

# Proposed treatments of planted white pine in the Waynesville Watershed



**Peter Bates and Rob Lamb**  
in collaboration with  
**The Waynesville Watershed Advisory  
Committee**  
September 14, 2010



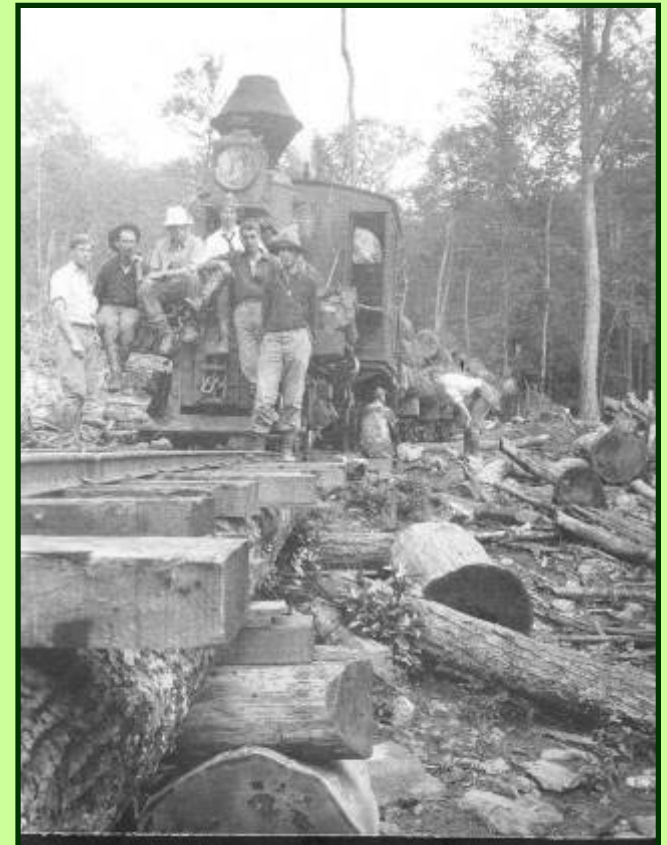
# **Presentation overview**

- Brief review of watershed history
- Summary of current conditions and rationale for proposed treatments
- Proposed strategy for implementation of treatments

