11

CHAPTER 11. FARM WILDLIFE HABITATS THROUGH THE ANNUAL CYCLE

Farms occupy space. The total land area of the United States is 2,264,000,000 acres (3,537,500 square miles), with the land use divided into the categories shown in Figure 11-1. Note that cropland and grassland pasture occupy about 2/3 of the land area in the five categories shown (Figure 11-1).

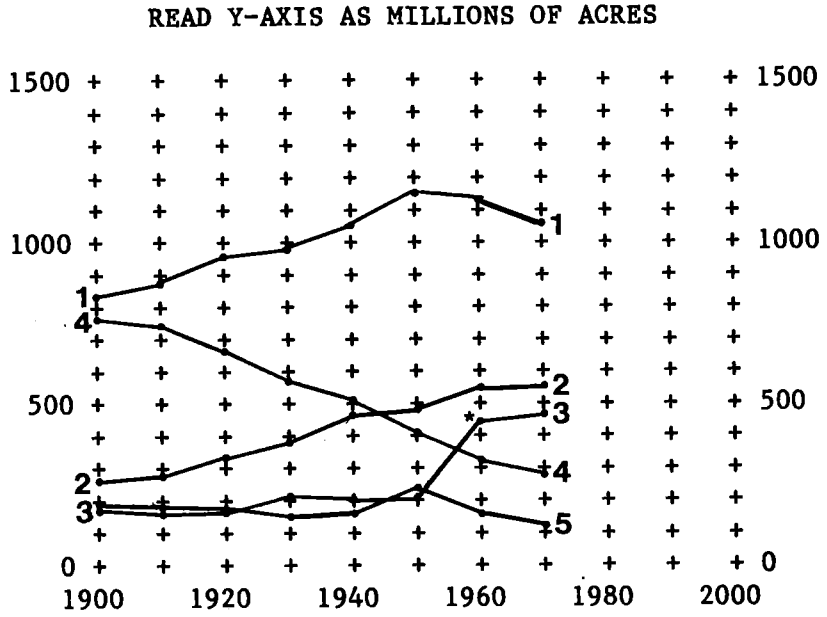


Figure 11-1. Major land uses in the United States, 1900-1980. 1 = cropland, 2 = grassland pasture, 3 = forest land not grazed, 4 = grazing land, 5 = farm woodland. *Increase due to statehood of Hawaii and Alaska. (Source: U.S. Bureau of the Census, 1976).

The amount of land in each state that is in farmland is listed in Table 11-1. Note that Alaska has less than 1% of its land in farms. Of the 48 contiguous states, Maine has the least farm acreage (9%) and North Dakota the most (97%). The farmland included in these calculations includes both land that is being tilled and open land that could be tilled; the percents for each state are a reflection (100%- farmland) of the amount of land that is not forested, too mountainous, or too arid for farming.

Table 11-1. Areas and percent of each state in farmland. (Calculated from data in U.S. Bureau of the Census, 1976).

	Square miles		Percent
Alabama	50,708	21,334	42
Alaska	566,432	2,506	1
Arizona	113,417	59,692	53
Arkansas	51,945	24,523	47
California	156,361	55,816	36
Colorado	103,766	57,339	55
Connecticut	4,862	845	17
Delaware	1,982	1,053	53
Florida	54,090	21,925	41
Georgia	58,073	24,697	43
Hawaii	6,425	3,216	50
Idaho	82,677	22,527	27
Illinois	55,748	46,739	84
Indiana	36,097	27,458	76
Iowa	55,941	52,453	94
Kansas	81,787	77,172	94
Kentucky	39,650	24,950	63
Louisiana	44,930	15,295	34
Maine	30,920	2,750	9
Maryland	9,891	4,380	44
Massachusetts	7,826	1,095	14
Michigan	56,817	18,595	33
Minnesota	79,289	45,070	57
Mississippi	47,296	25,063	53
Missouri	68,995	50,656	73
Montana	145,587	98,309	68
Nebraska	76,483	71,616	94
Nevada	109,889	16,731	15
New Hampshire	9,027	958	11
New Jersey	7,521	1,619	22
New Mexico	121,412	73,113	60

TABLE 11-1 IS CONTINUED ON THE NEXT PAGE

TABLE 11-1, CONTINUED FROM PREVIOUS PAGE

	Square miles		Percent
New York	47,831	15,856	33
North Carolina	48,798	19,897	41
North Dakota	69,273	67,372	97
Ohio	40,975	26,736	65
Oklahoma	68,782	56,263	82
Oregon	96,184	28,153	29
Pennsylvania	44,966	13,908	31
Rhode Island	1,049	108	10
S. Carolina	30,225	10,925	36
S. Dakota	75,955	71,225	94
Tennessee	41,328	23,527	57
Texas	262,134	222,761	85
Utah	82,096	17,677	22
Vermont	9,267	2,994	32
Virginia	39,780	16,641	42
Washington	66,570	27,436	41
West Virginia	24,070	6,783	28
Wisconsin	54,464	28,295	52
Wyoming	97,203	55,431	57

Farm habitats include tilled and untilled land. Tilled land includes cropland and temporary pasture, habitats which change in one annual cycle from plowed fields to dense vegetation to little or no cover after the crop is harvested, and hayland, which is often in a 3-year rotation. Untilled land includes permanent pasture, woodlots, hedgerows, and marshes. These habitats do not change much each year, but may change drastically over a period of years.

The amount of acreage in cropland has decreased slightly since 1950, while production per acre has increased about 3% per year. These changes have occurred along with a number of other changes or accomplishments of conservation agencies, especially local soil and water conservation districts, in the 35 years since the dust bowl of the thirties. Some of these are, (from Yearbook of Agriculture 1970):

1. Strip cropping covers more than 20 million acres, reducing erosion.

2. More than 45 million acres are contour farmed.

3. Nearly 2 million ponds dot the countryside.

4. 13 million acres of rangeland have been reseeded.

5. More than 17 million acres of trees have been planted on farms.

6. Wildlife habitat has been improved on over 16 million acres.

7. More than 20 million acres of cropland have been converted to grassland.

8. More than 3 million acres of cropland have been converted to woodland.

9. More than 1 million acres of cropland have been converted to wildlife and recreation.

These are overall changes and trends in land use. The statistics indicate that conservation practices have been established. Decisions concerning land use are being made at the local level, in soil and water conservation districts, which are organized under state law and operated by local people.

