

Land Management and Research Demonstration Program

Engaging Climate Change
at the Landscape Level

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What is LMRD?

“Land management demonstration areas are places where new habitat management techniques and approaches are developed, implemented, and showcased – places where professional land managers and others come to learn about cutting edge habitat management techniques and technology and carry back with them the information and knowledge which allows them to better manage their own lands”

Fulfilling the Promise, 1999



What is LMRD?

- It is a habitat based program with each LMRD Biologist focusing on a featured ecosystem.
- 14 Ecosystems featured throughout the refuge system.
- 5 LMRD programs that have been implemented.
 - Shrub Steppe
 - Boreal Forest
 - Tallgrass Prairie and Oak Savanna
 - Managed Arid Wetlands and Riparian Areas
 - Coastal Salt Marsh



Goals

- 1) Demonstrate land management techniques that maintain and restore natural processes for sustaining the featured habitat and dependent wildlife.**
- 2) Research, test, and develop new innovative land management techniques.**
- 3) Communicate information on featured habitats and associated management techniques.**





LMRD – REGION 1

Featured Ecosystem – Shrub Steppe

Michael Gregg

Mid-Columbia River National Wildlife Refuge Complex

Featured Ecosystem – Shrub Steppe

- **Shrub-steppe is among the largest shrub/grassland ecosystems in North America, covering 155.5 million acres of the Western United States.**
- **Shrub-steppe extends south from eastern Washington, through eastern Oregon, into northern California, Nevada, Utah, southern Idaho, southwestern Montana, Wyoming, and Colorado.**
- **A xeric system with low precipitation and generally harsh conditions of hot dry summers and cold dry winters. Supports many uniquely adapted species of plants and animals.**



Shrub-Steppe: The Endangered Ecosystem

- Perhaps one of the most altered ecosystems, over 100 million acres in need of restoration
- Conversion and fragmentation (agricultural, resource extraction, development)
- Historical overuse by domestic livestock
- Introduction and invasion of non-native species
- Altered fire frequency and intensity
- Climate change

