



# Invasive Plant Management for Klondike Gold Rush National Historical Park

## *2010 Summary Report*

Natural Resource Data Series NPS/KLGO/NRDS—2011/131



**ON THE COVER**

(from top left moving clockwise): Southeast Alaska Guidance Association crew pulling tall buttercup in a Dyea meadow; Student Conservation Association intern Jenny Busam monitoring reed canarygrass; volunteers at the Skagway Community Weed Pull; Jenny Busam, Taiya Inlet Watershed Council intern Alex Coberly, and biotech Jessica Wilbarger survey the Dyea Flats for invasive plants; Student Conservation Association intern Kassie Hauser uses GPS on the Dyea Road bike survey.

Photographs by: courtesy of Klondike Gold Rush National Historical Park

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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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## **Abbreviations**

AKDOT	Alaska Department of Transportation
EPMT	Exotic Plant Management Team
GPS	Global Positioning System
KLGO	Klondike Gold Rush National Historical Park
NPS	National Park Service
SAGA	Southeast Alaska Guidance Association
TIWC	Taiya Inlet Watershed Council

## Abstract

In 2010 the Klondike Gold Rush National Historical Park worked with the Alaska Exotic Plant Management Team to control existing invasive plant infestations and prevent their spread through the park and into the nearby continental interior. The 2010 season was the seventh year of the program. Alaska Exotic Plant Management Team crewmembers, park staff, and volunteers devoted approximately 3,410 hours to managing invasive species found in and around Skagway and Dyea. The Klondike Gold Rush Exotic Plant Management Team staff surveyed 269.9 acres in total, including 60.8 acres infested with invasive species. Of these infested acres, approximately 9.8 were treated during the 2010 season – 0.5 on NPS managed lands. Discoveries of particular concern include the reappearance of yellow toadflax (*Linaria vulgaris*) in Dyea and ornamental jewelweed (*Impatiens glandulifera*) found in two locations in Skagway. The known infestation of white sweetclover (*Melilotus alba*) at the airport returned but had diminished from last year. All white sweetclover plants found at the airport were pulled before going to seed. Over thirty volunteers participated in the Skagway Community Weed Pull, removing 365 pounds of invasive plants from the airport medians. Invasive plant management in Klondike Gold Rush National Historical Park is focused on early detection and eradication in backcountry and undeveloped frontcountry areas and containment on road systems in the park and in the town of Skagway.

## **Acknowledgments**

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Finally, the authors would like to acknowledge all of the indefatigable volunteers who worked during the 2010 season to keep Alaska's wilderness pristine at Klondike Gold Rush National Historical Park. Numerous people were integral to the success of the program including those who attended the Skagway Community Weed Pull, the Southeast Alaska Guidance Association youth and adult crews, and the countless citizens who worked to educate others and control invasive plants throughout Skagway. Their hard work and dedication is greatly appreciated.

# Introduction

Alaska Exotic Plant Management Team (EPMT) staff have been controlling invasive plants in and around Klondike Gold Rush National Historical Park (KLG0) for seven seasons. Many characteristics of KLG0 make the park particularly vulnerable to the introduction and spread of invasive plants. The park is located in the Skagway and Taiya River Valleys, two diverse regions with varied levels of visitor use. Invasive plant disturbance levels vary greatly by geographic location in the park making invasive plant management in one section completely different than the other.

The valleys surrounding Skagway contain a multitude of ecological zones ranging from lowland tidal flats near sea level to high-alpine meadows above 4,000 feet. Within these zones, the Chilkoot and White Passes act as rare glacier-free conduits between the coastal rainforest and the dry continental interior (DeLost 2004). The historic Chilkoot Trail originates near the site of the former town of Dyea and follows the Taiya River up to the Chilkoot Pass into Canada while the motorized Klondike Highway connects to Skagway via the White Pass. Both tourism and local road maintenance operations are prime vectors for the spread of invasive plants.

The boundaries of KLG0 are unique in that there are three separate units of the park interspersed within private, municipal, United States Forest Service, and state-owned property. The three separate park units are: Skagway, the Dyea-Chilkoot Trail Unit, and the White Pass Unit, all of which are connected by roads but have few other shared qualities (fig. 1). All three units have varied levels of visitor use, biology, and terrain making invasive plant control different for each location and emphasizing the need to control invasive plants adjacent to park property.

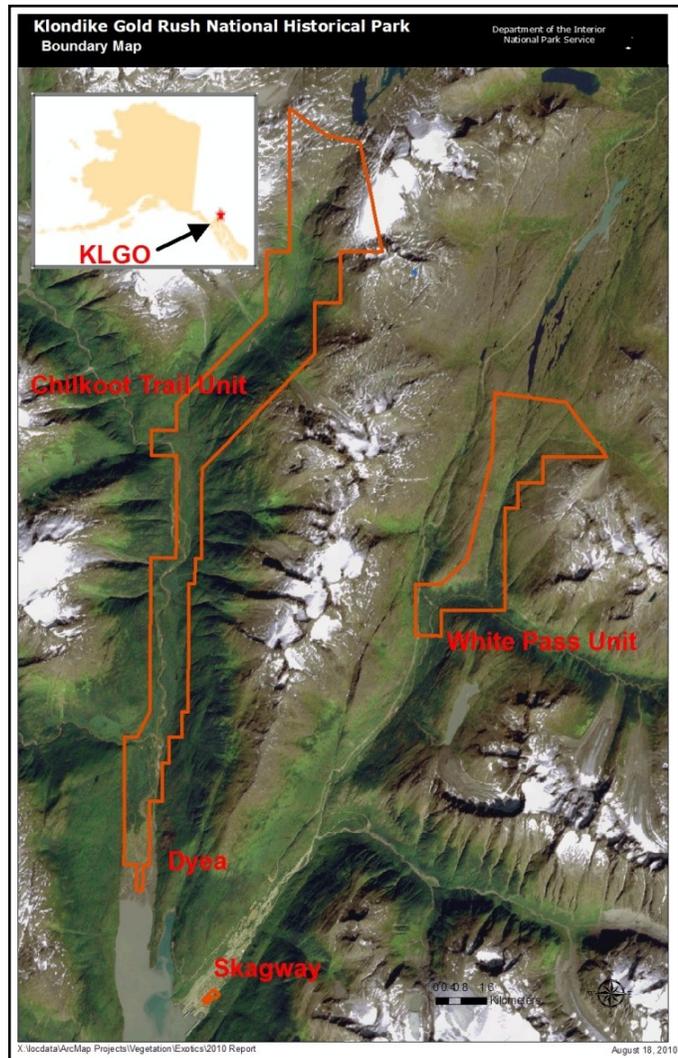


Figure 1. Boundary map of Klondike Gold Rush National Historical Park.

The town of Skagway is the first KLG0 unit that most visitors experience. This bustling tourist town sees approximately 800,000 visitors arrive via cruise ships, ferries, airplanes, and cars

during the summer tourist season. Many of these visitors go on to traverse the other park units by car, foot, horse, train, in rafts and on bicycles.

Skagway is also known as the garden city of Alaska. Gardening is a hobby for many citizens of Skagway and with gardening can come the introduction of invasive plants with the potential to escape and grow where they are not wanted. This is the case in Skagway where invasive plants have become a problem. EPMT work within the town of Skagway has focused on control of the most aggressive invasive species and containment of the others in order to keep them out of the more remote units of the park: Dyea and the White Pass.

The Dyea Unit of KLGGO is connected via the Dyea Road to the city of Skagway and the Klondike Highway. Tour busses, rental cars, bicycles and pedestrians all use this road to gain access to the former town of Dyea and the Chilkoot Trail. Many guide companies accompany tourists to the area to go hiking, rafting, or horseback riding through the park. The infestations of invasive species in the Dyea Unit are mostly contained to disturbed fill sites and roadsides. Monitoring and control work has been emphasized in Dyea to keep infestations small and catch any possible invasive species that have traveled via the road system before they get out of control.

The White Pass Unit of the park is the most remote unit of KLGGO. East of the Klondike Highway, this unit is mainly accessible via the popular White Pass and Yukon Route Railroad. This is the only way visitors see the White Pass Unit save for very few intrepid hikers. The possibility for invasive species in the White Pass Unit is mainly confined to areas closest to the Klondike Highway and near the train tracks.

KLGGO has implemented the first stages of invasive plant management at the park. Program milestones of the past seven years include—an accurate inventory of invasive plants in and around the park, the implementation of an annual monitoring plan, and the implementation of a fast-acting control plan for emerging infestations. Specifically, the KLGGO EPMT has focused on early detection and eradication of small infestations throughout the park, periodic inventories of the White Pass Unit and Chilkoot Trail, and monitoring and control of invasive species in Dyea, Skagway, and along the Dyea Road. This early response approach to emerging infestations coupled with increased public education and awareness has helped to keep the threat of invasive species manageable in KLGGO.

This report details the status of invasive plants in and around KLGGO and draws conclusions on best management practices for the future of invasive plant management in the area.

## Objectives

The KLGO EPMT's objectives for the 2010 season were as follows:

- Monitor and control infestations of high priority in Dyea
- Monitor and contain highly invasive infestations in Skagway
- Keep infestations in Skagway and along the Dyea Road from expanding, especially those not present in other areas of the park
- Survey backcountry areas of the park for any invasive species
- Educate the public on the threat invasive species pose to Alaska's native ecosystems

Control of individual infestations was prioritized based on the location of the infestation and the invasiveness ranking of the species in question. Invasive species with higher invasiveness rankings were considered a priority for management. The invasiveness ranking system is a 1 to 100 scale which incorporates four categories for each species: potential impacts to the ecosystem, biological attributes such as growth rate and method of reproduction, distribution, and effective control measures (Carlson et al. 2008). Control efforts have been designed to contain invasive plants to Skagway and the surrounding road system, while infestations growing in undeveloped frontcountry and backcountry park areas have been targeted for eradication. The combined prioritization of invasiveness ranking and geographical location create a monitoring and control strategy with the goals of stopping the spread of invasive species coming from Skagway to other areas of the park and into the continental interior.



## Methods

The KLGO EPMT staff used reports and recommendations from previous years to inform staff on how best to prioritize the 2010 summer work plan. Factors considered included infestations locations, species, select equipment, control methods, and personnel available. Methods of mapping and data collection were taken from the Alaska EPMT 2010 Field Protocol (Million and Rapp 2010).



**Figure 2.** Tools used near cultural resource sites minimized possible damage to artifacts.

In order to prevent invasive weed management activities from impacting to cultural resources within the park, protection methods were outlined in a resources integration meeting with the archeology department at KLGO. KLGO archaeologists Anya Rardin and Shawn Jones developed field protocols for the EPMT crew to follow. Tools were selected that would do the least amount of damage to any potential cultural resource that could be uncovered while conducting control work in the Dyea townsite (fig. 2). Additionally, a cataloging system was created and utilized for any artifact that might be found.

