Pheasant Habitat Improvement Through Multiple Land Use Planning on Cache Valley Farmland

Shannon B. Heath

Utah State University

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PHEASANT HABITAT IMPROVEMENT
THROUGH MULTIPLE LAND USE PLANNING
ON CACHE VALLEY FARMLAND

by

Shannon B. Heath

A thesis submitted in partial fulfillment
of the requirements for the degree
of
MASTER OF LANDSCAPE ARCHITECTURE
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(Plan B)

UTAH STATE UNIVERSITY
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Shannon B. Heath
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CHAPTER I
INTRODUCTION

Statement of the Problem

In Utah, the number of farms has been steadily decreasing since the 1930's while farm size has grown and mechanization increased (Utah Agricultural Statistics, 1981). The "family farm" is beginning to disappear as larger farms become more economical (McCorkle, Jr., 1981). Due primarily to this trend toward more intensive land use, habitat for the ring-necked pheasant (Phasianus colchicus) is on the decline (Kellert, 1981). In addition, changes which have occurred in crop production since 1950 have not favored pheasant production (Nish, 1973).

It is of critical importance that attention be drawn to the conservation of pheasant habitat if the future of this popular gamebird in Utah is to be secured.

Since a sizeable percentage of pheasant habitat is in private ownership, the welfare of this species is largely in the hands of private landowners. Unfortunately, the Utah farmer, in general, resists suggestions for active habitat management on his land (Sennett, 1982). The primary factors contributing to his reluctance include: (1) lack of knowledge concerning the relationship between his land and pheasant population decline (Olsen, 1976), (2) lack of information about habitat improvement programs (Christensen and Norris, 1983), (3) fear of increasing hunter trespass problems, and (4) lack of incentive (Olsen, 1977). All four factors will be discussed in Chapter Five.

At present, the only agency which promotes the idea of managing farmland for wildlife to any great extent is the Soil Conservation Service (SCS), a federal agency which provides technical assistance to
private landowners. Utah's Division of Wildlife Resources (UDWR) concentrated a great deal of effort on developing a pheasant habitat management program in the mid to late 1970's, but for a variety of reasons it was not accepted by landowners and there have been no attempts to date at reintroduction. The SCS deals with wildlife management as part of the overall land planning process discussed with the landowner. Usually wildlife is considered a secondary land use and benefits only when it's management also favorably affects the primary land use (i.e. cropland)(Erickson, 1983). This is, of course, understandable since the farmer has little or no incentive to manage wildlife and often is unaware of alternative cultivation practices which may benefit wildlife without negatively affecting and, in some cases, actually enhancing crop production. The future of planned pheasant habitat on farmland therefore depends upon introducing these productive cultivation options to the farmer and encouraging him to use them.

Purpose of the Study

The purpose of this study is to discover a viable means of reversing the declining trend in pheasant populations through encouraging multiple land use planning on Utah cropland. This study will also serve to demonstrate how an environmental planner would handle a problem which has traditionally been thought of as being solely within the domain of wildlife management. Wildlife biologists have ample information available to them concerning techniques for improving pheasant habitat and are trained in the implementation of these techniques. However, where private land is involved, this wealth of knowledge is useless without the support of the landowner. Problems
such as this exceed the specialist capabilities of the wildlife biologist and demand a more holistic problem-solving approach of an environmental planner.

Due to the variability in terrain and types of farming present throughout the state, the study area will include only Cache Valley in northern Utah. Hopefully the information gained will be applicable, all or in part, to the rest of the state.

Objectives

1. Research habitat requirements of the ring-necked pheasant.
2. Evaluate what needs to be done to preserve or restore pheasant habitat on Utah cropland.
3. Study means for encouraging the Utah farmer to actively participate in pheasant habitat preservation.

Research Design

This study encompasses five major areas of discussion. Background information and habitat preferences of the ring-necked pheasant will be the first topic covered. Following this will be a discussion of the farming practices in Cache Valley as they relate to pheasant habitat. Previous efforts to reverse the declining habitat trend will then be reviewed. In the final chapters, the discussion will focus on current and potential means of improving habitat through gaining local landowner cooperation. Each of these five topic areas will be introduced in the succeeding paragraphs.

Background information is essential to understanding the need for concern for pheasant habitat in Cache Valley. Statistics drawn from the
Utah Upland Game Reports which demonstrate the decline in the pheasant population are included in this section. Also discussed in this chapter are the habitat requirements of the pheasant and how these requirements are now being met on Cache Valley farmland.

A brief historical overview of farming in Cache Valley will demonstrate how local agricultural practices are increasingly contributing to the deterioration of pheasant habitat. Since there is a great deal of literature published on alternative farming techniques which benefit wildlife, this chapter further discusses this area only to the extent of determining which farming practices are currently used in Cache Valley and how they might be improved to preserve or create pheasant habitat.

The declining trend in pheasant populations is not a newly discovered problem. Numerous attempts have been made in the past to reverse this trend in Utah. Chapter Four will discuss these past efforts.

Past attempts have obviously failed to substantially improve the pheasant's situation. During the literature review and discussions with UDWR personnel, the point which continually surfaced was that the primary barrier to habitat management on farmland is a lack of incentive for the landowner. Even the farmer who desires to cooperate in this effort often cannot afford to remove land from production (Winn, 1983). This study would therefore be incomplete without a discussion of existing and potential means of gaining the Utah farmers' cooperation.

The UDWR proposed a Pheasant Habitat Management Program in 1976 which was to be applied to existing posted pheasant hunting units in Cache and other counties. Unfortunately the program never received
enough landowner support to be implemented. Prior to formulating the program proposal, surveys were conducted among farmers to determine landowner willingness to participate in an improvement program and types of incentives that would be both feasible and acceptable. The results of this survey will be analyzed and carefully considered in determining means of gaining landowner cooperation.

Surveys of other fish and game agencies were conducted to gather information on existing habitat improvement programs nationwide. The results of these surveys will also be discussed.

Utilizing the information gained from both surveys and from literature review, some viable alternatives for pheasant habitat improvement in Cache Valley will be suggested in the final chapter.

This study will make detailed information available to land managers and private landowners in Utah concerning ring-necked pheasant habitat management on cropland. At present, little action has been taken to reverse the declining trend in the population numbers of this popular gamebird in Utah. This situation is probably due to a lack of information concerning techniques for motivating landowner cooperation. This study will hopefully assist in initiating an active program of pheasant habitat management on cropland in this state.
CHAPTER II

THE PHEASANT: BACKGROUND INFORMATION AND HABITAT REQUIREMENTS

History of the Pheasant in Utah

The pheasant was first introduced to Utah from Asia in about 1890. An intensive stocking program gradually increased their numbers until by the late 1930's they could be found in all suitable habitat areas of the state, approximately 2-4 percent of the total land area (Nish, 1973).

Pheasant population density is best indicated by the number of pheasants bagged per hunter-day. This data, collected since 1949 by UDWR personnel, reveals that there has been a downward trend in pheasant numbers since a relatively high population density in 1963. The rate of annual decline from 1949 to 1981 is 1.1 percent per year. In addition to this information, the trend of pheasants observed per mile has been determined from summer roadside counts since 1962. The rate of annual decline indicated by this data is 1.8 percent per year (see Figure 1). The first figure is probably a more accurate indication of population trends because the roadside count system was initiated during a peak population period (Nish, 1973).

Figures indicative of pheasant population density in Cache County are comparable to those representative of the entire state (see Figure 2). Using the number of pheasants bagged per hunter-day data, the rate of annual decline from 1952 to 1981 is 1.2 percent per year. The rate of annual decline indicated by the summer roadside count data from 1962 to 1981 is 2.71 percent per year (Roberson and Leatham, 1981; Utah Division of Wildlife Resources, 1959-1980).

Many sportsmen and landowners believe predation or hunting is the main factor contributing to population declines but the following quote
Figure 1. State trend of pheasants bagged per hunter-day and pheasants observed per mile during summer roadside counts (Roberson and Leatham, 1981; Utah Division of Wildlife Resources, 1959-1980).
Figure 2. Cache County trends of pheasants bagged per hunter-day and pheasants observed per mile during summer roadside counts (Roberson and Leatham, 1981; Utah Division of Wildlife Resources, 1959-1980).
from a UDWR brochure discusses the more likely source of the decline:
"During a typical year, approximately 70 percent of the population is
lost to a variety of mortality factors (even in non-hunted populations).
Few, if any, die of old age. Such losses are completely normal and
expected and, given adequate habitat and weather conditions suitable for
breeding, populations are capable of substantial growth from year to
year. Wide fluctuations in numbers between years and over short periods
of time are completely normal and usually attributable to weather
conditions. Long-term downward trends over many years are not normal
and usually reflect habitat changes (Utah Division of Wildlife
Resources, 1977, n.p.)."

Habitat Requirements

If the UDWR assertion is correct, it is necessary at this point to
determine exactly what the habitat requirements of the pheasant are.
Trautman (1982, p.47) defined pheasant habitat as "the region or
environment, where pheasants naturally live and thrive. It is the
product of the combined influences of a variety of favorable
environmental factors (climate, topography, soil, vegetation, land use,
etc.) that fulfills the basic pheasant living requirements - protective
cover, food, water and living space." The pheasant will usually live
and die within two square miles or less of its hatching site (Trautman,
1982). It is therefore imperative that all necessary habitat elements
be in close proximity to one another (Newton, n.d.). Trautman (1982)
lists the required components of a pheasant's home range as: cover,
food, water, grit and calcium.
Cover. In general the pheasant needs protective cover to escape predators and provide for nesting, brood-rearing, loafing and roosting requirements. In addition it needs winter cover which is protected from drifting snow and blizzards as well as good fencerow, roadside and field margin cover to serve as travel lanes between cover types or between cover and food.

Protective cover may be separated into two categories: upland and lowland. Upland protective cover may be provided by vegetation of upland grasses, legumes, forbs and weeds of grass hayland, pastures, alfalfa, uncultivated odd areas, idle farmland, abandoned farmyards, railroad rights-of-way, field margins, grassed waterways, roadsides, fencerows and limited stands of sweet clover. Additional upland protective cover may be found in farm crop vegetation of small grains, corn and sorghums, woody cover of field and farmstead shelterbelts, groves and thickets and natural woodlands. Lowland cover consists of tall, lush vegetation (grasses, sedges, reeds, shrubs and weeds) found on waterlogged sites in poorly drained low areas of grassland and cropland, usually dry in summer and autumn (Trautman, 1982).

Nesting cover has been determined to be one of the two most limited components of pheasant habitat (the other being winter cover) (Olsen, 1977). The pheasant's reproductive season lasts from late April to early August. Thus the suitability of protective nesting cover is dependent on the time it is available to nesting hens and the length of period it remains undisturbed (Trautman, 1982). Initial nesting attempts generally result in low hatching success since the modern farm has a minimum of suitable nesting cover in the spring. Nesting cover at this time is limited to waste areas, roadsides, fencelines or residual
vegetation remaining from the previous year. The low success rate is attributable to high nest abandonment and predators which utilize these areas as travel lanes (Olsen and Leatham, 1976). High reproduction is dependent on available undisturbed nesting cover during this early portion of the nesting season since broods produced from first clutches average approximately 38 percent larger than those from renestings which follow destruction or abandonment of the first nesting attempt (Trautman, 1982).

By early to mid-May, crops (mainly alfalfa and other hay crops) have reached a height of eight to ten inches and begin attracting nesting or renesting hens (Olsen and Leatham, 1976). At least 37 days are required for a hen to lay, incubate and hatch a clutch of ten eggs. Unfortunately, the first hay harvest of the year occurs around the second week in June, before the majority of broods have hatched. This practice not only destroys nests but also a large number of nesting hens (Trautman, 1982).

Despite the attractiveness of hayfields to nesting hens, the associated hazards obviously reduce the value of this cover type to total pheasant production. Table 1 shows the extent to which other cover types are utilized and the resulting nesting success in each (Nish, n.d.). According to Trautman (1982), good hatching cover is that which enables 30 percent nesting success. Looking at Table 1 then, small grains (38.5 percent success) and wetlands (32.9 percent success) appear to offer the best nesting cover for pheasants. Percent of total chick production is also highest in these two cover types.

Nesting cover also serves as the bulk of initial brood cover. During the first three weeks following hatching, broods range within ten
Table 1. Cover type utilization with associated nesting success and total chick production (Nish, n.d.).

<table>
<thead>
<tr>
<th>Cover type</th>
<th>Percent nests located in cover type</th>
<th>Percent nesting success for nests in cover type</th>
<th>Percent of total chick production in cover type</th>
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<tr>
<td>Hayfields</td>
<td>44.2</td>
<td>20.9</td>
<td>10.0</td>
</tr>
<tr>
<td>Small grains</td>
<td>15.8</td>
<td>38.5</td>
<td>45.0</td>
</tr>
<tr>
<td>Pastures</td>
<td>7.4</td>
<td>28.5</td>
<td>9.8</td>
</tr>
<tr>
<td>Wetlands</td>
<td>13.6</td>
<td>32.9</td>
<td>27.7</td>
</tr>
<tr>
<td>Woodlands</td>
<td>3.5</td>
<td>22.0</td>
<td>1.1</td>
</tr>
<tr>
<td>Strip cover$^2$</td>
<td>24.0</td>
<td>19.8</td>
<td>25.2</td>
</tr>
<tr>
<td>Misc.$^3$</td>
<td>12.0</td>
<td>21.5</td>
<td>3.6</td>
</tr>
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$^1$Figures obtained from results of published studies from across the United States.

$^2$"Strip cover" - All narrow bands of permanent cover such as roadsides, railways, ditch-banks, fencelines and canal rights.

$^3$"Misc." - Includes all cover types not ordinarily receiving heavy use by nesting hens; ie. cultivated orchards, row crops and gardens.
to thirty acres of the hatching site. By late August the area is enlarged to an average of 71 acres.

Brood cover used in the summer differs from that utilized in the fall. In June and July, the cover of medium-density vegetation is more commonly sought than light or dense cover. During these months broods may be found in hay, ungrazed or weedy pastures, grain and weedy and grassy vegetation of other crops and odd areas, including shelterbelts, slough edges, abandoned farmsteads, railroad rights-of-way, roadsides and fencerows. From early August through September and October, most young birds have detached themselves from broods and adults and may be found in row-crop fields used for resting, feeding and dusting. As the winter months approach young birds gravitate to the heavier cover of sloughs, sweet clover, unmowed bottomland grass, weedy grain stubble and the dense cover of odd areas (Trautman, 1982).

Another cover requirement of roosters, idle hens and maturing birds is for loafing. Loafing cover must provide the shelter of a windbreak or sunscreen, some bare ground for dusting and reasonable proximity to a food source and escape cover (Newton, n.d.). The vegetation comprising this type of cover also varies with time of year. During late spring a mixed alfalfa-grass type appears to be favored. On hot summer days, pheasants may be found loafing in brush thickets, shrub rows and tall weed patches. Late summer loafing cover consists of cornfields after grain and grass have been harvested. After the corn is harvested in late fall, loafing cover is limited to dense woody or herbaceous cover on severe winter days and sparse vegetation on milder days (Trautman, 1982).
Preferred roosting cover tends to be open, low-growing vegetation lacking a canopy except during periods of harsh weather (Olsen and Leatham, 1976). Common roosting sites year-round occur in vegetation such as grasses, hedges and weedy farm-crop combinations including grain stubble (Trautman, 1982). Also favored are pastures, fencelines and ditch banks. When temperatures drop and snow cover limits food availability, the utilization of brushy areas or dense marsh vegetation increases (Olsen and Leatham, 1976). When snow has filled the marsh and field cover, roosting birds tend to move into the trees (Trautman, 1982).

As previously mentioned winter cover is one of the major inadequacies in pheasant habitat. One problem is the proximity of cover types. Several states have reports indicating that pheasants rarely travel more than one-quarter mile between roosting cover and a winter food source (Olsen and Leatham, 1976). Thus winter cover beyond a maximum distance of one mile from food is unsuitable (Trautman, 1982). In addition to being favorably located, it must be dense to cut winds, strong enough to withstand snow load, and thick enough to escape predators (Newton, n.d.). Vegetation types commonly used are found in marshlands, brush coverts, shelterbelts and dense weed patches (Olsen and Leatham, 1976).

It must be stressed that one cover type is ineffective if the others are absent or inaccessible due to a lack of travel lanes. Even the provision of perfect cover for most of the year is not enough if it is then burned or disked, leaving the birds, dependent on that cover, vulnerable to weather and predation (Newton, n.d.).
Food. According to food habit studies, the pheasant is an omnivorous bird and feeds on a wide range and variety of plant, animal and mineral food items. Adult pheasants are primarily seed-eaters with cereal grains (corn, wheat, oats, barley) comprising their staple food items (Trautman, 1982). Regional and local availability will determine the percentage of the diet made up by each of the farm crops although corn seems to be preferred. Weed seeds, important in the diet to a lesser degree, include ragweed (Ambrosia spp.), foxtails (Setaria spp.), smartweeds (Polygonum spp.) and sunflower (Helianthus spp.). In Utah specifically, vegetable material has been found to compose 85.5 percent of the adult's annual diet. Animal matter provided the additional 14.5 percent. Gravel or mineral uptake (26.2 percent) was computed as a percentage of the food contents (Olsen, 1977). The pheasant chick survives almost exclusively on insects during the first few weeks (primarily grasshoppers, crickets, and ants). As the birds mature the food habits gradually change and by autumn their diet is the same as that of an adult bird (Trautman, 1982).

Water. The availability of permanent open water is not crucial to pheasant survival despite the bird's tendency to occupy stream bottoms, swales and swamp edges. These areas often harbor the highest pheasant populations (Olsen, 1977). Other sources of water include dew, succulent fruits and berries, seeds and rainwater pools. In winter frost and snow combined with moisture derived from grain kernels and weed seeds provide sufficient water (Trautman, 1982).

Grit and Calcium. Grit commonly refers to a variety of abrasive materials (gravel, coarse sand, bone fragments, woody seeds etc.) ingested by the pheasant and retained in the gizzard as an aid to
digestion. Contractions of the gizzard cause the grit to grind food to a size suitable for digestion in the intestine (Trautman, 1982).

Grit has been cited by several authors as a vital source of calcium. The pheasant's diet is low in calcium yet it is an essential element to pheasant reproduction and welfare (Olsen, 1977). Pheasants have the ability to select calcareous (calcium-bearing) over non-calcareous grit (Trautman, 1982). Common sources of calcium for the pheasant are snail shells, crushed limestone used as a road surfacing material and soil fertilization and liming. Obviously calcium is a crucial element of suitable pheasant habitat (Olsen, 1977).

