NEW JERSEY FFA
CAREER AND LEADERSHIP
DEVELOPMENT EVENTS

Forestry
2021
Purpose
The New Jersey 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 agricultural education classroom.

Objectives
This event will provide the participant with 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 environmental and social factors affecting the management of forests
• Identify major species of trees of economic importance to the United States and internationally
• Identify hand tools and equipment in forestry management
• Recognize and understand approved silvicultural practices in the United States
• Identify forest disorders
• Recognize safety practices in forest management

Event Rules
• Teams will consist of four members.
• Team ranking is determined by combining the scores of all team participants.
• This event will be held rain or shine.
• Travel Official Dress is required during the event.
• Under no circumstances will any participant be allowed to touch or handle plant materials or other specimen during event except as specified in certain practicums.
• Each participant must have a clipboard, at least two No. 2 pencils and a calculator.
• Participants are NOT allowed to use (or have visible) electronic devices during the event, unless for medical reasons or a portion of the event requires usage. This includes cell phones, iPods, mp3 players, etc. Participants will be allowed to use calculators, if specified for that event; however, cell phone calculators and graphing calculators are not permitted! Failure to adhere to these rules will result in disqualification.
• All individuals participating will judge in a cooperative manner following the rules set forth by the event coordinator.

Event Format
EQUIPMENT
Materials to be provided by the student:
• Calculator (calculators with programmable abilities are not permitted)
• Computer
Participants are not to bring:
• Cell phones or other electronic devices
FLOW OF EVENT

- Forestry General Knowledge Exam – 30 minutes
- Tree Identification* – 30 minutes
- Tree Measurement* – 30 minutes
- Practicum 1 – 30 minutes
- Practicum 2 – 30 minutes

INDIVIDUAL ACTIVITIES

The Forestry Career Development Event will have five components:

Forestry General Knowledge Exam (100 points)

- 30 minutes, 50 questions
- Fifty (50) 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.
- Scoring: Each answer has a value of 2 points for a total maximum score of 100 points.

Tree Identification (100 points)

- 30 minutes, 20 specimens
- Twenty live specimens, pressed samples, fresh leaf samples and/or standing trees, from the tree identification specimen list will be displayed for participants to identify by common names.
- Scoring: Five points will be given for each specimen that is correctly identified for a maximum of 100 points.

Tree Measurement (100 points)

- 30 minutes, 10 specimens
- Each participant will measure ten pre-numbered trees on a plot for board foot volume. The participant must record the DBH (Diameter Breast Height) to the nearest one-inch class and the merchantable height of each tree height rounded down to the nearest ½ log.
- Volume tables will be provided at the event.
- The following minimum diameters and log length will be:

<table>
<thead>
<tr>
<th>Minimum Saw Timber</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBH</td>
</tr>
<tr>
<td>Top Diameter</td>
</tr>
<tr>
<td>Height</td>
</tr>
</tbody>
</table>

- Merchantable height stops are estimated to the upper point on a tree where it becomes 10 inches in diameter or where a major fork in a tree stem occurs or where a limb has a diameter equal to ½ of the diameter of the tree at that point.
- Scoring: Thirty points will be given for the correct DBH and thirty points for the correct height. Forty points will be given for the correct volume per acre. Five points will be deducted for each five percent deviation (plus or minus) from the correct measured volume.
Individual Practicums - TWO (2) practicums will be chosen from the list below and announced on the morning of the event. – 30 MINUTES EACH

- **Forest Management Evaluation** (100 points)
  - 30 minutes, 1 prompt
  - An area will be selected and identified by ribbons, paint, rope, etc. It will contain 20 marked trees within a timber stand. All trees in the selected area will be considered as a forest management site, and the participants will score each marked tree using one of the following options:
    - Harvest — utilize the tree.
    - Leave — the tree should remain in stand for a good reason.
    - Deaden — Undesirable tree, not merchantable or beneficial to wildlife, should be deadened or cut down and left in woods.
  - The participants will be given a situation concerning the forest management objectives of the stand selected. This information will be given to participants at the site before they start. Information that will be needed to help participants in their decisions will include the following: Markets available, wildlife considerations, present condition of stand and management plan.

