



Boy Scout Merit Badges

This collection of fact sheets will walk you through many Boy Scout Merit Badge requirements and how Bangor Land Trust can help you meet them!



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Badge descriptions and requirements were taken from the Boy Scouts of America website, www.scouting.org/scoutsourc/BoyScouts/AdvancementandAwards/MeritBadges.aspx, May 2010.

Bird Study

Birds are among the most fascinating creatures on Earth. Many are beautifully colored. Others are accomplished singers. Many of the most important discoveries about birds and how they live have been made by amateur birders. In pursuing this hobby, a Scout might someday make a valuable contribution to our understanding of the natural world.

Badge Requirements

1. Explain the need for bird study and why birds are useful indicators of the quality of the environment.
2. Show that you are familiar with the terms used to describe birds by sketching or tracing a perched bird and then labeling 15 different parts of the bird. Sketch or trace an extended wing and label six types of wing feathers.
3. Demonstrate that you know how to properly use and care for binoculars.
 - a. Explain what the specification numbers on the binoculars mean.
 - b. Show how to adjust the eyepiece and how to focus for proper viewing.
 - c. Show how to properly care for and clean the lenses.
4. Demonstrate that you know how to use a bird field guide. Show your counselor that you are able to understand a range map by locating in the book and pointing out the wintering range, the breeding range, and/or the year-round range of one species of each of the following types of birds:
 - a. seabird
 - b. plover
 - c. falcon or hawk
 - d. warbler or vireo
 - e. heron or egret
 - f. sparrow
 - g. nonnative bird (introduced to North America from a foreign country since 1800)
5. **Observe and be able to identify at least 20 species of wild birds.** Prepare a field notebook, making a separate entry for each species, and record the following information from your field observations and other references:
 - a. Note the date and time.
 - b. Note the location and habitat.
 - c. Describe the bird's main feeding habitat and list two types of food that the bird is likely to eat.
 - d. Note whether the bird is a migrant or a summer, winter, or year-round resident of your area.
6. Explain the function of a bird's song. Be able to identify five of the 20 species in your field notebook by song or call alone. For each of these five species, enter a description of the song or call, and note the behavior of the bird making the sound. Note why you think the bird was making the call or song that you heard.



How can BLT Help?

Requirement 5

Our preserves are great places to see a wide variety of birds in many different habitats. Trails in the Northeast Penjajawoc Preserve provide access to great birding spots overlooking a shrub marsh and a cattail marsh. Our West Penjajawoc Grasslands Preserve provides Bobolink nesting habitat each spring, and is a great place to see the bobolinks mating displays. Additionally, both the Northeast Penjajawoc Preserve and Walden-Parke Preserve provide birding opportunities in early successional and mature forests.

Requirement 7a

Each May, BLT partners with the Audubon Society to lead several bird walks through our preserves. Check our website for current events.
www.bangorlandtrust.org

7. Do ONE of the following:
 - a. **Go on a field trip with a local club or with others who are knowledgeable about birds in your area.**
 1. Keep a list or fill out a checklist of all the birds your group observed during the field trip.
 2. Tell your counselor which birds your group saw and why some species were common and some were present in small numbers.
 3. Tell your counselor what makes the area you visited good for finding birds.
 - b. By using a public library or contacting the National Audubon Society, find the name and location of the Christmas Bird Count nearest your home and obtain the results of a recent count.
 1. Explain what kinds of information are collected during the annual event.
 2. Tell your counselor which species are most common, and explain why these birds are abundant.
 3. Tell your counselor which species are uncommon, and explain why these were present in small numbers. If the number of birds of these species is decreasing, explain why, and what, if anything, could be done to reverse their decline.
8. Do ONE of the following. For the option you choose, describe what birds you hope to attract, and why.
 - a. Build a bird feeder and put it in an appropriate place in your yard or another location.
 - b. Build a birdbath and put it in an appropriate place.
 - c. Build a backyard sanctuary for birds by planting trees and shrubs for food and cover.

Environmental Science

While earning the Environmental Science merit badge, Scouts will get a taste of what it is like to be an environmental scientist, making observations and carrying out experiments to investigate the natural world.



