

# 2014 Anchorage, Alaska Canada thistle final report

Department of Natural Resources, Division of Agriculture

## Invasive Weeds Program

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### Summary

*Cirsium arvense* was first documented in Alaska in 1968 by the late Eric Hultén. It has consistently been identified in the Anchorage, Alaska area by the Alaska Exotic Plant Information Clearinghouse since 2002 (AKEPIC, 2013), documented and managed by the Department of Natural Resources the Anchorage Parks Foundation. Because of the continual efforts for the potential eradication of Canada thistle in the Anchorage area, this report supplements and uses information previously reported on in the 2013 report. This report also summarizes the work done in 2014 by the Alaska State Division of Agriculture in *C. arvense* management, with emphasis on priority sites and the additional management method of herbicide applications.

### Introduction and Background

#### Identification and Habitat

*C. arvense* is a perennial plant with deep rhizomes that propagate laterally and can form new shoots. The plant can grow up to 2 meters tall with alternate leaves with spines on its edges. The flowers are pink to purple and rarely white with small heads of disk flowers only. The flowers are dioecious; male and female flowers are produced on separate plants and cross pollination is necessary for seed production. The bracts have purple tips and sharply pointed. Seeds are oblong, and flattened in shape and grow up to 4mm long. They are attached to a feathery white pappus for aiding in wind dispersal. Vegetative reproduction from the root system accounts for most of the local growth. *C. arvense* is native to Eurasia; southeastern Europe, western Asia and northern Africa (Pojar and MacKinnon, 1994). It is commonly found growing along roadsides, lawns, gardens, abandoned fields, pastures, and disturbed areas; mainly agricultural lands. Some natural areas *C. arvense* has invaded include prairies, wet grasslands, and sedge meadows in the central plains area of the lower 48 states and Canada (AKEPIC, 2014).

#### History in Alaska

Presently, *C. arvense* is predominantly invading urban areas along roadsides with few infestations in natural areas. Figure 1 demonstrates the *C. arvense* records since 2002 in the greater Anchorage area (AKEPIC, 2014). These records also present information on attributes of the infestation, highlighting management strategy during the time of record. In this AKEPIC dataset, there are 304 records of *C. arvense* in the Anchorage area. Of these, only 4 have been recorded to have chemical management implemented by the

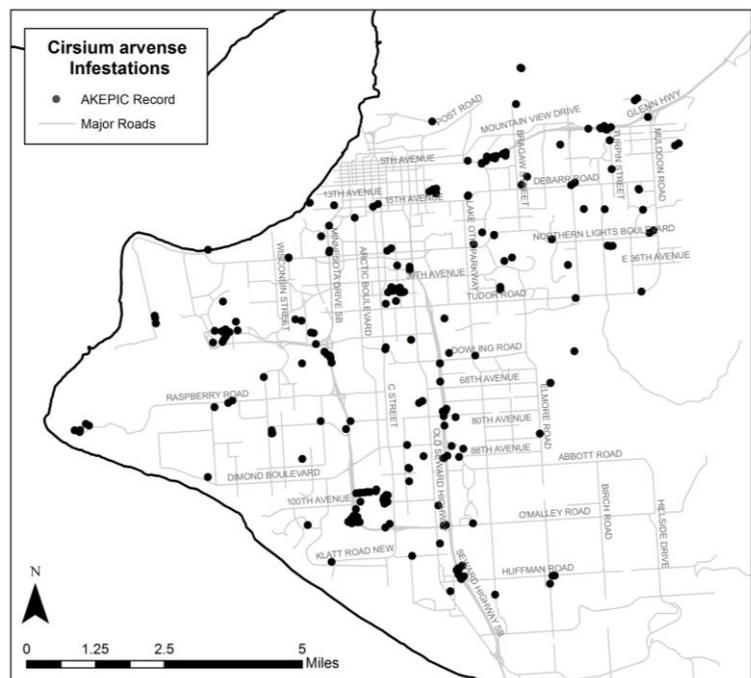


Figure 1. *C. arvense* infestations in the Anchorage area.

Municipality in Parks before 2014. 2014 was the first year the Department of Natural Resources utilized the Department of Transportation's (DOT) Integrated Vegetation Management Plan (IVMP, 2013) for herbicide applications on State owned properties and Right-of-Ways.

### **2014 Project Objectives**

Previous project objectives have aimed towards the control of this noxious weed in the Anchorage area. However, with the implementation of the DOT IVMP, the *C. arvensis* project goals for the 2014 season have adjusted towards site-specific eradication, not just control efforts of infestations. Therefore, the project objectives for 2014 are to:

1. Identify high priority infestations of *C. thistle* in the Anchorage area, and begin immediate control work using appropriate herbicides.
2. Using AKEPIC records identify additional areas for management and inventory to fill gaps in these activities.
3. Continual mechanical and manual management on non-priority infestations.
4. Provide unique outreach materials and resources to provide contact information for reporting new *C. arvensis* infestations, and management on private properties.

### **Methods**

#### *Outreach*

Community education, involvement and reporting are important components to understanding and surveying for invasive noxious weeds. Due to *C. arvensis* being prevalent in the Anchorage area, community awareness allows for the prevention of spread, word-of-mouth responsiveness to newly identified infestations and instruction on how to manage on private property. In spring of 2014, with the consultation of University of Alaska Fairbanks Cooperative Extension, a document targeting landowners addresses how to effectively manage *C. arvensis* on private property (See Appendix A). This document was handed out to businesses or companies with known *C. arvensis* infestations so that they have a resource on how to manage an infestation themselves. When given the "how to" document, it was verbally emphasized how important of an issue invasive noxious weeds are to Alaska.

