Aspen silviculture

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Outline

- Review of aspen silvics
- Overview of general silvicultural approaches for aspen-dominated stands
- Production and ecologically-oriented aspen silviculture
- Final points

Aspen silvics

Aspen silvics

Species	Shade tolerance	Effective rotation ages	Site requirements
Big-tooth aspen	Very intolerant	50-70	High; best development on well-drained loamy sands/sandy loams
Quaking aspen	Very intolerant	40-50, 50-60	Low; best development on sandy and silt loams

- Aspen requires disturbance across space and time to maintain dominance on a site
  - Large openings (> 1 acre)
  - Shorter rotations to maintain rootstocks
- Aspen dominance on a particular site does not always indicate it is a “good site” (i.e., SI $\geq$ 70 ft) to promote aspen

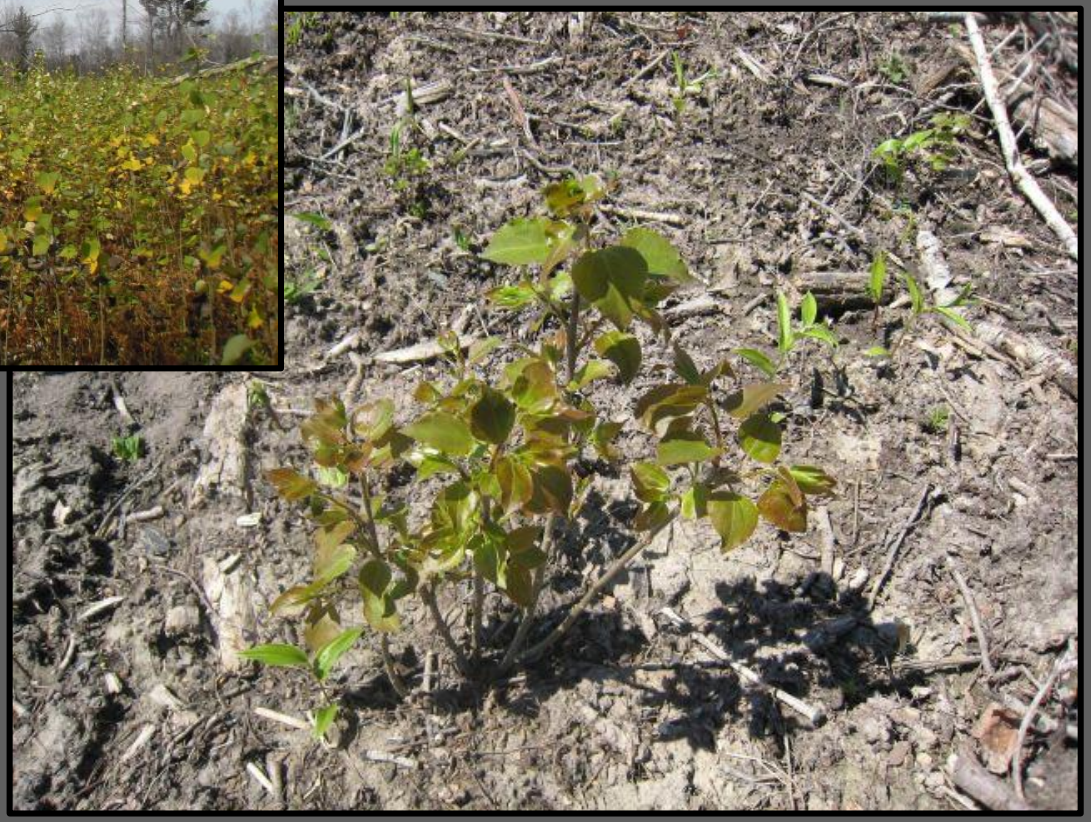
Silvics of primary species

- Primary modes of reproduction
  - Wind-dispersed seed
    - Seed dispersal between May-June (often miles)
    - Good seed years every 4-5 years
    - Limited longevity (2-4 weeks)
    - Requires moist, mineral soil seedbed

Silvics of primary species

- Primary modes of reproduction
  - Root suckers
    - Arise from adventitious buds in roots
    - Stimulated by decrease in auxin from parent stem
    - Require warm (> 55°F), aerated soil conditions
    - Faster early growth than regeneration from seedling origin (inherit root system and carbohydrates from parent tree)

Silvicultural systems



Silvicultural systems

- Aspen begets aspen
  - If objectives involve naturally regenerating aspen-dominated stand, at least 10-20 ft^2/ac of overstory aspen is needed (~50 TPA across site)