Badge Requirements

1. Make a time line of the history of environmental science in America. Identify the contribution made by the Boy Scouts of America to environmental science. Include dates, names of people or organizations, and important events.
2. Define the following terms: population, community, ecosystem, biosphere, symbiosis, niche, habitat, conservation, threatened species, endangered species, extinction, pollution prevention, brownfield, ozone, watershed, airshed, nonpoint source, hybrid vehicle, fuel cell.
3. Do ONE activity from EACH of the following categories (using the activities in this pamphlet as the basis for planning and projects):
 - a. Ecology
 1. Conduct an experiment to find out how living things respond to changes in their environments. Discuss your observations with your counselor.
 2. Conduct an experiment illustrating the greenhouse effect. Keep a journal of your data and observations. Discuss your conclusions with your counselor.
 3. Discuss what is an ecosystem. Tell how it is maintained in nature and how it survives.
 - b. Air Pollution
 1. Perform an experiment to test for particulates that contribute to air pollution. Discuss your findings with your counselor.
 2. Record the trips taken, mileage, and fuel consumption of a family car for seven days, and calculate how many miles per gallon the car gets. Determine whether any trips could have been combined ("chained") rather than taken out and back. Using the idea of trip chaining, determine how many miles and gallons of gas could have been saved in those seven days.
 3. Explain what is acid rain. In your explanation, tell how it affects plants and the environment and the steps society can take to help reduce its effects.
 - c. Water Pollution
 1. Conduct an experiment to show how living things react to thermal pollution. Discuss your observations with your counselor.
 2. Conduct an experiment to identify the methods that could be used to mediate (reduce) the effects of an oil spill on waterfowl. Discuss your results with your counselor.
 3. Describe the impact of a waterborne pollutant on an aquatic community. Write a 100-word report on how that pollutant affected aquatic life, what the effect was, and whether the effect is linked to

How can BLT Help?

Requirement 4 a and b

The Northeast Penjajawoc Preserve is comprised of four distinct natural communities within a relatively small area. It would be a great place for scouts to compare a wetland and an upland forest, or compare two different types of wetlands. Scouts could also compare an upland forest and grasslands by visiting Walden-Parke Preserve and the West Penjajawoc Grasslands.

biomagnification.

d. Land Pollution

1. Conduct an experiment to illustrate soil erosion by water. Take photographs or make a drawing of the soil before and after your experiment, and make a poster showing your results. Present your poster to your counselor.
2. Perform an experiment to determine the effect of an oil spill on land. Discuss your conclusions with your counselor.
3. Photograph an area affected by erosion. Share your photographs with your counselor and discuss why the area has eroded and what might be done to help alleviate the erosion.

e. Endangered Species

1. Do research on one endangered species found in your state. Find out what its natural habitat is, why it is endangered, what is being done to preserve it, and how many individual organisms are left in the wild. Prepare a 100-word report about the organism, including a drawing. Present your report to your patrol or troop.
2. Do research on one species that was endangered or threatened but which has now recovered. Find out how the organism recovered, and what its new status is. Write a 100-word report on the species and discuss it with your counselor.
3. With your parent's and counselor's approval, work with a natural resource professional to identify two projects that have been approved to improve the habitat for a threatened or endangered species in your area. Visit the site of one of these projects and report on what you saw.

f. Pollution Prevention, Resource Recovery, and Conservation

1. Look around your home and determine 10 ways your family can help reduce pollution. Practice at least two of these methods for seven days and discuss with your counselor what you have learned.
2. Determine 10 ways to conserve resources or use resources more efficiently in your home, at school, or at camp. Practice at least two of these methods for seven days and discuss with your counselor what you have learned.
3. Perform an experiment on packaging materials to find out which ones are biodegradable. Discuss your conclusion with your counselor.

4. **Choose two outdoor study areas that are very different from one another (e.g., hilltop vs. bottom of a hill; field vs. forest; swamp vs. dry land). For BOTH study areas, do ONE of the following:**

- a. Mark off a plot of 4 square yards in each study area, and count the number of species found there. Estimate how much space is occupied by each plant species and the type and number of nonplant species you find. Write a report that adequately discusses the biodiversity and population density of these study areas. Discuss your report with your counselor.
- b. Make at least three visits to each of the two study areas (for a total of six visits), staying for at least 20 minutes each time, to observe the living and nonliving parts of the ecosystem. Space each visit far enough apart that there are readily apparent differences in the observations. Keep a journal that includes the differences you observe. Then, write a short report that adequately addresses your observations, including how the differences of the study areas might relate to the differences noted, and discuss this with your counselor.

5. Using the construction project provided or a plan you create on your own, identify the items that would need to be included in an environmental impact statement for the project planned.
6. Find out about three career opportunities in environmental science. Pick one and find out the education, training, and experience required for this profession. Discuss this with your counselor, and explain why this profession might interest you.

