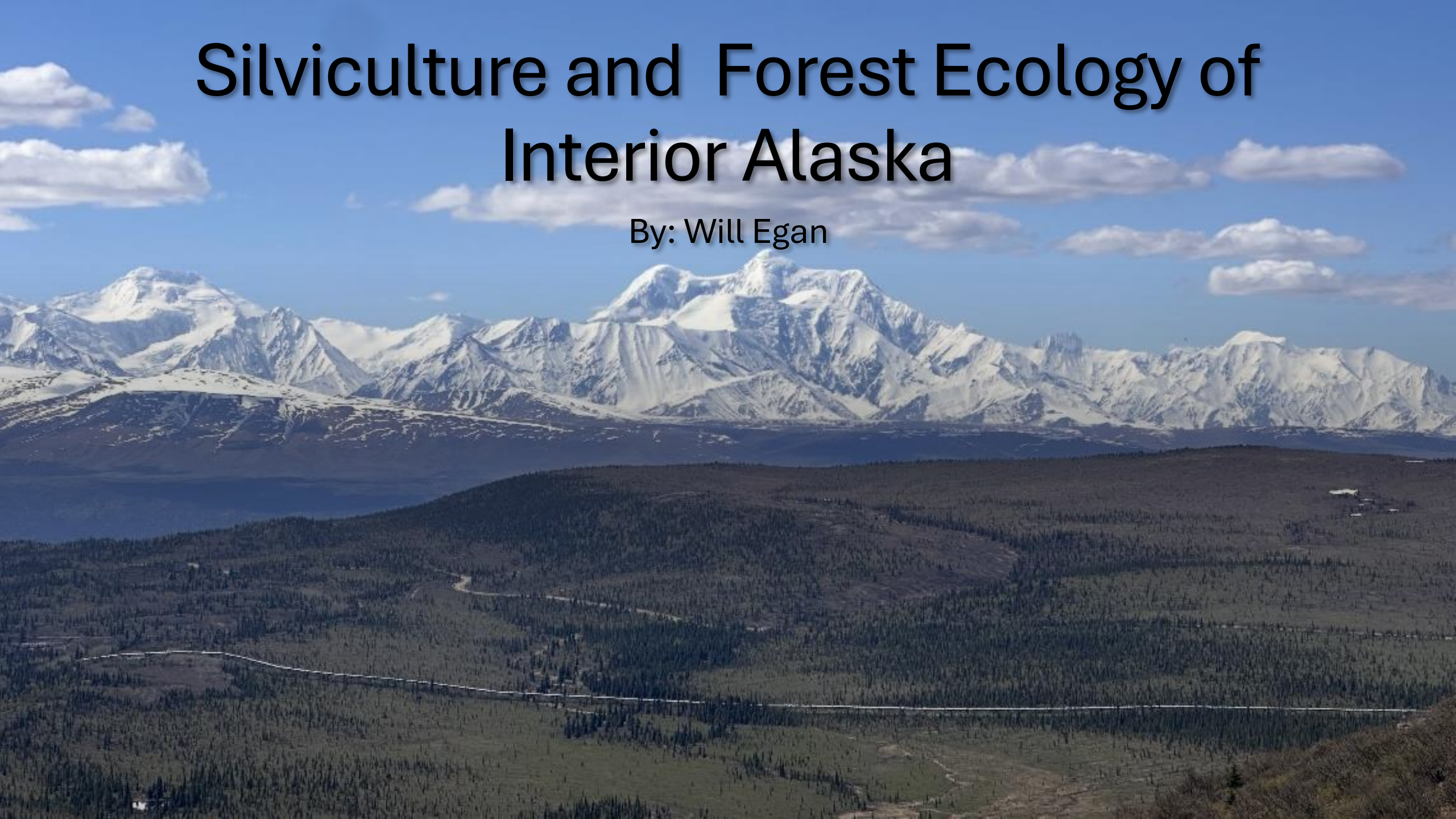


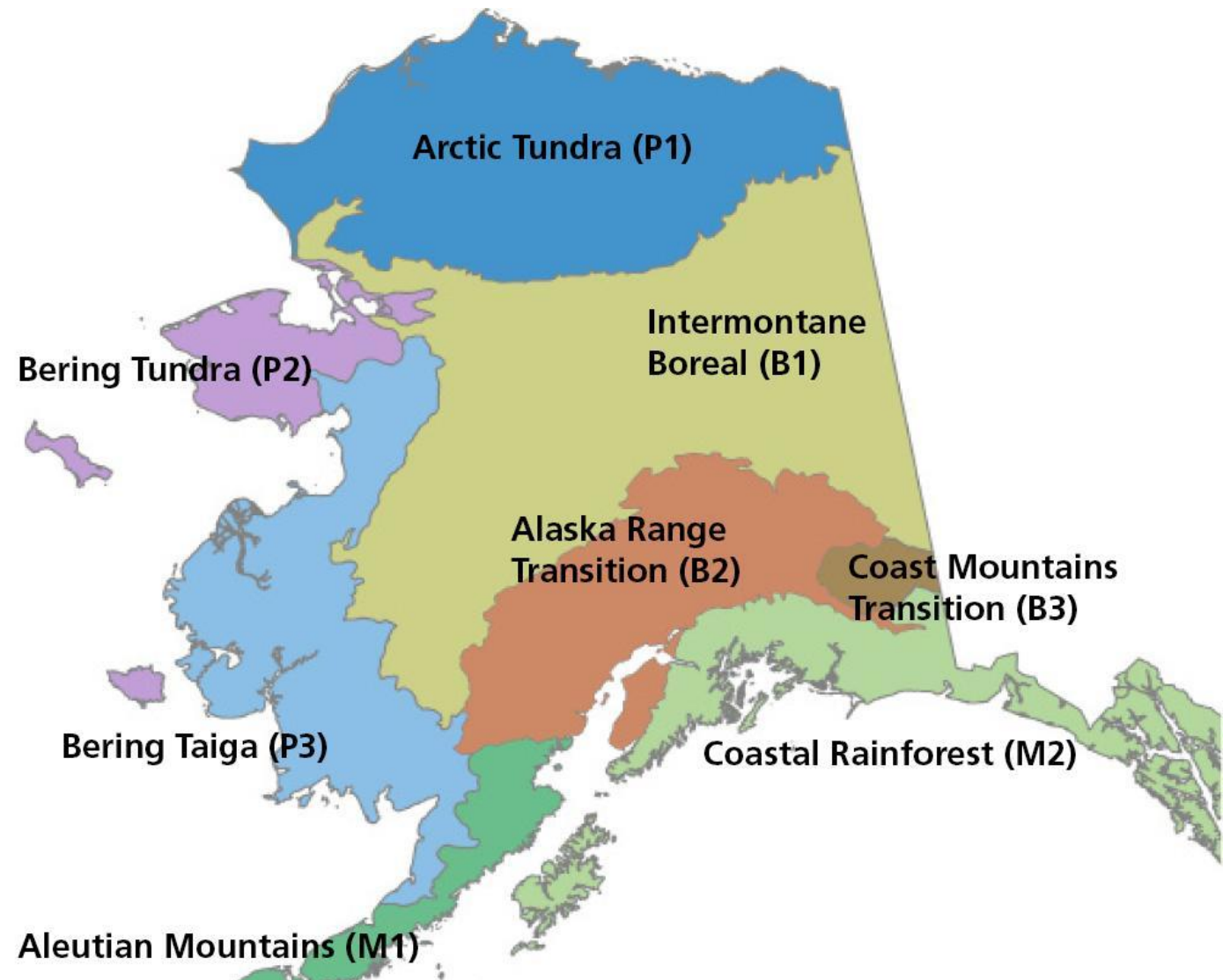
Silviculture and Forest Ecology of Interior Alaska