### Defining Work Areas

KLGO and surrounding lands were divided into six work areas to facilitate planning of seasonal field work. These work areas were drawn around major roads, population centers and other large landscape features of interest. Results and recommendations in this report are divided by work area. The six work areas are:

1. Nelson Slough Restoration Site
2. The Chilkoot Trail
3. Dyea
4. The Dyea Road
5. Skagway
6. Klondike Highway and White Pass Unit

Park lands in the first three areas are managed with the goal to eradicate all infestations. The last three areas are managed to prevent the spread of invasive species into surrounding park and wilderness areas. For maps on each of these areas see the appendices.

Although the Nelson Slough and Chilkoot Trail are in the Dyea Unit of KLGO, the Nelson Slough restoration site is treated separately due to the high concentration of invasive species. The Chilkoot Trail is treated separately because of its remote location and relative inaccessibility.

### Prioritizing Species

Discussions in 2006 between KLGO Natural Resources staff and Alaska EPMT staff resulted in the compilation of a list of the following six high priority species for management: bird vetch (*Vicia cracca*), common tansy (*Tanacetum vulgare*), white sweetclover, oxeye daisy (*Leucanthemum vulgare*), yellow toadflax, and narrowleaf hawksbeard (*Crepis tectorum*). Along

with these species, common eyebright (*Euphrasia nemorosa*) was recognized as a local species of priority, due in large part to its limited distribution and recent appearance within park lands.

2010 KLG0 EPMT staff adopted the work plan formulated in the 2006 management strategy recommendations, though several changes were included to account for new conditions. The EPMT staff decided to only monitor bird vetch for the 2010 season after several years of continuous control work produced no discernable measure of control in 2009. Plans are being made to work with the City of Skagway in 2011 to remove the bird vetch. Monitoring and control work was continued for the five other high priority species. Additionally, ornamental jewelweed is another species of concern not previously identified by the 2006 review and work plan; this species was monitored and pulled in parts of Skagway beginning in 2009 (fig. 3). Of the three infestations of ornamental jewelweed identified in 2009, one infestation was treated by hand pulling, one was left alone due to its location on private property, and the final infestation is thought to be eradicated but will continue to be monitored.



**Figure 3.** The invasive ornamental jewelweed is found in two locations around Skagway.

Additionally, tall buttercup (*Ranunculus acris*) and creeping buttercup (*Ranunculus repens*) were listed as priority species for the 2010 season, especially in Dyea. The infestations of tall buttercup were controlled as they were threatening to choke out native plant populations. The full list of invasive species identified by the park can be found, listed with common and scientific names, in Appendix A.

### **Tools for Identification and Data Collection**

The primary field guides referenced for plant identification during the 2010 season were Hitchcock and Cronquist (1973) and Pojar and MacKinnon (1994). Hultén (1968) was used to confirm plant identification. The online database, E-Flora BC (University of British Columbia 2010), was used as an additional reference. Pressed specimens of most of the plants encountered were available for reference at the KLG0 herbarium.

Spatial data depicting invasive plant infestations were collected using two global positioning system (GPS) units, the Juniper Systems Archer, and the Trimble Recon<sup>®</sup> with Trimble ProXT<sup>®</sup> and Trimble Hurricane L1<sup>®</sup> antenna. Each of these GPS units is set to be accurate within zero to five meters in compliance with the 2010 Alaska EPMT field protocol (Million and Rapp, 2010). Trimble Pathfinder Office 4.0<sup>®</sup> was used to correct and edit the data. GPS positions were differentially corrected using data from the continuously operating reference station located at Gustavus, Alaska.

Processed data were sent to the Alaska EPMT regional office for entry into the National Park Service (NPS) Alien Plant Control and Management database every two weeks. GPS data were

also converted to ArcMap® shapefiles for use in KLGO geographic information system projects and the Alaska regional invasive plant geodatabase.

### **Control Methods**

The primary control method employed for invasive plant removal was hand pulling, occasionally with small hand tools which allowed for the most selective and low impact control. The greatest concern with this method was that the entire root system be removed with the plant. Plants with just a single tap root pulled easily, but those with rhizomatous root systems needed special care to remove the entire root system. Most of these plants can grow back from just a small portion of root left in the soil. This has been observed in previous years with common tansy, yellow toadflax and oxeye daisy.

All removed plants were bagged on site, weighed in the KLGO maintenance building, and then burned in the Skagway city incinerator. This method ensured the least amount of seed dispersal between locations. Care was also taken to ensure bags used in town were not reused outside of Skagway due to the possibility for unwanted seed dispersal.

The use of chemicals for invasive plant control is not widely employed by the NPS in Alaska at this time. The Alaska Region Invasive Plant Management Plan created a protocol for decision-making regarding the use of chemical control (NPS 2010). This plan will be utilized in 2011 to consider the possibility of herbicides for the infestations of reed canarygrass (*Phalaris arundinacea*) and bird vetch.

### **Personnel**

The 2010 KLGO EPMT season saw an increase in personnel from previous years with the additional help of two Southeast Alaska Guidance Association (SAGA) crews. SAGA is an AmeriCorps affiliated non-profit organization that conducts service projects throughout the state of Alaska. An adult SAGA crew worked with the KLGO EPMT from June 28-July 9 and a high school SAGA crew followed from July 12-23. Thirty volunteers assisted with invasive plant management at the Skagway Community Weed Pull. These volunteers almost entirely controlled the white sweetclover infestation at the airport in a single afternoon before any of the plants had gone to seed. Due to the volunteers' productive work, the KLGO EPMT program was able to decrease focus on the airport allowing control work to increase in other locations.



## Results

In 2010 KLGO EPMT staff and volunteers inventoried 280.151 acres and treated or retreated 9.864 infested acres of invasive species within and around the park. A total of 3,105 field hours were logged by EPMT staff and volunteers this season. The KLGO EPMT crew spent a total of 1,825 hours working on a number of different activities including: control work consisting of all removal work; GIS and GPS work including mapping infestations, uploading and editing rover files and managing GPS units, and survey time; and office and administrative tasks which includes data management, research, report writing, planning, outreach, training and travel.

The park also tracks control work by acreage, measuring the season's accomplishments against goals set for the exotic plant management program in accordance with the Government Performance Results Act. The park sets goals for the acres of previous infestations found to be eradicated, the size of infestations that are being controlled, and the acreage of the plants actually pulled. KLGO EPMT matched or exceeded all of the GPRA goals set for the park in 2010. Tables 1 and 2 summarize EPMT work conducted in 2010.

**Table 1.** Summary of Klondike-Gold Rush National Historical Park Exotic Plant Management Work.

Year	Invasive GPS Data* NPS Lands(non-NPS lands)		
	Species Acres Surveyed	Species Acres Infested	Acres Treated
2004	43.531 (52.497)	7.838 (6.842)	0.792 (1.505)
2005	3.106 (6.450)	3.099 (2.617)	0.732 (2.436)
2006	63.145 (74.350)	4.577 (2.308)	2.912 (0.726)
2007	1.481 (7.673)	0.487 (5.513)	0.011 (1.676)
2008	5.842 (47.974)	2.063 (22.159)	0.235 (1.351)
2009	11.931 (83.259)	2.453 (21.645)	0.388 (2.504)
2010	34.638 (245.513)	3.914 (56.212)	0.502 (9.362)

\* All acreage was calculated using January 2010 NPS land status. Acres infested 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%. Acres treated are calculated by taking the acres infested that were labeled as treated and applying the percent of the infestation treated.

**Table 2.** Summary of the 2010 invasive plant acres in Klondike Gold Rush National Historical Park.

Species		AKEPIC ranking	Chilkoot Trail	Dyea	Dyea Road	Klondike Hwy	Skagway	White Pass
Latin Name	Common Name							
<i>Capsella bursa-pastoris</i>	shepherd's purse	40	-	-	-	-	0.488	-
<i>Crepis tectorum</i>	narrowleaf hawksbeard	54	-	0.003	0.185	-	8.083	-
<i>Euphrasia nemorosa</i>	common eye-bright	-	-	0.300	0.003	-	-	-
<i>Hordeum jubatum</i> <sup>1</sup>	foxtail barley	63	-	-	-	-	0.015	-
<i>Impatiens glandulifera</i>	ornamental jewelweed	82	-	-	-	-	0.012	-
<i>Leucanthemum vulgare</i>	oxeye daisy	61	-	0.062	0.096	0.253	0.182	-
<i>Linaria vulgaris</i>	yellow toadflax	69	-	0.001	0.002	0.011	1.769	0.001
<i>Lupinus polyphyllus</i>	large leaf lupine	-	-	0.053	-	-	-	-
<i>Matricaria discoidea</i>	pineapple weed	32	-	0.013	0.028	0.056	2.381	-
<i>Melilotus alba</i>	white sweet clover	81	-	-	-	0.033	2.986	-
<i>Phalaris arundinacea</i>	reed canarygrass	83	-	-	0.001	0.026	-	-
<i>Plantago major</i>	common plantain	44	-	0.200	2.702	0.011	1.430	-
<i>Polygonum aviculare</i>	prostrate knotweed	45	-	-	-	0.019	0.503	-
<i>Ranunculus acris</i>	tall buttercup	54	-	1.617	1.656	0.011	1.685	-
<i>Ranunculus repens</i>	creeping buttercup	54	-	0.226	0.124	-	0.628	-
<i>Rumex acetosella</i>	common sheep sorrel	51	-	0.307	2.755	0.055	5.400	-
<i>Rumex crispus</i>	curly dock	48	-	-	0.001	0.031	0.798	-
<i>Senecio vulgaris</i>	common groundsel	36	-	-	-	0.011	0.494	-
<i>Silene noctiflora</i>	nightflowering silene	42	-	-	-	-	0.466	-
<i>Sonchus arvensis</i>	perennial sowthistle	73	-	-	-	0.011	1.122	-
<i>Tanacetum vulgare</i>	common tansy	57	-	-	0.001	-	-	-
<i>Taraxacum officinale</i>	common dandelion	58	0.025	0.446	5.709	0.025	3.552	0.136
<i>Trifolium hybridum</i>	alsike clover	57	-	-	0.923	-	1.516	-
<i>Trifolium pratense</i>	red clover	53	-	0.046	0.312	-	1.445	-
<i>Trifolium repens</i>	white clover	59	0.001	0.376	3.334	0.055	3.174	0.081
<i>Vicia cracca</i>	bird vetch	73	-	-	-	-	0.011	-
<i>Viola tricolor</i>	Johnny jump-up	-	-	-	-	-	0.019	-

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 but may still be controlled in certain areas due to the impacts on domestic animals.

## **Nelson Slough Area**

Native plants in the restoration site are thriving despite the presence of invasive species. Common dandelions (*Taraxacum officinale*), common plantain (*Plantago major*), red clover (*Trifolium pratense*), white clover (*Trifolium repens*) and alsike clover (*Trifolium hybridum*) cover most of the ground along the edges of the restoration site along with native Nootka lupine (*Lupinus nootkatensis*) and wild-flag iris (*Iris setosa*). The aforementioned invasive species were not a focus of regular control because the natives appear to be unaffected by the invasive ground cover. Common eyebright was detected and controlled in one patch in the southeast corner of the restoration site. A few scattered stems of common eyebright were detected and controlled throughout the site. These infestations can be seen on the map in Appendix B.

