## Re-initiate WFn55 forests as would selective windthrow to create open to very large gap habitat

Emulating stand-replacing windthrow to promote good and excellent suitable shade intolerant species.

The primary goal when maintaining a WFn55 forest using this strategy is to remove most of the mature canopy in large gaps to avoid hydrologic swamping that would favor non-tree vegetation (e.g., cattails, lake sedge, etc.). The silvicultural focus is on restoring understocked sites to a fully-stocked forest that, at maturity, can be maintained using the less-risky large or small-gap strategy.

**Open (very large) gap concept**

Sometimes severe windstorms would flatten WFn55 forests by toppling the largest and tallest trees on a weak substrate to create open to very large-gap habitat. Such events 1) selected against wind-susceptible trees like quaking aspen, balsam fir, and balsam poplar, 2) released advance regeneration strongly dominated by black ash but included American elm, red maple, yellow birch, balsam fir, green ash, basswood, and northern white cedar, 3) encouraged some recruitment of less-tolerant trees such as paper birch and quaking aspen, 4) created future nurse logs that especially encouraged yellow birch and northern white cedar establishment, 5) created deep cradles that functioned as treeless pools for decades, and 6) released rough alder and other wetland shrubs capable of delaying the recovery of the forest.

**Silviculture prescription highlights (see table on next page)**

- Favor non-ash species for natural regeneration
- Increase or introduce non-ash replacement species via artificial regeneration
- Reduce the black ash canopy to 20-30 square feet per acre of basal area
- Retain a legacy of pole size black ash to help regulate water table response and favor retention of healthy non-ash trees suitable to WFn55 sites

**Photo**

Figure 1. Clearcut with scattered reserves in a mature WFn55 native plant community.

## Open (Very Large) Gap Silviculture Prescription Summary Table

**Objective**

- Even-aged forest with patches, strips and scattered seed-tree residuals; release of advance understory or poles if present
- Reduce black ash basal area. Promote artificial regeneration opportunities due to a greater range of suitable species

**Species Favored (Natural or Advance Regeneration)**

- Quaking aspen, paper birch, northern white cedar, yellow birch, American elm, red maple, basswood, and balsam poplar

**Species to Diminish**

- Black ash because of its susceptibility to emerald ash borer morality; it is the superior competitor and frequently dominates sites

**Canopy Removal**

- 0.75-1 acre gap size – emulate clearcut with reserves or seed tree regeneration method

**Forest Health Concerns**

- WFn55 has a high hazard rating for emerald ash borer
- If emerald ash borer damage is present in the stand, implement regeneration methods that salvage timber
- Several native insects and abiotic factors contribute to black ash decline with signs and symptoms similar to emerald ash borer

**Legacy Considerations**

- Healthy black ash trees or advance regeneration to control water table response
- Retention of all desirable non-ash species as seed trees

**Management Concerns and Risk**

- Soils are weak and inoperable unless frozen solid. Springheads and seeps may never freeze enough for heavy equipment
- Rutting risk is very high due to constant soil saturation. Ruts are almost certain to channel moving surface water Hydrology could change in unpredictable and possibly dramatic ways
- Swamping may occur with large canopy clear gap removal (>1 acre) which reduces suitable seeding substrate
- If rough alder, bluejoint grass, fowl manna grass, or lake sedge are abundant, damage to the organic layer poses a risk of converting forested wetlands to non-forest

**Site Preparation**

- Although not common practice, consider trenching and mounding for artificial planting or seeding
- Careful consideration of surface hydrology is required; orientate trenches parallel to surface flow

**Artificial Regeneration (See Table 4 in Ash Management Guidelines)**

- Balsam poplar, swamp white oak, hackberry, cottonwood, silver maple, red maple, bur oak, disease resistant elm, yellow birch, balsam fir, tamarack, northern white cedar, white spruce, and black spruce
- Techniques: hand planting (before or after harvesting), live staking, and direct seeding

**Climate Change Considerations**

- Forested wetlands have low adaptive capability due to hydrologic regimes, and low tree species diversity
- Black ash is expected to decrease in suitable habitat; assess site-level factors to determine management and regeneration opportunities to establish non-ash species
- Consult the NPC-silviculture strategies website for tree habitat response to climate change in WFn55
- Winter frozen ground conditions may decline requiring modifications to harvest operations; longer permit durations

**Future Actions**

- Evaluate the tree and hydrologic response within the first 3 years after treatment
- Conduct a regeneration survey age 3 (natural regeneration), age 1 (planting/live staking), age 5 (direct seeding)
- Consider crop tree selection, release, thinning, or stand improvement

**Case Studies**

- Several unpublished, contact the ECS and Silviculture Programs for more information
- Great Lakes Silviculture Library

**Literature**

- Ash Management Guidelines