Fish and Wildlife Management

Wildlife management is the science and art of managing the wildlife—both animals and fish—with which we share our planet. Maintaining the proper balance and the dynamics that go with it requires humankind's attention. We use this stewardship tool to help minimize or eradicate the possibility of extinction of any given species. We want our descendants to have the opportunity to experience the same animal diversity that we now enjoy.

Badge Requirements

1. Describe the meaning and purposes of fish and wildlife conservation and management.
2. List and discuss at least three major problems that continue to threaten your state's fish and wildlife resources.
3. Describe some practical ways in which everyone can help with the fish and wildlife conservation effort.
4. List and describe five major fish and wildlife management practices used by managers in your state.
5. Do ONE of the following:
 - a. **Construct, erect, and check regularly at least two artificial nest boxes (wood duck, bluebird, squirrel, etc.) and keep written records for one nesting season.**
 - b. Construct, erect, and check regularly bird feeders and keep written records of the kinds of birds visiting the feeders in the winter.
 - c. Design and implement a backyard wildlife habitat improvement project and report the results.
 - d. Design and construct a wildlife blind near a game trail, water hole, salt lick, bird feeder, or birdbath and take good photographs or make sketches from the blind of any combination of 10 wild birds, mammals, reptiles, or amphibians.
6. Do ONE of the following:
 - a. **Observe and record 25 species of wildlife. Your list may include mammals, birds, reptiles, amphibians, and fish. Write down when and where each animal was seen.**
 - b. List the wildlife species in your state that are classified as endangered, threatened, exotic, game species, furbearers, or migratory game birds.
 - c. Start a scrapbook of North American wildlife. Insert markers to divide the book into separate parts for mammals, birds, reptiles, amphibians, and fish. Collect articles on such subjects as life histories, habitat, behavior, and feeding habits on all of the five categories and place them in your notebook accordingly. Articles and pictures may be taken from newspapers or science, nature, and outdoor magazines, or from other sources including the Internet (with your parent's permission). Enter at least five articles on mammals, five on birds, five on reptiles, five on amphibians, and five on fish. Put each animal on a separate sheet in alphabetical order. Include pictures whenever possible.
7. Do ONE of the following:
 - a. Determine the age of five species of fish from scale samples or identify



How can BLT Help?

Requirement 5a

Two nesting boxes are currently installed at the tip of the Penjajawoc Marsh, in our Northeast Penjajawoc preserve. Scouts could make observations using these nesting boxes, or could contact BLT for permission to construct and install additional boxes within our preserves.

Requirement 6a

Our preserves encompass a wide variety of habitats, and are great places for wildlife viewing. In particular, the Northeast Penjajawoc Preserve encompasses two wetlands that provide excellent birding opportunities, as well as a vernal pool that would give scouts opportunities to view amphibians and insects. Our preserves are also home to mammals such as squirrels, beaver, deer, and even moose.

various age classes of one species in a lake and report the results.

- b. Conduct a creel census on a small lake to estimate catch per unit effort.
 - c. Examine the stomach contents of three species of fish and record the findings. It is not necessary to catch any fish for this option. You must visit a cleaning station set up for fishermen or find another, similar alternative.
 - d. Make a freshwater aquarium. Include at least four species of native plants and four species of animal life, such as whirligig beetles, freshwater shrimp, tadpoles, water snails, and golden shiners. After 60 days of observation, discuss with your counselor the life cycles, food chains, and management needs you have recognized. After completing requirement 7d to your counselor's satisfaction, with your counselor's assistance, check local laws to determine what you should do with the specimens you have collected.
8. Using resources found at the library and in periodicals, books, and the Internet (with your parent's permission), learn about three different kinds of work done by fish and wildlife managers. Find out the education and training requirements for each position.

Forestry

In working through the Forestry merit badge requirements, Scouts will explore the remarkable complexity of a forest and identify many species of trees and plants and the roles they play in a forest's life cycle. They will also discover some of the resources forests provide to humans and come to understand that people have a very large part to play in sustaining the health of forests.

