WILDLIFE
HABITAT
ENHANCEMENT

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Illustration of ruffed grouse by wildlife artist Don Whitlatch, made available from The Ruffed Grouse Society

Preparation of illustrations funded by the American Wildlife Research Foundation, Inc.

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Cooperative Extension, New York State College of Agriculture and Life Sciences, New York State College of Human Ecology, and New York State College of Veterinary Medicine at Cornell University, and the U.S. Department of Agriculture, cooperating. In furtherance of acts of Congress, May 8 and June 30, 1914, and providing equal opportunities in employment and programs. Lucinda A. Noble, Director. 6/84 5M CP 8718
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Wild birds and mammals are among our most valuable and important renewable natural resources. Wildlife provide recreation for millions of Americans, young and old. In addition, some species of wildlife are excellent food, and others provide valuable furs. Wildlife also serve as monitors of the quality of our environment.

Since wildlife depend directly on the natural environment, they often give us early warning of environmental health problems. For example, the decline of birds of prey clearly emphasized the environmental hazards of DDT, and the decline of many aquatic life forms dramatically demonstrated the effects of acid precipitation. Because many youth enjoy hunting, trapping, and observing nature, the study of wildlife is an especially good way to encourage young people's interest in ecology.

Wildlife and their various environments, or habitats, seem to have an inherent interest for people of all ages. The variety of wildlife habitats coupled with that interest give us a superb opportunity for helping youth to embark on a fascinating exploration of wildlife and their environmental requirements. An understanding of the physical and biological aspects of the environment and how wildlife function in that environment will help us understand wildlife species. Youth participating in the project will acquire this understanding through hands-on experiences in enhancing wildlife habitat.

One does not have to be a biologist to study wildlife or to improve wildlife habitat. Anyone with an interest in and curiosity about natural systems and their workings can learn more about them. This guide will assist you in giving youth guidance and encouragement in obtaining a basic practical understanding of wildlife ecology through a series of habitat enhancement activities.

General guidance concerning the awareness approach may be found on pages 3-6 of the bulletin Environmental Awareness. Because many of the habitat enhancement activities discussed in this bulletin concern forest and farmland wildlife, you may find the sections “Discovery in the Forest Environment” (pages 7-16) and “Discovery in the Farm Environment” (pages 28-37) in Environmental Awareness of special interest.

A key to both the environmental awareness project and this project is the use of the “discovery method” for learning. As a leader you should constantly remind yourself that awareness cannot be taught—it must be experienced. Try to encourage youth to use all their senses. In the field, encourage them to touch, listen, see, smell, and taste. Whenever possible, let them discover for themselves. Avoid the temptation to provide quick answers. Guide their thinking by questioning them. Help them work through the answers to their questions so they will arrive at conclusions largely on their own. Most people remember best what they themselves discover. True, some knowledge about the habitat needs of wildlife must be acquired through reading, but only through personal, firsthand experience can youth gain a genuine appreciation for the interrelatedness of wildlife habitat components. The combination of reading and personal experience can be very effective in promoting learning.

Be flexible. Don’t hesitate to depart from your intended course of instruction temporarily if a unique opportunity for learning presents itself. Keep in mind that young people have an abundance of energy. Don’t fight it; try to channel it in constructive directions. Whenever possible, use the actual object or teaching aids such as pictures and models to get your point across. Above all, make a conscious effort to teach at your listeners’ level of understanding. Tailor your materials to the age and education level of your youth group members, but never talk down to them.
Our approach in this project is to encourage youth to explore wildlife resources and to begin to learn about them by participating in several activities focused on wildlife or their habitat needs. These activities are designed to develop interest in wildlife and wildlife habitat enhancement, with the intent to motivate youth to gain a better understanding of these renewable resources.

**Activity Format**

Just as beginning hunters must learn a few basic skills to assure a minimum level of success, so too must the novice wildlife manager learn a few basic observation and data-collection skills. This guide is designed to assist you in helping youngsters acquire these skills. You are the best judge of what to do with your particular group of youngsters, but this guide suggests some general approaches and activities of proven value.

The material is divided into seven activities. Each activity contains sufficient information or references for its completion. A discussion of the goals to be accomplished and a suggested procedure for each activity are included to provide background for the leader with no previous experience or training in wildlife ecology. Materials, equipment, and teaching aids needed for each activity are listed. We rely heavily upon information in companion publications for this project.

**Field Trips and Activities**

Field trips are needed to conduct the wildlife enhancement activities of this project. They will provide youth with opportunities for personal environmental experiences. The basic purpose and procedure for each activity will be outlined to help you in planning. Leaders are encouraged to use their ingenuity, time, and available resources as they see fit.

For field trips, be sure that everyone is properly clothed from head to toe for the conditions and weather that may be encountered. Food and beverages may be necessary, depending on the timing and length of the trip. A first-aid kit and ready access to transportation in case of an emergency are essential. Everyone should have appropriate safety equipment (hard hats, eye protection, gloves, proper footwear). Safety and good outdoor etiquette should be stressed.

A field trip can be either extremely rewarding or disastrous. The following suggestions should help ensure a successful experience.

