BAER Invasive Plant Survey
Yukon-Charley Rivers National Preserve
Coal and Woodchopper Creek Watersheds:
2005 Fieldwork Report

Jeff Heys and Penny Bauder
Exotic Plant Management Team Biologists
National Park Service, Alaska Regional Office

Introduction

Summer 2005 marked the fifth year that surveys for non- native plant species were carried out on National Park Service (NPS) lands in Alaska. These surveys serve as the first source of data to be used in formulating a long- term control and monitoring plan for these species in Alaska's NPS units. Exotic plant species are a concern to resource managers because they threaten the genetic integrity of native flora through hybridization (D'Antonio et. al 2001), can outcompete resident plant species for limited resources, and can change the structure and function of ecosystems through alterations of geochemical and geophysical processes (Ruesnik et. al 1995, Gordon 1998), among other impacts. By 1996, exotic plant species had infested an estimated 7 million acres of NPS lands, with 4,600 acres of new infestations occurring daily (NPS 1996).

In Alaska, NPS lands have been considered relatively immune to the establishment of many pernicious exotic species found in the lower 48 states (Westbrooks 1998). Several factors have contributed to this immunity. The first is climate. Circumboreal plants are adapted to a wide range of climatic conditions that exotic plants cannot tolerate. In addition, parklands in Alaska have remained relatively free of anthropogenic disturbances such as livestock grazing, wildfire suppression, and altered hydrological regimes that encourage the introduction of exotic species. As a result, the remote wilderness areas of parks in Alaska still have all of their major floral and faunal ecosystem components (Densmore et. al 2001). Despite these protective factors, the threat of exotic plant invasion is increasing due to global warming and increases in human activity and development. Fortunately, the NPS has the opportunity to head off exotic plant introduction in Alaska before it becomes a major problem, but research and active management must begin now (Spencer 2001).

Despite that Yukon- Charley Rivers National Preserve (YUCH) has a history of anthropogenic settlement and disturbance, it has fared well with respect to invasion by exotic plants. This is due to its isolation and the relative scarcity of exotic plants in Alaska during the period of its mining history. The threat of invasive plants, however, grows with every passing year in Alaska, as new species arrive in the state and legacy species prosper and spread. The same goes for YUCH, especially because Fairbanks, the point of departure for many who come to YUCH, is increasingly infested with invasive plant species. If these plants are not prevented from arriving in YUCH or managed early in their establishment, they will be quite difficult to keep from spreading into the Preserve's pristine ecosystems and along the Yukon River to other parts of Alaska.

The primary purpose of the 2005 fieldwork in YUCH was to assess the possibility that invasive plants had spread onto lands burned during the summer of 2004 by the Woodchopper Fire. An additional purpose of surveys in YUCH during the 2005 field season was to monitor the baseline information collected at Coal and Woodchopper Creeks in 2002 by Chris McKee (formerly a biologist for the US Geological Survey's Biological Resource Division) on the distribution, abundance, and species composition of exotic plants. The updated information will be used to develop a long- term monitoring and control strategy for the park, to coordinate efforts among all the parks in the Alaska Region, and to contribute to the statewide effort to document and address this rapidly growing problem. Especially important for YUCH, the information can address the potential for burned lands to provide a vector for invasive plants to spread and become established in remote parts of Alaska.

Methods

Personnel for the fieldwork included Jeff Heys (Exotic Plant Management Team [EPMT] Liaison), Penny Bauder (EPMT Biologist), and Katja Mocnik (FirePro Technician). The method used to inventory lands for exotic plants was opportunistic sampling, focused on areas of human development and frequent use. All trails and associated structures in the Coal Creek drainage were inventoried from July 10 through July 14, 2005, for the presence, distribution, and abundance of exotic plant species. All off- highway vehicle (OHV) trails in the Coal Creek and Woodchopper Creek watersheds were inventoried by OHV, as were the airstrips in each valley. The trails included the upper and lower trails from Coal Creek Camp to Slaven's Roadhouse, the trail from the Roadhouse to boat access on the Yukon River, the upper and lower trails from Coal Creek Camp up the valley to their junction, the entire Coal Creek to Woodchopper Creek trail, and the trail up the Woodchopper valley from the camp to the airstrip (Figure 1). Coal Creek Camp, Slaven's Roadhouse, the Coal Creek Dredge, Woodchopper Camp, and their vicinities were exhaustively inventoried on foot. While the proposed work under the BAER plan specified a survey distance of 50 m from trails and structures, this was never necessary because all infestations were located within 10 m of them.