Badge Requirements

- 1. Prepare a field notebook, make a collection, and identify 15 species of trees, wild shrubs, or vines in a local forested area. Write a description in which you identify and discuss the following:**
 - a. The characteristics of leaf, twig, cone, or fruiting bodies
 - b. The habitat in which these trees, shrubs, or vines are found
 - c. The important ways each tree, shrub, or vine is used by humans or wildlife and whether the species is native or was introduced to the area. If it is not native, explain whether it is considered invasive or potentially invasive.
- 2. Do ONE of the following:**
 - a. Collect and identify wood samples of 10 species of trees. List several ways the wood of each species can be used.
 - b. Find and examine three stumps, logs, or core samples that show variations in the growth rate of their ring patterns. In the field notebook you prepared for requirement 1, describe the location or origin of each example (including elevation, aspect, slope, and the position on the slope), and discuss possible reasons for the variations in growth rate. Photograph or sketch each example.
 - c. Find and examine two types of animal, insect, or damage on trees. In the field notebook you prepared for requirement 1, identify the damage, explain how the damage was caused, and describe the effects of the damage on the trees. Photograph or sketch each example.
- 3. Describe the contributions forests make to:**
 - a. Our economy in the form of products
 - b. Our social well-being, including recreation
 - c. Soil protection and increased fertility
 - d. Clean water
 - e. Clean air (carbon cycling, sequestration)
 - f. Wildlife habitat
 - g. Fisheries habitat
 - h. Threatened and endangered species of plants and animals
 - i. Tell which watershed or other source your community relies on for its water supply.
- 4. Describe what forest management means, including the following:**
 - a. Multiple-use management
 - b. Sustainable forest management
 - c. Even-aged and uneven-aged management and the silvicultural systems associated with each
 - d. Intermediate cuttings
 - e. The role of prescribed burning and related forest-management



How can BLT Help?

Requirement 1

Walden-Parke Preserve and the Northeast Penjajawoc Preserve are great places to see and collect specimens from many species of trees.

Requirement 2a

Scouts are welcome to take wood samples from down trees and branches in our preserves.

Requirement 2b

Scouts are welcome to borrow our increment borer to take core samples from trees on our preserves. We ask that this is done judiciously, and under the supervision of a scout leader.

Requirement 2c

The Northeast Penjajawoc Preserve is a good place to see the effects of pine weevils on white pine. A keen eye will also recognize beech bark disease, and signs of woodpeckers, sapsuckers, porcupine, and deer on trees and saplings within the preserve.

practices.

5. With your parent's and counselor's approval, do ONE of the following:
 - a. Visit a managed public or private forest area with the manager or a forester who is familiar with it. Write a brief report describing the type of forest, the management objectives, and the forestry techniques used to achieve the objectives.
 - b. With a knowledgeable individual, visit a logging operation or wood-using manufacturing plant. Write a brief report describing the following:
 1. The species and size of trees being harvested or used and the location of the harvest area or manufacturer
 2. The origin of the forest or stands of trees being utilized (e.g., planted or natural)
 3. The forest's successional stage. What is its future?
 4. Where the trees are coming from (land ownership) or where they are going (type of mill or processing plant)
 5. The products that are made from the trees
 6. How the products are made and used
 7. How waste materials from the logging operation or manufacturing plant are disposed of or utilized
 - c. Take part in a forest-fire prevention campaign in cooperation with your local fire warden, state wildfire agency, forester, or counselor. Write a brief report describing the campaign, how it will help prevent wildfires, and your part in it.

6. Do the following:
 - a. Describe the consequences to forests that result from FIVE of the following elements: wildfire, absence of fire, insects, tree diseases, air pollution, overgrazing, deer or other wildlife overpopulation, improper harvest, and urbanization.
 - b. Explain what can be done to reduce the consequences you discussed in 6a.
 - c. Describe what you should do if you discover a forest fire and how a professional firefighting crew might control it. Name your state or local wildfire control agency.

7. Visit one or more local foresters and write a brief report about the person (or persons). Or, write about a forester's occupation including the education, qualifications, career opportunities, and duties related to forestry.

Hiking

Hiking is a terrific way to keep your body and mind in top shape, both now and for a lifetime. Walking packs power into your legs and makes your heart and lungs healthy and strong. Exploring the outdoors challenges you with discoveries and new ideas. Your senses will improve as you use your eyes and ears to gather information along the way.

Badge Requirements

1. Show that you know first aid for injuries or illnesses that could occur while hiking, including hypothermia, heatstroke, heat exhaustion, frostbite, dehydration, sunburn, sprained ankle, insect stings, tick bites, snakebite, blisters, hyperventilation, and altitude sickness.
2. Explain and, where possible, show the points of good hiking practices including the principles of Leave No Trace, hiking safety in the daytime and at night, courtesy to others, choice of footwear, and proper care of feet and footwear.
3. Explain how hiking is an aerobic activity. Develop a plan for conditioning yourself for 10-mile hikes, and describe how you will increase your fitness for longer hikes.
4. Make a written plan for a 10-mile hike. Include map routes, a clothing and equipment list, and a list of items for a trail lunch.
5. **Take five hikes, each on a different day, and each of 10 continuous miles. Prepare a hike plan for each hike.***
6. Take a hike of 20 continuous miles in one day following a hike plan you have prepared.*
7. After each of the hikes (or during each hike if on one continuous "trek") in requirements 5 and 6, write a short report of your experience. Give dates and descriptions of routes covered, the weather, and interesting things you saw. Share this report with your merit badge counselor.

