Exotic Plant Management Report
Denali National Park
Summer 2008

Katie Weidman
Wendy Mahovlic

ABSTRACT
Of the 31 known recorded invasive plant species in the area, this season Denali National Park saw the reoccurrence of 15 of these species. Major eradication efforts were directed at dandelion and narrowleaf hawksbeard populations. Other highly invasive plants were also monitored and retreated. The EPMT intern attempted to learn identifying characteristics of most native plants of the area, as well as to recognize what the main and potential invasives are likely to be. All entrance-area trails and roadsides were visited and revisited, and monitored for new and returning invasives.

Using Trimble Mapping GPS units, invasive plant populations were mapped, re-mapped, and as often as possible eradicated. Areas of highest impact included highly-visited areas in the front country, construction sites, and significant portions of the 75-mile gravel road. Sites of known previous infestations in the Kantishna area were revisited as well.

38 volunteers put in a total of 1260 hours this summer, assisting the EPMT in pulling weeds, particularly dandelion, narrowleaf hawksbeard, and clover infestations. A SAGA crew spent 2 weeks on dandelion eradication efforts in the visitor center area, and a YCC crew of 4 local high-school students spent 2 months of full-time work with the EPMT. 2265 pounds of weeds were eliminated from DENA soils this summer. This translates to an estimated potential of millions of invasive seeds that may otherwise have been spread throughout the park.

New infestations found this summer include a viciously spreading exotic dandelion population below the horseshoe lake trail/beaver-dam areas, several single plants of *Melilotus alba* and *M. officinalis* in the park entrance area and around the Aramark Housing area's EDR, 14 stems of *Vicia cracca* growing near the power plant in the visitor center parking-lot and 4 stems of *Vicia cracca* growing on the Denali airstrip just 20 ft. south of the existing Vicia population.

Revegetation and restoration efforts in the park included planting seeds at the new Eielson Visitor Center; replanting areas around Denali Visitor Center parking-lot; planting seeds in areas that have to do with the C-Camp utility upgrade; collection of seeds from native grasses, asters, and pea-family species; and the manual cleaning of several large portions of seeds collected in previous years.

INTRODUCTION

The 2008 Field Season is the eighth year of exotic plant inventories across the Alaska National Parks system. Currently in its fifth year, Alaska's Exotic Plant Management Team (AKEPMT) continues to create thorough documentation, GPS mapping, and manual treatment (hand-pulling) of invasives throughout Alaska National Parks. It is our hope that by keeping thorough records of past years' exotic plant infestations, we can provide excellent information and training to future members of the EPMT, continue to evaluate both the shorter and longer term effects of our current management efforts, and aid the future AKEPMT program in effective, enjoyable and worthwhile exotic plant prevention tactics.

Two members of the AKEPMT were stationed at Denali National Park this field season. With an annual visitation rate of 1,178,745 people in 2006 alone (Online source found on

August 21, 2008: http://www.ohranger.com/denali), covering 6 million acres and over 9,419 square miles, Denali is one of the most well-known and highly visited parks of the Alaska National Park System. Due to the high visitation rate, as well as the means in which visitors reach and travel within the park—including flight, foot, bus, automobile, and railroad—there is a tremendous potential for the "hitchhiking" seeds of invasive plants from virtually anywhere to become introduced and established within the park. The park's frequent and ongoing construction projects contribute regular, significant front-country anthropogenic disturbances, which are especially vulnerable to these exotic plant invasions. Therefore, frequent, thorough inspections, mapping, and re-mapping of the most highly visited and disturbed sites are important parts of Denali's EPMT program.

Due to climactic and geographic factors separating us from many of the tough invasive problems of other parks, Denali National Park is still in the relatively early stages of invasion by many of the most annoying noxious weeds. This has often allowed us the opportunity to eliminate pioneering establishments of exotics before they become large, time-consuming projects. Of the thirty-one exotic plant species that have been recorded in the park (2006 EPMT Report) thus far, fifteen were again found during the 2008 field season.