**Planning**

1. Decide on your objectives. Do not try to accomplish too much in one trip. For example, one properly built brush pile may be a reasonable goal for an afternoon.
2. Pick an area that is well suited for your purposes. Obtain permission to use the area. It would be best if all activities could be conducted on the same property. Your county 4-H camp or other county-owned site might be used, and private property, such as that of a local sportsmen’s club, may be an ideal project area.
3. Prepare a teaching plan. Consider the main points to be covered during each portion of the activity. Carry an outline or notes of what you want to cover on each trip or during each activity.
4. Announce to your group the purpose, nature, and other details of the trip, including special equipment and clothing required, well in advance of the trip.
5. Preview the trip route and activity site by yourself as close to the date of the trip as possible. Note interesting spots and potential hazards.
7. Make a list of supplies needed, including safety equipment, and be sure to take them with you.
8. Be sure to let parents know where you are going and when you will be back.
9. Obtain permission slips from parents if necessary.
10. Have a first-aid kit handy.

Conducting
1. Start on time.
2. Take a head count before you begin the trip.
3. Stay in the lead at all times. An assistant or teen leader should bring up the rear to prevent straggling and to help keep the group in order.
4. Avoid "canned" lectures. Encourage maximum learner participation. Ask questions to stimulate interest and discussion.
5. Encourage questions, but don't answer all of them. Let the group look up answers for themselves. If you don't know an answer, don't be ashamed to say so. You can always note the question and look it up together later.
6. Be sure all the youth can see and hear you when you are speaking. Try not to speak while walking.
7. Interpret, don't just label. Don't tell what something is; tell about it so students will have an aid in remembering and better understanding.
8. Practice conservation. Cut or move materials only when and where it is appropriate and then only with permission. Don't create more disturbance than you need to.
9. Recommend that members take notes, in their own words and style, while working on the activity as an aid to learning and later recall. Formats for notetaking can be found in two bulletins, IB 157 and IB 193, in the list of references at the end of this guide.
10. Repeat important information.
11. Don't schedule more work than can reasonably be accomplished in one trip. Be alert to signs of fatigue, cold, boredom, exhaustion, and so on among the group. Rest periods are a good time for discussing and clarifying information.
12. Return to the starting point at the designated time.

Concluding
1. Summarize the main points of the activity before you leave the field.
2. Evaluate the work accomplished; this may require returning to the site several months following completion of the enhancement practices. Were they worthwhile? How could they have been better? Should they be repeated? Record the results of the evaluation for later use.
3. Take a final head count at the end of the trip. Be sure everyone is accounted for.

On all field activity trips you should be alert to any interesting natural phenomenon, even if it does not directly relate to wildlife or wildlife habitat. The basic woodland or farmland environment should be discussed whenever convenient, and any "teachable moments" that present themselves should be grasped as productive mini-lessons. Such mini-lessons seem to occur most often when young people investigate on their own. Appreciation of the environment can be a beneficial by-product of learning about wildlife.

The aid of adult volunteers on field activity trips may prove useful for everyone. Ask a rod and gun club to help, or ask an outdoor columnist from the newspaper or an environmental conservation officer to suggest people who could help. Be sure to contact potential assistants well in advance of your proposed trip.
Safety Considerations
Some activities in this project involve the use of cutting implements such as axes, pruning shears, knives, hand saws, and chain saws. These potentially hazardous tools should be used only under close supervision, and users should wear appropriate eye and ear protection and other safety gear. Caution is also vital when handling brush and logs because anyone accidentally struck by them could be injured. Everyone should wear work gloves. Unsafe actions should be pointed out immediately and avoided.

Project Demonstration Areas
A particularly useful goal for your group on this project would be to create a wildlife enhancement demonstration area that could be used for educational purposes for adults and youth for years after your project is completed. Your 4-H agent should be able to help you identify particularly good sites. Long-term access will be a concern if your goal is to establish an area where continued availability is assured. Your group may want to consider constructing a nature trail through the demonstration area as a follow-up to this project (refer to Nature Trails: Guides to Environmental Understanding, 4-H Leaders’ Guide L-5-4).
Meeting 1

The first meeting in this activity should concentrate on introducing youth to key concepts in wildlife management. You might want to enlist the aid of a state wildlife biologist for this session. Environmental conservation law enforcement officers, hunter training instructors, and high school or college biology instructors might also be able to offer assistance.

The first concept your group must become familiar with is wildlife habitat. Wildlife habitat can be generally described as an area that meets the life requirements of one or more animal species.

Wildlife habitat has three main elements that can be changed by habitat enhancement work. These are cover (shelter), food, and water. These elements must be available in the proper proportion and within an appropriate distance. The amounts, qualities, and distribution of these elements are important for they determine the carrying capacity of an area for a species. Carrying capacity means the number of animals a habitat can support over a given period of time. It is not a constant number but changes as the condition of the habitat changes. A fourth habitat element—space—may be affected by the degree to which the other elements are available, as well as by the behavioral characteristics of the species themselves (for example, territoriality). The question of space is discussed in Activity 6.

Cover

Cover is the protective element within an animal's habitat. Cover may be a brush pile for a rabbit (escape cover) or a tree cavity for a chickadee (nesting cover). Whatever form cover takes, it contributes to one or more of the necessary functions in the lives of animals: breeding, nesting, hiding, resting, sleeping, feeding, and traveling.

Cover is often provided and described by vegetation types or structure. For example, herbaceous openings are important as nesting cover for many species of wildlife. (Refer to IB 193, Wildlife and Timber from Private Land, pages 4-5 and 8-9, for more discussion of cover.) When considering manipulation of vegetation to provide cover for wildlife, you must know the cover requirements of the particular species so as to determine optimal vegetative patch types (combinations of plants such as trees and shrubs of various sizes and species) and patch sizes and their interspersion.