# Waynesville watershed history



*Historic photographs  
from Quinlaintown  
Ca. 1907*



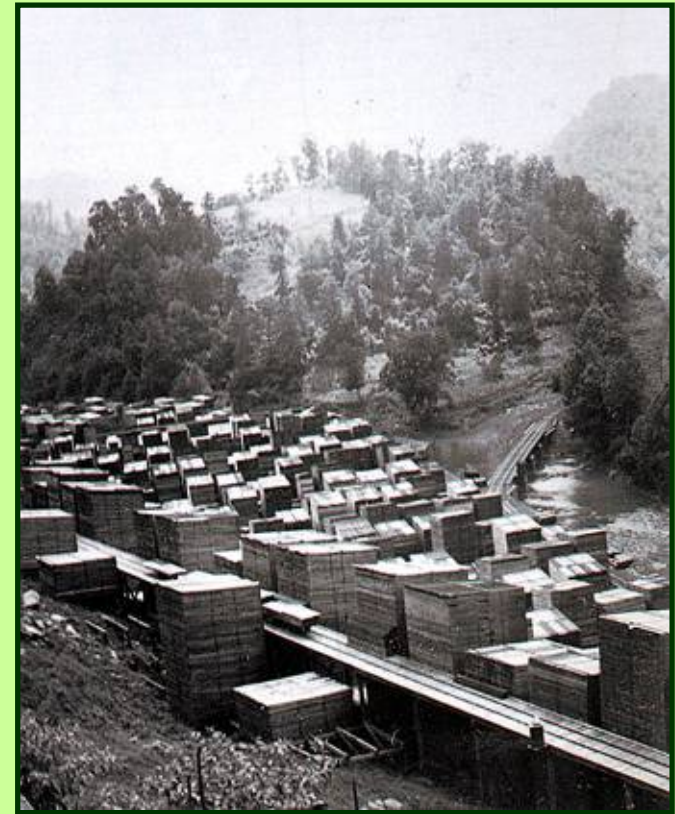
**A century of intensive land use**



# 1900 to 1920: Timber mining

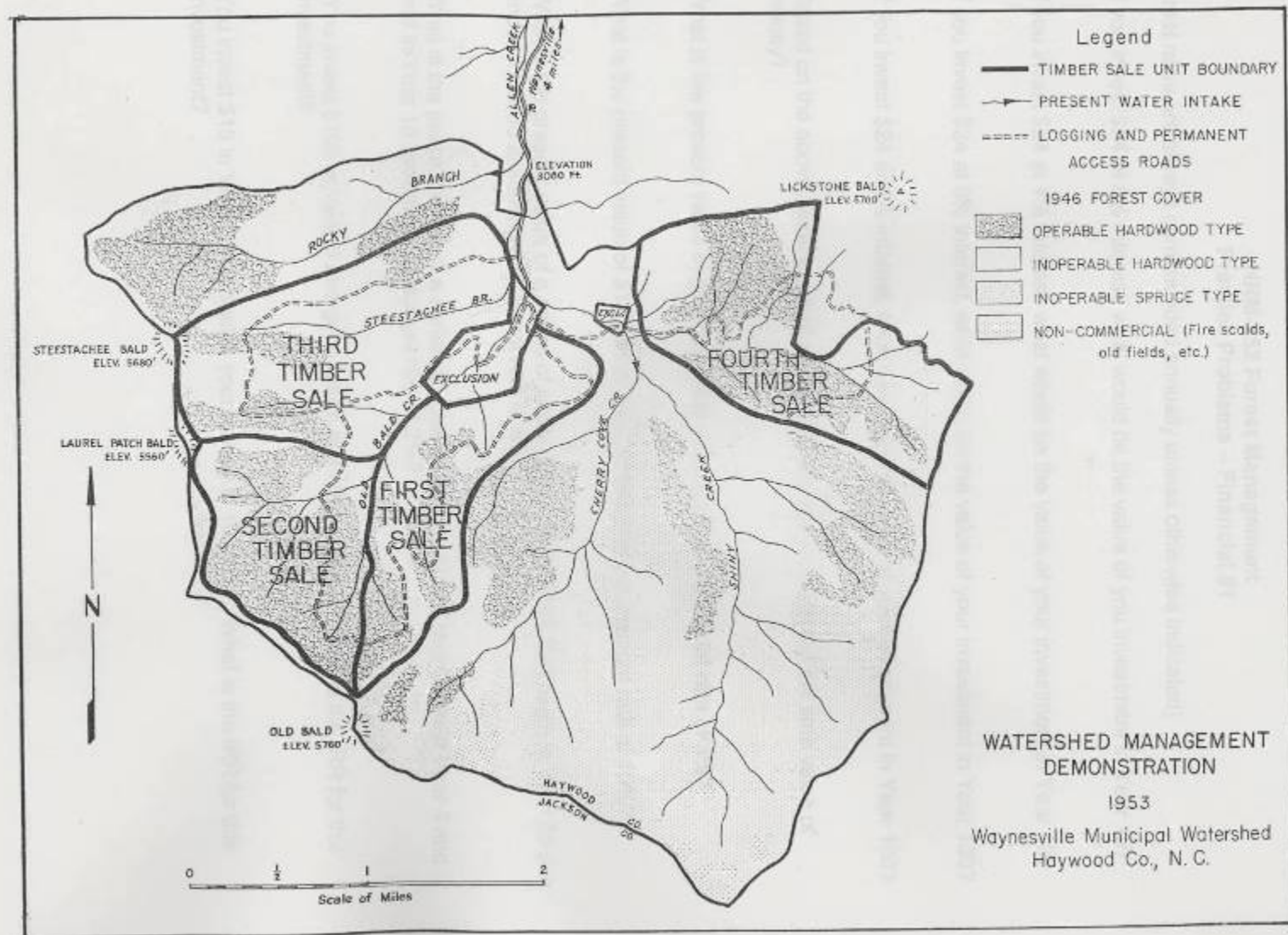


*Note: These are local photos, but they are not from the watershed*



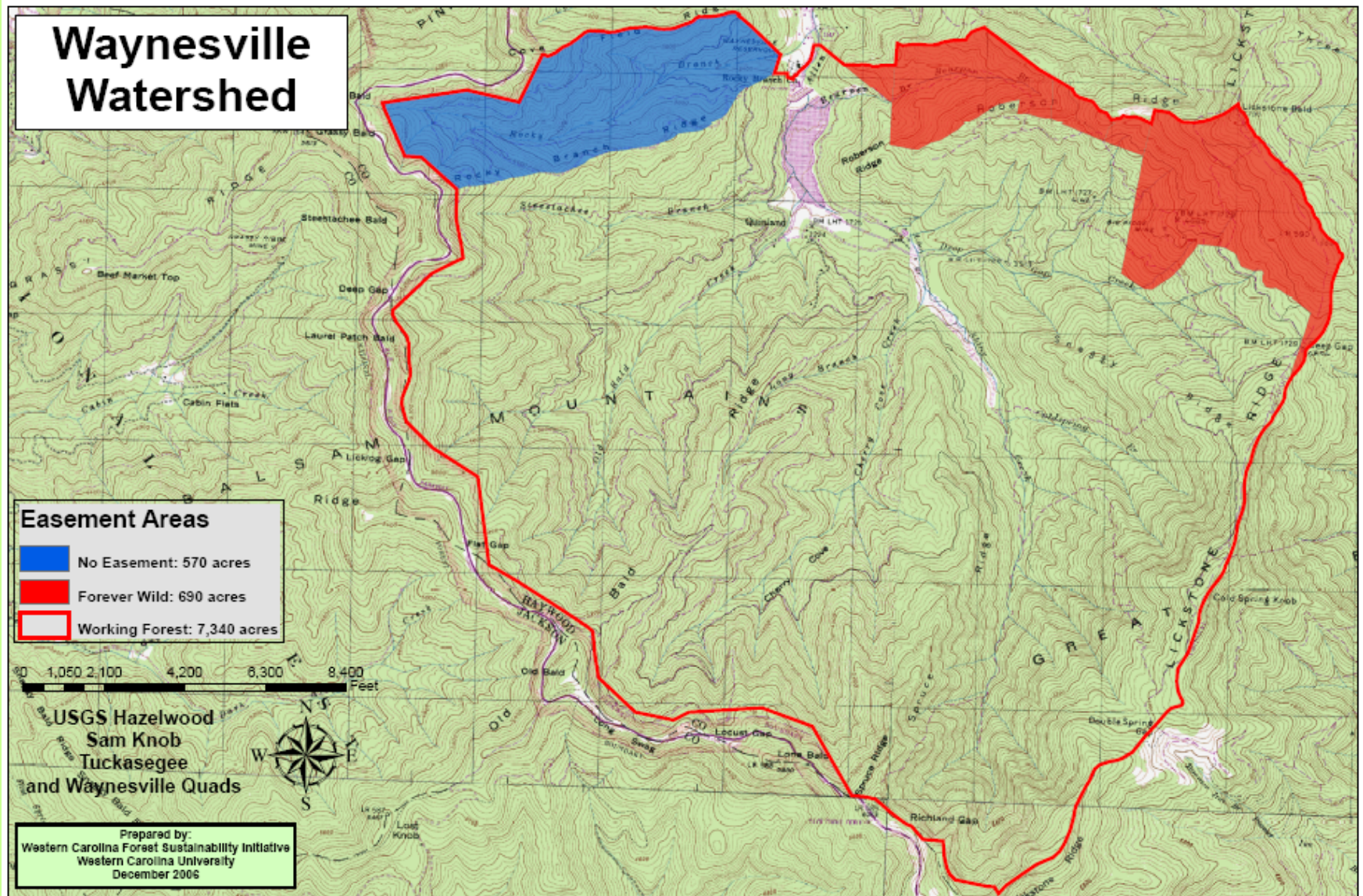
- 5 million BF harvested per year
