in the Exit Glacier area and included surveys of several locations on the outer coast in McCarty Fjord, Northwestern Lagoon and Aialik Bay. Exotic plants were surveyed and mapped using a Trimble GeoXT Global Positioning System (GPS) unit and treated with manual control efforts. A total of 1,826 pounds of weeds were pulled throughout the summer. Monitoring and control efforts should continue at Kenai Fjords National Park to prevent the further spread of existing and introduction of new exotic plant species and to keep native ecosystems intact.

Introduction

Highlights and Observations from 2009

- 1,826 pounds of weeds were controlled via efforts of Kenai Fjords National Park Exotic Plant Management Team
- Common dandelion (*Taraxacum officinale*) populations noticeably decreased at the Nike Stripe area
- Yellow toadflax (*Linaria vulgaris*) population slightly decreased along Exit Glacier Road
- Red clover (*Trifolium pratense*) appeared (in two new locations) along Exit Glacier Road
- Sheep sorrel (*Rumex acetosella*) population at Exit Glacier parking lot notably decreased
- Curled dock *(Rumex crispus)* was eradicated from the employee housing area
- Population of common dandelions (*Taraxacum officinale*) discovered in 2008 on the Overlook Trail was noticeably reduced in size and number
- Kenai Fjords National Park organized a very successful community weed pull
- Exotic plant monitoring was conducted in McCarty Fjord, the outer coastline, Northwestern Lagoon and Aialik Bay

History at Kenai Fjords National Park

2009 marks the sixth consecutive year of systematic inventory, monitoring and manual control of exotic plants in Kenai Fjords National Park (KEFJ) under the Exotic Plant Management Team (EPMT) protocol. During the 2000 field season, prior to the establishment of the Alaska region's EPMT, exotic plant management in KEFJ involved surveys, monitoring and community weed pulls (Martin 2003; Densmore, 2001; Bryden, 2003). In 2004, the NPS Alaska EPMT partnered with KEFJ to document weed infestations and incorporate the data into a regional database, joining KEFJ to a larger network of exotic plant managers. Monitoring and collection is now conducted according to a regional data collection protocol (Rapp, 2009). During 2009 field seasons one Biological Science Technician at KEFJ, partially funded by the EPMT, assisted by two Youth Conservation Corps (YCC) employees monitored and documented infestation sites, mapped new infestations, and coordinated manual control efforts in high-priority areas

Significance of Exotics in the Park

Nonnative plants threaten natural ecosystems by competing with native flora for resources such as light, water, and soil. They also interfere with nutrient cycles and hydrologic regimes, and can alter natural plant succession (Martin 2003). Interference with natural plant succession is a major concern in the Exit Glacier area. Invasive plants establish easily in disturbed areas such as roadsides, mines, burned areas, and physically disturbed soil. As Exit Glacier continues to recede it creates an outwash plain of naturally disturbed soil. The outwash plain provides an ideal environment for invasive plants to establish, creating competition for early-succession plant populations, such as the native fireweed (*Epilobium angustifolium*) and alder (*Alnus rubra*).

The National Park Service recognizes the importance of controlling exotic species and preventing the resultant ecosystem damage they can incur. Goal Ia1B of the Servicewide goals adopted by the National Park Service for the strategic planning period FY 2008 through FY 2012 addresses invasive plants (National Park Service, 2007) and are reported on by each individual park through the Government Performance Results Act (GPRA).

Several trail building and improvement projects have been completed in the past three years around the Nature Center at Exit Glacier. These new trails have been identified as potential

vectors for the spread of existing exotic plant species and introduction of new ones in the park. The coastal areas are still relatively free of exotic plants. Increased visitor use of camping beaches and new commercial development at Pederson Lagoon may also contribute to the spread of invasive plants along the coastal area.

Status of Exotic Species in the Park

In 2009 the EPMT identified 12 exotic plant species growing in KEFJ (Table 1). The Alaska region EPMT maintains the official reference list of exotic plants documented in Alaska national parks.

Table 1. Exotic plant species observed in Kenai Fjords National Park in 2009

Common Name	Taxon	Area
foxtail barley	*Hordeum jubatum*	Exit Glacier
oxeye daisy	*Leucanthemum vulgare*	Exit Glacier Road
yellow toadflax	*Linaria vulgaris*	Exit Glacier Road
pineapple weed	*Matricaria discoidea*	Exit Glacier
common timothy	*Phleum pratense*	Exit Glacier, Nuka Bay
common plantain	*Plantago major*	Exit Glacier
blue grass	*Poa annua*	Exit Glacier, Aialik Bay
common sheep sorrel	*Rumex acetosella*	Exit Glacier
common dandelion	*Taraxacum officinale* ssp. *officinale*	Exit Glacier, Dinglestadt Glacier
alsike clover	*Trifolium hybridum*	Exit Glacier
red clover	*Trifolium pratense*	Exit Glacier Road
white clover	*Trifolium repens*	Exit Glacier Road

Outer coast populations of red top (*Agrostis gigantean*), mouse-ear chickweed (*Cerastium fontanum*), and blue grass (*Poa annua*) were all documented in the 2004 Vascular Plant Inventory conducted for the National Park Service (NPS) Inventory and Monitoring Program (Carlson et al 2004). In 2009 EPMT staff monitored these sites and determined that in addition to its original site, the blue grass (*Poa annua*) was also found to be growing at a second site in Aialik Bay. The sites previously mapped with red top (*Agrostis gigantean*) and mouse-ear chickweed (*Cerastium fontanum*) were monitored but, in 2009, neither of these species were identified where they had been previously mapped.

