

Summary of 2008/09 Forest Stewardship Activities in the Waynesville Watershed



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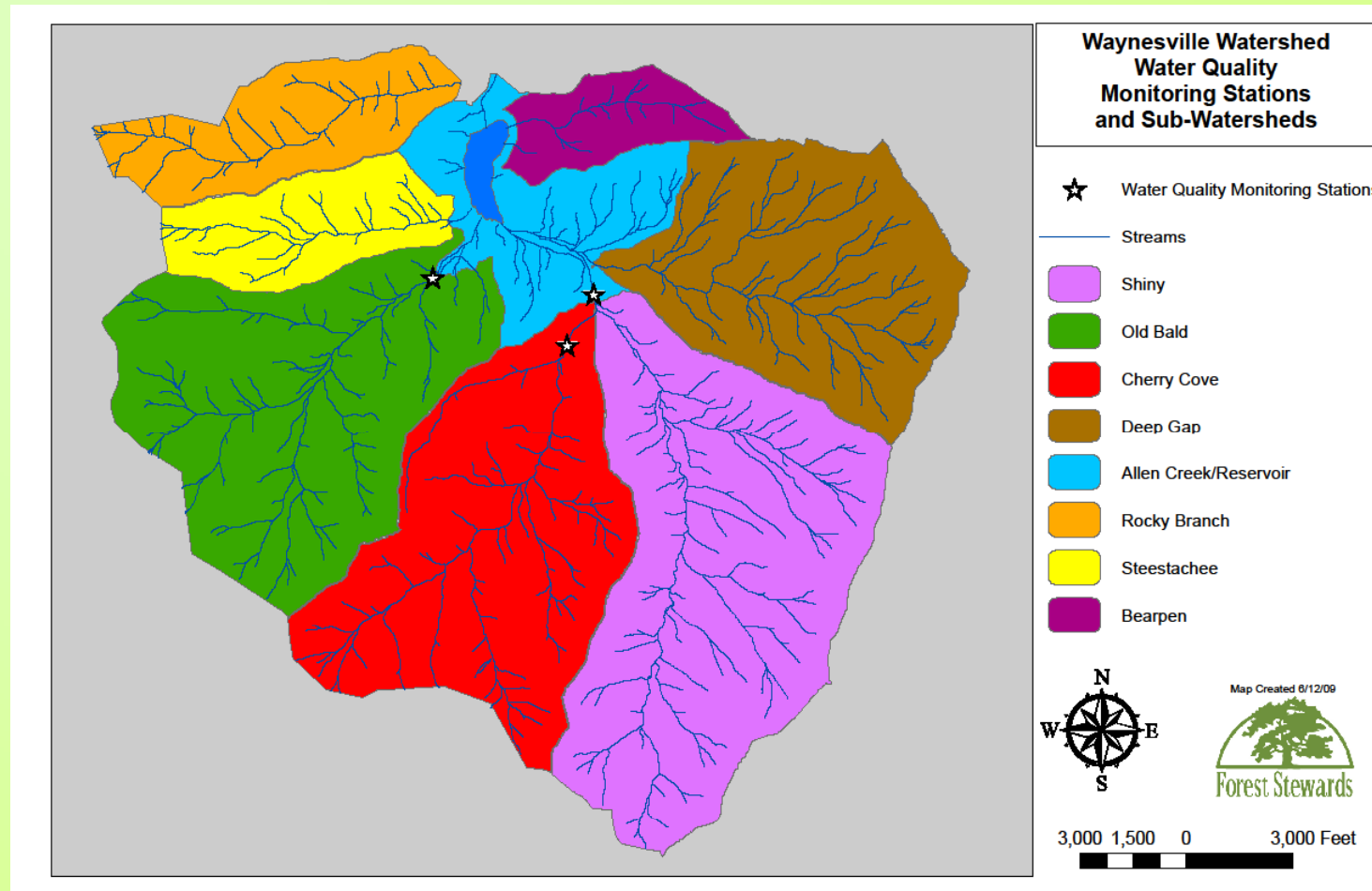
Key activities:

- Completed initial draft of Forest Stewardship plan
 - Submitted for public and professional review during summer of 2008
 - Revised draft completed in October 2008
- Continued stewardship activities as outlined in the plan and approved by the Watershed Advisory Committee

Stewardship activities for 2008/09:

