Using Science & Silviculture to Improve Land Stewardship

Dan Donahue

Dan Evans

Norcross Wildlife Sanctuary

The Forests of Southern New England: Dynamic & Resilient

- Altered by Historic Events
  - Clearing and intensive agriculture
  - Industrial revolution – charcoal
  - Railroad / charcoal – wildfire
  - Soil erosion
  - American chestnut blight
  - Salvage logging
  - 1938 Hurricane
  - Gypsy moth, hemlock wooly adelgid, emerald ash borer, ALB
  - Invasive species / climate change

ONE OF THE LARGEST LOADS OF LOGS EVER HAULED.—From a Photograph.
21 FEET HIGH AND 20 FEET WIDE, CONTAINING 31,480 FEET.

Charcoal Industry

American Chestnut Blight

1938 Hurricane

1938 Hurricane Post-Salvage

The Role of Research

- Improve understanding & inform management
- Ecological processes
  - Forest succession
- Energy cycling
  - Forest carbon
- Plant – animal Interactions
  - Deer herbivory
- New England-based institutions
- Foundation for management

Silviculture; aims to control the establishment, growth, composition and density of trees in managed forests

- Should be the central tool used for accomplishing any forest management objective
  - Aesthetics
  - Recreation
  - Wildlife habitat
  - Carbon storage
- An Applied Science
  - Ecology
  - Biology
  - Entomology
  - Soil chemistry
  - Wildlife Biology
- Variety of Techniques & Applications

Silviculture in Southern New England

- A Rich History
  - First forestry school was founded (Yale, 1900) – Gifford Pinchot
  - Nations first state forester – CT 1901
  - New England's 1st State Forest – CT 1903 – 'Portland State Forest'
  - First prototype of the Civilian Conservation Corp - (CT 1930)
  - Major educational institutions maintain research forests
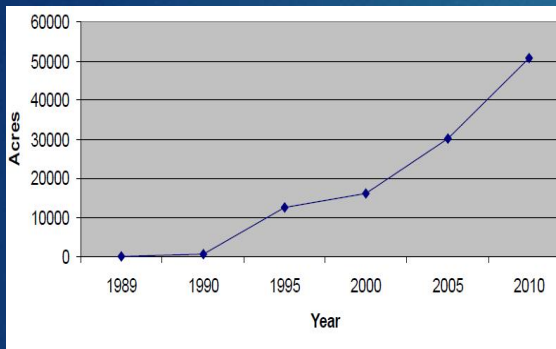 - RI Forest Stewardship Program

Rhode Island Statistics

Figure 3
Acreage of Forest Classified Properties in FFOS Program[15]

Figure 6
Changes in Area by Forest Size Class [19]

Figure 14
RI Hunting and Fishing License Sales

Forest Stewardship
Enrollment in landowner
incentive program

Young Forest
Acreage on the decline

Hunting & Fishing
Long-term participation decline

Case Study:
Norcross Wildlife Sanctuary

USING SCIENCE AND SILVICULTURE TO IMPROVE LAND STEWARDSHIP

The Planning Process – Why

Why Plan?

