



WASHINGTON
FFA ASSOCIATION

Forestry

Career Development Event

Handbook

2017-2021

Purpose

The Washington FFA Forestry Career Development Event is designed to stimulate student interest and to promote the forestry industry as a career choice. It also provides recognition for those who have demonstrated skills and competencies as a result of forestry instruction in the agriculture education classroom.

Objectives

This event will provide the participant the ability to:

- understand and use forestry terms.
- promote an understanding of the economic impact of the forest environment and the forest industry to the American economy.
- recognize sustainability (multiple use) opportunities in the forests.
- recognize environmental and social factors affecting the management of forests.
- identify major species of trees of economic importance to the United States and internationally.
- identify and properly use hand tools, equipment in forestry management.
- recognize and understand approved silvicultural practices in the United States.
- identify forest disorders.
- take a forest inventory.
- utilize marketing management strategies.
- recognize safety practices in forest management.

Event Rules

****If there are any questions or issues, the State FFA Advisor will make the final decision.****

- Five members will be on each team. All five members will be scored, and the top four scores will count toward the team total.
- The team score is comprised of the combined scores of each individual and the team activity in which all team members will participate.
- Participants must come to the event prepared to work in adverse weather conditions. The event will be conducted regardless of weather. Participants should have rain gear, warm clothes and closed toed shoes. Each participant must provide the following safety equipment, and it must be worn while in the woods:
 - Hard hat (unless otherwise noted in the National FFA Forestry CDE orientation packet)
 - Safety glasses
- Students are required to bring their own pencils and clipboards, clinometers, diameter tapes, compass.
- All other equipment (100' tapes, prisms) will be furnished for the event. Participants must use the tools and equipment provided. Electronic hypsometers or dendrometers are not allowed.
- Participants must follow instructions from event staff for handling materials during the event. Any infraction of this rule will be sufficient to eliminate the team from the event.
- Observers will not be permitted in the event area while the event is in progress, however the State CDE will utilize designated runners as needed (possibly advisors) during the event.
- No team, team member or team coach shall visit the event facilities/location to observe plant materials and facilities prior to the State event. Any team, team member or coach reported and proven to do so will cause the elimination of the team from the State FFA Forestry CDE.
- Participants will be assigned to group leaders who will escort them to various event-staging sites. Each participant is to stay with his/her assigned group leader throughout the event or until told to change leaders by the event superintendent.
- All written materials will be furnished for the event. No written materials such as tests, problems and worksheets shall be removed from the event site.
- Any participant in possession of an electronic device in the event area is subject to disqualification.

EVENT FORMAT

INDIVIDUAL ACTIVITIES

GENERAL KNOWLEDGE EXAM (100 POINTS)

- Fifty multiple-choice questions will be selected from areas of the forestry industry reflected in the event objectives. This phase of the event will test the participant’s knowledge and understanding of basic principles of forestry.
- Test Questions will come from the previous 3 years National FFA Forestry CDE (except for the last year event). *EXAMPLE: For the 2017 event, it would include questions from 2013, 2014, 2015.*
- Each participant will be allowed 25 minutes to complete this phase of the event.

TREE IDENTIFICATION (100 POINTS)

- 20-25 specimens from the following list taken from the “Trees of Washington” Cooperative Extension book will be displayed for participants to identify by common names.
- A number will designate each specimen.

Western White Pine	Whitebark Pine	Ponderosa Pine	Lodgepole Pine	Western Larch
Subalpine Larch	Sitka Spruce	Engelmann Spruce	Douglas Fir	Western Hemlock
Mountain Hemlock	Pacific Silver Fir	Subalpine Fir	Grand Fir	Noble Fir
Western Red Cedar	Alaskan Yellow Cedar	Rocky Mt. Juniper	Pacific Yew	Willow
Quaking Aspen	Black Cottonwood	Western Paper Birch	Red Alder	Oregon White Oak
Pacific Madrone	Netleaf Hackberry	Big Leaf Maple	Vine Maple	Cascara
Pacific Dogwood	Oregon Ash			

- Each participant will be allowed 25 minutes to complete this phase.

INDIVIDUAL PRACTICUMS

Participants will compete individually in the following practicums:

- Equipment Identification
- Map Interpretation
- Compass
- Chainsaw Part Identification, Troubleshooting and Safety
- Tree/Forest Disorder

Each participant will have 25 minutes to complete each practicum.

>EQUIPMENT IDENTIFICATION PRACTICUM (60 POINTS)

20 pieces of equipment from the equipment identification list will be displayed for participants to identify by technical names. Each piece of equipment will be designated by number.

The equipment will be presented in one or more of the following forms:

- Actual samples
- Pictures or slides
- Written description

>MAP INTERPRETATION PRACTICUM (100 POINTS)

1. Participants will be furnished a United States Geological Survey topographic map with specific points marked for the participant to identify. The participant shall know legal description, recognize topographic map symbols, understand the meaning of map symbols and size and location of 40 acres or more in a section.

2. *Examples:*

- a. *What is the legal description of the area boxed?*
- b. *What is the item located at this point?*
- c. *What is the acreage of the area enclosed?*
- d. *In what section is the city of Marshall located?*

3. Legal descriptions will be written or described according to the following: a. SE $\frac{1}{4}$ of NE $\frac{1}{4}$ of Section 1, T24N R26E of the Willamette Meridian

- b. $\frac{1}{4}$, $\frac{1}{2}$ sections, $\frac{1}{2}$ of $\frac{1}{4}$, $\frac{1}{4}$ of $\frac{1}{4}$, or $\frac{1}{2}$ of $\frac{1}{2}$ sections may be used

>COMPASS & PACING PRACTICUM (100 POINTS)

The participant will use a hand compass and pacing to the nearest full foot to simulate the determination of the property lines on a tract of timber. The participant will start at any point and record the compass reading and distance to the next point. Azimuth readings shall be recorded. Participants will record data for 10 points. A total of 100 points are possible: 10 points for each correct numbered site. Five points will be given for correct azimuth and five points will be given for correct distance. Partial credit will be given with a deduction of one point for each two degrees or two feet the participant is off the correct answer. If a student is off more than 10 degrees/feet, they may not get a score less than 0.

