



Invasive and Exotic Species Management for Yukon-Charley Rivers National Preserve

2010 Summary Report

Natural Resource Data Series NPS/YUCH/NRDS—2010/103



ON THE COVER

Upper Left: Student Conservation Association intern Susan Sherman after arriving at Coal Creek airstrip. Upper Right: Common dandelion & bee in Coal Creek Camp. Lower Left: Yukon River view from near Washington Creek Cabin. Lower Right: Student Conservation Association intern Chelsy Passmore taking a well deserved break.
Photographs by: M. Susan Sherman & Chelsy Passmore

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November 2010

U.S. Department of the Interior
National Park Service
Natural Resource Program Center
Fort Collins, Colorado

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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.

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

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This report is available from the Alaska Region Exotic Plant Management Team Reports website (<http://www.nps.gov/akso/NatRes/EPMT/reports.html>) and the Natural Resource Publications Management website (<http://www.nature.nps.gov/publications/NRPM>).

Please cite this publication as:

Passmore, C., and M. S. Sherman. 2010. Invasive and exotic species management for Yukon-Charley Rivers National Preserve: 2010 Summary Report. Natural Resource Data Series NPS/YUCH/NRDS—2010/103. National Park Service, Fort Collins, Colorado.

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Abbreviations

AKEPIC	Alaska Exotic Plant Information Clearinghouse
ATV	All Terrain Vehicle
CCC	Coal Creek Camp
EPMT	Exotic Plant Management Team
GAAR	Gates of the Arctic National Park
GIS	Global Information Systems
GPS	Global Positioning System
NPS	National Park Service
SCA	Student Conservation Association
YUCH	Yukon-Charley Rivers National Preserve

Abstract

This report describes the work performed by the Alaska Exotic Plant Management Team at Yukon-Charley Rivers National Preserve during the 2010 season. The 2010 field season was the first year of an organized weed program in Yukon-Charley Rivers National Preserve with two Student Conservation Association interns stationed at the preserve for the entire summer. Both staff members were hired with American Recovery and Reinvestment Act funding. Prior to 2010 Yukon-Charley Rivers National Preserve staff surveyed for invasive plants in the preserve with some assistance from the Alaska Exotic Plant Management Team. Limited treatments were performed and little data exists to describe the type or density of species previously treated. During the 2010 field season invasive plant inventories were conducted in high use areas such as trails, public use cabins, and river banks in Yukon-Charley Rivers National Preserve and in one area in Gates of the Arctic National Preserve. Invasive plant populations were recorded using Trimble GeoXH Global Positioning System units. Data was edited and analyzed using Trimble Pathfinder Office and ESRI ArcGIS. A total of 110 acres were surveyed, 11.25 acres of invasive plant infestations were mapped, and 1.34 of these infested acres were treated throughout the summer, laying a foundation for an invasive weed control program in both Yukon-Charley Rivers National Preserve and Gates of the Arctic National Preserve. Monitoring and control efforts should continue into the future in high use areas of the park. Surveys should be performed at more remote locations, as many sites that were historically disturbed by mining and other human activities have not been visited by Exotic Plant Management Team staff.

Introduction

Public perception holds that Alaska's native ecosystems are buffered from non-native invasive plant invasion by the region's climate and relative isolation. While the distribution of invasive plants in Alaska is mostly limited to areas of human disturbance, there are indications that invasives are spreading and that several species may be able to colonize undisturbed native ecosystems (AKEPIC 2010). The potential for these species to disperse via river systems or expand into niches opened by climatic change presents a threat to the stability of Alaska's ecological systems. Only about 319 invasive species are documented in Alaska and most of these have restricted ranges around population centers within the state (AKEPIC 2010). The distribution and density of invasive species in Alaska is lower compared to other regions of the United States and, unlike the rest of the country, land managers in Alaska still have an opportunity to prevent the spread of invasive plants into most roadless areas of the state. This makes the current work of the Alaska Exotic Plant Management Team (EPMT) of extreme importance as population growth is most easily inhibited at the earliest stages of growth.

The relatively weed free ecosystem found in the Yukon-Charley Rivers National Preserve (YUCH) is a prime example of a region where the Alaska EPMT can make a difference and address the issues associated with invasive plants. One hundred and fifteen miles of the Yukon River and the entirety of the Charley River meander through the 2.5 million acres of YUCH (Fig. 1). The Yukon River hosts seven public use cabins within YUCH which are maintained by the National Park Service (NPS) (Fig. 2). During the summer months, the rivers provide the only ground transportation corridor within the majority of the preserve.

This area was used extensively in the late 1800s when miners travelled here to take advantage of the natural resources of the land (NPSa 2010). Following a century of off-again, on-again mining, YUCH was designated a national preserve in 1980; designed to encompass major landmarks relating to the region's history of mineral exploration. While the introduction of some of the invasive species currently present in the preserve likely traces to the area's mining past, current events continue to threaten the introduction of additional species. The preserve's historic value is enhanced by its ecological significance; YUCH is one of the largest peregrine falcon nesting sites in North America and is the spawning site of thousands of king salmon. To ignore the spread of invasive plants could allow for increased pressure on the fish and wildlife habitats, impair the genetic integrity of native plant populations in the area, limit recreational opportunities within the park, and alter the original historic use of the land. For these reasons the Alaska EPMT is working to control or eliminate invasive plants in YUCH and to stop more invasive plants from being introduced to the preserve.

Because of its remote nature, there are limited vectors for spread of invasive species within YUCH. The primary vectors are the prominent river systems along which there are occasional float trips. Visitors and staff on float trips bring equipment and gear that may carry the propagules of invasive plants in the park. The summer is not the only part of the year when visitors may inadvertently transport invasive plants into YUCH. An influx of visitors arrive within the preserve during the Yukon Quest, an international sled dog race between Fairbanks, Alaska and Whitehorse, Canada. While the race brings excitement, it also brings the potential for further spread of non-native seeds in the hay used for the dogs' bedding. Visitation in the preserve has increased over 900% since its establishment in 1980 (NPSb 2010).

