



## ALASKA DEPARTMENT OF TRANSPORTATION

# Vetch Infestations in Alaska

Prepared by: Andrew Nolen  
Agronomist  
Alaska Plant Materials Center  
Division of Agriculture  
Department of Natural Resources  
State of Alaska

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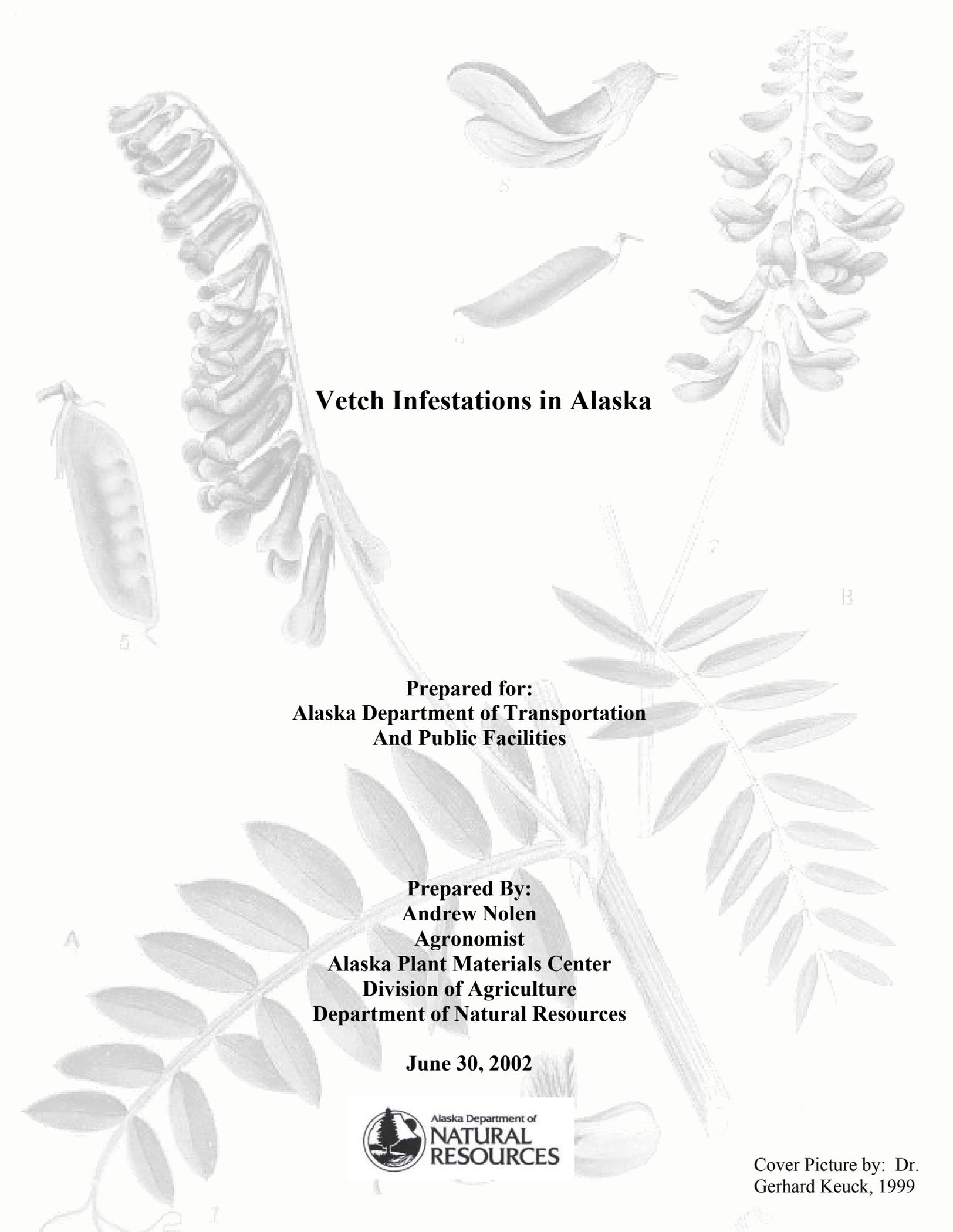
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A detailed botanical illustration of vetch plants. The background features a large, upright stem with a terminal raceme of numerous small, rounded seed pods. To the right, a smaller stem shows a similar raceme. Below these, a single seed pod is shown in detail, split open to reveal four seeds inside. Another seed pod is shown in a different view, possibly showing its attachment to the stem. The bottom of the illustration shows a stem with several pairs of pinnate leaves, each with several oval leaflets. The entire illustration is rendered in a light, monochromatic style.

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And Public Facilities**

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**June 30, 2002**



Alaska Department of  
**NATURAL  
RESOURCES**

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**Abstract:**

Vetch is one of many problematic non-native plants that have become prevalent along Alaska's picturesque highways. Known by the common names tufted vetch, bird vetch and cow vetch, *Vicia cracca* has infested many disturbed areas in south central and interior Alaska. Visual surveys and intensive communication with industry professionals indicate vetch presence in significant amounts in the core area of Mat-Su, Fairbanks and Anchorage with smaller areas present in Seward, Girdwood, Homer, Sutton, Soldotna, Delta Junction, Nenana, Denali Park, a few runways along the Kuskakwim River, and sporadically along the Parks Highway. Though infestations are considered a problem, more research is needed to determine the invasiveness of this species before eradication control measures are implemented. Including this species in a general weed management plan is appropriate. Care must be taken not to misidentify other native legumes with similar growth habits as the problem vetch. Many strategies are effective at controlling it but mowing is preferred.

## Table of Contents

Introduction . . . . .	1
Vetch Background . . . . .	1
<i>Vicia cracca</i> Identification . . . . .	2
Weedy Potential of Vetch . . . . .	2
Vetch Surveys . . . . .	3
Table 1: Infestation Levels Defined . . . . .	4
Is Vetch management Necessary . . . . .	6
Vetch Management . . . . .	7
Table 2: Vetch Control Options . . . . .	9
References . . . . .	11
Image 1: <i>Hedysarum alpinum</i> . . . . .	12
Image 2: <i>Vicia cracca</i> . . . . .	12
Image 3: <i>Lathyrus palustris</i> . . . . .	13
Image 4: Insect Feeding Damage on Vetch Leaflets . . . . .	13
Table 3: Fairbanks Vetch Survey Data . . . . .	14
Table 4: Matanuska-Susitna Vetch Survey Data . . . . .	24
Map 1: Southwest Fairbanks Vetch Survey Map . . . . .	27
Map 2: Central Fairbanks Vetch Survey Map . . . . .	28
Map 3: Northern Fairbanks Vetch Survey Map . . . . .	29
Map 4: Northeast Fairbanks Vetch Survey Map . . . . .	30
Map 5: Southeast Fairbanks Vetch Survey Map . . . . .	31
Map 6: East Mat-Su Vetch Survey Map . . . . .	32
Map 7: North Mat-Su Vetch Survey Map . . . . .	33
Map 8: Central Mat-Su Vetch Survey Map . . . . .	34

## **Introduction**

Alaska is noted for the scenic beauty of its transportation corridors; however, infestations of exotic weedy plant species are invading along right-of-ways. Vetch has found a niche in fence rows, ditch banks and roadsides throughout South Central and Interior Alaska. “Some 150 species (of vetch) are known, about 25 of which are native to the United States. However, the species grown agriculturally here are all introduced, being native to Europe or western Asia.” (Magness 1971 p.1) Hultén describes the following five *Vicia* species present in Alaska: *Vicia angustifolia*, *Vicia gigantea*, *Vicia americana*, *Vicia cracca*, and *Vicia villosa*. (Hultén 1968) *Vicia cracca* and *Vicia villosa* are the only two occurring in South Central and Interior Alaska; the others are present in Southeast Alaska and Canada. (Hultén p. 669-671) *Vicia cracca* is the vetch invading Alaska’s right-of-ways.

## **Vetch Background**

*Vicia cracca*, one of many species referred to as vetch, is known by the common names tufted vetch, bird vetch, and cow vetch and is a member of the family Fabaceae (legume). Legumes are nitrogen fixers, meaning they have symbiotic bacteria living as nodules in their roots that metabolize nitrogen from the air making it available for plant nutrition. “Vetches are weak-stemmed, semi-vining (legumes) with pinnate leaves terminating at tendrils.”(Magness 1971 p.1) *Vicia cracca* is a perennial that reproduces from rhizomes in the soil and from seed. It has leaves with 7-10 pairs of leaflets and purple flowers. Seeds are formed in pods that pop open when ripe dispersing seed away from the parent plant. In a monoculture vetch grows about two feet tall, but with external support such as trees and fences it can reach 6 feet in height. Extremely drought tolerant and cold

hardy, vetch adapts to all soil textures. (Plants Database) “Few introduced plant species seem more ideally ‘at home’ in Alaska.” (Klebesadel 1980 p.46)

*Vicia cracca* has been researched and used for its agronomic qualities throughout North America. “Records reveal that it was first planted in Alaska at the now-closed Rampart Experiment Station on the Yukon River in 1909.” (Klebesadel 1980 p.46) “ The vetches are extensively used as green manure for soil improvement, for hay, and in the South for winter pasture.” (Magness 1971 p.1) Evaluation of its’ forage potential by the various Alaskan experiment stations continued until the early 1970’s. (Klebesadel 1980) *Vicia cracca* is no longer considered a crop or horticultural plant in Alaska except by unaware home gardeners who misidentify it or just like its pretty purple flowers. Other legumes native to Alaska have similar appearances and growth habits. *Latharus sp.* and *Hedysarum sp.* have been known to be confused with *Vicia cracca*. (images 1, 2 and 3)

### ***Vicia cracca* Identification**

The following list gives distinct features of *Vicia cracca* that can be used to make a positive identification:

1. 7 to 10 pairs of leaflets per leaf
2. Trailing, vine like growth habit, usually forming a tangled mat or cluster
3. Leaves terminating in tendrils
4. Leaflets with non-distinct mid-vein
5. Leaflets covered with silky hairs
6. Flowering period form about July 1 until freeze up
7. Bluish-violet or purple flowers
8. Weak stem
9. 15 – 40 flowers formed per cluster
10. Seeds formed in pods similar to a pea

### **Weedy Potential of Vetch**

*Vicia cracca* is a weed of definite concern in Alaska. Many agencies within the state have been observing it’s spread over the last few decades. It thrives in areas of recent

soil disturbance such as roadsides and waste places. “As early as 1880, *Vicia cracca* was reported as well established and spreading in Canada.” (Aarssen et. al. as quoted in Fletcher., 1880) “It is the most common and serious problem of the five weedy species” of vetch found in Canada. (Aarssen et. al. 1986, p. 718) In an experiment looking into competition among field perennials, *Vicia cracca* was generally the best competitor in the trial group. (Gurevitch 1990)

The problematic aspects of infestations of *Vicia cracca* are associated with its’ climbing habit. It’s tendrils cling to everything and proceed to climb up or pull down whatever is in reach. When growing by its’ self, vetch clings together forming large tangled mats that seem to be completely interconnected. Dr. Klebesadel, an agronomist who worked on trial plots at the experiment station in Palmer, said, “you could pull on a plant on one corner of the plot and the entire plot would move.” Fences, trees, and road signs provide good support for the plant to climb up. Fences covered in vetch can reduce visibility and change snow-drift patterns. Grasses and small shrubs, especially those newly planted, can be engulfed with branching and flowering vetch. A recent revegetation project on a utility easement on Fort Richardson has some vetch invading which appears to be out competing the desired native vegetation planted on the site.