Specific goals of the Denali EPMT for the 2008 Season include:
*Eliminating large portions of the parks' Common Dandelion infestation, particularly near edges and areas where seed sources can most easily spread further into the park;
*returning to and retreating previous sites where *Linaria vulgaris, Crepis tectorum, Vicia cracca, Melilotus alba,* and *Tripleurospermum perforata* have been found;
*Restoration efforts at the new Eielson Visitors Center;
*Collecting and cleaning native seeds for future restoration projects;
*Continued education of the public and communication with neighboring landowners about the hazards of allowing invasives to be planted or continue growing on their land.

METHODS

EPMT members this year used a combination of last years' personal knowledge of invasive infestations; species mentioned and directions listed in previous years' reports; observations by park service employees and other individuals familiar with the park; and revisiting all major disturbed sites throughout the park to discover, inventory and monitor infestations. Areas of high visitor traffic were frequently monitored and given highest priority in management efforts. Specimens of plants unknown to the EPMT intern were subsequently identified in one of the four following books: *Wildflowers of Denali National Park*—by Verna E. Pratt and Frank G. Pratt, *Plants of the Western Boreal Forest & Aspen Parkland*—by Johnson, Kershaw, MacKinnon and Pojar, *Flora of Alaska and Neighboring Territories*—by Eric Hulten, the *Invasive Plants of Alaska* guide—by the Alaska Exotic Plant Information Clearinghouse, or taken to a more knowledgeable member of the DENA botany crew to be keyed out.

Areas of focus:
Areas of highest priority included the railroad tracks; the Denali (east-end) Airstrip, Kantishna Airstrip; park roadsides from the entrance up to Headquarters; the dandelion-carpeted yards of headquarters, trails and bike paths near the visitors center; highly traveled locations in c-camp; all around and through the campsites in Riley Creek Campground; the train depot and surrounding parking-lots; horseshoe lake trail, Mount Healy trail, the taiga trail, and the sewage lagoon. Most trails were visited at least every 3 weeks during July and August, and two major "*Crepis tectorum* sweeps" occurred around the currently known creeping *Crepis* populations. *Crepis tectorum* sweeps proved helpful in discovering several invading *Melilotus alba* plants, and aided in monitoring of the extent of late-season dandelions (*Taraxacum officinale),* pineapple weed (Matricaria *discoidea*), plantain (*Plantago major*), and the three invasive clovers (*Trifolium* spp.). All areas managed were mapped with Trimble GPS units.

Dandelion battles:
Significant time and effort was directed towards controlling the large infestation of common dandelions (*Taraxacum officinale*) which occur in virtually every highly visited site in the park. It is suspected that if *T. officinale* got into the back country, particularly on rocky and gravelly areas, it could have significant impacts both aesthetically and ecologically. Efforts were thus aimed at restricting the problem to smaller areas and preventing further spread or establishment in more remote locations in the park. Areas treated for *T. officinale* were also well monitored for early infestations of other (usually later-blooming) exotics.

Volunteers, a dedicated YCC work crew, and a SAGA group all helped the Denali National Park EPMT to eradicate infestations of exotics, collect and clean native plant seeds, and restore areas around the new Eielson Visitor's Center.

RESULTS
Species of primary importance:
Among the plant species possessing the most highly invasive characteristics according to the Weed Ranking Project, Alaska National Heritage Program, AKEPIC (Found online, 08/25/2008: http://akweeds.uaa.alaska.edu/akweeds_ranking_page.htm), those found to be the most significant this year included: common dandelion, bird vetch, narrowleaf hawksbeard, yellow and white sweet clover, scentless false mayweed, and butter-and-eggs/yellow toadflax. Eradication efforts of these seven species, followed by the more insignificant invasive plants dealt with this year, are listed in detail below:

Narrowleaf Hawksbeard—285 lbs pulled
Crepis tectorum is an innocent-looking frail yellow flower with a distinctive stench that somehow smells very similar to the parks' sewage lagoon. It has shallow roots and is easily hand-pulled even in rather rocky areas. It is also nearly invisible unless flowering, and remains in a small, close-to-the-ground rosette until sending up a straight narrow stem.

