



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

2014 Summary Report

Natural Resource Data Series NPS/WRST/NRDS—2015/748



ON THE COVER

(Top left) Peter Frank conducting elodea survey on Grizzly Lake

(Top right) Infestation of yellow toadflax in McCarthy

(Bottom left) Megan Weidman conducting survey on the Root Glacier trail in Kennecott

(Bottom right) Common dandelion at the gravel pit near the NPS headquarters in Copper Center

Photographs by: Peter Frank & Megan Weidman

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The Natural Resource Data Series is intended for the timely release of basic data sets and data summaries. Care has been taken to assure accuracy of raw data values, but a thorough analysis and interpretation of the data has not been completed. Consequently, the initial analyses of data in this report are provisional and subject to change.

All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner.

This report received informal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data. Data in this report were collected and analyzed using methods based on established, peer-reviewed protocols and were analyzed and interpreted within the guidelines of the protocols.

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Abstract

This report summarizes work conducted by the Exotic Plant Management Team (EPMT) in Wrangell-St. Elias National Park and Preserve (WRST) during the 2014 field season. This summer marked the tenth consecutive year WRST staff have monitored and controlled exotic plants in the park, preserve and adjoining gateway communities. The 2014 WRST EPMT consisted of one National Park Service (NPS) Biological Science Technician and one Chicago Botanical Garden Conservation Land Management (CLM) Intern stationed at Park Headquarters in Copper Center. Field work was focused on the following objectives: Monitor and control known infestations; survey for and document new infestations; and prevent the spread of invasive species through NPS activities. EPMT staff devoted approximately 595 field hours toward managing invasive species found in and around the park. A total of 80.1 acres were surveyed by EPMT staff during the 2014 field season, of which a total of 4.6 acres were found to be infested. Of the 4.6 acres found to be infested, a total of 1.4 acres were treated by means of manual, chemical and mechanical control resulting in 170 bags of plant material with a combined weight of 5,073 pounds. In total, 33 invasive species were documented by the WRST EPMT. No new species were documented on park lands in 2014, but one species, reed canarygrass (*Phalaris arundinacea*), was found in the gateway community of Glennallen which represents the first documentation of this high priority species in the upper Copper River Basin. Throughout the season, seed from 24 native species was collected resulting in a combined weight of 5.4 pounds. The collection efforts included 14 new species which were added to the parks seed bank for the first time. Seeds collected this season will be used for restoration projects within the Kennicott Valley.

Acknowledgments

The authors would like to thank all the individuals who have dedicated their time and energy to make the 2014 Wrangell-St. Elias National Park and Preserve Exotic Plant Management Team's season a success. A special thanks to Miranda Terwilliger, whose guidance, support and extensive knowledge were invaluable over the course of the season and to Chris Overbaugh for his overall expertise and assistance in all aspects of the EPMT program. We would like to acknowledge the Ellis family at Devil's Mountain Lodge, the Collins family at Long Lake, the Rowland Family in McCarthy, and Gerry Lee at Tolsona Lake for permitting us to conduct exotic plant surveys and control work on their property. We would also like to recognize all the partners involved in the Copper Basin Community Weed Management Area for their assistance in monitoring and controlling infestations in the park's gateway communities.

The authors would also like to acknowledge those who have so generously volunteered their time to benefit the EPMT this summer; the Southeast Alaska Guidance Association crew members, Student Conservation Association Interns and Youth Conservation Corps interns whose hard work helped to control some of our largest and most persistent infestations. Finally, we would like to thank all the volunteers who helped make the second annual Glennallen Weed Smackdown a huge success.

Abbreviations

AKNHP Alaska Natural Heritage Program

CB-CWMA Copper Basin Cooperative Weed Management Area

CLM Chicago Botanic Garden's Conservation Land Management

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

WISE Wrangell Institute for Science and Environment

WRST Wrangell-St. Elias National Park and Preserve

YCC Youth Conservation Corps

Introduction

Invasive plant species are a concern to resource managers because they can threaten the genetic integrity of native flora through hybridization, out-compete resident plant species for limited resources, change the structure and function of ecosystems through alterations of geochemical and geophysical processes, and impact fish and wildlife habitat (Vitousek et al. 1996, Gordon 1998). While most invasive plants in Alaska are limited to human-altered landscapes, several species have begun to threaten undisturbed ecosystems and influence ecological processes (Carlson et al. 2008). The potential for invasive species to disperse into areas of natural disturbance and benefit from climatic change presents a real ecological threat to Alaska's wildlands (Spellman and Wurtz 2010). The Alaska Exotic Plant Management Team (EPMT) has adopted the management approach of early detection and rapid response to invasive plant infestations in response to these threats.

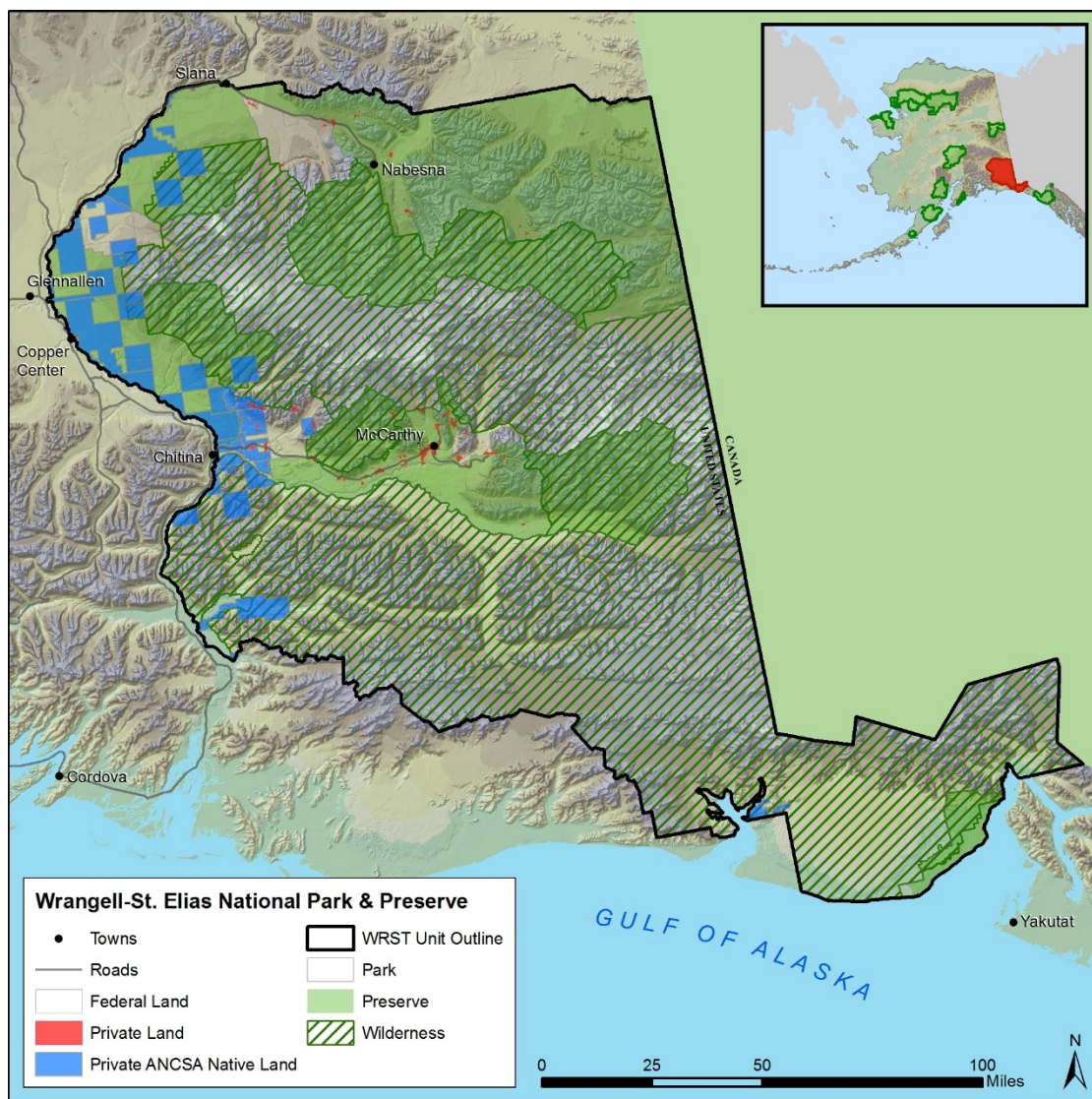


Figure 1. Map of Wrangell-St. Elias National Park and Preserve.

Initially, baseline invasive plant surveys were necessary to develop an exotic plant management plan for NPS lands in Alaska and these were conducted from 2000-2004 on Alaska NPS lands (Densmore et al. 2001, McKee 2003, Bauder and Heys 2004). The NPS established the Alaska EPMT in 2003 (McKee 2003) and WRST established a park based EPMT program in 2005 (Gilmore 2005). Over the past ten years the WRST EPMT has expanded its exotic plant inventory and has incorporated monitoring and control work into its annual efforts.

Wrangell-St. Elias National Park & Preserve (WRST) is located in south central Alaska and encompasses 13.3 million acres making it the largest U.S. national park unit (Figure 1). In conjunction with Glacier Bay National Park and Kluane National Park and Tatshenshini-Alsek Provincial Park 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 amount of NPS 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 and float plane lakes) provide mechanical access to WRST, although the majority of park lands remain inaccessible to all but foot and river traffic.



Figure 2. White sweet clover at Tok Cutoff in Slana.

Access portals such as roads, trails, rivers, float plane lakes and airstrips are the primary vectors for invasive plants in the park. Human altered landscapes including, developed private and Native Corporation lands, logging areas, 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 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 continues 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.

Remote airstrips and floatplane lakes are also potential locations for introduction and dispersal of invasive plants onto park lands. WRST has 19 park-maintained remote airstrips, three state-maintained strips (May Creek, and two strips in McCarthy), several privately maintained strips, and 100 or more airstrips, landing spots, and floatplane lakes which 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.

Climate change and invasive species pose serious threats to the structure and function of aquatic ecosystems worldwide (Parmesan and Yohe 2003). In August of 2010, the USDA Forest Health Protection program became aware of a substantial infestation of *Elodea canadensis* in the Fairbanks area (Wurtz and Lisuzzo 2010). Further research lead to the discovery that *Elodea* had been documented in 1982 in Cordova (ALA:Herb: 146813), a coastal town outside the park boundaries which serves as the origin of many float planes destined for lakes within the park . The Forest Service confirmed the presence of *Elodea* in Eyak Lake in 2012 (Malstrom 2012) and has since documented *Elodea* in five additional lakes, one lagoon and two slow moving rivers near Cordova. Currently *Elodea* has spread to Anchorage, Cordova, Fairbanks, and the Kenai Peninsula (AKDNR 2014).

If *Elodea* were to infest any of the salmon breeding habitat in WRST it could be detrimental to the Copper River fishery, some of the more important fisheries in Alaska (Demientieff 2002). *Elodea* has been shown to reduce the suitability of Chinook salmon breeding habitat in Northern California (Merz et al. 2008). It is estimated that *Elodea*, if left unchecked, could 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). *Elodea* can be spread by boats or float plane and therefore the EPMT has been monitoring lakes within the park that receive heavy boat or float plane traffic since 2011(Figure 3). The EPMT has also increased outreach efforts to educate boaters, pilots, property owners and the general public about the potential impacts of *Elodea* on the aquatic ecosystems in WRST.



Figure 3. Aquatic plant survey on Grizzly Lake

Objectives

The primary objectives of the WRST EPMT are to a) monitor known infestations of invasive plants; b) contain, control and where possible eradicate these infestations; c) to inventory areas with known human disturbance where invasive plants are likely to appear and d) where possible, to prevent the further spread of invasive species in and around WRST.

Restoration & Prevention

The most efficient and cost effective strategy for managing invasive species is to prevent their introduction. NPS management policies state that park staff should strive to limit impacts on natural systems within the parks, such as introduction of exotic species (NPS 2006). Restoring human altered landscapes to a natural condition is an excellent means of preventing the introduction of invasive species to park lands. Restoration of native plant communities can not only precludes invasive species, but can accelerate the recovery of the biological functions and physical components of the parks ecosystems (NPS 2006). Through 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).

Outreach, Education & Partnerships

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 invasive plants becomes 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). Partnerships with other landowners is critical as invasive plants do not recognize boundaries and often it is the invasive plants outside of park boundaries that are the reservoir for establishing populations within the park.