### **Vetch Surveys**

Locating *Vicia cracca* throughout the state has been accomplished through visual surveys and communication with industry professionals. The visual surveys of the Matanuska-Susitna Valley and Fairbanks roadways, completed on October 2, 2001 and October 6-7, 2001 respectively, were accomplished by randomly selecting common routes and driving them looking for plants. Areas that had vetch present were marked as way points in a

hand held GPS unit and numerically rated 1 through 5 based on the level of infestation.

Determination of infestation levels was accomplished using the criteria in Table 1.

**Table 1:** Infestation Levels Defined

- Level 1: One to 10 stems in an isolated area covering less than 2 square feet.
- Level 2: 10 to 50 stems growing in an area 2 square feet to 5 square feet and usually leading into a large infestation.
- Level 3: 50 to 200 stems growing in an area 5 square feet to 15 square feet, but not covering the entire area.
- Level 4: 200 to one thousand stems creating a mat over an area more than 15 square feet, but not extensively engulfing trees and fences.
- Level 5: Thousands of stems creating a massive mat completely covering an area more than 30 square feet and hiding fences and small shrubs as well as draping from trees.

Many areas of infestation were rounded between two levels and some were considered to be greater than level five. Roadways not surveyed within these areas can be expected to have similar infestation levels. Tables 2 and 3 list the infestation levels at each coordinate compiled from the surveys. These tables were used to generate maps 1-8. Maps 1-5 are of the Fairbanks area and maps 6-8 are of the Matanuska-Susitna Valley region.

Infestation levels are most severe in areas surrounding the University of Alaska facilities in both locations. Levels generally decrease the farther one travels on main traffic corridors away from the epicenter. Roads of more recent construction tend to be less affected than more long standing routes. Routes used to transport agricultural products around farming areas over the years are more likely to have higher infestation levels. Perhaps unintended broadcasting of vetch seed occurred during transport of hay crops. Newly constructed and revegetated roadsides tend to have low levels of impact, though movement of plants is occurring from infested areas close by or from imported material.

Though the highest concentrations of *Vicia cracca* are in the Fairbanks and Mat-Su regions, other areas of South Central and Interior Alaska are affected. The Anchorage bowl has many infestation sights, notably along the Seward Highway from Midtown to Potters Marsh and the Glenn Highway from Birchwood south. Neighborhoods throughout Anchorage from the hillside to Ted Stevens International Airport have it. The Old Glenn Highway has spotty infestations from the Matanuska river bridge to Butte. Sutton has a few patches in the main part of town. Parks Highway infestation levels decrease as one travels from Wasilla to Big Lake with no indication of vetch between Big Lake and Willow, though current road construction has eliminated most of the existing right-of-way vegetation. If it was present along this route prior to the new development it is possible that it will return in a few years. Findings of *Vicia cracca* by Dr. Rosanne Densmore of the National Park Service at Hurricane Gulch, the entrance to Denali Park and in Nenena indicate spread along the entirety of the Parks Highway, though not at the levels found in Fairbanks and the core area of Mat-Su.

Girdwood and Bird Creek have many localized infestations according to Micheal Sheapard of the U. S. Forrest Service.

The Kenai Peninsula has a few locations indicated by local weed scouts. Bill Hague, a weed scout for the Homer Soil and Water Conservation District, found *Vicia cracca* in Homer for the first time this year. A field at mile 6.5 of East End Road has a well established patch. Janice Chumley, an IPM technician for the Cooperative Extension in Kenai/Soldotna, found a small patch at the end of a driveway about one half mile down Sport Lake Road in Soldotna. She said that it looked as though it may have been planted intentionally. Seward has vetch present also, notably in the front of the Sea Life Center.

Dr. Densmore indicates that it appears to have been brought in as seed mixed with the topsoil used for landscaping.

Phil Casperi with the Cooperative Extension in Delta Junction finds some *Vicia cracca* present in that area, but not nearly at the extent of Fairbanks. Dr. Steve Sparrow with the University of Alaska at Fairbanks planted a test plot in Delta 10 years ago. He indicated that it has become grown up with cottonwood and willow trees and does not appear to be spreading outside the perimeter of the planting.

Jeff Denton with the Bureau of Land Management has found bird vetch along the runway at Rohn Roadhouse on the south fork of the Kuskakwim River. Carrol Sanner with DOT/PF indicates it is present near the landing strip in Chevak, a village near the mouth of the Kuskakwim River.

All indications are that vetch is spreading. Bureau of Land Management officials indicate a significant increase in the level of infestation in the Anchorage and Fairbanks areas over the past several years. Areas that had little or no evidence of vetch in the initial Mat-Su survey did have noticeable infestations the following year. Based on experience with *Vicia cracca* test plots, Dr. Sparrow says that the plants are slow growing from seed. The seedling year and the second year of growth do not amount to much foliage, but an explosion of growth occurs during the third year.

### **Is Vetch Management Necessary?**

Though *Vicia cracca* is a problem weed in Alaska, more research is needed before an extensive eradication program focusing on this single species is implemented. Based on observations, it currently poses no threat to undisturbed land, nor is it an agricultural pest or public safety risk. Beneficial qualities of vetch are its' nitrogen fixing potential and

attractive growth habit. Concern about potential movement into undisturbed areas is high, but no evidence has been found of such occurrences. Natural disasters such as forest fires could provide an excellent opportunity for vetch to move in where it may inhibit or slow down natural succession, but more research is necessary to determine the invasiveness of the species. If plants were obviously moving into natural areas, immediate eradication would be recommended. Discussions with Canadian weed scientists indicate rare vetch presence in Canada and little concern with it as a weed. It is possible that vetch populations have a limited duration. Traveling to the sites of former agriculture experiment stations in Alaska with known vetch plantings would be of value to determine long-term persistence of vetch.

*Vicia cracca* should be included on a list of many weedy species that have become problematic throughout Alaskan right-of-ways. Discussions with industry professionals indicate many weeds are more pressing than vetch, especially white sweet clover, Canadian thistle, and sowthistle. An integrated management plan covering all undesirable plants along right-of-ways is the best course of action for the Department of Transportation and Public Facilities. Monitoring plant locations and concentrations for consecutive years would indicate which species are the ones in need of control. A public awareness campaign to educate Alaskans which problem species to watch for and avoid propagation of would help drastically reduce proliferation of problem species.

### **Vetch Management**

Management strategies are broad and numerous. Options include chemical, biological, and/or mechanical control. Any method chosen would be labor and capitally intensive. Mechanical control is best suited for management of vetch on right-of-ways. In

agricultural plantings where vetch emerges from seed held over in the soil from previous cropping cycles, mechanical control is the preferred method. “Mow infested fields before seeds are ripened. Plow and follow with a cultivated crop for one season.” (Muenscher 1980, p. 288) “It doesn't tolerate frequent harvesting, even 3 cuts of alfalfa is enough to wipe out most of the volunteer birdvetch.” (Thomas, Ev.

<http://www.ibiblio.org/london/agriculture/forums/forage-mg/msg00135.html>, 1995)

Cutting plants near the base of their stem before the end of flowering, approximately June 20 to July 15, for consecutive years should eliminate most plants. Mowing of roadsides only impacts the plants in the open ditch bank but not those climbing the trees on the edges. Hand brushing or pulling around trees and fences may be the only method possible to remove hard to reach plants.

Chemical control has also been extremely successful in agricultural and may be a viable option for many private landowners. “In field studies on soybeans, combinations of metribuzin and metolachlor gave 94 to 100% control of tufted vetch. (Crops and Livestock Research Centre 2001)” This is incredible due to the close relationship of the two legumes. Roy Cranston, a weed scientist in Canada, has been involved in herbicide trials on vetch in cranberry and Christmas tree plantings. Chemicals with the active ingredient clopyralid have been extremely successful. Cranston said, “when you open the container near vetches, they start to die.” Of course these chemicals would likely kill all the legumes, including desirable ones. Bill Campbell, an agronomist with the Plant Materials Center, has been battling *Vicia cracca* in his yard for several years. He indicates that it takes three applications of Roundup in one season to have a significant affect on the plants, but all intermixed species die as well. Research into selective

herbicides that kill vetch but not desired legumes should be accomplished prior to chemical selection.

Biological control with insects may be an option to investigate due to evidence of predation (image 4). Entomological research needs to be completed to determine the insect species and attainable control levels. Grazing of livestock in infested areas could limit re-growth in subsequent seasons. Though this may not be realistic for right-of ways, it would work well on private property.

**Table 2: Vetch Control Options**

	<b>Mechanical</b>	<b>Chemical</b>	<b>Biological</b>	<b>Grazing</b>
<b>Public Acceptance</b>	Yes	No	Unknown	Yes
<b>Practical in Right-of-Ways</b>	Yes	Yes	Unknown	No
<b>Are Necessary Materials Available</b>	Yes	Unknown	Unknown	Yes
<b>Species Selective</b>	No	No	Maybe	No
<b>Number of Treatments Required</b>	3 per year for multiple years	One or two for one or two years	Unknown	One or two years
<b>Ability to Access Hard to Reach Areas</b>	No	Maybe	Yes	Yes
<b>Known Success</b>	Yes	Yes	No	Yes

Since seed can remain viable in the soil for many years, care should be taken during roadside maintenance not to disturb soils containing vetch in the buried seed bank.

Successful control in an area can be undone by one pass with a snowplow if it disturbs the soil. *Vicia cracca* seed can also be transported in soils used for road construction and landscaping. Management of plant populations surrounding gravel pits and other

material sources is recommended. Inspection of topsoil sources should be done in order to prevent transportation of seed to areas currently free of this weedy pest.

Public involvement will be essential to the success of any management strategy since much of the infestation is present on or next to private land. Education on proper plant identification and control methods would enable the public to actively participate. Removal of plants from the most seriously infested areas would limit the source of material for future spread.