Another outreach campaign was implemented using the resources of Anchorage Daily News (ADN). This campaign used both print and online advertising during the *C. arvensis* growing season for the purpose of gaining information about the extent of *C. arvensis* in Anchorage. The online advertisement (Figure 2, [http://bangertercreative.com/staging/state\\_of\\_ak\\_6-2014\\_300x250.html](http://bangertercreative.com/staging/state_of_ak_6-2014_300x250.html)) had 150,000 impressions, or online postings, and was run between June 15<sup>th</sup> and August 30<sup>th</sup>, 2014. A 4x3 inch black and white print advertisement was printed six times in the ADN Sunday paper between June 15<sup>th</sup> and August 9<sup>th</sup>, 2014. Another 4x3 inch color advertisement was printed in the Wednesday Xtra edition 11 times between June 18<sup>th</sup> and August 27<sup>th</sup>, 2014. Finally, an 8.5x10.5 inch color advertisement (Figure 2) was run for the "Print and Deliver" program for a total of 20,000 pieces in 12 different zip codes.



Figure 2. Anchorage Daily News Print and Deliver color advertisement and online advertisement.

Given that the current outreach efforts are seasonal, and relatively short-term resources, another campaign for a long-term outreach project was accomplished during the 2014 season. The Anchorage Zoo is situated in south Anchorage receives over 200,000 visitors per year. With DNR and the Zoo's

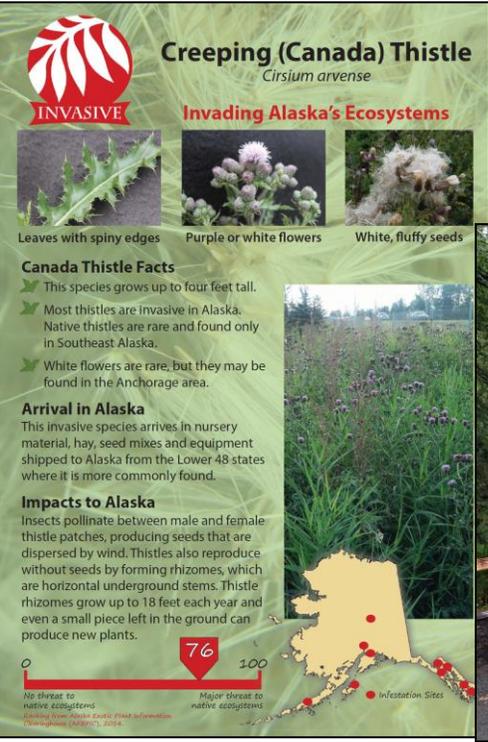


Figure 3. *C. arvense* permanent display with content panel designed for the Anchorage Zoo.



common goal of maintaining natural Alaskan habitats and resources for preserving biodiversity, a permanent educational display about invasive plant species common

to Alaska, including *C. arvense* was produced for exhibition at the Anchorage Zoo. The educational display was designed by Zoo staff using photos and content produced by DNR field staff. Information on the signs includes common identifiers, distribution and arrival in Alaska, impacts specific to Alaska, and invasiveness

ranking (Figure 3). Additional Zoo project funds were also utilized to aid in the construction of a platform display in a natural area of the zoo's campus (Figure 3.).

#### *Surveying and Quantification*

For quantification of each infestation, stem counts were estimated for the entire infestation and recorded in an excel spreadsheet. Other information about the infestation's characteristics was also recorded using the AKEPIC (2013) datasheet. The Adaptive Cluster Sampling Method modified from Rew and Pokorny (Fig. 2, 2006) was utilized in the 2014 field studies of Canada thistle in the Anchorage area in order to keep consistent records from years before. Sites managed for the 2014 field season were determined by work completed in previous years that have been recorded in the Alaska Natural Heritage Program's AKEPIC database (AKEPIC, 2014), and sites for the duration of this project were selected based on proximity to transportation vectors, and prioritized based on likeliness to spread to adjacent, natural areas.

#### *Mechanical or Manual Management*

Sites were managed with mechanical or manual treatments throughout the season to prevent seed setting and to stress the rhizome growth of *C. arvensis*. Graglia et al. (2006) and Nuzzo (1997) demonstrate the effectiveness of mechanical and cultural treatment of *C. arvensis* when mature leaves (~20 cm) are left on the shoot to prevent accelerated vegetative growth. Small sites ( $\leq 10$  stems) were hand-dug with a shovel to completely remove the rhizomes. This material was carefully collected, placed in a two-layered plastic bag and disposed of properly. If seed development was observed at a site, seed heads were clipped from the plant, placed in a two-layered plastic bag and disposed of properly. If seed heads were removed from a priority or large site, a follow-up mechanical treatment was also implemented to augment additional stress.

