EXOTIC PLANTS IN ALASKA NATIONAL PARKS
2002 FIELD SEASON REPORT

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Introduction

In 2002, field surveys were conducted to look for exotic vascular plant species in Alaska National Park units. The National Park Service (NPS) defines exotic species as those occurring in a given area as a result of human actions (Densmore et. al 2001). These species are of concern to the NPS because they can out compete native species, thereby altering the natural landscape, decreasing biodiversity, degrading habitats for native flora and fauna, and jeopardizing the genetic integrity of the affected parks (Allen and Hansen 1999). The purpose of the current study is to survey areas of current or historical human use within Alaska National Parks and compile a database of the locations and identities of any exotic vascular plants encountered in these areas. This report focuses on work I conducted in Yukon-Charley Rivers National Preserve (YUCH) and Gates of the Arctic National Park and Preserve (GAAR) during the 2002 summer field season.

Study Area

The parks surveyed during the 2002 field season were selected based on the potential logistical (read financial) problems accessing the areas of interest within these parks. It was decided that while money for access was available, the more remote parks would be surveyed first, in case future monies did not materialize. This concern, coupled with the researchers familiarity with the parks in question led to the decision to survey YUCH and GAAR in 2002.

Yukon-Charley Rivers Preserve is located in east-central Alaska near the border of Canada. The preserve lies within the interior basin climatic division of the state. Cold winter temperatures, low-level temperature inversions, and relatively warm summers characterize the area. Average annual temperatures range from -30^{o} to 25^{o} C. Average precipitation is extremely variable, ranging from 10 to 30 cm, and often occurs in the form of local severe thunderstorms during the summer months. Vegetation communities range from woodlands of spruce, cottonwood, birch, and aspen in the low lying hills, mesic shrub communities on the bluffs of the Yukon River, and dryas/ericaceous tundra in the high alpine (McKee 1999).

Gates of the Arctic National Park and Preserve is located in the central Brooks Range of Alaska. The area is characterized by two climatic zones: the subarctic zone at lower elevations and south of the Brooks Range, and the arctic zone to the north of the Brooks Range and at higher elevations (Swanson 1995). Yearly temperatures range from -30^{o} to 21^{o} C. Precipitation is low within the park, averaging between 30 to 45 cm in the south and 13 to 25 cm in the north (National Park Service 1986). Boreal forests cover the south side and valleys of the Brooks Range and are composed of black spruce, white spruce, birch, and cottonwood. Thickets of alder and willow occur along river corridors. Moist tundra predominates on the north side of the Brooks Range. It is composed primarily of cotton sedge and forms on poorly drained soils. Low willow thickets line stream channels and river valleys.

Survey Sites

Most of the areas of interest in YUCH consist of old mining claims and the disturbances associated with such operations. Specifically, I surveyed the Coal Creek drainage, including Coal Creek camp, the landing strip, the dredge and surrounding mine tailings, Slavens Roadhouse, and the old mining roads leading from Coal Creek camp to Woodchopper Creek to the southwest and Slavens Roadhouse to the northeast. In addition to the Coal Creek drainage, I also surveyed the upper reaches of Fourth of July Creek, a drainage with an intermittent mining history from the 1890's to the early 1980's. I surveyed the old cabin site and associated outbuildings, the airstrip, and the tailing piles.

In GAAR, I concentrated on areas receiving the highest human use in this relatively unvisited park. Areas with established impacts that the NPS refers to as Brooks Range Impact Monitoring (BRIM) sites were surveyed. BRIM sites are made up of consistently used camping sites or portage/hiking trails to and from popular areas of the park. Surveying these areas simplified my work and allowed me to key in on areas most likely to contain exotics. Specific areas surveyed included the

Arrigetch Creek area and surrounding Arrigetch mountain range, the Anaktuvuk River drainage from the village of Anaktuvuk Pass to Ernie Pass, Walker Lake, and the upper Noatak River from Twelve Mile Slough to Matcherak Lake.

Methods

Vascular plant lists were obtained from the NPS for both parks, to give me an idea of the types of species that might be encountered. Species lists compiled for each park by the Alaska Natural Heritage Program were also used. In addition, exotic plant species known to occur in Alaska were obtained from Hulten (1968). All nomenclatures followed either Hulten or Kartesz and Meacham (1999).