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Image 1: *Hedysarum alpinum*  
Photo by: Andrew Nolen



Image 3: *Lathyrus palustris*  
Photo by: Andrew Nolen

Image 2: *Vicia cracca*  
Photo by: Andrew Nolen



Image 4: Insect feeding damage on vetch leaflets Photo by: Andrew Nolen

<b>Table 3: Fairbanks Vetch Survey Data</b>				<b>October 6 &amp; 7, 2001</b>	
<u>GPS Coordinates</u>		<u>Infestation Level</u>	<u>Roadway</u>	<u>Comments</u>	
N 64° 51.472'	W 147° 50.165'	3-4		UAF	
N 64° 51.482'	W 147° 50.414'	3		UAF	
N 64° 51.484'	W 147° 51.198'	5		UAF	
N 64° 51.504'	W 147° 51.262'	4		UAF	
N 64° 51.452'	W 147° 51.229'	4		UAF	
N 64° 51.429'	W 147° 51.043'	3-4		UAF	
N 64° 51.395'	W 147° 50.848'	5		Around railroad tracks and overtaking fences	
N 64° 51.358'	W 147° 50.629'	5	Noatak Dr.		
N 64° 51.332'	W 147° 50.590'	5	Noatak Dr.		
N 64° 51.336'	W 147° 50.830'	4-5	Noatak Dr.		
N 64° 51.339'	W 147° 50.992'	5	Noatak Dr.		
N 64° 51.346'	W 147° 51.411'	5	Noatak Dr.		
N 64° 51.398'	W 147° 51.881'	4	Noatak Dr.		
N 64° 51.462'	W 147° 52.030'	4	Noatak Dr.		
N 64° 51.533'	W 147° 52.144'	5	Noatak Dr.		
N 64° 51.629'	W 147° 52.228'	5	Noatak Dr.		
N 64° 51.714'	W 147° 52.287'	4	Sheep Creek Rd.		
N 64° 51.834'	W 147° 52.373'	2	Sheep Creek Rd.		
N 64° 51.909'	W 147° 52.441'	3	Sheep Creek Rd.		
N 64° 52.044'	W 147° 52.759'	4	Sheep Creek Rd.		
N 64° 52.086'	W 147° 53.004'	4	Sheep Creek Rd.		
N 64° 52.122'	W 147° 53.383'	3	Sheep Creek Rd.		
N 64° 52.140'	W 147° 53.581'	4	Sheep Creek Rd.		
N 64° 52.214'	W 147° 53.909'	5	Sheep Creek Rd.		
N 64° 52.303'	W 147° 54.077'	4	Sheep Creek Rd.		
N 64° 52.467'	W 147° 54.252'	3-4	Sheep Creek Rd.		
N 64° 52.612'	W 147° 54.460'	2-3	Sheep Creek Rd.		
N 64° 52.755'	W 147° 54.852'	3	Sheep Creek Rd.		
N 64° 52.920'	W 147° 55.314'	3	Sheep Creek Rd.		
N 64° 53.045'	W 147° 55.429'	4	Sheep Creek Rd.		
N 64° 53.179'	W 147° 55.293'	4	Sheep Creek Rd.		
N 64° 53.251'	W 147° 55.275'	4	Sheep Creek Rd.		
N 64° 53.328'	W 147° 55.566'	4	Sheep Creek Rd.		
N 64° 53.363'	W 147° 56.080'	2-3	Sheep Creek Rd.		
N 64° 53.407'	W 147° 56.315'	3	Sheep Creek Rd.		
N 64° 53.575'	W 147° 56.682'	3-4	Sheep Creek Rd.		
N 64° 53.681'	W 147° 56.786'	4	Sheep Creek Rd.		
N 64° 53.831'	W 147° 56.870'	4	Sheep Creek Rd.		
N 64° 54.055'	W 147° 57.040'	2	Sheep Creek Rd.		
N 64° 54.141'	W 147° 57.095'	2	Sheep Creek Rd.		

N 64° 54.352'	W 147° 57.047'	1	Sheep Creek Rd.
N 64° 54.457'	W 147° 56.987'	2	Sheep Creek Rd.
N 64° 54.631'	W 147° 56.884'	1	Sheep Creek Rd.
N 64° 54.714'	W 147° 56.700'	2	Sheep Creek Rd.
N 64° 54.738'	W 147° 56.428'	2	Goldstream Rd.
N 64° 54.716'	W 147° 56.140'	2	Goldstream Rd.
N 64° 54.691'	W 147° 55.832'	2	Goldstream Rd.
N 64° 54.688'	W 147° 55.392'	3	Goldstream Rd.
N 64° 54.800'	W 147° 54.915'	3	Goldstream Rd.
N 64° 54.812'	W 147° 54.857'	5	Goldstream Rd.
N 64° 54.821'	W 147° 54.692'	4	Goldstream Rd.
N 64° 54.823'	W 147° 54.340'	3	Goldstream Rd.
N 64° 54.859'	W 147° 53.957'	2	Goldstream Rd.
N 64° 54.940'	W 147° 53.615'	2	Goldstream Rd.
N 64° 55.001'	W 147° 53.308'	2-3	Goldstream Rd.
N 64° 55.107'	W 147° 52.906'	3-4	Goldstream Rd.
N 64° 55.202'	W 147° 52.568'	4	Goldstream Rd.
N 64° 55.477'	W 147° 52.153'	3	Goldstream Rd.
N 64° 55.655'	W 147° 51.911'	2-3	Goldstream Rd.
N 64° 55.786'	W 147° 51.704'	2	Goldstream Rd.
N 64° 55.878'	W 147° 51.490'	2	Goldstream Rd.
N 64° 56.022'	W 147° 51.134'	2	Goldstream Rd.
N 64° 56.629'	W 147° 49.813'	2	Goldstream Rd.
N 64° 56.724'	W 147° 49.562'	1	Goldstream Rd.
N 64° 56.809'	W 147° 48.319'	1	Goldstream Rd.
N 64° 57.087'	W 147° 46.518'	2	Goldstream Rd.
N 64° 57.246'	W 147° 46.298'	1	Goldstream Rd.
N 64° 57.319'	W 147° 46.112'	2	Goldstream Rd.
N 64° 57.391'	W 147° 45.721'	2	Goldstream Rd.
N 64° 57.399'	W 147° 45.567'	2	Goldstream Rd.
N 64° 57.401'	W 147° 45.281'	2	Goldstream Rd.
N 64° 57.383'	W 147° 44.063'	2	Goldstream Rd.
N 64° 57.366'	W 147° 43.695'	2	Goldstream Rd.
N 64° 57.263'	W 147° 43.100'	3	Goldstream Rd.
N 64° 57.052'	W 147° 41.768'	2	Goldstream Rd.
N 64° 56.936'	W 147° 41.040'	3	Goldstream Rd.
N 64° 56.918'	W 147° 40.926'	4	Goldstream Rd.
N 64° 56.836'	W 147° 40.581'	1	Goldstream Rd.
N 64° 56.632'	W 147° 39.345'	1	Goldstream Rd.
N 64° 56.590'	W 147° 38.989'	1	Goldstream Rd.
N 64° 56.559'	W 147° 38.652'	3	Goldstream Rd.
N 64° 56.573'	W 147° 38.601'	2	Goldstream Rd.
N 64° 56.741'	W 147° 38.522'	2	Goldstream Rd.

N 64° 56.954'	W 147° 37.867'	1	Goldstream Rd.
N 64° 57.342'	W 147° 36.872'	2	Goldstream Rd.
N 64° 56.611'	W 147° 37.108'	2	Goldstream Rd.
N 64° 56.391'	W 147° 38.601'	2	Goldstream Rd.
N 64° 56.108'	W 147° 38.557'	2	Goldstream Rd.
N 64° 55.994'	W 147° 38.469'	2	Goldstream Rd.
N 64° 55.873'	W 147° 38.192'	3	Goldstream Rd.
N 64° 55.809'	W 147° 38.002'	4	Goldstream Rd.
N 64° 55.746'	W 147° 37.818'	4	Goldstream Rd.
N 64° 55.682'	W 147° 37.646'	2	Goldstream Rd.
N 64° 55.498'	W 147° 37.225'	2	Goldstream Rd.
N 64° 55.265'	W 147° 36.698'	2	Goldstream Rd.
N 64° 54.935'	W 147° 35.939'	1	Goldstream Rd.
N 64° 54.065'	W 147° 35.968'	3	Goldstream Rd.
N 64° 53.997'	W 147° 36.099'	2-3	Steese Hwy.
N 64° 53.904'	W 147° 36.283'	3	Steese Hwy.
N 64° 53.793'	W 147° 36.492'	3-4	Steese Hwy.
N 64° 53.654'	W 147° 36.732'	4	Steese Hwy.
N 64° 53.346'	W 147° 37.298'	3	Chena Hot Springs Rd.
N 64° 53.272'	W 147° 37.355'	3	Chena Hot Springs Rd.
N 64° 53.122'	W 147° 36.467'	3	Chena Hot Springs Rd.
N 64° 53.109'	W 147° 34.876'	2	Chena Hot Springs Rd.
N 64° 53.137'	W 147° 34.308'	1	Chena Hot Springs Rd.
N 64° 53.187'	W 147° 34.080'	2	Chena Hot Springs Rd.
N 64° 53.298'	W 147° 33.559'	2	Chena Hot Springs Rd.
N 64° 53.365'	W 147° 33.247'	3	Chena Hot Springs Rd.
N 64° 53.545'	W 147° 33.203'	2	Chena Hot Springs Rd.
N 64° 53.540'	W 147° 31.234'	1	Chena Hot Springs Rd.
N 64° 53.537'	W 147° 30.300'	2	Chena Hot Springs Rd.
N 64° 53.533'	W 147° 26.609'	2	Chena Hot Springs Rd.
N 64° 53.532'	W 147° 26.379'	2	Chena Hot Springs Rd.
N 64° 53.524'	W 147° 24.701'	1	Chena Hot Springs Rd.
N 64° 53.380'	W 147° 23.563'	1	Chena Hot Springs Rd.
N 64° 53.043'	W 147° 22.705'	3	Chena Hot Springs Rd.
N 64° 53.044'	W 147° 22.516'	3	Chena Hot Springs Rd.
N 64° 53.044'	W 147° 22.313'	2	Chena Hot Springs Rd.
N 64° 53.046'	W 147° 21.837'	2	Chena Hot Springs Rd.
N 64° 53.135'	W 147° 20.144'	2	Chena Hot Springs Rd.
N 64° 53.154'	W 147° 19.849'	2	Chena Hot Springs Rd.
N 64° 53.308'	W 147° 18.376'	1	Chena Hot Springs Rd.
N 64° 53.309'	W 147° 18.149'	1	Chena Hot Springs Rd.
N 64° 53.328'	W 147° 17.818'	1	Chena Hot Springs Rd.
N 64° 53.346'	W 147° 17.531'	2	Chena Hot Springs Rd.