Methods

EPMT fieldwork at WRST was conducted between May 27th and September 15th, 2014. The core members of the 2014 WRST EPMT were; Peter Frank, NPS Biological Science Technician and Megan Weidman, Chicago Botanic Garden Conservation Land Management (CLM) Intern. Four Youth Conservation Corps (YCC) students worked a total of 229 person hours assisting the WRST EPMT in various park related projects. Two seven-person Southeast Alaska Guidance Association (SAGA) crews and one six-person Student Conservation Association (SCA) crew assisted the WRST EPMT with invasive plant control efforts and native seed collection for three weeks totaling 744 person hours.

Defining Reporting Zones

To facilitate reporting efforts, the park and its environs have been divided into nine reporting zones (RZ) based on the 2011 WRST Natural Resource Condition Assessment (Dratzkowski et al. 2011). Given the parks size these divisions allow for more meaningful and focused reporting. The results and discussion in this report are structured around these RZ. This report only addresses RZ that were visited in 2014 even though there may be documented invasive plants elsewhere (Figure 4).

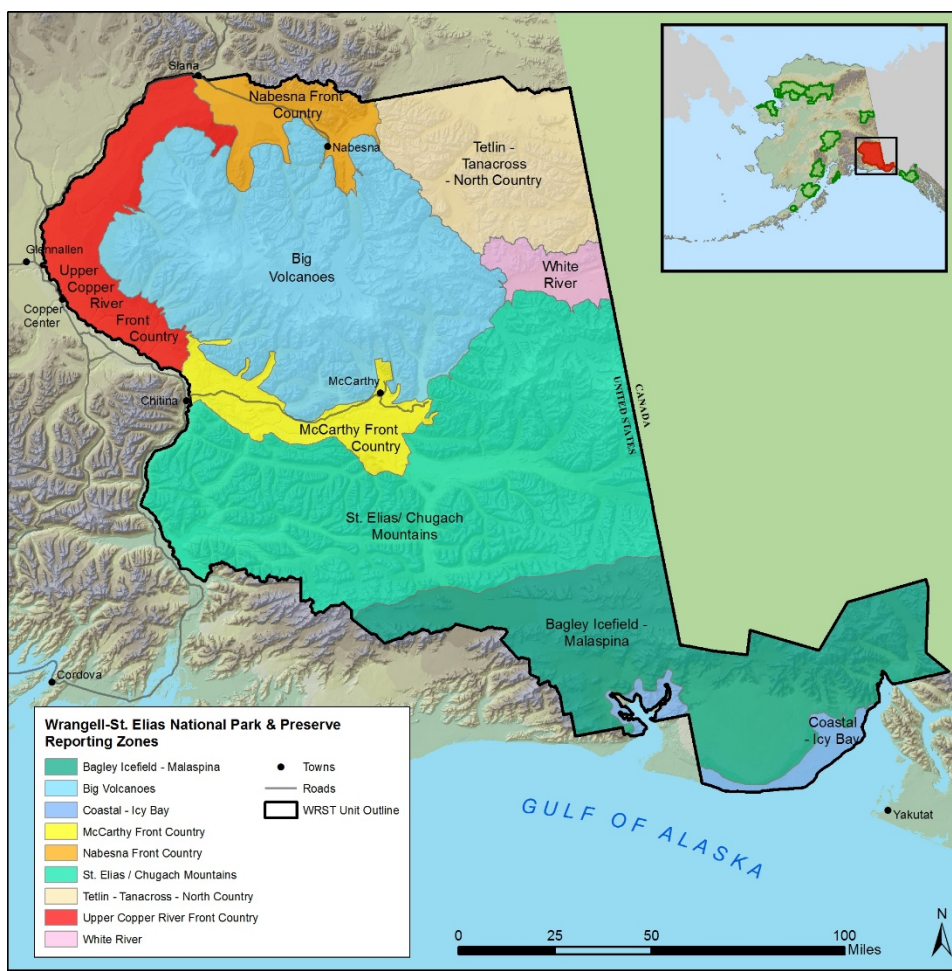


Figure 4. WRST Reporting Zones

Data Collection & Analysis

Methods of mapping and data collection followed the 2014 Alaska EPMT field protocol (Million et al. 2014). All inventory, control, and restoration work were mapped using two Trimble GeoExplorer 2008 Series GeoXT data loggers equipped with a standardized Alaska EPMT data dictionary. These units were used to record both spatial and attribute data for geographic information system (GIS) analysis. GPS data were differentially corrected and edited by field personnel using Trimble GPS Pathfinder Office 5.60. Post-processed GPS data were sent to the Alaska Regional office every two weeks to be converted into GIS data and entered into two geodatabases: the National Park Service's National Invasive Species Information Management System (NISIMS) and the Alaska Natural Heritage Program's Alaska Exotic Plant Information Clearinghouse (AKEPIC). GIS data were used to calculate the number of acres surveyed, infested and treated during the 2014 field season. Acres surveyed represent the total area mapped. Acres infested represent the area of a mapped infestation multiplied by the percent cover of invasive plants in that mapped area. Acres treated represents the area of a mapped infestation multiplied by the percent cover of invasive plants in that mapped area and by the percent of the infestation treated. These acreage numbers are used in reporting by the Alaska EPMT and will be used throughout this report. This method of acreage calculation differs from methods used in the past, thus acreages reported in this report differ from those reported in past reports.



Figure 5. Smooth brome located at the Silk Stocking residence in Kennecott

Prioritizing Fieldwork

The WRST EPMT staff utilized existing data and recommendations from previous years to prioritize inventory and monitoring efforts, identify species for control and select appropriate control methods. In developing a course of action this season's phenology, available work force and resources were all taken into account.

Inventory & Monitoring

Inventory and monitoring efforts focused on areas most likely to be affected by human activity. Particular attention was paid to areas of obvious disturbance, such as populated places, roads, trails gravel pits, pullouts, airstrips, and floatplane lakes. Monitoring efforts for 2014 focused on the McCarthy and Nabesna roads, established trailheads and trails, airstrips, float plane lakes, and park administered lands in Copper Center, Glennallen, Slana, Kennecott and Chitna. In 2014, driving surveys of the Nabesna and McCarthy Roads were conducted focusing on monitoring pullouts and

trail heads. Newly inventoried areas included the Soda Lake Trail reroute and the Horsfeld area trail system.

Inventories for aquatic invasive species, specifically *Elodea*, were focused on water bodies known to receive heavy float plane traffic from infested areas such as Cordova or Anchorage. Water bodies which support spawning habitat for salmon were given the highest priority. Inventories are conducted by paddling the perimeter of the lake in an inflatable raft or canoe and visually surveying the littoral zone. Unknown plants were retrieved with a net and identified in the boat. In 2014 EPMT staff surveyed aquatic plants in the following five lakes; Grizzly Lake, Copper Lake, Long Lake, Twin Lake and Tolsona Lake.

Control Work

Under direction of NPS Management Policy Section 4.4.4 (2006), 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 very little impact on park resources or that cannot be successfully controlled within the season. Where an invasive species cannot be successfully eliminated, EPMT seeks to contain the invasive species to prevent further spread or resource damage (NPS 2006).



Figure 6. Invasive common dandelion (left), native horned dandelion (right)

Given this objective, EPMT control work was prioritized for each RZ using the geographical location, extent and invasiveness ranking of the plant in question. The invasiveness rank is a 1 to 100 scale, created and maintained by the Alaska Natural Heritage Program (AKNHP), in which higher scores denote greater invasiveness. Rankings are assigned to each invasive species by assessing four criteria: potential impacts to ecosystems, biological attributes, distribution, and effectiveness of control measures (Carlson et al. 2008). Species with higher invasiveness rankings and smaller

extents were considered the highest priority for management. Conversely, species with low invasiveness rankings and larger extents were considered the lowest priority. Prioritization was further refined by geographic location. Infestations growing in undeveloped backcountry areas of the park were targeted as a higher priority than those infestations limited to front country areas in and around the park.

Infestations given top priority for control in 2014 included: white sweetclover (*Melilotus albus*) at the intersection of the Nabesna Road and Tok Cutoff (Figure 2), common tansy (*Tanacetum vulgare*) at the Glennallen park maintenance yard, oxeye daisy (*Leucanthemum vulgare*) in Kennecott, yellow sweetclover (*Melilotus officinalis*) and yellow toadflax (*Linaria vulgaris*) in McCarthy, and scentless false mayweed (*Tripleurospermum inodorum*) at the Betty Freed property, NPS seasonal park housing in Slana.

Control Methods

Manual control methods such as hand pulling or digging were the primary means of invasive plant removal employed by the 2014 WRST EPMT (Figure 6). These methods allowed for selective, although labor intensive, control. Mechanical control methods such as mowing or string trimming were utilized to a lesser extent on large infestations which have shown little response to manual control efforts. Though this method does not directly reduce the size of infestations and is less selective, it may help curb the spread of species that propagate through seed dispersal. Chemical control methods, which allow for selective and less labor intensive control were also used.

All invasive plant material removed through manual or mechanical control was bagged and weighed using a hanging scale. Bags were stored and periodically transported to Anchorage for incineration at a commercial incinerator. This method minimizes the potential for seed or vegetative dispersal while disposing of the invasive plant material.

Chemical control was utilized by the 2014 EPMT staff in accordance with the 2010 NPS herbicide Environmental Assessment's (EA) Finding of No Significant Impact (FONSI) (NPS 2010). Chemical herbicides have been employed in WRST since 2011 to control high priority infestations of narrowleaf hawksbeard (*Crepis tectorum*) and common tansy (*Tanacetum vulgare*) which have not responded to other treatment methods. The herbicide Milestone VM, a broadleaf specific herbicide containing the active ingredient aminopyralid, was selected for use in WRST. During chemical treatments, an herbicide solution containing 6ml of Milestone per gallon of water, was applied to individual plants by spot spraying. All herbicide operations were performed by crew members who had received training and earned certification as State of Alaska Licensed Pesticide Applicators (Appendix A).



Figure 7. EPMT staff Peter Frank, reseeding lawn at Betty Freed Property in Slana

Restoration & Prevention

Restoration efforts at park administrative areas have focused on delineating and restoring natural areas and planting grass in regularly mowed areas for lawns (Lain and Terwilliger 2013). Efforts at the Copper Center headquarters have also included creating native plant beds for interpretive purposes and beautifying the welcome sign area. Efforts at the Chitina and Slana administrative areas have mostly been on re-establishing the historic lawns with grass seed and fertilizer and making sure they get mowed regularly. Where the lawn was re-established, weed-free grass seed (Alaska Lawn Mix), was used and spread at a rate

of 41 lbs. per 1,000 sq. feet. Both the 18-32-16 fertilizer and the lime were spread at a rate of 15 lbs. per 1,000 sq. feet.

In Kennecott, restoration efforts were identified in the Kennecott Operations Plan (NPS 2013a) and involve collecting native seed for herbaceous re-vegetation around the NHL, planting grass in historic lawn sites and planting fast growing native shrubs (mainly willow and alder) in select areas for screening and stabilization purposes. Prevention efforts have been focused mostly on equipment brought in to Kennecott for the on-going stabilization work.

In the Nabesna area, restoration and prevention efforts have centered on current park projects such as the building of the Kendesnii Campground and the ORV trail re-routes (NPS 2011). The park has also incorporated the salvaging of tundra mats as part of trail work in the park. This acts as both restoration and prevention. Tundra mats are removed from sections where trail is going to be installed and then used later on bare cut-banks or down slopes. This provides both an organic layer and a seed source for bare areas and reduces the ability for invasive plants to take root and the amount of time for natives to recolonize. The park has used this successfully on the new River Overlook trail at headquarters (Upper Copper River RZ), the Kendesnii Campground, and the ORV trail re-routes (Nabesna Front Country RZ).

A key component to prevention has been ensuring equipment is cleaned and sterilized (with a steam cleaner) prior to moving it to whatever portion of the park it is going to be used and re-cleaning it before moving it to another portion. The park is not only working on improving our own efforts in this regard, but making it a part of contract language

Native seeds are another way in which habitat can be restored. Collection of native seeds takes place when seeds are fully mature. Many plant species are easy to hand collect without incorporating a lot of excess plant material, these seeds are hand cleaned and stored in sealed bags within a freezer at 0°F, located at the park headquarters in Copper Center. Seeds which would require a lot of time or special equipment to be cleaned, such as berries, are sent to the Alaska Plant Material Center in Palmer, where the seeds can be quickly and efficiently cleaned. The seeds are then returned to the EPMT and stored in the Copper Center freezer. Seeds are separated into species as well as the collection location.

Outreach, Education & Partnerships

The WRST EPMT participated in 4 community events this season: the McCarthy 4th of July parade, the second annual Glennallen Weed Smackdown, the Kenny Lake Fair and the second annual Need for Seed event in Kennecott. The crew set up a public education booth at both the McCarthy parade and the Kenny Lake Fair and discussed the threat invasive plants pose to the ecosystem in the Copper Basin.