- There should be 10 compass points to complete distance and azimuth indicated 1-2, 2-3, 3-4 or another easy to understand method. **Mr. Todd Rightmire (Mount Baker)** has a compass excel spreadsheet he can email to contest coordinators or bring to enter the correct azimuths and distances onsite.

>CHAINSAW PART IDENTIFICATION, TROUBLESHOOTING AND SAFETY PRACTICUM (100 POINTS)

All three areas below will be included and scored. Parts may utilize photos, video, demonstration, actual parts, written situations and/or problems. This is not an inclusive list.

- **Chainsaw parts identification:** Each participant will identify parts of a chainsaw – Stihl or Husqvarna parts only. Any discrepancy on parts between the two brands need to identify which saw.
- **Troubleshooting:** The participant will identify chainsaw problems or troubles – each station will have a part, component, saw or written situation with problem areas clearly marked. The participant may pick up parts or touch the saw.
- **Safety:** The participant will observe photos, actual parts, written situation and/or problems to identify safety hazards, unsafe practices and/or proper safety equipment.

>TREE/FOREST DISORDERS PRACTICUM (100 POINTS)

Symptoms of at least 10, but not more than 20 disorders from the Tree Disorders Identification list will be displayed for participants to identify by common names. The symptoms will be presented in one or more of the following forms:

- Actual sample
- Pictures/slides
- Written description
- **Written case history**

TREE DISORDERS

<u>Name</u>	<u>Name</u>	<u>Name</u>
P. Pine Dwarf Mistletoe	Needle cast	Larch Mistletoe
Scale	Hemlock Sawfly	Red Belt Fungus
Gypsy moth	Air pollution	Blue Stain
Douglas-fir tussock	Canker	Fire damage
Moth	Laminated Root Rot	Climatic injury: snow, wind, frost, drought, hail
Spruce budworm	Damping off	Indian Paint Fungus
Gall Rust	Wetwood or slime flux	Pouch Fungus
White Pine Blister Rust	Chemical damage	Lightning damage
Doug Fir Beetle	Tent caterpillar	Butt or Heart Rot
Mountain Pine Beetle	Mechanical damage	
Wood borer	Asian Longhorn Beetle	
Wildlife/Livestock Damage	Doug Fir Pole Beetle	Ambrosia Beetle
Armillaria Root Rot	Fir engraver	Doug Fir Dwarf Mistletoe

FOREST INDUSTRY SCENARIO TEAM ACTIVITY (450 POINTS)

Each team will be provided with a team cruising activity. Heights, diameter class, plot size must be provided (exception: plot size on prism cruising).

Team cruising activity:

- Westside (**even years**)- it is a fixed plot sample usually 1/10th or 1/20th of an acre. Need to determine volume on a per acre basis.
Even years (2018, 2020, 2022) Fixed plot sampling using 1/10th acre, 1/20th acre, 1/25th acre. Plot radius does not need to be provided. Cruising should be based on a per acre basis with this sampling. Tree diameters should be to the nearest 1" or 2" class and clearly identified on the instructions. Tree heights should be to the nearest 5' or 10' increment for total height. Volume tables by species should be provided. Identifying trees, volume per tree, diameter, height should be calculated. Site index may also be included.
- Eastside (**odd years**)- it is a variable plot sample using a wedge prism provided by the coordinators. Odd years (2017, 2019, 2021) Variable Plot (Prism) Sampling should be used as part or all of the event. Students must be given a plot center. Students should also calculate the volume of trees based on diameter and height of some selected trees within the plot. Questions on Basal Area, Trees per acre (with expansion factor chart provided), and Average Spacing (with formula) must be provided if used. Site index

may also be used. Students are expected to know what an “in”, “borderline”, “out” tree would look like in a prism. Plot radius factor or equation should be provided. Wedge prisms/cruiser’s crutch with a 20 BAF need to be provided by event coordinators or request teachers bring their own.

Calculate volume, identify species, determine plot radius (on fixed only). DBH to nearest 1" or 2" class, species, height to nearest 5' or 10'. Variable- could include BA, trees per acre, avg. spacing, etc. Can include total volume, volume per acre, etc.

Scoring: Allowance (partial credit) for 15%, 10%, 5% off total volume per acre or equivalent calculations. Cruising individual trees is usually 4-8 “marked trees”.

Forestry Issues Presentation Team Activity (100 points)

Teams will communicate their knowledge and opinion about national or regional forestry issues through a presentation with a judge. State CDE Contest Coordinator will pick 3 topics from National list (below). Those three will be sent on the WAAE listserv by **March 15**; 1 issue will be announced at the State CDE for all teams to follow.

General Topics:

- What practices or processes have affected timber sales and or markets in your region?
- What are some important forest pests? Why is it important to control them?
- What are the positive and negative aspects of genetically modified trees?
- What are some issues that urban foresters face?
- What forestry best management practices (BMPs) are used in your state and why?
- How does watershed restoration impact communities? What role can forest management play in watershed restoration?
- Explain forest fragmentation and the strategies used to prevent it.
- Explain what Sustainable Forest Initiative (SFI) and Forest Stewardship Council (FSC) are and what they have in common.
- How are endangered species protected by law? Why should we be concerned about saving them?
- **What is woody biomass? What are the positives and negatives of producing woody biomass?**

Example NFFA scenario:

You are speaking to a group of private forest landowners concerning the Conservation Reserve Program (CRP). Many CRP contracts are due to expire in the next five years and will no longer be available in the future. How will this affect the price of timber and future reforestation?

Time: Each team will have ten minutes to prepare, allowed ten minutes to complete the presentation, and five minutes of questions.

Scoring criteria are presented on the issues preparation and presentation rubric, which will be recorded by a judge.

Scoring

ACTIVITIES	Individual Points	Team Points
General Knowledge Exam	100	400
Tree Identification	100	400
Equipment Identification	60	240
Tree Disorders	100	400
Compass Course	100	400
Map and Legal descriptions	100	400
Chainsaw	100	400
Team Activity		250
Forestry Issue Presentation Team Activity		100
	660	2990

TIEBREAKERS

TEAM

Tiebreakers for teams will be determined by adding together the individual ranking of team members. The team with the lowest score will earn the tiebreak.

INDIVIDUALS

1. Knowledge exam
2. Tree identification

Awards

Awards will be presented to individuals and teams based upon their rankings at the awards ceremony.

References

This list of references is not intended to be all inclusive.

