A Handbook Linking Project Learning Tree's Secondary Modules to NH Frameworks For Science Literacy (K-12)

New Hampshire Project Learning Tree

March 1998
Revised September 2006

This handbook is a project of New Hampshire Project learning Tree, a private non-profit organization committed to the environmental education of our youth. The handbook is dedicated to the hundreds of school teachers and administrators who are responding to the state's move to standards-based education. Yours is not an easy job; we hope this handbook helps to lighten the load.

We would like to hear from our readers about how you have used the handbook and whether you find it accurate and clear. You can reach NH Project Learning Tree at

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METHODOLOGY
2006 Correlation Revision (Science)

NH's curriculum standards have undergone substantial change in response to the federal No Child Left Behind Act. The former state standards were written for the end of grades three, six and ten. To meet new formalized assessment requirements, the NH Frameworks for Science Literacy (K-12), approved in June 2006, address content and skills, and are divided into grade spans for K-2, 3-4, 5-6, 7-8, 9-11 (basic literacy) and 11-12 (advanced literacy).

The NH Frameworks for Science Literacy (K-12) contain the following components:

- Domain: There are four domains within the science curriculum frameworks: Earth Space Science (ESS), Life Science (LS), Physical Science (PS), and Science Process Skills (SPS).
- Strand: There are five strands, or enduring knowledge statements, in LS and four each in domains of PS and ESS. Strands are the SAME for each grade span although not all components may be seen in each grade span. (Example: LS1 – All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species.))
- Stem: These are the categories of ideas. Stems are common throughout all grade spans. (Example: 1. Classification)
- Grade-span Expectations (Proficiencies): These are what all students should know and be able to do within a specific grade range. The ranges include: K-2, 3-4, 5-6, 7-8, 9-11 (basic literacy level) 11-12 (advanced level).

For each strand, the associated proficiencies were consulted to help inform the degree of correlation of the broader strand with each activity; a match of at least one proficiency was required to indicate a correlation. Three elements of each activity will help focus the correlation process.

- The subject identifier in the sidebar determined whether the activity was correlated to the science frameworks; if science is not listed the activity was not be addressed.
- The grade levels noted in the sidebar determined which grade span proficiencies were examined.
- The description of activity objectives in the sidebar informed which curriculum and proficiency standard(s) are related to the activity.

Note: Any attempt to correlate universal curriculum standards and a single curriculum program involves subjectivity. Two important steps were taken to limit bias. First, the author applied this rigorous methodology to determine correlation. Second, drafts were peer-reviewed by PLT-trained elementary, middle, and high school teachers. Reviewers most common finding was that PLT activities lend themselves to modification, and in so doing, would meet many more standards than indicated. NHPLT chose, however, to correlate based on a strict interpretation of the activities, as they are written.

HOW TO USE THIS HANDBOOK

The purpose of this handbook is to assist educators who are reviewing and revising their science curricula. The primary audience is classroom teachers, curriculum specialists, and curriculum committees. The handbook is divided into three sections, as follows

- **<u>PART I</u> lists each PLT activity in the *Secondary Modules* followed by the standards from the NH Frameworks for Science Literacy (K-12) with which it is aligned.**

  Use Part I if you have a particular PLT activity in mind and want to know how it correlates with the state curriculum standards. Or, to find an appropriate activity to meet your needs, use PLT's "Topic Index" to select several potential activities to supplement your unit. To determine which state standards correlate with these activities, find the number and name of each activity in this handbook. Select an activity based on your objectives for your unit and the degree to which the activity correlates with appropriate standards. Each PLT activity is indicated by activity number and name and is followed by the strand and stem for each framework that is correlated to that activity.

- **<u>PART II</u> lists individual state curriculum standards from the NH Frameworks for Science Literacy (K-12), followed by the PLT activities that meet the individual standards.**

  Use Part II if you have a particular curriculum standard in mind and want to find an activity that meets this standard. Then read about the activities in your PLT guide to determine the one most suitable for your particular situation.

