



# Invasive Plant Management in Wrangell-St. Elias National Park & Preserve

## *2011 Summary Report*

Natural Resource Data Series NPS/WRST/NRDS—2012/230



**ON THE COVER**

Native flowers of Wrangell-St. Elias National Park & Preserve.  
Photograph by: Timothy Luethke

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## **Abstract**

This report describes the work performed by the Alaska Exotic Plant Management Team in Wrangell-St. Elias National Park and Preserve during the 2011 season. Two Alaska Exotic Plant Management Team staff members were stationed at Park Headquarters in Copper Center while working at various locations within the park and preserve. Invasive plant inventories and treatments occurred around the following locations: along the McCarthy and Nabesna roads, Kennecott Mines National Historic Landmark, park owned operations facilities, and several backcountry destinations within park lands. Invasive plant infestations were mapped using Trimble GeoXT units. Manual treatments were performed with the help of volunteers, a Southeast Alaska Guidance Association crew, Youth Conservation Corps interns, one Student Conservation Association intern, and seasonal National Park Service employees. Data was edited and analyzed using GPS Pathfinder Office and ArcGIS 10. A total of 103 bags were loaded with pulled weeds and then taken to an incinerator in Anchorage to be burned. The team mapped, vouchered, and verified one invasive plant species that was new to the park's invasive plant data set. Gross acres treated decreased to 8 acres in 2011 from 18 acres in 2010. The 2011 acres are more consistent with what the three-membered crew was able to accomplish in 2009. The acres treated in 2011 reflect a decrease of crew size from six members in 2010 (due to American Recovery and Reinvestment Act project dollars) to only two members in 2011.

## Acknowledgments

The Wrangell-St. Elias National Park and Preserve Exotic Plant Management Team members would like to extend a big thanks to all who helped us weed this year. First and foremost, thank you to the Student Conservation Association intern Timothy Luethke for all of his hard work in the field and the office. Without him very little would have been accomplished. Thanks go out to Mark Keogh, park Concession's Specialist, who provided multiple opportunities to accompany him on flights to various concessioners throughout the park. This allowed us to survey airstrips on park lands as well as private strips that are surrounded by park lands. We also appreciate the Southeast Alaska Guidance Association crew members and Youth Conservation Corps interns for providing lots of person power to pull our largest and most persistent infestations. Thanks to volunteer Barbara Challoner for helping us with our restoration project. We would also like to recognize Bonnie Million, regional Alaska Exotic Plant Management Team coordinator for the enormous amount of data she crunched and analyzed for us as and to park Ecologist Miranda Terwilliger for all of her logistics and coordination work. We would also like to thank Matt Smith and Meghan Seifert for donating trees for our restoration efforts.

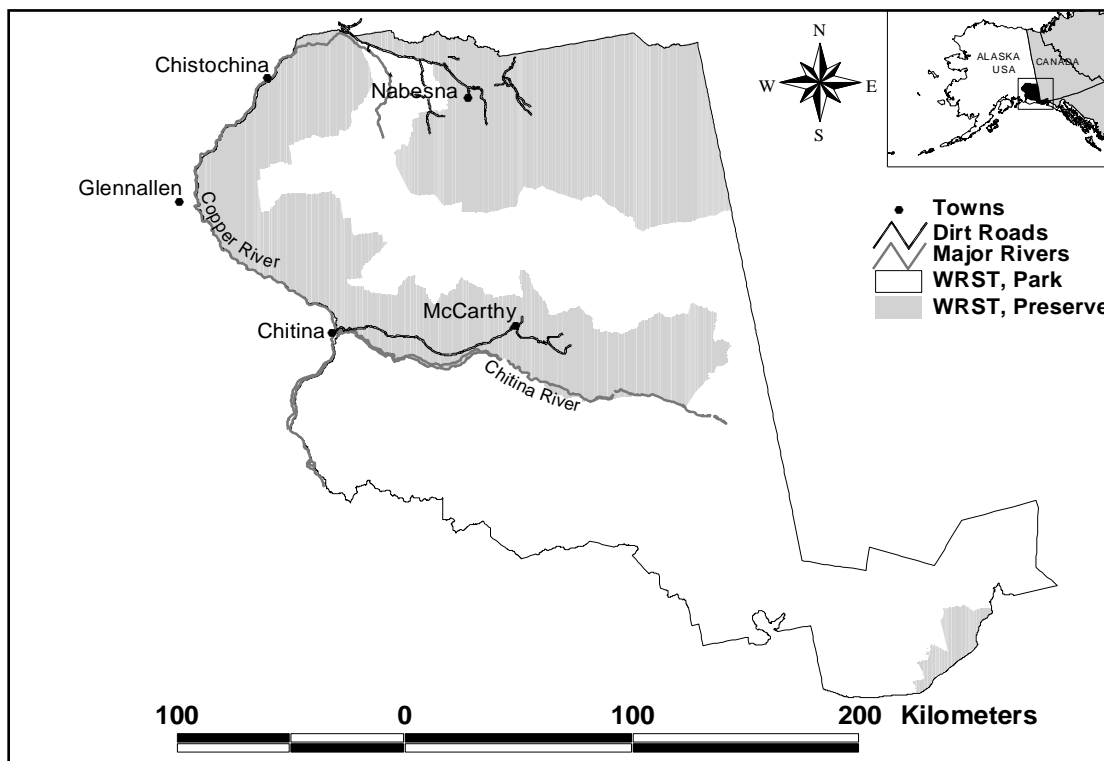
## Abbreviations

AKNHP	Alaska Natural Heritage Program
DOT	Alaska Department of Transportation
EPMT	Exotic Plant Management Team
GPS	Global Positioning System
NHL	National Historic Landmark
NPS	National Park Service
ORV	Off-road vehicle
RZ	Reporting zone
SAGA	Southeast Alaska Guidance Association
SCA	Student Conservation Association
WMC	Wrangell Mountain Center
WRST	Wrangell-St. Elias National Park and Preserve
YCC	Youth Conservation Corps

# Introduction

While invasive plants are mostly limited to areas of human disturbance in Alaska, several species have begun to infest undisturbed ecosystems (Carlson et al. 2008). The potential for these species to disperse via glacial river systems and potentially benefit from climatic change presents a real ecological threat to Alaska's wildlands (Spellman and Wurtz 2008). Climate change could play a direct role to the success of invasive species as they are better able to adjust the timing of their annual activities in regards to propagation than native species (Willis et al. 2010). As climate changes, invasive species impacts may alter in severity and direction, posing greater threats to the natural ecosystems and biodiversity (YISC 2011). As time passes impacts and management costs are increasing, in response to these threats the National Park Service (NPS) Alaska Exotic Plant Management Team (EPMT) has adopted the management approach of early detection and rapid response to invasive plant infestations.

