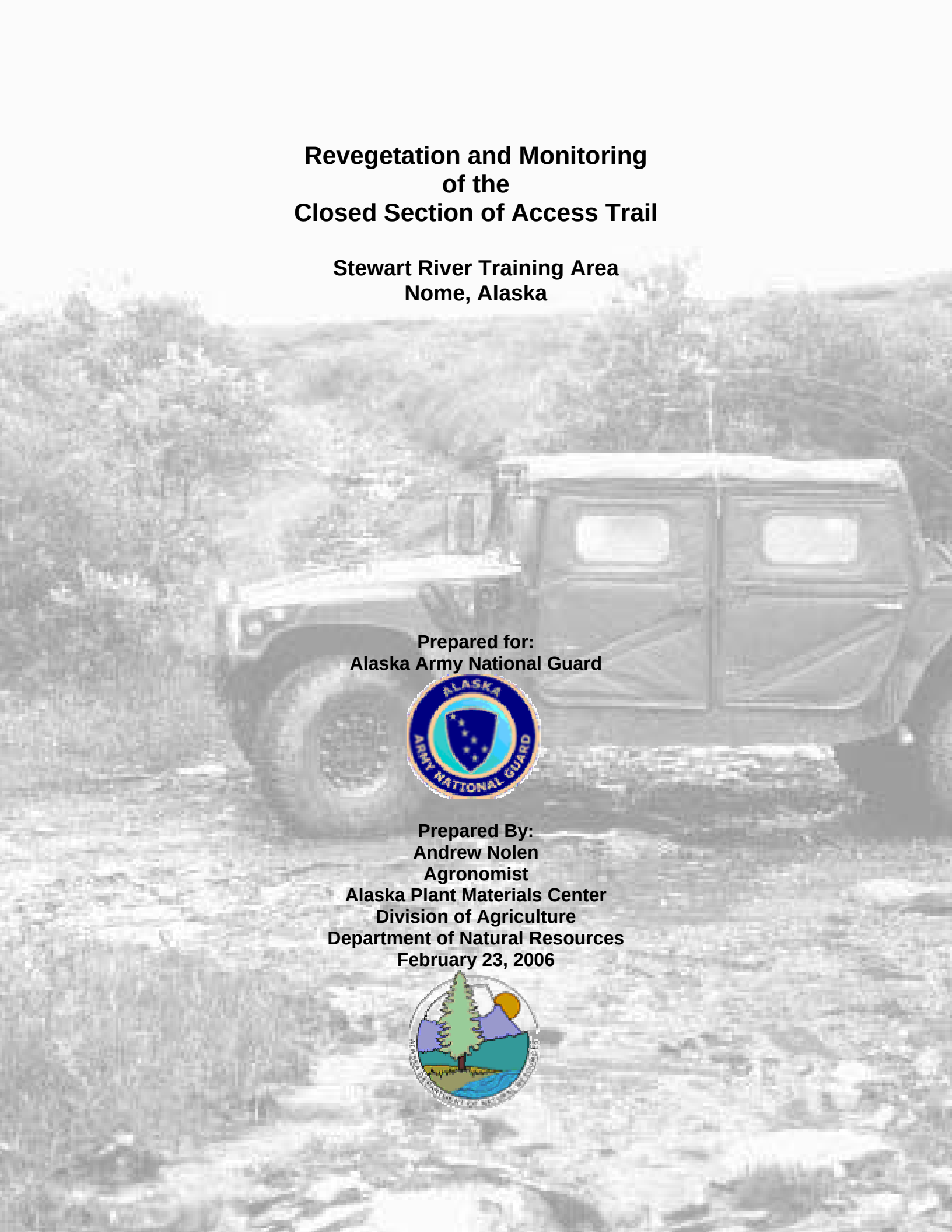
Revegetation and Monitoring of the Closed Section of Access Trail

Stewart River Training Area
Nome, Alaska



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Abstract

The Alaska Plant Materials Center, through an agreement with the Alaska Army National Guard Environmental Section, developed the revegetation plan and preformed post-restoration monitoring for a disturbance along the route to the Stewart River Training Area near Nome, AK. Damage to the tundra and erosion resulted from off road vehicle traffic traversing a new route due to the impassability of the traditional trail. Four levels of treatment were prescribed in the revegetation plan including eliminating traffic, seed and fertilizer applications, filling large gullies to reduce thermal erosion, and live staking willow cuttings. The revegetation efforts occurred during the summers of 2004 and 2005. Though there were some difficulties with willow cutting survival and introduction of a few undesirable plants, the restoration effort was generally successful and stability appears to be returning to the site.

