Oregon Agriculture, Food and Natural Resources (AFNR)

AFNR - Natural Resources System

Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions to natural resource issues and goals. NRS.01.

1 **Apply methods of classification to examine natural resource availability and ecosystem function in a particular region.** NRS.01.01.

- 1a Summarize and classify the different kinds of natural resources using common classification schemes (e.g., living versus non-living, renewable versus nonrenewable, native versus introduced, etc.). NRS.01.01.01.A.
- 1b Assess the characteristics of a natural resource to determine its classification. NRS.01.01.01.B.
- 1c Devise strategies for the preservation of natural resources based on their classification. NRS.01.01.01.C.
- 2a Summarize the components that comprise all ecosystems. NRS.01.01.02.A.
- 2b Analyze the interdependence of organisms within an ecosystem (e.g., food webs, niches, impact of keystone species, etc.) and assess the dependence of organisms on nonliving components (climate, geography, energy flow, nutrient cycling, etc.). NRS.01.01.02.B.
- 2c Conduct analyses of ecosystems and document the interactions of living species and non-living resources. NRS.01.01.02.C.
- 3a Summarize and classify different kinds of living species based on evolutionary traits. NRS.01.01.03.A.
- 3b Analyze how biodiversity develops through evolution, natural selection and adaptation; explain the importance of biodiversity to ecosystem function and availability of natural resources. NRS.01.01.03.B.
- 3c Evaluate biodiversity in ecosystems and devise strategies to enhance the function of an ecosystem and the availability of natural resources by increasing the level of biodiversity. NRS.01.01.03.C.

2 **Classify different types of natural resources in order to enable protection, conservation, enhancement and management in a particular geographical region.** NRS.01.02.

- 1a Research and examine the characteristics used to identify trees and woody plants. NRS.01.02.01.A.
- 1b Apply identification techniques to determine the species of a tree or woody plant. NRS.01.02.01.B.

Skip to main content

1c Evaluate the species of trees present to assess the health of an ecosystem (e.g., presence of native versus invasive species, biodiversity, etc.). NRS.01.02.01.C.

2a Research and examine the characteristics used to identify herbaceous plants. NRS.01.02.02.A.

2b Apply identification techniques to determine the species of an herbaceous plant. NRS.01.02.02.B.

2c Evaluate the species of herbaceous plants present to assess the health of an ecosystem (e.g., presence of native versus invasive plants, biodiversity, etc.). NRS.01.02.02.C.

3a Research and examine the characteristics used to identify wildlife and insects. NRS.01.02.03.A.

3b Apply identification techniques to determine the species of wildlife or insect. NRS.01.02.03.B.

3c Evaluate the species of wildlife and insects present to assess the health of an ecosystem. NRS.01.02.03.C.

4a Research and examine the characteristics used to identify aquatic species. NRS.01.02.04.A.

4b Apply identification techniques to determine the species of an aquatic organism. NRS.01.02.04.B.

4c Evaluate the aquatic species present to assess the health of an ecosystem. NRS.01.02.04.C.

5a Research and examine the characteristics used to identify non-living resources (e.g., soil types, climate, geography, etc.). NRS.01.02.05.A.

5b Apply identification techniques to determine the types of non-living resources in an area. NRS.01.02.05.B.

5c Evaluate the non-living resources present in an area to determine the best practices for improving, enhancing and protecting an ecosystem. NRS.01.02.05.C.

6a Research the purpose and value of resource inventories and population studies. NRS.01.02.06.A.

6b Apply procedures for conducting resource inventories and population studies. NRS.01.02.06.B.

6c Conduct an assessment of the resource inventories or population in a given area. NRS.01.02.06.C.

---

3 **Apply ecological concepts and principles to atmospheric natural resource systems.** NRS.01.03.

1a Classify different kinds of biogeochemical cycles and the role they play in natural resources systems. NRS.01.03.01.A.

1b Assess the role that the atmosphere plays in the regulation of biogeochemical cycles. NRS.01.03.01.B.

Skip to main content

c Evaluate and make recommendations to lessen the impact of human activity on the ability of the atmosphere to regulate biogeochemical cycles. NRS.01.03.01.C.

2a Research and summarize how climate factors influence natural resource systems. NRS.01.03.02.A.

2b Analyze the impact that climate has on natural resources and debate how this impact has changed due to human activity. NRS.01.03.02.B.

2c Assess the primary causes of climate change and design strategies to lessen its impact on natural resource systems. NRS.01.03.02.C.

---

4 Apply ecological concepts and principles to aquatic natural resource systems. NRS.01.04.

1a Summarize the roles and properties of watersheds. NRS.01.04.01.A.