Wrangell-St. Elias National Park & Preserve (WRST) is the largest U.S. national park. Encompassing 13 million acres, WRST is slightly bigger than Switzerland. In conjunction with Kluane and Glacier Bay National Parks and Provincial Park Tatshenshini-Alsek in Canada, WRST is part of a World Heritage Site containing one of the largest protected ecosystems on the planet. In addition WRST contains the largest designated Wilderness in the country (over 9 million acres) and the Kennecott Mines National Historic Landmark (NHL), the site of the richest copper mine in U.S. history. Two roads, eleven distinct off-road vehicle (ORV) trails, and 19 maintained backcountry landing strips (and numerous unmaintained landing sites) provide access to WRST, although the majority of park lands remain inaccessible to all but foot, river, and floatplane traffic (Figure 1).



**Figure 1.** WRST boundary and location in relation to the rest of Alaska.

Existing roads, trails, rivers, and airstrips are the primary vectors for invasive plants in the park. Human disturbed areas, such as private and native corporation lands that have been developed, logging areas, landing strips, abandoned homesteads, or camping and mining sites, offer a welcome home to invasive plants. The land status within WRST is one of the most complex situations of any unit in the NPS with over 800,000 acres of private, state, native corporation, and university lands inside the park boundaries. Due to the Alaska Native Claims Settlement Act of 1971 and the Alaska National Interest Lands Conservation Act of 1980 the ownership of these lands has not been static. Lands within the WRST boundaries have been selected for conveyance to the state of Alaska, Native Villages, and Native Corporations. Until these lands have been surveyed and conveyed they are still considered park managed. Land conveyances began in 1971 and continue today. Likewise the park continues to buy and acquire lands from individuals who wish to sell. Access to non-federal lands across park lands via ORVs or aircraft, plus land uses such as commercial and residential development, logging, and mining add to the challenge of invasive species management.

Invasive plant species are a concern to resource managers because they threaten the genetic integrity of native flora through hybridization, can out-compete resident plant species for limited resources, can change the structure and function of ecosystems through alterations of geochemical and geophysical processes, and can impact fish and wildlife habitat (Vitousek et al. 1996, Gordon 1998). From 2000-2004 baseline surveys were conducted for invasive plants on Alaska NPS lands (Densmore et al. 2001, McKee 2003, Bauder and Heys 2004). The NPS established the Alaska EPMT in 2003 and WRST first obtained funding for a seasonal position specific to the EPMT program in 2005 (Gilmore 2005). Since then the program has grown mostly through youth internship programs (Gilmore 2006, Gilmore and Goldsmith 2007, Gilmore and Harper 2008, Terwilliger et al. 2010, Lain et al. 2011). The 2011 WRST EPMT field season crew consisted of two members: one seasonal hire and one youth intern.

## Objectives

The primary objectives of the WRST EPMT are to a) monitor known infestations of invasive weeds; b) contain, control and where possible eradicate these infestations; and c) to inventory areas with known human disturbance where invasive plants are likely to appear. Control work is principally prioritized using the invasiveness rank from the Invasiveness Ranking System for Non-Native Plants of Alaska (Carlson et al. 2008). Under direction of NPS Management Policy Section 4.4.4, high priority is given to managing invasive species that have or could have, a substantial impact on park resources and that can reasonably be expected to be successfully controlled. Lower priority is given to invasive species that have almost no impact on park resources or that cannot be successfully controlled. Where an invasive species cannot be successfully eliminated, EPMT seeks to contain the invasive species to prevent further spread or resource damage (NPS 2006).

Some of the most aggressive known infestations that are monitored and controlled every year in WRST are white sweetclover (*Melilotus albus*) at the junction of the Tok Cutoff, oxeye daisy (*Leucanthemum vulgare*) in Kennecott, common tansy (*Tanacetum vulgare*) at the Glennallen park maintenance yard, and scentless false mayweed (*Tripleurospermum inodorum*) at the Betty Freed property, NPS seasonal park housing in Slana.

Areas with high visibility, human activity, or probable pathways (areas likely to transfer invasive plants or seeds to other areas of the park) are also a priority. Annual monitoring and control efforts continue around WRST visitor centers in Slana, Copper Center, Chitina, McCarthy, and Kennecott Mines NHL. This year's survey efforts were focused on the Nabesna Road, right-of-way access routes, and concessionaires.



## Methods

Invasive plants were inventoried and monitored following the 2011 Alaska EPMT field protocol (Million and Rapp 2011). Both areas with and without invasive plants were mapped with detail sufficient to analyze any changes to infestation size. The data were collected for incorporation into two databases: Alien Plant Control and Management Database – the nationwide NPS database for invasive plant data – and Alaska Exotic Plant Information Clearinghouse – a collaborative, web-based database for tracking invasive weed infestations in Alaska. Attributes are based on North American Weed Management Association standards and describe the size, density, and severity of the invasive plant infestation being mapped.

Surveying and mapping were conducted with a Trimble GeoExplorer 2008 Series GeoXT Global Positioning System (GPS). These units were used to record location and attribute information for geographic information system analysis. GPS units can achieve sub-meter horizontal accuracy and were equipped with a standard Alaska-specific data dictionary enabling both precise mapping and standardized data collection. GPS data was post-processed and edited by field personnel using GPS Pathfinder Office, then transferred to the regional office for processing.

Areas of human development, frequent use, and weed pathways were the main focus of invasive plant surveys. Walking and bicycle inventories were conducted along roadsides, trails, and at WRST Headquarters to identify previously unknown invasive plant infestations. Particular attention was paid to areas of obvious disturbance, such as gravel pits, pullouts, new culvert sites, airstrips, etc. Forty-three vouchers of unidentified plants were collected, pressed, labeled and will be sent to the Alaska Natural Heritage Program (AKNHP) in Anchorage for identification over the winter. Specimens of interest will be curated into the park herbarium collection.

If invasive species were found in numbers that could be controlled within a reasonable time frame, they were removed by hand. Control work was conducted using manual methods, including pulling, digging, and cutting. Weeds were then disposed of in clearly labeled plastic bags which were packed full and tied tightly. These bags were stored in a connex container designated for weed storage until they could be taken to an incinerator at the end of the season.

Herbicide was used to manage particular aggressive infestations of narrow-leaf hawksbeard at the Copper Center administrative areas. All herbicide applications were made by state of Alaska certified pesticide applicators using a precise, spot application method with calibrated backpack sprayers (Appendix I). A wide range of best management practices are followed to ensure legal, safe, and responsible herbicide use (NPS 2010).

