Title of Lesson Plan	Using Pine Trees as a Record of Yearly Environmental Change
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City and State	Whitinsville, MA
Grade Level(s)	10-12
Keywords (subjects covered)	Ecology, Biology, Environmental Science
Brief Description	Students will use eastern white pine saplings to determine how much growth has occurred year-to-year. In addition, students will attempt to "date" their saplings. Students will then make predictions about the yearly precipitation changes that have occurred and correlate these with real data from the area.
Total Time Required	50-75 minutes
Setting	In a stand of white pine saplings
Lesson Objectives/Goals	Essential Questions: How can a student determine the relative age of a white pine? How can the relative growth of a tree be used to determine the environmental conditions year-to-year?
Materials Needed	Meter sticks, clipboards, computer or other source of obtaining research information
Standards Addressed	Ties to MA Curriculum frameworks: Student Inquiry Skills 1-4 Ecology 6.2 (High School)
Procedure	Students will be instructed on how to take measurements of distance between whirl patterns on a pine tree stem, as well as how to age a tree. Students will then go outside and take measurements in a pine stand with lots of small saplings. Students will be instructed to take the age and distances between whirls of at least 10 saplings. Compare the measurements to one another, and average those measurements. Basing the fact that tree growth is dependent on precipitation, determine what years were the wettest and which

	were the driest. Rank in order the data. Once done, compare to actual collected precipitation and temperature patterns and see how accurate you predictions were.
Assessment	Students will be given a school learning rubric for the activity beforehand (still finalizing it) and will be evaluated on how well they collected their data. In addition, a complete lab report will be written which includes data, analysis, research and a conclusion.
Literature Cited/References	Information obtained in the Forestry Tour 2007
Forestry Tour Attended	2007 Northeastern Forestry Teacher Tour-Saranac Lake, NY

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