Two articles regarding invasive weeds, one on the Glennallen Weed Smackdown and the other on chemical treatments in WRST, were published in the Copper River Record to increase awareness of invasive species management occurring in the Copper Basin (Appendix B). Megan Weidman, the CBG CLM intern, also contributed 6 blog entries to the CBG CLM blog as part of her internship. The Weed Smackdown press release was noted in one blog post; in addition, information on *Elodea* and ongoing control projects were topics used to blog. EPMT staff also participated in a live

interview on the local public radio station KSKA, to discuss invasive plants in the Copper River Basin and promote the Glennallen Weed Smackdown.

The WRST EPMT has long been involved in the fledgling development of the Copper Basin – Cooperative Weed Management Area (CB-CWMA). In November 2013 the CB-CWMA became official with the signing of the group’s memorandum of understanding (CB-CWMA 2013). This year marked the second year that the CB-CWMA organized a public weed removal event, the Glennallen Weed Smackdown which focused on the removal of white sweetclover in Glennallen. The CB-CWMA also organized some local talks on invasive plants and supported the inventory and control of invasive plants on private lands around the Basin adjacent to park lands.

Results

The 2014 WRST EPMT staff surveyed 80.1 acres in and around the park & preserve of which 3.4 acres were found to be infested (Table 2). EPMT staff treated 1.6 infested acres this summer; of which 1.57 acres were manually controlled resulting in the removal of 5,073 pounds of invasive plant material and the remaining 0.03 infested acres were chemically controlled during which 3 gallons of mixed herbicide containing 0.6 ounces of concentrate were applied. A total of 1811 person-hours were logged by the EPMT staff this season while performing activities associated with the program. EPMT staff and volunteers spent a total of 1,527 hours in the field performing activities including surveying for, mapping and controlling invasive plant species (Table 1). Survey work during 2014 resulted in the mapping of 33 invasive plant species including one new species found outside park boundaries; reed canarygrass (*Phalaris arundinacea*), which was documented for the first time in the upper Copper Basin at the Northern Nights Campground in Glennallen (Table 3). Over the course of the season, 24 species of native plant seeds were collected resulting in a combined weight of 5.4 pounds. The collection included 14 species which were added to the WRST seed bank for the first time.

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

Year	EPMT Personnel				Youth Groups			Other Volunteers		Total Person Field Hours
	Hires	SCA	CLM	Field 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, AmeriCorps TCCC	7	126	2	870	1,256
2007	1	0	1	303	AmeriCorps 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	10, 4	3,808	1	120	5,608
2011	1	1	0	410	SAGA, YCC	8,4	2,240	2	16	2,666
2012	1	2	0	302	SAGA	8,8,8	1,488	0	0	1,790
2013	1	1	1	1,009	SAGA, YCC	13,7,7	1,480	2	16	2,505
2014	1	0	1	554	SAGA, SCA, YCC	14,6,4	973	0	0	1,527

Table 2. Ten year summary of WRST EPMT invasive plant management data collection (NPS 2013b).

Fiscal Year	Invasive GPS Data ¹												New Exotic Plant Spp in Park
	NPS Managed Lands ²			Non-NPS Lands inside boundary			Non-NPS Lands outside boundary			Total Acreage			
	Acres Surveyed	Acres Infested	Acres Treated	Acres Surveyed	Acres Infested	Acres Treated	Acres Surveyed	Acres Infested	Acres Treated	Acres Surveyed	Acres Infested	Acres Treated	
2005 ^A	0.71	0.03	0.01	1.20	0.06	0.06	7.69	0.32	0.02	9.59	0.41	0.09	1
2006	287.58	0.37	0.24	13.43	0.43	0.01	30.84	0.55	0.00	331.85	1.35	0.25	9
2007	398.76	18.49	0.02	111.57	4.18	0.01	80.84	4.78	0.49	591.17	27.44	0.52	2
2008 ^B	535.87	0.04	0.04	279.54	1.66	0.04	1560.19	0.32	0.14	2375.60	2.17	0.21	4
2009	117.66	6.68	2.10	89.53	12.86	0.42	75.43	10.60	9.80	282.61	30.15	12.32	3
2010	830.09	41.54	3.65	375.20	24.88	1.70	251.58	15.45	3.49	1456.87	81.88	8.84	4
2011	61.89	4.46	1.51	1.55	0.47	0.07	9.01	1.79	1.60	72.45	6.73	3.18	1
2012	27.14	4.43	2.73	7.81	1.18	0.04	10.71	1.70	1.42	45.65	7.31	4.19	0
2013 ^C	153.17	2.03	1.11	47.53	11.94	3.18	104.40	46.40	2.38	305.10	60.38	6.67	0
2014	55.64	1.39	0.30	13.18	1.32	0.001	11.26	1.94	1.05	80.08	4.65	1.36	0

Note: Foxtail barley acreage is included in this data.

1- The method used to calculate acreage in this table differs from methods used in the past, thus acreages reported in this table differ from those listed in past reports.

2- The March 2014 NPS Land Status (NPS 2014) geodatabase was used delineate NPS Lands. 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 March 2014 is counted as NPS managed land.

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

B-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.

C-Acres surveyed in 2013 & 2014 include acreage from *Elodea* surveys

Table 3. Summary of infested acres documented in 2014 organized by species and reporting zone.

* Documented in 2014 for the first time in this RZ

** Denotes species found outside park boundaries

Note: The data presented in this table does not necessarily represent the full number or extent of exotic species present in a given RZ

Invasive Plant Species detected in 2014			McCarthy Front Country RZ	Nabesna Front Country RZ	Tetlin-Tanacross RZ	Upper Copper River Front Country RZ
Scientific Name	Common Name	AKE PIC Rank				
Phalaris arundinacea**	reed canarygrass	83				<0.001*
Melilotus albus	white sweetclover	81		1.501		0.349
Caragana arborescens	Siberian peashrub	74	0.002			
Linaria vulgaris	yellow toadflax	69	0.002			
Melilotus officinalis	yellow sweetclover	69	<0.001*			
Medicago lupulina	Black medic	64				0.004
Bromus inermis	smooth brome	62	0.361			0.296
Leucanthemum vulgare	oxeye daisy	61	0.001			
Tanacetum vulgare	common tansy	60				<0.001
Elymus repens	quackgrass	59	0.103			0.002
Trifolium repens	white clover	59	0.021			
Taraxacum officinale ssp. officinale	common dandelion	58	0.220	0.477		0.156
Trifolium hybridum	alsike clover	57	0.028	<0.001		0.040
Crepis tectorum	narrowleaf hawksbeard	56	0.003		<0.001	0.123
Phleum pratense	common timothy	54	0.006		<0.001*	
Trifolium pratense	red clover	53	<0.001			
Poa pratensis	Kentucky bluegrass	52			0.001	
Fallopia convolvulus	black bindweed	50			<0.001*	
Tripleurospermum inodorum	scentless false mayweed	48		<0.001		
Poa annua	annual bluegrass	46			<0.001*	
Polygonum aviculare	prostrate knotweed	45	<0.001		0.002	0.000
Lappula squarrosa	European stickseed	44		<0.001		
Plantago major	common plantain	44	<0.001	0.707		0.002
Silene noctiflora	night-blooming cockle	42	<0.001			

Table 3. Summary of infested acres documented in 2014 organized by species and reporting zone (continued).

* Documented in 2014 for the first time in this RZ

** Denotes species found outside park boundaries

Note: The data presented in this table does not necessarily represent the full number or extent of exotic species present in a given RZ

Invasive Plant Species detected in 2014			McCarthy Front Country RZ	Nabesna Front Country RZ	Tetlin-Tanacross RZ	Upper Copper River Front Country RZ
Scientific Name	Common Name	AKE PIC Rank				
<i>Stellaria media</i>	common chickweed	42	<0.001		0.098*	
<i>Thlaspi arvense</i>	field pennycress	42				<0.001
<i>Descurainia sophia</i>	flixweed	41	<0.001	<0.001		
<i>Capsella bursa-pastoris</i>	shepherd's purse	40	<0.001	<0.001	0.005*	
<i>Papaver croceum</i>	Icelandic poppy	39		0.019		
<i>Chenopodium album</i>	common lambsquarter	37	<0.001	<0.001	<0.001	<0.001
<i>Matricaria discoidea</i>	pineapple weed	32	0.009	0.104	0.006	0.003
<i>Lepidium densiflorum</i>	common pepperweed	25			<0.001*	
<i>Erysimum capitatum</i>	sanddune wallflower	-				<0.001*

McCarthy Front Country RZ

The McCarthy Front Country Reporting Zone is a complex portion of the park that includes the Chitina Ranger station, Kennecott Mines NHL, the town of McCarthy, and the entire McCarthy Road. This RZ is a patchwork of private and federal lands and a mix of park and preserve (Figure 8). It is the most heavily visited area in the park outside of the visitor center in Copper Center.

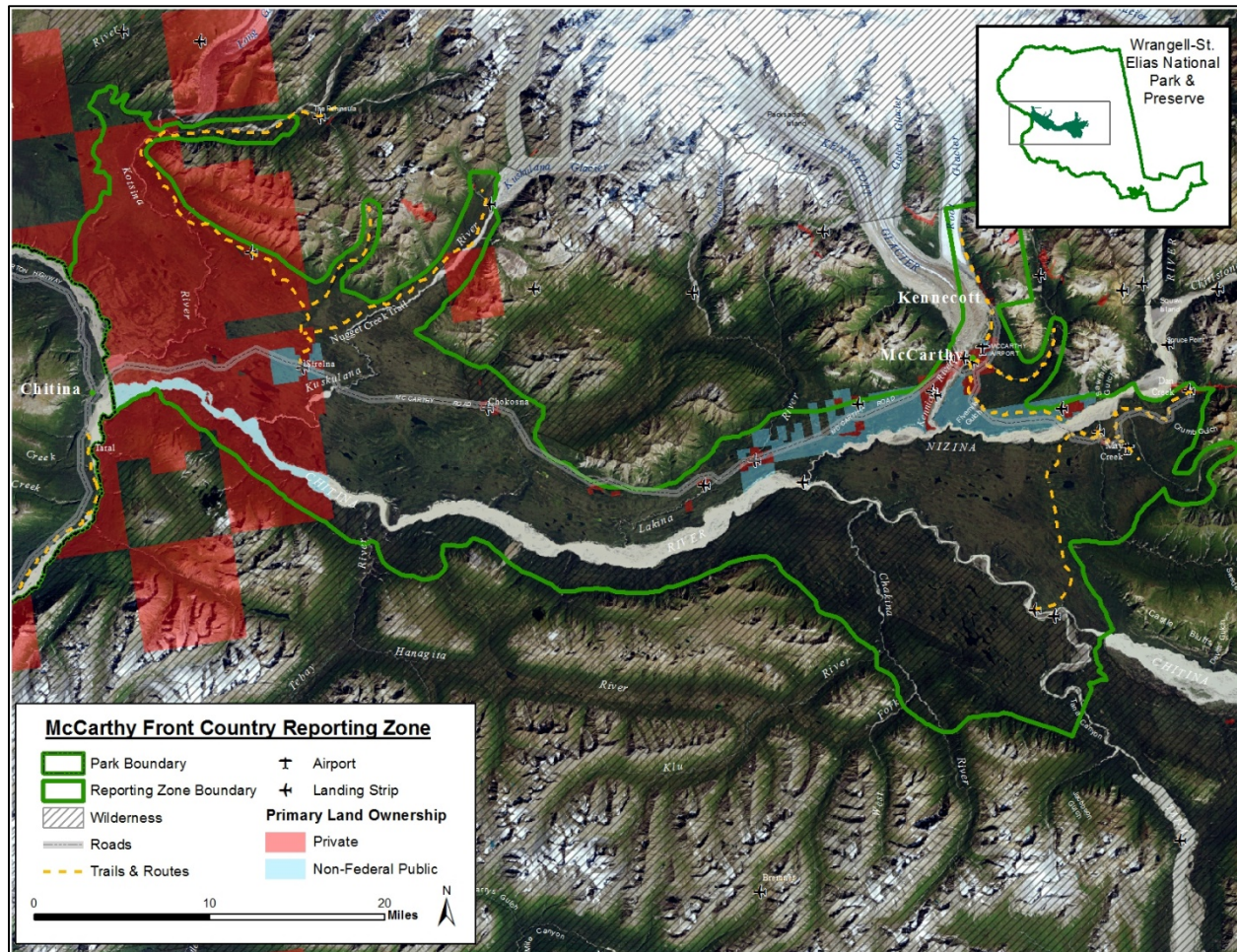


Figure 8. Map of McCarthy Front Country Reporting Zone

McCarthy Road and Trail System

Since 2010, bicycle surveys have been conducted along the McCarthy and Nabesna roads and alternated on a yearly basis between the two roads. In the 2013 field season, a complete bicycle road survey was conducted of the McCarthy road, thus for the 2014 season only a driving survey was performed in early July. In 2014 EPMT staff performed visual scans from a slow moving vehicle and surveys at vehicle pullouts along the full 60 miles of the McCarthy Road. These surveys focused on improving the documentation of invasive grasses along the McCarthy Road. Smooth brome (*Bromus inermis*) and quackgrass (*Elymus repens*) were found in dense but sporadic populations between mile 1 and mile 18. Populations of suspected quackgrass, not mapped in 2013, were confirmed and mapped in 2014 along this stretch of road. Large populations of smooth brome were documented

surrounding the abutments on both sides of the Kuskalana Bridge at mile 17. Narrowleaf hawksbeard was also documented sporadically along the first 16 miles of the McCarthy road. Between mile 18 and mile 40, non-native grasses became more infrequent until Long Lake at mile 41, where two large infestations of smooth brome were documented. No invasive grasses were documented between miles 49 to 56. Low priority species like common dandelion (*Taraxacum officinale* ssp. *officinale*), pineapple weed (*Matricaria discoidea*), common plantain (*Plantago major*), white clover (*Trifolium repens*), alsike clover (*Trifolium hybridum*) and lambsquarters (*Chenopodium album*) were found intermittently throughout the length of the road, but were not mapped in 2014.