By: Will Egan



Region Overview

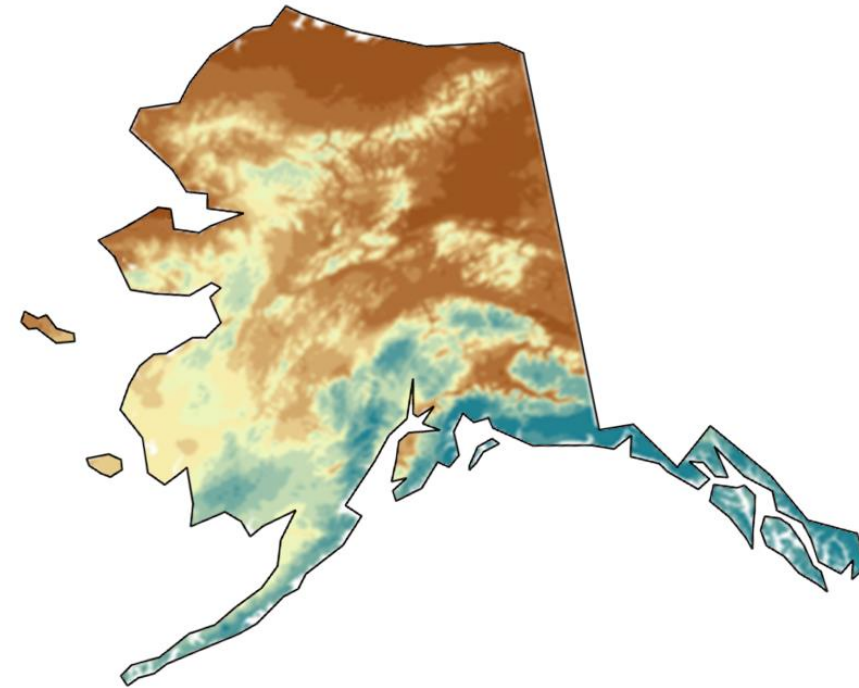
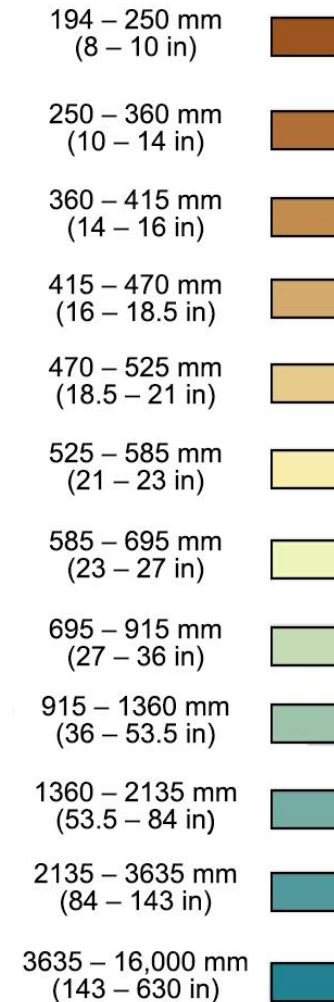
- Located between the Brooks range and the Alaska range
- Major waterways include the Yukon and Tanana rivers
- Includes uplands, wetlands, flood plains and mountains
- Part of the Boreal forest



