

Minnesota State-Approved Technical Skill Assessments

4/20/2017

Pathway: Natural Resources Systems

Cluster: Agriculture, Food, and Natural Resources

CLUSTER/ PATHWAY/ PROGRAM	CERTIFICATION / ASSESSMENT TITLE	TYPE	ISSUING ORGANIZATION	WEBSITE Please report broken web links	ELIGIBILITY REQUIREMENTS / PREREQUISITES	ADMINISTRA- TION ELIGIBILITY (Written, Oral, Practical, etc.)	PASSING SCORE	COST	COMMENTS
<p>● For use at SECONDARY For use at SECONDARY For use at SECONDARY For use at SECONDARY</p>									
Natural Resources & Environmental Systems	Natural Resources: Environmental	Academic Assessment	CareerTech	http://www.okcareertech.org	Broad-based assessment that verifies student mastery of the knowledge and skills that provide the foundation for natural resources careers.	Online	70%	\$12 per exam	May be used at secondary or postsecondary level.
Introduction to Agriculture Education	Agriculture Education I: Core	Academic Assessment	CareerTech	http://www.okcareertech.org	Enrolled in advanced high school general agriculture course	Online	70%	\$12 per exam	Recommended for 11th & 12th grade students.

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● For use at POSTSECONDARY

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Natural Resources	Natural Resources: Environmental	Academic Assessment	CareerTech	http://www.okcareertech.org	Broad-based assessment that verifies student mastery of the knowledge and skills that provide the foundation for natural resources careers.	Online	70%	\$12 per exam	\$12 for pretest and \$12 for posttest
Parks & Recreation	Natural Resources: Parks & Recreation	Academic Assessment	CareerTech	http://www.okcareertech.org	Job-ready assessment that verifies student mastery of the knowledge and skills that provide the foundation for parks & recreations careers.	Online	70%	\$12 per exam	\$12 for pretest and \$12 for posttest
Wildlife	Natural Resources: Wildlife Emphasis	Academic Assessment	CareerTech	http://www.okcareertech.org	Broad-based assessment that verifies student mastery of the knowledge and skills that provide the foundation for careers with a wildlife emphasis.	Online	70%	\$12 per exam	\$12 for pretest and \$12 for posttest

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Forestry	Forestry: Forestry Aide	Academic Assessment	CareerTech	http://www.okcareertech.org	Job-ready assessment that verifies student mastery of the knowledge and skills that provide the foundation for careers in forestry.	Online	70%	\$12 per exam	\$12 for pretest and \$12 for posttest
	CareerTech Testing Information for Consortia Leaders and/or High School Testing Coordinators	CareerTech	TESTING AGREEMENT	Each institution/ consortium should have a Testing Coordinator who contacts CareerTech to obtain assessment exams, proctoring information, data management needs, and other important functions. Click here for the CareerTech Testing Agreement form: http://www.okcareertech.org/about/state-agency/divisions/testing					

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Natural Resources & Environmental Systems	NOCTI Forest Products and Processing Job Ready Assessment	Academic Assessment	NOCTI	Agriculture, Food & Natural Resources Assessments: http://www.nocti.org/BlueprintCategoryLinks.cfm?category=Agriculture, Food%26 Natural Resources http://www.nocti.org	Job-ready assessment that verifies student mastery of the knowledge and skills that provide the foundation for careers in forestry.	Online or written	National Norm	\$19 per post-test exam; \$31 for pre-test & post-test exam	Contact NOCTI directly to order assessments for your high school program; information is on their web site (http://www.nocti.org).
Natural Resources & Environmental Systems	NOCTI Natural Resources Pathway Assessment	Academic Assessment	NOCTI	Agriculture, Food & Natural Resources Assessments: http://www.nocti.org/BlueprintCategoryLinks.cfm?category=Agriculture, Food%26 Natural Resources http://www.nocti.org	Broad-based assessment that verifies student mastery of the knowledge and skills that provide the foundation for natural resources careers.	Online or written	National Norm	\$19 per post-test exam; \$31 for pre-test & post-test exam	Contact NOCTI directly to order assessments for your high school program; information is on their web site (http://www.nocti.org).

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	NOCTI	NOCTI	TESTING AGREEMENT	Each institution/ consortium should have a Testing Coordinator who contacts NOCTI to obtain assessment exams, proctoring information, data management needs, and other important functions. Click here for getting started: http://www.nocti.org/gettingstarted.cfm					
Natural Resources Systems	Associate Wildlife Biologist	Professional Certification	The Wildlife Society	http://wildlife.org/learn/professional-development-certification/certification-programs/	Has limited experience but has completed the rigorous academic standards and is judged to be able to represent the profession as an ethical practitioner.			\$115 for member; \$325 for nonmember	Completion of program required to apply for certification

