Agriculture, Food, Natural Resources

Statewide Program of Study:
Natural Resource / Forestry Career Cluster

Knowledge and Skill Statements/Performance Indicators

Employability | Career Cluster | Focus Areas

Natural Resource Systems

Forestry

Environmental Services

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Overview

The Statewide Program of Study for the Natural Resource / Forestry is designed to prepare students for entry-level employment in a range of careers across the industry and/or to pursue advanced postsecondary educational studies. The cluster encompasses five program areas from the pre-existing skill statements cluster that were incorporated into three focus areas: (1) Natural Resource, (2) Forestry, and (3) Environmental Services.

This document summarizes the technical skills that a student completing a career and technical education (CTE) Program of Study might be expected to know and be able to do. When reading the document, note that:

- ***A Program of Study spans secondary and postsecondary education***, meaning that students are expected to master the identified skills during high school or at an affiliated community college. It is not expected that all skills will be taught at the high school level.
- ***Knowledge and Skill Statements*** (indicated in bold) summarize the types of skills to be taught in a specific focus area. Educators are expected to address these skill statements as part of their CTE Program of Study.
- ***Suggested Performance Indicators*** illustrate tasks that students might perform to demonstrate their understanding of each skill statement. They are offered as examples and are not required to be taught.

Faculty in Oregon community colleges offering related industry training were asked to rate the relative importance of each skill and indicator for high school graduates entering a community college after having completed a CTE Program of Study offered at the secondary level. These ratings included:

- **Critically important**: This skill would be expected of students continuing their studies at a community college offering related programming or entering the workforce after having completed a CTE Program of Study at the high school level.
- **Somewhat important**: This skill would be useful but not necessary for students continuing their studies at a community college offering related programming or entering the workforce after having completed a CTE Program of Study at the high school level.
- **Not important**: This skill would not be expected of students continuing their studies at a community college or entering the workforce after having completed a CTE Program of Study at the high school level (i.e., it will be taught in college or on the job).

How to Use This Document

Educators offering a CTE Program of Study in the Natural Resource / Forestry Career Cluster should review the Knowledge and Skill Statements and Suggested Performance Indicators in this document. Three types of skills and indicators are provided:

Employability Knowledge and Skills — *Applicable to all Career Clusters*

All learners are expected to master these basic skills to function in the workplace. These cross-cutting abilities, found in all jobs in all industries, encompass a broad range of communication, critical thinking, interpersonal, and organizational skills imperative for career success.

Career Cluster-Level Knowledge and Skills — *Applicable to all careers in the Natural Resource / Forestry Cluster*

All workers in Natural Resource / Forestry are expected to have a broad understanding of the field. These cross-cutting skills prepare workers to succeed in a range of jobs in the cluster. High school students mastering these skills are prepared to enter college or the workforce with an understanding of their career options and training needs.

Focus Area-Level Knowledge and Skills — *Applicable to a specific career area*

Field-specific knowledge that an entering college student or entry-level worker would be expected to possess. High school students mastering these skills are prepared to enroll in college to pursue advanced training or enter employment prepared to succeed. Postsecondary graduates would be prepared to enter employment with a credential, certificate, or degree.

These skills have been classified based on the level of knowledge required for their mastery:

- *Foundational Skills* describe technical skills that all high school students completing a Program of Study would be expected to master. Ideally, these skills would be taught within a high school CTE Program of Study (or in collaboration with a postsecondary partner if it is not feasible within high school).
- *Intermediate Skills* describe more technically advanced skills that high school instructors are encouraged to teach in a CTE Program of Study, though some might be taught at a partnering community college due to equipment or time constraints.
- *Advanced Skills* describe highly technical skills that high school instructors may choose to teach with the understanding that, due to their complexity, most will be taught by community college faculty in the postsecondary component of a CTE Program of Study.

Each Knowledge and Skill Statement includes a list of Suggested Performance Indicators that illustrate how students might demonstrate their understanding or abilities relating to each statement. These indicators are offered as an optional, industry-suggested, community college faculty-vetted way to demonstrate the Knowledge and Skill Statements. They are **not** required.

Educators may choose to select from these indicators and/or design other means for students to show skill mastery in their CTE Program of Study. It is anticipated that secondary and postsecondary educators will collaborate in selecting the number, type, and technical specificity of Suggested Performance Indicators, as well as the educational level at which they will be taught.

For more detailed information, see the Natural Resource / Forestry Resource Guide on the Oregon Department of Education website.

Natural Resource / Forestry Career Cluster Knowledge and Skill Statements

Employability Knowledge and Skills

These Knowledge and Skill Statements apply to all Career Clusters in Oregon.

EMP-01	**Adhere to workplace practices**
EMP-02	**Exhibit personal responsibility and accountability**
EMP-03	**Practice cultural competence**
EMP-04	**Demonstrate teamwork and conflict resolution**
EMP-05	**Communicate clearly and effectively**
EMP-06	**Employ critical thinking to solve problems**
EMP-07	**Demonstrate creativity and innovative thinking**
EMP-08	**Demonstrate fluency in workplace technologies**
EMP-09	**Plan, organize, and manage work**
EMP-10	**Make informed career decisions**

Career Cluster-Level Knowledge and Skills

These Knowledge and Skill statements apply for all of the Natural Resource / Forestry Programs of Study in Oregon.

Sector_Skills-01	**Analyze how issues, trends, technologies, and public policies impact systems in the Agriculture, Food & Natural Resources Career Clusters.**
Sector_Skills-02	**Evaluate the nature and scope of the Agriculture, Food & Natural Resources Career Clusters and the role Agriculture, Food & Natural Resources play in society and the economy, both domestically and internationally.**
Sector_Skills-03	**Examine and summarize importance of health, safety, and environmental management systems in AFNR organizations.**
Sector_Skills-04	**Demonstrate stewardship of natural resources in AFNR activities.**
Sector_Skills-05	**Describe career opportunities and means to achieve those opportunities in each of the Agriculture, Food & Natural Resources Career Pathways.**
Sector_Skills-06	**Analyze the interaction among AFNR systems in the production, processing and management of food, fiber, and fuel and sustainable/responsible use of natural resources.**
Sector_Skills-07	**Utilize leadership and interpersonal skills in team work and group settings.**

Focus Area Level Knowledge and Skills

These Knowledge and Skill Statements for the three Focus Area Programs of Study in the Natural Resource / Forestry Career Cluster.

Natural Resource Systems Knowledge and Skill Statements with Suggested Performance Indicators

NatResSys-1	**Examine the relationships between natural resource systems and human activities.**
NatResSys-2	**Plan and conduct natural resource management activities that apply logical, reasoned, and scientifically based solutions to natural resource issues and goals.**
NatResSys-3	**Develop plans to ensure responsible and sustainable production and processing of natural resources.**
NatResSys-4	**Demonstrate responsible control and management procedures and techniques to protect or maintain natural resources.**

Forestry Knowledge and Skill Statements with Suggested Performance Indicators

Forestry-01	**Describe the ecological concepts and principles; investigate and explain the relationships between these principles and forests.**
Forestry-02	**Illustrate Oregon's diverse forests including history, cultural uses, forest types, policies, and related industry.**
Forestry-03	**Explain the human/natural resources relationships when implementing forestry management activities.**
Forestry-04	**Demonstrate skills essential forestry for leadership and citizenship responsibilities.**
Forestry-05	**Demonstrate skills in career research, planning, and preparation.**
Forestry-06	**Document and describe forestry production practices in forestry and timber processing procedures.**
Forestry-07	**Summarize and explain applications of appropriate forest health management practices.**
Forestry-08	**Identify and analyze the inter-relationships between multi-use principles on forestlands and associated lands (to include wildlife, fish, recreation, water, energy, air, carbon and etc.).**
Forestry-09	**Apply forest mensuration techniques and understand their uses.**
Forestry-10	**Apply forest mensuration techniques and understand their uses.**
Forestry-11	**Prepare a business plan using accepted business management principles for forest-products or other related projects, incorporating production, processing, marketing and transportation where appropriate.**
Forestry-12	**Analyze the effect of natural and human caused disturbances (e.g. fire, earthquake, volcano, land use conversions, climate change) on forest ecosystems and the related mitigation efforts.**

