

## **Wildlife Learning Objectives for the NCF-Envirothon**

Wildlife may be the first topic that comes to mind when you think of conservation: the panda, the elephant, the snow leopard, the grey wolf, the bald eagle, or any other well-known current or former endangered animal. These charismatic species are easy to rally behind, but the wildlife in your backyard or local park need the same basic resources as a rhinoceros: food, water, shelter, and space. Conservation for local wildlife is just as important as conservation for big-name species in exotic locales. Through understanding wildlife biology, ecology, and conservation, humans can reduce our negative impacts to wildlife and implement management strategies to help species thrive, both locally and globally.

Just like the ecosystems we study, human society and culture are incredibly diverse. In the same way that biodiversity makes ecosystems more resilient, these differences in human perspective and experience make us stronger as a global community. Every person's story and relationship with the environment is important, and we must work together to ensure that everyone's stories are heard, including the historically marginalized and economically disadvantaged. We invite you to seek out stories from your own communities – to discover the unsung conservation heroes, to learn the histories that aren't typically taught in classrooms, to highlight local environmental issues, and to explore what types of natural resource conservation are occurring in your local community, state/province, and nation.

Students should be able to:

- Provide an informed opinion about current issues in wildlife conservation.
- Think critically about solutions to current wildlife conservation issues.
- Work collaboratively in a team to synthesize and apply knowledge.
- Make connections between concepts in Wildlife and the subjects of Soils and Land Use, Forestry, Aquatic Ecology, and the Current Issue.

Students will be able to:

### **Wildlife Biology**

1. Distinguish between major taxonomic classifications of wildlife, their typical roles in ecosystems, and their habitat requirements (including mammals, birds, fish, reptiles, amphibians, and insects).
2. Identify anatomy of various wildlife species and describe the functions of anatomical parts, particularly special adaptations.
3. Explain the processes of natural selection and evolution and relate these processes to the variety of life we see on Earth today.
4. Identify the different stages in a species' life cycle and describe how each stage relates to the species' biology, behavior, adaptations, habitat requirements, and ecological niche.
5. Provide examples of physical and behavioral adaptations (such as mimicry, camouflage, freeze response, hibernation, special organs, et cetera) and how these adaptations benefit wildlife.
6. Describe the significance of migration in the life cycle of certain wildlife species.

7. Explain how the needs of a species might change throughout its life cycle, and how these changing needs are addressed in management strategies.
8. Describe the roles that circadian and seasonal rhythms play in the life cycles of different wildlife species.
9. Differentiate between a territory and a home range and discuss how each is important for wildlife species.
10. Explain the difference between generalist and specialist species and provide examples of each.

## **Wildlife Ecology**

11. Identify the essential components of a habitat and recommend suitable habitat for local wildlife species.
12. Identify biotic and abiotic factors in ecosystems and how they are related to wildlife habitat requirements, ecosystem variation, and wildlife conservation.
13. Describe the roles of producers, consumers, and decomposers in various ecosystems and identify their trophic levels.
14. Diagram a food web and describe the flow of energy within it.
15. Relate the energy pyramid to different trophic levels and the total amount of energy available to consumers.
16. Identify the effects of various environmental impacts on the energetic relationships in food chains and webs.
17. Explain the different types and levels of biodiversity, and how they apply to ecosystems.
18. Name and describe the different types of symbiotic relationships.
19. Identify common wildlife diseases, their causes, and their effects.
20. Identify the biological and social carrying capacities for a species, along with the limiting factors that influence these numbers.
21. Describe how changes in demographic parameters (such as birth, mortality, reproduction rate, immigration, emigration, age structure, sex ratio, et cetera) affect wildlife populations.
22. Apply concepts of landscape ecology as they relate to wildlife conservation, including:
  - a. Patterns in landscape and habitat type, and how this affects the distribution of wildlife species
  - b. Use and proximity of different habitat types over the course of a species' life (migration, species that undergo metamorphosis, et cetera)
  - c. Effects of disturbance on an ecosystem and its impacts to wildlife
  - d. Habitat connectivity and the importance of wildlife corridors
  - e. Genetic diversity in species across landscapes and the importance of this genetic diversity to healthy species populations
23. Describe the different levels of ecosystem organization, including individuals, populations, communities, and ecosystems.
24. Define an ecological niche and describe how species fulfill these different roles in an ecosystem.
25. Describe competition between species, list examples of this relationship, and explain different strategies used by wildlife to avoid or overcome competition (such as niche partitioning, behavioral adaptations, et cetera).