  All science domains (i.e. Life Science), strands (i.e. All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species) and stems (i.e. 1- Classification) are listed. Following each standard, the PLT activities aligned with that standard are identified by number and name.

- **<u>Part III</u> is a chart that lists each PLT activity in the *PreK-8 Activity Guide* and *Energy & Society Kit* and the standards from the NH Frameworks for Science Literacy (K-12) with which each activity is aligned.**

Note: Throughout this handbook, the domains are abbreviated as follows:

ESS – Earth Space Science
LS – Life Science
PS – Physical Science
SPS – Science Process Skills

NH Frameworks for Science Literacy (K-12)

Earth Space Science

ESS1 - The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.

1. Atmosphere, Climate, & Weather
   None

2. Composition & Features
   None

3. Fossils
   None

4. Observation of the Earth from Space
   None

5. Processes & Rates of Change
   None

6. Rock Cycle
   None

7. Water
   Municipal Solid Waste
   6: Landfills

ESS2 - The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.

1. Earth, Sun and Moon
   None

2. Energy
   None

3. Solar System
   None

4. View from Earth
   None

ESS3 - The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and time.

1. Size and Scale
   None

2. Stars and Galaxies
   None

3. Universe
   None

ESS4 - The growth of scientific knowledge in Earth Space Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.

1. Design Technology
   None

2. Tools
   None

3. Social Issues (Local and Global)
   <u>Municipal Solid Waste</u>
   1: Introduction to MSW: The Waste Stream
   2: Source Reduction
   3: Recycling and Economics
   5: Waste-to-Energy
   8: Take Action: Success Stories and Personal Choices

   <u>Places We Live</u>
   6: A Vision for the Future

4. Career Technical Education Connections
   None

Life Science

LS1 - All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).

1. Classification
   None

2. Living Things and Organization
   None

3. Reproduction
   None

LS2 - Energy flows and matter recycles through an ecosystem.

1. Environment
   Forest Ecology
   - 1: Adopt-A-Forest
   - 2: Cast of Thousands
   - 4: Home Sweet Home
   - 5: Saga of the Gypsy Moth
   - 6: Story of Succession
   - 7: Understanding Fire
   - 8: Fire Management

   Risk
   - 2: Things Aren't Always What They Seem
   - 5: Communicating Risk
   - 6: Weighing the Options: A Look at Tradeoffs
   - 7: Decision Making: Ecological Risk, Wildfires, and Natural Hazards

2. Flow of Energy
   Forest Ecology
   - 1: Adopt-A-Forest
   - 2: Cast of Thousands

3. Recycling of Materials
   Forest Ecology
   - 2: Cast of Thousands

LS3 - Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).

1. Change

<u>Forest Ecology</u>

2: Cast of Thousands
4: Home Sweet Home
5: Saga of the Gypsy Moth
7: Understanding Fire
8: Fire Management

<u>Municipal Solid Waste</u>

6: Landfills

<u>Places We Live</u>

3: Mapping Your Community Through Time
4: Neighborhood Design
5: Green Space
6: A Vision for the Future
7: Far-Reaching Decisions
8: Regional Community Issues: The Ogallala Aquifer

<u>Risk</u>

3: Chances Are… Understanding Probability and Risk
6: Weighing the Options: A Look at Tradeoffs
7: Decision Making: Ecological Risk, Wildfires, and Natural Hazards
8: Taking Action: Reducing Risk in Your School or Community
Special Topic: Electromagnetic Fields
Special Topic: Chlorine
Special Topic: Plastics, Risk/Benefit Analysis, and Environmental Legislation

2. Evolution

None

3. Natural Selection

None

LS4 - Humans are similar to other species in many ways, and yet are unique among Earth's life forms.

1. Behavior

None

2. Disease

None

3. Human Identity

None

LS5 - The growth of scientific knowledge in Life Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.