  - In 2005, the USFS cut 8.6 million BF from 1.2 million ac in NC
- Extensive clearcutting
- Use of natural flumes and splash dams

# 1950's and 1980's: Intensive timber extraction on thousands of acres

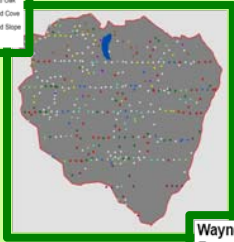
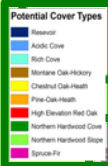
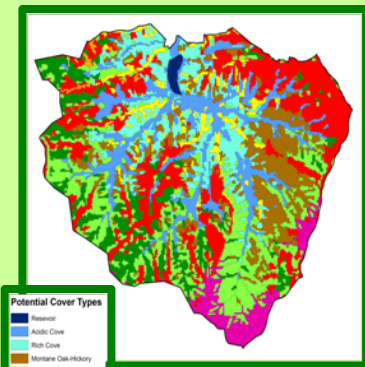
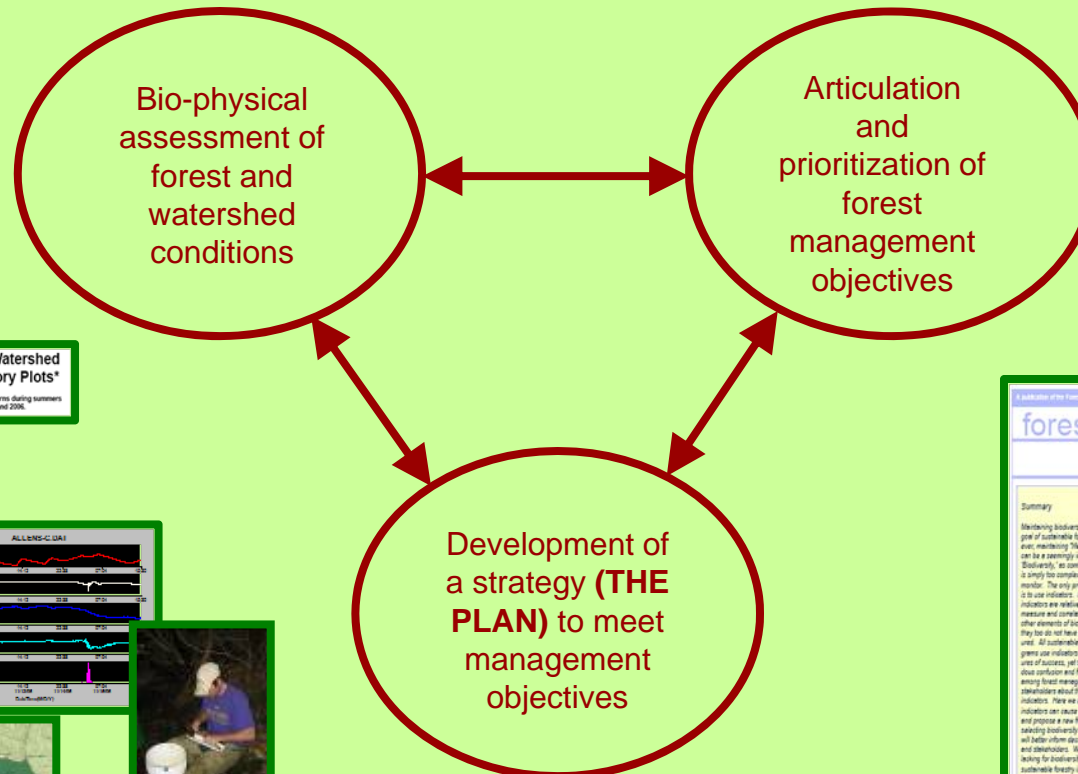