1b Assess the function of watersheds and their effect on natural resources. NRS.01.04.01.B.

1c Evaluate and defend the importance of watersheds to ecosystem function. NRS.01.04.01.C.

2a Examine and describe the importance of groundwater and surface water to natural resources. NRS.01.04.02.A.

2b Analyze how different classifications of ground and surface water affect ecosystem function. NRS.01.04.02.B.

2c Devise and apply strategies to manage, protect, enhance or improve sources of groundwater or surface water based on its properties. NRS.01.04.02.C.

3a Compare and contrast riparian zones and riparian buffers based on their function. NRS.01.04.03.A.

3b Assess techniques used in the creation, enhancement and management of riparian zones and riparian buffers. NRS.01.04.03.B.

3c Devise and apply strategies for the creation, enhancement and management of riparian zones and riparian buffers. NRS.01.04.03.C.

---

5 Apply ecological concepts and principles to terrestrial natural resource systems. NRS.01.05.

1a Research and describe the stages of ecological succession. NRS.01.05.01.A.

1b Analyze and summarize examples of stages of succession. NRS.01.05.01.B.

1c Evaluate the stages of succession present in an ecosystem and predict which species will become more prevalent through future stages of succession. NRS.01.05.01.C.

2a Compare and contrast the impact of habitat disturbances and habitat resilience. NRS.01.05.02.A.

2b Analyze and summarize examples of habitat disturbances and habitat resilience. NRS.01.05.02.B.

2c Interpret signs of habitat disturbances and resilience in an ecosystem and use these signs to assess the health of an ecosystem. NRS.01.05.02.C.

Skip to main content

3a Compare and contrast techniques associated with sustainable forestry (e.g., timber stand improvement, diversity improvement, reforestation, etc.). NRS.01.05.03.A.

3b Analyze a forest in order to determine which forestry techniques would improve that habitat. NRS.01.05.03.B.

3c Devise a forest management plan that improves the habitat while sustainably maximizing the amount of timber that can be harvested. NRS.01.05.03.C.

4a Compare and contrast techniques associated with soil management (e.g., soil survey and interpretation, erosion control, etc.). NRS.01.05.04.A.

4b Analyze a plot of land in order to determine which soil management techniques would be most applicable. NRS.01.05.04.B.

4c Devise a soil management plan to minimize erosion and maximize biodiversity, plant productivity, and the formation of topsoil. NRS.01.05.04.C.

---

6 **Apply ecological concepts and principles to living organisms in natural resource systems.** NRS.01.06.

1a Differentiate between population ecology, population density and population dispersion and describe the importance of these concepts to natural resource systems. NRS.01.06.01.A.

1b Analyze the factors that influence population density and population dispersion in natural resource systems. NRS.01.06.01.B.

1c Create a management plan for a population of a species in an ecosystem given its population ecology, population density and population dispersion in natural resource systems. NRS.01.06.01.C.

2a Research and summarize examples of invasive species. NRS.01.06.02.A.

2b Analyze factors that influence the establishment and spread of invasive species and determine the appropriate steps to prevent or minimize the impact of invasive species. NRS.01.06.02.B.

2c Evaluate the presence and impact of invasive species on natural resources in a given area and devise a plan to prevent, control or eliminate invasive species from that habitat. NRS.01.06.02.C.

Analyze the interrelationships between natural resources and humans. NRS.02.

1 **Examine and interpret the purpose, enforcement, impact and effectiveness of laws and agencies related to natural resource management, protection, enhancement and improvement (e.g., water regulations, game laws, historic preservation laws, environmental policy, etc.).** NRS.02.01.

1a Distinguish between the types of laws associated with natural resources systems. NRS.02.01.01.A.

1b Analyze the structure of laws associated with natural resources systems. NRS.02.01.01.B.

1c Evaluate the impact of laws associated with natural resources systems (e.g., mitigation, water regulations, carbon emissions, game limits, invasive species, etc.). NRS.02.01.01.C.

Skip to main content

2a Distinguish between the types of agencies associated with natural resources systems. NRS.02.01.02.A.

2b Analyze the specific purpose of agencies associated with natural resources systems. NRS.02.01.02.B.

2c Evaluate the impact and effectiveness of agencies associated with natural resources systems (e.g., regulation of consumption, prevention of damage to natural resources systems, management of ecological interactions, etc.). NRS.02.01.02.C.

---

2 Assess the impact of human activities on the availability of natural resources. NRS.02.02.

1a Summarize the relationship between natural resources, ecosystems and human activity NRS.02.02.01.A.

1b Assess and explain how different kinds of human activity affect the use and availability of natural resources (i.e., agriculture, industry, transportation, etc.). NRS.02.02.01.B.