Climate

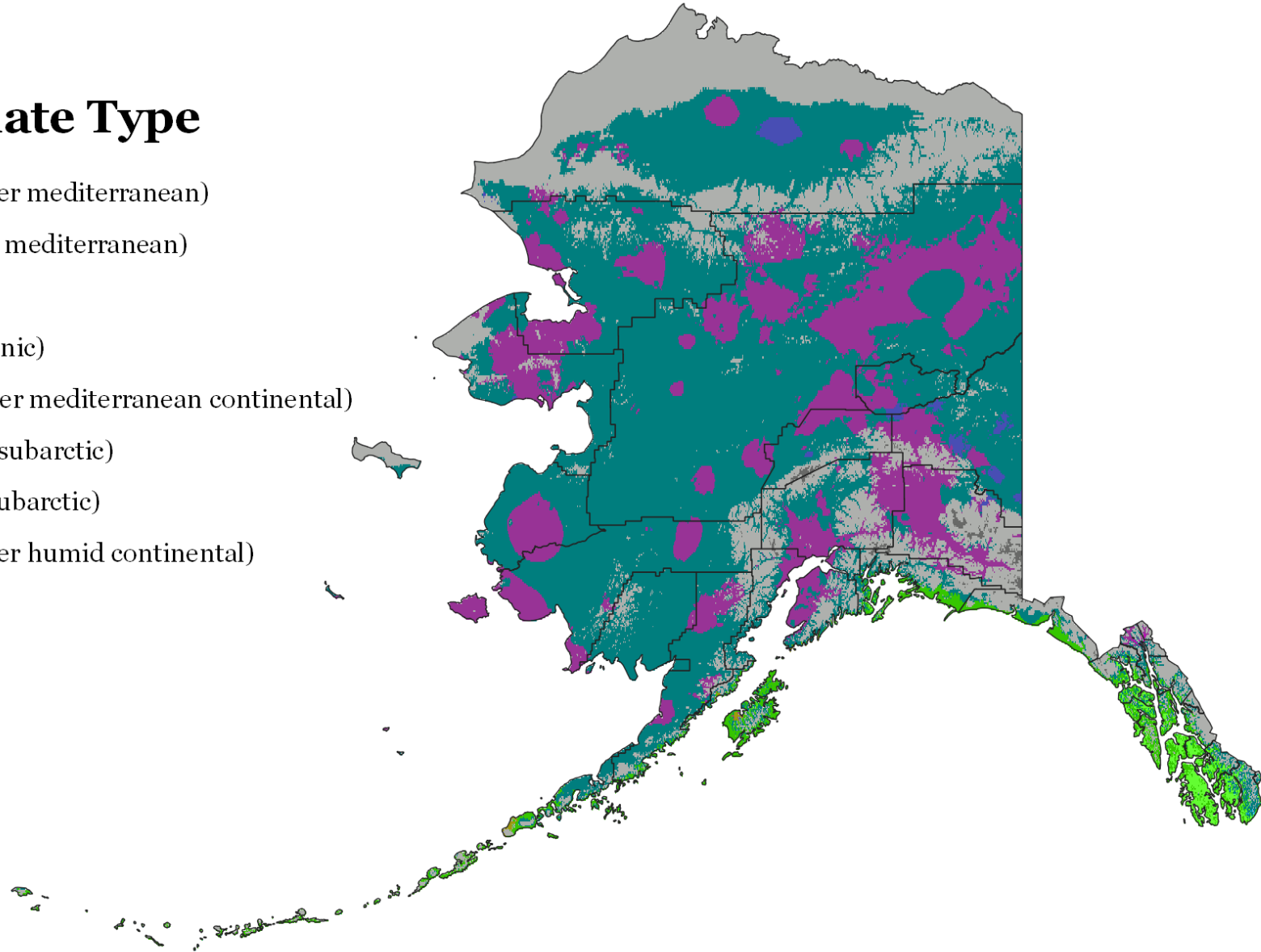
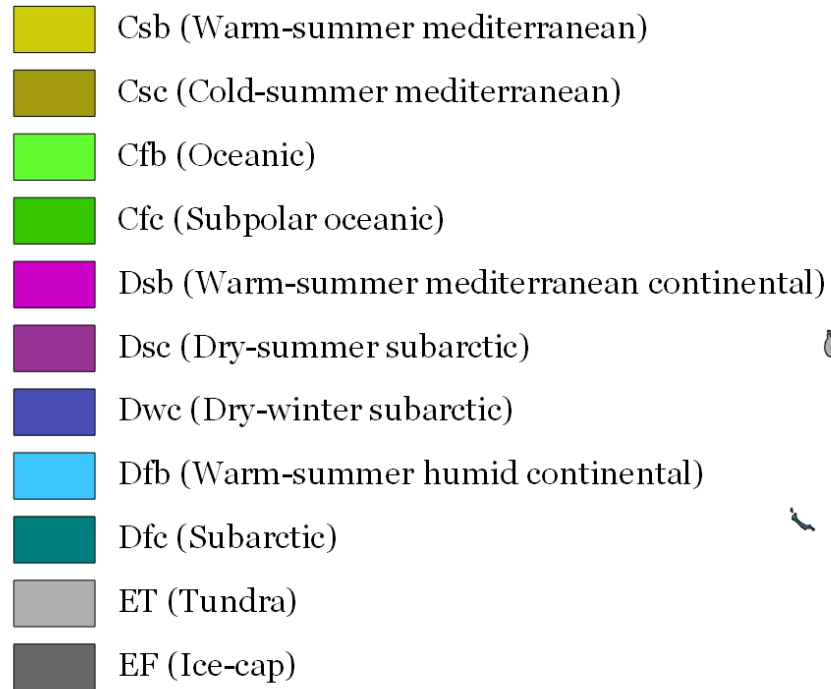
- Long cold winters, short warm summers
- 90-120 frost free days
- 20-22 hours of sunlight in summer
- 3-4 hours of sunlight in winter
- 10-20 inches precipitation per year

