

MOOSEHORN NATIONAL WILDLIFE REFUGE,
U.S. FISH AND WILDLIFE SERVICE

MAINE AGRICULTURAL EXPERIMENT STATION
UNIVERSITY OF MAINE

A Landowner's Guide to
Woodcock Management in the Northeast



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PREFACE

The American woodcock holds a special place among birds of eastern North America. The woodcock's unique courtship performance has made it a favorite of bird watchers. Also, its tendency to remain immobile or "freeze" in time of danger has made it a favorite of sportsmen who seek their quarry with highly trained pointing dogs.

For nearly five decades wildlife biologists have studied the life history of the woodcock and the factors affecting its welfare. The ultimate aim has been to insure that woodcock can be maintained in adequate numbers, in the face of increasing human demands on natural resources, and with decreasing wildlife habitat. From the biologists' studies several important publications have resulted, especially in the northeastern states, which are in the heart of woodcock breeding range. These publications emphasized the biology of the bird and its environmental needs. They treated only in general terms the specific steps that the small landowner could take to enhance his property for woodcock by economically feasible methods. The present booklet is aimed at filling that gap. It is for the landowner who is not a biologist, but who wants to do something for woodcock on his or her own land. The authors are to be commended for a timely how-to-do-it presentation.

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INTRODUCTION

Wildlife habitat changes as a forest grows older. Wildlife dependent upon particular stages of plant growth also change; some species decrease while others increase. Old farms growing back to forest make ideal woodcock habitat. Unfortunately, in the northeast, the peak of farm abandonment has passed. Much of the land has grown to forest now too old for woodcock and other wildlife that need young forest stands (Figure 1).

Many of us have watched our favorite woodcock covers come and go. It all started as alders began to appear at the edge of an abandoned field. Slowly they spread and in less than 10 years completely covered the field. Woodcock use was high at that time and remained so for another 10 years. Then shade tolerant trees began to invade, the alder died; woodcock no longer found the cover attractive.

Landowners can reverse these trends locally. Woodcock habitat can be managed. When a landowner cuts or burns to improve his forest, woodcock and other wildlife can benefit. Deer, grouse, snowshoe hare, beaver, and a variety of song birds also seek vegetation found in a well managed young forest. In addition, while making the habitat attractive to wildlife, the landowner may realize a cash return from firewood or pulpwood and sawlogs.

Most of the management suggestions in this guide were tested at the Moosehorn National Wildlife Refuge near Calais, Maine. The refuge was established in 1937 to develop, test, and demonstrate woodcock management techniques. Woodcock studies by Gustav Swanson, Howard Mendall, and Clarence Aldous began during the late 1930's; Eldon Clark continued studies in the 1950's and early 1960's. Today work continues with the objective of developing inexpensive methods useful to the small landowner who wants to improve his land for woodcock. Our suggestions are based on 6 years of testing at the Moosehorn Refuge as well as upon results of previous studies. This guide covers the biology of the woodcock, its habitat requirements, and management techniques used to improve woodcock habitat. Actual management situations are stressed.

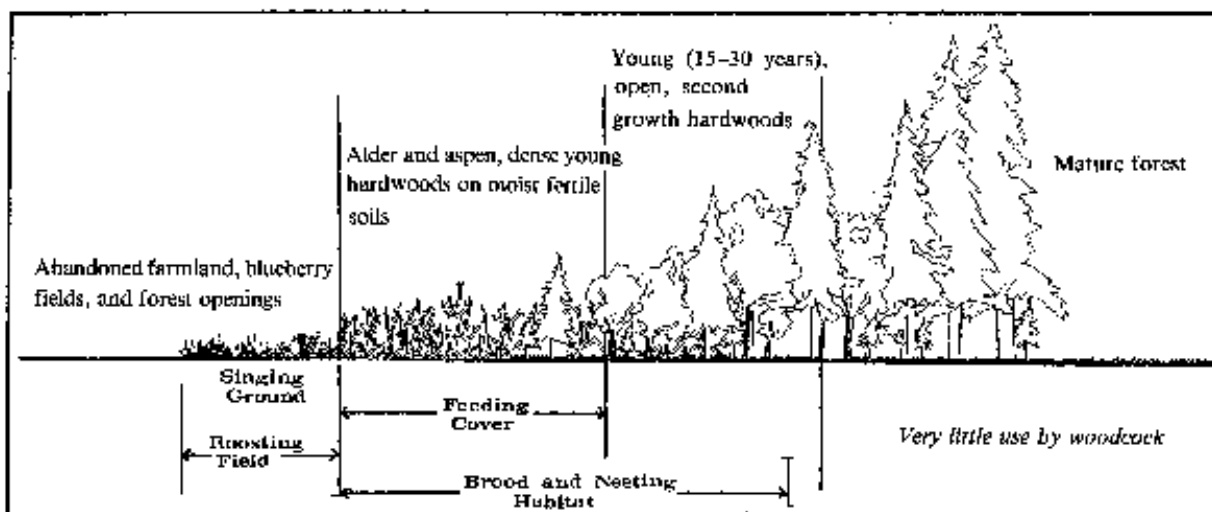


Figure 1. The stages of forest succession used by woodcock.

NATURAL HISTORY

The literal translation of the woodcock's scientific name, *Philohela minor*, is "little lover of swamps or bogs", but the woodcock has numerous local names such as timberdoodle, bogsucker, and Labrador twister. As its name suggests it is a bird of the forest even though it looks like and is classified as a shorebird.

The woodcock's mottled, brown coloration blends with the leaf pattern of the forest floor (Figure 2). Short rounded wings permit flight in dense cover. Its large eyes, set far back on the head, provide the bird a wide viewing angle. The specialized bill is about 2½ inches (6.4 cm) long with a flexible tip allowing it to seize worms and insect larvae while probing in the soil. Females weigh about 7 oz. (200 g) while males average 5.3 oz. (150 g).

The range of the woodcock is chiefly eastern North America from southern Canada to the Gulf states. Most of the birds breed in the North and winter in the South (Figure 3).

Spring Migration and Courtship

Migration begins in late January or early February in the southern part of the wintering range. Woodcock arrive in the Northeast from mid-March to early April. Soon after arrival the male woodcock begins performing courtship flights over an opening called a "singing ground." The singing ground may range from less than 1 acre (0.4 ha) to over 100 acres (40 ha) and is usually an abandoned field, forest cutting, or other opening.

Male courtship activities last for 30 to 60 minutes at dusk and dawn and throughout the night when the moon is full. Individual flights last from 40 to 60 seconds. Each flight is followed by a ground display during which the male utters a series of nasal "peents". The entire performance is repeated



Figure 2. An incubating hen blends well with its surroundings (USFWS Photo).