The tall buttercup infestation appeared to be larger than recorded in previous years. A SAGA crew and KLGO EPMT spent four hours uprooting the tall buttercup in the restoration site, potentially reducing the infestation. The Nelson Slough Area was revisited weekly by KLGO EPMT staff to monitor and control common eyebright and tall buttercup.

## **Chilkoot Trail**

The Chilkoot Trail was surveyed this season for the first time since 2006. Data were collected from the trailhead to Sheep Camp with few invasive species found. All infestations found were recorded near the Canyon City campground and the Sheep Camp ranger station. The map of the survey is available in Appendix C. Patches of common dandelion and white clover were found at Canyon City. An infestation of common dandelion was found at Sheep Camp. No tall buttercup was found, suggesting the species has been eradicated since it was detected and pulled in 2009. No control work was done on the Chilkoot Trail in 2010. The Canadian side was not mapped for invasive species due to a low GPS receiver battery and poor satellite reception though low priority invasive species (white clover, common plantain, and common dandelion) were noted near the train station at Lake Bennett. A map of all of the surveys conducted during the 2010 EPMT season can be found in Appendix D.

## **Dyea**

The Dyea unit continues to be the focal point of invasive plant management in KLGO. It is the most heavily used and accessible natural site in the park. Except for common dandelion and one or two species of lesser concern, the invasive plant infestations lie in disturbed sites adjacent to roads. Large leaf lupine was not detected at all in Dyea this year suggesting eradication of the species. The creeping buttercup monitored and controlled in 2009 at the Lost Lake Trailhead was not detected this year. The narrowleaf hawksbeard infestation between the Taiya River bridge and campground was found greatly diminished, allowing EPMT staff to monitor and control the infestation in less than an hour once every month. Maps of these infestations are located in Appendix E.

A SAGA spent multiple days controlling invasive species in a large meadow south of the Nelson Slough restoration site (fig. 4). The meadow is full of thriving native plants but also an increasing amount of tall buttercup. This meadow is also the location of the only infestation of yellow toadflax in Dyea. One SAGA crew spent four days uprooting tall buttercup starting at the edges of the infestation, and another SAGA crew spent one day removing the heads of the flowers to prevent the plants from going to seed. KLG0 EPMT monitored and controlled the small yellow toadflax infestation twice monthly. The final control method involved digging up a portion of the soil in which the yellow toadflax was recurring.



**Figure 4.** SAGA crew controlling tall buttercup in Dyea.

Common eyebright was recorded again in Dyea, but most of the infestation was confined to a small highly trafficked area. A SAGA crew spent two full days controlling common eyebright in this location. The decision was made to focus on containment as opposed to eradication of this particular common eyebright patch because the location should be considered a disturbed area. The location is within a very busy horse and walking trail next to a parking area and is overrun with pineapple weed (*Matricaria discoidea*), red, white and alsike clovers in addition to common eyebright. It was decided that this spot should be carefully monitored and contained. The common eyebright in this spot is not choking out other native plants and therefore received less control work.

One infestation of oxeye daisy was found north of the Taiya River Bridge in late July. A SAGA crew spent two hours controlling this infestation. Due to the late discovery of the patch, some of the plants may have gone to seed.

The control of tall buttercup in Dyea was mostly confined to the Nelson Slough restoration site and the large meadow south of the restoration site. A SAGA crew spent two hours uprooting tall buttercup in a smaller meadow along the townsite road and another two hours walking the townsite road and clipping tall buttercup flowers to prevent it from spreading its seeds. Additionally, a SAGA crew spent a day manually removing tall buttercup found in small patches on the north end of the Dyea Flats.

## Dyea Road



**Figure 5.** SCA intern Kassie Hauser mapping on the Dyea Road bike survey

The entire Dyea Road was surveyed on bicycle this season (fig. 5). The survey was conducted in June, started at the end of the West Creek Road, and finished at the intersection of the Dyea Road and the Klondike Highway just outside of Skagway city limits. Twelve miles of road were surveyed. Very few invasive species were found on the West Creek Road, though a small infestation of common plantain and dandelion were located near the shooting range. Narrow-leaf hawksbeard and tall buttercup were found in scattered patches along the Dyea Road, while oxeye daisy and yellow toadflax were located on the two mile stretch of road nearest Skagway. Reed canarygrass was also monitored later in the year. Maps of these infestations are located in Appendix F.

Invasive plant control is particularly important on the Dyea Road because the road can act as a conduit for plants introduced in Skagway to reach park lands. For example, yellow toadflax is common in Skagway gardens and has been spotted moving further along the Dyea Road away from town over the last few years. This scenario could happen with other invasive plants in the years to come making monitoring, control and prevention on the

Dyea Road a vital part of KLG0 invasive plant management. The control of invasive plants on the Dyea Road is also difficult, due to the fact that much of the land adjacent to the road is private property.

Many of the large, high priority infestations were controlled earlier than expected in 2010, thanks to the reduced extent of some infestations from years past, a productive Community Weed Pull Day, and a diligent SAGA adult crew. These factors allowed the EPMT crew to focus more energy than planned on controlling infestations along the Dyea Road. A SAGA crew spent two days pulling tall buttercup and narrowleaf hawksbeard starting at the Taiya River Bridge and continuing up the road three miles. The EPMT staff along with other natural resources staff spent two days a month in June, July, and August controlling invasive plants on the first two miles of the Dyea Road closest to Skagway. These infestations of yellow toadflax, tall buttercup, and narrowleaf hawksbeard were easier to control with two to four people at a time. A SAGA crew focused on the tall buttercup infestation on the Klondike Highway right before the Dyea Road turnoff. This location was chosen because it was a safe spot for the younger crew to be working, and a large enough infestation for a crew of that size. A SAGA crew spent five days between the Skagway River Bridge and the Dyea Road turnoff controlling tall buttercup, oxeye daisy and yellow toadflax. A large infestation of narrowleaf hawksbeard was discovered near the cemetery between mile marker one and two on the Dyea Road. KLG0 EPMT staff and one volunteer spent an entire day controlling the infestation.

The oxeye daisy infestations scattered along the road did not appear to increase from last year. The patches were monitored throughout the season, but not heavily controlled due to landowners

nearby who strongly object to the removal of the plant. Some of the infestations on public land were pulled just before the plants had gone to seed, while the infestations on or near private property were only monitored.

The patch of reed canarygrass found last year at the edge of the paved section of the Dyea Road was mapped but not hand controlled this season, as the Skagway municipality expressed interest in partnering with the park to treat the infestation with herbicide. The municipality did not apply herbicide this year but will consider it again next year. The infestation does not appear to have grown from last year, and no other infestations were found.

## Skagway

The busy garden city of Skagway continues to be overwhelmed with invasive plants. A concerted effort between the park, local government and residents is necessary to address the underlying causes of the problem: private gardens where invasive ornamentals are planted but not contained, and disturbed or bare soil on public property where spreading plants can establish themselves. The Taiya Inlet Watershed Council (TIWC) continues to be an instrumental partner with monitoring and control work throughout the town. With so many existing infestations, KLGO and TIWC's goal in past years and in 2010 has been to contain the problem. More specifically, KLGO and TIWC are focusing on controlling the most highly invasive plants in high-traffic areas in an effort to stop the spread of invasive plants to park and wilderness lands outside of town.. The invasive species found in Skagway are mapped in Appendix G.

The surveys of Skagway this season showed that the town continues to be a hotbed of invasive species. Of the six species of concern identified in 2006 (Schultz 2006), i.e. narrowleaf hawksbeard, yellow toadflax, oxeye daisy, bird vetch, and white sweetclover, all were observed last year and reappeared this season. Additionally, the highly aggressive ornamental jewelweed was found in two locations around town. One site, located on private property, was monitored. The other site in an unoccupied private lot was controlled.

Though greatly reduced from last year, the white sweetclover infestation at the airport persisted down the center medians, on both sides of the fencing, and sparsely around the terminal and parking lot. The infestation was controlled before any plants had gone to seed thanks to the work done at the Community Weed Pull and five days of control work completed by a SAGA crew (fig. 6). Yellow toadflax and narrowleaf hawksbeard were also pulled within the airport along with the white sweetclover. KLGO EPMT staff walked the airport twice a month to monitor and control invasives.



**Figure 6.** Volunteers remove white sweet-clover from the airport medians.

Invasive plants were also prevalent just outside of the fenced airport area, so control work was also focused there. The SAGA crew spent three days controlling infestations in between 12<sup>th</sup> and 15<sup>th</sup> Street outside of the airport fence. KLGO EPMT staff also spent three days controlling the

infestations outside of the airport. The invasive species mapped and pulled were: narrowleaf hawksbeard, yellow toadflax, perennial sowthistle, white sweetclover, oxeye daisy, tall buttercup, creeping buttercup, and night flowering silene (*Silene noctiflora*).

White sweetclover is mostly confined to the airport, but was also spotted in very small infestations throughout town. The largest infestations in town are located at the semi-truck parking lot and the railroad tracks on the north end of town. These infestations were monitored and controlled monthly by KLG0 EPMT staff. All of the white sweetclover plants found were pulled before going to seed. Oxeye daisy, tall buttercup, narrowleaf hawksbeard, and yellow toadflax were also located in the area and were pulled before going to seed.

Invasive species continue to be prevalent in and around the Pullen Creek restoration site and pond. SAGA crews spent one day each pulling invasive plants with the TIWC at the Pullen Creek locations. Black medic (*Medicago lupulina*), black bindweed (*Polygonum convolvulus*), and tall tumble-mustard (*Sisymbrium altissimum*) were all found, along with infestations of prostrate knotweed (*Polygonum aviculare*), night-flowering silene, split-lip hemp-nettle (*Galeopsis bifida*), narrowleaf hawksbeard, creeping buttercup, shepherd's purse (*Capsella bursa-pastoris*), lambsquarters (*Chenopodium album*), common plantain, pineapple weed and clovers (red, white, alsike). The white sweetclover that was found along Pullen Creek and pulled in 2009 was not detected in 2010.

Outside these high-transit areas, two infestations from last year were of particular concern: the ornamental jewelweed planted at Dedman's Photography Shop and the bird vetch on municipal property at 9<sup>th</sup> and Spring Street. Both species are highly invasive and currently found only in town, great reasons to control them as soon as possible. Unfortunately, little progress was made this season with either species. The owners of last year's patch of ornamental jewelweed will not permit its removal. The patch of ornamental jewelweed found in 2009 in the alley by State and 21<sup>st</sup> Street was not detected this season, and the patch discovered on 4<sup>th</sup> Street this season was removed, but will likely come back to some extent next year. Like the reed canarygrass on the Dyea Road, the bird vetch was considered by the municipality for an herbicide treatment that could not be completed this season but is planned for 2011. After considering recommendations from previous years regarding the ineffective results from hand pulling the bird vetch, EPMT staff decided to monitor the species and make control a priority for next season with the help of the municipality.