* The hikes in requirements 5 and 6 can be used in fulfilling Second Class (2a) and First Class (3) rank requirements, but only if Hiking merit badge requirements 1, 2, 3, and 4 have been completed to the satisfaction of your counselor. The hikes of requirements 5 and 6 cannot be used to fulfill requirements of other merit badges.



How can BLT Help?

Requirement 5

While no single preserve is large enough to meet this requirement on its own, scouts could easily plan a 10 mile hike through the corridor formed by the Northeast Penjajawoc Preserve, Walden-Parke Preserve, and the Bangor City Forest.

Insect Study

In earning the Insect Study merit badge, Scouts will glance into the strange and fascinating world of the insect. There, they will meet tiny creatures with tremendous strength and speed, see insects that undergo startling changes in habits and form as they grow, and learn how insects see, hear, taste, smell, and feel the world around them.



Badge Requirements

1. Tell how insects are different from all other animals. Show how insects are different from centipedes and spiders.
2. Point out and name the main parts of an insect.
3. Describe the characteristics that distinguish the principal families and orders of insects.
4. **Do the following:**
 - a. **Observe 20 different live species of insects in their habitat. In your observations, include at least four orders of insects.**
 - b. Make a scrapbook of the 20 insects you observed in 4a. Include photographs, sketches, illustrations, and articles. Label each insect with its common and scientific names, where possible. Share your scrapbook with your counselor.
5. Do the following:
 - a. From your scrapbook collection, identify three species of insects helpful to humans and five species of insects harmful to humans.
 - b. Describe some general methods of insect control.
6. Compare the life histories of a butterfly and a grasshopper. Tell how they are different.
7. Raise an insect through complete metamorphosis from its larval stage to its adult stage (e.g., raise a butterfly or moth from a caterpillar).*
8. Tell the things that make social insects different from solitary insects.
9. Observe an ant colony or a beehive. Tell what you saw.
10. Tell things that make social insects different from solitary insects.
11. Tell how insects fit in the food chains of other insects, fish, birds, and mammals.
12. Find out about three career opportunities in insect study. Pick one and find out the education, training, and experience required for this profession. Discuss this with your counselor, and explain why this profession might interest you.

* Some insects are endangered species and are protected by federal or state law. Every species is found only in its own special type of habitat. Be sure to check natural resources authorities in advance to be sure that you will not be collecting any species that is known to be protected or endangered, or in any habitat where collecting is prohibited. In most cases, all specimens should be returned to the location of capture after the requirement has been met. Check with your merit badge counselor for those instances where the return of these specimens would not be appropriate.

How can BLT Help?

Requirement 4

Scouts can view a wide variety of insects living in all sorts of habitats in our preserves. Scouts could find everything from aquatic insects such as mayflies and dragonfly larvae in the stream running through the Northeast Penjajawoc Preserve, to grasshoppers and butterflies in the West Penjajawoc Grasslands.

Mammal Study

A mammal may weigh as little as 1/12 ounce, as do some shrews, or as much as 150 tons, like the blue whale. It may spring, waddle, swim, or even fly. But if it has milk for its young, has hair of some kind, is relatively intelligent, and has warm blood, then it is a mammal.



Badge Requirements

1. Explain the meaning of "animal," "invertebrate," "vertebrate," and "mammal." Name three characteristics that distinguish mammals from all other animals.
2. Explain how the animal kingdom is classified. Explain where mammals fit in the classification of animals. Classify three mammals from phylum through species.
3. Do ONE of the following:
 - a. **Spend three hours in each of two different kinds of natural habitats** or at different elevations. List the different mammal species and individual members that you identified by sight or sign. Tell why all mammals do not live in the same kind of habitat.
 - b. **Spend three hours on each of five days on at least a 25-acre area** (about the size of 3 1/2 football fields). List the mammal species you identified by sight or sign.
 - c. From study and reading, write a simple history of one nongame mammal that lives in your area. Tell how this mammal lived before its habitat was affected in any way by humans. Tell how it reproduces, what it eats, and its natural habitat. Describe its dependency upon plants and other animals (including humans), and how they depend upon it. Tell how it is helpful or harmful to humankind.
4. Do ONE of the following:
 - a. Under the guidance of a nature center or natural history museum, make two study skins of rats or mice. Tell the uses of study skins and mounted specimens respectively.
 - b. Take good pictures of two kinds of mammals in the wild. Record light conditions, film used, exposure, and other factors, including notes on the activities of the pictured animals.
 - c. Write a life history of a native game mammal that lives in your area, covering the points outlined in requirement 3c. List sources for this information.
 - d. Make and bait a tracking pit. Report what mammals and other animals came to the bait.
 - e. Visit a natural history museum. Report on how specimens are prepared and cataloged. Explain the purposes of museums.
 - f. Write a report of 500 words on a book about a mammal species.
 - g. Trace two possible food chains of carnivorous mammals from soil through four stages to the mammal.
5. Working with your counselor, select and carry out one project that will influence the numbers of one or more mammals.

