INVASIVE PLANT MANAGEMENT IN WRANGELL-ST. ELIAS NATIONAL PARK & PRESERVE

2007 FIELD SEASON REPORT

Vegetation Management Report 2007-01
October 11 , 2007

Volunteer, Amanda Dunaway, pulling invasive dandelions on the Jumbo Mine Trail in Kennecott

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INTRODUCTION

Wrangell-St. Elias National Park and Preserve is the largest park in the National Park system. It covers more than 13 million acres and is part of the largest protected ecosystem on the planet. This report, written by Lil Gilmore, Biological Technician for the Park/Preserve, and David Goldsmith, an intern from the Chicago Botanic Garden, describes the 2007 Invasive Plant Management Program. David Goldsmith prepared the GIS maps found in Appendix A. The report was reviewed by Whitney Rapp, Exotic Plant Program Manager for Kenai Fjords National Park, and reviewed and edited by Mary Beth Cook, botanist for Wrangell-St. Elias National Park and Preserve.

Although two roads, numerous off-road vehicle trails, and 16 maintained backcountry landing strips provide access to the Park/Preserve, the majority of it remains inaccessible to all but foot traffic. This is both a blessing and a curse. Lack of motorized traffic protects the land from many of the disturbances that invite colonization by invasive plants. Invasive plants can make themselves at home in undisturbed areas such as the *Taraxacum officinale* ssp. *officinale* (common dandelion) documented in Hidden Creek Valley by the students at The Wrangell Mountains Center's College Field Program in McCarthy. They reported finding the common dandelion growing in an undisturbed area among native wildflowers. Without human visitation, such populations will not be quickly discovered and controlled. However, the roads and trails that permit access are major factors in damage to the native vegetation.

Landing strips and abandoned home sites also provide ideal locations for the spread of invasive plants. In-holders in the Park/Preserve grow non-native plants for food and ornamental value. Some of these have escaped cultivation and are moving into public areas. Not all of these plants fit the definition of invasive plants. For purposes of this report, we will use the definitions for exotic, non-native, and invasive plants given in the *Invasive Plants of Alaska* handbook. "Exotic, alien, non-native, or non-indigenous plants are plants whose presence in a given area is due to accidental or intentional introduction by humans. The majority of non-native plants are beneficial . . . Invasive plants are exotic plants that produce viable offspring in large numbers and have the potential to establish and spread in natural areas. [They may] . . . have a negative effect on ecosystems or cause economic losses or harm to human health."

Since 2004, plants considered invasive have been inventoried, monitored, and weeded on a small percentage of Park lands and on the roads and trails leading into and surrounding the Park/Preserve. In 2005, the Exotic Plant Management Team (EPMT) provided funding to hire a seasonal employee for the position of Biological Technician. This position was also funded and filled in 2006 and 2007.

During the 2007 season, David Goldsmith was stationed in McCarthy. He spent eight weeks, from June 18th to August 8^{th,} inventorying, monitoring, and weeding invasive plants in and around the Kennecott/McCarthy area. This was extremely beneficial to the program as he was able to devote himself exclusively to this relatively small area. Many locations that had not been inventoried or weeded in Kennecott or McCarthy received intensive attention this season.

Having an employee in an area for a period of time provides him or her with a valuable opportunity to access the knowledge of the local residents. It can also help to "demystify" the concept of invasive plant control and remove it from the joke or outrage category of "What, you're wasting my tax dollars pulling dandelions!," to a deeper understanding of what invasive species can do to a known and loved landscape. Without help from local residents, there can be little expectation that invasive species can be eradicated.

Intern, David Goldsmith, collecting suspected bird vetch off of the Richardson Highway.

OBJECTIVES

It was decided that plants assigned an invasiveness rank of 50 or higher in the Alaska Natural Heritage Program (AKNHP) database would be the focus of work during the 2007 season.

Objectives and goals were determined for five locations:

- Kennecott/McCarthy
  - monitor and weed *Leucanthemum vulgare* (oxeye daisy) across from the Recreation Hall in Kennecott and the *Taraxacum officinale* ssp. *officinale* populations on the Root Glacier and Bonanza Mine Trails;
  - as time allows, inventory or monitor and weed *Bromus inermis* (smooth brome), *Crepis tectorum* (narrowleaf hawksbeard), *Linaria vulgaris* (yellow toadflax), *Phleum pratense* (timothy), *Trifolium hybridum* (alsike clover), *Trifolium pratense* (red clover), and *Trifolium repens* (white clover);
  - as time allows, survey and weed areas not yet inventoried or monitor and weed areas previously inventoried.
- McCarthy Road
  - inventory and weed the 16 miles of the Crystalline Hills section of the road adjacent to Park holdings, from the Gilahina Bridge to the Collins Homestead at Long Lake;
  - inventory and collect vouchers from two populations of a *Vicia* sp. reported on the far side of the Lakina River;
  - visually assess *Taraxacum officinale* ssp. *officinale* and other high priority species along the road to determine if construction during 2006 substantially changed the locations and/or density of the populations;
  - as time allows, inventory and/or monitor and weed sections of the road not yet surveyed.
- Nabesna Road
  - collect vouchers from random locations along the road to determine which species of *Taraxacum* has been mapped since 2002;
  - monitor and weed *Melilotus alba* (white sweetclover) at the junction of the Nabesna Road and Tok Cut-Off;

- monitor and weed *Crepis tectorum* at Mile 11;
- as time allows, inventory foot and off-road vehicle (ORV) trails;
- monitor and weed *Lappula squarrosa* (European stickseed) at Dead Dog Hill rest area;
- monitor and weed the *Tripleurospermum perforata* (scentless false mayweed) at the Betty Freed property;
- as time allows, survey and weed species not yet inventoried or monitor and weed areas previously inventoried.

- Headquarters
  - if time allows, monitor and weed;
  - if time allows, collect and spread seed from native plants for revegetation.
- Copper Basin
  - monitor *Melilotus alba* and *Vicia cracca* populations.

METHODS

Plants were inventoried and monitored with Trimble GeoXT units programmed with TerraSync and a data dictionary developed by the Alaska EPMT. The data was differentially corrected and edited using GPS Pathfinder Office before being sent to the EPMT to be synthesized. David Goldsmith and Lil Gilmore inventoried, monitored, and weeded invasive plants. When feasible, "plant scans" (walking or driving very slowly) were conducted along roadsides and trails. Particular attention was paid to areas of obvious disturbance, such as gravel pits, pullouts, new culvert sites, etc. Manual methods, primarily digging, were used to weed invasive plants. Weeds were bagged and later collected by a Bureau of Land Management employee for burning.

Vouchers were collected of plants that could not be immediately identified in the field. A specimen point and a photo point were entered in the EPMT data dictionary and the plant was dug, pressed and labeled. Vouchers were identified by Mary Beth Cook, botanist for the Park/Preserve. Data from all vouchers will be entered into the National Park curatorial database, the National Park species database, and the Park/Preserve collection database.

Two crews from the Americorp Tribal Civilian Community Corps program, with a total of 18 members, spent approximately 32 hours per person pulling *Melilotus alba* at the junction of the Tok Cut-Off and Nabesna Road. A volunteer worked for six hours on the McCarthy Road and another worked seven hours on the Jumbo Mine Trail out of Kennecott.

RESULTS

Five locations are discussed in this report: Kennecott/McCarthy, the McCarthy Road, the Nabesna Road, Park Headquarters, and the Copper Basin. A total of 20 bags of weeds were collected from these areas.

Vouchers of six plants were collected from the McCarthy Road and Richardson Highway. The five plants collected on the McCarthy Road were identified by the Park botanist as *Actaea rubra* (red baneberry), *Bromus inermis*, *Papaver somniferum* (opium

poppy), *Rhinanthus minor* (yellow rattle), and *Senecio pauciflorus* (alpine groundsel). The sixth plant, collected along the Richardson Highway, was identified as *Vicia cracca* (bird vetch).

Opium Poppy found at Mile 51 on the McCarthy Road

Fourteen vouchers of *Taraxacum* sp. were collected on the Nabesna Road. Thirteen of these vouchers proved to be *T. officinale* ssp. *ceratophorum*; one was identified as *T. officinale* ssp. *officinale*.

Nine vouchers were collected in the Kennecott area. Only two of the nine specimens (*Trifolium repens* and *Plantago major* (common plantain) from the Bonanza Mine Trail) were non-native plants and all the others were identified as native to Alaska. An infestation behind Fireweed Mountain Arts and Crafts was first thought to be *Phleum pratense* until a specimen was identified as *Alopecurus aequalis* (shortawn foxtail), a native grass.

Of the four specimens collected in McCarthy, all but one proved to be non-native (*Poa pratensis* ssp. *pratensis* (Kentucky bluegrass) (AKEPIC ranking of 57) The *Potentilla* cf. *norvegica* specimen will be sent to Fairbanks for confirmation since it is possible it could be *Potentilla biennis*, a previously unrecorded plant in Alaska. A specimen first thought to be *Descurainia sophia* (flixweed), a known invasive in the park, was later identified by the park botanist as *Descurainia sophioides* (northern tansymustard), a native plant.

Appendix A depicts areas in and around the park that were found to contain high priority invasive species this year. The shapefile generated from the field inventory may be used in GIS to access additional information, including the assessment of invasive plant densities and the estimated control effort needed to eradicate these infestations.

Kennecott

Kennecott was surveyed once again this summer, as was the Root Glacier Trail, Bonanza Mine Trail and, for the first time, Jumbo Mine Trail emerging from the town. *Taraxacum officinale* ssp. *officinale* was, by far, the most widespread invasive species in the town of Kennecott, having established many infestations along the town's main road, the service road and the three previously mentioned trails.

New *T. officinale* ssp. *officinale* infestations found along the Root Glacier Trail extended approximately 3 kilometers farther down the trail than previously recorded. Due to the small sizes of these infestations, they were all able to be mapped and eradicated during June, yet some of the populations were already observed to be growing back when they were monitored in August.

T. officinale ssp. *officinale* was very widespread along the Bonanza Mine Trail, with new infestations also appearing farther up the trail than had been previously documented (Appendix A, page 28). The vast majority of the new infestations found above the tree-line were able to be mapped and treated. Unfortunately, due to the size of the infestations that were monitored and treated last year and the limited time and lack of a volunteer crew this year, not all of the previously treated sites were able to be re-treated this year.

Invasive dandelions in seed on the Bonanza Mine Trail

The Jumbo Mine Trail and Old Wagon Trail, which were mapped for the first time this year, also contain several *T. officinale* ssp. *officinale* populations. Due to the relatively small number of infestations found along these two trails, there is likelihood that, if time allows, they can be cleared of this invasive species next season.

Leucanthemum vulgare still remains a high priority invasive in Kennecott (Appendix A, page 29). This year marks the fourth year that the infestation behind the Recreation Hall in Kennecott was treated, and was done so with less effort than previously required. Another infestation previously recorded behind the Kennicott Wilderness Guides campsite was also able, for the first time, to be treated this year. A new infestation, found and recorded on Silk Stocking Row, was not treated because it was on private property (the property owner(s) could not be reached). Next season, it would be beneficial to ask the property owner(s) if they would permit the Park Service to treat this infestation. Once again, there was no luck in convincing the owners of the Kennicott Glacier Lodge to allow the treatment of any of the oxeye daisy present in their garden or property.

Along with *Trifolium repens*, *T. hybridum* was very widespread in the town of Kennecott as well as up the Bonanza Mine Trail. *T. pratense*, although having been recorded in quite a few places around Kennecott in the previous seasons, did not appear as abundant this season and was certainly not as widespread as the other two *Trifolium* species.

Although *Descurainia sophia* and *Caragana arborescens* (Siberian peashrub) had both been previously recorded within Kennecott, when the sites were monitored this year, there was no visible evidence of either plant. It appeared there was construction equipment taking up the space where the *D. sophia* had been recorded and the vessel that the *C. arborescens* was occupying had been removed.

Stellaria media (common chickweed), *Capsella bursa-pastoris* (shepherd's purse), *Elymus repens* (quackgrass), *Matricaria discoidea* (pineapple weed) and *Plantago major* were all found in various locations throughout Kennecott. The *E. repens* infestation first recorded in 2004 still persists alongside the Kennicott Glacier Lodge driveway and,

without the permission of the property owners, cannot be treated. *M. discoidea* and *P. major*, along with being two of the more common invasive plants within Kennecott, were also present in numerous places throughout the Bonanza Mine Trail. Each of these plants were monitored and treated when time allowed.

McCarthy

As was the case in Kennecott, *Taraxacum officinale* ssp. *officinale* has become one of the dominant invasive species in McCarthy, now well established on the roads and yards in the town as well as on the McCarthy Creek floodplain (Appendix A, page 30). New populations of the invasive plant were mapped and treated along both sides of the McCarthy Creek floodplain this season and, fortunately, certain older infestations were found to have diminished after examining previous years' data. The McCarthy Creek Trail, Nizina Road and McCarthy Airstrip were all inventoried this season and all were found to contain the invasive dandelion. The McCarthy Creek Trail infestations turned out to be small in numbers and size and would have required very little control effort; however, most were located on private property and were not able to be treated. Due to the pervasiveness of this invasive plant, a community wide effort would have to be put forth in order to begin eradicating it from McCarthy.

An infestation of *Bromus inermis* was once again found on the McCarthy Creek floodplain this summer mixed among the *T. officinale*. The infestation, which also appeared much smaller than previous years' data indicated, was mapped and treated and should continue to be monitored in the future seasons.

The *Crepis tectorum* infestation previously mapped and treated in 2006 in the National Park Service employee parking lot near John Adams' Airstrip was monitored and retreated multiple times this summer as well (Appendix A, page 31). Other *C. tectorum* infestations that had not been previously recorded were found on the McCarthy Road just past the Park Service kiosk, by the McCarthy/Kennecott Historical Museum and the private field adjacent to the Herben Cabin that had previously been occupied by the "Pilgrim" family. Each of these areas were inventoried, treated and deserve attention in the future seasons.

New Yellow toadflax infestation found growing near the National Park Service parking lot in McCarthy

Linaria vulgaris was once again found growing outside of the Wrangell Mountains Center and was re-treated twice this past season with little effort (Appendix A, page 31). To our surprise, a new population was found at the entrance to the National Park Service employee parking lot near the *C. tectorum* infestation. This population was mapped and also treated twice this past season with little control effort before any of the plants could go to seed.