### **Klondike Highway and White Pass Unit**

The Klondike Highway was not thoroughly surveyed during the 2010 EPMT season. Known patches of reed canarygrass were monitored and mapped and found infestations of oxeye daisy, yellow toadflax, and white sweetclover were monitored and controlled. KLG0 EPMT staff and a volunteer spent a day and a half monitoring and pulling infestations from mile marker thirteen on the Klondike Highway continuing into Skagway. White sweetclover was discovered in four locations and pulled that day. A map of the Klondike Highway infestations can be found in Appendix H.

A survey of the White Pass Unit was conducted late in the season. Two park staff hiked into the White Pass Unit from the Klondike Highway and surveyed the north area of the unit. White clover and common dandelion were found along the railroad tracks going through the White

Pass. Invasive species in the White Pass were found only along the train tracks. A map of the survey route and infestations can be found in Appendix I. Two archaeological sites were found while conducting the White Pass Unit Survey. These sites were mapped and photographed and the Cultural Resources department was informed of the details.

### **Outreach and Education**

Efforts to educate the general public on the issue of invasive plants were emphasized in the 2010 season. Many new outreach materials were created early on in the season, well before monitoring or control work were possible. The materials informed the general public on the subject and educated the reader on possible invasive species in the area and how to spot them. Two educational talks were given on invasive plants in the area during the field season. Helen Cortés-Burns, a Botanist for the Alaska Natural Heritage Program spoke on Identifying Invasive Plants in Southeast Alaska; and Jessica Wilbarger, a seasonal staff member from KLG0 spoke about Edible Invasive Plants in Skagway. Native Nootka lupine plants grown by the KLG0 EPMT staff were given away at the talk.



**Figure 7.** Volunteers show off their Skagway Community Weed Pull t-shirts.

KLG0 EPMT staff made a connection with the Skagway Public Library early in the season and secured the library display case for an invasive plant display throughout the month of June. The display featured a specimen of the eradicated spotted knapweed found in the area and live specimens of common exotic plants in Skagway and what kinds of problems they cause. The display was also a venue to advertise for the Community Weed Pull hosted on June 26 (fig. 7). Over thirty people volunteered and pulled 365 pounds of exotic plants on the airport. Volunteers successfully removed a majority of the white sweetclover infestation at the airport. Volunteers received an organic cotton Skagway Community Weed Pull shirt for their efforts and lunch.

KLG0 EPMT staff also participated in Junior Ranger Day, an event that hosted over 200 participants. Children were invited to create their own pressed plant bookmark and invasive species coloring pages with crayons were handed out. The coloring pages were created by Iraise Garcia, a volunteer with the Teacher to Ranger program after attending the Community Weed Pull and learning about invasive plants in the area.

### **Restoration Efforts**

KLG0 EPMT staff pursued restoration efforts in a variety of ways during the 2010 season. Nootka lupine and wild-flag iris seeds collected from the Nelson Slough restoration site in 2006 were planted in the office to observe viability of the seeds collected. The Nootka lupine seeds did well, but the wild-flag irises did not germinate. Some Nootka lupines were given away at the Edible Invasives talk by Jessica Wilbarger and others were planted in the restoration site where clover and common eyebright were removed.

In August 2010, KLGO was awarded a First Bloom grant to start a native plant garden for environmental education purposes in Skagway. Due to this grant, KLGO EPMT was able to educate local high school science classes on native plant gardening. Each class learned about the native plants of the area, how to collect seeds and discussed the reasons why invasive plants can be harmful to the environment. The classes and EPMT staff also collected seeds for the native plant garden that will be created in Skagway next year.



## **Recommendations**

Recommendations for the 2011 KLG0 EPMT season center on adopting an early detection and eradication approach focused in the backcountry; undeveloped frontcountry areas; and containment on road systems and in the town of Skagway. Recommendations are divided up by cultural resources integration, work area, survey work and outreach.

### **Cultural Resources Integration**

Due to the historical significance of KLG0, a meeting on proper cultural resources field methods should occur annually. Additionally, any time control work is conducted in the Dyea Townsite all workers should be briefed on what to do if a cultural artifact is found. Possible artifacts or archaeological sites found while conducting surveys should be photographed, mapped and discussed with the Cultural Resources department.

### **Dyea Unit and the Nelson Slough Restoration Site**

Eradication efforts of common eyebright take precedence in the Nelson Slough Restoration Site. The large leaf lupine sites should also be monitored, though none were detected in 2010. The common eyebright patch near the Nelson Slough Bridge should be monitored and contained. This patch is also infested with pineapple weed various clover species so proper containment strategies should be employed until other higher priority infestations are managed.

Control work should be done on the two creeping buttercup infestations. This work is best conducted with two to four people as the infestations are manageable. Surveying Lost Lake Trail is unnecessary every year, though revisiting the location of the creeping buttercup by the trail steps found in 2009 but not detected in 2010 is a priority.

Focus on the tall buttercup throughout Dyea takes second priority to the creeping buttercup, though the tall buttercup infestations are better suited to larger working groups. Work on eradication of tall buttercup in the Nelson Slough Restoration site, on the Dyea Flats and the large meadow to the south of the restoration site is most important. Other infestations of tall buttercup should be controlled by removing their heads to prevent them from going to seed. Tall buttercup should be pulled along the Townsite Road if time allows, but it is more important to eradicate invasive plants in the meadows that support thriving native plant populations and on the Dyea Flats.

Monitoring and control of narrowleaf hawksbeard between the Taiya River Bridge and Dyea Campground are important for the 2011 season. So few plants were found at this location in 2010 that it may be possible to eradicate this species entirely from Dyea. Care should be taken to control these infestations before any of the plants go to seed.

### **Chilkoot Trail**

Surveying the Chilkoot Trail should be done every other year. Control work at Canyon City and Sheep Camp is important if time allows for it. These sites had the highest density of invasive plants, but were made up of lower priority species. Monitoring the site where tall buttercup was found in 2009 should be a priority for 2011 to ensure that the infestation was indeed eradicated.

## Dyea Road

The bicycle survey of the Dyea Road this year provided a better understanding of invasive species threatening the Dyea Unit of KLG0. The highest concentration of invasive species occurred within the first two miles of the Dyea Road closest to Skagway. Control work is important within the first two miles, with a focus on stopping the spread of yellow toadflax along the road (fig. 8). Oxeye daisies are located in spots along the Dyea Road, though some property owners have expressed concern over the park pulling them. It is recommended that control work be conducted right before the oxeye daisies go to seed and only on public property to minimize problems with local property owners. KLG0 EPMT should consider talking with landowners about the reasons for controlling this highly invasive plant, and other options, such as replacing the invasive oxeye daisies with the less invasive shasta daisy (*Leucanthemum x superbum*), though concern should be taken not to overstep jurisdiction. Containment of the oxeye daisy infestations should be the main priority and preventing the existing plants on NPS lands from going to seed will help with that mission.



**Figure 8.** SAGA youth crew control invasive species along the first two miles of Dyea Road.

Controlling the reed canarygrass along the Dyea Road should be a priority for 2011, along with the infestations on the Klondike Highway. This work can be done later in the season, but the planning should be started early so this highly invasive grass can be controlled. The reed canarygrass on the Klondike Highway and the Dyea Road should be controlled to the fullest extent possible. Connections should be made with the City of Skagway and the Alaska Regional Office to treat these small patches of reed canarygrass before they get out of control.

Work on the Dyea Road should focus on containment of existing reed canarygrass and oxeye daisies infestations. Working with a larger crew to clip flower heads to prevent them from going to seed will help. If time allows, control work should be started along the road just after the Dyea campground and move towards Skagway.

## Skagway

Control work in Skagway should continue to focus on preventing the spread of the most invasive plants to locations outside of Skagway. The spread of white sweetclover to roads off the Klondike Highway shows how challenging this can be, but should be a reminder of the importance to minimize the presence of this species in heavy transit areas. Thus, continued control work on white sweetclover in and around the airport is a priority. The 2009 and 2010 seasons were successful in pulling all observed white sweetclover plants in and around the airport before going to seed. This practice should be continued along with the control of other nearby invasives. Events like the Community Weed Pull have been integral in the control of the white sweetclover on the airport and should continue.

Each time the town is surveyed, any and all white sweet-clover plants should be pulled. The species has become notorious to many in Skagway and most property owners will respond positively to the removal of the plant with prior permission. Oxeye daisies grow in small patches throughout town and should be controlled whenever possible.

KLGO EPMT should continue to assist TIWC with monitoring and control work at Pullen Creek. Pulling the most aggressive species at Pullen Creek will be necessary to keep the infestations from getting out of control. KLGO EPMT should also support the TIWC in their work to eliminate the invasive species at the Pullen Creek meander and at other restoration projects they undertake. Their help with community outreach and enthusiasm for learning about the Pullen Creek weeds suggest great potential for continued partnership between the council and the park.

Eliminating the bird vetch on Spring and 9<sup>th</sup> Streets should be a priority for the 2011 KLGO EPMT program. The best way to do this would be in working with the city to apply an herbicide. Discussions of control of this infestation should start early in the season, and a plan must be made before application is possible.

It will be important to monitor the three identified locations of ornamental jewelweed in 2011. The site on 21<sup>st</sup> and State Streets behind You Say Tomato was not found in 2010, but monitoring should continue. The site on 4<sup>th</sup> Street across from Starfire was controlled, but will most likely need additional work. While the property owner of Dedman's Photography on Broadway has not been willing to remove the ornamental jewelweed, the site should continue to be monitored and controlled if the property owner is willing to cooperate.

Tall buttercup has taken over the roadsides on the north end of Skagway, which likely serves as the seed source for the prevalent infestations in Dyea. This location is ideal for a work crew if other infestations have been controlled already, because of its size and safety compared to other locations. If time allows, the roadsides should be monitored and control work should be performed on invasive species, but this infestation should definitely be prevented from going to seed.

The railroad tracks on the north end of town have seen varied levels of invasive species over the years (Schultz 2006). This area should continue to be monitored and controlled, especially the highly invasive white sweet clover and oxeye daisy infestations. This location is more suited to two to four volunteers due to safety concerns with the proximity of the railroad tracks and should be revisited throughout the season. The semi-truck parking lot on First Street should also be monitored and controlled in this manner.

## White Pass Unit and Klondike Highway



**Figure 9.** SCA Intern Jenny Busam mapping reed canarygrass infestations on the Klondike Highway.

Work on the White Pass Unit and along the Klondike Highway should increase from previous years. A Klondike Highway road survey should be conducted starting at the northernmost section of the White Pass Unit adjacent to the road (fig. 9). Species of concern along the highway include: reed canarygrass, white sweetclover, yellow toadflax, and oxeye daisies.