Curled dock (*Rumex crispus*) was documented and controlled at the Exit Glacier employee cabins in 2008, but did not return in 2009 and was not observed in any new locations, either. Three species that were documented in 2007 but did not reappear in 2008 were observed again in 2009: oxeye daisy (*Leucanthemum vulgare*), red clover (*Trifolium pratense*), and foxtail barley (*Hordeum jubatum*).All three of these species were observed and controlled along Exit Glacier Road but in different locations than previously mapped..

Five species of concern grow just outside the park boundary on USDA Forest Service land along the Exit Glacier Road. In addition to the ubiquitous common dandelion *(Taraxacum officinale)*, black medic (*Medicago lupulina*) is abundant along the road corridor. Narrowleaf hawksbeard (*Crepis tectorum*), yellow sweetclover (*Melilotus officinalis*), oxeye daisy (*Leucanthemum vulgare*) and red clover (*Trifolium pratense*) grow around the Resurrection River trailhead, which borders KEFJ's road entrance to the Exit Glacier area. Populations of purple alfalfa

(*Medicago sativa*) and yellow alfalfa (*Medicago falcata*) have been observed along the road corridor further away from the park boundary. White sweetclover (*Melilotus alba*) is growing at the intersection of Exit Glacier Road and the Seward Highway.

In 2006 the Alaska Department of Transportation (AKDOT) completed roadwork on the Seward Highway including construction of a hike and bike trail. Upon completion of this project, AKDOT reseeded the roadside with a seed mix to discourage erosion and facilitate revegetation. This mix apparently included a nonnative, biennial sweetclover (*Melilotus sp*.) which sprouted up in full-flower along the highway in town and along Exit Glacier Road. In addition to the roadside populations, a less accessible population of sweetclover colonized an island in the Resurrection River, just downstream of KEFJ's boundary. There is concern amongst local natural resource managers that this population could spread upriver and form large monospecific stands along the river corridor.

Beginning in September 2008 and throughout the 2009 field season the local conservation group, Resurrection Bay Conservation Alliance (RBCA), organized weed pulls and weed burns to remove the most invasive nonnative plants from the highways including yellow sweetclover (*Melilotus officinalis*), white sweetclover (*Melilotus alba*), bird vetch (*Vicia cracca*), and scentless false mayweed (*Tripleurospermum perforate*). Although these control efforts occurred outside the park, they are relevant to KEFJ's exotic plant efforts as these populations provide the nearest and most likely seed source for the introduction of these species into the park.

Methods and Materials

Monitoring and control in KEFJ is conducted according to the EPMT data collection protocol (Rapp 2009). A Trimble GeoExplorer 2008 Series GeoXT GPS unit loaded with legacy exotic plant data was used to locate previous infestations and to monitor and map new infestations. The legacy data that was used was collected by each park and compiled and distributed by the regional EPMT office. This data is organized by species and includes all exotic plant data for the park. This year the EPMT data manager provided this data for each individual park, rather than all data for the region (as was done in past years). This worked much better as it took less time to redraw the legacy data and used less space on the GPS. KEFJ recommends that legacy data be distributed by individual parks in the future, too.

Figure 1. EPMT staff planning surveys on the outer coast.

The 2009 field season lasted from June through early September and was organized by a Biological Science Technician working out of Seward, Alaska. Two YCC hires (Figure 2) assisted with field work from June 1st until mid-August. Southeast Alaska Guidance Association (SAGA) volunteers assisted for one week in early June. Three high school volunteer groups

through an 'eco-travel and field experience' company, Green EdVentures, assisted with weed pulls on three separate occasions.

Logistically, KEFJ is separated into two parts: the Exit Glacier area and outer coast area. Control and monitoring efforts focus mainly on the Exit Glacier area, which contains the most extensive infestations.

The road-side, trail-side, and parking lot areas of Exit Glacier are the most easily-accessible areas in KEFJ and serve as the main human-use corridors. As a result, they contain the greatest extent and diversity of exotic plants in the park. Monitoring and control work was performed in those areas weekly. Within the Exit Glacier area (but more difficult to access) is a large population of common dandelions on the south side of Exit Creek on the outwash plain. It is typical for high water levels on Exit Creek to impede access to the old glacial moraines and outwash plain along the south side of Exit Creek. In 2009, the combination of early season warm temperatures and heavy, late season rains resulted in constant high water levels throughout the field season. This made fording the creek challenging and as a result we were only able to make one successful creek-crossing to this site. Due to the lack of time, we were unable to monitor and map the entire extent of the infestation that has been documented in this area in previous years and only had enough time to revisit and monitor the northern-most areas which are closest to the creek.

Figure 2. KEFJ YCCs pulling common dandelions on the outwash plain.

Although we were not able to fully monitor all areas in the Exit Glacier area as planned, we were able to extend the geographic scope of our exotic plant inventory and monitoring efforts to include more backcountry locations along KEFJ's outer coast including McCarty Fjord, the outer coastline, Northwestern Lagoon and Aialik Bay.