How can BLT Help?

Requirement 3a

Scouts can observe mammals and mammal sign in wetlands, early successional, and mature forests in the Northeast Penjajawoc Preserve. Scouts should keep a look-out for signs of white-tailed deer, red squirrels, showshoe hare, beaver, porcupine, and even moose and black bear.

Requirement 3b

Both the Northeast Penjajawoc Preserve (80 acres) and Walden-Parke Preserve (205 acres) are large enough to meet this requirement.

Nature

There is a very close connection between the soil, the plants, and all animal life, including people. Understanding this connection, and the impact we have upon it, is important to preserving the wilderness, as well as to our own well-being as members of the web of nature.



Badge Requirements

1. Name three ways in which plants are important to animals. Name a plant that is protected in your state or region, and explain why it is at risk.
2. Name three ways in which animals are important to plants. Name an animal that is protected in your state or region, and explain why it is at risk.
3. Explain the term "food chain." Give an example of a four-step land food chain and a four-step water food chain.
4. Do all of the requirements in FIVE of the following fields:
 - a. Birds
 1. **In the field, identify eight species of birds.**
 2. Make and set out a birdhouse OR a feeding station OR a birdbath. List what birds used it during a period of one month.
 - b. Mammals
 1. **In the field, identify three species of wild animals.**
 2. **Make plaster casts of the tracks of a wild mammal.**
 - c. Reptiles and Amphibians
 1. Show that you can recognize the venomous snakes in your area.
 2. **In the field, identify three species of reptiles or amphibians.**
 3. **Recognize one species of toad or frog by voice; OR identify one reptile or amphibian by eggs, den, burrow, or other signs.**
 - d. Insects and Spiders
 1. **Collect, mount, and label 10 species of insects or spiders.**
 2. Hatch an insect from the pupa or cocoon; OR hatch adults from nymphs; OR keep larvae until they form pupae or cocoons; OR keep a colony of ants or bees through one season.
 - e. Fish
 1. Catch and identify two species of fish.
 2. Collect four kinds of animal food eaten by fish in the wild.
 - f. Mollusks and Crustaceans
 1. Identify five species of mollusks and crustaceans.
 2. Collect, mount, and label six shells.
 - g. Plants
 1. **In the field, identify 15 species of wild plants.**
 2. **Collect and label the seeds of six plants OR the leaves of 12 plants.**
 - h. Soils and Rocks
 1. Collect and identify soils found in different layers of a soil profile.
 2. Collect and identify five different types of rocks from your area.

NOTE: In most cases all specimens should be returned to the wild at the location of original capture after the requirements have been met. Check with your merit badge counselor for those instances where the return of these specimens would not be appropriate.

Under the Endangered Species Act of 1973, some plants and animals are or may be protected by federal law. The same ones and/or others may be protected by state law. Be sure that you do not collect protected species.

Your state may require that you purchase and carry a license to collect certain species. Check with the wildlife and fish and game officials in your state regarding species regulations before you begin to collect.

How can BLT Help?

Requirement 4

There are all kinds of animals and plants that can be found on our preserves. Here is list of the specific requirements that can be met within BLT's preserves: a1, b1, b2, c2, c3, d1, g1, and g2.

Plant Science

Plant scientists use their curiosity and knowledge to develop questions about the world of plants. Then they try to answer those questions with further observations and experiments in the laboratory and in the field. To earn this merit badge, Scouts will explore three of the most important plant science specialties: agronomy, horticulture, and field botany.