The population of *Leucanthemum*

vulgare was once again found on the private property of Wrangell Mountain Air this year and monitored. The owners of the property could not be contacted, so the area was not treated. There was no evidence of the *L. vulgare* infestation previously recorded in the yard across from the Wrangell Mountains Center's garden yet one flowering plant was recorded in the front yard of the Wrangell Mountains Center. The staff for the Wrangell Mountains Center's College Program is eager to help rid the area of invasive plants, so the flower was able to be treated and its location recorded. Each one of these locations should continue to be monitored in the future and treated if necessary. The owners of Wrangell Mountain Air should also be contacted to see if they would allow treatment of the *L. vulgare* on their property.

Several large, mature specimens of *Caragana arborescens* were still present on the private property opposite of the Wrangell Mountains Center. Even though no new plantlets have been found nearby, this area needs to be monitored in the future due to the high AKEPIC ranking of *C. arborescens* (66) and the large number of seeds these plants are producing each season.

A single, small flowering *Lappula squarrosa* plant was noticed in the West Side Park Service housing area and was easily treated before it had a chance to seed. Later in the season a much larger, more mature, seeding population was found near the McCarthy Community Church, and all visible plants were removed.

Trifolium hybridum and *T. repens* have become very well established in the McCarthy area. Many large infestations were found on the road leading to the McCarthy Airstrip, much of the yards and roadsides in the town of McCarthy, the start of the McCarthy Creek Trail and on a very large portion of the Nizina Road.

Other invasive species found growing around McCarthy include *Polygonum aviculare* (prostrate knotweed), *Matricaria discoidea*, *Plantago major* and *Hordeum jubatum* (foxtail barley), which have all become very common along the roadsides. *Capsella bursa-pastoris*, *Stellaria media*, *Silene noctiflora* (night-blooming cockle), *Phleum pratense* and *Lepidium densiflorum* (common peppergrass) were also present but still limited to specific localities across the town. The *S. noctiflora* infestation was treated and should be re-treated next season.

McCarthy Road

Four vouchers were collected from the McCarthy Road. Three were not listed as invasive species in the Alaska Natural Heritage Program database. They were identified by the Park botanist as *Actaea rubra*, *Rhinanthus minor*, and *Senecio pauciflorus* (from the west end of Long Lake at Mile 45). The fourth was identified as *Bromus inermis* (from the east end of Long Lake where a population of *Tripleurospermum perforata* was documented in 2006). A fifth voucher, collected at Mile 51, was identified as *Papaver somniferum.* This is near private property (the Fireweed Subdivison) where *Linaria vulgaris*, *Leucanthemum vulgare*, *Erysimum cherianthoides* subsp. *cherianthoides*, *Descurainia incana* and *Arabis glabra* had been documented previously.

The extensive growth of *Taraxacum officinale* ssp. *officinale, Trifolium, hybridum, T. pratense,* and *T. repens* along the road makes it impractical to map them. *T. officinale* ssp. *officinale* does not appear to have increased since the road construction in 2006. With the exceptions of *Bromus inermis, T. officinale* ssp. *officinale, T. hybridum, T. pratense,* and *T. repens,* the invasive plants growing along the McCarthy Road are ranked below 50 in the Alaska Natural Heritage Program database. *Descurainia sophia, Matricaria discoidea,* and *Plantago major* are the most pervasive of the lower ranked plants. *Lappula squarrosa* grows thickly from Mile 1-7; *Crepis tectorum* is growing at Mile 7.

The Park botanist discovered a *Linaria vulgaris* population in a garden at Silver Lake. This is private property so the plants were not inventoried or weeded. The owners should be contacted next year and asked for permission to remove the plants.

The surprise find on the McCarthy Road was a population of *Leucanthemum vulgare* at Mile 10.9 (Appendix A, page 34). The plant was discovered in late July and was beginning to seed. It was inventoried but not weeded as it is growing on private land. The owners of this property should also be contacted and asked for permission to weed.

Crystalline Hills Study Area

The Crystalline Hills area of the McCarthy Road was surveyed this season and will continue to be monitored in the future since it contains the only section of the McCarthy Road directly adjacent to National Park Service land (Appendix A, page 32) and the study area is relatively weed free when compared to the rest of the road. It is also adjacent to some significant sources of non-native and invasive plants on private property. The study area extends from Mile 29 (the Gilahina Bridge) to Mile 45 (just west of Long Lake). Prior to 2007, the non-native plants occurring in this section of road were *Crepis tectorum, Lappula squarrosa, Polygonum aviculare, Matricaria discoidea, Melilotus officinales, Taraxacum officinale* subsp. *officinale, Trifolium repens* and *T. hybridum.* Except for *Crepis tectorum* and *Melilotus officinale* all of these species are prevalent along the McCarthy Road. The *Crepis tectorum* and *Melilotus officinale* were treated in previous years.

The survey method used involved parking at each milepost marker and walking approximately one-quarter mile each side of the marker. Although this left gaps in the coverage, it allowed for a reasonably complete survey in the time available.

No high priority invasive plants were found in this section of the McCarthy Road during the 2007 inventory (Appendix A page 33).

Slana and the Nabesna Road

The Nabesna Road was surveyed at the junction of the Tok Cut-Off and Nabesna Road, the Slana Ranger Station at Mile 0.2 and continuously from the Betty Freed property at Mile 2.4 to the pullout for the Reeve Field Trailhead at Mile 40.2. Depending on trail conditions, approximately the first 200 to 300 feet of Caribou Creek Trail, Viking Lodge Trail, Tanada Lake Trail, Skookum Volcano Trail, and Reeve Field Trail were

inventoried. Most of these are ORV trails and conditions were not always conducive to walking. No invasive plants were found during the trail surveys. Due to equipment failure no inventories were done on the Suslota Lake Trail or the Copper Lake Trail.

Invasive plants growing along the Nabesna Road include *Lappula squarrosa*, *Matricaria discoidea*, *Melilotus alba*, *Plantago major*, *Taraxacum officinale* ssp. *officinale*, and *Tripleurospermum perforate* (Appendix A, pages 37-42) . With the exception of the *M. alba*, which is confined to the area around the junction of the Tok Cut-Off and Nabesna Road and a side trail connecting to the Slana Fishwheel Trail, the populations of these plants are either small and/or widely scattered.

Although the *Melilotus alba* population at the junction of the Tok Cut-Off and Nabesna Road appears to have diminished over the past two seasons, the area remains a high priority (Appendix A, page 37). This site was weeded twice during 2007. The first weeding was during the third week of June. Weeding was difficult and not very effective due to the small size (less than three inches) of the majority of the plants. The area was re-weeded during the fourth week of July. Although the plants were still very small, more were large enough to grasp and pull than in June.

In 2004, a population of *Melilotus alba* on a side trail connecting to the Slana Fishwheel Trail was inventoried and weeded (Appendix A, page 37). No plants were reported at this site in either 2005 or 2006. When the site was monitored this season, approximately 20-30 three to six inch first year plants were discovered. This is both a walking and an ORV trail. All plantlets were growing in the tire tracks. All plants were pulled and bagged for disposal.

The Betty Freed property at Mile 2.4 on the Nabesna Road was monitored. Originally a private home site, the property was donated to the Park/Preserve in 2001 and is used as housing for seasonal employees and volunteers. Remnants of a vegetable garden and other domestic plants remain on the site. Small, scattered populations of *Matricaria discoidea*, *Plantago major* and *Tripleurospermum perforata* were the only invasive plants found. The *T. perforata* was weeded in June but, during a visit to the site in mid-August, another 10-15 plants in successive stages of flowering and seeding were discovered. All plants were again pulled and bagged. The number of plants on the property appears to be increasing. Although its rank of 48 in the Alaska Natural Heritage Program database puts it outside the parameters for monitoring and weeding this year, the small amount of time and effort involved justified the control effort. No other populations of this plant have been found along the road.

During the 2004 inventory, *Crepis tectorum* was found at the junction of the Tok Cut-Off and Nabesna Road and at Mile 31 on the Nabesna Road. No plants were observed at either location in 2005 or 2006. In 2006, a small population was inventoried and weeded in an abandoned gravel pit at Mile 11. No *C. tectorum* plants were found at any location in 2007.

Matricaria discoidea is the most common invasive plant found on the Nabesna Road. Although the plant is pervasive between Mile 4 and Mile 29, the growth is rarely heavy.

It is less common after Mile 29. The low rank and the difficulty involved in eradication have precluded any attempts to weed.

From Mile 0.2 to Mile 40.2, three to ten plants from randomly selected populations of *Taraxacum* sp. were inspected and 14 vouchers were collected (Appendix A, pages 38 and 39). A voucher taken at a pullout between Mile 23 and 24 was identified as *T. officinale* ssp. *officinale*. The *T. officinale* ssp. *officinale* plants at this site were dug and bagged for disposal. The Park botanist identified the remaining 13 specimens as *T. officinale* ssp. *ceratophorum*.

During the 2006 season, a single *Descurainia sophia* plant was found at Little Jack Creek Bridge. This plant was pulled and bagged. Its large size made it memorable; it measured 5'4". No plants were found in this location during 2007.

Two *Lappula squarrosa* plants were weeded at the rest stop at Dead Dog Hill (Appendix A, page 42). No others were found on the Nabesna Road. This is another lower ranked plant where the few minutes needed to weed seemed worthwhile.

Headquarters

In 2006, the area around the entrance sign was planted with three *Picea glauca* (white spruce) trees, *Rosa acicularis* (rose) bushes, and *Shepherdia canadensis* (soapberry) bushes. Of this planting, the three *P. glauca*, six to eight *R. acicularis*, and one *S. canadensis* survived the winter, although none appear to be thriving. In 2006, several species of flowers were seeded and transplanted in this same area. Only *Lupinus nootkatensis* (lupine) and *Polemonium pulcherrimum* (beautiful Jacob's ladder) were noticeable this year. The grounds around the buildings were mowed in early summer so it was difficult to determine which, if any, seeds germinated in the spring.

The Interpretative Trail was inventoried this season. No invasive plants were found on the trail although a few *Crepis tectorum* were growing near it. These were pulled and bagged.

The two most pervasive weeds are *Crepis tectorum* and *Taraxacum officinale* ssp. *officinale*. The grounds are also infested with *Chenopodium album* (lambsquarters), *Hordeum jubatum*, and *Lappula squarrosa*. The maintenance crew did some weeding, as did David and Lil, but little other progress was made in improving the grounds. Keeping Headquarters free of weeds is an important step in preventing seed from spreading further into the Park/Preserve. It would also provide a more attractive and welcoming aspect for visitors. Without an official landscape plan and someone designated to implement it, the grounds will continue to look unkempt.

Copper Basin

A survey of *Melilotus alba* in the Copper Basin was undertaken in late July through August (Appendix A, pages 35 and 36). Plant growth appeared diminished and plants growing in the southern region were stunted. Monitoring was inhibited by the fact that most of the roadside verges were closely mowed during the summer. It was often very difficult to determine if *M. alba* was present, let alone gauge the amount of cover or the phenology of the plants. The only new plants discovered were a small population on the

upper Brenwick-Craig Road in Copper Center. No *M. alba* was found on the Edgerton Highway this season. Significant populations were inventoried at both of these locations in 2006. No *M. alba* was noted during an inventory of a short section of the banks of the Copper River near Chitina

The *Melilotus alba* plants on the Richardson Highway and on the Tok Cut-Off became thicker, although most remained stunted, further north. There was a thick growth of very small plants at the Gulkana River Bridge. The gravel pit near Mile 126 on the Richardson Highway was heavily infested although, again, most of the plants appeared smaller than in 2006. Plants in three *M. alba* populations monitored on the Tok Cut-Off were more nearly the size noticed in previous years.

A voucher collected near Mile 126 on the Richardson Highway was identified as *Vicia cracca*. This population was inventoried but, because it was seeding heavily, no effort was made to weed. The *V. cracca* in front of Gakona Lodge was impossible to monitor. The area had been closely mowed and no plants were visible. No attempt was made this season to monitor the *V. cracca* at Mile 2.25 on the Edgerton Highway.

Other invasive plants noted visually while surveying for *Melilotus alba* included *Crepis tectorum*, *Matricaria discoidea*, *Medicago lupulina* (black medick), *Melilotus officinalis* (yellow sweetclover), *Plantago major*, *Trifolium hybridum*, and *Taraxacum officinale* ssp. *officinale*. A small patch of *Tanacetum vulgare* (common tansy) was found at the entrance to the NPS maintenance yard in Glennallen. It was not inventoried or weeded.

DISCUSSION OF PLANTS

Crepis tectorum

Crepis tectorum is beyond control in the southern and central areas of the Copper Basin. It is evident on all roadsides. At times only a few plants are noticeable but often it is growing thickly.

The roads leading into the Park/Preserve are not as heavily infested. Although populations were reported in 2004 and 2006, *Crepis tectorum* was not found growing on the Nabesna Road this season. *C. tectorum* was monitored and weeded at Mile 7 on the McCarthy Road. No other plants were seen until the end of the road. Since *C. tectorum* seed is easily dispersed, both roads should continue to be surveyed for this plant.

The *Crepis tectorum* infestations that were treated this season in McCarthy were still small enough to be pulled with little control effort and the plant remains unnoticed in Kennecott. Due to the importance of early treatment in preventing establishment, it is recommended that each infestation be retreated next year and new populations of *C. tectorum* be searched for in both McCarthy and Kennecott.

Leucanthemum vulgare

A previously unknown population of *Leucanthemum vulgare* was discovered at Mile 10.9 on the McCarthy Road. The population was inventoried but, as it is private property, the plant was not weeded. It should be monitored and, if permission is given, weeded during coming seasons.

Oxeye daisy once again found growing among fireweed behind the Kennecott Recreation Hall. It was pulled soon after picture was taken.