#### *Herbicide Management*

Herbicides are one the primary methods used to manage invasive plants, and one of the most effective options for *C. arvensis*, as the rhizomes are difficult to completely manually remove. Under the DOT IVMP, the use of herbicide treatments specifically for noxious weeds including *C. arvensis*, is allowable by any agency within State owned right-of-ways. Therefore, this IVMP was utilized for this 2014 season for meeting project goals. In order to comply with the IVMP, a coordination effort with DOT was established, along with appropriate requirements for monitoring, roadside safety, herbicide selection, and documentation. The permitting process involved the application for a Temporary Construction Permit with the DOT with a delegation of herbicide treatment sites and mechanical or manual managed sites (Figure 3.). For the 2014 season, sites selected for herbicide treatment based on their previous priority status, accessibility, and designation as State-owned right-of-ways. Per the DOT IVMP requirements, prior to herbicide application, a notification was provided to the Alaska Department of Environmental Conservation at least 15 days before the proposed application, along with two consecutive public notices no later than 30 days before an application. A number of different techniques were used in the herbicide application of this project by a Certified Pesticide Applicator in Category 9 (right-of-way) issued by the Alaska Department of Environmental Conservation. For the 2014 field

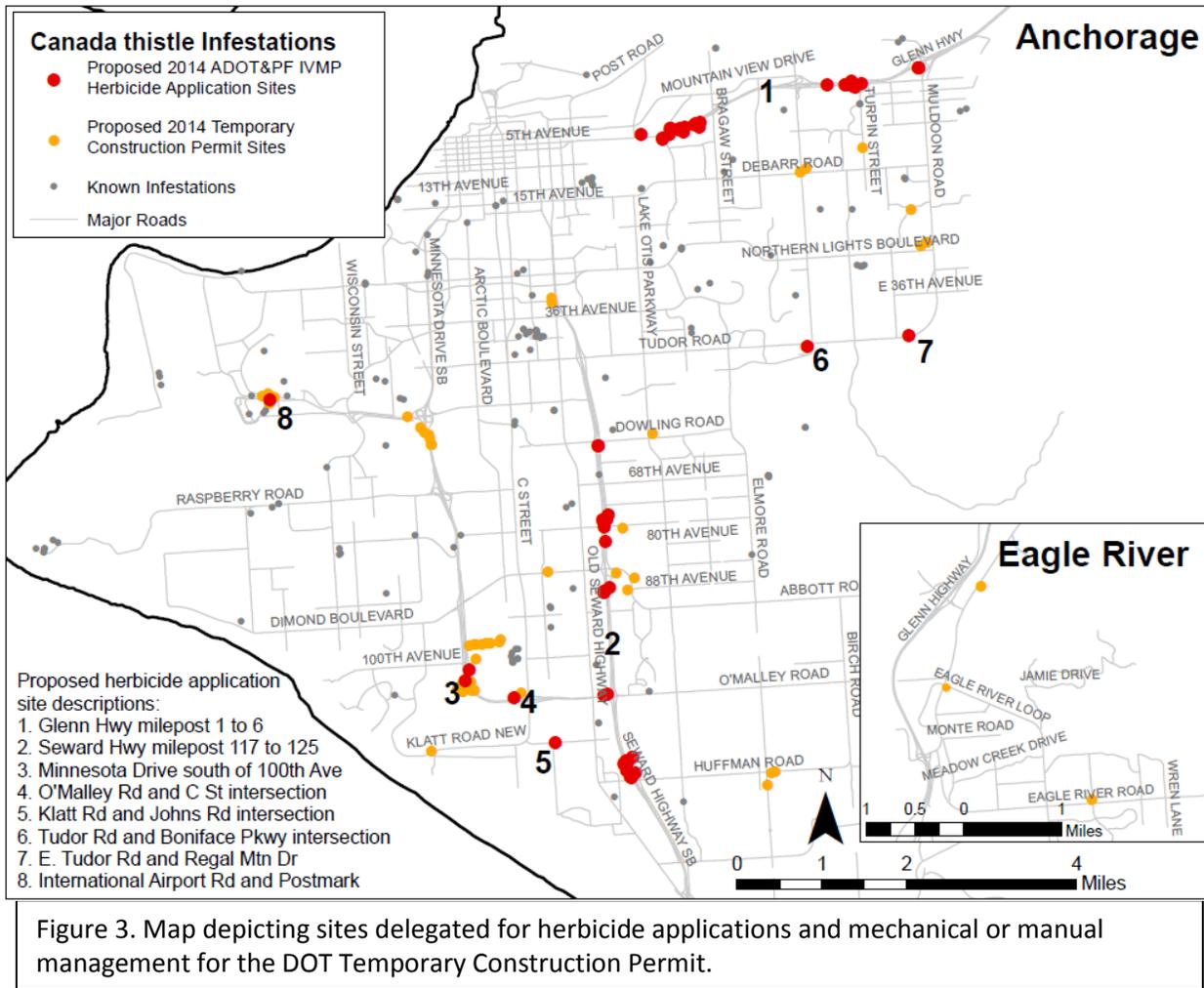


Figure 3. Map depicting sites delegated for herbicide applications and mechanical or manual management for the DOT Temporary Construction Permit.

season, DNR also contracted a company with Category 9 Certified Applicators to aid in larger site applications where larger equipment was more efficient.

For larger sites ( $\geq \sim 1$  acre), boom sprayers were used; either 10 feet in width or 20 feet in width. The larger of the boom sprayers was operated by a tractor with a 300 gallon tank, while the smaller boom was operated by an all-terrain vehicle with two 50 gallon spray tanks. The all-terrain vehicle also allowed the operator to use a hand-wand to selectively spray areas where the boom spray could not reach. This was utilized around trees and on steep slopes. A backpack sprayer was used in areas that did not need a large area treated or where vehicles could not access. Herbicide selection was determined based on the restrictions listed in the IVMP and by availability and suitability for being effective on *C. arvensis*. The herbicides used in this project included Milestone<sup>®</sup> (EPA registration number 524-343) with active ingredient aminopyralid, Aquamaster<sup>®</sup> (EPA registration number 524-343) with active ingredient glyphosate, and Garlon 3A<sup>®</sup> (EPA registration number 62719-37). These herbicides require foliar application to the target species while the plant is actively growing. Some sites were prepared for an herbicide application with an early-season mowing, and allowed to regenerate for at least 2 weeks before application. This was done to eliminate an added vertical component of foliage because some sites had grown at least 4 feet in height by the time of scheduled application. Application concentrations were determined based on label specifications of the

appropriate herbicide. Efficacy was measured with before and after pictures, and most sites were marked with an “indicator plant” representative of the infestation results.