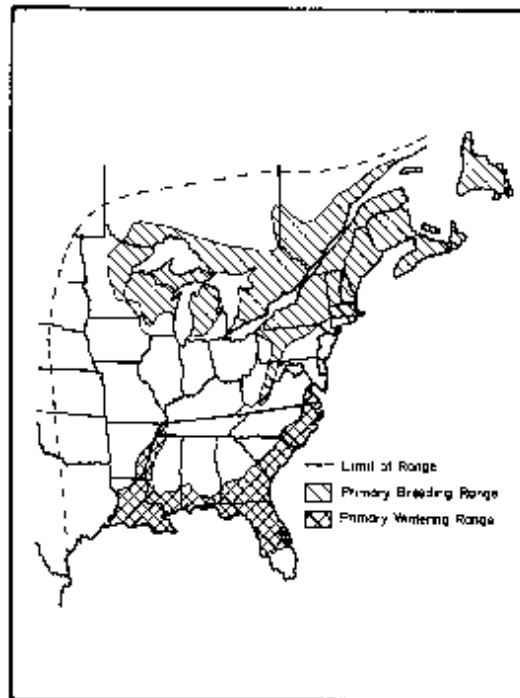


Figure 3. The range of the American woodcock.

10 to 20 times during each courtship session. In Maine, the male birds court from the time of their arrival in late March until May or early June. The function of these flights and calls is to attract females for mating.

The daytime habitat of the male woodcock is usually close to the singing ground. Daytime sites generally have moist, rich soils with plenty of earthworms and dense overhead cover of young alders, aspen, or birch.

Nesting

In the Northeast, woodcock begin to nest in April (Figure 2). Nests often are within 100 yards (90 m) of an occupied singing ground. Young, open, second growth woodlands are the most desirable kind of nesting cover (Figure 4). The nest is a shallow depression lined with a few leaves (Figure 5). Occasionally twigs or stems may be placed around the edges of the nest. Most nests contain 4 brown, pink, and gray mottled eggs. About 75 percent of all nests started by females hatch. Eggs generally hatch in May (Figure 6) after an incubation period of 19 to 22 days.

Brood rearing cover is similar to nesting cover except that areas with either bare ground or dense ground cover are avoided during the first few weeks. At this time the main diet of the young woodcock consists of insects and worms.

The chicks are able to leave the nest soon after hatching, can fly short distances at 2 weeks, and are almost fully grown by 4 weeks. By early June most young woodcock can fly well and are no longer dependent on the female. Most young remain in the general vicinity of where they hatched until the fall migration.



Figure 4. Young hardwoods, often with scattered small conifers, are typical of good nesting covers (Photo by Michael Haramis).



Figure 5. Woodcock nest. (Photo by U.S. Fish and Wildlife Service.)



Figure 6. A two day old chick posing after banding (Photo by Greg Sepik).

Roosting

In the early summer woodcock begin to use roosting fields at night in the vicinity of their daytime covers; many of these roosting fields also served as courtship sites in the spring (Figures 7 and 8). Blueberry fields and reverting farm fields are common roosting areas. Sometimes 30-40 woodcock may be found roosting in a 4 acre (1.6 ha) field at night. Woodcock fly into the fields at dusk and return to daytime covers at dawn. Most of the time in the fields is spent resting.

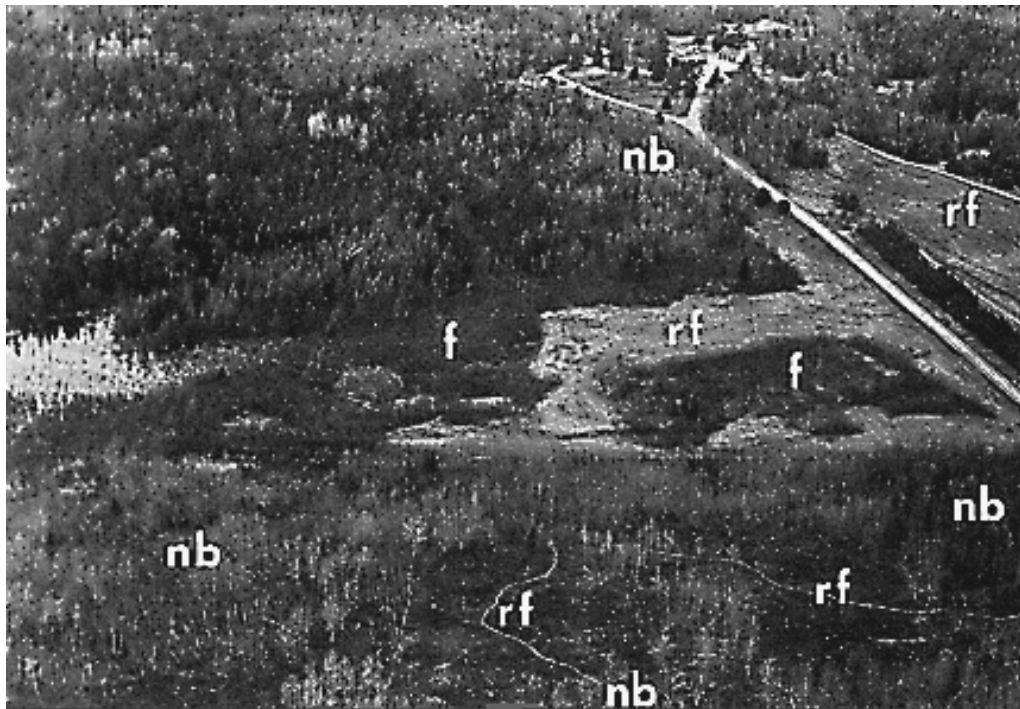


Figure 7. Roosting fields (rf) surrounded by feeding (f) and nesting and brood habitat (nb) (Photo by Greg Sepik).



Figure 8. All the components for good woodcock habitat are illustrated. This is another view of the habitat shown in Figure 7. The same labels apply. Note the variety of vegetative types (Photo by Michael Haramis).

Feeding

Earthworms make up 50 to 90 percent of the woodcock's diet. Alders and second growth forest located on fertile, moist soil with many earthworms are favorite feeding sites. Other animal foods, such as beetles and fly larvae, are also eaten.

Fall Migration

Fall migration begins during October following the first heavy frosts and lasts through November, depending upon weather. Young birds tend to utilize coastal routes while adult birds use more inland routes. Breeding woodcock from the eastern states and provinces winter in the Southeastern United States (Figure 3).

