Massachusetts Envirothon

Wildlife Manual

Massachusetts Division of Fisheries & Wildlife (MassWildlife)

Revised November 2025

Contents

Learning Objectives 3
Introduction 5
Biodiversity 5
Threats to Biodiversity 6
People and Wildlife 7
Uses 7
Habitat loss 7
Food Chains and Food Webs 8
Nutrient Exchange 9
Wildlife Management 9
Why is wildlife management needed? 10
Population Ecology 10
Carrying Capacity 11
Harvesting through Regulated Hunting, Trapping, or Fishing 12
Rare and Endangered Species 12
Laws and Regulations 13
Resources and References 14
Glossary 16

Cover photo: Bill Byrne, MassWildlife

Learning Objectives

1. **Have knowledge of wildlife (wild birds, mammals, amphibians, reptiles, fish, and invertebrates). Team members should be able to:**
   - Define wildlife;
   - Use a key or field guide to identify wildlife species using mounted specimens, skins/pelts, pictures, skulls, silhouettes, decoys, wings, scat, tracks, animal sounds, or other common signs; and
   - Identify general food habits (herbivore, omnivore, carnivore), habitats (terrestrial, aquatic, fossorial), and habits (diurnal, nocturnal) using skull morphology and/or teeth.
2. **Understand wildlife ecology. Team members should be able to:**
   - Know the basic survival requirements of all wildlife;
   - Know the meaning of "habitat" and be able to name the habitat requirements for wildlife and the factors that affect wildlife suitability;
   - Know and understand basic ecological concepts and terminology (limiting factors, biological carrying capacity, cultural carrying capacity, populations, ecosystem, community, home range);
   - Describe specific adaptations (anatomical, physiological, behavioral) of wildlife to their environment;
   - Describe predator/prey relationships and provide examples;
   - Describe food chains and food webs and provide examples;
   - Evaluate a habitat's suitability for a particular species when given a description of its needs;
   - Describe ways a habitat can be improved for specific species through knowledge of its specific requirements; and
   - Understand the importance of the 3 levels of biodiversity: genetic, species, and ecosystem and the implications of biodiversity loss at each level.
3. **Conservation and management of wildlife. Team members should be able to:**
   - Know the preferred habitat types and specific habitat requirements of common Massachusetts wildlife;
   - Understand the concept of carrying capacity (biological and cultural) and limiting factors;
   - Identify ways wildlife managers and the general public can help conserve wildlife;
   - Identify common wildlife management methods that can be used to manage and improve wildlife habitat;
   - Understand the role of Massachusetts Division of Fisheries and Wildlife (MassWildlife) as the agency responsible for the conservation of freshwater fish and wildlife resources; and
   - Identify MassWildlife as the agency responsible for hunting and trapping regulations and for providing mandatory hunter education courses.

4. **Issues involving wildlife and society. Team members should be able to:**

   - Define biodiversity and identify major threats to biodiversity;
   - Explain the terms endangered, threatened, special concern, extinct, extirpated, listed, de-listed, and reintroduction;
   - Understand the role of the State and Federal Endangered Species Act and the agencies responsible for implementing endangered species regulations;
   - Describe major factors affecting threatened and endangered species and methods used to improve the populations of these species;
   - Describe the impact of non-native species;
   - Describe wildlife diseases and implications for humans.

For a complete and thorough description of the wildlife learning objectives, suggested activities, resources and correlations to the National Science Standards, visit the National Envirothon website at https://envirothon.org/the-competition/areas-of-study/wildlife/.

Introduction

What is wildlife?

The term wildlife refers to living things that are not human and not domesticated and includes birds, mammals, reptiles, amphibians, fish, and invertebrates. Wildlife is all around us even if we don't see or hear it. People and wildlife share similar environments, needs, and problems.

All types of wildlife need a home to survive and thrive. This home—or habitat—must include food, water, shelter, and space. There's no wildlife without wildlife habitat. This is why plants, trees, and other natural features that make up habitats are a vital part of the study of wildlife conservation. Different types of wildlife have a variety of adaptations, or traits, that allow them to survive in their surroundings.

Who is responsible for wildlife?

Massachusetts is home to an impressive variety of plants, fish, and wildlife, from the well-known black bear to the endangered bog turtle. Wildlife is public resource held in trust by the government for the benefit of all people. The Massachusetts Division of Fisheries and Wildlife (MassWildlife) is the agency responsible for the conservation of freshwater fish and wildlife in the Commonwealth, including endangered plants and animals. MassWildlife restores, protects, and manages land for wildlife to thrive and for people to enjoy.

Wildlife professionals from the agency conserve the Commonwealth's wildlife and habitats by collecting data and making management decisions based on the best available science. They conduct field work, restore habitats, provide recreational opportunities, and deliver information to the public to minimize conflict that may arise from human-wildlife interactions. MassWildlife works with a wide variety of partners to accomplish this important work.