# Conservation Easements -- 2005

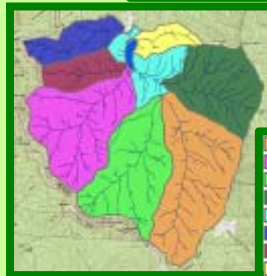
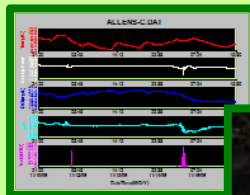


# Forest Management Planning Process



**Waynesville Watershed Forest Inventory Plots\***

\*Plots collected by NCFRI interns during summers 2002, 2003, 2004, and 2006.



**Workshops**  
**Public Meetings**  
**Stakeholder Dialogue**

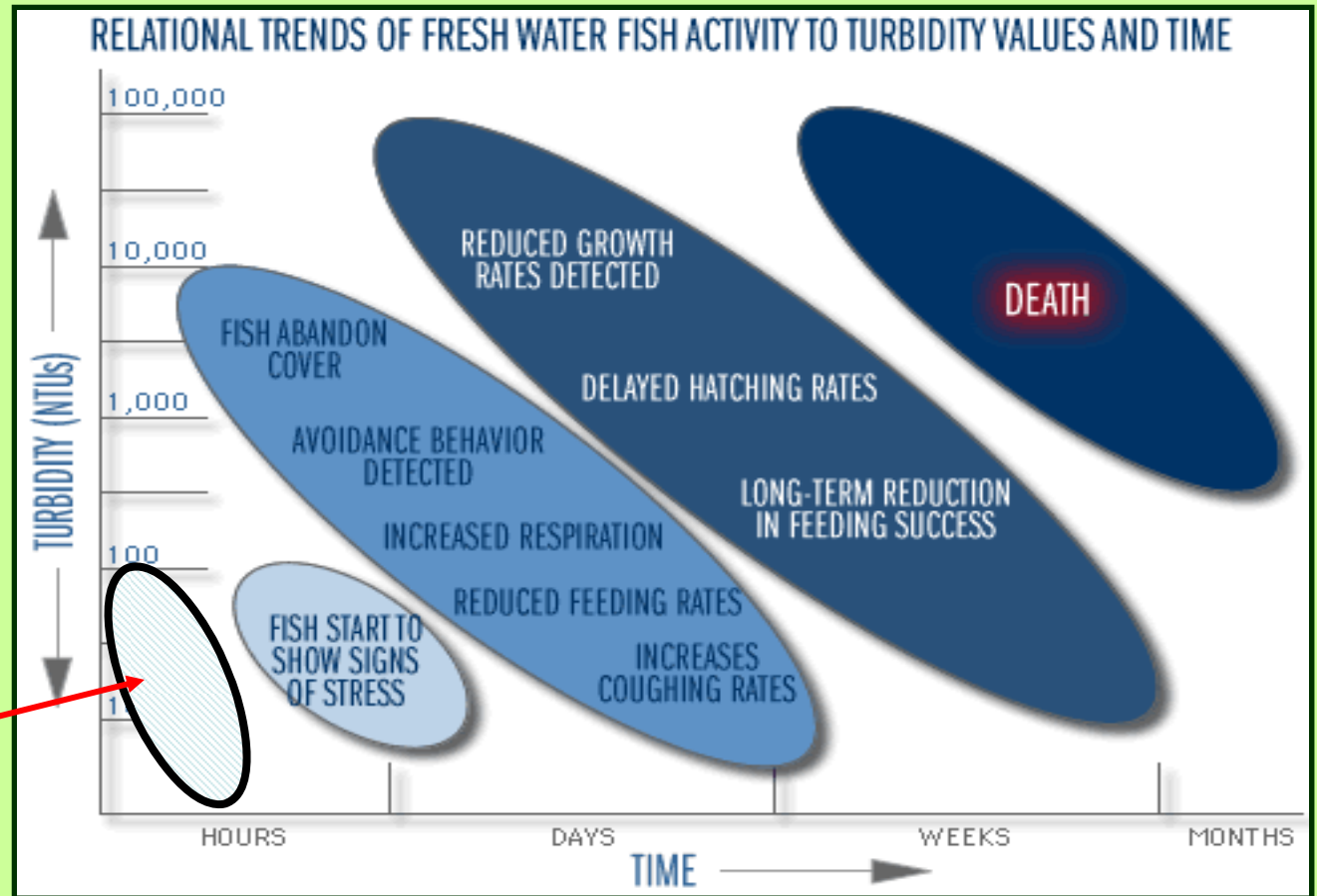




# Water quality

## Water quality (excellent)

- Turbidity
- Total suspended solids





# Aquatics

Excellent

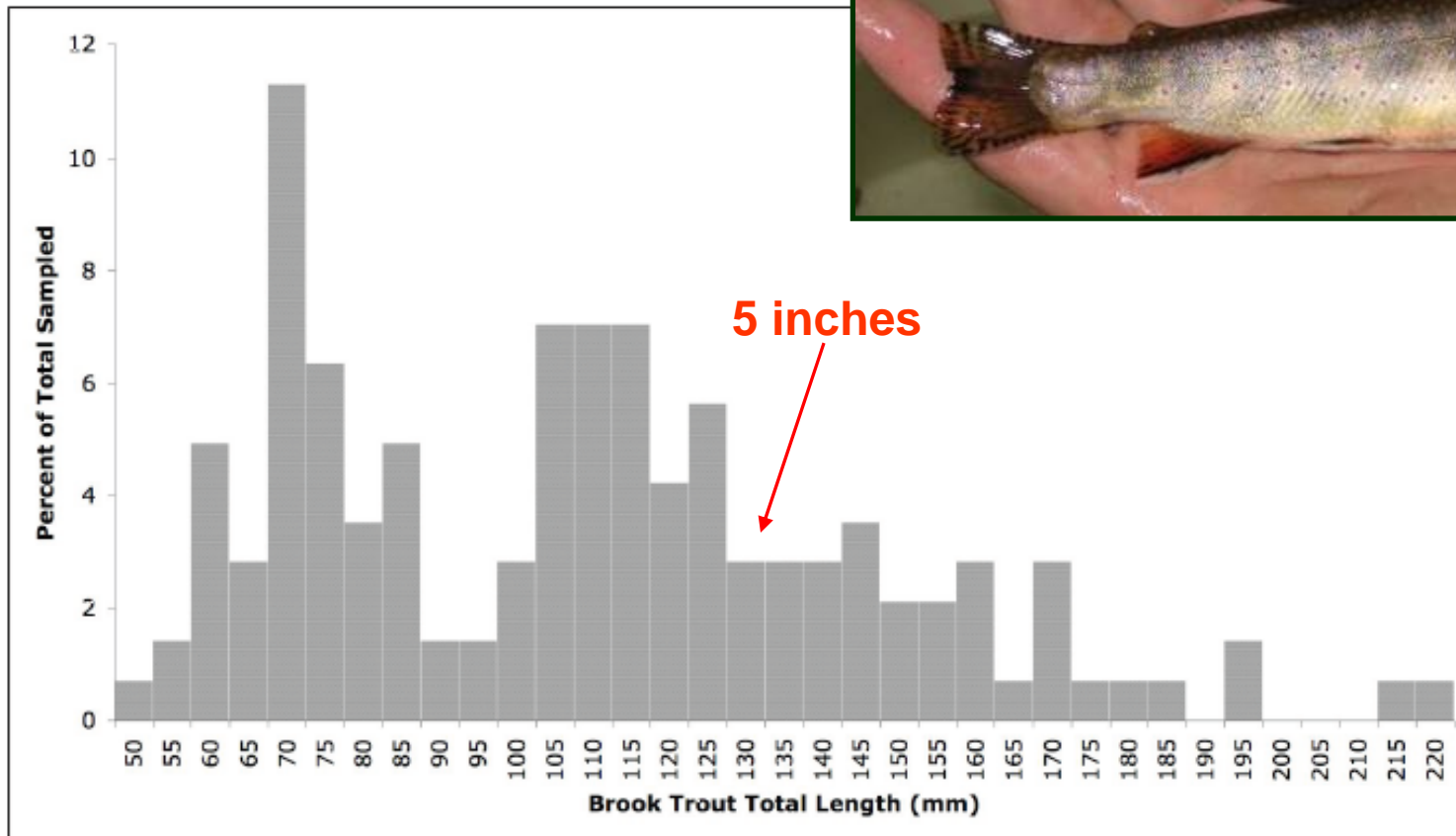
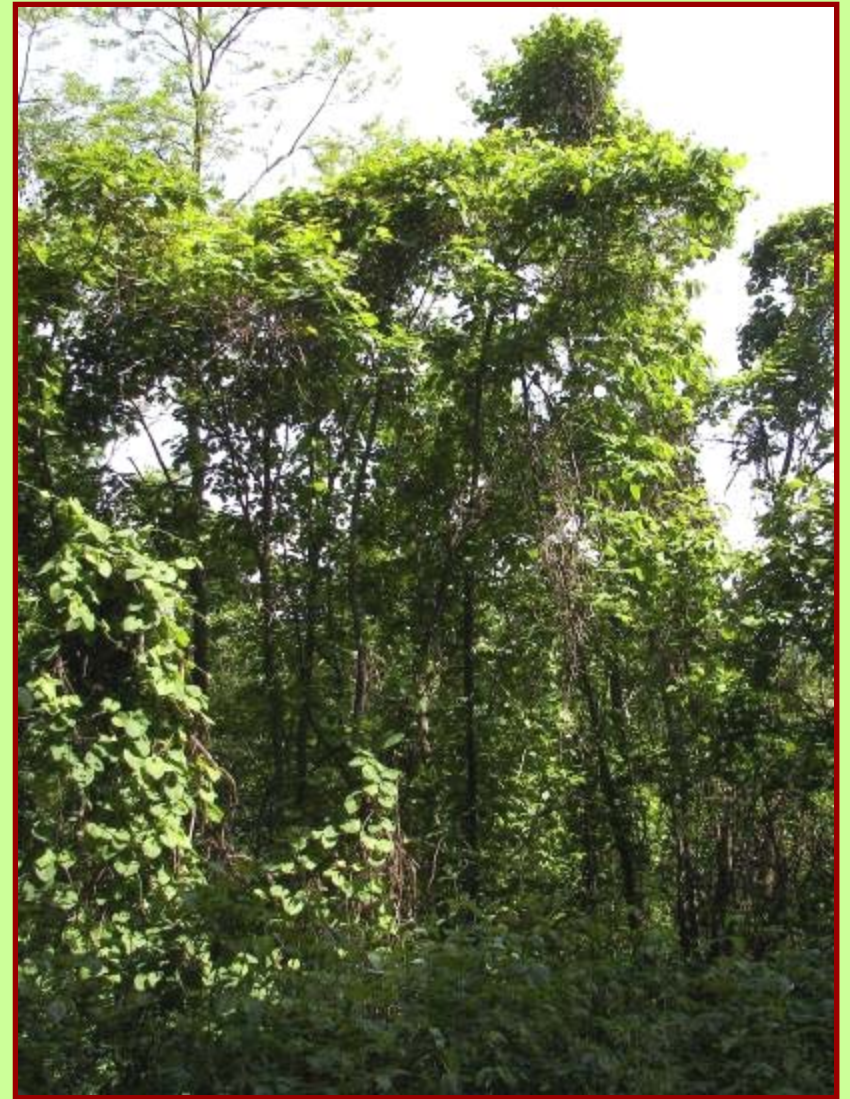


Figure Fish.1. Brook trout length distribution for streams in the Waynesville watershed.

# Some Forest Assessment Highlights

- Generally healthy
- Contains less overall diversity than was historically present
  - widespread clearcutting during the past century
  - introduction of non-native pests
    - Chestnut blight
    - Balsam adelgid
  - Reduction in fire frequency on some of the drier sites.





## Some forest assessment highlights (cont.)

- Much of the forest has been converted from multiple-aged stands to even-aged stands.
- The overstory contains a greater percentage of early successional species than were previously present.
- American chestnut and Fraser fir have essentially been lost from the overstory due to insect and disease attacks, though both still persist in the understory.
- Maple and birch are dominating the midstory and in many areas will replace oaks and hickories in the overstory
- The production of high quality hard mast will fall well below historical levels due first to the loss of American chestnut, and then to a reduction in the number of mature oaks.
- For the most part, the forest is not structured to achieve historical levels of natural gap phase stand disturbances.
- Mountain laurel is becoming increasingly dense on drier sites (perhaps due to a reduction in fire frequency), and is limiting the growth of other species.