It is clear from the preceding discussion that pheasant populations will continue to decline unless serious attention is drawn to the preservation of their habitat. The necessary habitat components for pheasant survival (cover, food, water, grit and calcium) are well known. It is the provision of these components within close proximity to one another which poses an ever increasing problem. The following chapter will reveal the reasons for pheasant habitat deterioration over the years.
CHAPTER III
CACHE VALLEY FARMING PRACTICES

The pheasant is primarily found on farmed land where its habitat needs are most closely met, hence its population trends are directly related to farming trends. Two major trends have occurred on Cache Valley farmland which have substantially contributed to the decline in pheasant numbers: 1) a decrease in farm numbers accompanied by an increase in farm size; and 2) a change in the type of crops produced.

Historical Overview and Recent Changes

As the demand for food for human consumption escalates, farmlands expand and are used more intensively. Farm wildlife in all parts of the country has suffered as a result (McConnell, 1981), and Cache Valley farmland is following this trend. Increasing costs for land and equipment force maximum utilization of all available acreage with a resulting farm consolidation and consequent increase in farm and field size. The most recently available county data from the Census of Agriculture indicates that the number of farms in Cache county has steadily declined from 2253 in 1940 to 1214 in 1978, a 46 percent reduction. Concurrent with this decline in farm numbers, average farm size has increased 39.5 percent from 146.5 to 242 acres per farm in 1978 (U.S. Bureau of the Census, 1946-1980) (see Figure 3).

What are the consequences of this trend? Aerial photographs taken of a typical square mile of Utah farmland in 1946 and 1966 clearly illustrate the impact (see Figure 4). In this example, the average field size increased from 6.5 to 13.2 acres, resulting in the removal of miles of fenceline and ditchbank nesting and escape cover and a decrease in
Figure 3. Trend in number of farms in Cache County as compared to average farm size 1940-1978 (U.S. Bureau of the Census, 1946-1980).
Figure 4. A diagrammatic comparison of field patterns in the same square mile of farmland in Box Elder County, Utah, between 1966 and 1946 (Nish, 1973).
cover interspersion. The final result is lower pheasant production on the area (Nish, 1973). There is no indication that this trend will reverse in the near future.

As has already been mentioned, the crop production trends since 1950 in the Valley are contributing significantly to the reduction of the pheasant population. Production of crops favorable to pheasant production such as wheat, oats, barley and beets have declined. From a peak in 1949, the acreage of land in wheat production has declined 54.14 percent. Available data indicates a decline in oat production also. Between 1949 and 1974 oat production acreage dropped 72.8 percent. Barley production was at its highest in 1959 but has since dropped by 7.51 percent. Beets are no longer grown in the Valley. In contrast, the production of corn silage has increased 425 percent since 1949 (U.S. Bureau of the Census, 1946-1980). This practice is undesirable since the harvesting technique virtually strips the land leaving no cover for pheasants.

Much of the cropland which produced desirable commodities has been diverted to pasture or grazing uses which decreases the value of land for pheasant nesting (see Figure 5). In addition, land remaining in crop production is often grazed, following the harvest, to such an extent that little or no cover remains for pheasants (Nish, 1973).

There are, of course, numerous other factors associated with those discussed which have contributed to the reduction in pheasant numbers. Modern, fast-moving, tractor-powered mowers seriously threaten the survival of incubating hens (Trautman, 1982). Ditch bank cover is being eliminated with the institution of concrete-lined ditches for improved irrigation. The increasing trend toward sprinkler irrigation
Figure 5. Cache County trend in use of cropland acreage 1940-1978 (U.S. Bureau of the Census, 1946-1980).
has caused the removal of many ditches (Olsen and Leatham, 1976). Roadside burning or mowing, weed and pest control programs, fall plowing and shelterbelt and hedgerow removal, all negatively impact the pheasant (Nish, 1973). These habitat decimating factors are discussed in the following analysis of farming practices in Cache Valley.

Current Farming Practices in Cache Valley and Possible Alternative Practices to Conserve Pheasant Habitat

Modernization of farming in Cache Valley, although somewhat behind the national trend, is having the same increasingly negative effect on the local pheasant population. Following is a discussion of agricultural practices currently in use in Cache Valley which have an effect on pheasant populations and also how they might be altered to preserve or create pheasant habitat.

Plowing. One practice which greatly affects pheasant habitat is plowing. Two aspects of plowing need to be discussed; the time of year when plowing is accomplished and the type of equipment used. Most Cache Valley farmers plow their fields in the fall (Huber, 1983). By doing this, they are able to conserve moisture in the soil, improve the seedbed and reduce crop planting time for the following spring. Unfortunately this practice effectively buries the post-harvest stubble, weedy vegetation stands and waste grains greatly needed for winter cover, winter food and nesting cover of the resident pheasants (Olsen and Leatham, 1976).

The concept of conservation tillage (no tillage, zero tillage or minimum tillage) has been suggested by many authors as an alternative to fall plowing which would not only benefit the pheasant but also the
landowner. This practice involves either a minimum of plowing or none at all. The result is that leftover stubble and crop residues remain on the surface. Several benefits may be reaped. Surface stubble and undisturbed root systems hinder water erosion and anchor the soil in high winds. Surface residues also catch snow which provides extra springtime moisture for crops. The organic content of the soil is increased. There is also a decrease in the number of surface rocks when using this practice since it is erosion which generally uncovers rocks and tillage which loosens them (Stanley, 1982). In addition, the pheasant is provided with improved food, cover and nesting sites (Basore and Best, 1982).

Farmers who practice conservation tillage need not plow their fields at planting time. They only need to drive their tractors through their fields once with a "drill" - a planting machine which carves narrow grooves through the covered soil, depositing seed and fertilizer at the same time. Approximately five percent of an untilled field is broken up in this manner as compared to 100 percent by conventional methods. Thus erosion is decreased by more than 90 percent (Stanley, 1982).

Conservation tillage is also attractive from an economic standpoint. Depending on the soil, this practice could significantly reduce fuel and equipment repair costs as well as labor costs. Using the same equipment, a farmer can plant and harvest 1500 no-till acres in the time it takes him to work 500 acres conventionally (Stanley, 1982). Additionally the increase in soil moisture and decrease in soil loss should escalate total net farm income in the long run (Heintz, Morgan, and Podoll, 1980).
There are of course some drawbacks to conservation tillage. To date no large implement company has marketed a reasonably priced grain drill which uniformly plants seed and fertilizer at optimum depths. Because weed control becomes a problem, more herbicides must be used than with conventional farming. Although the chemicals commonly used in conservation tillage break down very quickly, there is still a lack of knowledge concerning their effect on the environment (Stanley, 1982). There is also the possibility of increased survival of some plant pathogens and insects, the control of which could increase costs (Heintz et al, 1980).

The second aspect of plowing to be reviewed, type of equipment used, has been discussed somewhat above. In Cache Valley, most farmers operate a moldboard plow (Huber, 1983). Until further developments in the implement industry occur, it is suggested that the chisel plow be used (regardless of when the plowing is done) to the benefit of both farmer and pheasant. Chisel plowing reduces erosion and leaves more food available on the soil surface for pheasants by maintaining a protective covering over the field. This practice is also less expensive than moldboard plowing (Heintz et al, 1980).

Herbicide Use. The use of herbicides is another practice which may have an adverse effect on the pheasant population, if not directly then indirectly through habitat destruction. Cache Valley farmers commonly use 2-4D and Atrazine for weed control (Huber, 1983).

Acute and chronic toxicities from herbicides appear to be minor problems for the pheasant. The primary concern with the use of herbicides is the reduction in plant species favorable to pheasants. Chemicals are often responsible for the destruction of herbaceous
nesting cover, seed-bearing plants important as food and protective woody cover (Trautman, 1982). In addition the overuse of herbicides may pollute surface and ground waters to the detriment of the landowner and others (Heintz et al, 1980).

Some alternatives have been suggested. Merely restricting the use of herbicides to control only noxious weeds would benefit pheasants. Other weeds, particularly annuals, could be left untreated in non-use areas unless spreading should occur (Heintz et al, 1980).

There is also great promise for weed-control methods that do not employ chemicals. One such practice which is gaining in popularity is organic or biological farming. Specific methods used vary depending on the individual farmer or locale but, in general, this form of farming is characterized by crop rotation, increased plantings of oats and legume hays, smaller field sizes and a lack of inorganic chemicals (Gremaud and Dahlgren, 1982). Interest in organic farming has grown as a result of high energy prices, increased fertilizer costs and a growing concern over the environmental impacts of agricultural chemicals (Langley and Heady, 1982).

An analysis done by Langley and Heady (1982, p. 42) showed that compared to conventional alternatives, "organic farming leads to a decrease in total production (primarily because of lower estimated yields), lower export potential, higher supply prices, higher value of production (given an inelastic demand for agricultural commodities), lower costs of production, and higher net farm income, for each of the crops included in the study." Another study conducted on the DeSoto National Wildlife Refuge demonstrated that biological crop yields have kept pace with conventional yields. From 1979 to 1981, corn yields from
biological practices were 102 bushels per acre while conventional practices yielded 103 bushels. Average soybean yields were 37 bushels per acre on biological acres as compared with 34 bushels on conventionally farmed acres (Sojda, Jr., 1982).

Regardless of the immediate effect of organic farming on crop production, it will improve the long-term structure, microflora, fauna, and general productivity of soils (Sojda, Jr., 1982). At the same time there is great potential for producing pheasants on intensively farmed lands. In one study done at the University of Nebraska six times more bird territories were found on organic farms than on adjacent chemically managed farms (Strange, 1981).

The adoption of alternative methods of weed control have proceeded slowly due to a lack of economic and other incentives and because researching other methods is a time-consuming process. The ultimate solution will require both regulatory and educational programs. Since regulations are effective only if they reflect general public understanding the key to safeguarding habitat will be an informed public (National Academy of Sciences, 1970).

Mowing. One of the greatest threats to pheasant survival is the mowing of hayfields. Most hayfield nests are established when the vegetation reaches a height of eight to ten inches. For the hen pheasant to lay an average clutch of ten to eleven eggs takes approximately 14 days (1.3 days per egg). An additional 23 days are necessary for incubation. Therefore, approximately 37 days of unmolested time is required to hatch a nest which was initiated when the hay was eight to ten inches high. Researchers in Wisconsin found that the cutting date of hay averaged 35 days after a height of eight to ten
inches had been reached. The result is high nest destruction and hen mortality (Olsen and Leatham, 1976). Normally this first cutting destroys from 32 to 39 percent of the incubating hens and from 86 to 91 percent of the nests. This loss of hens is the most damaging result since any chance of the hen renesting and having a successful nest in safer cover is lost (Trautman, 1982).

This farming practice is highly instrumental in limiting pheasant populations in Cache Valley as well. Most landowners on irrigated farms in the valley do three cuttings of hay each summer while those on the bench lands manage one to two cuttings. The first crop is generally mowed during the first week of June, the second, four to six weeks later. It is the first mowing which is most destructive to pheasants since early June is the peak of hatching (Huber, 1983).

Several recommendations may be found in the literature for mitigating the effects of this practice. The UDWR asks that mowing be delayed as long as possible or at least to June 20 to allow the hatching peak to pass (Olsen, 1977). Unfortunately, few farmers would be interested in this proposal since a delay of only one week decreases the forage quality and increases fiber while the protein composition is reduced two percent. The quality of alfalfa cut late would be adequate for beef cows but not for dairy cows (Heintz et al, 1930). On a more positive note, the quality of subsequent cuttings would not be affected by delaying the first cut.

A viable suggestion for limiting destruction by mowing is to reduce the hay mowing speed. Speeds under three miles per hour allow more escape time. Obviously this increases the time allotted for mowing but
it also increases safety and decreases wear on the machinery (Heintz et al., 1980).

Wildlife workers have experimented with various types of "flushing bars", attached to the front of mowers, with some measure of success in the past (National Academy of Science, 1970). However with increased tractor speeds, these devices are no longer effective. Work is being done in Nebraska on an amplified sound system for use in flushing birds (Olsen and Leatham, 1976).

Also suggested is the development of set-aside areas as "bait cover" and general pheasant habitat to encourage pheasants to nest in areas other than alfalfa (Trautman, 1982). Another proposal to the farmer is to contact individuals or organizations interested in salvaging and hatching pheasant eggs for later release on the same land (Bremicker, 1983). UDWR personnel should be able to encourage participation in such a project.

A final suggestion would be to mow hay from the center of the field outward or from one side to the other to herd the hens and young broods out of the field (Olsen and Leatham, 1976).

**Increasing Productive Acreage**. As has already been mentioned, farmers in Cache Valley are following the national trend of putting all available land into production at the expense of pheasant habitat. According to Don Huber, the Cache County Agricultural Extension Agent, the greatest loss of habitat has been due to the removal of fences and the associated fenceline cover. Loss of ditchbank cover is also occurring due to the increasing practice of lining existing ditches with concrete (Hurst, 1983) and the elimination of ditches all together with the gradual shift to sprinkler irrigation. Windbreak vegetation
(shelterbelt) is also being removed in the interest of increasing productive acreage (Huber, 1983). Lastly, thorough harvesting techniques leave little cover for pheasants.

Unfortunately, the literature does not suggest alternatives to removing fences. The only course of action is to inform the farmer of the importance of fenceline cover to the pheasant for loafing, nesting and brooding and hope that his environmental conscience will cause him to leave some of this cover undisturbed. Fenceline vegetation does have some value to the farmer in erosion control (Heintz et al, 1980). The UDWR recommends that a minimum four foot strip of permanent vegetation be provided along each side of all fences (Nish, n.d.).

Concerning those ditches which are not removed, it is suggested that grass be established on the banks as opposed to lining them with concrete. Grassed waterways not only move the water adequately but also stop erosion and provide habitat (Newton, n.d.). Grass species should be used which can successfully compete with woody plants that would otherwise invade the ditch and lower its water-carrying capacity (Anderson, 1969). Again the UDWR recommends the provision of a four foot strip of vegetation along each side of all permanent ditches (Nish, n.d.).

Removal of windbreak vegetation may not only be detrimental to the pheasant but the farmer as well. This vegetation reduces evapotranspiration downwind, provides snow retention and reduces wind erosion. Therefore, removing the windbreak eliminates wind erosion control and may cause a loss of soil and soil moisture. The long term result is likely to be a reduction in net income in addition to the destruction of valuable pheasant habitat (Heintz et al, 1980).
One study done in Nebraska in 1976 clearly illustrated the benefits of windbreak vegetation to the farmer. Two 40 acre plots were observed; one with a windbreak and one without. The windbreak-protected plot had a crop yield of 55 bushels per acre while the unprotected acreage produced only ten bushels per acre. When all preparation and material costs were considered, the harvest meant over $93/acre profit for the windbreak plot and a $7/acre loss for the other plot (Newton, n.d.).

An effective shelterbelt should be a minimum of 200 feet wide (Trautman, 1982) and contain ten rows of different tree species and shrubs with undergrowth allowed to establish in some (Bremicker, 1983). Juniper has been suggested for plantings in shelterbelts as it provides the pheasant greater protection from the elements in the winter than other tree species and benefits the farmer by reducing wind-speed, increasing snow accumulation, and lowering the wind-chill factor for farmsteads and livestock (Heintz et al, 1980). Russian Olive has been a successful windbreak species in Cache Valley (Winn, 1983). In order to retain their effectiveness, shelterbelts must be protected against fire and grazing (Bremicker, 1983).

In addition to the above, Cache Valley farmers are continually putting more land into production by farming right up to the road and converting odd areas in to cropland (Huber, 1983).

Although it would mean a small loss in production, farmers should be encouraged to leave a strip of unharvested corn along field edges (Winn, 1983) and where corn is harvested for forage, leave two or more rows of cornstalks adequately spaced across the field (Trautman, 1982). The standing stalks will reduce soil losses from wind and increase snow cover, thus improving moisture conditions. The stalks also reduce
drifting snow into pheasant winter habitat and shattered ears provide winter food (Heintz et al, 1980). Leaving an unplowed strip next to fences is also encouraged (Winn, 1983).

If the farmer insists on harvesting the entire field, he should be encouraged to spread manure over the snow near winter cover areas. This practice, with its associated waste grain, mainly corn, provides additional winter food for pheasants (Wagner, Besadny and Kabat, 1965).

**Crop Rotation.** Cache Valley farmers practice a crop rotation of alfalfa for seven years and small grains for two years. Some corn is rotated in with the above crops (Huber, 1983). Jay Roberson, Upland Game Program Coordinator for the UDWR suggests a similar rotation of alfalfa-wheatgrass for eight years and small grains for one year (Roberson, 1982).

Heintz et al (1980) recommends that a greater variety of adapted crops be used in farm rotations to the benefit of wildlife and the farmer. Concerning the pheasant, a variety of crops will have a greater likelihood of providing for all habitat needs than a single crop. The farmer benefits, by planting variety, through the reduction in seriousness of disease, insect damage and weed problems. Rotation may also improve the efficiency of fertilization. Another positive result is greater stability of farm income. The only potential negative factor mentioned is the lower efficiency in field operations due to the need for additional machinery and more labor.

**Roadside Management.** It has already been mentioned that many landowners farm right up to the road. However, this is not the case in the entire valley and proper roadside management can greatly benefit the pheasant. According to Huber (1983) most roadside vegetation in the
county, other than that along State highways, is sprayed with herbicides to reduce weeds and increase aesthetics although some are mowed. State highway rights-of-way are mowed but an unwritten cooperative agreement has been established between the Utah Department of Transportation (UDOT) and the UDWR, concerning the date on which the mowing is done.

Prior to January 1979, the UDOT scheduled roadside mowing to begin June 1. The UDWR, at that time, encouraged UDOT to delay mowing in the interest of pheasants. This request was complied with and the date of mowing was moved to July 1 except for areas where safety is a factor. Also mowing has been limited to delineation mowing (one cut less than ten feet wide) of the shoulder of the roadway, except within urban freeway rights-of-way and other safety-related locations (Leatham, 1981). UDOT is amenable to these requests since they are able to cut fuel and labor costs (Roberson, 1982).

In 1982 UDWR requested that UDOT further delay mowing until August 15 in those areas of prime agricultural use where pheasants are most numerous. UDOT indicated that it would comply with this request also (Roberson, 1982).

According to the literature, managing roadsides shows great potential for increasing pheasant numbers. Studies conducted in eight midwestern states show roadsides are heavily used by pheasants. A ten-year study done in Illinois to compare pheasant nesting use of disturbed roadsides to unmowed and reseeded-unmowed roadsides found:

1. 1.7 times more nests in unmowed roadsides.
2. 2.5 times greater use of reseeded-unmowed roadsides.
3. No increase in road-killed wildlife on roads bordered by unmowed vegetation.
4. Little noxious plant control is needed in dense stands of grasses and legumes.