- **Equipment Identification** (100 points)
  - 30 minutes, 25 items
  - Twenty-five (25) pieces of equipment from the list will be pictured 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 and written description.
  - Scoring: Four points will be given for each piece of equipment identified correctly for a total of 100 points.

- **Map Interpretation** (100 points)
  - 30 minutes, 1 prompt
  - Participants will answer questions using a furnished United States Geological Survey topographic map. The participant should know legal description, recognize topographic map symbols, and understand the meaning of map symbols, size and location of 40 acres or more in a parcel.
  - Examples:
    - What is the legal description of the boxed area?
    - What is the item located at this point?
    - What is the acreage of the area enclosed?
    - In what section is the city of Marshall located?
    - What is the elevation at this point?
  - Legal descriptions will be written or described according to the public land survey system.
    - Example: SE ¼ of NW ¼ of Section 3, T3N, R1E
Compass Use* (100 points)
- 30 minutes, 10 data 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.
- Scoring: 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.

Chainsaw Part Identification, Trouble Shooting and Safety* (100 points)
- 30 minutes, 10 questions (may include ID photos and/or multiple-choice questions)
- This practicum will consist of one or more of the parts below. Parts may utilize photos, video, demonstration, actual parts, written situations and/or problems. This is not an all-inclusive list.
  - Chainsaw parts identification - Each participant will identify parts of a chainsaw.
  - Troubleshooting - The participant will identify chainsaw problems or troubles.
  - Safety - The participant will identify safety hazards or unsafe practices.
- Scoring: 10 points will be given for each question answered correctly for a total of 100 points.

Tree/Forest Disorders* (100 points)
- 30 minutes, 20 disorders from actual samples, pictures/slides, written description and written case histories
- Symptoms of 20 disorders from the Tree Disorders Identification list will be displayed for participants to identify by common names.
- Scoring: Five points will be given for each tree/forest disorder identified correctly for a total of 100 points.

Forest Products* (100 points)
- 30 minutes, 20 samples
- Wood products/samples will be displayed for participants to evaluate and identify its tree species source from the tree identification specimen list. The wood products/samples will be presented in one or more of the following forms: actual sample, pictures/slides, and written description.
- Scoring: Five points will be given for each wood product/sample identified correctly for a total of 100 points.

Forest Business Management Problem (100 points)
- 30 minutes, 10 questions
- This section is designed to determine the participant’s ability to apply economic principles and concepts of management to the decision-making process by actual problem analysis and to defend the decisions made. This will involve a model forest operation with possible calculation on profit/loss, cost of operation, taxes, depreciation, marketing product, stumpage cost, record keeping, etc.
- Scoring: Ten points will be given for each correct answer for a total of 100 points.
**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. Timber Cruising
3. Tree Identification
4. Total rotational practicum score

**Scoring**
Total Possible Individual Points: 500 points
Total Points per Team: 2000 points

*(1200 team points are needed to advance to Nationals)*

*denotes a hands-on practicum area, individual practicum areas are notated next to the individual event

- **Forestry General Knowledge Exam** – 100 points (2 pts. X 50 = 100 pts.)
- **Tree Identification** – 100 points (5 pts. X 20 = 100 pts.)
- **Tree Measurement** – 100 points
- **Practicum 1** – 100 points
- **Practicum 2** – 100 points

**Awards**
Awards will be presented to individuals and the first team based on their rankings at the CDE awards ceremony at the New Jersey State FFA Convention. Awards are sponsored by the National FFA Foundation and the New Jersey FFA Association.

The 1st place team will represent New Jersey at the National FFA Convention in October (if 60% mastery is met).