Habitat Requirements

Woodcock abundance is closely related to the availability and quality of four distinct types of habitat (Figure 1). Clearings are necessary to provide a courtship area for males. Good nesting and brood rearing cover consisting of young, second growth hardwoods must be near the clearings. Also of great importance is the need for abundant feeding covers made up of alders or dense stands of young hardwoods on moist, rich soils. Lastly, woodcock require large fields to roost in at night. The lack of these requirements means woodcock may be absent or greatly reduced in number.

GETTING STARTED

The Inventory

The most important step in the management process is an inventory of your land and some knowledge of your neighbor's property. An initial sketch outlining different habitat types often can be made while resting in front of a roaring fire in the middle of the winter. Details can be checked later during a Sunday afternoon stroll through the back forty. For many landowners this outline is

sufficient. However, if your land holdings are large or contain a variety of habitats, a more detailed inventory may be preferred.

An inventory can be made using an aerial photograph. Photos can be purchased from the Soil Conservation Service or from local engineering firms specializing in aerial photography and mapping. A scale of 1 inch = 660 ft. (200 m) is convenient. Major landmarks, openings, and habitat types are easily seen. With a little practice some trees and shrubs also can be identified. You may wish to purchase aerial photos taken 10, 20, or more years earlier if available. These older photos will vividly reveal previous land use and may help define boundaries for your current management.

If you choose to conduct a comprehensive inventory, the next step is to prepare an overlay map or tracing from the aerial photo (see Figure 19). First, on the photo, outline different types of vegetation or cover such as fields, alder thickets, oak ridges, softwood patches, etc. Next, trace the outline of these covers onto a clean sheet of paper and briefly describe each cover. This tracing is called an overlay or cover map. A field check may be necessary at this time to accurately describe some of the cover units. You may wish to enlarge all or portions of your map in preparation for developing the management plan.

Setting Your Objectives

Now it is time to decide exactly what your goals are. A combination of your goals and the inventory will indicate the management potential of your land. Some possible goals are:

1. Improve the land for woodcock and other wildlife.
2. Improve the land for woodcock and other wildlife while providing firewood for home use.
3. Improve the land for woodcock and other wildlife while covering the management costs by the sale of wood products such as firewood, pulp, and sawlogs.
4. Maximum profit from sale of wood products while making small management alterations to benefit woodcock and other wildlife.

Caution—do not force your plan onto land that does not have the natural characteristics necessary to reach your goals. For example, softwood stands may not be suitable for woodcock management. Such land should probably be managed for other wildlife species and long term production of forest products.

Professional Help

At this point, or perhaps earlier, you may want some professional advice. County, state, or extension foresters can look at the property and recommend ways to harvest and market the timber. These professionals can also alert you to harvesting restrictions on ecologically sensitive locations such as deer wintering areas and streams. Private consulting foresters can be hired who will take care of the complete logging operation. Recommendations based purely on timber production may or may not be in the best interest of wildlife or more specifically, woodcock management. Some consulting foresters have training both in forestry and wildlife management.

The relative costs of various options will vary greatly with location, time, and the economy. Therefore, we have not attempted to give detailed cost figures for various management practices.

State wildlife biologists can be consulted to ensure that any proposed timber management is in the best interests of the desired wildlife species. These biologists can help interpret and modify the suggestions contained in this guide to fit any particular case.

Both the Cooperative Extension Service and Soil Conservation Service can provide information on the maintenance of old fields, planting of cover crops, commercial blueberry management, soil erosion, and wetlands management.

People in most of the above professions are public employees. Don't hesitate to call them if you need additional help; their advice is free.

The Ruffed Grouse Society (994 Broadhead Road, Coraopolis, Pennsylvania 15108) can also help. They are interested in all forest wildlife and provide management information in the form of guides and demonstration areas. They also have numerous State Chapters. There may be one near you.

MANAGING HABITAT

Outlined below are suggestions for managing vegetation to create daytime feeding, nesting, and rearing covers, singing grounds, and roosting areas. Specific techniques such as burning and clear-cutting are discussed. The particular management scheme you choose will depend on the kind of land, management goal, and the time and money available.

How to Create and Keep Daytime Covers

Good feeding (daytime) covers are essential for high numbers of woodcock. The useful life of an alder cover for feeding is short (Figure 9). Invading trees will begin to replace alders in less than 30 years and the cover is only at its best for about 10 years. Therefore, periodic rejuvenation of good covers is necessary (Figure 10). In covers where there are few dead stems or other kinds of trees, 70 feet (21 m) wide strips may be clear-cut (Figure 11). The clear-cut strips should be separated by uncut strips 280 feet (85 m) wide. The strips should be cut across any wet area or stream running through the cover. Differences in moisture result in varying densities of alder and rates of growth and provide a more constant supply of earthworms throughout the summer. Alder growth will be slow on the drier portions of the strips; thus openings for singing grounds will be retained longer. In moist areas alder growth will be faster and earthworms will be available later in the summer when the higher ground becomes too dry. New strips should be cut next to the old strips every 4 or 5 years. Thus, the entire cover will be cut and replaced about every 20 years.

In alders more than 20 years old, strips should be cut at 2-year intervals. The entire cover will then be cut over a 10-year period. The regular 20-year cutting cycle can be started during the second cutting rotation. If alders are only scattered in the understory, the entire cover should be clear-cut.



Figure 9. Horizontal alder stems are one indicator of a cover that is becoming too old for high woodcock use (Photo by Greg Sepik).



Figure 10. Small upright stems are typical of young alders often heavily used by woodcock (Photo by Greg Sepik).



Figure 11. Clear-cut growing back to alders. This opening may be used as a singing ground as long as bare patches remain. Within 5 years woodcock may be feeding in these areas (Photo by Greg Sepik).

A large rotary mower pulled behind a tractor can be used to clear areas containing trees and brush up to 4 inches (10 cm) in diameter; however, this method is expensive. Alternatively, local sportsmen's clubs might be contacted to do the work in return for hunting privileges or permission to train their dogs. Scout troops may be interested in doing the work as a conservation project. Students at a nearby school or college might do the work as a class project or for a wildlife management demonstration area.

Best results will be in covers located on soils where earthworms are plentiful, such as on old farms. Covers on muck soils generally have few earthworms. Work on such sites will result in little, if any, increase in woodcock. Covers which are relatively dry during the spring will be used for nesting.

Slash removal is desirable, but not necessary. Slash covering the site may discourage use by singing males, but careful felling to provide slash free areas or spot clearing of slash will provide attractive courting sites. Once the alders in the strip have grown enough to provide suitable feeding cover (7–10 years) the slash will have decayed.

Young aspen can also serve as good feeding or nesting habitat as long as the stand is located on soils capable of supporting earthworms. Aspen responds to clear-cutting by sending up sprouts along its roots. Sprouting can be increased if the area is cut after leaf fall and the slash is burned within one year. The resulting dense stands of up to 70,000 stems/acre provide good feeding habitat. As aspen stands grow older they provide excellent nesting and brood cover and also are attractive to ruffed grouse and deer.