The Nugget Creek Trail, found at mile 14.5 of the McCarthy road, is a well-established off-road vehicle (ORV) trail which runs 14 miles reaching a park public use cabin, and eventually letting out at the Kuskulana Glacier. The trail was surveyed using an ORV for transport in mid-July. At the time of the survey, all creeks were crossable using the ORV except for Nugget Creek, which was too swift and deep to pass safely on the ORV. The creek was crossed on foot and the area around the public use cabin was surveyed. In the cleared area around the public use cabin, common dandelion and pineapple weed were found and 96-100% of the plants were manually treated. During the return trip, the trail was found to be free of invasive plants between Nugget Creek (mile 14) and Clear Creek (mile 9). Small infestations of common dandelion and common plantain were found on both banks of Clear Creek and continued sporadically in low lying moist areas until Sheep Creek (mile 7). Infestations of common plantain, common dandelion, and white clover became more prevalent west of Sheep Creek (Figure 9). EPMT staff encountered mechanical issues with the ORV shortly after the Sheep Creek crossing which prevented them from mapping or controlling the first 6 miles of the trail; all invasive plants up to this point on the trail had been manually controlled and bagged. Based on visual surveys, there were several dense patches of common plantain, common dandelion, and white clover in the first 6 miles of the trail.

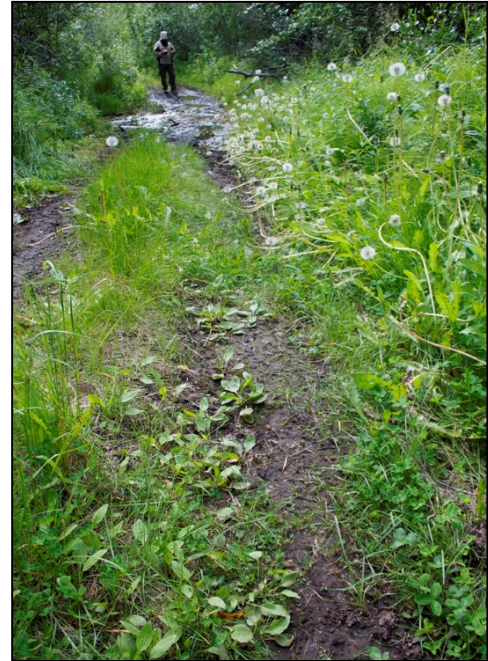


Figure 9. CLM intern Megan Weidman mapping invasive plants along Nugget Creek Trail.

Kennecott Mines National Historic Landmark

The Kennecott Mines National Historic Landmark (NHL) is one of the most heavily visited sites in WRST, drawing approximately 10,000 visitors annually (NPS 2013a). The Kennecott NHL and the nearby town of McCarthy are hot beds for invasive plant species within the surrounding wilderness. The landmark was designated in 1998, encompassing 7,700 acres of public and private lands (Gilbert et al. 2001). Since then the park has acquired or purchased additional lands and buildings. Stabilization work in the Kennecott Mines NHL is ongoing and is expected to take many years. Construction projects such as this disturb native vegetation and can contribute to invasive plant

infestations. Fill material brought in for use in these projects can be a vector for spreading invasive plants into the park. These areas will need attention in the future, both by pulling invasive plants and planting native species and has been identified as a priority by the park in the newly revised Kennecott Operations Plan (NPS2013a).

The 2014 EMPT focused on survey and control work along the trails systems in an around Kennecott. The Root Glacier trail that travels along the eastern moraine of the Root Glacier was a target for control work in 2014 due to its accessibility and relatively small infestations. EPMT staff mapped and controlled all invasive plants found along the trail during 3 trips to the area in July.



Figure 10. Oxeye daisy (white flower) in Kennecott; control progress from 2007-2014

efforts to control this invasive plant within the town are of low priority due to the time and effort it would take. The Silk Stocking Road leading to park housing was surveyed in late May; sections of alsike clover and common dandelion were manually treated. Around the Silk Stocking residence, common dandelion, smooth brome, pineapple weed, common plantain, common chickweed (*Stellaria media*), shepherd's purse, white clover, and smooth brome were mapped. 2014 is the first time smooth brome has been recorded at the Silk Stocking residence (Figure 5). The Kennecott maintenance yard has common dandelion, alsike clover, white clover, flixweed (*Descurainia sophia*), and quackgrass. Along the main street, white clover, common dandelion and night-blooming cockle

Common dandelion was the most prevalent invasive plant, but 2 specimens of both common plantain and timothy grass (*Phleum pratensis*) were found and manually treated. EPMT staff controlled all small outlying populations of common dandelion during survey efforts. In mid-July EPMT staff located a large infestation of common dandelion in the Jumbo Creek campground, which had not been documented since 2009. Controlling this area is important because it is closely located to early successional lands recently uncovered from the Root Glacier. The EPMT returned to the location with a 6 person SCA crew at the end of July to control the infestation. The crew was able to manually control 699 ft² of infested area. The SCA crew also helped the EPMT control a small infestation of white clover and alsike clover within the town of Kennecott.

The old mining town of Kennecott was also surveyed. Common dandelion is widespread throughout the town, and

(*Silene noctiflora*) were found along private property and mapped. The Kennecott Glacier Lodge has a large infestation of oxeye daisy (*Leucanthemum vulgare*) on its private land. This stand has the potential to spread to park lands, which is a concern for the EPMT. A second infestation of oxeye daisy is located on a hill side owned by the NPS, southwest of the Kennecott Glacier Lodge. This area has been treated every year since 2004, excluding 2005 and 2012, and was treated during all three trips to Kennecott. Control of oxeye daisy can be difficult because the plants are perennial and can regrow from root fragments left in the soil. In 2014 less than 75 stems were located along this slope and all were found before the plants had set seed (Figure 10). The infestation seems to be decreasing in size with every additional year of control. With continued control, eradication of oxeye daisy along this slope may be possible.

Nabesna Front Country RZ

The Nabesna Front Country RZ is also a complex area of the park with a patchwork of private and federal lands containing, among other things: the entirety of the Nabesna Road, the highest density of trails in the park, the Slana Ranger station, the traditional Batzulnetas fish camp, and the community of Slana. It too is a mix of park and preserve (Figure 11).

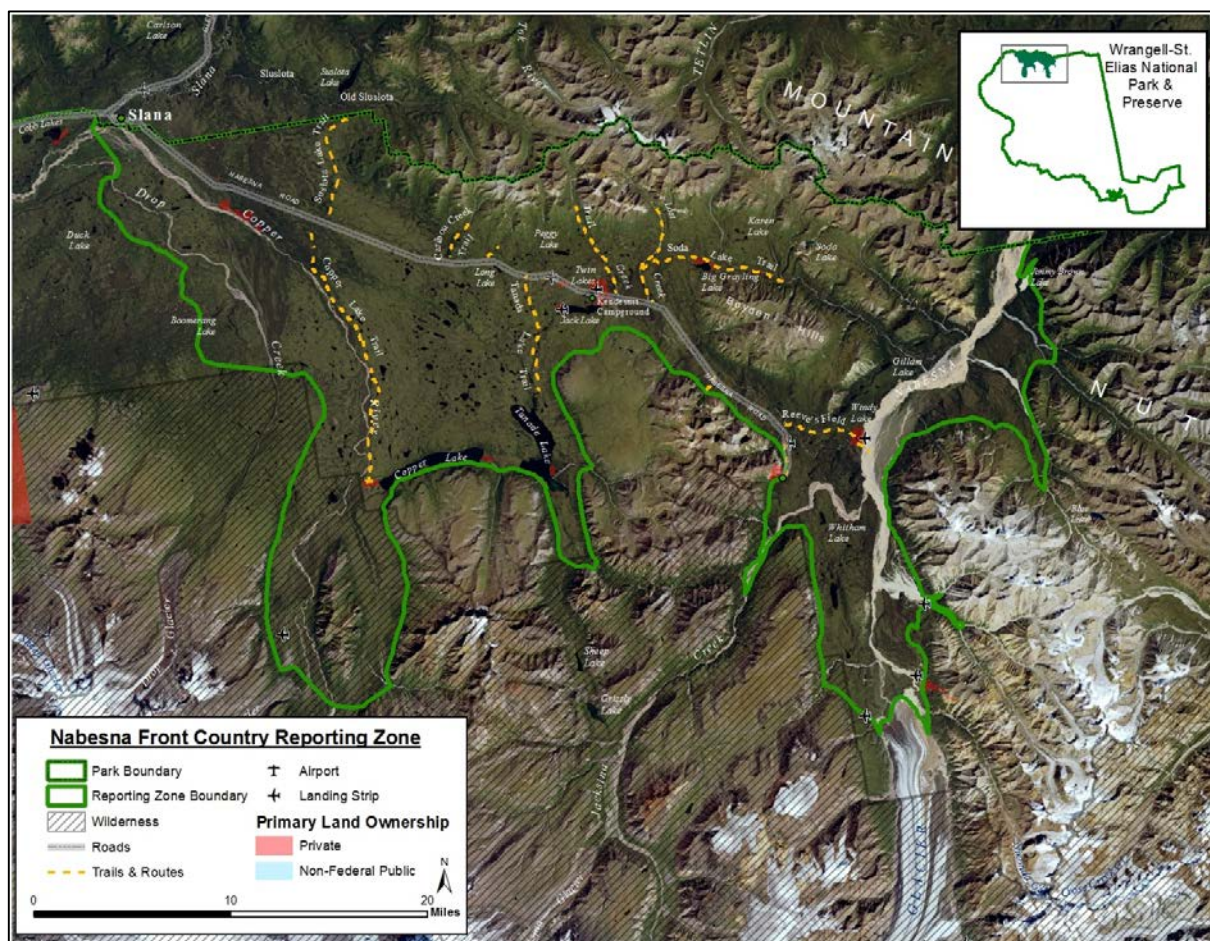


Figure 11. Nabesna Front Country Reporting Zone

Slana

Since 2005, control work has been performed on a large infestation of white sweet clover (*Melilotus albus*) just outside of the RZ at the intersection of the Nabesna Road and Tok Cut-Off. The potential for white sweetclover to spread down the Nabesna Road, as it has along the Glenn Highway, onto park service land is of great concern to the WRST EPMT. Over two days in mid-July the EPMT, as well as crews from both SAGA and YCC, manually removed and bagged roughly 930lbs of white sweetclover, which covered 0.68 acres of land (Figure 12). Control efforts focused on pushing the infestation away from the Nabesna Road that leads to the Slana Ranger Station and into the park.

The Slana Ranger Station is located just outside of the park boundaries at the beginning of the Nabesna Road. In mid-June EPMT staff surveyed the areas around the Slana Ranger Station and associated park buildings. Common dandelion and common plantain were documented and controlled around park buildings behind the ranger station. Several large patches of pineapple weed were documented in the parking areas behind the ranger station, but were not controlled due to their large size and density.

Approximately 2 miles west of the Slana Ranger Station along the Nabesna Road is the Betty Freed Property. This is park-owned land used for seasonal staff housing. Through surveying, EPMT staff documented scentless false

mayweed (*Tripleurospermum inodorum*), common dandelion, pineapple weed, shepherd's purse, and common lambsquarters in the mowed areas around the park housing. Less than 50 stems of scentless false mayweed were found around the Freed property; all plants were manually controlled. Common plantain, pineapple weed, and common dandelion make up the bulk of the infestation. Most of these plants were manually pulled during a trip at the end of June by EPMT and later with the help of a SAGA crew in mid-July, although many plants had already set seed before they were controlled.