Silvicultural systems

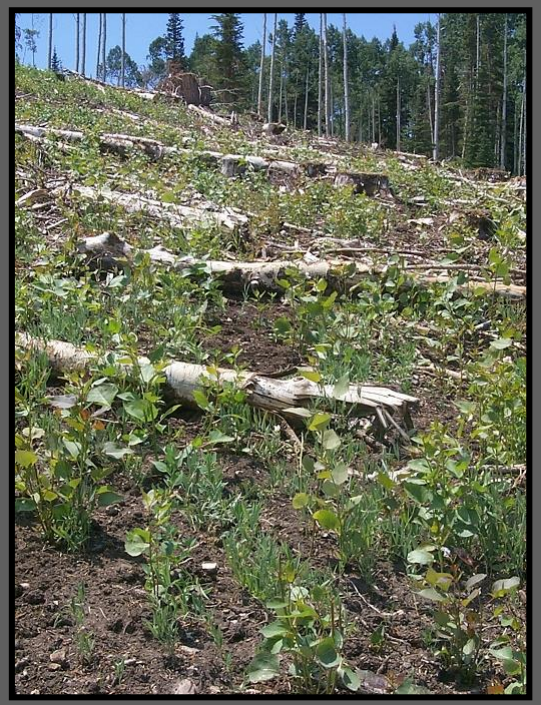
➢ Coppice system for aspen

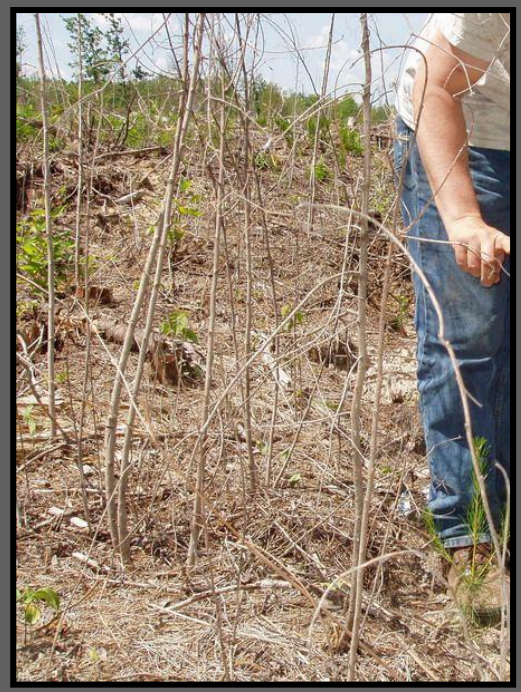
- Sucker point of origin requires consideration to ensure success
  - Most suckers initiate from roots within 3 inches of soil surface
    - Avoid causing damage to parent root systems
    - Harvest under frozen or dry soil conditions

Silvicultural systems

➢ Coppice system for aspen

- Clearcut harvest original stand
  - Maximize resources for suckers and minimize hormonal control of parent stems
  - Fall/Winter harvest will also maximize root carbohydrate stores





Silvicultural systems

➢ Coppice system for aspen

- Minimum stocking two-years after harvesting is 4-5,000 stems per acre (can be as many as 70,000)
- If after 10 years, stocking is not adequate, shearing has proven useful to improve sucker density
- Return at age 40-60 and repeat coppice sequence

Silvicultural systems

- Intermediate treatments
  - Pre-commercial thinning (site index 80 or greater)
  - Applied to 8-10 year old stands
    - Alternating 6.5 x 8 ft rows with shearing blade
    - Crop-tree approach leaving 1200-1500 stems

Silvicultural systems

➢ Intermediate treatments

- Commercial thinning (site index 80 or greater)
  - Traditionally applied at ages 25-30 in stands with at least 125 ft^2/acre with residual densities of 70-80 ft^2/acre
  - Potential for greater product recovery (7-15 cds per acre)
  - High risk of stem damage

Production & ecological approaches

Production systems with hybrid aspen

➢ Hybrid aspen

- Cross between quaking aspen and European aspen (*Populus tremula*)
  - Greater growth (4-10xs) and disease resistance than native aspen due to heterosis
  - Similar suckering response to native aspens
  - Application primarily on well-drained, productive sites (loams)

Production systems with hybrid aspen

- Hybrid aspen
  - Competition control followed by establishment of 400-800 stems/acre
  - Early browse protection is critical due to desirability by deer and moose
  - Typical rotation length=20-25 years

