
WASHINGTON STATE ENVIROTHON TEACHER HANDBOOK



Updated 11/2019

INTRODUCTION

The Washington State Envirothon offers your students a fun and competitive opportunity to become skilled stewards of our state's land, water, plants, and wildlife habitats. The Washington State Envirothon (WSE) Committee has developed the enclosed materials with the hope that you will join us in this exciting endeavor.

Washington State Envirothon is a non-profit organization dedicated to helping conservation districts and partner groups conduct regional and state competitions, as well as supporting the NCF Envirothon, a North American competition.



www.waenvirothon.org

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SECTION ONE: TEAM ADVISOR INFORMATION

This section contains the following information:

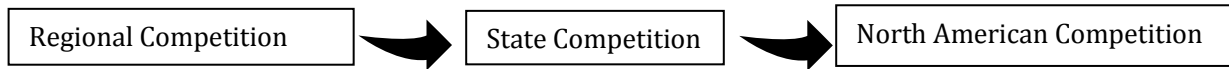
- What is Envirothon?
- The Envirothon Journey
- Mission and Goals
- History



What is Envirothon?

The Washington State Envirothon is an annual competition in which teams compete for recognition and the opportunity to attend the North American Envirothon Competition by demonstrating their knowledge of environmental science and natural resource management. The teams, each consisting of five high school students (grades 9-12) exercise their problem-solving skills in a competition centered on soils/land use, aquatic ecology, forestry, wildlife, and a current environmental issue.

The Envirothon Journey



Washington Regional Envirothon:

Washington Regional Envirothon is the first step in the Envirothon journey! High school teams will first study and compete at their Regional event. The top two teams will move on to the Washington State Envirothon Competition.

- Typically held March-April
- One-day event

Washington State Envirothon:

The Washington State Envirothon brings together top teams from the Washington Regional events to compete for the opportunity to attend the North American Envirothon Competition by demonstrating their knowledge of environmental science and natural resource management. The top team from Washington State Envirothon will go on to compete in the North American Envirothon Competition.

- Typically held at the end of May
- Two-day event

North American Envirothon:

The North American Envirothon competition brings together students throughout the U.S. and Canadian provinces who have won their state or provincial event. At North American Envirothon, teams compete for recognition and scholarships by demonstrating their knowledge of environmental science and natural resource management.

- Typically held July-August
- One-week event

Mission, Goals, and Objectives

The mission of the NCF-Envirothon is to develop knowledgeable, skilled and dedicated citizens who understand natural resources and are willing and prepared to work towards achieving and maintaining a balance between the quality of life and the quality of the environment.

The Envirothon mission is accomplished by developing in young people an understanding of the principles and practices of natural resource management and ecology and through practice dealing with complex resource management decisions. The following goals and objectives should be used as a guide to develop effective curricula, educational resources, and testing scenarios.

GOAL 1: To promote a desire to learn more about the natural environment and equip students with the knowledge and skills needed to apply the basic principles and practices of resource management and ecology to complex environmental issues.

GOAL 2: To promote stewardship of natural resources and to encourage the development of critical thinking, cooperative problem-solving, and decision-making skills required to achieve and maintain a natural balance between the quality of life and the quality of the environment.

GOAL 3: To provide students with experience in environmentally-oriented activities, enabling them to become environmentally-aware, action-oriented citizens.

History

The Envirothon is a good example of an ongoing partnership with conservation district associations and cooperating state, provincial, and federal natural resource agencies. The program boasts a successful history of providing hands-on environmental and natural resource management education to high school students and empowering young people with the competencies and motivation vital to achieving and maintaining a natural balance between the quality of life and the quality of the environment.

In 1979, the Pennsylvania Soil and Water Conservation Districts created an "Environmental Olympics" as a way to encourage high school students to become interested in natural resource conservation and environmental issues and careers. The Environmental Olympics, later shortened to Enviro-Olympics, quickly gained popularity as a hands-on outdoor competition designed to challenge and test students' knowledge of soils/land use, aquatic ecology, forestry, wildlife and current environmental issues.

The program grew rapidly and involved 40 conservation district teams at the 1987 Pennsylvania State Enviro-Olympics, providing greater visibility and stimulating interest from neighboring states

In 1988, the program became known as the Envirothon. Teams from Pennsylvania, Ohio, and Massachusetts competed in the first "National Envirothon." The Pennsylvania Association of Conservation Districts hosted the event. Subsequently, Massachusetts, Ohio, and Maine hosted the annual "National Envirothon," and in 1992, the first Canadian team (from Nova Scotia) participated in the competition, hosted by Maryland's Envirothon Committee.

Historically, Envirothon funding came from local conservation districts, state conservation committees, state, federal and provincial conservation organizations, and provincial forestry associations. In 1997, Canon U.S.A., Inc. began supporting the Envirothon program and, in 1999, became the title sponsor until 2013. The program currently operates under the name NCF-Envirothon.

National Conservation Foundation (NCF)- Envirothon is a 501(c)3 not-for-profit organization established to coordinate the delivery of an environmental education program for high school students throughout North America and China (2016). The program was incorporated in Ohio in 1992 for the purpose of introducing an education-based environmental competition.

Each year the Envirothon touches and positively influences the lives of more than 50,000 young people across the country. More and more inquiries are made of the host state each year.