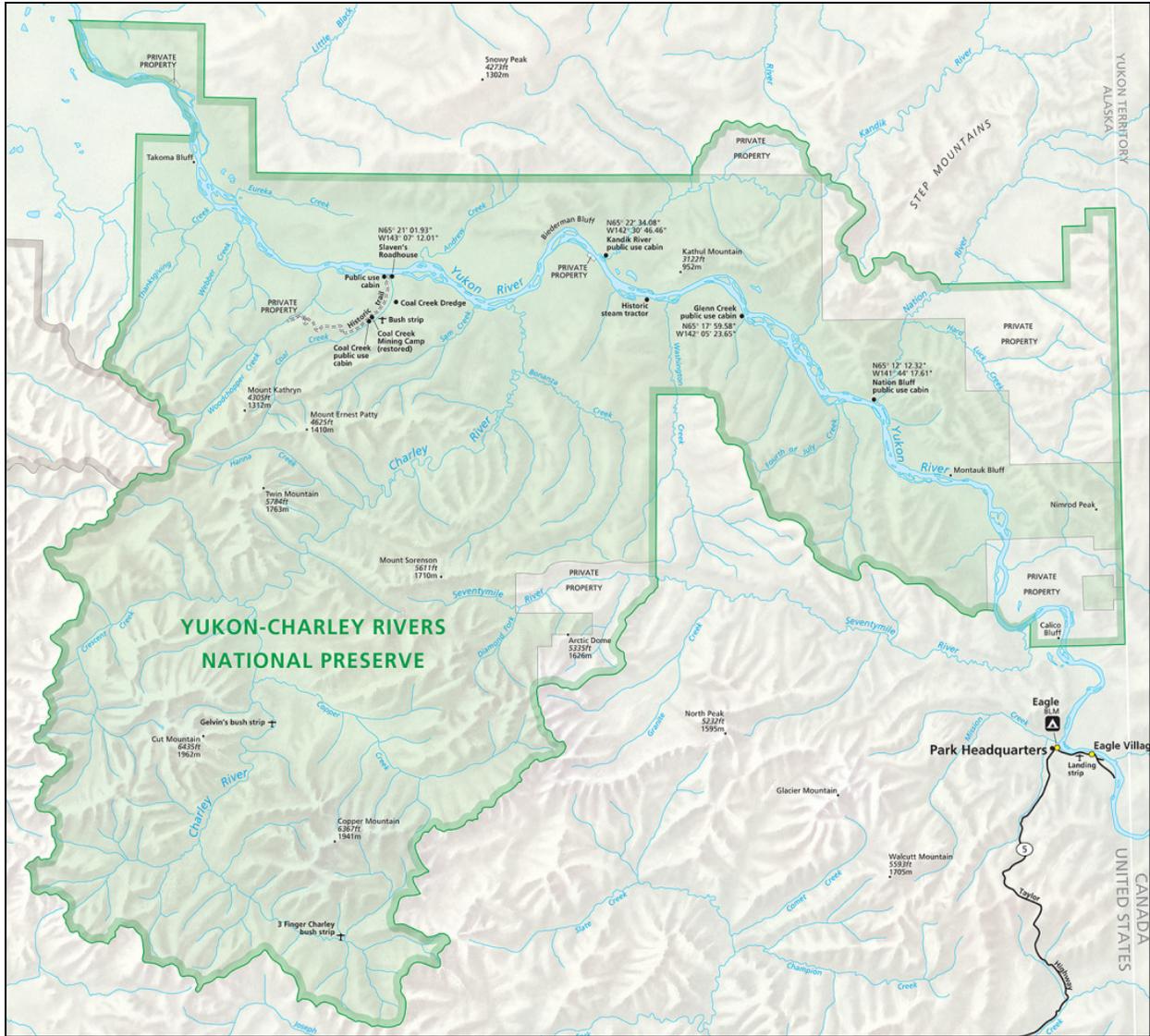


Figure 1. A map of the Yukon-Charley Rivers National Preserve.

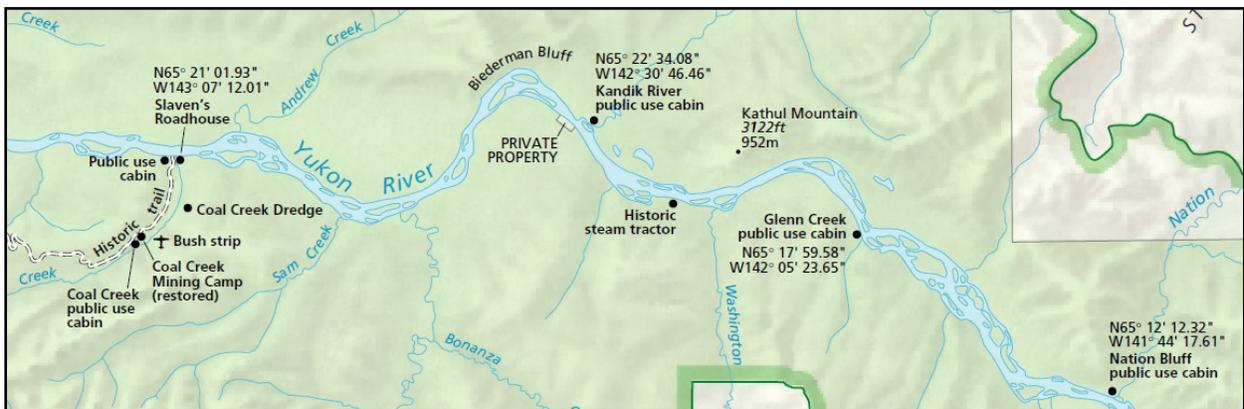


Figure 2. A map of the Yukon River showing several public use cabins where invasive plant inventories were conducted during the 2010 field season.