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Natural Resources Systems	Certified Wildlife Biologist	Professional Certification	The Wildlife Society	http://wildlife.org/learn/professional-development-certification/certification-programs/	Has demonstrated expertise in the art & science of applying ecology to the stewardship & management of the wildlife resource and its environment.			\$155 for member; \$525 for nonmember	Completion of program required to apply for certification
Forestry/ Natural Resources/ Wildlife	S-130/S-190 Fire Certification	Professional Certification	National Wildlife Coordinating Group	http://www.nwcg.gov/	Must take S-130 & S-190 tests plus "pack test"		Pass/Fail	Fee is part of course	Basic wildlife fire training qualifies you for a "red card."
Forestry/ Natural Resources/ Wildlife	MDA Commercial Pesticide Applicator Certification	Professional Certification	Minnesota Department of Agriculture	http://www.mda.state.mn.us/licensing/licensetype/pesticideapplicator/licenses.aspx			70%	\$58.25 fee	Must renew annually.
Natural Resources Systems	MDA Non- Commercial Pesticide Applicator Certification	Professional Certification	Minnesota Department of Agriculture	http://www.mda.state.mn.us/licensing/licensetype/pesticideapplicator/licenses.aspx			70%	\$58.25 fee	Must renew annually.
Water/ Wildlife/ Natural Resources/ Forestry	Wetland Delineation Licensure	Licensure	University of Minnesota Water Resources Center	https://www.mnwetlands.umn.edu/training-courses/wetland-field-day				\$100 fee to take exam; \$50 fee to retake; \$40 biennial renewal	

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Forestry	Certified Plan Writer	Certification	Wisconsin Department of Natural Resources	http://dnr.wi.gov/topic/ForestLandowners/taxCPW.html	Requires a management plan of the land into the Managed Forest Law Program				
Water	Class D Water Operator Exam	Class D license	Minnesota Department of Health (MDH)	http://www.health.state.mn.us/what_a_class_d_operator_needs_to_know/	1 year experience or 1 year college	Written	70%	\$60	

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		2nd KEY: Y=Essential N=Not Essential O=Optional		
		COMMON CORE COMPETENCIES		
		- Consensus among work group -		
		Secondary	Postsecondary	
TOPIC 1: PERFORMANCE ELEMENT - Explain interrelationships between natural resources and humans necessary to conduct management activities in natural environments.				
INDICATOR 01.01 Performance Indicator: Apply knowledge of natural resource components to the management of natural resource systems.	MEASURE 01.01.01 Identify natural resources.	Y	Y	Comment from Business/Industry: Essential for Biologist!
	MEASURE 01.01.02 Differentiate between renewable and nonrenewable natural resources.	Y	Y	
	MEASURE 01.01.03 Research and debate one or more current issues related to the conservation or preservation of natural resources.	Y	Y	Comment from Business/Industry: Forestry--very important to research a subject.
	MEASURE 01.01.04 Define ecosystem and related terms.	Y	Y	
	MEASURE 01.01.05 Describe the interdependence of organisms within an ecosystem.	Y	Y	
	MEASURE 01.01.06 Conduct a field study of an ecosystem, and record and document observations of species interactions.	O	Y	
INDICATOR 01.02 Performance Indicator: Classify natural resources.	MEASURE 01.02.01 Describe morphological characteristics used to identify trees and other woody plants.	Y- F	Y - F; NR; Wi	Comment from Business/Industry: Not essential for Fisheries--what happens on land affects the water; Helpful for Biologist and Water.
	MEASURE 01.02.02 Identify trees and other woody plants.	Y- F	Y - F; NR; Wi	Comment from Business/Industry: For Parks - critical; especially identifying hazardous trees.

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		COMMON CORE COMPETENCIES - Consensus among work group -		
		Secondary	Postsecondary	
	MEASURE 01.02.03 Conduct a field inventory of trees and other woody plants, and record and document findings.	Y - F	Y - F; NR; Wi	Comment from Business/Industry: Not essential for Water; critical for Parks--if hazardous; Biologist--on the line.
	MEASURE 01.02.04 Describe morphological characteristics used to identify herbaceous plants.	O	Y	Comment from Business/Industry: Essential for Water due to focus on aquatic plants; Biologist--on the line.
	MEASURE 01.02.05 Identify herbaceous plants.	O	Y	
	MEASURE 01.02.06 Conduct a field inventory of herbaceous plants, and record and document findings.	O	Y	Comment from Business/Industry: Critical for Biologist.
	MEASURE 01.02.07 Describe morphological characteristics used to identify wildlife species.	Y - Wi	Y - NR; Wi	Comment from Business/Industry: Essential for majority of group; need to identify how wildlife affects forest.
	MEASURE 01.02.08 Identify wildlife species.	Y - Wi	Y - NR; Wi	Comment from Business/Industry: Essential for majority of group.
	MEASURE 01.02.09 Conduct a field inventory of wildlife species, and record and document findings.	O - Wi	Y - NR; Wi	Comment from Business/Industry: What happens on land affects the water; Helpful for Biologist and Water.
	MEASURE 01.02.10 Describe morphological characteristics used to identify aquatic species.	O	Y - NR; Wa	Comment from Business/Industry: Optional for Forestry; Biologist on the line.
	MEASURE 01.02.11 Identify aquatic species, plants and wildlife.	O	Y - NR; Wa	Comment from Business/Industry: Optional for Forestry; Biologist on the line.
	MEASURE 01.02.12 Conduct a field inventory of aquatic species, and record and document findings.	O	Y - Wa	Comment from Business/Industry: Optional for Forestry.