Inquiries have come from around the world including states, provinces, Mexican states, and countries such as Turkey, Japan, and Australia. The Envirothon is truly becoming International in scope. Thanks to dedicated volunteers, staff of cooperating agencies, teachers and advisors, enthusiastic students, and valuable support and sponsorship from organizations like Canon U.S.A., Smithfield Foods, Monsanto Chemical Company, the American Clean Water Foundation, the U.S. Forest Service, the National Association of Conservation Districts, the Soil and Water Conservation Society, and many others, the Envirothon has proven to be an exciting and useful tool for incorporating natural resource education into high school classrooms.

SECTION TWO: THE COMPETITION

This section contains the following information:

- Curriculum Overview
- Soils and Land Use
- Aquatic Ecology
- Forestry
- Wildlife
- Current Issue: Oral Presentation



Curriculum Overview

North American Envirothon spans the length and breadth of North America – from the deserts of the southwestern United States to the frozen tundra near the Arctic Circle in Canada; from the Everglades to the Olympic peninsula. It is a large territory with many different habitats and remarkable biological and cultural diversity. The Curriculum Guidelines have been developed to accommodate as much educational diversity as possible. They are not meant to replace any state or provincial Envirothon curriculum, but rather to provide a standard framework for students and advisors headed to the North American Envirothon.

SOILS AND LAND USE

Key Learning Objectives

- Recognize soil as an important and dynamic resource.
- Recognize and understand the features of a soil profile.
- Describe basic soil properties and soil formation factors.
- Understand the origin of soil parent materials.
- Identify soil constituents (e.g., clay, organic matter, sand and silt).
- Identify and list soil characteristics (e.g., texture, structure, etc.) and their relation to soil properties.
- Determine basic soil properties and limitations (e.g., mottling and permeability) by observing a soil pit or a soil profile.
- Understand the nature of plant nutrients and how they are held by soil.
- Recognize the characteristics of wetland (hydric) soils.
- Understand soil drainage classes and know how wetlands are defined.
- Understand soil water, its movement, storage, and uptake by plants.
- Understand the effects of land use on soils.
- In land use planning discussions, discuss how soil is a factor in or is impacted by non-point source pollution.
- Identify types of soil erosion and discuss methods for reducing erosion.
- Utilize soil information, including a soil survey.

Key Point 1—Physical Properties of Soil and Soil Formation

- ◇ Understand the importance of soils and appreciate the relatively small amount of usable soil that exists on Earth.
- ◇ Know the five soil forming factors, and understand how they influence soil properties.
- ◇ Understand the origin and types of soil parent materials.
- ◇ Understand basic soil forming processes: additions, losses, translocations, and transformations.

- ◇ Recognize and understand features of Soil Profiles and be able to use this information to determine basic soil properties and limitations.
- ◇ Identify and describe soil characteristics (texture, structure, and color- using Munsell color charts).

Suggested Activities:

- ◇ Generate a list of reasons why soils and the study of soil science is important to sustaining life on Earth, and explore how much soil available on Earth is for human use.
- ◇ Describe the five factors of soil formation and be able to explain how each factor affects the soil profile.
- ◇ Conduct a field analysis by digging or using an auger to examine a soil pit. Determine soil characteristics and properties, by describing soil horizons and recording data.
- ◇ Use soil profile information to compare soil samples from agriculture cropland, wetland, forest and an urban area, and explain why there are differences in water table, permeability, runoff, infiltration and water holding capacity.
- ◇ Estimate percent sand, silt, and clay for soil samples collected and determine texture class using the texture triangle. Explain how texture is important in soil fertility and soil management.

Key Point 2—Soil Ecosystems

- ◇ Recognize that biological diversity is important for soil health and hence plant, human and environmental health.
- ◇ Understand how the hydrologic, carbon and nutrient cycles relate to soil management.
- ◇ Recognize that understanding soil ecosystems is important to soil management.

Suggested Activities:

- ◇ Construct a Burlese funnel to learn about the diversity of life living in the soil. Draw a soil food web showing the 5 trophic levels and discuss why biodiversity is important to healthy soil. (note: some important soil organisms will not show up in the Burlese funnel, but they should be included in the trophic level diagram.)
- ◇ Draw the nitrogen, carbon and phosphorus cycles and identify the types of organisms (flora and fauna) involved in these cycles. Identify their roles in decomposition and nutrient cycling.
- ◇ Discuss the decomposition and transformations of organic matter, toxins and pesticides. Discuss the importance of microorganisms, and what would occur if they were not present in the food chain.
- ◇ Discuss how Integrated Pest Management can affect biological diversity.

Key Point 3—Chemical Properties of Soil and Soil Fertility

- ◇ Understand the procedure for taking a soil sample and conducting nutrient analysis.
- ◇ Know that plants must receive essential micronutrients and macronutrients from the soil in order to be healthy and understand that soil fertility relates to the physical and chemical properties of the soil in addition to the quantity of nutrients.
- ◇ Understand why soil fertility reflects the physical, chemical and biological state of the soil.

Suggested Activities:

- ◇ Collect a representative soil sample from a piece of land (preferably your own) as an introduction to soil testing. Conduct soil test experiments to measure pH and determine the amounts of plant available nitrogen (N), Phosphorus (P), and Potassium (K) in soil samples collected from different locations such as: cropland, forested area, and in a flood plain. Record your data, and analyze and compare results.
- ◇ Explain the ABC's of Nutrient Management, and how Nutrients and Plant Health, Pest, Profits and the Environment relate to healthy soil.
- ◇ Explain why soil fertility reflects the physical, chemical and biological state of the soil.
- ◇ Compare and contrast the benefits and risks of using nutrients from a synthetic fertilizer with those from a natural source.