Patches of softwoods growing on abandoned agricultural land can provide important daytime cover during warm weather and extended dry periods. Softwoods can be encouraged by weeding, thinning, or planting near alders. However, on many sites a constant effort is necessary to keep conifers from invading and overtopping the valuable alder stands.

Herbicides can be used to regenerate daytime covers. Herbicide applied as a foliage spray will top kill alder and promote new sprout growth. Two applications from a backpack or small tank sprayer at 2-week intervals are necessary for an adequate coverage of all foliage. The best time for application

is shortly after the leaves have attained full size. Herbicides should be applied on still days to decrease drift. Spraying on very hot days is less effective and should be avoided. This technique is far less labor intensive (3 man-hours/acre) than clear-cutting (160 man-hours/acre) and has no effect on earthworm numbers. However, since the woody vegetation is left standing when using herbicides the very important but temporary singing grounds provided by clear-cutting are not available.

Contact your local forest or agricultural extension agent for current information before using any herbicide. Remember, herbicides are poisons; don't experiment! Use herbicides as directed on the label.

Creating Singing Grounds

Creating forest openings where few are present often increases the number of courting males (Figures 12 and 13). The best place to make the openings is in the feeding covers, thus providing singing grounds and at the same time improving the feeding sites. Clear-cut strips described above under Daytime Covers are the best way to make these openings.

Clearings in the woods should be at least 0.5 acres (0.2 ha) where surrounding trees are taller than 25 feet (7.6 m) and in climates where snow persists into the spring. Openings with shorter surrounding vegetation can be as small as .25 acres (0.1 ha). Where possible, these potential singing grounds should face to the south and be rectangular. Complete slash disposal is best, but the removal of branches from two to three 100 square foot (9.3 m²) areas per clearing is satisfactory. Careful felling of larger trees will also provide open areas in a clearing.

The number of singing grounds required will vary with the amount and quality of other nearby habitats. To determine the number needed, cut 1 or 2 clearings each year until there is no further increase in singing males. During this period keep all of the singing grounds free of new tree growth.



Figure 12. This firewood clearing has been used by courting males (Photo by Greg Sepik).



Figure 13. Small clear-cut strips for firewood and commercial forest products create openings for singing grounds. These openings will become daytime cover, and still later be used for nesting and brood rearing (Photo by Ray Own, Jr.).

The useful life of a singing ground varies. If the clearing is cut in a hardwood stand new sprouts may soon reduce the attractiveness to woodcock. Sprout growth can be slowed if cutting is done in the summer. Sprout growth on isolated clearings is sometimes eliminated or held back by browsing deer. Treating sprouts with herbicides, fire, or by cutting for 3 or 4 years will eliminate sprout growth and decrease future maintenance. On the other hand, if a few singing grounds are created each year there is no need for annual maintenance.

Three criteria that increase the probability that clearings in hardwood areas will be used are: (1) feeding cover within 0.5 mile (0.8 km); (2) nearby brood and nesting cover; (3) and, of course, woodcock in the vicinity.

Places to Roost

Woodcock prefer to roost at night in fields of at least 3 acres (1.2 ha) (Figure 14). Fields of low bush blueberry, hay fields on poor soils, abandoned agricultural fields with shrubs invading, recently-harvested woodlands, and occasionally, pastures are used most often. Hay fields with thick, lush vegetation are seldom used. Roosting sites should be within 0.5 mile (0.8 km) of suitable feeding cover.

Traditional agricultural practices will suffice to maintain pasture and hayfields that are attractive to woodcock. If the fields are not being farmed there is the danger that invading vegetation soon will make the field unsuitable for roosting. However, this is not a problem if there are numerous fields in the vicinity since reverting farm land provides woodcock with feeding, brood, and nesting habitat. About one field per 100 acres (40 ha) should be adequate.

Singing grounds and summer roosting fields can be maintained by burning every 2 years to eliminate invading woody species (Figures 15 and 16). Adequate fire lines should be established and burning should occur as early in the spring as possible to prevent nest destruction. Mowing during the preceding fall will increase the amount of fuel on the ground and result in a more even burn. Be sure to contact your local fire warden or fire department for permits, details about local regulations, and advice before beginning.

Burning is also effective for removing dense slash from a harvested area to enhance use by woodcock. Slash can be piled and burned or burned in place. In either case professional help is mandatory. State or local fire personnel may be willing to conduct the burn as a training exercise.

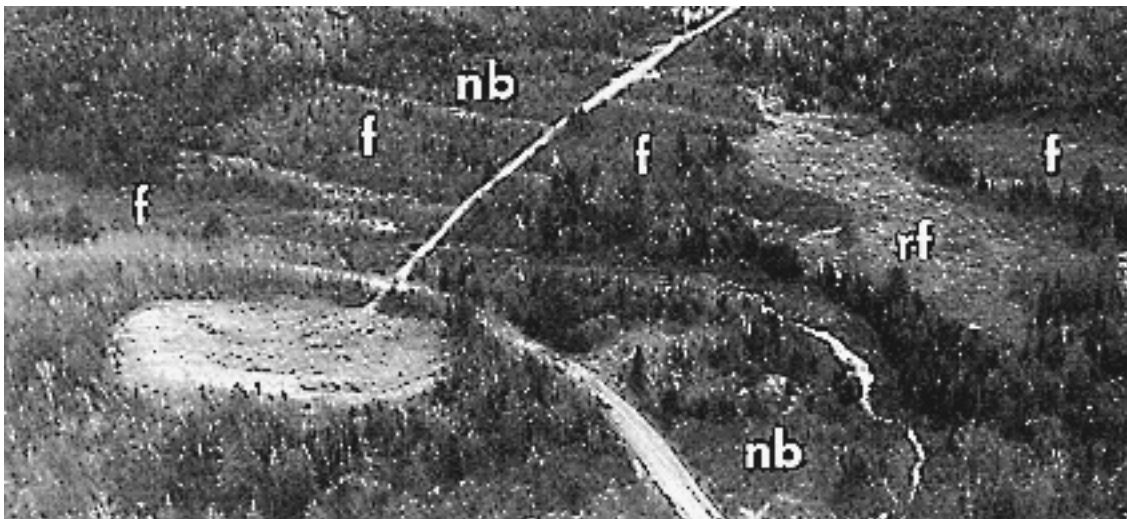


Figure 14. Roosting field (rf) maintained by burning. Note clear-cut strips to renew adjacent alders. These alder covers (f) also serve as good brood and nesting habitat (nb) (Photo by Greg Sepik).