Badge Requirements

1. Make a drawing and identify five or more parts of a flowering plant. Tell what each part does.
2. Explain photosynthesis and tell why this process is important. Tell at least five ways that humans depend on plants.
3. Explain how water, light, air, temperature, pollinators, and pests affect plants. Describe the nature and function of soil and explain its importance. Tell about the texture, structure, and composition of fertile soil. Tell how soil may be improved.
4. Tell how to propagate plants by seeds, roots, cuttings, tubers, and grafting. Grow a plant by ONE of these methods.
5. List by common name at least 10 native plants and 10 cultivated plants that grow near your home. List five invasive nonnative plants in your area and tell how they may be harmful. Tell how the spread of invasive plants may be avoided or controlled in ways that are not damaging to humans, wildlife, and the environment.
6. Name and tell about careers in agronomy, horticulture, and botany. Write a paragraph about a career in one of these fields that interests you.
7. Choose ONE of the following options and complete each requirement:

(Option 1 and Option 2 do not relate to Bangor Land Trust)

Option 3: Field Botany

- A. **Visit a park, forest, or other natural area near your home. While you are there:**
1. Determine which species of plants are the largest and which are the most abundant. Note whether they cast shade on other plants.
 2. Record environmental factors that may influence the presence of plants on your site, including latitude, climate, air and soil temperature, soil type and pH, geology, hydrology, and topography.
 3. Record any differences in the types of plants you see at the edge of a forest, near water, in burned areas, or near a road or railroad.
- B. **Select a study site that is at least 100 by 100 feet. Make a list of the plants in the study site by groups of plants: canopy trees, small trees, shrubs, herbaceous wildflowers and grasses, vines, ferns, mosses, algae, fungi, lichens. Find out which of these are native plants and which are exotic (or nonnative).**

How can BLT Help?

Option 3

Many of the requirements for this option can be met on our preserves, including A, B, D, F1, F2, F3, and F5. Scouts are welcome to judiciously sample vegetation. Additionally, they are welcome to borrow BLT's "forestry tool kit," which includes a 300' tape measure, DBH tape, 10-factor prism, Abnee level, and increment borer, to help them conduct a transect study (F2) or nested plot (F3). Scouts are also welcome to contact us to schedule a "Plant Conservation Organization Visit" (F5), if they wish to learn more about our conservation efforts.

- C. Tell how an identification key works and use a simple key to identify 10 kinds of plants (in addition to those in general requirement 5 above). Tell the difference between common and scientific names and tell why scientific names are important.
- D. **After gaining permission, collect, identify, press, mount, and label 10 different plants that are common in your area. Tell why voucher specimens are important for documentation of a field botanist's discoveries.**
- E. Obtain a list of rare plants of your state. Tell what is being done to protect rare plants and natural areas in your state. Write a paragraph about one of the rare plants in your state.
- F. Choose ONE of the following alternatives and complete EACH of its requirements:
1. **Tree Inventory**
 - a. Identify the trees of your neighborhood or a park or section of your town.
 - b. Collect, press, and label leaves, flowers, or fruits to document your inventory.
 - c. List the types of trees by scientific name and give common names. Note the number and size (diameter at 4 feet above ground) of trees observed and determine the largest of each species in your study area.
 - d. Lead a walk to teach others about trees and their value, OR write and distribute materials that will help others learn about trees.
 2. **Transect Study**
 - a. Visit two sites, at least one of which is different from the one you visited for Field Botany requirement 1.
 - b. Use the transect method to study the two different kinds of plant communities. The transects should be at least 500 feet long.
 - c. At each site, record observations about the soil and other influencing factors AND do the following. Then make a graph or chart to show the results of your studies.
 - Identify each tree within 10 feet of the transect line.
 - Measure the diameter of each tree at 4 feet above the ground, and map and list each tree.
 3. **Nested Plot**
 - a. Visit two sites, at least one of which is different from the one you visited for Field Botany requirement 1.
 - b. Mark off nested plots and inventory two different kinds of plant communities.
 - c. At each site, record observations about the soil and other influencing factors AND do the following. Then make a graph or chart to show the results of your studies.
 - Identify, measure, and map each tree in a 100-by-100-foot plot. (Measure the diameter of each tree at 4 feet above the ground.)
 - Identify and map all trees and shrubs in a 10-by-10-foot plot within each of the larger areas.
 - Identify and map all plants (wildflowers, ferns, grasses, mosses, etc.) of a 4-by-4-foot plot within the 10-by-10-foot plot.
 4. **Herbarium Visit**
 - a. Write ahead and arrange to visit an herbarium at a university, park, or botanical garden; OR, visit an herbarium Web site (with your parent's permission)
 - b. Tell how the specimens are arranged and how they are used by researchers. If possible, observe voucher specimens of a plant that is rare in your state.
 - c. Tell how a voucher specimen is mounted and prepared for permanent storage. Tell how specimens should be handled so that they will not be damaged.
 - d. Tell about the tools and references used by botanists in an herbarium.
 5. **Plant Conservation Organization Visit**
 - a. Write ahead and arrange to visit a private conservation organization or government agency that is concerned with protecting rare plants and natural areas.
 - b. Tell about the activities of the organization in studying and protecting rare plants and natural areas.
 - c. If possible, visit a nature preserve managed by the organization. Tell about land management activities such as controlled burning, or measures to eradicate invasive (nonnative) plants or other threats to the plants that are native to the area.