The 2011 WRST EPMT consisted of one seasonal biological technician: AnnMarie Lain, and one intern with the Student Conservation Association (SCA): Timothy Luethke. The 2011 EPMT staff members were stationed at the WRST Headquarters in Copper Center. A Southeast Alaska Guidance Association (SAGA) crew assisted the WRST EPMT for a total of three weeks and three Youth Conservation Corps (YCC) students assisted for one week.



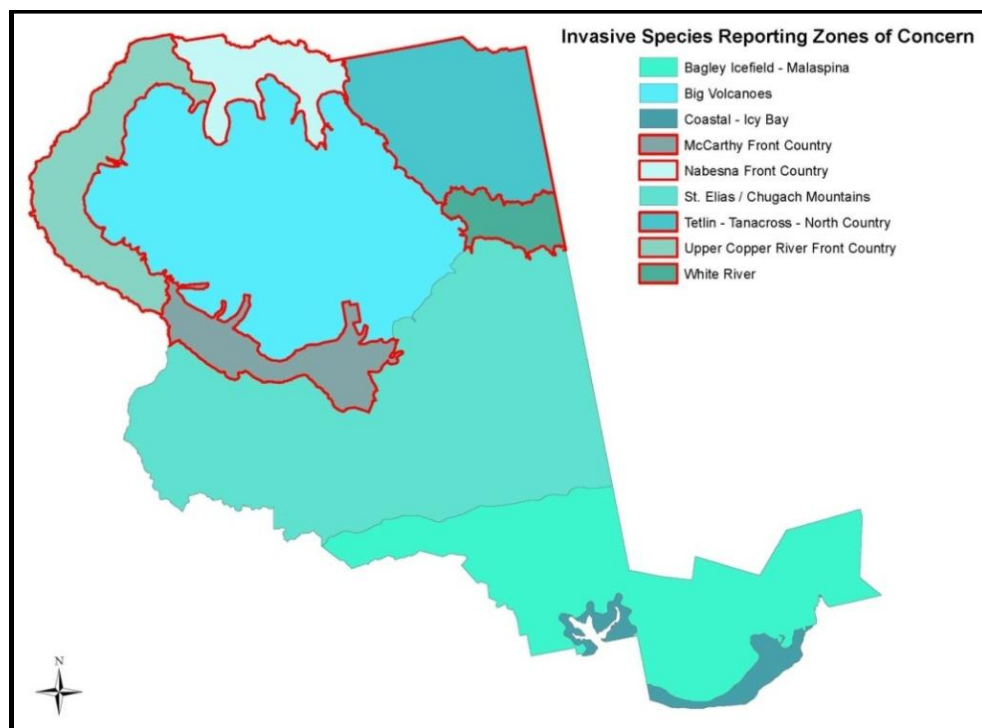


# Results

## Overview

A total of 3,076 field hours were logged by WRST EPMT members and volunteers this season. The 2011 WRST EMPT crew spent a total of 410 person hours in the field, while the youth groups and other volunteers added 2,666 hours (Table 1). At the end of the 2011 field season WRST had mapped a total of 63.4 acres finding 29.3 acres infested with invasive plants, most of which are located along road and trail corridors and in communities within the park (Table 2). When the Alaska EPMT program first started in WRST the main focus was mapping infestations outside of the park to understand where the seed sources and pathways were located (Gilmore 2005). While the mapping of new infestations is still a key part of the program, the focus has now shifted to monitoring and treating known infestations within WRST boundaries (Terwilliger et al. 2009).

This year the number of surveyed acres and numbers of treated acres dramatically decreased from 2010 due to a decrease in crew size – six crew members in 2010 versus two crew members in 2011. A total of 8 acres of invasive plants were treated this season and the total canopy acres controlled was 0.4 (Table 2). Due to the park's large geographic range, reporting infestations at a meaningful scale has been a challenge. For the purpose of this report WRST EPMT has adopted the same eight reporting zones (RZ) that were developed and used for the 2011 WRST Natural Resource Condition Assessment (Figure 2). During the Assessment each RZ was given a condition or level of concern to park management in regards to non-native species (Drazkowski et al. 2011). After evaluating the results of the condition assessment and past invasive plant reports, the WRST EPMT considers five of the nine RZ's as moderate concerns to park management (Figure 2, in red).



**Figure 2.** Reporting zones of concern for invasive plant management.

**Table 1.** Invasive plant management person hours for WRST EPMT staff, youth groups, & volunteers.

Year	WRST EPMT Personnel				Youth Groups			Other Volunteers		Total Person Field Hours
	NPS	SCA	CLM	Total Hours	Group(s) Involved	# persons	Total Hours	# persons	Total Hours	
2005	1	0	0	240	DNR Forestry Intern Program	14	49	0	0	289
2006	1	0	0	260	SAGA, DNR Forestry Intern Program, TCCC	7	126	2	870	1,256
2007	1	0	1	303	TCCC	18	576	2	108	987
2008	2	0	0	315	SAGA, YPP	14	98	7	149	562
2009	2	1	1	948	SAGA	10	580	6	117	1,645
2010	2	4	0	1,680	SAGA, YCC	14	3,808	1	120	5,608
2011	1	1	0	410	SAGA, YCC	12	2,240	2	16	2,666

CLM – Chicago Land Management program  
DNR – Department of Natural Resources

TCCC – Tribal Civilian Community Corps  
YPP – Youth Professionals Program

### Nabesna Front Country

During the 2011 field season the 42-mile Nabesna Road was surveyed for invasive plants by bicycle in mid-July (Figure 3). It should be noted that parts of the Nabesna Road experience yearly flooding requiring that road work be done by the State of Alaska Department of Transportation (DOT) to fix areas that wash away.

The crew began at the end of the road near a privately owned coffee shop, wooden cabins and airstrip. The poppy infestation that was recorded in 2010 (Lain et al. 2011) was revisited and collected for identification. Common plantain (*Plantago major*), common dandelion (*Taraxacum officinale* ssp. *officinale*), foxtail barley (*Hordeum jubatum*), pineapple weed (*Matricaria discoidea*), and mouse-ear chickweed (*Cerastium fontanum*) were inventoried along the side of the road. One infestation consisting of thirty three white sweetclover plants was inventoried and manually treated by staff near the gravel pit at mile one on the Nabesna Road, in 2010 there were only nine white sweetclover plants at this site.