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		COMMON CORE COMPETENCIES - Consensus among work group -		
		Secondary	Postsecondary	
	MEASURE 01.02.13 Demonstrate techniques used to identify rock, mineral and soil types.	Y - NR	Y	Comment from Business/Industry: Not essential for Biology.
	MEASURE 01.02.14 Identify rock, mineral and soil types.	Y - NR	Y	Comment from Business/Industry: Biology on the line.
	MEASURE 01.02.15 Conduct a field inventory of rock, mineral and soil types, and record and document findings.	O - NR	Y	

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		Secondary	Postsecondary	

TOPIC 2: PERFORMANCE ELEMENT - Apply scientific principles to natural resource management activities.

INDICATOR 02.01 Performance Indicator: Develop a safety plan for work with natural resources.	MEASURE 02.01.01 Identify hazards associated with the outdoor environment.	Y	Y	
	MEASURE 02.01.02 Demonstrate safety practices when working in an outdoor environment.	Y	Y	
	MEASURE 02.01.03 Demonstrate appropriate responses to accidents and injuries that occur in an outdoor environment.	Y	Y	
	MEASURE 02.01.04 Recognize biohazards associated with natural resources.	O	O	
	MEASURE 02.01.05 Use appropriate techniques and equipment when working with biohazards.	O	O	Comment from Business/Industry: Awareness is important but employers train. Recognize biohazards. Not Essential for Forestry, Biology - we teach according to agency. Employee-specific training may be required by insurance carrier.

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		Secondary	Postsecondary	
	MEASURE 02.01.06 Demonstrate appropriate responses for disasters involving biohazardous materials.	O	O	Comment from Business/Industry: Awareness is important but employers train. Not essential for Forestry - we teach at agency. Not Essential for Wildlife - usually nationally. Safety procedures on site. Safety is huge. Employers want to teach CPR and first aid gives advantage in parks. Personal safety important in remote areas. Employers assume new employees know nothing. Employee-specific training may be required by insurance carrier.
INDICATOR 02.02 Performance Indicator: Demonstrate cartographic skills to aid in developing, implementing and evaluating natural resource management plans.	MEASURE 02.02.01 Demonstrate how to use maps to identify directions and features, calculate actual distance and determine the elevations of points.	Y - F; NR	Y	Comment from Business/Industry: Crucial in NR Map reading is also a critical safety issue.
	MEASURE 02.02.02 Locate natural resources using a land survey and geographic coordinate system.	Y - F; NR	Y	Comment from Business/Industry: Crucial in NR Map reading is also a critical safety issue.
	MEASURE 02.02.03 Employ Global Positioning System and Geographic Information Systems technologies to inventory features in natural resource management.	O	Y	Comment from Business/Industry: Crucial in NR Map reading is also a critical safety issue.

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		COMMON CORE COMPETENCIES - Consensus among work group -		
		Secondary	Postsecondary	
INDICATOR 02.03 Performance Indicator: Measure and survey natural resource status to obtain planning data.	MEASURE 02.03.01 Describe the value of resource inventories and population studies.	Y	Y	
	MEASURE 02.03.02 Discuss the procedures for conducting resource inventories and population studies.	Y	Y	
	MEASURE 02.03.03 Conduct resource inventories and population studies to assess resource status.	O	Y	
INDICATOR 02.04 Performance Indicator: Demonstrate natural resource enhancement techniques.	MEASURE 02.04.01 Identify the different kinds of streams.	Y - NR; Wa	Y - NR; Wa	Comment from Business/Industry: Biology is desirable.
	MEASURE 02.04.02 Identify indicators of the biological health of a stream.	Y - Wa	Y - Wa	Comment from Business/Industry: Biology is desirable.
	MEASURE 02.04.03 Create and implement a stream enhancement plan.	O - NR; Wa	Y - Wa; Wi	Comment from Business/Industry: Essential for Wildlife. Biology is desirable.
	MEASURE 02.04.04 Identify characteristics of a healthy forest.	Y - F	Y - F; NR; Wi	Comment from Business/Industry: Not essential for Water. Pertains to eradicating invasive species.
	MEASURE 02.04.05 Identify ways in which forest stands may be improved.	Y - F	Y - F; NR; Wi	Comment from Business/Industry: Not Essential for Water. Biology on the line.
	MEASURE 02.04.06 Develop or implement a timber stand improvement plan for a forest.	O	Y - F; NR; Wi	Comment from Business/Industry: Agency specific.
	MEASURE 02.04.07 Identify characteristics of a healthy wildlife habitat.	Y - Wi	Y - F; Wi	Comment from Business/Industry: Not essential for Water; well-rounded background is extremely important.