In some areas cover may be limited, although food and water are abundant. In these situations artificial cover such as nest boxes for wood ducks and conifer plantings for ruffed grouse can be provided. In other areas the right cover may be generally available but isolated. In this situation you may need to provide vegetative travel lanes between cover types so wildlife can safely move between types. Wildlife enhancement practices to improve cover will be dealt with in detail later.

Food

Food, of course, is required by all wildlife. All animals must eat other animals or plants to survive. If a site has few or no animals that are otherwise native to the area, the reason may be lack of adequate food. Sometimes food plants also serve as cover (for example, oak trees for gray squirrels). In another area food and cover may be located too far apart. In such a case, you may provide access to food by establishing vegetative travel lanes or by artificially providing the missing habitat element closer to the existing element.

Efforts to enhance the food element of wildlife habitat require knowledge of the food preferences of particular species. You should pay particular attention to seasons of food scarcity. It is also necessary to know the fruiting habits, persis-

Activity 1

Basics of Wildlife Habitat

Objectives

To help youth:
- understand the elements of a suitable habitat for wildlife
- develop a sense of stewardship toward wildlife and a land conservation ethic
- learn about the life histories and habitat requirements of native wildlife species

Materials and Equipment
- slide projector
- projection screen
- extension cord
- spare bulb for projector

Teaching Aids
- "Enhancement of Wildlife Habitat on Private Lands" slide set and script
- Managing Small Woodlands for Wildlife, IB 157
- "Environmental Awareness" slide sets and scripts for "Environmental Awareness: Introduction," "Environmental Awareness in the Forest Environment," and "Environmental Awareness in the Farm Environment" sections of Environmental Awarenesses, 4-H Leaders' Guide L-5.10
- Enhancement of Wildlife Habitat on Private Lands, IB 181
- New York's Wildlife Resources' series, available from Department of Natural Resources, Cornell University
- Understanding Prolation and Northeastern Birds of Prey, IB 175 and slide set and script

The purpose of this activity is to introduce students to the general elements of wildlife habitat and related concepts important to wildlife management and to help them realize that the needs of wildlife differ from species to species.

Activity 1 is conducted indoors as a lecture/discussion rather than as outdoor fieldwork. You may wish to divide the material into more than the two meetings we have outlined.
tence, period of availability, and other characteristics of food plants provided. Careful selection of food plants for their additional cover qualities can increase their overall benefit to the species. Selection can also be made for a diversity of food types, for plants that mature early or late, or for those that retain their fruits well into winter.

Some animals eat a great variety of food items; others eat only a few foods. Some wildlife species use an abundant food resource almost exclusively when it becomes available. Mast (nuts and fruits) is a good example of periodically abundant food. Squirrels, chipmunks, and blue jays store acorns for later use; deer and bears develop a thick layer of fat (stored energy for winter) through feeding on acorns in the fall. Seasonally abundant berry crops are also attractive to wildlife.

Water
Water is an essential requirement for all wildlife, though not all need standing water. For those requiring it, a creek, spring, small pond, or artificial water basin may serve the purpose. Sometimes existing water sources may be improved by enlarging them (for example, digging out a spring) or cleaning them out and stabilizing their sides (for example, removing debris from a pool in small streams and laying the sides up with stone).

Spatial Relationship of Habitat Elements
An important consideration in wildlife habitat enhancement is creating or maintaining the appropriate arrangement and mixture of cover, food, and water. The required closeness of these elements to one another varies according to the wildlife species of concern; a rule of thumb is to provide them within 1 acre (0.4 ha) for small mammals such as rabbits and squirrels or within 10 acres (4 ha) for larger mammals such as raccoons. Differences in these spatial relationships depend on the home range of each species, the area within which an animal spends most of its time.

When an element is in short supply for the population of animals in an area, that element is called a limiting factor. Often it is possible to increase the number of wildlife populations within an area if you can identify limiting factors. For example, there is no sense in increasing the amount of cover for a species if adequate cover exists but food is insufficient. Rather, the limiting factor of food should receive attention. Generally, as limiting factors are made less limiting, the carrying capacity of an area for a species will increase because habitat quality is improved.

Edges/Diversity/Interspersion—Keys to Wildlife Habitat Enhancement

General Considerations
An edge is the place where different plant communities, successional stages, or vegetative conditions come together. The area where these communities or stages blend is called an ecotone. Such areas usually hold more wildlife than adjoining, more uniform plant communities or successional stages. In the ecotone we find a mingling of the wildlife species common to the adjacent plant communities, as well as other wildlife that may be unique to the ecotone.

When planning how to increase wildlife populations associated with an edge, you need to keep in mind that those adapted to particular edges and their ecotones increase as appropriate edges increase. Additionally, the number of individual wildlife species requiring two or more vegetative types typically depends on the degree of interspersion of numerous blocks of such types. More edge with particular characteristics gives rise to more of the wildlife associated with that
edge. Typically, edge effect can be magnified by increasing interspersion of the types of habitat creating those edges.

**Characteristics of Edge**

The amount of edge habitat in an area can be changed by increasing edge width (the width of the zone of transition between two vegetative types), length, and shape (for example, straight or sinuous). The width and length measurements can be used to determine the area of edge habitat. An abrupt, narrow edge typically has less value than a wider edge of the same length.

The richness of a particular edge for wildlife is influenced by the size of the edge area and the plant communities coming together at the edge. The size of the patch has a direct effect on the number of wildlife species it can contain. The animals primarily associated with adjacent vegetative types have a tendency to "spill" over the edge into the other types. The larger the vegetative patches, the larger the number of animals associated with them and the more animal and plant diversity resulting along the edge.