## Conclusions

### Outreach

Approximately 100 rack cards produced from 2013 were distributed to greenhouses and garden centers, private property owners, and to the Anchorage Cooperative Weed Management Area (CWMA). About 300 stickers, also produced in 2013, were distributed to the same community educational outreach efforts. The instructional private property management resource was selectively given to those who already have *C. arvensis* on their property. Approximately 75 were given to those individuals and to those from the CWMA, Alaska State Division of Forestry, and Bureau of Land Management.

The ADN advertisements generated 67 phone calls to the main invasive species contact number reporting *C. arvensis*. Most of these were reports on private property, and reporters asked for more information on how to manage it themselves, and more general information about invasive plant species in Alaska. Some reporters requested a visit for species verification, while others were requested to send in pictures. Five private property visits were conducted, and only one was confirmed as *C. arvensis* and only had 7 stems. Other reports on private property were speculated to be *Galeopsis bifida*, commonly known as splitlip hempnettle, which is very often confused with *C. arvensis* because of the nutlets having a spiny appearance. Other reports of confirmed *C. arvensis* on Municipality property, including parks, were reported to the Anchorage CWMA for their field staff to manage. Confirmed reports along right-of-ways were documented and managed. Eighteen of the 67 reports were made of infestations along right-of-ways, only 2 of which were not previously documented.

Due to the nature of the long term outreach project, it is quantitatively difficult to document the success of the Anchorage Zoo outreach efforts in one season. The kiosk was completed September 7<sup>th</sup>; the later part of the *C. arvensis* growing season and at a time when Zoo visitors are much sparser. No reports of *C. arvensis* have been reported to the main invasive species contact that was generated by the educational display. However, basic awareness of invasive plant species is unlike any other educational material relating to animals in the Zoo and may captivate and increase visitor interest, attracting power (number of visitors stop), and holding time (how long the visitors stopped for) for potentially the entire population of Zoo visitors. These results are preliminary, and will likely be conclusive in long-term evaluation.

### Mechanical and Manual Management

In the 2014 field season, a total of 42 infestation sites (Fig. 2), amounting to 0.1km<sup>2</sup> (~30 acres) in the Anchorage area were surveyed, quantified, and managed. Five of these were newly found infestations. Mechanical management began the 9<sup>th</sup> of June until early October. The first flower of *C. arvensis* was seen the

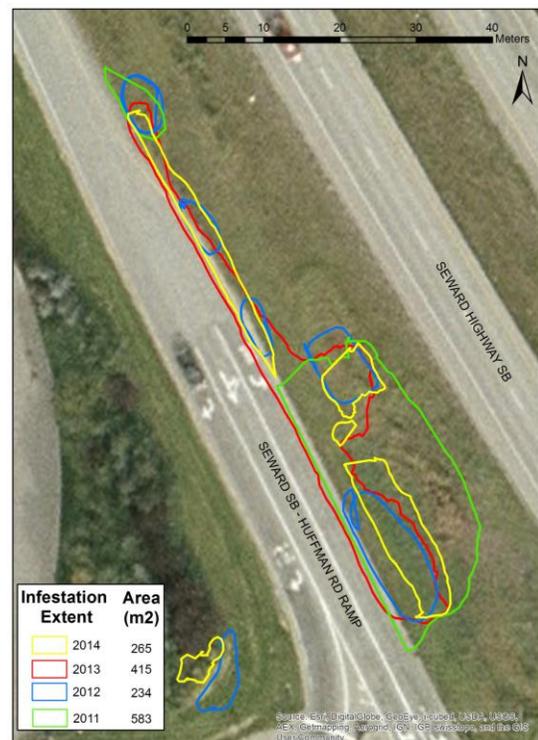


Figure 4. Priority site 1 infestation

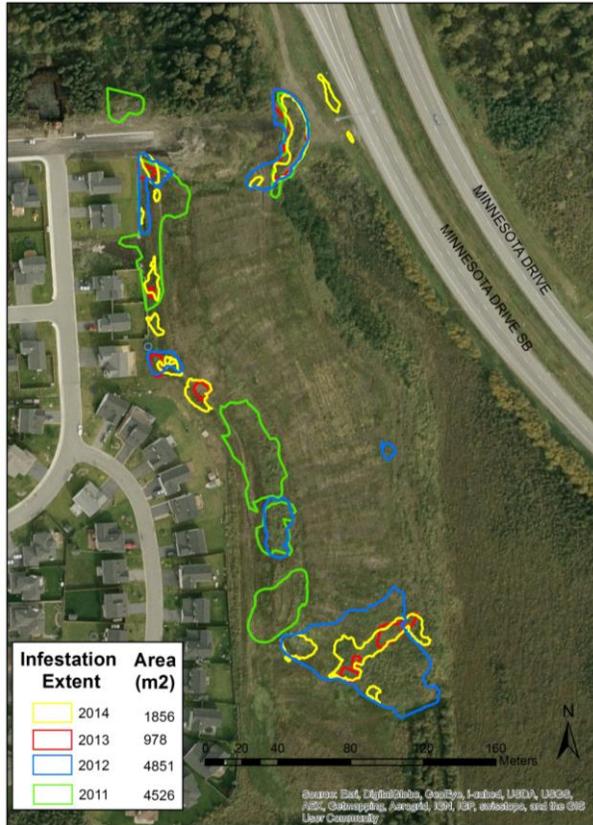


Figure 5. Priority site 2 infestation extents.