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		Secondary	Postsecondary	
	MEASURE 02.04.08 Identify methods of wildlife habitat improvement.	Y - Wi	Y - F; NR; Wi	Comment from Business/Industry: Not essential for Water.
	MEASURE 02.04.09 Conduct a survey of a habitat and devise a comprehensive improvement plan.	O	Y - F; NR; Wi	Comment from Business/Industry: Essential for surveying aquatic habitat.
	MEASURE 02.04.10 Identify characteristics of healthy prairie.	O	Y - NR; Wi	Comment from Business/Industry: Essential for prairie; Not essential for biology. There may be regional variations where substitutions are acceptable.
	MEASURE 02.04.11 Identify methods of prairie restoration techniques.	O	Y - NR; Wi	
	MEASURE 02.04.12 Evaluate prairie and conduct a restoration plan for improvement.	O	Y - NR; Wi	
	MEASURE 02.04.13 Identify natural resource characteristics desirable for recreational purposes.	Y - NR	Y - F	Comment from Business/Industry: Essential for Wildlife--Enhance to include bird watching
	MEASURE 02.04.14 Identify natural resource management techniques for improving recreation opportunities.	Y - NR	O	
	MEASURE 02.04.15 Evaluate the impact of recreational activities on natural resources and create an improvement plan.	O	O	Comment from Business/Industry: E.g., invasive species, watercraft inspection.
	MEASURE 02.04.16 Identify characteristics of healthy Great Lakes natural resources.	O	O	Comment from Business/Industry: Essential for Wildlife, Water, Bio. Not Essential for Forestry, Parks (e.g., Lake Superior water/biology). Wildlife refers to migratory birds - Mississippi River.

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	MEASURE 02.04.17 Identify methods to improve marine and coastal Great Lakes natural resources.	O	O	Comment from Business/Industry: Optional for Water, Biology. Not Essential for Forestry, Parks. Important to entire state of Minnesota (e.g., Lake Superior water/biology. Migratory birds - Mississippi River).
	MEASURE 02.04.18 Assess marine and coastal Great Lakes natural resources and prepare an improvement plan.	O	O	Comment from Business/Industry: Optional for Water, Biology. Not Essential for Forestry, Parks. See comments above.
INDICATOR 02.05 Performance Indicator: Interpret laws related to natural resource management and protection.	MEASURE 02.05.01 Identify laws associated with natural resource systems awareness.	Y - Wi	O	Comment from Business/Industry: Essential for Wildlife, Wetlands, Biology (e.g., Wetland regulations, water quality). Biology and Park Ranger train on local laws, know and abide by specific.
	MEASURE 02.05.02 Identify the purposes of laws associated with natural resource systems awareness.	Y - NR; Wi	O	Comment from Business/Industry: Essential for Park Management.
	MEASURE 02.05.03 Abide by specific laws pertaining to natural resource systems awareness.	Y - NR	O	Comment from Business/Industry: Essential for Park Management.
	MEASURE 02.05.04 Define mitigation awareness.	O	O	Comment from Business/Industry: Essential for Wetland; Not Essential for Park Management or Forestry.
	MEASURE 02.05.05 Identify issues involving mitigation of natural resources awareness.	O	Y	Comment from Business/Industry: Essential for Wetland; Not Essential for Park Management or Forestry.
	MEASURE 02.05.06 Demonstrate mitigation of techniques for natural resources awareness.	O	O	Comment from Business/Industry: Essential for Biology, Natural Resource; Park Management; Not essential for Wildlife.

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		COMMON CORE COMPETENCIES - Consensus among work group -		
		Secondary	Postsecondary	
INDICATOR 02.06 Performance Indicator: Apply ecological concepts and principles to natural resource systems.	MEASURE 02.06.01 Identify biogeochemical cycles.	O	Y	Comment from Business/Industry: Essential for Biology, Water, and Restoration. Not Essential for Parks, Wildlife, Wetlands.
	MEASURE 02.06.02 Diagram biogeochemical cycles and explain the processes.	O	Y	Comment from Business/Industry: Essential for Biology, Water, Natural Resources; Not Essential for Parks, Wildlife, Wetlands.
	MEASURE 02.06.03 Determine the human influence on biogeochemical cycles.	O	Y	Comment from Business/Industry: Essential for Biology, Water, Natural Resources; Not Essential for Parks, Wildlife, Wetlands.
	MEASURE 02.06.04 Describe properties of watersheds and identify the boundaries of local watersheds.	Y - Wa	Y	
	MEASURE 02.06.05 Relate the function of watersheds to natural resources.	Y - Wa	Y	
	MEASURE 02.06.06 Analyze ecosystem functions of a watershed.	O	Y - Wa	Comment from Business/Industry: Critical for Biology and Water; optional for Forestry.
	MEASURE 02.06.07 Compare and contrast groundwater and surface-water flow.	Y	Y - Wa	Comment from Business/Industry: Essential for Wildlife and Wetlands; Not Essential for Forestry.
	MEASURE 02.06.08 Explain stream hydrology and structure, and determine the different classes of streams.	O	Y - Wa	Comment from Business/Industry: Essential for wildlife and wetlands. Stream work is specialty work. Interaction between ground water and surface water; Not Essential for Forestry.
	MEASURE 02.06.09 Classify and predict the behavior of local streams.	O	O	
	MEASURE 02.06.10 Define riparian zones and riparian buffers, and explain their functions.	O	Y - NR; Wa	Comment from Business/Industry: Not essential for Park Management.