Annual Precipitation



Köppen Climate Types of Alaska

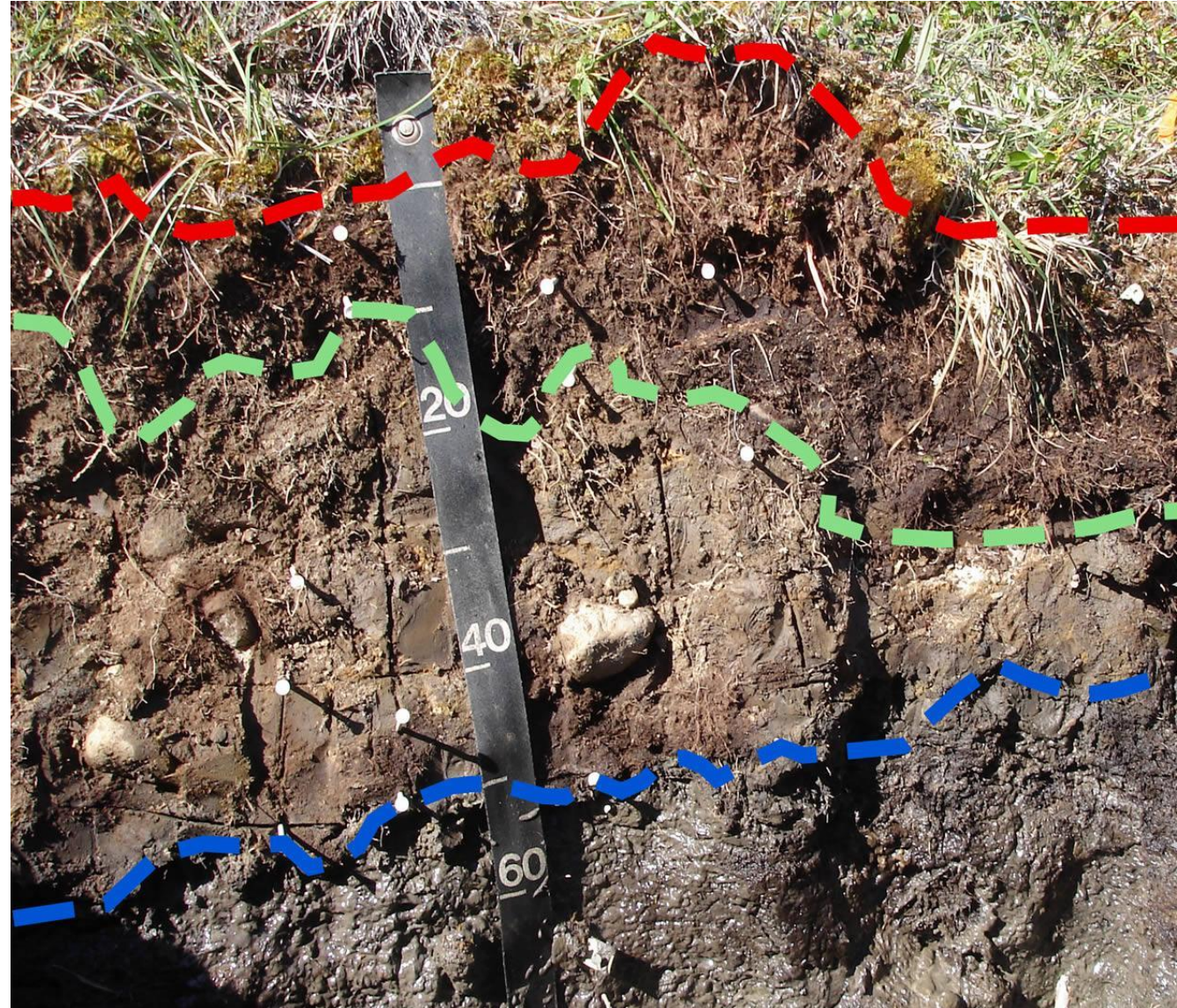
Köppen Climate Type



Data sources: 1981-2010 climate normals from PRISM Climate Group, Oregon State University, <https://prism.oregonstate.edu>; Outline map from US Census Bureau