MassWildlife is responsible for protecting wildlife and plants that are listed under the Massachusetts Endangered Species Act (MESA). The agency is also responsible for setting regulations for hunting, trapping, and freshwater fishing. Learn about the benefits of regulated hunting. The Division works to balance the needs of people and wildlife today so wildlife will be available for everyone's enjoyment today and for future generations.

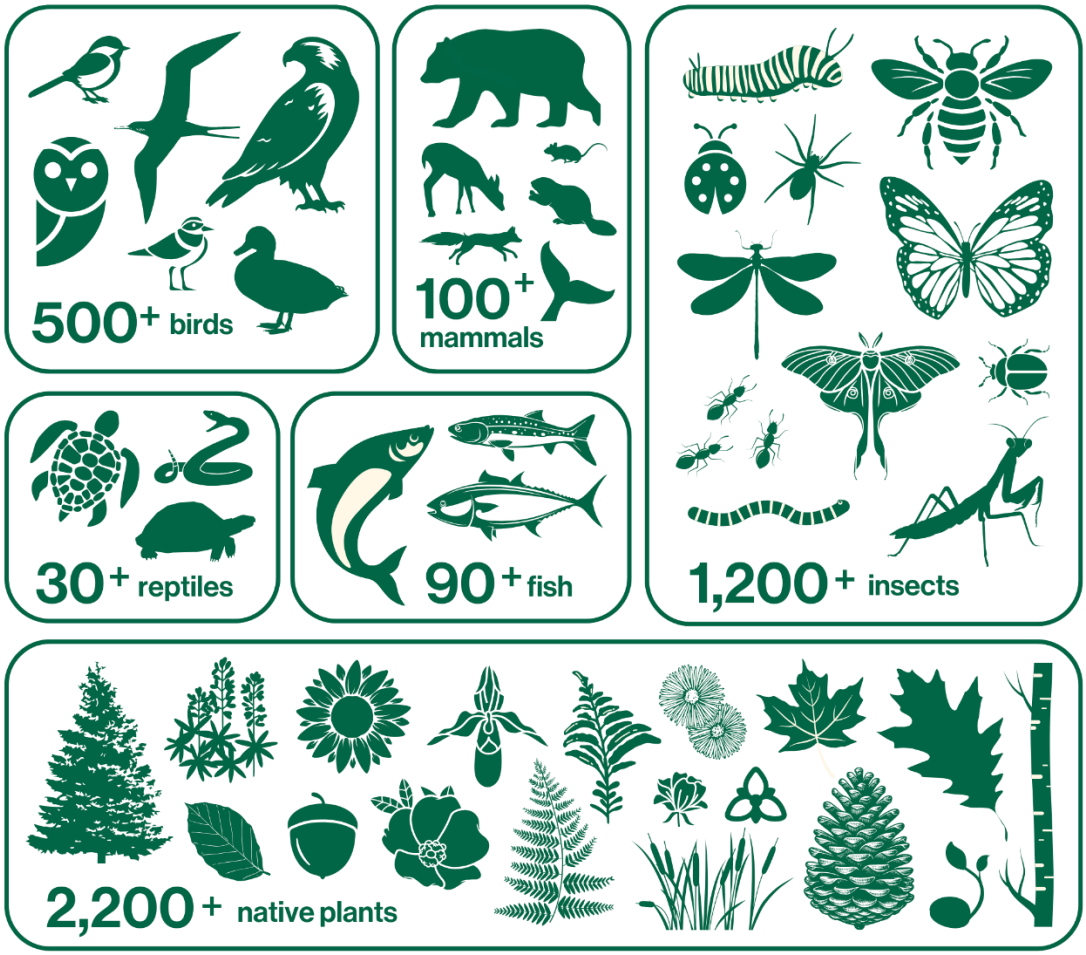
Biodiversity

Biodiversity (biological diversity) can be defined as the diversity of life and its many processes. This richness or diversity includes wild species, their genetic variability, the natural communities they make up and live in, and the environmental processes that maintain them.

Massachusetts is home to an extraordinary abundance and variety of life. From the black bear to the bobcat to the bumblebee. Red-tailed hawk, hermit thrush, and black-capped chickadee. Hemlock,

maple, cedar, and oak. Fantastic fungi, beetles, moths, and mycorrhizae. Box turtle, beaver, river otter, and spotted salamander. Asters, goldenrod, milkweed, and monarch butterfly. Horseshoe crab, tern, osprey, piping plover. Oyster, quahog, blue mussel, and barnacle. North Atlantic right whale, white shark, sturgeon, striped bass, and herring.

How many species call Massachusetts home?



Over 450 species of animals and plants are protected by the Massachusetts Endangered Species Act (MESA) and listed as endangered, threatened, or special concern. Hundreds more are at risk.

