

Species Selection Decisions

Inland Empire Reforestation Council
March 1, 2016

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Silviculture / Forest Management

- Stand density
- Species composition
 - Management objectives
 - Species best suited to the site
 - Compatibility of species mix



Species Composition Decisions

- When you can change it
 - PCT
 - Planting
 - Keep or start over?



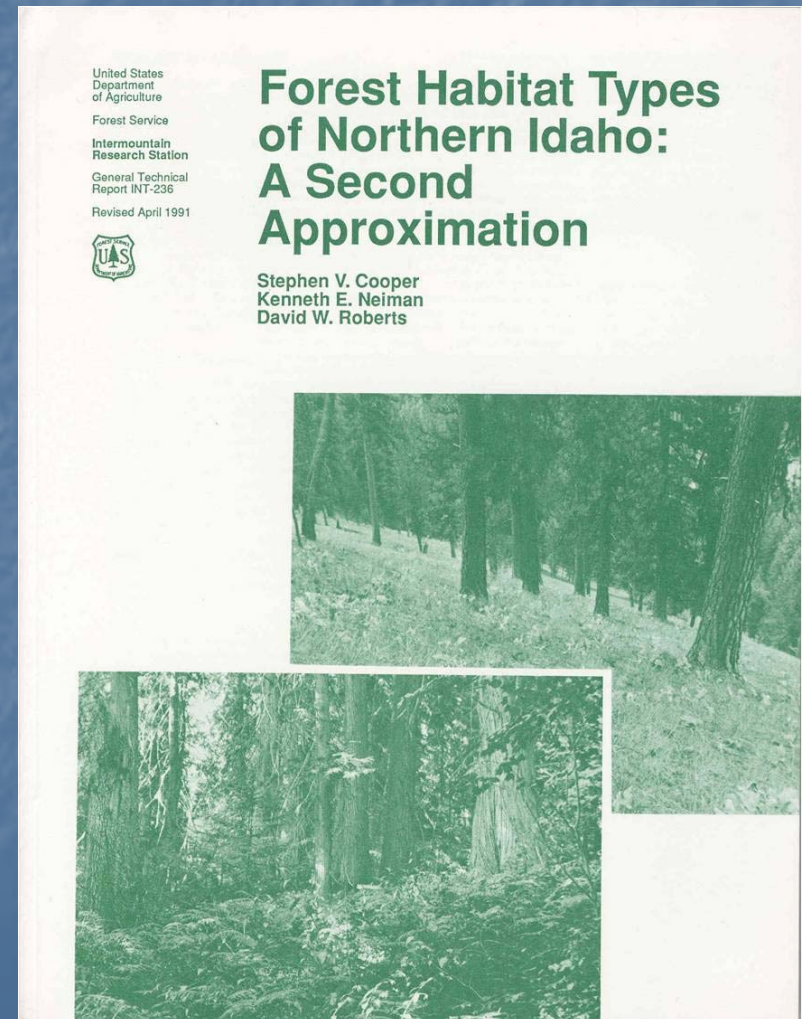
How Do We Decide?

- Site factors to consider:
 - Habitat type
 - Frost problems
 - Geology & soils
 - Insect / disease problems
 - Future treatments



Habitat Type

- Good integrator of site factors
 - Temperature
 - Precipitation
 - Annual
 - Growing season
 - Available soil moisture
- Includes a broad range of variability



Habitat Type

- Northern Idaho commercial forest land 2,000-5,500 ft. elev.
- Grouped habitat types within series by species significant occurrence
 - Appendix B in Cooper *et al.*
- Considered growth rates of species by habitat type in grouping process
 - FVS model

Habitat Type

- Rather subjective
- Based on species occurrence & growth
 - Primarily climax & major seral species
- Identified 9 "climatic subseries"
 - All habitat types (within series) that support the same conifer species
 - With similar growth rates

Climatic Subseries

- Western hemlock
- Western redcedar - wet
- Western redcedar - moist
- Subalpine fir - cold
- Subalpine fir - moderate
- Grand fir - moist
- Grand fir - dry
- Douglas-fir - moist
- Douglas-fir dry
& Ponderosa pine - all