N 64° 53.168'	W 147° 16.774'	2-3	Chena Hot Springs Rd.
N 64° 53.046'	W 147° 13.828'	2	Chena Hot Springs Rd.
N 64° 53.036'	W 147° 13.676'	2	Chena Hot Springs Rd.
N 64° 53.015'	W 147° 13.368'	2	Chena Hot Springs Rd.
N 64° 52.980'	W 147° 12.870'	2	Chena Hot Springs Rd.
N 64° 52.964'	W 147° 12.638'	1	Chena Hot Springs Rd.
N 64° 52.943'	W 147° 12.329'	2-3	Chena Hot Springs Rd.
N 64° 52.928'	W 147° 12.121'	2-3	Chena Hot Springs Rd.
N 64° 52.860'	W 147° 11.913'	2-3	Chena Hot Springs Rd.
N 64° 52.706'	W 147° 11.562'	2	Chena Hot Springs Rd.
N 64° 52.631'	W 147° 11.390'	2	Chena Hot Springs Rd.
N 64° 52.588'	W 147° 11.288'	3	Chena Hot Springs Rd.
N 64° 52.446'	W 147° 10.970'	1	Chena Hot Springs Rd.
N 64° 52.378'	W 147° 10.812'	3-4	Chena Hot Springs Rd.
N 64° 52.194'	W 147° 10.391'	1-2	Chena Hot Springs Rd.
N 64° 52.115'	W 147° 10.154'	2	Chena Hot Springs Rd.
N 64° 52.118'	W 147° 09.738'	2-3	Chena Hot Springs Rd.
N 64° 52.126'	W 147° 09.360'	2	Chena Hot Springs Rd.
N 64° 52.129'	W 147° 09.137'	2	Chena Hot Springs Rd.
N 64° 52.136'	W 147° 08.617'	1	Chena Hot Springs Rd.
N 64° 52.147'	W 147° 08.159'	2	Chena Hot Springs Rd.
N 64° 52.154'	W 147° 07.741'	1	Chena Hot Springs Rd.
N 64° 52.240'	W 147° 07.192'	1	Chena Hot Springs Rd.
N 64° 52.242'	W 147° 06.577'	1	Chena Hot Springs Rd.
N 64° 52.249'	W 147° 06.243'	3	Chena Hot Springs Rd.
N 64° 52.261'	W 147° 05.632'	1	Chena Hot Springs Rd.
N 64° 52.269'	W 147° 04.991'	1-2	Chena Hot Springs Rd.
N 64° 52.278'	W 147° 04.744'	2	Chena Hot Springs Rd.
N 64° 52.287'	W 147° 04.489'	3	Chena Hot Springs Rd.
N 64° 52.242'	W 147° 03.405'	2-3	Chena Hot Springs Rd.
N 64° 52.190'	W 147° 03.004'	2-3	Chena Hot Springs Rd.
N 64° 52.349'	W 147° 01.642'	3	Chena Hot Springs Rd.
N 64° 52.477'	W 147° 01.006'	2	Chena Hot Springs Rd.
N 64° 53.133'	W 147° 24.820'	1	Nordale Rd.
N 64° 52.914'	W 147° 24.422'	2-3	Nordale Rd.
N 64° 52.749'	W 147° 24.329'	2	Nordale Rd.
N 64° 52.494'	W 147° 24.329'	3	Nordale Rd.
N 64° 52.092'	W 147° 24.327'	3	Nordale Rd.
N 64° 51.741'	W 147° 24.326'	2	Nordale Rd.
N 64° 51.543'	W 147° 24.324'	3	Nordale Rd.
N 64° 51.071'	W 147° 24.443'	1	Nordale Rd.
N 64° 50.955'	W 147° 24.577'	2	Nordale Rd.
N 64° 50.820'	W 147° 24.605'	3	Nordale Rd.

N 64° 50.576'	W 147° 24.603'	1	Nordale Rd.
N 64° 50.435'	W 147° 24.604'	3	Nordale Rd.
N 64° 50.294'	W 147° 24.605'	2	Nordale Rd.
N 64° 50.179'	W 147° 24.605'	2-3	Nordale Rd.
N 64° 49.895'	W 147° 24.607'	2	Nordale Rd.
N 64° 49.197'	W 147° 24.606'	2	Nordale Rd.
N 64° 48.876'	W 147° 24.646'	2	Badger Rd.
N 64° 48.750'	W 147° 24.703'	3	Badger Rd.
N 64° 48.669'	W 147° 24.491'	4	Badger Rd.
N 64° 48.338'	W 147° 24.211'	4	Badger Rd.
N 64° 48.047'	W 147° 23.979'	3	Badger Rd.
N 64° 47.945'	W 147° 23.899'	4	Badger Rd.
N 64° 47.830'	W 147° 23.784'	4-5	Badger Rd.
N 64° 47.632'	W 147° 23.445'	4	Badger Rd.
N 64° 47.457'	W 147° 23.266'	4-5	Badger Rd.
N 64° 47.340'	W 147° 23.221'	4-5	Badger Rd.
N 64° 47.194'	W 147° 23.258'	4	Badger Rd.
N 64° 47.026'	W 147° 23.321'	4	Badger Rd.
N 64° 46.869'	W 147° 23.203'	4	Badger Rd.
N 64° 46.752'	W 147° 22.808'	3-4	Badger Rd.
N 64° 46.695'	W 147° 22.550'	3	Badger Rd.
N 64° 46.697'	W 147° 22.552'	3	Badger Rd.
N 64° 46.669'	W 147° 22.274'	2	Badger Rd.
N 64° 46.607'	W 147° 22.016'	3	Badger Rd.
N 64° 46.518'	W 147° 21.757'	3	Badger Rd.
N 64° 46.450'	W 147° 21.563'	3-4	Badger Rd.
N 64° 46.311'	W 147° 21.167'	2	Badger Rd.
N 64° 46.245'	W 147° 20.977'	3	Badger Rd.
N 64° 46.172'	W 147° 20.793'	3-4	Badger Rd.
N 64° 46.020'	W 147° 20.672'	3	Badger Rd.
N 64° 45.832'	W 147° 20.756'	2	Badger Rd.
N 64° 44.806'	W 147° 19.187'	1	Richardson Hwy.
N 64° 46.199'	W 147° 25.470'	1	Richardson Hwy.
N 64° 47.827'	W 147° 32.477'	1	Richardson Hwy.
N 64° 49.230'	W 147° 40.325'	2	Richardson Hwy.
N 64° 49.369'	W 147° 42.578'	2	Richardson Hwy.
N 64° 51.053'	W 147° 41.437'	3	Trainer Gate Rd.
N 64° 51.059'	W 147° 41.290'	3-4	Trainer Gate Rd.
N 64° 52.190'	W 147° 40.436'	3	Farmers Loop Rd.
N 64° 52.226'	W 147° 40.562'	3	Farmers Loop Rd.
N 64° 52.334'	W 147° 40.652'	2-3	Farmers Loop Rd.
N 64° 52.417'	W 147° 40.589'	3-4	Farmers Loop Rd.
N 64° 52.630'	W 147° 40.399'	3	Farmers Loop Rd.

N 64° 53.324'	W 147° 40.920'	2	Farmers Loop Rd.
N 64° 53.403'	W 147° 41.038'	2	Farmers Loop Rd.
N 64° 53.495'	W 147° 41.181'	3	Farmers Loop Rd.
N 64° 53.685'	W 147° 41.472'	3-4	Farmers Loop Rd.
N 64° 53.920'	W 147° 41.827'	2	Farmers Loop Rd.
N 64° 53.967'	W 147° 42.047'	2	Farmers Loop Rd.
N 64° 53.991'	W 147° 42.346'	2	Farmers Loop Rd.
N 64° 53.996'	W 147° 43.468'	2	Farmers Loop Rd.
N 64° 53.993'	W 147° 43.836'	2	Farmers Loop Rd.
N 64° 53.992'	W 147° 43.964'	3	Farmers Loop Rd.
N 64° 53.991'	W 147° 44.131'	3-4	Farmers Loop Rd.
N 64° 53.978'	W 147° 44.742'	3	Farmers Loop Rd.
N 64° 53.984'	W 147° 44.958'	3	Farmers Loop Rd.
N 64° 53.955'	W 147° 45.251'	3	Farmers Loop Rd.
N 64° 53.875'	W 147° 45.396'	4	Farmers Loop Rd.
N 64° 53.716'	W 147° 45.386'	3	Farmers Loop Rd.
N 64° 53.605'	W 147° 45.373'	3	Farmers Loop Rd.
N 64° 53.511'	W 147° 45.360'	3-4	Farmers Loop Rd.
N 64° 53.359'	W 147° 45.575'	3	Farmers Loop Rd.
N 64° 53.321'	W 147° 45.720'	3	Farmers Loop Rd.
N 64° 53.273'	W 147° 45.917'	4	Farmers Loop Rd.
N 64° 53.205'	W 147° 46.181'	3	Farmers Loop Rd.
N 64° 52.141'	W 147° 46.586'	3	Farmers Loop Rd.
N 64° 53.121'	W 147° 46.786'	4	Farmers Loop Rd.
N 64° 53.098'	W 147° 47.002'	4	Farmers Loop Rd.
N 64° 52.999'	W 147° 47.401'	4	Farmers Loop Rd.
N 64° 52.966'	W 147° 47.501'	4-5	Farmers Loop Rd.
N 64° 52.899'	W 147° 47.703'	4-5	Farmers Loop Rd.
N 64° 52.861'	W 147° 47.915'	5	Farmers Loop Rd.
N 64° 52.847'	W 147° 48.159'	4	Farmers Loop Rd.
N 64° 52.833'	W 147° 48.398'	4-5	Farmers Loop Rd.
N 64° 52.776'	W 147° 48.719'	4	Farmers Loop Rd.
N 64° 52.643'	W 147° 49.134'	4	Farmers Loop Rd.
N 64° 52.592'	W 147° 49.246'	4	Farmers Loop Rd.
N 64° 52.580'	W 147° 49.280'	4	Farmers Loop Rd.
N 64° 52.538'	W 147° 49.385'	4	Farmers Loop Rd.
N 64° 52.463'	W 147° 49.477'	4	Farmers Loop Rd.
N 64° 52.346'	W 147° 49.469'	4-5	Farmers Loop Rd.
N 64° 52.246'	W 147° 49.460'	4	Farmers Loop Rd.
N 64° 52.143'	W 147° 49.451'	3	Farmers Loop Rd.
N 64° 52.061'	W 147° 49.446'	4	Farmers Loop Rd.
N 64° 51.954'	W 147° 49.430'	4	Farmers Loop Rd.
N 64° 51.892'	W 147° 49.345'	4	Farmers Loop Rd.