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		Secondary	Postsecondary	
	MEASURE 02.06.11 Identify techniques used in the creation, enhancement and management of riparian zones and riparian buffers.	O	Y	Comment from Business/Industry: Provided by employer; Specialized - employee trained.
	MEASURE 02.06.12 Create, enhance and restore riparian zones and riparian buffers.	O	O	Comment from Business/Industry: Essential for Wildlife; Water on the line; Not Essential for Park and specific management guidelines.
	MEASURE 02.06.13 Describe the processes associated with ecological succession.	Y - F; Wi	Y - NR	Comment from Business/Industry: Essential for Biology and Wildlife; Water is neutral on this concept.
	MEASURE 02.06.14 Give examples of primary succession and secondary succession species in a community of organisms.	O	Y	Comment from Business/Industry: Essential for Biology and Wildlife; Water is neutral on this concept.
	MEASURE 02.06.15 Conduct a field study to determine the stages of ecological succession in a community of organisms.	O	Y	Comment from Business/Industry: Essential for Biology and Wildlife.
	MEASURE 02.06.16 Explain population ecology, population density and population dispersion.	Y - Wi	Y	Comment from Business/Industry: Essential for forestry.
	MEASURE 02.06.17 Discuss factors that influence population density and population dispersion.	Y - Wi	Y	
	MEASURE 02.06.18 Create and implement a management plan based on a population study for a community of organisms.	O	Y	Comment from Business/Industry: Essential for Biology.

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Secondary	Postsecondary			
	MEASURE 02.06.19 Define invasive species.	Y	Y	
	MEASURE 02.06.20 Discuss factors that influence the establishment and spread of invasive species.	Y	Y	
	MEASURE 02.06.21 Develop and implement a plan to reduce the impact of invasive species on natural resources.	O	O	Comment from Business/Industry: Essential for Parks, Wetlands. Specific to agency and planned by agency.
	MEASURE 02.06.22 Describe sources of pollution and delineate between point and nonpoint source pollution.	Y - NR	Y	
	MEASURE 02.06.23 Describe the impact of pollution on natural resources.	O	Y	
	MEASURE 02.06.24 Create and implement a plan to prevent or limit the effects of pollution on natural resources.	O	O	Comment from Business/Industry: Not Essential for Forestry, Park Management, Biology.
	MEASURE 02.06.25 Describe climatic factors that influence natural resources.	Y - NR	Y	
	MEASURE 02.06.26 Describe the impact climate has on natural resources.	Y - NR	Y	
	MEASURE 02.06.27 Monitor the effects of climate on plants and wildlife.	O	O	Comment from Business/Industry: Essential for Wildlife, Water.

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TOPIC 3: PERFORMANCE ELEMENT - Apply knowledge of natural resources to production and processing industries.

INDICATOR 03.01 Performance Indicator: Produce, harvest, process and use natural resource products.	MEASURE 03.01.01 Describe forest harvesting methods.	Y - F	Y - F; NR; Wi	Comment from Business/Industry: Essential for Forestry, Wildlife; Essential for Wetlands due to urban growth; Not Essential for Water/ Fisheries-- develop and implement a plan is specific with agency.
	MEASURE 03.01.02 Determine when to harvest forest products.	Y - F	Y - F; NR; Wi	Comment from Business/Industry: Essential for Forestry, Wildlife, Wetlands; Not Essential for Water/ Fisheries.
	MEASURE 03.01.03 Harvest forest products according to principles of sustainable forest management.	O	Y - F; NR; Wi	Comment from Business/Industry: Essential for Forestry, Wildlife. Not Essential for Water, Fisheries Harvest.
	MEASURE 03.01.04 Describe uses of tree species.	Y - F	Y - F; NR; Wi	Comment from Business/Industry: Essential for Forestry, Wildlife. Not Essential for Water.
	MEASURE 03.01.05 Describe processing of forest products.	Y - F	Y - F; NR; Wi	Comment from Business/Industry: Essential for Forestry. Not Essential for Water.
	MEASURE 03.01.06 Process forest products.	O	Y - F; NR; Wi	Comment from Business/Industry: Essential for Forestry, Wildlife. Not Essential for Water.
	MEASURE 03.01.07 Identify wildlife species that can be sustainably harvested.	Y - Wi	Y	Comment from Business/Industry: Essential for Wildlife.
	MEASURE 03.01.08 Describe techniques used in the harvesting of wildlife.	O	Y - NR; Wi	Comment from Business/Industry: Essential for Wildlife. Not Essential for Water, Forestry.