**Individual**
- Overall Medals
  - Medals – Top three individuals
- H.O. Sampson Certificates (hands-on sections ONLY)
  - Certificate – Top five individuals

**Team**
- Plaque Sponsored by the National FFA Foundation – 1st place
References
This list of references is not intended to be all-inclusive.

- National FFA National Career Development Event Questions and Answers FFA.org
- General Knowledge Exam
  - Introduction to Forestry Science, Burton, Delmar Publications
  - Science of Forestry Management, Kris Irwin, University of Georgia, AAVIM
- Tree Identification
  - “FFA Georgia State and National Tree Lists”, available from www.amazon.com
  - Silvics of North America, Handbook #654, volume one and two, U.S. Forest Service, P. O. Box 2417, 12th and Independence Avenue SW, Washington, DC 20013.
- Tree Measurement
- Forest Management
  - Introduction to Forestry Science, Burton, Delmar Publications
  - Science of Forestry Management, Kris Irwin, University of Georgia, AAVIM
- Equipment Identification
  - Current Catalog of Forestry Suppliers, Inc., 205 West Rankin Street, Jackson, MS 39204-039
  - www.husqvarna.com/us/forest/accessories/chainsawaccessories/#forests_tools
  - www.deere.com/en_US/industry/forestry/forestry.page?
  - www.treestuff.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
- Chainsaw Parts and Identification
  - Husqvarna publication, How to Work With a Chainsaw, National FFA website
- Compass
  - http://forest.mtu.edu/classes/fw2051/docs/compass_pace.pdf
- Forest Products
  - www.fpl.fs.fed.us/products/publications/several_pubs.php?grouping_id=100&header_id=p
- Forest Business Management
  - Introduction to Forestry Science, Burton, Delmar Publications
  - Science of Forestry Management, Kris Irwin, University of Georgia, AAVIM
### Tree Identification Specimen List

1. Alder, Red (*Alnus rubra*)
2. Ash (*Fraxinus sp.*)
3. Aspen, Bigtooth (*Populus grandidentata*)
4. Aspen, Quaking (*Populus tremuloides*)
5. Baldcypress (*Taxodium distichum*)
6. Beech, American (*Fagus americana*)
7. Birch, Black (*Betula lenta*)
8. Birch, White (*Betula papyrifera*)
9. Cherry, Black (*Prunus serotina*)
10. Cottonwood, Eastern (*Populus deltoides*)
11. Elm (*Ulmus sp.*)
12. Fir, Balsam (*Abies balsamea*)
13. Fir, Douglas (*Pseudotsuga menziesii*)
14. Hemlock, Eastern (*Tsuga canadensis*)
15. Hemlock, Western (*Tsuga heterophylla*)
16. Hickory (*Carya sp.*)
17. Maple, Red (*Acer rubrum*)
18. Maple, Sugar (*Acer saccharum*)
19. Oak, Black (*Quercus velutina*)
20. Oak, Chestnut (*Quercus Montana*)
21. Oak, Northern Red (*Quercus rubra*)
22. Oak, Scarlet (*Quercus coccinea*)
23. Oak, Southern Red (*Quercus falcata*)
24. Oak, White (*Quercus alba*)
25. Pecan (*Carya illinoisensis*)
27. Pine, Loblolly (*Pinus taeda*)
28. Pine, Lodgepole (*Pinus contorta*)
29. Pine, Longleaf (*Pinus palustris*)
30. Pine, Pitch (*Pinus rigida*)
31. Pine, Ponderosa (*Pinus ponderosa*)
32. Pine, Red (*Pinus resinosa*)
33. Pine, Shortleaf (*Pinus echinata*)
34. Poplar, Yellow (*Liriodendron tulipifera*)
35. Red Cedar, Western (*Thuja plicata*)
36. Redcedar, Eastern (*Juniperus virginiana*)
37. Spruce, Red (*Picea rubens*)
38. Spruce, Sitka (*Picea sitchensis*)
39. Spruce, White (*Picea glauca*)
40. Sweetgum (*Liquidambar styraciflua*)
41. Sycamore (*Platanus sp.*)
42. Walnut, Black (*Juglans nigra*)
Equipment Identification List