N 64° 51.795'	W 147° 49.139'	4	Farmers Loop Rd.
N 64° 51.750'	W 147° 49.333'	4	Tanana Dr.
N 64° 51.738'	W 147° 49.617'	3	Tanana Dr.
N 64° 51.714'	W 147° 49.695'	4	Tanana Dr.
N 64° 51.795'	W 147° 49.126'	4	Farmers Loop Rd.
N 64° 51.746'	W 147° 48.927'	3-4	Farmers Loop Rd.
N 64° 51.596'	W 147° 48.796'	3-4	Farmers Loop Rd.
N 64° 51.466'	W 147° 48.799'	3	University Ave.
N 64° 51.337'	W 147° 48.719'	3	College Rd.
N 64° 51.432'	W 147° 48.067'	2	College Rd.
N 64° 51.461'	W 147° 47.958'	2	College Rd.
N 64° 51.502'	W 147° 47.803'	3	College Rd.
N 64° 51.581'	W 147° 47.507'	3	College Rd.
N 64° 51.617'	W 147° 47.374'	3	College Rd.
N 64° 51.656'	W 147° 47.227'	3	College Rd.
N 64° 51.760'	W 147° 46.837'	2	Ivanoff Dr.
N 64° 51.816'	W 147° 46.587'	2	College Rd.
N 64° 51.854'	W 147° 46.208'	1	College Rd.
N 64° 51.855'	W 147° 45.937'	1	College Rd.
N 64° 51.849'	W 147° 45.819'	2	College Rd.
N 64° 51.801'	W 147° 45.385'	2	College Rd.
N 64° 51.728'	W 147° 44.979'	3	College Rd.
N 64° 51.714'	W 147° 44.803'	3	College Rd.
N 64° 51.693'	W 147° 44.582'	2	College Rd.
N 64° 51.477'	W 147° 42.894'	2	College Rd.
N 64° 50.746'	W 147° 42.145'	2-3	Slater Dr.
N 64° 50.297'	W 147° 42.417'	2	Steese Expy.
N 64° 49.189'	W 147° 42.636'	1	S. Cushman St.
N 64° 49.118'	W 147° 42.624'	1	S. Cushman St.
N 64° 49.015'	W 147° 42.645'	2-3	S. Cushman St.
N 64° 48.929'	W 147° 42.651'	2-3	S. Cushman St.
N 64° 48.842'	W 147° 42.650'	2	S. Cushman St.
N 64° 48.608'	W 147° 42.644'	2	S. Cushman St.
N 64° 48.554'	W 147° 42.644'	2	S. Cushman St.
N 64° 48.476'	W 147° 42.643'	2	S. Cushman St.
N 64° 49.205'	W 147° 42.632'	2	Old Richardson Hwy.
N 64° 49.157'	W 147° 42.414'	3	Old Richardson Hwy.
N 64° 49.123'	W 147° 41.237'	1	Old Richardson Hwy.
N 64° 49.114'	W 147° 41.106'	2	Old Richardson Hwy.
N 64° 49.097'	W 147° 40.821'	2	Old Richardson Hwy.
N 64° 48.996'	W 147° 39.311'	2	Old Richardson Hwy.
N 64° 48.640'	W 147° 34.343'	2	Badger Rd.
N 64° 48.756'	W 147° 34.280'	1	Badger Rd.

N 64° 48.936'	W 147° 34.165'	3	Badger Rd.
N 64° 48.999'	W 147° 34.125'	3	Badger Rd.
N 64° 49.101'	W 147° 34.062'	2-3	Badger Rd.
N 64° 49.164'	W 147° 34.023'	3	Badger Rd.
N 64° 49.339'	W 147° 33.913'	2-3	Badger Rd.
N 64° 49.341'	W 147° 33.912'	3	Badger Rd.
N 64° 49.466'	W 147° 33.771'	3-4	Badger Rd.
N 64° 49.550'	W 147° 33.553'	3-4	Badger Rd.
N 64° 49.587'	W 147° 33.381'	4	Badger Rd.
N 64° 49.639'	W 147° 33.127'	4	Badger Rd.
N 64° 49.690'	W 147° 32.882'	4	Badger Rd.
N 64° 49.736'	W 147° 32.655'	3-4	Badger Rd.
N 64° 49.785'	W 147° 32.419'	3	Badger Rd.
N 64° 49.828'	W 147° 32.189'	3	Badger Rd.
N 64° 49.851'	W 147° 32.054'	4	Badger Rd.
N 64° 49.886'	W 147° 31.859'	3	Badger Rd.
N 64° 49.926'	W 147° 31.618'	3-4	Badger Rd.
N 64° 49.943'	W 147° 31.194'	2-3	Badger Rd.
N 64° 49.948'	W 147° 30.941'	3	Badger Rd.
N 64° 49.969'	W 147° 30.840'	2-3	Badger Rd.
N 64° 50.117'	W 147° 30.229'	2	Badger Rd.
N 64° 50.111'	W 147° 30.029'	2-3	Badger Rd.
N 64° 50.105'	W 147° 29.851'	2-3	Badger Rd.
N 64° 50.097'	W 147° 29.658'	3	Badger Rd.
N 64° 50.054'	W 147° 29.471'	3	Badger Rd.
N 64° 50.021'	W 147° 29.384'	3-4	Badger Rd.
N 64° 49.971'	W 147° 29.309'	4	Badger Rd.
N 64° 49.962'	W 147° 29.161'	3-4	Badger Rd.
N 64° 49.958'	W 147° 28.981'	3	Badger Rd.
N 64° 49.953'	W 147° 28.793'	4	Badger Rd.
N 64° 49.948'	W 147° 28.555'	3-4	Badger Rd.
N 64° 49.931'	W 147° 28.339'	3-4	Badger Rd.
N 64° 49.881'	W 147° 28.111'	3-4	Badger Rd.
N 64° 49.843'	W 147° 27.924'	3-4	Badger Rd.
N 64° 49.740'	W 147° 27.560'	3-4	Badger Rd.
N 64° 49.652'	W 147° 27.313'	4	Badger Rd.
N 64° 49.590'	W 147° 27.170'	3-4	Badger Rd.
N 64° 49.517'	W 147° 27.002'	3-4	Badger Rd.
N 64° 49.437'	W 147° 26.814'	3	Badger Rd.
N 64° 49.332'	W 147° 26.574'	3	Badger Rd.
N 64° 49.211'	W 147° 24.923'	1	Peede Rd.
N 64° 49.211'	W 147° 24.763'	2	Peede Rd.
N 64° 49.211'	W 147° 24.702'	2	Peede Rd.

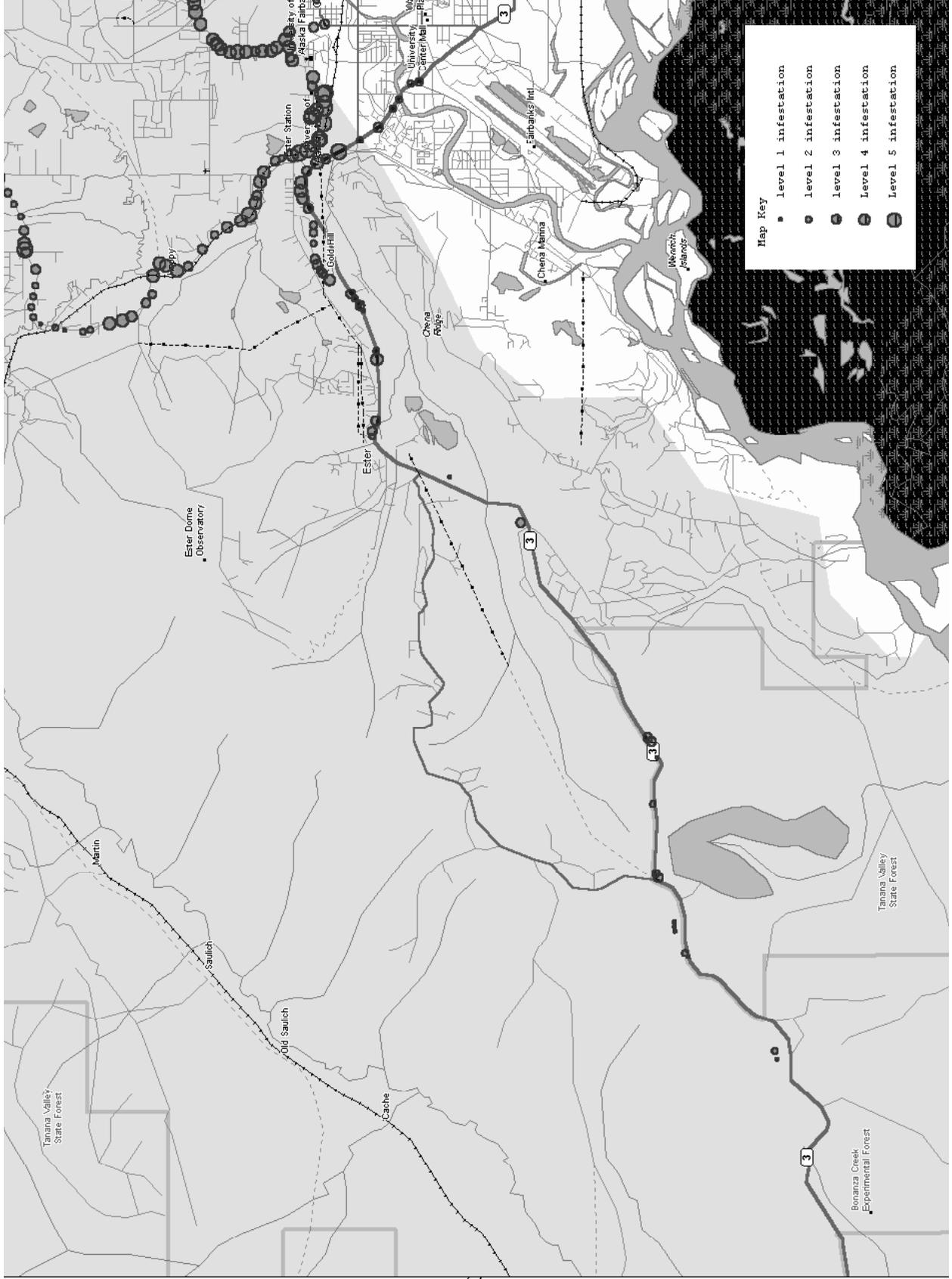
N 64° 50.502'	W 147° 22.487'	2	Freeman Rd.
N 64° 50.502'	W 147° 22.363'	2	Freeman Rd.
N 64° 50.502'	W 147° 22.136'	2	Freeman Rd.
N 64° 50.501'	W 147° 21.203'	1	Freeman Rd.
N 64° 50.501'	W 147° 20.944'	1	Freeman Rd.
N 64° 49.210'	W 147° 24.398'	2	Peede Rd.
N 64° 49.209'	W 147° 24.161'	2	Peede Rd.
N 64° 49.207'	W 147° 23.754'	2-3	Peede Rd.
N 64° 49.208'	W 147° 23.457'	2	Peede Rd.
N 64° 49.207'	W 147° 22.911'	1	Peede Rd.
N 64° 49.155'	W 147° 22.553'	1	Brook Rd.
N 64° 49.066'	W 147° 22.557'	1-2	Brook Rd.
N 64° 48.989'	W 147° 22.558'	1	Brook Rd.
N 64° 48.732'	W 147° 22.560'	1	Brook Rd.
N 64° 48.247'	W 147° 22.560'	1	Brook Rd.
N 64° 48.141'	W 147° 22.562'	2	Brook Rd.
N 64° 48.037'	W 147° 22.564'	1	Brook Rd.
N 64° 47.881'	W 147° 22.567'	2	Brook Rd.
N 64° 47.709'	W 147° 22.569'	1-2	Brook Rd.
N 64° 47.574'	W 147° 22.569'	2-3	Repp Rd.
N 64° 47.482'	W 147° 22.568'	3	Repp Rd.
N 64° 47.475'	W 147° 22.453'	2	Repp Rd.
N 64° 47.475'	W 147° 22.310'	2	Repp Rd.
N 64° 47.478'	W 147° 22.272'	2	Repp Rd.
N 64° 47.479'	W 147° 20.835'	1	Repp Rd.
N 64° 47.477'	W 147° 20.561'	2	Repp Rd.
N 64° 47.300'	W 147° 20.550'	1	Howell Rd.
N 64° 47.220'	W 147° 20.549'	2-3	Howell Rd.
N 64° 46.613'	W 147° 20.550'	2	Plack Rd.
N 64° 46.609'	W 147° 19.787'	2	Plack Rd.
N 64° 45.628'	W 147° 15.464'	2	Nelson Rd.
N 64° 45.177'	W 147° 15.467'	1	Nelson Rd.
N 64° 44.512'	W 147° 15.471'	1	Nelson Rd.
N 64° 46.092'	W 148° 16.910'	1	Yellowstone Rd.
N 64° 46.118'	W 148° 16.638'	2	Yellowstone Rd.
N 64° 47.126'	W 148° 14.126'	1	Parks Hwy.
N 64° 47.160'	W 148° 14.030'	2	Parks Hwy.
N 64° 47.277'	W 148° 13.419'	1	Parks Hwy.
N 64° 47.281'	W 148° 13.300'	1	Parks Hwy.
N 64° 47.284'	W 148° 13.164'	1	Parks Hwy.
N 64° 47.469'	W 148° 11.961'	3	Parks Hwy.
N 64° 47.495'	W 148° 11.848'	2-3	Parks Hwy.
N 64° 47.530'	W 148° 09.967'	2	Parks Hwy.