Threats to Biodiversity

Humans have altered 75% of Earth's lands and 66% of our oceans.[1] Massachusetts is a leader in the conservation of land, water, and habitat for the benefit of people and wildlife. Nevertheless, our biodiversity is in crisis, in Massachusetts and globally. Land development and roads destroy and

[1] Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). (2019). Global Assessment Report.

fragment habitat, and invasive species threaten ecosystems. Pollution of our air, soil, oceans, and rivers degrades habitats, affecting the animals and plants that rely on them. In addition, the increasingly severe effects of climate change exert stress on global biodiversity—and Massachusetts is not immune.

Habitat loss

Climate change

Pollution

Disease

Invasive species

People and Wildlife

Uses

Wildlife is used for food, clothing, spiritual well-being, and enjoyment. Wildlife is also an economic resource. Wildlife users contribute billions of dollars to the economy every year by visiting parks and zoos, and by buying bird seed, bird feeders, binoculars, cameras, hunting and fishing equipment, field guides, furs, videos, memorabilia, and much more.

Habitat loss

People influence animal populations both directly and indirectly. Some people believe that if they don't hunt, fish, or trap they have no effect on wildlife, but all people affect wildlife in their daily activities. For example, the simple process of eating has an impact on wildlife. Whether you eat wild or domestic meat or consider yourself a vegetarian, you are still affecting wildlife and the environment. The land that is used to grow crops for human or livestock consumption was once wildlife habitat for many species; when that land is used for agriculture, the natural ecosystem is disrupted.

Habitat loss is the biggest threat to wildlife species today. There are many ways in which humans influence habitats. Historically, two activities with the largest impact have been urbanization and cultivation.

Urbanization

People cause many environmental problems, and these problems get worse when people live close together in cities. When lots of people live in one area, it leads to habitat loss, more waste, and the overuse of natural resources. As the population grows and cities spread into the countryside, pollution and habitat loss also increase.

Humans, like beavers, change their surroundings to get food, water, and shelter. While some animals lose their homes because of cities, others—like raccoons, coyotes, deer, and songbirds—do well in towns. Cities give these animals easy food from garbage, safe places to live, and fewer predators, helping them survive even as natural areas disappear.

People usually enjoy seeing wildlife, but when wild animals live close to people, problems can arise. Wildlife professionals try to prevent this by educating people about wildlife behavior and by encouraging them to make their yards and neighborhoods less attractive to wildlife.

Cultivation

When people learned to farm plants and animals, they changed from hunting and gathering to agriculture. Farming helped human populations grow, but it was detrimental to habitats and wildlife. It radically changed plant communities, affected water cycles, and spread new diseases and species.

Today's farming practices continue to alter natural systems and impact native wildlife. Some animals rely on agriculture as an alternative food source. For example, black bears in Massachusetts often eat corn from farms, especially when there aren't many acorns.

Cranberry Bogs in Wareham, MA (skypic.com)

Food Chains and Food Webs

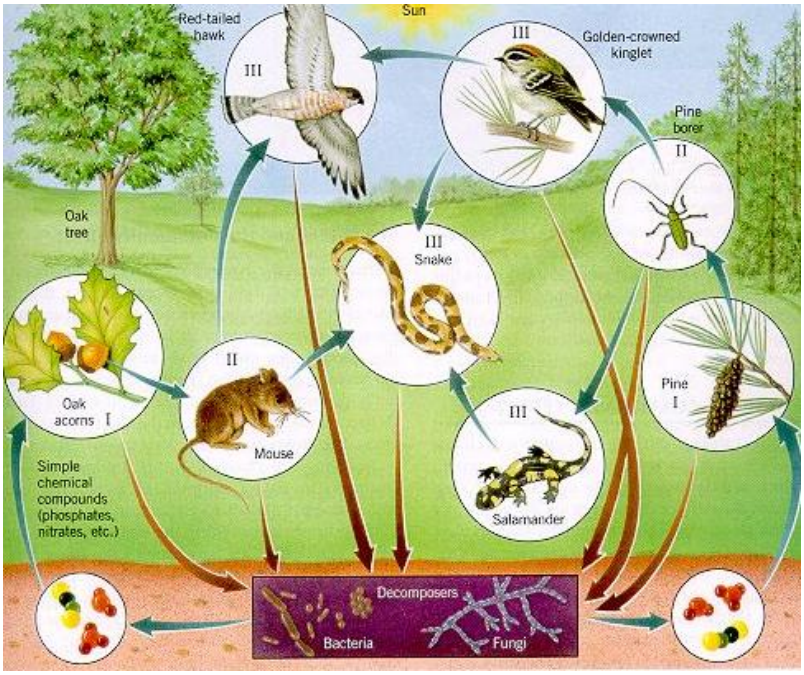
A **food web** shows how living things get their energy and how they are connected in nature.