The challenge facing wildlife biologists is that of being a meaningful part of decision-making by such groups. Improved wildlife habitat on more than 16 million acres is a statement (number 6 above) subject to further biological interpretation. Improved for what species? What population responses have been observed? Who determines if the habitat has actually been "improved?" These are biologically complex questions, and there are no simple answers to complex questions.

Analyses of farm wildlife habitats through the annual cycle must involve more than numbers of acres put to different agricultural uses. One time-tested generalization that may be applied to the general question of land use and habitat improvements in relation to wildlife on farmland is the "Law of Interspersion" (Leopold 1933). This generalization is based on the fact that interspersions of cover types provide edges which are attractive to wildlife with low mobility. Such species do not move far in their daily travels, and therefore depend on a variety of habitats for food and cover from day to day and from season to season. Thus, there are patterns in space and changes through time, with the former being the result of both short-term and long-term decisions by the farmer and the later the result of annual cycles of weather and growing conditions. The concept is discussed further in Giles (1978).

Considerations of wildlife food and cover requirements when making agricultural and wildlife management decisions are discussed in CHAPTER 13. The TOPICS and UNITS in this CHAPTER include descriptions of farm habitats used by wildlife, how they change through annual cycles, and how wildlife relate to different agricultural practices.

TOPIC 1. CROPLAND

Cropland varies considerably through the year as wildlife habitat because of the crop management effects on food and cover characteristics. Cropland prepared with primary tillage equipment goes from exposed soil to lush young growth to mature crops to harvested stubble through each growing season; fields are a rapidly-changing habitat in the spring, summer and fall. The uses of such fields by wildlife are obviously affected by these changes in food and cover characteristics. Conservation tillage or no-till farming involves less change in cover as planting occurs in the residue from the previous growing season. Less change in the physical environment is accompanied by more change in the chemical environment, however, as herbicides are necessary for weed control when there is less primary and secondary tillage.

Wildlife responses to cropland that is fertilized and sprayed with various chemicals for weed and pest control are not yet understood. Chemicals certainly have the potential for affecting wildlife populations but the effects of the more recently-formulated chemicals and the trade-off benefits between physical and chemical changes in cover characteristics have not yet been studied; they are not understood well enough at the present time.

It is important to think of the environment in a functional way (Moen 1973). The environment of an organism is best described by the interactions between organism and environment. The habitat of an organism is best described by its components. Thus pheasant habitat may include foods such as corn and wheat, cover such as hedgerows and cattail marshes, and space sufficient for nesting territories. A pheasant's environment includes sights, sounds, chemicals, mechanical forces, thermal energy . . . all of the things that affect the pheasant. These functional relationships are described and illustrated in my text Wildlife Ecology (Moen 1973).

Up to World War II, crops were usually grown in a 3-year rotation of corn-oats-clover. Corn was grown without fertilizer, with 10,000 plants to the acre in rows 40 inches apart. Corn fields were cultivated several times early in the growing season. Then, yield was about 38 bushels per acre in the Corn Belt. Now, corn is planted in the same field year after year, plant populations range from 25,000 to 30,000 per acre, rows are as little as 20 inches apart, and weeds are controlled with herbicides. By 1970, the average yield in the Corn Belt was 90 to 100 bushels per acre (1970 YBAG:3).

Research on the effects of agricultural chemicals on wildlife has accelerated in recent years. Observations of animals in distress or dying as a result of suspected chemical poisoning have been reported, and there is cause for considerable concern. Such

concern is not simply because of the death of wildlife, but because wildlife may act as indicators of general habitat conditions. If wild animals are dying as a result of management practices on farmland, domestic animals and humans may, and very likely will, be affected eventually.

A controlled study of the effects of granular fertilizer in the feed of pheasant chicks and penned adults exposed to fertilized ground showed no differences in the responses of the experimental birds compared to the control birds as a result of fertilizer ingestion (Fredrickson et al. 1978). The study does not prove that agricultural fertilizer is entirely harmless, but it does demonstrate that all chemicals are not necessarily bad. Proper use and an understanding of the potential effects of improper use is important. Further, natural organic wastes may be toxic when applied in large amounts too. Fish kills as a result of run-off from fields spread with manure have occurred; this happened in the last month to a farmer just two miles from my farm when manure was spread and a heavy rain resulted in larger-than-expected run-off. Different wildlife species have different cover preferences. The discussions in the next two UNITS focus n the changing characteristics of small grain and row crop cover during the annual cycle.

UNIT 1.1. SMALL GRAINS

Small grains, such as wheat, oats, barley and rye, and (the cereal grains discussed in CHAPTER 5), provide habitat for wildlife both when they are growing and after they are harvested. Winter wheat field habitats may be used as nesting habitat since the cover is there and growing early in the spring when nest-site selection occurs. Winter wheat fields are also grazed by deer in the fall, during the winter, and in the spring. Oat fields, planted each spring, are sometimes used as nesting sites by upland game birds. Pheasants in an area in Illinois intensively farmed for corn and soybeans used oats and hayfields for both feeding and roosting (Warner 1979). Oats and hayfields comprised only 6.4% of the study area, but 43.4% of the radio-determined locations were in these fields, indicating much higher use than expected on the basis of area available.

Small grain fields, have a noticeable lack of surface cover when they are tilled before planting. Upland game birds nest in such fields after planting when the plants are a few inches high. The nests are usually completed before the crop is harvested, so they are not likely to be disturbed by farming operations.

Crops provide the best cover for both prey and predator when they are neither too sparse nor too thick. Radio-tracked coyotes demonstrated this in Nebraska (Andelt and Andelt 1981), with the

added influence of time of day affecting habitat use. Daytime retreats were usually located in tall vegetative cover, but nighttime hunting activities occurred in sparser cover.

"Retired cropland" is a term that pertains to cropland which has been set aside or retired from active farming for one or more years. Its semipermanent status makes it desirable wildlife habitat, and high pheasant populations, for example, seemed to be related to the amount of land in this category. Pheasant hens, for example, chose early nest sites where residual cover provided concealment (Dumke and Pils 1979). Retired cropland provided both residual cover and suitable nesting cover during the entire season. The highest percent of successful pheasant nests were located in retired cropland in Wisconsin. (Figure 11-2).