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Introduction

The trail to the Alaska Army National Guard's Stewart River Training Area near Nome is located at the end of Glacier Creek Road, a well traveled and minimally maintained gravel road. A new section of trail was adopted by off-road vehicle traffic to bypass severely eroded conditions that are present near the end of the traditional route. Increased traffic across the tundra has resulted in rill, gully and thermal erosion. Restoration of the trail was necessary to provide stability to the site.

General Site Conditions

The Stewart River Training Area is located in the foothills of the Kigluaic Mountains about twenty miles north of Nome, Alaska. The topography consists of "expansive convex hills with scattered broad valleys, and small, isolated rugged mountains. Vegetation is principally tundra, with alpine *Dryas*-lichen and barrens at high elevations and moist sedge-tussock tundra at lower elevations. Patches of low growing ericaceous and willow-birch shrubs occur on better drained areas. Permafrost is continuous, but ranges from thin to moderately thick. Soils are often wet, shallow and organic because of the permafrost. The climate is best classified as moist polar." (U.S. Dept. of the Interior. 2001)

The damaged trail section is to the east of Mount Distin at an elevation of approximately 700 feet above sea level. The area has an east aspect. The disturbed area is approximately 5620 feet long and 10 feet wide equaling 1.3 acres.

The Eroded Trail

Glacier Creek Road is a gravel road that passes a gold mine, several fish camps and has many stream crossings. The road ends at a "Y" near Jensen's Camp. The traditional route had become impassable due to heavy water runoff and lack of maintenance. Around 1998, a new trail was adopted by off-road vehicle traffic to bypass an impassable section of the traditional route near Jensen's Camp.

Traffic on the new section of trail damaged the tundra resulting in severe erosion. Though approximately the first hundred yards of the southern end of the closed trail appeared as if it may have been used consistently in the past, the remainder looked like a fairly recent disturbance. This portion of the trail follows the fall line down slope and has large gullies formed due to the destruction of the vegetative surface layer of the tundra by frequent traffic. Once the vegetative layer is destroyed, nothing remains to protect the organic and mineral soils underneath from erosion. Also, thawing of the permafrost under the disturbance is occurring due to the degradation of the insulating vegetative surface layer. Water flowing down slope at breakup and during heavy rains events accelerates along the disturbance collecting soil along the way. Some gullies are so deep that the mineral soil underneath the organic surface layer is exposed.

Off-road traffic continued to travel this section of trail with a 4-wheeler passing our group during a site visit in July 2003. The traffic was going around

damaged trail sections which resulted in increasing the scope of the disturbance over time.

Revegetation Plan

The following revegetation plan was developed by the Alaska Department of Natural Resources, Division of Agriculture, Plant Materials Center through an interagency agreement with the Alaska Army National Guard. The Guard implemented the plan through a contract with a local Nome construction company in July 2003. The revegetation and restoration work was completed in stages during the summers of 2004 and 2005.

(a) Task 1: Eliminate Access

The disturbance was created and continues to be exacerbated by off-road vehicle traffic. Blocking access will remove the cause of the erosion and result in the natural re-invasion of native plant species. Seed production by species surrounding the site as well as buried plant propagules within the disturbed area will begin to establish and stabilize the disturbance.

Install signs indicating correct route of traffic past Jensen's Camp along existing access route to Stewart River Training Area. If necessary, install gates or fences to enforce signage. Hold public meetings to announce the new traffic pattern and explain reasons for the permanent detour. Produce a one-page information paper indicating closed section of trail.

(b) Task 2: Apply Seed and Fertilizer

Apply seed and fertilizer as described below.