1c Evaluate how the availability of natural resources can be improved through changes to human activity. NRS.02.02.01.C.

2a Categorize the primary causes of extinction of living species due to human activity (e.g., over-harvesting, habitat loss, invasive species, pollution, etc.). NRS.02.02.02.A.

2b Assess causes of extinction and describe how those causes related to loss of biodiversity. NRS.02.02.02.B.

2c Devise a strategy for preventing the loss of species and biodiversity that takes into account the primary causes of species extinction from human activity. NRS.02.02.02.C.

---

3 Analyze how modern perceptions of natural resource management, protection, enhancement and improvement change and develop over time. NRS.02.03.

1a Summarize and categorize the different social considerations in regards to the use of natural resources (e.g., public versus private, laws and regulations, economics, green technology, etc.). NRS.02.03.01.A.

1b Analyze how social considerations can affect the use and sustainability of natural resources. NRS.02.03.01.B.

1c Develop predictions for how the management, protection, enhancement and improvement of natural resources will evolve through social considerations (e.g., establishment of national parks, public opinion, and fishing, reduction of waste and energy consumption, etc.). NRS.02.03.01.C.

2a Research and assess how historical figures played a prominent role in shaping how natural resources are viewed and used today (e.g., Aldo Leopold, Teddy Roosevelt, John Muir, Rachel Carson, Gaylord Nelson, etc.). NRS.02.03.02.A.

b Examine and describe the relationship between current trends in natural resource systems and historical figures that played a prominent role in shaping how natural resources are viewed and used today NRS.02.03.02.B.

Skip to main content

2c Anticipate and predict how society's views and use of natural resources will continue to change as a result of historical figures and trends in modern society NRS.02.03.02.C.

3a Research how technology has affected the use and views of natural resources. NRS.02.03.03.A.

3b Analyze and document how some technological advancements changed how natural resources were used and viewed (e.g., Industrial Revolution, fossil fuels, green technology, etc.). NRS.02.03.03.B.

3c Anticipate and predict how future technological advancements may affect the use and views of natural resources. NRS.02.03.03.C.

---

4 Examine and explain how economics affects the use of natural resources. NRS.02.04.

1a Compare and contrast how the economic value of a natural resource affects its availability NRS.02.04.01.A.

1b Assess whether economic value increases or decreases the conservation, protection, improvement and enhancement of natural resources. NRS.02.04.01.B.

1c Devise a plan to improve the conservation, protection, improvement and enhancement of natural resources based on economic value and practices. NRS.02.04.01.C.

2a Research the impact of the use of natural resources on local, state and national economies (e.g., outdoor recreation, energy production, preservation, etc.). NRS.02.04.02.A.

2b Assess the importance of the use of natural resources on local, state and national economies. NRS.02.04.02.B.

2c Anticipate and predict how changes to the availability of natural resources because of human activity may impact a local, state and national economy. NRS.02.04.02.C.

3a Compare and contrast the economic impact of green technology and alternative energy. NRS.02.04.03.A.

3b Analyze and document how the adoption of green technology and/or alternative energy affected a local, state or national economy. NRS.02.04.03.B.

3c Anticipate and predict the economic impact green technology and alternative energy. NRS.02.04.03.C.

---

5 Communicate information to the public regarding topics related to the management, protection, enhancement, and improvement of natural resources. NRS.02.05.

1a Examine and describe ways in which a message regarding natural resources may be communicated to the public through standard media sources (e.g., press, radio, TV, public appearances, etc.). NRS.02.05.01.A.

Skip to main content

b Assess the effectiveness of different methods for communicating natural resource messages. NRS.02.05.01.B.

1c Devise and implement a strategy for communicating a natural resources message through media. NRS.02.05.01.C.

2a Research and summarize how social media and the Internet have changed how people perceive and utilize natural resources (e.g., greater awareness of conservation issues, calls to action, etc.). NRS.02.05.02.A.

2b Assess how to most effectively communicate a message about the conservation, management, enhancement and improvement of natural resources via social media and the Internet. NRS.02.05.02.B.

2c Anticipate and predict how messages about the conservation, management, enhancement and improvement of natural resources will change because of social media and the Internet. NRS.02.05.02.C.

3a Examine and describe how communication can be used to influence behavior, call people to action and instill a sense of civic behavior related to the conservation, management, enhancement and improvement of natural resources. NRS.02.05.03.A.

3b Analyze and summarize examples of how communication can be used to influence behavior, call people to action and instill a sense of civic behavior related to the conservation, management, enhancement and improvement of natural resources. NRS.02.05.03.B.