Last years' efforts of 180 people-hours to pull 1,301 pounds of *Crepis tectorum* within the sewage lagoon resulted in very little impact to the *Crepis tectorum* population within that area. Therefore, most effort this season was put towards roadside *Crepis tectorum* sweeps and pulling *Crepis tectorum* around the sewage lagoon's burn-pile area where heavy equipment was about to tear the area up, rather than retreating the hopelessly infested sewage lagoon area itself.

Crepis tectorum was found along roadsides from nearly the entrance of the park, all the way to the railroad crossing, in and around Riley Creek Campground and the Riley Creek bus stop area, along the gravel bike path especially at the trailhead to the Jonesville Trail (where more than 200 plants were pulled), in the Denali Visitors Center parking lot, and along the railroad tracks. During the late-August *Crepis tectorum* sweep, a map showing various stem counts of populations was compiled by the EPMT intern, to illustrate the population centers of *Crepis tectorum's* spread outward from the sewage lagoon.

Our YCC crew and EPMT members spent several days pulling 285lbs of these dainty yellow flowers, covering areas all around the burn pile near the sewage lagoon, and out along the 4 miles of park road along which this invasive is sneaking. This was done in hopes that the population would be controlled until it could somehow be eliminated by methods more powerful and deadly than the previous hand-treatment efforts have been.

The portion of the *Crepis tectorum* population within the sewage lagoon fence was mechanically treated via weed-eating and some use of scythes, to remove excessive vegetation, with hopes of being able to chemically treat the same area later in the season. However, EPMT members are still in the process of trying to obtain herbicides, and so this project may not happen this year.

Unfortunately, as stated in last year's EPMT report:

> "It is important to note, also, that mechanical treatment is effective in the short-term only. Burn field populations that were weed-eaten last year responded by sprouting more robustly this year, and with an increased number of stems from each plant. Mechanical treatment appears to logarithmically increase the number of potential seeds in the long run. DENA EPMT members do NOT recommend mechanical treatment as an effective solution to controlling *Crepis tectorum* populations.

Hopefully, the mechanical retreatment within fences of the sewage lagoon will not be too much worse next year as a result of this half-finished project.

Four 2-meter-square experimental plots—including a hand-pulled plot, weed-whacked plot, and weed burner-treated plot—as well as a control plot where no weeds were pulled—have been set up inside the sewage lagoon fenced-area. Our plan is to monitor these plots to discover which method is most effective at controlling *Crepis tectorum*. The only potential problem with this experiment is that the unmanaged plot might easily reseed all the other plots with a shower of millions of seeds. However, this could be incorporated into the study, by measuring which form of vegetation management is most easily reseeded by a significant seed-source.

Bird vetch—10 lbs pulled
Vicia cracca is a beautiful purple flower obviously associated with the pea family, which produces fragile climbing vines and establishes underground runners that way-too-easily break off when the plant is pulled from the ground. Six known sites of *Vicia cracca* were revisited this summer, and all existing visible plants were re-treated. These included: 10 stems in the C-Camp propane field, 4 stems in one location and 10 stems in another along the airstrip, 5 stems west of the WAC sign, and 1 stem on the mound near the mercantile bus stop. The previous two sites of *V. cracca* found near the railroad tracks and near the old roadside trail appeared not to have any plants growing there this year.

A new infestation of 14 stalks was discovered in the parking lot of the Denali Visitors Center, near the Power Plant, and subsequently pulled. Additionally, a five-foot-tall *Vicia cracca* monster plant was found growing up an alder tree along the roadside of McKinley Chalet housing area right outside the park, which was brutally destroyed and a specimen taken and shown to the locations' lead landscaper, who was very friendly. While visiting with her we also mentioned that her hillside was covered with *Melilotus officinalis* (Yellow Sweet Clover).