Seeding Recommendation:

Seed should be applied to the disturbed and eroded area at a rate of 40 pounds of pure live seed per acre. The seed mix should be as follows: 20% Arctared Fescue (*Festuca rubra* ~$1.50/lb), 30% Norcoast Hairgrass (*Deschampsia beringensis* ~$12.00/lb), 30% Tundra Bluegrass(*Poa glauca* ~$16.00/lb), and 20% Alyeska Polargrass (*Arctagrostis latifolia* ~$20.00/lb) Seed can be applied with a hand held broadcast seed spreader. Seed needs to be applied between June 1 and July 1 to insure adequate establishment time. A dormant fall seeding is not recommended due to the increased risk of erosion during breakup. Seed application should be able to be completed in one day with two people.

Fertilizer should be 20-20-10 N-P-K. It should be applied at a rate of 250-300 pounds per acre. This should be done at the same time as seeding. Fertilizer application should be able to be completed in one day with two people using a hand held broadcast spreader. Fertilizer is available in 50 pound bags for $10-$15 each. Care should be taken not to over apply fertilizer as it can burn existing plant populations.

(c) Task 3: Install Dormant Willow Cuttings

Installation of dormant willow cuttings, in a live siltation fashion, in the worst of the thermal eroded areas will further increase site stability. Willow species such as *Salix alaxensis* and *Salix pulchra* present around the sight are suitable for this use. Dormant cuttings should be taken and live siltations should be installed as described in the publication Streambank Revegetation and Protection, a Guide for Alaska available from the Alaska Plant Materials Center.

Collecting and installing willow cuttings is rather technical and time consuming. A clear understanding of the procedure is essential if a successful planting is to result. It is expected that cutting collection could be accomplished in one day with two people and installation could be done in as few as two days but as long as four days. Cuttings must be stored properly after collection and installation must be completed by July 1 to ensure adequate establishment time. Questions regarding willow planting methodology may be directed to the Alaska Plant Materials Center.

(d) Task 4: Add Fill

An additional step to decrease the re-establishment time is filling the cavernous areas created by thermal erosion. A suitable material such as straw or peat can be used to fill these holes prior to seeding, fertilizing, and willow applications. This will insulate the permafrost, minimizing thaw and slowing the thermal erosion. If straw is used as a fill, 2"-4" of soil must be used to cap it in order to provide a suitable substrate for plant growth.

September 2004 Evaluation

The revegetated section of trail was visited for monitoring on September 8, 2004. Revegetation activities were completed in July 2004.

The access to the trail is adequately blocked by a substantial gate (Photo 1). Good establishment of seedling grasses was apparent along the entire length of the eroded trail. Willow cuttings were live staked along much of the project.

Photo 1. Gate and signage

Grass seedlings of at least three species were identified during the site visit. Alpine bluegrass (*Poa alpine*), red fescue (*Festuca rubra*), and hairgrass (*Deschampsia beringensis*) seedlings were vigorous and providing good cover over most of the site. Other species used in the seeding mix are probably present but are difficult to identify at the current growth stage. Even distribution and adequate rates of seed and fertilizer was evident.

Willow cuttings appeared to have survived at an estimated rate of about 30 percent. The cuttings were installed after the July 1st deadline thus the surviving cuttings have little root and shoot growth. Most of the cuttings that failed are the result of improper cutting selection and installation. Some cuttings were obviously dead at the time of installation and others were not buried deep enough to allow for good root establishment. It was expected that none of the living cuttings had enough root development to survive the winter.

Though water continues to flow down the entire length of trail and erosion continues to occur, substantial establishment and re-growth was expected. Buried plant propagules were noted to be abundant and thriving along the eroded

areas. Elimination of traffic across the site will allow the impacted area to recover. Seedling grasses will provide adequate stability in most areas and the fertilizer application will improve growth of existing vegetation.

September 2005 Evaluation

The site was again visited for monitoring on September 15, 2005. Additional revegetation work occurred during the summer of 2005. It appears that travelers are respecting the closed trail section with no new off-road traffic evident.

Willow cuttings that had failed the previous season appeared to have been replaced. The new cuttings were considerably more developed than those observed in 2004. Survival of 40% of these cuttings is likely.

Seeded grasses were noted to be well established in most areas with a few locations of exceptional cover (Photo Points 1-4, Pgs 5-8). Plants of hairgrass, polargrass, alpine bluegrass, glaucous bluegrass and red fescue were observed.

