



## EXAM GUIDE FOR THE **NATURAL RESOURCES** SPECIALIST CERTIFICATION

Industry Certifications by Agricultural Education Services and Technology (AEST) and Florida Farm Bureau are essential components of the Complete Experience and prepare students for successful careers and a lifetime of informed choices in global agriculture, food, fiber and natural resources systems.

## CONTENTS

About the Natural Resources Specialist Certification.....	3
Purpose of the Exam Guide .....	3
Exam Specifics .....	3
Primary Recommended References .....	4
Secondary References.....	4
State Alignment and Weighting.....	4
Basic Exam Outline.....	5
Detailed Outline & Sample Questions .....	7

## About the Natural Resources Specialist Certification

The Natural Resources Specialist Certification encompasses the study of the management, improvement and conservation practices of ecosystems, agroecosystems, soil, water, air, wildlife, wetlands and forests.

## Purpose of the Exam Guide

This exam guide is designed to prepare you to sit for the AEST Natural Resources Specialist certification exam. It includes information about the exam, exam objectives, recommended references and sample questions – all with the intent of helping you achieve a passing score. AEST recommends a combination of classroom instruction and self-study to maximize your chances of earning industry certification.

## Exam Specifics

Certified individuals will have demonstrated competence in the application of industry-based principles and techniques required for effective performance of skills related to natural resources in an agricultural context.

The exam is 100 questions in length and includes multiple-choice options for all questions. Individuals are required to score a 75% or above to earn certification.

In addition to fundamental skills and knowledge related to natural resources, certifications encompass skills and practices that everyone should acquire to be career ready including communication, decision-making, creativity and innovation, critical thinking, problem solving, integrity, ethical leadership and cultural/global competency.

Indicators are identified by industry and correlated with current educational frameworks.

## Primary Recommended References

1. Text: Agriscience Fundamentals and Applications 5th Edition
2. Text: Managing Our Natural Resources 6<sup>th</sup> Edition

## Secondary References

1. Text: Soil Science and Management 6<sup>th</sup> Edition

Secondary references can be found at **CERTIFY.AG**. They are designed to enforce the industry concepts measured on this exam.

## State Alignment and Weighting

Area of Study	Florida Standard Alignment (FL DOE 2017-18 program 8006200)	Weight
Natural Resource Management	11.01, 11.03, 11.04, 11.05, 11.06, 11.07, 11.08, 21.06, 33.01, 33.02, 33.03, 33.04, 40.01, 40.04, 40.05	20%
Soil Resource Management	14.01, 14.03, 14.05, 14.06, 14.07, 14.08, 15.01, 15.02, 15.04, 15.05, 15.06, 15.07, 15.08, 16.02, 16.03, 40.04, 40.06, 40.07	20%
Water Resource Management	12.01, 12.02, 12.03, 12.04, 12.05, 21.06, 22.04, 22.07, 25.01, 25.06, 26.04, 40.04, 40.05, 40.07	15%
Air and Air Quality	04.01, 04.03, 04.05, 11.06, 17.02, 40.04	5%
Wildlife Ecology and Management	14.01, 14.03, 19.01, 19.02, 19.03, 19.04, 19.05, 19.06, 40.04	20%
Wetland Preservation and Management	18.01, 18.02, 18.03, 18.04, 18.09, 34.02, 34.03, 40.04	10%
Forest Resource Management	20.01, 20.02, 20.03, 20.04, 20.05, 30.01, 30.06, 31.02, 31.03, 31.05, 31.06, 40.04, 40.05, 40.07	10%

## Basic Exam Outline

### **Natural Resource Management.....20 Questions**

*Text: Managing Our Natural Resources, Chapters 1, 2, 3*

- Natural Ecosystems
- Pollution Effects
- Agroecosystems

### **Soil Resource Management.....20 Questions**

*Text: Agriscience Fundamentals and Applications, Units 8, 9*

*Text: Managing Our Natural Resources, Chapters 4, 5, 6*

- Soil Taxonomy
- Chemical Properties of Soil
- Physical Properties of Soil
- Soil Erosion
- Soil, Plant and Nutrient Relationships