When an exotic or unknown plant was encountered, a standardized data collection protocol was used. For each plant encountered, an estimate of population size was made, along with a site description of associated habitat, GPS location, and digital photograph. In addition, an attempt was made to describe the type of disturbance with which the plant was associated (i.e. mining area, road, BRIM site number, etc.). Any unknown specimens encountered were collected and later identified using botanical keys.

Plant locations and associated site descriptions were compiled into an Excel database. This is a continuation of a database begun in 2000. The database contains the scientific name of plants based on the Integrated Taxonomic Information System (ITIS) (2001), the date they were encountered, elevation, latitude, longitude, population estimates (1-5, 6-25, 26-50, 51-150, 151-500, >500), notes on habitat and associated disturbance, and synonyms used by the herbarium at the University of Alaska. This database will be downloaded annually into the Alaska Exotic Plant Mapping Project (AKEPMP), a regional database system generating derived maps of exotic plant distributions in Alaska.

Results

Yukon-Charley Rivers National Preserve

The Coal Creek drainage of YUCH had the highest incidence of exotic infestation. Although exotic species diversity was low, the species that were present were often abundant in terms of numbers and coverage. A full list of species locations is included in Table 1.
A total of six exotic vascular plant species were found in this drainage: *Achillea millefolium, Chenopodium album, Matricaria discoidea, Plantago major, Taraxacum officinale,* and *Tripleurospermum inodorum*. All species were present in large numbers in the Coal Creek drainage except for *Tripleurospermum inodorum,* which consisted of only one specimen collected in the vehicle parking area at Coal Creek camp. By far the most abundant exotic in this drainage was *Plantago major,* which occurred at every waypoint for which data were collected. The exotic dandelion *Taraxacum officinale* was also a common exotic, particularly around Coal Creek camp. The composite *Achillea millefolium* was abundant along the old mining roads, but rare or absent at other disturbed areas in this drainage. This exotic also grew in mixed groups with the native species of yarrow, *A. borealis,* making taxonomic differentiation difficult, especially since plants were still in a rather early stage of phenolgy. Only plants in a sufficient stage of development were recorded and marked with GPS coordinates. The other exotic species were present in large but concentrated numbers around Coal Creek camp and Slavens Roadhouse. The total area covered by the survey in this drainage was approximately 400 acres. Of this acreage, approximately 25 acres were infested with exotic plant species.

Fourth of July Creek was surveyed during a one day surveying excursion. Only a small population of *Plantago major* (26-50 specimens) was found growing on a trail between the main cabin and workshop buildings. This species was confined to the immediate trail corridor by a thick growth of native grasses and ericaceous shrubs. All other areas of the mining operation were free of any exotics. The total area covered by the survey in this drainage was approximately 20 acres. Of this acreage, approximately $1/10^{th}$ of an acre contained exotics.

Gates of the Arctic National Park and Preserve

The only area of GAAR in which exotics were found was at Walker Lake (Table 1). A small (6-25) population of *Taraxacum officinale* was found growing in disturbed gravel at the old main lodge site on the southeast shore of the lake. This population was confined to the immediate lodge site and did not extend into adjacent undisturbed native vegetation. BRIM sites 8, 34, 35, 36, 41, 42, 43, 45, 47, 59, 61, 64, 123, 220, 221, and 222 were also surveyed, but yielded no exotics. The total area covered by the Walker Lake survey was approximately 80 acres. Of this acreage, approximately $1/10^{th}$ of an acre contained exotics.

The Arrigetch Creek area was surveyed in early July from Circle Lake to the upper Arrigetch Peaks. BRIM sites 13, 26, 27, 29, 30, and 46 were surveyed at Circle Lake and the immediate surrounding area. BRIM sites 14, 67, 74, 75, 77, 78, 79, 92, 107, 109, 110, 116, 129, 130, 146, and 149 covering the entire Arrigetch Creek area were also surveyed. None of these sites yielded any exotics, even at sites with heavy, repetitive human disturbance. The total area covered by the Arrigetch Creek survey was approximately 30 acres, with 0 acres of exotic infestation.

