Lesson 6

Stand Selection

30 minutes

Objectives

- Summarize the three main types of constraints to fertilization (strategic, biological and operational)
- Demonstrate a method of using stand attribute information to rank an individual stand for forest fertilization
- Test the participants' ability to recognize types of constraint factors for fertilization

Equipment Needs

- Overhead projector
- Lesson 6 transparencies

Method

Lecturette with overheads and group discussion

Instructions

The three areas that may constrain forest fertilization are: strategic (related to wood supply), biological and operational. A strategically unsuitable site is one that does not address projected timber supply falldowns. Numerous examples of this type of constraint exist, such as insufficient area of a tree species responsive to fertilization, a lack of stands of the required age class, and lack of growth and yield information for tree species that predicts positive, cost-effective growth responses. A biologically unsuitable site is one limited by significant climatic and soil moisture constraints for tree growth. The higher elevations of some subzones and the exceptionally dry conditions of the Chilcotin Plateau are examples. Operationally unsuitable sites are those on which the economics for application or realization of the growth response are limited by geographical constraints. Remote locations, such as along the coastal inlets, or areas prone to access problems due to road and bridge floodings, are examples of this constraint.

If a stand can pass through this key constraint to reach the potentially suitable designation, it will be given further examination. The failure of a stand to satisfy all conditions is reason enough to exclude it from current consideration. A factor may change with time (e.g., if good access is

developed) so the record for the opening should include the specific reason for its elimination. There is a short exercise to end this lesson which tests the participants' ability to identify which of the three guideline factors covered in this lesson is the most likely constraining factor to forest fertilization. They should first read the following case study to suggest the next actions to determine the ranking of this stand for fertilization.

Coastal Douglas-fir Case Study

Scenario: You are a silviculturist in the Sunshine Coast Forest District. You have been asked to evaluate the following stand of Douglas-fir for inclusion in an aerial fertilization program which currently consists of 630 hectares.

Stand Data:

The inventory database and the silviculture history records provide you with the following:

Total area:	120 ha
Dominant tree species:	Douglas-fir (Fd)
Minor tree species:	Western redcedar (Cw) < 10%
BEC subzone:	CDFmm
Site association:	Douglas-fir – Salal
Estimated site class:	Medium (SI = 25 m)
Establishment history:	Planted in 1950 with Fd 2+0 BR
Stand tending history:	Spaced in 1980 to 800 sph
Other:	No insect, disease or wildlife concerns

* All the operational factors and strategic objectives are acceptable for the stand.

What should you do next to determine the ranking for a fertilization treatment of this stand?

NOTES:

Coastal Douglas-fir Case Study

Facilitator's Guide Response

Scenario: You are a silviculturist in the Sunshine Coast Forest District. You have been asked to evaluate the following stand of Douglas-fir for inclusion in an aerial fertilization program which currently consists of 630 hectares.

Stand Data:

The inventory database and the silviculture history records provide you with the following:

Total area:	120 ha
Dominant tree species:	Douglas-fir (Fd)
Minor tree species:	Western redcedar (Cw) < 10%
BEC subzone:	CDFmm
Site association:	Douglas-fir – Salal
Estimated site class:	Medium (SI = 25 m)
Establishment history:	Planted in 1950 with Fd 2+0 BR
Stand tending history:	Spaced in 1980 to 800 sph
Other:	No insect, disease or wildlife concerns

* All the operational factors and strategic objectives are acceptable for the stand.

What should you do next to determine the ranking for a fertilization treatment of this stand?

Refer to the *Forest Fertilization Guidebook*, Appendix I.

Factor	*Score*
Area	1
Dominant species	1
BEC subzone and site association	1
Site class	1
Density	2 (1200 sph is rather high)
Age	1
Forest health	1
Total treatment area	1

This stand is a good candidate for fertilization. The age and its relation to rotation are not clear from the example, but this issue would be good for some group discussion. The stand's density is another issue for discussion. Is 1200 sph ideal? Should it be lower? What are the participants' experience with stand density for fertilization projects and the response in crown closure and duration of growth increase?

Interior Lodgepole Pine Case Study

Scenario: You are a silviculturist in the Prince George Forest District. You have been asked to evaluate the following stand of lodgepole pine for inclusion in an aerial fertilization program which currently consists of 630 hectares.