Environmental Services Knowledge and Skill Statements with Suggested Performance Indicators

EnvironServSys-1	**Use analytic procedures and instruments to manage environmental systems activities.**
EnvironServSys-2	**Evaluate the impact of public policies and regulations on environmental services facility operations.**
EnvironServSys-3	**Propose and apply solutions to environmental issues and problems using scientific principles of meteorology, soil science, hydrology, microbiology, chemistry and ecology.**
EnvironServSys-4	**Describe the operation of environmental service systems (e.g., pollution control, water treatment, wastewater treatment, solid waste management, and energy conservation).**
EnvironServSys-5	**Identify and properly use tools, equipment, machinery, and technology common to tasks in environmental system services.**

Employability Knowledge and Skill Statements with Suggested Performance Indicators

EMP-01	**Adhere to workplace practices**	**Foundational**
Suggested Performance Indicators	(A) Explain and follow workplace standards, rules, and regulations (B) Show up on time and prepared to work (C) Demonstrate the ability to take direction, be proactive, and work independently	✓ ✓ ✓
EMP-02	**Exhibit personal responsibility and accountability**	**Foundational**
Suggested Performance Indicators	(A) Apply professional and ethical standards of the industry to personal conduct (B) Maintain integrity and promote personal and professional integrity in co-workers (C) Take responsibility and carry out work assignments	✓ ✓ ✓
EMP-03	**Practice cultural competence**	**Foundational**
Suggested Performance Indicators	(A) Demonstrate awareness of issues related to diversity, equity, and inclusion (B) Work effectively with colleagues of differing abilities, cultures, and backgrounds (C) Describe issues relating to workplace harassment (D) Model behaviors that are respectful and sensitive of others	✓ ✓ ✓ ✓
EMP-04	**Demonstrate teamwork and conflict resolution**	**Foundational**
Suggested Performance Indicators	(A) Demonstrate the ability to collaborate and contribute to the work of a diverse team (B) Explain when it is appropriate to lead and when to follow another's lead (C) Demonstrate strategies for resolving issues with coworkers	✓ ✓ ✓
EMP-05	**Communicate clearly and effectively**	**Foundational**
Suggested Performance Indicators	(A) Listen attentively and speak and write clearly to convey information correctly (B) Interpret information and instructions presented in verbal and written form (C) Demonstrate effective communication with colleagues, supervisors, customers, and suppliers (D) Demonstrate the ability to communicate verbally, in writing, and using electronic communication tools	✓ ✓ ✓ ✓
EMP-06	**Employ critical thinking to solve problems**	**Foundational**
Suggested Performance Indicators	(A) Recognize problems in the workplace and diagnose their root causes (B) Develop well-reasoned plans to solve identified challenges (C) Apply and follow through on plans to ensure that problems are resolved	✓ ✓ ✓
EMP-07	**Demonstrate creativity and innovative thinking**	**Foundational**
Suggested Performance Indicators	(A) Develop ideas to solve problems in new and different ways (B) Investigate one's own and others' ideas to find those with greatest applicability (C) Develop and deploy plans to implement new ideas in the workplace	✓ ✓ ✓

EMP-08	Demonstrate fluency in workplace technologies	Foundational
Suggested Performance Indicators	(A) Demonstrate knowledge and application of general technology skills, including hardware and software commonly used in the industry (B) Use online communication, networking tools, and social networks to access, manage, evaluate, and create information to successfully function in a knowledge economy (C) Describe and demonstrate a fundamental understanding of the ethical, legal, and security issues surrounding access to and use of information technologies	✓ ✓ ✓
EMP-09	**Plan, organize, and manage work**	**Foundational**
Suggested Performance Indicators	(A) Identify an intended project outcome including available inputs, materials, labor, timeline for producing work, and job-site obligations (B) Effectively plan, monitor, and complete projects on time and within budget using available resources and materials (C) Demonstrate ability to write coherent reports and project summaries to communicate the progress of project work and its adherence to schedule	✓ ✓ ✓
EMP-10	**Make informed career decisions**	**Foundational**
Suggested Performance Indicators	(A) Identify job and entrepreneurial opportunities in the industry and the required education and credentials to obtain employment (B) Set short- and long-term career goals based on personal interests and aptitudes (C) Maintain a project portfolio (D) Develop a professional resume (E) Explain and demonstrate how to cultivate and maintain a professional presence in an online environment, including the appropriate use of social media and networking platforms	✓ ✓ ✓ ✓ ✓

Agriculture, Food & Natural Resource Sector Skills Career Cluster Knowledge and Skill Statements with Suggested Performance Indicators

Sector_Skills-01	**Analyze how issues, trends, technologies, and public policies impact systems in the Agriculture, Food & Natural Resources Career Clusters.**	Foundational	Intermediate	Advanced
AG01.01.01	Explain how regulations and major laws impact management of AFNR activities.			
AG01.01.02	Describe the major impacts of AFNR legislation.			
AG01.01.03	Describe the major regulations impacting the management of an individual resource.			
AG01.01.04	Identify situations that violate regulations.			
AG01.02.01	Describe current issues impacting AFNR activities.			
AG01.02.02	Identify significant issues that impact work assignment.			
AG01.03.01	Identify, organize alternatives, and evaluate public policy issues related to AFNR.			
AG01.03.02	Identify alternatives to an issue's potential solution.			
AG01.03.03	Evaluate alternatives for strengths and weaknesses.			
AG01.03.04	Recommend a solution based on research and analysis.			
AG01.04.01	Consider public input in decision-making for AFNR activities.			
AG01.04.02	Conduct a local survey of public perceptions and desires concerning AFNR issues.			
AG01.05.01	Explain the impact of sustainability on ARNR activities and practices.			
AG01.05.02	Identify significant environmental and economic issues facing AFNR.			
AG01.05.03	List the potential economic, environmental, and social costs and benefits of enacting sustainability initiatives in AFNR.			
AG01.06.01	Recognize the historical, social, cultural and potential applications of biotechnology on AFNR activities.			
AG01.06.02	Discuss the current applications of biotechnology in AFNR.			
AG01.07.01	Demonstrate the application of biotechnology to AFNR activities.			
AG01.07.02	Explain how biotechnology is used in specific AFNR activities.			
Sector_Skills-02	**Evaluate the nature and scope of the Agriculture, Food & Natural Resources Career Clusters and the role Agriculture, Food & Natural**	Foundational	Intermediate	Advanced

	Resources play in society and the economy, both domestically and internationally.			
AG02.01.01	Examine company performance and goals within AFNR organizations and the AFNR industry.			
AG02.01.02	Examine the role and major functions of AFNR organizations to better utilize AFNR guidelines.			
AG02.01.03	Explain the major guidelines used by AFNR organizations to manage and improve performance while maintaining ecosystem health.			
AG02.01.04	Examine economic, social, and technological changes to spotlight their impact on AFNR organizations and the industry.			
AG02.01.05	Explain technological changes to reveal their impact on information technology and transportation.			
AG02.02.01	Examine the role of AFNR in global, national, and regional economies.			
AG02.02.02	State the economic output of AFNR-related industries in the United States.			
AG02.02.03	Describe the role of global supply and demand on AFNR.			
AG02.02.04	Evaluate the impact of AFNR activities in your local community.			
AG02.03.01	Explain the types of industries, organizations, and activities part of AFNR.			
AG02.03.02	Provide examples of AFNR organizations in each of the AFNR pathways.			
AG02.03.03	Explain the relationship between agriculture, food, and natural resources.			
AG02.03.04	Describe the role of government, multinational companies, regional companies, small businesses, entrepreneurs, and consumers in AFNR activities.			
AG02.04.01	Explain the influence of AFNR on society.			
AG02.04.02	Identify ways in which the average person interacts with AFNR on a daily basis.			
AG02.04.03	Find examples of tradition, custom, or policy that result from practices in AFNR.			
AG02.04.04	Communicate the importance of AFNR to general public.			
Sector_Skills-03	**Examine and summarize importance of health, safety, and environmental management systems in AFNR organizations.**	Foundational	Intermediate	Advanced
AG03.01.01	Examine health risks associated with a particular skill to better form personnel safety guidelines.			