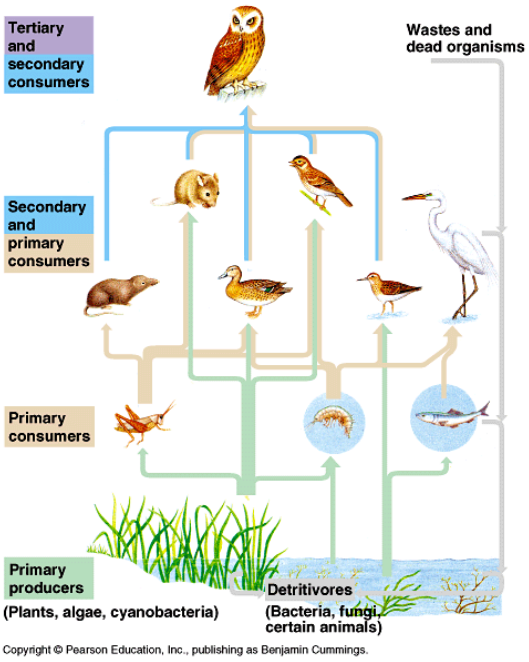
All living organisms are part of a food chain. The chain is driven by the sun, which provides energy for green plants to perform photosynthesis. Since plants make their own food from sunlight, they are called **producers**. This process allows the plants to fix inorganic compounds into plant tissues that can later be digested by animals.

Animals that eat plants are **herbivores**, and animals that eat other animals are **carnivores**. Some animals eat both plants and animals—these are **omnivores**. All these "eaters" are linked together because one species is food for another. When many food chains connect, they form a **food web**. It shows that energy moves through an ecosystem and that all living things depend on each other to survive.

Nutrient Exchange

Nutrients are constantly exchanged (recycled) between links in an ecosystem. Respiration, decomposition, and excretion are ways that nutrients are returned to the system. Decomposers and fire release large amounts of residual energy back into a system. If it were not fire and decomposers like bacteria, fungi and insects, nutrients would remain trapped in dead organic matter. Bacteria and fungi perform most of the world's decomposition, with insects and other invertebrates also playing an essential role. Take a look at the food web illustrations below, and the many resources available online.





Wildlife Management

Wildlife management is the field of study and practice focused on the conservation of wild animal populations and their habitats for the benefit of both wildlife and humans. Wildlife professionals use science-based methods to study wildlife populations and employ a variety of techniques and set regulations to ensure healthy wildlife populations that are aligned with human tolerance.

State and federal agencies employ many specialists to help preserve and manage wildlife and wildlife habitats. These employees do field work, conduct research, and oversee human interactions with wildlife. Universities and colleges, private and non-profit organizations, zoos and museums, private industry, and others employ people trained in the wildlife field.

Wildlife management tools and practices may include: population monitoring; setting hunting, trapping, or fishing regulations; and habitat management and restoration.

Why is wildlife management needed?

Wildlife management is needed to ensure healthy, balanced populations of animals and to protect their habitats from threats like human activity, climate change, and habitat loss. Wildlife management is needed to keep nature healthy and balanced. Without it, some animal populations could grow too large and harm their habitat, while others could become too small and risk extinction. Wildlife management in Massachusetts, the nation's third most densely populated state, is especially important.

White-tailed deer in Massachusetts. When Europeans first settled the area, they cleared most of the forests to create farmland. While this was helpful for people, it destroyed deer habitat and nearly wiped out the species in the state for almost 200 years. When forests started to grow back after many farms were abandoned, and with active wildlife management, deer populations recovered to healthy levels. However, continued management is needed to prevent new problems.

Deer are an important part of the ecosystem, but if their numbers grow too high, they can eat too many plants—a problem called over-browsing. This can change which forests grow, harm other wildlife that depend on those plants, and throw the whole ecosystem out of balance. To keep nature healthy, it's important to manage wildlife so populations stay within the carrying capacity, or the amount of food and space their habitat can support.

Population Ecology

The key to managing wildlife is to focus on populations, not single animals. A population is all the animals of one species living in a certain area. Population density refers to how many animals live in that area—for example, how many deer live in one square mile.

Populations don't have lifetimes like individual animals do. Instead, they last as long as their habitat can support them. The main goal of wildlife management is to keep populations healthy and at sustainable levels, so species survive and ecosystems stay balanced.

Biologists usually manage whole populations, not individual animals. The only time they focus on single animals is when a species is so rare that every individual matters for the population to survive.

Determining population size

How does a biologist determine the size of a population? It's often unrealistic to attempt to count every individual in a population. There are a variety of techniques that can be used to count or reliably estimate a population's size, see the examples below.

- Mark-recapture: Capture a sample of animals, mark them, and release them. After they've mixed, capture a second sample and count how many are marked from the original effort. Use the ratio of marked to unmarked animals in the second sample to estimate the total population size. Try this population estimating activity.
- Line transects: Walking in a straight line, count the number of plants, animals, or animal sign.
- Pellet counts: Count the pellet (scat) groups within a predetermined area; after a set number of days, return to count new pellet groups again.
- Camera traps: Place trail cameras in the area you are interested in and count unique animals.
- DNA analysis: Collect samples of hair or feces. DNA analysis can identify unique individuals and their relationships, allowing for population estimates even without physically capturing them.

These are just a few of the methods used to estimate population size. Each method must be carefully planned and conducted according to protocols to ensure their accuracy.