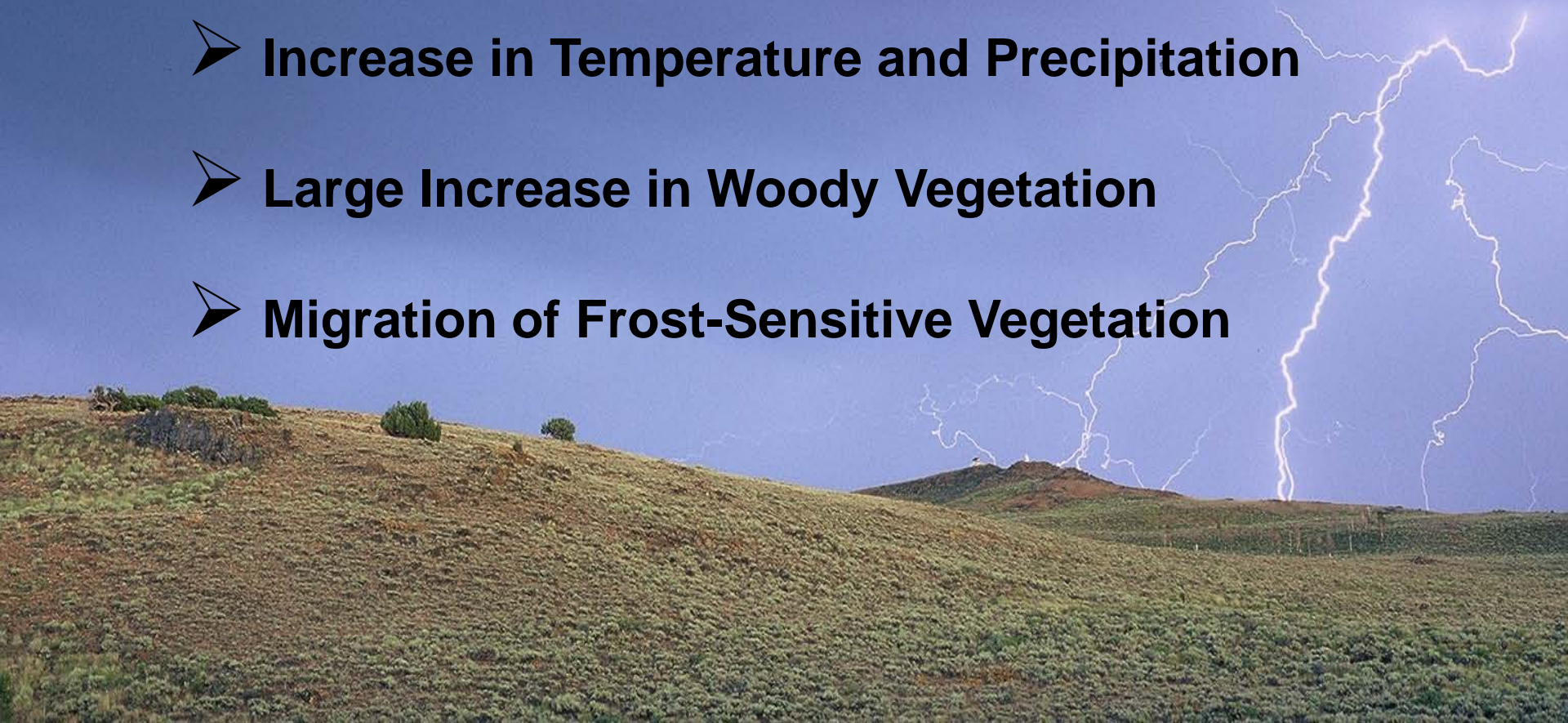


Climate Change and Shrub-Steppe

Dramatic Reduction in Area of Sagebrush Cover

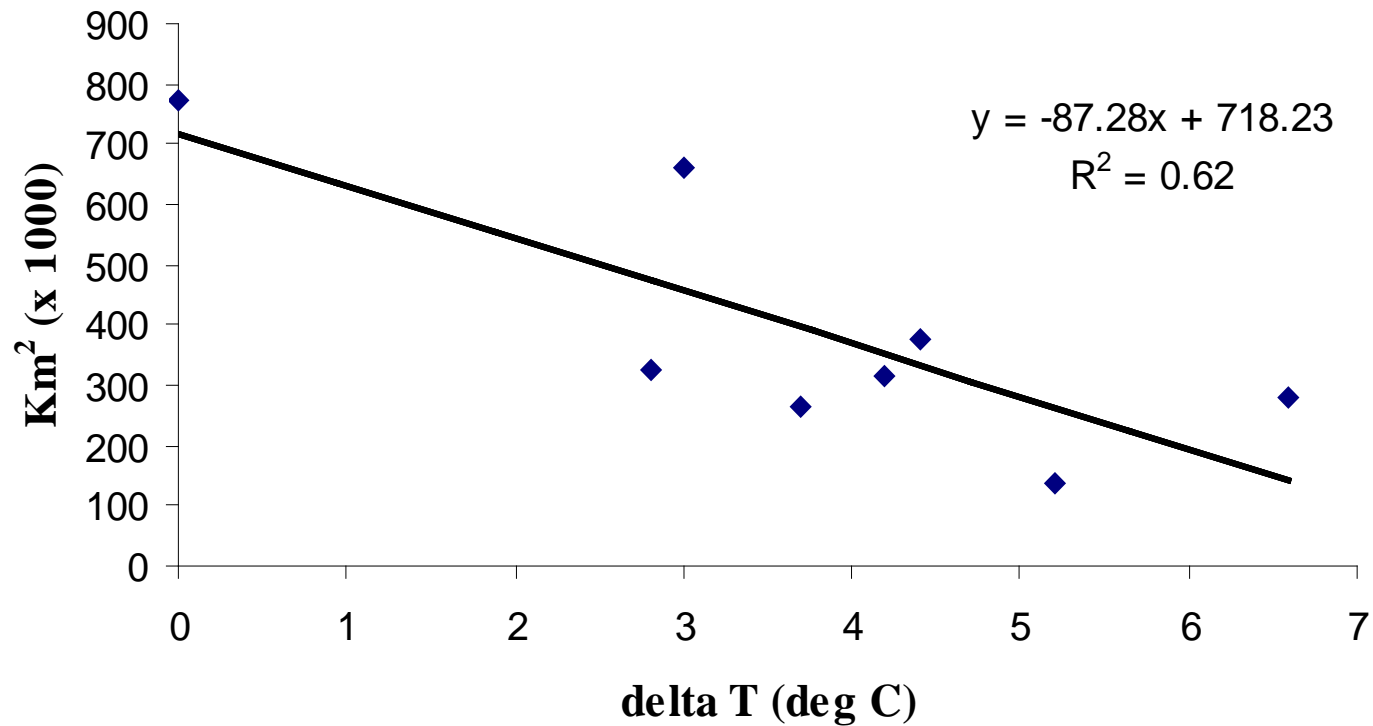
Neilson et al. 2005. Climate change implications for sagebrush ecosystem. Transactions of the 70th North American Wildlife and Natural Resources Conference p. 145-159.