Other sources may be utilized, and teachers are encouraged to make use of the very best instructional materials available. Make sure to use discretion when selecting website references by only using reputable, proven sites. The following list contains references that may prove helpful during event preparation. The most current edition of resources will be used.

Past CDE materials and other resources are available by logging in to FFA.org

GENERAL KNOWLEDGE EXAM

- Previous 3 years of National tests except for the most recent year. *Example: 2017 test would include questions from 2013, 2014, 2015.*

TREE IDENTIFICATION

- WASHINGTON FFA: “Trees of Washington” from Cooperative Extension is the tree list for the State CDE. *Online version no longer available – must source from Mr. Todd Rightmire (Mt. Baker FFA).*
- Zobrist, Kevin. Native Trees of Western Washington. MISC583 – Published 12/1/2014.

TREE MEASUREMENT

- *Washington State University Cooperative Extension – Measuring Trees.*

EQUIPMENT IDENTIFICATION

- Current Catalog of Forestry Suppliers, Inc., 205 West Rankin Street, Jackson, MS 39204-039. www.forestry-suppliers.com.

MAP INTERPRETATION

- The U.S. Department of Interior Geological Survey Topographic Map Information and Symbols Key, Map Distribution, U. S. Geological Survey, Box 25286, Federal Center, Denver CO.

TREE DISORDERS

- www.forestryimages.org
- USFS Disorders Publication. https://www.fs.usda.gov/detail/r6/forest-grasslandhealth/insects-diseases/?cid=fsbdev2_027189.

CHAINSAW PARTS AND IDENTIFICATION

- Husqvarna publication, How to Work With a Chainsaw, National FFA website.
- Stihl parts lists and resources.
- Husqvarna parts lists and resources.

Tree Identification Specimen List – Trees of Washington

Western White Pine
Whitebark Pine
Ponderosa Pine
Lodgepole Pine
Western Larch
Subalpine Larch
Sitka Spruce
Engelmann Spruce
Douglas Fir
Western Hemlock
Mountain Hemlock
Pacific Silver Fir
Subalpine Fir
Grand Fir
Noble Fir
Western Red Cedar
Alaskan Yellow Cedar
Rocky Mountain Juniper
Pacific Yew
Willow
Quaking Aspen
Black Cottonwood
Western Paper Birch
Red Alder
Oregon White Oak
Pacific Madrone
Netleaf Hackberry
Big Leaf Maple
Vine Maple
Cascara
Pacific Dogwood
Oregon Ash

Equipment Identification List

1. Altimeter
2. Angle guage
3. Ascender
4. Automatic Level
5. Back-pack Fire Pump
6. Bark Gauge
7. Bulldozer
8. Canthook
9. Carabiner
10. Chainsaw
11. Chainsaw Chaps
12. Clinometer
13. Combination tool
14. Data Recorder
15. Densimeter
16. Diameter Tape
17. Dot Grid
18. Drip Torch
19. Ear Protection
20. Endloader
21. Feller Buncher
22. Felling Wedge
23. Fiberglass Measuring Tape
24. Fire Rake
25. Fire shelter
26. Fire Weather Kit
27. Fire-Swatter
28. First aid kit
29. Flow/current Meter
30. GPS Receiver
31. Hand Compass
32. Hand Lens/Field Microscope
33. Hip Chain
34. Hypo-Hatchet
35. Increment Borer
36. Jacob Staff
37. Log Rule
38. Logger’s Tape
39. Maul
40. Peavy
41. pH Meter
42. Planimeter
43. Plant Press
44. Plastic Flagging
45. Pole saw
46. Pruning Saw
47. Pulaski Axe
48. Relaskop
49. Safety Glasses
50. Safety Hard Hat
51. Scale Stick
52. Secchi Disc
53. Soil Sampler
54. Soil Test Kit
55. Staff Compass
56. Stereoscope
57. Tally Book
58. Tally Meter
59. Timber Tongs
60. Tree Caliper
61. Tree Harvester
62. Tree Marking Gun
63. Tree Planting Hoe or Bar
64. Tree Skidder
65. Water Sampler
66. Water Test Kit
67. Wedge Prism

Washington Tree Disorders Identification List –

Ponderosa Pine Dwarf Mistletoe
Scale
Gypsy Moth
Douglas Fir Tussock Moth
Spruce Budworm
Gall Rust
White Pine Blister Rust
Douglas Fir Beetle
Mountain Pine Beetle
Wood borer
Wildlife/Livestock Damage
Armillaria Root Rot
Needle Cast
Hemlock Sawfly
Air Pollution
Canker
Laminated Root Rot
Damping Off/Fusarium
Douglas Fir Mistletoe
Wetwood/Slime Flux
Chemical Damage
Tent Caterpillar
Mechanical Damage
Asian Longhorn beetle
Douglas Fir Pole Beetle
Fir Engraver
Larch Mistletoe
Red Belt Fungus
Blue Stain
Fire Damage
Climatic injury – snow, wind, frost, drought, hail
Indian Paint Fungus
Pouch Fungus
Lightning Damage
Butt/Heart Rot
Ambrosia Beetle