Key Point 4—Soil Conservation and Land Use Management

- ◇ Compare different land uses and conservation practices and their impact on soils and erosion.
- ◇ Understand how soil is impacted by point & non-point source pollution & the importance of soil management to agriculture and clean water.
- ◇ Understand that soil management and environmental protection requires agricultural and resource managers to use spatial tools such as Geographic Information Systems (GIS), and Global Positioning Systems (GPS) in order to make the best possible resource decisions.
- ◇ Learn about career opportunities and the role of government in the management of natural resources.

Suggested Activities:

- ◇ Identify or recommend Best Management Practices to maximize agriculture production and control water movement to prevent erosion and pollution on construction sites, residential development and cropland.

- ◇ In a land use planning discussion, identify types of soil erosion and explain how soil is a factor in non-point source pollution, and describe how soils can be used to clean up pollutants.
- ◇ Become familiar with the Universal Soil Loss Equation (USLE) and learn how it used to estimate the soil erosion rates of a selected construction site and cropland field.
- ◇ Practice using topographic and thematic maps to uncover mysteries about the cultural and physical geography of the Earth. USGS Map Mysteries Activities.

Key Point 5—Web soil surveys & Soil Surveys

- ◇ Access and use published and on-line soil data and other resources to learn how land use affects soil, and the limitations of local soils.
- ◇ Understand the eight Land Capability Classes and how they are important in determining appropriate land use.
- ◇ Understand soil drainage classes and be able to recognize the characteristics of hydric soils and know how soils fit into the definition of wetlands.

Suggested Activities:

- ◇ Download your local area's soil survey map to learn the limitations that local soils have for septic systems, foundations, agriculture, and future development.
- ◇ Describe the eight Land Capability Classes and use a soil profile and site description to determine land capability class.
- ◇ Visit your local land planning office and ask how GIS and GPS systems are used in making land use planning and development decisions. Explain how GIS and GPS can be used in learning about the soil characteristics in a wetland soil.

Sample Soil & Land Use Test Question:

Which soil texture typically has the highest permeability?

- a. Sandy loam
- b. Silty clay
- c. Silt loam
- d. Clay loam

AQUATIC ECOLOGY

Key Learning Objectives

1. Identify the processes and phases for each part of the water cycle.
2. Describe the chemical and physical properties of water and explain their implications for freshwater and saltwater ecosystems.
3. Analyze the interaction of competing uses of water for water supply, hydropower, navigation, wildlife, recreation, waste assimilation, irrigation, industry and others.
4. Discuss methods of conserving water and reducing point and non-point source pollution. Identify common aquatic organisms through the use of a key.
5. Delineate the watershed boundary for a small water body.
6. Explain the different types of aquifers and how each type relates to water quantity and quality.
7. Briefly describe the benefits of wetlands, including both function and value.
8. Describe the benefits of riparian areas, including both function and value.
9. Describe the changes to the aquatic ecosystem based on alteration to the aquatic habitat.
10. Know methods used to assess and manage aquatic environments and be able to utilize water quality information to assess the general water quality of a specific body of water. This includes sampling, technique, and water quality parameters used to monitor point and non-point source pollution.
11. Be familiar with major methods and laws used to protect water quality (i.e., both surface and ground water) and utilize this information to make management decisions to improve the quality of water in a given situation.

Key Point 1: Abiotic Factors

- ◇ Know the processes and phases for each part of the water cycle and understand the water cycle's role in soil nutrient erosion, salinization of agricultural lands, and climatic influences.
- ◇ Understand the concept and components of a watershed and be able to identify stream orders and watershed boundaries. Know the features of a healthy watershed and an unhealthy watershed.

- ◇ Know how to perform and interpret chemical water quality tests and understand why aquatic organisms and water quality is affected by the physical, chemical and biological conditions of the water.

Suggested Activities:

- ◇ Use topographic maps to investigate the concept of a watershed, identify a river's watershed system, and delineate the watershed of a given area. Be able to describe how different land uses and watershed characteristics can affect water runoff, water flow, types of stream habitats and management approaches.
- ◇ Investigate and find out who is using the water in your watershed and become familiar with historic stream and river levels to learn if levels are increasing or decreasing. Use stream assessment data to determine the health of your watershed.
- ◇ Conduct chemical water quality tests to determine the temperature, dissolved oxygen, pH, phosphorus, alkalinity, nitrogen, and dissolved oxygen percent saturation of a water sample and explain why these test results are indicators of water quality and can be used to assess and manage aquatic environments.

Key Point 2: Biotic Factors

- ◇ Understand the dependence of all organisms on one another and how energy and matter flow within an aquatic ecosystem.
- ◇ Understand the concept of carrying capacity for a given aquatic ecosystem and be able to discuss how competing water usage may affect the ability of the system to sustain wildlife, forestry and anthropogenic needs.
- ◇ Identify common, rare, threatened and endangered aquatic species as well as Aquatic Nuisance Species (ANS) through the use of a key.
- ◇ Know how to perform biological water quality monitoring tests and understand why these tests are used to assess and manage aquatic environments.