- Increase in Temperature and Precipitation
- Large Increase in Woody Vegetation
- Migration of Frost-Sensitive Vegetation



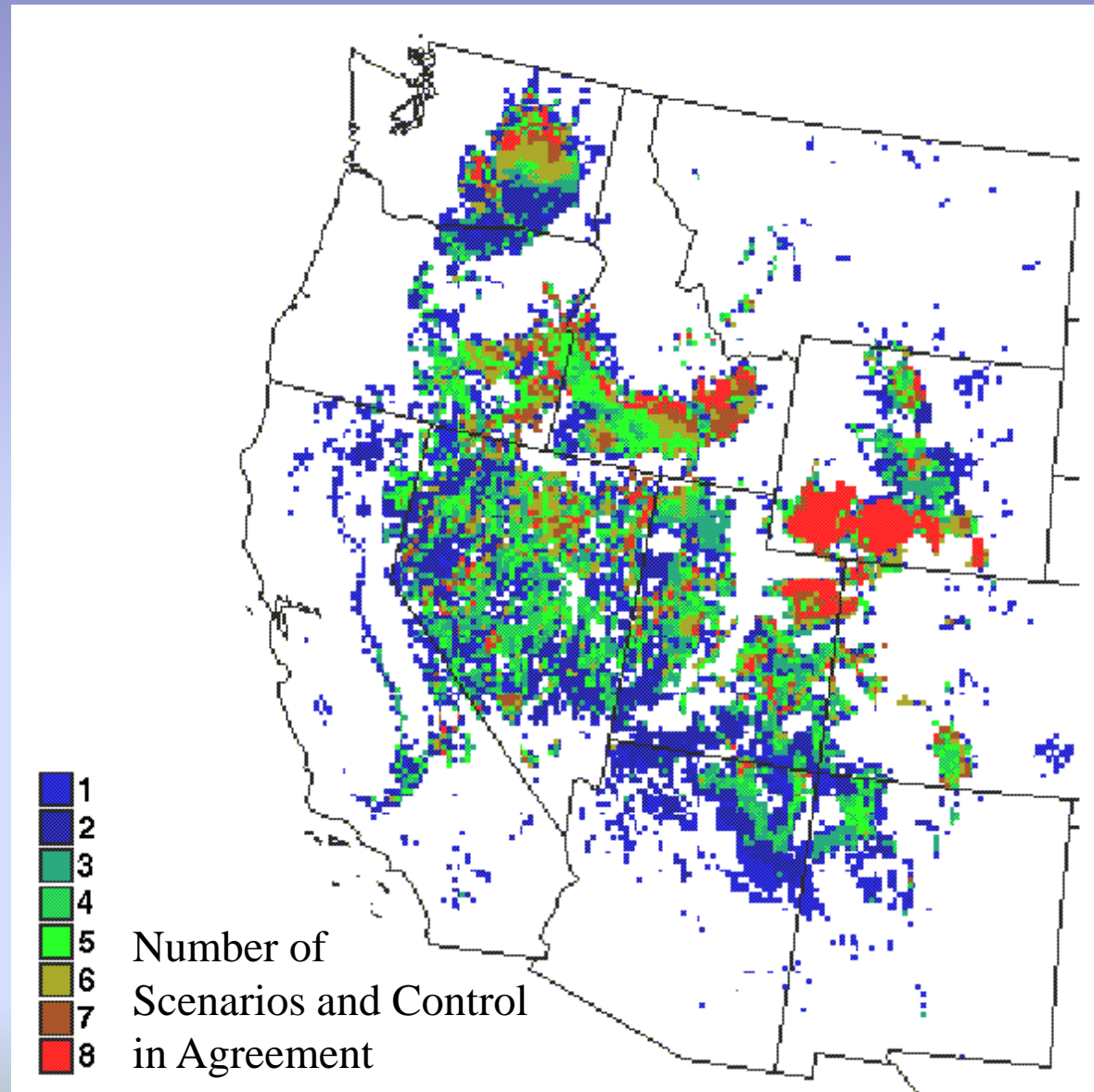
Area of Great Basin Shrubland (Sagebrush)