Species Preference

- Preferred (P) = commonly occur and exhibit good growth
- Acceptable (A) = occur less frequently or do not grow as well
- Not an option (O) = rarely or never occurs
- **Seed lots should match site conditions.**

Species Preference by Climatic Subseries

Climatic Subseries	PP	DF	LPP	WL	ES	GF	WP	WRC	WH
Western Hemlock	A(d)	P	A(f)	P	A(f)	P	P	P	p
Redcedar - wet	0	0	A	0	P	P	A(d)	P	p
Redcedar -moist	A(d)	P	A(f)	P	A(f)	P	P	A	
Subalpine fir - moderate	0	P(f)	P	A	P	P	P		
Subalpine fir - cold	0	0	P	A	P	A	A		
Grande fir - moist	P	P	P	P	A(f)	A	A		
Grand fir - dry	P	P	A	A					
Douglas-fir - moist	P	A	A						
Douglas-fir - dry + Ponderosa - all	P	0							

However, there are exceptions!



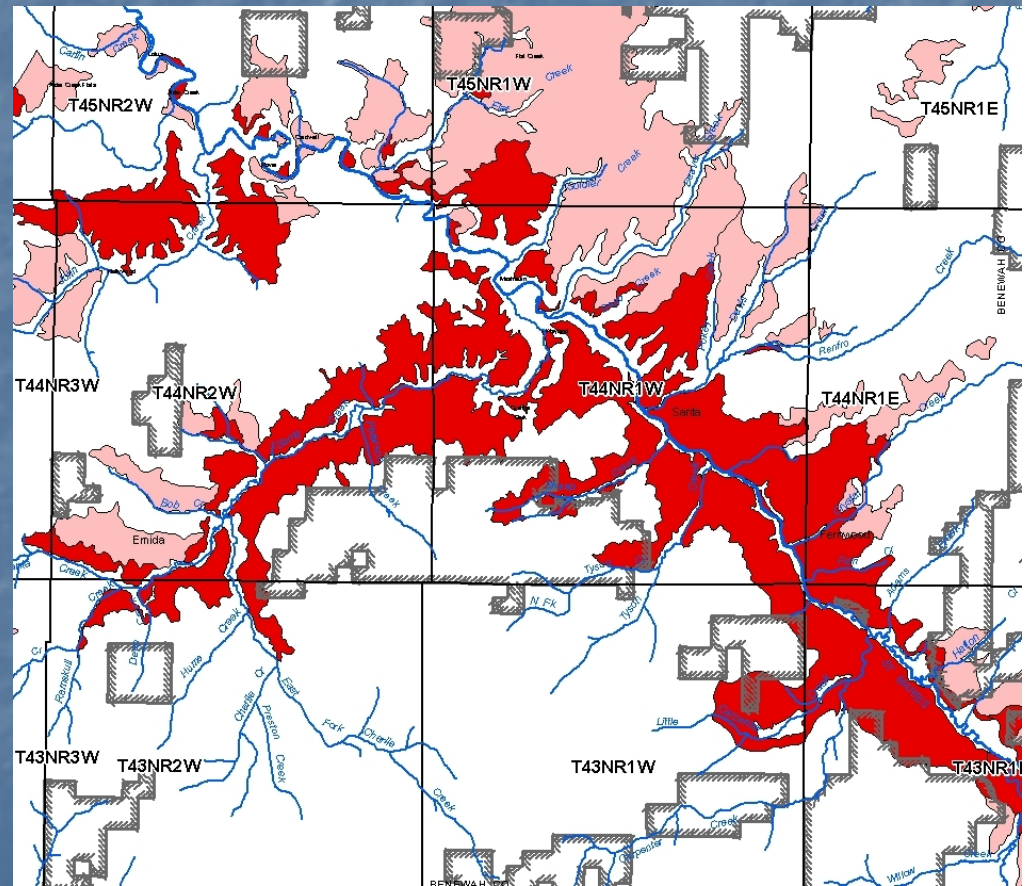
Soil Issues

- Ash cap present ? - hopefully covered by habitat type
- Hardpans & perched water tables
 - Shallow soils reduce rooting space and available water - become evident as stands age
 - Perched water tables - become evident after timber is cut - GF mortality
 - Require soils expertise or good maps



Hardpans & Perched Water Tables

- Preferred species
 - Western larch
 - White pine
 - Western hemlock
- Acceptable species
 - Ponderosa pine
 - Lodgepole pine
 - Western redcedar
- Species to avoid
 - Douglas-fir
 - Grand fir



Frost Injury

What is it?