- *Maintain and monitor water quality monitoring stations.*
- *Install a continuous forest inventory (CFI) system for the watershed.*
- *Begin assessment of road/stream intersections*
- *Develop functional indicators that can be used to track whether stewardship objectives are being met.*
- *Develop recommendations for treating planted white pine in the Allen Creek management compartment*
- *Meet with Town Board and/or WAC*
- *Participate in public forums and workshops as needed*
- *Lead hikes and other activities during watershed days*

Water quality monitoring



We maintain 3 automated water quality monitoring stations

Water quality parameters collected at 5 minute intervals

- Allen creek station

- **Stage:** the height of the stream above an index point at the monitoring station
- **Turbidity:** a measure of the clarity of the water
- **DO:** dissolved oxygen content
- **EC:** electrical conductivity, a measure of the total dissolved salts in the water
- **pH:** the acidity of the water
- **Temperature**

- Old Bald and Cherry Cove stations

- **Stage**
- **Turbidity**

Water quality data being collected at less frequent intervals

- **Total suspended solids (TSS)**
 - Water samples filtered to determine actual sediment loads
 - Collected automatically during storm events at Allen Creek
 - Collected during probe maintenance at Old Bald and Cherry Cove

Nearly 500 TSS samples collected to date

Problems with automated stations

- Calibration issues: DO and turbidity probes drift
- Standard equipment maintenance
- Memory capacity exceeded causing data to be overwritten (and lost)
- Data downloading errors

While these problems created some data gaps, we are succeeding at developing a large baseline dataset for the watershed

Analysis update

- Currently migrating data into a new software program that can handle a database of this size
 - Will begin assessing variations in water quality parameters in relation to storm events
- Monthly summaries are being generated and will be available online any day

Monthly summaries of stage and turbidity for the Old Bald monitoring station in the Waynesville Watershed from July 2008 through May 2009.

Old Bald Station

	Stage (cm)			Turbidity (NTU's)		
	Mean	Max	Min	Mean	Max	Min
July 08	15.4	31.2	12.7	10.8	204.1	4.4
August 08	15.6	19.9	13.5	7.8	226.2	4.2
September 08	14.4	22.6	10.5	4.0	58.7	1.5
October 08	10.3	13.5	4.4	5.2	33.8	1.6
November 08	5.6	10.4	0.1	5.1	71.0	0.7
December 08	2.8	16.1	0.0	27.2	207.3	0.0
January 08	6.2	16.3	0.0	27.6	212.1	3.1
February 09	6.4	18.6	0.0	1.7	50.1	0.9
March 09	8.4	25.1	0.0	2.8	98.6	1.0
April 09	11.0	31.8	0.0	33.5	71.7	2.0
May 09	11.3	16.1	7.6	na	na	na