▶ 8,000+ acres of forest land

▶ Wide array of forest types & conditions

▶ Acquired between 1916-1965 & 1993-present

▶ 100+ Different Grantors

▶ Hundreds of previous owners

▶ Organizational mission to protect and improve flora & fauna

The Planning Process – How

Legend
- Working Forest
- Forest Reserve
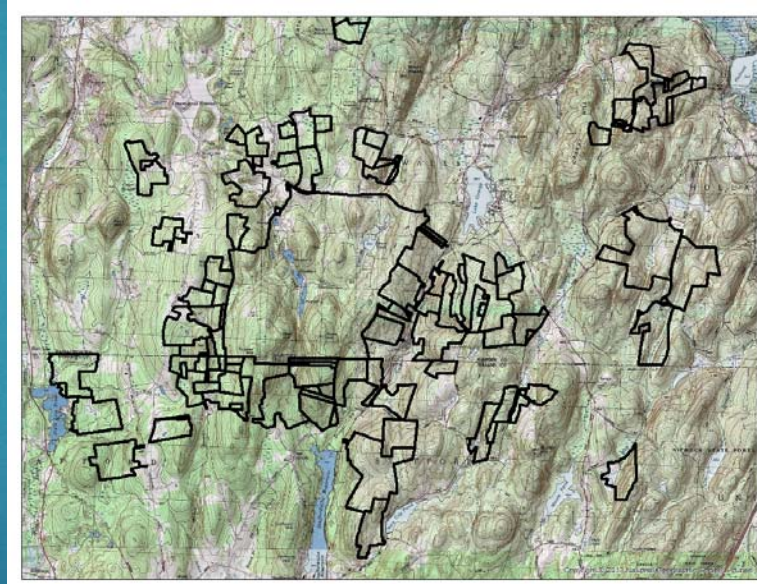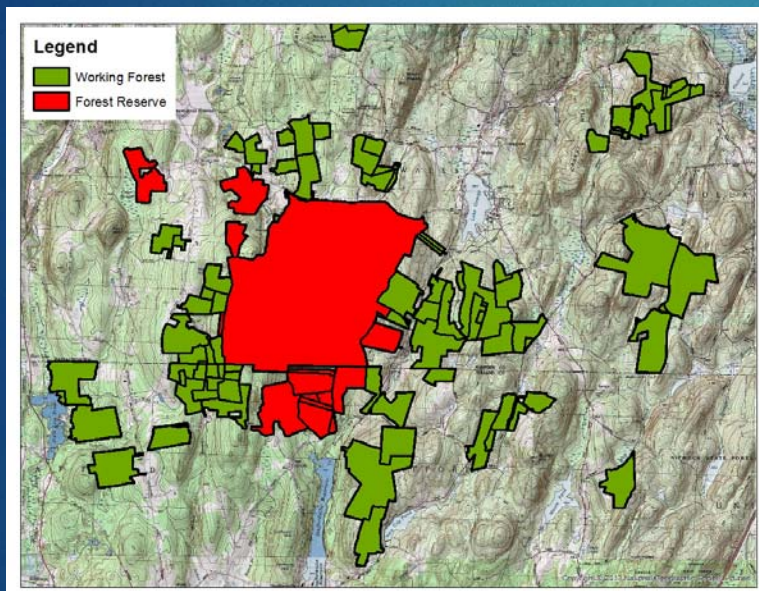
How To Plan

- ► Set Goals – why do you own land?
  - ► Over what time period?
- ► Inventory – what do we have here
- ► Observe – is our forest resource serving our goals?
- ► How can we do better?
  - ► Action steps
- ► Volunteers vs. Professionals

The Planning Process – Goals

Goals & Objectives

► What do you value about the land
► Why do you own the land
► How can land further our mission
► Set Goals and ways to achieve them
► Specific – Measurable – Attainable
► Based on
    ► Wildlife
    ► Aesthetics
    ► Forest Products
    ► Ecological Processes
► Silviculture can help achieve goals
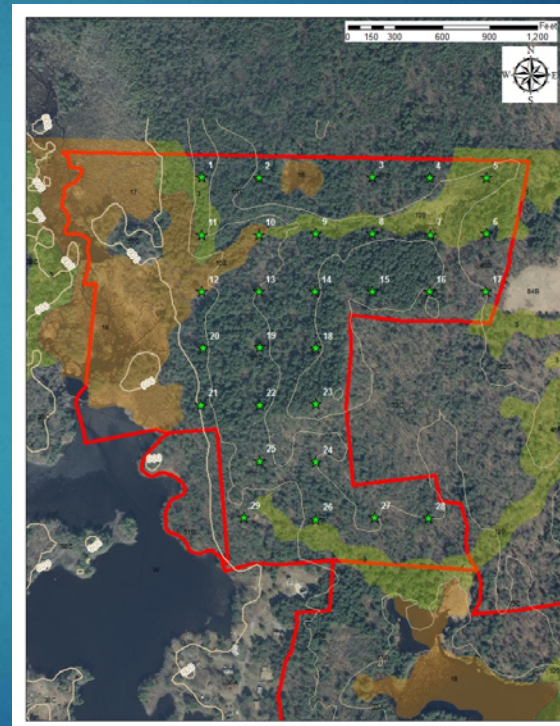► Multiple-Use Management