Invasive plant management in YUCH began in 2005 with a weeklong survey of the Coal Creek drainage. No other invasive plant surveys occurred within the preserve until 2008 when EPMT staff surveyed several public use cabins along the Yukon River during a week-long float trip. Further survey work was performed in 2009 by a group of NPS volunteers who mapped invasive plants along the Yukon River. These data gave the YUCH EPMT a starting point to plan the 2010 work season.

The 2010 YUCH EPMT survey efforts focused on high-traffic areas with ground disturbance. Major sites included Coal Creek Camp (CCC), Slaven's Roadhouse, public use cabins and trails along the Yukon River, and several sites on Walker Lake in Gates of the Arctic National Park and Preserve (GAAR). EPMT staff surveyed areas for invasive weeds, recorded extent of infestations with Trimble Global Positioning System (GPS) units, and hand-pulled small manageable infestations as time allowed. The YUCH EPMT performed these tasks over the course of seven weeks, from early June through late July. Most sites were reached during two boat trips on the Yukon River between Eagle, Alaska, and CCC.

Objectives

The primary goal of the 2010 summer field season was to lay the groundwork for a sustainable invasive weed management program in YUCH. Top priority for staff time was given to expanding the baseline inventory of the preserve so that in future years changes in the extent of existing infestations could be monitored, new infestations could be inventoried, and treatment priorities could be more effectively planned. The 2010 field season work also included a strong focus on the identification of plants due to several reports of invasive weed infestations from uncertain sources and, since the park has not been surveyed since 2008, to assist with the possibility of discovering new infestations.

The 2010 treatments of known invasive weed infestations within YUCH were prioritized based on two factors: 1) the size of the infestation, with smaller areas receiving a higher priority and 2) the Alaska invasiveness ranking. Invasive species with higher invasiveness rankings were considered a higher priority for management. The invasiveness rank is a 1 to 100 scale which incorporates four categories on each species: potential impacts to the ecosystem, biological attributes such as growth rate and method of reproduction, distribution, and effective control measures (Carlson 2008).

Based on information from the Alaska Exotic Plant Information Clearinghouse (AKEPIC) and preserve visitors, several species were of particular concern at YUCH at the start of the 2010 field season: spotted knapweed (*Centaurea stoebe*) and narrowleaf hawksbeard (*Crepis tectorum*). Spotted knapweed has an invasiveness rank of 86, which is one of the highest invasiveness rankings of any plant introduced into Alaska (Carlson 2008). This weed had been observed on a riverbank near Glenn Creek Cabin by preserve visitors in 2009. One goal of the summer field season was to determine whether the report of this infestation was accurate.

Narrowleaf hawksbeard had been previously mapped and pulled by YUCH staff at Slaven's Roadhouse in 2005 and 2008. Although narrowleaf hawksbeard has a relatively low invasiveness rank of 54, the Slaven's Roadhouse infestation was growing robustly, as over 1,400 stems had been pulled in previous years (Carlson 2008). The potential for spread of narrowleaf hawksbeard from this area made it a priority to map and treat.

Methods

Monitoring and control of invasive plants in YUCH and GAAR was conducted according to the Alaska EPMT 2010 Field Protocols (Million and Rapp 2010). A Trimble Geo XH GPS unit was used to record any invasive weed infestations encountered during the survey of high use areas in both NPS units (Fig. 3). A common Alaska EPMT data dictionary was used, which ensured that data were collected in a consistent manner within and across the NPS Alaska Region. After collection, GPS data was post-processed and edited by field personnel using GPS Pathfinder Office, then transferred to the Alaska Regional Office for export to Geographic Information System (GIS) format and input into NPS and statewide public-access databases.

The 2010 field season lasted from early June through late July. Two Student Conservation Association (SCA) interns were stationed within YUCH during this period. The season's operations were focused on mapping rather than control work as the data collected in previous years were sporadic. Areas with and without invasive plants were mapped. Sites where there was a higher probability of finding non-natives, such as high use areas and areas with previously documented infestations, were inventoried first. These included public use cabins, mining sites, employee housing and work sites, maintenance yards, trails, all terrain vehicle (ATV) roads and disturbance sites, and areas of high visitor use. Mapping in GAAR was restricted to the NPS managed public use cabins at Walker Lake due to limitations of time and legal access to private property.

Infestations deemed to require less than eight person hours of treatment were hand-pulled. Hand-pulled plants were bagged and burned or carried out of the park to be disposed of. The 2010 season was conducted in four main areas: CCC, Slaven's Roadhouse, the Yukon River corridor, and GAAR.

Coal Creek Camp

CCC was inventoried on foot and all mapped infestations during the first ten-day work week were pulled. No infestations were treated after the first ten work days in the camp as the extent and density of the infestations precluded further manual removal in the time available. This area was re-inventoried in late July for non-natives flowering later in the season.

Slaven's Roadhouse

Slaven's Roadhouse and its outbuildings were surveyed twice during the course of the field season. The first inventory was conducted in early June. This inventory was ineffective as most plants were not yet in flower and were therefore difficult to positively identify. Identification was possible later in the season when the site was mapped again in early July. Many invasive species present at the site had gone to seed in between site visits.



Figure 3. A Trimble GeoXH GPS unit was used to map the locations of invasive plant infestations.

Yukon River

The Yukon River was inventoried using both motorized and non-motorized vessels. Motorized vessels were used to travel to different public use cabins quickly, while a non-motorized raft, a *Pro-Pioneer* inflatable raft, was used to survey the banks of the river. Using the raft to float sections of the river was found to be more efficient since the bank cannot be seen from a fast-moving power vessel. However, these float surveys proved difficult in some situations when heavy rain, flooding, and debris did not allow the raft close enough to the bank for adequate visibility (Fig. 4). This caused inconsistent accuracy in invasive monitoring along certain sections of the river.



Figure 4. Flooding on the Yukon River caused setbacks in data collection.