- Occurs when temperature drops below freezing during growing season
 - Actively growing tissue not frost hardy (27-23 deg. F)
- Sometimes covered by habitat type
- Often created by harvest patterns



Frost-prone Sites

What are they?

- Flat to gently rolling areas where cold air cannot drain away
- Low spots where cold air flowing down slope collects - frost pockets (canopy coverage does not apply)
- Open areas with < 50% canopy coverage
- Areas with cold site vegetation
 - Beargrass, false huckleberry, subalpine fir, etc.



Upland slopes are relatively free from radiation frost



Late Spring Frost Injury Characteristics

- Occurs after spring bud break
- Usually affect only newly emerging foliage but can kill seedlings
- Generally only seedlings & saplings affected
- Reduces lateral & terminal growth
- Affects crown shape - Christmas trees



Late spring
frost injury

Newly emerging
foliage killed

Significantly
reduces current
year's growth



Sub-lethal Frost Injury

Characteristics

- Caused by freezing temps during growing season
- Foliage not killed but needle cells are injured
- Affects Seedlings & saplings
- Symptoms
 - Significant reduction in growth & vigor
 - Yellow foliage often seen in DF



Species Frost Resistance

(Larson 1978, Emmingham 1985)

Species	Resistance	Preference
Lodgepole & ponderosa pine	Highly resistant	Preferred
Subalpine fir	Resistant	Preferred
White pine & larch	Mod. resistant	Acceptable
Western redcedar	Mod. resistant	Acceptable
Engelmann spruce	Sensitive	Acceptable
Douglas-fir	Sensitive	N. R.
Grand fir & W. hemlock	Highly sensitive	N. R.

Disease and Insect Problems

- Blister rust
 - Wish we could hazard rate sites
- Dwarf mistletoe
 - Change species
- Douglas-fir tussock moth
 - Manage for resistant species on high hazard sites

