Forest management for multiple objectives:

Adaptation, timber production, and wildlife silviculture prescriptions at the Cloquet Forestry Center

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Summary

"Silviculture deals with the methods for establishing and maintaining healthy communities of trees and other vegetation that people deem important." [C] What "people deem important" shifts based upon society's needs and desires and the biases of institutions and land managers. The Triad is a conceptual framework for forest management that helps to balance broad and local objectives by categorizing management prescriptions as Intensive, Extensive, or Reserve Management. For application, I think of these categories as existing upon a gradient of management intensity and continued management involvement. One "Intensive" and two "Extensive" silviculture prescriptions being implemented at the Cloquet Forestry Center (CFC) are presented along with some lessoned learned through their development and application.

Why multiple objectives?

- Diversified forest management portfolio
- Resilience and adaptability to known, unknown, and ever-changing Economic, Ecological, and Societal demands

CFC's Management Plan Objectives

The following are forest-wide objectives outlined from the CFC's 10-yr forest management plan [D].

1. Education
2. Research
3. Outreach
4. Diversity of cover types and growth stages
5. Habitat
6. Water and soil quality
7. Historical and cultural resources

What biases influenced my management decisions?

Known and unknown biases abound in any decision-making process. My broad-scale biases are heavily influenced by my educational background in forestry. I need to be aware of these and open to change. Here are a few other personal opinion biases that influenced the prescriptions:

- Harvest operations should pay for themselves and future non-commercial treatments (planting, tending, etc.)
- Planning for landscape diversity outweighs within-stand diversity
- Most wildlife population habitat needs are too broad for me to be able to influence through a stand-level prescription
- Quality trees are more manageable than "quality wildlife"

Three parts of the Triad, a conceptual framework for balancing broad objectives [A,B]

Intensive Management

- Primary goal is maximized timber growth and yield and economic gain
- Values efficiency
- Tools may include active site preparation, competition control, improved planting stock, pruning, irrigation, fertilization, etc.

Extensive Management

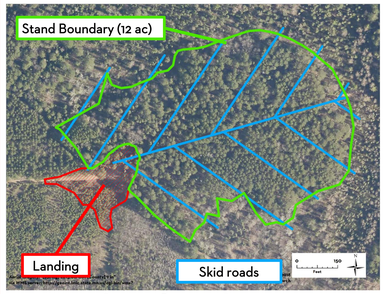
- Primary goal is to incorporate a combination of goals
- Level of attention to given goals depends on a hierarchy set in a specific prescription
- Goals may include wildlife habitat, old growth, ecological complexity, recreation, aesthetics, water filtration, timber production, etc.

Reserve Management

- Primary goal is to promote forest existence in a pre-determined condition or ability to function as a complex ecological system
- May or may not include human-driven management actions, depending on structural or compositional targets
- May include "restoration" goals

GRADIENT OF MANAGEMENT INTENSITY AND INVOLVEMENT

Red Pine Strip Seedtree Natural Regeneration System [E]



Broad objective

Implement an ecologically and economically viable natural regeneration silvicultural system for even-aged red pine timber production

Hierarchy of goals

Entry 1 (December 2016)

- Economically viable harvest (minimum 200 cords)
- Prepare stand for two further entries
  - Establish 15' wide skid roads 150' on center that feed to landing
  - Establish processing and landing area
  - Evenly thin remaining timber to 175 trees per acre (~ 115 ft²/ac)
    - Increase structural stability of residual trees
    - Improve timber quality for future entries

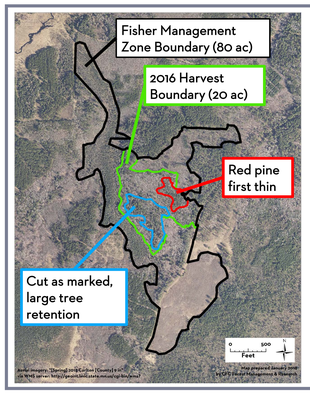
Entry 2 (8 – 10 years following Entry 1)

- Retain seedtrees and prepare seedbed for regeneration

Entry 3 (4-6 years following Entry 2)

- Overwood-removal harvest once regeneration > 800 seedlings per acre and before shoot blight infections take hold

Fisher Management Zone



Broad objectives (80 ac)

- Manage the composition and structure of contiguous stands across a broader area to promote habitat for fisher (*Pekania penannti*)
- Prescriptions developed for smaller portions of area on a 15-25 year rotation
- Maintain mixed hardwood & conifer cover consistent with FDn33
- Preserve lowland spruce on west side for travel corridor to Otter Creek

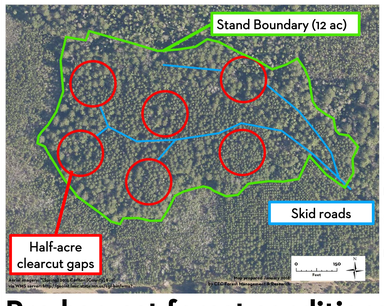
Prescription goals hierarchy (20 ac)

- Promote diverse tree composition and ages
- Maintain current and promote future large diameter (>18") deadwood
- Economically viable harvest

Implementation (May 2016)

- Growing-season clearcut with reserves of all white pine and paper birch to promote natural regen of aspen (root sprouts), white pine, and birch
- Thin group of 40-y.o. red pine to 110 ft²/ac
- Retain large diameter (>20" DBH) red pine

"FAPP": Forest Adaptation Practices and Planning [F]



Broad objective

Diversify species composition and forest structure to increase resilience and adaptability to changing climatic regimes

Pre-harvest forest conditions:

- Homogeneous and high-density red pine canopy; sparse understory composition, some pockets of hazelnut shrubs
- Basal area = 254ft²/acre, over 90% of which was 70 year old red pine.

Hierarchy of goals

- Diversify spatial and vertical structure of trees to create variable growing conditions for woody and non-woody plants
  - Establish six one-half-acre clearcut gaps
  - Thin other areas to 110 ft²/ac
- Diversify tree composition
  - Plant a mix of red oak, bur oak, white pine, and ponderosa pine into both gaps and matrix
  - Protect regen from white-tailed deer herbivory

"Well duh!" - Lessons learned

Don't do the same thing everywhere

- Perspectives and desires change, prescription development should be adaptable to these changes
- A prescription for within-stand diversity, if done everywhere, may not create landscape diversity

Work with a stand's features

- Bend the prescription to the stand rather than the other way around
- A stand's history and current structural components may limit its ability to currently meet certain objectives
- For example, other stands with a similar age, NPC, and cover type to the "Fisher" stand would not have had the structural and compositional components to meet the specific objectives

Think outside the stand

- Structural or compositional goals may not have to be met within a stand's boundary if I enlist the help of surrounding or other stands
- Increasing timber production on some stands creates freedom to reduce production in other stands

References

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