Suggested Activities:

- ◇ Describe the habitat needs of three specific aquatic animals and compare and contrast the flow of energy in three different aquatic food chains.
- ◇ Create a visual display of rare and endangered aquatic species. Explain how human activities are causing species imperilment and specify actions being taken to protect these species.
- ◇ Conduct a biological stream assessment by collecting macro-invertebrates. Stream Data sheets (key point 1, resource 4) should be used to record and analyze information. Explain why these organisms are biological indicators that help us determine the health of a stream or waterway.

Key Point 3: Aquatic Environments

- ◇ Identify aquatic and wetland environments based on their physical, chemical and biological characteristics.
- ◇ Know characteristics of different types of aquifers and understand historical trends and threats to groundwater quantity and quality.
- ◇ Understand societal benefits and ecological functions of wetlands.
- ◇ Understand the functions and values of riparian zones and be able to identify riparian zone areas.

Suggested Activities:

- ◇ Describe the physical, chemical and biological characteristics of a stream, river, pond, lake and wetland.
- ◇ Explain how different types of aquifers indicators of water quantity and water quality are. Describe how subsidence and salt water intrusion are related to the falling water table in many aquifers.
- ◇ Describe three functions of wetlands and explain how these functions are met in the absence of wetlands.
- ◇ Describe three functions of riparian zones and explain how the removal of or damage to the riparian zone would affect water quality and specific aquatic food chains.

Key Point 4—Water Protection and Conservation

- ◇ Understand how education programs and enforcement agencies are working together to protect aquatic habitats and preventing those who use our waterways from inadvertently transporting Aquatic Nuisance Species ANS from one river to another.
- ◇ Interpret major provincial and /or federal laws and methods used to protect water quality (i.e. surface and ground water). Utilize this information to propose management decisions that would improve the quality of water in a given situation.
- ◇ Be familiar with the Federal, Provincial and state agencies that provide oversight of water resources and understand that Geographic Information Systems (GIS) is a useful and important tool in the management of water resources.
- ◇ Identify global and local sources of point and non-point source pollution and be able to discuss methods to reduce point and non-point source pollution.
- ◇ Understand the interaction of competing uses of water for water supply, hydropower, navigation, wildlife, recreation, waste assimilation, irrigation, and industry.
- ◇ Know the meaning of water conservation and understand why it is important every time you turn on a faucet.

Suggested Activities:

- ◇ List at least 3 Aquatic Nuisance Species ANS, and describe their effects on an aquatic ecosystem. Consider what can happen when predator ANS are imported, and develop a plan for the eradication of a target ANS.
- ◇ Site water protection laws at a mock hearing to decide whether a permit should be given to build a new shopping mall along a river.
- ◇ Explain how Geographic Information Systems (GIS) are being used to help communities assess water quality and watershed health information.
- ◇ Compare water usage in different regions of Canada and the United States and propose actions to help countries strike a balance between supply and demand in order to realize maximum benefit from our water resources.
- ◇ Design a comprehensive water conservation plan for your home and the watershed below your home. This should include groundwater replenishment, securing sediment on your property, managing non-point source pollution and following the path of good quality water as it leaves your property on its way to the sea. Many dams are used to provide low cost electricity at the critical time of day when there is peak demand for electricity. Today a major issue is deciding which is more important to the economy, low cost energy or improving/restoring the ecology of a river. Evaluate the issue and develop recommendations for conservation groups and utility executives.

Sample Aquatic Ecology Test Question:

- 1.) A _____ is an area of land that drains water, sediment and dissolved materials to a common receiving body or outlet.

FORESTRY

Key Learning Objectives

1. Identify common trees without a key and identify specific or unusual species of trees or shrubs through the use of a key.
2. Understand forest ecology concepts and factors affecting them including the relationship between soil and forest types, tree communities, regeneration, competition, and succession.
3. Understand the cause and effect relationship of factors affecting tree growth and forest development (climate, insects, microorganisms, wildlife, etc.).
4. Understand how wildlife habitat relates to forest communities, forest species, forest age and structure, snags and den trees, availability of food, and riparian zones.
5. Understand how the following issues are affected by forest health and management: biological diversity, forest fragmentation, air quality, aesthetics, fire, global warming, and recreation.
6. Understand basic forest management concepts and tools such as how various silvicultural practices are utilized, the use of tree measuring devices, and the best use of management practices.
7. Apply silvicultural concepts and methods to develop general management recommendations and goals for a particular situation.
8. Identify the complex factors that influence forest management decisions (e.g., economic, social, and ecological).
9. Understand the value of trees in urban/suburban settings and the factors affecting their health and survival.

Key Point 1—Tree Physiology and Tree and Shrub Identification

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

Key Point 2—Forest Ecology

- ◇ Know the typical forest structure: canopy, understory and ground layers and crown classes.
- ◇ 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.
- ◇ 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:

- ◇ 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.
- ◇ 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.
- ◇ 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.

Key Point 3—Sustainable Forest Management

- ◇ 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.
- ◇ Explain the following silviculture systems: clear-cutting, seed tree method, evenaged management, unevenaged management, shelterwood and selection.
- ◇ Understand the methodology and uses of the following silviculture treatments: Planting, weeding, pre-commercial thinning (PCT), commercial thinning and harvesting.
- ◇ Know how to use forestry tools and equipment in order to measure tree diameter, height and basal area.
- ◇ 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.
- ◇ Understand how forestry management practices and policy affect sustainability.
- ◇ Understand how economic, social and ecological factors influence forest management decisions.

- ◇ Learn how science and technology are being utilized in all aspects of forest management.