(Simulated current and future climate)



Neilson et al. 2005. Climate change implications for sagebrush ecosystem. Transactions Of the 70th North American Wildlife and Natural Resources Conference p. 145-159.

Sagebrush Persistence Across Climate Scenarios



Neilson et al. 2005. Climate change implications for sagebrush ecosystem. Transactions Of the 70th North American Wildlife and Natural Resources Conference p. 145-159.

Shrub Steppe LMRD and Climate Change

- **Develop Collaborative Research Partnerships**
- **Conduct Species and Habitat Vulnerability Assessments**
- **Reduce Non-climate Stressors**
- **Address Key Ecological Processes**
- **Promote Habitat Connectivity**



LMRD – REGION 7

Featured Ecosystem – Boreal Forest

Bud Johnson

Tetlin National Wildlife Refuge

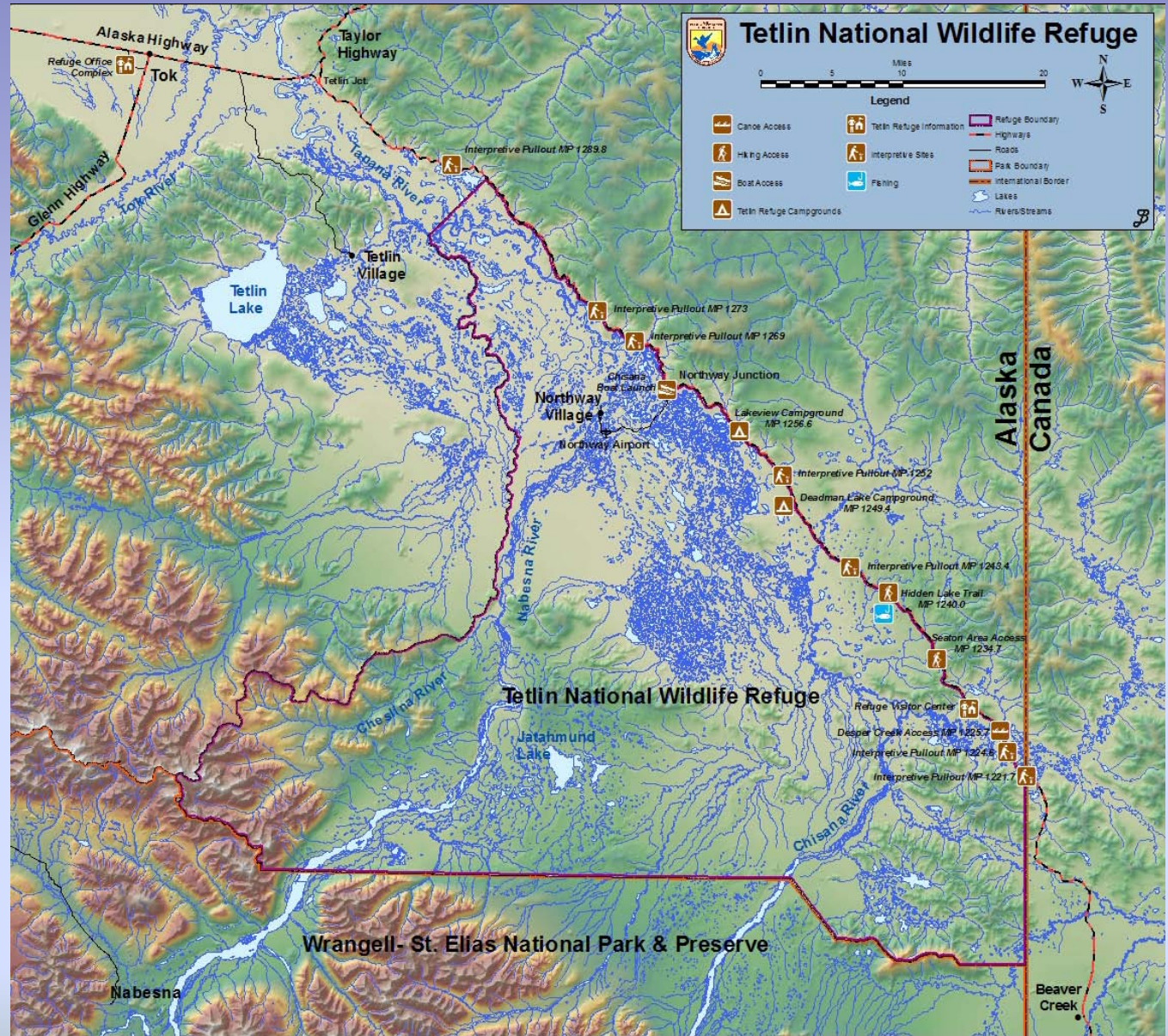


Boreal Forest: One of the world's great ecosystems...