Team Issues Presentation Scoring Rubric 100 points

INDICATOR	5 points	4 points	3 points	2 points	1 point	Points Earned	Weight	Total Points
Introduction (5 points)	Introduction is clear, well organized and focused; clearly prepares listener for what is to come.	Topic indicated clearly; organized; focused.	Indication of topic somewhat clear; generally organized and focused.	Introduction gives some indication of topic; poorly organized.	No introduction; extremely brief, non-specific, not related to the topic; disorganized.		X2	
Poise/posture (5 points)	Maintains good eye contact; voice projection and speed excellent; good posture and uses hand gestures as appropriate.	Has good eye contact; voice quality is good; posture somewhat rigid.	Breaks eye contact; looks away occasionally; voice quality uneven; poor posture.	Seldom makes eye contact; voice quality uneven; distracting gestures.	Does not make eye contact; difficult to understand; mumbles; generally distracted.		X2	
Response to questions (10 points)	Responds quickly with complete statements; uses factual information; opinion based on fact; presents information in a logical manner.	Responds with little wait time; uses complete statements most of the time; most answers based on facts; presents information in a somewhat logical order.	Hesitates before answering; speaks in phrases rather than complete statements; repeats information; opinions lack factual basis; random thoughts.	Few facts and basic information; often uses one word answers; many pauses; long response time; no structure to response.	No factual answers; uses one word answers; long delays in responding; answers indicate no understanding of question.		X2	
Knowledge of issue (20 points)	Extremely well informed; clearly differentiates between fact and opinion; aware of current issues.	Well informed; differentiates between fact and opinion; aware of current issues.	Somewhat knowledgeable; lines between fact and opinion are blurred; responses sound memorized; limited awareness of current issues.	Lacks knowledge; more opinion than fact; talks in circles; avoids the issue; seemingly unaware of current issues.	No knowledge of issue; no understanding of current issues.		X2	
Conveyance of thought and meaning (10 points)	Communicates opinion as clear statement; uses appropriate terminology; backs up statements with suitable examples; clear, coherent expression of ideas.	Makes fairly clear statements using appropriate language; is able to back up most statements.	Sounds somewhat rehearsed; difficulty backing up statements; draws blanks; often uses filler words (“ah”, “um”).	Sounds rehearsed; uses incorrect terminology; unable to back up statements; demonstrates little understanding of terminology.	Unable to clearly articulate a clear thought; cannot back up any statements; demonstrates no understanding of terminology.		X2	
TOTAL POINTS								

Agriculture, Food and Natural Resources Content Standards

Measurement Assessed	Where measured in event	Academic Content Standards Addressed
ABS.01.01. Performance Indicator: Apply micro- and macroeconomic principles to plan and manage inputs and outputs in an AFNR business.		
ABS.01.01.01.c. Create strategies to maximize the efficiency of AFNR business inputs and outputs using microeconomic principles.	Forest Business Management Problem Practicum	CCSS.ELA-Literacy.L.9-10.6 CCSS.ELA-LITERACY.L.11-12.6 CCSS.ELA-LITERACY.RST.9-10.4 CCSS.ELA-LITERACY.RST.11-12.4 CCSS.MATH.CONTENT.HSS.ID.C.7 CCSS.MATH.CONTENT.HSS.IC.B.6 Financial Investing: Benchmarks: Grade 12, Statement 9
ABS.01.02. Performance Indicator: Read, interpret, evaluate and write statements of purpose to guide business goals, objectives and resource allocation.		
ABS.01.02.02.c. Evaluate AFNR business goals and objectives, then make revisions based on data and observations.	Forest Business Management Problem Practicum	CCSS.ELA-LITERACY.W.9-10.2 CCSS.ELA-LITERACY.W.11-12.2 CCSS.ELA-LITERACY.W.9-10.9 CCSS.ELA-LITERACY.W.11-12.9 CCSS.ELA-LITERACY.RI.9-10.4 CCSS.ELA-LITERACY.RI.11-12.4
ABS.01.03. Performance Indicator: Devise and apply management skills to organize and run an AFNR business in an efficient, legal and ethical manner.		
ABS.01.03.01.c. Devise strategies to improve the operation of AFNR businesses using management skills.	Forest Business Management Problem Practicum	CCSS.ELA-LITERACY.SL.9-10.6 CCSS.ELA-LITERACY.SL.11-12.6 CCSS.ELA-LITERACY.L.9-10.6 CCSS.ELA-LITERACY.L.11-12.6 CCSS.ELA-LITERACY.RST.9-10.4 CCSS.ELA-LITERACY.RST.11-12.4
ABS.01.03.02.c. Devise management or operational strategies to address and adhere to local, state, federal, international and industry regulations.	Forestry Issues Presentation Team Activity	CCSS.ELA-LITERACY.SL.9-10.6 CCSS.ELA-LITERACY.SL.11-12.6 CCSS.ELA-LITERACY.L.9-10.6 CCSS.ELA-LITERACY.L.11-12.6 CCSS.ELA-LITERACY.RST.9-10.4 CCSS.ELA-LITERACY.RST.11-12.4
ABS.04.02. Performance Indicator: Develop production and operational plans for an AFNR business.		
ABS.04.02.01.c. Make recommendations to improve operational plans for an AFNR business based on best practices.	Forestry Issues Presentation Team Activity Forest Business Management Problem Practicum	AFNR Career Cluster – Agribusiness Systems Pathway, Statement 3 CCSS.ELA-LITERACY.ELA-W.9-10.2 CCSS.ELA-LITERACY.W.11-12.2 CCSS.ELA-LITERACY.L.9-10.6

		CCSS.ELA-LITERACY.L.11-12.6 CCSS.ELA-LITERACY.RST.9-10.4 CCSS.ELA-LITERACY.RST.11-12.4
ABS.05.01. Performance Indicator: Analyze the role of markets, trade, competition and price in relation to an AFNR business sales and marketing plans.		
ABS.05.01.01.c. Evaluate and predict future trends for a specific AFNR product as related to markets, trade and price (e.g., corn, oil, wheat, etc.).	Forestry Issues Presentation Team Activity	AFNR Career Cluster, Statement 7 AFNR Career Cluster – Agribusiness Systems Pathway, Statement 1 Financial Investing: Benchmarks: Grade 12, Statement 13
CS.01.01. Performance Indicator: Examine issues and trends that impact AFNR systems on local, state, national and global levels.		
CS.01.01.01.c. Evaluate and explain AFNR issues and their impacts to audiences with limited AFNR knowledge.	Forestry Issues Presentation Team Activity	
CS.01.01.02.c. Evaluate emerging trends and the opportunities they may create within the AFNR systems.	Forestry Issues Presentation Team Activity	
CS.01.03. Performance Indicator: Identify public policies and their impact on AFNR systems.		
CS.01.03.01.c. Evaluate a public policy within AFNR systems and defend or challenge it.	Forestry Issues Presentation Team Activity	
CS.02.01. Performance Indicator: Research geographic and economic data related to AFNR systems.		
CS.02.01.02.c. Devise a strategy to solve a problem in an AFNR system using a set of economic data.	Forestry Issues Presentation Team Activity	
CS.02.02. Performance Indicator: Examine the components of the AFNR systems and their impact on the local, state, national and global society and economy.		
CS.02.02.01.c. Devise a strategy for explaining components of AFNR systems to audiences with limited knowledge.	Forestry Issues Presentation Team Activity	
CS.02.02.02.c. Evaluate how society traditions, customs or policies have resulted from practices with AFNR systems.	Forestry Issues Presentation Team Activity	
CS.02.02.03.c. Evaluate how positive or negative changes in the local, state, national or global economy impacts AFNR systems.	Forestry Issues Presentation Team Activity	