**Figure 3.** SCA intern Timothy Luethke conducting a bike survey of the Nabesna Road.

**Table 2.** Summary of WRST EPMT invasive plant management species acreage accomplishments.

Year	Invasive GPS Data <sup>1</sup>													New Spp	# Bags
	NPS Managed Lands			Non-NPS Lands inside boundary			Non-NPS Lands outside boundary			Total Acreage			Acres Restored <sup>3</sup>		
	Acres Surveyed	Acres Infested <sup>2</sup>	Acres Treated	Acres Surveyed	Acres Infested	Acres Treated	Acres Surveyed	Acres Infested	Acres Treated	Acres Surveyed	Acres Infested	Acres Treated			
2001	-	-	-	-	-	-	-	-	-	-	-	-	-	17	-
2002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2003 <sup>A</sup>	-	4.95	-	-	3.5	-	-	-	-	-	-	-	-	-	-
2004	2.46	2.46	0.18	10.03	0.10	0.02	5.03	0.60	0.13	17.52	3.16	0.33	-	1	-
2005 <sup>B</sup>	0.71	0.71	0.17	1.20	1.20	0.24	7.69	1.89	0.41	9.60	3.80	0.82	-	1	96
2006	284.70	5.19	2.51	16.24	2.89	0.05	30.84	5.20	<0.01	331.78	13.28	2.56	-	9	-
2007	402.63	8.29	0.37	107.64	5.07	0.18	80.82	7.32	0.36	591.09	20.68	0.91	-	2	20
2008 <sup>C</sup>	383.32	1.45	0.35	434.87	2.99	0.52	1557.38	0.69	0.22	2375.57	5.13	1.09	-	4	99
2009	131.53	20.24	8.43	86.60	21.70	1.90	64.50	9.70	8.70	282.63	51.64	19.03	-	3	187
2010	804.40	110.40	17.60	476.70	72.30	4.30	175.80	30.30	4.30	1456.90	213.00	26.20	0.05	4	304
2011	49.43	24.43	8.48	13.98	4.91	3.01	0.00	0.00	0.00	63.40	29.33	11.49	0.31	1	103

Note: Foxtail barley acreage is included in this data.

1-All acreage was calculated using January 2010 NPS land status. Due to conveyances this may not have been the status at the time it was mapped. Land that has been selected for conveyances but was not yet conveyed by January 2010 are counted as NPS managed land.

2-Acres infested is calculated by acres mapped multiplied by the percent cover in areas greater than 0.5 acres. If under 0.5 acres, acreage mapped is counted as 100%.

3-2010 is the first year that restoration efforts were mapped & seed collections tracked.

A-Data was collected during the 2003 field season but is highly inaccurate/imprecise.

B-Problems with GPS units resulted in low mapping acres.

C-WRST EPMT members drove and mapped the Richardson Highway and the Nabesna and McCarthy Roads looking for only for white sweetclover. This accounts for the unusually high number of survey acres.

The trail to the Tanada Creek fish weir and Batzulnetas Village was mapped with no invasive plants documented. In 2007 and 2008, white sweetclover was found and controlled on the Tanada Creek fish weir trail (Gilmore and Goldsmith 2007, Gilmore and Harper 2008). Monitoring the area revealed no invasive plants in 2009-2011, indicating successful removal efforts (Terwilliger et al. 2010, Lain et al. 2011). This trail should be monitored again in three years.

Invasive weeds have been documented at Dead Dog Hill, Long Lake, Twin Lakes Campground and Rock Lake rest stop along the Nabesna Road (Gilmore 2006, Gilmore and Goldsmith 2007, Gilmore and Harper 2008, Terwilliger et al. 2010, Lain et al. 2011). No new infestations were found this year. The new Twin Lakes Campground was still closed this season for the completion of construction, and should be re-visited and checked again next season. Despite continued weeding efforts; foxtail barley, common plantain, and pineapple weed continue to grow around the Slana District Ranger Station, bunkhouse, garage, and cabanas.

The WRST EPMT and SAGA crews surveyed and pulled the scentless false mayweed, common dandelion, and pineapple weed at the Betty Freed property. The Betty Freed property was originally a private home that was donated to the park in 2001 where it has since been used as seasonal housing. Despite seven years of weeding and control work at the Betty Freed property, scentless false mayweed does not appear to be decreasing at this location (Gilmore 2005, Gilmore 2006, Gilmore and Goldsmith 2007, Gilmore and Harper 2008, Terwilliger et al. 2010, Lain et al. 2011). This may be a location where alternate control methods could be applied.

Weeding was performed on a large infestation of white sweetclover at the Tok and Nabesna Roads, otherwise known as the Tok Cutoff (Figure 4). This infestation has been an intensively weeded since 2005 (Gilmore 2005 & 2006, Gilmore and Goldsmith 2007, Gilmore and Harper 2008, Terwilliger et al. 2010). The infestation is not on park lands but is in a vector location just outside of the Nabesna Front Country RZ and is considered a potential threat to park lands. This year the infestation was controlled for three days in July by the WRST EPMT and SAGA crews, and for two days in August by the WRST EPMT and SAGA crews. White sweetclover was pulled on the north side of the highway, as well as on the slopes on the west and east side of the Nabesna Road. Smaller infestations of common dandelion, lambsquarter (*Chenopodium album*), and European stickseed (*Lappula squarrosa*) were also controlled within this area.



**Figure 4.** WRST EPMT staff and SAGA crew pulling white sweetclover at the Tok Cutoff.



## McCarthy Front Country

Due to a decreased size in crew a bicycle survey of the McCarthy Road was not conducted this year. Road surveys indicate that the road continues to have sporadic infestations of foxtail barley, various clovers, and common dandelion. An infestation of smooth brome (*Bromus inermis*) was reported along the Kuskulana Bridge which should be mapped in 2012.

In 2009 one white sweetclover plant was observed at approximately mile marker 13 on the McCarthy Road. Last year two white sweetclover plants were mapped and controlled (Lain et al. 2011). This season the area was re-visited both in June and August but no plants were found. This infestation should be re-visited in 2012.

In August WRST EPMT members received a report of a possibly invasive aquatic plant growing at mile marker 32 on the McCarthy Road. WRST EPMT took samples of the plant, which was thought to be native common mare's-tail (*Hippuris vulgaris*). The voucher has been sent to AKNHP for positive identification.

In 2011 WRST EPMT staff was asked to survey an in-holding in conjunction with surveying a right-of-way access route to Tract 28-114[a]. In 2003 the following infestations were found at this location: white clover, black bindweed (*Fallopia convolvulus*), hempnettle (*Galeopsis tetrahit*), common plantain, common chickweed (*Stellaria media*), and lambsquarter (Terwilliger 2011). Park staff removed 274 black bindweed plants from the site in 2003 (G. Bleakley, personal communication, June 17, 2011). The preliminary re-visitation in 2011 confirmed the existence of black bindweed. Both the right-of-way and the private land had sufficient infestations of invasive weeds to warrant being a high priority for control in 2012, possibly with a large crew.

The WRST EPMT inventoried the access route to Tract 41-113 along the Lakina River this season and no invasive species were found (Lain and Terwilliger 2011). The NPS Right-of-Way Certificate of Access can be obtained by contacting Danny Rosenkrans, WRST Lands and Special Projects Manager.