Gates of the Arctic National Park & Preserve

Mapping in GAAR was limited to Walker Lake due to scheduling restrictions. Two NPS cabins, an old lodge site, and a portion of the lake's shoreline were surveyed for invasive species. No private property homesteads were surveyed.

Results

Overview

As of the end of 2010 field season YUCH has 11.25 acres infested with invasive plants most of which are located along road and trail corridors in the Coal Creek drainage and near the public use cabins along the Yukon River. In YUCH a total of 1066 field hours were logged by EPMT workers this season. A total of 110 acres were surveyed and 1.34 acres of invasive plants were treated this season. This year the YUCH EPMT staff documented one new species of invasive plant within the park, bird vetch (*Vicia cracca*). Bird vetch was found for the first time at several public use cabins along the Yukon River (Table 2.). This brings the total number of documented non-native plants in YUCH to 16 (Table 3).

Table 1. Summary of Yukon-Charley Rivers National Preserve Exotic Plant Management.

Year	EPMT Personnel		Volunteers		Total Person Field Hours	Invasive GPS Data NPS Lands(non-NPS lands)			New Spp.
	# pers.	Field Hours	# pers.	Field hours		Species Acres Surveyed	Species Acres Infested*	Acres Treated	
2005 ¹	2	40	-	-	80	133.152	10.582	0.464	11
2006	-	-	-	-	-	-	-	-	-
2007	1 ²	8	-	-	8	18.843 ³	0.056 ³	0	-
2008	2 ⁴	60	-	-	120	20.725 (36.957)	2.653 (0.370)	0.030	3
2009 ⁵	-	-	2	40	80	11.070	3.934	-	- ⁶
2010	2 ⁷	1040	13	2	1066	YUCH: 110.024 GAAR: 0.149	YUCH: 9.135 GAAR: 0.033	YUCH: 0.608 GAAR: 0.033	2

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

1-2005 efforts only occurred in the Coal Creek drainage

2-Includes one YUCH staff member

3-These numbers are interpreted from a verbal description of findings – not GPS data

4- Includes one YUCH staff member

5-2009 efforts were conducted entirely by volunteers, any findings were not verified

6-While the 2009 volunteer efforts did discover several new species not all discoveries have been verified

7-Includes two SCA interns

Table 2. Summary of the infested acres in Yukon-Charley Rivers National Preserve during 2010.

Species		Coal Creek Camp	Slaven's Roadhouse	Yukon River Cabins	Gates of the Arctic
Latin Name	Common Name				
<i>Capsella bursa-pastoris</i>	shepherd's purse	✓ no data ²	0.379	0.014	-
<i>Chenopodium album</i>	common lambsquarter	1.020	0.495	0.084	-
<i>Crepis tectorum</i>	narrowleaf hawksbeard	-	0.002	0.001	0.016
<i>Hordeum jubatum</i> ¹	foxtail barley	0.973	0.734	-	-
<i>Matricaria discoidea</i>	pineapple weed	✓ no data ²	0.397	0.009	-
<i>Plantago major</i>	common plantain	0.959	0.463	0.114	-
<i>Stellaria media</i>	common chickweed	-	0.654	0.111	-
<i>Taraxacum officinale</i>	common dandelion	1.235	0.760	0.097	0.016
<i>Vicia cracca</i>	bird vetch	-	0.487	0.148	-

Infested acres are calculated by acres mapped times the percent cover in areas greater than 0.5 acres. If under 0.5 acres, acreage mapped is counted as 100%.

1-Foxtail barley has, until recently, been considered a non-native. However as of 2010 it is being considered as a native to Alaska (AKEPIC 2010) but may still be controlled in certain areas due to the impacts on domestic animals.

2-species found but not GPSed

Table 3. Summary of new invasive plant species detected in Yukon-Charley Rivers National Preserve and their associated invasiveness rankings (Carlson 2008).

Season	#	New Invasive Plant Species Detected		AKEPIC Rank
		Latin Name	Common Name	
2005	11	<i>Bromus inermis</i>	smooth brome grass	62
		<i>Capsella bursa-pastoris</i>	shepherd's purse	40
		<i>Chenopodium album</i>	common lambsquarter	37
		<i>Crepis tectorum</i>	narrowleaf hawksbeard	54 ¹
		<i>Elymus repens</i>	quackgrass	59
		<i>Lepidium densiflorum</i>	common pepperweed	25
		<i>Matricaria discoidea</i>	pineapple weed	32
		<i>Plantago major</i>	common plantain	44
		<i>Polygonum aviculare</i>	prostrate knotweed	45
		<i>Stellaria media</i>	common chickweed	42
		<i>Taraxacum officinale</i>	common dandelion	58
2008	3	<i>Poa annua</i>	annual bluegrass	46
		<i>Rumex acetosella</i>	common sheep sorrel	51
		<i>Trifolium hybridum</i>	alsike clover	57
2010	2	<i>Hordeum jubatum</i> ²	foxtail barley	63
		<i>Vicia cracca</i>	bird vetch	73
TOTAL		16		

1-Narrowleaf hawksbeard ranking will be revisited during the fall of 2010 due to field observations of its invasiveness tendencies.

2-Foxtail barley has, until recently, been considered a non-native. However as of 2010 it is being considered as a native to Alaska (AKEPIC 2010) but may still be controlled in certain areas due to the impacts on domestic animals.

Coal Creek Camp

Plants of highest concern found at CCC included common dandelion (*Taraxacum officinale* ssp. *officinale*), common plantain (*Plantago major*), and foxtail barley (*Hordeum jubatum*). Pineapple weed (*Matricaria discoidea*), shepherd's purse (*Capsella bursa-pastoris*), and common lambsquarters (*Chenopodium album*) were also observed in lower densities. Species-acres are summarized above in Table 2.

The first ten-day cycle of the operations at CCC consisted of eliminating common dandelion and plantain on paths around the cabins where growth was most evident. Compacted soil throughout these areas made it difficult to adequately remove the roots and, within a week, re-growth of these species in the treated areas was observed.