Reptile and Amphibian Study

Boys always have been interested in snakes, turtles, lizards, and alligators, as well as frogs and salamanders. Developing knowledge about these captivating creatures leads to an appreciation for all native wildlife; understanding the life cycle of a reptile or amphibian and keeping one as a pet can be a good introduction to natural history; and knowing about venomous species can help Scouts to be prepared to help in case of an emergency.

Badge Requirements

1. Describe the identifying characteristics of six species of reptiles and four species of amphibians found in the United States. For any four of these, make sketches from your own observations or take photographs. Show markings, color patterns, or other characteristics that are important in the identification of each of the four species. Discuss the habits and habitats of all 10 species.
2. Discuss with your merit badge counselor the approximate number of species and general geographic distribution of reptiles and amphibians in the United States. Prepare a list of the most common species found in your local area or state.
3. Describe the main differences between
 - a. Amphibians and reptiles
 - b. Alligators and crocodiles
 - c. Toads and frogs
 - d. Salamanders and lizards
 - e. Snakes and lizards
4. Explain how reptiles and amphibians are an important component of the natural environment. List four species that are officially protected by the federal government or by the state you live in, and tell why each is protected. List three species of reptiles and three species of amphibians found in your local area that are not protected. Discuss the food habits of all 10 species.
5. Describe how reptiles and amphibians reproduce.
6. From observation, describe how snakes move forward. Describe the functions of the muscles, ribs, and belly plates.
7. Describe in detail six venomous snakes and the one venomous lizard found in the United States. Describe their habits and geographic range. Tell what you should do in case of a bite by a venomous species.
8. Do ONE of the following:
 - a. **Maintain one or more reptiles or amphibians for at least a month. Record food accepted, eating methods, changes in coloration, shedding of skins, and general habits;** or keep the eggs of a reptile from the time of laying until hatching; **or keep the eggs of an amphibian from the time of laying until their transformation into tadpoles (frogs) or larvae (salamanders).**
 - b. Choose a reptile or amphibian that you can observe at a local zoo, aquarium, nature center, or other such exhibit (such as your classroom



How can BLT Help?

Requirement 8a

Scouts are welcome to sample the vernal pool in our Northeast Penjajawoc preserve, to collect frog or salamander eggs in order to meet this requirement, as long as all specimens are returned to the pool after observation.

Requirement 9a and b

The vernal pool in our Northeast Penjajawoc Preserve is a great spot to see (or hear) many frogs and salamanders such as the wood frog, spotted salamander, and blue-spotted salamander.

or school). Study the specimen weekly for a period of three months. At each visit, sketch the specimen in its captive habitat and note any changes in its coloration, shedding of skins, and general habits and behavior. Find out, either from information you locate on your own or by talking to the caretaker, what this species eats and what are its native habitat and home range, preferred climate, average life expectancy, and natural predators. Also identify any human-caused threats to its population and any laws that protect the species and its habitat. After the observation period, share what you have learned with your counselor.

9. Do TWO of the following:
 - a. **Identify at night three kinds of toads or frogs by their voices. Imitate the song of each for your counselor. Stalk each with a flashlight and discover how each sings and from where.**
 - b. **Identify by sight eight species of reptiles or amphibians.**
 - c. Using visual aids, give a brief talk to a small group on three different reptiles and amphibians.

10. Tell five superstitions or false beliefs about reptiles and amphibians and give a correct explanation for each. Give seven examples of unusual behavior or other true facts about reptiles and amphibians.

NOTE: Scouts must not use venomous reptiles in fulfilling requirement 8a. Species listed by federal or state law as endangered, protected, or threatened must not be used as live specimens in completing requirement 8a unless official permission has been given. In most cases, all specimens should be returned to the wild at the location of capture after the requirement has been met. Check with your merit badge counselor for those instances where the return of these specimens would not be appropriate.

Under the Endangered Species Act of 1973, some plants and animals are, or may be, protected by federal law. The same ones and/or others may be protected by state law. Be sure that you do not collect protected species.

Your state may require that you purchase and carry a license to collect certain species. Check with the wildlife and fish and game officials in your state regarding species regulations before you begin to collect.