AG03.01.02	Define what level of possible contamination or injury is considered a risk in order to set safety priorities.			
AG03.01.03	Assess mental and physical stresses to determine all aspects necessary to perform well and what health risks are associated with both the mental and physical aspects.			
AG03.02.01	Develop response plans to handle emergencies.			
AG03.02.02	Identify various emergency response plan requirements for a facility.			
AG03.02.03	Develop an emergency response plan for natural disasters.			
AG03.03.01	Identify hazards and acquire first aid skills to promote environmental safety.			
AG03.03.02	Identify general workplace safety hazards.			
AG03.03.03	Apply general workplace safety precautions/procedures.			
AG03.03.04	Acquire and maintain first aid certification.			
AG03.03.05	Acquire and maintain cardiopulmonary resuscitation (CPR) certification.			
AG03.03.06	Respond to medical emergencies.			
AG03.03.07	Explain purpose of pollution control systems.			
AG03.03.08	Describe procedures to comply with environmental regulations.			
AG03.03.09	Maintain environmental health and safety facilities.			
AG03.03.10	Handle chemicals and safety equipment appropriately.			
AG03.03.11	Explain ergonomic procedures.			
AG03.03.12	Assess workplace safety.			
AG03.03.13	Assess a safety-training plan.			
AG03.04.01	Examine required regulations to maintain/improve safety, health, and environmental management systems and sustainable business practices.			
AG03.04.02	Study appropriate resources to identify the major regulatory areas (e.g., personal protective equipment) and government laws and regulations.			
AG03.04.03	Examine the major system components to realize benefits of health, safety, and environmental management systems in AFNR organizations.			
AG03.04.04	Measure or estimate benefits to explain how government agencies promote compliance and improved health, safety, and environmental performance to AFNR organizations.			

AG03.04.05	Examine logistics, distribution, and transportation organizations to explain how AFNR organizations promote improved health, safety, and environmental performance.			
AG03.05.01	Enact procedures that demonstrate the importance of safety, health, and environmental responsibilities in the workplace.			
AG03.05.02	Establish a set of safety, health, and environmental principles to ensure a high level of performance.			
AG03.05.03	Develop a pollution/waste prevention plan to reduce or eliminate waste.			
AG03.06.01	Demonstrate methods to correct common hazards.			
AG03.06.02	Identify and describe common hazards in the workplace.			
AG03.06.03	Identify and describe major sources of information about hazards in the workplace (e.g., MSDS, work procedures, exposure control plans, training materials, labels, and signage).			
AG03.06.04	Identify sources of combustible/flammable materials, fire, and emergencies to establish a fire-safe environment.			
AG03.06.05	Interpret safety signs and symbols.			
AG03.07.01	Demonstrate application of personal and group health and safety practices.			
AG03.07.02	Identify procedures necessary for maintaining a safe work area.			
AG03.07.03	Identify methods to correct common hazards.			
AG03.07.04	Identify methods for disposing of hazardous materials.			
AG03.07.05	Demonstrate principals of safe physical movement to avoid slips, trips, and spills.			
AG03.07.06	Inspect and use protective equipment (PPE).			
Sector_Skills-04	**Demonstrate stewardship of natural resources in AFNR activities.**	Foundational	Intermediate	Advanced
AG04.01.01	Demonstrate evidence of interest and concern for natural resource stewardship.			
AG04.01.02	Explain how personal choices are related to natural resource sustainability.			
AG04.01.03	Describe strategies to help an organization create a culture of natural resource stewardship.			
AG04.02.01	Explain the environmental considerations of decision making in AFNR management.			
AG04.02.02	Predict the positive and negative impacts of given AFNR activities.			

Sector_Skills-05	**Describe career opportunities and means to achieve those opportunities in each of the Agriculture, Food & Natural Resources Career Pathways.**	Foundational	Intermediate	Advanced
AG05.01.01	Locate and identify career opportunities that appeal to personal career goals.			
AG05.01.02	Locate and interpret career information for at least one career cluster.			
AG05.01.03	Identify job requirements for career pathways.			
AG05.01.04	Identify educational and credentialing requirements for career cluster and pathways.			
AG05.02.01	Match personal interest and aptitudes to selected careers.			
AG05.02.02	Identify personal interests and aptitudes.			
AG05.02.03	Identify job requirements and characteristics of selected careers.			
AG05.02.04	Compare personal interests and aptitudes with job requirements and characteristics of career selected.			
AG05.02.05	Modify career goals based on results of personal interests and aptitudes with career requirements and characteristics.			
AG05.03.01	Provide examples and descriptions of various careers in each of the AFNR pathways.			
AG05.03.02	List examples of careers that require various levels of postsecondary education in each AFNR pathway.			
AG05.03.03	Explain the primary benefit of having a career in each of the AFNR pathways.			
Sector_Skills-06	**Analyze the interaction among AFNR systems in the production, processing and management of food, fiber, and fuel and sustainable/responsible use of natural resources.**	Foundational	Intermediate	Advanced
AG06.01.01	Explain foundational cycles and systems of AFNR.			
AG06.01.02	Explain the typical plant and animal life cycle.			
AG06.01.03	Explain nutrient and water cycles.			
AG06.01.04	Describe basic plant and animal production cycles.			
AG06.02.01	Explain the interconnectedness of systems within AFNR.			
AG06.02.02	Describe how various systems (e.g., soil, water, economic, plant, insect, livestock production) are impacted by the production practices of a give crop such as corn or alfalfa.			

AG06.02.03	Explain how changes in one system in AFNR can benefit and cost components of other systems. (e.g., using less irrigation water and the impact on soli systems, economic systems, watersheds)			
Sector_Skills-07	**Utilize leadership and interpersonal skills in team work and group settings.**	Foundational	Intermediate	Advanced
AG07.01.01	Know and apply the essential elements of leadership and citizenship.			
AG07.01.02	Identify different models of leadership; recommend the best model for a project, program or systemic change.			
AG07.01.03	Identify the differences between systematic change and systemic change.			
AG07.01.04	Demonstrate knowledge of a local, state and national political processes which affect change management.			
AG07.02.01	Lead a team to accomplish an authentic community project.			
AG07.02.02	Demonstrate the use of facilitation and consensus building techniques in resolving issues.			
AG07.02.03	Identify legal and ethical issues relating to leading an authentic project.			
AG07.02.04	Analyze a topic, present both pros and cons in written format.			
AG07.02.05	Demonstrate the ability to speak in public in both extemporaneous and prepared situations using an AFNR related topic.			
AG07.03.01	Create a web page to present and interpret an AFNR related topic area or phenomenon.			
AG07.04.01	Adapt an interpretive program or site to accommodate people.			
AG07.04.02	Develop an operational plan for an interpretive center.			
AG07.04.03	Set up and staff a display booth during a community event.			
AG07.04.04	Develop a public use area to explain AFNR (display board, interpretive signs, brochures, ect, ect).			
AG07.05.01	Participate as a facilitator during a public meeting.			
AG07.06.01	Volunteer in an AFNR management area.			

Natural Resource / Forestry Career Cluster Knowledge and Skill Statements with Suggested Performance Indicators

NatResSys-1	**Plan and conduct natural resource management activities that apply logical, reasoned, and scientifically based solutions to natural resource issues and goals.**	Foundational	Intermediate	Advanced
AGNR01.01.01	Recognize weather and other natural hazards related to working in an outdoor environment.			
AGNR01.01.02	Recognize weather-related dangers.			
AGNR01.01.03	Recognize hazards as they relate to terrain.			
AGNR01.01.04	Recognize poisonous plants and animals.			
AGNR01.01.05	Recognize hazardous situations at the work location.			
AGNR01.02.01	Apply cartographic skills to the planning, implementing, and evaluating natural resource activities.			
AGNR01.02.02	Describe different types of maps.			
AGNR01.02.03	Interpret map features and legend.			
AGNR01.02.04	Determine map scale and actual distance.			
AGNR01.02.05	Determine direction from map.			
AGNR01.02.06	Determine elevation and terrain features from topographic maps.			
AGNR01.02.07	Use directional tools with map to locate position.			
AGNR01.02.08	Use land survey and coordinate system.			
AGNR01.02.09	Use a Geographic Information System (GIS) to interface geospatial data.			
AGNR01.03.01	Obtain and analyze data by monitoring natural resource status.	Foundational	Intermediate	Advanced
AGNR01.03.02	Conduct resource inventory and population studies.			
AGNR01.03.03	Establish sample plots and points.			
AGNR01.03.04	Locate and identify resources.			
AGNR01.03.05	Collect data concerning resource availability and health.			
AGNR01.03.06	Maintain databases of resource data.			
AGNR01.03.07	Use a Geographic Information System (GIS) to analyze resource data.			
AGNR01.03.08	Prepare a technical report.			