CS.03.04. Performance Indicator: Use appropriate protective equipment and demonstrate safe and proper use of AFNR tools and equipment.		
CS.03.04.01.a. Identify and differentiate the appropriate protective equipment for the safe use and operation of specific tools and CS.03.04.02.a. Identify standard tools, equipment and safety procedures related to AFNR tasks.	Chainsaw Part Identification, Troubleshooting and Safety Practicum	
CS.03.04.02.b. Complete the set up and adjustment for tools and equipment related to AFNR tasks.	Chainsaw Part Identification, Troubleshooting and Safety Practicum	
C3.06.04.02.c. Evaluate and select appropriate tools and equipment to complete AFNR tasks.	Chainsaw Part Identification, Troubleshooting and Safety Practicum	
CS.03.04.03.a. Read and interpret operating instructions related to operation, storage and maintenance of tools and equipment related AFNR tasks.	Chainsaw Part Identification, Troubleshooting and Safety Practicum	
CS.03.04.03.b. Assess and demonstrate appropriate operation, storage and maintenance techniques for AFNR tools and equipment.	Chainsaw Part Identification, Troubleshooting and Safety Practicum	
CS.04.01. Performance Indicator: Identify and implement practices to steward natural resources in different AFNR systems.		
CS.04.01.01.b. Analyze available practices to steward natural resources in AFNR systems (e.g., wildlife and land conservation, soil and water practices, ecosystem management, etc.). TSI	Forest Business Management Problem Practicum	AFNR Career Cluster, Statement 2 AFNR Career Cluster, Statement 3
CS.04.01.02.b. Analyze and assess sustainability practices that can be applied in AFNR systems (e.g., energy efficiency, recycle/reuse/repurpose, green resources, etc.).	Forestry Issues Presentation Team Activity	AFNR Career Cluster, Statement 2 AFNR Career Cluster, Statement 3
CS.04.02. Performance Indicator: Assess the natural resource related trends, technologies and policies that impact AFNR systems.		
CS.04.02.01.b. Analyze natural resources trends and technologies and document how they impact AFNR systems (e.g., climate change, green technologies, water resources, etc.).	Forestry Issues Presentation Team Activity	AFNR Career Cluster, Statement 7
CS.05.01. Performance Indicator: Evaluate the steps and requirements to pursue a career opportunity in each of the AFNR career pathways (e.g., goals, degrees, certifications, resumes, cover letter, portfolios, interviews, etc.).		
CS.05.01.01.a. Identify and summarize the steps to pursue a career in an AFNR pathway (e.g., self-assessment, set goals, etc.).	Exam	

CS.05.01.02.a. Examine the educational, training and experiential requirements to pursue a career in an AFNR pathway (e.g., degrees, certifications, training, internships, etc.).	Entire event	
CS.05.01.03.a. Research and summarize specific tools (e.g., resumes, portfolios, cover letters, etc.) and processes (e.g., interviews, applications, etc.) needed to pursue a career in an AFNR pathway.	Entire event	
CS.06.01. Performance Indicator: Explain foundational cycles and systems of AFNR.		
CS.06.01.01.b. Analyze how foundational cycles affect production, processing and management of food, fiber and fuel.	Exam	
ESS.01.01. Performance Indicator: Analyze and interpret laboratory and field samples in environmental service systems.		
ESS.01.01.01.c. Collect and prepare sample measurements using appropriate data collection techniques.	Tree Measurement—Timber Cruising for Board Volume Compass Practicum	CCSS.ELA-LITERACY.SL.11-12.5 CCSS.ELA-LITERACY.RST.11-12.9 CCSS.MATH.CONTENT.HSN.Q.A.1 CCSS.MATH.CONTENT.HSN.Q.A.2 CCSS.MATH.CONTENT.HSN.Q.A.3 CCSS.MATH.CONTENT.HSS.ID.A.2 CCSS.MATH.CONTENT.HSS.ID.B.5 HS-ESS2-2
ESS.01.01.02.c. Utilize data analysis to identify trends in a data sample and assess the confidence that can be drawn from those conclusions.	Forest Business Management Problem Practicum	CCSS.ELA-LITERACY.SL.11-12.5 CCSS.ELA-LITERACY.RST.11-12.9 CCSS.MATH.CONTENT.HSN.Q.A.1 CCSS.MATH.CONTENT.HSN.Q.A.2 CCSS.MATH.CONTENT.HSN.Q.A.3 CCSS.MATH.CONTENT.HSS.ID.A.2 CCSS.MATH.CONTENT.HSS.ID.B.5 HS-ESS2-2
ESS.01.02. Performance Indicator: Properly utilize scientific instruments in environmental monitoring situations (e.g., laboratory equipment, environmental monitoring instruments, etc.).		
ESS.01.02.01.a. Identify basic laboratory equipment and explain their uses.	Equipment Identification Practicum	
ESS.01.02.02.a. Identify basic environmental monitoring instruments and explain their uses.	Equipment Identification Practicum	
ESS.05.01. Performance Indicator: Use technological and mathematical tools to map land, facilities and infrastructure for environmental service systems.		
ESS.05.01.01.c. Demonstrate surveying and cartographic skills to make site measurements in order to address concerns and needs within an environmental service systems situation.	Map Interpretation Practicum Compass Practicum	HS-ETS1-4

NRS.01.01. Performance Indicator: Apply methods of classification to examine natural resource availability and ecosystem function in a particular region.