Nabesna Road & Trail System

The Nabesna Road stretches 43 miles into the park from its intersection with the Tok Cut-Off. This road acts as the primary conduit by which exotic plants, found along the Glenn Highway, spread into the Nabesna Front Country RZ. Bicycle surveys were performed along the Nabesna road in 2010 and 2012, which have generated adequate baseline data on the infestations along the road. The EPMT had



Figure 12. Before and after photo of control work on white sweetclover at the Tok Cutoff

planned to conduct a bicycle survey again this year, but were unable to because of time constraints with other projects. Instead, surveys at all parking areas, trailheads, and pull-offs were conducted in mid-June to monitor areas with higher visitor traffic and thus a higher likelihood of invasive species (Figure 13).

In 2013, the Kendesnii campground, a NPS public use campground, was constructed along the Nabesna road. Construction of this campground entailed clearing out native vegetation and importing gravel to create tent pads, walkways, and a road. During the 2014 road survey, nine pineapple weed plants were found growing in the gravel pad at campsite number 3; these plants were mapped and manually controlled. Three stems of flixweed were also found in the gravel margins at the entrance of the campground and were manually controlled. The relative lack of invasive plants here represents successful coordination among park staff to reduce seed introduction.



Figure 13. EPMT member, Megan Weidman, surveying on the Nabesna Road

The Nabesna Road is home to many private land owners. Near the end of the road is the privately owned Devils Mountain Lodge, along with a private runway. The runway was surveyed with the permission of the owners in mid-June. This runway was heavily infested with common dandelion, common plantain, and pineapple weed. Patches of Icelandic poppy (*Papaver croceum*) were also found on the property. Because this runway is private property, no control work was performed on the plants, but the owners were informed of the invasive plants species located on their land.

Trailheads are a common location for new invasive plants to establish themselves. Invasive plant seeds from infested locations can be transported on gear and clothing to un-infested trails. These seeds then fall along the trail and sprout. During the Nabesna Road survey in mid-June, all 11 trailheads were surveyed. The trailheads for the Suslata Trail, Caribou Creek Trail, Tanada Lake Trail and Trail Creek Trail were all surveyed and no invasive plants were found.

The Batzulnetas Fish Weir trail was surveyed along its entire length. This trail is frequently used by park staff accessing the Tanada Creek fish weir as well as members of the local Ahtna tribe visiting their traditional fishing camp. A few specimens of common plantain were found and treated at the start of the trail and at the end near the fish weir. On the return trip, the EPMT walked to an adjoining trail about .25mi NW of the Batzulnetas trail. No invasive plants were found along the trail, but a large patch of common plantain was found in the parking area at the trailhead along the road.

The Copper Lake Trail trailhead contained pineapple weed and common plantain. 96-100% of the common plantain found at the trailhead was controlled. Pineapple weed was mapped, but not treated due to the high density of the infestation and the tiny plant size.

Viking Lodge is a public use cabin located at mile 22.5 of the Nabesna road. At the trailhead, a few specimens of common plantain were found and controlled. The EPMT surveyed along the length of the trail and no invasive plants were found. Upon reaching the lodge, common plantain was found growing around the fire-pit in front of the lodge. These plants were manually controlled and bagged.

During surveys of the popular Skookum Volcano Trail, only a small patch of pineapple weed was found. The few plants found were manually controlled. Common dandelion and common plantain were found and manually controlled in the parking lot area at the trailhead for the Lost Creek Trail.

Reeves Field Trail was also found to have common plantain on its trailhead. 96-100% of the common plantain found was manually controlled. Pineapple weed was found at the trailhead as well, but the plants were very dense and difficult to treat, so the infestation was only mapped.

The Nabesna Road ends at mile 42; from there the road becomes a privately owned and maintained ORV trail leading to the Nabesna Mine. Due to time constraints only the first 1.27 miles of the approximately 2.75 mile trail were surveyed. Common plantain was found at low densities in the margins of the trail consistently along the entire portion of trail surveyed, and did not appear to decrease at the point of stopping. Roughly 75% of the common plantain found along the surveyed portion was manually controlled.

In 2013, the first five miles of the Soda Lake trail was re-routed to drier areas at higher elevation by the WRST trail crew. This work entailed the use of heavy equipment to clear a trail and bring in gravel. EPMT staff backpacked along this new portion of the trail to assess the status of revegetation along the trail margins and to determine whether any invasive plants were introduced during the trail work. No invasive plants were found along the Soda Lake trail and native vegetation was returning to the trail margins.

Upper Copper River Front Country RZ

This RZ covers the lowlands around the Copper River east to the foot hills of the Wrangell Mountains. Within this RZ, 41% of the land is owned by Native corporations (NPS PDS 2009). Though not contained within the park boundary, the park headquarters in Copper Center and park properties in Glennallen are included in this RZ. These locations serve as the main hubs from which NPS employees and equipment depart when traveling into the park. As such, these sites serve as potential sources for the translocation of invasive species into the park and are an important component of the invasive plant management strategy in WRST (Figure 14).

WRST Headquarters

The WRST Headquarters campus in Copper Center was constructed in 2002. Despite being located outside of the park boundary, the NPS visitor center in Copper Center is the most visited area under park ownership. Efforts have been made to control and monitor the invasive plants within this complex since its construction. During the 2014 season, common dandelion, alsike clover, common plantain, narrowleaf hawksbeard, pineapple weed, black medic (*Medicago lupulina*), prostrate knotweed, and white sweetclover were found on the headquarters campus. Control efforts were mainly focused on the largest infestations and most threatening infestations of narrowleaf

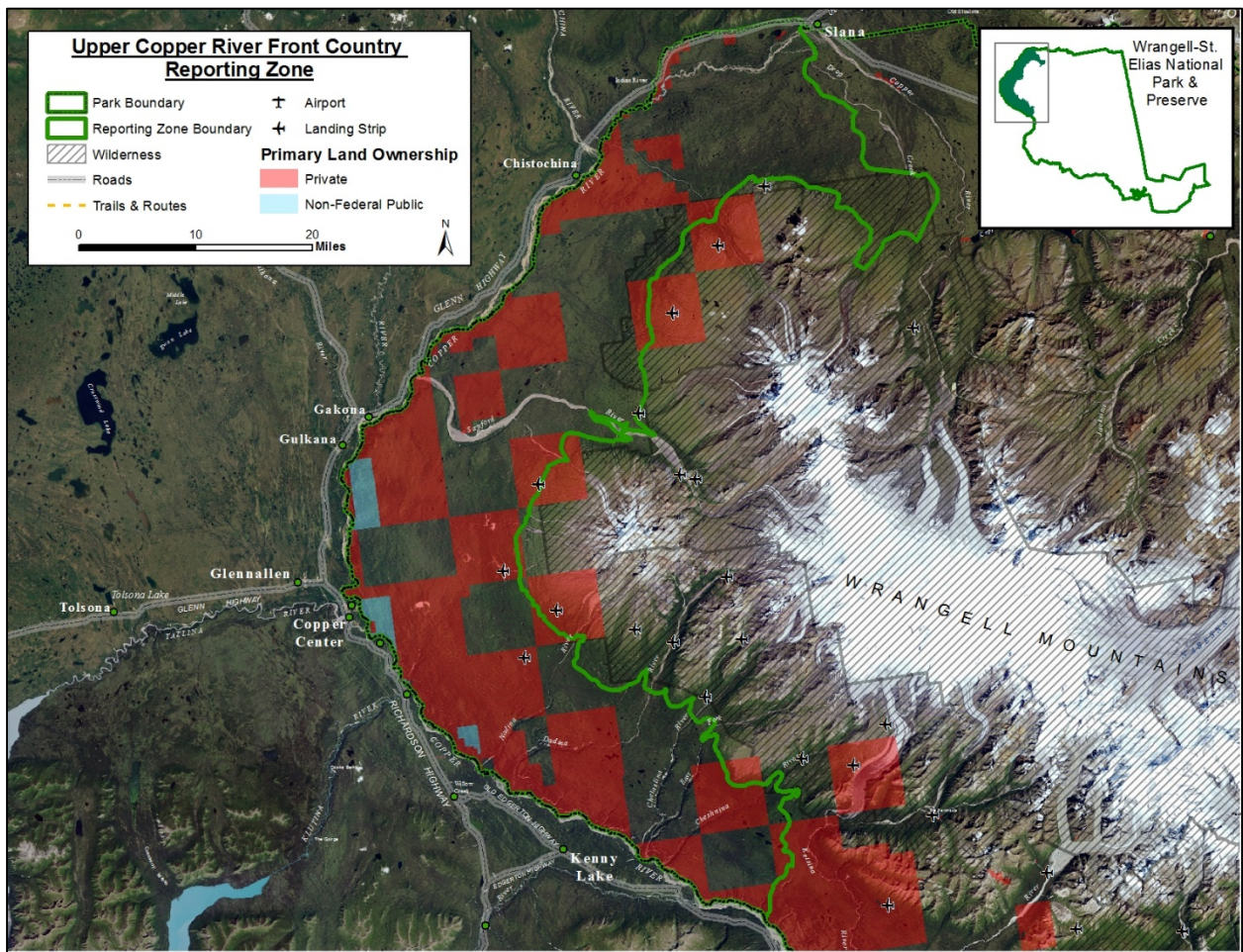


Figure 14. Upper Copper River Front Country Reporting Zone

hawksbeard, common dandelion, and alsike clover. The areas around the Visitor Center buildings and in the parking lot receive a lot of attention as these are the areas within the complex that produce the most invasive plants.

In addition to the invasive plants stated above, a non-native cultivar of sanddune wallflower (*Erysimum capitatum*) was found in a native plant bed behind the visitor center. This plant is thought to have been brought in with a native wild flower mix used to seed the bed. AKNHP does not currently have an invasiveness ranking for this species, but as of now the plant seems to have remained where the seed was planted and efforts to control the plant should be minimal.

A point of focus within the Headquarters campus is the area around the WRST entrance sign. Common dandelion and narrowleaf hawksbeard were documented at high densities, especially in the area in front of the sign which is frequently trampled by visitors. During the 2014 season, the entrance sign area was manually treated three times from early June to mid-July. Control work and revegetation efforts around the park sign have occurred annually since 2007, but do not appear to be decreasing the density of common dandelion. As an effort to increase native vegetation cover and

deter trampling by visitors, several prickly rose (*Rosa acicularis*) plants were transplanted in early June. The transplants were watered infrequently due to lack of access to proper equipment and as a result significant die back occurred on many of the plants. Despite this, by the end of the season several new stems were growing from many of the root masses. These plants will need to be examined next season to determine if the transplants survived.

The gravel pit located just south of the WRST Headquarters is another location of high concern. Each spring, the gravel pit is used for park staff ORV training. It also houses the EPMT weed barn used for storing bags containing invasive plants removed from the park. In previous years, invasive plants were burned within the gravel pit in a large burn pile, which proved to be a problem as many invasive plant seeds survived the burning and infested the surrounding area.



Figure 15. Common dandelion at the park gravel pit in Copper Center.

Common dandelion and narrowleaf hawksbeard can be found in high densities in this area. The population of common dandelion is so dense manual control is no longer an effective control and therefore no time was spent controlling the common dandelion in the gravel pit in 2014 (Figure 15). EPMT staff hand pulled all mature narrowleaf hawksbeard plants within the gravel pit at the end of September to prevent them from setting seed before the winter frosts killed them off. A small patch of black medic originally documented in 2010, was remapped just outside of a wooded area in the middle of the gravel pit. The infestation was found in the late fall after seed set and no control efforts were taken.

Glennallen Maintenance Yard

The joint BLM/NPS maintenance yard in Glennallen is used to store and stage equipment used for multiple projects throughout the park. Therefore the risk of introducing or spreading invasive plant propagules between the maintenance yard and the park on gear, vehicles and equipment, is high. Common dandelion, common plantain and pineapple weed have become thoroughly established throughout the maintenance yard. Due to the scale of these infestations, effective manual control work is no longer feasible. Narrowleaf hawksbeard and common tansy (*Tanacetum vulgare*) are the two species of highest concern in the maintenance yard. These species have been targeted for manual control since 2009 and chemical control since 2011. The density of common tansy has decreased significantly as a result of this continued control and in 2014 only 16 plants were documented. Given the limited number of plants, EPMT staff decided to manually control the infestation in 2014. Special care was taken to remove as much of the root system as possible, as common tansy can regenerate from root fragments and tubers left in the ground.