The population of *Leucanthemum vulgare* on the slope behind the Recreation Hall in Kennecott continues to decrease with each passing season, demonstrating the effectiveness of the control efforts that are being put forth. For this reason it is very important to keep up the control work at this location as well as with the infestation by the Kennicott Wilderness Guides campsite, which was treated for the first time this season. Unfortunately , the owner of the Kennicott Glacier Lodge still will not permit these invasive plants to be pulled from his property. Until this is done, *Leucanthemum vulgare* will continue to pose a threat in Kennecott.

Linaria vulgaris

The two small *Linaria vulgaris* populations mapped and treated in McCarthy this summer should definitely receive attention in the future. They were both able to be treated with very little control effort and should be pulled again next season before they go to seed.

A small number of *Linaria vulgaris* plants were discovered at in a garden at Silver Lake on the McCarthy Road. These plants should be inventoried and weeded if allowed by the owners.

Melilotus alba

The *Melilotus alba* in the Slana/Nabesna area remains a high priority. Although the population appeared diminished this year, it was difficult to determine whether this was due to past control efforts or to unfavorable spring conditions. By mid-August, few of the plants were more than 8-12 inches high. Only the plants growing at the base of the slope on the north side of the junction approached a normal size. Plants here were three to five feet high and growing very thickly. They were also observed to be growing approximately three feet into the woods. The area around the junction will need to be closely monitored and growth may need to be vigorously controlled for many years.

Disappointingly, when the side trail connecting to the Slana Fishwheel Trail was monitored, 20 to 30 first year plantlets were found for the first time since 2004. All plants were weeded and bagged for disposal. This is an ORV trail and the plants were

growing in the tire tracks. It seems probable that a vehicle had been driven through the infested area at the junction and picked up seeds which were spread.

The *Melilotus alba* populations growing in the southern section of the Copper Basin, and along the Edgerton, Richardson, and Glenn Highways, appeared diminished this year. In the more northern area of the Basin, three stands monitored on the Tok Road seemed little changed from 2006. Due to time and energy constraints, several sections of the Richardson Highway between Mile 113 and the junction with the Tok Cut-Off were monitored from a moving vehicle.

The *Melilotus alba* near Park Headquarters at Mile 106 on the Richardson Highway was diminished and few plants grew taller than 8 to 12 inches. No *M. alba* was found growing on the grounds at Headquarters. Monitoring and weeding of *M. alba* should be continued.

Taraxacum officinale ssp. *officinale*
Taraxacum officinale ssp. *officinale* is pervasive in all areas covered in this report. At Park Headquarters, *T. officinale* ssp. *officinale* grows thickly along the drive to the Visitor's Center and more sparsely in other areas.

The *Taraxacum officinale* ssp. *officinale* populations on the McCarthy Road were visually monitored. The extensive road construction during 2006 did not appear to have caused much change in either the locations or density of the growth. The plants are highly visible from the beginning of the road to the end.

Taraxacum officinale ssp. *officinale* was the main focus of the work on the Nabesna Road this season. Fourteen vouchers were collected between the Slana Ranger Station at Mile 0.2 and the Reeve Field Trailhead at Mile 40.2. Thirteen of these were identified as *Taraxacum* ssp. *ceratophorum*. The remaining voucher was collected in a pullout near Long Lake and was identified as *Taraxacum officinale* ssp. *officinale*. The three *T. officinale* ssp. *officinale* plants at that location were weeded and bagged for disposal.

Taraxacum officinale ssp. *officinale* also still persists on the Root Glacier Trail and Bonanza Mine Trail. The infestations on the Root Glacier Trail are limited enough to be eradicated by one person with a couple weeks' work, which is why it is crucial to keep up the control work. The Bonanza Mine Trail, however, is very heavily infested to the point where a volunteer crew and multiple days of work are required to begin removing the invasive plants. Monitoring and control work should remain high priorities on these two trails in future seasons especially since these invasive plants pose a threat to six rare plants (state ranking of 3 or lower by the Alaska Natural Heritage Program) that are known to occur on the Bonanza Ridge (Nordell and Schmitt, 1976).

In early July, Ben Shaine, one of the leaders of The Wrangell Mountains Center's College Field Program based in McCarthy, was contacted. Each summer college students from the University of California – Santa Barbara take part in this particular program to study land-use policy and relative environmental issues. Ben Shaine said that his students were to take part in a 3-week expedition, during which they would explore areas of the park that were well into the backcountry. He showed great interest in the invasive

plant work the National Park Service was conducting and was given information about which invasive plants to keep a look out for as well as an *Invasive Plants of Alaska* book with the appropriate pages marked for Kennecott and McCarthy. The staff ended up bringing back a pressed, in-seed, specimen of *Taraxacum officinale* ssp. *officinale* in August, which they collected in Hidden Creek Valley. It was reportedly found on an undisturbed slope about 400 or 500 feet away from Hidden Creek mixed in with some native wildflowers. The specimen was very large and healthy with multiple seeding stems. Unfortunately the students were not able to get a GPS location of the spot where they found the specimen. Despite this lack of data, this gives a good reason survey Hidden Valley next year, especially since the specimen was found in an undisturbed region of the park. Due to the distance Hidden Valley is from Kennecott, this would be an overnight project.

Vicia cracca

The *Vicia cracca* at Mile 2.25 on the Edgerton Highway was visually monitored. It appears to be slowly increasing. An area in front of Gakona Lodge inventoried in 2006 had been closely mowed. It was impossible to determine if any *V. cracca* remained. Another population of *V. cracca* was discovered near Mile 126 on the Richardson Highway. This is a small stand, approximately four meters long and one meter wide. All three locations are outside the boundary of the Park/Preserve.

In 2006, Danny Rosenkrans, land specialist at Wrangell-St. Elias National Park and Preserve, found a *Vicia* sp. growing along a route to the Lakina River. This trail takes off from the McCarthy Road at approximately Mile 42. He also reported a wide swath of plants growing across the Lakina River. Due to high water levels, it was not possible to inventory the population this year. Hans Klausner, a seasonal hydrologist for the park who previously worked with invasive plants in Homer, did not report seeing any specimens on the north side of the Lakina.

Lappula squarrosa, Tripleurospermum perforata, Caragana arborescens

In 2006, two *Lappula Squarrosa* plants were inventoried and weeded at the Dead Dog Hill rest area on the Nabesna Road. Two plants were found in the same location this season. They were again pulled and bagged. This area should continue to be monitored.

Lappula squarrosa grows in several locations along the McCarthy Road. The populations at Mile 7 and Mile 10 are particulary heavy. No attempt was made to inventory or weed in these areas.

The mature infestation of *L. squarrosa* that was pulled by the McCarthy Community Church should be revisited next season since this was the largest patch of *L. squarrosa* found in the McCarthy area. The plants in this infestation had already begun to deposit seed when they were pulled, meaning there will most likely be plantlets growing next season.

Tripleurospermum perforata was inventoried and weeded at the Betty Freed property on the Nabesna Road during the 2005, 2006, and 2007 field seasons. It appears to be slowly increasing, possibly because the property is being used more intensively for housing. It has not been reported in any other locations on the Nabesna Road or the Park/Preserve.

There is also a population at the east end of Long Lake at the overlook that was mapped and treated in 2006. It was not documented in 2007.

As the mature *Caragana arborescens* specimens on the property across from the Wrangell Mountains Center continue to deposit large numbers of seed pods each season, the likelihood of a greater infestation increases. The owners of the property have mentioned that they are aware of the invasive potential of *C. arborescens*. They said they were willing to look for plantlets on their property and perhaps they could be persuaded to remove the mature plants from their yard next season

RECOMMENDATIONS

Education and Public Involvement

A key element in success controlling invasive plants is education and community involvement. Radio and newspaper interviews help bring the problem to public attention. The summer craft and agricultural fairs are good venues for educational displays. The Interpretive Rangers at the visitor centers at Headquarters, Slana, and Kennecott could be asked to incorporate information about invasive plants in the talks given by their staffs. Field crews working in the Park/Preserve could be provided with a form to help them easily report possible invasive species and the coordinates. This standardized form could also be included in the Employee Handbook.

Handouts about exotic plants, especially the easily carried booklet, *Selected Invasive Plants of Alaska*, should be widely distributed. Good distribution points include the Park Visitor Centers at Headquarters, Slana and Kennecott. Libraries, laundromats, post offices, local visitor centers, gift shops and hotels throughout the Copper Basin are also good locations to display information.

Another very important educational opportunity is community involvement. David had time in Kennecott to interact with the community and made important contacts. He recruited help with weeding and was notified about locations of suspected invasive plants. Keeping an intern in McCarthy while expanding the program to include one in Nabesna would be very useful.

The Wrangell Mountain Center also hosted educational talks each Sunday in the Kennecott Recreation Hall this past summer. If they decide to keep a similar program in 2008, it would be an educational event worth taking advantage of as information on invasive plant treatment and prevention could be given to an interested audience.

2008 Field Season

For the previous three field seasons, the focus of work has been on the road system. The Nabesna Road, in particular, has been extensively surveyed, inventoried, and monitored. It is a fairly “clean” area. The McCarthy Road has not been as thoroughly surveyed although much of the Crystalline Hills area was walked in 2007.

Only very short sections of the trails on either road have been surveyed on foot; no surveys have been done in areas requiring ORV travel. Six backcountry airstrips, Chelle Lake, Ampitheatre Creek, Doubtful Creek, Glacier Creek, Peavine, and the strip at the confluence of the Chitina and Nizina Rivers, were surveyed in 2006. There is no data on

the remaining ten strips maintained by Park Service. It seems important to begin including off-road areas in the inventory process.

Recommendations for next field season include:

- Kennecott/McCarthy
  - Unless an employee is based in Kennecott or McCarthy, trips should be scheduled for a week as travel takes most of two days.
  - Hidden Creek Lake/Valley should also be visited next summer due to the discovery of a mature *Taraxacum officinale* ssp. *officinale* found growing there in an undisturbed location this past season.
  - The McCarthy Airstrip should continue to be monitored since it represents a vector into the backcountry landing strips.
  - Backcountry airstrips around McCarthy, known to contain invasive plants, should be visited next season and the invasive plants controlled.
  - Monitor and control the *Taraxacum officinale* ssp. *officinale* infestations on the Bonanza Mine Trail with help from volunteer crews. The *T. officinale* ssp. *officinale* infestations treated farthest up the trail this year should be re-treated next year by the Park Service employee stationed in the area since they are still relatively small and easy to control. The volunteer crew(s) should focus on the larger infestations found up the Bonanza Mine Trail and start pushing them back.
  - Monitor and control the *Taraxacum officinale* ssp. *officinale* on the Root Glacier Trail. This year the species was found to be in seed by June 19th, meaning that treatment on the Root Glacier Trail should start as early as possible in June. Due to the relatively small sizes of these infestations, the trail can be treated in two weeks or less.
  - The *Leucanthemum vulgare*, *Linaria vulgaris* and *Crepis tectorum* infestations in Kennecott and McCarthy should continue to be monitored and treated.
  - The Wrangell Mountain Center's College Program in McCarthy should be kept in close contact since their leaders expressed interest in the invasive plants issue and are willing to keep an eye out for them while on their 3-week backcountry expedition.
  - If time permits, Donoho Peak should be mapped. It is a glacial island frequently visited by campers and experienced a major disturbance event this past July as a fire burned several acres of alder habitat. This fire disturbance presents a great opportunity for invasive plants to establish themselves, which is why it is important to begin treatment as soon as possible if they are found.
- McCarthy Road
  - if time allows, the most heavily traveled ORV trails should be inventoried;
  - monitor and, if needed, weed the Crystalline Hills area, Mile 29 to Mile 45, surveyed in 2007;
  - monitor and, if given permission by owners, weed the *Leucanthemum vulgare* at Mile 10.9;
  - inventory and, if given permission by owners, weed the *Linaria vulgaris* at Silver Lake;

- as time permits, survey the entire road for new infestations of high ranking species;
- if the water level permits, inventory a reported population of *Vicia* sp. across the Lakina River.

- Slana/Nabesna Road
  - a majority of the work should be on ORV and foot trails; if possible, include the water crossings at Trail Creek, Lost Creek, and Boyden Creek;
  - monitor and weed *Melilotus alba* at the junction of the Tok Cut-Off and Nabesna Road and on the trail connecting to the Slana Fishwheel Trail;
  - monitor and weed *Crepis tectorum and Lappula squarrosa.*
  - survey the Nabesna Road from Reeve Field Trailhead at Mi. 40.9 to the end of the maintained road at Mi. 42; if possible, inventory from Mi. 42 to the Nabesna Mine at Mi. 46.
- Remote Locations
  - as time and budget allow, fly to the 10 unsurveyed landing strips, designated lakes, and back country locations; inventory and weed plants as needed.
- Headquarters
  - help with weeding, seed collection and dissemination, and landscaping work.
- Copper Basin
  - monitor *Melilotus alba* along the Edgerton, Glenn, and Richardson Highways, and on the Tok Cut-Off; include side roads, trails, and gravel pits;
  - as time permits, monitor *Vicia cracca* found at Mile 2.25 on the Edgerton Highway, in front of Gakona Lodge, and near Mile 126 on the Richardson Highway.

<u>Recommended Schedule for 2008</u>

- **Early Season (mid-May until June)**
  - Attend training. Although the training this year was excellent, more focus on the technical aspects of the GPS unit and software would be helpful as would more time spent practicing "negative" inventories and estimating coverage.
  - Distribute educational literature.
  - Recruit volunteers and have the required forms on file.
  - Schedule trips to the Nabesna/Slana area, the McCarthy/Kennecott area, and backcountry airstrips.
  - Complete travel forms.
  - Assemble necessary supplies and literature for any interns, youth conservation corps employees, or volunteers that may be part of the program.
  - Plan for weed disposal.
  - Load GPS unit with required software and maps.
- **Mid-Season (June, July, August) Field Work**
  - Travel, inventory, monitor, and weed in the Park/Preserve, adjacent roads, and the Copper Basin.
  - Download, correct, and post-process GPS files at end of each trip; send to W:// drive.

- Keep time sheet, rover file log, phenology log, and collections log current.

- **Late Season (September)**
  - Do final edits and corrections for all GPS data collected, the rover file log, phenology log, collections log, and time log. Post to W:// drive.
  - Write end-of-season report.
  - Collect and spread seeds.
  - Attend autumn meeting of the Copper Basin Exotic Plant Work Group.
  - Organize files and materials for next season.