01. Altimeter
02. Angle guage
03. Ascender
04. Automatic Level
05. Back-pack Fire Pump
06. Bark Gauge
07. Bulldozer
08. Canthook
09. Carabiner
10. Chainsaw
11. Chainsaw Chaps
12. Clinometer
13. Combination tool
14. Data Recorder
15. Densiometer
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
Tree Disorders Identification List

01. Aphid
02. Asian Longhorn Beetle
03. Butt or Heart Rot
04. Canker
05. Chemical damage
06. Cicada
07. Climatic injury: snow, wind, frost, drought, hail
08. Damping off
09. Douglas fir tussock moth
10. Emerald ash borer
11. Fir Engraver Beetle
12. Fire damage
13. Gypsy moth
14. Hemlock woolly adelgid
15. Ipps Engraver Beetle
16. Landscape equipment damage
17. Lightning damage
18. Mechanical damage
19. Mistletoe
20. Mountain Pine Beetle
21. Nematode
22. Rust
23. Sawfly
24. Scale
25. Spruce budworm
26. Sunscald
27. Tent caterpillar
28. Wetwood or slime flux
29. Wildlife/Livestock damage
## Agricultural, Food and Natural Resources Content Standards

<table>
<thead>
<tr>
<th>Measurement Assessed</th>
<th>Where measured in event</th>
<th>Academic Content Standards Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ABS.01.01.01.c.</strong> Create strategies to maximize the efficiency of AFNR business inputs and outputs using microeconomic principles.</td>
<td>Forest Business Management Problem Practicum</td>
<td></td>
</tr>
<tr>
<td><strong>ABS.01.02.</strong> Performance Indicator: Read, interpret, evaluate and write statements of purpose to guide business goals, objectives and resource allocation.</td>
<td></td>
<td>CCSS.ELA-Literacy: W.9-10.2&lt;br&gt;CCSS.ELA-Literacy: W.11-12.2&lt;br&gt;CCSS.ELA-Literacy: W.9-10.9&lt;br&gt;CCSS.ELA-Literacy: W.11-12.9&lt;br&gt;CCSS.ELA-Literacy: RI.9-10.4&lt;br&gt;CCSS.ELA-Literacy: RI.11-12.4</td>
</tr>
<tr>
<td><strong>ABS.01.02.02.c.</strong> Evaluate AFNR business goals and objectives, then make revisions based on data and observations.</td>
<td>Forest Business Management Problem Practicum</td>
<td></td>
</tr>
<tr>
<td><strong>ABS.01.03.</strong> Performance Indicator: Devise and apply management skills to organize and run an AFNR business in an efficient, legal and ethical manner.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ABS.01.03.01.c.</strong> Devise strategies to improve the operation of AFNR businesses using management skills.</td>
<td>Forest Business Management Problem Practicum</td>
<td>CCSS.ELA-Literacy: SL.9-10.6&lt;br&gt;CCSS.ELA-Literacy: SL.11-12.6&lt;br&gt;CCSS.ELA-Literacy: SL.9-10.6&lt;br&gt;CCSS.ELA-Literacy: SL.11-12.6&lt;br&gt;CCSS.ELA-Literacy: RST: 9-10.4&lt;br&gt;CCSS.ELA-Literacy: RST: 11-12.4</td>
</tr>
<tr>
<td><strong>ABS.01.03.02.c.</strong> Devise management or operational strategies to address and adhere to local, state, federal, international and industry regulations.</td>
<td>Forestry Issues Presentation Team Activity</td>
<td>CCSS.ELA-Literacy: SL.9-10.6&lt;br&gt;CCSS.ELA-Literacy: SL.11-12.6&lt;br&gt;CCSS.ELA-Literacy: SL.9-10.6&lt;br&gt;CCSS.ELA-Literacy: SL.11-12.6&lt;br&gt;CCSS.ELA-Literacy: RST: 9-10.4&lt;br&gt;CCSS.ELA-Literacy: RST: 11-12.4</td>
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</tbody>
</table>
## Agriculture, Food and Natural Resources Content Standards continued