Common Dandelion—1485 lbs pulled
Taraxacum officinale was pulled for a solid two months in the beginning of the season, before most other plants were flowering or even emerging from the soil. Areas managed included all known previous infestations along the gravel portions of the park road - from the Savage Box west, all around Riley Creek Mercantile and throughout the Visitors Center parking lots, near roadside construction at mile four all the way back down the road towards headquarters, and along most entrance-area trails. In an effort to manage the spread of the significant roadside population between miles 1-3, YCC and EPMT members picked more than 80 pounds of flower heads and vegetation from plants in their later stages of growth, hoping to prevent them from going to seed.
Other eradication efforts included:

40 lbs from Park Headquarters to construction at mile 4 with a YCC crew of 4,
100 lbs from West End Dandelion Deveg. Efforts with a crew of 4,
105 lbs from around Riley Creek Mercantile with 5 YCC and a volunteer,
40 lbs from along visitor center area trails (with a crew of 7),
15 lbs from the Aramark bus parking-lot (with crew of 7),
400 lbs from the Park Headquarters area in one week with 5 YCC
140 lbs from the areas surrounding the railroad station, with 5 workers
40 lbs from Teklanika Rest stop to mile 19 of the park road, with 6 workers.
200 lbs from Visitor Center area and roadsides, by a crew of 7 SAGA in 2 weeks.

The Kantishna Airstrip was also given particularly high priority, since air traffic leaving from the airstrip has the potential to carry seeds into very remote areas of the park.

All together, our YCC crew averaging 4 workers a day pulled 1000 pounds of exotic dandelions this summer. Part of their control efforts included biking along the gravel road for the 30 miles between Teklanika rest-stop and savage box. This proved to be an

efficient method for spotting and eradicating low density dandelion populations. The EPMT intern recommends biking along the park road in the future as an effective way for small work crews to quickly reach and manage small dandelion infestations spread out along relatively large stretches of the park road.
A new infestation of common dandelion was discovered below the Horseshoe Lake Trail, below the first beaver dam and spreading into the cleared area, all along the side of the main channel of horseshoe creek. This area provided the YCC crew a dramatic and frightening example of what could happen if the common dandelion (*T. officinale*) is allowed to spread into and establish itself in similar locations of the backcountry. This area was mapped but proved too time consuming to eradicate this year (although 5 workers spent 1.5 hours hand-pulling 10 pounds of these dandelions).

However dauntingly hopeless the dandelion eradication efforts may have seemed this summer, due to the significant time and efforts devoted to eradicating the smaller, more recently established, newly spreading portions of the population, we have most likely confined the problem to a much more concentrated area located mainly near the first 4 miles of the park road.

Yellow Toadflax—1 lb pulled
Linaria vulgaris is a weeding nightmare, with fragile stringy roots similar to those hairs corn-on-the-cob is covered with after being shucked, which may be impossible to get out of the ground entirely without digging up the surrounding area and shifting them out. An infestation of yellow toadflax continues to exist along the railroad tracks near the most northerly shelter of the train station, three-fourths of which has so far been carefully dug up. Another previously documented site of yellow toadflax along the railroad tracks near the Triple Lakes Trail has yet to be visited this summer.

Tall White Sweetclover—90 lbs pulled
Melilotus alba is a tall, majestic plant from the pea family, with an elegant sweet-scented aroma, and easy to pull carrot-like roots. Its cousin plant – yellow sweetclover (*M. officinalis*) is similar in appearance and invasive potential. Various scattered individuals and small flocks of tall white sweet clover were discovered growing along the first mile of the Park Road, in Riley Creek campground sites 95 and 93, in the propane field at C-Camp, and near the Rock Creek Bridge on the opposite side of the river from Park Headquarters. They were subsequently mapped and removed from the premises.