3c Create a communication plan to influence the behavior of people, call people to action and instill a sense of civic behavior related to the conservation, management, enhancement and improvement of natural resources. NRS.02.05.03.C.

Develop plans to ensure sustainable production and processing of natural resources. NRS.03.

1 **Sustainably produce, harvest, process and use natural resource products (e.g., forest products, wildlife, minerals, fossil fuels, shale oil, alternative energy, recreation, aquatic species, etc.).** NRS.03.01.

1a Summarize forest harvesting methods. NRS.03.01.01.A.

1b Assess harvesting methods in regards to their economic value, environmental impact, and other factors. NRS.03.01.01.B.

1c Develop a forest harvesting plan that ensures economic, environmental and social sustainability. NRS.03.01.01.C.

2a Research and describe methods by which wildlife can be sustainably harvested (e.g., controlled harvests, hunting licenses, regulations, etc.). NRS.03.01.02.A.

2b Assess and apply techniques used to harvest wildlife in regards to sustainability, practicality and other factors. NRS.03.01.02.B.

2c Develop a method for the sustainable harvest of wildlife species. NRS.03.01.02.C.

3a Compare and contrast the costs and benefits (e.g., impacts on environment, economic, wildlife, etc.) of mineral extraction to a local, state and/or national economy. NRS.03.01.03.A.

b Assess the economic impact of mineral extraction in regards to the costs and benefits to a local, state and/or national economy. NRS.03.01.03.B.

Skip to main content

3c Evaluate methods used to extract and process minerals for economic, environmental and social sustainability. NRS.03.01.03.C.

4a Compare and contrast the costs and benefits (e.g., impacts on environment, economic, wildlife, etc.) of fossil fuels to a local, state and/or national economy. NRS.03.01.04.A.

4b Assess the economic impact of fossil fuel extraction in regards to the costs and benefits to a local, state and/or national economy. NRS.03.01.04.B.

4c Evaluate methods used to extract and process fossil fuels for economic, environmental and social sustainability. NRS.03.01.04.C.

5a Compare and contrast the costs and benefits (e.g., environmental impacts, etc.) of shale oil from fracking to a local, state and/or national economy. NRS.03.01.05.A.

5b Assess the economic impact of shale oil extraction (i.e., fracking) in regards to the costs and benefits NRS.03.01.05.B.

5c Evaluate methods used to extract and process shale oil for economic, environmental and social sustainability. NRS.03.01.05.C.

6a Compare and contrast the costs and benefits (e.g., environmental impacts, etc.) of alternative sources of energy (e.g., hydroelectric, solar, wind, biofuels, geothermal, etc.). NRS.03.01.06.A.

6b Assess and evaluate factors that affect the economic, environmental and social sustainability in regards to the use of alternative sources of energy. NRS.03.01.06.B.

6c Assess trends in energy production and consumption in order to predict how the impact of alternative energy will change in the future. NRS.03.01.06.C.

7a Research and summarize how recreational uses of natural resources can be changed to improve sustainability. NRS.03.01.07.A.

7b Assess different options for improving the sustainability of outdoor recreation based on its impact on natural resources and likelihood of acceptance. NRS.03.01.07.B.

7c Evaluate an example of outdoor recreation and develop suggestions for how that activity can be made more sustainable in a manner that is acceptable to those who take part in that activity. NRS.03.01.07.C.

8a Categorize aquatic species used for commercial and recreational purposes. NRS.03.01.08.A.

8b Analyze and apply techniques used to acquire aquatic species for their environmental, economic and social sustainability. NRS.03.01.08.B.

8c Develop recommendations for the sustainable harvest of aquatic species. NRS.03.01.08.C.

---

2 **Demonstrate cartographic skills, tools and technologies to aid in developing, implementing and evaluating natural resource management plans.** NRS.03.02.

Skip to main content

1a Summarize how to use maps and technologies to identify directions and land features, calculate actual distance and determine the elevations of points. NRS.03.02.01.A.

1b Apply cartographic skills and tools and technologies (e.g., land surveys, geographic coordinate systems, etc.) to locate natural resources. NRS.03.02.01.B.

1c Evaluate the availability of and threats to natural resources using cartographic skills, tools, and technologies (e.g., spread of invasive species, movement of wildlife populations, changes to biodiversity of edge of habitat versus interior, etc.). NRS.03.02.01.C.

2a Summarize how GIS can be used to manage, conserve, improve and enhance the natural resources of an area. NRS.03.02.02.A.

2b Analyze an area's resources using GIS technologies. NRS.03.02.02.B.

2c Use GIS data for a given area to devise a management plan for the management, conservation, improvement, and enhancement of its natural resources. NRS.03.02.02.C.

Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources. NRS.04.

1 **Demonstrate natural resource protection, maintenance, enhancement and improvement techniques.** NRS.04.01.

1a Identify and categorize different kinds of streams. NRS.04.01.01.A.

1b Assess and explain indicators of the biological health of a stream. NRS.04.01.01.B.

1c Create an enhancement plan for a stream. NRS.04.01.01.C.

2a Identify and categorize characteristics of a healthy forest NRS.04.01.02.A.

2b Assess and apply the methods used to improve a forest stand. NRS.04.01.02.B.

2c Create a timber stand improvement plan for a forest. NRS.04.01.02.C.

3a Identify and categorize characteristics of a healthy wildlife habitat. NRS.04.01.03.A.

3b Assess and apply methods of wildlife habitat improvement. NRS.04.01.03.B.

3c Devise a comprehensive improvement plan for a wildlife habitat. NRS.04.01.03.C.

4a Identify and categorize characteristics of healthy rangeland. NRS.04.01.04.A.

4b Assess and apply methods of rangeland improvement. NRS.04.01.04.B.

4c Evaluate and revise a rangeland management plan. NRS.04.01.04.C.

5a Identify and categorize characteristics of natural resources that make them desirable for recreational purposes. NRS.04.01.05.A.

5b Assess and apply management techniques for improving outdoor recreation opportunities. NRS.04.01.05.B.

5c Evaluate the impact of recreational activities on natural resources and create an improvement plan. NRS.04.01.05.C.

a Identify and categorize characteristics of healthy marine and coastal natural resources. NRS.04.01.06.A.

Skip to main content

6b Assess and apply methods to improve marine and coastal natural resources. NRS.04.01.06.B.

6c Create an improvement plan for marine or coastal natural resources. NRS.04.01.06.C.

---

2 Diagnose plant and wildlife diseases and follow protocols to prevent their spread. NRS.04.02.

1a Classify causes of diseases in plants and the correct authorities to whom some diseases should be reported. NRS.04.02.01.A.

1b Analyze a plant disease based on its symptoms, identify if the disease needs to be reported to authorities and determine which authorities it should be reported to. NRS.04.02.01.B.

1c Create a management plan to reduce infection and the spread of plant diseases in natural resource systems. NRS.04.02.01.C.

2a Classify causes of diseases in wildlife and aquatic species and determine the correct authorities to whom some diseases should be reported. NRS.04.02.02.A.

2b Analyze a wildlife or aquatic species disease based on its symptoms, identify if the disease needs to be reported to authorities and determine which authorities it should be reported to. NRS.04.02.02.B.

2c Create a management plan to reduce infection and spread of wildlife or aquatic species diseases in natural resource systems. NRS.04.02.02.C.

---

3 Prevent or manage introduction of ecologically harmful species in a particular region. NRS.04.03.

1a Categorize harmful and beneficial insects, as well as signs of insect damage to natural resources. NRS.04.03.01.A.

1b Analyze signs of insect infestation, identify if it needs to be reported to authorities and determine which authorities it should be reported to. NRS.04.03.01.B.

1c Create a management plan to reduce spread of harmful insects in natural resource systems. NRS.04.03.01.C.

2a Identify and classify invasive species common to a particular region. NRS.04.03.02.A.

2b Analyze signs of the spread of invasive species, identify if it needs to be reported to authorities and determine which authorities it should be reported to. NRS.04.03.02.B.

2c Create a management plan to reduce spread of harmful invasive species in natural resource systems. NRS.04.03.02.C.

3a Research and summarize strategies and benefits of preventing the introduction of harmful species to a particular region. NRS.04.03.03.A.

3b Assess and implement a plan for preventing the spread of harmful species for its effectiveness. NRS.04.03.03.B.

Skip to main content

3c Identify potentially invasive species and devise strategies to prevent ecological damage that would result from the introduction of that species. NRS.04.03.03.C.

4 Manage fires in natural resource systems. NRS.04.04.

1a Differentiate between desirable and undesirable fires and research the role fire plays in a healthy ecosystem. NRS.04.04.01.A.

1b Assess and apply techniques used to fight wildfires, manage prescribed fires and ensure human safety. NRS.04.04.01.B.

1c Develop a prevention plan for harmful fires for a particular region. NRS.04.04.01.C.

2a Research and summarize how fire management techniques have evolved. NRS.04.04.02.A.

2b Assess the effectiveness of techniques previously and currently used to prevent harmful fires NRS.04.04.02.B.

2c Anticipate and predict how fire management techniques will evolve in the future. NRS.04.04.02.C.