Since 2009 the EPMT has made efforts to hand pull narrowleaf hawksbeard within the maintenance yard, although efforts do not seem to be very effective. During the last week of July, EPMT staff along with a 6 person SCA crew went through the entire maintenance yard and removed 96-100% of all mature narrowleaf hawksbeard leaving behind only small immature plants to be treated with herbicide later that week. In mid-September the EMPT returned to the maintenance yard and hand pulled all flowering and seeding narrowleaf hawksbeard plants, with the idea that the remaining younger plants would be killed off by the cold weather.

The 2014 season also revealed previously undocumented infestations of smooth brome, quackgrass, and white sweetclover. Large and dense patches of smooth brome and quackgrass were documented on all three tiers of the maintenance yard covering a total of 0.45 gross acres. Given the size and density of these infestations, no control efforts were made in 2014. Five specimens of white sweetclover were found in or near the gravel pile at the center of the maintenance yard in late July, and were manually controlled. It is suspected these plants were brought into the maintenance yard with contaminated gravel.

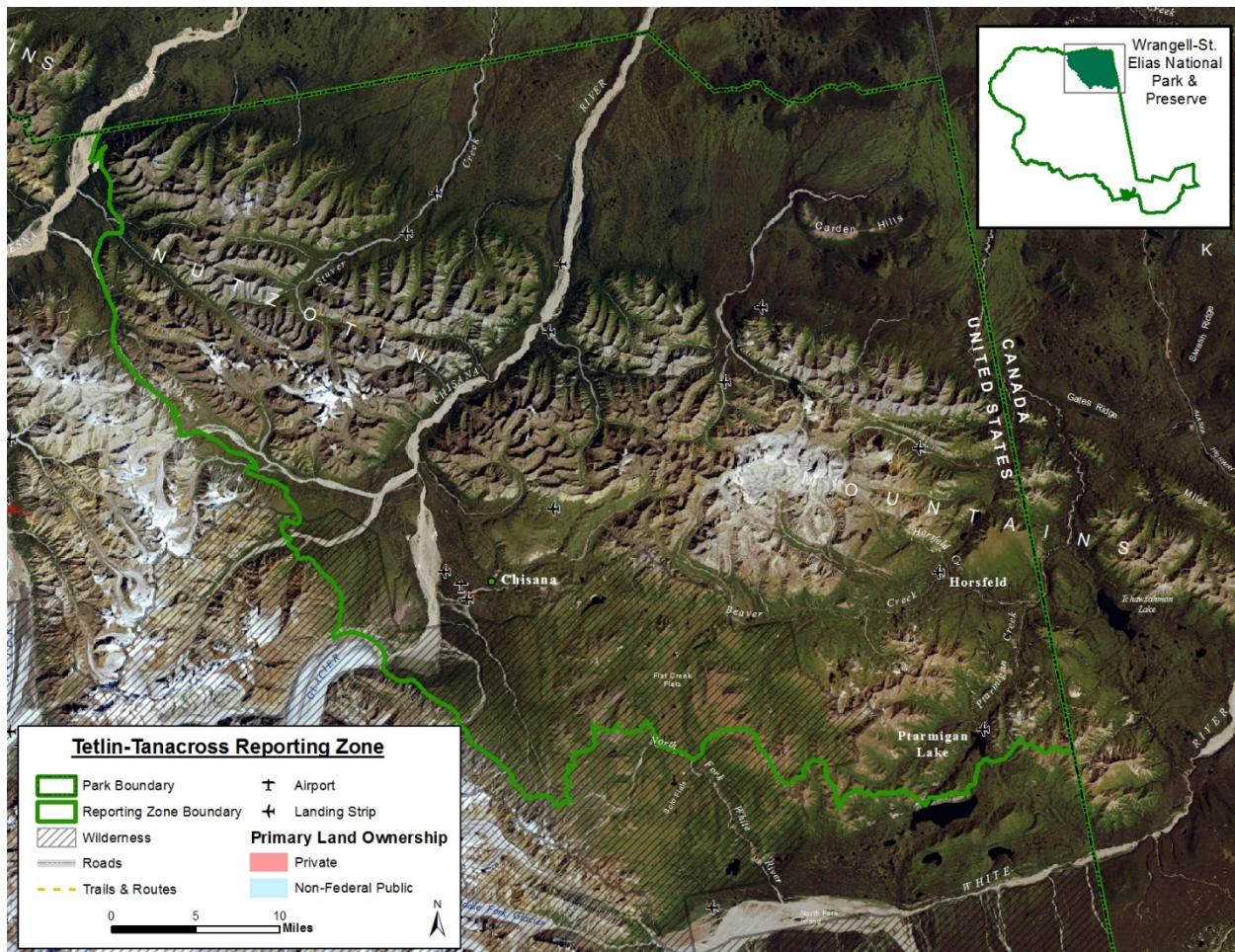


Figure 16. Tetlin-Tanacross Reporting Zone

Tetlin-Tanacross RZ

The Tetlin-Tanacross RZ lies completely within the preserve and has small scattered private lands. Notably, it does contain non-federal subsurface ownership, particularly within the active Gold Hill Historic Mining District. The Chisana Historic District contains an active community and is a popular base for other park activities in the area (Figure 16).

In 2014, the WRST EPMT went to Horsfeld, a hunting camp on WRST land, where horses have been kept for over 100 years. Staff surveyed two airstrips, 9.8 miles of horse/hunting trails, the hunter's camp, and the horse corral. No invasive plants were found along the airstrips or the horse trails cutting through the surrounding boreal lowlands, only within a half mile of the horse corral. The most abundant plant around the corral was common chickweed, found growing in dense patches along horse trails in the willow and alder thickets surrounding the corral. A manure pile next to the corral was found to contain an extraordinarily large specimen of narrowleaf hawksbeard and five stems of black bindweed (*Fallopia convolvulus*). This is the first time these species have been observed in this RZ. Additionally, Shepard's purse, common lambsquarters, common pepperweed, pineapple weed, common timothy, Kentucky bluegrass, annual bluegrass, and prostrate knotweed were found around the corral and are suspected to have been brought in on hay feed.

***Elodea* Surveys**

Since 2011, yearly non-native aquatic plant surveys have been conducted in WRST, as part of an early detection effort. In 2014, five lakes were surveyed; Tolsona Lake, Long Lake, Copper Lake, Grizzly Lake, and Twin Lakes. Tolsona Lake is a heavily used floatplane lake just west of the park along the Glenn Highway. Float-planes regularly travel from Tolsona Lake to water bodies within the park. If infested, Tolsona Lake could serve as a source for the translocation of *Elodea* into the park. Therefore regular monitoring is part of the strategy to prevent *Elodea* from invading WRST. Surveys of the lake were conducted via canoe in mid-September and no *Elodea* was found.



Figure 17. *Elodea* survey on Copper Lake, Megan Weidman

Long Lake, located at mile 45.2 along the McCarthy road, was surveyed for the second time in 2014. The outlet creek of Long Lake flows into the Lakina River, a tributary of the Chitina River in the Copper River drainage. This system provides important spawning habitat for sockeye salmon, which contribute to down-river commercial, personal use, and subsistence fisheries (McCormick and Sarafin 2013). Private land owners fly between Long Lake and another property in Cordova, which has several infested lakes on a regular basis. A canoe was used

by the EPMT to travel around the perimeter of the lake looking for *Elodea*. During the survey, no specimens of *Elodea* were found.

Copper Lake supports a large population of sockeye salmon as well as many other sport fish species such as lake trout. In addition, a privately owned lodge, located on Copper Lake, is regularly visited by floatplanes during the year. The combination of high float plane traffic and the large fishery make Copper Lake a lake of interest for *Elodea* surveys. The EPMT performed a survey for *Elodea* at the end of August using an inflatable canoe. The entire perimeter of the lake was surveyed and no signs of *Elodea* were found (Figure 17).

Grizzly Lake, a few miles south west of Copper Lake higher in the Wrangell Mountains, is also known for its sport fishing. During the last week of August, an inflatable canoe was used to survey the perimeter of Grizzly Lake for non-native aquatic species. Samples of 6 native aquatic plants were collected and identified. No non-native species were documented.

The final lake surveyed during 2014 was Twin Lakes located on the Nabesna Road. The owners of a private residence located at the eastern end of the lake are known to fly floatplanes into the lake making this an important lake to survey. In addition, this lake has road access, meaning boaters could potentially introduce *Elodea* on propellers. A canoe was used to survey the lake's perimeter, no invasive species of plants were found.

Restoration and Prevention

Reducing suitable habitat for invasive plants is one of the most effective methods used to prevent their spread. In an effort to minimize the impacts of trail maintenance, the 2014 EPMT staff assisted trail crews with native plant salvage during a project to reroute sections of the Caribou Creek Trail. This involved salvaging vegetation mats and top soil removed from the new trail and using it to revegetate old trail sections or to improve impacted trail margins.

In 2013, areas with historic lawns were seeded using a weed-free native seed mix (Alaska Lawn Mix). In late May of 2014, reseeded was done at the Chitina ranger station, in Kennecott at the Silk Stocking residence as well as around the WRST park seasonal housing at the Betty Freed Property in Slana. Grass was well established from the 2013 seeding of these lawns, and only small scattered patches of bare ground were found at each site. Areas that had established lawns were mowed regularly to prevent invasive plants from setting seed.

To build-up the parks native seed bank, EPMT staff collect seed from around the park each fall. In 2013, the EMPT held a Need for Seed community volunteer event to increase the amount of seed collected and to promote community involvement. The second annual Need for Seed community event was hosted by the 2014 EPMT crew on Saturday August 23rd from 10am-2pm in Kennecott. No community volunteers showed up for the event, but the event was still successful with the help of a 7-person SAGA crew (Figure 18). Twenty-four species of native plants were collected, including 14 new species added in the WRST seed bank for the first time in 2014. Seed collection efforts in 2014 resulted in a 2-fold increase, from 2.7 pounds in 2013 to 5.4 pounds in 2014 (Table 4).



Figure 18. SAGA crew member collecting dryas (*Dryas drummondii*) during the Need for Seed

Table 4. Native seed collected for the Need for Seed within the Kennicott Valley

Scientific Name	Common Name	Seed Weight (g)
<i>Achillea millefolium</i>	Common yarrow	2.1
<i>Aconitum delphinifolium</i>	Monkshood	1.5
<i>Anemone multifida</i>	Pacific anemone	31.2
<i>Aquilegia formosa</i>	Western columbine	18.1
<i>Arctostaphylo rubra</i>	Red fruit bearberry	4.3
<i>Aster sibiricus</i>	Siberian aster	40.4
<i>Boechea holboellii</i>	Holboell's rockcress	0.4
<i>Castilleja unalaschcensis</i>	Unalaska indian-paintbrush	14
<i>Delphinium glaucum</i>	Sierra larkspur	0.2
<i>Elaeagnus commutata</i>	silverberry	7
<i>Erigeron acris</i>	Northern daisy fleabane	31.7
<i>Geocaulon lividum</i>	False toadflax	56.3
<i>Hedysarum alpinum</i>	Eskimo potato	500.8
<i>Lupinus arcticus</i>	Lupine	1.9
<i>Mertensia paniculata</i>	Tall bluebell	0.3
<i>Oxytropis campestris</i>	Oxytrope	1094.1
<i>Polemonium acutiflorum</i>	Achutish Jacob's ladder	0.1
<i>Potentilla fruticosa</i>	Shrubby cinquefoil	0.2
<i>Potentilla multifida</i>	Staghorn cinquefoil	406.5
<i>Rosa acicularis</i>	Prickly rose	150.9
<i>Saxifraga tricuspidata</i>	Three-toothed saxifrage	2
<i>Solidago multiradiata</i>	Mountain goldenrod	53.1
<i>Solidago simplex</i>	Mt. Albert goldenrod	24.1
<i>Viburnum edule</i>	Highbush cranberry	3.2
<i>Zygadenus elegans</i>	Death camas	< 0.1

To prevent the spread of invasive plants during park projects, EPMT and maintenance staff have worked together to ensure that equipment and gear is cleaned outside the park prior to being taken into the field. The EPMT is also working with maintenance staff to create contract language which will ensure that best management practices for mitigating the spread of invasive are followed by WRST staff and contractors. This would include a more formal equipment cleaning process and inspections of outside materials being used such as fill, gravel or erosion control materials.

Education/Outreach

Efforts to educate the park staff, visitors and the general public about the presence and impacts of invasive plants in WRST were emphasized during the 2014 season. Each year the town of McCarthy hosts a 4th of July parade. EPMT staff set up a booth in McCarthy along the parade route. The booth was designed to inform the residents about the invasive plants within the park and Alaska. Informational plant identification booklets were handed out to the public and people were welcomed to come speak to the EPMT. The Need for Seed event was also advertised at this event.