A threateningly large population was found growing along the roadside adjacent to the train depot parking lot. Unfortunately, this plant was so small during the dandelion eradication efforts in July that no one noticed it; yet by the time it was found and pulled, it was three feet tall and going to seed.

Melilotus alba was also found along the railroad tracks; in the Glitter Gulch area near the Kingfisher Creek sign (this infestation included many young plants and took an hour for two YCC and two EPMT members to pull—a vast improvement in the amount of time spent, compared with previous years' efforts to eliminate the populations growing in this site. In 2006 it took 36 hours to pull this infestation compared to 4 hours this year); in

Glitter Gulch along the paved walking paths and out front of the main developed areas; at mile 237.25 of the Parks Highway—across from the park entrance; and between mile 232.5-232.75 of the Parks Highway (This infestation also has decreased - in 2006 it took 80 hours to pull and this year it took 14 hours to pull). All together, around 80 pounds of sweetclover were removed from these locations.

Yellow Sweet clover—2 lbs pulled
Two *Melilotus officinalis* plants were found within the park this summer, one growing between the Aramark Employee Dining Hall and Murie Science and Learning Center, and another growing along the roadside between the railroad crossing and WAC sign.

Yellow sweetclover is currently growing all over a hillside in the McKinley Chalet residential area right outside of the park, and it is suspected that the few plants found within the park this year may be offspring from that population.

Scentless False Mayweed—10 lbs pulled
Tripleurospermum perforata, an invasive with the most horrendous scientific name imaginable for an ornamental flower, is a tall stringy-leaved daisy with shallow easily pulled-up roots. This evil daisy was found within the park growing only along the railroad tracks, from the railroad crossing to the trestles crossing the river. An estimated 35-40 plants were pulled. However, a large infestation of incredibly minute approximately 2-centimeter-tall baby plants found between the train station and trestles was left to grow bigger for a while, in order to save time and effort in pulling it. This should be closely monitored next year.

Oxeye daisy—0 lbs pulled
Leucanthemum vulgare, a white daisy with yellow center, similar in resemblance to scentless false mayweed, was not found this year in the park.

Bigleaf Lupine—5 lbs pulled
Lupinus polyphyllus, although seeming to have a relatively mild invasive potential, several plants were found growing on the side of the road between the sign for the Wilderness Access Center and the railroad crossing, mapped, and pulled. The population previously found at mile 7 has yet to be found this season.

Pineapple weed—0 lbs pulled
Matricaria discoidea occurs all around highly visited areas of the east end of the park, including in the sewage lagoon, around Riley Creek Campground, along the roadside, near the Visitors Center and Train Depot, in C-camp, and all over Headquarters. Since the EPMT members considered this plant to be of relatively low invasive potential, most populations were monitored and included when GPS mapping other invasives in the area.

White, Red, and **Alsike clovers—10** lbs pulled
Trifolium repens, T. pratense, and *T. hybridum* occur throughout the Railroad Depot, Visitor Center and Headquarters areas. They create very difficult to eradicate mats of tangled roots, and seem to be primarily confined to very specific, frequently trampled

areas in the front country. While the EPMT intern and YCC crew spent several hours trying to remove a chunk of these plants from areas near the train station and Visitors Center, the plant proved very time consuming and difficult to remove. Thus most efforts were put towards management of more aggressive invasives rather than these three small clover species. *Trifolium* spp. were monitored in conjunction with the more highly aggressive weed species growing in similar locations.

Common plantain—1 lbs pulled
Plantago major, a low-growing plant with a thick, deep root, is found in many locations around park headquarters, in C-Camp, and near the Visitors Center. This exotic was included in GPS mapping with other invasives, but rarely pulled.

Lambsquarters—0 lb pulled
Chenopodium album was found growing in the Riley Creek Campground area and along Railroad tracks, but was neither mapped nor controlled this year.