### **Water Resource Management.....15 Questions**

*Text: Agriscience Fundamentals and Applications, Unit 8*

*Text: Managing Our Natural Resources, Chapters 13, 14, 16*

- Water Supply and Uses
- Water Quality
- Water Pollution
- Water Conservation

### **Air and Air Quality.....5 Questions**

*Text: Agriscience Fundamentals and Applications, Unit 7*

*Text: Managing Our Natural Resources, Chapter 17*

- Air Quality
- Air Pollution from Agriculture Activities
- Atmospheric Effects

### **Wildlife Ecology and Management.....20 Questions**

*Text: Agriscience Fundamentals and Applications, Unit 11*

*Text: Managing Our Natural Resources, Chapters 24, 25*

- Habitat Requirements for Wildlife Species
- Wildlife Behaviors, Competition and Relationships
- Wildlife Population Size and Management Practices
- Wildlife Species, Diseases and Parasites

**Wetland Preservation and Management.....10 Questions**

*Text: Agriscience Fundamentals and Applications, Unit 11*

*Text: Managing Our Natural Resources, Chapter 10*

- Characteristics of Wetland Ecosystems
- Impacts on Wetlands
- Wetland Preservation Efforts

**Forest Resource Management .....10 Questions**

*Text: Agriscience Fundamentals and Applications, Unit 10*

*Text: Managing Our Natural Resources, Chapters 19, 20, 22*

- Forests of the Southeast
- Products and Forest Produced Benefits
- Harvesting and Planting Techniques
- Silviculture Practices

# Detailed Outline & Sample Questions

## Natural Resource Management

- Natural Ecosystems
  - a. The nature of resources
    - Inexhaustible resources
    - Renewable and Nonrenewable resources
  - b. Characteristics of biomes
  - c. Energy flow within a food web
  - d. Carrying capacity
    - Factors determining population
    - Factors limiting carrying capacity
      - Abiotic factors
      - Biotic factors
    - Exotic populations and effects on native wildlife
    - Extinct, endangered and threatened animals
      - Extinct species
        1. Dusky Seaside Sparrow, *Ammodramus maritimus nigrescens*
        2. Eastern Cougar, *Puma concolor cougar*
        3. Passenger Pigeon, *Ectopistes migratorius*
      - Endangered species
        1. California Condor, *Gymnogyps californianus*
        2. Florida Panther, *Puma concolor coryi*
        3. Imperial Woodpecker, *Campephilus imperialis*
        4. Key Deer, *Odocoileus virginianus clavium*
        5. Red Wolf, *Canis rufus*
      - Threatened species
        1. Eastern Indigo Snake, *Drymarchon couperi*
        2. Florida Scrub-Jay, *Aphelocoma coerulescens*
        3. Purple Bankclimber, *Elliptioideus sloatianus*
        4. Wood Stork, *Mycteria americana*
  - e. Nutrient Cycling
    - Carbon cycle
    - Nitrogen cycle
  - f. Balance of Nature
    - Factors that may upset the balance of an ecosystem
      - Non-native (Invasive) species introduction
      - Disease introduction
      - Climatic changes
      - Pollution

- Human interferences
- Pollution Effects
  - a. Trace the effects of pollution through an ecosystem
- Agroecosystems
  - a. Development of agroecosystems
    - Green Revolution
  - b. Types of agroecosystems
    - Crop-based systems
    - Animal-based systems
  - c. Risks and consequences of simplified agroecosystems
    - Diminished plant and animal diversity
    - Concentration of livestock
    - Increased nutrient and energy inputs
    - Soil loss
  - d. Historical examples of consequences
    - The Dust Bowl
    - The Irish Potato Famine

### Sample Question

What can upset the balance of species in an ecosystem?