<table>
<thead>
<tr>
<th>Measurement Assessed</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>ABS.04.02.</strong> Performance Indicator: Develop production and operational plans for an AFNR business.</td>
<td></td>
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</tr>
<tr>
<td><strong>ABS.05.01.</strong> Performance Indicator: Analyze the role of markets, trade, competition and price in relation to an AFNR business sales and marketing plans.</td>
<td></td>
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</tr>
<tr>
<td><strong>ABS.05.01.01.c.</strong> Evaluate and predict future trends for a specific AFNR product as related to markets, trade and price (e.g., corn, oil, wheat, etc.).</td>
<td>Forestry Issues Presentation Team Activity</td>
<td>AFNR Career Cluster, Statement 7 AFNR Career Cluster – Agribusiness Systems Pathway, Statement 1 Financial Investing: Benchmarks: Grade 12, Statement 13</td>
</tr>
<tr>
<td><strong>C5.01.01.</strong> Performance Indicator: Examine issues and trends that impact AFNR systems on local, state, national and global levels.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>C5.01.01.01.c.</strong> Evaluate and explain AFNR issues and their impacts to audiences with limited AFNR knowledge.</td>
<td>Forestry Issues Presentation Team Activity</td>
<td></td>
</tr>
<tr>
<td><strong>C5.01.01.02.c.</strong> Evaluate emerging trends and the opportunities they may create within the AFNR systems.</td>
<td>Forestry Issues Presentation Team Activity</td>
<td></td>
</tr>
<tr>
<td><strong>C5.01.03.</strong> Performance Indicator: Identify public policies and their impact on AFNR systems.</td>
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<tr>
<td><strong>C5.01.03.01.c.</strong> Evaluate a public policy within AFNR systems and defend or challenge it.</td>
<td>Forestry Issues Presentation Team Activity</td>
<td></td>
</tr>
<tr>
<td><strong>C5.02.01.</strong> Performance Indicator: Research geographic and economic data related to AFNR systems.</td>
<td></td>
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</tr>
<tr>
<td><strong>C5.02.01.02.c.</strong> Devise a strategy to solve a problem in an AFNR system using a set of economic data.</td>
<td>Forestry Issues Presentation Team Activity</td>
<td></td>
</tr>
<tr>
<td><strong>C5.02.02.</strong> Performance Indicator: Examine the components of the AFNR systems and their impact on the local, state, national and global society and economy.</td>
<td></td>
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</tr>
<tr>
<td><strong>C5.02.02.01.c.</strong> Devise a strategy for explaining components of AFNR systems to audiences with limited knowledge.</td>
<td>Forestry Issues Presentation Team Activity</td>
<td></td>
</tr>
<tr>
<td><strong>C5.02.02.02.c.</strong> Evaluate how society traditions, customs or policies have resulted from practices with AFNR systems.</td>
<td>Forestry Issues Presentation Team Activity</td>
<td></td>
</tr>
<tr>
<td><strong>C5.02.02.03.c.</strong> Evaluate how positive or negative changes in the local, state, national or global economy impacts AFNR systems.</td>
<td>Forestry Issues Presentation Team Activity</td>
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</tr>
</tbody>
</table>
### Agriculture, Food and Natural Resources Content Standards continued