A second infestation located near a fire ring behind the CCC cookhouse was also treated. Early in the season only common dandelion, plantain, and lambsquarters were detected at this infestation. Common dandelion coverage exceeded 50% of the area and included plants in phenology stages from rosette to some plants in seed. YUCH EPMT staff used shovels in addition to hand-trowels to treat this area, which easily loosened the gravel and allowed more of the root to be removed.

Control work was also conducted at a location close to one of the pump sheds and the Susie Paul Cabin. The same invasive species were present in front of the cabin as in the rest of the camp. The infestation in the adjacent area behind the pump shed was growing around numerous stones concealing the growth of the weeds. This infestation extended up a steep grade behind the pump house where the loose soil made hand-pulling a simple task. Invasive plants growing in this area could likely be eradicated in the future if careful monitoring is continued. A population of native dandelion (Fig. 5) was found dispersed within this area; this made removal work progress slowly as careful identification between the native and non-native dandelion was necessary.



Figure 5. Native dandelions growing in Coal Creek Camp.

An infestation of common dandelion was found and controlled behind the cookhouse. Most of the plants found at this location were in seed. EPMT staff cut and bagged seed heads before the entire plants were removed to reduce the chance of distributing seeds during treatment. Less than half of this population was treated.

The weeds that were collected within the vicinity of CCC were incinerated. Approximately half of the bags were too damp to burn immediately. Plants that were too damp were dried and then were burned in the fire ring.

As the season progressed, more invasive species became apparent. Newly flowering species were mapped as they were observed. In the maintenance yard infestations of common dandelion

were present in 76-95 percent covers, intermixed with a 6-25 percent cover of foxtail barley. It is unlikely this area can be effectively treated using only hand-pulling methods.

The road from CCC to the airstrip was surveyed and had scattered infestations of common dandelion, lambsquarters, and plantain. These species were most common along the sides of the trail where brush has often been cut for fire suppression. It was difficult to inventory this site because a fire crew was clearing brush along the roadside at the same time EPMT staff were present. The extent of these infestations continued through the intersecting ATV trail leading to a beaver dam but the full extent of this overgrown road was not inventoried. Part of the trail that was not surveyed leads to a plot of land where old maintenance equipment is stored and the potential for invasive species presence is high. An infestation of common dandelion, foxtail barley, and shepherd's purse was found at the intersection of the CCC trail and the path to the caretaker's cabin. Bird vetch was also present farther up the hill between the incinerator and the cabin but was not pulled.

Common plantain and common dandelion were found growing on the upper road to Slaven's Roadhouse, directly past the public use cabin. The density of the infestation was heaviest around the roadhouse and decreased up the trail. Common plantain, common dandelion, foxtail barley, and lambsquarters were found along the road leading to the large pump house with higher density found near the pump house.

Several problems arose when it came time to edit and transfer GPS data. File management had to be conducted in Fairbanks or Eagle, Alaska because reliable internet connectivity was not available at Coal Creek Camp. In addition, there was no access to the NPS Alaska regional shared drive to which the edited data was to be sent. Travel to Fairbanks was arranged to work these issues out. However, after data transfer was completed an infestation of pineapple weed was discovered at CCC in the gravel lot between the maintenance shed and the cookhouse. This was not recorded in the GPS data and was not added to the records afterward.

Slaven's Roadhouse

Slaven's Roadhouse was first inventoried on June 28 (Fig. 6). The maintenance shed and trail to the outhouse contained common plantain, common chickweed (*Stellaria media*), and shepherd's purse, some of which extended into the neighboring forested areas. Further surveys were conducted later in the season between July 8 and July 10, 2010. YUCH EPMT staff found one large patch of common chickweed, shepherd's purse, lambsquarter, and pineapple weed between the public use cabin behind Slaven's Roadhouse and the outhouse. A small and dispersed population of common plantain was found on the trail running from the cabin to the roadhouse.

Narrowleaf hawksbeard was previously recorded at the point where this trail merged with the path leading to the Yukon River. This infestation was first mapped and pulled in 2005 by Penny Bauder. The same area was retreated by Jobe



Figure 6. Slaven's Roadhouse was a site monitored and treated by the YUCH EPMT.

Chakuchin, Jeff Heys and Carl Stapler in 2008, where they hand-pulled approximately 1,400 flowering stems within the .029 acre infestation. During the 2010 field season only 13 stems were identified between that area and the river, all of which were pulled. There is no apparent reason for this dramatic reduction in infestation size and this area should be carefully monitored in the 2011 season.

On the overlook next to the greenhouse and smokehouse were small infestations of common plantain with approximately a 10% cover. These infestations extended sporadically through the foxtail barley, common dandelion, and pineapple weed growing on the path in front of Slaven's Roadhouse. Common dandelion was present in the front yard of the cabin and the area behind the building, which also included larger infestations of common chickweed and pineapple weed.



Figure 7. Boy Scout Troop 92 helped pull weeds around Slaven's Roadhouse.

On July 14, 2010 some of these areas in front of the roadhouse were pulled by a visiting 13-member Boy Scout Troop – Troop 92. The scouts were given a brief lesson on invasive plants including why their management is important, practices to prevent seed spread, and a summary of which species are common to the area and how to identify them. The troop pulled bird vetch, lambsquarters, common plantain, pineapple weed, common chickweed, common dandelion, and foxtail barley in the yard in front of Slaven's Roadhouse (Fig. 7). They continued weeding down the road to the Coal Creek Dredge which had not yet been fully surveyed due to Fire Crew operations. There they found common

plantain, common dandelion, foxtail barley, lambsquarters, and an abundance of bird vetch. They worked for a total of two hours. The weeds they collected were bagged and incinerated at CCC.

Yukon River

Yukon River Bank

The bank of the Yukon River was particularly challenging to survey, as weather and debris restricted visibility and the ability to float close to shore. The areas of riverbank which were surveyed were found to be remarkably clean. The infestations of non-native vegetation that were found were all associated with public use cabin sites and were included in the mapping of individual cabin data. No other invasive species were found on the bank of the Yukon in the 2010 season.

