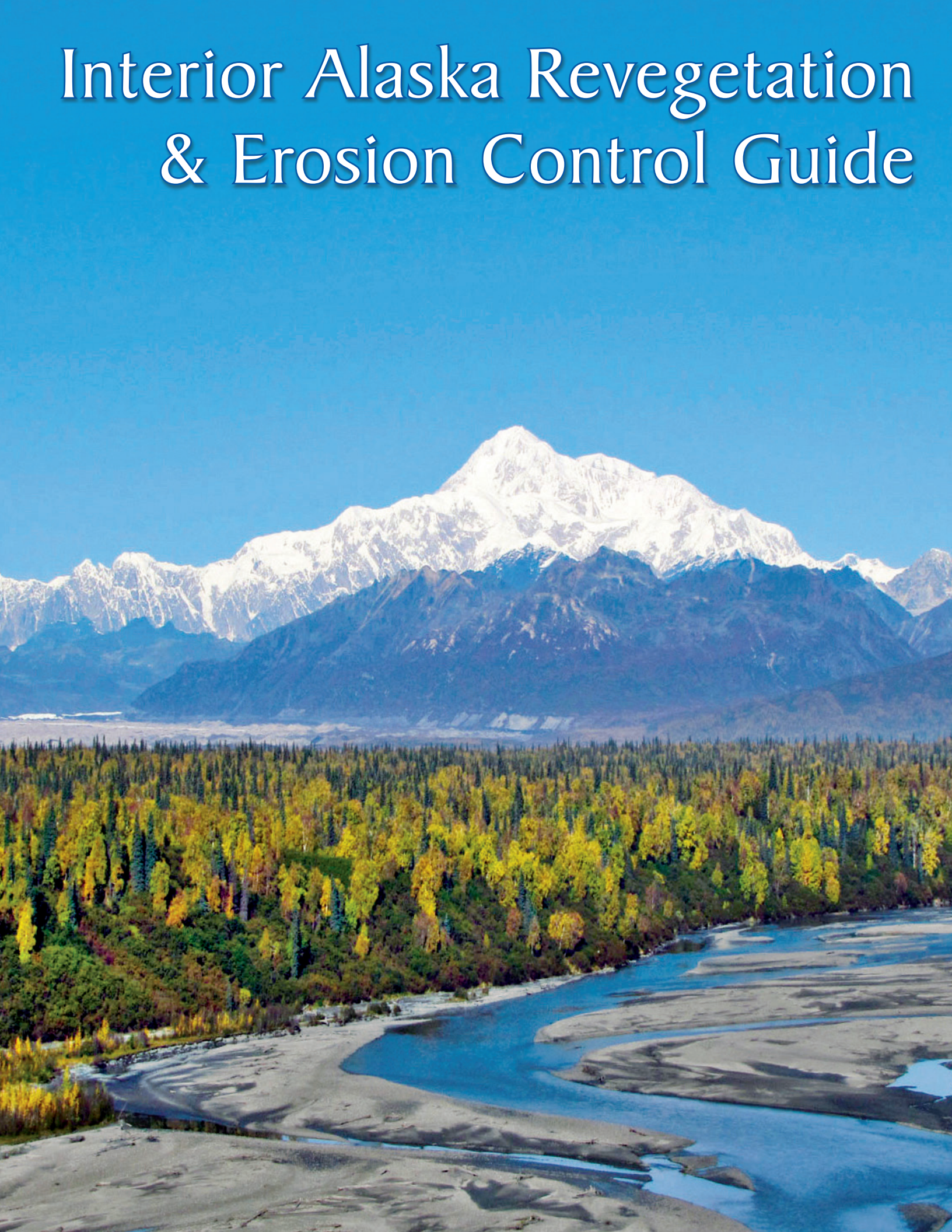
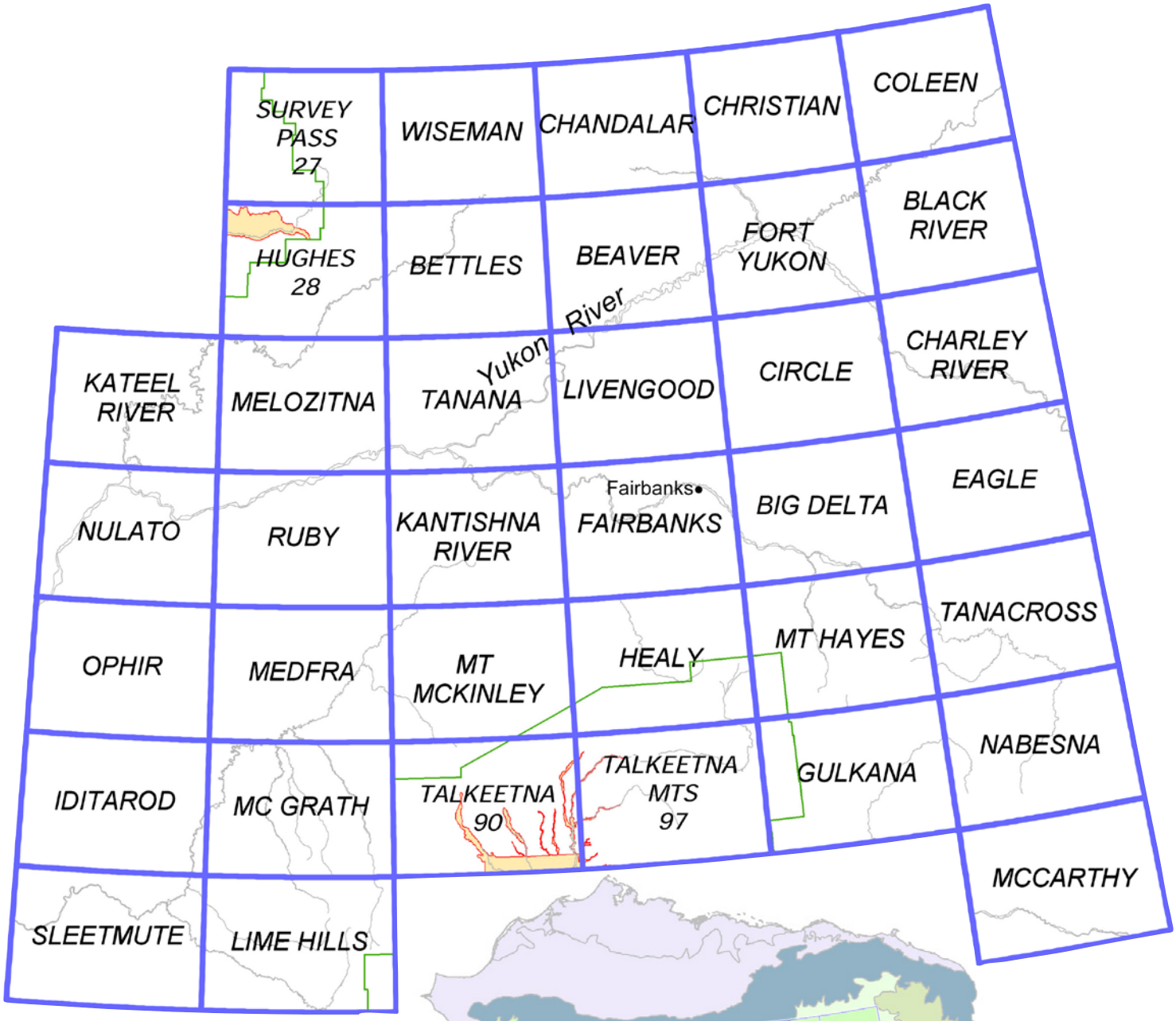
