Restoration of Degraded Woodlots

Kimberly Bohn, Ph.D.
Forestry Extension Educator

PennState Extension
extension.psu.edu

Outline

• Identifying degraded woodlands

• Assessing condition of degraded woodlands

• Management options for salvage/restoration

PennState Extension

What are "degraded" woodlands?

- Woods with a reduced ability to provide **resources** or **ecosystem services/function**

- Reduced growth rates
  - Wood production
  - Nutrient cycling
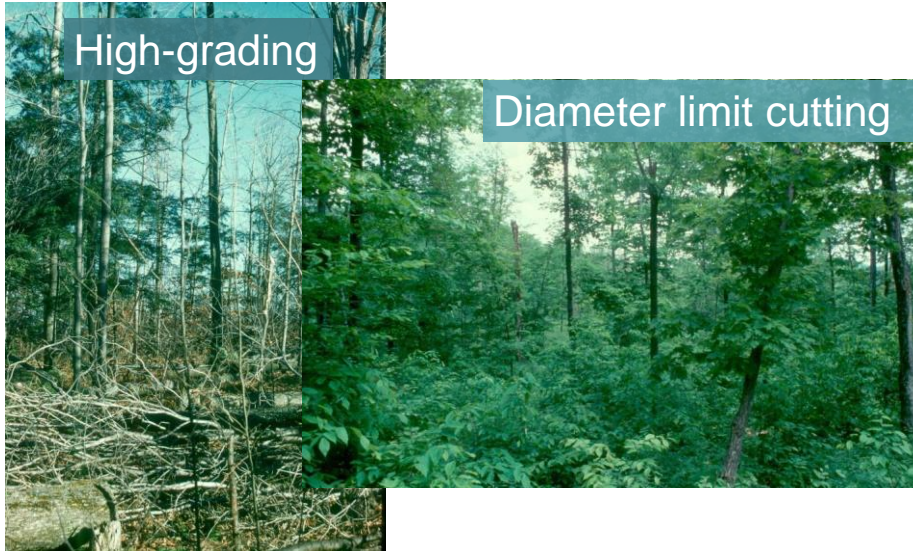 - Water balance
  - Habitat

PennState Extension

How do woodlands become "degraded"?

- Nature

PennState Extension

How do woodlands become "degraded"?

High-grading
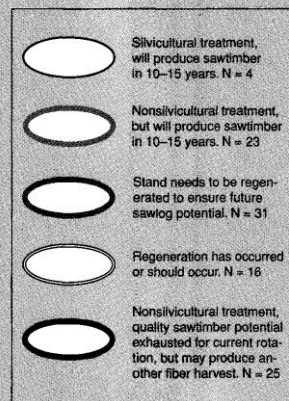
Diameter limit cutting

PennState Extension

How common are these practices?

- In West Virginia survey:

  - 72 of 99 stands could not support sustainable harvest of high-quality sawlogs

Figure 1. Decision chart for classifying harvest types of 99 hardwood stands in West Virginia. Preharvest and postharvest stand characteristics are compared, and classification is based on changes in stand structure.

Silvicultural treatment, will produce sawtimber in 10–15 years. N = 4

Nonsilvicultural treatment, but will produce sawtimber in 10–15 years. N = 23

Stand needs to be regenerated to ensure future sawlog potential. N = 31

Regeneration has occurred or should occur. N = 16

Nonsilvicultural treatment, quality sawtimber potential exhausted for current rotation, but may produce another fiber harvest. N = 25

(Fajvan et al. 1998)

How common are these practices?

- In PA and NY:

  o

Before harvest

Before

After harvest

14/03/2018

Characteristics of degraded woodlands

No big trees!