<p>NRS.01.01.01.c. Devise strategies for the preservation of natural resources based on their classification.</p>	<p>Forest Business Management Problem Practicum</p>	<p>AFNR Career Cluster, Statement 1 AFNR Career Cluster, Statement 2 AFNR Career Cluster - Natural Resources Systems Pathway, Statement 3 STEM Career Cluster, Statement 1 CCSS.ELA-LITERACY.RST.11-12.1 CCSS.ELA-LITERACY.RST.11-12.8 CCSS.ELA-LITERACY.WHST.9-10.2 CCSS.ELA-LITERACY.WHST.11-12.2 CCSS.ELA-LITERACY.WHST.9-10.9 CCSS.ELA-LITERACY.WHST.11-12.9</p>
<p>NRS.01.02. Performance Indicator: Classify different types of natural resources in order to enable protection, conservation, enhancement and management in a particular geographical region.</p>		
<p>NRS.01.02.01.b. Apply identification techniques to determine the species of a tree or woody plant.</p>	<p>Tree Identification Tree/Forest Disorders Practicum</p>	<p>AFNR Career Cluster - Natural Resources Systems Pathway, Statement 3 CCSS.ELA-LITERACY.RST.11-12.1 CCSS.ELA-LITERACY.RST.11-12.7 CCSS.ELA-LITERACY.RST.11-12.8 CCSS.ELA-LITERACY.WHST.9-10.2 CCSS.ELA-LITERACY.WHST.11-12.2 CCSS.ELA-LITERACY.WHST.9-10.7 CCSS.ELA-LITERACY.WHST.11-12.7 CCSS.ELA-LITERACY.WHST.9-10.9 CCSS.ELA-LITERACY.WHST.11-12.9 CCSS.MATH.CONTENT.HSN-Q.A.1 CCSS.MATH.CONTENT.HSN-Q.A.2 HS-ESS3-2</p>
<p>NRS.01.02.01.c. Evaluate the species of trees present to assess the health of an ecosystem (e.g., presence of native versus invasive species, biodiversity, etc.).</p>	<p>Forestry Issues Presentation Team Activity</p>	<p>AFNR Career Cluster - Natural Resources Systems Pathway, Statement 3 CCSS.ELA-LITERACY.RST.11-12.1 CCSS.ELA-LITERACY.RST.11-12.7 CCSS.ELA-LITERACY.RST.11-12.8 CCSS.ELA-LITERACY.WHST.9-10.2 CCSS.ELA-LITERACY.WHST.11-12.2 CCSS.ELA-LITERACY.WHST.9-10.7 CCSS.ELA-LITERACY.WHST.11-12.7 CCSS.ELA-LITERACY.WHST.9-10.9 CCSS.ELA-LITERACY.WHST.11-12.9 CCSS.MATH.CONTENT.HSN-Q.A.1 CCSS.MATH.CONTENT.HSN-Q.A.2 HS-ESS3-2</p>
<p>NRS.01.02.02.b. Apply identification techniques to determine the species of an herbaceous plant.</p>	<p>Tree/Forest Disorders Practicum</p>	<p>AFNR Career Cluster - Natural Resources Systems Pathway, Statement 3 CCSS.ELA-LITERACY.RST.11-12.1 CCSS.ELA-LITERACY.RST.11-12.7</p>

		<p>CCSS.ELA-LITERACY.RST.11-12.8 CCSS.ELA-LITERACY.WHST.9-10.2 CCSS.ELA-LITERACY.WHST.11-12.2 CCSS.ELA-LITERACY.WHST.9-10.7 CCSS.ELA-LITERACY.WHST.11-12.7 CCSS.ELA-LITERACY.WHST.9-10.9 CCSS.ELA-LITERACY.WHST.11-12.9 CCSS.MATH.CONTENT.HSN-Q.A.1 CCSS.MATH.CONTENT.HSN-Q.A.2 HS-ESS3-2</p>
NRS.01.02.03.b. Apply identification techniques to determine the species of wildlife or insect.	Tree/Forest Disorders Practicum	<p>AFNR Career Cluster - Natural Resources Systems Pathway, Statement 3 CCSS.ELA-LITERACY.RST.11-12.1 CCSS.ELA-LITERACY.RST.11-12.7 CCSS.ELA-LITERACY.RST.11-12.8 CCSS.ELA-LITERACY.WHST.9-10.2 CCSS.ELA-LITERACY.WHST.11-12.2 CCSS.ELA-LITERACY.WHST.9-10.7 CCSS.ELA-LITERACY.WHST.11-12.7 CCSS.ELA-LITERACY.WHST.9-10.9 CCSS.ELA-LITERACY.WHST.11-12.9 CCSS.MATH.CONTENT.HSN-Q.A.1 CCSS.MATH.CONTENT.HSN-Q.A.2 HS-ESS3-2</p>
NRS.01.02.06.c. Conduct an assessment of the resource inventories or population in a given area.	<p>Forest Business Management Problem Practicum Tree Measurement—Timber Cruising for Board Volume</p>	<p>AFNR Career Cluster - Natural Resources Systems Pathway, Statement 3 CCSS.ELA-LITERACY.RST.11-12.1 CCSS.ELA-LITERACY.RST.11-12.7 CCSS.ELA-LITERACY.RST.11-12.8 CCSS.ELA-LITERACY.WHST.9-10.2 CCSS.ELA-LITERACY.WHST.11-12.2 CCSS.ELA-LITERACY.WHST.9-10.7 CCSS.ELA-LITERACY.WHST.11-12.7 CCSS.ELA-LITERACY.WHST.9-10.9 CCSS.ELA-LITERACY.WHST.11-12.9 CCSS.MATH.CONTENT.HSN-Q.A.1 CCSS.MATH.CONTENT.HSN-Q.A.2 HS-ESS3-2</p>
NRS.01.05. Performance Indicator: Apply ecological concepts and principles to terrestrial natural resource systems.		
NRS.01.05.01.b. Analyze and summarize examples of stages of succession.	Exam	<p>AFNR Career Cluster, Statement 1 AFNR Career Cluster – Animal Systems Pathway, Statement 3 AFNR Career Cluster – Natural Resources Systems Pathway, Statement 3 CCSS.ELA-LITERACY.RST.11-12.1 CCSS.ELA-LITERACY.RST.11-12.7 CCSS.ELA-LITERACY.RST.11-12.8 CCSS.MATH.CONTENT.HSS-ID.A.1</p>