Results

Exit Glacier Road

The gravel fill material that lines the sides of Exit Glacier Road provides habitat for the most visible and dense population of invasive plants in the park. The roadside is dominated by common dandelion (*Taraxacum officinale* ssp. *officinale*), interspersed with common plantain (*Plantago major*), patches of timothy grass *(Phleum pratense)*, white clover (*Trifolium repens*), a few alsike clover plants (*Trifolium hybridum*), and a small population of yellow toadflax (*Linaria vulgaris*). In 2009 one oxeye daisy *(Leucanthemum vulgare)* and two red clover *(Trifolium pratense)* were discovered and pulled on the north side of the road at the east end near the bridge.

In 2009 the KEFJ EPMT program had five days of assistance from an eight-person SAGA crew during the second week of June. The arrival of the SAGA crew was well-timed with phenology this year as dandelions and other exotic plants were easily observed and identified but had not yet gone to seed. SAGA crew efforts were focused along Exit Glacier Road where 243 pounds of dandelions and plantain plants were pulled over the course of two days. The rest of the SAGA crew's time with EPMT staff was spent pulling three pounds of weeds in the area north of Exit Glacier Road, referred to as the Nike Stripe, along the Harding Icefield Trail, and one day on the outwash plain where 13 pounds of dandelions were pulled.

Despite repeated control work on Exit Glacier Road, there were still numerous dandelions along the entire stretch of road within the park. However, it did appear that there was a lower density of dandelions at each end of the road (the west end of the road by the parking lot and the east end of the road by Resurrection River Bridge) where more control efforts have been focused. In addition to dandelions, other exotics that were monitored, mapped and controlled along the road included yellow toadflax (*Linaria vulgaris*), white clover (*Trifolium repens*), and common plantain (*Plantago major*). The most dense white clover and common plantain populations are found near the welcome sign, along the south side of Exit Glacier Road where approximately 50% of the clover population was controlled. In 2009, KEFJ EPMT made it a priority to control all of the clover on Exit Glacier Road in an effort to eradicate it. In addition, we mapped and controlled 100% of the yellow toadflax (*Linaria vulgaris*) located on the south side of the road across from the welcome sign.

In 2007 one red clover (*Trifolium pratense*) plant was found and controlled on the north side of Exit Glacier Road near the welcome sign at the park entrance. Although this species did not reappear in 2008, two individual plants was mapped and pulled on the north side of the road further east between the pullout and the bridge. A similar situation occurred with oxeye daisy (*Leucanthemum vulgare*) which was found and controlled along Exit Glacier Road in previous years but not during 2007-2008, only to have an individual sprout up in a new area and be mapped and removed in 2009. However, we are pleased to report that narrowleaf hawksbeard (*Crepis tectorum*) was not observed along the road again this year, marking the second year of its eradication.

Figure 3. Flood damage along Exit Glacier Road July 2009.

Unusual weather in July (record high temperatures in the first half of the month followed by above-average rain in the second half of the month) caused flooding on Exit Glacier Road that washed away the shoulders in the area containing dandelions, plantain, and clover, near the entrance sign (Figure 3). New material was brought in from Metco, Inc. to stabilize the road. Monitoring in 2010 should be conducted with this in mind as it is possible that the existing invasives were washed away, but other ones (such as yellow sweetclover which is growing on an island upstream from Metco) were introduced.

Exit Glacier Parking Lot

Common dandelion (*Taraxacum officinale* ssp. *officinale*) is the most prevalent species growing around the Exit Glacier parking lot. With repeated control events, control efforts succeeded in pulling 95-100% of dandelions found in this area, 95-100% of common plantain (*Plantago major*), and 100% of white clover (*Trifolium repens*) plants. Common sheep sorrel (*Rumex acetosella*) returned along the north side of the parking lot near the bus pullout, but was reduced in number. 100% of this returning population was controlled.

95-100% of pineapple weed (*Matricaria discoidea*), which was found around the Nature Center, along the south side of Exit Glacier parking lot, and around the east side of Alder Cabin, were controlled. Common timothy (*Phleum pratense*) plants returned between the parking lot and the Nature Center in 2008, and new individuals were mapped and controlled on the north side of the main (paved) trail.

One native dandelion (*Taraxacum ceratophorum)* was observed growing on the south side of the RV section of the parking lot in 2009. This specimen is identified as native based on the horned involucrel bracts and the deep, even serration of the leaves., However, this specimen grew to be uncharacteristically large by the end of the summer, raising the question of whether this individual had hybridized with a nonnative dandelion since it had taken on the more characteristic large and aggressive growth habits of the nonnatives.

Campground

Exit Glacier campsites remain free of invasive plants. Scattered individuals of common plantain (*Plantago major*) and common dandelion (*Taraxacum officinale* ssp. *officinale*) were documented and completely controlled in the campground parking lot area.

Dandelions along Exit Glacier Road at the entrance to the campground are very dense. Additional effort should be focused on controlling dandelions along the road by parking in the lot at the campground and initiating control efforts along the center section of the road near the campground, in addition to the end sections near the parking lot and the bridge.

Employee Cabin Area

In 2009 only two out of the three staff housing cabins in the Exit Glacier area had exotic plants growing around them. The curled dock (*Rumex crispus*) population growing along the front deck of the Willow Cabin, which has been documented and controlled every year since 2005, did not return this year. Cottonwood Cabin has a small dandelion (*Taraxacum officinale* ssp. *officinale*) patch outside the back door and around the campfire area, which continues to decrease in size. A small dandelion infestation was observed near the front of the Alder Cabin in June, followed by pineapple weed (*Matricaria discoidea*) in July. All infestations were mapped and completely removed.