PennState Extension

Characteristics of degraded woodlands

Change in species composition

PennState Extension

6

Characteristics of degraded woodlands

Patchy, highly variable stocking and canopy cover

PennState Extension

Characteristics of degraded woodlands

• Logging damage
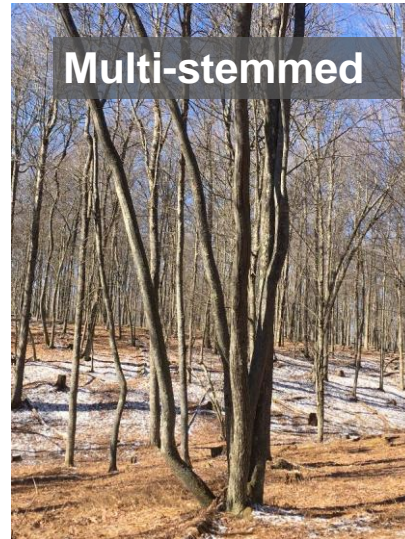
PennState Extension

Trees left in degraded woodlands

Multi-stemmed

Poor form

Photo: Dave Jackson

Trees left in degraded woodlands

• Reduction in tree quality and grade

Treatment	Grade 1	Grade 2	Grade 3	Below grade
Medium selection	32(7.2)*a*	34(5.3)*ab*	24(5.3)*c*	10(4.6)*b*
Light selection	32(4.0)*a*	25(4.6)*bc*	31(4.9)*bc*	12(4.3)*b*
Heavy selection	19(4.2)*b*	43(5.5)*a*	36(3.6)*abc*	2(1.7)*b*
Crop tree release	17(4.1)*b*	34(5.4)*ab*	39(6.8)*ab*	10(3.0)*b*
Control	12(3.7)*bc*	25(3.5)*bc*	26(5.4)*bc*	37(4.5)*a*
Diameter-limit	5(2.3)*c*	14(2.7)*c*	50(4.9)*a*	31(4.0)*a*

(Sendak et al. 1995)

Trees left in degraded woodlands

Poor health,
Low vigor

Photo: NRCS

PennState Extension

Prospects for a degraded woodland?

Not good!

Assessing the level of degradation

- Overstory/midstory
  - ○ Range of tree ages

PennState Extension

How to tell young, small trees from old, small trees

→ Vigorous young sapling

Flat-topped, low vigor old sapling →

Source: Susan Stout, USFS Northern Research Station

PennState Extension
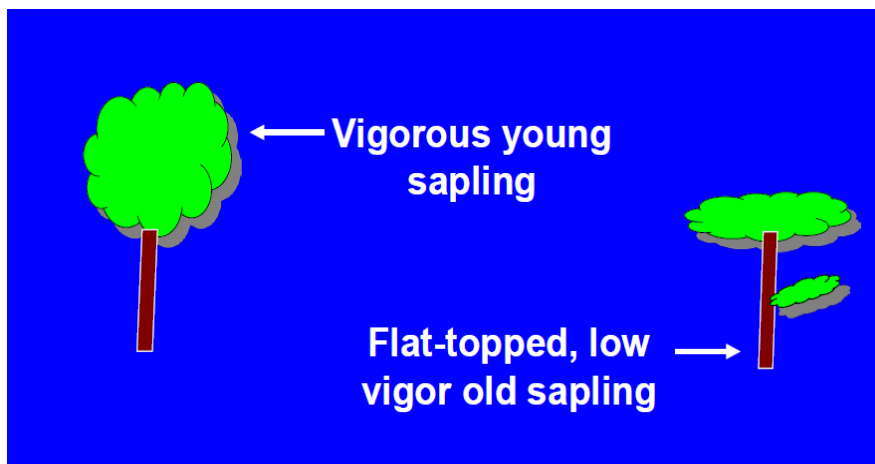
Do smaller, old trees respond to release?

(Canham et al. 1989)

PennState Extension

Assessing the level of degradation

- Overstory/midstory

  o Range of tree ages

  o Species composition

  o Acceptable vs unacceptable growing stock

PennState Extension

What is "acceptable growing stock"?

- Traditional "AGS":
  - Tree of desirable species
  - Good form and free of defect (timber)
  - Healthy tree- no wounds on bole
  - No significant crown damage over 25%

PennState Extension

What is "acceptable growing stock"?

- In a degraded woodlot?
  - Traditional AGS

 - Unacceptable, but a potential **seed source**

PennState Extension

Assessing the level of degradation

- Understory
  - o Advanced Regeneration
    - Species

  - o Interfering vegetation
    - Degree of competition

PennState Extension

Management options for degraded woodlands

Do you work with the remaining trees that you have, or focus efforts on the next forest?