The Anaktuvuk River drainage was surveyed for approximately 25 miles over highly impacted All-Terrain-Vehicle (ATV) trails. Despite the high levels of human disturbance in this area, no exotics were found. The only area of interest was in the village of Anaktuvuk Pass itself, where a small population of smooth brome grass, *Bromus inermis*, was found on the edge of a runway access road. In addition, the airstrip in the village was seeded with a population of red fescue, *Festuca rubra*, of unknown genetic stock. The total area covered by the Anaktuvuk River survey was approximately 20 acres. Of this acreage, approximately $1/10^{th}$ of an acre contained exotics. None of the affected acreage was on NPS lands.

The Noatak River was surveyed for approximately 60 miles. BRIM sites 96, 164, and 165 were surveyed at Twelve Mile Slough, and sites 49, 50, 411, and 412 at Pingo Lake, 99 and 200 at Nelson Walker Lake, 52, 53, and 115 at Kugrak River, and 40, 51, and 199 at Lake Matcherak. No exotics were found at any of these BRIM sites, despite heavy and consistent human use in this river drainage. The total area covered by the Noatak River survey was approximately 50 acres, with 0 acres of exotic infestation.

Discussion

Both YUCH and GAAR have benefited from their relatively low visitor use in terms of the presence of exotics. During 2001, YUCH had approximately 1900 visitors and GAAR had approximately 1300 visitors (National Park Service 2002). The low visitor use combined with the difficulty of access and the large size of these park service units, make them much less vulnerable to exotic introduction than the more “urban” parks in the lower 48 states. However, visitor use is on the increase in Alaska national parks and many of the parks in the state are seeing increasing visitor service developments that could create vectors for exotic plant introduction. A large multimillion-dollar visitor center is being built along the Dalton Highway on the eastern edge of GAAR and the state is encouraging development of the road corridor. This could lead to an increase in visitors to the park from the road corridor, creating the opportunity for exotic introduction.

The biggest factor controlling the spread of exotics in Alaska is most likely climate. The long cold winters and short summers that are the rule in the state make it difficult for exotics species to increase their range. The most successful plant invaders require long growing seasons with relatively extended periods of frost-free days (Chicoine et. al 1985, Goodwin et. al 1999). GAAR in particular is characterized by a very short growing season (especially on the north side of the Brooks Range), and the park can experience snow and/or freezing temperatures during any month of the year. These factors, combined with a plant population adapted to very narrow climatic conditions make it difficult for exotic plants to gain a foothold. However, with the specter of global climate change being a very real threat, slight changes in global temperatures could be all that is needed for exotic plants to begin a larger invasion in Alaska national parks.

As for YUCH and GAAR, continued monitoring of disturbed sites by park service personnel is needed if the spread of exotics in these parks is to be kept in check. YUCH should closely monitor the

Coal Creek drainage in particular as it receives the highest number of visitors and because it is subjected to the most consistent anthropogenic disturbance regimes in the preserve. The Coal Creek drainage could serve as the source of exotics invasion throughout the rest of the preserve. GAAR personnel could effectively monitor the presence of exotics in the park by continuing to inspect BRIM sites over the long term. These sites receive the highest numbers of visitors and the most repetitive disturbances in this relatively pristine park. In addition, involvement of NPS resource managers with the AKEMP database would greatly improve communication with other land management agencies that have lands adjoining NPS units, thereby helping to minimize the spread of these species throughout the state.

Table 1. GPS locations for exotic plant locations in Yukon-Charley Rivers National Preserve and Gates of the Arctic National Park and Preserve, Alaska, 2002.