5. The uniform appearance is acceptable to Illinois landowners.

6. Reseeded stands in Illinois have shown a capability of maintaining their vigor for 15 years (Bremicker, 1983).

Although UDOT's cooperation in delayed mowing of State highway rights-of-way is a step in the right direction, more could be done to improve roadside vegetation for pheasant nesting. The Cache Valley farmer needs to be encouraged to leave this vegetation undisturbed except for spot control of noxious weeds on roads other than State highways. Reseeding these areas to a mixture of grasses and legumes would also greatly improve the pheasant habitat potential.

The implementation of any of the alternative practices discussed in this chapter would benefit the pheasant. For a clearer view of how some of these practices might look on the ground, Figure 6 shows a portion of a hypothetical farm with suggestions for providing better pheasant habitat (Utah Division of Wildlife Resources, 1977, n.p.).

As can be seen from the previous discussion, Cache Valley farming practices do not favor a prosperous future for the pheasant. There is however potential for change. Before discussing these potential means of correcting the problem it would be prudent to review past efforts so as to avoid duplication of unsuccessful tactics. Chapter Four will review past efforts by both the State and Federal governments to reverse the declining habitat trend.
120 total acres - 25 acres corn, 50 acres hay, 17 acres pasture, 15 acres grain, 13 acres in buildings, yard and slough.

Improvement Areas:

- Leave as standing feed for wintering birds - 1 or 2 rows or swaths of grain.
- Improve an permanent travel lane and nesting cover - plant to tall wheatgrass and alfalfa where needed.
- Plant the break in the brushrow to Russian olive and other shrubbery to add winter and escape cover.
- Plant to tall wheatgrass and leave ungrazed to provide nesting cover.

Protect roadsides, ditchbanks and waste areas to provide additional travel, escape and nest cover.

Figure 6. One square mile of a hypothetical farm with suggested habitat improvements (Utah Division of Wildlife Resources, 1977).
CHAPTER IV

PREVIOUS EFFORTS TO REVERSE DECLINING HABITAT TRENDS

Numerous attempts have been made to date by both state and federal agencies to improve the plight of the pheasant on private lands in Utah. Thus far none of these endeavors could be considered as successful except that each attempt increases public awareness of the problem to some degree.

State Efforts

The UDWR has probably made the greatest contribution over the past forty years toward finding a solution to this pheasant dilemma. In the 1940's and 1950's local wildlife federations operated a tree and shrub planting program with seedlings provided by the UDWR. Technical assistance was also offered to interested landowners. Many shrubs were planted, but only on a piecemeal basis. Later many farmers decided they were a nuisance and removed them. Some seedlings were delivered but never planted (Nish, 1983). During the same period of time, UDWR was attempting to purchase or lease hayfield nesting cover. These programs were terminated within a short period of time because they proved to be ineffective and costly (Olsen, 1977).

The UDWR has also attempted to develop an "Acres for Wildlife" program in Utah patterned after those operating in other states. Proposed implementation would be through the Agricultural Extension Service with financial support provided by the UDWR. The proposed program would involve the 4-H Club, Future Farmers of America and other local service organizations. Through this program, farmers would be encouraged to set-aside an acre or more of their land for wildlife. The
primary incentive would be publicity and recognition. Unfortunately the Extension Service has not been contacted and no progress has been made to date toward developing a format to be implemented in Utah (Leatham, 1981; Nish, 1973).

In 1975, the Pheasant Management Area Program was first proposed by Darrel Nish, Upland Game Supervisor for the UDWR. The purpose given for proposing such a program was to improve habitat for pheasants on private lands; to provide hunter access to private land, and to compensate the landowner for services rendered (Nish, n.d.).

The original proposal was of course revised several times but retained the same basic shape. The name was changed to Pheasant Habitat Management Program. The proposed program was to be implemented on existing posted pheasant hunting units whose owners would be willing to enter into cooperative agreements. Initially, one existing hunting unit would be selected for experimental implementation of the proposed program. If positive results were attained, the program would be expanded to include landowners of any posted units having 1,000 contiguous acres, that were agreeable to providing stipulated habitat improvements (Nish, n.d.).

Surveys were conducted among farmers in the more prominent pheasant counties to determine their willingness to participate in an improvement program and to discover what incentives would be feasible and acceptable to them. Information was also gained from interviews with selected landholders in Cache Valley. Since these results will be covered in more detail in Chapter Five, they will only be discussed here to the extent necessary to show their influence on program formulation.
The questionnaire results showed incentives preferred by respondents in exchange for providing habitat improvement to be (in order beginning with most desirable incentive):

- Increased trespass enforcement: 25 percent
- Hunter-caused damage payments: 23 percent
- Subsidy payments: 13 percent
- Seed and planting stock: 10 percent
- Technical assistance: 8 percent
- Cost sharing: 8 percent
- Access fees: 6 percent
- Recognition: 4 percent
- Other: 2 percent

The questionnaire also asked what landowners felt sportsmen owed them for raising pheasants. Responses were as follows:

- Forty-three percent specified payment of hunter-caused damages.
- Thirty-three percent specified simply occasional thanks and recognition.
- Seven percent indicated a desire for hunting fees.
- Seven percent demand respect of property.
- Six percent indicated nothing.

Results of Cache Valley interviews and meetings were not quantified but generally agreed with the other questionnaire results. It is apparent that Cache Valley landowners demonstrated a strong aversion to government control of a management area operation, especially concerning hunting permits. The information gained from these questionnaires helped UDWR personnel to refine the proposed program (Nish, n.d.).

The proposal emphasized the creation of permanent vegetative cover along fencelines, ditchbanks, roadsides and in "waste" areas that would
provide effective weed control; stabilize soil; be an attractive addition to the farm landscape; and provide safe and highly preferred nesting cover for pheasants. In return for providing stipulated habitat improvements the landowner would receive increased trespass and property damage control, administrative assistance from UDWR and extra income through permit sales.

Unit officers, themselves landholders, would be responsible for overall hunting area operation. UDWR personnel would assist in planning, mapping, and monitoring of required habitat features. They would also post boundaries and safety zones, operate checking stations, intensify trespass control and aid in habitat development. The task of selling permits would be accomplished by unit officers who would be authorized to disburse the money collected as determined by the landholder organization. Hunter-caused damages would receive first priority in disbursment of permit money.

Qualifying units would be enrolled in the program and issued a certificate of registration from the UDWR which would remain effective for three years. The UDWR would evaluate improvements annually. Failure to comply with program requirements would result in the dissolution of the unit (Nish, n.d.).

The experimental area chosen for initial program implementation was the Benson Pheasant Hunting Unit in Cache Valley. Division personnel contacted the unit officers and received support for the idea. However when a meeting was held to introduce the program to landholders, the attendance was very low and few of those present favored the proposal (Nish, 1983). Unfortunately, no further efforts have been made to
promote the program since that time. Possible reasons for the program's failure will be discussed in Chapter Five.

Federal Efforts

Federal efforts to improve habitat for pheasants on farmland, have been indirect as most federal programs which benefit pheasants are actually aimed at improving soil conservation. The most frequently cited example in the literature is the Conservation Reserve (Soil Bank) Program of the 1956 Soil Bank Act, an Agricultural Stabilization and Conservation Service (ASCS) administered federal farmland program for retiring private farmland from crop production and livestock grazing. This program required long-term contracts and mandated "permanent" protective cover practices. Contracts were established for three, five and ten-year durations. Removal or destruction of established cover was prohibited except for spot weed control or in the event of government declared emergencies. Needless to say wildlife habitat was substantially improved. Numerous citations in the literature point to this program as being responsible for peak pheasant populations in many states during the years of its operation (1956-1969) (Trautman, 1982). The pheasant population in Utah had its peak production in 1963. However, Darrel Nish, who originally proposed the Pheasant Management Area Program, stated that the Soil Bank Program had little impact in Utah (Nish, 1983).

Richard Bartmann, a graduate student at Utah State University, conducted research in Box Elder County, Utah (bordering Cache county on the west side), to evaluate the effects of the Soil Bank Program on pheasants. His findings were as follows:
Nest density was highest in Soil Bank cover followed by sablebrush, hayfields, and grain. Data was collected from sample plots and from a near complete search of a mowed and raked 85 acre hayfield. Soil Bank cover showed the greatest increase in nest density the second year while hayfields showed a large decrease.

Significantly more young pheasants were found on Soil Bank sections during morning, noon, and evening brood transects.

Pheasants were observed to make considerable use of Soil Bank cover at least in mild weather.

Significantly more hunters were observed on Soil Bank than farmed areas during the first two days of both seasons (Bartmann, 1966).

Most lands enrolled in the Soil Bank Program were grazed or mowed for hay during drought emergencies in 1964 and 1965 and by the end of 1965 less than half of the 1961 peak acreage remained. The majority of the remaining contracts expired in 1969 (Trautman, 1982).

Current federal programs operating in Cache Valley are the Payment-in-Kind Program (PIK) and the Agricultural Conservation Program (ACP). Both are operated by the ASCS. These will be discussed further in the following chapter.

Past efforts by both state and federal agencies have been largely unsuccessful in promoting long-term habitat improvement for the pheasant. The most apparent reason for failure, of all of the programs discussed, has been a lack of landowner endorsement. There appears to have been several promising approaches to solving the problem. These should not be totally discarded, but rather they should be carefully studied to discover how they might add to future habitat improvement attempts, keeping the landowner's interest foremost.
CHAPTER V
GAINING LANDOWNER COOPERATION:
KEY TO SUCCESSFUL HABITAT MANAGEMENT

As was brought out in the introductory chapter, the critical ingredient to initiating an active pheasant habitat management program is landowner cooperation. Past programs have failed due primarily to the absence of this crucial element (Nish, n.d.). Current efforts at gaining landowner cooperation in conservation practices in Cache Valley are being made by the ASCS through two incentive programs. These will be analysed here in terms of their success in promoting pheasant habitat management.

Work being done by other states in this area will also be reviewed in this chapter with a view toward learning new techniques which might be adapted to Cache Valley.

Before making suggestions concerning further means of gaining local landowner support it would be beneficial to study the attitudes of Cache Valley farmers toward pheasant habitat management. This type of information has been drawn from the questionnaire sent by the UDWR to landowners during the time that the Pheasant Habitat Management Program was being developed (see Chapter Four, p. 37). Pertinent information has also been drawn from the notes on interviews and meetings with Benson landowners (see p. 38).

Finally, using all the above information, suggestions will be made concerning future attempts at improving pheasant habitat in the Valley.
Current Efforts

The trend on Cache Valley farmland has been toward putting more land into production and thereby removing fencerows, field borders, ditches, windbreaks etc. Numerous landowners now farm right up to the road (Huber, 1983). Cache Valley farmers now have bigger and better machinery so that every possible acre is plowed leaving few odd areas for pheasant habitat (Winn, 1983). Many farmers are concerned about environmental quality but for the farmer trying to earn a living, practices which enhance the quality of pheasant habitat must fit within the framework of making his farm an economically viable operation (Pope III and Heady, 1982). Due to land costs and the resultant lack of revenue, it would cost a local farmer approximately $200 per acre per year to leave land in an unproductive state in an effort to benefit pheasants (Winn, 1983). The provision of crucial pheasant habitat elements on Cache Valley farmland is therefore becoming primarily limited to those odd areas which cannot be farmed.

Two federal programs currently in operation include provisions for improving this deteriorating habitat situation. These are the Agricultural Conservation Program (ACP) and the Payment-in-Kind (PIK) program. Both are administered by the Agricultural Stabilization and Conservation Service (ASCS).

The Agricultural Conservation Program (ACP) is the principal means by which the Federal government shares with farmers and ranchers the cost of implementing approved soil, water, woodland, and wildlife conservation practices on their land to help insure the productive capacity of American agriculture (Utah State ASCS Office, 1979). The farmer is required to follow a specific procedure in order to obtain...
cost-share funds to help him implement a conservation practice on his land. This procedure is as follows:

The farmer must fill out an application for financial aid on a specific improvement project.

The application is referred to the SCS for assessment of technical feasibility and actual designing of the improvement.

The county ASCS must approve the project; all requests are made and approved locally by an elected committee which includes local farmers.

If approved, the project may be installed.

The SCS conducts a performance review of the completed project.

If approved, the farmer must then submit a cost report to the ASCS.

The ASCS pay approximately 50 percent of costs depending on which practice is installed.

The farmer must maintain the improvement for the number of years specified by the ASCS or repay the cost-share money.

The funds used for this program are appropriated by Congress and allocated to individual State ASCS offices on a formula basis. State offices in turn allocate funds to the county offices (Tuttle, 1983).

The Cache County ASCS committee receives $100,000 annually for the ACP program. Of this amount the maximum allocation per individual enrolled in Annual Agreements (ANA) is $3500. Long-Term Agreements (LTA) authorize farmers to enter into from three to ten year contracts for carrying out conservation practices. A larger amount of money is allocated to LTAs depending on the practice and the farmer is made aware at the beginning of the project what the total amount will be, however he is paid in increments after each phase of the project is completed (Hurst, 1983). Several of the available practices may benefit pheasants
indirectly, however, two are suggested specifically for wildlife habitat improvement:

- **WL1 Permanent Wildlife Habitat** and
- **WL2 Shallow Water Areas for Wildlife**

The first practice, WL1, authorizes cost-sharing for the establishment or improvement of vegetative cover which will provide permanent habitat, food or cover for wildlife and erosion control. Fencing the area to control grazing is also cost-shared. This practice must be maintained for at least five years. The second practice, WL2, authorizes cost-sharing for the development or restoration of a shallow water area, eligible plantings for habitat cover or food and permanent fencing to protect the area from grazing. A ten-year minimum maintenance period is required for this practice (see Appendix A for details)(Tuttle, 1983).

In Cache Valley in 1983, only one WL2 practice was enrolled and no WL1 practices (Hurst, 1983). The following practices, although not specifically suggested for wildlife habitat improvement, could also benefit the pheasant:

- **SL1 Permanent Vegetative Cover Establishment**
- **SL2 Permanent Vegetative Cover Improvement**
- **SL7 Windbreak Restoration or Establishment**
- **SL11 Permanent Vegetative Cover on Critical Areas**

**SP Special Conservation Practices**

Practice SL1 provides cost-sharing for the establishment of permanent vegetative cover on farm or ranch land subject to wind or water erosion. The area must be protected from grazing and maintained for a minimum of five years. Although this practice has been implemented on a limited basis in Cache Valley in past years, none were enrolled in 1983.
Practice SL2 provides cost-sharing for the improvement or protection of land already in permanent vegetative cover to control erosion. A five year maintenance period is assigned to this practice also. Four SL2 practices were enrolled in Cache Valley for 1983.

Practice SL7 provides cost-sharing for planting trees or shrubs as needed for restoring or establishing field or farmstead windbreaks. Fencing the area is also covered by cost-share money. The maintenance period here is for a minimum of ten years. This practice has received little attention in the past and in 1983 no SL7 practices were enrolled in Cache Valley. Practice SL11 provides cost-sharing for the establishment of permanent vegetative cover on critical areas which are subject to erosion such as, gullies, banks, logging trails and roads, roadsides, field borders etc. This practice requires a five-year minimum maintenance period. As with the above practices SL11 has received little attention and in 1983 no SL11 practices were enrolled in Cache Valley.

Practice SP provides for the development of special permanent type erosion and sediment control practices to solve a specific local problem which may not be addressed by established program practices. An example might be minimum tillage for which there is currently a practice code at the national level but not yet at the State level.

The ACP practice which is the most popular in Cache Valley and Utah is:

WC4 Irrigation Water Conservation

In 1982, 76 percent of State money was allocated for this practice. This year in Cache Valley, 50 WC4 practices were enrolled (75 percent of all enrolled practices). Unfortunately, this practice would be more
likely to destroy than to improve pheasant habitat since cost-sharing is provided here for permanently installing lined irrigation ditches (see Appendix A for more detailed information on above practices) (Hurst, 1983).

As can be seen, the ACP does include provisions for improving pheasant habitat although implementation is lacking. It appears that in Cache Valley this program may actually be more detrimental to pheasant habitat than beneficial. If, in the future, more emphasis were to be placed on favorable practices discussed, the potential of this program for improving pheasant habitat could be great. The likelihood of such a shift in emphasis is doubtful.

The ASCS also administers the PIK program. This plan was initiated this year to encourage farmers to further reduce crop acreages of wheat, corn, sorghum, upland cotton and rice. In return for participation, the producer will receive an amount of the government-stored commodity, or a check for the commodity at market prices as payment for reducing a specified percentage of his crop base acreage. The primary requirement is that the reduced or diverted acreage be devoted to a conservation use approved by the county ASC committee in consultation with the SCS District Conservationist. When deciding on the conservation measures they plan to institute, farmers are encouraged to consider the following: the soil and water conservation benefits, protection of wildlife, and the long-term nutrient returns from a well chosen cover crop.

Protective cover on the diverted acreage may be provided by annual, biennial, or perennial grasses or legumes. Small grains may also be used as cover but either the seed must be planted too late to form grain
or the grain must be clipped. Residue or stubble may also serve as a protective crop. Other cover or plantings, particularly those beneficial to wildlife, may be developed if approved by ASCS. Grazing is prohibited during the growing season and where mowing is necessary to control weeds, the county committee will specify a time compatible with wildlife and prior to weed seed formation. Eligible cropland may be converted to noncrop conservation uses such as, sod waterways, filter strips, terraces, water storage, and forests. Another suggested alternative is the development of properly designed wildlife food plots or managed habitat.

The county ASC committees have been encouraged to offer cost-sharing under the ACP for permanent vegetative cover practices and other permanent type practices such as sediment retention, erosion or water control structures, sod waterways and permanent wildlife habitat (USDA Agricultural Stabilization and Conservation Service, 1983).

In Cache Valley, 12,200 acres (95 percent of eligible lands) were enrolled in the PIK program. The most popular conservation practice implemented was a protective cover crop (see Appendix B for details on approved cover and practices). Farmers who had planted wheat last fall either left it unharvested or mowed it and left it on the ground. Some farmers planted alfalfa and will not harvest it until next year. To date there have been no requests for the development of wildlife food plots.

The PIK program is currently only operating on an annual basis but there has been a proposal to extend the program into 1984 (Hurst, 1983). From all available information it appears that the PIK program could definitely benefit the pheasant through added habitat acreage.
Hopefully the program will receive sufficient landowner support to remain in operation.

Other States Efforts

In the past, state-sponsored habitat management programs commonly have offered indirect or non-economic incentives such as signage, and other protection from trespass, access control, recognition, technical advice, and plant materials (Teer, Burger and Deknatel, 1983). For the purpose of gaining current information for this thesis, letters were sent to 40 state fish and game departments across the nation requesting any available information on habitat management programs (See Appendix C for sample letter). Thirty-two states responded. Using the information gained from this survey and another recent survey done by James G. Teer, George V. Burger and Charles Y. Deknatel, a brief overview of other states efforts will be presented here.