Portions of the Klondike Highway are in the White Pass Unit. A thorough understanding of the threat of invasive species for this pristine unit of the park is important and surveys of this unit to date have been inconsistent and sporadic. A defined strategy for addressing invasive plant inventories and overall management within the White Pass Unit needs to be developed in 2011 to better protect this remote and largely weed-free portion of KLGO. It is recommended that a survey of the White Pass unit be conducted over a two to three day backcountry trip due to the time needed to hike to the train tracks from the Klondike Highway. Another option would be to work with the White Pass and Yukon Route Railroad to coordinate a drop off and pick up time for

backcountry survey efforts. The survey should focus on the land adjacent to the railroad tracks and the highway as those are the most likely vectors for invasive plants.

Control work in the White Pass Unit and on the Klondike Highway should focus on the most aggressive invasive plants—reed canarygrass and white sweetclover being the most important to control. A thorough understanding of what other species are present in this unit will help plan future control work.

### Inventory Work

Inventories are a vital component of invasive plant management. Early detection and control of species will help contain infestations before they spread out of control. For example, patches of tall buttercup found during the Dyea Flats Survey this year were treated early to prevent the species from spreading even further into this unique part of the park. Aside from general inventories around Skagway, six more targeted inventories were conducted in 2010. Table 3 below shows the date, amount of time, and personnel needed to conduct these inventories.

**Table 3.** Summary of Targeted Inventories Conducted in 2010

Date	Inventory Location	Personnel	Time
June 10	Dyea Road (start on West Creek Road end at Klondike Highway)	2	8 hours
June 15, July 21	Dyea Flats	4	8 hours
June 16	Airport	2	8 hours
July 30 & 31	Chilkoot Trail Head to Sheep Camp	4	12 hours*
August 13	Lost Lake Trail (including road to the trail head)	2	4 hours
August 25	White Pass Unit	2	12 hours*

\*The Chilkoot and White Pass Unit inventories are best conducted over a period of two to three days while camping in the backcountry.

It is recommended that the airport, the Dyea Road and the Dyea Flats be surveyed every year. The Chilkoot Trail, Lost Lake Trail and White Pass Unit require surveying every other year. A survey of the Klondike Highway should be conducted next season, possibly on bicycle. The survey should start adjacent to the northernmost boundary of the White Pass Unit, around mile marker 15 on the Klondike Highway. A thorough survey of this road is vital to understanding the threat of invasive species moving into the White Pass Unit.

### Outreach and Education

Outreach pays dividends well beyond the hours of the presentation or volunteer day (fig. 10). In a place like Skagway where invasive plants outstrip the ability of park staff to control them, connections between the park, land owners, and any potential volunteers are vital. Partnering with the TIWC on outreach activities should continue in the future as the group is a great community resource.

Once again, the Community Weed Pull proved to be a successful tool for control of invasive plants and education of the public. Many volunteers look forward to it on a yearly basis suggesting the event should continue and grow. Partnering with the TIWC makes this event even more successful, and a suggestion for next year would be to include the Sustainability and Garden Clubs in planning efforts to increase the volunteer pool. The refreshments, lunch and t-shirt provided for hours of hard work are great outreach tools and have proved to keep people coming back year after year. Including a display with edible weeds as snacks and highlighting other uses of invasive species would be a great addition to the event.



**Figure 10.** Events like the Community Weed Pull encourage intergovernmental partnerships. Pictured above, KLG0 Superintendent Susan Boudreau and AKDOT Foreman Missy Tyson.

Another event to suggest for 2011 is a Skagway Survey Day. The KLG0 Education Specialist could help put the event on with local Skagway youth or community groups. The purpose would be to break up into teams and survey the entire town of Skagway—finding, identifying and learning about invasive plants in town. This type of event will assist with survey efforts and educating the public. It could potentially save days of survey work that would otherwise be done

with only a few people. Hosting the event two weeks before or after the Community Weed Pull would ensure that invested volunteers would be a part of both events.

KLGO was able to purchase four boot brushing stations for areas in and around the park in 2010. These stations should be installed early in the season with educational information on the importance of invasive plant management. Possible locations include the Dyea campground, the Chilkoot trailhead, the Mascot garage, and the maintenance department. The final boot brushing station could be installed at the Alaska Department of Transportation office in Skagway to further develop the partnership with the organization. This could be a way to continue the conversation about invasive plant management with the Alaska Department of Transportation and what else they can do to help stop the spread of invasive plant species throughout the area.



**Figure 11.** KLGO EPMT display at the Skagway Public Library.

The library display proved to be a successful way to outreach to citizens and visitors of Skagway (fig. 11). If time permitted, this would be a good connection to keep up and should be expanded in the future. A possibility for 2011 would be to focus part of the display on native plants of Alaska. This would work well with another KLGO initiative, the creation of a native plant garden in Skagway. This garden should also be viewed as a great outreach opportunity as it will be created by youth of Skagway with the help of the KLGO Education Specialist. Invasive plant education has the potential to be better received when native plants make up a portion of the educational material. Working on the native

plant garden, and helping to educate locals on the importance of native plants will provide great ground for increasing conversations about invasive plants and controlling them.

Outreach to individual landowners has the potential to do a lot of good, but should be done with care. A great way to outreach to individuals comes in the form of informed community groups that care about a subject enough to talk to their neighbors about it. Expanding the KLGO EPMT program's relationship with Skagway youth and the Garden and Sustainability Clubs and working with them to reach out to others may be the best possible way to connect with individual land owners.

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## Appendix A. Klondike Gold Rush National Historical Park Invasive Species List and Known Locations.

Scientific Name	Common Name	Chilkoot Trail	Nelson Slough	Dyea	White Pass	Dyea Road	Klondike Hwy	Skagway
<i>Anthemis arvensis</i>	corn chamomile							X
<i>Anthemis arvensis</i>	stinking chamomile							X
<i>Bromus inermis</i>	smooth brome				XO		XO	X
<i>Capsella bursa-pastoris</i>	shepherd's purse		XO			XO	XO	XO
<i>Cerastium fontanum</i>	mouse-ear chickweed		X				X	X
<i>Chenopodium album</i>	lambsquarters		X			X	X	X
<i>Collomia linearis</i>	narrow-leaved collomia							X
<i>Crepis tectorum</i>	narrowleaf hawksbeard			XO	XO	XO	XO	XO
<i>Elymus repens</i>	quackgrass			XO		XO	XO	XO
<i>Erysimum cheiranthoides</i>	wormseed mustard		X			X		X
<i>Euphrasia nemorosa</i>	common eye-bright		XO	XO				
<i>Galeopsis tetrahit</i>	bristlestem hempnettle		X					
<i>Galeopsis bifida</i>	splitlip hempnettle							X
<i>Hordeum jubatum</i>	foxtail barley			XO	XO	XO	XO	XO
<i>Impatiens glandulifera</i>	ornamental jewelweed							XO
<i>Lepidium densiflorum</i>	common pepperweed							X
<i>Leucanthemum vulgare</i>	oxeye daisy			XO		XO	XO	XO
<i>Linaria vulgaris</i>	yellow toadflax		XO	XO	XO	XO		XO
<i>Lupinus polyphyllus</i>	large-leaf lupine			X ER				
<i>Matricaria discoidea</i>	pineapple weed		XO	XO	XO	XO	XO	XO
<i>Medicago lupulina</i>	black medic							XO
<i>Melilotus alba</i>	white sweet clover						XO	XO
<i>Papaver nudicaule</i>	Iceland poppy							X
<i>Phalaris arundinacea</i>	reed canarygrass				XO	XO	XO	
<i>Phleum pretense</i>	timothy grass						X	
<i>Plantago major</i>	common plantain		XO	XO	XO	XO	XO	XO
<i>Poa pratensis</i>	Kentucky bluegrass	X		X	X			
<i>Polygonum aviculare</i>	prostrate knotweed		X	X	X	X	X	
<i>Polygonum convolvulus</i>	black bindweed							XO
<i>Potentilla gracilis</i>	slender cinquefoil			X				
<i>Ranunculus acris</i>	tall buttercup	XO	XO	XO	XO	XO	XO	XO
<i>Ranunculus repens</i>	creeping buttercup			XO				XO
<i>Rumex acetosella</i>	sheep sorrel	XO	XO	XO	XO	XO	XO	XO
<i>Rumex crispus</i>	curled dock		XO			XO		XO
<i>Senecio viscosus</i>	sticky ragwort			XO		XO		XO
<i>Senecio vulgaris</i>	common groundsel		XO	XO	XO	XO	XO	XO
<i>Silene cucubalus</i>	bladder campion		X			X		
<i>Silene noctiflora</i>	nightflowering silene							XO
<i>Sonchus arvensis</i>	perennial sowthistle							XO
<i>Sorbus aucuparia</i>	European mountain ash							X
<i>Stellaria media</i>	common chickweed		XO	XO	XO	XO	XO	XO
<i>Tanacetum vulgare</i>	common tansy					XO		XO
<i>Taraxacum officinale</i>	common dandelion	XO	XO	XO	XO	XO	XO	XO
<i>Thlaspi arvense</i>	field pennycress		X				X	
<i>Trifolium hybridum</i>	alsike clover					XO	XO	XO
<i>Trifolium pretense</i>	red clover		XO	XO		XO	XO	XO
<i>Trifolium repens</i>	white clover	XO	XO	XO	XO	XO	XO	XO
<i>Vicia cracca</i>	bird vetch							XO
<i>Viola tricolor</i>	Johnny-jump-up violet		X					XO

X – Recorded at least once between 2004 and 2009.