Stand Data:

The inventory database and the silviculture history records provide you with the following:

Total area:	120 ha
Dominant tree species:	Lodgepole pine (Pl)
Minor tree species:	White spruce (Sw) < 10%
BEC subzone:	SBSmk
Site association:	Bunchberry-moss (01)
Estimated site class:	Medium (SI = 19 m)
Establishment history:	Planted in 1970 with Pl 1+0 BR
Stand tending history:	Spaced in 1990 to 1200 sph
Other:	No insect, disease or wildlife concerns

* All the operational factors and strategic objectives are acceptable for the stand.

What should you do next to determine the ranking for a fertilization treatment of this stand?

NOTES:

Interior Lodgepole Pine Case Study

Facilitator's Guide Response

Scenario: You are a silviculturist in the Prince George Forest District. You have been asked to evaluate the following stand of lodgepole pine for inclusion in an aerial fertilization program which currently consists of 630 hectares.

Stand Data:

The inventory database and the silviculture history records provide you with the following:

Total area:	120 ha
Dominant tree species:	Lodgepole pine (Pl)
Minor tree species:	White spruce (Sw) < 10%
BEC subzone:	SBSmk
Site association:	Bunchberry-moss (01)
Estimated site class:	Medium (SI = 19 m)
Establishment history:	Planted in 1970 with Pl 1+0 BR
Stand tending history:	Spaced in 1990 to 1200 sph
Other:	No insect, disease or wildlife concerns

* All the operational factors and strategic objectives are acceptable for the stand.

What should you do next to determine the ranking for a fertilization treatment of this stand?

Refer to the *Forest Fertilization Guidebook*, Appendix I.

Factor	*Score*
Area	1
Dominant species	1
BEC subzone and site association	1
Site class	1
Density	1
Age	2
Forest health	1
Total treatment area	1

This stand is a good candidate for fertilization. The age is not ideal (score of 2) but is still acceptable. The stand density is suitable for lodgepole pine fertilization as the stand is open enough to benefit from fertilization without premature crown closure.

Which stand would you rather fertilize and why?

	STAND #1	STAND #2
Species	Pl70 Sx30	Pl60 Sx30 At10
Age	40 years	50 years
Density	1000 wsph (JS 1984)	1400 total sph Sx dominants with aspen in clumps
Ecosystem	SBSdk 05 submesotropic	SBSdk 05 mesotropic
Site Index	SI_{50} 18	SI_{50} 22
Forest Health	<5% insect and disease damage	<5% insect and disease damage
Access	Road washed out, need to rebuild bridge	Good access, near mainline
Slope	avg. 15%	avg. 15%
Block Size	120 ha	320 ha of cumulative blocks

Overhead: Which stand would you rather fertilize and why?

Facilitator's Guide Response

	Stand #1	**Stand #2**
Species	Pl70 Sx30	Pl60 Sx30 At10
Age	40 years	50 years
Density	1000 wsph (JS 1984)	1400 total sph, Pl and Sx dominants with aspen in clumps
Ecosystem	SBSdk 05 submesotrophic	SBSdk 01 mesotrophic
Site index	SI_{50} 18	SI_{50} 22
Forest health	< 5% insect and disease damage	< 5% insect and disease damage
Access	Road washed out, need to rebuild bridge	Good access, near mainline
Slope	avg. 15%	avg. 5%
Block size	120 ha	320 ha of cumulative blocks

Response

Factor	**Best Stand**
Species	Stand #1 has 10% more Pl
Age	Both stands are priority #1. Consider 30% Sx component and rotation length.
Density	Stand #1 has more room for crown expansion. At 50 years of age, Stand #2 is probably too dense for fertilization.
Ecosystem	Both stands in middle of edatopic grid and therefore good candidates for fertilization.
Site index	Stand #2 has higher SI but both are medium site.
Forest health	Both stands are fine but need to know what forest health agents present as they may respond differently to fertilization.
Access	Stand #1 may be a non-candidate based on need to rebuild bridge. Consider access required to area for other purposes and possibility of amortizing bridge work for more than this fertilization project.
Slope	Both slopes are fine, but Stand #2 has slightly better topography.
Block size	Need to see how many blocks involved and their size and configuration. Stand #1's total 120 ha is better and may compensate for rebuilding the bridge to gain access.