Of the 32 states responding to this student's survey, only those whose programs appear to have the most promise will be reviewed here. Information gained from the survey done by Teer et. al will give a more general overview of habitat programs across the nation.

The Nebraska Game and Parks Commission is operating the program which is most frequently discussed in the literature. Nebraska's Wildlife Habitat Program has been in operation for over six years. Funding for the program is provided by the revenues of a $7.50 Habitat Stamp which is required annually of persons hunting or trapping in Nebraska after January 1977. Habitat Stamp sales have averaged about a seven percent increase per year. Sales are expected to level off and remain static.
The Private Lands Habitat Program, comprising one third of the total program, is administered through the Natural Resources Districts. It is intended to establish or maintain habitat on private lands throughout the state. In 1982, there were 45,854 acres enrolled in this program with 2,126 cooperators statewide. Generally, the Commission provides 75 percent of contract costs, and Natural Resource Districts supply 25 percent.

The program consists of four practices:

Practice I - The cooperator must establish permanent vegetative cover on marginal lands now in crop production. The minimum area is 5 acres per cooperator, with a maximum of 80 acres. The contract must run 3 to 10 years. The maximum payment is $35 per year, however, the landowner receives an additional $25 per acre the first year for soil preparation costs.

Practice II - This practice is designed to protect wetlands and other areas where grasses, legumes, and/or woody vegetation already occur. Contracts are for 10 years for a minimum of 3 acres and a maximum of 40 acres per cooperator. Annual payments range from $7.50 to $15 per acre per year depending on the nature of the tract.

Practice III - This practice encourages the farmer to plant sweet clover with oats. The oats may be harvested and sold, but the clover must remain through the second February of the two-year contract period. The plot must be between 10 and 80 acres in size per cooperator. Annual payments are $30 per acre.

Practice IV - The nature of this practice is decided by the Natural Resource District in order to meet specific regional needs.

Each practice offers $2.50 per acre per year additional payment for allowing public access for hunting or fishing. Approximately 45 percent of the landowners have taken advantage of this offer.

Thus far, Nebraska's program is doing well and is increasing public awareness of wildlife habitat (Edwards, 1982).

The Iowa Conservation Commission is also operating a program funded by Habitat Stamp sales, the Switchgrass Cost-Sharing Program.
Switchgrass is a warm-season native prairie grass which can supply excellent forage for cattle during hot summer months when cool-season grasses are dormant. Cattlemen are in favor of this program since a pasture rotation system which incorporates both cool-season grasses and switchgrasses is more efficient. Cattle are removed from grazed cool-season pastures in late June, and placed in switchgrass pastures during July and August. In the fall, the cattle are returned to the cool-season pastures. This practice allows continuous grazing through the growing season and improves weight gain for steers.

The advantages of this program to wildlife are obvious. Studies conducted by Commission biologists have shown that switchgrass pastures are utilized as nesting cover by pheasants. Additionally, if the switchgrass is properly managed, it should be free from cattle grazing disturbance and hay harvest until after the completion of peak nesting.

Funds from Habitat Stamp sales are used to cost-share the establishment of switchgrass on private land. In exchange for the cost-sharing payments, landowners are required to sign a five-year contract covering management of the planting (Iowa Conservation Commission, n.d.).

Unfortunately, switchgrass does not grow well in Cache Valley. Nevertheless, the idea is innovative and perhaps could be extended to another warm-season species.

The Indiana Division of Fish and Wildlife offers a wide array of interesting programs. There are seven individual programs which could potentially benefit the pheasant. Those which apply to private land will be discussed here.

Game Bird Habitat Program - This program is funded by the sale of game bird habitat stamps to Indiana hunters. Through this program,
landowners may be reimbursed up to $75 per acre for creating and/or maintaining game bird habitat. The habitat practices implemented must be approved by a Division biologist.

Wildlife Habitat Cost-Share Project - This program provides cost-share monies for such wildlife benefiting practices as tree and shrub plantings, windbreaks, herbaceous food and cover plantings, brushpile construction and nest box construction. The maximum cost-share is $1,000 per landowner per year and must not exceed 90 percent of the cost of the project.

Classified Wildlife Habitat Project - This program enables private landowners to classify wildlife land and ease the property tax burden. The Classified Wildlife Habitat Act allows private landowners to receive property tax benefits for setting aside a parcel of land and following certain restrictions. The assessed value of classified lands is reduced to $1.00 per acre.

Public Involvement Project - Following the belief that a strong information and education program is crucial to any wildlife program, Indiana's Division of Fish and Wildlife publishes a bi-monthly newsletter, sponsors a weekly radio program and operates an awards program. The primary message being conveyed is the importance of wildlife habitat development (Indiana Division of Fish and Wildlife, n.d.).

These programs, if well-supported, could have a very beneficial impact on pheasant populations. The fact that a public information and education program is promoted suggests there is hope for successful results.

The Wildlife Bureau in Connecticut has another interesting approach to habitat management. The major cooperative state-private effort here is the State-wide Agricultural Agreement Program. Under this program, cooperating farmers may use selected parcels of state lands for producing crops in exchange for the provision of a variety of services to the state. Applicable services include strip mowing, planting food plots, leaving portions of crops standing, or other habitat manipulation practices designed to increase use of the area by farm wildlife species (Clavette, 1983). Since this program appears to be mutually beneficial to both the landowner and wildlife, it shows promise. The state,
however, must have enough surplus fertile land in desirable locations to assure program success.

The programs offered by the four states just discussed are by no means representative of all programs across the nation. They do, however, appear to be some of the more promising in terms of potential long-term success. Some other state programs will be discussed in the final chapter in terms of how they might contribute to solving the pheasant habitat deterioration in Utah. The findings of Teer et al., which follow, cover briefly the programs available in other states.

In the survey done by Teer et al., only 13 of the 50 states had no type of wildlife program. Many of the states responding did not offer specific, organized and budgeted programs; however their personnel provide technical assistance when requested. As in the past, the provision of technical advice and plant materials remains the most usual service provided by the states (see Table 2)(Teer et al., 1983).

According to these surveys, habitat management is centered in the farm and wetland areas of the mid-continent states. There is a lack of habitat programs in the 17 western states because a great part of the land is federally owned, and few of the states have chosen to allocate funds into the management of private lands. Table 3 summarizes the current state programs offered. Specific ideas from these and other states' programs which could easily be adapted to Utah will be discussed in the final chapter.

Local Landowner Attitudes Toward Habitat Management

In 1976, a questionnaire (discussed briefly in Chapter Four) was sent by the UDWR to a sample of license-buying sportsmen and landholders
Table 2. Habitat management programs\(^a\) supported by state funds in 1982 (Teer et al., 1983).

<table>
<thead>
<tr>
<th>Activity</th>
<th>States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provision of technical advice</td>
<td>AL, AR, CA, CO, CN, FL, GA, HI, IA, ID, IL, IN, KS, KY, LA, ME, MD, MI, MN, MO, MS, MT, NE, NH, NJ, NM, NY, NC, ND, OH, OK, OR, PA, RI, SC, SD, TN, TX, VT, WA, WI, WY, CO, HI, IA, IN, MD, MN, MT, NH, OR, WI.</td>
</tr>
<tr>
<td>Provision of plant materials</td>
<td>AR, CO, IA, IL, IN, KS, LA, MA, MD, MN, MO, NE, NC, OH, OR, PA, RI, TN, WI.</td>
</tr>
<tr>
<td>Provision of signage</td>
<td>CO, IL, IN, KA, MD, NC, NE, OH, OR, PA, RI, SD.</td>
</tr>
<tr>
<td>Provision of labor</td>
<td>CO, IA, IL, KS, LA, MN, MO, OR, PA, WI.</td>
</tr>
<tr>
<td>Conservation easements and tax credits</td>
<td>CO, HI, IA, IN, MD, MN, MT, NH, OR.</td>
</tr>
<tr>
<td>Cost-sharing with landowner and direct payments</td>
<td>CO, IA, IN, KS, KY, MD, MN, NE, ND, OH, OR, PA, SD, WI.</td>
</tr>
<tr>
<td>Agreements made with landowner to maintain practices</td>
<td>CO, IA, IL, IN, LA, MN, NE, ND, OH, OR, PN, RI, SD, WI.</td>
</tr>
</tbody>
</table>

\(^a\)Every state that reported some type of habitat management provided technical assistance to landowners by visits to the field. Some of these states had extension personnel whose main job was to work with landowners in wildlife management activities.
Table 3. State budgets, sources of funds, species featured, and name of programs for wildlife habitat management on private lands (Teer et al., 1983).

<table>
<thead>
<tr>
<th>State</th>
<th>Most recent amount budgeted (dollars)</th>
<th>Source of funds</th>
<th>Species emphasized</th>
<th>Name of program or activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas</td>
<td>78,000</td>
<td>Appropriated by legislature and game and fish funds</td>
<td>All species</td>
<td>Acres for wildlife</td>
</tr>
<tr>
<td>Colorado</td>
<td>212,840</td>
<td>License fees</td>
<td>Pheasant</td>
<td>Pheasant habitat program</td>
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<td></td>
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<td></td>
<td></td>
<td>Wildlife habitat improvement program</td>
</tr>
<tr>
<td>Florida</td>
<td>40,000</td>
<td>Appropriated by legislature and license fees</td>
<td>Deer, waterfowl</td>
<td></td>
</tr>
<tr>
<td>Georgia</td>
<td>3,960</td>
<td>Appropriated by legislature and license fees</td>
<td></td>
<td>Acres for wildlife</td>
</tr>
<tr>
<td>Illinois</td>
<td>25,000</td>
<td>License fees</td>
<td>All species</td>
<td>Acres for wildlife</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Private lands habitat program</td>
</tr>
<tr>
<td>Indiana</td>
<td>37,000</td>
<td>License fees habitat stamp</td>
<td>Pheasant, turkey, quail, non-game species</td>
<td>Game bird habitat program</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Wildlife habitat cost-share project</td>
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<td></td>
<td></td>
<td>Wildlife habitat trust areas</td>
</tr>
<tr>
<td>Iowa</td>
<td>182,000</td>
<td>License fees</td>
<td>All species</td>
<td>Switchgrass program</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Farm game habitat program</td>
</tr>
<tr>
<td>State</td>
<td>Most recent amount budgeted (dollars)</td>
<td>Source of funds</td>
<td>Species emphasized</td>
<td>Name of program or activity</td>
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<tr>
<td>Kansas</td>
<td>59,176</td>
<td>License fees</td>
<td>All species</td>
<td>Wildlife habitat improvement program</td>
</tr>
<tr>
<td>Kentucky</td>
<td>8,420</td>
<td>License fees</td>
<td>All species</td>
<td>Technical guidance program</td>
</tr>
<tr>
<td>Louisiana</td>
<td>114,000</td>
<td>Appropriated by legislature</td>
<td>All species</td>
<td>Acres for wildlife</td>
</tr>
<tr>
<td>Maryland</td>
<td>7,444</td>
<td>License fees</td>
<td>Waterfowl and upland game species</td>
<td>Waterfowl restoration program</td>
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<tr>
<td>Michigan</td>
<td>466,623</td>
<td></td>
<td></td>
<td>Land lease program for public hunting</td>
</tr>
<tr>
<td>Minnesota</td>
<td>4,570,000</td>
<td>General funds appropriated by legislature game and fish funds</td>
<td>Waterfowl, deer pheasant, non-game</td>
<td>State water bank</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Wildlife habitat improvement program</td>
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<td></td>
<td></td>
<td></td>
<td>Wetland tax exemption and credit program</td>
</tr>
<tr>
<td>Missouri</td>
<td>1,050,921</td>
<td>License fees and sales tax (1/8 of 1%)</td>
<td>Upland game and Forest game</td>
<td>Planning ahead for wildlife survival program</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Field services program</td>
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<td></td>
<td></td>
<td>Expanded private land habitat program</td>
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<tr>
<td>State</td>
<td>Most recent amount budgeted (dollars)</td>
<td>Source of funds</td>
<td>Species emphasized</td>
<td>Name of program or activity</td>
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<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>Montana</td>
<td></td>
<td>Tax deduction</td>
<td>Big game</td>
<td>Conservation easement program</td>
</tr>
<tr>
<td>Nebraska</td>
<td>900,000</td>
<td>Habitat stamp</td>
<td>Pheasant</td>
<td>Wildlife habitat program</td>
</tr>
<tr>
<td>New Hampshire</td>
<td></td>
<td>Tax deduction</td>
<td>Forest wildlife</td>
<td>Current use assessment law</td>
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<tr>
<td>New York</td>
<td>86,875</td>
<td></td>
<td>Upland game</td>
<td>Farm cooperative planning program</td>
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<tr>
<td>North Carolina</td>
<td>79,700</td>
<td>License fees</td>
<td>Deer, dove, bobwhite, rabbit</td>
<td>Public hunting grounds (RENEW) program</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Wildlife habitat improvement Planting materials program</td>
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<tr>
<td>North Dakota</td>
<td>555,000</td>
<td>Habitat stamp</td>
<td>Upland birds</td>
<td>Wildlife habitat restoration programs for private agricultural lands</td>
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<tr>
<td></td>
<td></td>
<td>Interest money program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ohio</td>
<td>79,000</td>
<td>License fees</td>
<td>Upland game</td>
<td>Wildlife habitat restoration programs for private agricultural lands</td>
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<tr>
<td>Oregon</td>
<td>400,000</td>
<td>License fees</td>
<td>Big game</td>
<td>Green forage</td>
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<td>Pennsylvania</td>
<td>1,039,069</td>
<td>License fees</td>
<td>Pheasant</td>
<td>Cooperative farm game program Pheasant recovery program Safety zone program Cooperative forest game program</td>
</tr>
</tbody>
</table>
Table 3. Continued.

<table>
<thead>
<tr>
<th>State</th>
<th>Most recent amount budgeted (dollars)</th>
<th>Source of funds</th>
<th>Species emphasized</th>
<th>Name of program or activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhode Island</td>
<td>3,000</td>
<td>Forest game</td>
<td>License fees</td>
<td>Small game program</td>
</tr>
<tr>
<td>South Carolina</td>
<td>66,000</td>
<td>Quail, rabbits, dove, waterfowl</td>
<td>Appropriated by legislature</td>
<td>State duck stamp</td>
</tr>
<tr>
<td>South Dakota</td>
<td>610,000</td>
<td>Pheasant</td>
<td>License fees</td>
<td>South Dakota pheasant program</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pheasant restoration</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>habitat stamp</td>
<td></td>
</tr>
<tr>
<td>Tennessee</td>
<td>65,475</td>
<td>All species</td>
<td>License fees</td>
<td>Farm game program</td>
</tr>
<tr>
<td>Vermont</td>
<td>121,000</td>
<td>Anterless deer hunting permits License fees</td>
<td>Forest wildlife</td>
<td>Wildlife habitat improvement program</td>
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<tr>
<td></td>
<td></td>
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</table>

Only states that provided more than technical assistance in 1982 are included.
operating farmland in the more prominent pheasant producing counties of the state. Interviews were also conducted with selected landholders in Cache County. The purpose of the questionnaire was to determine the attitudes of sportsmen and landowners toward pheasant hunting and a habitat program. Fifteen of Utah's 29 counties were sampled. The rate of return for the questionnaire was less than desirable (42 percent for landholders and 35 percent for sportsmen) (Olsen, 1976). Nevertheless, the responses should be carefully considered before developing future habitat programs.

The questionnaire sent to landowners was designed to assess their attitudes toward pheasant hunting; willingness to implement habitat improvements; incentive requirements for providing habitat; willingness to cooperate in a pheasant management area program. The questionnaire also served to gather information on farming operations.

A summary of responses to this questionnaire indicate the following about the Utah landowner:

He has a favorable overall attitude toward pheasants and pheasant hunting as a sport.

He is, in most instances, willing to allow pheasant hunters on his land, but would like hunters to ask permission. In return he asks only for reimbursement for damages and occasional recognition.

He is concerned over pheasants' welfare, but feels predation and overhunting are chief causes of decline followed by habitat deficiency. Most landowners prescribe predator control and shorter seasons as cures for pheasant population declines.

Overall, he does not look favorably at increasing pheasant cover on his farm, but appears to be more willing to provide habitat improvements if incentives are provided. He chooses the following incentives in order of attractiveness: trespass enforcement with limited landowner involvement, reimbursement for hunter-caused damages, and subsidy payments for improving pheasant cover.

He expects to be completely reimbursed for expenses involved should he develop improved pheasant habitat yet does not want technical assistance from UDWR.
He owns a farm which is approximately 40-320 acres but probably between 80 and 320 acres. His chief farming interests are non-dairy livestock and hay and feed grains.

There is approximately a 50-50 chance that he will have an additional source of income to his farming interests. He has graduated from high school and may have attended college; is over 35, most likely over 45, and is male (Olsen, 1976).

An important point to note from these results is that the Utah landowner does not realize that habitat deterioration is the main factor contributing to pheasant population declines. He points to predation and overhunting as the real culprits. It is small wonder then that he is less than willing to put time, energy and dollars into habitat improvements. Nevertheless, he might be willing to provide habitat improvements if desirable incentives are provided.

Questionnaire results applicable directly to Cache Valley showed that of 114 landholders surveyed, 46 would be willing to improve cover for pheasants while 68 would not. However if desirable incentives were provided 64 of 102 landholders surveyed would be willing to participate in a habitat program while 38 would not. When given a choice of nine incentives, Cache Valley landowners rated them according to their desireability. These incentives are listed below in order from most to least desirable to Cache Valley landowners (there is a tie for third most desirable):

1. Reimbursement for hunter-caused property damages.
2. Enforcement of trespass laws without requiring landowners to sign a complaint for each offense.
3. Subsidy payments made directly to farmers for providing pheasant cover.
4. Technical assistance on habitat improvements.
5. Free seed and planting stock to be used for habitat improvements.
6. Cost-sharing on habitat improvements.
8. Hunter access fees paid to farmer.

As can be seen the attitudes of the Cache Valley farmer do not differ greatly from those of other Utah farmers.

It was mentioned in Chapter Four that the now defunct Benson Pheasant Hunting Unit in Cache Valley was chosen as an experimental area for initial implementation of the UDWR's proposed Pheasant Habitat Management Program. At that time each available landowner (110 out of the 121 landowners comprising the unit) was interviewed and presented with the project proposal. Those not interviewed were either "non-resident" landowners, utility companies or government agencies holding land in the area. Later a meeting was held with hunting unit officers and finally a public meeting was planned to involve all landowners as a group. From these contacts with the Benson landowners several items of pertinent information were gained. The local social ties resulting primarily from religious affiliation in the area are strong. Farmers are very reluctant to commit themselves to a habitat management program until they know their neighbors attitudes and how their own property might be involved. Even then, interviews indicated that community members leave most decisions concerning the pheasant hunt to their elected unit officers. When UDWR personnel met with hunting unit officers, they noted a definite reluctance to make any commitments for unit participation evident.