Suggested Activities:

- ◇ Use the following forestry tools and know how they are used in forest management: clinometer, increment borer, diameter tape, biltmore stick, abney level, and compass, prism and telescope.
- ◇ Use a variety of volume tables to calculate the volume of lumber for several different tree species.
- ◇ Project Learning Tree Activity 8, Fire Management: Learn the many interdependencies of forests and fire in healthy ecosystems.
- ◇ Compare two different forest types. For example: an eastern hardwood forest in PA to a conifer forest in Oregon. Identify economic, social and ecological factors that affect how both of these forests are managed.
- ◇ 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

- ◇ Understand the importance and value of trees in urban and community settings, and know the factors affecting their health and survival.
- ◇ Understand the economic value of forests and know many of the products they provide to people and society.
- ◇ 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:

- ◇ 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.
- ◇ 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.

Sample Forestry Test Question:

Name the two main abiotic factors that determine where trees grow in eastern Washington?

1) _____

2) _____

WILDLIFE

Key Learning Objectives

1. Identify common wildlife species and wildlife signs. Identify basic wildlife survival needs.
2. Describe specific adaptations of wildlife to their environment and their role in the ecosystem.
3. Describe predator/prey relationships and identify examples. Describe food chains and food webs and cite examples.
4. Describe factors that limit or enhance population growth.
5. Evaluate a given habitat and its suitability for a designated species when given a description of its habitat needs.
6. Describe ways a habitat can be improved for specific species through knowledge of its specific requirements.
7. Discuss the concept of carrying capacity and limiting factors.
8. Discuss various ways the public and wildlife managers can help in the protection, conservation, management, and enhancement of wildlife populations.
9. Describe the potential impact of the introduction of non-native species.
10. Describe major factors affecting threatened and endangered species

Key Point 1—Knowledge of Wild Birds, Mammals and Herps

- ◇ Identify wildlife species using mounted specimens, skins/pelts, pictures, skulls, silhouettes, decoys, wings (waterfowl), scats, tracks, animal sounds, or other common signs. Animal tracks may be original or molds made of the prints. Wildlife signs may be real or reproduced.
- ◇ Use a key or field guide to identify wildlife species or signs. Wildlife species or signs may be presented in any form as described above.
- ◇ Identify general food habits (herbivore, omnivore, carnivore), habitats (terrestrial, aquatic, fossorial), and habits (diurnal, nocturnal) using skull morphology and/or teeth.

Key Point 2—Wildlife Ecology

- ◇ Know the meaning of “habitat” and be able to name the habitat requirements for wildlife and the factors that affect wildlife suitability.
- ◇ Know and understand basic ecological concepts and terminology.
- ◇ Understand the difference between an ecosystem, community and population. Be able to explain how communities interact with their non-living surroundings to form ecosystems.
- ◇ Understand wildlife population dynamics such as birth, mortality, age-structure, sex ratio, and mating systems. Understand the impact of limiting and decimating factors of common wildlife species on wildlife management.
- ◇ Recognize that all living things must be well adapted to their native environment in order to survive. Be able to identify, describe and explain the advantages of specific anatomical, physiological and/or behavioral adaptations of wildlife to their environment.
- ◇ Know the meaning of the term “Biodiversity” and understand why biodiversity is important to people and wildlife.
- ◇ Understand the importance of the 3 levels of biodiversity: genetics, species and ecosystem or community, and understand the implications of biodiversity loss at each level.

Suggested Activities:

- ◇ Draw a map of an area and identify sources of food, water and shelter available to wildlife. Select a wildlife species, and assess whether the area on your map will provide suitable habitat for this species. If any part of the habitat is lacking, explain what you could do to improve the habitat for this species?
- ◇ Explain the relationship between the Pyramid of Numbers and the Pyramid of Biomass. Relate this exercise to an actual habitat to help you understand how much land area is needed to support life at each level of the food chain. Lesson: Ecological Pyramids.
- ◇ Create a detailed display to show examples of different types of food chains and illustrate the interdependence of organisms within a food web. Include terms such as trophic levels, predator, prey, scavengers, decomposers, omnivore, insectivore, herbivore, carnivore, producer, primary consumer, secondary consumer and tertiary consumer.
- ◇ Explain the term “ecosystem” and give examples of different types of ecosystems. Describe a type of ecosystem and explain the importance of a keystone species. Draw food chains that include a specific keystone species and discuss what might happen if this species were removed from the food chain or if their populations diminished.
- ◇ Select several wildlife species common to your area and list potential limiting and decimating factors for each. Visit a natural area, park, forest, and/or farm and assess

the area to determine which of the limiting and decimating factors on your list would actually impact your selected species. For example, water may be a potential limiting factor, but the area you visit may have an abundance of water. Therefore, water would not be a limiting factor on this area and would have no impact.

- ◇ Explain why your state or province is so diverse and explain what is being done to protect the biodiversity of wildlife. Include the following vocabulary to help you explain your answer: biodiversity, keystone species, native, endemic, habitat, biome, and food web.
- ◇ Compare and contrast the behavioral and physiological adaptations of specific animals that live in two different environments. Explain why these animals are well-adapted to survive in their particular environment and include wildlife biology terms to describe specific adaptations.
- ◇ Web Lesson: Measuring Biodiversity across North America. As a result of completing an investigation into the biodiversity of North American Mammals, students should develop an understanding of the concept of biodiversity, and learn ways to measure the diversity of organisms. In addition, students should become more familiar with the mammal communities and eco-regions in their residential areas and the biomes and ecoregions across North America.
- ◇ Explain the three levels of biodiversity and give several reasons why biodiversity is important to wildlife and people. Select examples of species in your area that have become locally extinct and explain what causes loss of biodiversity. What can be done to gain biodiversity?