AGNR01.03.09	Describe the relationship of harvest levels to long-term availability of resources.			
AGNR01.04.01	Explain the application of laws and regulations related to natural resource systems.			
AGNR01.04.02	Identify applicable laws and regulations.			
AGNR01.04.03	List federal, state, and local agencies that carry out laws and regulations related to natural resource systems.			
AGNR01.05.01	Execute natural resource strategies and activities applying scientific knowledge from the study of ecology and wildlife.			
AGNR01.05.02	Demonstrate stream enhancement techniques.			
AGNR01.05.03	Demonstrate forest stand improvement techniques.			
AGNR01.05.04	Demonstrate wildlife habitat enhancement techniques.			
AGNR01.05.05	Demonstrate range enhancement techniques.			
AGNR01.05.06	Demonstrate recreation area enhancement techniques.			
NatResSys-2	Examine the relationships between natural resource systems and human activities.	Foundational	Intermediate	Advanced
AGNR02.01.01	Examine natural resource topics using science concepts, processes, and research techniques.			
AGNR02.01.02	Develop a research/monitoring plan to inquire about a natural resource topic.			
AGNR02.01.03	Conduct a research/monitoring activity for a natural resource topic.			
AGNR02.01.04	Evaluate the results of a natural resource-related inquiry.			
AGNR02.01.05	Produce a technical report of results/findings			
AGNR02.02.01	Examine biological and physical characteristics to identify and classify natural resources.			
AGNR02.02.02	Identify tree species and other woody vegetation.			
AGNR02.02.03	Identify grass and forage species.			
AGNR02.02.04	Identify wildlife species.			
AGNR02.02.05	Identify fish species.			
AGNR02.02.06	Identify rocks, minerals, and soil types.			
AGNR02.03.01	Examine natural cycles and related phenomena to describe ecologic concepts and principles.			

AGNR02.03.02	Describe the hydrologic cycle.			
AGNR02.03.03	Describe the nitrogen cycle.			
AGNR02.03.04	Describe the carbon cycle.			
AGNR02.03.05	Describe nutrient cycles.			
AGNR02.03.06	Describe succession.			
AGNR02.03.07	Describe population dynamics.			
AGNR02.03.08	Describe primary and secondary producers.			
AGNR02.03.09	Describe predator-prey relationships.			
AGNR02.03.10	Identify potential pollution sources.			
AGNR02.03.11	Define watershed boundaries.			
AGNR02.03.12	Use stream classification system.			
AGNR02.03.13	Describe the influence of weather and climatic factors.			
NatResSys-3	**Develop plans to ensure responsible and sustainable production and processing of natural resources.**	Foundational	Intermediate	Advanced
AGNR03.01.01	Plan for the production, harvesting, processing, and/or use of natural resources in a responsible and sustainable manner.			
AGNR03.01.02	Describe forest harvest techniques and procedures.			
AGNR03.01.03	Describe wildlife harvest techniques and procedures.			
AGNR03.01.04	Describe fish harvest techniques and procedures.			
AGNR03.01.05	Describe how minerals and ores are extracted and processed.			
AGNR03.01.06	Describe how oil is extracted and processed.			
AGNR03.01.07	Describe hydroelectric generation techniques and procedures.			
AGNR03.01.08	Describe how public recreation use is a product.			
NatResSys-4	**Demonstrate responsible control and management procedures and techniques to protect or maintain natural resources.**	Foundational	Intermediate	Advanced
AGNR04.01.01	Employ techniques and equipment needed to manage and/or prevent fire.			
AGNR04.01.02	Demonstrate personal fire prevention precautions while working in natural environments.			
AGNR04.01.03	Participate in wildfire prevention community service project.			
AGNR04.01.04	Explain the use of prescribed burns.			

AGNR04.01.05	Meet industry standards for fire suppression training (e.g., National Wildfire Coordinating Group Firefighter Certification Standards).			
AGNR04.02.01	Employ appropriate techniques to prevent the spread of animal and plant diseases affecting natural resource systems.			
AGNR04.02.02	Identify observable diseases impacting plants and animals.			
AGNR04.02.03	Describe how to report observance of disease infestations.			
AGNR04.02.04	Use appropriate techniques and equipment when working with bio-hazards.			
AGNR04.03.01	Manage invasive species infestations that threaten natural resource systems.			
AGNR04.03.02	Identify and classify insects.			
AGNR04.03.03	Identify insect damage signs.			
AGNR04.03.04	Describe how to report observance of insect infestation.			
AGNR04.03.05	Identify examples of invasive species that threaten natural resource systems.			
AGNR04.03.06	Plan for control techniques to manage spread of invasive species.			

Forestry Knowledge and Skill Statements with Suggested Performance Indicators

Forestry-01	Describe the ecological concepts and principles; investigate and explain the relationships between these principles and forests.	Foundational	Intermediate	Advanced
AGFP01.01.01	Identify biotic and wildland components of a Forestry ecosystem and explain their interrelations.			
AGFP01.01.02	Identify the food chain / food web of a typical Forestry.			
AGFP01.01.03	Identify renewable and non-renewable resources in a Forestry ecosystem.			
AGFP01.02.01	Describe anatomical and physiological plant characteristics and processes.			
AGFP01.02.02	Explain the nutrient uptake of a plant (xylem and phloem).			
AGFP01.02.03	Describe the growth and development of a plant.			
AGFP01.02.04	Explain the process of photosynthesis.			
AGFP01.02.05	Chart the process of transpiration; include notes.			
AGFP01.02.06	Explain and illustrate shade tolerances among different tree species.			
AGFP01.02.07	Explain the basic anatomy of plants.			
AGFP01.02.08	Apply characteristics in nursery system practices and propagation.			
AGFP01.03.01	Use the taxonomic classification to identify trees and shrubs.			
AGFP01.03.02	Describe external plant characteristics.			
AGFP01.03.03	Develop and use a dichotomous key.			
AGFP01.03.04	Explain/illustrate the taxonomic structure.			
AGFP01.03.05	Identify common Oregon plants to species.			
AGFP01.03.06	Create a plant collection of important local species.			
AGFP01.04.01	Identify and describe natural cycles and interrelationships affecting Forestry growth and development.			
AGFP01.04.02	Describe how carbon, oxygen, water, nutrients (nitrogen) cycles relate to Forestry growth and development.			
AGFP01.04.03	Explain the process of Forestry succession and Forestry stand development.			
AGFP01.04.04	Describe site adaptations including invasive species.			
AGFP01.04.05	Identify/explain a keystone species and examine interrelationship of subsequence species.			