From these interviews UDWR biologists were able to summarize local farmers attitudes toward participation in a habitat management program.
as follows:

86 percent indicated that they would participate if their neighbors did.

14 percent wanted no part in providing habitat.

These results suggest that there is potential for gaining local landowner cooperation if appropriate encouragement is provided. It almost appears that if one prominent member of the farming community, perhaps a unit officer, could be convinced of the importance of habitat management for the pheasant, the others would be more inclined to get involved.

Comments made during interviews and meetings did indicate some specific reservations of local farmers which should be considered.

1. They were concerned that the proposed program would be costly and interfere with their farming operation.

2. They felt that the program represented another governmental interference in their private affairs.

3. It was felt that habitat improvements would serve as an inlet to weed invasion.

4. They expressed concern regarding the preservation of strip cover along fences and ditches. Many farmers graze cropland after harvest and the cost of fencing to preserve strips would be prohibitive.

5. They were also concerned over the UDWR's requirement of a public permit sale since they desire complete control of permit sales (Olsen, 1976). Funds collected from these sales in excess of damage claims were often used for local community projects (Leatham, 1981).

It is obvious from the above that for a habitat program to be instituted in this area, it must be designed such that the majority of responsibility is in the hands of the landowners with limited guidance from UDWR biologists. Some type of subsidy payment would also be necessary. The expressed fear of weed invasion points again to the lack
of information provided to the farmer since weed control is a minor problem in habitat management.

As has already been mentioned, questionnaires were also sent to Utah sportsmen. In reviewing the summary of this questionnaires' responses, three characteristics of Utah hunters were noted which should be considered here.

1. The average pheasant hunter is of the opinion that the landowner is justified in wanting to know who is on his property at all times. The average hunter feels that the trespass law should be rigidly enforced. According to him, the landowners close land to hunting for two main reasons: protection of family and property or previous distasteful encounters with sportsmen.

2. The average pheasant hunter is not willing to pay more than three dollars for a permit to hunt on private land. He is, however, willing to pay more for a permit if the landowner provides habitat improvement for pheasants. A clearly defined acceptable price was not indicated.

3. The average pheasant hunter feels that pheasant population declines are primarily due to habitat deficiencies followed by overhunting and predation. His suggested cures are: habitat improvements, stocking pen-raised birds and predator control (Olsen, 1976).

The important points to note here are that the Utah hunter realizes the importance of habitat management to pheasant populations and is willing to pay more for a hunting permit if his money will be used for habitat improvement. In addition, the average hunter respects the landowner's concern for his property.

The information presented in this section concerning landowner and sportsman attitudes toward a pheasant habitat management program is critically important and must be integrated into future program proposals if any degree of success is to be attained.
CHAPTER VI
POTENTIAL SOLUTIONS

After reviewing previous and current attempts to deal with the problem of pheasant population declines (both locally and across the nation) and studying local attitudes on the subject, it is now appropriate to discuss potential solutions to the problem. There is of course no single solution and all available options must be considered. Proposals range from educational programs which encourage voluntary adoption of conservation practices to mandated limits and regulations. Several feasible solutions will be discussed in this section.

Public Information and Education

Judging from the responses to the UDWR's 1976 Landholder Questionnaire, one of the greatest obstacles to a pheasant habitat management program in Cache Valley is the lack of knowledge on the part of the landowner concerning the relationship between his land and the pheasant population decline. Until he is made aware of the importance of habitat management to pheasant populations the landowner cannot be expected to support any habitat improvement programs. It therefore seems obvious that the first and most important step toward solving the problem at hand is to launch an intensive public education effort.

The state of Vermont's Wildlife Habitat Improvement Program serves as a good example of a program whose success is largely attributable to an organized and intensive education program. Vermont Fish and Game personnel developed a public relations plan which directs informational, educational and publicity materials at private landowners, land managers, sportsmen and other interested publics. A variety of
communication techniques have been employed to heighten public awareness and motivate participation:

1. A newsletter, "Habitat Highlights", is published quarterly and distributed to natural resource managers, private landowners, legislators, sportsmen's clubs and the media. The newsletter contains pertinent information concerning the Habitat Program and/or habitat management practices (see Appendix D for sample).

2. Three minute radio tapes on habitat management have been broadcast monthly on the UVM Extension Service Radio Network which includes 19 radio stations in the state (see Appendix E for sample script).

3. Shows have been aired on the Extension Service's "Across the Fence", an 18 minute noontime television program (see Appendix F for sample script).

4. Press releases and newsletter and magazine articles have been prepared (see Appendix G for sample).

5. A directory of habitat management assistance, "Give Us a Call", has been developed for land managers and private landowners (see Appendix H for sample).

6. The Habitat Publicist developed and coordinated several training sessions for private landowners and land managers on a regular basis to convey habitat management information and establish working relationships. He and Habitat Biologists spoke to close to 5,000 individuals at more than 110 speaking engagements (Vermont Department of Fish and Game, 1982).

These techniques could also be used in Cache Valley. A public relations program of this type would be easier to implement if one individual, such as Vermont's Habitat Publicist, was hired whose sole responsibility involved informing the public of the importance of habitat management.

An informed public (including students, conservation organizations, sportsmen, landowners and interested citizens) can more easily be encouraged to participate in planning, hearings, political campaigns and other areas where support for a habitat management program can be gained (Walton, 1981).
Once public awareness of the problem is developed, a transfer of knowledge about practices which can solve the problem should begin (Christensen and Norris, 1983). This could be done in a number of ways. The communication techniques used in Vermont would also be effective in this endeavor. However, a seemingly more effective method for transferring information would be through actively involving local organizations such as Boy Scouts of America, 4-H Clubs, Future Farmers of America, Girl Scouts, Bridgerland Audubon Society, Sierra Club, Cache Gun Club, USU student Chapter of The Wildlife Society, etc., in habitat management projects. This would not only involve various sectors of the local public but would also serve as a means to acquiring community recognition of the landowners efforts. One such program is "Acres for Wildlife" which has been adopted by several states and has in fact been considered in Utah (see Chapter Four, p. 35). The program essentially requires that a landowner fence and retain an acre or more of land specifically for habitat for wildlife. In Wyoming the Game and Fish Department began an Acres for Wildlife program with 4-H clubs in that state. Individual members or groups of members were encouraged to find a plot of eligible land and enroll it in the program. With the aid of Wyoming Game and Fish Department personnel 4-H members attempted to improve the plot for wildlife (see Appendix I for detailed description of program) (Corsi, 1983). This approach could be effectively used for several of the organizations listed. To assure successful application of conservation practices technical assistance from UDWR biologists would be necessary. Actual on-site implementation of practices would be done by the local organization and the landowner, thus minimizing the government intervention which local landowners dislike.
Incentives

Public information and education programs are crucial to the success of any habitat management program but they may be of limited effectiveness when instituted without some type of incentive for the landowner to cooperate. Incentives may be divided into two categories, economic and non-economic.

Non-economic incentives could be something as simple as a personal sense of fulfillment for the landowner or community recognition of habitat improvements (through such means as posting signs on the landowners property which indicate his involvement in habitat management) (McConnell, 1981). Another non-monetary incentive which would be particularly attractive to local landowners might be the institution of adequate trespass laws which are rigidly enforced (Walton, 1981).

"The land the pheasant manager needs for growing pheasants will also grow corn. So the pheasant he grows must literally be purchased in terms of the amount of corn, or rice or hay that a farmer would have to sacrifice" (MacMullan, 1961). In order to purchase that pheasant economic incentives are required. Economic incentives may include cost-sharing land management practices such as those sponsored by the ASCS (McConnell, 1981). In some states (eg. North Dakota) the fish and game agency will augment the cost-share monies allocated by the ASCS for practices which benefit wildlife habitat (North Dakota Game and Fish Department, n.d.).

The most frequently mentioned economic incentive in the literature deals with taxes. Several states have sought to encourage conservation
of wildlife habitat through reduction in property taxes. This may be
done either by zoning or by a direct reduction in property taxes on land
which is placed in a state program designed to preserve wildlife land
for the future. Minnesota, for example, has begun an innovative
property tax credit program to preserve wetlands and native prairie
(Shelton, 1982). In 1979, the Minnesota legislature enacted the Wetland
Tax Credit Law which added wetlands to the list of tax exempt properties
such as churches, hospitals etc. This law also provides a tax credit on
other taxable lands owned by the landowner who agrees to maintain his
wetlands in a natural state. The amount of credit allowed is 3/4 of one
percent of the highest valued cropland in each township for each acre of
wetland preserved (Berryman, 1979).

In 1980 the Minnesota legislature amended the Wetland Tax Credit
Law such that preserved native prairies are eligible for the same
property tax exemption and a similar tax credit. Since native prairie
is more productive than wetland, the tax credit is set at 1.5 percent of
the market value of an acre of nearby cropland. To receive the tax
credit for preservation of either wetland or prairie, the landowner must
agree to maintain these lands in their natural state for one year. He
retains all other rights (Peterson and Madsen, 1981). Thus far the
program is being well received by Minnesota landowners (Shelton, 1982).

In order to offset the resultant loss of local revenue from
property taxes, the Minnesota legislature provided that these deficits
would be financed from the State's General Revenue Fund. In this way
all taxpayers in the state help to bear the expenses of maintaining
wetlands and native prairie. If public interests in privately owned
natural resources are to be strengthened, it seems appropriate that the
public fulfill an obligation to the private landowner to make it worth his while to provide these public benefits (Peterson and Madsen, 1981). A similar program could be initiated for pheasant habitat in Cache Valley. The major obstacle would be encouraging legislative action. Here the driving force of an educated public demanding legislation to protect the pheasant would be necessary, and an effective lobby of special interest groups interested in increasing pheasant numbers.

On October 14, 1980, the President signed into law two new tax incentives which could benefit pheasant habitat. All persons who plant trees on their property can take advantage of these incentives. First, if a landowner spends $10,000 for tree planting costs (eg. site preparation, seeds and seedlings, labor) he may subtract a ten percent investment tax credit ($1000) from the amount of taxes he owes the federal government. Secondly, he may deduct the full $10,000 from yearly earnings over a seven year period. The maximum expenditure eligible with this tax treatment is $10,000 per year (Shelton, 1982). These incentives could easily be applied to local landowners who plant shelterbelts on their farms and thus improve pheasant habitat.

Shelton (1982) suggests extending these incentives to reimburse landowners for other habitat enhancement projects. He recommends that ASCS designate these projects and when a landowner completes one and has it inspected by SCS, he could receive a document to be filed with his tax return which would qualify him for a tax credit and depreciation for the project (Shelton, 1982). An extension such as that which he is suggesting would again need the strong support of a public interested in habitat improvement.
Another economic incentive to consider is the leasing of hunting rights (commercial hunting or user-pay system). The concept of "free hunting" promotes the illusion that a hunter is guaranteed not only game in the bag but a place to bag it simply because he paid the license fee. As such, the landowner has no incentive to maintain the habitat (Gottschalk, 1977). There is no guarantee that a landowner will improve his leased acres for pheasants but under the user-pay system the pheasant becomes an income-producing crop and since the income from that crop will depend on how it is managed the landowner is encouraged to preserve its habitat. Leases may be per acre and/or per bird taken (Teer et al, 1983).

Commercial hunting is a controversial issue since hunters do not believe they should have to pay for something which they consider a heritage while landowners are beginning to ask for compensation for the provision of hunting (Teer et al., 1983). Hunters must be made aware of the real costs of providing wildlife habitat as opposed to other land uses (Gottschalk, 1977).

Potential benefits of a user-pay system extend beyond the monetary issue. Hunters who lease land to hunt on generally return to that land year after year. As such they are more apt to take care of the property and conduct themselves according to the rules stipulated by the landowner. They would also be inclined to help prevent trespassing since a long-term lease develops a sense of ownership on the lands on which they hunt (Burger & Teer, 1981). Since prevention of property damage and trespass control were reported to be the most desired incentives by Cache Valley landowners followed by some form of subsidy
payment, the concept of commercial hunting could be a viable solution to pheasant population declines in the Valley.

Another type of incentive which may be considered economic or non-economic, depending on the program involved is cross-compliance. Cross-compliance is a method of joining commodity support and conservation efforts. There are two approaches: the "bonus" approach and the "requirements" approach. In the "bonus" approach farmers become eligible for extra benefits from other agricultural programs if they participate in a conservation program. The "requirements" approach dictates that a farmer cannot receive other program benefits unless he participates in a conservation program. This type of incentive is attractive since it encourages coherence in federal programs for agriculture. Too often one program rewards a farmer for non-conservation practices while another pays him to conserve (Christensen and Norris, 1983).

Stocking Pen-Raised Birds

A technique often suggested in the past to improve pheasant populations is stocking of pen-raised birds. This entails adding pen-raised pheasants to wild populations. This game-bird was originally introduced to this country in this manner but subsequent programs designed to increase breeding season pheasant populations through stocking have been unsuccessful. The theory is that the first birds introduced came from hybrid stock which possessed superior adaptive traits. These traits have apparently disappeared over the generations leaving an essentially pure, but less adaptive, subspecies (Trautman, 1982). The stocked birds are forced to compete with wild populations
for life sustaining necessities. Wild birds can survive the strain of this competition but the pen-raised birds cannot (Bremicker, 1983). Stocking may pad the total hunter kill to some extent but it will not prevent long-term population declines as a result of habitat deterioration (Wagner et al, 1965).

Despite the negative comments above, it is possible to utilize stocking to the benefit of the pheasant. In Kentucky, the stocking of pen-raised quail is used as a public relations tool. Landowners are offered pen-raised birds as incentive for habitat improvement. Cooperating landowners whose lands support normal quail populations do not need to stock if they improve the habitat. However, they appear to take more interest in their projects if they are able to observe birds which they released (Durell, 1983).

If a program of stocking pheasants in Cache Valley was instituted as a public relations measure, the birds could be raised as a project of some of the local organizations discussed previously (4-H, Boy Scouts, Cache Gun Club etc.) in an effort to involve other members of the community.

Regulatory Programs

Even more controversial than commercial hunting as a means of habitat protection are regulatory programs (Walton, 1981). However, due to limited success with voluntary programs, interest has been stimulated in this area (Christensen and Norris, 1983). Two potential means of habitat protection through regulation warrant discussion here: zoning and prevention environmental law.
Land use zoning may be defined as "the control of privately owned real estate by public policy...an exercise of the police power of government first used to prevent intrusion of such nuisances as slaughter houses in residential neighborhoods, but zoning has been expanded in scope to control land use for most public benefits" (Walton, 1981, p. 198). Zoning may serve as a tool in the preservation of highly valuable habitat. In order for zoning to be used in such a way wildlife interests would have to be very active participants in zoning programs affecting wildlife habitat since the real test of a zoning proposal is whether or not it can survive in the political arena (Walton, 1981).

Prevention environmental law involves national and state statutes which regulate activities and impacts on the environment. Some examples on the national level are the National Environmental Policy Act (NEPA), the Fish and Wildlife Coordination Act and the Endangered Species Act. NEPA in particular has evolved into an important tool for preserving wildlife habitat on private lands when federal funds and major programs or actions are involved since it requires that an environmental impact statement be written (Walton, 1981).

Before instituting any form of regulatory program on private land, policy-makers should carefully consider the added benefits expected and determine whether they justify the increased public and private costs (Christensen and Norris, 1983).

In Cache Valley, regulatory programs should doubtless be considered as a last resort. Local landowners have voiced an aversion to government intervention in the management of their land and would certainly be strongly opposed to any form of mandated program.
Hopefully the plight of the pheasant can be reversed without resorting to a regulatory solution.

Conclusion

As was stated in the introductory chapter, it is hoped that this study might in some way contribute information necessary to initiate an active program of pheasant habitat management on cropland in Utah. A quote from Trautman (1982, p.46) suggests the dire consequences if action is not taken in the near future to reverse the declining trend in pheasant populations: "The progeny of one pair of pheasants, free of all environmental resistance, could potentially increase to 20 million in ten years, even if birds lived only long enough to produce one brood. Ten chicks from a pair of adults represent a 500 percent increase in the population in one year. This is known as the breeding potential (fixed biological reproductive capacity) and constitutes the population increase factor which is high for pheasants.

Conversely, environmental resistance consists of a variety of population limiting factors (habitat-depleting changes in land use and farming methods and other carrying capacity stresses affecting mortality caused by weather, predators, hunting, accidents, diseases, agrichemicals and possibly starvation ) that tend to offset the high breeding potential. If environmental resistance increases and, thus, exceeds security afforded by the habitat, then the survival level and population decline accordingly. If the increase in environmental resistance stabilizes at a higher intensity level, then survival stabilizes at a new lower level. A continuing increase in environmental resistance may remove all security and result in population extinction."


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APPENDIXES
Appendix A. ACP Practices

PART 2 1-UT(ACP) (Rev. 2) PAR. 68

68 WL1 PERMANENT WILDLIFE HABITAT

*A. The purpose of this practice is to protect farmland from erosion and provide permanent wildlife habitat cover or food.

*B. Apply this practice to farmland needing protection from erosion and which is suitably located and adapted to the establishment of permanent wildlife habitat.

*C. Policies for this practice are as follows:

1. Cost-sharing is authorized for:
   a. Establishing or improving a stand of trees, shrubs, grasses, legumes, or other vegetative cover which will provide permanent habitat, food or cover for wildlife and for erosion control.
   b. Permanent fencing (excluding boundary and road fences) needed to protect the area from grazing by livestock or to regulate beneficial grazing of livestock.

2. Cost-sharing for an eligible measure is limited to once with the same person on the same acreage.

3. This practice shall be maintained for a minimum of 5 years following the calendar year of installation.

D Specifications.

1. Plantings must be in accordance with a plan developed within the scope of standards and specifications set forth in the SCS Technical Guide.

2. All seedings shall be with adapted seed which meets the requirements of State seed laws.

3. Fencing materials and construction shall be in accordance with the specifications set forth in the SCS Technical Guide.

E Technical Responsibility. Assigned to SCS.

F Federal Cost-Share Level. (Refer to paragraph 3 F.)

4-12-82 Amend. 10 Page 57 (and 58)
PART 2

1-UT(ACP) (Rev. 2)

PAR. 69

69 WL2 SHALLOW WATER AREAS FOR WILDLIFE

*A The purpose of this practice is to develop or restore shallow--*
water areas for wildlife.

*B Apply this practice to farmland suitably located and adapted--*
to the development or restoration of shallow water areas
for wildlife.

*C Policies for this practice are as follows:--*

1 Plantings are limited to those within the floodable
area and plantings on any embankment constructed.

2 Cost-sharing is authorized for:
   a Earthmoving to construct dams, levees, shallow
dupouts, or dikes if needed to develop or restore
the shallow water area.
   b Eligible plantings for habitat cover or food.
   c Permanent fences (excluding boundary and road fences)
needed to protect the shallow water area from grazing
by domestic livestock.