Carrying Capacity

Carrying capacity (K) is an important concept in population management. Biological carrying capacity is the maximum population of a species that a specific ecosystem can support over long periods of time. Carrying capacity for many wildlife species is in a constant state of change, both seasonally and from year to year. Alteration of habitat quality or quantity may increase or decrease the carrying capacity. Cultural carrying capacity is the maximum population level of a species with which the human population can coexist with or tolerate. The biological and cultural carrying capacity can differ tremendously. For example, the land may be able to support a high population of deer; however, when population levels are high then conflicts between humans and deer increase (deer-vehicle collisions and damage to agriculture and ornamental plantings). The cultural carrying capacity is dependent on the sensitivity of the local human population to the presence of wildlife. The sensitivity level can vary from person to person and be dependent on the land-use practices, priorities and attitudes, and local densities of the various wildlife species.

Even with the influence of people, populations can reach biological carrying capacity. This indicates that the number of animals has reached the point where the availability of food, water, and shelter is not sufficient to support any more animals in good health. This leads to habitat degradation and intense competition for resources among the animals. At this point body weight and reproductive rates decrease, while death through starvation and disease increases. The degraded habitat, low reproductive rate, and increased mortality of the animals can cause a population to crash. It is important to keep population levels below the carrying capacity. The healthiest level for a population is around half the biological carrying capacity (K/2). At this level (K/2) there are fewer animals with the result that there is less competition for food, water, and shelter. This leads to healthier animals, high reproductive rates and less damage to the habitat and other wildlife or plant species.

Harvesting through Regulated Hunting, Trapping, or Fishing

Harvest is the ***regulated*** removal of a certain number of individuals from a population. It allows wildlife biologists to maintain the population at a desired level. Hunting, trapping, and fishing are harvest techniques that can be used to regulate the population levels of various types of wildlife. Harvest management is the most effective and least expensive tool for managing game species with high population levels.

Before setting harvest levels, wildlife biologists need to have an estimate of the current population size and an understanding of the biological and cultural factors that influence that population. The biological factors that directly affect population size are birth rate (natality), death rate (mortality), reproductive rate, age ratios, sex ratios, recruitment, immigration, and emigration. For species that are hunted, some of this information is gathered through mandatory harvest reporting. Cultural factors that affect populations and harvests include human population densities, the amount of conflict between wildlife and humans, the number of hunters, and the amount of land open to hunting.

After considering the current population size and the various factors that influence the wildlife population, a biologist can determine the appropriate number of individual animals needed to be removed from a population to bring the population level to the desired level. To reach the level of harvest, biologists can adjust the following:

- season lengths (how long the harvest season will be)
- daily and seasonal bag limits (how many may be harvested)
- sex or age limitations (what sex or how old the individuals harvested can be)
- limited entry (limit the # of access sites or the # of participants)
- timing of the season (what time of year will the harvest take place)
- equipment restrictions (what type of equipment can be used)
- size restrictions (what size harvested individuals must be)

To become more familiar with state harvest regulations visit https://www.mass.gov/hunting-regulations

Rare and Endangered Species

When most people think of wildlife management they think of “game” species (species that are hunted under strict regulations), however, wildlife officials are also dedicated to “nongame” species (species that are not hunted, killed, or consumed by humans). Nongame & game species have many benefits to humans (aesthetic, recreational, economical) and the ecosystem (roles they play in the ecosystem).

Endangered species is any species of plant or animal in danger of extinction throughout all or a significant portion of its range. Threatened species is any species of plant or animal whose numbers are low and decreasing rapidly and which may therefore become endangered within the foreseeable future

throughout all or a significant portion of its range. The terms endangered and threatened are universally recognized terms. Species of special concern is a term used by MassWildlife to designate those species that occur in small numbers, or with such a restricted distribution or with such specialized habitat requirements that they could easily become threatened. Extirpated species (ex. Regal Fritillary) are species that no longer occur in a region or a state, but which continue to exist elsewhere. Visit mass.gov/mesa-list to see a list of all species listed under the Massachusetts Endangered Species Act.

Although extinction is a natural occurrence, excessive and intensive human activities in the environment have caused a dramatic increase in its rate. Loss of habitat as a result of human activity is considered to be the most pervasive cause of species extinction. Other major causes of endangerment and extinction include habitat changes or degradation, unregulated or illegal harvest and/or collection, disruption of migration routes and breeding behaviors, contamination by pollutants, predator control, competition or predation from introduced species and other natural causes.

Nongame species play an essential role in the ecosystem and their management is important. Managing animals with low populations differs from managing animals with high populations. The goal of managing rare species is to increase population size. This is done through one or more of the following methods:

- habitat protection
- habitat management
- captive breeding and foster parent programs
- controlling predators and competitors
- controlling human activities
- other techniques specific to that species

Laws and Regulations

Laws and regulations are established to enforce the requirements that are made for the management of all wildlife. The Guide to Freshwater Fishing, Hunting and Trapping Regulations contain a summary of the wildlife laws and regulations in Massachusetts. Environmental Police Officers (EPOs) are the primary personnel responsible for enforcing these wildlife laws and regulations in Massachusetts. In other states EPOs are referred to as game wardens, conservation officers, or wildlife officers. Federal agents within the U.S Fish and Wildlife Service enforce migratory waterfowl, endangered species, and other laws governing interstate transportation of wildlife and the commercial use of wildlife.