AGFP01.04.06	Explain ecological interactions (e.g., population dynamics, food webs).			
AGFP01.04.07	Evaluate soil profiles, land capability classes and soil conservation practices.			
Forestry-02	Illustrate Oregon's diverse forests including history, cultural uses, forest types, policies, and related industry.	Foundational	Intermediate	Advanced
AGFP02.01.01	Describe or map Forestry types of Oregon.			
AGFP02.01.02	Locate and describe the Spruce/hemlock Forestry and relevant facts.			
AGFP02.01.03	Locate and describe the Douglas fir Forestry and relevant facts.			
AGFP02.01.04	Locate and describe the mixed conifer Forestry and relevant facts.			
AGFP02.01.05	Locate and describe the sub alpine Forestry and relevant facts.			
AGFP02.01.06	Locate and describe Juniper woodlands and relevant facts.			
AGFP02.01.07	Locate and describe the Lodgepole Pine Forestry and relevant facts.			
AGFP02.01.08	Locate and describe the Ponderosa Pine Forestry and relevant facts.			
AGFP02.01.09	Explain the meaning of urban Forestry and identify where they are located.			
AGFP02.02.01	Describe major trends in Forestry policy and associated socio/economic effect.			
AGFP02.02.02	Explain the meaning of sustainability.			
AGFP02.02.03	Compare and contrast the interpretations of “healthy” Forestry.			
AGFP02.02.04	Identify global Forestry land trends.			
AGFP02.02.05	Identify current state and federal legislation and map the trends over time.			
AGFP02.02.06	Identify the affect of policy trends on timber harvests in Oregon in the last 50_80 years.			
AGFP02.03.01	Identify land ownership and the corresponding management objectives.			
AGFP02.03.02	Identify the owners.			
AGFP02.03.03	Identify the long-term goals and purpose.			
AGFP02.03.04	Identify the key management strategies.			
AGFP02.03.05	forecast the long term effect(s) of these strategies.			
AGFP02.04.01	Describe local, state and national historical individuals, events and the impact they had on Forestry.			

AGFP02.04.02	Research and document major events that had a significant effect on Forestry management at a local level.			
AGFP02.04.03	Research and document major events that had a significant effect on Forestry management in Oregon.			
AGFP02.04.04	Research and document major events that had a significant effect on Forestry management in the U.S. level.			
AGFP02.04.05	Prepare a presentation to identify key figures who played a major role in Forestry management.			
AGFP02.04.06	Identify the impact that the Tillamook Burn had on Oregon Forestry policy and practices.			
AGFP02.04.07	Identify the impact that Ed Schroeder had on Oregon Forestry practices.			
AGFP02.04.08	Develop an illustration that documents the historical use and management of Forestry systems. (e.g. native American, 1800's to present)			
AGFP02.05.01	Describe geographical, cultural, regional production uses of Oregon Forestry products.			
AGFP02.05.02	Using an Oregon map, illustrate the dollar impact of lumber and wood products and employment by region or county.			
AGFP02.05.03	Using an Oregon map, illustrate where various Forestry products are produced (e.g., lumber and engineered wood products, panel products/millwork, pulp paper and chemical products, playground equipment, wood crafts).			
AGFP02.06.01	Identify a human impact on a natural resource.			
AGFP02.06.02	Compare and contrast past activities vs. current practice with reference to soil compaction.			
AGFP02.06.03	Compare and contrast past activities vs. current practice with reference to water management.			
AGFP02.06.04	Compare and contrast past activities vs. current practice with reference to air quality.			
AGFP02.06.05	Compare and contrast past activities vs. current practice with reference to fish and wildlife populations.			

AGFP02.06.06	Compare and contrast past activities vs. current practice with reference to fire.			
AGFP02.06.07	Compare and contrast past activities vs. current practice with reference to erosion.			
AGFP02.07.01	Assess the social, ecological/environmental and economic effects of a Forestry management activity.			
AGFP02.07.02	Discuss an impact(s) of the increased demand for Forestry products.			
AGFP02.07.03	Examine and discuss the human pressure(s) on Forestry systems.			
AGFP02.07.04	Examine sustained yield of Forestry products in a green area.			
AGFP02.08.01	Identify the historical use and management of Forestry systems. (e.g. native American, 1800's to present)			
AGFP02.08.02	Identify the various historical tools used in Forestry and explain/demonstrate their use.			
AGFP02.08.03	Explain the use of fire as a management tool from a historical perspective.			
AGFP02.08.04	Examine the different Forestry management policies that have been enacted over and identify their affect.			
AGFP02.08.05	Identify private and public land use practices and explain their impact on Forestry management.			
AGFP02.08.06	Identify the various historical harvesting and processing techniques.			
AGFP02.08.07	Explain how transportation and distribution of final Forestry products have changed over time.			
Forestry-03	Explain the human/natural resources relationships when implementing forestry management activities.	Foundational	Intermediate	Advanced
AGFP03.01.01	Describe a Forestry management activity.			
AGFP03.01.02	Describe/illustrate Reforestation techniques.			
AGFP03.01.03	Identify different harvesting methods (past and present); explain where each method is most effective.			
AGFP03.01.04	Investigate and evaluate different Forestry access methods.			
AGFP03.01.05	Demonstrate techniques used AGFP stream protection and riparian management.			
AGFP03.01.06	Identify and recommend wildlife habitat enhancement techniques.			

AGFP03.01.07	Develop a vegetative plan AGFP improving wildlife habitat in urban areas.			
AGFP03.01.08	Describe the procedure AGFP an urban tree inventory.			
AGFP03.01.09	Demonstrate proper tree planting/transplanting trees in the urban landscape.			
AGFP03.01.10	Demonstrate proper tree pruning, trimming and fertilization techniques.			
AGFP03.02.01	Identify the role of fire in the Forestry ecosystem.			
AGFP03.02.02	Identify the different perspectives that have been held concerning Forestry fire policy.			
AGFP03.02.03	Examine the concepts of prescribed fire in Forestry management practices.			
AGFP03.02.04	Identify the techniques of prescribe fire in Forestry management practices.			
AGFP03.02.05	Illustrate the concept of ecological succession in post Forestry fire regeneration.			
AGFP03.03.01	Identify other uses of Forestry land			
AGFP03.03.02	Explain the concept of ecosystem service (carbon banking, air quality)			
AGFP03.03.03	Compare and contrast the multiple use principles of management (grazing, recreation, habitat)			
Forestry-04	Demonstrate skills essential forestry for leadership and citizenship responsibilities.	Foundational	Intermediate	Advanced
AGFP04.01.01	Know and apply the essential elements of leadership and citizenship.			
AGFP04.01.02	Identify different models of leadership; recommend the best model for a project, program or systemic change.			
AGFP04.01.03	Identify the differences between systematic change and systemic change.			
AGFP04.01.04	Demonstrate knowledge of a local, state and national political processes which affect change management.			
AGFP04.01.05	Lead a team to accomplish an authentic community project.			
AGFP04.01.06	Demonstrate the use of facilitation and consensus building techniques in resolving issues.			
AGFP04.01.07	Identify legal and ethical issues relating to leading an authentic project.			
AGFP04.01.08	Analyze a topic, present both pros and cons in written format.			
AGFP04.01.09	Demonstrate the ability to speak in public in both extemporaneous and prepared situations using a Forestry related topic.			

AGFP04.01.10	Create a web page to present and interpret a Forestry related topic area or phenomenon.			
AGFP04.01.11	Adapt an interpretive program or site to accommodate people.			
AGFP04.01.12	Develop an operational plan for an interpretive center.			
AGFP04.01.13	Set up and staff a display booth during a community event.			
AGFP04.01.14	Develop a public use area to explain Forestry (display board, interpretive signs, brochures, ect, ect).			
AGFP04.01.15	Participate as a facilitator during a public meeting.			
AGFP04.01.16	Volunteer in a Forestry management area.			
Forestry-05	Demonstrate skills in career research, planning, and preparation.	Foundational	Intermediate	Advanced
AGFP05.01.01	Identify potential careers in the field of Forestry and the workforce projections for that career.			
AGFP05.01.02	Conduct a search on sites such as Oregon Labor Market Information, Oregon's Career Information System (CIS), Oregon Forestry Resources Institute (OFRI), etc.			
AGFP05.01.03	Research and identify the knowledge, skills proficiencies and educational requirements to enter a specific career.			
AGFP05.01.04	Prepare a personal index and opportunities of essential knowledge and skills relative to career needs.			
AGFP05.02.01	Identify the educational venues where knowledge and skills can be developed in preparation for an identified career; assess potential costs, loans and scholarships for education at these venues.			
AGFP05.02.02	Develop an index of scholarships and grants that may be available to support education and training.			
AGFP05.02.03	Identify a career(s) to target in a personal/career plan.			
AGFP05.02.04	Update and enhance the personal education/career plan with information as acquired.			
AGFP05.02.05	Develop an extended learning activity to gain knowledge and skills in a career area of interest.			
AGFP05.02.06	Develop a career related project that supports the acquisition of a skill or credential requirement for a specific career.			