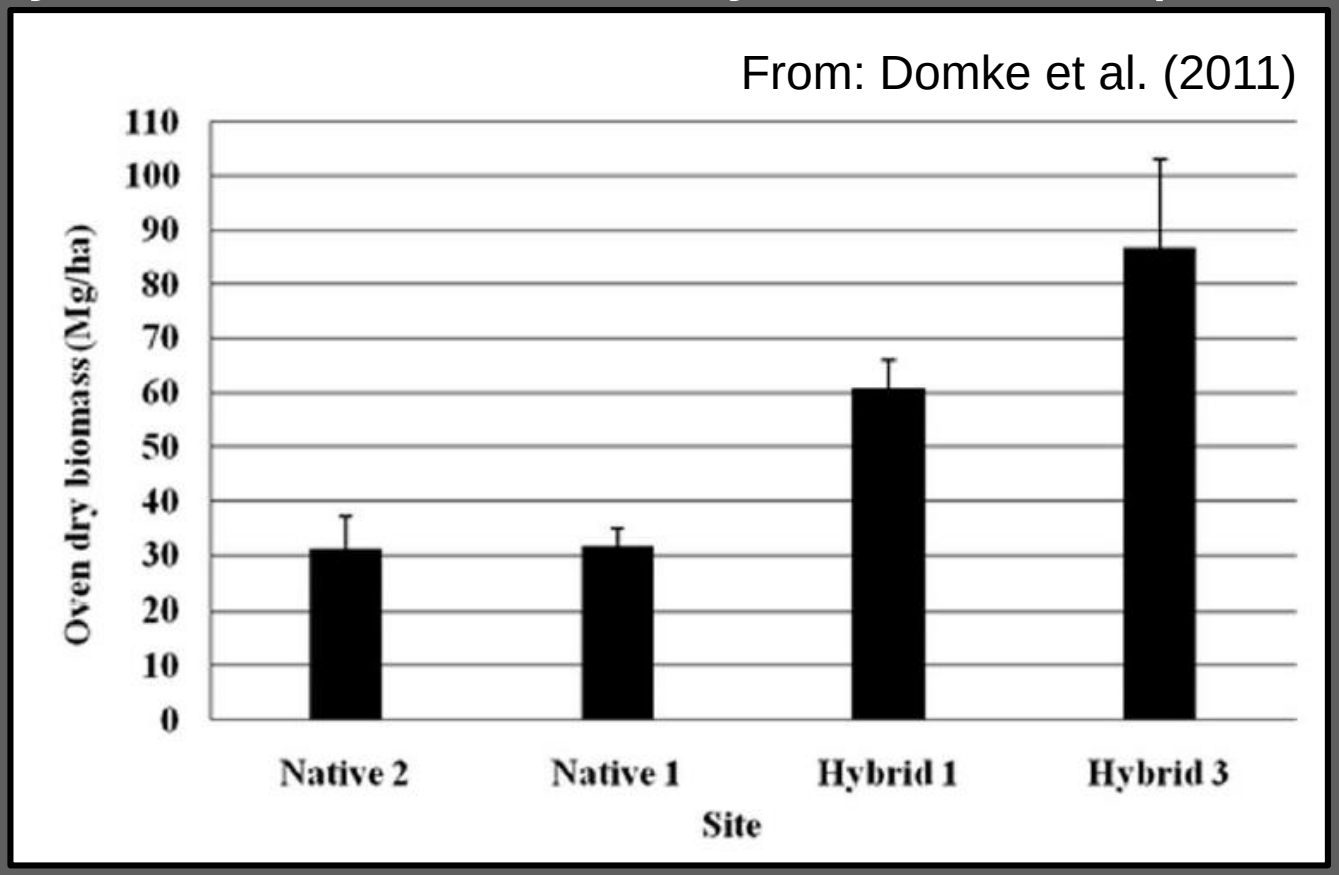
Production systems with hybrid aspen

- Hybrid aspen
  - If goal is for rapid establishment of high density hybrid aspen stand:
    - Establish lower density planting (50-200 TPA)
    - Shear plantation 5-7 years post planting
    - Adds 3-5 years to first rotation (sheared stems reach planted stems quickly)

Production systems with hybrid aspen

- Hybrid aspen
  - 10-year-old native and hybrid stands post-shearing

From: Domke et al. (2011)



-Average stand-level biomass is ~2.5 times greater in hybrid stands (volume is ~4 times greater)

Ecological considerations with aspen

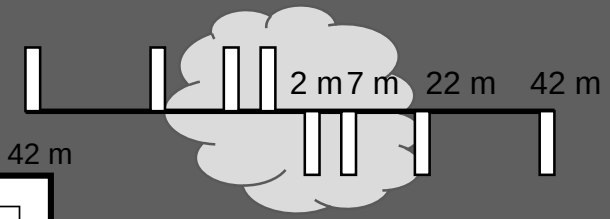
- Importance of structural retention for biodiversity objectives widely recognized (and enforced)
- Aspen silvics present challenge in relation to retention due to intolerance and auxin regulation of sprouting
  - Retention of 10-15 ft^2/ac has been shown to reduce sucker height growth and densities by 40-50%