3 This practice shall be maintained for a minimum of 10
years following the calendar year of installation.

D Specifications. All plans and construction must be in ac-
cordance with standards and specifications as set forth in
the SCS Technical Guide.

E Technical Responsibility. Assigned to SCS.

F Federal Cost-Share Level. (Refer to paragraph 3 F.)

70-100 (Reserved)

4-12-82 Amend. 10

Page 59 (thru 100)
PART 2  REGULAR PRACTICES

51 PERMANENT VEGETATIVE COVER ESTABLISHMENT

A*--The purpose of this practice is to protect the soil and reduce the pollution of water, air, or land from agricultural or silvicultural non-point sources.

B*--Apply this practice to farm or ranch land subject to wind or water erosion to be established in permanent vegetative cover.

C*--Policies for this practice are as follows:--*

1 Cost-sharing is authorized for eligible seed, seedbed preparation, and seeding. (See paragraph 6.)

2 Cost-sharing is not authorized for:
   a Clearing of rocks or other obstructions from the area to be seeded.
   b Fencing.
   c Vegetative cover which includes only legumes.
   *--d Converting land from a stand of merchantable or partially merchantable timber or pulpwood to a grass or legume cover.--*

3 The acreage seeded must be protected from grazing by domestic livestock until the stand is well established.

4 The vegetative cover must be maintained without additional cost-sharing for a minimum lifespan of 5 years following the calendar year in which the cover was established. Cost-shares must be refunded if the farmer destroys the cover during its lifespan.

5 Consideration should be given to the needs of wildlife when determinations as to seed varieties and other practice specifications are made.

6 Cost-share shall be limited to the minimum seed needed to establish adequate cover to control erosion.

D Specifications.

1 All seeding shall be with adapted seed which meets the requirements of State seed laws.
PART 2

1-UT(ACP) (Rev. 2)  PAR. 51

2 Seeding must be by selection of one of the seeding specifications contained in Utah State University Circular 153 or from the SCS Technical Guide. Varieties or strains of eligible seed will qualify.

3 The substitution or addition of adapted species of forbs and shrubs may be authorized.

4 Seeds with a pure live seed standard (percent purity times germination, including hard seeds = PLS) less than the minimum contained in Utah State University Circular 153 shall be ineligible for Federal cost-share and shall not be considered in meeting minimum seeding requirements.

5 The county committee shall determine and include on the notice of practice approval the following:
   a Method of seeding.
   b Proportions of grass and legume seeds.
   c Optimum rate of seeding with statement that minimum rate is two pounds per acre below the total optimum rate.
   d Use of a nurse crop.
   e Period of non-use.

6 Premixed seed not conforming to specified proportions and species on notice of practice approval will not qualify.

7 A well-compacted seedbed shall be prepared by performing those cultural operations applicable to the area and class of land to be seeded.

8 The seeded area must be protected from grazing until the stand is well established.

E Federal Cost-Share Level. (Refer to paragraph 3 F.)
A*--The purpose of this practice is to provide soil or watershed protection and to reduce the pollution of water, air, or land from agricultural or silvicultural non-point sources.

B*--Apply this practice to land in permanent vegetative cover needing improvement or protection to control erosion.

C*--Policies for this practice are as follows:

1. Cost-sharing is limited to measures that materially extend the life of the existing permanent cover by such means as artificial reseeding (including any necessary scarification), fencing, controlling competitive shrubs, establishing firebreaks, as needed. (See paragraph 6.)

2. Cost-sharing is not authorized under this practice:
   a. For measures which would constitute complete re-establishment of the cover unless such re-establishment is the most practical method of solving the erosion problem.
   b. For normal maintenance measures such as annual top dressings with fertilizers or other mineral elements.
   c. If the area treated is grazed before the stand is well established.
   d. If any pasture or rangeland in the unit is overgrazed unless the producer is making satisfactory progress toward establishing a satisfactory grazing program.
   e. Vegetative cover which includes only legumes.

3. Competitive shrub control may be included as a component of SL2 with State Committee approval.

a*--Only where it is determined that soil loss will be prevented and water conservation benefits will occur.

b*--COC shall submit justification based on prevented soil loss and water conservation benefits.

c. For mechanical or chemical treatment, or prescribed controlled burning.

d. Where the control of competitive shrubs will reduce the vegetative cover to such an extent as to intensify erosion, the practice must be followed by seeding or other approved erosion control measures.
e. Chemicals used in performing the practice must be Federally, State and locally registered and must be applied strictly in accordance with authorized registered uses, directions on the label, and other Federal or State policies and requirements.

f. Control measures must be carried out in such a manner as to give full consideration to the needs of wildlife and protection of archeological sites.

g. Cost-sharing is not authorized for repeating any of the approved measures under this practice with the same person on the same acreage.

h. The term "shrub" is defined for the purpose of this practice as woody stemmed perennial plants. This does not include annual, biennial, or perennial weeds.

i. Shrubs eligible for control include sagebrush, rabbitbrush, greasewood, Russian olive, salt cedar (Tamarisk), and pinion-juniper. Other shrubs considered to be a conservation problem in an area may be specifically approved for the county by the State Committee.

j. Control methods may be by grubbing, mechanical means, prescribed controlled burning, or by use of chemicals. The specific method of control shall be designated by the SCS technician in the determination of need.

4. Cost-sharing for fencing is limited to permanent fences which will contribute to protecting the vegetative cover through better distribution of livestock and seasonal use of forage. There must be pasture or rangeland on both sides of the fence.

5. A fence along a public road (one built or maintained by any public entity and recognized locally as part of the public road system) is not eligible. A fence along a private road or trail is eligible only if:

a. Such location is purely incidental and the only practicable place to construct the fence.

b. The purpose is not to keep livestock off the road or to fence out the road.

c. Constructing the fence will not result in fencing on both sides of the road.
6 The vegetative cover that has been improved or protected must be maintained without additional cost-sharing for a minimum lifespan of 5 years following the calendar year in which the improvement measure(s) was performed.

7 Improvement measures should be carried out in such a manner as to give full consideration to the needs of wildlife.

8 Fences on irrigated land are limited to cross fences which will result in rotation grazing.

9 Cost-sharing shall be limited to the minimum seed(s) needed to establish cover to control erosion.

D Specifications.

1 Plantings must be in accordance with one of the seeding specifications contained in the Utah State University Circular 153 or from the SCS Technical Guide. Varieties or strains of eligible seed will qualify. The minimum rate is two pounds per acre below the total optimum rate. * *

2 This practice must be performed in accordance with the principles of sound range management.

3 All seeding shall be with adapted seeds which meet the requirements of State seed laws.

4 Seeds with a pure live seed standard (percent purity times germination, including hard seeds = PLS) less than the minimum shall be ineligible for Federal cost-share and shall not be considered in meeting minimum seeding requirements.

5 Premixed seed must be approved prior to seeding.

6 The period of non-use will be as specified by the county committee.

7 Barbed wire fences:

a A good grade of new steel wire must be used in the construction of fences and must be 12-1/2 gauge, or heavier and galvanized.

b Cedar, juniper, black locust, oak, split pinion pine, or steel posts shall be used or other posts properly treated by a commercial process.
PART 2

1-UT(ACP) (Rev. 2) PAR. 51

56 SL7 WINDBREAK RESTORATION OR ESTABLISHMENT

A*-The purpose of this practice is to restore or establish windbreaks for protecting eligible farm or ranchland from soil erosion and for reducing the pollution of water, air--*
or land.

B*-Apply this practice to farm or ranchland needing protection--*
against serious wind erosion.

C*-Policies for this practice are as follows:--*

1 Cost-sharing is authorized for:
   a Planting trees or shrubs as needed for restoring or establishing field or farmstead windbreaks.
   b Permanent fences needed to protect the planted area from grazing, excluding boundary and road fences.

2 Cost-sharing is not authorized for planting orchard trees or plantings for ornamental purposes.

3 Planting must be protected from destructive fire and destructive grazing.

4 Chemicals used in performing this practice must be Fed-
erally, State, and locally registered and must be applied
strictly in accordance with authorized registered uses,
directions on the label, and other Federal or State
policies and requirements.

5 Wildlife and environmental considerations must be given
when designing this practice.

6 The system shall be maintained for a minimum of 10 years
following the calendar year of installation.

D Specifications. Plantings for windbreaks must be performed
in accordance with standards and specifications set forth in
the SCS Technical Guide.

E Technical Responsibility. Assigned to SCS.

F Federal Cost-Share Level. (Refer to paragraph 3 F.)
PERMANENT VEGETATIVE COVER ON CRITICAL AREAS

A*--The purpose of this practice is to reduce erosion and the pollution of land, water, or air from sediment of agricultural or silvicultural origin.

B*--Apply this practice to critical areas, such as gullies, banks, logging trails and roads, roadsides, field borders, and similar problem areas, on farms that are susceptible to erosion or where runoff carrying substantial amounts of sediment constitutes a significant pollution hazard, or where both exist.--*

C*--Policies for this practice are as follows:--*

1 Cost-sharing is authorized.

   a For measures needed to stabilize a source of sediment such as grading, shaping and filling, the establishment of grasses (including filter strips) trees, or shrubs, and similar measures which the county committee determines are practical for the solution of the problem.

   b Only if the measures will significantly reduce erosion and maintain, or improve the quality of water in a stream, lake, pond, or other water source.

   c For measures performed on public roadsides only where such measures are essential to solve a farm-based pollution or conservation problem.

2 Consideration should be given to wildlife and enhancing the appearance of the area where establishing the protective measures.

3 The acreage shall be maintained for a minimum of 5 years following the calendar year of installation.

D Specifications. This practice must be performed in accordance with standards and specifications as set forth in the SCS Technical Guide.

E Technical Responsibility. Assigned to SCS.

F Federal Cost-Share Level. (Refer to paragraph 3 F.)
PART 3 SP SPECIAL CONSERVATION PRACTICES

101 Authority. Counties may develop special permanent type erosion and sediment control practices needed to solve a significant and unique local conservation problem designated high priority in their plan for which national program practices are not adequate.

B*--Policies. SP practices shall:--*

1. Provide the most effective solution to soil, water, woodland, or pollution abatement problems identified in the county ACP plan.
2. Be subject to the same policies and standards as other practices in the program.
3. Specify the eligible measures on which Federal cost-sharing may be approved.
4. Have significant public benefits such as prevention of soil loss, conservation of water supply, maintenance of water quality, protection of woodland or wildlife resources, or have other environmental benefits.
5. Comply with herbicide regulations or other farm chemical use requirements.
6. Conform to the applicable standards and permit requirements of any national, State or local regulatory agencies.
7. Specify a lifespan of not less than 5 years.

C Approval. SP practices recommended by the State and/or county group may be included in the county or State programs subject to approval of CEPD. The "SP" practice recommendation shall include a detailed justification indicating compliance with National policies. See subparagraph 1 D, Exhibit 3, 1-ACP (Rev. 1).--*

D Practice Identification. SP practices shall be identified by the code as designated by CEPD.

E Technical Responsibility. As recommended by the COC in consultation with the District Conservationist and concurred in by the State Development Group.
PART 2

1-UT (ACP) (Rev. 2)

PAR. 60

IRRIGATION WATER CONSERVATION

A*--The purpose of this practice is to conserve irrigation water, improve water quality, control erosion, and reduce the pollution of water or land from agricultural non-point sources.

B*--Apply this practice to reorganizing systems on land currently under irrigation for which an adequate supply of suitable water is available, on which irrigation will be continued, and on which a significant soil or water conservation problem exists.

C*--Policies for this practice are as follows:

1. Cost-sharing is authorized only for the following measures if included in a plan, or a portion of a plan, approved by SCS for reorganizing an irrigation system. (Where water management is included as part of the reorganization plan, the applicant is to be encouraged to follow it.)
   a. Permanently installed systems.
   b. Lining irrigation ditches.
   c. Land leveling.
   d. Tailwater recovery systems or other installations for the conservation of soil or water where needed as an integral part of the irrigation system being reorganized.

2. Cost-sharing is not authorized for:
   a. Reorganizing a system if the primary purpose is to bring additional land under irrigation.
   b. Portable pipe, cleaning a ditch, or installations primarily for the farm operator’s convenience.
   c. Installations to convert an existing sprinkler or overhead system to a gravity system.
   d. Constructing or deepening wells.
   e. Restoring a system which has deteriorated due to lack of maintenance during periods of non-use.
3 Consideration must be given to the needs of wildlife, preserving or enhancing the appearance of the area, and potential pollution hazards, when reorganizing the system.

4 Cost-sharing is authorized for land leveling as the sole component if it is shown that it is a needed part of the plan for the reorganization of the system.

5 To assure compliance with the Utah State Water Rights Law, producers requesting to build seasonal water control reservoirs under this practice will sign a statement under "Remarks" on the request for cost-share: "I certify that I have a storage right to the water and will inform the Utah State Division of Water Rights of this impoundment."

6 The land under irrigation for practice eligibility purposes must have been irrigated four of the last five years.

7 The practice must be maintained for a minimum of 10 years following the calendar year of installation.

D Specifications. All plans and construction shall be in accordance with the standards and specifications set forth in the SCS Technical Guide.

E Technical Responsibility. Assigned to SCS.

F Federal Cost-Share Level. (Refer to paragraph 3 F.)
PART 4 5-PA (Rev. 4) PAR. 161

161 APPROVED COVER AND PRACTICES

A

1

a Volunteer stands of grasses and legumes shall be predominant over the weeds. Otherwise, the growth shall be clipped in the early growing stages for control.

2

(2) State Committee has established August 1 as the date by which small grains shall be clipped, shredded, or lightly tilled.
The STC in concurrence with the SCS State Conservationist are providing additional guidance and policy under the "minimum till" practice on conservation use acreage. These items are general in nature because of great variations within the State, and sometimes even within a county itself.

The following measures have been adopted as minimums for this purpose and are in addition to all other eligibility requirements of the land designated for acreage reduction program uses:

a. The residue from the previous crop shall be left on top of the ground as much as possible. Minimum tillage operations that must be carried out should be accomplished by the use of "sweeps" and "chisels" on nonirrigated acreage.

b. Mowboard plowing will only be acceptable in very extreme cases. These cases, if any, would need prior approval by the CCC predicated on the type of soil, etc., as well as other justifications.

c. On irrigated cropland, cover shall be maintained insofar as possible. Weed control, preferably by chemical spraying, must be performed according to regulations. Weed control measures should be performed early in the year and continue through June. Soon thereafter, a cover, or a crop for the subsequent year, should be seeded so that the ground is not bare.
Dear Mr. Webb,

I am presently a graduate student in the Department of Landscape Architecture and Environmental Planning at Utah State University. I have a Bachelor's degree in Wildlife Biology from Colorado State University. I am writing to you in the hope of obtaining some information which would pertain to my thesis topic: Techniques for Improving Ring-Necked Pheasant Habitat on Northern Utah Cropland.

I am attempting to gather information from as many states as possible concerning any programs which promote conservation of wildlife habitat on farmland. I am particularly interested in any forms of incentive which have been offered to farmers to gain their cooperation. I am also interested in the degree of success any of these programs have attained.

If your agency has been involved in any type of farm wildlife conservation program, I would be most grateful for any information you might be able to pass along. Thank-you.

Sincerely,

Shannon E. Heath
Goals, Objectives and Strategies for the Management of Vermont's White-Tailed Deer

The Vermont deer herd is an important natural resource. Many people share an acute interest in the herd which frequently makes management a controversial task. However, managed it must be — through population and habitat manipulation based on biological principles and judgements in the best interest of the deer herd, the land base, sportsmen, and other interested publics. Below follows the Vermont Fish and Game Department’s planned approach to white-tailed deer management.

**GOAL**
Balance the Vermont deer herd with the carrying capacity of the winter range while managing harvests at optimal sustained levels.

**SPECIFIC OBJECTIVES**
1. Increase winter survival of deer.
2. Improve the physical condition of the deer herd as measured by increased reproductive rates, body weights, and antler development by 1988.
3. Achieve an annual sustained deer harvest of 15,000-20,000 animals by 1990.

**MANAGEMENT STRATEGY**

**General**
Manage the deer population in balance with the existing winter food supply through an annual program of controlled antlerless deer harvests, except when non-biological factors deem it necessary to do otherwise.

**Phase 1**
A maximum number of antlerless permits will be required during the early years of the management program to reduce the deer population to the carrying capacity of the winter range.

**Phase 2**
Upon achieving a deer population level in balance with the available winter habitat, the number of antlerless hunting permits issued annually will be adjusted to maintain the deer population at that balance or slightly below. During this phase the deer herd will be intentionally maintained at relatively low levels for a period of five to ten years until the winter range recovers from its current overbrowsed condition. Combined antlered and antlerless harvests should approximately be 10,000-15,000 animals annually during this period.

A significantly intensive program of forest management, designed to improve the carrying capacity for deer on public and private lands, can accelerate the rate of habitat recovery and thereby accelerate Phase 2.

**Phase 3**
With adequate improvements in both the physical condition of Vermont’s deer and winter habitat, the number of antlerless permits issued will be moderated to encourage deer population growth to a level consistent with the increased carrying capacity of wintering areas. During this phase, the goal of a 15,000-20,000 annual deer harvest should be gradually achieved.
Habitat Program Progress

A progress report for the Wildlife Habitat Improvement Program was recently submitted to the VT Senate Natural Resources Committee and the VT House Fish & Game Committee. The report reviews the period July 1, 1981 to June 30, 1982.

During this period the Program was fully staffed and operational. It began its first segment of costshare funding from the U.S. Fish and Wildlife Service's Federal Aid in Wildlife Restoration Act. The report states that "the habitat program gained greater recognition and acceptance on the part of landowners, public and private foresters, and other land managers." Some of the program’s specific accomplishments follow:

- Contact was made with 151 private landowners, controlling over 23,000 acres of land.
- Seventy-four deer wintering areas were visited on private land.
- Management plans were prepared for each deer wintering area on state land.
- A major planning effort was completed for the Victory Basin wildlife Management Area.
- A temporary work force was employed to accomplish habitat improvement practices on State Wildlife Management Areas and Forests such as apple tree release, old field restoration, and deer wintering area improvement cuts.
- A remapping project for all deer wintering ranges was initiated using the latest aerial photography and a standardized methodology.
- This newsletter was published quarterly and distributed to over 2,000 individuals each time.
- Radio tapes were made monthly for broadcast on the UVM Extension Service Radio Network and two shows were aired on the “Across the Fence” television program.
- Habitat Program personnel spoke to approximately 5,000 individuals at more than 100 speaking engagements.
- Training sessions were held for state forestry personnel and private foresters.

The report concludes that "Habitat Program personnel look forward to continued cooperation with public and private land managers and landowners...to increase the level of habitat management and protection across the state." Copies of the report are available from the Montpelier office.