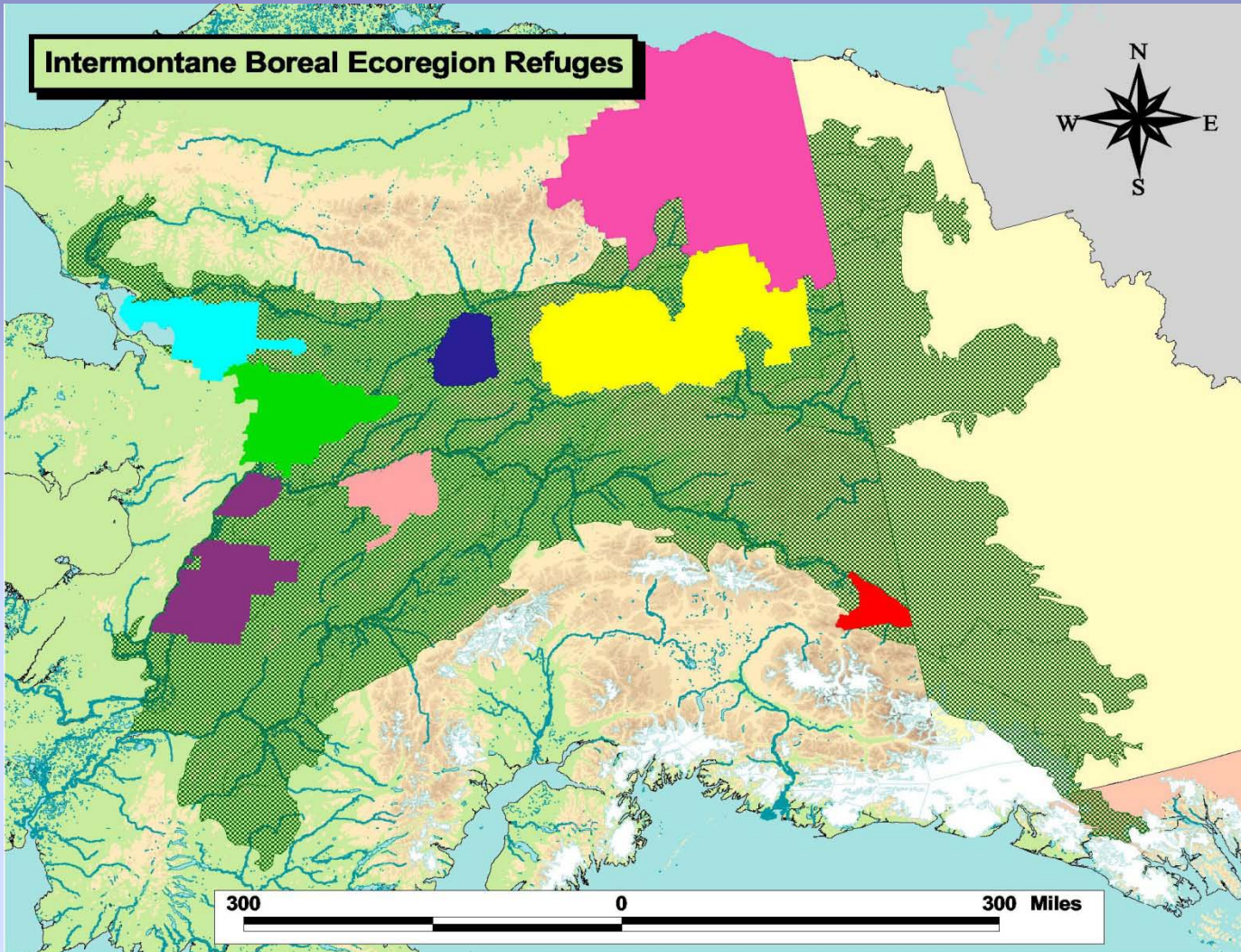
- The boreal forest contains 25% of the world's closed canopy forests and account for about a third of the carbon sequestered in terrestrial ecosystems.
- The boreal forest covers 2.3 million square miles and is larger than the remaining Brazilian Amazon Rain Forest.
- More than 1.2 million acres of boreal forest burns annually in Alaska from natural sources of ignition.



The Region 7 LMRD program is located at the Tetlin National Wildlife Refuge in eastern Interior Alaska.



Intermontane Boreal Ecoregion Refuges



Legend

- Kanuti National Wildlife Refuge
- Koyukuk National Wildlife Refuge
- Innoko National Wildlife Refuge
- Nowitna National Wildlife Refuge
- Selewik National Wildlife Refuge
- Tetlin National Wildlife Refuge
- Yukon Flats National Wildlife Refuge
- Intermontane Boreal Ecoregion
- Yukon Territory
- British Columbia

Boreal Forest: Threats and Concerns

- Forests are highly sensitive to climatic change, and global change is likely to have its greatest impact on boreal forests.
- The conversion from an extreme boreal climate to a more temperate climate will have unknown effects on the boreal ecoregion.
- Long-distance migratory birds may face trophic mismatch on the breeding grounds.



Tetlin/Region 7 LMRD Mission

To demonstrate how data acquired from long-term ecological monitoring, when coupled with experimental data, can be used to evaluate and predict the effects of a changing climate on key ecological processes affecting boreal forest species and habitats.



Tetlin/Region 7 LMRD Focus

The Tetlin/R7 LMRD has pursued partnerships and other collaborative opportunities to initiate research studies and inventory and monitoring efforts involving:

- Phenology (insect emergence, bird migration)
- Non-native invasive insects
- Soils mapping
- Non-native invasive plant I&M and control
- Water regimes
- Lake and wetland drying