26. Describe different habitat characteristics that are important to wildlife (such as ecotones, edges, snags, downed logs, riparian areas, early successional stages, et cetera).
27. Explain the importance of the edge effect for species diversity and wildlife habitat.
28. Define succession and describe how each successional stage is important for different species of wildlife.
29. Describe wildlife adaptations to unique ecosystems (such as high elevations, deserts, fire-dependent ecosystems, et cetera).
30. Identify sources of disturbance in an ecosystem and predict how different types of disturbance may impact wildlife species.
31. Define resilience and describe what it means for ecosystems and wildlife species.
32. Identify the importance of major migratory flyways.
33. Explain the importance of pollinators in natural and agricultural ecosystems.

### **Wildlife, Conservation, and Society**

*Native and Indigenous peoples have cultures and traditions that include close relationships with the environment. Native and Indigenous communities are unique, and each group has its own history, culture, Indigenous systems of science, traditional ecological knowledge, and conservation practices. The NCF-Envirothon encourages each state, province, and partner nation to consult with your local Native and Indigenous communities to highlight their unique environmental perspective in your Envirothon learning objectives, study materials, and competitions.*

*The following Learning Objectives should be applied on a local, state/provincial, national and/or worldwide (international) scale as appropriate to each objective and the unique parameters under consideration.*

34. Identify major legislation (local and national) and international agreements pertaining to wildlife and describe how they provide protection for natural resources.
35. Explain the distinctions between species designations (such as common, rare, endangered, threatened, endemic, extirpated, and extinct) and provide examples of each type.
36. Recognize important issues facing wildlife on a local, state/provincial, national and international scale, propose solutions to current problems, and evaluate viability of solutions.
37. Define keystone, umbrella, game, non-game, and indicator species and describe their roles and functions within ecosystems.
38. Explain the differences between conservation and preservation.
39. Describe the different types of wildlife reserves and what types of activities are allowed in each type.
40. Describe the role and history of hunting in wildlife management.
41. Identify positive and negative human-wildlife interactions and describe how these interactions are taken into consideration when creating management plans.
42. Define invasive and exotic species, describe their characteristics, name examples, describe how they are spread, and explain their impact on local ecosystems.
43. Describe the impact of changes in climate on wildlife and their habitats.

44. Explain the roles of local, state/provincial, national, and international agencies in wildlife protection and management.
45. Identify the costs and benefits of various wildlife management strategies (for example, a farmer sacrifices tillable acreage to maintain a wildlife buffer, losing potential crop revenue, but gaining better water quality for the farm, reducing erosion, and fostering habitat area for pollinators, quail, and other wildlife).
46. Explain the roles of local, state/provincial, national, and international agencies in prevention, control, and regulation of exotic and invasive species.
47. Describe the use of technology such as remote sensing, GPS, and GIS in wildlife management.
48. Describe the roles of key leaders in the conservation movement, both historical and present (such as Michael Werikhe, Rachel Carson, Dr. Drew Lanham, Aldo Leopold, John Muir, Christian Cooper, Corina Newsome, Jason Ward, Anna Botsford Comstock, et cetera).

### **Field Skills**

49. Identify common local wildlife species from preserved specimens, skulls, skeletons, pelts, tracks, scat, and other animal signs without the use of a key.
50. Explain an animal's habitat, dietary requirements, and life cycle based on animal signs.
51. Identify wildlife based on communication methods (bird and frog calls, et cetera).
52. Use a field guide or dichotomous key to identify uncommon wildlife species.
53. Identify exotic and invasive species.
54. Assess a particular site for wildlife habitat and make recommendations for best management practices.
55. Recommend wildlife management practices for a variety of uses (including conservation, connectivity, and hunting) for a variety of landscapes (including grasslands, forests, croplands, wetlands, and urban settings).
56. Apply sampling methods to measure wildlife populations and interpret data gathered from population studies.
57. Interpret population and demographic models.