<table>
<thead>
<tr>
<th>Measurement Assessed</th>
<th>Where measured in event</th>
<th>Academic Content Standards Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CS.03.04. Performance Indicator: Use appropriate protective equipment and demonstrate safe and proper use of AFNR tools and equipment.</strong></td>
<td></td>
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</tr>
<tr>
<td>CS.03.04.01.a. Identify and differentiate the appropriate protective equipment for the safe use and operation of specific tools and CS.03.04.01.a. Identify standard tools, equipment and safety procedures related to AFNR tasks.</td>
<td>Chainsaw Part Identification, Troubleshooting and Safety Practicum</td>
<td></td>
</tr>
<tr>
<td>CS.03.04.02.b. Complete the set up and adjustment for tools and equipment related to AFNR tasks.</td>
<td>Chainsaw Part Identification, Troubleshooting and Safety Practicum</td>
<td></td>
</tr>
<tr>
<td>CS.06.04.02.c. Evaluate and select appropriate tools and equipment to complete AFNR tasks.</td>
<td>Chainsaw Part Identification, Troubleshooting and Safety Practicum</td>
<td></td>
</tr>
<tr>
<td>CS.03.04.03.a. Read and interpret operating instructions related to operation, storage and maintenance of tools and equipment related AFNR tasks.</td>
<td>Chainsaw Part Identification, Troubleshooting and Safety Practicum</td>
<td></td>
</tr>
<tr>
<td>CS.03.04.03.b. Assess and demonstrate appropriate operation, storage and maintenance techniques for AFNR tools and equipment.</td>
<td>Chainsaw Part Identification, Troubleshooting and Safety Practicum</td>
<td></td>
</tr>
<tr>
<td><strong>CS.04.01. Performance Indicator: Identify and implement practices to steward natural resources in different AFNR systems.</strong></td>
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</tbody>
</table>
| 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                                                                                     |                                                                                                      |
### Agriculture, Food and Natural Resources Content Standards continued

<table>
<thead>
<tr>
<th>Measurement Assessed</th>
<th>Where measured in event</th>
<th>Academic Content Standards Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.).</td>
<td>Entire event</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td>Entire event</td>
<td></td>
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<tr>
<td><strong>CS.06.01. Performance Indicator:</strong> Explain foundational cycles and systems of AFNR.</td>
<td></td>
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<tr>
<td>CS.06.01.01.b. Analyze how foundational cycles affect production, processing and management of food, fiber and fuel.</td>
<td>Exam</td>
<td></td>
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<tr>
<td><strong>ESS.01.01. Performance Indicator:</strong> Analyze and interpret laboratory and field samples in environmental service systems.</td>
<td></td>
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</tr>
</tbody>
</table>
| 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                                             |
### Agriculture, Food and Natural Resources Content Standards continued

<table>
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</table>
| **NRS.01.01.** Performance Indicator: Apply methods of classification to examine natural resource availability and ecosystem function in a particular region. |                              | 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 |
| **NRS.01.01.01.c.** Devise strategies for the preservation of natural resources based on their classification. | Forest Business Management Problem Practicum                  |                                                                                                     |
| **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. |                              | 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 |
| **NRS.01.02.01.b.** Apply identification techniques to determine the species of a tree or woody plant. | Tree Identification  
Tree/Forest Disorders Practicum                                |                                                                                                     |
| **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.). | Forestry Issues  
Presentation Team Activity                                      |                                                                                                     |