PennState Extension
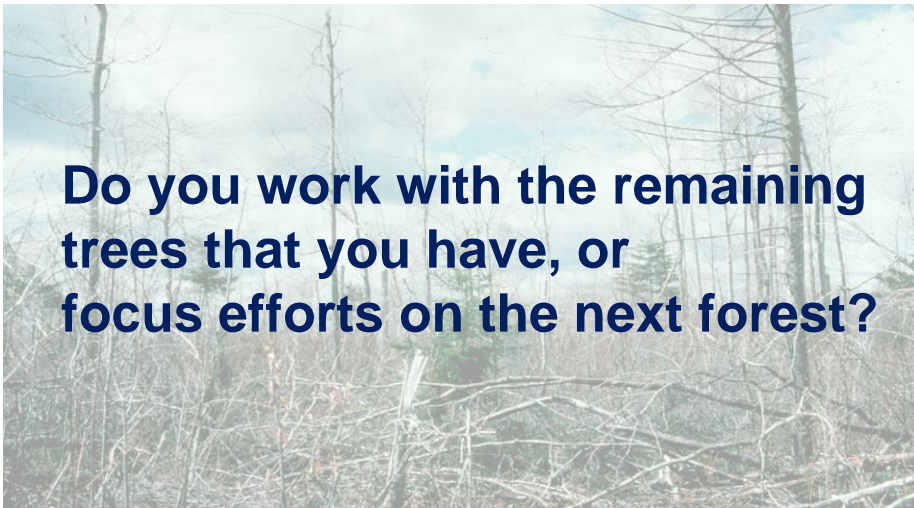
Classifying levels of action required

- **SALVAGE**
  - The removal of dying or damaged trees to *recover value* that would otherwise be lost

  - Implies more *dire conditions* and a *"start over"* approach such as with a 'regeneration method'

PennState Extension

Classifying levels of action required

- **RESTORATION / REHABILITATION**
  - Actions to accelerate *recovery of forest structure*, *ecological functioning* and *biodiversity levels*

  - Or restore capacity of forest to deliver **products and services**

  - Work with what you have to **improve conditions**

PennState Extension

(Roach and Gingrech 1968)
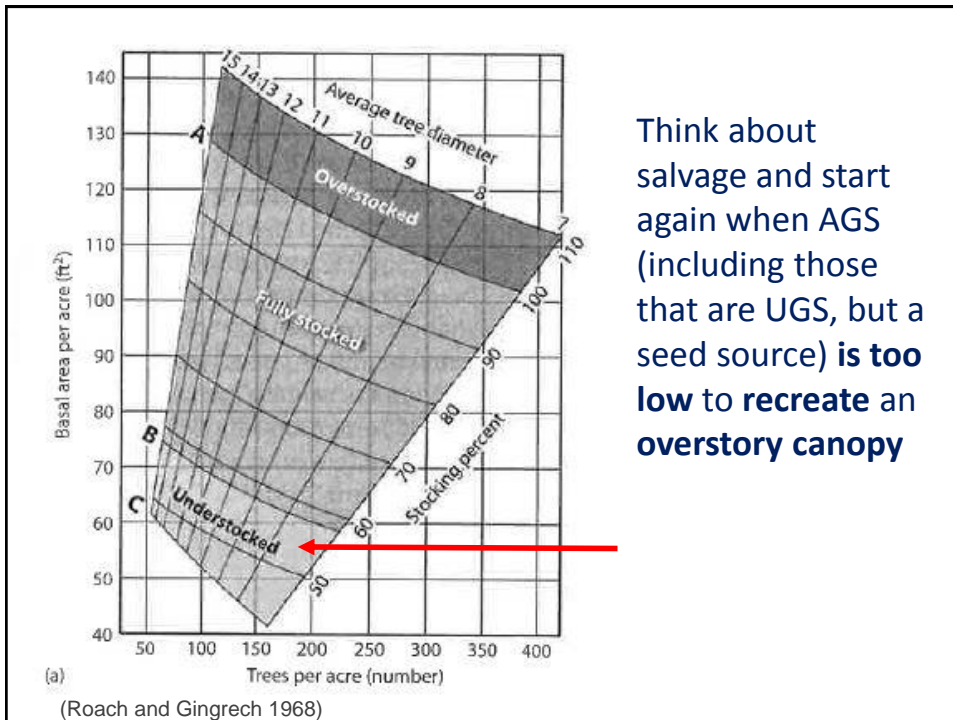
Think about salvage and start again when AGS (including those that are UGS, but a seed source) **is too low** to **recreate** an **overstory canopy**

Clear cut and promote advance regeneration (if you have it)

PennState Extension

If / when regeneration is present

PROTECT IT!