Norcross Specific Goals

Norcross Goals

▶ Protect & Improve Tupper Hill

▶ Plant & Wildlife Habitat

   ▶ Array of native species which inhabit our forests (bunnies – bears)

▶ Active stewardship impact

▶ Guide Forest Resilience

   ▶ Maintain diverse forest

▶ Store / Accrue Carbon
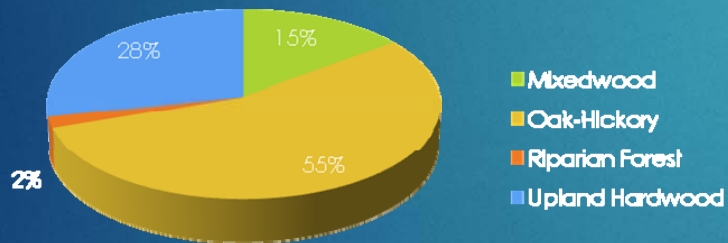
▶ Support local economy

The Planning Process – Inventory

- Forest Inventory is essential
  - Biological evaluation of resource
- Wildlife Habitat Resource
  - Food, Water Resources, Cover, Age-Class, Snags, Cavities, Acorns
- Boundaries & Encroachments
- Invasive Shrubs
- Forest Reserves
- Timber Resource
  - stocking, volume, quality, type
- Landscape History
  - stone walls, cellar holes, stumps, cedar trees, soil mounds

The Planning Process – Analysis
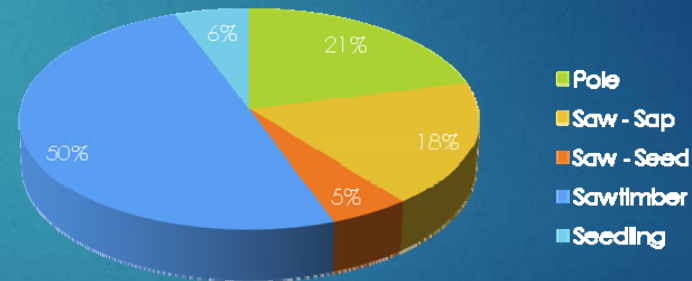## What, Where, How Much…

Forest Type by % Area

- Mixedwood
- Oak-Hickory
- Riparian Forest
- Upland Hardwood

15%
28%
2%
55%

Size-Class by % Area

- Pole
- Saw - Sap
- Saw - Seed
- Sawtimber
- Seedling

6%
21%
18%
5%
50%

The Planning Process – Desired Future Condition

Current Forest Condition

- Based on Inventory
- Baseline Condition
- Determined by past land-use and physical landscape properties
- Can be improved upon

Desired Future Condition

- Based on Research
- Determined by managers based on the capacity of the land and vision for the future
- Will depend upon actions or inactions undertaken today

Age Class	Percent Area	Desired Future %
Seedling/Sapling**	7%	25%
Pole	25%	25%
Saw-timber*	68%	50%

The Planning Process – How to Prioritize

▶ **Categorize!**

    ▶ Low, Medium, or High Intensity (Invasive Plant Populations)

    ▶ Ratio of Good Quality to Poor Quality Growing Stock (AGS vs. UGS)

    ▶ Overstocked / Adequately Stocked

    ▶ Site Quality (Soils) – More effective on better sites.

    ▶ Desirable Regeneration

    ▶ Plan appropriate areas to pursue specific goals

    ▶ Can't manage for every species on every acre

A Silviculture Case Study:
Norcross Wildlife Sanctuary

- 2,000-acre Core Sanctuary
  - Unmanaged interior forest habitat
- 6,000-acre Greater Sanctuary
  - Active Wildlife Habitat Mgmt.
  - Silviculture is the central tool
  - Inventory, Analysis, & Attributes help prioritize habitat projects.
- Don't need 8,000 acres!