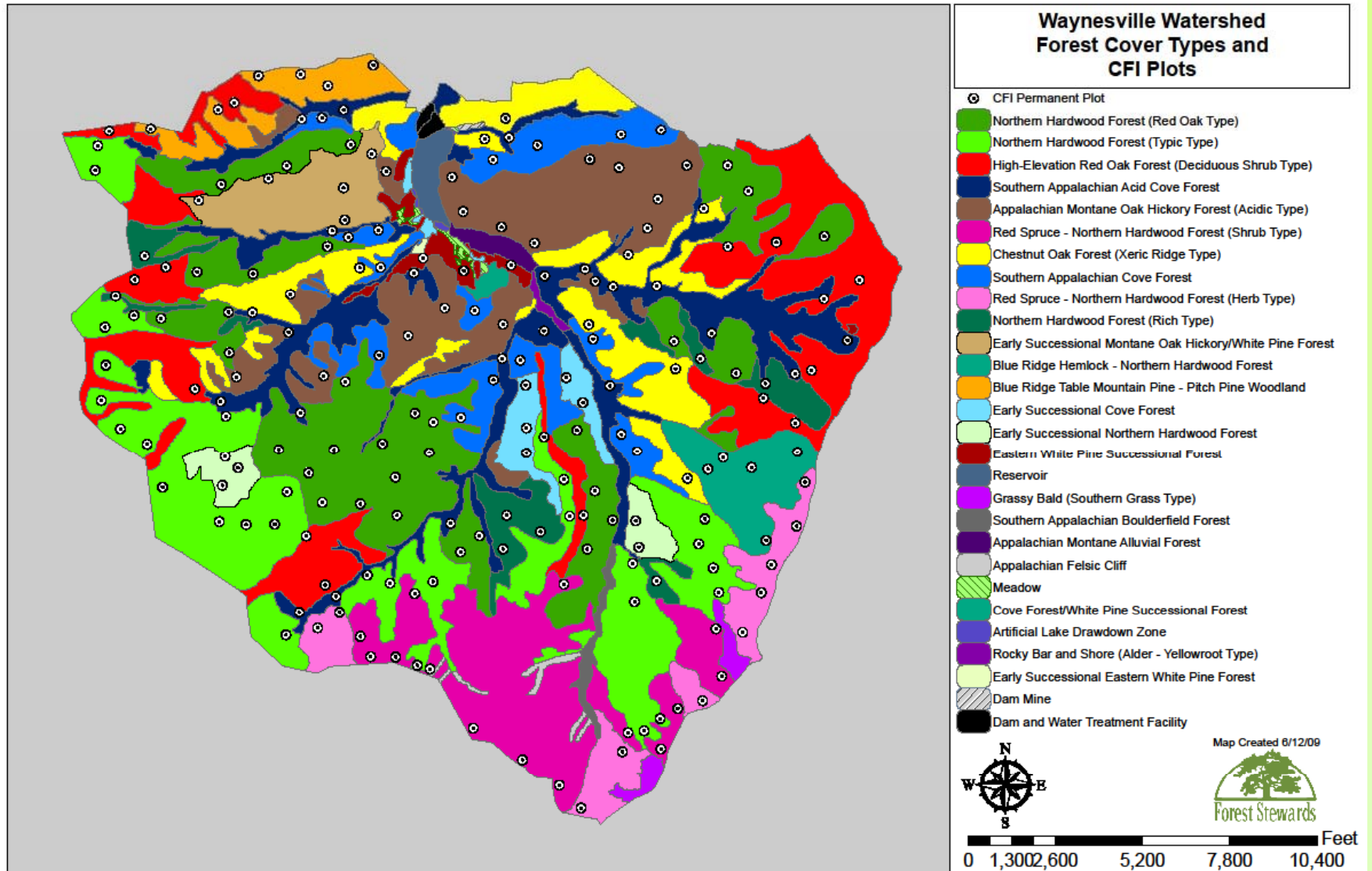
¹Data not available

Continuous forest inventory

- 200 permanent, 1/10th acre plots installed
- Document current forest condition
- Re-measure periodically (every 10 years) to monitor change in forest condition



CFI plot locations



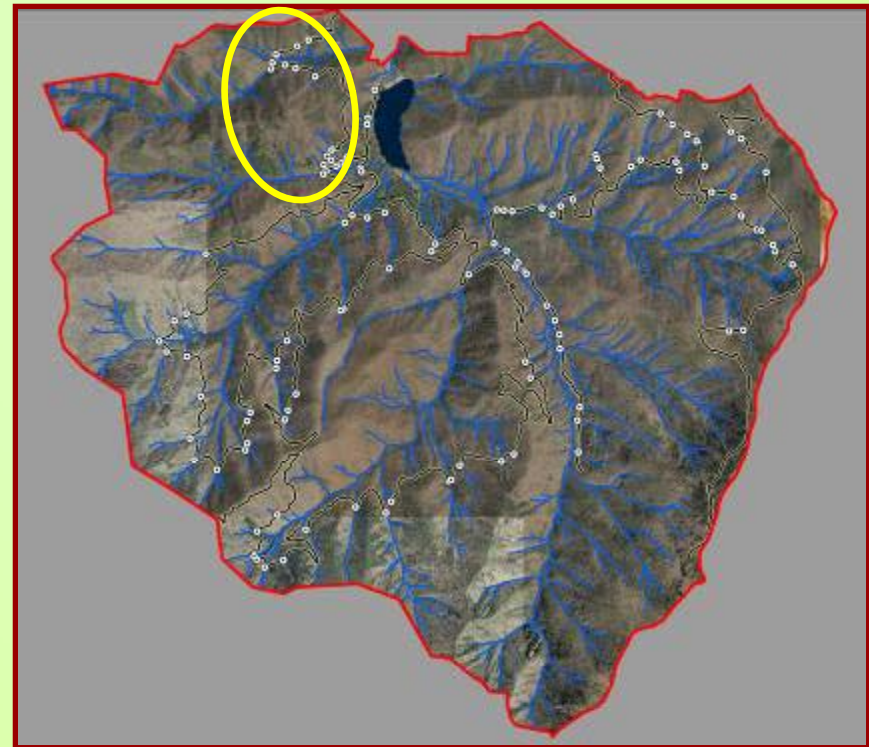
The twenty most commonly tallied overstory trees (and the percent of all trees tallied) in the initial CFI for the Waynesville watershed.