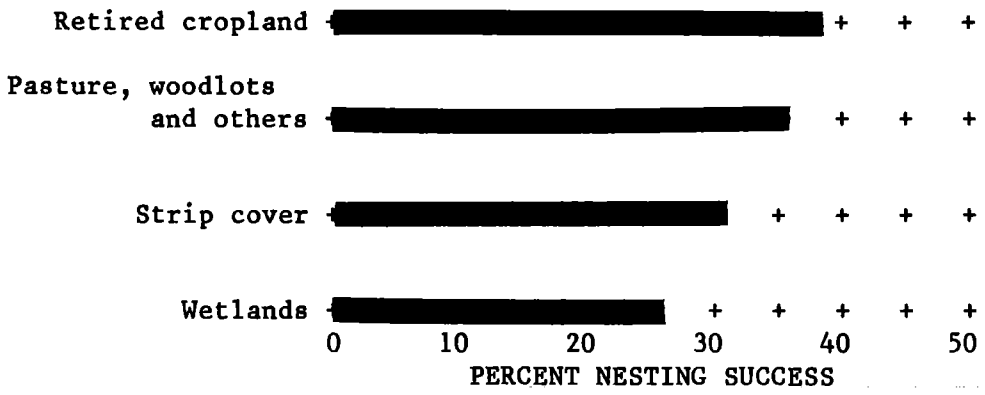


Figure 11-2. Pheasant nesting success in different cover types in Wisconsin, based on data in Dumke and Pils (1979:711).

One important point to make from the data above is that nesting success is usually not high. In general, fewer than 1/3 of the nests of upland game birds are successful each year, a much lower number than is expected by most people. Variations in game bird productivity are dependent on changes in percent nests hatched within the 0 to 50% range rather than the 50-100% range.

UNIT 1.2. ROW CROPS

Row crops, especially corn, change rapidly in spring and early summer when growth is rapid. Corn that is planted by the ned of May may be "knee-high" by the fourth of July, one to two meters tall in August, and two to three meters tall by September when the ears are forming (Figure 11-3).

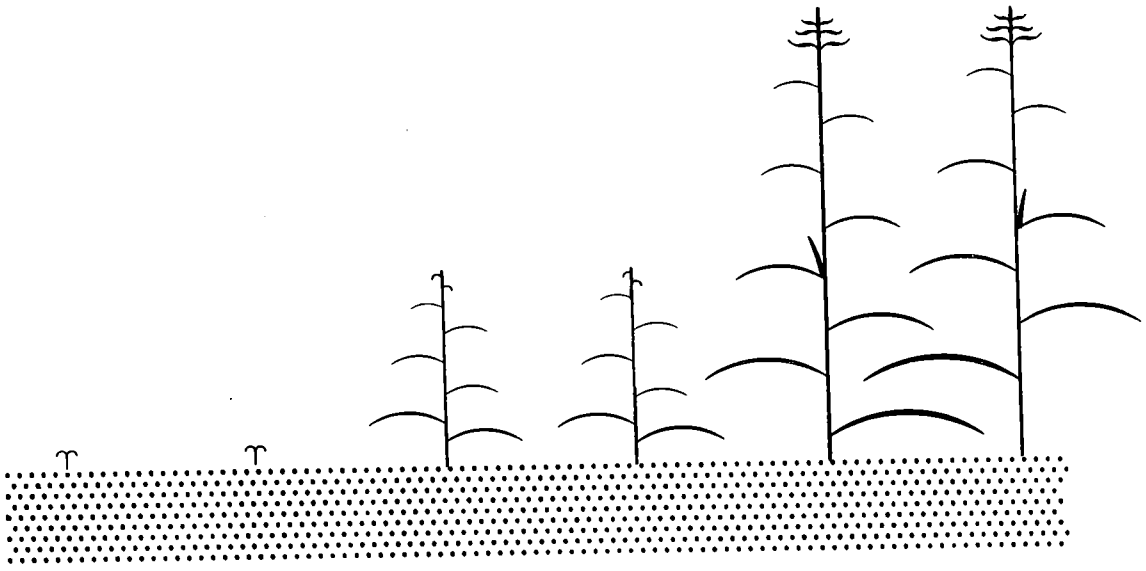


Figure 11-3. Corn grows rapidly, changing the habitat from exposed soil to a dense overheat canopy.

Row crops, particularly corn, have been part of prime pheasant habitat in the last 40 years. Recently, corn growers have shifted from producing a diverse food plot at pheasant height to one of almost barren ground, except for the corn plants. Further, the cobs are now found growing higher on taller stalks as a result of corn breeding. These subtle switches in crop management are accompanied by a reduction in the number and diversity of insects present. The overall effect is a reduction in the quality of the habitat for pheasants as both food and cover are reduced.

Row crops are not particularly good wildlife habitat before the plants have matured and the canopy has just about closed over (Figure 11-4). After maturity, when seeds are available and weeds that have survived weed-control practices during the summer also mature, row crops become sources of food for game birds--especially pheasants--and some mammals too. Grey and fox squirrels feed on corn, carrying cobs from the field to their dens.

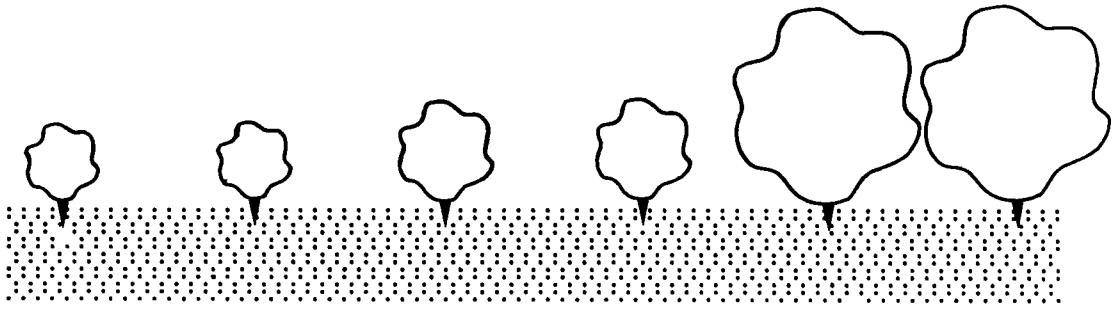


Figure 11-4. As row crops grow, they enlarge in both height and width, providing food and cover when they are mature.