Stability appeared to be returning to the disturbance. Significant establishment of both pre-existing and planted species has and will continue to occur. It is expected that as long as off-road traffic continues to avoid this area, re-establishment of vegetation will result.

Introduced species were observed during this site visit (Photo 2). Plants of chickweed (*Stellaria media*), annual bluegrass (*Poa annua*), lamb's-quarters (*Chenopodium album*) and corn spurry (*Spergula arvensis*) were growing from many of the straw bales used during the restoration effort. Also, plants of narrowleaf hawksbeard (*Crepis tectorum*) and rough cinquefoil (*Potentilla norvegica*) were observed in the seeded area, likely due to contaminants in the seed mix. The hawksbeard and cinquefoil plants were removed upon observation, however, future monitoring for undesirable plants on the disturbance may be warranted.

Photo 2. Straw bale with introduced species

Photo Point 1
N 64° 46' 14.4" W 165° 26' 16.6"
View up the trail from the gate at the southwest end of the project.

June 2004

September 2004

September 2005

Photo Point 2
N 64° 46' 23.8" W 165° 26' 2.1"
East view

July 2003

June 2004

July 2004

September 2004

September 2005

Photo Point 3
N 64° 46' 31.7" W 165° 26' 3.5"
North View

July 2003

July 2004

July 2005

September 2005

Photo Point 4
N 64° 46' 39.9" W 165° 26' 19.4"
North View

June 2003

June 2004

July 2004

September 2004

July 2005

September 2005

References

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Hultén, E. 1968. Flora of Alaska and neighboring territories. Stanford University Press. Stanford, CA.

Muhlberg, G.A., and N.J. Moore. 1998. Streambank Revegetation and Protection, a Guide for Alaska. Technical Report No. 98-3. Alaska Department of Fish and Game and Alaska Department of Natural Resources.

U.S. Department of the Interior. 2001. Unified Ecoregions of Alaska: 2001. U.S. Geological Survey. Open-File Report 02-297. Denver, CO

Appendix A. Soil Sampling

Soil samples where taken from three locations within the disturbance during the site visit on July 14, 2003. Sample locations are as follows:

Sample #1: N 64° 46' 12.0" W 165° 26' 25.4" near the southern end of the trail. Sandy gravel

Sample #2: N 64° 46' 25.2" W 165° 26' 11.6" near the middle of the trail. Silt

Sample #3: N 64° 46' 35.1" W 165° 26' 34.9" near the northern end of the trail. Organic Silt

The samples were taken the University of Alaska, Agriculture and Forestry Experiment Station, Plant and Soil Test Lab for nutrient analysis. The results of the soil testing are in table 1.

Table A-1: Soil Analysis

	Clients	1:1	Buffer	ppm	ppm	ppm	ppm
Lab #	Description	pH	pH	NH_4	NO_3	P	K
AAO4S 2	Sample #1	7.65	na	2	3	<1	27
AAO4S 3	Sample #2	6.88	7.23	2	1	<1	33
AAO4S 4	Sample #3	5.23	5.92	2	1	<1	66

Appendix B. Existing Vegetation

Plant species identified on the site are presented in table B-1. These species were observed on one or more of the site visits between 2003 and 2005. This table represents only those species observed and not a comprehensive list of all potential plant species present.

Table B-1: Plant Species Identified Growing On and Around the Disturbance

Trees and Shrubs	Grasses, Sedges and Rushes	Forbs
Betula glandulosa	*Arctagrostis latifolia*	*Aconitum delphinifolium*
Potentilla fruticosa	*Calamagrostis canadensis*	*Arctostaphylos alpina*
Salix alaxensis	*Carex sp.*	*Anemone parviflora*
Salix arctica	*Eriophorum angustifolium*	*Arnica frigida*
Salix pulchra	*Festuca altaica*	*Artemisia arctica*
Salix reticulata	*Festuca rubra*	*Boykinia Richardsonii*
Vaccinium vitis-idaea	*Juncus castaneus*	*Cerastium Beeringianum*
	Poa alpina	*Chamerion angustifolium*
	Poa glauca	*Chamerion latifolium*
		Dryas octopetala
		Empetrum nigrum
		Equisetum arvense
		Petasites frigidus
		Rumex arcticus
		Sedum rosea
		Solidago multiradiata
		Polygonum bistorta plumosum
		Valeriana capitata