Important Wildlife Legislation

- **Migratory Bird Treaty Act (1918)**: This act placed all migratory birds under the protection of the federal government. Visit https://www.fws.gov/law/migratory-bird-treaty-act-1918 to learn more.
- **Migratory Bird Conservation Act (1929)**: Created refuges for migratory waterfowl.
- **Migratory Bird Hunting Stamp Act (1934)**: Authorized the money for refuges (above) to come from the sale of migratory bird hunting stamps. (https://wildlife.org/wp-content/uploads/2014/11/Policy-Brief_DuckStamp_FINAL.pdf)
- **Pittman-Robertson Act (1937)**: levied 10% tax on manufactured sporting goods. Guns, ammunition, and archery equipment are taxed and the money goes to wildlife management and research. (https://www.fws.gov/program/wildlife-restoration)
- **Dingell-Johnson (1950)**: 10% manufacturer tax on sport fish rods, reels, lures, and creels. Note: Dingell-Johnson is the equivalent to Pittman-Robertson; however it relates to fishing equipment rather than hunting. (https://www.fws.gov/program/sport-fish-restoration)
- **Wallop-Breaux Amendment (1984)**: this was an amendment to the Dingell-Johnson Act of 1950. It expanded the DJ act to include virtually all fishing equipment and added a 3% sales tax on electric outboard motors and selected fish finders.

Note: Pittman-Robertson, Dingell-Johnson, and Wallop-Breux are very important to state fish and wildlife agencies. In most states, including Massachusetts, most of the funding for wildlife management comes from hunting and fishing license sales and directly from the revenue of these two acts. General tax dollars do not pay for the management of wildlife in Massachusetts. The revenue from the tax on hunting and fishing equipment first goes to the federal government where 6% is used for administrative duties. The government then appropriates the funds to the states based on a specific formula. The major components of the formula are: 1.) the number of hunting and fishing licenses sold in the state and 2.) the land area (size) of the state. The more hunting and fishing licenses sold and the larger the state, the more money is appropriated to that state.

- **Endangered Species Act (1966; Amended 1973)**: required that the Dept. of Interior identify all species of animals and plant species endangered or threatened with extinction. The act also required that the habitat of endangered species be protected. This act prohibits the hunting, killing, harassing, selling, exporting, or importing of endangered species or their body parts. https://www.fws.gov/endangered/laws-policies/
- **Massachusetts Endangered Species Act (1990)**: the act provides for many of the same protections contained in the national Act including the regulatory protection of designated habitats for listed species. https://www.mass.gov/service-details/ma-endangered-species-act-mesa-overview

Resources and References

This resource and reference list is just a start. There are several other resources available from your school or local library, world wide web, local nature center, museum, state park, wildlife professionals, sportsmen and women, and colleges.

- Mass.gov/MassWildlife
  Massachusetts Division of Fisheries and Wildlife (MassWildlife)
- Mass.gov/NHESP
  MassWildlife's Natural Heritage & Endangered Species Program is responsible for the conservation and protection of hundreds of species that are not hunted, fished, trapped, or commercially harvested in the state, as well as the protection of the natural communities that make up their habitats.
- Guide to Hunting, Freshwater Fishing, & Trapping in Massachusetts
  This guide contains the regulations for fishing, hunting, and trapping in Massachusetts. The guide is updated each year and designates licensing requirements, hunting and fishing seasons, bag limits, and other rules.
- Migratory Game Bird Hunting Regulations in Massachusetts
  Regulations guiding migratory game bird hunting are published separately from the larger hunting guide.
- *Field Guide to New England*
  National Audubon Society Alfred A. Knopf, Inc. New York, 1998 Peterson's Guides to mammals, birds, freshwater fish, reptiles & amphibians, and insects
- *Tracking and the Art of Seeing, How to Read Animal Tracks and Signs*
  Paul Rezendes, Camden House Publishing, Inc. 1992
- *New England Wildlife: Habitat, Natural History and Distribution*
  Richard M. DeGraaf & Mariko Yamasaki, University Press of NE, Hanover, NH 2001
- *Massachusetts Wildlife* magazine
  A quarterly publication of various natural resource topics within the Commonwealth.
  Cost $6.00/yr or $10.00/2 years.

Glossary

Abiotic – non-living components of the environment, including soil, water, air, light, temperature, and nutrients.

Adaptation – the genetically determined characteristics that improve the ability of a species to survive in its environment and to successfully reproduce.

Aesthetic – relating to or dealing with the beautiful.

Aestivation – dormancy, typically seasonal during drought or heat.