The extent of white sweetclover in the gateway community of Glennallen has increased steadily since it was first documented by the WRST EPMT in 2005. The spread of this infestation has been facilitated by recent road construction on the Glenn Highway. Several large stands of white

sweetclover are present at the intersection of the Glenn and Richardson Highways. To combat this infestation, the second annual Glennallen Weed Smackdown was hosted by the CB-CWMA. The community event was held this year on July 12th at the intersection of the Glenn and Richardson Highways. Community members were invited to help hand pull white sweetclover and received a t-shirt and lunch as a thank you from CB-CWMA. The 2014 Glennallen Weed Smackdown was a huge success (Figure 19). Over 40 volunteers pitched in pulling and bagging at total of 2,032 lbs. of invasive plant material.



Figure 19. Weed Smackdown, before and after photo, south of the Hub in Glennallen

Gypsy Moth Trapping

2014 is the 4th year WRST EMPT has participated in the Alaska Division of Agriculture's Gypsy Month Monitoring program. Efforts target European gypsy moths (*Lymantria dispar*) and Asian gypsy moths (*Lymantria dispar* ssp. *japonica*). Four pheromone baited delta traps were placed on park land where vehicle/RV traffic is relatively high. Traps were placed at the following locations: Park Headquarters in Copper Center, Chitina Ranger Station, Slana Ranger Station, and West Side Information Station in McCarthy. In the past, the park has put up a trap at the Yakutat ranger station, as gypsy moths can be spread on cargo or cruise ships. The logistics of getting a moth trap up and monitored in Yakutat were too difficult in 2014, but this area should remain a priority for monitoring. Traps were hung in hardwood trees about 5 feet off the ground in early May and left until early September. All traps were then collected and checked for gypsy moths. No moths were detected in any of the four traps. Monitoring for gypsy moths should continue in the park on an annual basis.

Discussion & Recommendations

McCarthy Front Country RZ

Kennecott National Historic Landmark



Figure 20. SCA crew clearing common dandelion at Jumbo Creek Campground in Kennecott

During the 2014 field season, the Jumbo Creek Campground in Kennecott was found to contain a large stand of common dandelion. When manual treatment of the common dandelion infestation was performed by the SCA crew in late July many of the plants had already went to seed. It is advised that the EPMT continue to monitor and control the Jumbo Creek Campground given its close proximity to the early successional ecosystem of the Root Glacier moraine. This site is a high priority because many of the areas where the common dandelion is present are high traffic areas for visitors traveling further into the backcountry such as to the Bonanza Mine, Erie Mine, Jumbo Mine, and also to the Root Glacier and beyond (Figure 20).

Trail systems leading away from Kennecott NHL are popular destinations for many park visitors making monitoring important. During a personal trip along the Bonanza Mines trail, Megan Weidman discovered infestations of common dandelion, common plantain, alsike clover, white clover, and timothy grass. No data was collected of the infestation in 2014 and should be a priority for monitoring and control in 2015 as these trails are used frequently by visitors in the summer.

McCarthy RZ Trails

Survey of the Nugget Creek trail should also be considered for 2015. The first survey of the trail was conducted in 2010, but no invasive plants were mapped. During the 2014 survey common dandelion, white clover, and common plantain were observed along the first 8 miles of the Nugget Creek Trail. Controlling these plants would prevent invasive plant infestations from spreading to the native vegetation.

Nabesna Front Country RZ

Slana

During the 2014 field season, maintenance staff in Slana worked to improve the temporary housing at the Betty Freed Property. In August of 2014, the temporary housing cabanas at the Slana ranger station were moved to the Freed property, leaving a large freshly excavated section of land at the ranger station. In the process of moving the cabanas, areas within the Freed property were also disturbed by machinery in addition to gravel being imported. Freshly disturbed ground and newly imported gravel are both susceptible to new infestations. It is advised both the Freed property and

Slana ranger station receive increased monitoring efforts in 2015, especially in areas where soil was disturbed and/or gravel was imported.

Upper Copper River Front Country RZ

A large stand of narrowleaf hawksbeard, estimated to be around 2 acres, was reportedly found along the Copper River at the confluence with the Chetaslina River by members of the Copper River Watershed Project and the Wrangell Institute for Science and Environment. This location is a known hunter's camp and is home to a local population of bison; both of these factors increase the risk of spreading seed further into the park. The report came to the EPMT at the end of field season, and due to the remote location of the infestation, staff members were not able to get to the site in 2014. The accuracy of the report is still unknown as no photos or specimens were taken. Confirming the presence of this infestation should be a high priority during the 2015 field season. If the reports are confirmed, the EPMT should create an EDRR plan for managing this infestation. The location of the site is reported to be on the eastern side of the Copper River and will require a multiday raft trip to conduct the survey. A partnership with cultural staff would help to complete compliance and expedite the treatment process.

Due to the scale and significant effort required to manually control the infestations at the maintenance yard, the park headquarters, and seasonal housing, EPMT staff have determined that the most effective means of control will be herbicide. Narrowleaf hawksbeard is a growing concern in each of these locations. This plant has the ability to bloom several times during the growing season making control efforts through manual means highly labor intensive and relatively ineffective. Manual control of narrowleaf hawksbeard has been performed at park headquarters since 2007 and the maintenance yard since 2009 with only a moderate reduction in the infestations size. The WRST EPMT has used herbicide treatments to target narrowleaf hawksbeard in these locations since 2011. To date, these sites have only been treated with herbicide once a year, typically in August or September. Given the continual emergence of this species throughout the growing season it is suggested that herbicide control occur multiple times throughout the season. With the use of herbicide, less personnel hours will need to be dedicated towards these infestations freeing up time for more backcountry work to be performed by the EPMT.

A single white sweetclover plant was found in the WRST Headquarters in 2014. Each year one or two white sweetclover plants crop up, suggesting there is either a steady influx of seed or a small seed bank. Continual monitoring and timely control have prevented white sweetclover from setting seed within the Headquarters.

Invasive plants can be spread through foot and vehicle traffic. Controlling areas with high traffic leading into the park are important. The gravel pit just south of the Visitor Center is one such place where traffic from park staff is high, creating a potential to spread invasive plants. The black medic found in the gravel pit in 2014 should be a priority for early season control in 2015. Control in the spring will hopefully prevent the plants from spreading further. It would also be a good idea to check back later in the season to ensure plants have not regrown.

***Elodea* Surveys**

Although no lakes within WRST have been found to contain *Elodea*, monitoring of popular float-plane lakes should continue to ensure early detection. The WRST EPMT has developed a rotational aquatic survey plan for lakes within the park. Because travel by float plane is required by many of the lakes being surveyed, typically lakes in close proximity to each other are grouped together each year. Hanagita Lake, Ptarmigan Lake, and Jack Lake are possible lakes to be surveyed during the 2015 field season.

During the 2014 season, an inflatable canoe was used to survey lakes where float plane travel was required. The inflatable canoe worked well and seemed to be faster and more stable than pack rafts would have been. Although, if hiking to the location is required, pack rafts would be the best option as the inflatable canoe is too cumbersome to hike a long distance. For lakes that are road accessible, a regular hard sided canoe worked very well, as it did not require inflating and could be easily dropped into the lakes being surveyed.

Restoration & Prevention

WRST trail crew staff employs a cyclical maintenance schedule to improve commonly used ORV trails throughout the park. During the 2014 season, extensive trail work was performed on the Copper Lake Trail, Caribou Creek Trail and Nugget Creek Trail. Trail maintenance along these trail systems creates a potential for the introduction of invasive plants. Along the Copper Lake Trail WRST trail crew installed rice straw wattles to decrease runoff and soil erosion. The rice straw wattles were “Certified Weed Free” in California, but are not rated for Alaska. All rice wattles were removed from the trail and burned. The areas where the rice wattles were used will need to be monitored in 2015 to ensure invasive plants were not introduced. Increased communication and partnership with WRST trail crew could prevent possible introduction of invasive plants through regular park maintenance.

Caribou Creek is another trail that received significant maintenance by WRST trail crews in 2014. Tundra mats taken from cleared sections along the trail were transplanted along the old trail and in damaged areas to increase the rate of native revegetation. Their success should to be monitored in 2015.

Restoration efforts in front of the entrance sign at WRST Headquarters in Copper Center have been largely unsuccessful. The section of land behind the sign seems to have more native plants than the front section, which is highly infested with common dandelion. Manual treatment of the common dandelion within this area seems to be doing little to stop the increase in the population. Native seeds were previously squashed by illegal tent campers in the area and now visitors taking photos in front of the sign seem to be trampling the native plants. Transplanted roses have stopped campers, but are not abundant enough to stop guests from walking to the sign. A good solution might be to create an obvious gravel path to the sign for guests as well as signs asking people to stay off of the native plants. Additional cuttings and starting some seeds will also help to increase native plants in this area.

In the past, watering was performed manually by hauling 5 gallon buckets of water to locations, which was time consuming, labor intensive and difficult to maintain when the EMPT staff were in

the field. A water tank was purchased at the end of the 2014 season, which will allow for easier watering of transplanted vegetation or newly seeded areas. The water tank easily fits in the back of a pickup truck and can be used with a pump and sprinkler to effectively water large areas.

Utilizing rooted cutting of woody perennials is a good way to produce a large amount of usable material, especially for plants that do not produce large amounts of seed or produce seeds with low viability or germination. If cuttings are going to be rooted and used for restoration, the desired species should be determined before the spring of 2015. Certain species root better when cuttings are taken either from hardwood or softwood. If a collection plan is made, cuttings can be collected and rooted during the ideal time for each species. Rooting success would also be increased if the cuttings were stuck into the rooting media during a week they could be regularly watered; young cuttings need a lot of water to root properly and any dehydration in the soil can lead to rapid root death.

Outreach, Education & Partnerships



Figure 21. Glennallen Weed Smackdown participants

Glennallen Weed Smackdown

The Glennallen Weed Smackdown went very well in 2014 (Figure 21). Having the additional help from SAGA, YCC, and one NPS trail crew greatly increased the amount of area that was treated. Although participation for this event was increased from the previous year, more community member participation should be a goal for 2015. Private land owners should also be asked for permission to pull white sweetclover on their land by CBCWMA members prior to the event. The free lunch, provided by Tok Thai and paid for by the Copper River Watershed Project (CRWP), was a great incentive for community involvement and should be continued in future years. Advertisement for the Weed Smackdown could be enhanced by improving the sign for the event. The sign used to advertise the event at the HUB in Glennallen was not very noticeable; this sign should be more eye catching and should include the dates that the event will be held. The sign used to advertise the Weed Smackdown can be seen in Figure 21. After the event, the plants should then be brought to Anchorage for incineration as soon as possible. It was discovered that white sweetclover quickly rots

and creates a foul smell, which permeates clothing and gear stored in close proximity and is very difficult to remove.

Need for Seed

The community participation at the Need for Seed event in Kennecott NHL has been very low for the past two years. Although the seed bank has been greatly increased in just two short years, the support of the community is important to the EMPT staff. Residents from McCarthy suggested moving the location closer to the town because reaching Kennecott can be a hassle for residents. Park land located at the second foot bridge in McCarthy could be used for the next Need for Seed. During 2014 seed collection, this area was found to have a large variety of seed available and its close proximity to McCarthy would make it a great place to host the event. That way any local volunteers would be able to easily walk to the location. The Wrangell Mountain Center should also be approached to see if they are willing to become a partner for the event.

EPMT Informational Booths

The EPMT participated in two local events, the McCarthy 4th of July parade and Kenny Lake Fair, to increase understanding of invasive plants within the community. At both events a small booth was put together with an informational poster on invasive plants in WRST and a quick guessing game for invasive and native plants. EPMT handed out invasive plant tattoos which seemed to be very popular for all ages. Informational invasive plant booklets were also handed out at these events. A coloring station was set up for children, but this did not seem to be very popular and took up a lot of space on the table. Having specimens of live invasive plants would be a better use of this space. Another possible activity might be an invasive flower arrangement station, which would teach guests about the invasive plants in the area and promote the removal of these plants to create bouquets.

Outreach and WRST Staff

Training, education and partnership with the parks maintenance staff, trail crews and contractors is key to mitigating the spread of invasive species through park maintenance projects. Presentations at spring training on vegetation salvage and invasive plant mitigation best management practices is recommended for 2015. It may also be useful to have an EPMT member attend or call in to the weekly trail crew meetings whenever possible to get scheduling information and project updates.

