SILVICULTURAL PRESCRIBED BURNING

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This outline was used as a presentation in a prescribed burning workshop,
in Brant County, in 2000.

NORTHERN ONTARIO:

Primarily for Site Preparation:

MEANING: preparing a cutover site (usually a clear cut) for further mechanical site preparation followed by aerial seeding, ground seeding, or planting. Mechanical site preparation may be by blades, barrels, trenchers.

SPECIES: Jack Pine, Black and White Spruce.

OBJECTIVES to be achieved:

- Slash reduction to improve efficiency of site preparation machinery
- Duff reduction to improve efficiency of mechanical site preparation equipment
- Release of nutrients from slash and duff (Initial loss of nitrogen through combustion is rapidly replaced after the fire)
- Can be used to destroy unwanted advanced regeneration of non-preferred species such as poplar, birch, pin cherry and balsam fir.

DISADVANTAGES:

- Combustion of seeds contained within the slash
- Possible destruction of organic matter and soil structure in exposed soils, if the fire is too hot.
- Destruction of some advanced reproduction of preferred species such as Black Spruce.

KEY FACTORS FOR THE USE OF FIRE:

- Timing after the harvest is critical, to burn when needles in slash are dry, yet before they fall off the slash.
- Timing of PB's must be adjusted to accommodate peak wildfire occurrences.
- Know the amount of fuel in Tonnes per Hectare, species of fuel, depth of duff, and adjust indeces to facilitate ignition and control, consume the correct amount of slash and duff, without undue exposure of mineral soil.
- Site preparation equipment, after the PB, must be able to expose correct amount of mineral soil, or properly mix organic matter and mineral soil to prepare a proper seedbed, or facilitate planting.

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CENTRAL ONTARIO

SPECIES: Red and White Pine

PRIMARILY FOR SITE PREPARATION, similar objectives to use in the north

ADDITIONAL USE: Can be used for slash and duff reduction and seedbed preparation under a shelterwood cut or a seed tree cut.

Shelterwood cut is an even-aged system wherein the mature stand is harvested in 2 or 3 cuts. After the seeding cut, the site is prepared under the remaining seed trees or in openings in the stand, to accept seed from the overstory. When sufficient regeneration is present, the remaining overstory is removed. In a group shelterwood, the last harvest must be regenerated by planting or hand seeding

Seed tree cut is similar, only residual overstory stand is much less. These trees may or may not be harvested.

PB factors are similar to the north, except that the added complication exists of trying not to destroy the seed trees.
Destruction of seed trees may occur if the fire is too hot, particularly if slash is piled up against the stems of the trees; also in areas of "confluence" - where fire lines meet.

CENTRAL AND SOUTHERN ONTARIO

SPECIES: Scots Pine
- Used for destruction of "Scots Pine Jungles".
- Scots Pine cut and bulldozed into windrows, and burned, or cut, tramped and burned.

ADVANTAGES:
- Destruction of seeds and advanced regeneration

DISADVANTAGES:
- Possible destruction of soil organic matter and soil structure under the windrows, due to excessive heat.
- Destruction of desirable advanced regeneration of hardwoods.

OTHER:

Used for site rehabilitation after disease infestations such as *Spaeropsis sapinea (Diplodia pinea),* shoot blight in Scots Pine, *Fomes annosus* root rot in red and white pine, insect infestations (Pine shoot beetle)

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CENTRAL AND SOUTHERN ONTARIO

SPECIES: Red Oak, Hickory

WHY BURN?

1. Consider the loss of the forest type: allow succession, or intervene.

2. Consider site index
   - Low site index: manage for pine
   - High site index: accept maple and ash and tolerant hardwoods
   - Mid site index: make a decision to manage for Oak/Hickory, or a mixture of tolerant hardwoods and oak/hickory

3. Consider the silvicultural system
   - Even-aged system such as a uniform or group shelterwood:
     - Stand is completely harvested in 2 or 3 cuts.
       OR
     - Final harvest can leave remnants of the original stand, widely dispersed over the new stand.
   - All-aged systems are not recommended for mid tolerants and intolerants

4. Steps:
   - 20 years before stand maturity, start treatments to adjust the overstory light and begin to establish a new stand (improvement and seeding cuts may remove poor oak and hickory trees, as well as competing species: resulting in a narrowing of the species richness on a particular site, in order to preserve biological diversity in the landscape).
   - May require cutting and girdling of non-desirable or competing species, with or without herbicide treatments: e.g. 2,4-D, Roundup.
     AND/OR
   - May include prescribed fire, at intervals, to discourage competing tree and shrub species, and encourage oak and hickory regeneration.
   - May require underplanting of seedlings.

5. ONLY when acceptable regeneration of oak and hickory seedlings are present, or expected through coppice from old stumps, is the remainder of the old stand removed.
(Acceptable seedlings meet height and diameter criteria, and numbers per hectare)

PROBLEMS TO BE DEALT WITH:

1. Periodicity of seed:
   White oaks have a seed that matures in one year, but periodicity of seed years is 4 to 10 years.
   Red oaks have a seed that matures in two years, which facilitates crop forecasting and timing of understory treatments, but seed periodicity is 3 to 5 years.

2. In intervening years between bumper crops, greater than 90% of all seed is destroyed by insects.

3. Further predation on seed by squirrels, jays, voles, deer, turkeys.

4. Predation on seedlings by deer, rabbits, may preclude regeneration success

5. Bumper crops of seed may result in a flush of oak regeneration:
Moist sites with insufficient light - this regeneration dies out over a period of years
Drier sites - this regeneration persists for a longer period of time
Generally does not result in a new stand.

6. Tolerant hardwoods have a higher "regeneration potential"
   More seed
   Less predation on seed and seedlings
   More frequent seed years: White Ash 3 - 5 years
   Sugar maple 3 - 7 years

PURPOSE AND ADVANTAGES OF PRESCRIBED BURNING

1. Discourage tolerant hardwoods and shrub understorys: these have less sprouting ability than oaks and hickories. Maple, particularly red maple, has thin bark, allowing damage by fire to the cambium.

2. Reduce litter and encourage burying of nuts by jays and squirrels.

3. Reduce predatory insect populations.

4. Reduce reliance on herbicides.

5. Burns are conducted so as to only consume leaf litter and fine fuels. (FFMC)

6. Minimal combustion of medium or heavy fuels, and little mineral soil exposure or damage. (Low DMC and DC)

7. In four burns conducted in Guelph (Cambridge) District, no erosion noted.

8. Cost can be less than manual treatments, i.e. cutting, herbicides.

9. Fire does not have to destroy vegetation, only scorch the cambium

10. Control of invasive exotics such as buckthorn: Taylor property.

DISADVANTAGES OF PRESCRIBED BURNING

1. Damage to overstory

2. Damage to ground nesting birds.

3. Damage to early rising ground flora: Mandrake or May Apples.

4. Stress to the Forester.

NEEDS:

1. More information on invertebrates

2. More information on amphibians

3. More silvicultural testing of light levels and regeneration treatments.