9<sup>th</sup> of June at C street and E. Potter, and was reported by DOT staff.

#### Priority Sites

Supplemental information for site descriptions is provided in the 2013 report. The information provided in this section describes 2014 observations and quantified results of surveys. Priority site 1 (Fig. 4) is located along the Seward Highway on the southbound exit for Huffman road (-149.851895, 61.109120). This site was mechanically managed September 2<sup>nd</sup> by clipping off seedheads and flowers and proper disposal, and followed up with an herbicide treatment using Aquamaster<sup>®</sup>. The extent of the infestation was reduced from 415m<sup>2</sup> in 2013 to 265m<sup>2</sup> in 2014. Observations suggested that areas closest to the road had increased in density.

Priority site 2 (Fig. 5) is located west of Minnesota Drive Expressway and east of Concord Hill Drive in a disturbed area (-149.908318, 61.126663). This site was mechanically managed September 19<sup>th</sup> by clipping seedheads and disposing of them in double plastic bags. Unlike in 2013, this site developed at a similar rate to the majority of the

other sites in the Anchorage area. And, the infestation at the berm was reduced by 115m<sup>2</sup> from 2013. However, the southern infestation significantly increased in size and had continual distribution, unlike in 2013 when this area was relatively segmented with small isolated stands. Also, a new moose fence was installed in early spring, located at the base of the berm site. This was the only priority site that did not have herbicide applied to it because it is privately owned.

Priority site 3 (Fig. 6) is located on the south side of the Glenn Highway between Airport Heights Drive and Bragaw Street intersections (-149.814665, 61.219177). Both quantifiable and observational results from 2013 to 2014 do not indicate a significant change in the infestation size or density. The average density in 2014 was 50%, and the total area decreased by 11m<sup>2</sup> since last season. It was observed that native vegetation was noticeably more mature and that the site in general lacked maintenance. It was also observed that the southwestern portion of the infestation, where mature trees are dense, did not significantly change. This site was mechanically managed in most areas, with the exception of a test area, on the 22<sup>nd</sup> of July with an herbicide application of Milestone<sup>®</sup>.

Priority site 4 (Fig. 7) is located on the north side of the Glenn Highway just east of the Mountain View Drive intersection (-149.820961, 61.218381). The density of the infestation was similar from 2011 to 2013 at 81%, and also did not change significantly in extent. From the 2013 season to the 2014 season, this site was reduced by 495m<sup>2</sup>. Spatially, this reduction occurred in an area that is densely populated by mature trees. This site was mechanically managed on July 14<sup>th</sup>, and on July 30<sup>th</sup>, the herbicide Garlon 3A<sup>®</sup> was applied to the *C. arvensis* infestation.



Figure 6. Priority site 3 infestation extents.