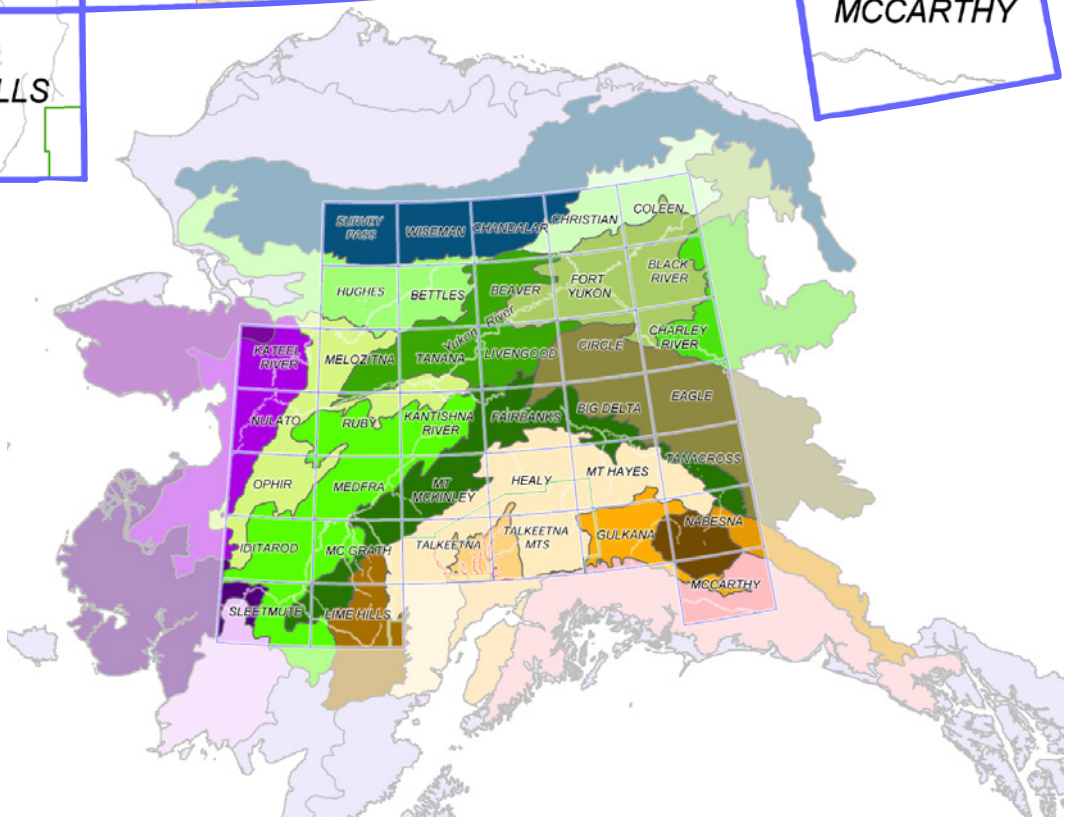
Interior Alaska Revegetation & Erosion Control Guide