1. Design Technology
   Places We Live
   3: Mapping Your Community Through Time

   Risk
   4: Risk Assessment: Tools of the Trade
   8: Taking Action: Reducing Risk in Your School or Community
   Special Topic: Electromagnetic Fields
   Special Topic: Chlorine

2. Tools
   None

3. Social Issues (Local and Global)
   Places We Live
   3: Mapping Your Community Through Time
   5: Green Space

   Risk
   2: Things Aren't Always What They Seem
   3: Chances Are… Understanding Probability and Risk
   4: Risk Assessment: Tools of the Trade
   7: Decision Making: Ecological Risk, Wildfires, and Natural Hazards
   Special Topic: Electromagnetic Fields
   Special Topic: Chlorine
   Special Topic: Plastics, Risk/Benefit Analysis, and Environmental Legislation

4. Career Technical Education Connections
   Places We Live
   3: Mapping Your Community Through Time

   Risk
   4: Risk Assessment: Tools of the Trade
   5: Communicating Risk

Physical Science

PS1 - All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).

1. Composition
   None
2. Properties
   None

PS 2 - Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.

1. Change
   None
2. Conservation
   None
3. Energy
   None

PS 3 - The motion of an object is affected by force.

1. Forces
   None
2. Motion
   None

PS4 - The growth of scientific knowledge in Physical Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.

1. Design Technology
   None
2. Tools
   None
3. Social Issues (Local and Global)
   None
4. Career Technical Education Connections
   None

Science Process Skills

SPS1: Scientific Inquiry and Critical Thinking Skills

1. Making Observations and Asking Questions
   - Forest Ecology
     - 1: Adopt-A-Forest
     - 2: Cast of Thousands
     - 3: The Nature of Plants
   - Municipal Solid Waste
     - 8: Take Action: Success Stories and Personal Choices
   - Risk
     - 3: Chances Are… Understanding Probability and Risk
     - 4: Risk Assessment: Tools of the Trade
2. Designing Scientific Investigations
   - Forest Ecology
     - 1: Adopt-A-Forest
     - 3: The Nature of Plants
   - Municipal Solid Waste
     - 6: Landfills
3. Conducting Scientific Investigations
   - Forest Ecology
     - 1: Adopt-A-Forest
     - 2: Cast of Thousands
     - 3: The Nature of Plants
   - Municipal Solid Waste
     - 1: Introduction to MSW: The Waste Stream
     - 6: Landfills
   - Risk
     - 3: Chances Are… Understanding Probability and Risk
4. Representing and Understanding Results of Investigations
   - Forest Ecology
     - 2: Cast of Thousands
     - 3: The Nature of Plants
   - Municipal Solid Waste
     - 1: Introduction to MSW: The Waste Stream
     - 6: Landfills

SPS1: Scientific Inquiry and Critical Thinking Skills (cont.)

5. Evaluating Scientific Explanations
   Forest Ecology
      3: The Nature of Plants

SPS2: Unifying Concepts of Science.

1. Nature of Science
   Forest Ecology
      3: The Nature of Plants

   Risk
      3: Chances Are… Understanding Probability and Risk

2. Systems and Energy
   None

3. Models and Scale
   Risk
      4: Risk Assessment: Tools of the Trade

4. Patterns of Change
   Forest Ecology
      6: Story of Succession
      7: Understanding Fire
      8: Fire Management

5. Form and Function
   None

SPS3: Personal, Social, and Technological Perspectives

1. Collaboration in Scientific Endeavors
   None

2. Common Environmental Issues, Natural Resources Management and Conservation
   Focus on Forests
      2: Case Study: Old-Growth Forests
      3: Tough Choices
      8: Take Action!