Frost pocket - grand
fir Christmas tree

Needle disease on
ponderosa pine

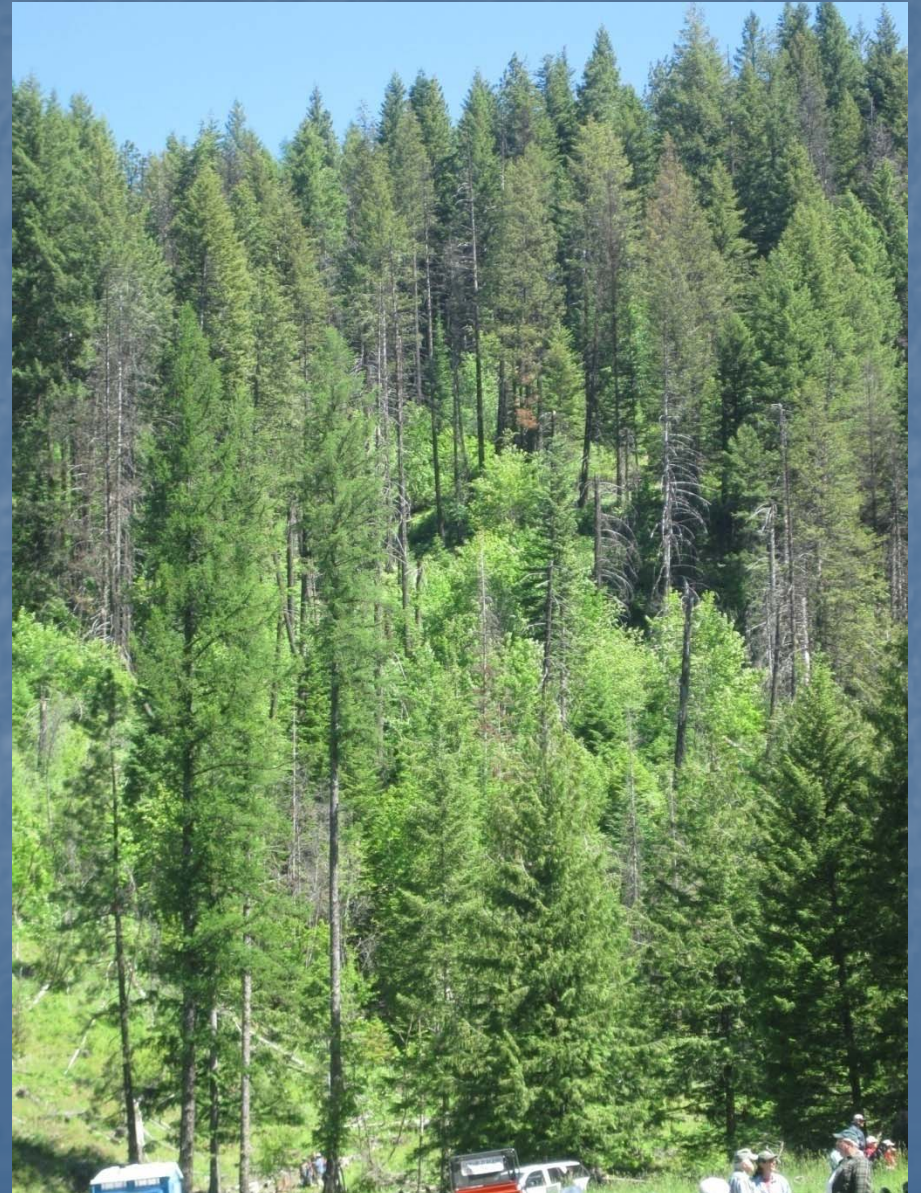
Caused by high
humidity - not frost

Identify seed lots
from frosty sites



ROOT DISEASE

- Preferred species
 - Western larch
 - Ponderosa pine
 - Lodgepole pine
- Acceptable species
 - White pine
 - Western hemlock
 - Engelmann spruce
 - Western redcedar
- Species to avoid
 - Douglas-fir
 - Grand fir



Herbicide Susceptibility

- Plan ahead!
- Certain species are injured by certain herbicides
- Can't spray over larch & sometimes redcedar
- Plan species mix for compatibility with future possible herbicide treatments



Species Mix Compatibility

- How well will different species grow when mixed together?
- Determined by competitive effects related to:
 - Height growth
 - Shade tolerance