Corn-growing and harvesting practices have changed from cultivation with horses and field-shocking to cultivation with tractors and mechanical picking to herbicide applications and corn combining (Figure 11-5) in the last 50 years, accompanied by a large increase in the amount of acreage in corn. There has been a concommittant loss in food and cover in such fields, with the loss of acreage in small grain and hay fields diverted to increased acreage as a result of the new look in cornfields.

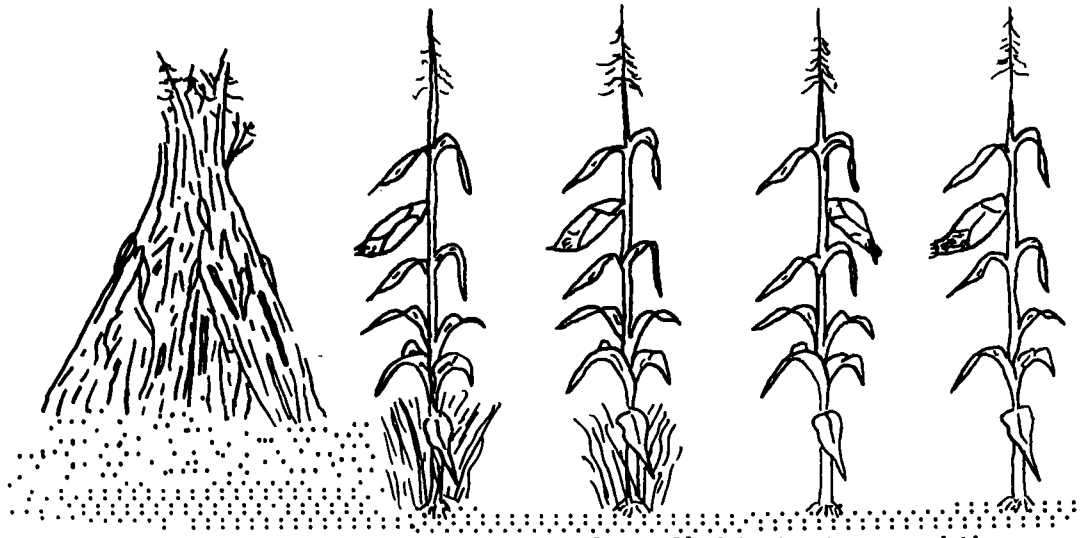


Figure 11-5. Corn fields have gone from field-shocks providing food and cover to cultivated but somewhat weedy fields to clean and efficiently harvested fields in the last 50 years.

Standing crops, especially sturdy ones like corn, protrude above snow and provide food in the winter when small grains and weeds are covered up. Standing corn and soybeans in Illinois provided an adequate supply of food when snow cover reached depths up to 16 inches (Roseberry 1964). These foods prevented mortality, and Roseberry recommends that a row or two of corn or soybeans be left adjacent to winter cover to enhance quail survival in the winter.

Gray partridge used harvested row crop habitats as a preferred winter habitat in eastern South Dakota; Smith et al. (1982) recommended that row crop stubble should be left unplowed to preserve a preferred winter habitat and maintain food supplies.

TOPIC 2. HAY FIELDS AND PASTURES

Hay fields and pasture are not tilled annually. They are often in a 3-4 year rotation, except in the case of permanent pasture which is established on areas too steep, wet, or rocky to be tilled regularly. Hay fields and pastures are often fertilized; pelleted inorganic fertilizers are spread in the spring to be carried into the soil by percolating rainfall. Hay fields are harvested mechanically, and pastures by grazing animals. These management practices affect the food and cover characteristics for different species of wildlife.

Nesting waterfowl appear to benefit more from the more permanent vegetation in hayfields and pasture than upland game birds do. One of the firm conclusions which can be reached as a result of several studies is that ". . . nesting puddle ducks prefer, and are more successful in, ungrazed and unmowed vegetation than in grazed and mowed vegetation" (Oetting and Cassel 1971).

A six-year study of duck nesting habitat in eastern North Dakota provides information on the selection and success of different cover types. Nest densities of all species were 12 times greater on untilled cropland than on annually-tilled cropland, and hatched-clutch densities were 16 times greater (Higgins 1977). Only about 1/4 of the nests hatched, with predators responsible for about 3/4 of the nests destroyed and farm machinery about 1/5 of the nests destroyed. The low nesting success of waterfowl compares with the nesting success of upland game birds discussed on page 249 and again in CHAPTER 13.

UNIT 2.1. HAY FIELDS

Hay fields begin the growing season with rather sparse vegetation, grow into lush thick cover quite rapidly, and are harvested quickly by equipment that reduces the vegetation to a few inches of stubble (Figure 11-6). All of these changes may take place within the time used by ground-nesting birds to establish territories, mate, select a nest site, lay the eggs, incubate the eggs, and hatch successfully. Hay fields are usually cut two to three times each summer. Alfalfa was the preferred cover by pheasants in South Dakota during June-October (Hanson and Progulske 1973), but they moved out for a time after cutting of the hay.

Figure 11-6. Hay fields grow fast, become lush cover, and are reduced to stubble in a day, two or three times a year.

Incubating birds may spend several days in a secluded, well-concealed nest surrounded by thick vegetation, such as alfalfa, that may be two to four feet high, only to find that within a few hours on a bright sunny day, all of this vegetation is destroyed from the bird's point of view. The hay has been harvested, and the incubating bird is fortunate to escape with its life, considering the concealment of the nest and the speed of the harvesting machine. If the nest is located in time to stop the machine, a patch of cover may be left around the nest, but the barren area surrounding this island of vegetation may be a drastic enough change to cause nest abandonment. Further, islands of vegetation, rocks, shrubs, narrow strips of cover, and other conspicuous natural objects or patterns serve as attractants to predators; they are investigated in the course of hunting. Hatching success is lower when nests are located in such small patches compared to larger patches of cover.