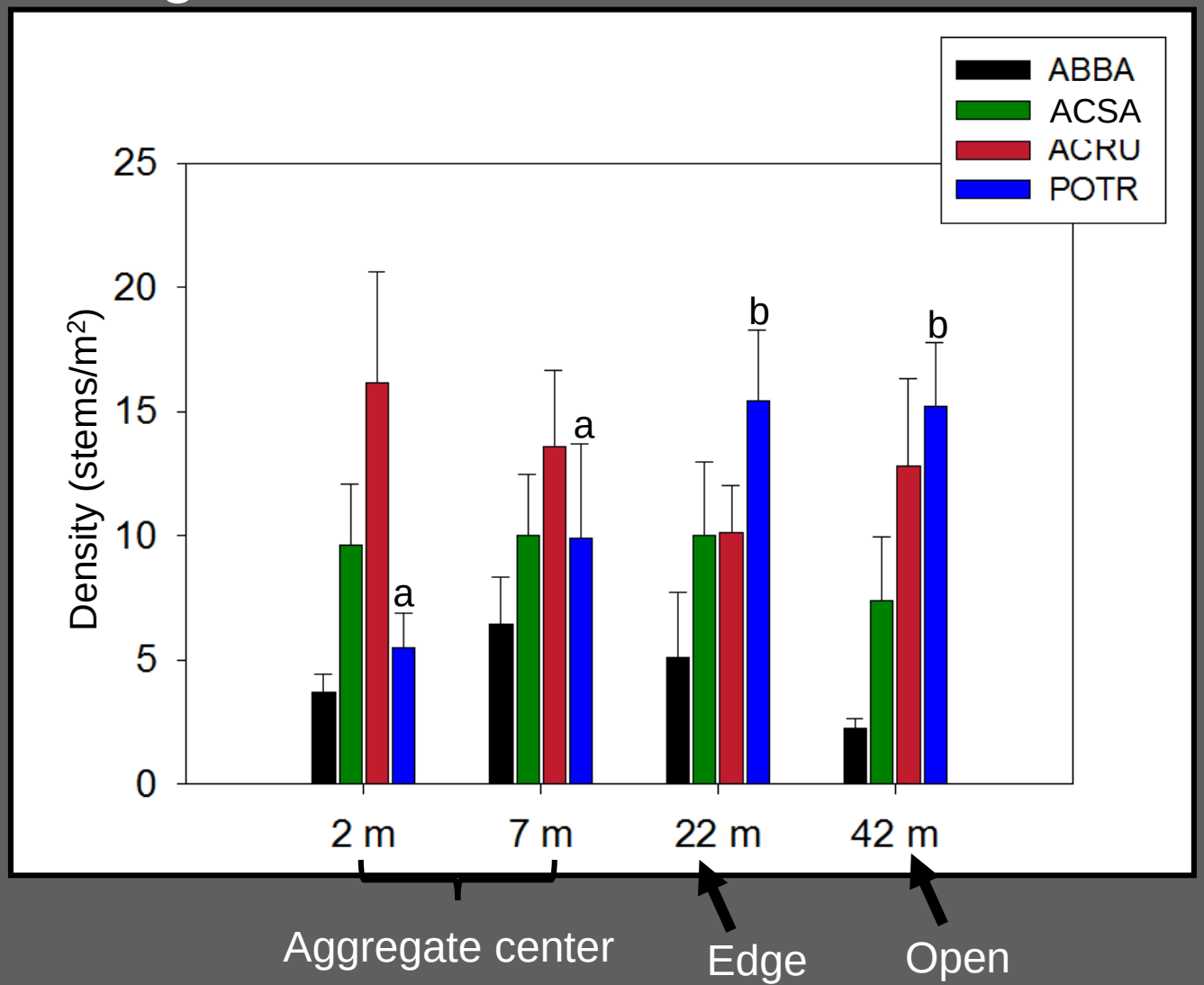
Ecological considerations with aspen

- Application of aggregate reserve patches minimizes influence of residuals and maintains other species options on site

Ecological considerations with aspen

- Effects of aggregates on tree regeneration





Conclusions

- Aspen can be a highly productive and straightforward type for management if site quality and overstory stocking allows
- Critical component to aspen management is understanding regeneration source both in harvest timing and rotation length
- By nature, aspen is a transitional type that allows for many mixedwood opportunities with more tolerant, long-lived species
  - Use retention and other approaches to maintain these options