Main Trail

The main (paved) trail was monitored regularly throughout the season and was treated for common dandelion (*Taraxacum officinale* ssp. *officinale*) and common plantain (*Plantago major*). In previous years common timothy (*Phleum pratense*) was documented along the trail. Although it was not observed in 2008, a few plants were mapped and removed in 2009, growing near several patches of native timothy (*Phleum alpine*). Special care should be given to the

identification of common timothy as these two species can be difficult to differentiate and are believed to be able to hybridize.

In early September 2008 KEFJ interpretive staff reported a population of the nonnative bladder campion (*Selene vulgaris*) behind the bridge on the Overlook Loop Trail. KEFJ interpretive staff and EPMT staff searched for this population in 2009 with no success in relocating it.

In August when field work was winding down, the YCCs' season had ended and time was limited, blue grass *(Poa annua)* was observed growing around the Nature Center, along the Main Trail, and up the Harding Icefield Trail. In the past, there was not much bluegrass located along the trails and regional EPMT staff recommended that KEFJ staff not prioritize management of this species so it was not included in EPMT surveys. This season there is an abundance of blue grass growing along these trails and it is beginning to look thick, like a mini-lawn, in some sections of the trails. Although time did not permit for this species to be mapped this season, KEFJ EPMT staff determined that this species should be mapped and controlled in 2010. If possible, a late season field crew should be acquired for 2-3 days to focus on this species along the Exit Glacier area trails.

Nature Trail

No dandelions were observed growing on the 1917 Moraine along the un-paved Nature Trail this season until early September when 13 individuals were observed and pulled. Due to the timing in the season, these dandelions were not mapped. Staff should continue to monitor this moraine carefully to see if any more dandelions return next season. No new populations of dandelions were discovered on the Nature Trail in 2009.

Overlook Trail

In 2008 a small patch of common dandelions (*Taraxacum officinale* ssp. *officinale*) was observed and mapped for the first time along the Overlook Trail beneath some alders growing in moss directly on top of bedrock. This population was monitored several times throughout the 2008 and 2009 seasons and each time 100% of the plants that had emerged since the previous visit were controlled. It is believed that none of these flowers went to seed in either season, even though they were in full flower when they were first detected. In 2009 there were fewer individuals than in 2008, so it is believed that control efforts are working and this patch will be eradicated with continued future control efforts. This patch of dandelions is closer to areas that have been recently disturbed by Exit Glacier than any other population of exotics. Therefore, it is even more important to closely monitor and control this patch to prevent seeds from spreading up the newly exposed terrain. No new populations of dandelions were discovered on the Overlook Trail in 2009.

Harding Icefield Trail

A patch of common dandelions (*Taraxacum officinale* ssp. *officinale*) grows along the Harding Icefield Trail (HIT), a quarter mile beyond the trail register, in the corner across from the rock staircase. This patch has been monitored and controlled each year and appears to be getting less dense. The new HIT reroute that opened to the public in 2009 bypasses this population, requiring it to be accessed by the old trail. In addition to monitoring the new reroute, this population was monitored and controlled in 2009 and will continue to be monitored as will the

now-retired trail. Although this population was smaller and less dense than in 2008, it should be carefully monitored since it is adjacent to newly accessible terrain along the trail reroute.

There are a few scattered common plantain (*Plantago major*) and common dandelion plants growing along the first half-mile of the HIT. In 2007 one dandelion was found growing at Marmot Meadows (1.25 miles), which is the farthest any exotic plants have been documented along the trail. This individual was documented and controlled again in 2008 but did not reappear in 2009, indicating another eradication.

As mentioned in the section on the Main Trail (above), blue grass *(Poa annua)* was observed along the Harding Icefield Trail, almost to Marmot Meadows, but was not mapped or treated. This species should be mapped and controlled in 2010 to halt further spread along the trail and into the alpine area.

Nike Stripe

The backcountry location north of Exit Glacier Road, known as the Nike Stripe, was only visited one time this year, due to more time spent on the outer coast and high water levels in the area from a flooding event in late July (Figure 4). This one visit included assistance from this year's eight-person SAGA crew, resulting in the control of 95-100% of the common dandelion (*Taraxacum officinale* ssp. *officinale*) infestation. This population continues to decline in size and density.

Figure 4. The SAGA crew pulling common dandelions at the Nike Stripe.

Outwash Plain

A small dandelion population was reported on the outwash plain on the south side of Exit Creek by an NPS Inventory and Monitoring crew in 2003. In 2006, the infestation was documented in the EPMT geodatabase and was controlled, though the plants had already gone to seed. The site was visited and controlled three separate days in 2007 when it was discovered that the dandelion infestation was larger and more widespread than previously thought. It was determined to be even larger, again, in 2008 when the EPMT team mapped a large infestation extending further east than previous mapping efforts indicated.

In 2009 priority was given to mapping and controlling efforts on the outwash plain to thoroughly understand the extent of the infestation, and proceed with planning. Unfortunately, unusually warm weather conditions during June caused increased melting of Exit Glacier, resulting in higher, faster water levels in Exit Creek. This warm weather was succeeded by heavy rains, resulting in unseasonal flooding during late July. Once Exit Creek and the Resurrection River water levels rose, they never completely receded, preventing us from attempting another crossing and concluding our mapping efforts on the outwash plain for the season.