The 2005 field season marked the second year that extensive surveys for exotic plants were conducted on NPS lands by the Alaska Region's EPMT using highly accurate Trimble GeoXT GPS units. These units can achieve sub- meter accuracy and can be equipped with data dictionaries, enabling precise mapping and standardized data collection. They were used to map both infested areas and areas without exotic plants with detail sufficient for annual monitoring of spread. The data were collected for entry into two distinct databases: APCAM – the nationwide NPS database for exotic plant data – and AKEPIC – a collaborative,

web- based database for tracking Alaskan weeds – and they also conform to North American Weed Management Association (NAWMA) standards. Attributes were designed to describe the size, diversity, and severity of exotic plant infestations in a given area (Table 1), as well as to satisfy database requirements. Digital photos were taken at many sites to augment the data recorded on the GPS units. If exotic species were found in sufficiently low numbers, they were removed by hand. Species new to YUCH were collected as voucher specimens, as were those needing positive confirmation of identity.

ArcGIS (ESRI 2004) software was used to generate a shapefile that includes all GPS records collected, from which maps of survey results were generated (Figures 1 and 2). The number of data fields collected renders tabular display unwieldly, and so the GIS shapefile (GLBA_EPMT_2004) and associated attributes (in the .dbf) should be used for data viewing and analysis.

Results

In 2002, Chris McKee's survey revealed the presence of five exotic plant species in the Coal Creek watershed of YUCH (Table 2). Scentless false mayweed (*Tripleurospermum perforata*) was not relocated in 2005, despite a thorough inspection of its former collection site. Common yarrow (*Achillea millefolium*) is currently considered to be a complex of native and introduced species (D. Trock, pers. comm. 2005) and has thus been removed from consideration. The other four species – common lambsquarters (*Chenopodium album*), pineapple weed (*Matricaria discoidea*), common plantain (*Plantago major*), and common dandelion (*Taraxacum officinale* ssp. *officinale*) – remain in the watershed and have increased in abundance and distribution (Figure 2).

Five new exotic plant species were documented in the Coal Creek watershed in 2005. Two are of particular concern: smooth brome grass (*Bromus inermis* ssp. *inermis*), which is known to invade wetlands, and narrowleaf hawksbeard (*Crepis tectorum*), which is spreading rapidly in Alaska and is quite difficult to eradicate once it is well established. Shepherd's purse (*Capsella bursa- pastoris*), common pepperweed (*Lepidium densiflorum*), and prostrate knotweed (*Polygonum aviculare*) are common weeds of disturbed sites elsewhere in Alaska and have been documented by McKee at other sites, suggesting that they have arrived at Coal Creek since his 2002 survey within the last three. Confirmation of identification for a yellowcress species (*Rorippa* sp.) is currently in process. Finally, bird vetch (*Vicia cracca*) was reported from the area in 2004, but a thorough search failed to document it in 2005.

Except for the plantain, dandelion, and pineapple weed, all exotic plants documented by this effort were found either in the vicinity of the Coal Creek

Camp or that of Slaven's Roadhouse. On the upland trail between Coal Creek and Woodchopper Creek, no exotic species were found, but in the Woodchopper Creek drainage, common plantain was documented in large quantities as opposed to spot infestations (Figure 2). Acreages inventoried and controlled are shown in the map legend. It should be noted, however, that the actual area inventoried was much larger than shown in the legend, because these values were calculated with buffer values generally of 5 meters on either side of trails surveyed. In fact, these buffers could be extended to 100 meters or more, because no exotic plant was found more than 5 meters from a trail edge or developed area. Because the BAER plan specified a 50 meter buffer area, values were recalculated using GIS to reflect this, yielding a total of 988.629 acres inventoried, of which less than 42.53 acres were infested by exotic plants. "Less than" is used because within those acres, there were large spaces between individual plants. With an average percent cover of 1%, the actual infested area was less than 5 acres.