Public Use Cabins

The bank of the Yukon River was particularly challenging to survey, as weather and debris restricted visibility and the ability to float close to shore. The areas of riverbank which were surveyed were found to be remarkably clean. The infestations of non-native vegetation that were found were all associated with public use cabin sites and were included in the mapping of individual cabin data (Table 4.). No other invasive species were found on the bank of the Yukon in the 2010 season.

Table 4. Summary of the infested acres at Yukon River public use cabins during the 2010 season.

Species		Smith Cabin	Sam Creek Cabin	Kandik Cabin	Washington Creek Cabin	Glenn Creek Cabin	Nation Creek Cabin
Latin Name	Common Name						
<i>Capsella bursa-pastoris</i>	shepherd's purse	-	-	-	-	-	0.014
<i>Chenopodium album</i>	common lambsquarters	0.031	-	0.024	0.003	X ¹	0.025
<i>Crepis tectorum</i>	narrowleaf hawksbeard	-	-	-	-	0.001	-
<i>Hordeum jubatum</i>	foxtail barley	-	-	-	-	-	-
<i>Matricaria discoidea</i>	pineapple weed	-	-	0.004	-	-	0.005
<i>Plantago major</i>	common plantain	0.031	-	0.004	0.001	0.058	0.020
<i>Stellaria media</i>	common chickweed	0.066	-	0.045	-	-	-
<i>Taraxacum officinale</i>	common dandelion	0.097	-	-	-	-	-
<i>Vicia cracca</i>	bird vetch	0.097	0.028	-	0.023	-	-

Infested acres are calculated by acres mapped times the percent cover in areas greater than 0.5 acres. If under 0.5 acres, acreage mapped is counted as 100%.

1-This species was discovered at the end of the visit and there was not time to collect GPS data for the location prior to departure.

Kandik Cabin

Kandik Cabin, located where the mouth of the Kandik River meets the Yukon River, was closed to overnight visitation during the summer of 2010. During the Yukon River breakup of 2009 the cabin was pushed off its foundation to a location approximately 100 feet behind its original location. Reconstruction of the cabin began in spring 2010 (Fig. 8) and was underway during the summer. Because disturbed soil is a perfect environment for the growth of invasive vegetation, the Kandik Cabin is a particularly important spot for monitoring in future years.



Figure 8. The original Kandik Cabin (left) lifted from its foundation from the 2009 flood and the construction work underway to restore it (right).

The cabin was inventoried twice over the course of the field season; on June 27 and again on July 13, 2010. Chickweed, pineapple weed, lambsquarters, and plantain were found both at the cabin and in its surrounding construction site. Chickweed was the most abundant species, growing in dense mats, particularly where the native vegetation had been cleared as a construction staging area. Pineapple weed and lambsquarters were common throughout camp

but not present on the shoreline. Common plantain was most abundant near shore and on the trail leading to camp, but was not abundant in the upper cabin area or construction site. There were no invasive species found on the trails leading out of the woods on which logs were dragged to the construction site. However, it is recommended that these trails be monitored in coming years as the disturbed ground is ideal for the spread of invasive species. No control work was performed at Kandik Cabin due to time restrictions and the large extent of invasive species.

Glenn Creek Cabin



Figure 9. The Glenn Creek Cabin was surveyed for invasive plants.

Glenn Creek Cabin (Fig. 9) sits approximately $\frac{1}{4}$ mile downstream of Glenn Creek on the bank of the Yukon River and receives frequent visitation throughout the summer, as well as some use throughout the winter by dog mushers and river travelers. For this reason it was monitored twice during the 2010 field season; once on June 25 and again on July 12, 2010. Common plantain was the most abundant non-native species found at the cabin and extended from the bank of the river to the outhouse and around all sides of the cabin. Four narrowleaf hawksbeard plants were found on the upper bank in front of the cabin and were immediately controlled.

Past reports from park volunteers indicated that spotted knapweed was present along the bank of the Yukon River both upstream from and in front of the cabin site. During the search for this infestation a locally-abundant native wild onion (*Allium schoenoprasum*) with a similarly colored flower was documented. As no spotted knapweed was found during the 2010 field season it is assumed that the wild onion was previously mistaken for spotted knapweed.

Smith Cabin

Smith Cabin rests six miles above Takoma Bluff just above the mouth of Eureka Creek. This site contains multiple outbuildings including two collapsing smaller secondary cabins, a food cache, and an outhouse, all of which are surrounded by areas of disturbed soil. Due to time restrictions this cabin was visited only once on June 30, 2010 when only some non-native species were in flower and identifiable. It is possible that later blooming species were not included in this inventory and it is recommended that more than one survey be conducted per season in the future. Although the river bank near the cabin was free of invasive vegetation, several non-native species were found at the cabin, mostly surrounding the main cabin. Common dandelion was the most prevalent at the site, covering over 50% of the trail and yard area from the food cache to the outhouse. Common plantain and chickweed were also present in lower numbers around the main cabin site extending as far as the outhouse. The previously inhabited cabin near the bank was not as disturbed and had a healthy population of native vegetation, thus few invasive weeds were present. No control work was conducted at Smith Cabin.

Nation Bluff Cabin

Nation Bluff Cabin is located along the Yukon River downstream from the Nation River at the base of Nation Bluff. Four invasive species were found during two surveys on June 25 and July 12, 2010 of the Nation Bluff Cabin site (Fig. 10). Common plantain was found growing along the trail to the cabin, in the yard around the cabin, and up to the outhouse. Lambsquarters was found in small infestations along the trail but was also recorded throughout the cabin construction site and up to the outhouse. The shoreline up to the cabin trail was free of invasive species but should be monitored for wind thrown seeds in future years. No control work was conducted at Nation Bluff Cabin.



Figure 10. Nation Bluff Cabin, related structures, and nearby trails were surveyed for invasive plants.