In a typical summer the south side of the outwash plain is difficult to access due to high water levels in Exit Creek. It is often only possible to ford the creek in June and July and requires using hip waders, crossing at heavily- braided sections, and selecting cloudy, cool days when meltwater is minimal, but even these conditions can make the creek-fording an exciting event (Figure 5).

Figure 5. YCC staff and SAGA crew crossing Exit Creek to map and control dandelions on the outwash plain.

The only foray across the creek to the south side of the outwash plain was with the SAGA crew in early June. It was disappointing to make it to the site only to find that, although dandelions were emerging, they were still fairly small for the season. Our efforts to get to the infestation far outweighed our effort to control dandelions in this location at that time.

Accessing the outwash plain across Exit Creek will always be an issue, but due to the isolated nature of this population and the potential that the dandelions in this area will spread into more remote backcountry locations, this area is a priority for control efforts. Unfortunately, KEFJ does not have the resources (people-hours) to effectively control this population manually. Due to access issues (high water in the creek) in 2009, KEFJ EPMT staff was not able to remap all dandelion populations that had been mapped in 2007 and 2008, or to inventory new areas for unknown infestations.

Maintenance Yard

Because of its proximity to the highway and town where a greater diversity of exotics are growing along the roadways and in people's yards, the maintenance yard has the potential to host invasive species that currently do not grow in the park. It is necessary to routinely monitor this location to employ early detection and rapid response strategies to eliminate new species that may appear, and to prevent them from being spread by maintenance tools, vehicles, and equipment into other areas of the park.

Monitoring efforts at the maintenance yard on Old Exit Glacier Road indicated that invasive plant populations had decreased this year. This decrease is likely a result of control efforts during 2008. It should be noted, however, that in 2008 a large mound of dirt that had been scraped up into a pile in the back of the maintenance yard had some plantain and dandelions growing on it. In 2009, this dirt was spread around the parking area of the maintenance yard, potentially spreading more invasive weed seeds around the facility.

In past years, common plantain (*Plantago major*) and common dandelion (*Taraxacum officinale* ssp. *officinale*) were documented growing in the yard and were controlled opportunistically on a few occasions during the field season (Wetherbee 2007). In 2008, control efforts in the maintenance yard were prioritized and volunteer crews were employed to assist with control.

Although pulling weeds at this facility located outside KEFJ's public boundaries may not be very appealing to volunteers, it was very productive and efficient to have the SAGA and SCA crews, and two YCC staff spend time controlling at this location as there was an apparent decrease in the density of invasives in 2009.

Outer Coast

Exotic plant management on the KEFJ outer coast varies from year to year depending on available resources. In 2009, EPMT staff visited several beaches on the outer coast within McCarty Fjord, Northwestern Lagoon, and Aialik Bay. Sites that were previously determined to have exotics were monitored, and new sites were inventoried for invasives for the first time.

Figure 6. EPMT staff pulling dandelions next to Dinglestadt Glacier.

In 2003 the KEFJ vascular plant inventory identified mouse-ear chickweed *(Cerastium fontanum)* in James Lagoon within McCarty Fjord (Carlson et. al, 2004). In 2009 EPMT staff returned to that site using a GPS to locate it (by navigating to the coordinate taken of the site during the original inventory) and resurveyed it. No *C. fontanum* was observed in the area. The site was in a small low-lying area wedged downstream of a waterfall but not too far above high tide. In the 2004 inventory report Carlson et. al state that they were surprised to discover this species in this location and that "It is generally not considered a serious threat to natural habitats as it does not establish in areas with open soils and it is a poor competitor." It is hypothesized that this species was wiped out by natural processes such as competition from native species, salt-water encroachment, or stream flooding since it was not identified in this area in 2009.

In 2006 a small infestation of common dandelion *(Taraxacum officinale)* was discovered and controlled on the knob to the south of the toe of Dinglestadt Glacier located on the west side of McCarty Fjord (Wetherbee, 2006). EPMT staff returned to this area in 2009 to map and control the infestation (Figure 6). Although some of the previous populations had been eradicated, a few new ones had formed. All dandelions located in this area were pulled.

Access to this location was more challenging than anticipated. Dinglestadt Glacier had receded since the last visit to the site in 2007 and a larger, more forceful meltwater stream had emerged from the south side of the glacier (left side of the glacier as you approach from the beach). In 2009 we walked directly to the toe of the glacier and across the ice bridge on the south side where the meltwater creek is flowing from the glacier (Figure 7). It is likely that this ice bridge will not persist in the future and that this stream will continue to grow as the glacier melts. Therefore, it is advised to access this patch of dandelions by staying near the knob and bushwhacking through the alders until you get to the top of the knob.