UNIQUEID	SPECIES PRESENT*	LATITUDE	LONGITUDE	PARK CODE	NOTES
WP001	TAOF, PLMA	65.3054034	-143.1538676	YUCH	In middle of road just past Coal Creek Camp
WP002	PLMA	65.3048674	-143.1585046	YUCH	In middle of Woodchopper road
WP003	PLMA, ACMI	65.3036564	-143.1670318	YUCH	Along 100 m length of road; Coal Creek
WP004	PLMA	65.3017500	-143.1712899	YUCH	More or less continuous from WP003
WP005	PLMA	65.2996743	-143.1815436	YUCH	Growing in middle and edge of Woodchopper road
WP006	PLMA	65.2986303	-143.1838234	YUCH	Along 50 m length of Woodchopper road
WP007	TAOF, PLMA	65.2982107	-143.1853198	YUCH	At junction of Woodchopper road and abandoned side road
WP008	PLMA, ACMI	65.2909533	-143.1907498	YUCH	
WP009	PLMA, ACMI	65.2862735	-143.2096316	YUCH	At junction of Woodchopper road and road leading to Coal Creek
WP010	PLMA	65.3059785	-143.1502875	YUCH	On edge of road just up from Coal Creek public use cabin
WP011	PLMA	65.3072100	-143.1488550	YUCH	On west side of road to Slavens
WP012	PLMA	65.3099067	-143.1458708	YUCH	West side of road to Slavens; lots of available sunlight
WP013	PLMA	65.3108254	-143.1453974	YUCH	On east side of road to Slavens
WP014	PLMA	65.3114994	-143.1441647	YUCH	More or less continuous from WP013
WP015	PLMA	65.3121050	-143.1434980	YUCH	Spread over 100 m area on west side of road to Slavens
WP016	PLMA	65.3142613	-143.1383334	YUCH	
WP017	PLMA	65.3150718	-143.1368312	YUCH	Spread over a 150 m area; lots of sunlight
WP018	PLMA	65.3178498	-143.1314188	YUCH	On west side of road to Slavens
WP019	PLMA	65.3194682	-143.1308268	YUCH	In disturbed gravel bed on west side of road to Slavens
WP020	PLMA, ACMI	65.3204619	-143.1305823	YUCH	In large turnout area; lots of available sunlight
WP021	PLMA, TAOF	65.3216911	-143.1285742	YUCH	Spread out over a 250 m area on road to Slavens
WP022	PLMA	65.3241615	-143.1269327	YUCH	In middle of road to Slavens
WP023	PLMA	65.3261770	-143.1243114	YUCH	East side of road to Slavens
WP024	PLMA, ACMI	65.3319470	-143.1244164	YUCH	
WP025	PLMA	65.3350442	-143.1222982	YUCH	More or less continuous from WP024
WP026	PLMA	65.3421211	-143.1258613	YUCH	In middle or road to Slavens; lots of sun
WP027	MADI, CHAL ACMI, TAOF PLMA	65.3508907	-143.1201864	YUCH	Exotic growing all over Slavens Roadhouse area and surrounding trails from Yukon River to Coal Creek
WP028	PLMA, ACMI	65.3443064	-143.1154650	YUCH	In middle of lower road from Slavens
WP029	PLMA, TAOF	65.3428505	-143.1163515	YUCH	
WP030	PLMA, ACMI	65.3415369	-143.1161761	YUCH	
WP031	PLMA	65.3346846	-143.1122346	YUCH	More or less continuous from WP030
WP032	PLMA, TAOF	65.3330734	-143.1113514	YUCH	On lower road from Slavens by tailings
WP033	PLMA, TAOF	65.3276014	-143.1148026	YUCH	
WP034	PLMA	65.3092302	-143.1351679	YUCH	On east side of Coal Creek airstrip
WP035	PLMA	65.3050282	-143.1432008	YUCH	On east side of road near Coal Ck airstrip
WP036	PLMA	65.3038850	-143.1499815	YUCH	More or less continuous from WP035
WP037	PLMA, MADI	65.3034562	-143.1513619	YUCH	On lower road just past Coal Ck. Camp
WP038	PLMA	65.3009619	-143.1535079	YUCH	
WP039	PLMA, TRIN	65.3042669	-143.1526146	YUCH	Growing in vehicle storage area; Coal Ck.
WP040	PLMA, TAOF MADI, CHAL	65.3053643	-143.1517493	YUCH	Growing around mess hall area in disturbed gravel; Coal Creek Camp
WP041	PLMA	65.1347366	-141.9853024	YUCH	Fourth of July mine
WP042	TAOF	67.1023372	-154.2756150	GAAR	Walker Lake lodge site

* See Table 2 for plant codes

Table 2. Exotic plant list for summer 2002 fieldwork in Yukon-Charley Rivers National Preserve and Gates of the Arctic National Park and Preserve.

Plant Name	**Plant Code**
Achillea millefolium	ACMI
Chenopodium album	CHAL
Matricaria discoidea	MADI
Plantago major	PLMA
Taraxacum officinale	TAOF
Tripleurospermum inodorum	TRIN

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