AGFP05.02.07	Examine the different Professional organizations lead to induction into the Forestry profession.			
Forestry-06	Document and describe forestry production practices in forestry and timber processing procedures.	Foundational	Intermediate	Advanced
AGFP06.01.01	Observe and investigate and explain silviculture processes including regeneration, tending and harvesting.			
AGFP06.01.02	Compare and contrast the silvicultural practices of even and uneven aged tree stands.			
AGFP06.01.03	Describe silvicultural techniques (e.g., thinning, cleaning, weeding and other intermediate treatments).			
AGFP06.01.04	Describe harvesting systems (e.g., aerial, cable, ground based).			
AGFP06.01.05	Describe the history of harvest system development in Oregon.			
AGFP06.01.06	Discuss the process of regeneration including seed genetics, and free to grow.			
AGFP06.02.01	Prepare presentations to describe how Forestry products are produced, harvested, processed and used.			
AGFP06.02.02	Observe and document a working mill and a harvest site.			
AGFP06.02.03	Describe historical utilization of wood (e.g., the early importance of spruce in WWI, Douglas fir and Ponderosa Pine).			
AGFP06.02.04	Describe the shift in Forestry products utilization to engineered and composite products.			
AGFP06.02.05	Compare and contrast disadvantage and/advantage of wood products to alternatives (e.g., steel).			
AGFP06.03.01	Compare and contrast technology, policy, social and market driven forces that affect Forestry practices.			
AGFP06.03.02	Describe how silviculture is science-based integration of social, economic, ecological and technological concerns.			
AGFP06.03.03	Describe historical utilization of wood (e.g., the early importance of spruce in World War I, Douglas fir and Ponderosa Pine).			
AGFP06.03.04	Describe a market shift due to state and federal government policy/regulation changes (NAFTA, taxation, laws).			
AGFP06.03.05	Describe the market shift due to changes in oil prices.			

Forestry-07	Summarize and explain applications of appropriate forest health management practices.	Foundational	Intermediate	Advanced
AGFP07.01.01	Identify a Forestry protection issue and describe the relationship between Forestry protection and Forestry health.			
AGFP07.01.02	Identify a significant Forestry protection issue in Oregon.			
AGFP07.01.03	Select an interpretation of the term “Forestry health”.			
AGFP07.01.04	Describe the relationship between the issues and this specific definition of Forestry health.			
AGFP07.02.01	Identify symptoms of threatening pest and disease infestations.			
AGFP07.02.02	Identify the five (5) most potentially economically devastating insects and the symptoms of these infestations in Oregon.			
AGFP07.02.03	Define native vs non-native (invasive species) and list examples.			
AGFP07.02.04	Describe insect detection methods.			
AGFP07.02.05	Discuss acceptable methods of controlling potential insect and pathogen infestations, including Integrated Pest Management.			
AGFP07.03.01	Identify control measures for pest and disease infestations.			
AGFP07.03.02	List control measures for insect and pathogen infestations.			
AGFP07.03.03	Apply a recommended control measure to an infestation.			
AGFP07.03.04	Monitor the outcomes of the treatment including record maintenance.			
AGFP07.04.01	Identify and implement appropriate fire suppression tools and techniques.			
AGFP07.04.02	Identify basic wildland fire suppression tools.			
AGFP07.04.03	Demonstrate safe use of tools and equipment.			
AGFP07.04.04	Describe the basic tactics used for fire suppression (mechanical direct attack) and the fire triangle.			
AGFP07.04.05	Explain the difference between wildland fire suppression tactics and strategies.			
AGFP07.04.06	Describe wildland fire firefighting safety concepts including standards for survival (e.g., LCES, standard fire orders and fire watch out situations).			
AGFP07.04.07	Demonstrate personal fire prevention precautions while working in Forestry environments.			
AGFP07.04.08	Participate in a wildfire prevention project.			

AGFP07.04.09	Meet industry standards for fire suppression training (e.g., National Wildfire Coordinating Group Firefight Certification Standards).			
AGFP07.05.01	List timber stand improvement strategies (silviculture methods) to address a Forestry health issues.			
AGFP07.05.02	Identify a situation where there is an affect from a stand improvement strategy.			
AGFP07.05.03	Discuss when and how to implement salvage.			
AGFP07.05.04	Discuss when and how to implement thinning.			
AGFP07.05.05	Discuss when and how to implement restorations.			
AGFP07.05.06	Discuss when and how to implement weeding.			
AGFP07.05.07	Discuss when and how to implement spraying.			
AGFP07.05.08	Discuss when and how to implement fertilizer application.			
AGFP07.05.09	Discuss when and how to implement pesticide application.			
AGFP07.05.10	When and how to implement a controlled burn?			
AGFP07.06.01	Develop a plan to address a Forestry health issue.			
AGFP07.06.02	Identify the threat.			
AGFP07.06.03	Identify Forestry landowner objectives.			
AGFP07.06.04	Determine possible treatments and assess the social, economic and environmental outcomes.			
AGFP07.06.05	Develop a list of actions, timelines, benchmarks and costs.			
AGFP07.06.06	Create a method to evaluate the success of the project.			
Forestry-08	Identify and analyze the inter-relationships between multi-use principles on forestlands and associated lands (to include wildlife, fish, recreation, water, energy, air, carbon and etc.).	Foundational	Intermediate	Advanced
AGFP08.01.01	Demonstrate an awareness of Forestry recreation management.			
AGFP08.01.02	Identify types of land ownership and ownership rights.			
AGFP08.01.03	Discuss legal responsibilities for private and public land owners when land is used by the public.			
AGFP08.01.04	Discuss the loss and benefit of multiple uses.			
AGFP08.01.05	Develop Forestry recreation management plan (e.g., user conflict, carrying capacity, impact).			
AGFP08.01.06	Describe how recreational opportunities vary with ownership.			

AGFP08.01.07	Develop an interpretation plan to describe a natural resource area (e.g., trail, materials signage).			
AGFP08.02.01	Demonstrate an awareness of range land habitats, plants and animals, ecological succession, human uses.			
AGFP08.02.02	Describe the relationships between rangeland plants and animals.			
AGFP08.02.03	List plant requirements for optimum nutritional value (e.g., water, soil, and nutrients).			
AGFP08.02.04	Explain over grazing and its effects on succession.			
AGFP08.02.05	Develop a range management plan.			
AGFP08.03.01	Demonstrate an awareness of water resources.			
AGFP08.03.02	Diagram a local watershed location, boundaries and users.			
AGFP08.03.03	Test and sample local water resource for water quality, etc.			
AGFP08.03.04	Demonstrate stream enhancement techniques.			
AGFP08.03.05	Use a stream classification system.			
AGFP08.03.06	Describe the influence of weather and climatic factors.			
AGFP08.03.07	Identify potential water pollution sources.			
AGFP08.04.01	Demonstrate an awareness of special Forestry products.			
AGFP08.04.02	Define/identify special Forestry products.			
AGFP08.04.03	Identify specialty markets for Forestry products in the local area.			
AGFP08.04.04	Identify local processors and wholesalers.			
AGFP08.04.05	Evaluate historical consumer trends related to specialty products.			
AGFP08.04.06	forecast future demand of a specific special product.			
AGFP08.04.07	Identify methods of harvesting of a special product.			
AGFP08.04.08	Discuss the effects of special product harvesting on the ecosystem.			
Forestry-09	Apply forest mensuration techniques and understand their uses.	Foundational	Intermediate	Advanced
AGFP09.0.01	Utilize map, compass reading, and related skills associated with Forestry applications.			
AGFP09.0.02	Monitor Forestry resource status and apply cartographic skills to obtain planning data to create a management plan.			
AGFP09.0.03	Describe different types of maps.			
AGFP09.0.04	Interpret map features and legend.			
AGFP09.0.05	Determine map scale and actual distance.			