In addition, habitat richness is associated with the degree of contrast in vegetative structure along the edge. By structure we mean plant density and size (e.g., a sapling thicket versus a mature hardwood stand with a dense canopy). The greater the contrast, the more likely are the adjoining habitats to represent a broader mixture of plants and to support a wider variety of wildlife species. Contrast also tends to increase the species richness of the ecotone.

**Habitat Size and Diversity**

If patches of particular types of wildlife habitat become too large, wildlife species diversity often decreases. For example, the relationship between the number of bird species present and the size of patches of woodland habitat interspersed with agricultural lands increases significantly through a size of about 60 acres (15 ha) but does not change much as stand size increases further. A rule of thumb you can use is that species richness, at least for birds, increases significantly with stand size to about 60 to 80 acres (15 to 20 ha).

If the average stand size is about 80 acres, the richness of wildlife species resulting from stand size alone should approach the maximum. The word "average" is important. Stands larger than average may accommodate the few species (such as wild turkey, barred owl, red-eyed vireo, scarlet tanager, ovenbird, and black bear) that require larger patches of habitat, whereas the smaller stands increase the edge effect that attracts species requiring more edge. It is important to know the habitat requirements of any wildlife species of particular interest to members of your group so they can realistically appreciate the best size of habitat needed by wildlife. Costs and benefits need to be weighed carefully. Remember that a change to benefit one species may negatively affect another. Consider all consequences, including the potential for wildlife to cause damage, before making management decisions.

**Management Considerations**

You will find that habitat diversity is a practical wildlife management objective. Each area of a woodland or farmland has a unique set of possibilities. One area may already have a high degree of diversity as a result of its natural mixture of plant communities and successional stages (see *Wildlife and Timber from Private Lands*, IB 193, page 8, for a discussion of plant succession). Conversely, another area may have only one or a few communities similar in age and structure (that is, little diversity) and may be a good candidate for improvement in diversity.
Edge may be affected by cutting or planting. In this 4-H Leaders’ Guide we will discuss these approaches in the context of odd area management.

**Wildlife Species Needs Vary**

The habitat needs of wildlife vary considerably from species to species. Some, such as the white-tailed deer, are able to live in a wide range of habitat conditions, although certain conditions are better than others. Deer can be found in remote areas of mature forest, in areas of extensive agriculture, and even in suburban settings. On the other hand, some species have very specific habitat requirements for some or all phases of their life histories. The wood duck, for example, must nest in tree cavities (or artificial nest boxes) with the entrance hole and cavity depth of certain dimensions and with location requirements regarding height above ground or water, distance from water, and orientation with respect to prevailing wind. Understanding these differences between species helps you to provide for those of particular interest to you and your group.

The food requirements of wildlife species differ. Their needs for food depend on their energy requirements, mobility, and winter survival strategy. Some wildlife migrate to areas of greater food availability (such as woodcock, waterfowl, and robins). Some store energy in the form of fat reserves and become inactive during winter (such as woodchuck and black bear). Others must manage on whatever food they can find (such as rabbits, ruffed grouse, and white-tailed deer). This latter group is often of greatest interest to us because we can help them the most.

Food is not the only habitat element we can improve. The need for cover, especially nesting cover, which is a limiting factor for some species of wildlife, can often be filled.

**Seasonal Needs Vary**

Wildlife needs for cover vary from season to season. For example, in spring ruffed grouse need two types of cover. The males have relatively specific requirements for their drumming sites: an elevated mound, stump, or log with both good overhead cover and horizontal visibility for a radius of about 50 to 60 feet in most directions but with a dense growth of brush within a 10- to 12-foot radius of the grouse for protection. Females need open woodland for nesting. In late spring and early summer brood cover is needed; herbaceous openings, where insects, a high-energy food for the growing young, usually abound, are best. But escape cover (dense undergrowth) needs to be nearby in case the brood is threatened. In fall, grouse eat high-energy foods that become available, such as thorn-apples, dogwood berries, and other fruits. In winter, buds of aspen, alder, apple, birch, and other trees and shrubs are key foods, so stands of such trees and shrubs become a habitat requirement.

Before your students make a plan for enhancing wildlife habitat, they should become familiar with the habitat needs of the set of species they are particularly interested in. One way to improve their knowledge of wildlife is for them to read about a species and then prepare a “species account,” a collection of relevant facts including life history descriptions and habitat needs.

Each member of your group should select a native species of wildlife from Table 2 (page 7) of IB 181, *Enhancement of Wildlife Habitat on Private Lands*, and develop a species account for it. At the next meeting of your group, each member can present his/her findings, including pictures or other visual aids. Through this sharing process, the group members will help each other learn more about wildlife in their area.
Outline of Information Included in a Typical Species Account

I. Common and Scientific Name (most current)

II. Description
   a. Text
      1. How to identify; how to tell one kind of animal from another
      2. Weight, size, color patterns, male and female differences
   b. Drawing, photograph

III. Distribution and Abundance in New York and Possibly in North America

IV. Life History
   a. Breeding and reproduction characteristics
   b. Population characteristics
   c. Movements (seasonal changes, home range size)
   d. Sociability (including territoriality)
   e. Food
   f. Growth and nutrition
   g. Mortality