Hay fields are also used by deer as feeding and resting sites. Pregnant and lactating females feed in hay fields in May and June. Deer often drop their fawns in hayfields, and the neonates remain hidden in the cover provided by vegetation. When

approached, they lie prostrate and also exhibit bradycardia (Moen et al. 1978). They jump up to escape only at the last moment. When this response is carried out in relation to an approaching machine, the usual result is legs cut or broken, and the fawns die.

The hiding or "freezing" response is characteristic of many species of wildlife. The bradycardia which accompanies it has been observed in both white-tailed deer (Moen, et al. 1978) and ring-necked pheasant (Soong 1981). A further comment on "abandoned fawns" is appropriate here. Fawns are often found by hikers in the fields around the end of May and first part of June. Coming upon a fawn in the flattened-out posture, the initial conclusion is that it is weak, dying, and has been abandoned. If it is picked up, it may lie limply in the arms, further evidence that it is weak and dying. NOT SO! The fawn is exhibiting the hiding reaction and bradycardia, and is to be left alone! Farmers observing hiding behavior while on the tractor will find the fawn has moved later in the day. Fawns and the young of all wild species are best left in their natural habitat.

While hay fields provide lush, thick cover, both birth and survival of young wildlife are very dependent on the timing of the nesting season and parturition in relation to predation and the timing of hay harvesting. Pheasant nests were most vulnerable in hayfields and most secure in retired cropland (a semi-permanent cover) in Wisconsin (Dumke and Pils 1979). Predation was the primary cause of first-nest disruption in hayfields, and mowing the primary cause of renesting disruptions as second nests were later, extending into the time of hay harvesting. The tendency toward earlier harvesting of hay is deleterious to wildlife using hay fields during this important part of the reproductive cycle.

A nesting study by Gates (1965) in Wisconsin illustrates the importance of biochronology (Moen 1973) as species exhibit differences in nesting cover preferences. Mallards, earlier nesters than blue-winged teal, nested primarily in wetlands, where more cover was available at the start of their nesting season. Hay fields did not yet have sufficient residual cover for early nesting, but were used for renesting. Teal, later nesters than mallards, used hay fields as they provided sufficient cover by the time nest-sites were selected. Species biochronology with reference to the timing of nest-site selection makes a difference in the kind of nesting cover used.

Pheasants nesting in hayfields are particularly vulnerable to machine-caused mortality during hay mowing operations. Flushing bars have been used (Figure 11-7), and an extension of the tractor exhaust ahead of the mower has also been tried (Zorb 1957). Results were not encouraging, and conflicted with reported success in earlier studies. Pheasant chick loss was higher in Zorb's

study; the chicks would "freeze" rather than flush in response to the extra disturbance by the flushing bar and the exhaust blast.

Greater success with flushing bars has been reported in earlier studies when horse-drawn equipment was used (see Leopold 1933, p.312) than in later studies involving tractor-drawn equipment. My interpretation of this shift in results is that nesting birds and hiding fawns are more prone to freeze and remain hidden when a fast-moving and noisy tractor approaches than when slow-moving horses do. Flushing bars are not effective when used with modern farm tractors and machinery.

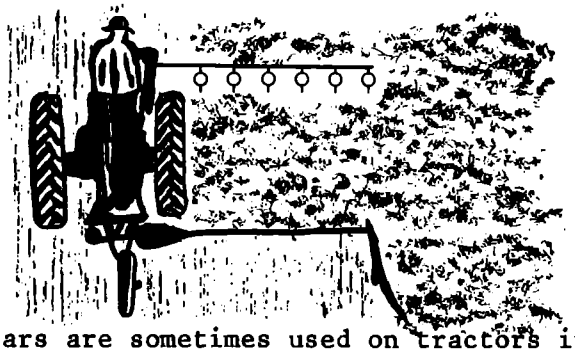


Figure 11-7. Flushing bars are sometimes used on tractors in attempting to prevent nest destruction.

The mixed results from flushing-bar studies and their apparent ineffectiveness on modern tractors indicate again that prevention is better than a cure, and any modifications of farming practices that result in little or no disturbance during the nesting season are much better than add-on preventive measures. Farmers must give highest priority to their farming operations, however, and the timing of hay harvesting is not something that is willingly modified to a large extent.

UNIT 2.2. PASTURES

Two kinds of pasture management affect their habitat characteristics for wildlife. Temporary pastures are usually grazed heavily for short periods of time and then allowed to recover while an adjacent strip is pastured. Permanent pastures are usually grazed less intensively than temporary pastures, with the timing of grazing and the number of grazing animals spread out through the grazing season.

Intensively-managed temporary pastures, used by a large number of animals for a few days, result in the removal of large amounts of forage in a relatively short time, with a lot of trampling by the grazing animals. Such pastures are usually part of dairy cattle management systems. The amount of vegetative cover is quickly reduced and such pastures do not provide good cover for wildlife.

Permanent pastures offer better and more stable wildlife habitat than temporary pastures. Land set aside as permanent pasture is usually too steep, too wet, too rocky, or too arid to be tilled; its primary production is harvested more efficiently by grazing animals than by machine. Permanent pasture usually does not receive the intensive management, including fertilization, that temporary pasture does. It is also grazed less intensively but for longer periods than temporary pasture, often for the entire growing season. It may be suitable habitat for nesting birds if there is litter present since the grazing animals usually can't keep up with early summer growth, allowing an increase in plant growth that provides some nesting security while accumulating forage for grazing animals later in the summer.

Figure 11-8. Permanent pastures and rangeland in the west are too arid to be tilled; herbivores convert native grasses to food.

Since permanent pasture is not subject to the drastic short-term changes associated with mechanical harvesting or intensive grazing, nesting success and survival of young wildlife can be reasonably good. The key factor which determines the suitability of permanent pasture as breeding habitat is the intensity of grazing and subsequent vegetation and litter left in the fall and present in the spring when territorities and nests are being established. If permanent pasture is grazed intensively after plant growth stops, often until late in the fall, then little cover will be left for wildlife to use in winter and spring. If grazing is not so intensive after plant growth stops, then sufficient cover may be left for protection in the winter and to attract ground-nesting birds in the spring.