Table 1. List of non-native taxa documented in or in the vicinity of Wrangell-St. Elias National Park & Preserve, Alaska.

Taxon	**Common Name**	**AKEPIC Rank 4/17/07**	**Observed on park lands?**	**Collected from park lands?**	**Year first docmented**	**Notes**
Allium schoenoprasum	wild chive	53	Y	Y	1984	Voucher from within park is native variety (*A. schoenoprasum* var. *sibiricum*). Kennicott observation (Bauder and Heys 2004) was in a garden. Also vouchered from Copper Center in 1934.
Arabis glabra	tower rockcress	59	N	N	1968	Vouchers not in park
Beckmannia syzigacene	slough-grass		Y	Y	1991	
Bromus inermis subsp. *inermis*	smooth brome grass	62	Y	Y	2002	
Capsella bursa-pastoris	shepherd's purse	40	Y	Y	2002	
Caragana arborescens	Siberian peashrub	66	N	N	2005	Gilmore 2005, McCarthy private property
Cerastium fontanum	mouse-ear chickweed	36	Y	Y	1976	
Chenopodium album	common lambsquarters	35	Y	Y	2002	
Collomia linearis	narrowleaf-mountain trumpet		Y	Y	1988	
Crepis tectorum	narrowleaf hawksbeard	54	Y	N	1997	Vouchers not in park
Descurainia sophia	flixweed	41	Y	Y	2002	
Elymus repens	quackgrass	59	Y	Y	2002	
Erysimum cheiranthoides subsp. *cheiranthoides*	wormseed mustard		Y	Y	1925	Subsp. needs verification for all vouchers, some could be native subsp.
Eschscholzia californica	California poppy		N	N	2004	Bauder and Heys 2004, McCarthy private property
Galeopsis tetrahit	hempnettle		N	N	2005	Voucher, private land
Hordeum jubatum	foxtail barley	63	Y	Y	1976	
Impatiens glandulifera	ornamental jewelweed	82	N	N		Observed in Michael Moody's garden, Chitina, by Lil Gilmore, 2004.
Lappula squarrosa	European stickseed	44	Y	Y	1981	
Lepidium densiflorum	common pepperweed	25	Y	Y	2002	
Leucanthemum vulgare	oxeye daisy	61	Y	Y	2002	
Linaria vulgaris	yellow toadflax	69	N	N	2001	Vouchers not in park

Taxon	Common Name	AKEPIC Rank 4/17/07	Observed on park lands?	Collected from park lands?	Year first docmented	Notes
Lolium perenne subsp. *perenne*	perennial ryegrass	41	N	N	2004	Bauder and Heys 2004, McCarthy
Matricaria discoidea	pineapple weed	32	Y	Y	2002	
Medicago lupulina	black medic	48	N	N		Observed by Lil Gilmore in fields in Kenny Lake and roadside Copper Center
Melilotus alba	white sweetclover	80	N	N	2002	Vouchers not in park
Melilotus officinalis	yellow sweetclover	65	N	N	2003	Vouchers not in park
Papaver rhoes	corn poppy		Y	Y	1913	
Papaver somniferum	opium poppy		N	N	2007	2007 Report, McCarthy Road
Phleum pratense	common timothy	56	N	N	2003	McKee 2003, McCarthy private property
Plantago major	common plantain	44	Y	Y	2002	
Poa pratensis subsp. pratensis	Kentucky bluegrass	52	Y	Y	1987	
Polygonum aviculare	prostrate knotweed	45	Y	Y	1995	
Polygonum convolvulus	black bindweed		Y	Y	2003	
Secale cerale	wild rye		N	N	2003	2003 voucher private property in park
Silene latifolia	bladder campion	45	N	N	2006	2006 voucher not in park
Silene noctiflora	night-blooming cockle	45	N	N	2005	2005 voucher, McCarthy private property.
Stellaria media	common chickweed	42		N		Commonly observed in Copper Basin, esp. on domestic sites
Taraxacum officinale subsp. officinale	common dandelion	58	Y	Y	1935	
Thlaspi arvense	field pennycress		N	N	1932	1932 voucher Gulkana; Bauder & Heys 2004, McCarthy private property
Trifolium hybridum	alsike clover	57	N	N	2002	Vouchers not in park , McKee 2003
Trifolium pratense	red clover	53	Y	Y	2003	
Trifolium repens	white clover	59	Y	Y	2002	
Tripleurospermum perforata	scentless false mayweed	48	Y	Y	2005	
Veronica serpyllifolia subsp. serpyllifolia	thyme-leaf speedwell		Y	Y	2003	
Vicia cracca	bird vetch	73	N	N	2005	Vouchers not in park, Kenny Lake
Vicia sativa	common vetch		N	N	2005	Vouchers not in park, Kenny Lake

Table 2. List of non-native taxa documented within or in the vicinity of the park by park region.

Taxon	**Kennicott**	**McCarthy**	**McCarthyRoad**	**Slana**	**Nabesna Road**	**Copper Center HQ**	**Copper River Basin**	**Other**
Allium schoenoprasum	X						X	Copper Center, Nizina River
Arabis glabra			X	X				
Beckmannia syzigacene								Tanada Lake, Upper Copper River
Bromus inermis ssp. inermis		X	X			X	X	
Capsella bursa-pastoris	X	X	X	X		X	X	
Caragana arborescens		X					X	
Cerastium fontanum								Bonanza Ridge
Chenopodium album	X	X	X			X	X	
Collomia linearis							X	McCarthy Creek
Crepis tectorum		X	X	X		X	X	
Descurainia sophia	X	X	X	X		X		
Elymus repens	X	X						
Eschscholzia californica		X						
Erysimum cheiranthoides subsp. *cheiranthoides*			X				X	Upper Chitina R, Nabesna Road, Nabesna River, Chitina, Copper Center
Galeopsis tetrahit							X	
Hordeum jubatum	X	X	X	X	X	X	X	White River, Chitina River, Klawasi, Bonanza Ridge
Impatiens glandulifera							X	
Lappula squarrosa		X	X		X	X	X	Upper Chitina River, Baldwin Glacier, Copper River, Kennicott River
Lepidium densiflorum		X		X		X		
Leucanthemum vulgare	X	X						
Linaria vulgaris		X	X					

Taxon	Kennicott	McCarthy	McCarthyRoad	Slana	Nabesna Road	Copper Center HQ	Copper River Basin	Other
Lolium perenne ssp. perenne			X					
Matricaria discoidea	X	X	X	X	X	X	X	
Medicago lupulina							X	
Melilotus alba				X			X	
Melilotus officinalis			X				X	
Papaver rhoes								Upper Chitina River
Papaver somniferum			X					
Phleum pratense		X						
Plantago major	X	X	X	X	X	X	X	
Poa pratensis ssp. pratensis		X						Horsfeld, Karr Hills
Polygonum aviculare			X				X	Mt. Chitina
Polygonum convolvulus								Upper McCarthy Creek
Secale cerale								Upper McCarthy Creek
Silene latifolia							X	
Silene noctiflora		X						
Stellaria media	X	X					X	
Taraxacum officinale ssp. officinale	X	X	X	X	X	X	X	Stuver Creek
Thlaspi arvense		X						
Trifolium hybridum	X	X	X			X	X	May Creek
Trifolium pratense	X							
Trifolium repens	X							May Creek
Tripleurospermum perforata			X	X				
Veronica serpyllifolia ssp. serpyllifolia								Tyndall Glacier
Vicia cracca							X	Gakona, Kenny Lake
Vicia sativa							X	Kenny Lake

Table 3. List of non-native taxa documented within or in the vicinity of the park indicating source of geodatabase documentation.

Taxon	**Geodatabase**			**Notes**
	EPMT	**AKEPIC (Pre-EPMT)**	**WRST Voucher Database**	
Allium schoenoprasum			X	
Arabis glabra	X		X	
Beckmannia syzigacene			X	
Bromus inermis subsp. *inermis*	X	X	X	
Capsella bursa-pastoris	X	X	X	
Caragana arborescens	X			
Cerastium fontanum			X	
Chenopodium album	X	X	X	
Collomia linearis			X	
Crepis tectorum	X	X	X	
Descurainia sophia	X	X		All vouchers are of *D. sophiodes*, questionable if mapped localities are *D. sophia*
Elymus repens	X	X	X	
Erysimum cheiranthoides subsp. *cheiranthoides*	X		X	
Eschscholzia californica				Observation (Bauder and Heys 2004)
Galeopsis tetrahit				Voucher data not entered yet
Hordeum jubatum	X		X	
Impatiens glandulifera				Observation (Gilmore and Goldsmith 2007)
Lappula squarrosa	X	X	X	
Lepidium densiflorum	X	X	X	
Leucanthemum vulgare	X	X	X	
Linaria vulgaris	X	X		
Lolium perenne subsp. *perenne*		X		
Matricaria discoidea	X	X	X	
Medicago lupulina	X			
Melilotus alba	X	X	X	
Melilotus officinalis		X		
Papaver rhoes			X	
Papaver somniferum				Voucher data not entered yet
Phleum pratense	X	X		
Plantago major	X	X		
Poa pratensis subsp. pratensis			X	
Polygonum aviculare	X	X	X	
Polygonum convolvulus			X	
Secale cerale			X	
Silene latifolia	X			
Silene noctiflora	X			
Stellaria media	X			

Taxon	Geodatabase			Notes
	EPMT	**AKEPIC (Pre-EPMT)**	**WRST Voucher Database**	
Taraxacum officinale subsp. officinale	X	X	X	
Thlaspi arvense				Observation (Bauder and Heys 2004)
Trifolium hybridum	X	X	X	
Trifolium pratense	X	X	X	
Trifolium repens	X	X	X	
Tripleurospermum perforata	X			Voucher data not entered yet
Veronica serpyllifolia subsp. serpyllifolia			X	
Vicia cracca	X			Voucher data not entered yet
Vicia sativa				Voucher data not entered yet

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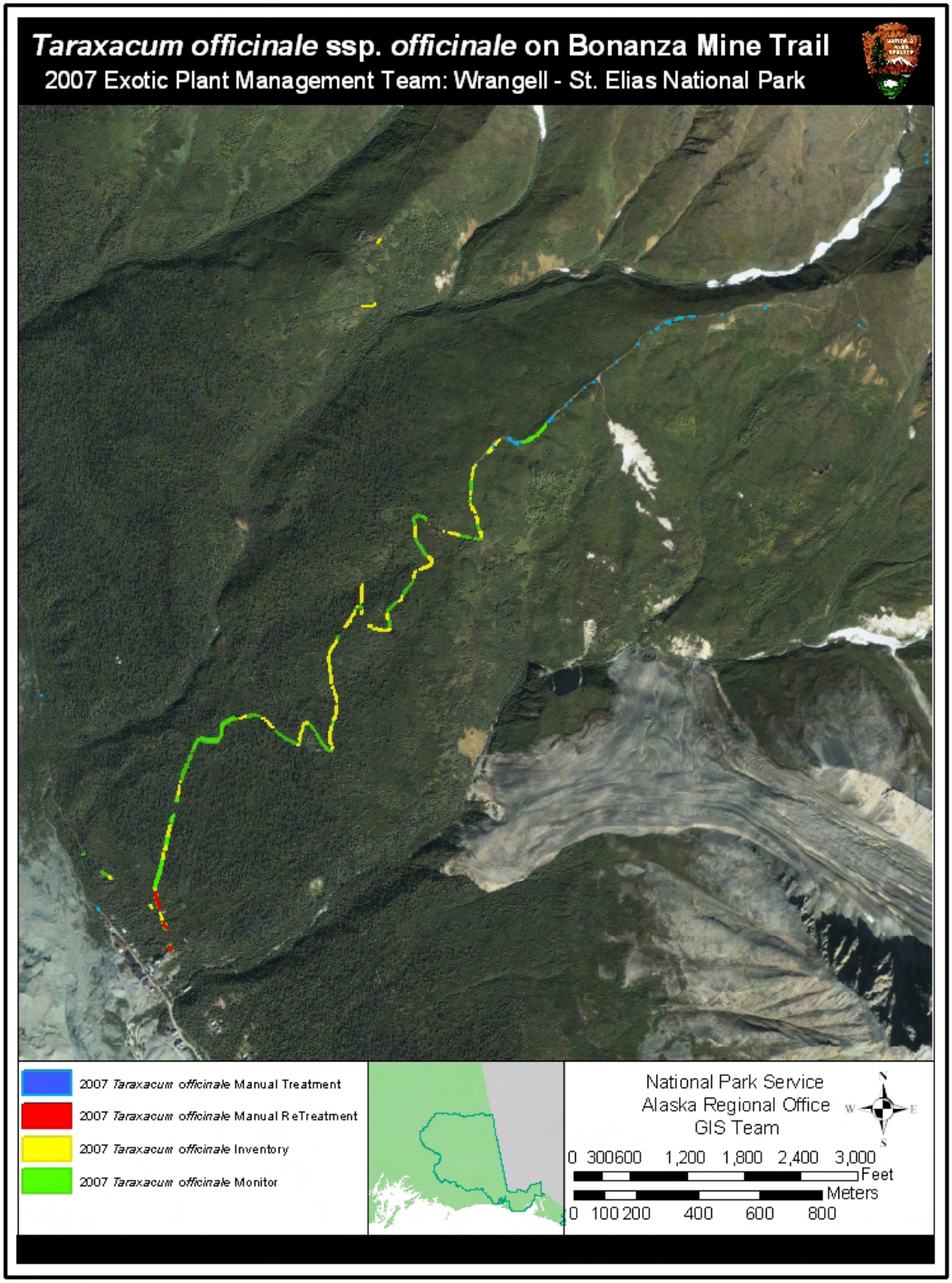
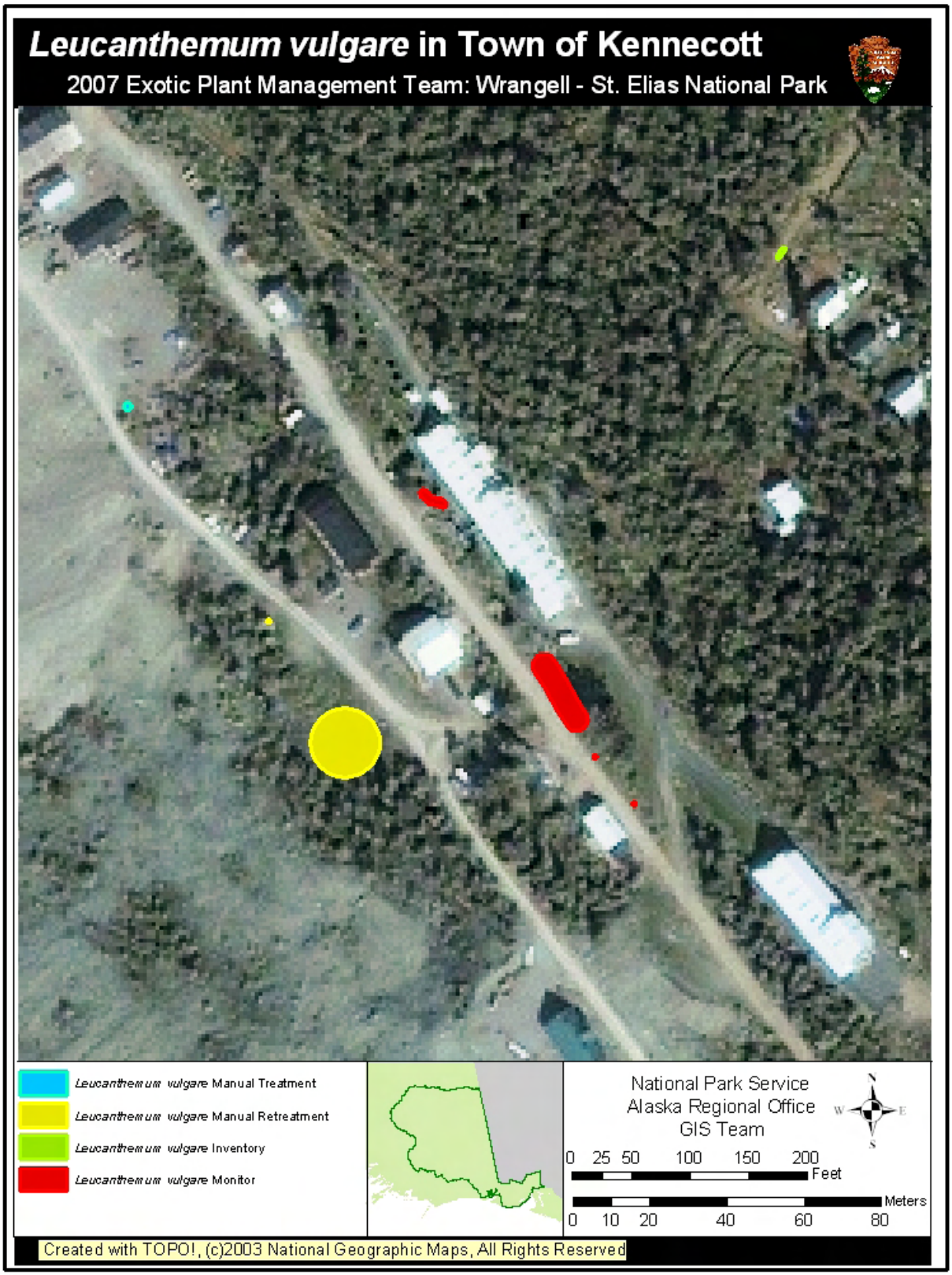
Appendix A: Maps of Selected Invasive Plants in WRST