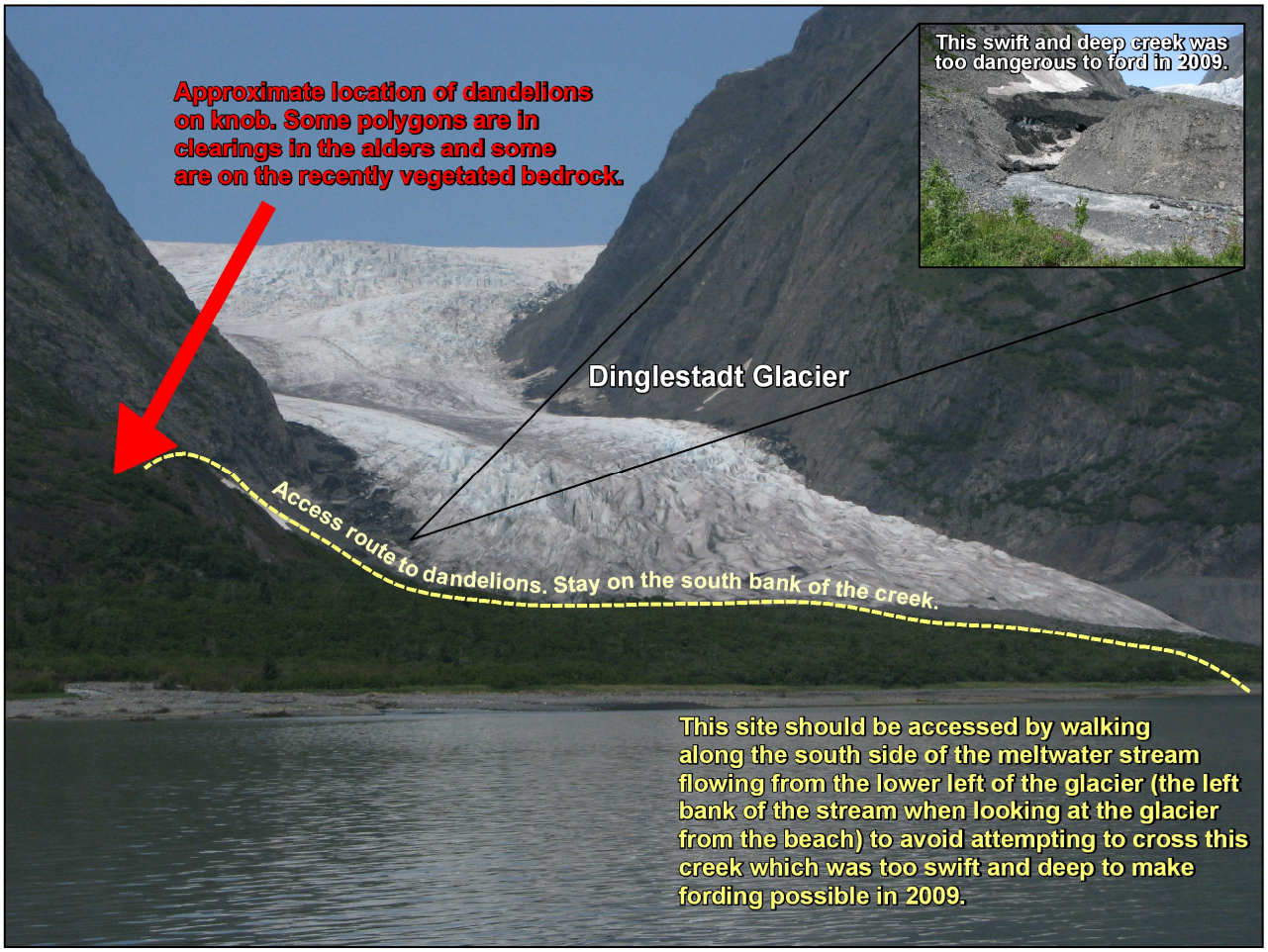

Figure 7. Location of dandelion patch next to Dinglestadt Glacier and suggested access route based on 2009 field excursion.

In 2004 Carlson et. al. documented annual blue grass *(Poa annua)* growing along the trail and surrounding the public use cabin (PUC) in Holgate Arm, Aialik Bay. EPMT staff revisited this site in 2009 and mapped and pulled most of the infestation. The infestation was only found along the disturbed areas at the cabin and had not encroached into any undisturbed vegetation in the area.

In 2009 EPMT staff discovered annual bluegrass at the Aialik PUC for the first time and followed up by mapping and pulling most of it. Both the Holgate and Aialik PUCs should be revisited and treated annually until this nonnative annual grass is eradicated.

EPMT staff are pleased to report that no exotic plants were discovered on any of the beaches in Northwestern Fjord or at the Aialik Bay Ranger Station (ABRS) in 2009.

Figure 8. Annual bluegrass (Poa annua) at Holgate PUC (left) and Aialik PUC (right). July 2009.

Two attempts to survey and map Pederson Lagoon were foiled by weather during the 2009 season. The first attempt was in July when two EPMT staff traveled to ABRS where they were going to base EPMT work in Aialik Bay, including Pederson Lagoon, but a strong storm left them stranded at the ranger station. A second attempt to visit Pederson Lagoon in August 2009 was cancelled prior to leaving town due to an unsafe marine forecast (8-25 foot seas) on the outer coast.

Figure 9. EPMT staff calibrate their GPS units in front of Northeastern Glacier in Northwestern lagoon.

Accomplishments and Highlights

Outer Coast Mapping

KEFJ EPMT staff were able to visit several new sites during the exotic plant trip on the KEFJ MV Serac in July and were pleased to find all of the new sites free of exotic plants.

Community Weed Pull Day

In recognition of the annual State of Alaska Invasive Weed Awareness Week, KEFJ directed the organization of a community weed pull event. By partnering with Resurrection Bay Conservation Alliance (RBCA), Chugach National Forest, and the Homer Soil and Water Conservation District, the 2009 community weed pull was the largest and most successful one ever organized in Seward involving 45 people and the removal of a total of 1,200 pounds of alfalfa, oxeye daisy, and dandelions along Exit Glacier Road.