TOPIC 3. UNTILLED LAND

Untilled land includes woodlots, hedgerows and shelterbelts, marshes and wetlands, and strip cover found along roadsides, fencerows, lanes, ditch banks, and property lines. The land may be untilled because the values of woodlots, shelterbelts, and hedgerows are greater than the returns from clearing and tilling, because it is too wet or it is undesirable to drain, or because it is present in long, narrow strips along some other feature of the landscape. Thus the amount of untilled land is dependent on current economic conditions, the glacial history and topography of the land, and the kind of vegetation present in them.

There is little untillable land in some areas of Iowa, Illinois, and other midwestern states (see Table 11-1) where the soil has been deposited by wind. Such soil is called "loess," and contains no rocks, since rocks are not carried by the wind. It is a fine soil deposited over rather level terrain, making it very desirable farmland. There is more untillable land in northeastern states such as New York, Pennsylvania, Vermont, and others where glacial till has been deposited and the land has more relief. Further, glacial till also includes rocks and boulders. Thus, some areas are too steep to be farmed, and some are too rocky. The result is that there are woodlots, hedgerows, marshes, potholes, and other remnants of vegetation and topography that have escaped clearing, drainage, and cultivation.

UNIT 3.1. WOODLOTS

Woodlots have been associated with farming since settlement. Many farms--most, in fact, in the eastern and north central states--have been carved out of the eastern deciduous forests by clearing and small fields established. As more land was cleared, remnants of the forest were left to supply fenceposts, firewood, lumber, and sometimes maple syrup. These farm woodlots not only persist today, but are growing in size and number in many areas.

Woodlots are sometimes pastured. When they are, forest regeneration is essentially eliminated; the understory is killed as the grazing animals eat the leaves and new twig growth of herbaceous and woody plants. Since primary production is low under a tree canopy, a few cattle and sheep can quickly remove enough of each plant to affect its vigor and forest regeneration. Pastured woodlots are usually not good wildlife habitat; they lack both food and cover for most species.

Cutting in small woodlots is usually done selectively, resulting in a stand of trees that may tend toward either fewer larger trees or more smaller trees, depending on management

objectives. If a woodlot is managed primarily for lumber, then thinning of smaller trees and pruning of larger trees should result in fewer but larger trees yielding high quality lumber. If the woodlot is managed primarily for fenceposts and firewood, than larger trees are removed first, leaving more but smaller trees of suitable size. The management objective selected is determined to a large part by the tree species in the woodlot; aspen does not make good fenceposts, red oak is good lumber for some purposes, and sugar maple is the only tree with a high enough sugar content to be useful as syrup for human consumption.

Properly managed but ungrazed woodlots provide habitat for different wildlife species. If management selects for a stand of older trees, than animals such as grey squirrels will benefit as they will find both food (seeds and mast) and shelter (cavities) there. The understory will be more sparse than in the younger stand, but will respond in small areas as the canopy is opened up by selectively cutting larger trees (Figure 11-9).

Figure 11-9. Farm woodlots provide food and cover for wildlife. Openings in the canopy provide diversity.

Stands of smaller but younger trees with a shorter cutting rotation provide a dense understory and more browse production within reach of animals such as white-tailed deer. Cavities are fewer, and seed and mast production may be less. Woodlots that are large enough will attract such species as sharp-tailed and ruffed grouse, birds that are characteristic of the earlier stages in forest succession. Sharptails prefer more brushy habitat than ruffed grouse (Moen 1973).

UNIT 3.2. HEDGEROWS AND SHELTERBELTS

Hedgerows and shelterbelts are important characteristics of farm habitats in many areas, and exist as a result of both political and natural factors. Hedgerows are often found along property lines in the northeastern states. Such living fences serve to reduce the apparent density of people as they visually

obstruct views of nearby houses and farms. This valuable sociological function also provides a particular kind of habitat for many wildlife species, especially songbirds and small game. Their importance as travel lanes, landmarks, and security factors for larger game such as deer and turkey may be greater than suspected.

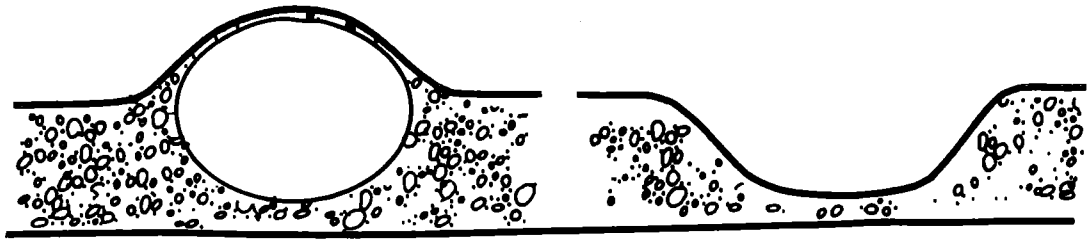
Hedgerows and shelterbelts also function as natural barriers, reducing wind speeds, trapping snow and thus adding water to the hydrology of an area and reducing transpiration from crop plants. Hedgerows are characteristic of eastern states where they are remnants of vegetation left after fields were cleared, and shelterbelts are characteristic of midwestern states where trees have been planted to provide protection for farmsteads, domestic livestock, and wildlife from winds and snows.

Hedgerows tend to increase in width as a result of the invasion of adjoining fields by such plants as sumac and aspen (Figure 11-10). Smooth sumac (Rhus glabra) sends up new stems from roots each year, and the encroachment of several feet a year by a hedgerow into a field is not uncommon. The new stems reach an inch or more dimeter at ground level in just one growing season, and hedgerows need to be cut back regularly or they will capture a field. They are a limited source of fuelwood, but are usually not cutover completely unless they are being eliminated. Unfortunately, larger machines are more easily used on larger fields, so hedgerows are being cut to increase field sizes on many farms. The opposite trend would be more beneficial to wildlife; wide hedgerows with food-producing plants on their edges and larger trees in the interior would be better.

Figure 11-10. Hedgerows increase in width as plants invade adjoining fields.

UNIT 3.3. POTHOLES, MARSHES AND WETLANDS

Potholes and marshes are wet areas with herbaceous vegetation, and open water during part of the year. Potholes are small ice-block depressions in the land of glacial origin (Figure 11-11), which hold water in the spring and into the summer. They are surrounded by different kinds of vegetation, usually grasses and sedges. Marshes are larger than potholes, hold water more permanently than potholes, and usually have cattails around their edges, with sedges and grasses on the dryer, outer edges. Marshes are abundant in the Upper Midwest where glaciers left an undulating topography with many water-holding basins.