Species	Total	Percent
Red Maple	551	18.5
Northern Red Oak	271	9.1
Silverbell	191	6.4
Sweet Birch	191	6.4
Sugar Maple	173	5.8
Chestnut Oak	144	4.8
American beech	140	4.7
Yellow Birch	132	4.4
White Pine	121	4.1
Basswood	112	3.8
Eastern Hemlock	103	3.5
Snag	102	3.4
Yellow Poplar	86	2.9
Hickory	85	2.9
Scarlet Oak	76	2.6
Red Spruce	67	2.3
Black Locust	62	2.1
Black Cherry	58	1.9
Serviceberry	58	1.9
Sourwood	39	1.3
Total	2977	92.8

Assessment of road/stream intersections

- Potentially the greatest source of sediment and other pollutants
- Goal is to develop a protocol for evaluating these areas

We conducted an initial assessment in the Rocky Branch subwatershed to develop the sampling protocol



Most problems associated with culverts or improperly graded roadbed surfaces



Suggested attributes to be assessed at road/stream intersections.

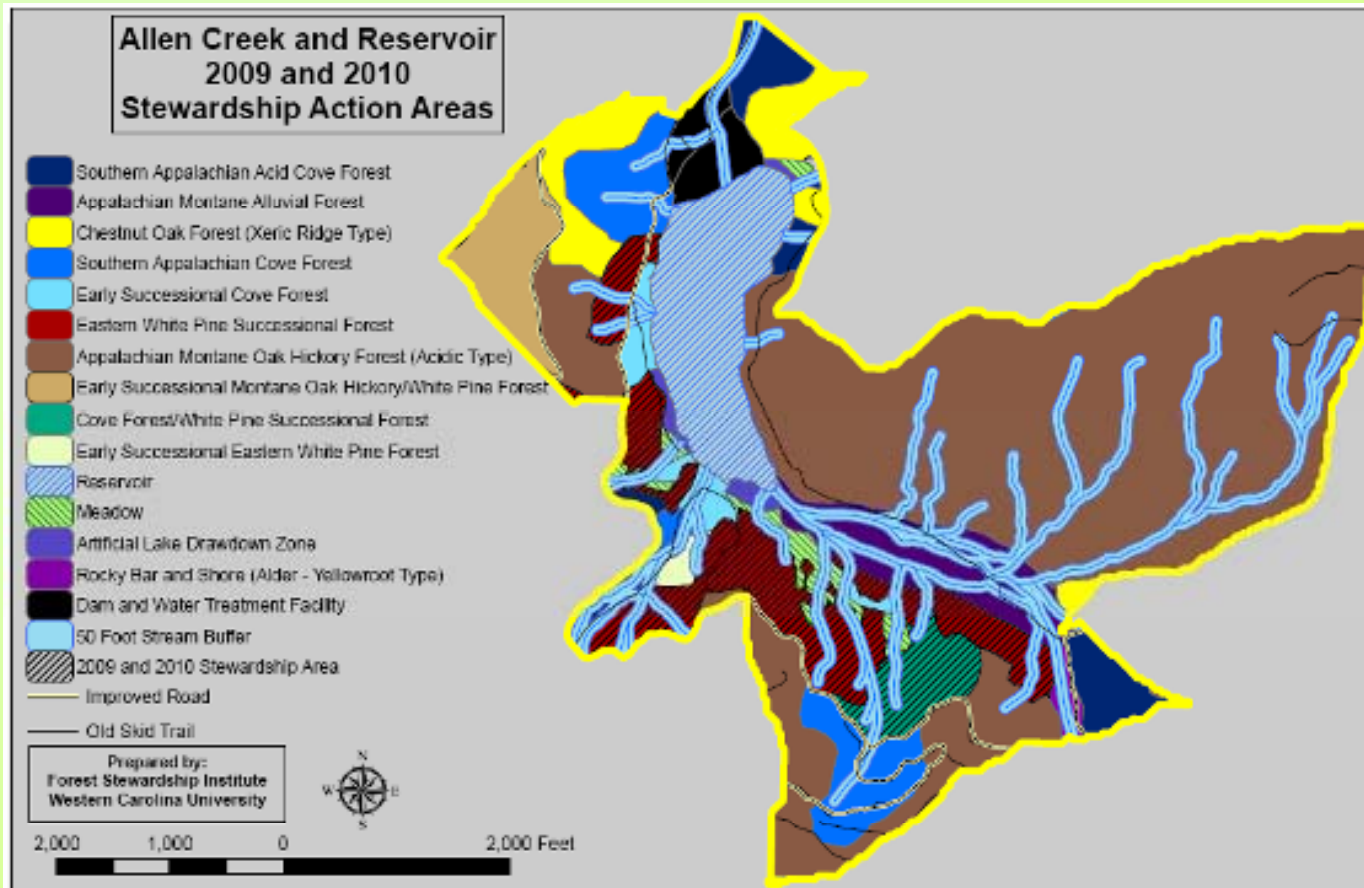
Attribute	Description of parameters
Location	UTM coordinates, sub-watershed, management compartment
Description of intersection	Photo-documentation of key intersection properties
Road type	Major or minor (based on anticipated traffic level)
Stream crossing type	Culvert or ford
Road surface	Gravel, firm, or soft, and description of remediation needs for soft roads
Culvert properties	Diameter, type, condition, and description of remediation needs for culverts that are not in good condition
Road ditch properties	Characteristics, description and remediation needs if ditch is failing or in poor condition
Road grade properties	Outsloping and broadbased dip characteristics, and description of remediation need if road does not allow water to adequately leave the road surface
Potential sedimentation risk	Severe, moderate, or low, based on summary of above criteria
Remediation effort required	Major, moderate, minor based on level of disturbance required as part of the remediation
Remediation expense	High, moderate, low based on equipment and time needed to remediate