N 64° 47.482'	W 148° 08.691'	1	Parks Hwy.
N 64° 47.548'	W 148° 08.258'	3	Parks Hwy.
N 64° 47.592'	W 148° 08.154'	3	Parks Hwy.
N 64° 49.064'	W 148° 02.295'	3	Parks Hwy.
N 64° 49.887'	W 148° 01.038'	1	Parks Hwy.
N 64° 50.116'	W 148° 00.676'	2	Parks Hwy.
N 64° 50.786'	W 147° 59.946'	2	Parks Hwy.
N 64° 50.778'	W 147° 59.801'	3	Parks Hwy.
N 64° 50.744'	W 147° 59.510'	3	Parks Hwy.
N 64° 50.731'	W 147° 57.848'	4	Parks Hwy.
N 64° 50.738'	W 147° 57.610'	2	Parks Hwy.
N 64° 50.890'	W 147° 56.525'	1	Parks Hwy.
N 64° 50.928'	W 147° 56.383'	3	Parks Hwy.
N 64° 50.945'	W 147° 56.329'	2	Parks Hwy.
N 64° 50.988'	W 147° 56.195'	2	Parks Hwy.
N 64° 51.034'	W 147° 56.066'	3	Parks Hwy.
N 64° 51.279'	W 147° 55.678'	3-4	Parks Hwy.
N 64° 51.341'	W 147° 55.550'	2	Parks Hwy.
N 64° 51.363'	W 147° 55.497'	2-3	Parks Hwy.
N 64° 51.388'	W 147° 55.413'	2-3	Parks Hwy.
N 64° 51.426'	W 147° 55.258'	3	Parks Hwy.
N 64° 51.449'	W 147° 55.115'	3	Parks Hwy.
N 64° 51.466'	W 147° 54.693'	2	Parks Hwy.
N 64° 51.467'	W 147° 54.399'	2-3	Parks Hwy.
N 64° 51.466'	W 147° 54.203'	2-3	Parks Hwy.
N 64° 51.529'	W 147° 53.724'	3	Parks Hwy.
N 64° 51.594'	W 147° 53.495'	3-4	Parks Hwy.
N 64° 51.616'	W 147° 53.255'	4	Parks Hwy.
N 64° 51.607'	W 147° 53.025'	3-4	Parks Hwy.
N 64° 51.544'	W 147° 52.717'	3	Parks Hwy.
N 64° 51.326'	W 147° 52.391'	3	Parks Hwy.
N 64° 51.172'	W 147° 52.192'	5	Parks Hwy.
N 64° 50.926'	W 147° 51.873'	2	Parks Hwy.
N 64° 50.716'	W 147° 51.523'	3	Parks Hwy.
N 64° 50.547'	W 147° 51.017'	2	Parks Hwy.
N 64° 50.474'	W 147° 50.761'	2	Parks Hwy.
N 64° 50.339'	W 147° 50.338'	2	Old Airport Rd.
N 64° 50.242'	W 147° 50.292'	2-3	Old Airport Rd.
N 64° 51.422'	W 147° 52.490'	3-4	Parks Hwy.

<b>Table 4: Matanuska-Susitna Vetch Survey Data</b>			<b>October 2, 2001</b>		
<u>GPS Coordinates</u>			<u>Infestation Level</u>	<u>Roadway</u>	<u>Comments</u>
N 61° 32.857'	W 149° 25.231'		1	Fairview Loop	
N 61° 33.352'	W 149° 25.101'		1	Fairview Loop	
N 61° 33.357'	W 149° 24.489'		3-4	Fairview Loop	Intersection with Parks Highway
N 61° 33.831'	W 149° 21.061'		1	Fairview Loop	Intersection with Parks Highway
N 61° 33.901'	W 149° 19.926'		1-2	Parks Hwy.	
N 61° 34.109'	W 149° 18.765'		3-4	Hyer Rd.	
N 61° 34.263'	W 149° 18.316'		1	Hyer Rd.	
N 61° 34.750'	W 149° 17.827'		1	Hyer Rd.	
N 61° 34.924'	W 149° 18.010'		2	Hyer Rd.	
N 61° 35.700'	W 149° 17.057'		1	Palmer-Wasilla Hwy.	
N 61° 35.964'	W 149° 13.780'		1	Palmer-Wasilla Hwy.	
N 61° 35.962'	W 149° 13.046'		3-4	Palmer-Wasilla Hwy.	
N 61° 35.959'	W 149° 12.278		3-4	Palmer-Wasilla Hwy.	
N 61° 35.961'	W 149° 11.657'		4-5	Palmer-Wasilla Hwy.	
N 61° 35.964'	W 149° 11.159'		5	Palmer-Wasilla Hwy.	
N 61° 35.965'	W 149° 10.779'		5	Palmer-Wasilla Hwy.	
N 61° 35.966'	W 149° 10.453'		5	Palmer-Wasilla Hwy.	
N 61° 35.971'	W 149° 9.845'		5	Palmer-Wasilla Hwy.	
N 61° 35.970'	W 149° 9.144'		5	Palmer-Wasilla Hwy.	
N 61° 35.970'	W 149° 8.365'		5	Palmer-Wasilla Hwy.	
N 61° 35.969'	W 149° 7.829'		4-5	Palmer-Wasilla Hwy.	
N 61° 35.967'	W 149° 7.373'		5	Palmer-Wasilla Hwy.	Intersection with Glenn Hwy.
N 61° 36.466'	W 149° 7.106'		4	Glenn Hwy.	
N 61° 37.118'	W 149° 7.104'		3	Glenn Hwy.	
N 61° 37.327'	W 149° 7.104'		2	Glenn Hwy.	
N 61° 37.469'	W 149° 7.104'		3	Glenn Hwy.	
N 61° 37.931'	W 149° 7.059'		1	Glenn Hwy.	
N 61° 38.175'	W 149° 7.101'		1-2	Glenn Hwy.	
N 61° 38.709'	W 149° 7.083'		2-3	Glenn Hwy.	
N 61° 39.323'	W 149° 6.404'		1	Glenn Hwy.	
N 61° 38.777'	W 149° 7.146'		2	Glenn Hwy.	Intersection with Farm Loop Rd.
N 61° 38.777'	W 149° 8.488'		1-2	Farm Loop Rd.	
N 61° 38.779'	W 149° 8.938'		1	Farm Loop Rd.	
N 61° 38.775'	W 149° 9.411'		4	Farm Loop Rd.	