Interior Alaska, for the purposes of this guide, is defined as the 37 USGS quads shown above. These quads span several unique eco-regions, further detailed on page 49.



Front Cover: The Chulitna River meanders in front of the Alaska Range

Cover Photo: Phil Czapla (AK PMC)

Interior Alaska Revegetation & Erosion Control Guide

By
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Alaska Plant Materials Center logo: '*Germinate*' - Original artwork by Sheila Wyne, used with permission

Foreword

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February 22, 2012

Dear Readers;

It is with great personal pleasure that I introduce the Interior Alaska Revegetation and Erosion Control Guide and recognize the great efforts of the Alaska Plant Materials Center's professional staff in preparing this information. Trained in landscape architecture, I am very familiar with the uses for which vegetation may be applied to assist in restoring and stabilizing the natural environment and to control erosion. Living systems can serve as a buffer between the constructed and natural environments, and should be considered as integral parts of development projects in Interior Alaska. Erosion control through vegetation is a valuable construction technique, and can represent significant cost savings over hard approaches, when circumstances allow.

I have been actively involved in working to design and implement large projects in Interior Alaska for many years. Soil conservation, erosion control and stream-bank protection are always an important concern. Solutions utilizing vegetative techniques were implemented in these development projects, to assist with soil stabilization, restoration and reclamation.