Common Chickweed,
Stellaria media, was identified growing in a ditch in Headquarters, but the small infestation, which is surrounded by dandelion fields forever, was neither mapped nor treated this season.

Foxtail Barley—350 lbs pulled:
Hordeum jubatum, with its fluffy looking green-to-red-to brownish grass stalks, was spotted growing plentifully all around the first mile of the park road. When occurring in conjunction with the common dandelion, narrowleaf hawksbeard, and other associated invasives being treated, this plant was pulled when possible. It was also noted in GPS mapping of sites where other invasives occurred. During the last week of August, a crew of 25 volunteers spent around two hours pulling up 345 pounds of *Hordeum jubatum* around the Visitor Center parking lot, along the nearby roadside, and near the railroad crossing. The disturbed areas where *Hordeum jubatum* had been pulled (within the Visitor Center parking lot area) were then reseeded with a mixture of native grasses, *Oxytropis campestris* and *Hedysarum alpinum*.

Bluebur, *Lappula squarrosa*, was neither documented nor managed this year.

Garlic Mustard, *Alliaria petiolata*, was suspected to have been found whenever a mustard of suspicious-looking stature was identified. Specimens of all suspicious plants were collected and taken to an experienced member of the Denali Botany crew, who keyed them out and identified them as native mustard varieties.

Shepard's Purse, *Capsella bursa-pastoris***,** previously found in Headquarters, and **Common Timothy,** *Phleum pratense***,** previously found outside the park in the Glitter Gulch area, were neither monitored nor treated this year.

Other species mentioned in Denali's 2006 and 2007 seasonal reports but not managed this year include: flixweed (*Descurainia sophia*), cheatgrass (*Bromus tectorum*), field

mustard (*Brassica rapa*), smooth brome (*Bromus inermus*), wormseed mustard (*Erysimum cheiranthoides*), peppergrass/common peppergrass (*Lepidium densiflorum*), prostrate knotweed (*Polygonum aviculare*), black bindweed (*Polygonum convolvulus*), creeping buttercup (*Ranunculus repens*), nightblooming cockle (*Silene noctiflora*), annual sowthistle (*Sonchus oleraceus*), corn spurry (*Spergula arvensis*), quackgrass (*Elymus repens*), Japanese knotweed and false mayweed. A list of these species, including where they have been found in the park, is included in Table 1, below.

Table 1: Master list of Exotics found in Denali National Park, with bold species signifying plants found in 2008 (Compiled with information found in Denali EPMT 2006 & 2007 seasonal reports).

	TAXON	COMMON NAME	WHERE IN PARK
1	Brassica rapa	Field Mustard	Kantishna
2	Bromus inermis ssp. inermis	smooth brome grass	Fr. Ctry
3	Capsella bursa-pastoris	shepherd's purse	HQ
4	**Chenopodium album**	**common lambsquarters**	**Fr.Ctry/HQ**
5	**Crepis tectorum**	**narrowleaf hawksbeard**	**Fr.Ctry**
6	Descurainia sophia	flixweed	Fr.Ctry/HQ
7	Erysimum cheiranthoides	wormseed mustard	Fr.Ctry/Kant.
8	**Hordeum jubatum**	**foxtail barley**	**Frountcountry**
9	Lappula squarrosa	European stickseed	Park road
10	Lepidium densiflorum	common pepperweed	Road, HQ, Fr. Country
11	Leucanthemum vulgare	oxeye daisy	Park road
12	**Linaria vulgaris**	**yellow toadflax**	**Railroad**
13	**Lupinus polyphyllus**	**bigleaf lupine**	**Park road**
14	**Matricaria discoidea**	**pineapple weed**	**Fr. Country**
15	**Melilotus alba**	**white sweetclover**	**Fr. Country, Pk. Rd.**
16	**Melilotus officinalis**	**yellow sweetclover**	**Park road**
17	Phleum pratense	common timothy	Fr. Country, Kant.
18	**Plantago major**	**common plantain**	**Fr. Country**
19	Polygonum aviculare	prostrate knotweed	Fr. Country, Kant.
20	Polygonum convolvolus	Black bindweed	Kantishna
21	Ranunculus repens	creeping buttercup	Frountcountry
22	Silene noctiflora	night-blooming cockle	Kantishna
23	Sonchus oleraceus	annual sowthistle	HQ
24	Spergula arvensis	Corn spurry	Kantishna
25	Stellaria media	common chickweed	Park road, Kantishna
26	**Taraxacum officinale ssp. officinale**	**common dandelion**	**Frountcountry**
27	**Trifolium hybridum**	**alsike clover**	**Frountcountry**
28	**Trifolium pratense**	**red clover**	**Frountcountry**
29	**Trifolium repens**	**white clover**	**Frountcountry**
30	**Tripleurospermum perforata**	**scentless false mayweed**	**Railroad**
31	**Vicia cracca**	**bird vetch**	**Frountcountry**