Minnesota Common Core Competencies

Pathway: Natural Resources Systems

Cluster: Agriculture, Food, and Natural Resources

PERFORMANCE INDICATOR	PERFORMANCE MEASURE	1st KEY: F=Forestry NR=Natural Resources Wa=Water Wi=Wildlife		COMMENTS
		2nd KEY: Y=Essential N=Not Essential O=Optional		
		COMMON CORE COMPETENCIES - Consensus among work group -		
		Secondary	Postsecondary	
	MEASURE 03.01.09 Formulate a management plan for protecting wildlife from overexploitation.	O	Y - NR; Wi	Comment from Business/Industry: Essential for Wildlife. Not Essential for Water.
	MEASURE 03.01.10 Identify products obtained from wildlife species.	Y - Wi	Y - NR; Wi	Comment from Business/Industry: Essential for Wildlife. Not Essential for Water.
	MEASURE 03.01.11 Describe techniques used in the processing of wildlife.	O	O	Comment from Business/Industry: Y for wildlife. N for water.
	MEASURE 03.01.12 Process harvested wildlife.	O	O	Comment from Business/Industry: Essential for Wildlife--only because of animal rights (i.e., PETA). Need to understand recreational hunting, fishing - understand process.
	MEASURE 03.01.13 Describe the value of minerals and ores to the economy.	O	N	
	MEASURE 03.01.14 Describe economically important minerals and ores that are extracted and processed.	O	N	
	MEASURE 03.01.15 Give examples of methods used to extract and process minerals and ores.	O	N	
	MEASURE 03.01.16 Describe the value of fossil fuels to the economy.	O	N	
	MEASURE 03.01.17 Describe sources of fossil fuels and products made from fossil fuels.	O	N	
	MEASURE 03.01.18 Give examples of methods used to extract and process fossil fuels.	O	N	

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Pathway: Natural Resources Systems

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		COMMON CORE COMPETENCIES - Consensus among work group -		
		Secondary	Postsecondary	
	MEASURE 03.01.19 Describe the benefits of hydroelectric generation.	O	N	
	MEASURE 03.01.20 Describe characteristics of sites that lend themselves to hydroelectric generation.	O	N	
	MEASURE 03.01.21 Describe hydroelectric generation techniques and procedures, and prepare a report on the impacts of hydroelectric dams on aquatic systems.	O	N	Comments from Business/ Industry: From Pollution Control Agency--need to understand agriculture interests and why they do the things they do and how to relate to each other.
	MEASURE 03.01.22 Identify recreational uses of natural resources.	Y - NR	Y	
	MEASURE 03.01.23 Debate an issue related to the recreational use of natural resources.	O	O	
	MEASURE 03.01.24 Evaluate a natural resource site and recommend opportunities for recreational activities.	O	O	Comment from Business/Industry: Critical for Forestry.
	MEASURE 03.01.25 Identify aquatic species harvested for commercial and recreational purposes.	Y - Wa	Y - NR; Wa	Comment from Business/Industry: Critical for Biology.
	MEASURE 03.01.26 Describe techniques used to harvest aquatic species.	O	O	

Minnesota Common Core Competencies

Pathway: Natural Resources Systems

Cluster: Agriculture, Food, and Natural Resources

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		2nd KEY: Y=Essential N=Not Essential O=Optional		
		COMMON CORE COMPETENCIES - Consensus among work group -		COMMENTS
Secondary	Postsecondary			
	MEASURE 03.01.27 Harvest aquatic species according to sustainable management principles.	O	O	
	MEASURE 03.01.28 Identify uses of aquatic species.	O	O	
	MEASURE 03.01.29 Explain techniques used to process aquatic species.	O	O	
	MEASURE 03.01.30 Process harvested aquatic species.	O	O	