Throughout my many years in land and water management, project management and on a broader scale as Deputy Commissioner of the Alaska Department of Natural Resources, I dealt with remediation and reclamation issues quite a bit. Interior Alaska plays host to a large percentage of the mines in Alaska; each mine must have a detailed reclamation plan and post a bond before operations begin.

The case studies and best practices in this manual serve to advance the science of revegetation and erosion control in Alaska. Had these materials been available during some of the larger projects I oversaw during my tenure, they would have been a useful planning tool. The information about and emphasis on the use of native Alaskan plants is also valuable, as the use of introduced species is one of the largest vectors for invasive weeds. I appreciate the efforts of those at the Alaska Plant Materials Center for the work they have done to bring this information to a larger audience. I look forward to applying this information in my current work.

Like many crafts, when done well, revegetation blends into the natural background. This publication serves to highlight this complex and nuanced work. The Interior Alaska Revegetation and Erosion Control Guide is a useful reference that covers the use of natural materials to recreate an ecosystem after a disturbance. While human hands may guide the process, the living roots of plants themselves are largely in control of revegetation, a reminder of who is really in charge.

Yours truly,

SRK Consulting (U.S.) Inc

Richard LeFebvre

Author's Preface

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The publishing of the Interior Alaska Revegetation and Erosion Control Guide marks my thirty-third year with the Alaska Plant Materials Center. Much of the early off-site plot evaluation work and revegetation studies during my career took place in Alaska's Interior. A shift to work on coastal regions occurred after roughly eight years, in part due to the increasing amount of construction activity in the coastal areas of Alaska, and the availability of federal funds for coastal projects.

Another reason revegetation and restoration activities in Alaska's Interior subsided was the fact that many disturbances self-restore. On non-fill disturbances, natural revegetation was fast and generally reliable. Revegetation in the Interior was required only when erosion potential was high and there was insufficient time to rely on natural revegetation. Highway and airport construction activities over the past two decades have kept the Plant Materials Center involved in the other revegetation efforts in the Interior.

Although the Interior allows for greater use of natural revegetation than other areas of Alaska, the region is not immune to the problems associated with surface disturbances. Permafrost poses unique and interesting problems when disturbed by construction and mining. The massive forest fires so common in the Interior also present water quality issues if erosion occurs after the fire and before natural revegetation can occur.

Working on projects in the Interior has left me with a number of great memories of successful projects and the outstanding summers in the region. Interior Alaska is a unique place. Hopefully this guide will assist others in their efforts to use vegetation to control erosion problems and restore disturbed lands to a natural condition.

The science of revegetation in Alaska's Interior is moving forward in a new direction. The seeding practice may be different, but erosion control and storm water issues remain important and must be accommodated during the entire process. This new seeding approach will be cautiously introduced so the techniques can be adapted to the rest of Alaska, advancing the science even more. May the effort begin!

Stoney J. Wright

"Responsibly develop Alaska's resources by making them available for maximum use and benefit consistent with the public interest."

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The distinct qualities of Interior Alaska are a great platform to introduce the next evolution of revegetation in Alaska. The shift away from standardized bulk seeding rates (lbs/acre) to the more nuanced art of seed mixes based on seed size/weight and a prescribed number of seed per given area is ongoing.

Steering away from the bulk (lbs/acre) seeding rate is necessary for a few reasons. Seeding rates based on weight per unit area, such as the standard bulk seeding rate, tend to over-emphasize small seeded species and under-emphasize large seeded species. As different species have differently weighted seeds, reliance upon this method can influence the species composition of the seeded area.

A general bulk seeding rate of 43 pounds Pure Live Seed (PLS) /acre has for many years been the recommended 'catch-all' revegetation seeding rate for sites across Alaska. This rate was developed for a 3-5 species composition mixture, applied by broadcast seeding. This recommendation has yielded many successful plantings, and is still made for revegetation sites in the Interior.

Lower seeding rates are becoming the norm in the revegetation field. Referencing the number of seeds per given area, instead of the weight, can make it easier to visualize bulk density, especially for smaller projects. Factors like seed cost and commercial availability also play a role in this shift to lower seeding rates. Lower seeding rates leave more ground space available and can create a ground surface microclimate suitable for natural colonization.