- A. thriving native species
- B. normal weather patterns
- C. introduction of alien species--*correct answer*
- D. occurrence of animal adaptive behaviors

### Soil Resource Management

- Soil Taxonomy
  - a. Soil profiles and horizons
  - b. Soil orders
- Chemical properties of soils
  - a. Cation exchange capacity (CEC)
  - b. Anion exchange capacity (ANC)
  - c. Soil reaction (pH)
  - d. Saline soils
- Physical properties of soil
  - a. Soil structure
    - Blocky
    - Granular
    - Massive
    - Platy
    - Prismatic/columnar
    - Single grain



- b. Texture
    - Textural triangle
  - c. Permeability
  - d. Drainage
  - e. Erosion
  - f. Slope
  - g. Land capability classes
- Soil Erosion
  - a. Types of erosion
  - b. Factors affecting rate of erosion
    - Soil texture and structure
    - Slope length and steepness
  - c. Effects on air and water quality
  - d. Best Management Practices for decreasing erosion potential
    - Vegetative controls
      - Buffer strips
      - Cover crops
      - Grassed waterways
      - Strip cropping
      - Windbreaks
    - Mechanical controls
      - Conservation tillage
      - Contour farming
      - Shelterbelts
      - Terracing
- Soil, Plant and Nutrient Relationships
  - a. Soil sampling procedures
  - b. Micro and Macro nutrients required by plants
  - c. Nutrient deficiency symptoms of N, P, K
  - d. Fertilizer application methods
  - e. 4R nutrient management principles

### Sample Question

What statement best describes soils that possess a high cation exchange capacity?

- A. drain water rapidly
- B. hold nutrients and are fertile--*correct answer*
- C. leach nutrients and are infertile
- D. hold water for extended periods of time

### **Water Resource Management**

- Water Supply and Uses
  - a. Water movement through the hydrologic cycle

- b. Primary uses of water
    - Agriculture
    - Domestic uses
    - Fish and wildlife
    - Hydroelectric plants
    - Industry
    - Recreation
  - c. Water management
    - Irrigation systems
    - Water removal
- Water Quality
  - a. Biological, chemical and physical properties
    - Temperature
    - Turbidity
    - Dissolved oxygen (DO)
    - Nutrients-nitrates and ammonia
    - Total Suspended Solids (TSS)
    - Bacteria
- Water Pollution
  - a. Types of pollution
  - b. Point source pollution
  - c. Diffuse source pollution (non-point source pollution)
  - d. Agriculture pollutants
    - Silt sediments
    - Animal wastes
    - Pesticides and fertilizers
      - Eutrophication
- Water Conservation
  - a. Clean Water Act of 1972
  - b. Precision agriculture for water conservation
    - Automation
    - GPS technology
    - Low volume irrigation
    - Soil moisture sensors
    - Variable rate irrigation

### Sample Question

What is the expected result from the proper management of irrigation inputs and drainage?

- A. higher production costs
- B. increased runoff or leaching
- C. lower marketable yields
- D. reduced nutrient-related impacts--*correct answer*

## Air and Air Quality

- Air Quality
  - a. Particulate matter
  - b. Other gasses
    - Carbon dioxide
    - Nitrogen oxides
    - Ozone
    - Methane
    - Lead
    - Sulfur
- Air Pollution from Agriculture Activities
  - a. Animal feeding operations
  - b. Land conversion from forest to agriculture production
  - c. Prescribed burning
  - d. Soil cultivation
- Atmospheric Effects
  - a. Carbon sequestration
  - b. Greenhouse effect
  - c. Ozone thinning

### Sample Question

How can large animal feeding operations help reduce atmospheric effects of air pollution?

- A. trap methane gas produced and use it as fuel--*correct answer*
- B. remove particulates from emissions by scrubbing
- C. trap carbon monoxide gas produced and burn it off
- D. remove chlorofluorocarbons (CFCs) from evaporative cooling systems

## Wildlife Ecology and Management

- Habitat Requirements for Wildlife Species
  - a. Cover (shelter)
  - b. Food
  - c. Territory and home range
  - d. Water
- Wildlife Behaviors, Competition and Relationships
  - a. Adaptive, innate and learned behaviors
  - b. Relationships--commensalism, competition, mutualism, parasitism, predation
- Wildlife Population Size and Management Practices
  - a. Population measurements
    - Wildlife surveys
    - Observation--direct and indirect
    - Mark and recapture