V. Habitat: Food, Cover, and Water Requirements

VI. Management in New York State (if appropriate)
   a. How is the species managed
   b. What are the management goals

VII. Economic and Social Values
   a. Positive
   b. Negative

VIII. Methods of Control (if appropriate)

IX. Continuing Personal Observations of the Species

Meeting 2

At this meeting the group members should present their species accounts. Your job will be to encourage questions. Be especially sure that they consider food, cover, and water requirements. Try to get the group to think about how habitat for each species could be improved by human intervention. What activities can they suggest to enhance living conditions for wildlife? How time-consuming, long-lasting, costly, or practical are these suggestions? It is also important for the group to begin to think about interactions among species. Predator-prey relationships (fox-grouse) and competition for food (deer-turkey-squirrel) should be considered. Based on the species accounts your group could try to put together a web of interactions, including shared food items, compatibility of cover preferences, predator-prey relationships, and vegetation modifications (for example, deer eat vegetation and beaver flood areas) each species is capable of. (Refer to IB 175 for a discussion of food webs.) The insights gained from this presentation/discussion meeting will be used in Activity 2.
Activity 2

Inventorying and Planning for Wildlife Habitat Enhancement

Objectives
To help youth:
- understand and identify the elements that make up suitable habitat for wildlife
- develop a conservation ethic and a sense of husbandry toward wildlife
- learn about the many sources of information on enhancing wildlife habitat

Materials and Equipment
- topographic maps (including one mounted on cardboard for instructional purposes), aerial photographs, soils maps of the area where habitat work will be conducted
- acetate overlay materials
- pencils and marking pens
- masking tape
- clear plastic rule

Teaching Aids
- a book on mapping (for example, *Mapping* by D. Greenwood)
- county soil survey

Meeting 1
Explain that this activity will be accomplished in three phases. During this first meeting the group will be introduced to some important information sources about the land where the wildlife habitat enhancement work will take place. This orientation will make the group's first visit to the site more meaningful. Examples of a topographic map, soils map, and aerial photograph can be found in Appendix 3 of IB 193, but actual maps and photos of the area are better if you can get them.

The first document to review is a topographic map of the area. This map will provide valuable information on slopes, waterways, roads, buildings, pipelines, and transmission line right-of-ways. A topographic map allows you to locate the site in relation to other nearby physical features that may provide clues about the habitat characteristics that should be encouraged in your area. Use a cardboard model to show how a topographic map is read.

Soils maps provide information on the general soil properties of the site and help identify potential problems in working with those soils. Soil conditions may be inappropriate for certain plantings—too wet, too dry, nutrient poor, too acid, or too sweet. Areas of poor drainage as well as potential spring locations can be determined from a soils map. Most county soils survey reports contain a section on soil suitability for wildlife that may provide helpful clues.

Aerial photographs may give a more complete picture of your wildlife habitat work site, depending on their scale and the date of the flight. Vegetative features not apparent from topographical or soils maps may be clearly visible from an aerial photograph. Tentative locations for habitat improvement projects can be chosen using all these standard map resources. County or town planning boards may have maps on a more appropriate scale, and these agencies should be contacted. It is also possible that your county Soil Conservation Service office has prepared a map of the property, so check there, too.

From these maps and other information sources, your group can prepare a base map of the site where the wildlife habitat enhancement activities will be conducted. This base map should include the boundaries of the property and the locations of streams, ponds, buildings, and roads. The acetate can be used to make one overlay showing different vegetative patches. The location of cultivated fields, old fields, forest plantations, natural woodlots, and other such features should also be marked on this overlay. Areas that seem particularly appropriate for any of the activities to be conducted should be noted. They can be checked out during the first field trip.

You may want to view the property as consisting of several general habitat compartments, especially if the parcel is moderate to large (that is, greater than 10 acres [4 ha]). Compartments are delineated for convenience in doing habitat enhancement work. Be sure the same habitat characteristics are noted for each compartment. Compartmentalizing habitats helps in planning by defining areas with different characteristics and thus different management potential. Compartments for this project should be limited, if possible, to 5 acres (2 ha) or less. Each compartment should be viewed separately for its potential for wildlife habitat enhancement. Some compartments may not be suitable to any wildlife enhancement work because of conflicting land use. In others, habitat improvement may be possible in the entire area. An acetate overlay should be drawn to show the location of each compartment.

Develop a list of wildlife management objectives for each compartment, including a schedule for activities. It will be easier to make this list after you have visited the site and assessed the types of wildlife that might be present and the possible limiting factors. This information will give you an idea about what habitat enhancement activities might be feasible for that compartment. During
this process your group should develop compartment cards and a journal to keep track of progress and to record activities and observations. A discussion of management compartments and suggestions on compartment cards and a journal format can be found on pages 21-27 in Appendix 3 of Wildlife and Timber from Private Lands: A Landowner's Guide to Planning (IB 193). A general discussion of wildlife management planning, including an example of a base map, can be found on pages 16-18 of Managing Small Woodlands for Wildlife (IB 157).

Before the close of this meeting be sure to announce that the next meeting will be the field trip. Specify clothing or equipment needed, time of departure, place of departure, destination, and time of return. Be sure to take along the base map and other materials (field guides, compasses, pens, pencils) for checking and orientation in the field.

**Meeting 2**

The primary objectives for this site visit are to become generally familiar with the site: to verify the existence and location of vegetative and physical components that were identified using the resource materials during Meeting 1 of this activity; to determine which wildlife species use the site and the condition of the habitat available for those species (that is, conduct a wildlife resource inventory); and to refine your original management compartment boundaries. For the purposes of this project, fulfilling these objectives does not require precise measurements.

