Study Concepts

Forest Ecology:

Key Point 1—Tree Physiology and Tree and Shrub Identification

Learning Objectives:

1. Know the parts and tissues of a tree, and be able to explain the growth cycle and life cycle of a tree.
2. Understand the processes of photosynthesis and respiration and how they are important to the growth and reproduction of trees.
3. Identify common tree species without a key, and identify specific or unusual trees and shrubs through the use of a key.

Suggested Activities:

1. Identify trees and shrubs using leaf and seed samples through the use of a key. Identify common and Latin names for the following common trees and know their approximate ranges in Oregon:

- Douglas-fir
- Sitka Spruce
- Western hemlock
- Port-Orford-cedar
- Junipers
- Western larch
- Western white pine
- Oregon ash
- Redwood
- Englemann spruce
- Western Redcedar
- Incense cedar
- Pacific yew
- Red alder
- Birches
- Poplars
- Lodgepole pine
- Sugar pine
- Bigleaf maple
- Oregon white oak
- Ponderosa pine
- Cottonwoods
- Vine maple
- True Firs (6)

Key Point 2—Forest Ecology

Learning Objectives:

1. Know the typical forest structure: canopy, understory and ground layers and crown classes.
2. Understand forest ecology concepts and factors affecting them, including the relationship between soil and forest types, tree communities, regeneration, competition, and primary and secondary succession.
3. Identify the abiotic and biotic factors in a forest ecosystem, and understand how these factors affect tree growth and forest development. Consider factors such as climate, insects, microorganisms, and wildlife.

Suggested Activities:

1. Identify and describe the life cycle of forest pests and invasive plants and describe their impact to a forest ecosystem. Research integrated pest management strategies for selected pests.
2. Draw food webs of a mature deciduous forest and a mature coniferous forest. Explain how wildlife habitat relates to the forest community and describe the niches of various organisms that live in both of these forest ecosystems.
3. Examine a “tree cookie” or core sample taken with an increment borer to determine the age, growing conditions, insect and disease damage, and past weather conditions.
4. Understand the ecology of fire: Explore patterns of change brought about by fires in a forest ecosystem.
9. Identify, understand the life cycles, and know common control techniques for the following insect pests and diseases of trees in Oregon:

- Western Pine Beetle
- Flat Headed Borers
- Dwarf Mistletoe
- Spruce Budworm
- Armillaria
- Heartrot
- White Pine Blister Rust
- Swiss needle cast

Key Point 3—Sustainable Forest Management

Learning Objectives:

1. Understand the term silviculture, and be able to explain the uses of the following silviculture techniques: thinning, prescribed burning, single tree and group tree selection, shelterwood method, clear-cutting with and without seed trees, and coppice management.
2. Explain the following silviculture systems: clear-cutting , seed tree method, even-aged management, uneven-aged management, shelterwood and selection.
3. Understand the methodology and uses of the following silviculture treatments: Planting, weeding, pre-commercial thinning (PCT), commercial thinning and harvesting.
4. Know how to use forestry tools and equipment in order to measure tree diameter, height and basal area.
5. Understand how the following issues are affected by forest health and management: biodiversity, forest fragmentation, forest health, air quality, aesthetics, fire, global warming and recreation.
6. Understand how forestry management practices and policy affect sustainability.
7. Understand how economic, social and ecological factors influence forest management decisions.
8. Learn how science and technology are being utilized in all aspects of forest management.

Suggested Activities:

1. Use the following forestry tools and know how they are used in forest management: clinometer, increment borer, diameter tape, Biltmore stick, abney level, compass, prism and relescope.
2. Use a variety of volume tables to calculate the volume of lumber for several different tree species.
3. Understand Fire Management: Learn the many interdependencies of forests and fire in healthy ecosystems.
4. Compare two different forest types. For example: a juniper woodland in eastern Oregon to a conifer forest in western Oregon. Identify economic, social and ecological factors that affect how both of these forests are managed.
5. Explain the Information Technology used to monitor and productively manage forests, and give specific examples of how this technology is being utilized in all aspects of forest management.

Key Point 4—Trees as an Important Renewable Resource

Learning Objectives:

1. Understand the importance and value of trees in urban and community settings, and know the factors affecting their health and survival.
2. Understand the economic value of forests and know many of the products they provide to people and society.
3. Explain the “Ecosystem Services” provided by trees, and understand why trees and forests are important to human health, recreation, wildlife, and watershed quality.

Suggested Activities:

1. Create a display showing the value of trees in both urban and suburban settings. Identify the factors that affect their health and survival, and explain how to properly care for trees in an urban environment.
2. Make a list of products and by-products that come from your home and are made from trees. Describe the chemical and physical properties of trees used in making these products.