…and if you don't…

PennState Extension

Clear cut and replant

With pre-planting veg. control !
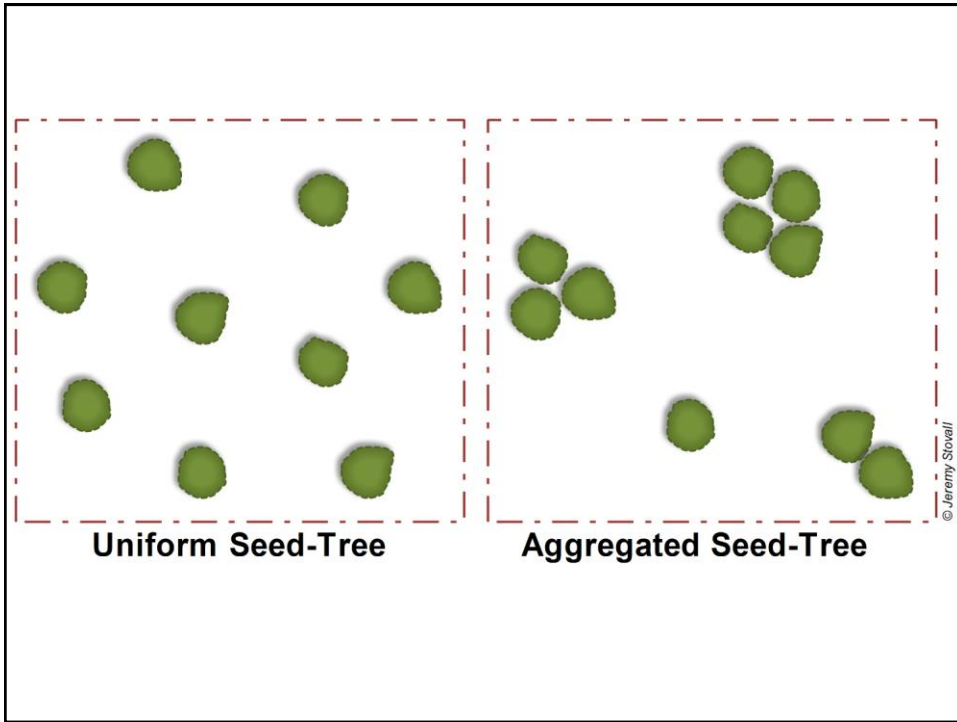And post-planting deer control!

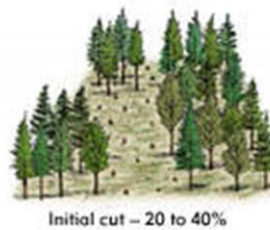PennState Extension

Seed Tree Method in degraded woodlands

- Rely on the scattered mature trees that could be a good seed source

PennState Extension

Uniform Seed-Tree   Aggregated Seed-Tree

© Jeremy Stovall

"Irregular" shelterwood variants: Expanding group shelterwood

Original stand

Initial cut – 20 to 40%

Second cut – 10 years
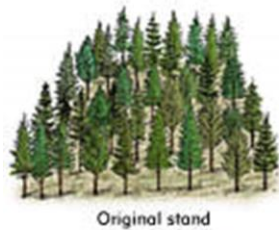
Start condition of degraded woodland

Extend group opening into shelterwood openings to promote new age classes

Source: www.for.gov.bc.ca/hfp/training/00014/index.htm   PennState Extension

Midstory but future seed tree

Midstory but future seed tree

Mature seed tree

PennState Extension

Photo: D. Jackson

PennState Extension

Management options for restoration

- Restoration Goals
  - Improve productivity of overstory/midstory (if there is enough to work with)

  - Improve woodlot quality
    - Remove poor vigor, unhealthy trees
    - Favor healthy trees of desirable species

  - Improve understory conditions to promote regeneration

PennState Extension

Low intensity restoration

Crop tree release

- Desirable species
- Between 6-12" dbh
- In better health/form

- Release at least 1-2 sides of tree

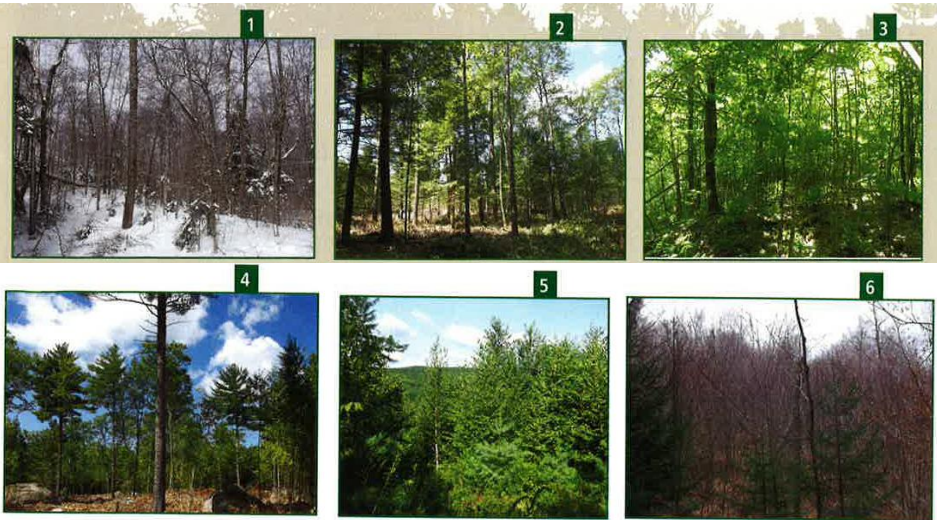- In dense patches, remove all competitors within 8-12 ft of crop tree