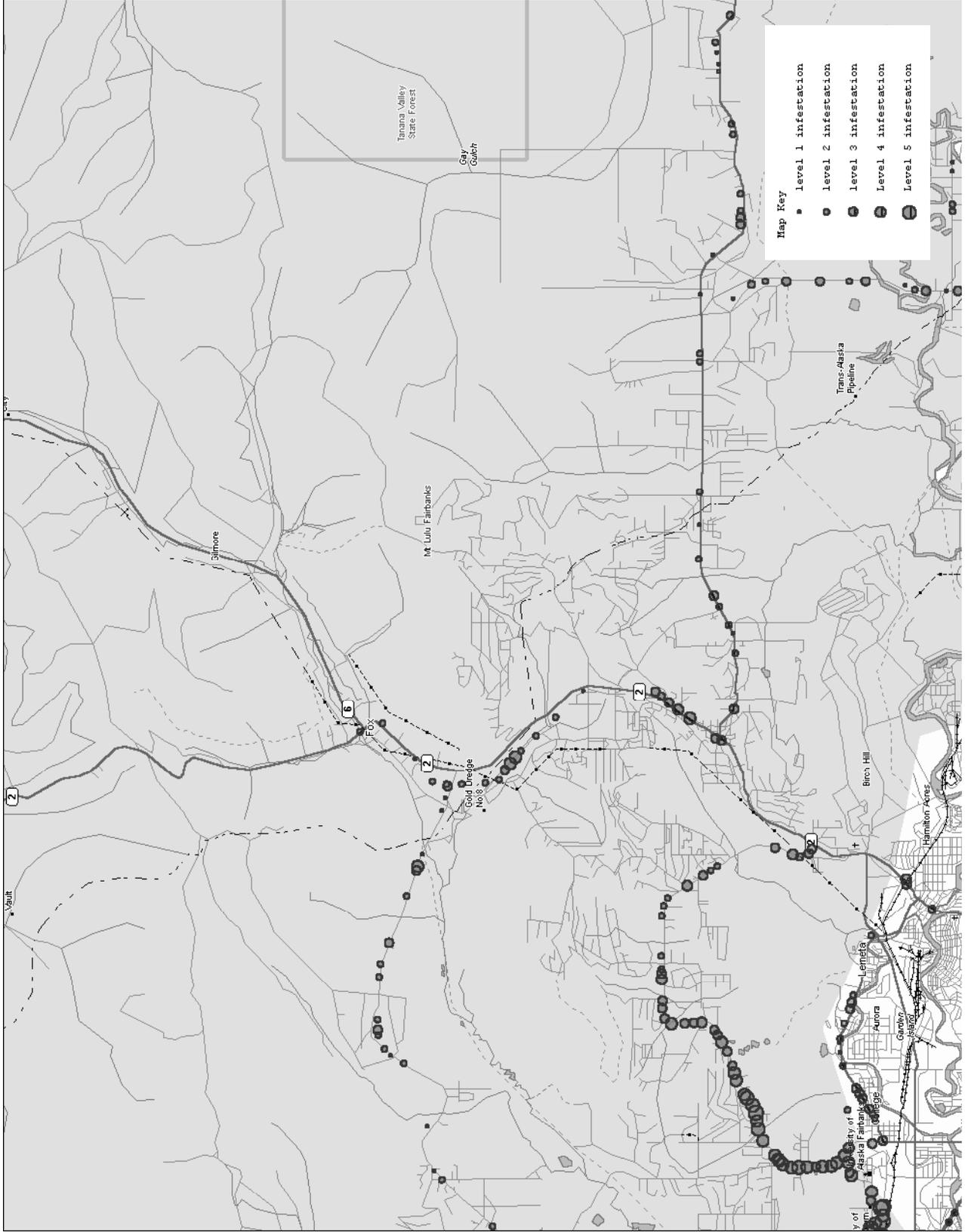
N 61° 38.571'	W 149° 9.485'	5	Farm Loop Rd.
N 61° 38.490'	W 149° 9.888'	2	Farm Loop Rd.
N 61° 38.165'	W 149° 10.030'	1	Farm Loop Rd.
N 61° 37.707'	W 149° 9.836'	1	Farm Loop Rd. Intersection with Palmer Fishhook Rd.
N 61° 37.694'	W 149° 8.869'	2-3	Palmer Fishhook Rd.
N 61° 37.697	W 149° 7.859'	2	Palmer Fishhook Rd.
N 61° 36.395'	W 149° 6.498'	5	Arctic Ave.
N 61° 36.392'	W 149° 6.808'	5	Arctic Ave.
N 61° 36.393'	W 149° 5.707'	4-5	Airport Rd. Intersection with Old Glenn Hwy.
N 61° 36.079'	W 149° 5.707'	5+	Airport Rd.
N 61° 35.952'	W 149° 5.804'	4-5	Evergreen St.
N 61° 35.769'	W 149° 6.667'	5	S. Chugach St.
N 61° 35.517'	W 149° 6.659'	4	S. Chugach St.
N 61° 35.410'	W 149° 6.652'	5	S. Chugach St.
N 61° 35.197'	W 149° 6.649'	4-5	S. Chugach St.
N 61° 35.080'	W 149° 6.649'	4-5	S. Chugach St. Intersection with Springer Loop Rd.
N 61° 35.084'	W 149° 5.262'	1-2	Springer Loop Rd. By Golf Course
N 61° 34.829'	W 149° 5.264'	1	Springer Loop Rd.
N 61° 34.691'	W 149° 5.263'	1	Springer Loop Rd.
N 61° 34.226'	W 149° 6.328'	3-4	Springer Loop Rd.
N 61° 34.226'	W 149° 6.697'	5	Springer Loop Rd.
N 61° 34.228'	W 149° 8.959'	1	Springer Loop Rd. Intersection with Glenn hwy.
N 61° 34.159'	W 149° 9.759'	1	Cienna St.
N 61° 33.964'	W 149° 9.406'	2	Glenn Hwy.
N 61° 33.753'	W 149° 9.668'	2	Glenn Hwy.
N 61° 33.579'	W 149° 9.902'	1	Glenn Hwy.
N 61° 33.374'	W 149° 10.282'	2-3	Glenn Hwy.
N 61° 33.040'	W 149° 11.426'	2-3	Glenn Hwy.
N 61° 33.099'	W 149° 12.388'	4-5	Glenn Hwy.
N 61° 33.065'	W 149° 13.309'	4-5	Glenn Hwy.
N 61° 33.056'	W 149° 13.781'	4-5	Glenn Hwy.
N 61° 33.222'	W 149° 14.388'	2-3	Glenn Hwy.
N 16° 33.454'	W 149° 15.123'	1	Parks Hwy.
N 61° 33.796'	W 149° 16.480'	3-4	Trunk Rd.
N 61° 33.794'	W 149° 17.392'	2	Trunk Rd.
N 61° 33.802'	W 149° 16.895'	5	Trunk Rd.
N 61° 33.942'	W 149° 18.488'	1	Parks Hwy.
N 61° 34.140'	W 149° 19.441'	2-3	Parks Hwy.
N 61° 34.140'	W 149° 19.505'	2	Parks Hwy.
N 61° 34.811	W 149° 20.121'	1	N. Begich Dr.
N 61° 35.014'	W 149° 20.245'	1-2	N. Begich Dr.
N 61° 35.056'	W 149° 20.034'	2-3	N. Begich Dr. Intersection With Palmer-Wasilla Hwy.

N 61° 35.100'	W 149° 19.918'	4	Palmer-Wasilla Hwy.
N 61° 35.100'	W 149° 19.381'	2-3	Palmer-Wasilla Hwy.
N 61° 33.399'	W 149° 29.328'	3-4	Knik Goose Bay Rd. Intersection with Fairview Loop Rd.
N 61° 33.312'	W 149° 29.307'	3	Fairview Loop Rd.
N 61° 33.204'	W 149° 29.285'	2-3	Fairview Loop Rd.
N 61° 33.198'	W 149° 28.928'	1	Fairview Loop Rd.
N 61° 33.173'	W 149° 28.614'	2-3	Fairview Loop Rd.
N 61° 33.162'	W 149° 27.706'	4-5	Fairview Loop Rd.
N 61° 32.997'	W 149° 27.436'	2	Fairview Loop Rd.
N 61° 32.606'	W 149° 26.993'	1	Fairview Loop Rd.
N 61° 36.906'	W 149° 14.402'	3	Trunk Rd.
N 61° 37.128'	W 149° 14.175'	2	Trunk Rd.
N 61° 35.727'	W 149° 14.630'	2	Trunk Rd.
N 61° 35.588'	W 149° 14.695'	3	Trunk Rd.
N 61° 35.202'	W 149° 14.879'	3	Trunk Rd.
N 61° 34.954'	W 149° 14.998'	4-5	Trunk Rd.
N 61° 34.656'	W 149° 15.323'	5	Trunk Rd.
N 61° 34.429'	W 149° 15.377'	5	Trunk Rd.
N 61° 34.244'	W 149° 15.354'	5	Trunk Rd.
N 61° 34.131'	W 149° 15.345'	5	Trunk Rd.
N 61° 34.033'	W 149° 15.453'	5	Trunk Rd. Experiment Farm
N 61° 40.429'	W 149° 13.567'	1	Palmer Fishhook Rd.
N 61° 39.028'	W 149° 19.035'	1	Wasilla Fishhook Rd.
N 61° 37.761'	W 149° 21.801'	1	Wasilla Fishhook Rd.
N 61° 37.524'	W 149° 22.144'	1-2	Wasilla Fishhook Rd.
N 61° 37.396'	W 149° 22.501'	3	Wasilla Fishhook Rd.
N 61° 37.313'	W 149° 22.837'	2-3	Wasilla Fishhook Rd.
N 61° 33.559'	W 149° 28.820'	1	Knik Goose Bay Rd.