## **Current threats of note:**

**Hemlock wooly adelgid:** It is likely that more than 90% of the hemlock will die within the next decade.

**Oak decline:** Isolated evidence of oak decline was observed in some areas, but was not widespread.

**Other insect and disease issues:** There is a continual threat that new insect and disease problems may become established in the watershed.

- ***Ex) emerald ash borer observed in TN***

**Air pollution and climate change:** Outcomes and effects are unknown, but could be significant



# **Forest stewardship goal – Maintain a healthy forest**



**A healthy forest is the best known  
land cover for protecting water quality**

# The key to forest health:

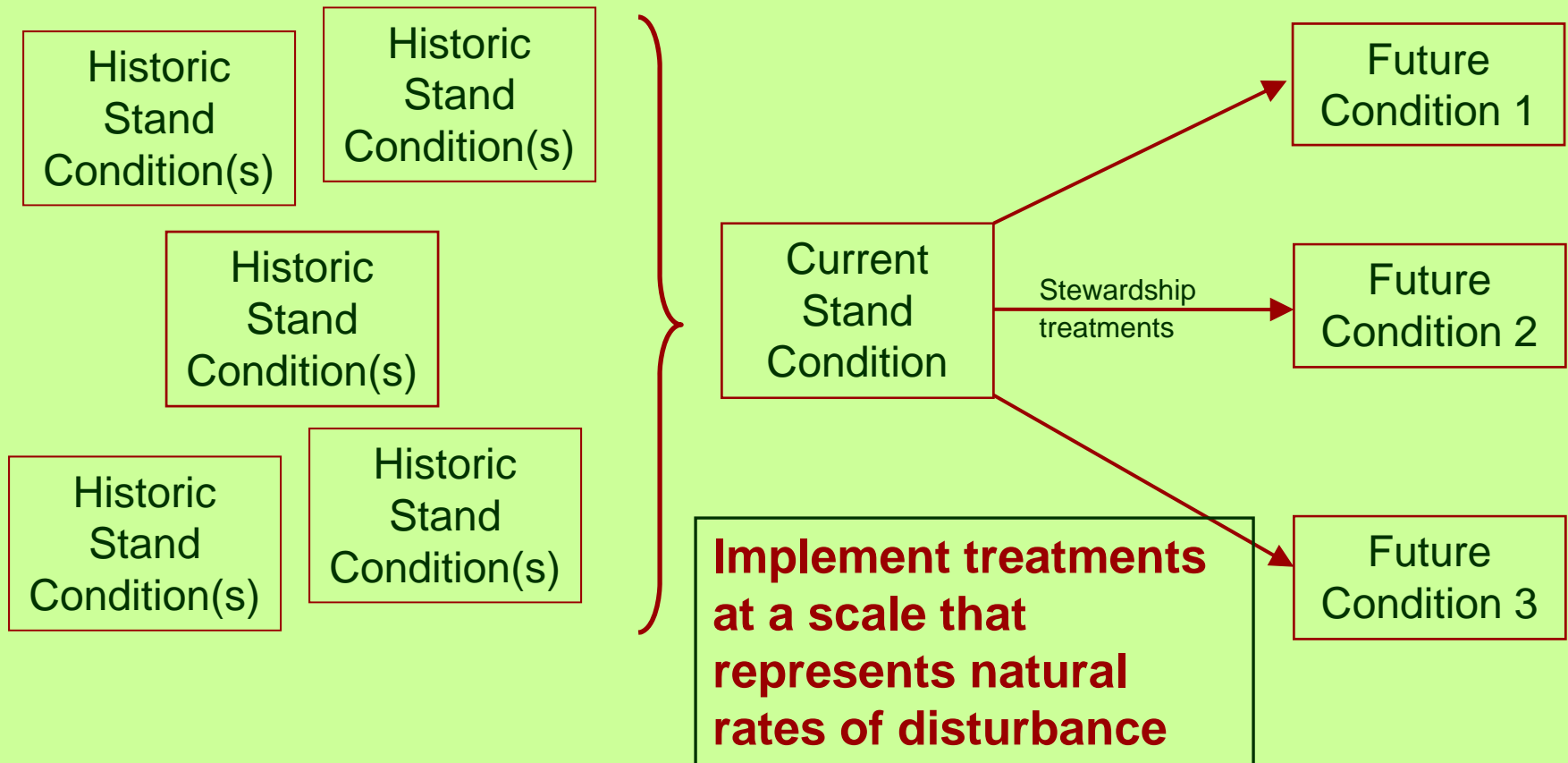


**Increase natural forest diversity**

**More resistant and resilient to current  
and future forest stresses**

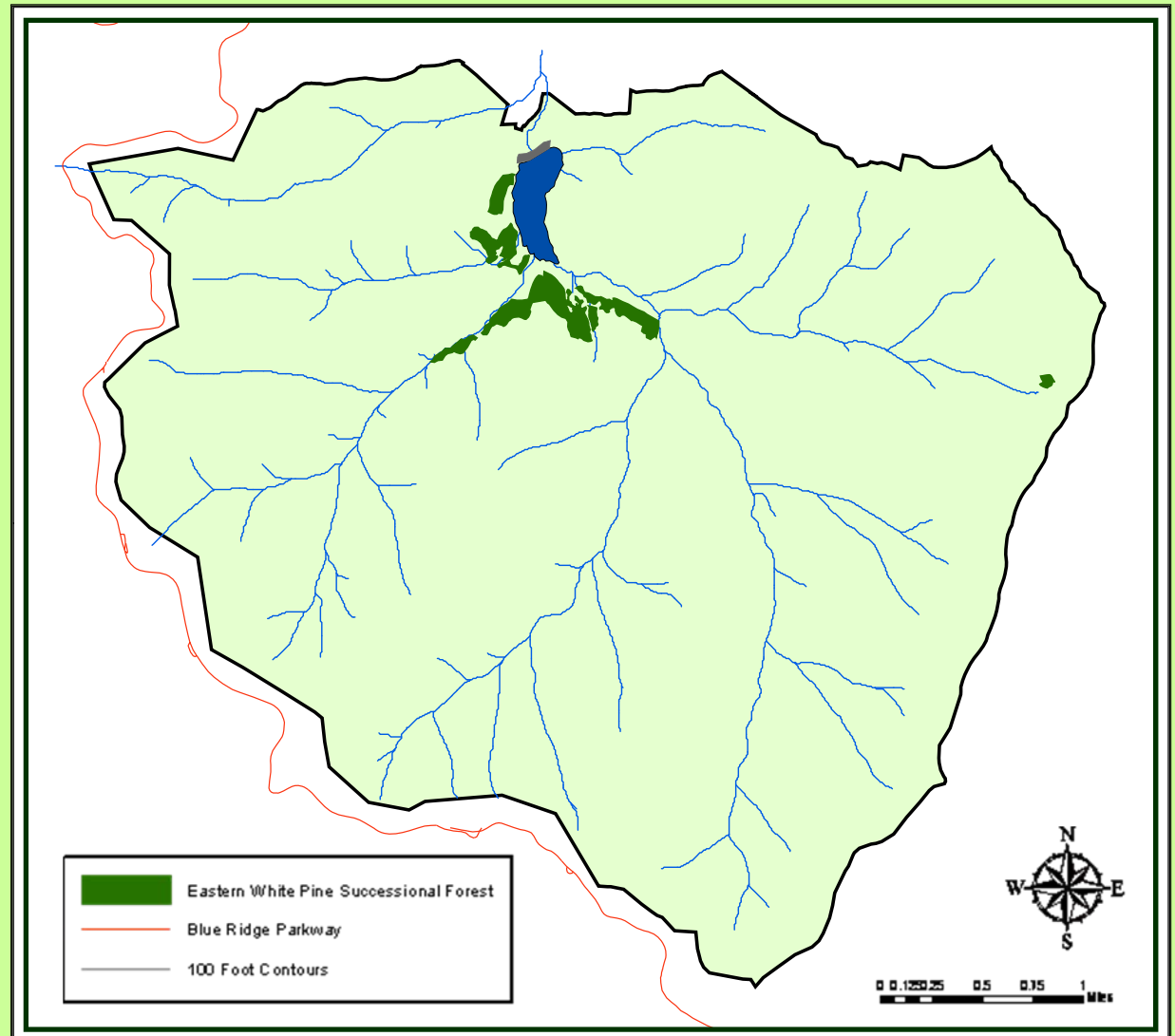


# Increase diversity by introducing treatments that mimic natural disturbances and allow for natural patterns of stand development



# First proposed treatment area: Eastern White Pine Stands

- White pine plantations that were established in the 1980's
  - Stabilize soils
  - Restore soil fertility