You may wish to seek the assistance of a wildlife biologist, forester, botanist, or other naturalist on the field trip. These people may be able to help your group identify habitat management potentials or wildlife needs. But a specialist is not necessary to make a field trip successful. By following field guides (see Appendix 4, page 53, in Wildlife and Timber from Private Lands: A Landowner's Guide to Planning (IB 193)) your group can learn a great deal about the site on its own. Remember, you now have some wildlife species “specialists” within your group because of their previous work on species accounts. Here are some suggestions for a productive site visit:

1. First, walk through the area simply to get a “feel” for the situation. Encourage questions and sharing of observations.
2. Review the original compartment outlines. Are any changes necessary?
3. Divide the group into work parties. This can be done several ways: If you are dealing with more than one compartment, assign one to each subgroup. If you are concentrating on one compartment, give specific tasks to the subgroups. For example, one subgroup could look for and identify (keeping records of the findings) wildlife and wildlife signs; another subgroup could identify trees and shrubs, noting their location and value to wildlife.
4. Save some time before leaving the site for a reporting session. During this time each subgroup can share with the entire group the results of its studies. Encourage discussion about the wildlife habitat needs of various species and the habitat enhancement possibilities for the site. Use this time to sketch out some changes or refinements of wildlife objectives for each compartment that should be considered during your next meeting. Record all notes, observations, and thoughts in a field journal—remember, “the palest ink is stronger than the best memory.”
Meeting 3

During this meeting the wildlife habitat management plan outlined during meeting 1 should be carefully reviewed in light of the findings and observations made during the site visit. It may be useful to review the section on preparing a management plan in *Wildlife and Timber from Private Lands* (IB 193).

All maps should be reviewed and corrected if necessary. Acetate overlays should be prepared showing locations selected for specific wildlife enhancement activities. Compartment cards should be prepared (if more than one compartment is involved), and a narrative for the plan should be written. Try to develop a schedule of your activities based on your meeting dates and the number of meetings to be devoted to each activity.

After completion of the plan, try to have it reviewed by a wildlife biologist. His or her insights and critique could be very instructive; they could be shared with the group directly or through you.

Do not become bogged down in your planning or paperwork. It is important to follow the steps outlined and to have a basic plan to work from. But too much planning and paperwork can become boring to young people, who are eager to "do something" on the ground that will give them a sense of accomplishment.
Importance of Wild Apple Trees to Wildlife
Wild apple trees, if tended properly, can be an extremely valuable source of food for many species of wildlife. Wild apple trees and old, overgrown apple orchards abound in the Northeast. There are many ways we can enhance their value to wildlife. (Refer to Project 3 in IB 181, pages 12-13.)

Plantings and Plants
Plants are necessary to wildlife as food, protective cover, and a forage base (for example, leaf-eating insects eaten by birds). The values to wildlife of various trees, shrubs, and vines are given in Managing Small Woodlands for Wildlife (IB 157, Appendix 1, pages 23-26). Procedures and considerations for improving the food element of wildlife habitat by establishing plantings or working with existing food plants are given in Project 8 of IB 181 (pages 29-35). Another good reference is American Wildlife and Plants by A. C. Martin, H. S. Zim, and A. L. Nelson.

Creating and Maintaining Openings
Openings of primarily grasses and weeds of various species are important to the early life stages of many wild animals. Cottontail rabbits use such areas for nest sites. Turkey and ruffed grouse broods use woodland openings extensively as feeding areas because nutritious insects are often plentiful in these areas. The creation of openings in woodlands through patch clearcuts may provide valuable wildlife habitat. An equally important activity for your youth group is to maintain existing openings.

Openings will not remain so forever. The natural process of plant succession will take place, with woody plants replacing herbaceous plants and the former opening eventually becoming a young forest stand. To slow down or prevent this natural process, woody stems should be removed or deadened. Portions of the open area may be mowed annually or brushy growth could be cut every few years. Other ideas can be found in Project 9 of IB 181 (pages 36-37).

Odd Area Management
Hedges, turn-rows, ditch banks, and field borders are examples of odd areas commonly found on agricultural land. They often provide food and cover for a variety of wildlife such as cottontails and ring-necked pheasants. Considerations for managing odd areas can be found in Project 10 of IB 181 (pages 38-39).

Artificial Feeding of Wildlife
All of the preceding activities for wildlife food enhancement except food planting depend on manipulation of natural plant food sources to make them more productive for wildlife. Another approach is the artificial provision of food. This is a common practice for birds—as witnessed by the millions of backyard and window bird feeders that are found across this country. Extending this concept of artificial feeding to other wildlife such as deer contains some pitfalls. In some areas artificial feeding may further increase an already overcrowded population and may be extremely expensive if many animals are drawn to the feeding site. Dependence on artificial food supplies is dangerous for wildlife, so artificial feeding should not be undertaken without considerable forethought. An advantage to artificial feeding is that you can draw wildlife to a desirable location for observation, which otherwise might be very difficult. A discussion of the considerations you should make and examples of some wildlife feeding stations are given in Project 6 of IB 181 (pages 26-27).