Key Point 3—Conservation and Management of Wildlife

- ◇ Know the preferred habitat types and specific habitat requirements of common wildlife species. Understand how this knowledge helps us to better protect both the land and the wildlife species that depend on it.
- ◇ Understand the difference between biological and cultural carrying capacity and be able to identify social and ecological considerations where human use of land conflicts with wildlife habitat needs.
- ◇ Identify common wildlife management practices and methods that are being used to manage and improve wildlife habitat.
- ◇ Understand the role of federal, state and provincial Fish and Wildlife Agencies in the management, conservation, protection, and enhancement of fish and wildlife and their habitats.
- ◇ Know that all states and provinces have a hunting safety course and mandatory hunter education program developed specifically for each state or provincial government's hunting and wildlife agency.

Suggested Activities:

- ◇ Explain the meaning of the terms "migration route" and "flyway". Know the four major North American flyways and understand the importance of these routes to migratory land, water and shore birds.
- ◇ Determine which common wildlife species in your area depend on open land, woodland and wetland habitat for their survival. Identify the various types of habitat within open lands, woodlands, and wetlands, and explain the importance of these specific habitats to common wildlife species within your area.
- ◇ Explain why human use of land the major reason for habitat loss is. Provide examples of habitat destruction, fragmentation, and degradation and explain how wildlife species survival is threatened by habitat loss in your area.
- ◇ Research and analyze controversial issues in order to understand the relationship between wildlife, economics and society. Penn. State School of Forest Resources: The Social and Economic Impact of Wildlife and Natural Resource Management Lesson Plan
- ◇ Make a list of wildlife management practices and strategies that will restore or improve habitat for each of the following land uses: cropland, grassland, woodland, wetland, pond/lake, and urban setting (backyards, greenways, urban parks). Include specific wildlife species that will benefit from each wildlife practice or strategy.
- ◇ Make a list of the Federal and State Fish and Wildlife Agencies within your state or province. Determine how each protects and manages the wildlife resources of your area and describe activities and programs that are undertaken to protect and manage wildlife and their habitats.
- ◇ Explain regulated trapping procedures and discuss the issues that are involved in trapping furbearing animals. Research and explain the dilemma of biological carrying capacity vs. cultural carrying capacity in your discussion.
- ◇ Explain how Wildlife Managers are using Satellite Remote Sensing, GPS and GIS in Conservation and Wildlife Management. Give an example explaining the benefits of using this technology in remote areas.

Key Point 4—Issues Involving Wildlife and Society

- ◇ Understand how non-native (exotic), invasive species threaten our environment and the biodiversity of many wildlife species. Understand that non-native (exotic), invasive plants impact wildlife habitat and thus have a tremendous impact on native wildlife.
- ◇ Learn about the complexities of decision-making in making land use decisions that affect wildlife and understand that wildlife resources are under constant pressure caused by human population growth, environmental degradation, and habitat reduction.
- ◇ Know that Wildlife species are subject to diseases resulting from exposure to microbes, parasites, toxins, and other biological and physical agents.

- ◇ Understand the terminology and factors that affect threatened and endangered wildlife species. Know the meaning of extinct, extirpated, endangered, threatened, candidate species and reintroduction.
- ◇ Identify the characteristics that many extinct and endangered species possess and be able to identify many species wildlife that are endangered and threatened.
- ◇ Understand the role of the Endangered Species Act in helping to conserve endangered and threatened species. Know the organizations and agencies responsible for listing and protecting endangered species on global, federal, state and provincial levels.

Suggested Activities:

- ◇ Give specific examples of non-native (exotic), invasive species in your area and describe how they have altered habitats, threatened ecosystems, and impacted wildlife. Explain what is being done to increase awareness and facilitate effective prevention and management of non-native (exotic) invasive species.
- ◇ Explain the three major kinds of habitat loss. Give examples of how human activity is the biggest threat to wildlife habitat and also discuss how people can have a positive impact on wildlife habitat and biodiversity.
- ◇ HIPPO is an acronym that represents the five major threats to biodiversity, which are caused by human activity. Design a poster to illustrate the HIPPO concept and factors that bring about the loss of biodiversity.
- ◇ Name and describe two examples of diseases that are critically impacting Wildlife and explain why controlling emerging wildlife diseases have become a high-priority concern in the United States and Canada. Explain the life cycles of these diseases and how they can be transmitted to humans.
- ◇ Identify and describe factors that threaten and endanger wildlife species in your area. Explain what actions are being taken by various agencies and interest groups to improve the chance of survival for specific threatened and endangered species. Also, determine what practical measures private citizens can take to assist in the recovery of threatened and endangered species.
- ◇ Select several endangered species and create a display to describe the characteristics that have made these species more vulnerable. Discuss state, provincial and federal efforts being taken to protect these species.

Sample Wildlife Test Question:

This track was found in the Southern Cascades - what species of animal is this?



CURRENT ISSUE: ORAL PRESENTATION

Each year, a different current issue is selected by the State hosting the North American Envirothon. At the North American, State, and some regional competitions, teams will also be asked to give an oral presentation on the year's rotating topic. Washington State Envirothon, as well as the majority of Washington Regional Envirothon competitions use the following format:

The Oral Presentation scenario will be sent to teams two weeks in advance to the competition. Teams create a PowerPoint presentation based on the scenario. On the day of the competition, students have 30 minutes to prepare at the event before they present. Presentations will be judged by a panel of natural resource professionals.