Ice block covered by glacial till Pothole forms after ice melts

Figure 11-11. A geological explanation for a "pothole;" ice-block depressions are common in some areas as a result of glacial retreat.

The prairie pothole region provides spring nesting grounds for the "puddle" ducks. These ducks, such as the mallard, teal, pintail, etc., feed in the marshes and potholes, nest on the surrounding upland and raise their broods on the marshes and potholes. In good years, the water level is up and food is abundant in the marsh until the young birds are able to fly. Then feeding flights into nearby fields begin to occur as flocks begin to form prior to migration.

Extensive areas of marshes and potholes have been drained in the period from 1950 to 1970 in order to gain more agricultural land. Federal assistance was given for the drainage of about 72,000 individual potholes in 89 counties in Minnesota and the Dakotas in the late 1950's, with an area of almost 10,000 acres per year (Burwell and Sugden 1964). Drainage not subsidized by the federal government accounted for unknown additional losses of

potholes and marshes. The authors cited above state further that the 1960 annual report of the Agricultural Stabilization and Conservation Service (ASCS) for Minnesota revealed that nearly 142,000 acres (222 square miles) were drained by permanent open drainage systems to dispose of "excess" water (quotes mine; water that's excess to farmers may be necessary to ducks). This open-ditch drainage cost the U. S. Government over $575,000. An additional $639,000 was spent on tile drainage; the total area drained was nearly 169,000 acres, or 264 square miles.

The prairie pothole region extends northward from the U.S. into Canada. Drainage occurred there too, but not to the extent it did in the prairie pothole states of Minnesota and the Dakotas. Legislation was soon enacted in both the U.S. and Canada to protect and reclaim wetlands. Thus, as federal subsidies encouraged drainage and cost-sharing made it very appealing to farmers that could not increase their acreage by buying more land, other federal programs were set up to preserve wetlands. Waterfowl production areas were also leased or purchased. Monies were allocated to acquire land for wildlife management areas and refuges to protect waterfowl habitat and benefit wildlife in general. Eventually, the Department of Agriculture was obligated to refer all requests for drainage to the Department of Interior for a determination of wildlife values before federal subsidies could be paid.

Marshes may be drained in several ways. Open ditches leading from the marsh to a lower-level outlet are the least expensive. The material removed from the ditch may be dumped into the pothole, reasing its own soil level. Tile drainage is also used; a network of tile or perforated pipe is buried beneath the soil, water percolates through the soil into the pipe, and drains away. Tile drainage on a per acre basis was 6 times more expensive than open drainage, based on data for Minnesota in 1960 in Burwell and Sugden (1964). Some potholes may be filled in simply by land leveling, either with heavy machinery or by plowing around a small pothole in such a way that the furrows are turned down the grade into the low area over a period of years. This kind of plowing plus soil erosion will eventually result in the elimination of the smaller potholes.

Marshes play an important role in maintaining the water table in some areas. Excessive drainage may have long-range consequences. Individual farmers, however, must meet current expenses for operating their farms and providing the necessary goods, services, and educational opportunities for their families. Idealized long range goals are then a lower priority than short-term necessities, and wildlife habitats and values have a lower priority than human needs under such conditions.

The value of wetlands to waterfowl is obvious. Large-scale population effects have been observed, and small-scale effects on the production by a mated pair have been studied. Water conditions in the prairie pothole region of south central North Dakota, for example, had a profound effect on habitat use and movement patterns by mallard broods (Talent et al. 1982). Good (high) water conditions provide many ponds for brood rearing and poor (low) water conditions provide fewer ponds, longer travel distances, and greater vulnerability to predation. The number of broods of ducks was positively associated with the number of natural or man-made basins in South Dakota (Mark and Flacke 1980). Stock ponds are often more permanent than natural basins because of their design, and broods moved to these as natural wetlands, which are usually more shallow, dried up.

The recent awareness in environmental quality may have started in earnest in the 1950's as a result of the effects of large-scale drainage on waterfowl populations. There is now a heightened awareness of the value of natural wetlands for water conservation, waterfowl production, controlled grazing, and recreation, though the tendency to drain farmland still exists as more acres are needed to produce a larger gross income to meet the ever-increasing expenses associated with farming.

UNIT 3.4. STRIP COVER

Strip cover is a term applied to long, narrow strips of cover bordering roads, fences, lanes, and ditches. This strip cover cannot, by definition, be extensive, but cumulatively it adds up to a fair amount of cover in rural areas. Roads in many farming areas, especially the more level areas, divide the land into square mile patches. Thus there is an intersection every mile, with roads leading to the left, right, and straight ahead. Topographical features--lakes and hills, for example--cause roads to curve but the overall road density in farm country such as that of the Upper Midwest is surprisingly constant. Roadside cover usually represents about 1 to 2% of a rural farming area, and since these roads are not travelled heavily, the roadside cover offers a relatively secure habitat for wildlife if it is managed properly.

Roadside slopes (Figure 11-12) often contribute sizable amounts of land to more-permanent wildlife habitats. Gray partridge preferred idle grassy habitats for nesting (Smith et al. 1982), with small grains used after hatching and row crops after small grain harvesting is completed. The significance of such idle lands as space resources at a critical time in the biochronology of the species may be easily underestimated. Further, reduced mowing of roadsides is less expensive than the more intensive mowing regimes that are usually followed.

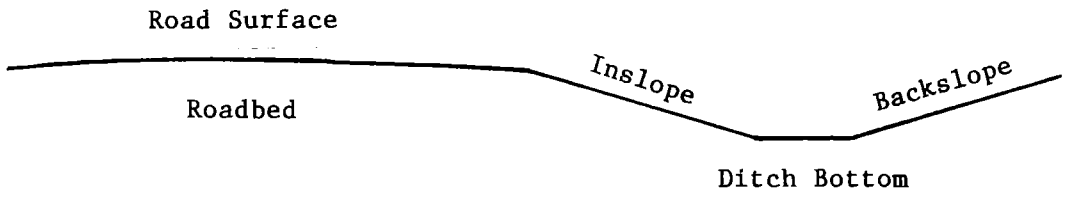


Figure 11-12. Cross-section of a road and right-of-way with management recommendations for the road slopes.