Leucanthemum vulgare in Town of Kennecott
2007 Exotic Plant Management Team: Wrangell - St. Elias National Park
Leucanthemum vulgare Manual Treatment
Leucanthemum vulgare Manual Retreatment
Leucanthemum vulgare Inventory
Leucanthemum vulgare Monitor
National Park Service
Alaska Regional Office
GIS Team
N
W
E
S
0 25 50 100 150 200
Feet
Meters
0 10 20 40 60 80
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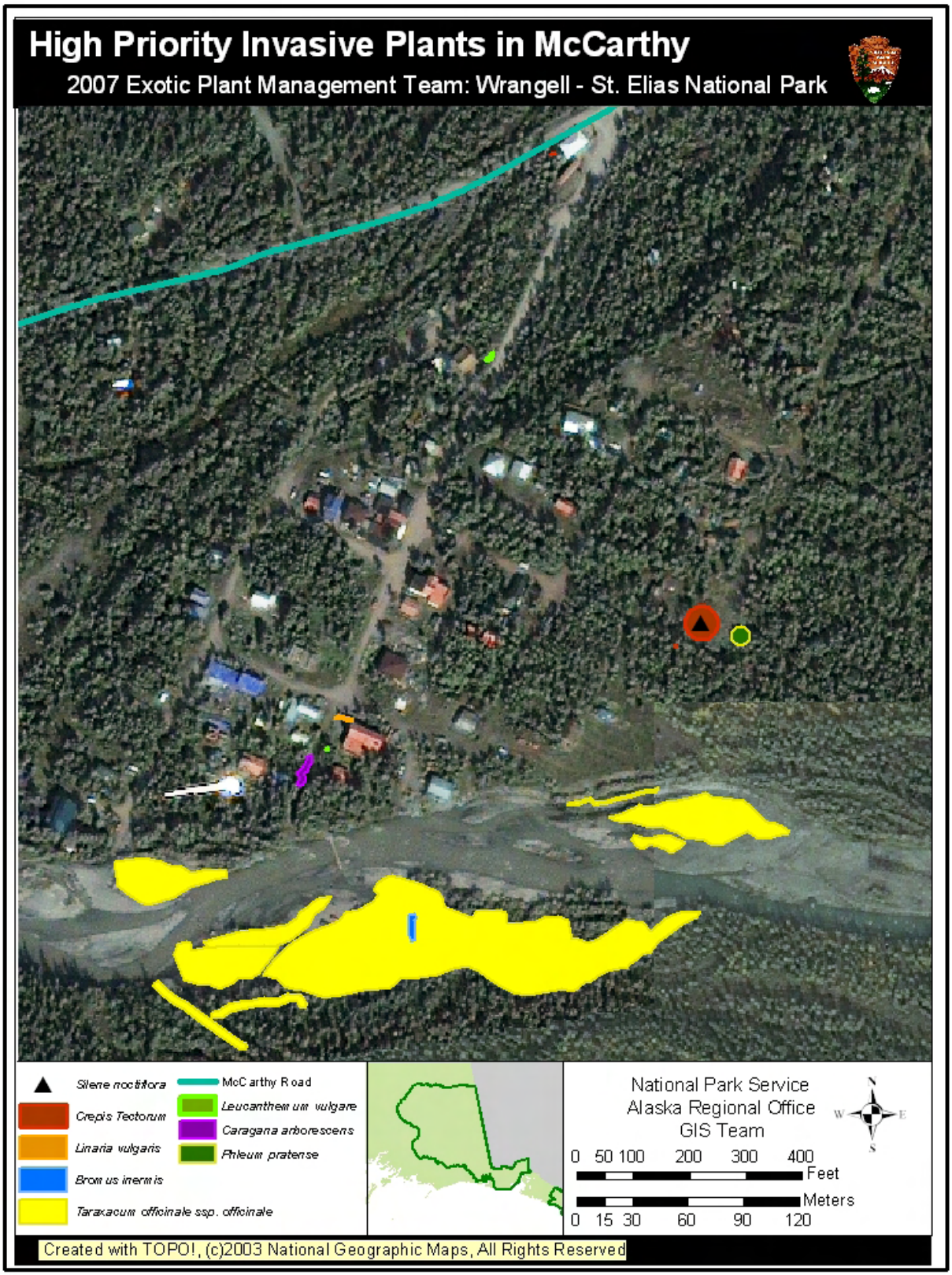
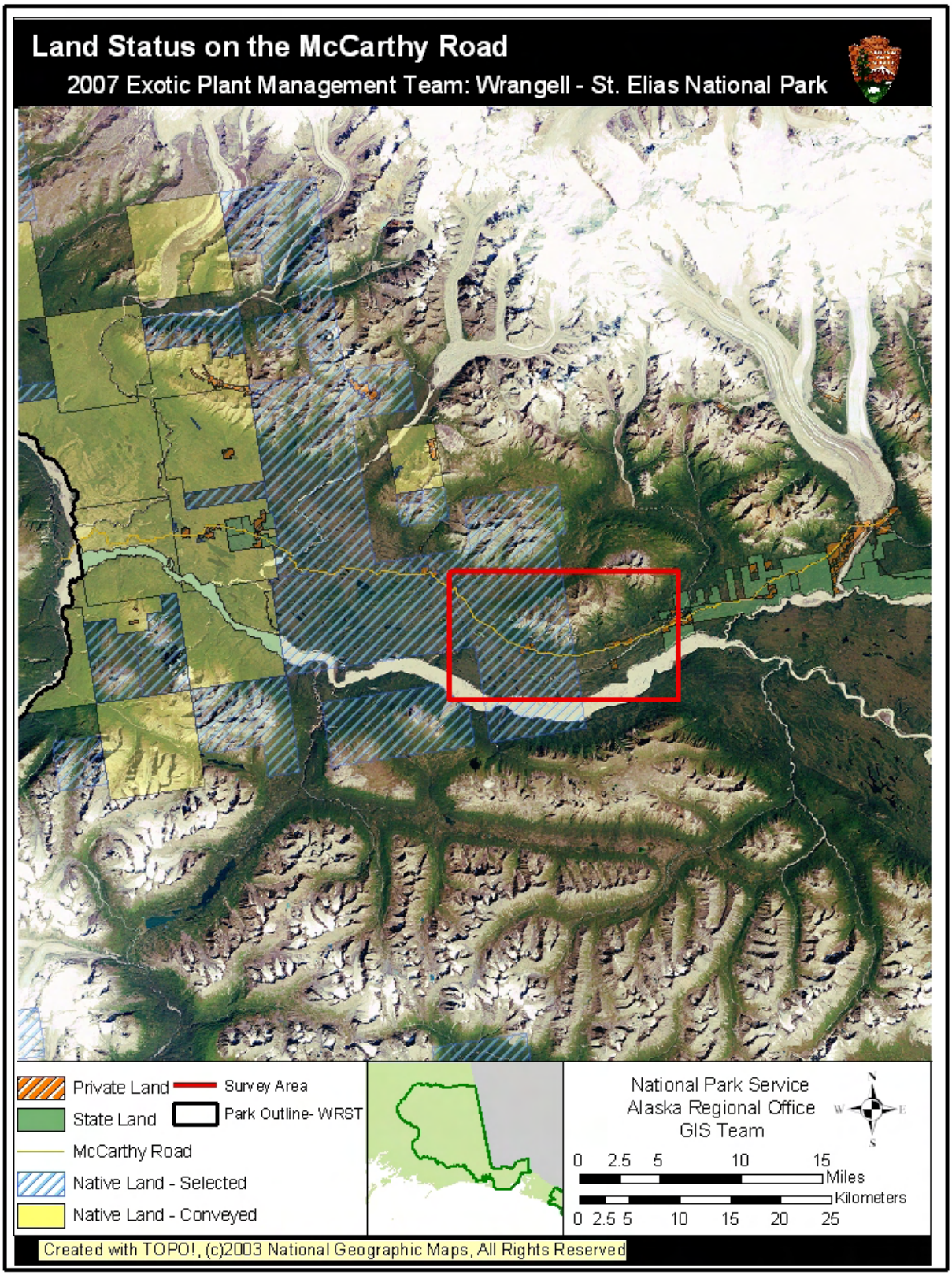
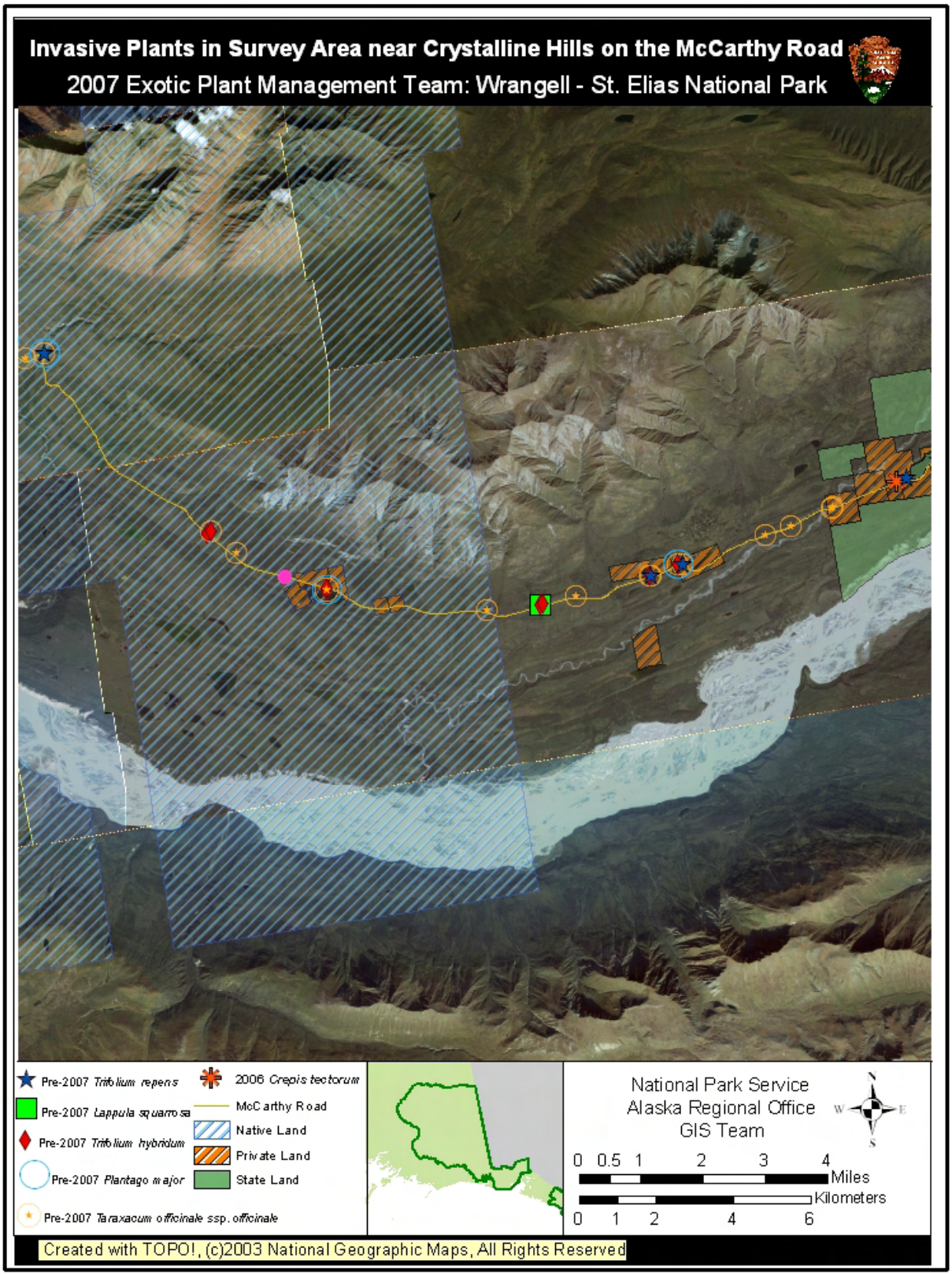
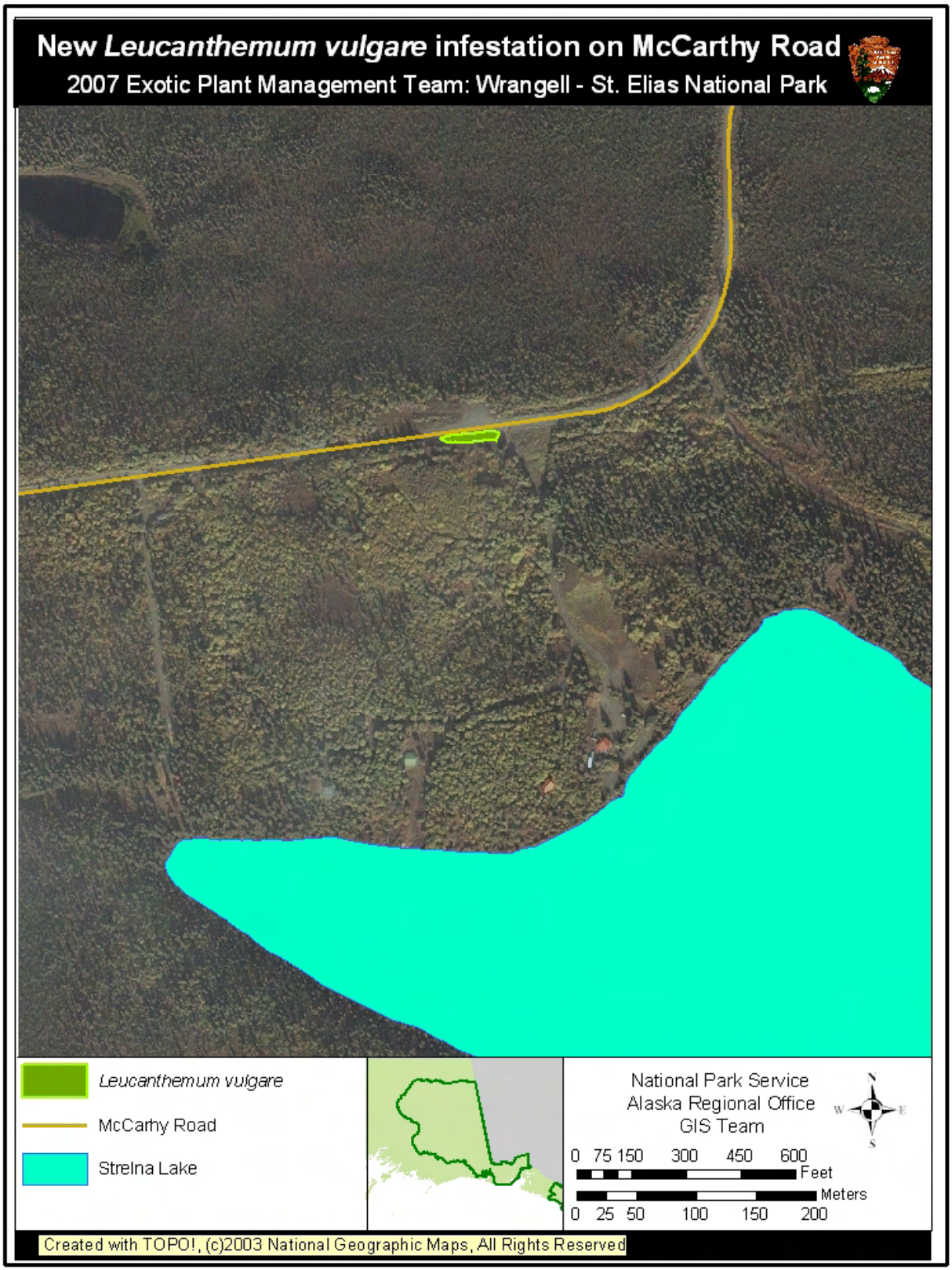
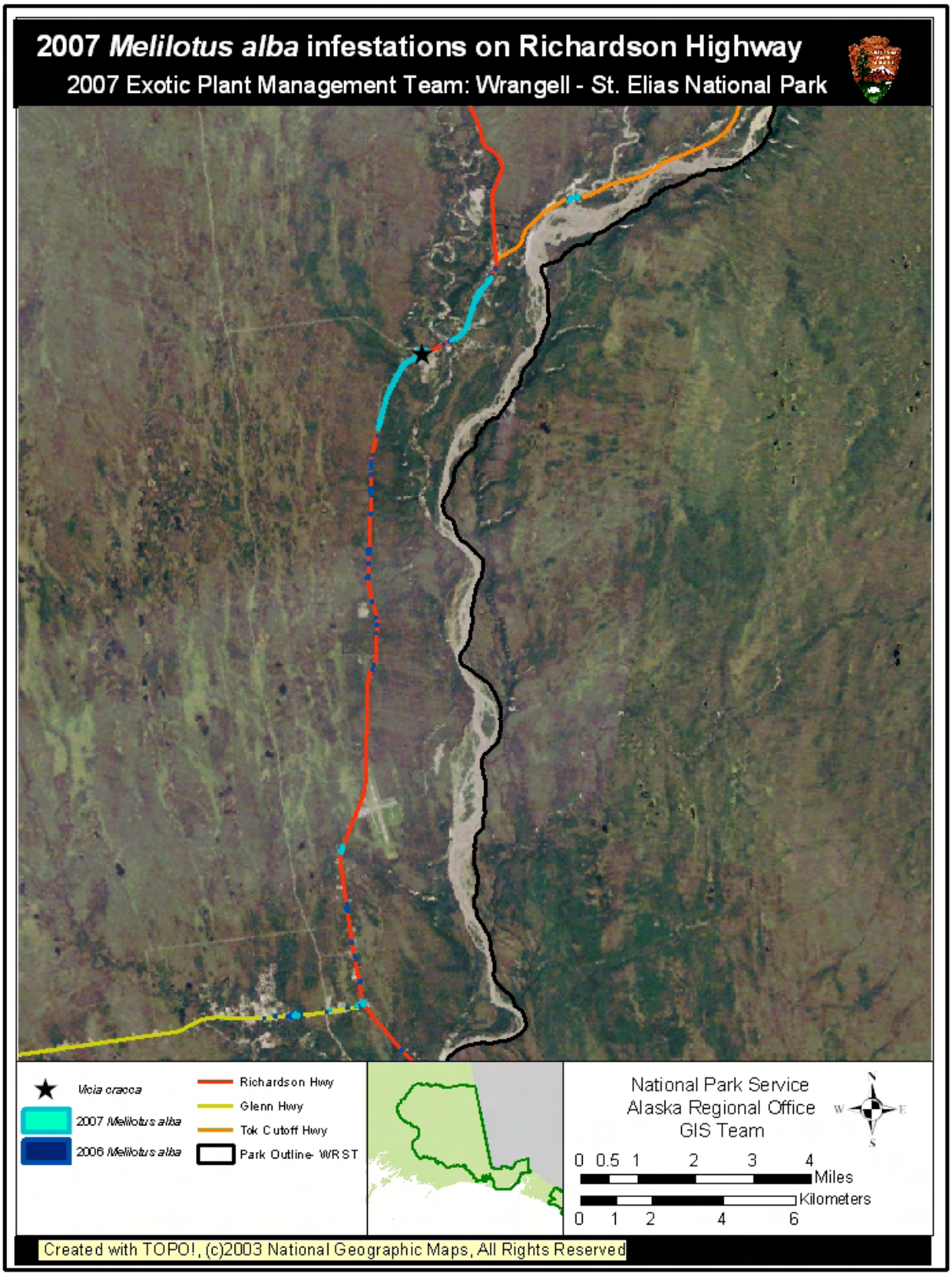