Construction disturbances:
Current and recent construction areas were monitored for invasives (particularly the common dandelion and narrowleaf hawksbeard) including road construction around mile 4 Park Rd.; heavy equipment operations near the burn pile in the sewage lagoon area;

recently constructed islands between the roads and parking lots of Denali Visitors Center and the Murie Science and Learning Center; and the looming c-camp construction.

Volunteer and work-crew efforts:
Denali EPMT worked with 38 volunteers this season, giving us an additional 1260 hours of help. A large portion of this volunteer work force arrived in late August, with a group of 25 college students who spent the morning pulling invasives (particularly *Hordeum jubatum)* around the Visitor Center and railroad tracks. This group also planted native seeds in highly-disturbed areas around Visitor Center area parking-lots. Individual volunteers also assisted with West- and East-End Dandelion Deveg weeks; restoration work at Eielson Visitor Center; and seed collecting near the park entrance area.

A crew of 4 YCC students assisted the Denali EPMT this year with two months of full-time invasive eradication efforts, totaling 1216 hours. Their work made a tremendous impact in the population of *Crepis tectorum* spreading out from the sewage lagoon; the slowly sprawling invasion of dandelions up the first few miles of the park road, and along the beginning of the gravel portion of the road, from mile 15-mile 45.

SAGA—This crew of seven spent 2 weeks in the visitor center parking-lot, pulling around 200 pounds of dandelions, with the result that many were having dandelion-weeding-nightmares by the end of the second week. In comparison to the surrounding area, very few dandelions have been spotted there since then.

Restoration efforts:
The fill on the roof and hillsides of the new Eielson Visitor Center was seeded with annual rye and Osmocote 14-14-14 by four west-end dandelion deveg-members on June 17. In late August, Eielson Visitor Center trailside, hillside, and drainage-ditch disturbed sites were reseeded with a mix of annual rye, *Arnica* spp., *Hedysarum alpinum*, native grasses and other species. Several rather disturbed-looking areas around the Denali Visitor Center parking-lot were reseeded with a similar mix of native plants. Native seeds collected this year have included *Arnica* spp, *Hedysarum alpinum*, *Poa alpina, Calamagrostis purpurescens,* and *Agropyron* spp. A significant quantity of previously collected native grass and aster seed was cleaned by hand during rainy days, by the YCC crew and 2 EPMT members.

Many plans for this season, including the annual “Need for Seed” week, were foiled by the late summer and below average cold temperatures. This summer proved to be one of the 5 wettest, coldest summers on record in Denali (ref. – Pam Sousanes – Climatologist for Denali National Park). This meant, for instance, that most *Crepis tectorum* were still in the near-invisible minute rosette stage, and thus not yet in flower—until nearly the second week of August—making large-scale eradication efforts with teams of primarily July-scheduled volunteers and work crews impossible. It also meant that most seed collection efforts had to be canceled, and the majority of native seeds commonly collected for revegetation efforts were still not ready for collection by the second week of August.