Five of the species discovered were treated by hand- pulling. Because of their high priority and small population sizes, smooth brome grass and narrowleaf hawksbeard were removed from all locations where they were discovered. For both species, however, non- flowering individuals are very easy to overlook, and so some may have escaped treatment.

Common pepperweed was the next most manageable species due to its limited distribution and abundance. Because of the likelihood of dispersing seeds during treatment, however, the control of this species was terminated before its completion. At their furthest distributions on the trail toward Woodchopper Creek from Coal Creek, common plantain and common dandelion were also treated in an attempt to prevent them from spreading further into the Preserve.

No species was observed to be growing directly on lands burned by 2004 wildfires. Common plantain and common dandelion, however, were found directly adjacent to burned lands at many sites, with the potential to spread into them over coming years.

Discussion and Management Recommendations

A doubling of the number of exotic plant species at Coal Creek in three years (2002- 2005) suggests that the interval of return should be shortened, and so the most important lesson from this year's findings is that the Coal Creek watershed needs to be monitored for exotic plant species annually. The Woodchopper Fire perimeter certainly needs to be re- examined in 2006, due to the possibility that exotic plants will establish on burned lands in the second summer after the fire rather than the first.

The two species of greatest concern for the Preserve, due to their potential ecological impacts, are narrowleaf hawksbeard and smooth brome grass. Both species are currently limited to very small infestations, and so their eradication should be quite feasible. Despite that both infestations were hand- pulled, experiences from other NPS units suggests that they will sprout again in 2006 due to the presence of a seed bank in the soil. It is extremely important that the narrowleaf hawksbeard be monitored and retreated throughout the summer, for this species has an incredible ability to set and disperse seed in a matter of days. The smooth brome grass behind the Coal Creek Camp Recreation Cabin should also be retreated, but this must be carefully done to limit soil erosion, and another species should be planted at the site to replace this species' stabilizing function.

The possibility exists to rid the Preserve of nearly every exotic plant species present, which would be quite an accomplishment. The only species found in the area that is not likely to be feasibly eradicated in the near future is plantain. The eradication of the other species, on the other hand, could only be efficiently accomplished through the use of herbicide.

Table 1. Selected fields used in GPS data dictionary and GIS shapefile for exotic plant surveys, summer 2005.

LocationID	Location ID (coal_creek)
Dstrbncs	Disturbance Type (e.g. fill importation, trampling, mowing, or abandoned homesite)
LctnDscrpt	Location Description
BufferM	Buffer distance (in meters) to convert points and lines to polygons
Taxon	Dominant exotic species
Phenology	Phenology of dominant exotic species (no_flower, full_flower, or in_seed)
CvrClssPer	Cover class percentage of dominant exotic species (1, 5, 10, 20, 30, 40, 50, 60, 70, 80, 90, 95, 100)
Action	Inventory or Treatment
Treatment	Treatment type (only PULL/DIG-MANUAL this year)
CntrlEffrt	Projected/actual control effort (low, medium, high)
Undetermined	Stem count of dominant exotic species
Remarks	Remarks
StartDate, StartTime	Date and time of site visit
AssocPark	Associated park (YUCH)
Recorder	Recorder (JAH = Jeff Heys, PSB = Penny Bauder)
Taxon2, Taxon3…	Additional 8 fields for 8 other exotic taxa for each unique site
Spatial Accuracy Fields	Range of attributes to describe spatial information and precision
Acres	GIS-calculated acreage of each infested or uninfested area

Table 2. Exotic plant species found in YUCH (Coal Creek) by year.

Species found in 2002/2004	Species found in 2005
common lambsquarters	common lambsquarters
Chenopodium album ssp. *album*	*Chenopodium album* ssp. *album*
pineapple weed	pineapple weed
Matricaria discoidea	*Matricaria discoidea*
common plantain	common plantain
Plantago major	*Plantago major*
common dandelion	common dandelion
Taraxacum officinale ssp. *officinale*	*Taraxacum officinale* ssp. *officinale*
scentless false mayweed	smooth brome grass
Tripleurospermum inodorum	*Bromus inermis* ssp. *inermis*
bird vetch	shepherd's purse
Vicia cracca	*Capsella bursa-pastoris*
	narrowleaf hawksbeard
	Crepis tectorum
	common pepperweed
	Lepidium densiflorum
not relocated in 2005	prostrate knotweed
new to YUCH in 2005	*Polygonum aviculare*

Figure 1. Area of survey in YUCH, 2005.