Figure 15. Fire is valuable for removing slash and encouraging plants such as blueberry on roosting fields. Burning should not be done during the nesting season (Photo by Greg Sepik).



Figure 16. Adequate fire lines, use of a drip torch, and careful attention to weather help insure safe burns (Photo by Greg Sepik).

Mowing will prevent woody growth from invading hay or pasture land. If possible, mowing should be done late in the summer to prevent destruction of nests. Mowing also provides fuel for burning as noted above.

If no large fields are available, small fields can be enlarged or new fields can be created. Where there is a choice it is preferable to enlarge a field that is being used. It may be several years before woodcock will roost in a newly cut field, but an enlarged field usually is used immediately. The removal of slash is not necessary unless it is dense and there are few slashfree areas. Sprout control using herbicides or burning is needed in any new clearing. If blueberries are present, burning will encourage their spread. When a field is enlarged or created the initial clearing should be larger than the intended field. Allow a 50 to 100 foot (15-30 m) strip around the field to grow back. This strip will add to the brood and nesting cover.

When new fields are being created, and the work is hired out, the type of clear-cutting should be specified in writing. Some logging contractors will remove only the merchantable wood. If there are numerous small trees on the site the landowner may have to clear them himself or sell the stumpage cheaper to accomplish the extra work. The remaining trees may be cut by local people for firewood if there is sufficient demand.

Check your local laws pertaining to forest cutting practices before beginning. Some states restrict cutting along bodies of water and public roads. Also ask about incentive programs. The Agricultural Stabilization and Conservation Service offers incentives for forest improvement and fire protection.

MANAGEMENT EXAMPLES

There are many ways that land can be managed for woodcock. The techniques used will be based on past land use, the current forest inventory, as well as economics and aesthetics. Much depends on the personal philosophy of you, the landowner. The following section provides specific examples of how land can be managed to benefit woodcock. The first example illustrates the use of aerial

photographs in the management scheme. The second example shows a detailed long range management plan and the last case highlights the management opportunities for the small landowner.

Example 1: Management Plan for an Old Farm Using Aerial Photos.

This example illustrates how an abandoned farm now reverting to forest can be managed. It is typical of thousands of old farms in the east. Stone walls, rail fences, tangles of barbed wire, and overgrown orchards remain as testimony to the patterns of earlier land use. On this farm, as was often the case, the land was abandoned by stages. The farmer first stopped cultivating the fields on the poorer soils—or perhaps those farthest from the buildings. Sometimes farming continued in a pasture or hayfield near the buildings long after the rest of the area was left idle.

Thus, the old fences and roads often outline separate units of land with varying histories of land use. A corn field, abandoned in 1932, supports a mixed woodland with trees 40 or more years old. An adjacent unit, pastured until 1955, has much younger and uneven tree growth. And, the field near the road, where a neighbor bought the hay until 1976, presents still another distinct unit where the forest has not yet begun to invade. These areas in combination offer excellent possibilities for improving the food and cover for woodcock and other wildlife, but before improvements are made a management plan should first be prepared.

The first step in preparing a management plan is to purchase the newest aerial photos available (Figure 18), plus photos taken several years earlier (Figure 17). In this case the photos were taken 17 years apart and vividly reveal the loss of much of the open farm land. The old photos will also be used in determining the management boundaries as we develop the plan.

The second step is to define, on the most recent aerial photo, the lines of ownership. The farm is bounded on the east and south by the major roads. Although our management program will take place within these boundaries, the adjacent lands are equally important. For instance, the land to the east contains many fields which serve as woodcock roosting areas; therefore, roosting sites need not be of prime consideration on lands we are managing.

The major vegetation types, roads, and important man-made structures on both the farm and adjacent land should be traced from the most recent photos onto an overlay (Figure 19). This overlay provides a good working map which we can take with us to survey the land and check each of the major vegetation types. The inventory will give an idea of the quality and quantity of the wildlife habitat and potential forest products.

With the inventory completed, definite management objectives can be made. Be practical. Unrealistic objectives may yield poor results. This is a good time to arrange for professional help if you have any doubts. For this old farm our objectives are:

1. Keep for feeding places those areas of the farm currently in early successional growth, i.e., alder, aspen, willow. This will mean an outlay of labor and money for which there will be no financial return.
2. Maintain one small field for a possible cash crop, either hay or blueberries. This field will serve as a roosting site.
3. Manage the second-growth mixed forest for pulpwood and firewood on the poor sites, and quality sawlogs on the better sites. Management of the timbered plots will provide an economic return, but will also be oriented to providing quality habitat, including singing, nesting and rearing areas, as well as food for deer, hare and other wildlife.,

Now that the objectives have been set the management strategies to accomplish these goals can be developed. On the overlay map of our old farm each stand has been numbered. The management scheme for these stands is outlined below by number.

1. Only one roosting field will be preserved on this tract of land since numerous other fields are available nearby. The field will be cleared of brush using a rotary mower pulled behind a tractor. A fireline will be cleared at the north end—the 2 roads and river are sufficient firelines on the other 3 sides. Since a few blueberry plants are growing in the field a



Figure 17. Old farm land starting to revert in 1955.



Figure 18. By 1972 much of the farm land has grown into excellent woodcock habitat.