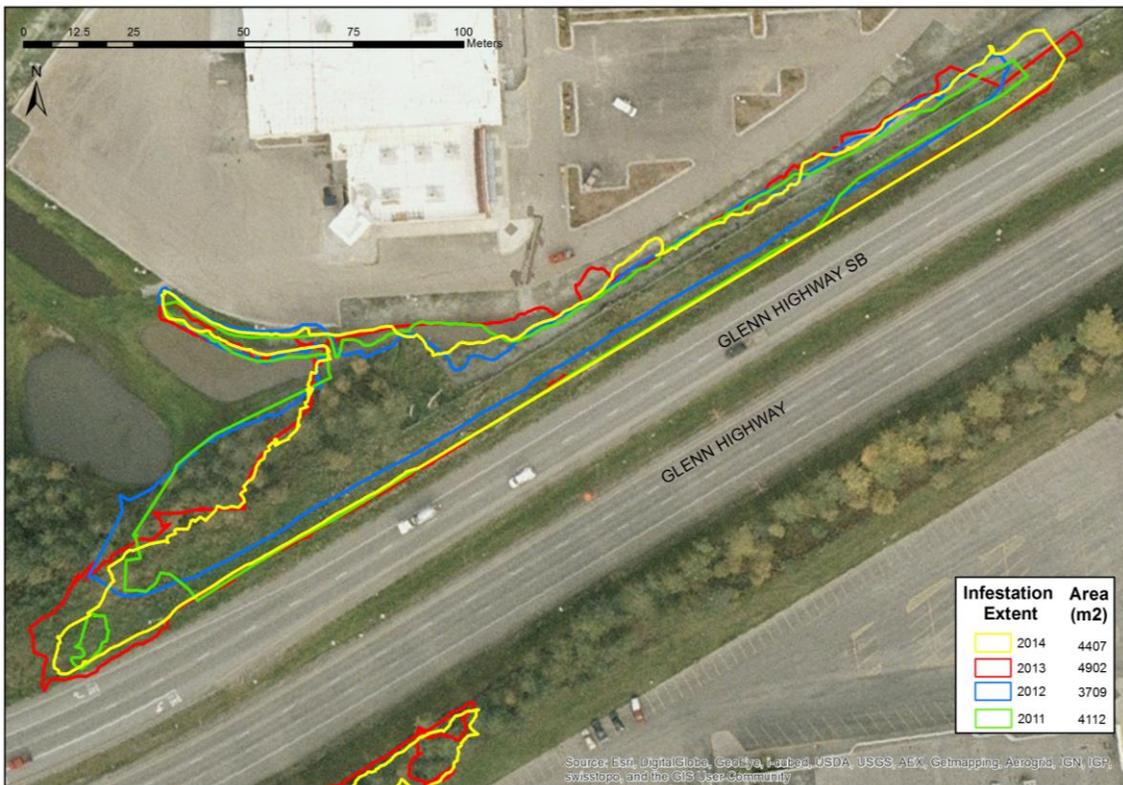


Figure 7. Priority site 4 infestation extents.

### *Herbicide Management*

Each of the mentioned priority sites had a different herbicide used, while priority site 5 will be utilized as a control for measuring management effectiveness since it did not have an herbicide application. Fifteen sites, including some priority sites, had IVMP approved herbicides applied to the surveyed and mapped *C. arvensis* infestation. Table 1 summarizes what herbicide was used at each of the 15 sites, the date of application, what growth stage at which the *C. arvensis* was during application, the method of application (i.e. boom sprayer), information about site preparation including mechanical management, and before and after visuals of herbicide effectiveness. Overall, 9 sites used Milestone<sup>®</sup>, 5 sites used Aquamaster<sup>®</sup>, and 1 site used Garlon 3A<sup>®</sup>. As for methods of applications, 10 sites utilized the backpack sprayer, 7 sites utilized the ATV boom sprayer, two sites used the handwand attached to the ATV, and one site used the tractor boom sprayer. Because surveyed areas and extents are not 100% cover of *C. arvensis*, it was estimated that 50% of these surveyed areas actually had an herbicide applied to them. Therefore, it is estimated total of 7 acres of *C. arvensis* infestations had herbicide treatments.

### **Discussion**

With the utilization of different management techniques, this project will gain a better understanding of *C. arvensis* in response to mechanical, cultural and chemical treatments in the Anchorage, Alaska area. Results from the past two seasons indicate that native, woody, and mature vegetation effectively compete with *C. arvensis* even in urban areas such as priority sites 3 and 4. While open areas, even in relatively natural areas such as the southernmost infestation in priority site 2, indicates that *C. arvensis* successfully competes with native grasses and short brush and maintains its established territory. It does seem, however, that in established infestations, mechanical management is not effectively reducing infestations to threshold levels, or even at all. For example, mechanical management has been used since 2011 at priority site 3, but the infestation continues to spread laterally along the roadside to the north. Using different herbicides will also help indicate which active ingredient is the most effective treatment for *C. arvensis* in Alaska; something that has yet to be documented. Spring site visits and continual monitoring of herbicide effectiveness at each of these target sites will be sure to determine future management decisions.

### **Future Work**

A complete understanding of *C. arvensis* behavior in the Anchorage area is still relatively unknown. While persistent management practices will continue in the future, our objectives to better understand how *C. arvensis* responds to variable management options is crucial to making decisions to include the most effective management techniques. The 2014 studies implemented herbicides for the first time, and with the long-term data of extents reaching back to 2011, future data will prove the effectiveness of herbicide treatments on *C. arvensis*. Some of the future work of the project includes:

1. Maintain existing goals of the project
  - a. Continue coordination with Department of Transportation for priority site mowing and implantation of their Integrated Vegetation Management Plan
  - b. Manage *C. arvensis* to background levels, include a herbicide application in 2014
  - c. Emphasize objective 2: follow up on *all* AKEPIC recorded sites at least once in the field season for monitoring
2. Perform systematic surveys in the Matanuska-Susitna valley
  - a. Minimum of 20 miles of road surveys
  - b. Minimum of 10 park's parking lots, trailheads, and campgrounds

3. Determine herbicide effectiveness vs. mechanical management in field studies
  - a. Monitoring herbicide sites and measure extents in 2015
  - b. Continue mechanical management in areas not included in right-of-way
  - c. Add new sites for herbicide applications for 2015

## References

AKEPIC (2013). Alaska Exotic Plant Information Clearinghouse database (<http://aknhp.uaa.alaska.edu/maps/akepic/>). Alaska Natural Heritage Program, University of Alaska, Anchorage. 19 June 2014.

Alaska Department of Transportation and Public Facilities. 2014. Integrated Vegetation Management Plan. <http://dec.alaska.gov/eh/docs/pest/PermitsIPMs/dot%202014.pdf>

Hultén, E. 1968. Flora of Alaska and Neighboring territories. Stanford University Press, Stanford, CA. 1008 pp.

Pojar, J., MacKinnon, A., eds. 2004. Revised Plants of the Pacific Northwest Coast. Lone Pine Publishing, Vancouver, British Columbia, Canada. 528 pp.

Rew, L., Pokorny, M. eds., Prather, T.S. 2006. Adaptive Sampling Design. Inventory and Survey Methods for Nonindigenous Plant Species. Montana State University Extension. 56-59 pp.