High Priority Invasive Plants in McCarthy
2007 Exotic Plant Management Team: Wrangell - St. Elias National Park
Silene noctiflora
Crepis Tectorum
Linaria vulgaris
Bromus inermis
Taraxacum officinale ssp. officinale
McCarthy Road
Leucanthemum vulgare
Caragana arborescens
Phleum pratense
National Park Service
Alaska Regional Office
GIS Team
0 50 100 200 300 400
Feet
Meters
0 15 30 60 90 120
Created with TOPO!, (c)2003 National Geographic Maps, All Rights Reserved

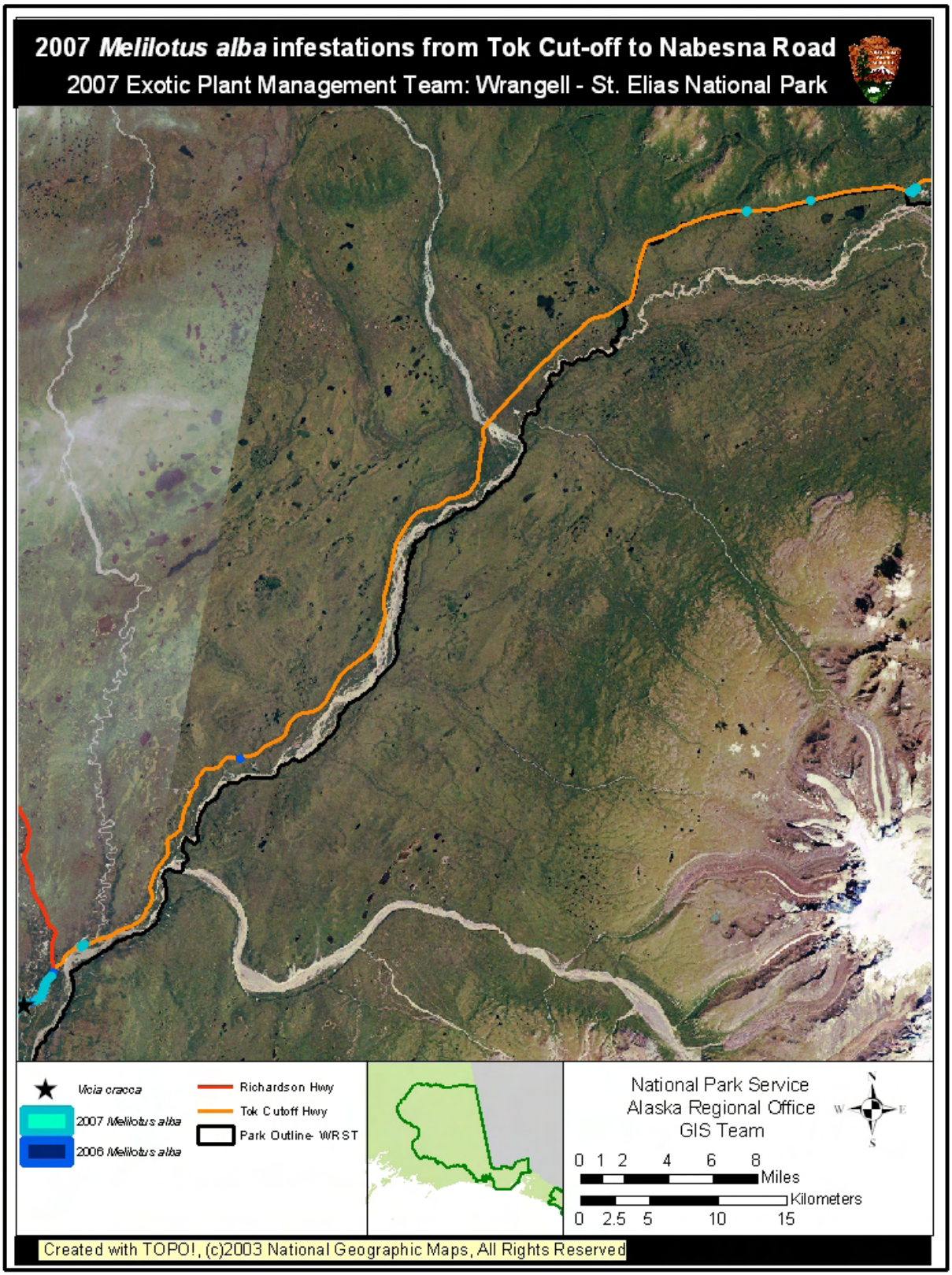
Linaria vulgaris and *Crepis tectorum* in McCarthy
2007 Exotic Plant Management Team: Wrangell - St. Elias National Park
Crepis Tectorum
Linaria vulgaris
McCarthy Road
John Adams Airstrip
National Park Service
Alaska Regional Office
GIS Team
N
W
E
S
0 25 50 100 150 200 250
Feet
Meters
0 10 20 40 60 80
Created with TOPO!, (c)2003 National Geographic Maps, All Rights Reserved