A Silviculture Case Study:
Core Sanctuary Interior Forest Habitat

- ▶ Un-fragmented Interior Forest
- ▶ High-Volumes of Carbon Stored
- ▶ Habitat for Wildlife Species sensitive to disturbance
- ▶ Multiple Age-Classes of Trees
- ▶ Multiple Layers of Vegetation
  - ▶ Herbs, Shrub, Sapling, Pole, Saw
- ▶ Coarse-Woody Material
- ▶ Compositional Complexity

A Silviculture Case Study:
Child's Road Farm Mgmt. Area

Acquisition & History

- Acquired in 1997
- Active dairy farm
- History of intensive grazing
- Perimeter fencing
- Severe invasive species
- Sand & gravel mining
- Timber & cordwood cutting
- Pond Establishment

A Silviculture Case Study: Child's Road Farm Mgmt.

Management Philosophy

- Rehabilitate abused forest land through thinning & regeneration
- Transition pine-dominated stand to young, hardwood forest
- Increase forest complexity
- Benefit wildlife food availability
- Increase proportion of young-forest habitat
- Introduce habitat from large woody material
- Retain uncommon tree species
- Use timber sale revenue for land acquisition / stewardship funding.

A Silviculture Case Study:
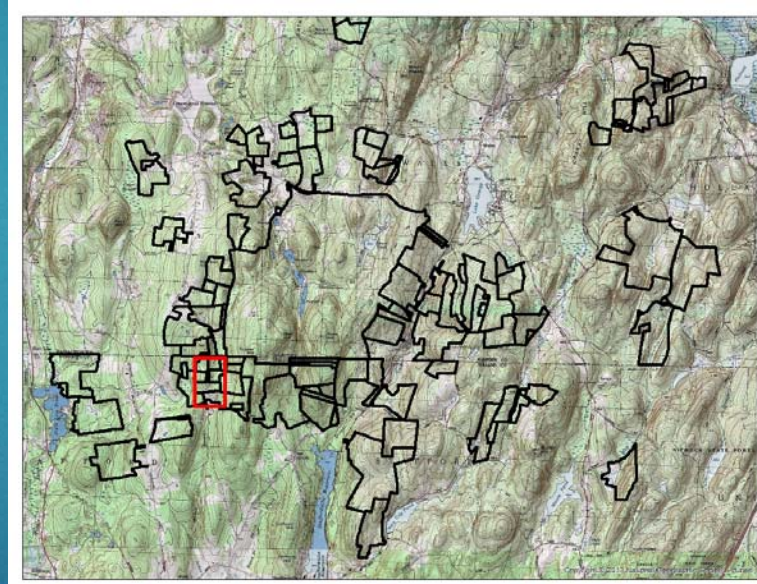
A Silviculture Case Study:
Child's Road Farm – NWS

Management Outcomes

▶ Treated 5 areas over 60+ acres

▶ Increased young forest habitat from 0-5%

▶ Controlled invasive species within and adjacent to harvest units

▶ Increased vigor, growth rates, and wildlife food availability

▶ Benefitted soft mast availability

▶ Introduced deer hunting

▶ Earned $6,000 in revenue: re-invested in road improvements.

A Silviculture Case Study:
Whaleback Ridge Management Area

Acquisition & History

- Nine Parcels acquired 1996-2009
- Diverse Management History
    - One Owner employed Forester
    - Remainder was logged heavily
- Contains a portion of existing young-forest habitat
- Adjacent to Agricultural Land
- Encompasses early-successional grasslands & shrub habitat

A Silvicultural Case Study:
Whaleback Ridge Management Area

Management Philosophy

- Establish an additional 18-acres of young-forest habitat.
- Target young-forest creation on historically mismanaged acreage.
- Plan follow-up silviculture to ensure a patchwork of young-forest.
- Improve stocking and species composition outside of regeneration areas.