**Forestry**
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</table>
| **NRS.01.02.02.b. Apply identification techniques to determine the species of an herbaceous plant.** | Tree/Forest Disorders Practicum | 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.WHST9-10.2  
CCSS.ELA-LITERACY.WHST9-11-12.2  
CCSS.ELA-LITERACY.WHST9-10.7  
CCSS.ELA-LITERACY.WHST9-11-12.7  
CCSS.ELA-LITERACY.WHST9-10.9  
CCSS.ELA-LITERACY.WHST11-12.9  
CCSS.MATH.CONTENT.HSN-Q.A.1  
CCSS.MATH.CONTENT.HSN-Q.A.2  
HS-ESS3-2                                                                                   |
| **NRS.01.02.03.b. Apply identification techniques to determine the species of wildlife or insect.** | Tree/Forest Disorders Practicum | 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.WHST9-10.2  
CCSS.ELA-LITERACY.WHST9-11-12.2  
CCSS.ELA-LITERACY.WHST9-10.7  
CCSS.ELA-LITERACY.WHST9-11-12.7  
CCSS.ELA-LITERACY.WHST9-10.9  
CCSS.ELA-LITERACY.WHST11-12.9  
CCSS.MATH.CONTENT.HSN-Q.A.1  
CCSS.MATH.CONTENT.HSN-Q.A.2  
HS-ESS3-2                                                                                   |
| **NRS.01.02.06.c. Conduct an assessment of the resource inventories or population in a given area.** | Forest Business Management Problem Practicum, Tree Measurement—Timber Cruising for Board Volume | 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.WHST9-10.2  
CCSS.ELA-LITERACY.WHST9-11-12.2  
CCSS.ELA-LITERACY.WHST9-10.7  
CCSS.ELA-LITERACY.WHST9-11-12.7  
CCSS.ELA-LITERACY.WHST9-10.9  
CCSS.ELA-LITERACY.WHST11-12.9  
CCSS.MATH.CONTENT.HSN-Q.A.1  
CCSS.MATH.CONTENT.HSN-Q.A.2  
HS-ESS3-2                                                                                   |
### Agriculture, Food and Natural Resources Content Standards continued

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<tr>
<td><strong>NRS.01.05.01.b.</strong> Analyze and summarize examples of stages of succession.</td>
<td>Exam</td>
<td>AFNR Career Cluster, Statement 1&lt;br&gt;AFNR Career Cluster – Animal Systems Pathway, Statement 3&lt;br&gt;AFNR Career Cluster – Natural Resources Systems Pathway, Statement 3&lt;br&gt;CCSS.ELA-LITERACY.RST.11-12.1&lt;br&gt;CCSS.ELA-LITERACY.RST.11-12.7&lt;br&gt;CCSS.ELA-LITERACY.RST.11-12.8&lt;br&gt;CCSS.MATH.CONTENT.HSS-ID.A.1&lt;br&gt;CCSS.MATH.CONTENT.HSS-IC.A.1&lt;br&gt;CCSS.MATH.CONTENT.HSS-IC.B.6&lt;br&gt;HS-ESS3-4&lt;br&gt;HS-ESS3-2</td>
</tr>
<tr>
<td><strong>NRS.01.05.03.c.</strong> Devise a forest management plan that improves the habitat while sustainably maximizing the amount of timber that can be harvested.</td>
<td>Forest Business Management Problem Practicum</td>
<td>AFNR Career Cluster, Statement 1&lt;br&gt;AFNR Career Cluster – Animal Systems Pathway, Statement 3&lt;br&gt;AFNR Career Cluster – Natural Resources Systems Pathway, Statement 3&lt;br&gt;CCSS.ELA-LITERACY.RST.11-12.1&lt;br&gt;CCSS.ELA-LITERACY.RST.11-12.7&lt;br&gt;CCSS.ELA-LITERACY.RST.11-12.8&lt;br&gt;CCSS.MATH.CONTENT.HSS-ID.A.1&lt;br&gt;CCSS.MATH.CONTENT.HSS-IC.A.1&lt;br&gt;CCSS.MATH.CONTENT.HSS-IC.B.6&lt;br&gt;HS-ESS3-4&lt;br&gt;HS-ESS3-2</td>
</tr>
<tr>
<td><strong>NRS.01.06.</strong> Performance Indicator: Apply ecological concepts and principles to living organisms in natural resource systems.</td>
<td>Forestry Issues Presentation Team Activity</td>
<td>AFNR Career Cluster, Statement 1&lt;br&gt;AFNR Career Cluster – Animal Systems Pathway, Statement 3&lt;br&gt;AFNR Career Cluster – Natural Resources Systems Pathway, Statement 3&lt;br&gt;CCSS.ELA-LITERACY.RST.11-12.1&lt;br&gt;CCSS.ELA-LITERACY.RST.11-12.8&lt;br&gt;CCSS.ELA-LITERACY.WHST.9-10.2&lt;br&gt;CCSS.ELA-LITERACY.WHST.11-12.2&lt;br&gt;CCSS.ELA-LITERACY.WHST.9-10.5&lt;br&gt;CCSS.ELA-LITERACY.WHST.11-12.5&lt;br&gt;CCSS.ELA-LITERACY.WHST.9-10.7&lt;br&gt;CCSS.ELA-LITERACY.WHST.11-12.7&lt;br&gt;CCSS.ELA-LITERACY.WHST.9-10.9&lt;br&gt;CCSS.ELA-LITERACY.WHST.11-12.9&lt;br&gt;HS.LS4-4&lt;br&gt;HS.LS4-6&lt;br&gt;HS-ESS3-4</td>
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<tr>
<td><strong>NRS.02.04.</strong> Performance Indicator: Examine and explain how economics affects the use of natural resources.</td>
<td></td>
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</table>