Objectives
To help youth:
- understand the elements that make up habitat for wildlife through firsthand observation
- work with nature to enhance the food element in wildlife habitat
- develop a sense of husbandry toward wildlife and a land conservation ethic through hands-on experience

Materials and Equipment
- lightweight chain saw
- pruning saw with a 10-foot handle
- long-handled pruning shears
- as
- fertilizer (5-10-5 or 10-10-10)
- materials for an artificial feeding station (lumber, nails, spikes, chicken fence, wire); types and amounts of materials needed will depend on the kinds and number of feeding stations to be built
- rake
- seeds for food plot

Teaching Aid
• Enhancement of Wildlife Habitat on Private Lands (IB 181)
Activity 4

Providing Cover for Wildlife

Objectives
To help youth:
- understand the elements that make up habitat for wildlife via firsthand observation
- work with nature to enhance the cover element of wildlife habitat
- develop a sense of husbandry toward wildlife and a land conservation ethic through hands-on experience

Materials and Equipment
- chain saw and safety equipment
- gloves
- ax
- tiles
- drill and bit
- shovel
- pick

Teaching Aids
- Enhancement of Wildlife Habitat on Private Lands, IB 181

Brush Piles as Cover for Wildlife
Brush piles, if constructed properly, will provide cover for and be used by a variety of wildlife including cottontail rabbits, weasels, white-footed mice, and some songbirds. The secret to the durability and high wildlife use of brush piles is in their construction and location. Base materials, size specifications, and building instructions for wildlife brush piles are given in Projects 1 and 2 of IB 181 (pages 8-11).

Den and Cavity Trees—Natural Homes for Wildlife
Dozens of wildlife species use tree cavities for nest sites and shelter (see Managing Small Woodlands for Wildlife [IB 157], Appendix 2, pages 27-29, for a list of birds and mammals that use den and cavity trees). Some species, such as the wood duck, require cavities for nesting, and the lack of suitable tree cavities may be a limiting factor for such species. Suggestions for preserving and creating snags and den trees are given in Project 4 of IB 181 (pages 14-18). Also included are recommendations for the appropriate number of snags in woodlots.

Nest Boxes—Artificial Homes for Wildlife
When natural den and cavity trees are scarce, shelter can often be provided for wildlife by building and placing artificial nest structures. Most people are familiar with various birdhouses, but many do not realize that properly built artificial nest structures will often be used by mammals. Birdhouses should be constructed according to specifications for the particular bird you wish to attract. Specifications for a variety of birdhouses and instructions for building dens for squirrels and raccoons are given in Project 5 of IB 181 (pages 18-25). Instructions for an artificial rabbit burrow, which can be used in conjunction with brush piles or separately, are also included.
Activity 5

Improving
Water Availability
for Wildlife

Some species of wildlife routinely use pools of fresh water for drinking. We can easily enhance the available water supply for these animals by digging out and enlarging spring seeps and by deepening pools of small or intermittent streams. This practice requires no special skills or tools and can pay off substantially because the new watering holes become excellent areas to observe wildlife. A major consideration in enhancing water sources in this way is the location of the water hole, though in some areas you may not have a choice of locations. Refer to Project 7 of IB 181 (pages 28-29) for more suggestions on improving spring seeps and small streams.

Objectives
To help youth:
- understand the elements that make up habitat for wildlife
- via firsthand observation
- work with nature to enhance the water element in wildlife habitat
- develop a sense of husbandry toward wildlife and a land conservation ethic through hands-on experience

Materials and Equipment
- shovel
- pick
- plastic sheet

Teaching Aids
- Enhancement of Wildlife Habitat on Private Lands, IB 181
Activity 6
Space:
The Elusive
Habitat Element

Objectives
To help youth:
- understand the elements that make up habitat for wildlife via firsthand observation
- understand the relationship of wildlife species’ needs for space to the availability of food, cover, and water
- develop an ecological perspective toward wildlife habitat enhancement

Effects of Previous Activities on Habitat Needs of Wildlife
This activity is designed to help your group begin to tie together the preceding concepts and activities. It is intended primarily to generate discussion and sharing of ideas and observations. A consideration of space rounds out the educational objectives of the entire project.

It is physically impossible to increase the amount of space available for a species of wildlife, but it is possible to reduce the amount of space required by an animal to survive. That is, increasing the amount and quality of other habitat elements may reduce the amount of living space an individual animal requires. If habitat is improved so that adequate food for a cottontail is available on 1 acre (0.4 ha) rather than on 2 acres (0.8 ha), the “space” available has effectively been increased by one “rabbit’s worth.” Of course, most animals have behavioral space requirements (for example, breeding territories) as well as physical space requirements. Also, because of their nature, some animals such as the black bear require much more space than can be affected by the activities suggested in this publication. Nevertheless, your group can discuss how the activities of this project have affected space availability for some species. Review the habitat requirements of various species discussed in Activity 3.

One part of this activity could be to have your group construct a map overlay illustrating the average space requirements of common species in the work area. This map could depict home ranges and breeding territories from which an estimation of the potential number of individuals or family units could be made. A particularly useful exercise would be to develop two such overlays for each species, showing the area before and after the group’s wildlife enhancement work. Comparison of the two will help demonstrate the potential impact of the habitat enhancement efforts. Much of this activity will be based on best guesses and estimates.

The following questions could be addressed by your group to stimulate discussion:
- What factors might limit the extent to which the space requirements of wildlife can be reduced?
- Which habitat element (food, cover, water) seems to affect the space requirements most for species in your work area?
- Does the limiting effect of a habitat element seem to vary for different species, for example, small mammals vs. large mammals, mammals vs. birds?
- How do the space requirements of one species affect those of another (for example, predator-prey relations?)
Activity 7
Checking Results

Observing Wildlife—Tips for the Beginner
The effort one might expend in observing wildlife can vary from a leisurely walk to carefully planned study. You can improve your chances of observing wildlife by being at the right place at the right time. The right place may be the intersection of two runways for white-tailed deer, near a den tree for squirrels, or beside a wooded stream or pond for raccoons. The right time is usually just before dusk or just after dawn, the times many species of wildlife are most active.