AGFP09.0.06	Determine direction from a map.			
AGFP09.0.07	Use directional tools with map to locate position.			
AGFP09.0.08	Use land survey and coordinate system; determine percent (%) slope.			
AGFP09.0.09	Use Geographic Information System (GIS) to interface and analyze resource data.			
AGFP09.0.10	Conduct resource inventory and sample population studies.			
AGFP09.0.11	Use sample plots and points.			
AGFP09.0.12	Collect data concerning resource availability and health.			
AGFP09.0.13	Prepare a technical report.			
Forestry-10	Apply forest mensuration techniques and understand their uses.	Foundational	Intermediate	Advanced
AGFP10.01.01	Identify and use appropriate Forestry tools used in mensuration (biltmore, clinometers, increment bore, Foresters tape, ect, ect)			
AGFP10.01.02	Monitor Forestry resource status and apply cartographic skills to obtain planning data to create a management plan.			
AGFP10.01.03	Conduct resource inventory and sample population studies.			
AGFP10.01.04	Use sample plots and points.			
AGFP10.01.05	Conduct growth and volume yield analysis			
AGFP10.01.06	Collect and interpret data concerning resource availability and health.			
AGFP10.01.07	Prepare a technical report concerning data collected through Forestry mensuration..			
Forestry-11	Prepare a business plan using accepted business management principles for forest-products or other related projects, incorporating production, processing, marketing and transportation where appropriate.	Foundational	Intermediate	Advanced
AGFP11.01.01	Prepare a business plan implementing accepted business management principles used in the production of forestry products.			
AGFP11.01.02	Use accepted business management principles in a business plan for the processing of forestry assets and products.			
AGFP11.01.03	Prepare a business plan that implements appropriate marketing strategies for forestry products.			
AGFP11.01.04	Incorporate multi-channel transportation strategies in a business plan for forestry products.			

Forestry-12	Analyze the effect of natural and human caused disturbances (e.g. fire, earthquake, volcano, land use conversions, climate change) on forest ecosystems and the related mitigation efforts.	Foundational	Intermediate	Advanced
AGFP12.01.01	Analyzing large data, processing and understanding. related scientific research in addressing the natural and human caused disturbances on forest ecosystems and the related mitigation efforts.			

Environmental Services Knowledge and Skill Statements with Suggested Performance Indicators

EnvironServSys-1	Use analytic procedures and instruments to manage environmental systems activities.	Foundational	Intermediate	Advanced
AGEV01.01.01	Monitor samples using a variety of instrumentation.			
AGEV01.01.02	Operate basic laboratory equipment and environment-monitoring instruments (e.g., pH meter/ISE meter, compound microscope/dissecting microscope, sound level measuring devices, turbidimeter, conductivity meter, chlorine meter OVA, HNMU).			
AGEV01.01.03	Perform chemical laboratory sample preparation.			
AGEV01.01.04	Perform analytical separation techniques.			
AGEV01.01.05	Perform spectroscopic analysis using instruments such as: spectrophotometer/auto spectrophotometer, AA/graphite furnace, ICP, GC/MS, oxygen meter, IC, IR, FTIR X-ray diffraction nitrogen analyzer, mercury analyzer, FID/PID analyzer, and RAD meter.			
AGEV01.01.06	Operate advanced laboratory and field equipment and instruments (e.g., HPLC, GC, bomb calorimeters, Geiger Mueller counters, explosimeters, specific gas meters, carbon analyzers, microwaves).			
AGEV01.01.07	Use computers to interface with chemical analytical instruments.			
AGEV01.01.08	Perform instrumental analysis (e.g., mass spectrometers, chromatographs, electron microscopes).			
AGEV01.02.01	Analyze and interpret results of sample measurements.			
AGEV01.02.02	Apply basic statistics concepts.			
AGEV01.02.03	Interpret scattergrams.			
AGEV01.02.04	Analyze probability theories.			
AGEV01.02.05	Determine control limits.			
AGEV01.02.06	Determine process capability.			
AGEV01.02.07	Prepare and evaluate charts.			
AGEV01.02.08	Conduct process improvement studies.			
AGEV01.02.09	Interpret quantitative and graphic output from chemical analysis instruments.			
AGEV01.03.01	Calibrate and service field equipment and instruments according to manufacturer's specifications.			

AGEV01.03.02	Maintain instruments using gas systems.			
AGEV01.03.03	Calibrate chemical analytical instruments.			
AGEV01.03.04	Operate and maintain flow instrument systems.			
AGEV01.03.05	Operate and maintain pressure test instruments (e.g., manometers, vacuum pumps, pressure and vacuum gages).			
AGEV01.03.06	Service thermal measuring instruments.			
AGEV01.03.07	Service physical property (e.g., sample control) measuring instruments.			
AGEV01.03.08	Service chemical property measuring instruments (e.g., O2 meter, spectrophotometer, atomic absorption spectrophotometer, inductively coupled plasma, ion chromatography, infrared).			
EnvironServSys-2	Evaluate the impact of public policies and regulations on environmental services facility operations.	Foundational	Intermediate	Advanced
AGEV02.01.01	Identify the major laws impacting environmental services by consulting reliable resources or participating in trainings.			
AGEV02.01.02	Identify key components of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).			
AGEV02.01.03	Identify requirements of the Superfund Amendment Reauthorization Act (SARA).			
AGEV02.01.04	Identify requirements of waste and material transportation.			
AGEV02.01.05	Describe job-related activities subject to the Occupational Safety and Health Administration (OSHA).			
AGEV02.01.06	Describe requirements of the Resource Conservation and Recovery Act (RCRA).			
AGEV02.01.07	Explain requirements of the Clean Water Act.			
AGEV02.01.08	Explain requirements of the Safe Drinking Water Act (SDWA).			
AGEV02.01.09	Explain requirements of the Clean Air Act.			
AGEV02.01.10	Identify requirements of the Nuclear Waste Policy Act.			
AGEV02.01.11	Identify key components of ISO 14000.			
EnvironServSys-3	Propose and apply solutions to environmental issues and problems using scientific principles of meteorology, soil science, hydrology, microbiology, chemistry and ecology.	Foundational	Intermediate	Advanced

AGEV03.01.01	Recognize weather systems and weather patterns using meteorological principles and knowledge.			
AGEV03.01.02	Identify the components of the earth's atmosphere.			
AGEV03.01.03	Explain basic meteorology principles.			
AGEV03.02.01	Describe soil compositions and properties to demonstrate knowledge of soil science.			
AGEV03.02.02	Describe soil geology.			
AGEV03.02.03	Describe composition of soil.			
AGEV03.02.04	Describe the biological properties of soil.			
AGEV03.02.05	Identify the physical properties of soil.			
AGEV03.02.06	Describe the chemical properties of soil.			
AGEV03.02.07	Test soil samples to determine characteristics.			
AGEV03.02.08	Explain classification of soil water.			
AGEV03.02.09	Explain the relationship between soil classifications and land use.			
AGEV03.03.01	Explain well design and groundwater supplies using knowledge of hydrology.			
AGEV03.03.02	Explain hydrology.			
AGEV03.03.03	Explain geological and meteorological principles affecting groundwater supply.			
AGEV03.03.04	Conduct channel flow analysis.			
AGEV03.03.05	Identify basic criteria for water well design.			
AGEV03.03.06	Identify differences in groundwater potential.			
AGEV03.03.07	Identify environmental hazards associated with groundwater supplies.			
AGEV03.04.01	Use chemical analysis to conduct tests.			
AGEV03.04.02	Explain basic chemistry principles (e.g., elements, compounds).			
AGEV03.04.03	Apply chemical laboratory skills.			
AGEV03.05.01	Perform common microbiology procedures to examine cell types and conduct tests.			
AGEV03.05.02	Conduct bioassay tests.			
AGEV03.05.03	Identify groups of microorganisms.			
AGEV03.05.04	Analyze factors affecting microbial growth.			