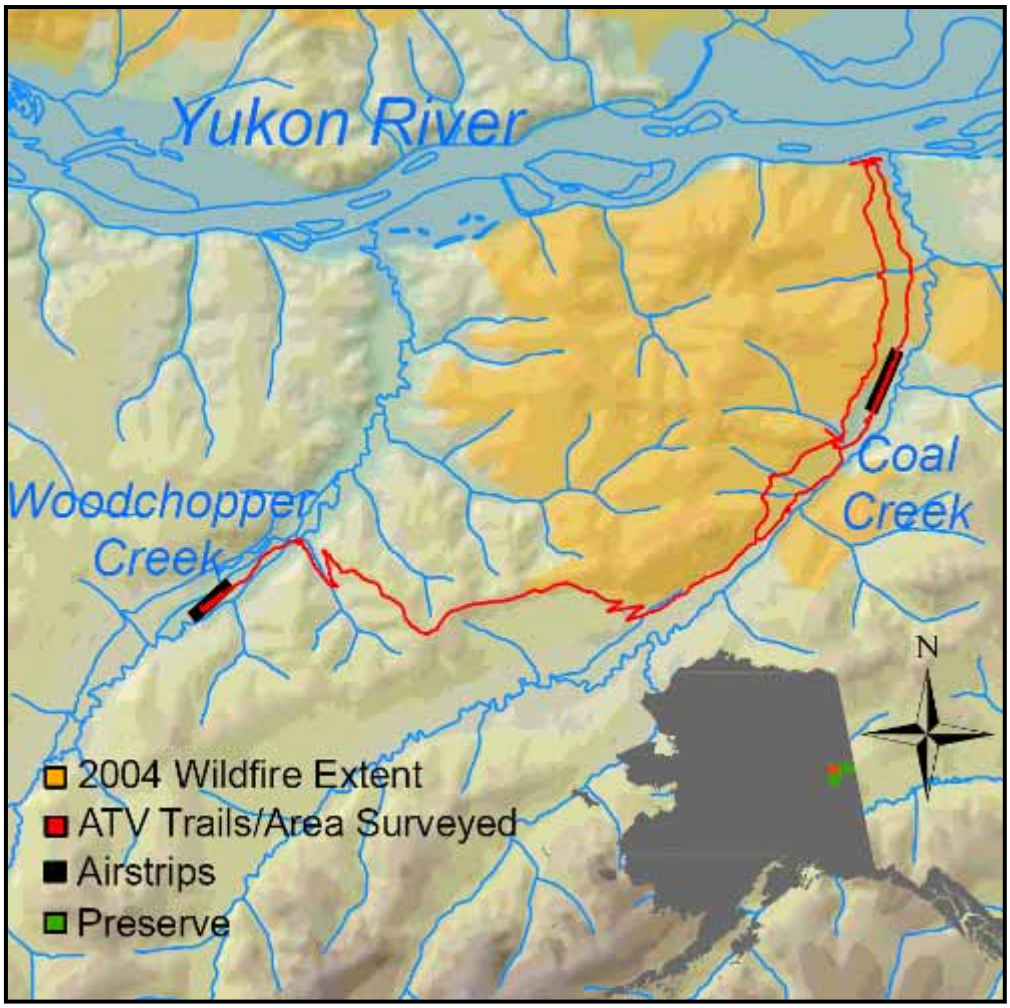
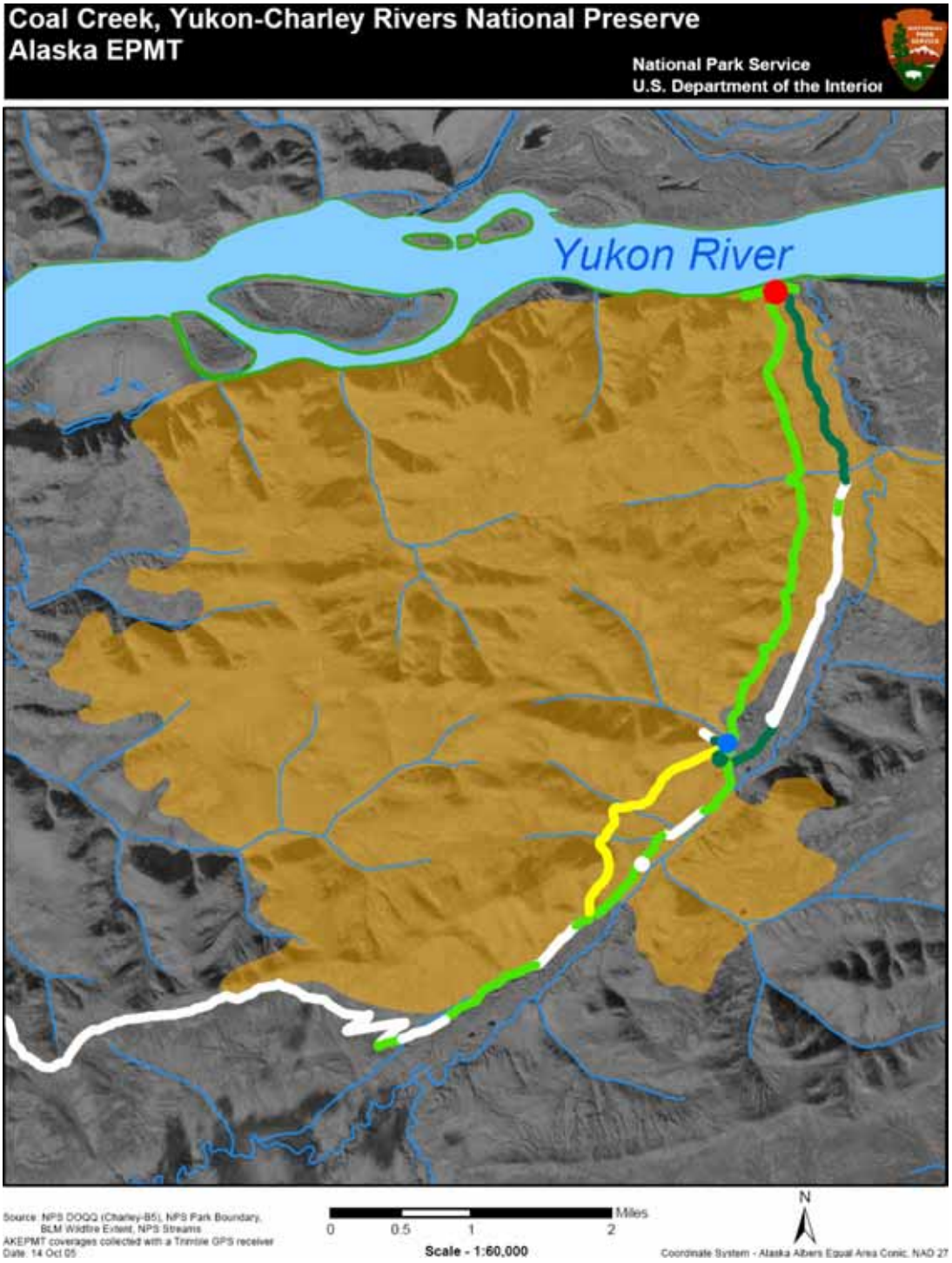


Figure 2. Exotic plant distribution in YUCH, 2005 (see legend on following page).



Inventory and Treatment Area

Preserve Boundary	
2004 Wildfire Extent	

Gross Infested Acres by Species

no exotic plants	50.30
common plantain	24.14
common plantain and dandelion	7.03
common plantain, dandelion, and pineapple weed	6.69
above species, prostrate knotweed, pepperweed, and smooth brome grass	2.55
above species and narrowleaf hawksbeard	2.02

Manual Treatment Acres

all smooth brome grass	0.02
all narrowleaf hawksbeard and smooth brome grass	0.08

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