Site Constraint Factors Exercise

State whether the constraint factor is wood supply/strategic (S), biological (B) or operational (O) from the following site descriptions:

- ☐ Soil moisture regime is very dry
- ☐ Site is located on a small island in Johnstone Strait
- ☐ Squirrel damage is evident in adjacent stands
- ☐ Site has a fluctuating water table
- ☐ Average slope is 35% with broken terrain
- ☐ Soil temperature rarely exceeds 10°C
- ☐ Limestone rock outcrops are common
- ☐ Roads and bridges into blocks are subject to washouts
- ☐ Rooting depth is < 30 cm
- ☐ Falldown has not been factored into Timber Supply Review
- ☐ Mineralizable-N rate is high
- ☐ Stand is situated on an active alluvial plain
- ☐ Visual green-up requirements restrict harvest opportunities
- ☐ Inventory database shows few Douglas-fir leading species stands in the management unit

Site Constraint Factors Exercise

Answers for Facilitators Guide

State whether the constraint factor is wood supply/strategic (**S**), biological (**B**) or operational (**O**) from the following site descriptions:

B Soil moisture regime is very dry

O Site is located on a small island in Johnstone Strait

B Squirrel damage is evident in adjacent stands

B Site has a fluctuating water table

O Average slope is 35% with broken terrain

B Soil temperature rarely exceeds 10°C

O Limestone rock outcrops are common

O Roads and bridges into blocks are subject to washouts

B Rooting depth is < 30 cm

S Falldown has not been factored into Timber Supply Review

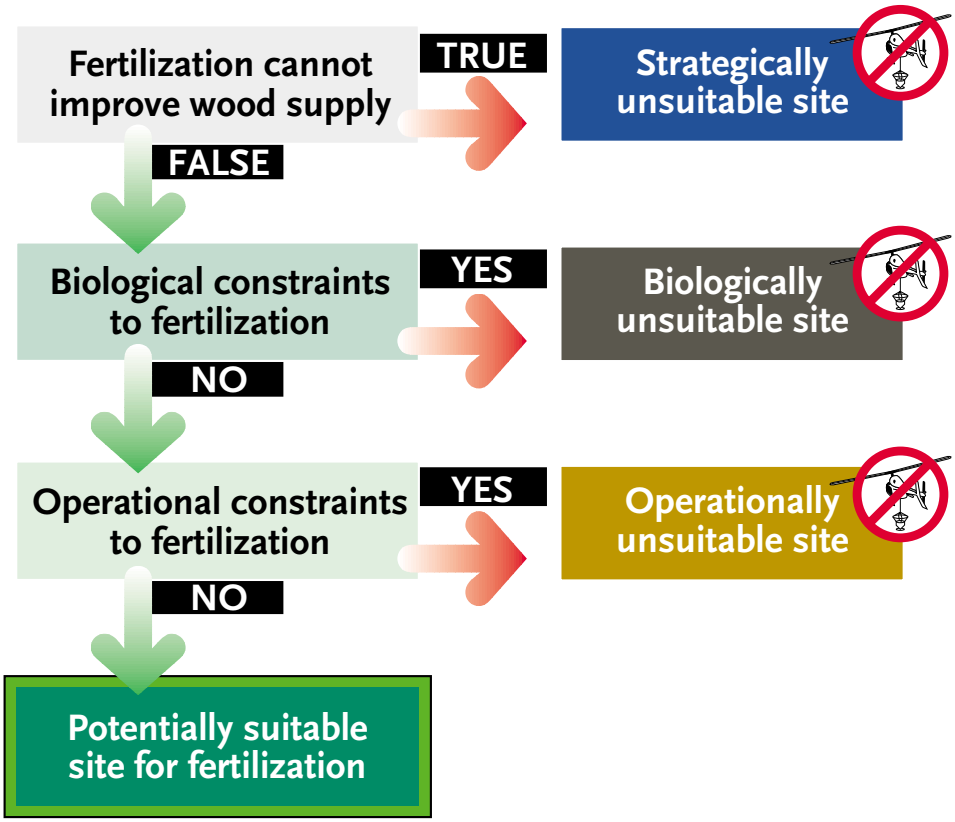
B Mineralizable-N rate is high

O Stand is situated on an active alluvial plain

S Visual green-up requirements restrict harvest opportunities

S Inventory database shows few Douglas-fir leading species stands in the management unit

Stand Selection Process



Overhead: Stand Selection Process

Key Points

- Lesson #6 is summarized through this flow chart
- Flow chart illustrates thought process in sequential order – strategic, biological, operational
- Imperative to assess candidate stands at each step to properly assess for fertilization