Soils & Permafrost

- Soils
 - Gelisols
 - Inceptisols
 - Entisols
- Discontinuous permafrost throughout entire region
- Year round permafrost creates poor drainage
- Thick moss insulates permafrost in summer



Topography

- Expansive natural flood plains
- Small mountains and rolling hills form uplands
- Majority is low elevation which creates wetlands



Forest Types

Black Spruce

- Cold, poorly drained sites

White Spruce

- Well-drained uplands and floodplains

Aspen-Birch

- Disturbed and early successional sites
both flood plains and uplands

Floodplain

- Balsam poplar, willows, and alders



Species of Interior Alaska

Black Spruce *Picea mariana*

- Dominates wetland permafrost sites
- Makes up 52% of forest area
- Slow growing, tolerant of nutrient poor soils
- Associated with stand replacing fires
- Semi serotinous cones regenerate post fire
- Used for fuelwood production



White Spruce *Picea Glauca*

- Makes up 16% of forest area
- Upland, well-drained soils
- Requires more nutrients than black spruce
- Intermediate shade tolerance
- Seed dispersal via wind
- Produces 64% of commercial timber



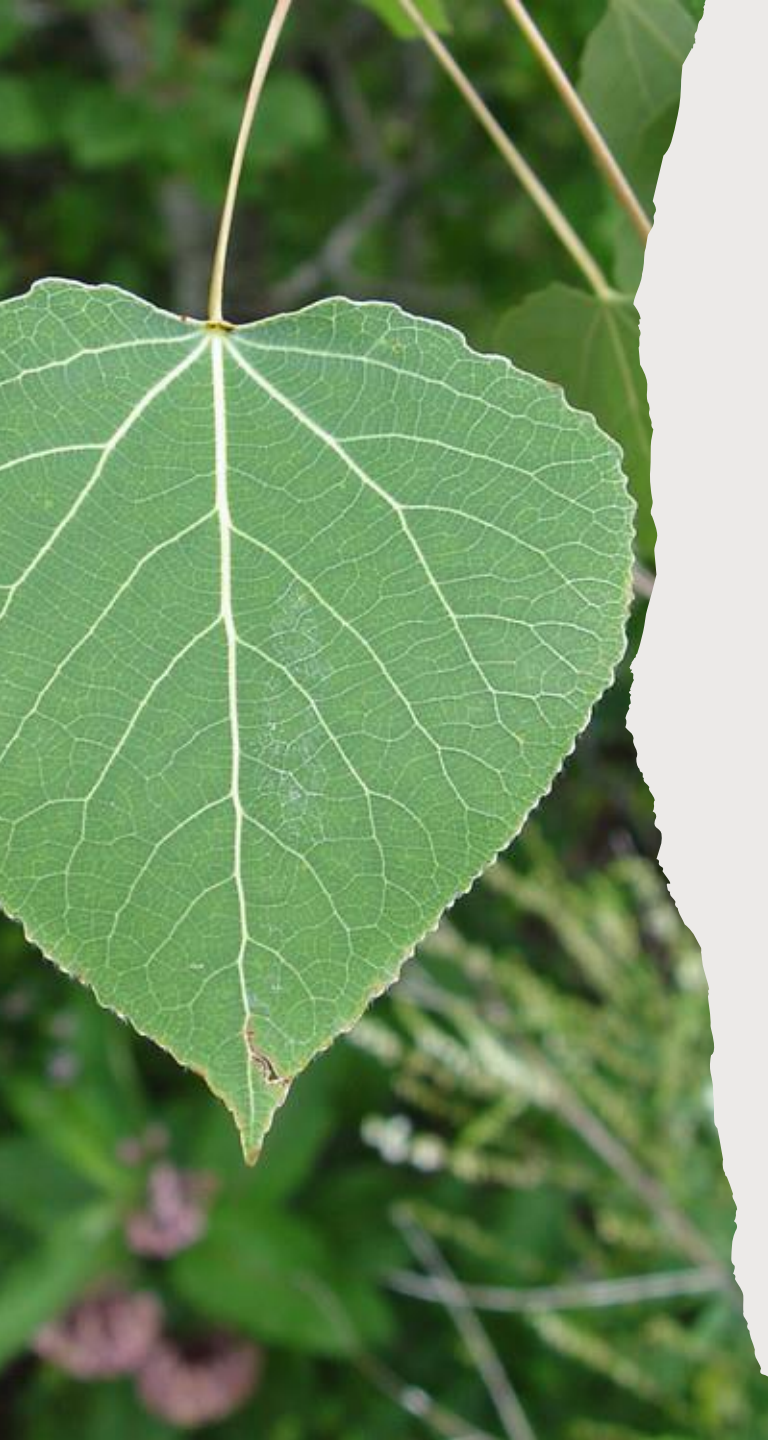


Alaska Paper Birch

Betula neoalaskana

- Makes up 19% of forest area
- Moist river bottoms and active floodplains
- Early successional
- Propogates via wind dispersed double wing nutlets
- Low nutrient demand
- 21% of commercial timber





Quaking Aspen

Populus tremuloides

- Within remaining 13%
- Dry and warm upland sites
- Early successional species
- Propagates via root systems, forms clonal colonies
- High nutrient demand – fast growing



Balsam Poplar

Populus balsamifera

- Within the remaining 13%
- Moist, well drained floodplains and riverbanks
- Early successional, shade intolerant
- Regeneration through wind dispersal and root suckers
- Fast growing – high nutrient demand