Algae – simple one celled or many celled organisms that are capable of photosynthesis; usually aquatic. Unlike true plants, algae lack organs such as leaves, roots and flowers.

Amphibian – an animal that typically lives in an aquatic habitat breathing by gills as young, and terrestrial habitat breathing by lungs and through moist glandular skin as adult.

Anadromous – fish that live in salt water and migrate to fresh water (rivers) to spawn.

Anaerobic – occurring, acting, or living, in the absence of oxygen.

Animalia – the animal kingdom, including animals with and without a backbone.

Aquaculture - the deliberate growing of plants and animals in freshwater environments.

Arboreal – inhabiting trees.

Autotroph – an organism capable of producing its own food; plants and algae.

Bag limit – the maximum number of animals allowed to be taken by an individual in regulated fishing or hunting.

Behavior – the actions and reactions of humans or animals in response to stimuli.

Benthic zone - that section of a water body near the bottom.

Biodiversity – the full range of variety and variability within and among living organisms and the ecological complexes in which they occur; term encompasses ecosystem or community diversity, species diversity, and genetic diversity.

Biological carrying capacity - the maximum population that a specific ecosystem can withstand (support) over long periods of time.

Biome – a large geographic area with somewhat uniform climatic conditions; a complex of natural communities characterized by a distinctive type of vegetation and maintained under the climatic conditions of the region.

Biota – all the living components of an ecosystem.

Biotic factors – environmental influences caused by living organisms.

Birth rate – the ratio of the number of live births to a total population over a period of time.

Bog – a wetland formed where low oxygen levels and soil temperature cause incomplete decomposition and limited drainage, in an accumulation of fibrous peat.

Brackish water – water containing a salinity level between freshwater and salt water.

Brood – the offspring of a bird or mammal.

Browse – to feed on the twigs, leaves, and shoots of woody plants and other vegetation.

Burrowing – to dig a hole or tunnel for habitation or refuge.

Carapace – upper (dorsal) shell of a turtle.

Carnivore – an animal who's diet consists of primarily meat.

Carrion – the bodies of dead animals, decaying.

Carrying capacity – the maximum number of individuals or inhabitants that a given environment can support without detrimental effects.

Catadromous - fish that live in fresh water and return to the ocean to spawn.

Census – count of each individual member of a population.

Community – a group of plants and animals living and interacting with one another in a specific region under relatively similar environmental conditions.

Competition – the simultaneous demand by two or more organisms for limited environmental resources, such as nutrients, living space, or light.

Conservation – management practice involving the wise use of natural resources, to provide maximum benefit over a sustained period of time.

Consumptive use – any use that involves activity resulting in the harvesting of wildlife.

Cover – the vegetation, debris, and irregularities of the land that provide concealment, sleeping, feeding, and breeding areas for wildlife.

Crepuscular – an animal primarily active during low light times, usually at dawn and dusk.

Cultural carrying capacity – the largest number of a wildlife species that humans will tolerate in their community.

Death rate – ratio of the number of deaths to a specific population at a specific time.

Decomposers – organisms which feed on and break down dead plant or animal matter.

Density – the size of a population of a single species in a given area.

Detritus – dead plant, animal, and other organic matter that will build up on the forest floor or the bottom of lakes, ponds, and streams.

Display – an observable behavioral pattern that is used to communicate visually.

Diurnal - refers to an animal that is primarily active during daylight hours.

Domesticated – a species removed from its wild state to be raised and bred for human use.

Ecology – the study of the interactions between living organisms and their environment.

Ecosystem – a functional system comprised of a community of organisms and their environment, including energy transfers and nutrient cycling.

Ecotone – transition zone between two different types of communities.

Ectothermic – an organism that regulates its body temperature largely by exchanging heat with its surroundings, cold-blooded.

Edge community – the area that borders two habitats, a transition zone.

Emigration – the movement of animals out of a specific area; contributes to a decrease in population.

Endangered species - species whose surviving numbers have dropped to such extremely low levels that they are in immediate danger of extinction.

Endothermic – an organism that generates its own heat to maintain its body temperature, warm-blooded.

Estuary – a site where fresh and salt-water meet, usually at the mouth of a river as it enters the ocean.

Eutrophication – the natural aging process of a body of water; process may be accelerated by human activity including industrial or agricultural runoff, sewage inputs, or the introduction of exotic plant species.

Evaporation – changing of a substance from a liquid to a gas.

Exotic species – a species not native to a particular area, usually introduced by human action; once introduced a particular species will often thrive, out-competing the native species originally occupying that particular niche; also called alien or invasive species.

Extirpated – a species that has been exterminated from a specific geographic region or part of its historic range, but exists in other areas.

Facultative species – a species that doesn't require one specific habitat type for its survival, but will seek out given habitat type if it is within its home range.

Fauna – animals.

Flora – plants.

Flyway – fly routes established by migratory birds.