SPS3: Personal, Social, and Technological Perspectives

2. Common Environmental Issues, Natural Resources Management and Conservation

Forest Ecology

1: Adopt-A-Forest
2: Cast of Thousands
3: The Nature of Plants
4: Home Sweet Home
5: Saga of the Gypsy Moth
7: Understanding Fire
8: Fire Management

Municipal Solid Waste

1: Introduction to MSW: The Waste Stream
2: Source Reduction
4: Composting
5: Waste-to-Energy
6: Landfills
7: Where Does Your Garbage Go?
8: Take Action: Success Stories and Personal Choices

Places We Live

1: Personal Places
2: Community Character
3: Mapping Your Community Through Time
4: Neighborhood Design
5: Green Space
6: A Vision for the Future
7: Far-Reaching Decisions
8: Regional Community Issues: The Ogallala Aquifer

Risk

1: What is Risk?
2: Things Aren't Always What They Seem
4: Risk Assessment: Tools of the Trade
5: Communicating Risk
6: Weighing the Options: A Look at Tradeoffs
7: Decision Making: Ecological Risk, Wildfires, and Natural Hazards
8: Taking Action: Reducing Risk in Your School or Community
Special Topic: Electromagnetic Fields
Special Topic: Chlorine
Special Topic: Plastics, Risk/Benefit Analysis, and Environmental Legislation

SPS3: Personal, Social, and Technological Perspectives (cont.)

3. Science and Technology; Technological Design and Application

<u>Focus on Forests</u>

3: Tough Choices
8: Take Action!

<u>Municipal Solid Waste</u>

1: Introduction to MSW: The Waste Stream
2: Source Reduction
4: Composting
5: Waste-to-Energy
6: Landfills
7: Where Does Your Garbage Go?
8: Take Action: Success Stories and Personal Choices

<u>Places We Live</u>

2: Community Character
3: Mapping Your Community Through Time
4: Neighborhood Design
5: Green Space
6: A Vision for the Future
7: Far-Reaching Decisions
8: Regional Community Issues: The Ogallala Aquifer

<u>Risk</u>

1: What is Risk?
7: Decision Making: Ecological Risk, Wildfires, and Natural Hazards
8: Taking Action: Reducing Risk in Your School or Community
Special Topic: Electromagnetic Fields
Special Topic: Chlorine
Special Topic: Plastics, Risk/Benefit Analysis, and Environmental Legislation

SPS4: Science Skills for Information, Communication and Media Literacy

1. Information and Media Literacy

<u>Focus on Forests</u>

2:Case Study: Old-Growth Forests
3:Tough Choices
8:Take Action!

SPS4: Science Skills for Information, Communication and Media Literacy (cont.)

1. Information and Media Literacy (cont.)

Forest Ecology

4: Home Sweet Home
5: Saga of the Gypsy Moth

Municipal Solid Waste

1: Introduction to MSW: The Waste Stream
2: Source Reduction
4: Composting
5: Waste-to-Energy
6: Landfills
7: Where Does Your Garbage Go?
8: Take Action: Success Stories and Personal Choices

Places We Live

2: Community Character
3: Mapping Your Community Through Time
4: Neighborhood Design
5: Green Space
6: A Vision for the Future
7: Far-Reaching Decisions

Risk

2: Things Aren't Always What They Seem
4: Risk Assessment: Tools of the Trade
5: Communicating Risk
6: Weighing the Options: A Look at Tradeoffs
7: Decision Making: Ecological Risk, Wildfires, and Natural Hazards
8: Taking Action: Reducing Risk in Your School or Community
Special Topic: Electromagnetic Fields
Special Topic: Chlorine
Special Topic: Plastics, Risk/Benefit Analysis, and Environmental Legislation

2. Communication Skills

Focus on Forests

1: What's a Forest to You?
2: Case Study: Old-Growth Forests
8: Take Action!

SPS4: Science Skills for Information, Communication and Media Literacy (cont.)