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

Forestry issues Presentation Team Activity

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

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

Forestry issues Presentation Team Activity

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

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

Forestry issues Presentation Team Activity

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
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| 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. | Forestry Issues Presentation Team Activity | 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 |

**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 |
### Agriculture, Food and Natural Resources Content Standards continued

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<td><strong>NRS.03.02.</strong> Performance Indicator: Demonstrate cartographic skills, tools and technologies to aid in developing, implementing and evaluating natural resource management plans.</td>
<td></td>
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<tr>
<td>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.</td>
<td>Map Interpretation Practicum</td>
<td></td>
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<tr>
<td><strong>NRS.04.01.</strong> Performance Indicator: Demonstrate natural resource protection, maintenance, enhancement and improvement techniques.</td>
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<td></td>
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<tr>
<td><strong>NRS.04.02.</strong> Performance Indicator: Diagnose plant and wildlife diseases and follow protocols to prevent their spread.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NRS.04.02.01.a. Classify causes of diseases in plants and the correct authorities to whom some diseases should be reported.</td>
<td>Tree/Forest Disorders Practicum</td>
<td>CCSS.ELA-LITERACY.RST.11-12.7  CCSS.ELA-LITERACY.RST.11-12.8  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.MATH.CONTENT.HSN.Q.A.1  CCSS.MATH.CONTENT.HSN.Q.A.2  CCSS.MATH.CONTENT.HSN.Q.A.3  HS-L52.7</td>
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| **NRS.04.03. Performance Indicator: Prevent or manage introduction of ecologically harmful species in a particular region.** | Tree/Forest Disorders Practicum | 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.9-10.5  
CCSS.ELA-LITERACY.WHST.9-11.2.5  
CCSS.ELA-LITERACY.WHST.9-11.12.7  
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.1  
CCSS.MATH.CONTENT.HSS-IC.A.1  
CCSS.MATH.CONTENT.HSS-IC.B.6  
HS-LS2-7  
HS-LS4-6 |
| **NRS.04.04. Performance Indicator: Manage fires in natural resource systems.** | Exam                     |                                                                                                        |
| **PS.02.02. Performance Indicator: Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.** | Exam                     | HS-LS1-4                                                                                               |
| 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.** | Tree/Forest Disorders Practicum |                                                                                                        |
| 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.** | Forestry Issues Presentation Team Activity | AFNR Career Cluster, Statement 4  
AFNR Career Cluster, Statement 5  
HS-ESS3-3  
HS-PS3-3 |
| 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. | Chainsaw Part Identification, | HS-PS3-1  
HS-PS3-3 |
| 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 |