Other Important Vegetation

- Willows *Salix spp.*
 - Make up 50-80% of annual moose diet
 - Creates cover and food for ptarmigan and snowshoe hare
 - Primary succession species
- Alders *Alnus spp.*
 - Nitrogen fixers



Wildfire

- Infrequent stand replacing fires
 - 50-150 year return interval for spruce
 - 50-210 year return interval for hardwoods
- 2025: 753,069 ac burned
- Lightning is the main ignition source



Flooding

- Spring snow melt
- Ice-jam flooding
 - Ice chunks obstruct the river and cause rapid flooding
- Deposits alluvium: favorable seed beds for balsam poplar and willow



Conifer Pests

- Spruce Beetle (*Dendroctonus rufipennis*)
 - Mainly found in coastal AK
 - 2024: 2,500 ac of activity
- Northern Spruce Engraver (*Ips perturbatus*)
 - 2024: 900 ac of white spruce mortality



Hardwood Pests

- Aspen leaf miners
(*Phyllocnistis populiella*)
 - 2024: 181,900 ac infested
 - 2010: 453,658 ac infested
 - 40% of aspen defoliated
- Aspen running canker
(*Neodothiora populina*)
 - 2021: 1 infected tree in 69% of sampled stands
 - 70% mortality



Harvesting Techniques

- Historically
 - Clearcuts 12-16 ha
 - 12 million board feet annually
 - Around 1996 this was stopped due to aesthetic and environmental concerns
- Currently – Partial Harvest
 - Diameter limit cuts
 - Species-selection cuts
 - Seed tree cuts
 - Fuelwood clearcuts



Site Preparation and Intermediate Treatments

Site Preparation

- Scarification
- V blading
- Prescribed burns

Intermediate

- Commercial thinning
- Fuel reduction thinning



Harvest Equipment

- Feller buncher
- Skidder
- Log loaders
- Chipper
- Self loading log trucks
- Chainsaw crews



Regeneration

- Mainly handplanted containerized seedlings for spruce
- Broadcast seeding can be effective on scarified or burned sites
- Natural regeneration and coppicing for fuelwood sites