Development of indicators

- Indicators used to assess whether stewardship goals are being achieved, and are being developed for
 - Surface water quality
 - Forest health

- Water quality indicator: **baseline sedimentation rates**
 - Established for varying streams under different storm flows
- Forest health indicator: **forest complexity**
 - Past harvesting homogenized much of the forest
 - Goal is to restore elements of ecosystem structure and function by re-establishing more diverse conditions
 - Measured by increases in naturally occurring forest conditions present in the watershed (complexity)
 - Species composition
 - Age class distribution
 - Successional stage

Development of treatment protocols for Allen Creek compartment



2009: Begin planning treatment of 82 acres in Eastern White Pine Successional Forests and Cove Forest/White Pine Successional forests in Allen Creek Compartment.

Other activities

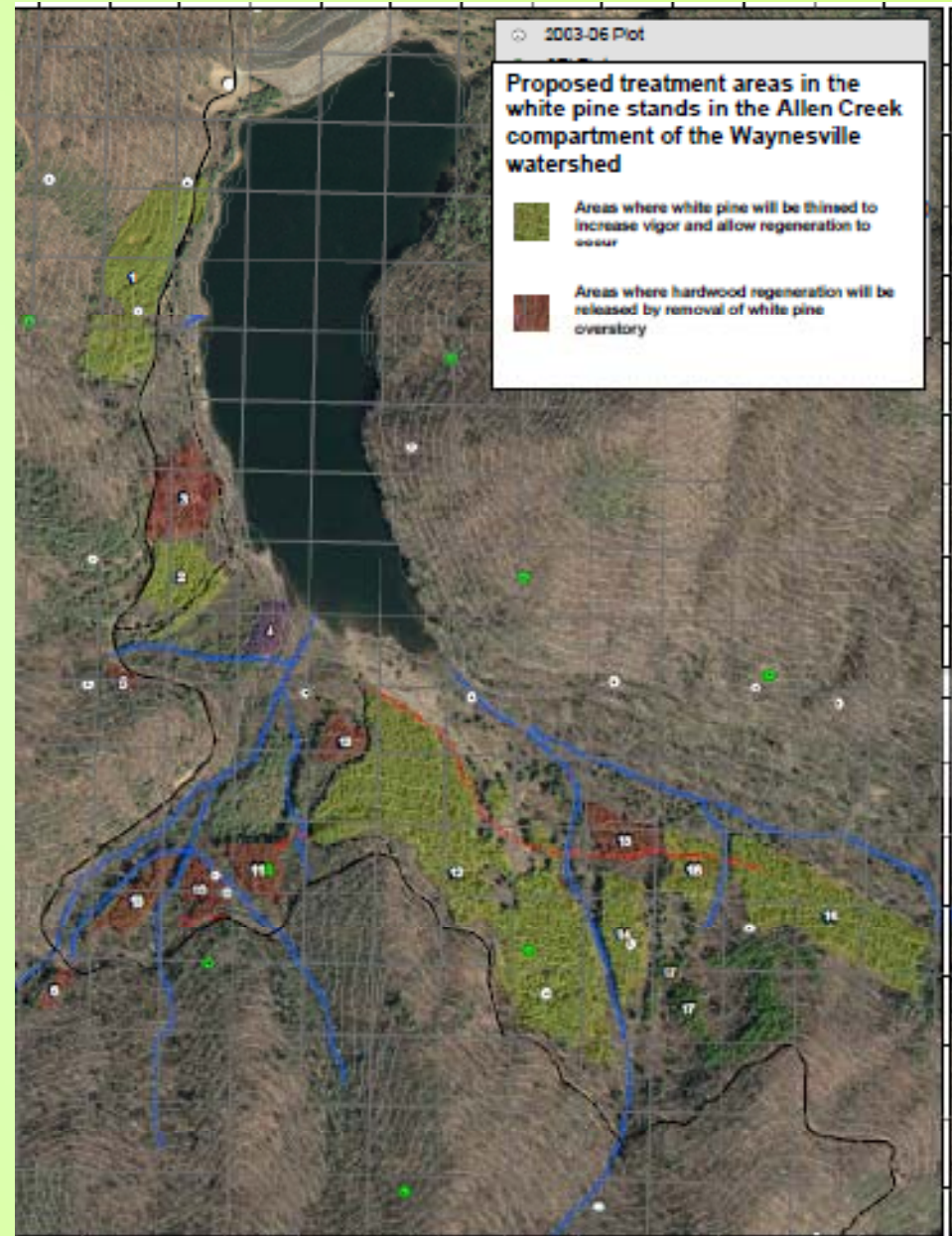
- Participated in watershed days during spring and fall
- Provided numerous paid internships for students
- Utilized the Rocky Branch subwatershed as a case study for WCU's NRCM capstone class experience
 - Thanks to Lee and Alison for attending the students' oral presentations of their projects in Cullowhee

White pine was planted to stabilize soil during the period of dam construction

- Trees are stagnating
- Inhibiting natural regeneration

Two principal treatments

1. Thin WP where possible to increase their vigor and all more sunlight to reach the ground
2. Remove WP overstory where hardwood regeneration is established



Continuing activities for 2009/10

- Water quality monitoring