PennState Extension

High intensity restoration

- Crop tree release
- Thin dense mid-story

- and underplanting if open patches exist

Micro-stand (or "micro-type") management

(Holleran, R. 2016. Rehabilitation Silviculture.
Sawmills & Woodlots Oct/Nov 2016: 28-31)

Evaluate microtypes for combinations of:

- Overstory canopy
    - Amount of canopy closure (full, partial, none)
    - Quality of canopy trees (AGS or UGS…or SUGS)
    - Age of overstory (mature or immature)

- Understory condition
    - Advanced regeneration? (Y/N)
    - Undesirable vegetation? (Y/N)

PennState Extension

Then in each microtype decide on treatment:

- Regeneration method where:
  - Advanced regeneration is present and
    - full or partial canopy of mostly UGS (clearcut)
  - No regeneration but sufficient SUGS (shelterwood)

- Crop tree release or TSI where:
  - No regeneration and full canopy with limited acceptable growing stock…that can respond to release or be a future seed tree

- Understory vegetation management only
  - Partial understory with interfering vegetation

PennState Extension

Consequences of this approach:

- Results in a multi-aged forest with complex age and structural diversity

PennState Extension

Benefit of this approach

- Recovery of forest is faster than just a crop-tree approach, but is less drastic than a complete salvage operation

- Maintain some overstory canopy cover across the stand at all times
  - "Continuous canopy forestry"

PennState Extension

How to simplify the process

Photo source: Benji Shanahan

PennState Extension
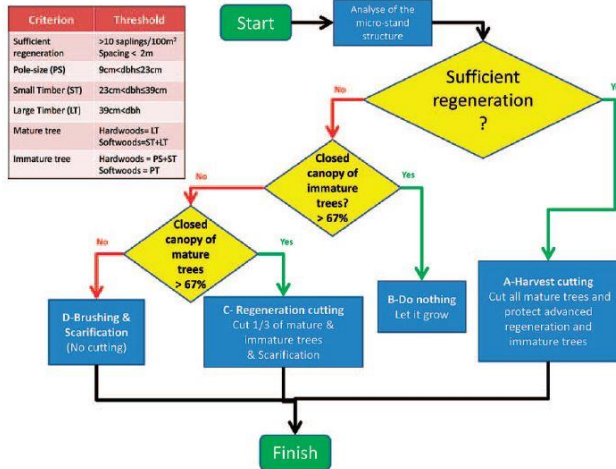
How to simplify the process

Figure 1. Decision-tree for multiple treatment irregular shelterwood systems.

Lussier and Meek. 2014. Managing heterogenous stands using a multiple treatment irregular shelterwood method. J. of For. 112: 287-295

PennState Extension

ROACH-BAUER FORESTRY FORUM

A series of lectures with discussion on current forestry topics for foresters and related professionals in Northwestern Pennsylvania and Southwestern New York

PROGRAM

"Using a Multiple Treatment Approach for Rehabilitation Silviculture"

Dr. Jean-Martin Lussier

Research Scientist in Silviculture and Forest Management, Canadian Wood Fibre Centre, Canadian Forest Service

Dr. Lussier's career has spanned 25 plus years. He is currently employed by the Canadian Wood Fibre Centre within the Canadian Forest Service. The Wood Fibre Centre is dedicated to the enhancement of the competitiveness of the Canadian forest sector and is directly supported by Forest Program Innovations, one of the world's largest private, non-profit research centers. Dr. Lussier's research focuses on the development of silviculture systems adapted to hardwood, mixedwood and softwood stands, on the growth response of stands to partial cuttings, and on the optimization of forest management decisions.

DATE: Thursday, April 5, 2018 REGISTRATION: 5:30 – 6:30 PM (Cash Bar) DINNER: 6:30 PM
LACE: Kane Country Club, Kane, PA. Route 6 between Lantz Corners & Kane, opposite Kane Drive-In Theatre

For reservations, contact the Allegheny Hardwood Utilization Group in Kane at 837-8550, by fax at 837-4950 or by email at hardwood@penn.com.

PennState Extension

What should we do here?

PennState Extension

Thank you!

PennState Extension