- Artificial ecosystems that do not represent natural forest communities for this area



## Currently overstocked – too many trees per acre

- Trees are stagnating and susceptible to:
  - drought,
  - pine beetle attacks
  - other stresses
- Potential for wide-spread mortality





## Currently overstocked – too many trees per acre (cont.)

- Trees are shading the understory
  - Preventing natural regeneration from becoming established



# Stewardship objectives

- Stimulate establishment of natural hardwood regeneration
  - Allow more sunlight to reach the forest floor
- Increase vigor and health of residual white pine overstory trees
  - Make more moisture and nutrients available to each tree
- Capture anticipated mortality
  - Generate revenue
  - Minimize future hazards as trees die in the overstory





# Two Proposed treatments to achieve objectives

## 1. Thinning

- Areas where white pine are still healthy
- Favor vigorous white pines of good form
- Favor existing hardwoods
- ***Leave a residual basal area of about 90 ft<sup>2</sup>/acre***
- ***180 trees/acre***

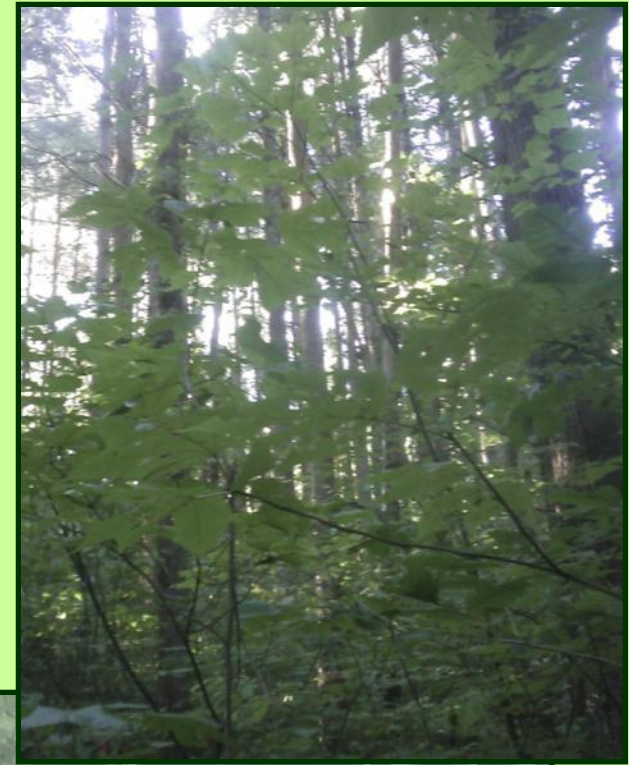




# Proposed stewardship treatments (cont.)

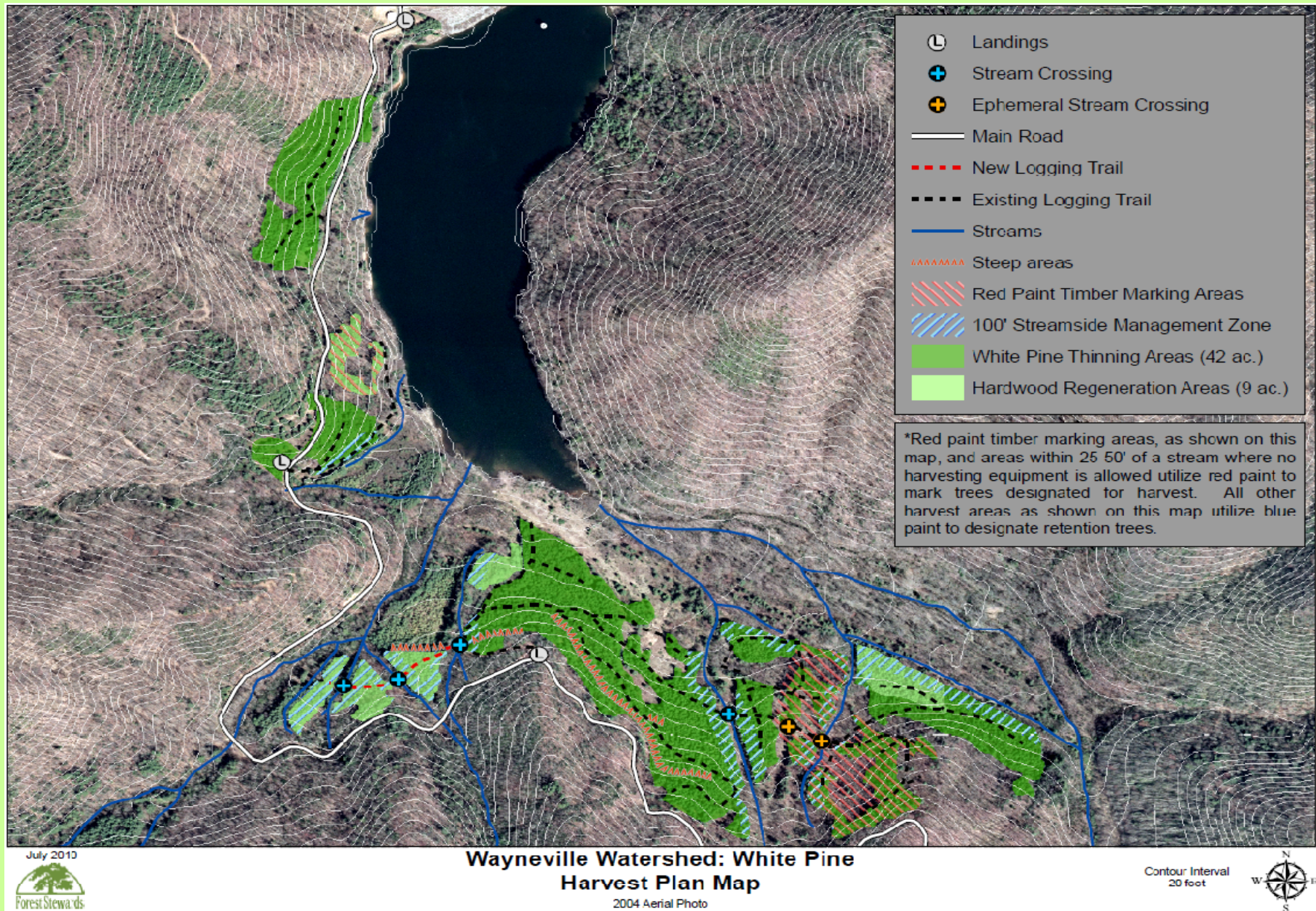
## 2. Release established hardwood regeneration