O – Recorded in 2010

ER – Not found in 2010, possible eradication

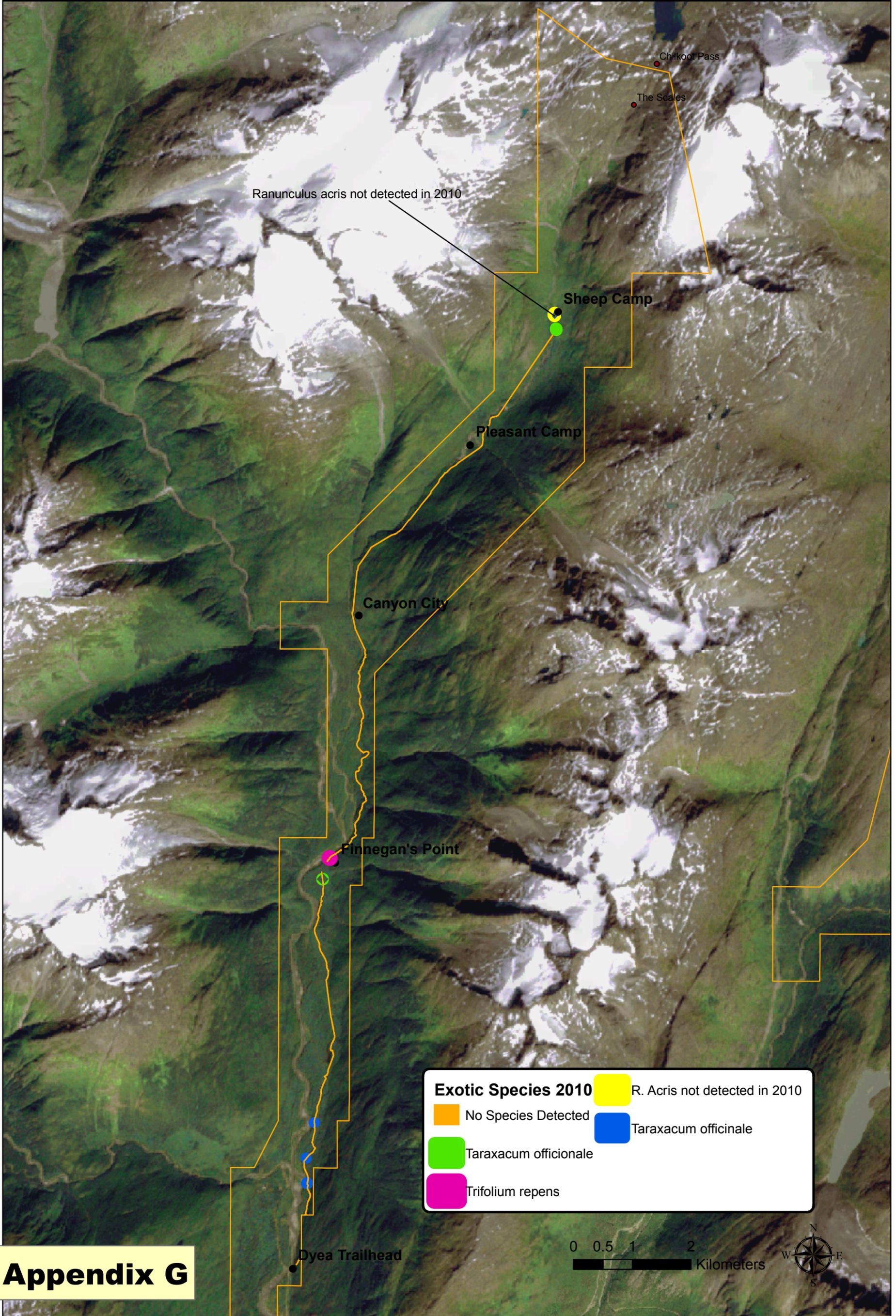


**Appendix B. Klondike Gold Rush National Historical Park  
Invasive Species Maps.**

# 2010 Chilkoot Trail Exotic Plants Survey

## Klondike Gold Rush National Historical Park

Department of the Interior  
National Park Service

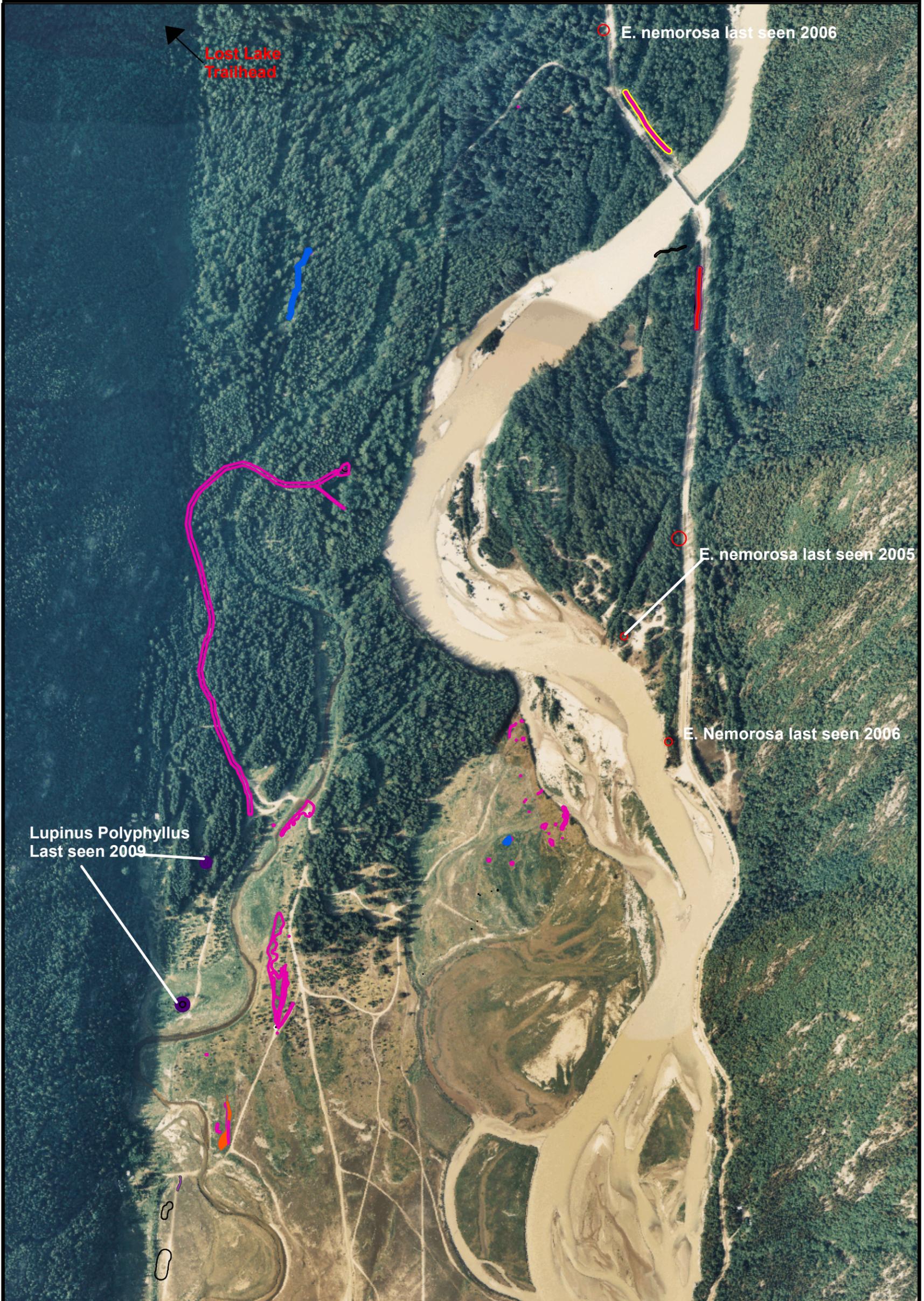


### Appendix G

# Exotic Species in Dyea - 2010

## Klondike Gold Rush National Historical Park

Department of the Interior  
National Park Service



Exotic_Species_Dyea	
<span style="color: red;">█</span> Crepis tectorum	<span style="border: 1px solid purple; padding: 2px;"> </span> Lupinus polyphyllus
<span style="color: orange;">█</span> Euphrasia nemorosa	<span style="border: 1px solid magenta; padding: 2px;"> </span> Matricaria discoidea
<span style="color: yellow;">█</span> Leucanthemum vulgare	<span style="border: 1px solid pink; padding: 2px;"> </span> Ranunculus acris
<span style="color: green;">█</span> Linaria vulgaris	<span style="border: 1px solid blue; padding: 2px;"> </span> Ranunculus repens
	<span style="border: 1px solid black; padding: 2px;"> </span> Low priority species

### Appendix C

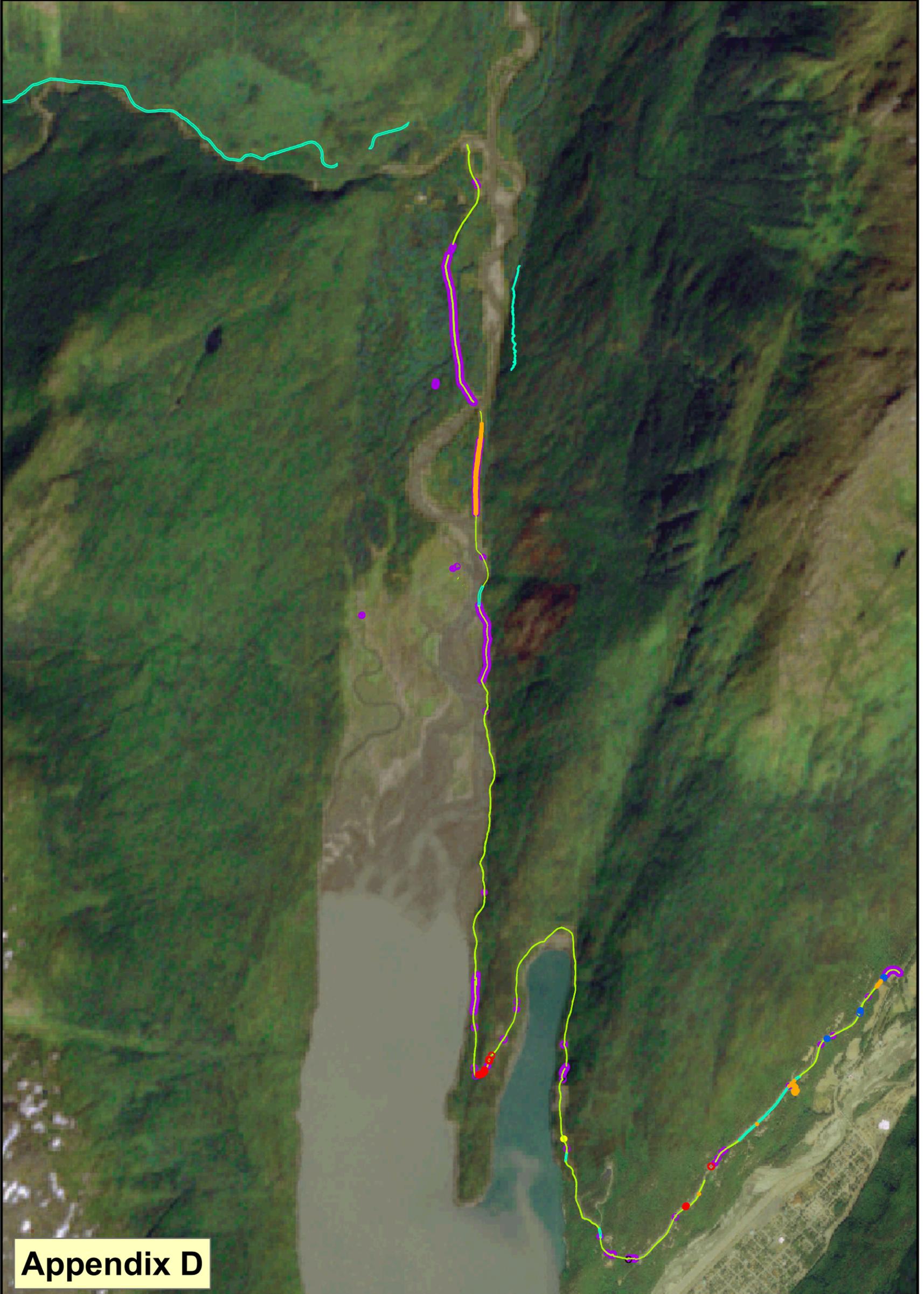
Kassie Hauser  
Natural Resources  
Klondike Gold Rush National Historical Park