Examples of the Rotating Environmental Topic from past years:

- 2009: Biodiversity in a Changing World
- 2011: Non-Point Source Pollution- Low Impact Development
- 2015: Urban and Community Forests
- 2020: Water Resource Management: Local Control and Local Solutions

Oral Presentation Judging Criteria

		Possible Points	Score
Participation	Did all team members participate? (15 pts)	15	
Clarity	Did they speak clearly (volume, enunciation)? (10 pts)	10	
Terminology	Did they use appropriate technical language and/or choices of words? (10 pts) Did they use grammatically correct English? (10 pts)	20	

<p>Organization</p>	<p>Were the facts developed in logical and continuous sequence? (20 pts)</p> <p>Was there sufficient background information provided in order to introduce the audience to the subject? (10 pts)</p> <p>How well did the presentation flow? (10 pts)</p>	<p>40</p>	
<p>Content</p>	<p>Did they start with a strong introduction? (20 pts)</p> <p>Did they show that they had gone through a critical thinking process in developing their presentation? (10 pts)</p> <p>How much knowledge of subject was exhibited? (10 pts)</p> <p>Use of examples and analogies? (10 pts)</p> <p>Did the presentation move logically from premise to conclusion? (10 pts)</p>	<p>60</p>	
<p>Persuasiveness</p>	<p>Did they show an ability to engage and convince the audience? (10 pts)</p> <p>Did they demonstrate confidence, sincerity, and a positive attitude? (10 pts)</p>	<p>20</p>	
<p>Conclusion</p>	<p>Did the conclusion support the main points? (10 pts)</p> <p>Was the conclusion well organized and planned? (10 pts)</p>	<p>20</p>	
<p>Timing</p>	<p>Did the presentation fall within the allotted time? (15 pts)</p> <p>8-10 min (15 pts) 6-8 min (10 pts) <6 min (5 pts)</p>	<p>15</p>	
<p>TOTAL</p>		<p>200</p>	

COMMENTS:

Oral Presentation Tips Washington State Envirothon

Teams competing at the WA State Envirothon will receive the Oral Presentation scenario two weeks before the competition. Teams are allowed to use technology to create presentations before the competition. *Technology is optional and teams are not required to use it.* Below are tips to use when creating your Oral Presentation. The Presentation is worth **200 points** towards your total score. In the case of a tie for total cumulative points, the Presentation score will be the tie breaker.

Presentation Time: Total presentation time for each team is 15 minutes. Your presentation must be **10 minutes** in length and all team members must participate. **5 minutes** will be dedicated to questions from the judges.

Presentation Format Options: Teams can design a poster, make a PowerPoint, design a Prezi, and/or use index cards for their presentations. Teams are not allowed to create videos for their presentation or show a video while presenting. Technology is optional!

Presentation Structure:

- Review all rules for the WA State Envirothon and the grading rubric for the Oral Presentations.
- You may choose to divide your presentation into a recognizable **Introduction, Body, and Conclusion**. Example:
 - **Introduction:** Recap the problem, state the objective, and name the person presenting each objective.
 - **Body:** Clearly outline and explain the objectives.
 - **Conclusion:** Use new language to restate the objectives and have a definite finish and closing remarks.
- Expand upon your ideas with examples from case studies and real-world examples that you find through research. **Use references** and cite them correctly!
- Practice:
 - Plan what each team member is going to say ahead of time and **make sure all team members participate at least once** during the presentation.
 - Make sure your team meets the 10 minute presentation requirement.
- Presentation tips:
 - Face the judges, not the screen!
 - Use complete sentences.
 - Avoid using slang terms, such as “uh” and “you know”.
 - Do not read verbatim from index cards or PowerPoints.
- You **DO NOT** have to create a presentation with technology, you could create a poster as well. *Using technology is optional.*

- The presentations will be loaded onto the laptop ahead of time, but be prepared with index cards or take advantage of poster boards or props. Keep in mind that technology is not always reliable.
- Properly cite all sources referred to in presentations on the last slide of the Presentation.

Considerations when/if creating a PowerPoint/Prezi:

1. Colors are very important, be sure that words are visible and colors don't clash.
2. Less words are best, if you need help with remembering what to say, USE INDEX CARDS!
 - If you need to use some words, use short bullet points.
3. Photos and maps are great! Try to incorporate as many photos and maps as you can into the slides to help get your point across.
4. List your references/sources in the last slide.

SECTION THREE: NEXT STEPS

This section contains the following information:

- Ready to Get Involved? Next Steps
- Washington State Envirothon Rules
- Resources



Ready to Get Involved? Next Steps:

1. Encourage students to form a team of five with two alternates. Contact your local conservation district to find out the event dates, times and locations. Your conservation district should provide you with the registration for the Regional Envirothon Competition for your county. Visit <https://waenvirothon.org/> to find your conservation district and regional competition.
2. In addition, your conservation district may be able to assist you in preparing your students for the event. Please contact your local conservation district earlier rather than later, so that conservation district employees can help support your team with workshops and supplemental studying.

3. Use this Teacher Handbook in tandem with the North American Envirothon website to help students prepare for learning objectives and competition curriculum.