Washington Creek Cabin

Washington Creek Cabin is located along Washington Creek about one mile upstream from its confluence with the Yukon River. Visitor use rates to the cabin were lower in 2010 due to low water levels in the Yukon River. The cabin is usually accessible by hiking a trail found along the Yukon River one mile upstream of Washington Creek. In 2010 the cabin was only accessible by hiking the Washington Creek River bed from the Yukon River bank. For this reason the cabin was only surveyed once on June 25, 2010.

Several invasive species were found at the cabin site. Common plantain was found infrequently along the trail but was common throughout the cabin yard. Bird vetch was found throughout the trail corridor, in several patches around the cabin, and behind the cabin on the bank above the slough. Lambsquarters was found scattered intermittently throughout the yard with the majority of the infestation near the cabin close to the trail from Washington Creek. No control work was performed at Washington Creek Cabin.

Sam Creek Cabin

Sam Creek Cabin is located near the confluence of Sam Creek and the Yukon River, although it is not marked on the NPS map that is handed out to the public. Two cabins are present at this site; both of which are deteriorating and not recommended for overnight stay. There was only one non-native species found during the June 24, 2010 Sam Creek Cabin survey. The relatively pristine condition of this site might be due to the cabin's remote location. An infestation which is believed to be bird vetch was found dispersed along the trail to the cabin. However, positive identification of this infestation has not yet been confirmed at the time of publication of this report. No other non-native species were found. There was no control work performed at Sam Creek Cabin.

Gates of the Arctic National Park and Preserve



Figure 11. Walker Lake in GAAR was included in the 2010 YUCH EPMT surveys.

At Walker Lake, invasive plants are most common at the old lodge site (Fig. 11). Finished in 1976 and subsequently removed by the park service in 1991, the site consisted of a three story wilderness lodge, two one-room cabins, a greenhouse, a generator shed, a large water storage tank, and an outhouse (NPS 1999). The construction and operation of these facilities facilitated the introduction of invasive plants into the immediate area around the lodge.

2010 field surveys of the site discovered two species: common dandelion and narrowleaf hawksbeard. Although no regular inventories had been recorded for

this site, local park staff already knew of the presence of common dandelions and periodic control events had previously been conducted, although this work was not recorded in the Alaska EPMT database. There are no records of narrowleaf hawksbeard at this site although this population was much more extensive than the population of common dandelion. Both species were mapped, pulled, and stored in a sealed plastic bag until they were taken out of the park for disposal.

No invasive species were detected at the campsites, public use cabin or shoreline near the lodge site. In addition the recently acquired cabin located on the north side of the lake and several shorelines around the lake were inventoried. All areas were found to be free of invasive species. It is recommended that these sites continue to be monitored at regular intervals for the possible spread of invasive plants.

Discussion

Overall the 2010 season was successful in that data collected during the 2010 field season has created a better baseline of weed distribution within YUCH. EPMT staff reached the program's objectives for monitoring and treating narrowleaf hawksbeard at Slaven's Roadhouse and verifying that there was no spotted knapweed growing on the bank near Glenn Creek Cabin. Additionally, high use areas and public use cabins were inventoried within YUCH and GAAR. Understanding the biology of invasive plants and native ecosystems is necessary for finding effective ways to control and eradicate invasive species. This data will be used to create a more efficient plan of action for their management in future years.

Species of Concern

Bird vetch (Fig. 12) and narrowleaf hawksbeard (Fig. 13) were the most problematic species found during the 2010 field season.



Figure 12. Bird vetch was found at several public use cabins along the Yukon River.

This was the first year that bird vetch was documented within YUCH. This is a notorious invasive species with an invasiveness rank of 73 (Table 3) and is difficult to control using only manual methods. The discovery of bird vetch makes it the most potentially damaging invasive species infesting YUCH. If this species continues to spread it could disturb the growth of native vegetation throughout YUCH. The vine's ability to climb could threaten to harm the historical significance of some of the buildings within YUCH. For these reasons it should be a priority for treatment in the future. Specific sites that should be treated in the 2011 field season include the Coal Creek Dredge, Smith Cabin, Sam Creek Cabin, and Washington Creek Cabin.

Removal of narrowleaf hawksbeard at the Slaven's Roadhouse site was prioritized after the plant's discovery in 2005. Based on the data collected in 2010 this infestation seems to have fluctuated wildly in size since the 2008 treatment. This infestation and the infestation at Glenn Creek Cabin should be monitored to prevent any further spread of this species. The narrowleaf hawksbeard infestation found at Walker Lake in GAAR should also be controlled, in particular because there are currently few invasive species recorded in this area. With a current invasiveness rank of 54 (Table 3), the ecological impact of this plant is not fully understood and it is being revisited in

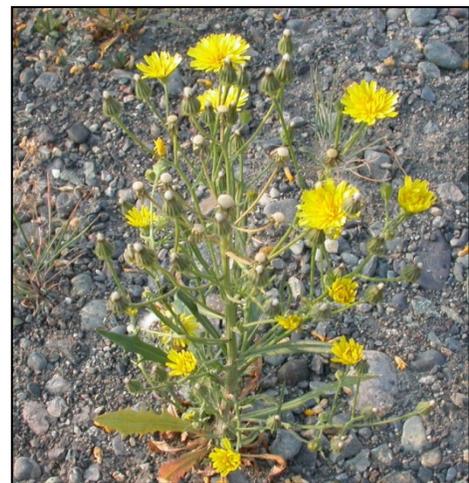


Figure 13. Narrowleaf hawksbeard.

the fall of 2010 to determine a new invasiveness rank. Seeds from the plant can spread long distances via wind dispersal and individual plants are capable of producing as many as 49,000 seeds (Royer and Dickinson 1999).

Recommendations for the 2011 Field Season

The first year of the invasive weed program in YUCH and GAAR faced unexpected challenges. Overall it was a very successful first year; however EPMT staff encountered certain logistical and planning issues that should be considered when preparing for future field seasons.