Relative Height Growth

■ Dry Sites

- Western larch
- Lodgepole pine
- Grand fir
- **Ponderosa pine**
- Douglas-fir

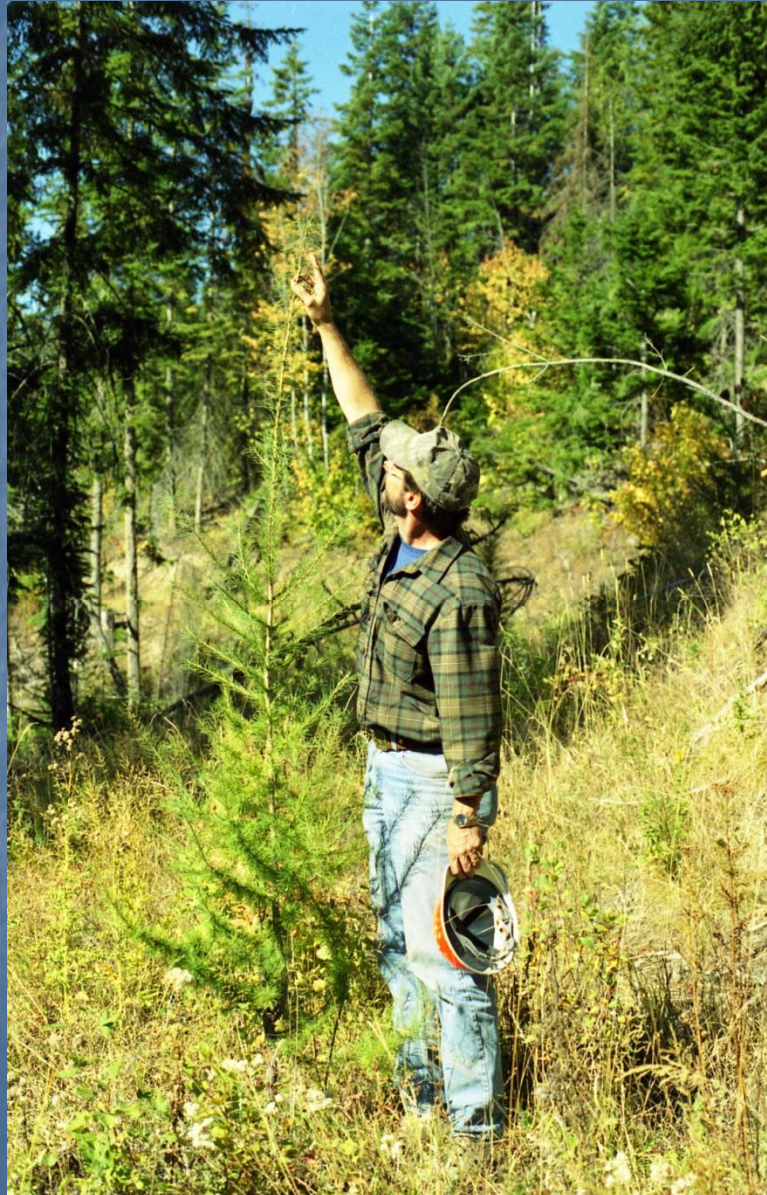
■ Moist sites

- Western larch
- Lodgepole pine
- White pine, grand fir
- Douglas-fir
- **Ponderosa pine**
- Engelmann spruce
- Hemlock, cedar

Relative Shade Tolerance

- Western larch
- Ponderosa pine
- Lodgepole pine
- Douglas-fir
- White pine
- Grand fir
- Western redcedar
- Western hemlock

Full Sun



Partial Shade



Heavy Shade



Live crown ratio affects diameter growth



Species Comments

- Shade intolerant species require wider spacing than tolerant species to maintain diameter growth - mixed species or pure stands
- Watch live crown ratios!
- Intolerant species
 - Larch
 - Ponderosa pine
 - Lodgepole pine
 - Douglas-fir

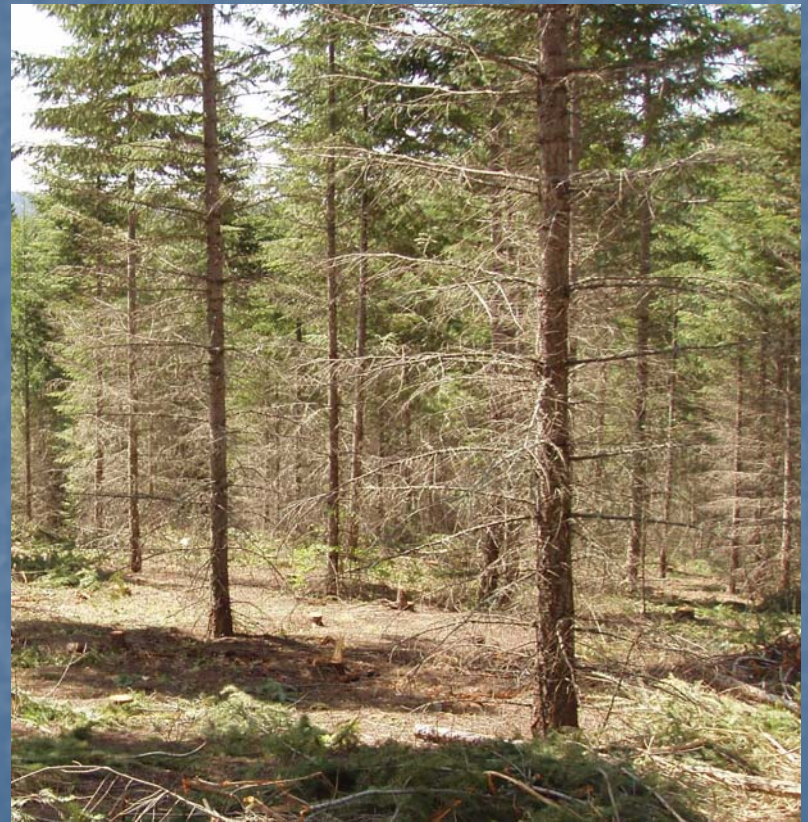
Ponderosa Pine

- Don't mix with grand fir, Douglas-fir or white pine on moist sites - can't match height growth
- Wide spacing required