WRST Interpretative rangers have assisted the EPMT in recording data on both native and invasive plant phenology around the Copper Center, Slana, Chitna and Kennecott visitor centers since 2010. Participation and thoroughness of the data collection vary significantly year to year depending on staff. Increasing awareness of these logs through a short announcement or presentation at the annual interpretation spring training followed by regular reminders throughout the season could help increase participation. Focusing the target species to include only specific plants of interest could decrease the time and effort required for phenology monitoring.

The use of social media & mobile technology to raise awareness for invasive plant issues should be increased by the WRST EPMT. The CLM blog and the park Facebook page are two quick and easy social media venues through which EPMT staff can share recent accomplishments, announce events, or publicize newly documented invasive species. The national EPMT program has developed an

iPhone mobile app through the Early Detection & Documentation Mapping System (EDDMapS) platform which allows park visitors to document and report invasive species to park managers. EPMT staff in 2014 created an account for WRST and established the park within the app. In 2015 EPMT staff should post information on the app at visitor centers to increase public awareness and hopefully encourage use of the app.

Exotic Plant Herbarium Vouchers

The collection of vouchers is an important part of the exotic plant management program at WRST because they provide tangible evidence that a species is or was present within the park. Vouchers can also be used to aid in future identification of the species. Voucher specimens of invasive plants have been collected in WRST since the 1930's and the park herbarium contains vouchers for the majority of invasive plant species currently or formerly found in the park (Appendix C). EPMT staff should continue to collect vouchers for the initial documentation of a species in the park or at a specific site. It should also be a priority to fill in the gaps in the collection by gathering vouchers of known invasive species in the park which are currently not represented in the herbarium.

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Appendix A: 2014 Herbicide Treatments Press Release



National Park Service
U.S. Department of the Interior

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Wrangell-St. Elias National Park & Preserve News Release

For Immediate Release – June 30, 2014

Mark Keogh – (907) 822.7223

2014 Proposed Herbicide Treatments Targeting Invasive Plants

Copper Center, Alaska – Wrangell-St. Elias National Park and Preserve (WRST) is home to complex native communities of plants and animals that have developed over millions of years. The delicate natural balance within these communities is threatened by the influx of invasive species, which are considered the second greatest threat to biodiversity after habitat loss.

Invasive species display rapid growth, spread with little or no human assistance, and are expensive to remove and difficult to control once established. These species are a concern because they can out-compete native species for limited resources and can change the structure and function of ecosystems. Establishment of invasive species can also result in loss of habitat and food sources for native insects, birds, fish, and other wildlife.

The Exotic Plant Management Team at WRST has been documenting and managing invasive plants for the past several years. The following are the proposed treatments for 2014:

- *Narrowleaf Hawksbeard* - at the Park Headquarters in Copper Center. This infestation has been manually controlled since 2007 with no decrease in the infestation size or density. The area was treated with herbicide in 2010, 2011, 2012 and 2013 and will be treated again in 2014.
Proposed treatment area: 0.6 acres
Proposed herbicide: Milestone
Proposed application window: July 8th to August 15th.
- *Common Tansy* and *Narrowleaf Hawksbeard*– Maintenance Yard, Glennallen. This infestation was first discovered in 2009 and has been manually controlled for three years. It is difficult to effectively control in this manner as it can reproduce by seed and vegetatively via an extensive underground root system. The location of this infestation makes it a high priority as it could easily spread into the park through the movement of equipment. This area was treated with herbicide in 2012 and 2013 and will be treated again in 2014.
Proposed treatment area: 0.6 acres
Proposed herbicide: Milestone
Proposed application window: July 8th to August 15th.

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.

For additional information please contact Peter Frank, Exotic Plant Manager, at 907-822-7282.

Appendix B: Weed Smackdown Press Release

National Park Service
U.S. Department of the Interior
InsideNPS
Information Gateway for NPS Employees



WRANGELL - ST ELIAS NATIONAL PARK & PRESERVE

Weed SmackDown a Big Success

Thanks to all of the fabulous Weed Warriors who showed up, the 2nd Annual Glennallen Weed SmackDown was a *smacking* success! On Saturday, July 12, more than 40 community members pulled and bagged 2,032 pounds of White Sweetclover from 35,458 square feet (0.82 acres) of heavily infested areas near the intersection of the Richardson and Glenn Highways, where many travelers pass. This year saw a 4-fold increase in participation in the Copper Basin Cooperative Weed Management Area (CWMA) led SmackDown over last year with a 15 month old as the youngest Weed Warrior. Research shows that White Sweetclover (and its relative, Yellow Sweetclover) competes with our native berry crops for pollinator attention and binds gravel soils along streams and rivers, impacting the quality of spawning areas. White Sweetclover is one of the most common weeds found within the Copper Basin CWMA and has been further spread by the recent road construction in the Glennallen area. The SmackDown achieved its goal of removing the plants before they go to seed and spread further. The event was topped off with a Thai lunch, and participants received t-shirts. Thanks to who helped!

To learn more about the Copper Basin CWMA and how you and your organization can become involved go to the website: <http://copperriver.org/programs/invasive-plant-management/cooperative-weed-management-area> or look for our new logo, designed by Cordova High School Junior Cadi Moffitt, at cooperator booths at the upcoming Kenny Lake Fair. The Copper Basin CWMA is comprised of 13 public, private, and nonprofit parties in the region. Of those partners, the following key members organized the SmackDown: Laurie Thorpe, Bureau of Land Management Glennallen Field Office; Danielle Verna, Don Hofstetter, and Kate Morse, Copper River Watershed Project; Megan Weidman, Conservation Land Management Intern with the Chicago Botanic Gardens; Ann Biddle, Kenny Lake Soil and Water Conservation District; Robin Underwood, Wrangell Institute for Science and the Environment; and Peter Frank and Miranda Terwilliger, Wrangell-St. Elias National Park & Preserve. The US Fish & Wildlife Service and the Alaska Association of Conservation Districts provided additional support. We'd also like to recognize the Student Conservation Association and the Southeast Alaska Guidance Association students and the National Park Service trail crew for their participation. The Alaska Department of Transportation signed the shoulders and allowed us to work in the right of way. Thanks also to several private land owners who allowed us to pull on their properties.

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Appendix C: List of park owned invasive plant vouchers

This table lists the invasive plant species documented within Wrangell-St. Elias National Park and Preserve and adjacent lands sorted by their 2014 AKEPIC invasiveness ranking. Plants where there are no vouchers should be targeted for collecting in future years. Species with an AKEPIC ranking over 50 are considered the highest priority for inventory and control by the EPMT. There may be other invasive plant vouchers that the park is not aware of.

Latin Name	Common Name	2014 AKEPIC Rank	Voucher Specimen No.	Found in Following Reporting Zones
<i>Phalaris arundinacea</i>	reed canarygrass	83	1	Upper Copper River RZ (Glennallen)
<i>Melilotus albus</i>	white sweetclover	81	1	McCarthy RZ, Nabesna RZ, Upper Copper River RZ
<i>Caragana arborescens</i>	Siberian peashrub	74	1	McCarthy RZ
<i>Vicia cracca</i>	bird vetch	73	4	Upper Copper River RZ (Kenny Lake)
<i>Linaria vulgaris</i>	yellow toadflax	69	2	McCarthy RZ
<i>Melilotus officinalis</i>	yellow sweetclover	69	1	McCarthy RZ (private property)
<i>Medicago sativa</i>	alfalfa	64	1	Upper Copper River RZ
<i>Bromus inermis</i>	smooth brome grass	62	4	McCarthy RZ, Upper Copper River RZ
<i>Leucanthemum vulgare</i>	oxeye daisy	61	1	McCarthy RZ
<i>Tanacetum vulgare</i>	common tansy	60	1	Upper Copper River RZ
<i>Elymus repens</i>	quackgrass	59	3	McCarthy RZ, Upper Copper River RZ
<i>Trifolium repens</i>	white clover	59	3	Big Volcanoes RZ, McCarthy RZ, Upper Copper River RZ
<i>Taraxacum officinale</i> ssp. <i>officinale</i>	common dandelion	58	0	McCarthy RZ, Nabesna RZ, Big Volcanoes RZ, St. Elias-Chugach RZ, North Country RZ, Upper Copper River RZ
<i>Trifolium hybridum</i>	alsike clover	57	1	McCarthy RZ, Nabesna RZ, Upper Copper River RZ
<i>Crepis tectorum</i>	narrowleaf hawksbeard	56	2	McCarthy RZ, Nabesna RZ, North Country RZ, Upper Copper River RZ, Tetlin-Tanacross RZ
<i>Phleum pratense</i>	common timothy	54	4	Big Volcano, McCarthy RZ, Nabesna RZ, Upper Copper River RZ, North Country RZ.
<i>Trifolium pratense</i>	red clover	53	1	McCarthy RZ, Big Volcanoes RZ, Upper Copper River RZ
<i>Poa pratensis</i> ssp. <i>pratensis</i>	Kentucky bluegrass	52	4	Big Volcanoes RZ, North Country RZ, Upper Copper River RZ
<i>Lolium perenne</i> spp. <i>perenne</i>	perennial ryegrass	52	0	McCarthy RZ
<i>Fallopia convolvulus</i>	black bindweed	50	1	Big Volcanoes RZ, McCarthy RZ, North Country RZ, Tetlin-Tanacross RZ
<i>Galeopsis tetrahit</i>	hempnettle	50	2	McCarthy RZ, Big Volcanoes RZ
<i>Tripleurospermum inodorum</i>	scentless false mayweed	48	0	Nabesna RZ, Upper Copper River RZ, McCarthy RZ
<i>Medicago lupulina</i>	black medic	48	0	Upper Copper River Front Country
<i>Rumex crispus</i>	curly dock	48	0	McCarthy RZ

Latin Name	Common Name	2014 AKEPIC Rank	Voucher Specimen No.	Found in Following Reporting Zones
<i>Polygonum aviculare</i>	prostrate knotweed	45	3	Nabesna RZ, McCarthy RZ, North Country RZ, Upper Copper River RZ
<i>Amaranthus retroflexus</i>	pigweed	45	0	Upper Copper River RZ
<i>Lappula squarrosa</i>	European stickseed	44	5	Nabesna RZ, Upper Copper River RZ, McCarthy RZ
<i>Plantago major</i>	common plantain	44	1	McCarthy RZ, Nabesna RZ, North Country RZ, Upper Copper River RZ
<i>Thlapsi arvense</i>	field pennycress	42	1	Nabesna RZ, McCarthy RZ, Upper Copper River RZ, Big Volcanoes RZ
<i>Silene noctiflora</i>	night-blooming cockle	42	0	McCarthy RZ
<i>Silene latifolia</i>	bladder campion	42	0	Upper Copper River RZ
<i>Stellaria media</i>	common chickweed	42	1	McCarthy RZ, Big Volcanoes RZ
<i>Descurainia sophia</i>	flixweed	41	0	Big Volcanoes RZ, McCarthy RZ, Nabesna RZ, North Country RZ, Upper Copper River RZ
<i>Capsella bursa-pastoris</i>	shepherd's purse	40	1	Big Volcanoes RZ, McCarthy RZ, Nabesna RZ, North Country RZ, Upper Copper River RZ
<i>Papaver croceum</i>	Icelandic poppy	39	1	Nabesna RZ (Ellis Property)
<i>Chenopodium album</i>	common lambsquarter	37	1	Big Volcanoes RZ, McCarthy RZ, Nabesna RZ, North Country RZ, Upper Copper River RZ
<i>Cerastium fontanum ssp. vulgare</i>	mouse ear chickweed	36	0	McCarthy RZ, Nabesna RZ, North Country RZ
<i>Veronica serpyllifolia</i>	Thyme-leaf speedwell	36	2	McCarthy RZ
<i>Senecio vulgaris</i>	common groundsel	36	1	McCarthy RZ
<i>Matricaria discoidea</i>	pineapple weed	32	0	McCarthy RZ, Nabesna RZ, North Country RZ, Upper Copper River RZ
<i>Lepidium densiflorum</i>	common pepperweed	25	1	McCarthy RZ, Nabesna RZ, Upper Copper River RZ
<i>Turritis glabra</i>	tower rockcress	-	0	McCarthy RZ
<i>Papaver somniferum</i>	opium poppy	-	0	McCarthy RZ (private)
<i>Lupinus polyphyllus</i>	big leaf lupine	-	0	adjacent, Yakutat RZ
<i>Erysimum cheiranthoides</i> subsp. <i>cheiranthoides</i>	wormseed mustard	-	3	McCarthy RZ
<i>Kochia scoparia</i>	kochia	-	1	adjacent - Silver Springs subdivision, Copper Center - 2013 voucher with ALA
<i>Erysimum capitatum</i>	sanddune wallflower	-	1	McCarthy RZ, Upper Copper River RZ

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