An interesting table of roadside nesting data is included in Oetting and Cassel (1971); they cite 7 North Dakota studies in which roadsides comprised only 1.0 to 2.6% of the study areas, but 24 to 57% of the game bird nests were found in roadsides. The recommendations by Oetting and Cassel include (1) no mowing of ditch bottoms or back slopes, (2) minimal mowing of inslopes, (3) and no mowing before July 20. While farmers are often not willing to delay hay harvesting, the mowing of roadside ditches for road maintenance can surely be scheduled later in the summer to provide additional nesting security to ground-nesting birds. Early cutting has no economic incentives there since the vegetation is not harvested as hay. Highway departments are urged to cooperate in determining the timing of the cutting as roadside ditches can provide thousands of acres of nesting habitat. In fact, the acres of roadside ditches usually far exceeds the acres of state-owned wildlife management areas that are set aside specifically as nesting habitats.

Fencerows and lanes are needed on farms to enclose animals in pastures and to provide access to fields for vehicles and machines used in the field work. The fences are usually of wire, and the lanes dirt or grass and other vegetation.

Fencerows may be kept very clear of vegetation, or natural vegetation may be allowed to grow around and sometimes on the fence. Birds often deposit seeds wile perching on fences, so berry-producing plants are often found along fencerows. From the farmer's perspective, well-kept fences should be kept clear of vegetation since the fences last longer and are easier to repair and maintain then. The shrubs and vines tend to pull the fences down, so they are removed from maintained fencerows. From the wildlife point of view, the vegetation is beneficial.

Lanes often follow fencelines, providing a strip of cover several yards wide. The lanes will be quite bare of cover if they are travelled often. Some lanes are used mostly in the spring and fall at planting and harvesting, and may provide rather lush growth during the summer. They are often mowed each year as part of maintenance operations.

Ditch banks also provide strips of cover. If cover grows up on the ditch bank used to drain a marsh, the net benefit to wildlife may be very different from what it would be if the ditch were kept bare, or if underground drainage had been installed. Ditch banks and waterways should be kept in permanent vegetation, in order to prevent erosion, so they will provide some value as cover through the year.

TOPIC 4. SUMMARY

This CHAPTER has included descriptions of different kinds of farmland and some of the impacts the methods of raising and harvesting crops have on the values of wildlife habitats. The perspectives of farmers are real considerations, since farmers have economic needs that must be met in order to provide for their families while growing food for the nation. Food produced is sold to the consumer (at about 3 or 4 times the cost of production due to processing), and yet tradition has it in the U.S. that wildlife is free, or belongs to everyone. Wildlife habitat is, for the most part privately-owned, however. The kind of wildlife habitat that is preserved and enhanced on farms is dependent on the priorities of not only the farmer, but also the public and recreational users. Given proper incentives, farmers as a whole are quite willing to recognize the recreational and aesthetic values of wildlife.

LITERATURE CITED

Andelt, W.F. and S.H. Andelt. 1981. Habitat use by coyotes in southeastern Nebraska. J. Wildl. Manage. 45(4):1001-1005.

Burwell, R. W. and L. G. Sugden. 1964. Potholes--Going, Going. Pages 369-380 In J. P. Linduska, Ed., Waterfowl Tomorrow, W.S. Dept. Interior, Fish and Wildlife Service. U.S. Govt. Printing Office, Washington, D. C. 770 pgs.

Dumke, R.T. and C.M. Pils. 1979. Renesting and dynamics of nest site selection by Wisconsin pheasants. J. Wildl. Manage. 43(3):705-716.

Fredrickson, L.F., R.L. Linder, R.B. Dahlgreen, and C.G. Trautman.1978. Pheasant reproduction and survival as related to agricultural fertilizer use. J. Wildl. Manage. 42(1):40-45.

Gates, J.M. 1965. Duck nesting and production on Wisconsin farmlands. J. Wildl. Manage. 29(3):515-523.

Giles, R.H., Jr. 1978. Wildlife Management. W.H. Freeman and Company, San Francisco. 416 pgs.

Hanson, L.E. and D.R. Progulske. 1973. Movements and cover preferences of pheasants in South Dakota. J. Wildl. Manage. 37(4):454-461.

Higgins, K.F. 1977. Ducknesting in intensively farmed areas of North Dakota. J. Wildl. Manage. 41(2):232-242.

Leopold, A. 1933. Game Management. Charles Scribner's Sons, New York. 481 pgs.

Mack, G. D. and L.D. Flake. 1980. Habitat relationships of waterfowl broods on South Dakota stock ponds. J. Wildl. Manage. 44(3):695-700.

Moen, A. N. 1973. Wildlife Ecology. W. H. Freeman and Company, San Francisco. 458 pgs.

Moen, A. N., M. A. Dellafera, A. C. Hiller, and B. A. Buxton. 1978. Heart rates of white-tailed deer fawns in response to recorded wolf howls. Can. J. Zool. 56(5):1207-1210.

Oetting, R.B. and J.F. Cassel. 1971. Waterfowl nesting on interstate highway right-of-way in North Dakota. J. Wildl. Manage. 35(4):774-781.

Roseberry, J.L. 1964. Some responses of bobwhites to snow cover in Southern Illinois. J. Wildl. Manage. 28(2):244-249.

Smith, L.M., J.W. Hupp., and J.T. Ratti. 1982. Habitat use and home range of gray partridge in eastern South Dakota. J. Wildl. Manage, 46(3):580-587.

Soong, S.S. 1981. Heart rate patterns in the female ring-necked pheasant (Phasianus colchius). M.S. Thesis, Cornell University. 74 pgs.

Talent, L.G., G.L. Krapu, and R.L. Javis. 1982. Habitat use by mallard broods in south central Dakota. J. Wildl. Manage. 46(3):629-635.

United States Bureau of the Census. 1976. Historical Statistics of the United States, Colonial times to 1970, Part I. U.S. Government Printing Office, Washington, D.C. 609 pgs.

Warner, R.E. 1979. Use of cover by pheasant broods in east-central Illinois. J. Wildl. Manage. 43(2):334-346.

Zorb, G.L. 1957. Effectiveness of two flushing devices used in hay mowing. J. Wildl. Manage. 21(4):461-462.