Pathway: Natural Resources Systems

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		COMMON CORE COMPETENCIES		
		- Consensus among work group -		
		Secondary	Postsecondary	
TOPIC 4: PERFORMANCE ELEMENT - Demonstrate techniques used to protect natural resources.				
INDICATOR 04.01 Performance Indicator: Manage fires in natural resource systems.	MEASURE 04.01.01 Differentiate between desirable and undesirable fires and prepare a report on the role fire plays in a healthy ecosystem.	Y - F	Y	Comment from Business/Industry: Not Essential for Water and Fisheries.
	MEASURE 04.01.02 Describe techniques used to suppress wildfires and manage prescribed fires.	O	Y - F; NR; Wi	Comment from Business/Industry: Not Essential for Water and Fisheries.
	MEASURE 04.01.03 Demonstrate the application of fire suppression and fire safety techniques.	O	Y - F; NR; Wi	Comment from Business/Industry: Water; Wetlands; Fisheries.
INDICATOR 04.02 Performance Indicator: Diagnose plant and wildlife diseases and follow protocol to prevent their spread.	MEASURE 04.02.01 Identify causes of diseases in plants.	Y - F	Y - F; NR	Comment from Business/Industry: Not Essential for Water; Wildlife; Wetlands; Fisheries.
	MEASURE 04.02.02 Report the observance of diseases affecting plants to the appropriate authorities.	O	O	Comment from Business/Industry: Not Essential for Water; Wildlife; Wetlands; Fisheries.
	MEASURE 04.02.03 Explain management techniques used to reduce infection and spread of plant diseases in natural resources.	O	O	Comment from Business/Industry: Not Essential for Water; Wildlife; Wetlands; Fisheries.
	MEASURE 04.02.04 Identify causes of diseases in wildlife.	O	O	Comment from Business/Industry: Not Essential for Forestry; Water; Wetlands; Fisheries.
	MEASURE 04.02.05 Report the observance of diseases affecting wildlife to the appropriate authorities.	O	O	Comment from Business/Industry: Not Essential for Forestry; Water; Wetlands; Fisheries.

Minnesota Common Core Competencies

Pathway: Natural Resources Systems

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PERFORMANCE INDICATOR	PERFORMANCE MEASURE	1st KEY: F=Forestry NR=Natural Resources Wa=Water Wi=Wildlife		COMMENTS
		2nd KEY: Y=Essential N=Not Essential O=Optional		
		COMMON CORE COMPETENCIES - Consensus among work group -		
		Secondary	Postsecondary	
	MEASURE 04.02.06 Explain wildlife disease management techniques.	O	O	Comment from Business/Industry: Not Essential for Forestry; Water; Wetlands; Fisheries.
INDICATOR 04.03 Performance Indicator: Manage insect infestations of natural resources.	MEASURE 04.03.01 Identify harmful and beneficial insects and signs of insect damage to natural resources.	Y - NR	Y	
	MEASURE 04.03.02 Report observance of insect pests to the appropriate authorities.	O	Y	
	MEASURE 04.03.03 Describe techniques used to manage pests of natural resources.	O	Y	

Minnesota Common Core Competencies

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Pathway: Natural Resources Systems

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		COMMON CORE COMPETENCIES		
		- Consensus among work group -		
		Secondary	Postsecondary	

TOPIC 5: PERFORMANCE ELEMENT - Use effective methods and venues to communicate natural resource processes to the public.

INDICATOR 05.01 Performance Indicator: Communicate natural resource information to the public.	MEASURE 05.01.01 Identify ways in which a message regarding natural resources may be communicated to the public.	O	Y	Comment from Business/Industry: Critical. Communicating with public is essential. Who and how to communicate. Need verbal/written skills. How to communicate/interact with public.
	MEASURE 05.01.02 Design and construct a display that communicates a natural resource topic and discuss the topic in a public forum.	O	O	Comment from Business/Industry: Giving oral presentations and PowerPoints is more common--cheaper and faster to produce.
	MEASURE 05.01.03 Communicate a natural resource message through the press, radio, television or public appearances.	O	O	Comment from Business/Industry: Essential knowledge and skills (inner circle of wheel) - persons are unprepared in this area.

Other Comments from Business/Industry:

Problem-Solving/Critical Thinking: Important to work on it; Know to do it; Difficult to train or teach. Need self-starters!

Pathways: Natural Resources Systems

Cluster: Agriculture, Food, and Natural Resources

An "assessment blueprint" is a document that indicates the knowledge and skills that will be covered in an assessment instrument and the percentage of the assessment that will be devoted to each area of knowledge and skills. The Minnesota assessment blueprints will be used to review the appropriateness of existing assessments by determining how closely those assessments match up to what the Foundation Knowledge & Skills teams have determined should be assessed. The assessment blueprints can also be used to guide the development of new assessments where suitable third-party assessments do not exist.