0 90 180 360  
Meters

# Exotic Species on the Dyea Road - 2010

## Klondike Gold Rush National Historical Park

Department of the Interior  
National Park Service



### Appendix D

#### Exotic Plant Species

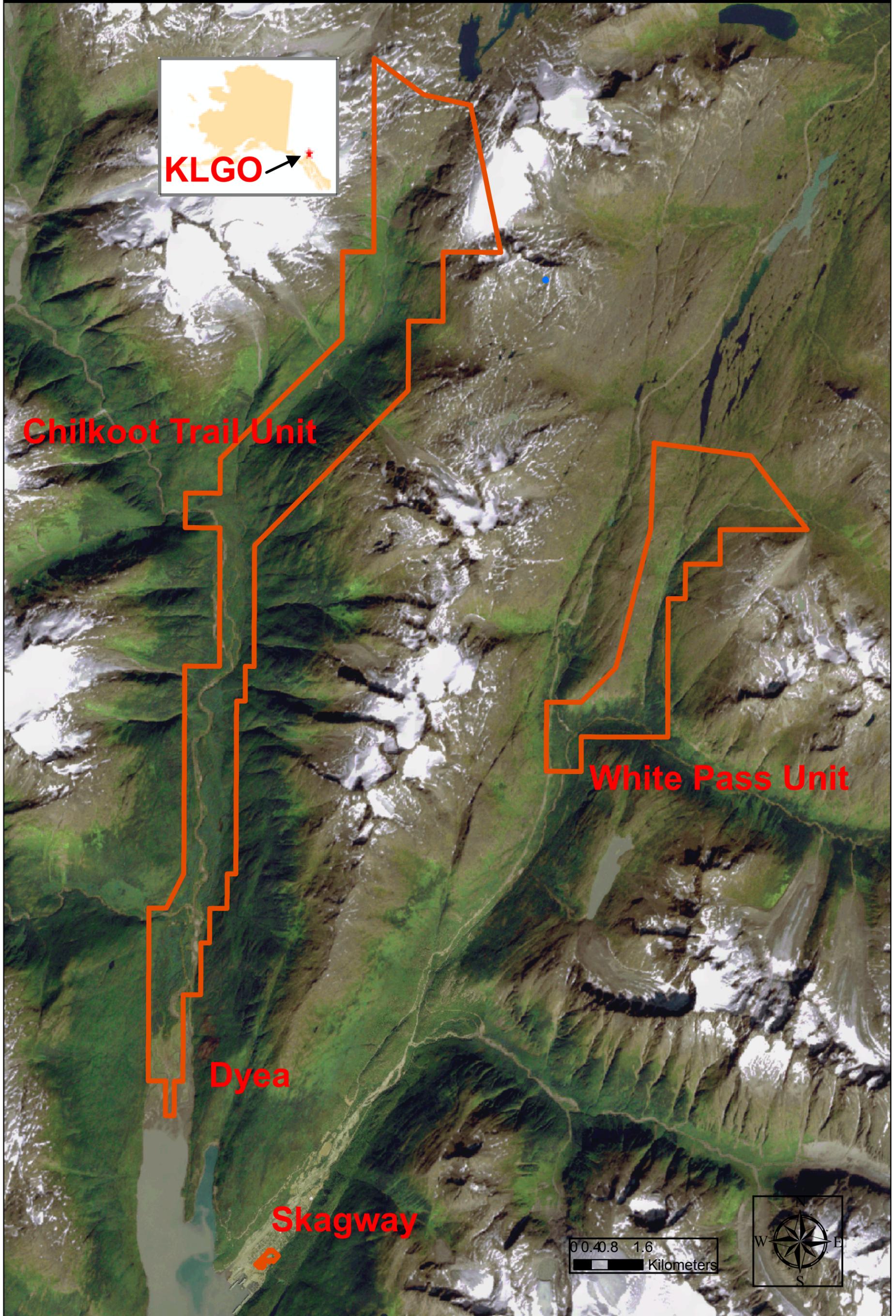
- |                      |                      |                  |
|----------------------|----------------------|------------------|
| Crepis tectorum      | Low Priority Species | Ranunculus acris |
| Leucanthemum vulgare | Phalaris arundinacea | Rumex crispus    |
| Linaria vulgaris     | No Species Found     |                  |

Kassie Hauser  
Exotic Plant Management  
Klondike Gold Rush NHP



# Klondike Gold Rush National Historical Park Boundary Map

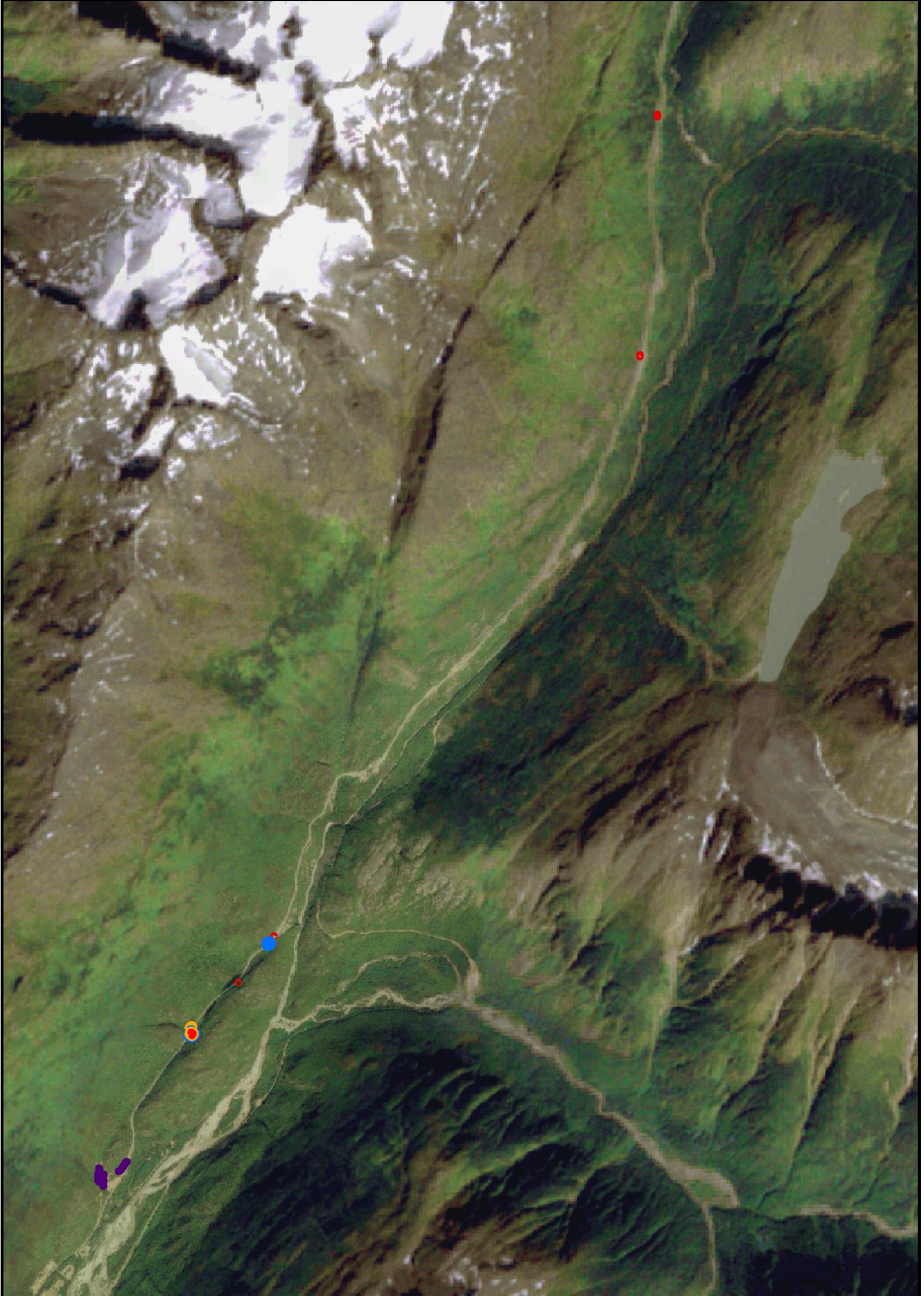
Department of the Interior  
National Park Service



# Exotic Species on the Klondike Highway - 2010

## Klondike Gold Rush National Historical Park

Department of the Interior  
National Park Service



### Exotic Plant Species

- Matricaria discoidea, 2010
- Melilotus alba, 2009
- Melilotus alba, 2010
- Rumex crispus, 2010
- Sonchus arvensis, 2010
- Phalaris arundinacea, 2009

### Appendix F

Kassie Hauser  
Exotic Plant Management  
Klondike Gold Rush NHP



# Exotic Species in Nelson Slough Area 2010

Klondike Gold Rush National Historical Park

Department of the Interior  
National Park Service



2010_Exotic_Species	
	Ranunculus acris
	Taraxacum officinale
	Linaria vulgaris
	Euphrasia nemorosa returned in 2009
	Euphrasia nemorosa not detected in 2010
	Scattered lower-priority species*
	Euphrasia nemorosa