		<p>CCSS.MATH.CONTENT.HSS-IC.A.1 CCSS.MATH.CONTENT.HSS-IC.B.6 HS-ESS3-4 HS-ESS3-2</p>
NRS.01.05.03.c. Devise a forest management plan that improves the habitat while sustainably maximizing the amount of timber that can be harvested.	Forest Business Management Problem Practicum	<p>AFNR Career Cluster, Statement 1 AFNR Career Cluster – Animal Systems Pathway, Statement 3 AFNR Career Cluster – Natural Resources Systems Pathway, Statement 3 CCSS.ELA-LITERACY.RST.11-12.1 CCSS.ELA-LITERACY.RST.11-12.7 CCSS.ELA-LITERACY.RST.11-12.8 CCSS.MATH.CONTENT.HSS-ID.A.1 CCSS.MATH.CONTENT.HSS-IC.A.1 CCSS.MATH.CONTENT.HSS-IC.B.6 HS-ESS3-4 HS-ESS3-2</p>
NRS.01.06. Performance Indicator: Apply ecological concepts and principles to living organisms in natural resource systems.		
NRS.01.06.02.b. Analyze factors that influence the establishment and spread of invasive species and determine the appropriate steps to prevent or minimize the impact of invasive species.	Forestry Issues Presentation Team Activity	<p>AFNR Career Cluster, Statement 1 AFNR Career Cluster – Animal Systems Pathway, Statement 3 AFNR Career Cluster – Natural Resources Systems Pathway, Statement 3 CCSS.ELA-LITERACY.RST.11-12.1 CCSS.ELA-LITERACY.RST.11-12.8 CCSS.ELA-LITERACY.WHST.9-10.2 CCSS.ELA-LITERACY.WHST.11-12.2 CCSS.ELA-LITERACY.WHST.9-10.5 CCSS.ELA-LITERACY.WHST.11-12.5 CCSS.ELA-LITERACY.WHST.9-10.7 CCSS.ELA-LITERACY.WHST.11-12.7 CCSS.ELA-LITERACY.WHST.9-10.9 CCSS.ELA-LITERACY.WHST.11-12.9 HS-LS4-4 HS-LS4-6 HS-ESS3-4</p>
NRS.02.04. Performance Indicator: Examine and explain how economics affects the use of natural resources.		
NRS.02.04.01.a. Compare and contrast how the economic value of a natural resource affects its availability.	Forestry Issues Presentation Team Activity	<p>AFNR Career Cluster, Statement 4 AFNR Career Cluster – Agribusiness Systems Pathway, Statement 4 AFNR Career Cluster – Natural Resources Systems Pathway, Statement 4 AFNR Career Cluster – Plant Systems Pathway, Statement 1 CCSS.ELA-LITERACY.RST.11-12.1 CCSS.ELA-LITERACY.RST.11-12.8 CCSS.ELA-LITERACY.RST.11-12.7</p>

		<p>CCSS.ELA-LITERACY.WHST.11-12.2 CCSS.ELA-LITERACY.WHST.11-12.7 CCSS.ELA-LITERACY.WHST.11-12.8 CCSS.ELA-LITERACY.WHST.11-12.9 CCSS.ELA-LITERACY.SL.11-12.4 HS-ESS3-2</p>
<p>NRS.02.04.02.b. Assess the importance of the use of natural resources on local, state and national economies.</p>	<p>Forestry Issues Presentation Team Activity</p>	<p>AFNR Career Cluster, Statement 4 AFNR Career Cluster – Agribusiness Systems Pathway, Statement 4 AFNR Career Cluster – Natural Resources Systems Pathway, Statement 4 AFNR Career Cluster – Plant Systems Pathway, Statement 1 CCSS.ELA-LITERACY.RST.11-12.1 CCSS.ELA-LITERACY.RST.11-12.8 CCSS.ELA-LITERACY.RST.11-12.7 CCSS.ELA-LITERACY.WHST.11-12.2 CCSS.ELA-LITERACY.WHST.11-12.7 CCSS.ELA-LITERACY.WHST.11-12.8 CCSS.ELA-LITERACY.WHST.11-12.9 CCSS.ELA-LITERACY.SL.11-12.4 HS-ESS3-2</p>
<p>NRS.02.04.03.a. Compare and contrast the economic impact of green technology and alternative energy.</p>	<p>Forestry Issues Presentation Team Activity</p>	<p>AFNR Career Cluster, Statement 4 AFNR Career Cluster – Agribusiness Systems Pathway, Statement 4 AFNR Career Cluster – Natural Resources Systems Pathway, Statement 4 AFNR Career Cluster – Plant Systems Pathway, Statement 1 CCSS.ELA-LITERACY.RST.11-12.1 CCSS.ELA-LITERACY.RST.11-12.8 CCSS.ELA-LITERACY.RST.11-12.7 CCSS.ELA-LITERACY.WHST.11-12.2 CCSS.ELA-LITERACY.WHST.11-12.7 CCSS.ELA-LITERACY.WHST.11-12.8 CCSS.ELA-LITERACY.WHST.11-12.9 CCSS.ELA-LITERACY.SL.11-12.4 HS-ESS3-2</p>
<p>NRS.02.04.03.b. Analyze and document how the adoption of green technology and/or alternative energy affected a local, state or national economy.</p>	<p>Forestry Issues Presentation Team Activity</p>	<p>AFNR Career Cluster, Statement 4 AFNR Career Cluster – Agribusiness Systems Pathway, Statement 4 AFNR Career Cluster – Natural Resources Systems Pathway, Statement 4 AFNR Career Cluster – Plant Systems Pathway, Statement 1 CCSS.ELA-LITERACY.RST.11-12.1 CCSS.ELA-LITERACY.RST.11-12.8 CCSS.ELA-LITERACY.RST.11-12.7 CCSS.ELA-LITERACY.WHST.11-12.2</p>