Browse Study Initiated

Deer wintering areas, or yards, have long been identified as a critical habitat to the annual life cycle of white-tailed deer in Vermont. Severe climatic conditions, including deep snows and cold temperatures, force deer to move, sometimes several miles, to forest sites that offer thermal protection and greater mobility. Deer winter range is typically dominated by snow-intercepting softwood cover, and it is usually located on low, south-facing slopes or along watercourses. In Vermont there are fewer than 300,000 acres of deer winter range which accounts for less than six percent of the state’s total deer range.

Because deer concentrate in the wintering areas for lengthy periods of time annually, there is tremendous competition for available food. Vermont’s historically high deer population has resulted in severe overbrowsing of the winter range. The low availability of deer browse on the winter range is easily recognized by the presence of deformed stems and the absence of regenerating hardwoods. In most cases, remaining food plants are either dead or low in quality. The result: large losses of deer during normal Vermont winters from starvation or other malnutrition-related causes.

The reduction of the deer herd to a size that may be supported by the winter range, or to the carrying capacity of the habitat, is an objective of Vermont’s deer management program. The term carrying capacity can be defined in several ways. Frequently, carrying capacity refers to the number of healthy animals that can be supported by a habitat. In Vermont, deer carrying capacity is governed by the winter months, when limited range is able to support fewer deer than spring, summer, or fall ranges.

A smaller herd size on the winter range will allow an increase in available browse to occur and will eventually result in minimal levels of starvation and healthier deer. Over time, deer will demonstrate increased weights, improved antler score development, and increased reproductive rates.

The Vermont Fish and Game Department has begun a formal study to determine browse availability on 33 deer wintering areas throughout the state (approximately two yards per antlerless management zone). Numerical trends in food availability will become an important factor in determining the degree of imbalance between the carrying capacity of the winter range and the herd size. The selected yards have all shown historically high browse utilization and are considered vital to the survival of local deer herds. Twelve of the wintering areas are located on public lands. The remaining 21 are on private land, and they required extensive coordination with, and assistance of, the landowners.

Twenty, 1 x 10 meter plots were placed in each deer wintering area to
monitor browse availability and deer use. Plot sites were permanently marked so they can be located for future sampling. Within each plot, all of the buds available as browse, between one and six feet in height (two and seven feet in height in Caledonia, Essex, and Orleans Counties), will be counted annually. The first count will occur each autumn prior to the movement of deer into the wintering areas. The second count will be performed the following spring in order to determine the percent utilization of available buds during the past winter.

In a normal winter, a substantial reduction in the number of buds available after the yarding period will indicate local deer numbers are at levels near or above the carrying capacity of the yard. As harvest management reduces the wintering deer population below the carrying capacity, the percent of buds utilized should decrease. This will indicate greater food availability on the winter range, a factor that will increase winter survival of deer and improve their health.

Current plans are to continue the plot sampling for a period of 15 to 20 years. The study will provide helpful information for determining trends in food availability after various winter conditions and deer densities. Eventually, monitoring the relationship between herd size and carrying capacity of the winter range will be an important determinant in setting winter population level objectives and obtaining maximum fall deer harvests.

—Scott Darling
Habitat Biologist

Clearcuts and Deer

The white-tailed deer is the most abundant and popular large mammal in Vermont. Each year, more than 90 percent of all Vermont hunters engage in deer hunting. The white-tailed deer is also an important economic resource: resident and nonresident deer hunters spend an estimated $3 million dollars annually in the Green Mountain State.

Deer condition and numbers are a function of the land that supports them. During the 1960's, the Vermont deer population reached record numbers in response to plentiful sources of food on farmlands abandoned during earlier periods, coupled with increased softwood acreages suitable as winter cover.

Deer habitat conditions are now much different. The thickets and young forest habitats are no longer as abundant as two to three decades ago because of natural plant succession. Furthermore, the deer winter range has been severely overbrowsed, and in many areas, cover has been eliminated or negatively influenced by logging and development practices.

Consequently, the health of the Vermont deer herd has declined. Deer have been getting progressively smaller in both body and antler size. Also, the number of fawns produced by adult does has been, and continues to be, far lower than it would be if the herd was in good physical condition.

Future land use, in particular forest management, will remain an important influence on Vermont's deer herd. Clearcutting, a practice in which all trees are harvested from an area, has become more widely employed in Vermont, primarily due to the simplicity and efficiency of this harvest practice. Clearcuts are usually considered beneficial to deer because they create forest openings to feed in. Dr. David Hirth, a wildlife biology professor at the University of Vermont, is directing a long-term project to document and assess the effects of clearcutting on deer habitat.

An initial study has been completed which monitored seasonal utilization of 13 clearcuts by white-tailed deer from June, 1980 to June, 1981. Pellet groups were used as an index to deer use. Four of the clearcuts were commercial timber cuts, averaging 11 acres each, located in the central Vermont town of Goshen. The other nine study sites were small clearcuts, averaging 1.5 acres each, designed to produce aspen regeneration for ruffed grouse habitat. They were located in southern Vermont in the town of Grafton.

This study found that deer frequented the clearcut habitats throughout the year, with greatest use occurring during the fall. Several other wildlife studies have also shown that deer prefer small forest openings during the fall. Because these areas produce a large amount of potential forage for deer, they would be expected to represent very important

Cont. pg. 4
Clearcutting activity prefers the younger by deer. However, they prefer the younger by deer. Clearcuts. Cuts larger than ten acres are used by deer, however, they concentrate their activity along the forest edge. In order to provide maximum benefit for deer, clearcuts should not be wider than 200 to 250 feet. Deer also seem to prefer low slash depths. Deer use was found to be greater inside the clearcuts where slash depths were less than three feet high. The small clearcuts in their fourth growing season had fantastic aspen regeneration, with trees over 25 feet tall and stem densities as high as 8,000 per acre; however, these cuts were not preferred by deer. Evidently, the dense regrowth of aspen was a barrier to mobility as well as a possible inhibitor to the production of food plants such as berries, herbs, and grasses.

—Mark Scott Information and Education Specialist

Uneven-Aged Forest Management

The terms even-aged and uneven-aged refer to systems of forest management. The former system maintains and creates stands of trees of similar ages and sizes, two or fewer age classes. Clearcutting is one method of even-aged management. Uneven-aged management, primarily through single tree and group selection cuts, maintains stands in which there are three or more age classes of trees. The harvest strategy for the single tree or group selection method is to remove the largest and/or the oldest trees at a rate proportional to their distribution in the stand. Subsequent openings in the forest canopy will allow sunlight to penetrate to the forest floor, and seedlings, which may have been suppressed in the shade of the larger trees, will be able to grow. The co-dominant trees, upon release from competition, will become the dominant seedbearing trees.

Periodic harvests and regeneration result in the uneven-aged character of the stand. Several factors will determine whether the single tree or group selection method is chosen, including size of the ownership, stocking levels, and the relative distribution of the merchantable stems.

Some advantages of uneven-aged management are market flexibility; the harvest income is spread out over many years, it is well-suited for small parcels of land, and there are limited aesthetic impacts. Conversely, particularly with single tree selection cuts, logging may be time-consuming and expensive. With regards to wildlife there are several considerations.

In general, uneven-aged management will produce the most benefits for wildlife species adapted to mature forest conditions. On small parcels of forest land, uneven-aged management is probably the best approach to maximize habitat diversity. Even though distinct blocks of successional stages may be lacking, attainable through even-aged harvests, there is a consistent mix of plant species and ages within stands. Selection cuts are often useful in managing deer yards, riparian areas, or other habitats where the retention of overhead cover is important.

During harvests, landowners should not eliminate important mast producers or cavity trees from the forest stands. Mast producers provide important sources of fall food, and cavity trees serve as resting, perching and feeding sites for many different wildlife species.

—John Buck Habitat Biologist

HABITAT HIGHLIGHTS is published four times a year by the Vermont Fish & Game Department. It is funded in part by cost-share monies made available by the U.S. Fish and Wildlife Service's Federal Aid in Wildlife Restoration Act. The intent of the newsletter is to provide information about wildlife habitat management, regional habitat issues and problems, and the Department’s Wildlife Habitat Improvement Program to landowners, natural resource managers, sportsmen, and the general public.

Editor: Ron Regan

HABITAT Highlights
Agency of Environmental Conservation
Vermont Fish & Game Dept.
Montpelier, VT 05602
WILDLIFE HABITAT RADIO PROGRAM #30

With me today is Ron Regan, a Wildlife Habitat Publicist for the Vermont Fish & Game Department. Ron is here today to talk about the Department’s Wildlife Habitat Improvement Program.

Bill: Briefly, what is the background of the Habitat Program and its objectives?

Ron: The Habitat Program was initiated in January of 1980 following a legislative mandate. It is funded by receipts from the sale of antlerless deer hunting permits. It is staffed by a Program Chief, four District Habitat Biologists, and myself, the Habitat Publicist. There are several Program objectives, already in motion, which include: 1) the development of informational and educational materials for private landowners and natural resource managers; 2) the implementation of habitat management practices on public lands, particularly Wildlife Management Areas; 3) the provision of technical assistance to private landowners.

Bill: At this time, what does the Habitat Program offer the private landowner?

Ron: Private landowners that contact a Habitat Biologist can expect to receive free habitat management technical assistance. Following a property reconnaissance, the Habitat Biologists will make verbal or written recommendations designed to enhance wildlife habitat. The recommendations are made with the landowners management interests in mind. This service is available regardless of acreages involved or wildlife interests. The Biologists are particularly interested, however, in working with landowners who have a deer wintering area or yard on their property.

Bill: Under what circumstances should landowners consider requesting technical assistance?

Ron: Any landowners interested in managing their land for wildlife could benefit from technical assistance. Landowners that already manage their land for agricultural or forest products should find out the impact of their activities on wildlife. Habitat Biologists can show landowners how to improve wildlife habitats while cutting firewood, harvesting timber, or growing agricultural products. Wildlife habitat management is frequently compatible with other land management practices; prior planning is the key ingredient. The Habitat Biologists often work very closely with foresters or district conservationists.

Bill: Where can landowners contact a District Habitat Biologist for technical assistance?

Ron: Habitat Biologists are located in District Environmental Conservation offices in North Springfield, Rutland, St. Johnsbury, Essex Junction, and Barre. Also, for more information on the Habitat Program, landowners can write to the Vermont Fish and Game Department in Montpelier.

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Appendix F. Television Script

EXTENSION SERVICE
University of Vermont

Participants:
Bill Sladyk
Ron Regan

Subject:
Deer Yard Management

Date:
Taped 2/23/81
Aired 2/24/81

VIDEO

Deer Footage
(10 sec.) Survival is difficult for many wildlife species during the course of a normal Vermont winter. The white-tailed deer is no exception. The winter habitat requirements of this popular game animal and methods of deer yard habitat improvement will be discussed on today's show.

AUDIO

Tony, Bill, Ron
Hello folks. With me today are two guests from the Vermont Fish & Game Department; Bill Sladyk, Wildlife Habitat Specialist, and Ron Regan, Wildlife Habitat Publicist. For starters Bill, let's have a recap of the 1980 deer hunting season.

Bill
Explain season results; reasons behind the high kill.

Tony
Bill, how are the deer faring this winter?

Bill
Briefly discuss this year's winter; expected mortality from starvation.

Tony, Bill, Ron
Ron, explain for our viewers what the winter habitat requirements are for deer.

Ron
#1 Trail
Same as rest of year... Deep snows restrict travel, bury foods and make them more critical.

#2 Deer
Move into areas of softwood cover called deer yards... snow intercepted, temperatures moderated.

#3 Yard
Important to keep in mind not all softwood areas are yards. Usually along stream, below 2000', southern exposure.

Tony
What do they feed on in the winter?

Ron
Almost exclusively on browse...
C.U. Plant Stem
Bud, new twig growth, bark...
Vidifont
Some foods preferred as browse...
Ron
Food frequently scarce, don't travel far to find it... in proximity to yard.
"ACROSS THE FENCE"

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<tr>
<th>VIDEO</th>
<th>AUDIO</th>
<th>SPEAKER</th>
</tr>
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<tbody>
<tr>
<td>Tony</td>
<td>Bill, how much acreage in the state is considered deer yard?</td>
<td>Tony</td>
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<tr>
<td>Bill</td>
<td>We ID winter range or yards by deer use. . .</td>
<td>Bill</td>
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<tr>
<td>#4 Activity</td>
<td>trails, beds, browse.</td>
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<tr>
<td>C.U. Maps</td>
<td>We map the yards. . .</td>
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<tr>
<td>in hand</td>
<td>We know that 5% of state is winter deer shelter. . . Explain slide</td>
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<tr>
<td>Tony</td>
<td>What types of practices can be done to improve deer yards?</td>
<td>Tony</td>
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<tr>
<td>Bill</td>
<td>Retain them. . . Cutting may be appropriate. . . timing</td>
<td>Bill</td>
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<td>#6 Strip C/C</td>
<td>and placement important. Shape and</td>
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<td>#7 C/C</td>
<td>size also variables. Specifically try to</td>
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<td>#8 Release</td>
<td>perpetuate the stand, increase it's size, or</td>
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<td>#9 B. Production</td>
<td>provide browse. . . explain each briefly.</td>
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<tr>
<td>Tony, Bill, Ron</td>
<td>Ron, where can a landowner get technical assistance?</td>
<td>Tony</td>
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<tr>
<td>Ron</td>
<td>Available from Wildlfe Habitat Improvement Program. Habitat Technicians located in . . .</td>
<td>Ron</td>
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<td>Vidifont</td>
<td>Rutland 775-2548 St. Johnsbury 748-8787 Waterbury 241-3520</td>
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<tr>
<td>Ron</td>
<td>District Biologists also available. . . May want to write for these</td>
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<td>C.U. on publ.</td>
<td>Habitat Publications. . .</td>
<td></td>
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<tr>
<td>Vidifont</td>
<td>To obtain those publications send name and address to:</td>
<td>Tony</td>
</tr>
<tr>
<td>#10 Deer</td>
<td>Closing Remarks. . .</td>
<td>Tony</td>
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Appendix G. Magazine Article

Municipal Forest Continues Forest Management Program

by Ron Regan, Wildlife Habitat Publicist
Vermont Fish & Game Department
Montpelier, VT

In the past, long-term, comprehensive management of Vermont’s private, nonindustrial forestland has been dependent on an enlightened landowner, a persistent forester, and a competent logger. Unfortunately, few forests have been the beneficiary of all three. The Morristown Municipal Forest in Lamoille County of Vermont, however, provides a good example of the cooperation which can and should exist between landowners, resource managers, and loggers during the harvest of forest products.

The 5,500 acre Municipal Forest has received continuous forest management attention for over thirty years. Approximately 900 acres of the Forest is comprised of softwood stands with a hemlock component. The balance of the Forest acreage is composed of northern hardwood timber. This tract of land contains a municipal watershed as well as one of northern Vermont’s larger deer wintering areas, or yards, which provide critical winter shelter for deer. In the past, the Forest had received land management assistance from public foresters provided by the State Department of Forests, Parks, and Recreation. Two years ago, however, Lamoille Water and Light Commissioners were faced with the elimination of this technical assistance service. The Commissioners determined to continue the sound forest management program initiated two decades ago so they sought the services of a consulting forester.

Warren Drown, a consulting forester from Newport, was retained to manage the Municipal Forest in the tradition of past objectives and accomplishments. Jersey, as he is affectionately called, has worked in the woods of northern Vermont and New Hampshire for over 35 years. His professional career has included employment as Orleans County Forester, timber manager for Weyerhauser, and forester for Atlas Plywood. Jersey was very enthusiastic about this opportunity to work on the Municipal Forest. For background information he was able to “pick the brain” of the Forest’s first forester, Arlo Sterner, who is now Lamoille County Forester.

For many years Arlo had managed the Forest as part of his duties as a public forester, and he supervised the first cutting operations. Arlo, when interviewed in his office, commented that the second cut should be better than the first harvest which was only an improvement cut.

Arlo did not hesitate to point out to Jersey that a large deer wintering area was on the Municipal Forest which might require special attention prior to cutting. Arlo suggested that biologists from the Vermont Fish and Game Department’s Wildlife Habitat Improvement Program be involved in developing cutting plans for the spruce-fir stands. In deer wintering areas, prior planning is especially important to insure the provision of adequate shelter following the harvest.

Fish and Game Department Habitat Biologists were quick to respond to the concerns. William Sladyk, Habitat Program Chief, and John Buck, District Habitat Biologist, met with Jersey to explore opportunities for the inclusion of deer shelter considerations in the 900 acres of softwood cover. Fifteen years ago, at the peak size of Vermont’s deer herd, white-tails used the entire softwood area as winter range. The levels of use in 1982 were less than earlier but significant enough to warrant attention in the cutting plan.

Sladyk and Buck, in cooperation with Drown, developed a management plan for the softwood acreage and presented it to the Water and Light Commissioners for approval. The Commissioners gave the go-ahead sign and preparations were made to implement the plan. Next, Merritt Earle of Wolcott, a logger for most of the past 16 years, was contacted to discuss the plan. Earle is well acquainted and agreeable with Drown’s forest management practices. Merritt was already harvesting timber on the Municipal Forest in hardwood stands adjacent to the mature spruce-fir cover.

After reviewing the plan, Merritt agreed to the provisions contained in it. He didn’t feel the conditions of the agreement

From left to right, Jersey Drown, John Buck, Larry Bohannon (one of Earle’s loggers), and Arlo Sterner discuss log grades while assembled on the landing. (Bill Sladyk photo)

Jersey Drown (right) and Merritt Earle discuss a road location on the Morristown Municipal Forest in Lamoille County, Vermont. (Bill Sladyk photo)
would create a hardship for him since he logs with a small crew (three men and himself) and uses a John Deere 540 skidder and a Case 450 crawler. Several deer had been seen in the hardwood cuts, and the loggers, who all hunt deer, felt there was room for winter deer cover in their operation.

The plan called for limiting the size of all clearcuts to three acres and for a diameter limit of ten inches DBH in selected cut areas. Buffer strips, 100 feet wide, along major streams would be marked for selective cutting. The retention of cover along the streams will be important for deer travel and access in the wintering area. It was also agreed to maintain fifty percent of the spruce-fir component in a pole or saw limber stage.

At this point, one might ask, “Why all the fuss about the deer wintering area?” The answer is simple — deer wintering areas provide critical winter shelter for deer for four to six months of the year. Dense softwood cover moderates temperature extremes and limits snow accumulations on the forest floor. For instance, recent measurements on the Mornsville Municipal Forest indicated that snow depths were close to four feet in the hardwoods, whereas in the softwood stands, snow depths ranged from two to three feet. That is a significant difference which has great bearing on the ability of local deer to travel and survive the rigors of winter.