Surveys

The biggest stumbling block encountered during the field season involved coordinating travel to many different remote sites during the short field season in order to best fit the phenology of the plants themselves and increase the effectiveness of the surveys and treatments. Two surveys were taken at three of the public use cabins but most cabins were only surveyed once. It is very possible that species may have been overlooked due to plant phenology at cabins that were only surveyed once. The same time restrictions also prevented staff from conducting comprehensive control work at each of the cabins. For subsequent years it is recommended that these field surveys be organized and planned earlier in the season to make sure the time during the field season is used to the maximum extent possible. EPMT staff should survey the public use cabins along the Yukon River three times a season, in mid-June, July, and at least one by the end of August. One of these inventories should consist of floating the river to inventory the bank as it cannot be adequately monitored from a powered vessel. This should ensure that all currently documented infestations are visited when the species are identifiable but before they go to seed.

Not all high traffic areas in YUCH were surveyed during the 2010 field season. EPMT staff should try to revisit all areas that have previously recorded infestations each field season. In addition to the sites visited in 2010, EPMT staff should survey the NPS buildings in Eagle, Alaska, the entire ATV trail system surrounding Slaven's Roadhouse and CCC, Woodchopper Roadhouse, Woodchopper Creek mining area, 22 Mile Cabin, and Charley River.

During the 2010 field season there was only one visit to GAAR to survey for invasive plants. EPMT should try to schedule survey trips to other, more heavily visited areas of GAAR. However, given the short field season it is recommended that EPMT staff interview NPS field going staff on what species might already be detected, to tailor site visits in the most effective way possible.

Treatments

Due to time limitations only partial treatments were conducted at the Yukon River public use cabins during the 2010 field season. Several infestations were not controlled and were able to go to seed. Because the public use cabins are the main points of infestation on the river it is suggested that when the cabin sites are inventoried one full day is spent at each cabin in order to perform the necessary control work. Data was collected in 2010 that recommends the estimated amount of time needed to control each infestation. This should be used to plan a suitable treatment schedule in future years.

In addition to time restrictions, the EPMT staff found that the number of people was not adequate to keep the invasive species at CCC or Slaven's Roadhouse under control. Control

work at Slaven's Roadhouse by the thirteen members of Scout Troop 92 was limited to a two hour pull. CCC was treated for ten days, however even these small areas could not be kept weed free with only a two person team. It is suggested that work crews, such as those fielded by the Southeast Alaska Guidance Association or Youth Conservation Corps, be employed in the future to bring control work down to a reasonable level.

It was also found that hand pulling was ineffective in certain areas of CCC (Fig. 14). Common dandelion and plantain were controlled in an area behind the cookhouse during the first ten day work week. Less than five days later both species had returned. The same response was observed after removing common dandelion and common plantain on the ATV road to the employee cabins site. The quick return of these species is likely due to the EPMT staff's inability to pull the entire root of these invasive species. The soils at these sites are composed of gravel and very hard dry packed dirt. These areas are maintained as fire breaks and thus minimal native vegetation can be introduced to compete with the invasive species growing there.



Figure 14. An area at CCC near the wash house before (left) and after (right) treatment.

It is recommended that different options of management for this area be developed and analyzed. Hand tools were not tried in these areas and may be effective in removing plant roots. It is possible that there are native plants available in the area that would meet the fire management's minimal vegetation requirements. If little or no vegetation is the goal for these fire breaks then consider the use of gravel over a vegetation barrier. Selective herbicide treatments could also be incorporated with manual techniques to more efficiently control the species found in the area.



Figure 15. Areas which are surveyed for invasive weeds are also managed as fire breaks.

Fire breaks are another issue of concern for invasive plant management in YUCH. All vegetation is kept clear around historic structures in the park in order to control the movement of wildfires and to prevent major devastation to historical structures (Fig. 15). However, the maintenance of these vegetation-free zones creates an opening for the establishment of non-native vegetation and potentially spreads invasive weed seeds if the maintenance occurs during seed set in

infested areas. Additionally, fire personnel could move the seeds of invasive plants on their clothing and equipment as they travel throughout the preserve. The spread of invasive plant seeds could be controlled by completely treating the area or simply removing the seed heads of invasive plants growing on fire line areas prior to conducting maintenance work at these areas. This will require increased communication between the EPMT staff and fire management crews.

Outreach

Outreach was not a priority during 2010 field season. In future years it is recommended that EPMT staff talk at the interpretation, maintenance and fire staff spring trainings to educate employees in these divisions about invasive plant issues, identification, and prevention. Outreach materials and posters should be distributed at CCC and the Fairbanks headquarters to encourage staff traveling to other areas in the park to clean their gear and equipment.

Public outreach should also be conducted at the visitor center in Eagle, Alaska. The location is an ideal one to reach visitors, as river travelers often enter the preserve from Eagle. Outreach brochures, pamphlets, and identification guides should be stocked at the visitor center. EPMT staff should work with interpretive rangers to develop invasive weed programs and to ensure that visitor center staff are properly educated on invasive weed issues and identification. EPMT staff should also try and conduct specific outreach to any private landowners in and around YUCH and GAAR. Approaching these landowners in the spirit of cooperation and coordination could go a long way to preventing new infestations in both areas. Public outreach materials should also be made available to the Alaska Public Lands Information Center in Fairbanks as many visitors stop here first to plan backcountry trips and learn about Alaska's natural resources.

Prevention

The threat of new invasive species introductions into YUCH and GAAR remains a major concern. This should be considered by NPS management and prevention measures should be incorporated into daily actions of all NPS staff. The clothing and equipment of NPS employees and contractors should be cleaned and inspected before entering the park or if travelling from an area known to have invasive weed infestations. Many visitors and staff travel to areas in the park from areas with infestations of invasive plants. Cleaning clothing and equipment prior to entry into the park will help prevent the introduction of seeds into weed free areas.

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