- Sampling
- b. Wildlife management practices
  - Habitat management practices
  - Population management practices
- c. Urban wildlife management practices
- Wildlife Species, Diseases and Parasites
  - a. Species Identification
    - Alligator, *Alligator mississippiensis*
    - American Crocodile, *Crocodylus acutus*
    - American Robin, *Turdus migratorius*
    - Armadillo, *Dasypus novemcinctus*
    - Bald Eagle, *Haliaeetus leucocephalus*
    - Blue Catfish, *Ictalurus furcatus*
    - Bob-White Quail, *Colinus virginianus*
    - Bullfrog, *Lithobates catesbeianus*
    - Coral Snake, *Micrurus fulvius*
    - Coyote, *Canis latrans*
    - Eastern Cottontail Rabbit, *Sylvilagus floridanus*
    - Eastern Indigo Snake, *Drymarchon couperi*
    - Fox Squirrel, *Sciurus niger*
    - Gopher Tortoise, *Gopherus polyphemus*
    - Hummingbird, *Trochilidae*
    - Imperial Woodpecker, *Campephilus imperialis*
    - Largemouth Bass, *Micropterus salmoides*
    - Mallard Duck, *Anas platyrhynchos*
    - Raccoon, *Procyon lotor*
    - Red Fox, *Vulpes vulpes*
    - Salamander Mole, *Ambystoma talpoideum*
    - Snapping Turtle, *Chelydra serpentina*
    - Whitetail Deer, *Odocoileus virginianus*
    - Wild Turkey, *Meleagris gallopavo*
    - Wood Stork, *Mycteria americana*
  - b. Wildlife Diseases
    - Avian Influenza
    - Brucellosis
    - Chytridiomycosis
    - Lyme Disease
    - Leprosy
    - Rabies
  - c. Wildlife Parasites
    - Lice
    - Mites
    - Mosquitos
    - New World Screwworms

- Roundworms and Tapeworms
- Ticks

**Sample Question**

Which wildlife management practice helps offset the effects of low fecundity within a species?

- A. artificial stocking--*correct answer*
- B. digging a pond
- C. planting food plots
- D. thinning trees

**Wetland Preservation and Management**

- Characteristics of Wetland Ecosystems
  - a. Types of wetlands
    - Bogs
    - Floodplains
    - Marshes
    - Ponds
    - Rivers and streams
    - Swamps
  - b. Functions of wetlands
    - Flood control
    - Habitat value
    - Recharge underground water supplies
    - Pollutants filter
- Impacts on Wetlands
  - a. Agriculture
  - b. Industry
  - c. Mining operations
  - d. Timber harvest
  - e. Urbanization
- Wetland Preservation Efforts
  - a. Natural wetland protection
  - b. Construction of new wetland areas
  - c. Wetland restoration

**Sample Question**

Which activity transforms wetland areas to open water areas, adversely affecting wildlife habitat?

- A. cattle grazing
- B. factory water discharge
- C. peat moss mining--*correct answer*
- D. timber harvesting

### Forest Resource Management

- Forests of the Southeast
  - a. Bottomland Hardwood Forest
  - b. Central Broad-leaved Forest
  - c. Southern Forest
  - d. Tropical Forest
- Products and Forest Produced Benefits
  - a. Carbon-dioxide-oxygen exchange
  - b. Climate moderation
  - c. Water and soil conservation
  - d. Wildlife and recreation
  - e. Wood and converted wood products
- Harvesting and Planting Techniques
  - a. Clear cutting
  - b. Seed-tree cutting
  - c. Selective cutting
  - d. Bare-root seedlings
  - e. Containerized seedlings
  - f. Natural seeding
- Silviculture Practices
  - a. Thinning
  - b. Salvage cuttings
  - c. Prescribed fires

### Sample Question

If the desire of a forest manager is to use natural regeneration on a stand of pines, which harvesting technique will lead to the best result of reforestation?

- A. clear cutting
- B. improvement cutting
- C. rotational cutting
- D. seed-tree cutting--*correct answer*