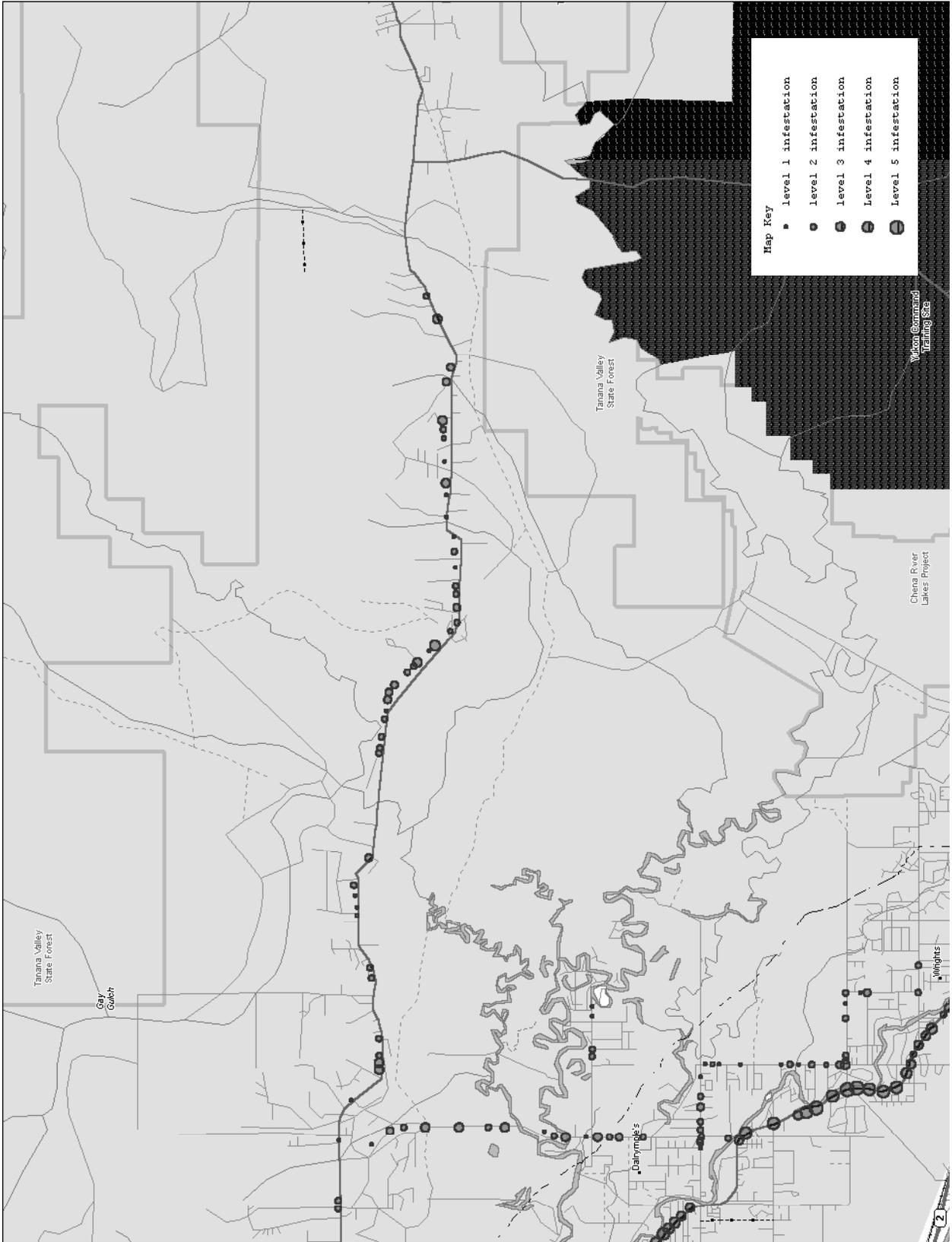


**Map 1: Southwest Fairbanks Vetch Survey Map**

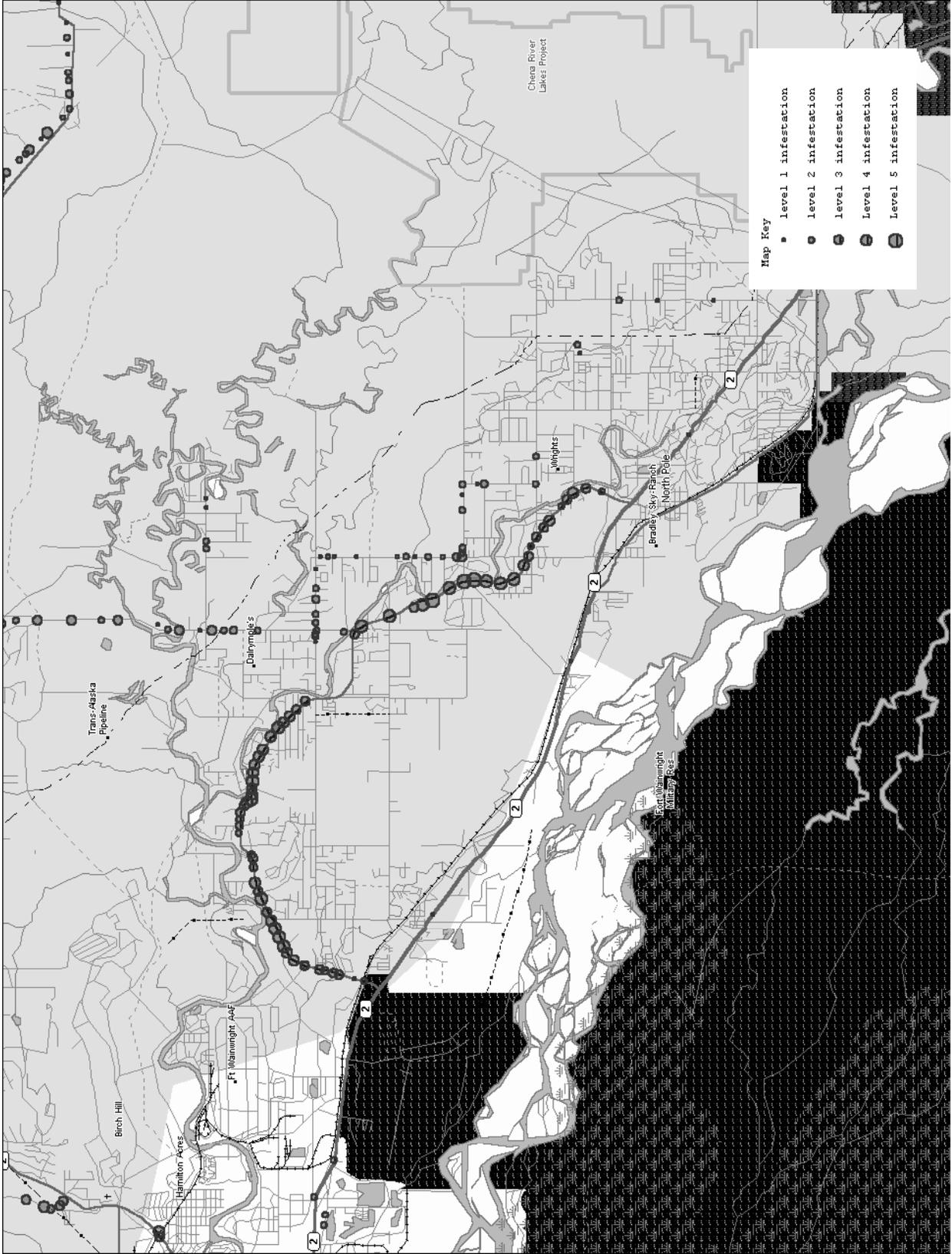




Map 3: North Fairbanks Vetch Survey Map



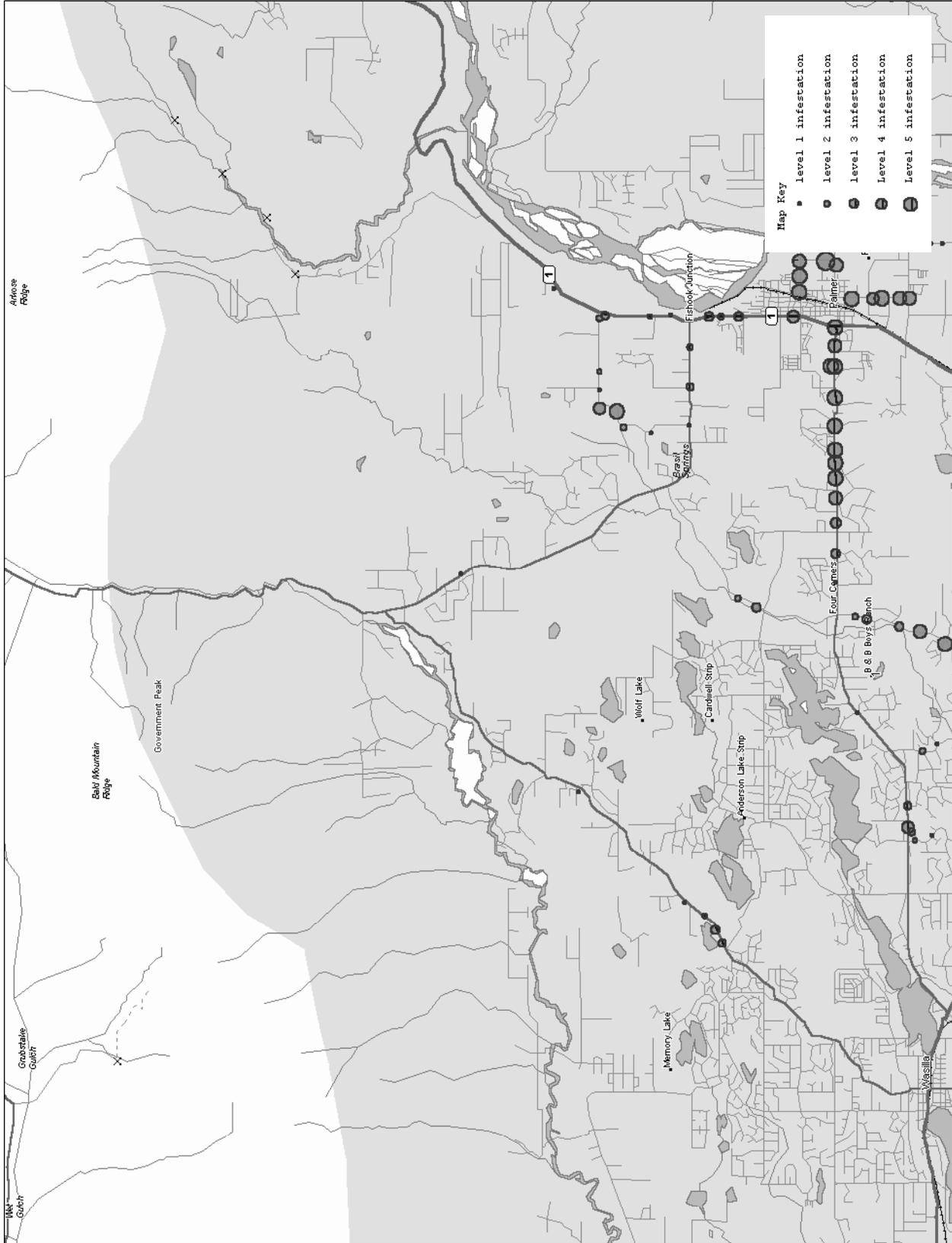
**Map 4: Northeast Fairbanks Vetch Survey Map**



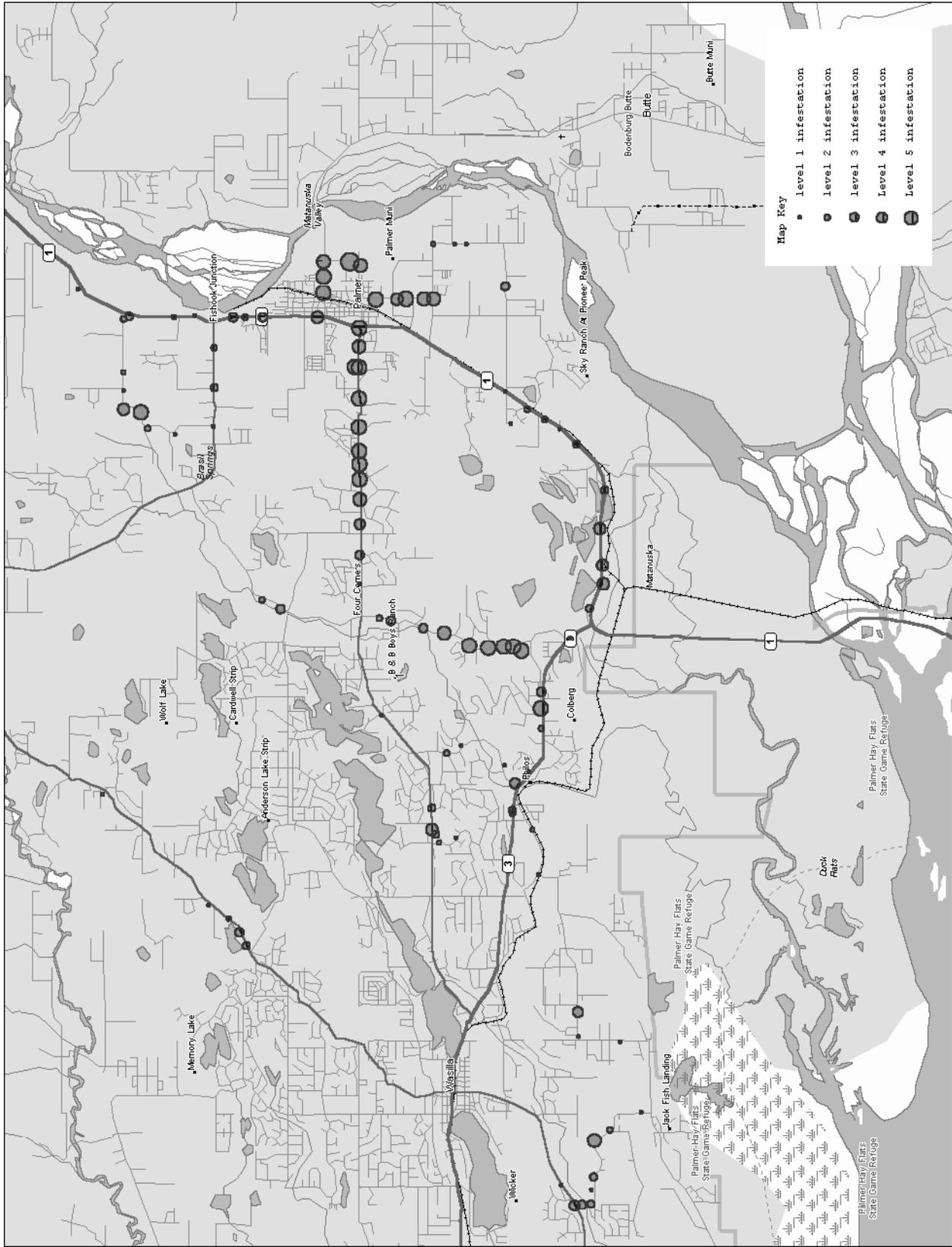
Map 5: Southeast Fairbanks Vetch Survey Map



**Map 6: East Mat-Su Vetch Survey Map**



**Map 7: North Mat-Su Vetch Survey Map**



Map 8: Central Mat-Su Vetch Survey Map