- Areas where natural regeneration is established, and
- Areas where overstory trees are no longer viable
- Remove ½ of overstory to release natural regeneration
- ***Leave a residual basal area of about 60 ft<sup>2</sup>/acre***
  - ***65 trees/acre***





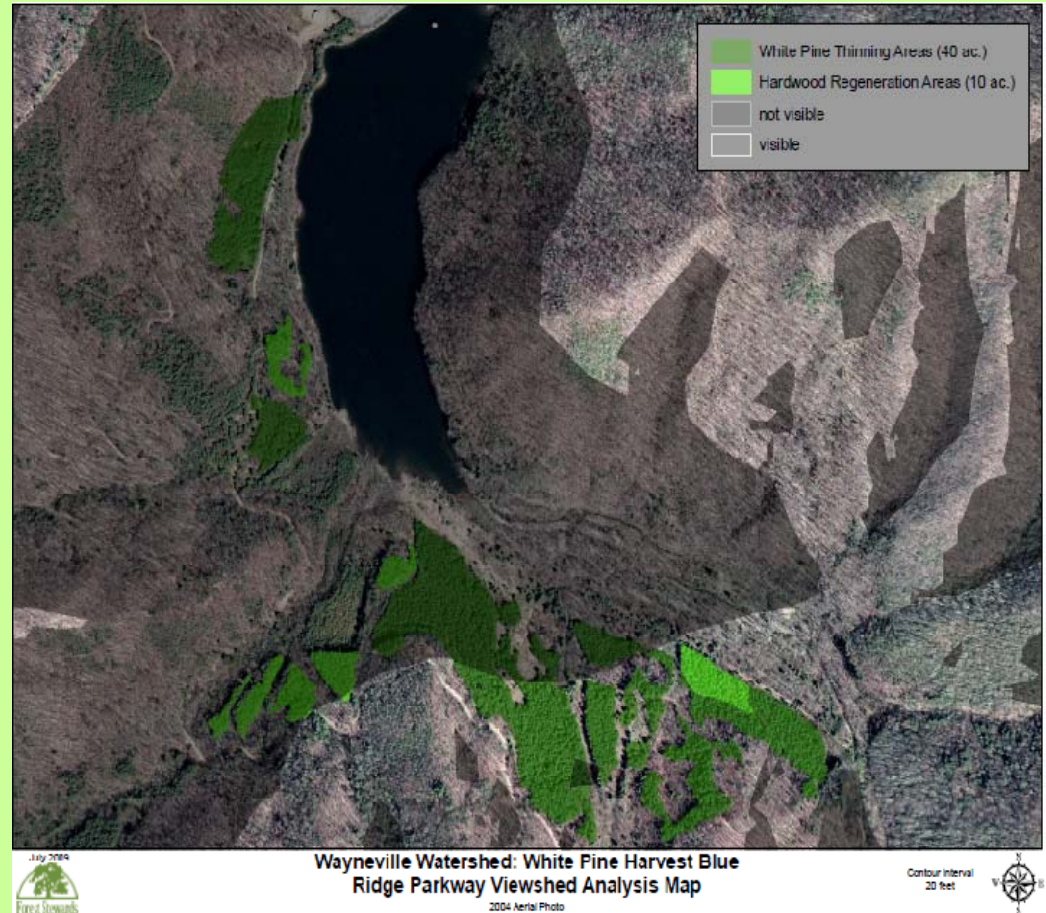
# Proposed implementation of treatments





# Compliance with Conservation Easement

- Inventory for rare, threatened or endangered species and other unique resources
  - None present
- Aesthetics and recreation
  - Viewshed analysis from parkway shows minimal to zero impact
- Recommended Stream buffers and streamside management zones
  - 50' no equipment
  - 25' no harvest