The Kennecott Mines NHL, designated in 1998, is the focus of much of the WRST EPMT efforts in this reporting zone. The landmark encompasses the land, mineral, and associated holdings of the Kennecott Copper Mines in south-central Alaska and includes structures in the historic mill town (Figure 5). The NHL designation encompasses 7,700 acres of public and private lands (Gilbert et al. 2001). Since then the park has acquired or purchased additional lands and buildings. Copper mining operations in Kennecott occurred from 1901 to 1938 and were among the nation's richest (Gilbert et al. 2001).



**Figure 5.** The main mill site in Kennecott NHL.

The NPS and the local community are engaged in an ongoing planning effort to identify buildings that will be stabilized or rehabilitated and the NPS is currently in the process of

revising their operations plan for the NHL. Stabilization work in the Kennecott Mines NHL is expected to take many years. These construction projects disturb native vegetation and can contribute to invasive weed infestations. In addition, outside fill material that may be used could be a vector for spreading invasive weeds into the park. These areas will need attention in the future, both by pulling invasive weeds and planting native species. The EPMT needs to become actively engaged in the planning efforts for the NHL.

The road leading up to Kennecott Mines NHL, Silk Stocking Row, and the Main Street in the town site of Kennecott were inventoried. Some of the most predominant invasive plant species in the NHL are clover species, common dandelion and oxeye daisies. Oxeye daisy remains the highest management priority in the Kennecott town site. For the eighth consecutive year, the main infestation on the slope behind the Jurick building was treated (Figure 6). Several infestations of oxeye daisy on private property were treated with permission.



**Figure 6.** WRST EPMT staff pulling an infestation of oxeye daisy in Kennecott.

In 2011, work was performed on several species growing around NPS seasonal employee cottages on Silk Stocking Row. This area had previously been disturbed by construction and remodeling of the cottages. Lambsquarter, common dandelion, prostrate knotweed (*Polygonum aviculare*), various clovers, pineapple weed, flixweed (*Descurainia sophia*), common chickweed, mouse-ear chickweed, and oxeye daisy were inventoried and controlled. The WRST EPMT and SAGA crews also focused on control work around the Recreation Hall, the Kennecott Visitor Center, and the General Managers Office. One large (>1 acre) infestation near the office contains 12 species of invasive plants: common lambsquarter, common dandelion, prostrate knotweed, two species of clover, pineapple weed, common chickweed, mouse-eared chickweed, shepherd's purse (*Capsella bursa-pastoris*), common plantain, Icelandic poppy (*Papaver nudicaule*) and oxeye daisy. South of the General Managers office near the National Creek Bridge, Kentucky bluegrass (*Poa pratensis*) was documented for the first time by the WRST EPMT. The infestation was mapped, vouchered, verified, and pulled.

The Root Glacier, Bonanza Mine, and Jumbo Mine are trails that start within Kennecott Mines NHL and lead into the park. Infestations of common dandelion and alsike clover were mapped in previous seasons, due to a lack in personnel the infestations were not re-visited in 2011.

WRST maintains a ranger and comfort station in Chitina in the summer. All road traffic to Kennecott travels through Chitina so careful monitoring of the area is vital. No new infestations were reported growing around the Chitina District Ranger Station this year. Chitina provides access to the Copper River and is in need of inter-agency cooperation to inventory and control for invasive weeds.

### **Upper Copper River Front Country**

WRST moved its headquarters to its current location in Copper Center in 2002 (Gilmore 2006). This location, although situated on the outskirts of the Upper Copper River reporting zone, is

relevant to park managers as a potential pathway for dispersal of invasive plant seeds. The native aspen (*Populus tremuloides*), black and white spruce (*Picea mariana* and *P. glauca*) and other vegetation make an impressive backdrop. Unfortunately, building sites were cleared of all vegetation and weed infested topsoil was spread. Narrowleaf hawksbeard (*Crepis tectorum*), common dandelion, and foxtail barley are heavily established infestations around WRST Headquarters. The area also has smaller infestations of lambsquarter, European stickseed, and white sweetclover. White sweetclover has the highest invasiveness rank of any invasive plant in WRST and as such these infestations warrant some concern. The WRST EPMT monitored and treated these areas to prevent further establishments of white sweetclover at these locations. The once abundant pigweed (*Amaranthus retroflexus*) that posed such a problem the first four years after moving to the new site seems to have all but disappeared (Gilmore 2006).

Mechanical, manual, and chemical methods were used to control infestations around WRST Headquarters. The maintenance staff has cooperated with the WRST EPMT by mowing and bagging invasive plant infestations upon request. The SAGA crew spent two days in July and two days in August manually controlling known weed infestations around WRST Copper Center Headquarters, employee housing, and adjacent roadways. YCC interns controlled weeds in conjunction with the SAGA crew at WRST Headquarters for one day. The planting area around WRST's welcome sign was intensively weeded several times this season by WRST EPMT staff. Common dandelions, narrowleaf hawksbeard, alsike clover (*Trifolium hybridum*), and foxtail barley were mapped and removed. The crew continued the re-vegetation efforts at the welcome sign that have been ongoing since 2006 (Gilmore 2006, Gilmore and Goldsmith 2007, Gilmore and Harper 2008, Terwilliger et al. 2010, Lain et al. 2011). This and other restoration projects are discussed further below in the Restoration Efforts section.

In other areas around WRST Headquarters there were continual efforts throughout the season to map and pull narrowleaf hawksbeard, foxtail barley and common dandelions. The SAGA and YCC crews pulled infestations at the Visitor Center, theater, exhibit building, resource buildings, behind the administrative building, around the visitor's parking lot, and at the junction of the administration and visitor center driveways. The area behind the administrative building is overrun with lambsquarter, narrowleaf hawksbeard, prostrate knotweed, clovers (*Trifolium spp.*), pineapple weed, common plantain, common dandelion, and foxtail barley. This infestation is from a septic tank replacement in 2008 which was covered with weed-infested topsoil and has resulted in a bumper crop of invasive weeds (Gilmore and Harper 2008). This area is a potential seed source for other areas around headquarters (Terwilliger et al. 2010). This area is continually mowed by the maintenance staff to prevent the infestations going to seed as invasive weeds continue to sprout despite ongoing control efforts.