Table 1. Herbicide Sites

Site Number/Description	Herbicide, Application Rate, and Method	Before Herbicide	After Herbicide
<p><b>1: Muldoon Glenn</b></p> <p>Application at bud stage</p>	<p>Milestone</p> <p>7oz/acre</p> <p>Backpack sprayer</p>	 <p>July 28th</p>	 <p>July 31st</p>
		 <p>July 28th</p>	 <p>July 31</p>

Site Number/Description	Herbicide, Application Rate, and Method	Before Herbicide	After Herbicide
<p><b>1: Turpin Glenn</b></p> <p>Application at bud stage</p>	<p>Garlon 3A</p> <p>4pints/acre</p> <p>ATV boom sprayer</p>	 <p>July 22nd</p>	 <p>July 28th</p>
		 <p>July 22nd</p>	 <p>July 28th</p>

Site Number/Description	Herbicide, Application Rate, and Method	Before Herbicide	After Herbicide
<p><b>1: Mountain View Glenn</b></p> <p>~4900 m<sup>2</sup> area</p> <p>This site was mechanically managed July 14<sup>th</sup> and herbicide application was July 30<sup>th</sup>.</p>	<p>Aquamaster</p> <p>2.3qt/acre</p> <p>Tractor boom sprayer and ATV boom sprayer</p>	 <p>July 14th</p>	 <p>September 24th</p>
		 <p>July 14th</p>	 <p>September 24th</p>
		 <p>July 14th</p>	 <p>September 24th</p>

Site Number/Description	Herbicide, Application Rate, and Method	Before Herbicide	After Herbicide
<p><b>1: Airport Heights Glenn</b></p> <p>Application at flower stage.</p>	<p>Milestone</p> <p>7oz/acre</p> <p>ATV boom sprayer and backpack sprayer</p>	 <p>July 22nd</p>	 <p>August 5th</p>
<p><b>2: Dowling Seward</b></p> <p>This site was mechanically managed August 21<sup>st</sup>, and herbicide application was September 23<sup>rd</sup>.</p>	<p>Milestone</p> <p>7oz/acre</p> <p>Backpack sprayer</p>	 <p>September 23rd</p>	 <p>October 8th</p>

Site Number/Description	Herbicide, Application Rate, and Method	Before Herbicide	After Herbicide
		 <p data-bbox="1024 654 1218 683">September 23rd</p>	 <p data-bbox="1671 654 1822 683">October 8th</p>
<p data-bbox="52 693 279 722"><b>2: Seward Median</b></p> <p data-bbox="52 764 495 829">Flowers and seedheads were clipped right before application.</p>	<p data-bbox="590 693 741 722">Aquamaster</p> <p data-bbox="600 764 730 794">2.3qt/acre</p> <p data-bbox="554 836 777 865">ATV boom sprayer</p>	 <p data-bbox="1052 1088 1190 1117">August 7th</p>	 <p data-bbox="1671 1125 1822 1154">October 8th</p>

Site Number/Description	Herbicide, Application Rate, and Method	Before Herbicide	After Herbicide
<p><b>2: Huffman Seward</b></p> <p>Flowers and any seedheads were clipped right before application.</p>	<p>Aquamaster</p> <p>2.3qt/acre</p> <p>ATV boom sprayer</p>	 <p>August 7th</p>	 <p>September 2nd</p>
		 <p>August 7th</p>	 <p>September 2nd</p>
<p><b>2: O'Malley Seward</b></p> <p>Application at bud stage.</p>	<p>Aquamaster</p> <p>2.3qt/acre</p> <p>Handwand attached to ATV and ATV boom sprayer</p>	 <p>August 7th</p>	 <p>October 8th</p>

Site Number/Description	Herbicide, Application Rate, and Method	Before Herbicide	After Herbicide
		 <p data-bbox="1052 683 1188 711">August 7th</p>	 <p data-bbox="1675 683 1812 711">October 8th</p>
<p data-bbox="54 719 285 747"><b>3: Minnesota 100<sup>th</sup></b></p> <p data-bbox="54 826 495 927">This site was mechanically managed August 21<sup>st</sup> and herbicide application was September 23<sup>rd</sup>.</p>	<p data-bbox="604 719 726 747">Milestone</p> <p data-bbox="611 792 720 820">7oz/acre</p> <p data-bbox="562 862 772 889">Backpack sprayer</p>	 <p data-bbox="1024 1089 1218 1117">September 23rd</p>	 <p data-bbox="1675 1066 1812 1094">October 8th</p>

Site Number/Description	Herbicide, Application Rate, and Method	Before Herbicide	After Herbicide
		 <p data-bbox="1024 740 1213 769">September 23rd</p>	 <p data-bbox="1671 740 1818 769">October 8th</p>
<p data-bbox="54 782 302 812"><b>4: O'Malley C Street</b></p> <p data-bbox="54 850 457 915">Flowers were clipped right before application.</p>	<p data-bbox="604 782 730 812">Milestone</p> <p data-bbox="611 850 724 880">7oz/acre</p> <p data-bbox="562 919 772 948">Backpack sprayer</p>	 <p data-bbox="1024 1159 1213 1188">September 23rd</p>	 <p data-bbox="1671 1175 1818 1205">October 8th</p>

Site Number/Description	Herbicide, Application Rate, and Method	Before Herbicide	After Herbicide
		 <p data-bbox="1024 581 1220 610">September 23rd</p>	 <p data-bbox="1675 719 1818 748">October 8th</p>
<p data-bbox="54 760 222 789"><b>5: Klatt Johns</b></p> <p data-bbox="54 829 485 930">This site was mechanically managed August 5<sup>th</sup> and herbicide application was September 23<sup>rd</sup>.</p>	<p data-bbox="604 760 730 789">Milestone</p> <p data-bbox="611 829 724 859">7oz/acre</p> <p data-bbox="562 899 772 928">Backpack sprayer</p>	 <p data-bbox="1024 1120 1220 1149">September 23rd</p>	 <p data-bbox="1675 1130 1818 1159">October 8th</p>