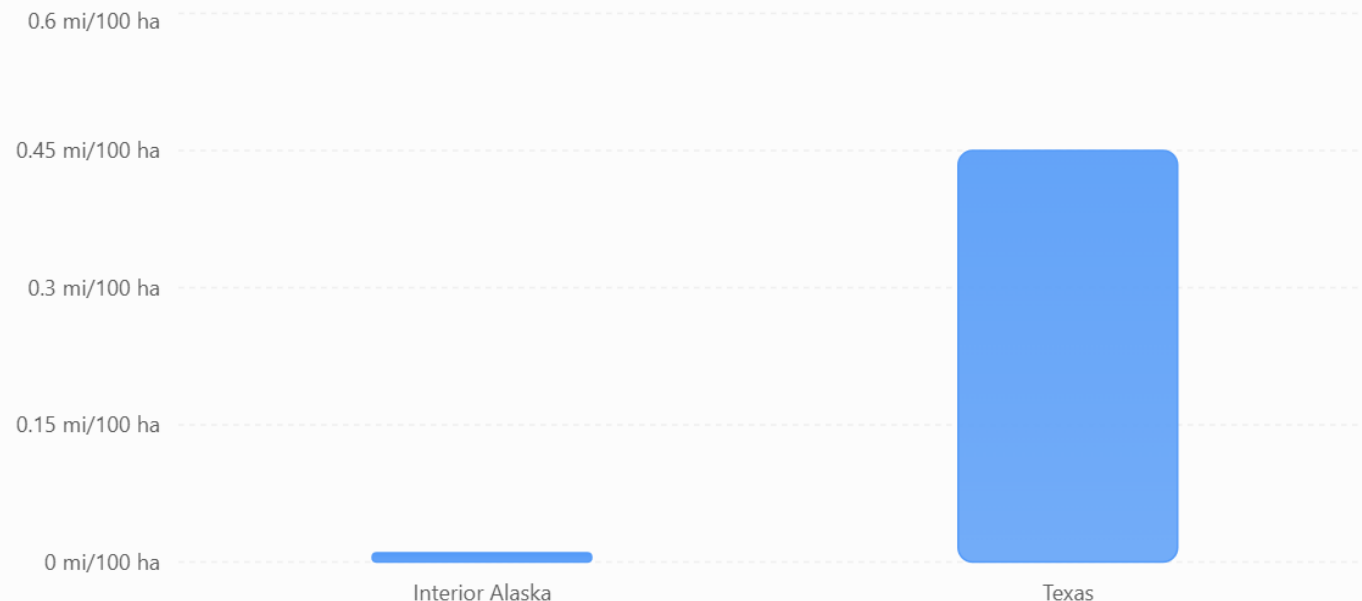
Not Much Harvested

- Access is limited due to soil conditions
- Productive stands are often small and scattered
- Limited infrastructure
 - 0.01 miles/100ha of road
 - Ex. Texas: 0.45 miles/100ha
- 340 miles to nearest seaport

- 6.58 million board feet harvested annually
 - Ex. Texas produces 1.5 billion

Road Infrastructure Density: Interior Alaska vs. Texas

Miles of road per 100 hectares, using figures supplied in the presentation; not independently verified.



Dimensional Lumber

- Produced by small scale mills/ portable operations
- 8 lumber producing mills
- Mainly 2x4 etc., house logs, and cabin kits



Fuelwood Production

- Small sawmills and local wood-products businesses
- 12 fuelwood facilities
- Sold as cut round wood, pellets, and wood chips
- Clearcutting can be used in birch-aspen stands
- Individual tree harvest and timber harvest salvage



Additional Forest Products

- Birch Syrup
- Small-scale artisan production



Wildlife and Timber Management

- Timber operations are limited
 - Typically no harvests during moose season
 - Protected nesting seasons for birds – short billed gull
 - Partial harvest techniques retain habitat and wildlife corridors
 - spruce grouse & marten
- Operations benefit wildlife
 - Young forests provide browse and cover for moose and snowshoe hare



Future Management Outlook

- Increasing temperatures could decrease permafrost changing composition and accessibility
- Increased emphasis on fuel reduction
- Potential opportunity for increased lumber production
- Must balance production with wildlife



Conclusion

- Permafrost and harsh winters limit timber productivity
- Regeneration depends largely on the target species
- Limited infrastructure and high transportation cost restrict harvesting
- Climate change and wildfire risk will require adapted management



A man wearing a blue and white patterned t-shirt, orange safety glasses, and a headlamp stands in a forest of tall evergreen trees. He is holding a chainsaw with both hands. In the background, there are mountains under a blue sky with scattered clouds.

Any Questions