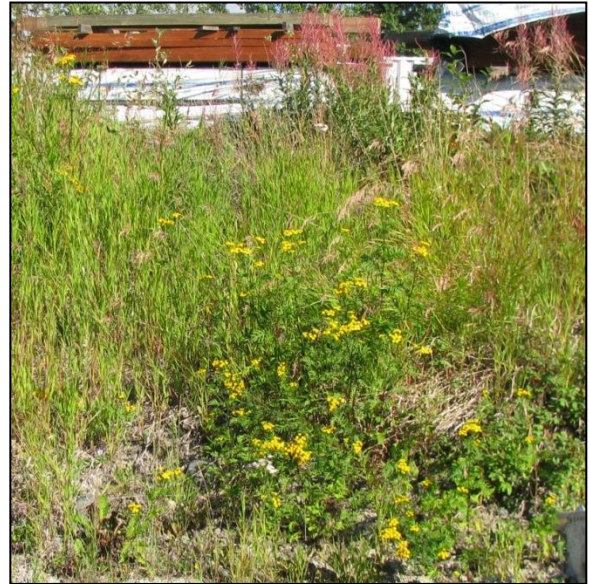
In the gravel pit just south of park Headquarters narrowleaf hawksbeard, common dandelion, foxtail barley, and a small infestation of white sweetclover were surveyed and weeded by SAGA and EPMT crew. Three vouchers of invasive looking dandelions were collected and sent to Anchorage for identification. All three plants were identified as native dandelion species. Regional EPMT staff members Bonnie Million and Tim Federal used herbicide to control narrowleaf hawksbeard throughout the pit. This is the third year a small infestation of white sweetclover has been observed at the gravel pit near headquarters (Lain et al. 2011). White sweetclover in the gravel pit could be the result of WRST burning weed bags in the area. This year, the WRST EPMT crew initiated alternative methods for weed bag disposal. The Park now

contracts an incinerator to dispose of bagged weeds. This disposal method is dependent upon funding from year to year.

An infestation of white sweetclover on the Richardson Highway across from the park entrance has been monitored and weeded the past two years (Lain et al. 2011). The infestation was mechanically treated via mowing by DOT on two occasions just prior to SAGA crew arrival; preventing manual pulling.

The grounds behind employee housing, located on a rise at the south edge of the gravel pit, have large numbers of narrowleaf hawksbeard, common dandelion, foxtail barley, and clover. This area was surveyed and pulled by the SAGA and WRST EPMT crews in August. The remaining area surrounding the buildings have scattered infestations of the same species.

The SAGA and WRST EPMT crews spent two days in August pulling common tansy at the NPS maintenance yard in Glennallen (Figure 7). Manual treatment over three years has had no impact on the tansy infestation. The infestation's location makes it a high priority as it could easily spread infestations into the park through the movement of equipment that is stored in the maintenance yard. There is some question as to who authority over the property. The WRST EPMT is seeking approval from the appropriate officials to chemically treat this infestation, the proposed treatment area is 0.39 acres.



**Figure 7.** Common tansy at the NPS maintenance yard in Glennallen

### **Tetlin-Tanacross-North Country**

In 2011, one remote airstrip was surveyed in conjunction with a concessioner site visit in this RZ. The WRST EPMT crew did not find any invasive species on the Snag Creek airstrip. They did find infestations of foxtail barley, mouse-ear chickweed, common plantain, and pineapple weed at a park owned cabin within the area. A large infestation of a potentially invasive grass was found at the same site (Lain and Terwilliger 2011). Although WRST EPMT members were unable to control the infestations this season, efforts will be made to revisit the site in 2012. The NPS Snag Creek Guide Area assessment can be obtained by contacting Mark Keogh, NPS Concession Specialist.

Remote airstrips are potential locations for introduction and dispersal of invasive plants onto park lands (Lain et al 2011). WRST has 19 park-maintained remote airstrips, four state-maintained strips (Chisana, May Creek, and two strips in McCarthy), several privately maintained strips, and perhaps 100 or more airstrips/ landing spots that are not maintained but used regularly. There are at least six state-maintained airstrips adjacent to park lands from which visitors, residents, and staff members all access the interior of the park: Beaver Creek, Canada; Chistochina; Chitina; Gulkana; Tok; and Yakutat.



### **White River and Bagley Icefield**

As of 2011, the WRST EPMT has not collected any data from the White River or Bagley Icefield reporting zones. However, domestic horses graze in the White River RZ and the park hopes to inventory it for invasive plants in the future. In contrast the Bagley Icefield is mostly ice and glaciers and is not currently an area of high concern.

### **Big Volcanoes**

In 2010 foxtail barley was documented growing at various locations along the Nizina River, at both of the airstrips at the toe of the Nizina Glacier and at the Lakina River. Infestations of common dandelion were inventoried at the Nizina public use cabin, along the lake on the Donahoe Basin trail, at the Peavine airstrip, and at the Hidden Creek Valley trail (Lain et al 2011).

### **Coastal-Icy Bay**

In 2009 a WRST EPMT intern and the park ecologist surveyed the Esker Creek public use cabin for invasive species; no invasive species were found (Terwilliger et al. 2010). Access is a limiting factor for inventorying in this reporting zone.

### **St. Elias-Chugach Mtns.**

Due to the recent findings of invasive aquatics that have the potential to disperse via float planes in Alaska, the WRST EPMT crew and park ecologist spot surveyed Tebay and Summit lakes in August, no invasive species were found. More information about invasive aquatic inventorying is discussed in the Discussion and Recommendations section. As of 2011 the only invasive species reported in this zone by WRST EPMT is foxtail barley.

### **Restoration**

Where infestations larger than 0.1 acre are controlled, Alaska NPS units are directed to restore the site with local seed sources and/or native vegetation (NPS 2010). NPS is directed to limit the impacts, such as introduction of exotic species, on natural systems by restoring areas disturbed by NPS activities such as hazard tree removal or construction. Restoration of native plants accelerates the recovery of the biological community function and physical components of these systems (NPS 2006). Thru Executive Order 13148, federal agencies are directed to promote environmentally sound landscaping practices and programs to reduce adverse impacts to the natural environment. Agencies are also expected to minimize adverse impacts of actions or projects on existing native plant communities by requiring on-site managers and contractors to ensure that practices which minimize impacts to natural habitat are followed during construction (Clinton 1994).

Under the direction of the park ecologist, WRST EPMT initiated two restoration projects this season. Both projects were submitted for public comment through the NPS Planning, Environment & Public Comment website, a decision making tool for park planners that fosters conservation-based consultation, cooperation, and communication. Efforts to restore natural vegetation to the National Creek drainage within Kennecott Mines NHL began on August 4<sup>th</sup>, 2011. The NPS installed cribbing and initiated major construction to stabilize the draining in 2010. By transplanting 18 birch trees and planting over 100 willow and rose cuttings the WRST EPMT hopes to naturalize the work done in 2010 (Figure 8). It took the SAGA and EPMT crews an entire day to complete the project. Survival rates will be evaluated in 2012.