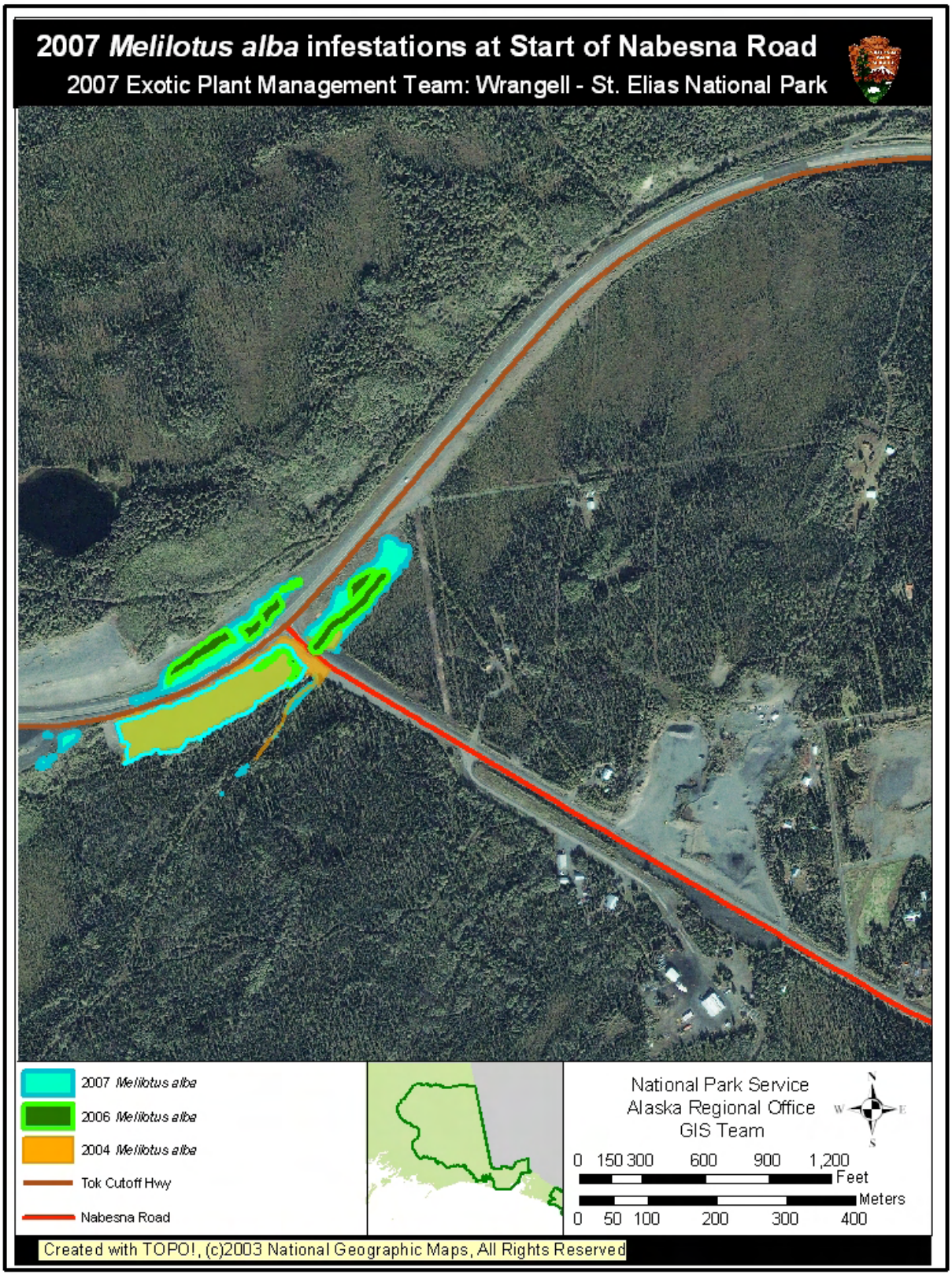

Land Status on the McCarthy Road
2007 Exotic Plant Management Team: Wrangell - St. Elias National Park
Private Land
State Land
McCarthy Road
Native Land - Selected
Native Land - Conveyed
Survey Area
Park Outline- WRST
National Park Service
Alaska Regional Office
GIS Team
0 2.5 5 10 15
Miles
Kilometers
0 2.5 5 10 15 20 25
Created with TOPO!, (c)2003 National Geographic Maps, All Rights Reserved

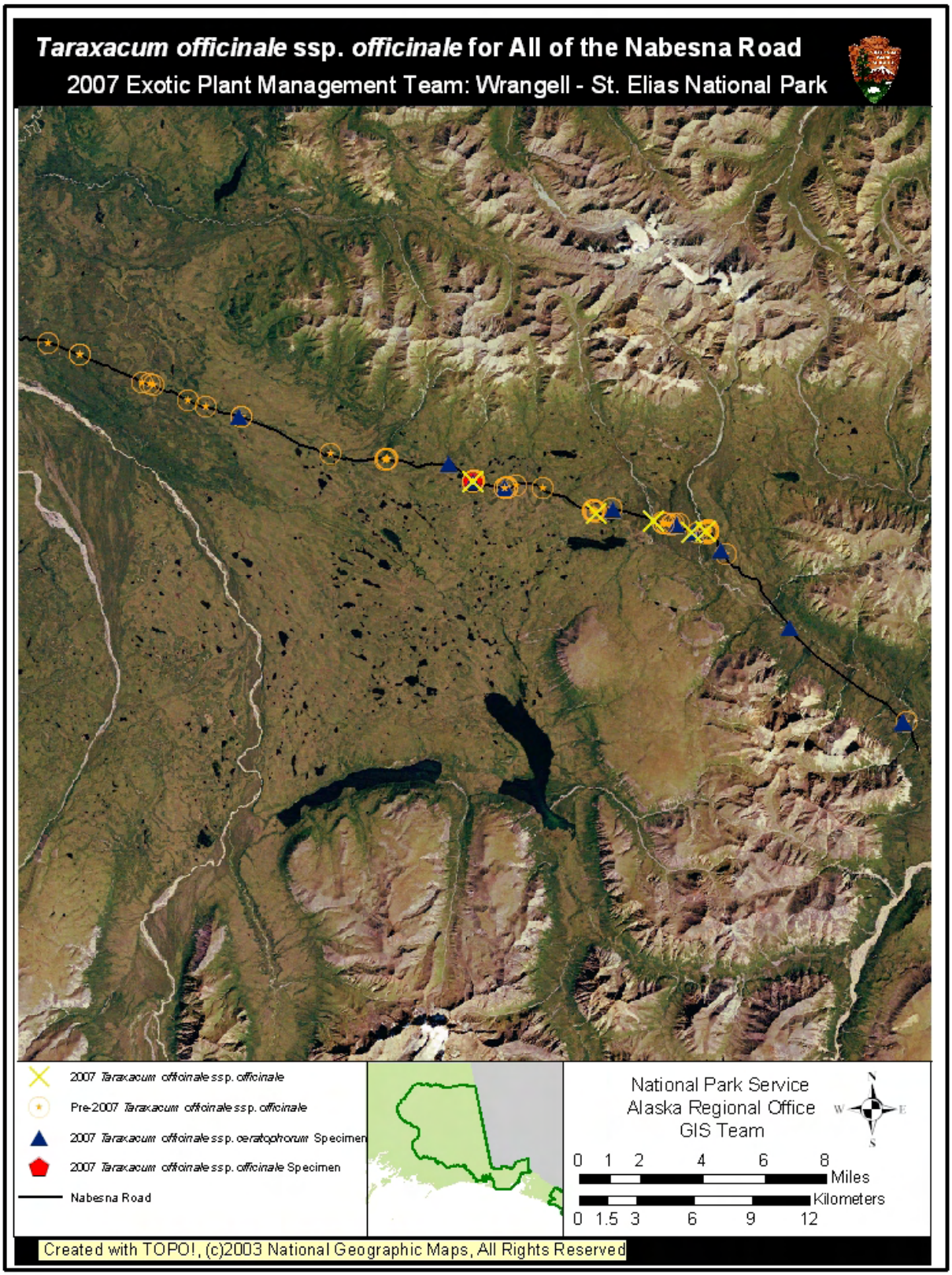

Invasive Plants in Survey Area near Crystalline Hills on the McCarthy Road
2007 Exotic Plant Management Team: Wrangell - St. Elias National Park
Pre-2007 Trifolium repens
Pre-2007 Lappula squarrosa
Pre-2007 Trifolium hybridum
Pre-2007 Plantago major
Pre-2007 Taraxacum officinale ssp. officinale
2006 Crepis tectorum
McCarthy Road
Native Land
Private Land
State Land
National Park Service
Alaska Regional Office
GIS Team
0 0.5 1 2 3 4
Miles
Kilometers
0 1 2 4 6
Created with TOPO!, (c)2003 National Geographic Maps, All Rights Reserved

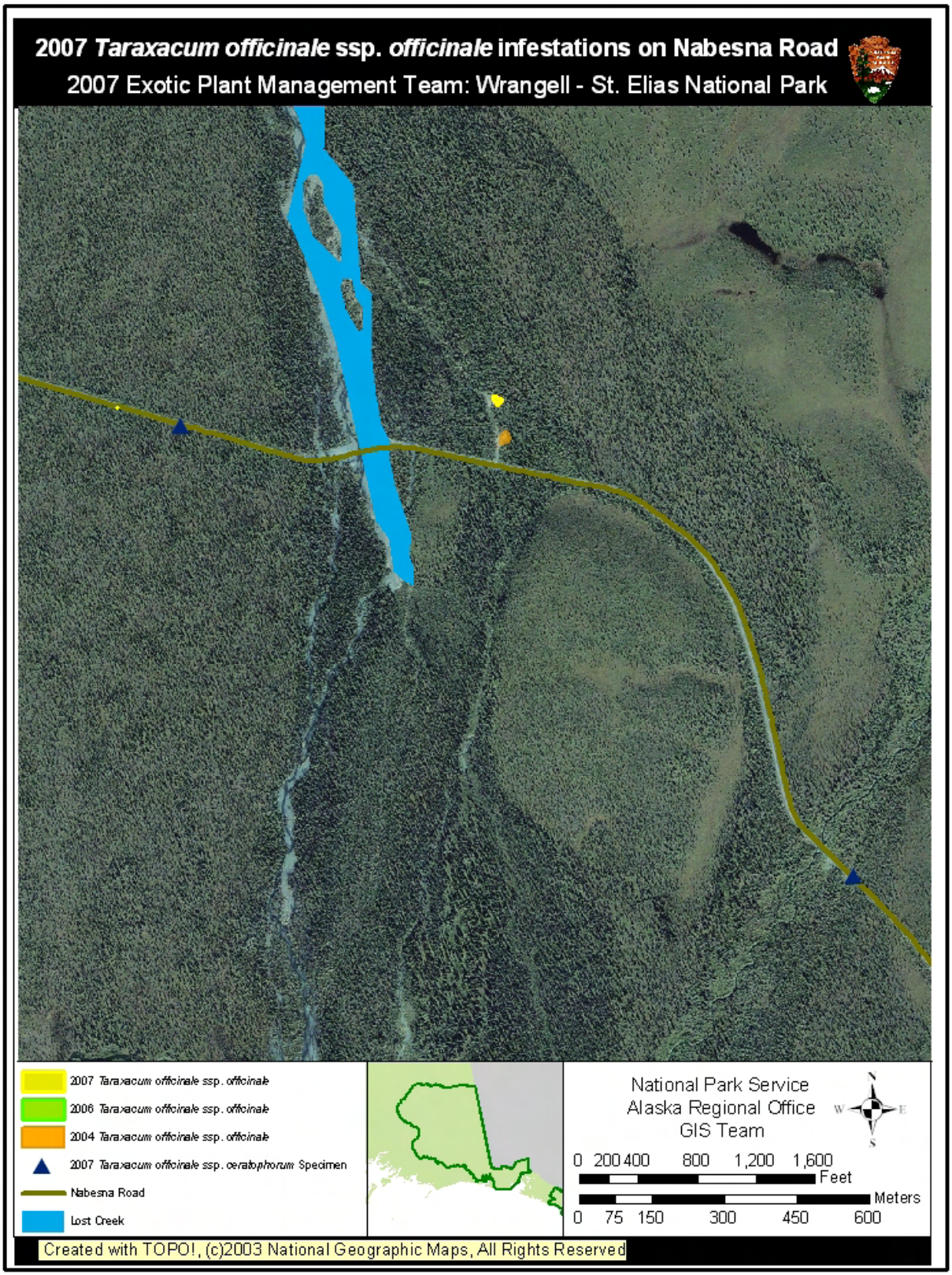

New *Leucanthemum vulgare* infestation on McCarthy Road
2007 Exotic Plant Management Team: Wrangell - St. Elias National Park
Leucanthemum vulgare
McCarhy Road
Strelna Lake
National Park Service
Alaska Regional Office
GIS Team
N
W
E
S
0 75 150 300 450 600
Feet
Meters
0 25 50 100 150 200
Created with TOPO!, (c)2003 National Geographic Maps, All Rights Reserved