You can also improve your chances of seeing wildlife by using blinds, which help hide your movements from wary animals so you will be less likely to scare them away. Blinds can be constructed from natural materials such as brush or from artificial materials such as camouflage netting made especially for that purpose. You can camouflage yourself by wearing appropriate clothing and remaining very still. Some animals, especially predators, can be attracted to your observation site by calls that imitate distressed prey, such as an injured cottontail. This tactic is especially effective at night and can be very exciting. No more than three youngsters should be in each group if predator calling is attempted.

Another technique for observing wildlife is to attract them to an area by baiting. This is suggested as a onetime effort to attract animals close enough for observation, not as a long-term management activity.

Finding and Recognizing Wildlife Sign
Observation of indirect evidence (wildlife sign) of wildlife activity or past presence is another way to check the results of your wildlife habitat enhancement work. Often this is much easier than actually seeing the animals themselves, especially for particularly wary animals (such as foxes) and those most active at night (such as raccoons and opossums). There are several types of sign you can look for, as discussed below.

Tracks
Look for tracks in snow, soft ground (for example, sand), and mud adjacent to wet areas. They can be identified by using the Peterson’s field guide. You may want to make plaster casts of various tracks; directions are given in Field Guide to Animal Tracks by Olaus Murie. Sometimes you can create soft ground in likely activity areas in order to have a better chance of detecting tracks.

Feeding
Some animals, especially chipmunks, red squirrels, and gray squirrels, leave midden piles at sites where they feed frequently. These are piles of seed husks and nut shells discarded by the animal. You may also find evidence of feeding by deer on woody twigs, especially hardwood seedlings that have been browsed (end of twig and bud torn off with ragged appearance). Rabbits sharply “chp” twigs and chew the bark of various tree seedlings/saplings (especially apples) and shrubs. This type of feeding may be especially evident on raspberry and blackberry canes. Partially eaten apples are a sign of wildlife activity—the size of the tooth marks is a clue to the identity of the animal that was feeding on the fruit. Turkeys leave tell-tale inverted “V”-shaped scratchings in the leaves in areas where they have been foraging for mast. Deer also paw through leaves for mast.

Scats
The fecal droppings (scats) of various animals are sure clues to the identity of animals using an area. A useful reference for scat identification is Olaus Murie’s Field Guide to Animal Tracks.

Objectives
To help youth:
• Realize by firsthand experience and observation that wildlife respond to habitat improvement, thereby reinforcing concepts presented in Activity 1.
• Develop observational skills.
• Learn about wildlife food habits and activities.
• Measure their accomplishments and evaluate results of their work.

Materials and Equipment
• Camera and film.
• Clipboard, paper, field journal, pencils, pens.
• Binoculars, spotting scope.

Teaching Aids
• Field guides (see Wildlife and Timber from Private Lands, IB 193, Appendix 4, page 53).
• IB 193 (pages 23-27).
• New York’s Wildlife Resources series and species accounts, available from Department of Natural Resources, Cornell University.
Other Signs
- Grouse dusting spots
- Deer beds (look for deer hair)
- Fur caught on trees and fences
- Raccoon hair on bark of suspected den trees
- Buck rubs and scrapes
- Feathers
- Nests (bird and mammal), dens, and burrows
- Overturned rocks and ripped-up logs or stumps
- Holes dug out in search for food
- Scent posts, marking posts, and scents (skunks)
- Remains of prey
- Trails and runways
- Scratches on logs or bark of trees

Nature Photography
Photographs can provide a vivid record of the wildlife habitat enhancement activities of your group, of wildlife observed, and of wildlife sign found. The skills needed for successful wildlife photography are much the same as those needed by successful hunters, and many of the challenges are similar. This activity can be very rewarding and maintain enthusiasm for wildlife habitat enhancement work by members of your group.

A discussion of wildlife photography is beyond the scope of this guide, but some helpful resources are A Home Study Course in Bird Photography, available from Laboratory of Ornithology, 159 Sapsucker Woods Rd., Cornell University, Ithaca, N.Y. 14850, and Kodak customer service pamphlets, available from Eastman Kodak Company, Consumer/Professional and Finishing Markets, Rochester, N.Y. 14650.

Books on nature and wildlife photography can be found in your local or school library.

Recording Your Observations
In addition to photographic records you may develop, a written record of wildlife sightings and habitat changes is important in checking the results of your wildlife habitat activities. These can be included with the wildlife enhancement plan document developed for the area. Two formats for keeping track of wildlife responses to your activities, a journal and species account, are given in Managing Small Woodlands for Wildlife (IB 157, pages 18-21). Everyone can contribute to journal notes, but you might want to assign the development of species accounts to individuals, each having their own species to focus on.

Sharing with Others
Often, young people want to know if they can make fair displays or have similar sharing activities as a result of a particular project. As in most other projects, the sharing activities in this one are limited only by the imagination. A few examples are listed here to stimulate your thinking:
- Models, drawings, or photographic displays of the project
- Notebook containing a species account and observations on the species
- Field notes detailing the entire project
- Illustrations of wildlife needs
- Displays showing wildlife food habits
- Comparisons of wildlife species and numbers before and after improvement activities
- Nest boxes


New York's Wildlife Resources Series. Department of Natural Resources, New York State College of Agriculture and Life Sciences, Cornell University, Ithaca, N.Y. For a current listing of species accounts available, contact Extension Secretary, Department of Natural Resources, Fernow Hall, Cornell University, Ithaca, N.Y. 14853.