Further research and test plot evaluation is necessary to properly document the effect of changed seeding rates on indicators like percent ground cover, species composition, vigor, and survival. The goal of revegetation seeding has always been to reduce or prevent erosion and protect soil surfaces. A lower seeding rate does not change this goal.

The Alaska Plant Materials Center will recommend seeding rates based on bulk density. Weight-per acre bulk seeding rates will still be provided while further research is conducted. These will be phased out over time, with emphasis given to a newer method of determining seeding rates. It is my hope that these more efficient seeding methodologies can be adopted across Alaska, advancing the art and science of revegetation in the last frontier.

Phil Czapla

Philip K. Czapla

"Responsibly develop Alaska's resources by making them available for maximum use and benefit consistent with the public interest."

Acknowledgements

This guide was written to assist land owners, land managers, engineers and environmental professionals in making decisions regarding revegetation and the use of vegetation in soil erosion control and soil conservation. The information contained in the guide builds upon past revegetation manuals including:

2001 Alaska Highway Drainage Manual - *Chapter 16: Erosion and Sediment Control*. (2001) State of Alaska, Department of Transportation and Public Facilities.

Wright, Stoney J. (2008) - A Revegetation Manual for Alaska. Edited by Peggy Hunt. State of Alaska, Department of Natural Resources, Division of Agriculture, Alaska Plant Materials Center.

Wright, Stoney J. & Czapla, Philip K. (2011) - Alaska Coastal Revegetation and Erosion Control Guide, 2nd Edition. Edited by Brennan Veith Low. State of Alaska, Department of Natural Resources, Division of Agriculture, Alaska Plant Materials Center.

The authors would like to thank the individuals named below for their participation in this project.

Dean Brown with the Alaska Department of Natural Resources (DNR), Division of Forestry, **Casey Dinkel** with the Alaska DNR, Division of Agriculture, Alaska Plant Materials Center, **Lee McKinley** with the Alaska Department of Fish & Game and **Anne Brown** with the Alaska DNR, State Pipeline Coordinator's Office.

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Interior Alaska Revegetation & Erosion Control Guide

Photo: Casey Dinkel (AK PMC)

The Trans-Alaska Pipeline winds through mixed hardwood and spruce forest in Interior Alaska.

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Section 2: Project Implementation

Section 3: Species Selection

Section 4: Case Studies

Section 5: Further Information

Background

Photo: Phil Czapla (AK PMC)

Interior Alaska is dominated by boreal spruce forests, with wetlands present throughout. The Alaska Range is visible in the background of this photo, taken near Talkeetna.

Section 1:

Introduction

- *Geography*
- *History*
- *Impacts*
- *Purpose*

Introduction

Photo: Brianne Blackburn (AK PMC)

Spruce, willow and fireweed are present in this Brooks Range vegetation community.

Geography

Interior Alaska is a region defined by three mountain ranges; the Brooks Range to the north, the Chugach to the south, and the Alaska Range in between. "[Interior Alaska] includes North America's highest mountain, permanently snow covered peaks, glaciers, rivers and streams, lakes, a diverse geology and vegetation that ranges from Alpine tundra to boreal forest and wetlands, and a rich flora and fauna" (Laursen & Seppelt, 2009).

Alaska is by far the largest state within the United States of America; having more than twice the area of its nearest largest state. Indeed, Alaska by itself covers 1% of the land mass on Earth, and is larger than all but 19 countries on the planet. For the purposes of this book, Interior Alaska is defined by the 37 USGS quadrangle maps included on the inside front cover.

History

Interior Alaska was first populated by indigenous Athabascan cultures and tribes. The Yukon river and its tributaries provided access and means of travel, communication and trade between peoples. Ancestral peoples followed the spawning salmon into the Interior, lived with the seasonal migration patterns of the caribou herds, and learned the habits of the moose, bear and other furbearing animals. Villages and individuals established rights to specific territory, land use, and water which were generally respected and guarded against foreign encroachment. Almost all villages were occupied in the winter and periodically in summer (Selkregg, 1976).