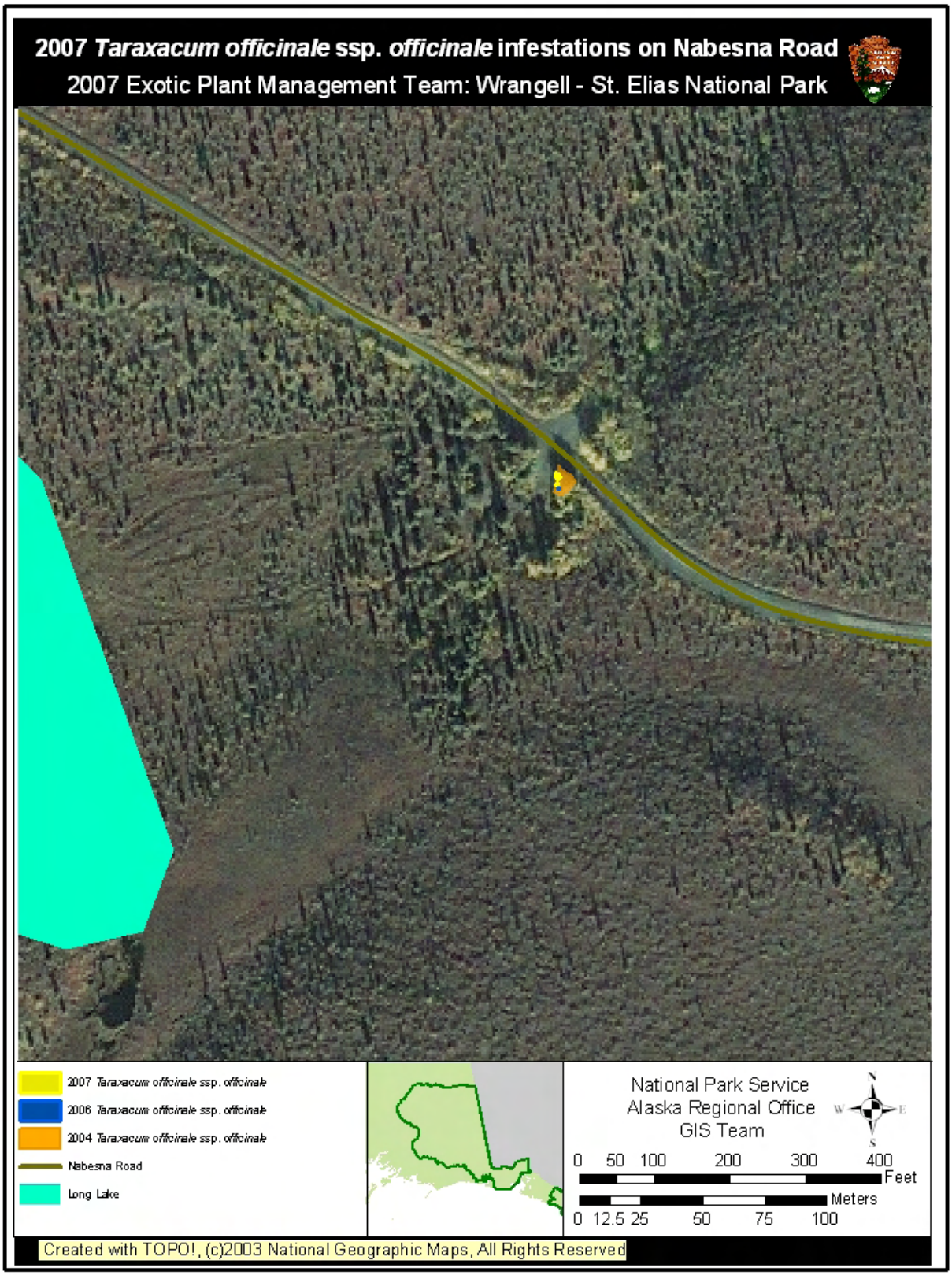

2007 Melilotus alba infestations on Richardson Highway
2007 Exotic Plant Management Team: Wrangell - St. Elias National Park
Moia cracca
2007 Melilotus alba
2006 Melilotus alba
Richardson Hwy
Glenn Hwy
Tok Cutoff Hwy
Park Outline- WRST
National Park Service
Alaska Regional Office
GIS Team
0 0.5 1 2 3 4
Miles
0 1 2 4 6
Kilometers
Created with TOPO!, (c)2003 National Geographic Maps, All Rights Reserved

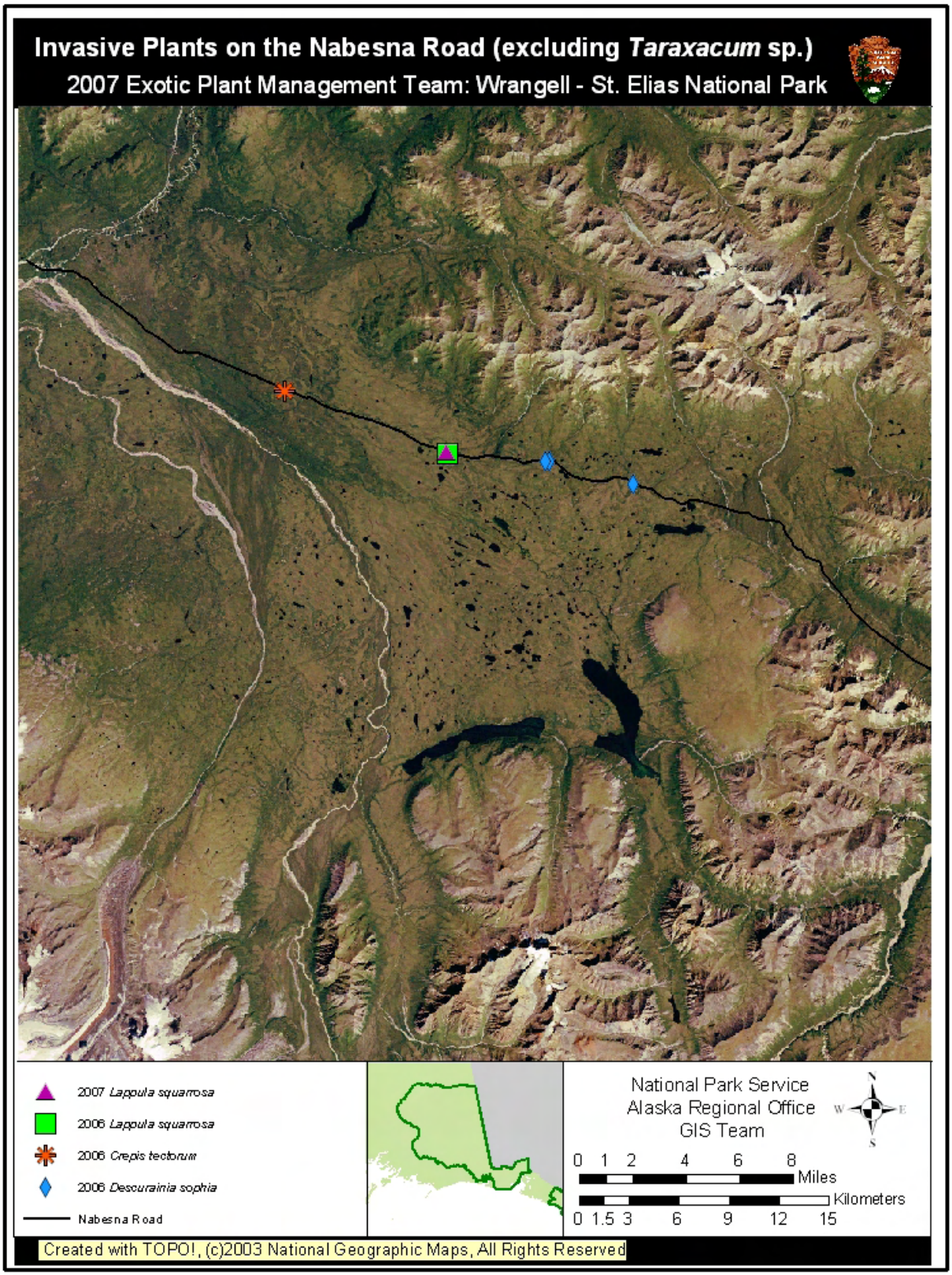

2007 Melilotus alba infestations from Tok Cut-off to Nabesna Road
2007 Exotic Plant Management Team: Wrangell - St. Elias National Park
Moia cracca
2007 Melilotus alba
2006 Melilotus alba
Richardson Hwy
Tok Cutoff Hwy
Park Outline- WRST
National Park Service
Alaska Regional Office
GIS Team
0 1 2 4 6 8
Miles
Kilometers
0 2.5 5 10 15
Created with TOPO!, (c)2003 National Geographic Maps, All Rights Reserved

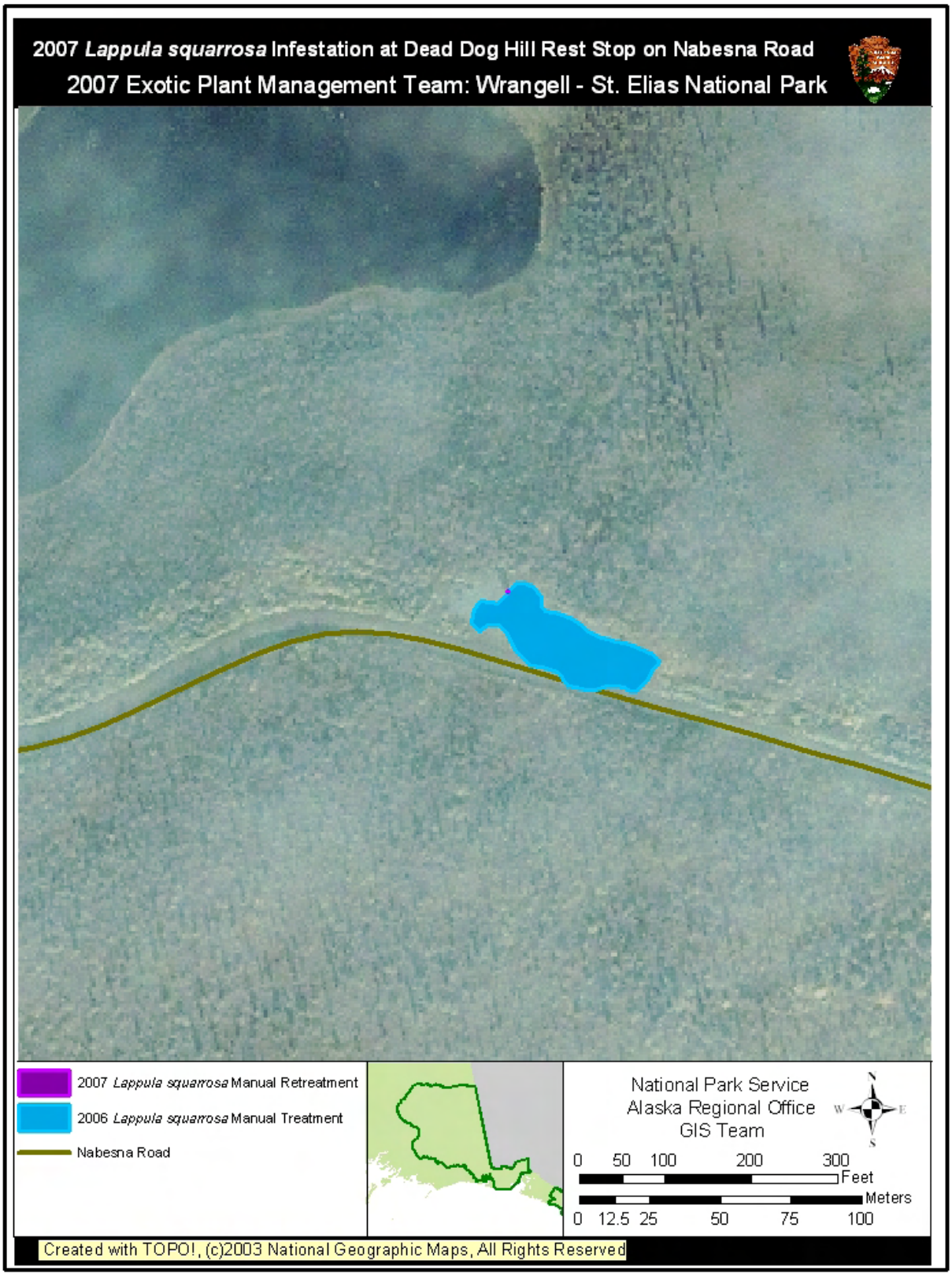

2007 Melilotus alba infestations at Start of Nabesna Road
2007 Exotic Plant Management Team: Wrangell - St. Elias National Park
2007 Melilotus alba
2006 Melilotus alba
2004 Melilotus alba
Tok Cutoff Hwy
Nabesna Road
National Park Service
Alaska Regional Office
GIS Team
0 150 300 600 900 1,200
Feet
Meters
0 50 100 200 300 400
Created with TOPO!, (c)2003 National Geographic Maps, All Rights Reserved


Taraxacum officinale ssp. officinale for All of the Nabesna Road
2007 Exotic Plant Management Team: Wrangell - St. Elias National Park
2007 Taraxacum officinale ssp. officinale
Pre-2007 Taraxacum officinale ssp. officinale
2007 Taraxacum officinale ssp. ceratophorum Specimen
2007 Taraxacum officinale ssp. officinale Specimen
Nabesna Road
National Park Service
Alaska Regional Office
GIS Team
0 1 2 4 6 8
Miles
Kilometers
0 1.5 3 6 9 12
Created with TOPO!, (c)2003 National Geographic Maps, All Rights Reserved


2007 Taraxacum officinale ssp. officinale infestations on Nabesna Road
2007 Exotic Plant Management Team: Wrangell - St. Elias National Park
2007 Taraxacum officinale ssp. officinale
2006 Taraxacum officinale ssp. officinale
2004 Taraxacum officinale ssp. officinale
2007 Taraxacum officinale ssp. ceratophorum Specimen
Nabesna Road
Lost Creek
National Park Service
Alaska Regional Office
GIS Team
N
W
E
S
0 200 400 800 1,200 1,600
Feet
Meters
0 75 150 300 450 600
Created with TOPO!, (c)2003 National Geographic Maps, All Rights Reserved


2007 Taraxacum officinale ssp. officinale infestations on Nabesna Road
2007 Exotic Plant Management Team: Wrangell - St. Elias National Park
2007 Taraxacum officinale ssp. officinale
2006 Taraxacum officinale ssp. officinale
2004 Taraxacum officinale ssp. officinale
Nabesna Road
Long Lake
National Park Service
Alaska Regional Office
GIS Team
N
W
E
S
0 50 100 200 300 400
Feet
Meters
0 12.5 25 50 75 100
Created with TOPO!, (c)2003 National Geographic Maps, All Rights Reserved


Invasive Plants on the Nabesna Road (excluding *Taraxacum* sp.)
2007 Exotic Plant Management Team: Wrangell - St. Elias National Park
2007 *Lappula squarrosa*
2006 *Lappula squarrosa*
2006 *Crepis tectorum*
2006 *Descurainia sophia*
Nabesna Road
National Park Service
Alaska Regional Office
GIS Team
0 1 2 4 6 8
Miles
Kilometers
0 1.5 3 6 9 12 15
Created with TOPO!, (c)2003 National Geographic Maps, All Rights Reserved


2007 *Lappula squarrosa* Infestation at Dead Dog Hill Rest Stop on Nabesna Road
2007 Exotic Plant Management Team: Wrangell - St. Elias National Park
2007 *Lappula squarrosa* Manual Retreatment
2006 *Lappula squarrosa* Manual Treatment
Nabesna Road
National Park Service
Alaska Regional Office
GIS Team
N
W
E
S
0 50 100 200 300
Feet
Meters
0 12.5 25 50 75 100
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