		CCSS.ELA-LITERACY.WHST.11-12.7 CCSS.ELA-LITERACY.WHST.11-12.8 CCSS.ELA-LITERACY.WHST.11-12.9 CCSS.ELA-LITERACY.SL.11-12.4 HS-ESS3-2
NRS.02.05. Performance Indicator: Communicate information to the public regarding topics related to the management, protection, enhancement, and improvement of natural resources.		
NRS.02.05.02.a. Research how social media and the Internet have changed how people perceive and utilize natural resources (e.g., greater awareness of conservation issues, calls to action, etc.).	Forestry Issues Presentation Team Activity	AFNR Career Cluster, Statement 2 AFNR Career Cluster, Statement 3 STEM Career Cluster, Statement 2 STEM Career Cluster, Statement 3
NRS.02.05.03.a. Examine how communication can be used to influence behavior, call people to action and instill a sense of civic behavior related to the conservation, management, enhancement and improvement of natural resources.	Forestry Issues Presentation Team Activity	AFNR Career Cluster, Statement 2 AFNR Career Cluster, Statement 3 STEM Career Cluster, Statement 2 STEM Career Cluster, Statement 3
NRS.03.01. Performance Indicator: Sustainably produce, harvest, process and use natural resource products (e.g., forest products, wildlife, minerals, fossil fuels, shale oil, alternative energy, recreation, aquatic species, etc.).		
NRS.03.01.01.c. Develop a forest harvesting plan that ensures economic, environmental and social sustainability.	Forest Business Management Problem Practicum	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Plant Systems Pathway, Statement 4 CCSS.ELA-LITERACY.RST.11-12.8 HS-ESS3-2 HS-ESS3-3
NRS.03.01.07.a. Research how recreational uses of natural resources can be changed to improve sustainability.	Forestry Issues Presentation Team Activity	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Plant Systems Pathway, Statement 4 CCSS.ELA-LITERACY.RST.11-12.8 HS-ESS3-2 HS-ESS3-3
NRS.03.02. Performance Indicator: Demonstrate cartographic skills, tools and technologies to aid in developing, implementing and evaluating natural resource management plans.		
NRS.03.02.01.a. Summarize how to use maps to identify directions and land features, calculate actual distance and determine the elevations of points.	Map Interpretation Practicum	
NRS.04.01. Performance Indicator: Demonstrate natural resource protection, maintenance, enhancement and improvement techniques.		
NRS.04.01.02.c. Create a timber stand improvement plan for a forest.	Forest Business Management Problem Practicum	AFNR Career Cluster – Environmental Service Systems Pathway, Statement 3

		<p>AFNR Career Cluster – Environmental Service Systems Pathway, Statement 4</p> <p>AFNR Career Cluster – Natural Resources Systems Pathway, Statement 2</p> <p>AFNR Career Cluster – Natural Resources Systems Pathway, Statement 5</p> <p>AFNR Career Cluster – Plant Systems Pathway, Statement 2</p> <p>AFNR Career Cluster – Plant Systems Pathway, Statement 3</p> <p>CCSS.ELA-LITERACY.RST.11-12.8</p> <p>CCSS.ELA-LITERACY.SL.11-12.4</p> <p>HS-ESS3-2</p> <p>HS-ESS3-3</p> <p>HS-ESS3-4</p>
<p>NRS.04.02. Performance Indicator: Diagnose plant and wildlife diseases and follow protocols to prevent their spread.</p>		
<p>NRS.04.02.01.a. Classify causes of diseases in plants and the correct authorities to whom some diseases should be reported.</p>	<p>Tree/Forest Disorders Practicum</p>	<p>CCSS.ELA-LITERACY.RST.11-12.7</p> <p>CCSS.ELA-LITERACY.RST.11-12.8</p> <p>CCSS.ELA-LITERACY.WHST.11-12.2</p> <p>CCSS.ELA-LITERACY.WHST.11-12.7</p> <p>CCSS.ELA-LITERACY.WHST.11-12.8</p> <p>CCSS.ELA-LITERACY.WHST.11-12.9</p> <p>CCSS.MATH.CONTENT.HSN-Q.A.1</p> <p>CCSS.MATH.CONTENT.HSN-Q.A.2</p> <p>CCSS.MATH.CONTENT.HSN-Q.A.3</p> <p>HS-LS2-7</p>
<p>NRS.04.03. Performance Indicator: Prevent or manage introduction of ecologically harmful species in a particular region.</p>		
<p>NRS.04.03.01.a. Categorize harmful and beneficial insects, as well as signs of insect damage to natural resources.</p>	<p>Tree/Forest Disorders Practicum</p>	<p>CCSS.ELA-LITERACY.RST.11-12.1</p> <p>CCSS.ELA-LITERACY.RST.11-12.7</p> <p>CCSS.ELA-LITERACY.RST.11-12.8</p> <p>CCSS.ELA-LITERACY.WHST.9-10.5</p> <p>CCSS.ELA-LITERACY.WHST.11-12.5</p> <p>CCSS.ELA-LITERACY.WHST.9-10.7</p> <p>CCSS.ELA-LITERACY.WHST.11-12.7</p> <p>CCSS.MATH.CONTENT.HSN-Q.A.1</p> <p>CCSS.MATH.CONTENT.HSN-Q.A.2</p> <p>CCSS.MATH.CONTENT.HSN-Q.A.3</p> <p>CCSS.MATH.CONTENT.HSS-ID.A.1</p> <p>CCSS.MATH.CONTENT.HSS-IC.A.1</p> <p>CCSS.MATH.CONTENT.HSS-IC.B.6</p> <p>HS-LS2-7</p> <p>HS-LS4-6</p>
<p>NRS.04.04. Performance Indicator: Manage fires in natural resource systems.</p>		
<p>NRS.04.04.01.b. Assess techniques used to fight wildfires, manage prescribed fires and ensure human safety.</p>	<p>Exam</p>	

PS.02.02. Performance Indicator: Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.		
PS.02.02.03.a. Identify and summarize the components and the functions of plant stems. Knowledge	Exam	HS-LS1-4
PS.02.02.04.a. Research and summarize leaf morphology and the functions of leaves.	Exam	HS-LS1-4
PS.03.03. Performance Indicator: Develop and implement a plan for integrated pest management for plant production.		
PS.03.03.01.b. Identify and analyze major local weeds, insect pests and infectious and noninfectious plant diseases.	Tree/Forest Disorders Practicum	
PST.01.01. Performance Indicator: Apply physical science and engineering principles to assess and select energy sources for AFNR power, structural and technical systems.		
PST.01.01.01.a. Research and identify renewable and nonrenewable energy sources used in AFNR.	Forestry Issues Presentation Team Activity	AFNR Career Cluster, Statement 4 AFNR Career Cluster, Statement 5 HS-ESS3-3 HS-PS3-3
PST.01.02. Performance Indicator: Apply physical science and engineering principles to design, implement and improve safe and efficient mechanical systems in AFNR situations.		
PST.01.02.03.c. Conduct a safety inspection of tools, machines and equipment used in different AFNR related mechanical systems.	Chainsaw Part Identification,	HS-PS3-1 HS-PS3-3