		SECONDARY	POST-SECONDARY	BUSINESS & INDUSTRY
		% of Assessment ↓	% of Assessment ↓	% of Assessment ↓
C01	Academic Foundations: Achieve additional academic knowledge and skills required to pursue the full range of career and postsecondary opportunities within agriculture, food, and natural resources.	13%	5%	11%
C02	Communications: Use oral and written communication skills in creating, expressing, and interpreting information and ideas including technical terminology and information.	12%	10%	14%
C03	Problem-Solving and Critical Thinking: Solve problems using critical thinking (analyze, synthesize, and evaluate) independently and in teams. Solve problems using creativity and innovation.	12%	12%	11%
C04	Information Technology Applications: Use information technology tools specific to agriculture, food, and natural resources to access, manage, integrate, and create information.	10%	8%	10%
C05	Systems: Understand roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. Identify how key organizational systems affect organizational performance and the quality of products and services. Understand global context of industries and careers.	4%	8%	8%
C06	Safety, Health, and Environmental: Understand the importance of health, safety, and environmental management systems in organization and their importance to organizational performance and regulatory compliance. Follow organizational policies and procedures and contribute to continuous improvement in performance and compliance.	4%	8%	10%
C07	Leadership and Teamwork: Use leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.	12%	8%	9%
C08	Ethics and Legal Responsibilities: Know and understand the importance of professional ethics and legal responsibilities.	10%	8%	8%
C09	Employability and Career Development: Know and understand the importance of employability skills. Explore, plan, and effectively manage careers. Know and understand the importance of entrepreneurship skills.	10%	5%	7%
C10	Technical Skills: Use of technical knowledge and skills required to pursue careers in the specific career cluster or pathway, including knowledge of design, operation, and maintenance of technological systems critical to agriculture, food, and natural resources.	13%	28%	12%
		100%	100%	100%

Agriculture, Food and Natural Resources: Natural Resources Systems

Career Pathway Plan of Study for ► Learners ► Parents ► Counselors ► Teachers/Faculty

*This Career Pathway Plan of Study (based on the Natural Resources Systems Pathway of the Agriculture, Food and Natural Resources Career Cluster) can serve as a guide, along with other career planning materials, as learners continue on a career path. Courses listed within this plan are only recommended coursework and should be individualized to meet each learner's educational and career goals. *This Plan of Study, used for learners at an educational institution, should be customized with course titles and appropriate high school graduation requirements as well as college entrance requirements.*

EDUCATION LEVELS	GRADE	English/ Language Arts	Math	Science	Social Studies/ Sciences	Other Required Courses Other Electives Recommended Electives Learner Activities	*Career and Technical Courses and/or Degree Major Courses for Environmental Service Systems Pathway	SAMPLE Occupations Relating to This Pathway
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Interest Inventory Administered and Plan of Study Initiated for all Learners

SECONDARY	9	English/ Language Arts I	Algebra I or Geometry	Earth or Life or Physical Science	Government & Citizenship/ Geography	All plans of study should meet local and state high school graduation requirements and college entrance requirements. Supervised Agricultural Experience (SAE) and participation in appropriate FFA activities support and reinforce classroom and laboratory learning and should be a requirement for all	<ul style="list-style-type: none"> • Introduction to Agriculture, Food and Natural Resources • Introduction to Natural Resources and the Environment • Advanced Natural Resources and Environmental Systems (i.e. Forestry) • Research in Natural Resources and Biotechnology • Internship in Internship in Natural Resources 	Occupations Requiring Postsecondary Education <ul style="list-style-type: none"> ► Commercial Fisherman ► Fisheries Technician ► Forest Technician ► Geology Technician ► Log Grader ► Logger ► Park Manager ► Pulp and Paper Manager ► Range Technician ► Water Monitoring Technician ► Wildlife Manager
	10	English/ Language Arts II	Geometry or Agl	Biology	U.S. History			
	11	English/ Language Arts III	Statistics & Probability	Chemistry or Physics	World History			
	<i>College Placement Assessments-Academic/Career Advisement Provided</i>							
	12	English/ Language Arts IV	Math Elective	Science Elective	Economics			

Articulation/Dual Credit Transcribed-Postsecondary courses may be taken/moved to the secondary level for articulation/dual credit purposes.

POSTSECONDARY	Year 13	Required Transfer Curriculum Goals Determined by Local College Program in College Year 1 and Year 2 - Goal 1: Communication; Goal 2: Critical Thinking/Problem-Solving; Goal 3: Natural Science; Goal 4: Mathematical/Logical Reasoning; Goal 5: History and the Social and Behavior Sciences; Goal 6: The Humanities and the Arts; Goal 7: Human Diversity; Goal 8: Global Perspective; Goal 9: Ethical and Civic Responsibility; Goal 10: People and the Environment				All plans of study need to meet learners' career goals with regard to required degrees, licenses, certifications or journey worker status. Certain local student organization activities may also be important to include.	<ul style="list-style-type: none"> • Management of Natural Resource Systems • Principles of Natural Resource Conservation • Protecting Natural Resources • Disease Management • Continue Courses in the Area of Specialization • Complete Natural Resources Systems Major (4-Year Program) 	Occupations Requiring Baccalaureate Degree <ul style="list-style-type: none"> ► Agricultural Educator ► Ecologist ► Fish and Game Officer ► Geologist ► Hydrologist ► Mining Engineer
	Year 14	<i>Suggested liberal arts courses include: Technical Writing, Statistics, Organic Chemistry, Microbiology, Political Science</i>						
	Year 15	Technical Writing	Statistics	Organic Chemistry Microbiology	Political Science			
	Year 16	Continue courses in the area of specialization.						