2. Communication Skills (cont.)

Forest Ecology

1: Adopt-A-Forest
2: Cast of Thousands
5: Saga of the Gypsy Moth

Municipal Solid Waste

2: Source Reduction
4: Composting
5: Waste-to-Energy
6: Landfills
7: Where Does Your Garbage Go?
8: Take Action: Success Stories and Personal Choices

Places We Live

3: Mapping Your Community Through Time
6: A Vision for the Future
7: Far-Reaching Decisions
8: Regional Community Issues: The Ogallala Aquifer

Risk

5: Communicating Risk
6: Weighing the Options: A Look at Tradeoffs
8: Taking Action: Reducing Risk in Your School or Community
Special Topic: Electromagnetic Fields
Special Topic: Chlorine
Special Topic: Plastics, Risk/Benefit Analysis, and Environmental Legislation

3. Critical Thinking and Systems Thinking

Forest Ecology

1: Adopt-A-Forest
2: Cast of Thousands
3: The Nature of Plants
5: Saga of the Gypsy Moth
7: Understanding Fire
8: Fire Management

Places We Live

4: Neighborhood Design
5: Green Space
6: A Vision for the Future
8: Regional Community Issues: The Ogallala Aquifer

SPS4: Science Skills for Information, Communication and Media Literacy (cont.)

3. Critical Thinking and Systems Thinking (cont.)
   - Risk
     - 3: Chances Are… Understanding Probability and Risk
     - 4: Risk Assessment: Tools of the Trade
     - 6: Weighing the Options: A Look at Tradeoffs
     - 7: Decision Making: Ecological Risk, Wildfires, and Natural Hazards
     - 8: Taking Action: Reducing Risk in Your School or Community
     - Special Topic: Electromagnetic Fields
     - Special Topic: Chlorine
     - Special Topic: Plastics, Risk/Benefit Analysis, and Environmental Legislation

4. Problem Identification, Formulation, and Solution
   - Focus on Forests
     - 3: Tough Choices
     - 8: Take Action!
   - Forest Ecology
     - 1: Adopt-A-Forest
     - 2: Cast of Thousands
     - 3: The Nature of Plants
   - Municipal Solid Waste
     - 6: Landfills
     - 8: Take Action: Success Stories and Personal Choices
   - Risk
     - 3: Chances Are… Understanding Probability and Risk
     - 4: Risk Assessment: Tools of the Trade
     - 7: Decision Making: Ecological Risk, Wildfires, and Natural Hazards
     - 8: Taking Action: Reducing Risk in Your School or Community

5. Creativity and Intellectual Curiosity
   - Municipal Solid Waste
     - 7: Where Does Your Garbage Go?
   - Places We Live
     - 6: A Vision for the Future
     - 7: Far-Reaching Decisions
     - 8: Regional Community Issues: The Ogallala Aquifer
   - Risk
     - 5: Communicating Risk

SPS4: Science Skills for Information, Communication and Media Literacy (cont.)

6. Interpersonal and Collaborative Skills

Focus on Forests

2: Case Study: Old-Growth Forests
3: Tough Choices
8: Take Action!

Forest Ecology

5: Saga of the Gypsy Moth
8: Fire Management

Municipal Solid Waste

4: Composting
5: Waste-to-Energy
6: Landfills
7: Where Does Your Garbage Go?
8: Take Action: Success Stories and Personal Choices

Places We Live

2: Community Character
4: Neighborhood Design
6: A Vision for the Future
7: Far-Reaching Decisions
8: Regional Community Issues: The Ogallala Aquifer

Risk

2: Things Aren't Always What They Seem
4: Risk Assessment: Tools of the Trade
5: Communicating Risk
6: Weighing the Options: A Look at Tradeoffs
8: Taking Action: Reducing Risk in Your School or Community
Special Topic: Electromagnetic Fields
Special Topic: Chlorine
Special Topic: Plastics, Risk/Benefit Analysis, and Environmental Legislation

7. Self Direction

None

8. Accountability and Adaptability

Municipal Solid Waste

7: Where Does Your Garbage Go?

8 Accountability and Adaptability (cont.)

Risk

5: Communicating Risk

8: Taking Action: Reducing Risk in Your School or Community

9. Social Responsibility

Focus on Forests

8:Take Action!

Municipal Solid Waste

7: Where Does Your Garbage Go?