## Appendix A

Kassie Hauser  
Exotic Plant Management  
Klondike Gold Rush NHP

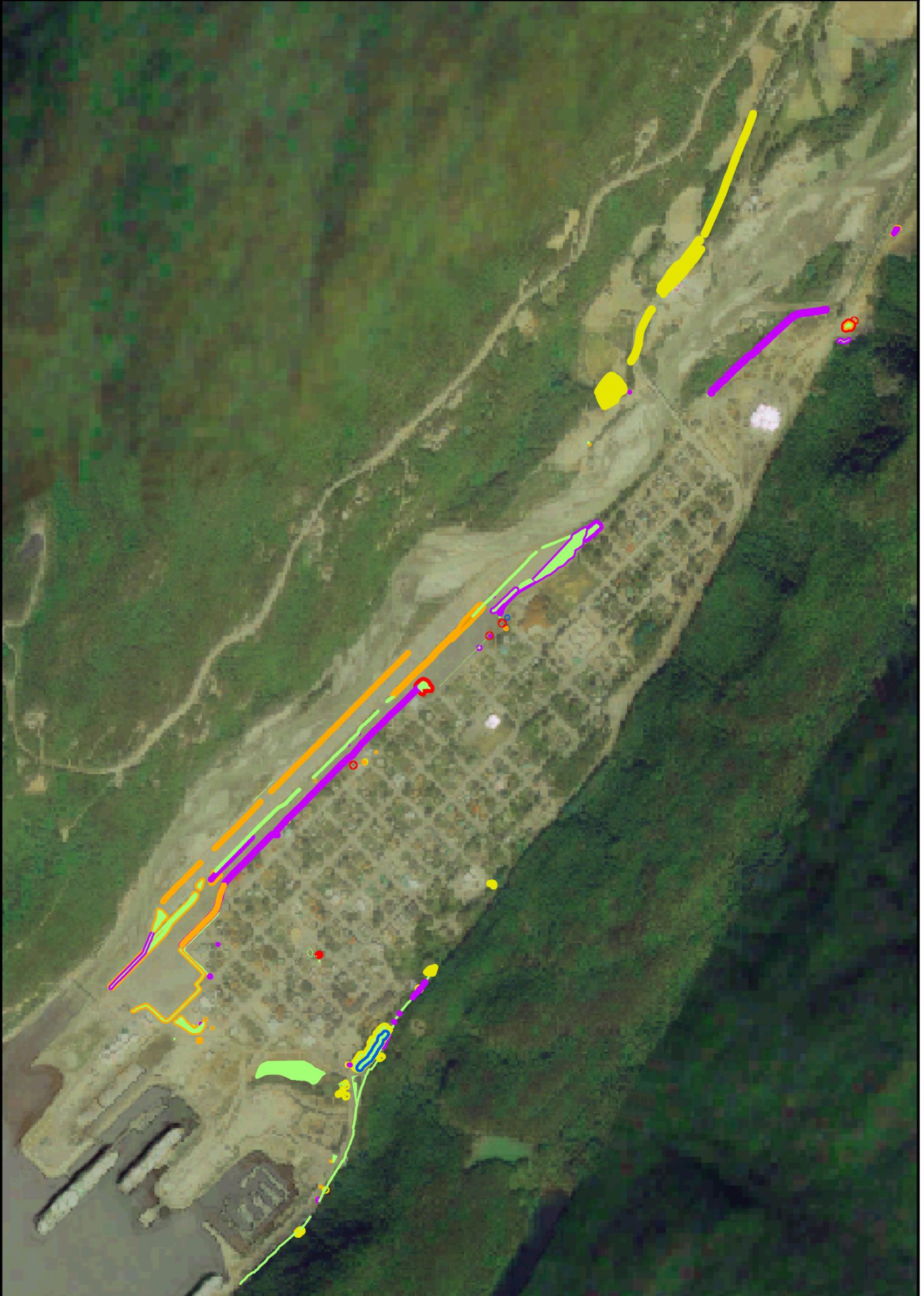
0 10 20 40  
Meters



# Exotic Species in Skagway - 2010

## Klondike Gold Rush National Historical Park

Department of the Interior  
National Park Service



### Exotic\_Plant\_Species

- Low Priority Species
- Leucanthemum vulgare
- Linaria vulgaris

- Melilotus alba
- Ranunculus acris
- Ranunculus repens

## Appendix E

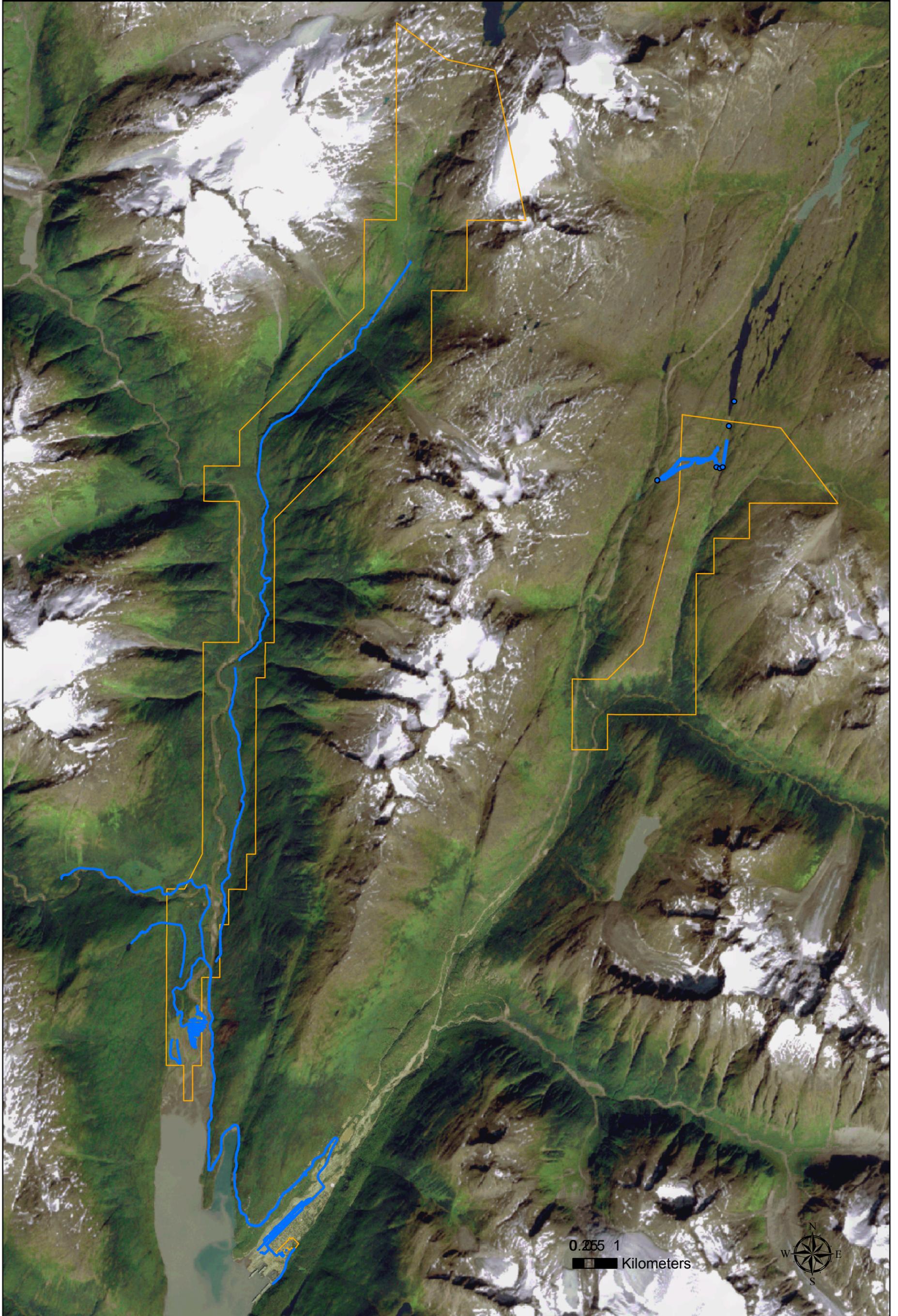
Kassie Hauser  
Exotic Plant Management  
Klondike Gold Rush NHP



0 165 330 660  
Meters

# EPMT Work Zones 2010 - Chilkoot Trail Klondike Gold Rush National Historical Park

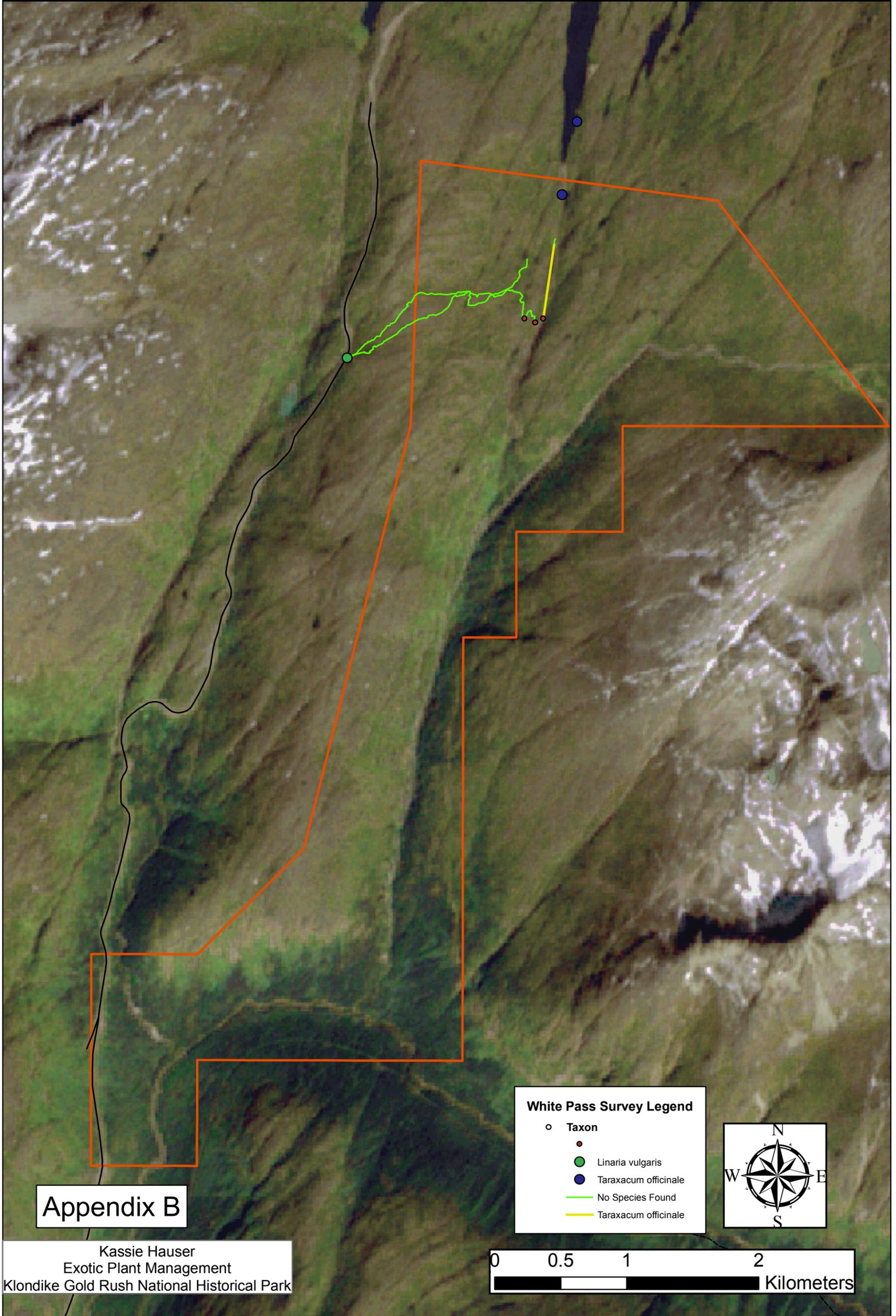
Department of the Interior  
National Park Service



# White Pass Survey 2010

## Klondike Gold Rush National Historical Park

Department of the Interior  
National Park Service



Appendix B

Kassie Hauser  
Exotic Plant Management  
Klondike Gold Rush National Historical Park

**White Pass Survey Legend**

- Taxon
- Linaria vulgaris
- Taraxacum officinale
- No Species Found
- Taraxacum officinale