The event was held all day from 9am- 7pm on June 24th and focused on areas along Exit Glacier Road in Chugach National Forest. Primary targets were the Resurrection River Trailhead and the Exit Glacier Overlook pullout, but all other pullouts were addressed as well.

Participants in this year's weed pull included KEFJ's SAGA crew members, high school volunteers from Green EdVentures, KEFJ Resource Management staff, employees of Chugach National Forest (including their volunteers from the American Hiking Society), Alaska Sea Life Center staff, members of RBCA, and the Invasive Plant Program Manager from the Homer Soil and Water Conservation District.

Figure 10. Green EdVentures volunteers digging up alfalfa at the Community Weed Pull.

Education

In addition to surveying, monitoring and controlling exotic plants in KEFJ, EPMT staff teach visiting crews about invasive species management and exotic plant mitigation to prevent introducing and/or spreading unwanted seeds into the park while they are doing their job. This year KEFJ maintenance trail crews were assisted by one SAGA and one SCA crew. Prior to beginning work in the park each crew was educated on the need to clean tools and clothing of any and all seeds and to be aware if they were working amongst any exotics that were in seed to prevent dispersing them. By giving these crews an introduction to invasive species management they gain an understanding of the ecological impacts of invasive species and how they can help prevent the spread of exotic plants.

Recommendations for the 2010 Field Season

To Keep in Mind:

- Attend the Kenai Peninsula Weed Workshop in May.
- Work with RBCA to organize an Exit Glacier Road Community Weed Pull in late June during Alaska Invasive Species Awareness Week. Priority should be given to the oxeye daisy at the first pull out on Forest Service land to prevent it from spreading along the road and into the park.
- Communicate with RBCA regarding the sweetclover growing on the island in Resurrection River.
- Consider having informational weed pamphlets available at the Seward Fourth of July Celebration.
- Revisit and control the common dandelion (*Taraxacum officinale*) populations on the right side of the Overlook Trail under alders.
- Monitor for and control pineapple weed (*Matricaria discoidea*) at Alder Cabin.

- Pull all white clover (*Trifolium repens*) and yellow toadflax (*Linaria vulgaris*) located on the south side of Exit Glacier Road across from the KEFJ welcome sign.
- Monitor and control weeds in the maintenance yard including common dandelion (*Taraxacum officinale*), pineapple weed (*Matricaria discoidea*), and common plantain (*Plantago major*).
- Post informational sheets about invasive species in the backcountry at the North Arm, Aialik and Holgate PUCs (need to obtain a key to access the bulletin boards inside the cabins).
- Obtain assistance in grass identification for a thorough understanding of grasses in the Exit Glacier area and on the outer coast.
- Work with Trail Crew Supervisor to share a volunteer trail crew (e.g. SCA or SAGA for 2-3 days to pull blue grass *(Annua poa)* at Exit Glacier, to assist with jute in the cliffs on the HIT and, if possible, to control dandelions on the outwash plain.
- Send an email to Interpretive staff bulleting the exotic plant program, letting them know what invasives are targeted at Exit Glacier and attach a native vs. nonnative dandelion identification sheet.
- Continue constructing document of exotic species on the outer coast that the YCCs worked on in 2009.

Suggested Priorities:

1. Remote sites: Nike Stripe(and all small sites mapped on the way to the Nike Stripe), Outwash Plain
2. Trail system: Harding Icefield Trail (old and new reroute), Overlook Trail, Main Trail, Nature Trail
3. Exit Glacier Area: Pump House, Nature Center, Restrooms, Employee Housing, Parking Lot, Campground (common dandelion (*Taraxacum officinale*), common timothy (*Phleum pratense*), white clover (*Trifolium repens*), common plantain (*Plantago major*), pineapple weed (*Matricaria discoidea*), sheep sorrel (*Rumex acetosella*))
4. Exit Glacier Road: yellow toadflax (*Linaria* vulgaris), common timothy (*Phleum pratense*), white clover (*Trifolium repens*), alsike clover (*Trifolium hybridum*)
5. Maintenance yard (common dandelion (*Taraxacum officinale*), common plantain (*Plantago major*), pineapple weed (*Matricaria discoidea*))
6. Outer Coast: Pedersen Lagoon, Holgate PUC and Aialik PUC

Suggested Schedule:
May- Plan for the season and early control of common dandelion along Exit Glacier Rd. Contact volunteer groups. Coordinate with USFS and/or RBCA for Statewide Weed Pull Day in June on Exit Glacier Road near Resurrection River Trailhead. Communicate with Maintenance regarding volunteer crews to pull and schedule plans with them if they are available. Check in with AKNHP on the status of identification of specimens submitted in May 2008. EPMT meeting last week of the month.