Desired Future Condition

- Irregular, resilient forest condition
- Multiple Age-Classes of trees
- Areas allocated to young-forest
- Increase early-successional habitat to 13% of forest block
- Increase young-forest adjacent to marsh and scrub-shrub habitat.
- Flood of regeneration to overwhelm deer

Irregular Shelterwood Harvest

Dominant, high-quality trees retained singly and in small groups. Areas greater than 1.5 tree heights (in diameter) allocated to young-forest regeneration. Creates Irregular, structurally diverse forest.

Irregular Shelterwood Harvest

Natural Disturbance-Based Silvicultural Model – Silviculture intended to mimic the effects of medium to large-scale natural disturbance (Hurricane, Ice Storm, Tornado etc.) High Intensity – Low Frequency Disturbance.

Natural Disturbance:
6/2011 MA Tornado

Not Every Tree

Isolated Groups of Trees remained undisturbed

Adjust Spacing

Individual trees impacted due to poor form or structural weakness

Regeneration

Significant areas allocated to growing young forest

Natural Disturbance Model:
The Difference Is…

Culls

Low-Quality, small, poorly-formed stems often retained

Control

No influence over which trees are impacted

Clean-Up

Achieve better regeneration response?

Early-Successional Forest Habitat:

Young Forest

Less than 25 years-old with abundant low-cover

Getting Too Old

Canopy closure = less cover at ground-level

Reset Timeline

Slash provides immediate low-cover, stump sprouts regenerate

# Science & Silviculture – Improving Land Stewardship at Norcross

- ▶ Ability to modify habitat across large acreages at low-cost

- ▶ Facilitates prioritization of invasive plant control

- ▶ Complexity can mitigate the effects of deer herbivory

- ▶ Increases opportunities to educate and demonstrate

- ▶ Increases property monitoring frequency – presence

Concluding Comments:

What you can do…

▶ Observe Forest Conditions

▶ Set Reasonable Goals

▶ Count & Categorize

▶ Make A Plan

   ▶ Involve Action Steps

▶ Utilize Research

▶ Evaluate the Effects

▶ Adapt Procedures

▶ Questions?
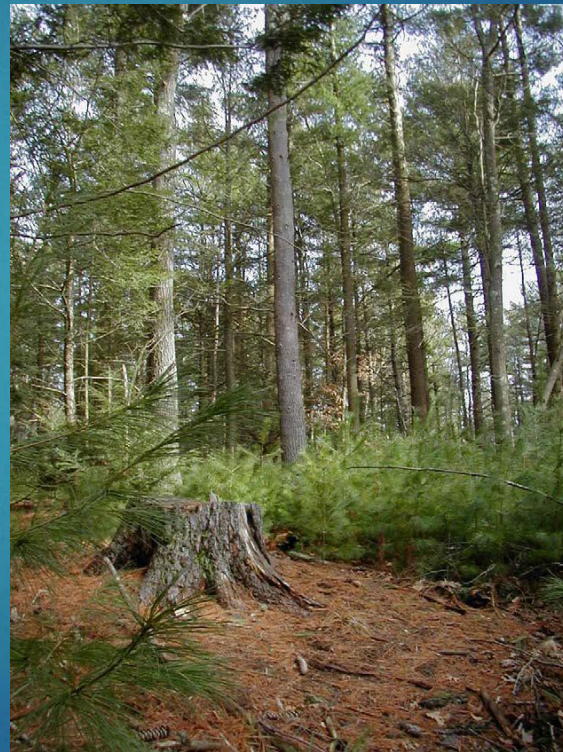
Contact Information

Dan Evans

Norcross Wildlife Sanctuary

30 Peck Rd.

Wales, MA 01081

drevt4124@yahoo.com

(413) 267-5579

Dan Donahue

Norcross Wildlife Sanctuary

30 Peck Rd.

Wales, MA 01081

dfdnwf@charter.net

(413) 267-5579