Site Number/Description	Herbicide, Application Rate, and Method	Before Herbicide	After Herbicide
		 <p data-bbox="1024 737 1215 769">September 23rd</p>	 <p data-bbox="1675 721 1820 753">October 8th</p>
<p data-bbox="54 776 275 808"><b>6: Tudor Boniface</b></p> <p data-bbox="54 846 459 911">Flowers were clipped right before application.</p>	<p data-bbox="604 776 730 808">Milestone</p> <p data-bbox="611 846 724 878">7oz/acre</p> <p data-bbox="562 915 772 948">Backpack sprayer</p>	 <p data-bbox="1024 1149 1215 1182">September 23rd</p>	 <p data-bbox="1675 1172 1820 1205">October 8th</p>

Site Number/Description	Herbicide, Application Rate, and Method	Before Herbicide	After Herbicide
		 <p data-bbox="1024 646 1218 675">September 23rd</p>	 <p data-bbox="1675 646 1818 675">October 8th</p>
<p data-bbox="54 683 275 712"><b>7: Muldoon curve</b></p> <p data-bbox="54 753 352 782">Application at bud stage.</p>	<p data-bbox="604 683 730 712">Milestone</p> <p data-bbox="611 753 724 782">7oz/acre</p> <p data-bbox="562 823 772 852">Backpack sprayer</p>	 <p data-bbox="1066 1057 1178 1086">July 28th</p>	 <p data-bbox="1696 1057 1808 1086">July 31st</p>

Site Number/Description	Herbicide, Application Rate, and Method	Before Herbicide	After Herbicide
		 <p data-bbox="1066 711 1178 740">July 28th</p>	 <p data-bbox="1692 695 1803 724">July 31st</p>
<p data-bbox="54 748 300 777"><b>8: Airport Postmark</b></p> <p data-bbox="54 818 384 847">Application at flower stage.</p>	<p data-bbox="604 748 730 777">Milestone</p> <p data-bbox="611 818 722 847">7oz/acre</p> <p data-bbox="562 888 772 917">Backpack sprayer</p>	 <p data-bbox="1024 1133 1220 1162">September 23rd</p>	 <p data-bbox="1671 1133 1824 1162">October 8th</p>

Site Number/Description	Herbicide, Application Rate, and Method	Before Herbicide	After Herbicide
		 <p data-bbox="1024 701 1218 730">September 23rd</p>	 <p data-bbox="1675 701 1822 730">October 8th</p>
<p data-bbox="52 738 268 768"><b>9: C Street Potter</b></p> <p data-bbox="52 812 487 912">This site was mechanically managed July 16<sup>th</sup> and herbicide application was July 31<sup>st</sup>.</p>	<p data-bbox="604 738 730 768">Milestone</p> <p data-bbox="613 812 722 841">7oz/acre</p> <p data-bbox="562 881 772 911">Backpack sprayer</p>	 <p data-bbox="1066 1075 1180 1104">July 31st</p>	 <p data-bbox="1684 1075 1810 1104">August 5th</p>

Site Number/Description	Herbicide, Application Rate, and Method	Before Herbicide	After Herbicide
		 <p data-bbox="1066 678 1176 706">July 31st</p>	 <p data-bbox="1680 678 1810 706">August 5th</p>

## Do you have this *noxious weed* on your property?



Photos starting with top right clockwise: Rosette or emergent stage, bud and flowering stage, seed stage, flowers can be both purple and rarely white

**Canada thistle** (also known as creeping thistle) is considered *noxious* in the state of Alaska, so it is unlawful to *import, transport, buy, sell, offer for sale or distribute* any part of this plant. Although you might not know how it got on your property, you can prevent the potential spread of this invader.

### How do I get rid of Canada thistle on my property?

A combination of control methods is most effective. Seed production and vegetative root propagation can be prevented by depleting the energy stored in long, creeping roots. Cutting, revegetation and applying herbicides are common practices for depleting the energy reserves of thistle roots.

There are three different control methods used for Canada thistle:

**1. Mechanical:**

*Repeated mowing or weed whacking can reduce the infestation of Canada thistle by weakening the plants. This practice reduces or prevents seed production and destroys the year's growth. Mowing for several years can deplete the underground root reserves, but will not completely eliminate the infestation.*



**2. Cultural:**

*Revegetation with perennial native grass species compete effectively with Canada thistle and, therefore, inhibit its emergence. However, this control method will never completely eradicate Canada thistle and is not likely to be effective for an established or already aggressive infestation.*

**3. Chemical:**

*Aggressive infestations of Canada thistle can be controlled by applying herbicides with the active ingredients 2, 4-D, glyphosate, or triclopyr in lawns and landscaping, and, aminopyralid or imazapyr for natural areas roadsides and non-cropland areas. Annual treatments of two or three years can reduce or even eliminate the infestation. Treatments are most effective in the early bud stage, when plants are actively growing.*



*Always follow all label instructions for all herbicides and observe restrictions on grazing and harvesting procedures.*

*For specific recommendations, consult your local UAF Cooperative Extension agent or The Alaska State Division of Agriculture:*

***UAF Cooperative Extension: 1-877-520-5211***

***Division of Agriculture: 907-745-4469***