 - Continue monitoring and maintenance of existing stations, and continue data summarization and interpretation.
 - Install additional station in white pine treatment units. Continue developing water quality indicators
- Finalize assessment of mapped road/stream intersections along drivable roads
 - Review stream characterization protocols with town staff, and modify protocols as needed.
 - Complete road/stream intersection inventory
 - Develop prioritized list of those intersections that pose the greatest risk
 - Summarize cost and remediation needs

Continuing activities for 2009/10

- Summarize Continuous Forest Inventory data
 - Check for data gaps and install additional plots as needed.
 - Update forest cover map and associated parameters
- Finalize planning for white pine treatments
 - Develop detailed stand prescriptions and harvest plans in conjunction with the Watershed Advisory Committee
 - Submit those plans to the Southern Appalachian Highlands Conservancy and Conservation Trust for NC for review and comment (as required in the conservation easement)
 - Lay out treatments on the ground
 - Design and host public information session(s) to review treatment goals

Continuing activities for 2009/10

- Begin detailed assessment of stand conditions within Rocky Branch subwatershed in preparation for future stewardship activities in that area
 - Review results with watershed advisory committee and develop initial prescriptions to achieve stewardship goals in this area.
- Continue to store and maintain GIS and other digital databases related the watershed
- Participate as requested/needed in public meetings and forums