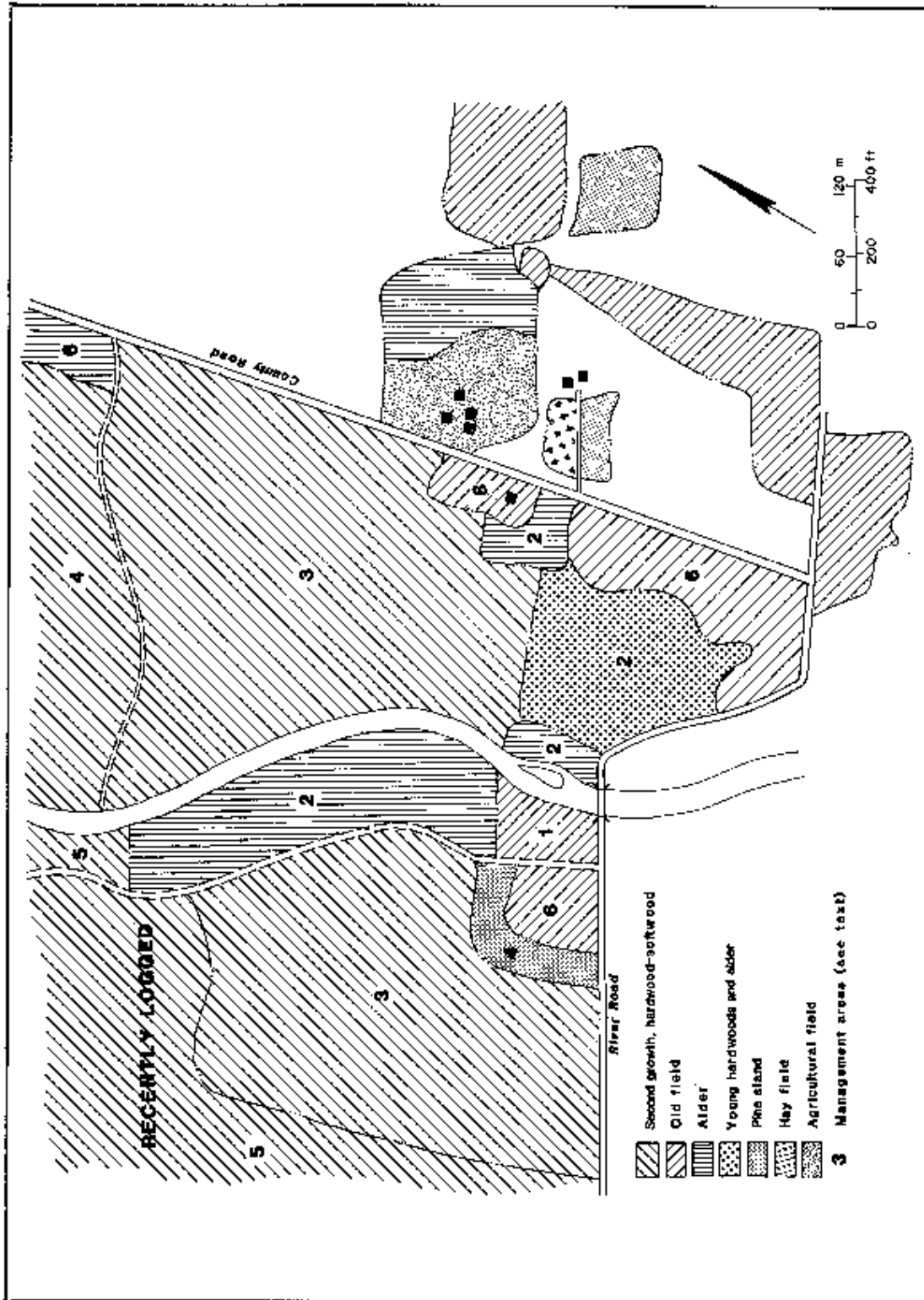


Figure 19. An overlay of the aerial photo in Figure 17.

program of herbicide-fertilizer applications will be used to increase the blueberries. The field will also be burned every second year; in the fall, if possible. This management scheme should yield a cash crop of blueberries and an excellent woodcock roosting and courting area.

2. The alder covers now nearing their peak will soon be overtopped by competing vegetation or will simply die of old age. In the covers along the river 70 foot (21 m) strips, 280 feet (85 m) apart, will be cut perpendicular to the water. In the other 2 covers the same type of cutting will be done, but the strips will be perpendicular to small streams running through the covers. Every 4-5 years new strips will be cut. This management will not only rejuvenate woodcock feeding cover, but also provide temporary singing grounds. Competing vegetation within 25 feet (8 m) of old apple trees will be cleared.
3. Second growth forest stands cover about half of the farm. These stands will be managed on a 40-year rotation in 4 acre (1.6 ha) blocks. About 25 percent of the stand will be clear-cut every 10 years. This area will provide temporary singing grounds, rejuvenate brood and nesting cover, and provide an economic return in wood products. It will also provide food for deer and moose. Potential den trees and snags should not be cut because of their high value to other species of wildlife.
4. These stands represent an opportunity to grow high quality white pine. A professional forester will be consulted for management recommendations. Maintenance of young pine stands on good quality soils sometimes provides feeding habitat for woodcock during periods of drought and warm weather.
5. The best logs were removed from this stand 5 years ago. Two, 0.5 acre (0.2 ha) clearings will be cut each year along the logging roads to provide temporary woodcock singing grounds and an annual supply of firewood. Block clear-cutting will be initiated when the stand again becomes merchantable.
6. In any of the management areas one should take advantage of the existing natural characteristics. Old apple trees should be saved for wildlife. Wild apple trees can be grafted with better varieties and released by cutting surrounding brush. Seeps, springs, or any area that holds moisture during the dry part of summer should not be disturbed. Stonepiles, swamps, mature trees with cavities, and the edges where fields or pastures meet the woodlands are focal points that are important in the wildlife management plan.

Example 2: A More Intensive Plan for a Reverting Farm

This 90 acre (36 ha) tract (Figure 20) is an old reverting farm surrounded by mature forests. The southern portion of the old field has grown to alder and is now being invaded by the surrounding hardwoods. The forest, composed primarily of maple, aspen, and birch, was last cut 40 years ago. The last of the old field is being invaded by young hardwoods and alder.

The management goals for this tract are: (1) to increase the number of woodcock; (2) to obtain an economic return; and (3) to provide firewood.

1. Increase woodcock—Daytime cover will be rejuvenated by yearly strip clear-cuts through the alders. The strips bisect a small stream. Only one strip will be cut per year, thus spreading out the labor required yet providing a 20-year rotation. Roosting cover will be maintained by mowing the remnant of the old field the first fall with a rotary mower. The field will be burned the next spring after an adequate fire line is constructed. The field can then be maintained by mowing yearly or, if there are blueberries, by spring or fall burning every second year. Brood and nesting cover will be maintained by small commercial clear-cuts at 8-year intervals resulting in a 40-year rotation. The small 0.6 acre (0.2 ha) firewood cuts will also serve as temporary singing grounds. Clear-cutting is necessary to maintain vigorous aspen growth. The brushy edge around the north and west sides of the field will be maintained by the application of herbicides every 5 to 10 years. This will top kill the vegetation and cause sprouting.

2. **Economic Return**—About 34 acres (14 ha) will be set aside for commercial timber harvesting. These areas have the potential of yielding about a dozen cords per year. If the field supports blueberries it has the potential of grossing several thousand dollars on alternate years using accepted blueberry management techniques (see your local ASCS office of the U.S. Department of Agriculture for details). In some instances fireline construction around the field may be subsidized if it borders woodland (contact your cooperative extension agent for details).
3. **Increase Diversity**—All clear-cuts will be spaced the maximum distance apart. Two areas, totaling about 11 acres (4.5 ha), in the interior will be left untouched. A small softwood area will be selectively cut to maintain it in conifers.
4. **Provide Firewood**—All the firewood cuts will be located along major roads for easy access. Each 0.6 acre (0.24 ha) plot should yield about a 2-year supply of firewood. A 40-year rotation will provide a permanent supply of wood.