AGEV03.06.01	Apply sampling techniques and other assessments using procedures and principles from the study of microbiology.			
AGEV03.06.02	Apply microbiological principles and procedures.			
AGEV03.06.03	Explain immunological procedures.			
AGEV03.06.04	Describe roles of microorganisms in the environment.			
AGEV03.06.05	Explain microbial growth.			
AGEV03.06.06	Describe influence of environmental factors on microbes.			
AGEV03.06.07	Demonstrate the use of fundamental statistics in sampling practices.			
AGEV03.07.01	Apply chemistry principles to environmental service systems.			
AGEV03.07.02	Distinguish the characteristics of inorganic and organic compounds related to environmental service systems.			
AGEV03.07.03	Apply standard operating procedures for use and management of chemicals in environmental service systems.			
AGEV03.08.01	Discuss properties, classifications, functions, and principles for managing wetlands.			
AGEV03.08.02	Explain wetlands classification.			
AGEV03.08.03	Explain the function of wetlands.			
AGEV03.08.04	Describe the living components of wetland habitats.			
AGEV03.08.05	Delineate wetlands.			
AGEV03.08.06	Identify techniques used in wetland management, enhancement, and restoration programs.			
AGEV03.08.07	Identify principles used in wetland mitigation and restoration.			
AGEV03.09.01	Discuss properties, classifications, functions, and principles for managing watersheds.			
AGEV03.09.02	Identify properties of watersheds.			
AGEV03.09.03	Explain watershed management.			
AGEV03.09.04	Delineate watersheds.			
AGEV03.09.05	Assess source water.			
EnvironServSys-4	Describe the operation of environmental service systems (e.g., pollution control, water treatment, wastewater treatment, solid waste management, and energy conservation).	Foundational	Intermediate	Advanced
AGEV04.01.01	Use pollution control measures to maintain a safe facility environment.			

AGEV04.01.02	Identify types of pollution (e.g., ground, surface water, air, noise, radioactive contamination).			
AGEV04.01.03	Identify presence of pollution.			
AGEV04.01.04	Describe environmental impact from industrial and non-industrial processes.			
AGEV04.01.05	Quantify extent of pollution.			
AGEV04.01.06	Locate and monitor sources of pollution.			
AGEV04.01.07	Conduct remediation activities.			
AGEV04.01.08	Monitor remediation activities.			
AGEV04.01.09	Establish pollution management and prevention program.			
AGEV04.02.01	Manage safe disposal of all categories of waste by applying principles of solid waste management (landfill operations).			
AGEV04.02.02	Collect solid waste materials.			
AGEV04.02.03	Treat solid waste materials.			
AGEV04.02.04	Manage solid waste systems.			
AGEV04.02.05	Identify characteristics of solid waste treatment.			
AGEV04.02.06	Identify the risks associated with solid waste accumulation and disposal.			
AGEV04.02.07	Describe methods of site identification and acceptance.			
AGEV04.02.08	Explain sanitary landfill operating procedures.			
AGEV04.02.09	Monitor sanitary landfill procedures.			
AGEV04.02.10	Describe methods to operate a composting facility.			
AGEV04.02.11	Describe methods to incinerate solid waste.			
AGEV04.02.12	Describe recycling methods.			
AGEV04.03.01	Apply drinking water treatment operation procedures and principles to assure safe water for a community.			
AGEV04.03.02	Identify characteristics of drinking water treatment.			
AGEV04.03.03	Explain the aeration process in water treatment.			
AGEV04.03.04	Monitor the mixing, coagulation, and flocculation processes in water treatment.			
AGEV04.03.05	Monitor the filtration and sedimentation process in water treatment.			
AGEV04.03.06	Monitor the water-softening process in water treatment.			
AGEV04.03.07	Monitor the stabilization process in water treatment.			

AGEV04.03.08	Monitor the corrosion-control process in water treatment.			
AGEV04.03.09	Monitor the disinfection process in water treatment.			
AGEV04.03.10	Monitor the iron and manganese removal processes in water treatment.			
AGEV04.03.11	Describe taste and odor control in water treatment.			
AGEV04.03.12	Describe the demineralization processes in water treatment.			
AGEV04.03.13	Monitor the fluoridation process in water treatment.			
AGEV04.03.14	Identify facility operational problems in water treatment.			
AGEV04.03.15	Identify methods for backflow prevention.			
AGEV04.04.01	Manage wastewater treatment and disposal operations using principles for managing wastewater and complying with rules and regulations.			
AGEV04.04.02	Identify characteristics of wastewater treatment.			
AGEV04.04.03	Sample wastewater.			
AGEV04.04.04	Describe wastewater collection systems.			
AGEV04.04.05	Analyze the constituents of wastewater entering wastewater treatment facility.			
AGEV04.04.06	Describe the mixing, coagulation, and flocculation processes in wastewater treatment.			
AGEV04.04.07	Describe the disinfection process in wastewater treatment.			
AGEV04.04.08	Describe the treatment train, effluent disposal, and biosolids management in wastewater treatment.			
AGEV04.04.09	Analyze process optimization for the treatment train, effluent disposal, and biosolids management in wastewater treatment.			
AGEV04.04.10	Analyze treatment process control for the treatment train, effluent disposal, and biosolids management in wastewater treatment.			
AGEV04.04.11	Inspect and maintain equipment for the treatment train, effluent disposal, and biosolids management in wastewater treatment.			
AGEV04.04.12	Describe common facility operational problems.			
AGEV04.05.01	Apply hazardous materials management principles to assure safe conditions and compliance with applicable regulations.			
AGEV04.05.02	Describe risks related to hazardous materials.			
AGEV04.05.03	Describe health and safety practices to reduce risks from hazardous materials.			

AGEV04.05.04	Demonstrate appropriate responses for major types of hazardous materials disasters (e.g., chemical, fire and explosion, general safety hazards) (FRA, FRO, HMT, HMS).			
AGEV04.05.05	Describe appropriate use of Personal Protective Equipment (PPE).			
AGEV04.05.06	Perform site evaluation for hazardous material risk.			
AGEV04.05.07	Retrieve and evaluate hazardous materials and hazardous waste sample data.			
AGEV04.05.08	Respond to mock hazardous materials emergency situations.			
AGEV04.05.09	Describe use of equipment related to hazardous materials and hazardous-waste operations.			
AGEV04.05.10	Prepare hazardous materials for transportation and storage in accordance with regulations.			
AGEV04.05.11	Demonstrate ability to operate treatment and disposal systems for hazardous materials and hazardous waste.			
AGEV04.05.12	Maintain required documents for hazardous-materials and hazardous-waste management activities.			
AGEV04.05.13	Audit regulatory compliance.			
AGEV04.05.14	Explain hazardous substance regulations.			
AGEV04.05.15	Demonstrate ability to obtain and use information addressing hazardous substance release.			
AGEV04.05.16	Demonstrate safe handling procedures for hazardous materials and hazardous waste.			
AGEV04.05.17	Evaluate laboratory results.			
AGEV04.06.01	Explain conventional and alternative energy sources.			
AGEV04.06.02	Identify conventional energy sources and their environmental impact.			
AGEV04.06.03	Identify alternate energy sources and their environmental impact.			
EnvironServSys-5	Identify and properly use tools, equipment, machinery, and technology common to tasks in environmental system services.	Foundational	Intermediate	Advanced
AGEV05.01.01	Create maps of land, facilities, and infrastructure using technological tools.			
AGEV05.01.02	Apply surveying and mapping principles to make site measurements and map facility accesses and infrastructure.			
AGEV05.01.03	Apply basic drafting skills to create working drawings.			

AGEV05.01.04	Use CAD fundamentals to create specialized documents.			
AGEV05.01.05	Apply cartographic skills.			
AGEV05.01.06	Apply surveying skills.			
AGEV05.01.07	Use geo-spatial analysis processes for an environmental services application.			
AGEV05.02.01	Demonstrate use of survey and drafting equipment used in planning of tasks in environmental services.			
AGEV05.03.01	Identify common pumps, vehicles, and instruments used in planning tasks in environmental services.			
AGEV05.04.01	Install and maintain pumps and associated delivery systems.			
AGEV05.05.01	Demonstrate design principles related to hydraulic systems and high-flow technologies related to fluid movement.			