Douglas-fir

- Use wider spacing when mixed with grand fir or white pine
- OR may require PCT



Western Larch

- Wider spacing required if mixed with D-f, Gf, Lpp, Wp? To maintain LCR at or above 40%



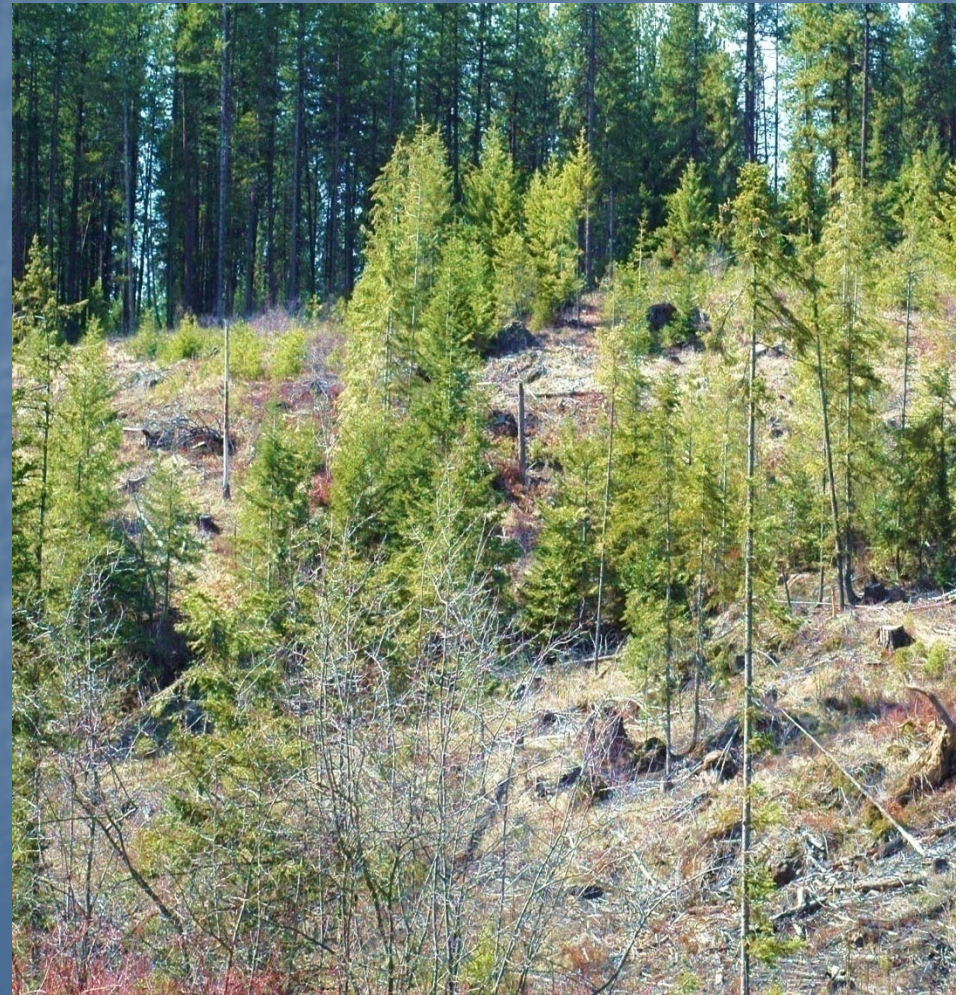
Western Redcedar

- Slow height growth
- Becomes an understory species when mixed
- Can be lost in PCT



Interplanting

- Even or uneven age?
- Size, vigor & species of competing trees?
- Opening sizes (light?)
- Species planted
 - Shade tolerance
 - Height growth potential
 - Will they become a functional part of the new stand?





How Competitive?

- Moisture?
- Light
 - How tall is the advanced regeneration?
 - How much shade does it (will it) produce?
- Relative shade tolerance is important
- As is relative potential height growth

Plan Ahead





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Future Value

- What will the species you regenerate be worth at harvest?
 - Specialty values - western redcedar
 - These can change - white pine
 - Multiple uses - DF, WL
 - Wood quality - faster growing PP
 - Ecological values

Needle disease on
ponderosa pine

Off-site seed

Identify frost site
seed lots