Example 3: A Management Plan for a Small Tract of Land

Even small areas can offer opportunities for management. The 5 acre (2 ha) property in Figure 21 is located where farm land is being turned into house lots although some farming still persists. The landowner cannot hope to furnish all the habitat requirements for woodcock, but by a careful inventory of his land and that of his neighbors' he can maximize the wildlife benefits from his small lot. Since land use is changing rapidly, the inventory should also include plans for the future development of neighboring land.

This inventory indicates that mature hardwoods are abundant and will probably remain so since the neighboring farmer plans to manage his woodlot for high quality sawlogs and the new subdivision includes restrictions in the deed preventing the removal of more than half the trees. The farmer also plans to continue his operations indefinitely and his son has shown an interest in farming—so, open fields are no problem. The nearby reverting farm land is being subdivided and will result in the elimination of much of the early growth forest in the area. Thus, the habitat that is and will be in short supply is primarily young growth forest.

The owner of this 5 acre (2 ha) block is extremely interested in woodcock, grouse, deer, and songbirds and wants to do some active wildlife management. Based on the desires of the owner and the results of the inventory the following objectives were formulated: (1) Create various stages of forest growth, (2) maintain some stands of old growth timber, and (3) divide the management into small, easily accomplished units.

These goals will be achieved using the following plan:

1. A series of strip clearcuts, 70 x 200 feet (21 x 61 m), will be cut perpendicular to the stream at 4-year intervals. These will initially provide woodcock singing grounds and deer feeding areas. In 7 or 8 years the cuts will become excellent woodcock feeding sites, provide grouse nesting, brood, and wintering covers, and serve as deer escape cover. A variety of new songbirds will frequent the cuts. At the end of 20 years the cutting sequence will be repeated.
2. A small clearing will be cut initially and will be maintained as a wildlife food plot. A mixture of clovers and grasses will be seeded and native shrubs will be encouraged around the edge. The field will be burned or mowed yearly to discourage woody vegetation.
3. Only about 50 percent of the wooded area will be cut. The rest will be allowed to grow with no active management. This area will provide den trees and snags and greatly increase overall diversity.

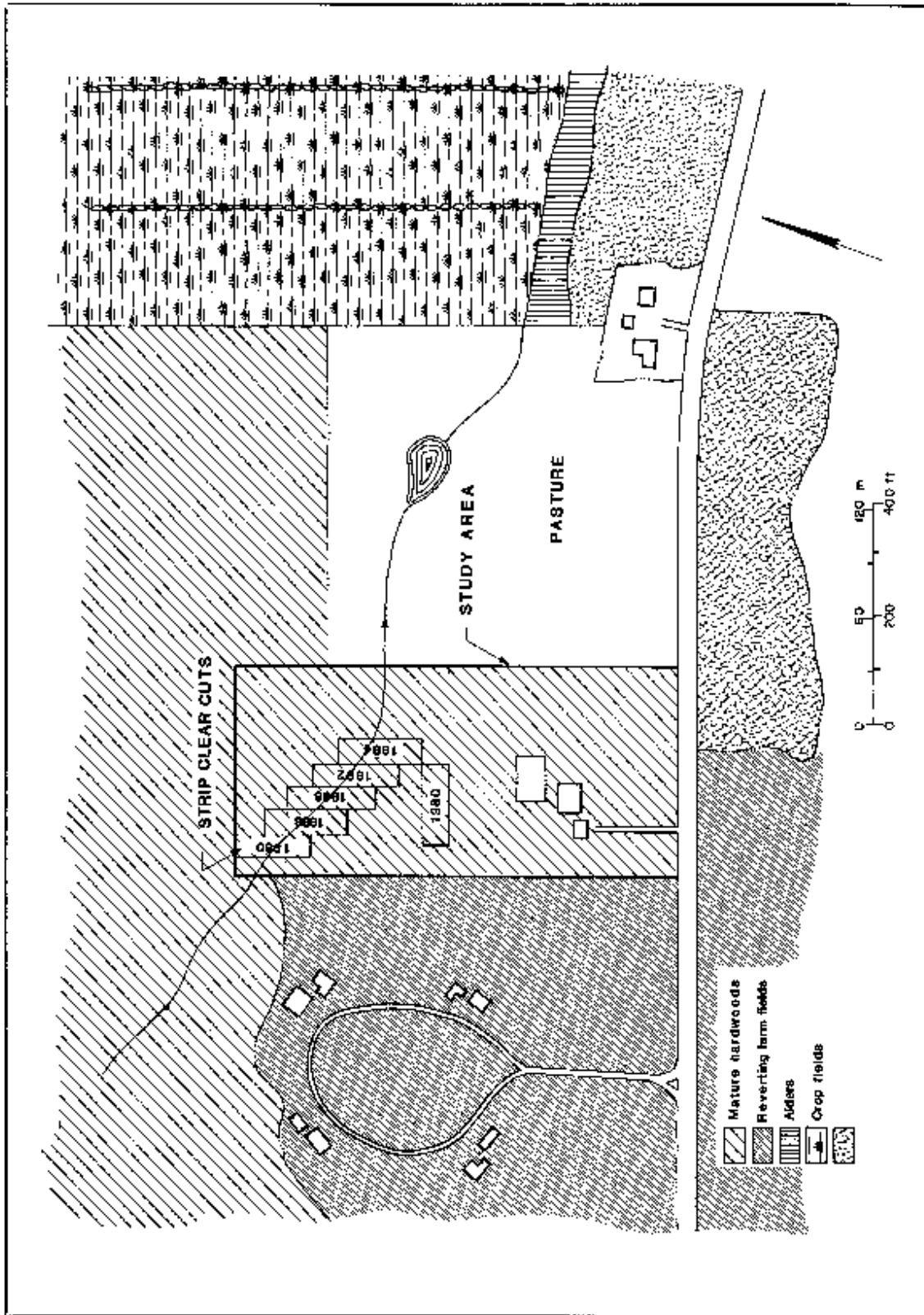


Figure 20. Illustration of a long term habitat management plan.