Food chain – a transfer of food energy as it passes from producers through the various trophic levels in an ecosystem, such as from producers to herbivores, carnivores, and finally decomposers.

Food web – an integration of the many food chains existing in an ecosystem, showing the complex interwoven pathways of energy flow between the organism living in that environment.

Fragmentation – reduction of a large habitat area into small, scattered remnants.

Game species – any species of wildlife or fish for which seasons and bag limits have been prescribed, & which are normally harvested by licensed hunters, trappers, & fishermen under state or federal laws, codes, and regulations.

Habitat – an environment used by an organism comprised of food, water, shelter, space in an appropriate arrangement.

Harvest – removing surplus animals from a given population to ensure the health of the habitat in which that animal resides.

Herbivore – an animal whose diet consists of primarily plants.

Heterotrophs – an organism that can not produce its own food.

Hibernation – winter dormancy characterized by a decrease in body temperature and metabolism.

Homeotherm – an animal with a fairly constant body temperature.

Home range – the area where an animal travels in the scope of normal activities.

Immigration – the movement of an organism, species, or population into a new area.

Indigenous – a naturally occurring species.

Insectivorous – insect eaters.

Introduced species – a non-native species that is intentionally or accidentally brought into an ecosystem.

Invasive species – a plant or animal species that has the ability to significantly displace native species.

Limiting factors – influences in the life history of any animal, population of animals, or species that prevents a population from growing any larger (ex. food, water, disease, shelter, space, climate, predation, pollution, hunting, poaching, and accidents).

Migratory – animals that make annual seasonal moves from one region or country to another.

Native – a plant or animal species that was produced, grew, or originated in a certain region.

Natural resources – raw material supplied by the natural world utilized by humans (fossil fuels/timber/certain fish & wildlife).

Niche – the ecological role or position that a living thing or group of living things occupies in an ecosystem.

Nocturnal – an animal primarily active at night.

Non-game species – all wildlife species that are not commonly hunted, or killed, by humans.

Obligate species – a species requiring a certain type of habitat for its survival.

Omnivore – an animal that diet consists of both plants and animals.

Parasite – an organism that lives by deriving benefit from another organism, usually doing harm to the organism from which it derives benefit.

Pelt – the skin and fur of a fur-bearing animal.

Photosynthesis – the process where green plants use chlorophyll, sunlight, water, and carbon dioxide to create water, oxygen, and carbohydrates such as starches, sugars, and waxes; primary source of energy in the global ecosystem.

Plastron – lower (ventral) shell of a turtle.

Population – the total count of individuals, of the same species, that occupy a specific area.

Population density - the number of individuals in a given population within a specific area.

Predator – an animal that hunts & then kills other animals for its food.

Preservation – protection that emphasizes non-consumptive values and uses.

Prey – an animal hunted, killed, and typically consumed by predators.

Range – the geographic region where a plant or animal normally lives and grows.

Recruitment – the number of individuals added to a population at a given time (includes reproduction and immigration).

Renewable resource – resources that have the potential of lasting indefinitely because the supply is replaced through natural processes (timber/grasslands/fresh water).

Reproductive rate – number offspring produce over a specific time period.

Riparian – located or living along or near a stream, river, or body of water; area adjacent to and influenced by a water source.

Scat – fecal material.

Scavenger – an organism that habitually feeds on refuse or carrion.

Spawning – the act of releasing and fertilizing eggs by aquatic or amphibian animals, such as fish and frogs.

Species – a naturally occurring population of organisms that is reproductively isolated from other populations or groups.

Species of special concern – a species that is neither threatened nor endangered, but its surviving numbers are so low that if they drop any lower they will become threatened or endangered.

Sustainability – maintaining resources in such a way to be able to renew themselves over time or to keep in existence and supply with necessities.

Symbiosis – a close living relationship between organisms.

Taxonomy – the science of classifying organisms.

Temperate – of or relating to moderate climates, between tropical and polar.

Terrestrial – living or growing on land.

Threatened species – a species whose surviving numbers in certain areas are so low that they are at risk of becoming endangered.

Trophic level – a stage in the food chain that is occupied by life forms that feed on the same type.

Vernal pool – a temperate pond that exists only during the wet season of the spring, and dries up later, in the growing season.

Vertebrate – an animal with an internal bony skeleton.

Water cycle – the continuous circulation of water in systems throughout the planet, involving condensation, precipitation, runoff, evaporation, and transpiration.

Wetland – any land area that tends to be regularly wet or flooded.

Wildlife management – the application of scientific knowledge and technical skills to protect, preserve, conserve, limit, enhance, or extend the value of wildlife and its habitat.

Most of these terms were taken from:

- Project WILD & Aquatic Project Wild – Education Activity Guide, Council for Environmental Education
- Pond and Brook – A guide to the Natural Study of Fresh Water Environments
- The Dictionary of Ecology and Environmental Science; Henry W. Art (ed.), copyright 1993; Henry Holt and Company, Inc.
- Elements of Ecology – Robert Leo Smith, HarperCollins Publishers, 1992