Arizona Envirothon: Forestry Study Guide

Arizona forests are a product of their soils, aspects, elevations, climates, associated species, endemic diseases and pests, and natural and unnatural disturbance factors as well as human influence. Arizona forests range from the dry evergreen oak woodlands, to pinyon-juniper savannahs, to ponderosa pine stands, to cool moist mixed conifers forests and everything in between. Diverse upland forests intersected by riparian forest corridors create a wide array of unique habitats for many native plants and animals.

Our state competition focuses upon Arizona Forests and will include questions about species identification, forestry equipment, and forest management concepts. Students should enter the competition with a *basic* understanding of:

- Arizona tree and shrub species
- Tree diseases and insect pests
- Forest seral stages
- Natural disturbance factors (i.e. fire, insects, wind,..)
- Forest mensuration equipment
- Forest management concepts and current issues and challenges
- How forest management relates to other resources (wildlife, water, soils, vegetation, etc..)
- https://www.thoughtco.com/basic-forest-measuring-tools-used-by-foresters-4020240
- https://www.thoughtco.com/equipment-used-to-cruise-timber-1343148
- https://www.americanforests.org/about-us/mission/

Learning Outcomes

I. Identify species of Arizona

- Identify tree species by specimens, leaves, seeds, bark [field guides provided for trees]
- Identify common shrubs found in Arizona by specimens, leaves, seeds, form

II. Forest Ecology

- Basic ecological concepts and related vocabulary
- Natural disturbance regimes (fire, wind, insect/disease, climate)
    - Tree adaptations
    - Vegetation responses
    - Endemic versus invasive species
- Seral stages (https://www.for.gov.bc.ca/hfd/pubs/docs/en/en18.pdf)
    - Cause & effect
    - Response
    - Process
- Biodiversity
    - Upland versus Riparian habitat
        - https://www.fs.usda.gov/rmrs/science-spotlights/where-desert-meets-river-investigating-southwestern-riparian-ecosystems

- Healthy vs Unhealthy forest

III. Forest Conservation and Management

- Arizona's State Forestry Program
- Role of thinning
  - Providing forest products
  - Impacts to vegetation
  - Impacts to animals/habitat
  - Impacts to water quantity & quality
    - https://www.fs.usda.gov/rmrs/streamside-management-zones
    - https://www.fs.fed.us/rm/pubs_journals/2020/rmrs_2020_goeking_s001.pdf
- Role of fire
  - Natural vs Prescribed
  - Impacts to vegetation
  - Impacts to animals/habitat
  - Impacts to water quantity & quality
- Restoration -
  - https://eri.nau.edu/
  - https://www.fs.usda.gov/rmrs/science-spotlights/science-based-framework-restoring-resiliency-frequent-fire-forests
  - https://www.fs.usda.gov/rmrs/publications/restoring-composition-and-structure-southwestern-frequent-fire-forests-science-based
- Forest products and forest health
  - Forest management in Arizona has evolved from product or commodity driven in the 1990's to restoration driven in the present.

IV. Challenges for Arizona Forests

- Invasive and non-native species
  - Tamarisk in riparian systems
  - When Endangered animal species use invasive plants for habitat
    - Southwestern willow flycatcher or yellow-billed cuckoo
- Balancing needs of Endangered species with Wildland urban interface issues
  - Mexican spotted owl
    - https://www.fws.gov/southwest/es/MSO_RecoveryPlan.html
    - https://www.fs.fed.us/rm/wildlife-terrestrial/mexican-spotted-owl/

Additional resources to prepare

- https://swbiodiversity.org/seinet/imagelib/index.php
- https://plants.sc.egov.usda.gov/checklist.html
- https://www.fs.fed.us/database/feis/plants/tree/pinpons/all.html#FIRE%20ECOLOGY
- https://www.fs.fed.us/database/feis/plants/tree/pinpons/all.html
- https://www.feis-crs.org/feis/
- https://www.fs.fed.us/rm/wildlife-terrestrial/northern-goshawk/