WWW.ENVIROTHON.ORG

WASHINGTON STATE ENVIROTHON RULES AND REGULATIONS

1. Team members must be registered in grades 9-12 for the current school year.
2. Teams consist of five members from the same school, home school group, or local organization. No more than two alternates may be substituted at the state contest without pre-approval by Washington State Envirothon (WSE) Committee. Teams with less than five members can participate at state but are not eligible to qualify for the First Prize Award. In the event of an emergency that would prevent a registered five member team from competing in the State Envirothon, the WSE may allow a team to compete with fewer than five members. The respective team advisor must certify the legitimacy of the emergency. A review panel will determine if a penalty shall be assessed to a team in the oral presentation for the absence of a complete five member team.
4. An adult advisor must accompany teams and is responsible for the behavior of team members during meals, free time and other times not related to testing or preparation for competition. The Washington State Envirothon (WSE) Committee, hosting conservation district, and hosting site personnel will not be responsible for improperly chaperoned teams. The adult advisor(s) will be responsible for ensuring the safety of their team members throughout the event.
5. Washington State Envirothon shall consist of five resource stations based on soil/land use, forestry, wildlife, aquatic ecology, and the current environmental issue. Additionally, there will be an oral presentation based on the current environmental issue. Students will receive the scenario for their oral presentation before the competition along with instructions for completing and submitting the presentation.
6. Judges' decisions are final on all events.
7. Transportation will be the responsibility of each participating team. Water will be available on site during the competition. The first day dinner, the second day breakfast and lunch, and overnight accommodations will be provided. The venue and committee will try to accommodate all dietary restrictions, but students with allergies or preferences need to identify these requests on the registration form.
8. Male and female students are not allowed to share rooms. Male and female students are not allowed to enter an each other's rooms or cabins. Individuals not comfortable sharing rooms may be provided with a separate cabin or room on a case by case basis decided by the committee. When a team consists of both male and female students, team members are not allowed to visit each other's rooms or cabins. Another location should be selected for team meetings. Twenty points will be deducted from a team's final score if a member breaks this rule. If the infraction occurs a second time, the team will be disqualified.
9. School medical release forms are required for students to participate at the competition. Advisors needs to use the form from their school or organization and have parents/guardians complete the form before the competition. The advisor

10. Scores for the five resource stations will be 100 points each and the Oral Presentation will be 200 points for a total possible score of 700 points. The winning team is the team with the highest cumulative point total from the six test stations. Should there be a tie for the highest cumulative points the winning team will be determined first by their score from the Oral Presentation. If there is still a tie, the scores will be compared next by the Aquatic Ecology test, then the Forestry test, then the Wildlife test, and lastly the Soils/Land Use test.
11. During the competition, team members must wear the State Envirothon t-shirt that was issued to them at registration. Team members may not wear or carry any items that would indicate which school or conservation district they are representing.
12. Rules are subject to change. Any and all relevant changes will be explained to all teams and advisors at an affected Envirothon competition.
13. No tobacco, intoxicants (other than prescription medications), or weapons are allowed on site. All Washington State laws will be strictly enforced.
14. No outside study materials or unauthorized electronic devices (such as cell phones, laptops, tablets, portable music players, etc.) will be allowed during the first day oral prep or the day of the competition. If a student uses electronic devices or outside study materials during competition or competition prep, his/her team will be disqualified.
15. All students must be in their rooms by 11 :00 P.M. This curfew will be strictly enforced: Any violation of the rules by a team member or an advisor may result in that team being disqualified from a competition.
16. Please respect other people and property while visiting. We would like to leave the community with a good impression of the Envirothon and its participants.

Obligations of the Winning Team

1. First and Second Place Teams and their Advisors must attend a mandatory briefing meeting (approximately one-half hour) directly after the award ceremony at the state competition.
2. Both 1st and 2nd Place Winning Teams will be given a registration packet for the North American Envirothon Competition. The packet must be filled out completely and turned back into the Committee within seven (7) working days. Failure of the first place team to meet this deadline will result in the second place team representing Washington State at North American Envirothon if their paperwork is in by deadline. If both teams do not meet the deadline, the WSE Committee will determine who will represent Washington State at the North American Envirothon competition.
3. The team representing Washington State must be ready, willing, and able to compete in all portions of the North American Envirothon competition. If the team cannot meet this obligation for any reason, they shall forfeit their right to represent Washington State at

the North American Envirothon, and the next place team shall take over as the representing team.

4. The Washington State team competing at North American Envirothon will make no reimbursable purchases without written permission of the WSE Committee

WSE Rules- Signatures

I have read and agree to abide by the Washington State Envirothon Competition Rules.

Student: _____ Date: _____

Parent: _____ Date: _____

Teacher: _____ Date: _____

Name of School: _____

Display of student work and photos taken during Envirothon Competition

WSE takes photographs of student activities during the Envirothon Competition for use in promotional information and reporting to funding agencies. These photos may be posted on the WSE website, used in promotional brochures and included in reports. We would like to use photographs of your student for these purposes. _____

I give my permission to WSE to use photographs of my student for promotional activities and reports without compensation. _____

I do not give my permission to WSE to use photographs of my student for promotional activities and reports without compensation. _____

CONCLUSION

Thank you for investing time and energy into Washington State Envirothon! The Teacher Handbook should be used as a guide, but never hesitate to contact your local conservation district with questions and concerns. You can find your local conservation district at: <https://waenvirothon.org/>