**Figure 8.** SAGA crew member collecting native birch trees to transplant in National Creek.

On August 12, 2011 the WRST EPMT and SAGA crews along with three other NPS employees transplanted 30 aspen trees and planted 40 each of rose and willow cuttings in efforts to reestablish native vegetation in the area between the Visitor Center and the Theater/Water Utility buildings at the Copper Center Administrative site. This area was of mutual concern to the WRST EPMT and Interpretation staff. In addition to reducing invasive weeds the goals of this project were to screen a staff parking lot and improve visitor flows. The project will be re-evaluated in 2012 to help with the planning of future restoration projects. The park is embarking on a long term re-vegetation plan for the Copper Center visitor complex to help facilitate better use of the space and reduce non-native plants.

### **Outreach and Education**

An objective of the Alaska EPMT is to inform employees, local residents, and park visitors about the threats and impacts caused by invasive plants and provide steps that individuals can take to minimize those impacts. For any management plan to be effective, the public must recognize the threats posed by nonnative plant species, change behavior that results in the spread of infestations, and provide support for management efforts (NPS 2006). Education is also vital to gain public, industry, and political support for prevention, control, and detection activities. As rural communities continue to grow and as introduction of new weeds become a greater threat, education will help rural communities avoid problems occurring in other parts of Alaska (AKDNR 2011). To build support for prevention programs, managers need to rigorously quantify the economic and ecological impacts of invasive species and clearly communicate this information to the public (YISC 2011).

In 2011 the WRST EPMT participated in two festivals in the Copper River Valley. The crew displayed booths and shared information at the Fourth of July celebrations in McCarthy and at the Kenny Lake Fair in August (Figure 9). The WRST EPMT crew staffed the booths and talked with participants about identifying invasive plants in the area and how to control them. All of the booths included maps of invasive weed infestations around the area, pamphlets with helpful information for identifying the plants, and a coloring activity for children. In May, the park ecologist gave an orientation talk to the seasonal interpretive staff to help them convey issues about invasive weeds to the public. In June, WRST EPMT SCA intern Timothy Luethke wrote and published an article in the Copper River record about Alaska's Invasive Weeds Awareness Week (Appendix II).



**Figure 9.** SCA intern Timothy Luethke at the WRST EPMT booth at the Kenny Lake Fair.



## Discussion and Recommendations

### Inventory and Control Work

In past seasons, the WRST EPMT has focused on mapping invasive weeds and then utilizing manual control methods where feasible. Although inventory and control work is essential to a successful invasive species program, the WRST EPMT should petition park managers to add Prevention as a park wide goal as part of their strategic plan for managing invasive species. Establishing strong prevention measures such as quarantine and inspection of common vectors of invasive plants is less expensive than resource losses or management of inventory and control, prevention is the most critical aspect of invasive plant management (AKDNR 2011). Prevention should include education, risk analysis, and pathway management.

WRST EPMT should rigorously identify pathways by which invasive species move into the park and cooperate with other departments in WRST to mitigate infestation risks and establish standard operating procedures and policies where needed.

Specific mapping goals for the 2012 season should include: a comprehensive bicycle survey of the McCarthy road (taking consideration for previously mapped infestations and for DOT construction sites), backcountry trails that have not been mapped or that have high priority infestations, hazard fuel treatment areas, campgrounds, pullouts, and unmapped airstrips.

In August of 2010, the USDA Forest Health Protection program became aware of a substantial infestation of Canadian waterweed (*Elodea nuttelli*) in the Fairbanks area (Wurtz and Lisuzzo 2010). Canadian waterweed directly competes with Chinook salmon for breeding habitat (Mertz et al. 2008). This was the first year that the WRST EPMT inventoried for aquatic invasive species. Slow moving rivers and lakes that are accessed by float planes should be monitored for aquatic invasive species due to the planes ability to inadvertently spread infestations. Several lakes in the park are visited by float planes that start in waters known to have Canadian waterweed infestations. It is estimated that Canadian waterweed, if left unmonitored and allowed to spread, would cost the state of Alaska \$230,000 a year in future commercial salmon harvest revenues and over a million dollars a year in future sport fishing revenues (Wurtz and Lisuzzo 2010).

Specific treatments should continue at WRST Headquarters and the Chitina, Copper Center, Kennecott Mines NHL, and Slana ranger stations. A long term treatment and re-vegetation plan for Kennecott Mines NHL should be a priority, as this area is under extensive renovations. To reduce the possible introduction of invasive plants from outside or the spread of existing invasive plants within the NHL, NPS should implement best management practices for all ground-disturbing operations. To minimize invasive plant colonization's, restoration and re-vegetation efforts should be included in project proposals and implemented utilizing native seedlings, native transplants, native cuttings, salvaged mats, bioengineering techniques with native plants, and native seeds.

An important part the WRST EPMT's inventory effort is to insure that the park herbariums contain vouchers of identified invasive weeds found in the park. It is important to coordinate with the park's museum coordinator to share information on invasive specimens collected from

other projects. This will reduce collecting multiple vouchers of the same specimen and will help identify areas of known infestations that are documented in the park by other collectors.

### **Restoration**

Restoration efforts should continue at WRST Headquarters (Figure 10). The WRST EPMT is currently working on a detailed plan for the area that includes architectural drawings with proposed areas for native re-vegetation, suggested planted species with type (seed, transplant, cutting) and amount per area, cost analysis and projected outcomes, watering schedules, and equipment needs for tree transplants, soil scarifications and vegetation screening. The WRST EPMT is also considering a plan to submit to park managers to seed the Kennecott Mines NHL town site with native seeds and potentially historically non-native garden plants with non-invasive, historically accurate plants. The Kennecott Mines NHL should include the same details listed for the WRST Headquarters re-vegetation plan.



**Figure 10.** SAGA and EPMT staff at the WRST HQ re-vegetation project.

In order to take on the greater need for restoration, the WRST EPMT should develop a restoration protocol for collecting and cleaning native seeds for future use. Although the WRST EPMT continues to collect and clean native seed around WRST Headquarters, the EPMT program currently lacks the equipment necessary to clean and store large amounts of seed or starter plants in the spring. As restoration work continues to upgrade, the investment in equipment and storage space may become necessary. The WRST EPMT is currently looking at various funding options to get this project started.

### **Outreach and Education**

Key elements for success in controlling invasive plants are education and community involvement. The WRST EPMT staff should continue to work with other park staff and finalize an invasive plant policy. Presentations should continue to be given to seasonal staff. Informal training should be provided both for interpreters who interact with the public as well as seasonal staff from other divisions, who are sometimes directed to do weeding around visitor centers. This will provide these staff with an understanding of the importance of the EPMT goals and allow them to contribute to the WRST EPMT effort. In addition, staff members who are directed to complete supplemental weeding should be aware of the WRST EPMT's mapping and reporting requirements so their work is properly documented.