The search for gold in Alaska is what gave many Interior communities their start. Gold was first discovered in Southeast Alaska during the 1870s; continued exploration through the years expanded the findings northwards. Fairbanks came into existence largely due to the discovery of gold in the creeks of Tanana hills by Felix Pedro in 1902. Prospectors flocked to the interior with gold fever, hoping to strike it rich. Development soon followed with a trading post and other buildings being built to support the new mining district. Today the Fort Knox mine, northeast of Fairbanks produces a large amount of gold.

The military presence in interior Alaska is significant. Ladd Field, a US Air Force base, was constructed in 1939. It served as a cold weather experimental station where soldiers tested clothing and equipment. With the onset of World War II, Ladd Field expanded its role to serve as a transfer station for soviet aircraft. American crews delivered approximately 8,000 aircraft to the Russians for their war effort under a lend-lease agreement. Planes were flown from Great Falls, Montana to Fairbanks. Russians accepted the planes at Ladd Field, then flew them to Siberia for use in the war effort against Germany (Pike, 2011).

In 1961 the Army assumed control of Ladd Air Force Base and renamed the base Fort Wainwright after General Jonathan Wainwright, a decorated officer. Today Fort Wainwright is home to about 7,700 soldiers. It also encompasses Fort Greely and the Donnely Training Area (wainwright.army.mil).

Fort Greely is home to the US Army's largest training area.

Fort Greely is a military installation situated in Delta Junction. This army base is part of the United States's Ballistic Mission Defense Systems (BMDS), charged with destroying threat missiles mid-course. Fort Greeley also hosts the Cold Regions Test Center and the Northern Warfare Training Center. Fort Greely plays a unique role in the Department of Defense, encompassing about 7,200 acres of training lands.

Impacts

Impacts to Interior Alaska have many causes. The region supports industries including mining, logging, tourism, and oil and gas production. Production industries, such as mining, can have significant impacts on the environment, and these effects must be mitigated. Mining, road-building, and tourism all take a toll on the natural environment. Human-caused impacts such as these have disrupted natural ecosystems and resulted in significant changes. Proper stewardship dictates that these human-caused impacts to Interior Alaska's ecosystem be minimized.

Purpose

This guide was developed to aid in the process of revegetation. The intended audience is private property owners, local and government agencies, environmental engineers, resource extraction companies, and anyone else that may encounter a need for erosion control or revegetation.

For the purpose of this document, revegetation is defined as:

> ***The re-establishment of plant cover by means of seeding or transplanting on a site disturbed by natural or man-caused actions.***

Impacts, both large and small, will continue to disrupt interior Alaska. Recovery (defined as the presence of self-sustaining vegetative cover and limited erosion) of most sites can be expedited and impacts minimized with human intervention to correct limitations and guide the ecosystem towards a desired end state. Material presented in the manual focuses on the "soft approach" to erosion control, using vegetation as opposed to the "hard approach" which utilizes engineered structures.

Numerous methods for reintroducing vegetation on a site are available. This manual details a logical sequence of surface preparation, fertilization, and seeding. When followed on a project site, this sequence will usually result in a self-sustaining native plant community that requires minimal management input.

When conditions allow, most disturbed sites will naturally be re-colonized with plants from the surrounding area, though it may take several years before a plant community becomes established. Natural reinvasion, as this technique is known, is at times used in Interior Alaska. This approach tends to be more acceptable in areas that are not highly visible and do not have immediate erosion control needs or regulatory time lines.

The latter portion of this manual is dedicated to case studies, highlighting past revegetation projects that have occurred throughout Interior Alaska. These projects expose the realities of revegetation in the field, including successes, challenges, and lessons learned. It is our hope that these case studies will become a useful resource for future projects. These reports, as well as case studies from the Alaska Coastal Revegetation & Erosion Control Guide are available from the Alaska Plant Materials Center's website, at plants.alaska.gov/reveg.