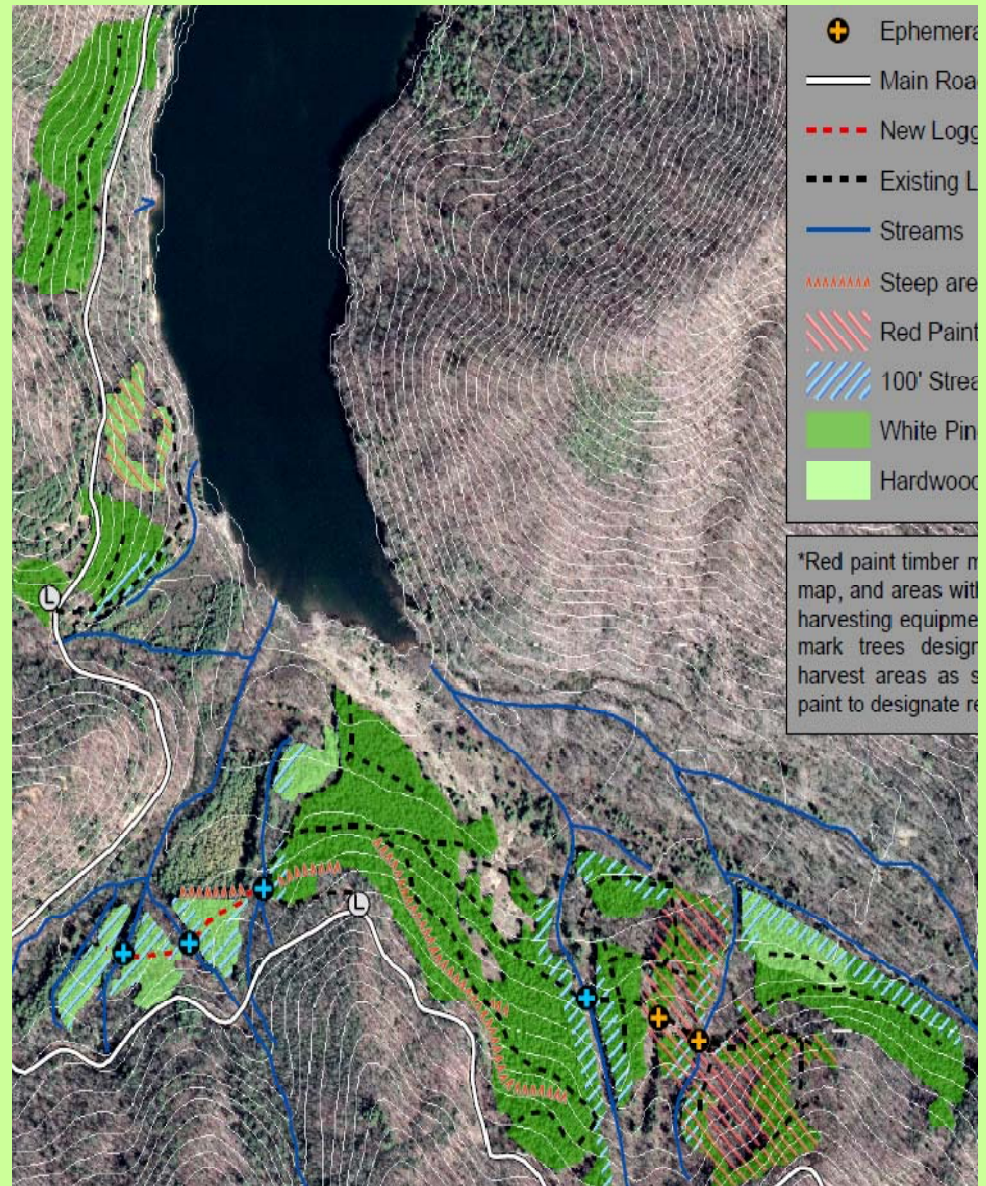


**Harvest Plan has been approved by CTNC and SAHC as compliant with the Conservation Easement**



# Placement of Logging Trails and Landings

- In order to minimize soil disturbances and other site impacts the amount of new logging trail construction will be minimized.
- This will be accomplished by utilizing existing logging trails for yarding operations, and allowing equipment to operate without skid trails in areas where slopes are less than 30%.
- This plan calls for one section of new logging trail to be constructed in the western corner of the stands (see harvest map).
- Equipment will be restricted from operating on slopes greater than 30%, and these areas are identified on the Harvest Map.





# Stream Buffers and Streamside Management Zones

- One hundred foot streamside management zones will be established around all perennial and intermittent streams. Harvesting and equipment operability will be greatly restricted in these areas.
- No equipment will be permitted to operate within 50 feet of streams (except for stream crossings), and no trees will be felled within 25 feet of streams.





# Stream Crossings

- In addition, this plan allows for 4 perennial and 2 ephemeral stream crossings, and temporary bridges or culverts will be used at these locations in accordance with NC Best Management Practices and with approval from NCDFR.





# White Pine Thinning Areas (42 Acres)

- About 80% of the area consists of dense, white pine that are generally healthy, but are beginning to stagnate.
- The plan is to thin in these areas to increase the vigor of the residual (remaining) trees and to allow more sunlight to reach the forest floor.
- Increasing the vigor of residual trees will decrease their susceptibility to pine beetle attack and other stresses.
- Allowing more light to reach the forest floor will accelerate the re-establishment and growth of native hardwood species.



# White Pine Thinning Areas (42 Acres)

- The thinning will approximate a geometric thinning strategy where the main objective will be removing approximately  $\frac{1}{2}$  of the white pine basal area in these areas in order to create a relatively even spacing between the residual trees.
- Marking will be done to ensure that the highest quality trees will be left following the thinning. These include trees with a healthy live-crown ratio (ratio of live crown: total tree height is about 25% or more), well-formed boles, and free from vines and other factors that might affect tree quality.
- An additional goal will be to favor any hardwood trees that occur in these areas.



# White Pine Thinning Areas (42 Acres)

**Table 3. Estimated number of trees, basal area, and volumes removed in proposed thinning areas per acre and for the harvest unit as a whole**

Diameter (in)	Per acre	Harvest unit
Density		
0-6	8	326
6-12	75	3,075
12-18	32	1,314
18-24	0	20
<b>Total</b>	<b>115</b>	<b>4,735</b>
Basal area (ft <sup>2</sup> )		
4-6	1	
6-12	34	
12-18	34	
18-24	1	
<b>Total</b>	<b>70</b>	
Sawtimber volume (BF)		
4-6	0	0
6-12	160	6,554
12-18	2,143	87,873
18-24	117	4,813
<b>Total</b>	<b>2,420</b>	<b>99,240</b>
Pulpwood (tons)		
4-6	1	23
6-12	19	795
12-18	9	349
18-24	0	10
<b>Total</b>	<b>29</b>	<b>1,177</b>

- Residual Forest After Harvest:

- 184 stems/acre

- 89 square feet/acre

- 122,100 total boardfeet

- 1,763 total tons



# Hardwood Regeneration Areas (9 acres)

- The remaining 20% of the area consists of larger, more widely spaced white pine where natural hardwood regeneration has already become established in the understory.
- The plan calls for the removal of the majority of the white pine in these areas in order to release the hardwood regeneration that is present.





# Hardwood Regeneration Areas (9 acres)

- In the overstory removal areas, the goal will be to remove most of the white pine in the overstory in order to release the hardwood regeneration that is present.
- Hardwood trees already in the overstory will be left unless they are of poor health or vigor.
- Overall a residual basal area of about 50 ft<sup>2</sup>/ac will remain following harvest. The residual basal area will be made up of hardwoods and high quality white pine with stout boles and vigorous healthy crowns.
- It should be noted that in areas where there are less than 50 ft<sup>2</sup> BA/ac of desirable trees, the stand will be more open.



## Hardwood Regeneration Areas (9 acres)

**Table 4. Estimated number of trees, basal area, and volumes removed in proposed overstory removal areas per acre and for the harvest unit as a whole**

Diameter (in)	White Pine	Hardwood	Total	
Density (stems/ac)				Harvest total
0-6	7	6	13	108
6-12	63	2	65	537
12-18	60	5	65	530
18-24	26	1	27	222
24-30	1	0	2	13
30-36	0	0	0	0
36-42	0	0	0	0
<b>Total</b>	157	14	172	1,410
Basal area (ft <sup>2</sup> /ac)				
4-6	1	1	2	
6-12	30	1	31	
12-18	75	6	81	
18-24	55	3	58	
24-30	5	1	6	
30-36	0	0	0	
36-42	0	0	0	
<b>Total</b>	166	11	177	
Sawtimber volume (BF/ac)				Harvest total
4-6	0	0	0	0
6-12	182	7	190	1,555
12-18	7,109	306	7,415	60,801
18-24	7,925	147	8,072	66,191
24-30	954	88	1,042	8,540
30-36	0	0	0	0
36-42	0	0	0	0
<b>Total</b>	16,170	548	16,718	137,087
Pulpwood (tons/ac)				Harvest total
4-6	1	0	1	9
6-12	17	1	18	145
12-18	19	1	20	165
18-24	14	1	14	118
24-30	1	0	1	11
30-36	0	0	0	0
36-42	0	0	0	0
<b>Total</b>	51	3	55	449

### • Residual Forest After Harvest:

• 65 stems/acre

• 60 square feet/acre

• 57,916 total boardfeet

• 208 total tons



# Next Steps: Bid Process and Timber Contract

- **Key Considerations:**
  - Bid process is recommended for simplicity and for receiving the best price.
  - Selection should be made based on not only the value of the bid but the capability of the logger to perform the desired work.
  - Terms of contract will specify adherence to harvest plan with special attention given to protecting residual trees and water quality.