In 2011 WRST EPMT technicians put together field flip books for each ranger station highlighting the “top ten” species for each area as well as invasive species phenology logs. Next year the staff should make a greater effort to encourage other resource divisions in WRST to use the phenology logs, the information collected is valuable to gauge the timing of mechanical and chemical treatments. Setting up joint EPMT and Interpretation staff meetings to evaluate the weed phenology at each station would be particularly helpful due to the turnover of rangers at each station. Future WRST EPMT staff should also work closely with the interpretive division to

include information about invasive plants in their ranger talks at the visitor centers, Princess Lodge, youth camps, and at teacher-ranger-teacher programs.

Radio and newspaper interviews help bring the problem to public attention. The summer craft and agricultural fairs are good venues for educational displays. Next year the WRST EPMT should have a booth at the Fair Weather Days in Yakutat (late August) in addition to the booths they sponsored in 2011. Handouts about invasive plants should be widely distributed, while site specific booklets should be distributed in Copper Center, McCarthy-Kennecott, and Slana. Libraries, laundromats, post offices, local visitor centers, and hotels throughout the Copper Basin are also good locations to display information.

One of the most important aspects of community education is the active involvement of local residents. The Copper Valley Invasive Plants Workgroup remains in existence but was unable to secure funding for a coordinator, this means that all workgroup activity is on a volunteer basis. Efforts should be made to strengthen this group and involve more community members.

Due to travel constraints the WRST EPMT should coordinate with the Yakutat area NPS staff. Yakutat is accessible to park staff mainly by driving to Anchorage and then flying to the Yakutat airport via commercial airline. It is expensive and difficult to inventory and monitor this portion of the park without a dedicated Yakutat crew who is stationed there seasonally. It would be valuable to have more information on invasive species in this part of the park, but it was logistically not possible to work there in 2010 or 2011.

Education and public involvement could be increased with more talks, work groups and partnering with other organizations that have an interest in the invasive species issue, such as the Wrangell Mountains Center (WMC) and Wrangell Institute for Science and Environment. It is important that the WRST EPMT maintain informal partnership with these local groups and work with them on educational programs and public outreach. The WRST EPMT should talk with WMC students and backcountry rangers before they go on their backcountry field trip to enlist their help with backcountry invasive plant monitoring.





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## Appendix A: Copper River Record February 2011 Article

8 February 24, 2011

### NPS targets invasive plants in Alaska

*Will begin using herbicides in several AK National Parks during 2011 field season*

**NPS NEWS RELEASE, COPPER CENTER**--The inventory and removal of invasive plants from national parks in Alaska reached a record level in 2010. These unwanted plants often display rapid growth, spread with little or no human assistance, and are expensive to remove and difficult to control once established.

Invasive plants are a concern because they threaten the genetic integrity of native flora through hybridization, can out-compete native plant species for

limited resources, and can result in loss of habitat and food sources for native insects, birds, fish, and other wildlife.

Due in large part to increased funding through the American Recovery and Reinvestment Act, crew time on the ground doubled in 2010 compared to the year before.

The National Park Service also used youth hires through AmeriCorps and internships to accomplish work in several parks.

In Wrangell-St. Elias National Park, the Alaska Exotic Plant Management Team was able to inventory more than 1,400 acres, checking areas around backcountry cabins, trails and airstrips that had never been surveyed. Most areas were still in pristine condition, with the exception of small infestations at several airstrips.

The 2010 season was also the first time the Alaska Exotic Plant Management Team had staff stationed at Katmai National Park, with work focused on the Brooks Camp area. During the season they discovered

three invasive species that had never been documented

in the park: bird vetch, fall dandelion, and narrowleaf hawksbeard.

The NPS invasive plants program also focuses on education efforts and encourages park visitors and employees to recognize invasive species. At Denali National Park bus drivers found new infestations of narrowleaf hawksbeard and common tansy was found just outside Wrangell-St. Elias by maintenance crews.

The 2011 field season will mark the first time herbicides will be used at multiple national parks in Alaska. Specific dates of

application will be made available through the park when the application date is more definite. A preliminary description of the work to be accomplished and the herbicides to be used is available [http://www.nps.gov/akso/NatRes/EPMT/2011\\_treatments.html](http://www.nps.gov/akso/NatRes/EPMT/2011_treatments.html)

All proposed applications will be made by State of Alaska certified pesticide applicators using a precise, spot application method with calibrated backpack sprayers. Herbicide application is dependent on the target plant's growth stage and the weather. Applications will only be made when weather conditions are appropriate.



COPPER RIVER RECORD



## Appendix B: Copper River Record June 2011 Article

contact@copperriverrecord.net



June 2, 2011

### Invasive weeds awareness week 2011

By TIM LUETHKE,  
NPS EXOTIC PLANT  
MANAGEMENT TEAM

"Invasive weeds awareness week 2011!" Untold mystery, shocking drama, and a breathtaking struggle between life and death might not be the first things that hit your radar when you hear that exclamation, but, when you take a close look, you might be surprised at what you find.

In the snapshot of time that I have been living in the Copper Basin, the rugged beauty, sheer size, and unique flora and fauna have blown away my previous concepts of wilderness.

But, the increases in transportation and tourism have spawned a menace that is threatening this remarkable

area.

Invasive plants are like ecological WMDs. All you need to see for proof is Kudzu in the south. It occupies about 7 million acres of the Southeastern United States and continues to take over more land every year.

Although Alaska is currently in much better shape than the lower 48 as far as invasive weeds, several invasive species are threatening Alaska's natural integrity. An invasive plant is one that has characteristics which allow it to out-compete other native plants. They grow quickly, mature early, and spread seeds that can survive for long periods of time.

For example, white sweet clover (*Melilotus Alba*) is a species which can out

compete and kill off willow. Willow makes up a large portion of moose's diet and provides protective habitat

for fish. If white sweet clover is allowed to ravage through Alaska, it could seriously impact moose and

fish populations.

White sweet clover is just one among many examples of the destructive force of invasive species in Alaska. This is why even Governor Sean Parnell is encouraging all Alaskans to learn more about the invasive weeds in Alaska and follow prevention techniques. Governor Parnell declared the week of June 19<sup>th</sup> through the 25<sup>th</sup> as Invasive Weeds Awareness Week in Alaska.

Come check out the exotic plant management team from Copper Center at our booth during the Fireweed Festival on June 25<sup>th</sup>. For more information please contact Annie Lain and Tim Luethke at 907-822-7283 or email us at [annmarie\\_lain@nps.gov](mailto:annmarie_lain@nps.gov) or [Timothy\\_Luethke@partner.nps.gov](mailto:Timothy_Luethke@partner.nps.gov).



NPS courtesy photo

White Sweet Clover taking over the shoulder of the Edgerton Highway.