June- Monitor and control dandelions at Nike Stripe, Harding Icefield Trail, South side of Exit Creek and Exit Glacier parking lot. Survey Pedersen Lagoon in late June via PackRafts.
July- Control pineapple weed, plantain, and dandelions in Exit Glacier parking lot and along Nature Trail. Check on yellow toadflax along roadside. Control clover along roadside and curled dock and pineapple weed around employee cabins. Continue monitoring dandelion populations on the south side of Exit Creek. If possible, control infestations in Nuka Bay, McCarty Fjord, and Aialik Bay as room is available on other trips.
August- Control timothy grass and sheep sorrel in Exit Glacier parking lot, clover along Exit Glacier Road, and all exotics along the outer coast. Monitor high-use areas in Northwestern Fjord and Pederson Lagoon in Aialik Bay for new infestations. Work with RBCA to coordinate a late August/ early September sweetclover pull on the Seward Highway and Exit Glacier Road.
September- data management, report writing, continue monitoring for late-growing exotics

Volunteers

Volunteer groups are useful in the control of exotics in the Exit Glacier area when put in the right location and given some basic instruction. Manual control of dandelions can be time-consuming and tedious for one person. May is a good month to contact groups interested in being involved in a weed control project. June and July are the best months to have groups involved because the plants are most visible and abundant but have not gone to seed.

Although it is ideal to have a large group pull on the outwash plain, groups like SCA and SAGA may not be comfortable or even permitted by their organization to cross Exit Glacier Creek. Check with groups before they arrive to see if they would be willing to travel to this site and if they can bring appropriate footwear for the crossing.

When giving the initial exotic plant overview and safety talks to each group, remind them to report any and all injuries received while volunteering for KEFJ to KEFJ staff.

KEFJ's own volunteer coordinator, CJ Rea, can connected EPMT staff with several local individuals interested in volunteering for the park. She can also organize groups and provide contacts for large-scale volunteer efforts such as Statewide weed-pull day and National Public Lands Day. These two established service days are a great opportunity to gather volunteers for weed pulling and to provide outreach to the community.

When working with volunteer crews it is necessary to:

1. Fill out volunteer forms to go to CJ before the volunteer work occurs.
2. Have volunteers fill out all necessary liability/volunteer forms.
3. Provide a safety talk tailored to the work being down (i. e. safety along the road, creek-crossings, backcountry travel, etc.)
4. Provide exotic plant management and mitigation talk. Remind volunteers to make sure their clothes are free of seeds .

Contact:
CJ Rea
Education Specialist and Volunteer Coordinator
Kenai Fjords National Park

(907)224-2121

Data Files
The local project folder **H:\Projects_Active\Flora\EPMT\KEFJ_2009_Exotic_Plants** contains spreadsheets, reports, spatial data, and GPS files. These files were also sent to the Regional EPMT team according to protocol. Spatial data is processed and stored on the ARO drive: **W:\ARO\NaturalResources\EPMT\2009_DATA\2009_INCOMING\KEFJ**

Useful Resources and Contacts
Alaska Natural Heritage Program. USDA Forest Service. 2008. Weed Ranking Project. Available online at http://akweeds.uaa.alaska.edu/akweeds_ranking_page.htm

Bauder, P. and J. Heys. 2005 Invasive Plant Manual Control Analysis. Kenai Fjords National Park. National Park Service, Alaska Regional Office.

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USDA Forest Service. 2002. A Chance to Catch the Problem Early. Available online at http://www.fs.fed.us/r10/spf/success/Noxious_Weed_Story_2002.pdf

Wetherbee, H. 2006 Invasive Plant Management in Kenai Fjords National Park; Summer 2006 Field Report. Kenai Fjords National Park. National Park Service.

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Bryden, W. 2002. Final Report: Exotics Inventory for Exit Glacier Study Area, Kenai Fjords National Park, Summer 2002.

Carlson, M.L., R. Lipkin, M. Sturdy, and J.A. Michaelson. 2004. Kenai Fjords National Park Vascular Plant Inventory Final Technical Report. Alaska Natural Heritage Program.

Densmore, R.V., P.C. McKee, C.Roland. 2001. Exotic Plants in Alaskan National Park Units.

Kurtz, D. 2008 Invasive Plant Management in Kenai Fjords National Park; Summer 2008 Field Report. Kenai Fjords National Park. National Park Service.

Martin, E.L. 2003. Exotic Vegetation Management Plan for Exit Glacier. Kenai Fjords National Park.

National Park Service. 2007. Technical Guidance for National Park Service Strategic Goals FY 2008 – 2012. Park Planned and Reported Goals. August 2007. Version 1.1.

Rapp, W. 2009. Alaska Exotic Plant Management Team Data Collection Protocol for 2009.

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Appendix 1.

Exit Glacier Road Weed Pull

Wednesday, June 24, 2009
9:00 am - 7:00 pm
Exit Glacier Road at the Resurrection River Trailhead Parking Area
(just prior to the Res. River bridge)

Please join the National Park Service, Resurrection Bay Conservation Alliance (RBCA), U.S. Forest Service and the Alaska SeaLife Center in this annual weed-pulling event! There will be several volunteer crews and even friends from the Homer Water and Soil Conservation District will be coming over to help. With these combined forces we are expecting dozens of people, far more than previous efforts. Please join the fun and help prevent invasive weeds from invading this amazing place we call home.

Wednesday, June 24th, from 9 am to 7 pm.

Volunteers can help at any time during these hours. We will concentrate our efforts on the area around the **Resurrection River Trail Head** and along the road across the bridge as well as towards town. Please check in with organizers at the trail-head parking lot to get your weeding assignment.

Volunteers should bring bright clothing for working along the road shoulder. Working gloves are highly recommended. We have a limited number of weed pullers. If you have a weed puller, please bring it. Remember to dress for the conditions. Please bring your own lunch and drink.

If you have any question please call Debbie Kurtz at 224-7545 or RBCA at 224-4621.

Come out and help keep this special place free of non-native weeds!