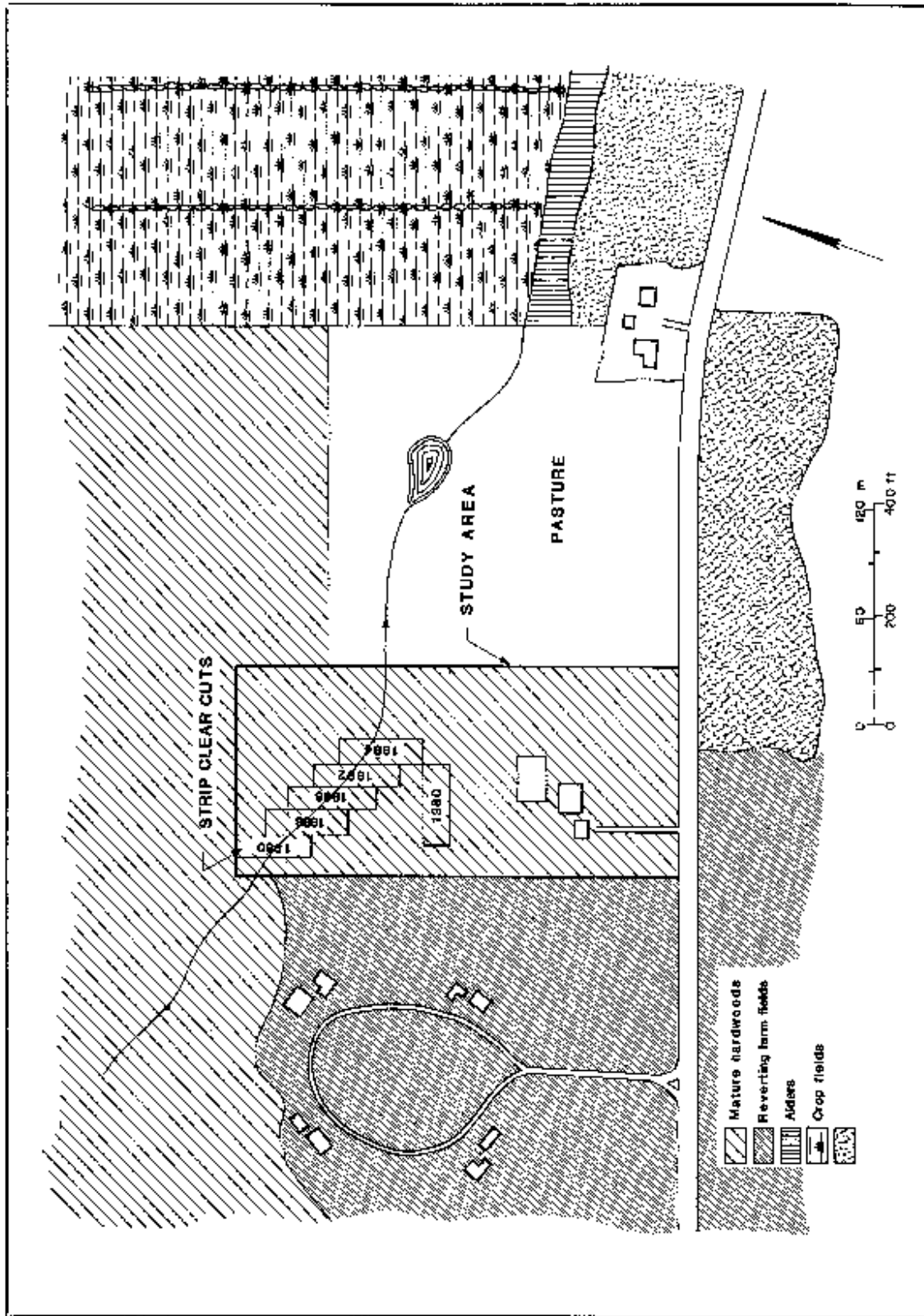


Figure 21. Even small properties lend themselves to habitat management.

SUMMARY

Woodcock require a young, diverse, vigorously growing forest. As more good woodcock habitat is lost to urbanization and large scale farming and forestry, management of the remaining habitat becomes more important. The private landowner and resource manager will have to take the lead in producing more woodcock and other wildlife on each acre of remaining land. There will be no cheering crowds, no pats on the back, and only a modest economic return from this work. But, there will be a warm feeling of accomplishment as you watch a woodcock courtship display in a clearing you cut one cool February day. You will not lose the thrill of a grouse flushing in front of a staunch point—after all you helped to maintain the habitat that made it possible (Figure 22). And the sight of a deer browsing on the young sprouts resulting from your management effort is priceless. These things do not happen by themselves. They take time spent in a careful survey of your land. You must know what you have and you must be honest with yourself. If your land simply will not make a good woodcock habitat, and this is entirely possible, do not try to force it. Instead, pick another species you are interested in and learn about its habitat requirements.

It is obvious, since you have read this far, that you are truly interested in making the best use of your land. We have given you some of the basic ideas needed to improve your land for woodcock and many other species of wildlife. The methods outlined work. Many thousands of man-hours went into developing and testing these management suggestions. If you have any questions do not hesitate to call on the many public resource specialists mentioned in this guide. The authors would also welcome any questions or comments you might have. And, if you are ever in northeastern Maine, the staff of the Moosehorn National Refuge would be glad to show you how these techniques have been developed and tested. This demonstration work is continuing.

Good luck with your management efforts. One way to collect some of the dividends is to sit at the edge of one of your clearings at dusk in mid-April and listen and watch. You will be assured that you made a wise investment (Figure 23).



Figure 22. The thrill of a pair of setters on point (Photo by Thomas Dwyer).



Figure 23. Rewards of skillful habitat management (Photo by Maine Fish and Wildlife).

SUGGESTED READINGS

The following list of readings contains some of the classic literature concerning woodcock. Also listed are selected readings on other wildlife species which would benefit from woodcock management.

The American Woodcock in West Virginia. 1976. R.C. Kletzly. W.Va. Dept. of Natural Resources Bulletin 8, Charleston. 46pp.

The Book of the American Woodcock. 1967. W.G. Sheldon. Univ. of Massachusetts Press, Amherst. 227pp.

The Ecology and Management of the American Woodcock. 1943. H.L. Mendall and C.M. Aldous. Maine Cooperative Wildlife Research Unit, Univ. of Maine, Orono. 201pp.

A Landowner's Guide—Wildlife Habitat Management for Vermont Woodlands. 1979~ State of Vermont Fish and Game Dept., Montpelier. 39pp.

The American Woodcock (*Philohela minor*) (Gmelin). 1936. O.S. Pettingill. Mem. Boston Soc. Natural History. Vol 9, No. 2, pp. 169-391.

Improving Your Forested Lands for Ruffed Grouse. 1972. G.W. Gullion. Ruffed Grouse Soc., Coraopolis, PA. 36 pp.

Ruffed Grouse. 1969. J. Madison. Winchester Press, E. Alton, Ill. 103pp.

The Pennsylvania Woodcock Management Study. 1972. S.A. Liscinsky. Research Bulletin No. 171. Pa. Game Commission, Harrisburg. 95pp.

Timberdoodle! 1974. F. Woolner. Crown Publishers, Inc., New York. 168pp.