In comparison with previous years, several invasive populations known to occur yearly at specific sites seem to be in decline. For instance, the amount of time and effort it took to eliminate *Melilotus alba* around the Kingfisher Creek sign in Glitter Gulch, right outside of the park, has decreased significantly in comparison to last year. Two of the six previously discovered *Vicia cracca* populations were undetected this year, and the amount of scentless false mayweed (*Tripleurospermum perforate)*, found in close proximity to the railroad tracks seems to have greatly declined in comparison to previous years. Additionally, this year's extensive common dandelion (*T. officinale*) eradication efforts will hopefully have a significant impact on the extent of these plants next year.

Education:
This year the EPMT had the privilege to work with four full-time YCC workers (who were local high-school students) for two months this summer. Educating local residents of the impact and significance of invasive species has the potential to affect the way neighboring residents choose to control the most proximate seed sources of Denali's common invasives.

An excellent "exotic plants of Alaska" computer exhibit has been set up in the Murie Science and Learning Center, which includes excellent information on the ecological impact of tall white sweet clover (*Melilotus alba*) in Alaska.

DISCUSSION
A huge amount of hours and effort was spent this year on the daunting task of partially eradicating the significant dandelion population from the entrance area of the park. Suggestions for dealing with this infestation in the future include: bringing in huge work crews of 200 individuals full-time for two weeks, doing "dandelion flower head sweeps" weekly to pick all potentially flowering plants—rather than devoting weeks of effort towards digging up young plants on the edge of the infestation, or figuring out some sort of acceptable weed-killer as an alternative to coordinating large volunteer group efforts aimed at digging deep dandelion roots out of the gravel.

The fight against *Crepis tectorum* terrorism in the sewage lagoon and against its spread out of the lagoon up the park road and into the Visitor Center area will probably prove a significant ongoing task for the future of the Denali EPMT. Herbicides or some other control tactic aimed at destroying this significant seed source within the sewage lagoon area may be the only way to thwart the problem, especially over the long run. Current results of our four different management plots within the sewage lagoon area (which include *Crepis tectorum* treated by hand-pulling, burning, weed-whacking, and one plot left unmanaged) show that burning decreased the total number of stems most significantly, leaving mostly very small rosettes with few in flower. Hand-pulling decreased the number of total stems per area when compared to the weed-whacked plot. The weed-whacked plot contained the highest density of young plants. However, the hand-pulled plot contained more plants in later stages of flowering than the weed-whacked plot. The plot left alone was by far the most thickly packed square meter in the area, with the most significant number of tall plants in later stages of growth. All this

suggests that (if only it were practical) burning the area with a flame-thrower would be a more effective method of control than hand-pulling or weed-whacking.

In regards to most other, less-common invasives found in Denali, regular monitoring of highly trafficked sites in the front country appears to be a highly worthwhile and effective means of preventing infestations, and should be continued.

Disturbed areas restored in previous years with native seeds appear to be thriving throughout the park, with very low levels of invasive plants. Therefore, an effective approach to proactive exotic plant invasion prevention should continue to include ongoing seed collection, cleaning, and restoration efforts aimed at all the current and future construction sites.

Priorities for next year:
*major control effort aimed at *Crepis tectorum* in the sewage lagoon
*continued monitoring of front-country developed areas and trails
*close attention to specific areas of known invasives from past years (particularly *Linaria vulgaris, Vicia cracca, Leucanthemum vulgare, Melilotus alba* and *M. officinalis),* since soils may continue to hold a significant seed bank for many years.
*dandelion-reproduction-rights-prevention efforts along miles 1-4 of the park road
*work out a way to eradicate tall yellow sweetclover from the Aramark Housing hillside
*restoration work on rooftops of Eielson Visitor Center (after they finish fixing the leaks)

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