Furthermore, the Vermont Fish and Game Department estimates only 300,000 acres, or six percent of the state’s total deer range, provides winter shelter for deer. Highway and recreational development has had a decided impact on deer wintering areas, but a greater threat exists from increased harvests of softwood timber. Between 1972 and 1979 the softwood sawlog harvest increased 114 percent.

The new Wildlife Habitat Improvement Program has had success at integrating wildlife and timber management considerations on private forestlands in Vermont. The cooperative efforts demonstrated on the Mornsville Municipal Forest highlight those successful efforts and provide a model for future cooperation between foresters, landowners, loggers, and biologists to the best interest of the state’s timber and wildlife resources.

Vermont Wildlife Habitat Improvement Program

The Vermont Fish and Game Department’s Wildlife Habitat Improvement Program was mandated by the Vermont Legislature in 1979. It is funded by receipts from the sale of antlerless deer hunting permits. It is staffed by a Program Chief, five District Habitat Biologists, and a Habitat Publicist. Since timber harvests are a major influence on wildlife habitats, it is a priority of the Habitat Program to work with foresters and private forest landowners to insure the integration of habitat considerations in cutting plans. Frequently, slight modifications to cutting plans will mitigate any negative aspects the harvest might have had on wildlife habitats. Foresters must remember that wildlife habitat management is a valid forest management objective.
A DIRECTORY OF WILDLIFE HABITAT ASSISTANCE

The Vermont Fish & Game Department is responsible for the protection and management of all fish and wildlife resources, including their habitats. Within the state, agricultural and forest management practices have a significant impact on wildlife habitats. Landowners, foresters, and other land managers are encouraged to contact a Fish & Game Department biologist if interested in incorporating habitat considerations for fish and wildlife in land management plans.

Local fishery biologists are available to provide technical assistance whenever public waterways are involved.

Local habitat biologists and wildlife biologists are available to assist private landowners by:
- carrying out a reconnaissance of farm and forestland to determine wildlife species present and to identify important habitats.
- developing short or long range habitat management plans, frequently in cooperation with foresters or district conservationists, which satisfy landowner objectives.
- identifying important and critical wildlife habitats such as deer wintering areas, wetlands, and mast or fruit producing areas.
- providing foresters with technical advice when timber cuts are planned for deer wintering areas, to insure the retention of suitable cover. Assistance in laying out and marking areas to be cut can be provided on request, however, the Department biologists prefer to work through foresters.

There is no charge for the services of any of the biologists. The receipts from hunting and fishing licenses as well as antlerless deer hunting permits make these services possible.

FOREST WILDLIFE FACTS

- The Vermont landscape has changed:
  - In 1790, the state was 92 percent forested.
  - In 1980, the state was 35 percent forested.
  - In 1981, the state was 83 percent forested.

- Deer wintering areas, or yards, are primarily coniferous forest stands below the 2,000 foot elevation mark, and they frequently have a southern exposure.

- Deer wintering areas account for 6 percent (300,000 acres) of Vermont's total deer range. Deer are dependent on these habitats as winter shelter for 4 to 6 months of the year.

- Private ownerships account for 90 percent of the forestland in Vermont.

- The harvest of forest products has a direct impact on the distribution and abundance of many wildlife species.

- Vermont's softwood sawlog harvest for 1972 was 63 million board feet. In 1979, it was 122 million board feet.

- Vermont's hardwood sawlog harvest for 1972 was 87 million board feet. In 1979, it was 108 million board feet.

- Vermont's residential firewood consumption for 1974 was 85,000 cords. In 1981, it was 485,000 cords.

- Hollow trees may not be empty. They provide nest sites for over 30 species of birds and 15 species of mammals in Vermont.

VERMONT WILDLIFE HABITAT ASSISTANCE

GIVE US A CALL

Agency of Environmental Conservation
Vermont Fish and Game Department
MONTPELIER PERSONNEL
Agency of Environmental Conservation
Vermont Fish and Game Department
State Office Building
Montpelier, VT 05602
Telephone (802) 828-4711

Benjamin Day, Director of Wildlife
Angelo Incerti, Director of Fisheries
William Sibillyk, Habitat Program Chief
Ronald Regan. Habitat Planner

DISTRICT BIOLOGISTS

District 1 Office
Agency of Environmental Conservation
Vermont Fish and Game Department
Bldg 1, Route 108
North Springfield, VT 05153
Telephone: (802) 886-2215

James DiSefano, Wildlife Biologist
Kenneth Cox, Fisheries Biologist
Kim Royer, Habitat Biologist

District 2 Office
Agency of Environmental Conservation
Vermont Fish and Game Department
9 Merchants Row
Burlington, VT 05401
Telephone: (802) 775-2581

Jeffrey Wallin, Wildlife Biologist
David Callum, Fisheries Biologist
Scott Darling, Habitat Biologist

District 3 Office
Agency of Environmental Conservation
Vermont Fish and Game Department
225 North Main Street
Burlington, VT 05401
Telephone: (802) 828-4744

Lawrence Garland, Wildlife Biologist
John Claussen, Fisheries Biologist
John Buck, Habitat Biologist

District 4 Office
Agency of Environmental Conservation
Vermont Fish and Game Department
111 West Street
Essex Junction, VT 05452
Telephone: (802) 835-7161

Thomas Myers, Wildlife Biologist
Jon Anderson, Fisheries Biologist
Douglas Bledgen, Habitat Biologist

District 5 Office
Agency of Environmental Conservation
Vermont Fish and Game Department
100 Portland Street
St. Johnsbury, VT 05819
Telephone: (802) 748-9787

Charles Willey, Wildlife Biologist
Philip Wightman, Fisheries Biologist
Cedric Alexander, Habitat Biologist

General inquiries about wildlife habitat management may be directed to
Wildlife Habitat Improvement Program
Vermont Fish & Game Department
State Office Building
Montpelier, VT 05602
Appendix I. Acres for Wildlife Program

ACRES
FOR
WILDLIFE

Pheasant chicks
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Persons seeking admission, employment, or access to programs of the University of Wyoming shall be considered equally without regard to race, color, national origin, sex, religion, political belief or handicap.
Introduction to 4-H Acres for Wildlife

You as a 4-Her can influence wildlife populations by participating in a habitat improvement program. With your young ideas and enthusiasm you can become involved and influence changes which can benefit wildlife for future years. As a participant you will not only help wildlife, but your own appreciation and understanding of nature and your knowledge and enjoyment of wild creatures will grow.

WHO MAY PARTICIPATE

Although you may think of an "Acres for Wildlife" project as one for farm or ranch members, it can be adaptable to urban areas as well. You may carry it as an individual 4-H member or as a group or club project.

RESOURCE MATERIALS

There are many resource materials, agencies, and professional people in Wyoming who will help you establish "Acres for Wildlife". See page 16 for a list.

WHAT TO DO

There are many suggestions on the following pages, but you do not have to do everything shown. It is better to do what you do well than to do everything half-well. You do not have directions to follow in a project step by step.

Develop a plan -- Use ingenuity --
Be original

Examine reference materials. Come up with ideas of your own. Talk it over with your leader, teachers, professional wildlife people, and agricultural department people. Listen to their suggestions. Refine your plan. Discuss it with the owner of the land involved; then proceed.

Remember, the more effort you put into your project, the more you will get out of it. The project may also be a continuing one.

RECORDS

Keep good records. Take accurate notes in the field. Do not trust memory. Take photographs before you start and during your project. They may substitute for lengthy descriptions. Your final written record should include all pertinent information, observations, conclusions, and ways in which principles learned can be applied to your way of living. You should also include changes in wildlife species and abundance, and how the project has benefited your community or area.

"Food and shelter galore... who could ask for anything more!"
HOW TO START "ACRES FOR WILDLIFE"

On your own or in a group, find a plot and enroll it in the "Acres for Wildlife" program. Contact your leader or the Education Section of the Wyoming Game and Fish Department, 5400 Bishop Blvd., Cheyenne, Wyoming 82001 for enrollment forms.

CRITERIA

SIZE: A minimum of one acre

ELIGIBLE LANDS: Almost any farm or ranch land in Wyoming is eligible—and roadsides, ditch banks, stream areas, pond areas, or waste areas.

LANDS NOT ELIGIBLE: Those currently set aside for wildlife.

TERMS OF AGREEMENT: Land operators and cover agents (4-H member or group) must agree to maintain the cover for at least one year, and longer terms may be arranged.

LAND USE: The land operator must agree not to burn, mow, graze, or spray the area for the term of the agreement. Noxious weeds may be controlled in ways not harmful to wildlife. Hunting, trespassing, or fishing is controlled by the landowner.

SIGNS: The Wyoming Game and Fish Commission will provide signs to identify the cover plot as a wildlife area. These are to be put up by the 4-H member(s).

AWARDS: Each 4-H member or club who enrolls one or more plots will receive a patch or certificate. A one-year subscription to the "Wyoming Wildlife" magazine will be issued to the cooperating landowner.

HELP YOUR WILDLIFE FRIENDS!

Obtain your enrollment forms from your leader or county Extension Office for "Acres for Wildlife". Fill out the form and send it to:

Education Section
Wyoming Game and Fish Department
5400 Bishop Boulevard
Cheyenne, Wyoming 82001

A Game and Fish representative will visit you and your plot, inspect your plot, and approve your enrollment. Cover signs will be given to you to designate the area, and awards given.
How to Improve Your "Acre for Wildlife"

Habitat is the environment that provides all of the basic requirements wildlife need to survive. Wildlife must have food, water, protective cover and living space in the proper kinds and amounts. Good clean air (oxygen) is also necessary. These five essentials are very important. However, outside factors such as predation, disease, weather conditions, accidents and man's activities also influence wildlife populations.

If any one of the five essential requirements becomes scarce, it is called a limiting factor, and may result in a limited or reduced population. Improvement of any one of the critical factors often results in increased carrying capacity, allowing wildlife populations to increase.

Because wildlife is often a product of the transition zone (where two habitat types meet), manipulation of food, water, cover, and living space should be directed toward the development of as much "edge-effect" as possible. It usually benefits wildlife to provide habitat that is "split-up" (more edge-effect) than to provide "essentials" in one or two large tracts.

A variety of improvements may benefit many species, while a single change of critical factors (essentials) might have a lesser effect, perhaps benefitting a single or only a few species. Wildlife management may be directed toward a target species or toward a variety of species, depending upon the manipulation of the land or aquatic environment.

Habitat improvement projects often require more than one summer (growing season) to demonstrate results. In some areas of Wyoming, habitat improvement may require several years before dramatic results are evident. Usually, with increased food, water and protective cover utilization of an area by wildlife increases. Keen observation will often note these changes.

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OBJECTIVES

Decide exactly what you would like to do for wildlife and your wildlife habitat. Do you want more individuals of a few game species, more birds at a feeder, or a greater diversity of species in your acre? Write down your objectives or goals in your record.
**Project Guidelines**

Most scientific work involves one basic question or problem. More often than not, problems dwell on a less spectacular but just as important factors that require ingenuity, keen observation, hard work, and patience.

Application of the decades' old "scientific method" or a variation of the method is very useful for most projects, regardless of scale. Using the scientific method teaches you to approach problems systematically and to use keen observation. Many written variations occur. The following method is one of those variations.

I. Recognize or define a problem (keep it simple)

II. Collect pertinent information

III. Form a hypothesis (keep to one topic or idea)

IV. Experiment—ingenuity comes in here

V. Observe and record data

VI. Analyze all of the data

VII. Report

**EXAMPLE:**

I. Problem (Improving an acre for wildlife)

II. Collect Information
   a. Books, library references, etc.
   b. Inventory your acre(s); what kind of plants/animals do you have in the area (observation) (this becomes part of your records)

III. Hypothesis (planting trees or shrubs or grasses will provide improved food sources, protective cover, and shelter for . . . )
    You can be specific or generalize: bird(s), mammal(s), etc.

IV. Experiment—carry out your planting (Improvements): water and care for them as necessary.

V. Observe—as your plantings grow, observe and record wildlife in the area and signs of animals you find.

VI. Draw conclusions from your data recorded.

VII. Complete report for your 4-H project.
Wildlife Habitat Improvement Ideas

INVENTORY YOUR "ACRE". Learn what species and habitats you already have. Spend some time in the area learning how to identify both the vegetation and the wildlife. Keep a record of what you find and draw a map of your area that includes different types of vegetation, water, den trees, springs, cover, and other key habitat elements.

Now that you have mapped and surveyed the wildlife and plants on your "acre", you are ready to begin a wildlife management plan.

Make a duplicate of the map you prepared, and on this second map indicate changes and additions you would suggest for improving the wildlife habitat of the area.

Label permanent features like roads, buildings, fencelines, ponds, streams, and lakes. Also label any gardens, crop fields, pastures, and existing cover sites. Plants are the key for food and cover; know what is there and what is its value to wildlife. Make a note of any poorly drained sites that could be used for marsh development (waterfowl). Note steep slopes that need planting to prevent erosion. Find out which parts of the land could be improved and which parts could not. (See map above.)

STUDY THE HABITAT REQUIREMENTS of those species with which you would like to work. Do you have a critical limiting factor or do all the elements of the habitat (food, cover, water) need to be supplemented? Remember to take each species into consideration.

STUDY THE LAND AREA IN YOUR "ACRE". You may wish to have a soil test since additional plantings will depend on the type of soil you have. Soil fertility is also important in determining the quantity and nutritional content of plants.
PROTECT EXISTING COVER. Wildlife benefits when areas are protected from overgrazing, burning, or cutting. Work with the owner of your "acre" to be sure that it is free from grazing domestic animals, burning, or cutting of present ground cover. Preservation of existing habitat should help to assure enough cover of various types to meet wildlife needs.

CONSTRUCT BRUSH PILES. Construct brush piles for protection and nesting sites. These piles of tree limbs and brush furnish excellent habitat diversity for all wildlife. Many small mammals will use the brushpile for a home. Even a doe might hide her fawn at the base of a large pile. They can be put to good use in adding variety to improve existing cover. As an example, consider a grassy border along a wood lot. Gather fallen branches into piles on the border. Or, consider a site with two woody fencelots meeting at the corner of a pasture. Use a windrow of brush as a fence to enclose a triangle in the corner.

CONSTRUCT ARTIFICIAL NESTING STRUCTURES. Some species of wildlife game birds, song birds, and some small game require adequate perching, roosting, or nesting sites.

Where natural cover is lacking, construct artificial nesting structures to substitute natural sites to provide needed protective cover. Whether they be boxes, houses, or platforms, these artificial nesting structures must be durable, predator proof, and they must meet the biological needs of each species that will utilize them.

ATTRACT BIRDS BY PROVIDING THEM WITH FOOD AND WATER. Bird feeders and waterers should be placed in a sunny, sheltered spot where protective cover is nearby. Be sure cats cannot jump onto the feeder or waterer. Once you start feeding and watering the birds, be sure to continue until cold weather is over. Food such as suet, bread crumbs, peanuts, and cracked corn are very acceptable to most song birds as are sunflowers and marigolds planted along with the garden the preceding spring.

DEVELOP WATER SOURCES. The amount availability, quality, and presence throughout the year of water can be used for the purposes of increasing wildlife numbers and/or expanding the use of habitat. Development of water, including natural springs, seeps, and water holes, and manmade structures such as ponds, reservoirs, "guzzler", and wells generally enhance wildlife numbers. These water sources must be properly developed to provide an adequate and proper drinking environment. Stabilization of the borders surrounding these watering areas should be accomplished by planting willows, native shrubs for protective cover as well as a food source is also beneficial. Control of excessive weed growth and providing floating logs or rafts and loafing areas for water birds and mammals also enhances this type of habitat.

SAVE EXISTING TREES. Leave most producing trees, save den trees for birds and small mammals, and favor tall nesting trees utilized by raptors in woodlots when cutting. Do not disturb trees and shrubs with high wildlife value, especially heavy producing species of seed, berry, and fruit.

PLANT COVER VEGETATION. Cover fulfills varied needs in the total wildlife habitat wherever it may be located. The absence of cover, its sparceness, or its poor distribution may be the only factor limiting the use of an area by wildlife. What do you need to add to your acre to provide cover needs for wildlife?

Check with reference books, your county agent, or with agency resource people to determine what your acre needs and where to obtain seed or plants.

SEEDING FOOD AND COVER PLOTS: Trees and shrubs actually provide a small portion of wildlife cover. Herbaceous plants such as weeds, grasses, and legumes provide cover of a maximum value for most sites in a prairie state. Weeds,
though they may sometimes be preferred by game birds, are offensive to many humans. However, we can certainly promote the use of grasses and legumes to cover erosion scars and establish wildlife cover.

In choosing species to work with, your first consideration will be to narrow the field to adapted species. You can't go too far wrong if you work with nature and use the natives. Unproven exotics should be used in small test plots.

Your purpose will influence the choice of species. Nesting cover for quail should not be too heavy. For pheasant the main cover should be close to the ground, but a high thin canopy is desirable. A stand of low grass with a scattering of sweet clover is an example. Escape cover should be high and dense. If the cover is to serve in winter and early spring, you need a plant that will withstand the pressures of winter winds and snows.

Food plots are used to improve the distribution of game. In areas of extensive pasture, quail and pheasants are likely to be quite scarce even though cover is adequate. It is possible that you can establish headquarters for a new covey of quail or flock of pheasants with the application of the food plot practice. Other species of game can be influenced, too.

FERTILIZER PLOTS: An experimental fertilizer project may fit your situation. Perhaps you have a site where the vegetation is dwarfed. Be it grass, shrubs, or trees, it may respond to an application of fertilizer to improve the habitat. When you find the right combination you can expand from the test plot to a larger application.

Don't overlook the trace elements. They may be more important on your site, than the standard ingredients for commercial products. Sometimes lime will be the answer.

Wouldn't it be worthwhile to start with a soil test?
STREAM IMPROVEMENT: Stream improvement for fish and wildlife may use any or all of our game management tools. Bank stabilization may require fencing, seeding, planting, and fertilizer. In the water itself you may need logs, limbs, brush, and other naturally available material. These will be formed into small dams, deflectors and diggers. These structures can change the shape and depth of a stream as well as the speed and temperature of the water. Sometimes small changes can make the difference when a fish is deciding whether to settle down or move on. Contact a Game and Fish, Bureau of Land Management or Forest Service biologist.

EROSION CONTROL: Heal an erosion scar with vegetation and you have more wildlife habitat. A complete program for any one site may require the use of all our tools as in stream improvement. In fact, stream improvement work is usually nothing more than a special kind of erosion control.

RESTORATION OF WETLANDS: Sometimes a wet area is drained without the results that the landowner expects. The crops just don't meet expectations. The owner may be willing to have the site back in wildlife production. Then you may be able to get permission to plug the drains and bring the water back to its normal level.

Your re-established wetlands may need fencing for protection against livestock. Seeding can be useful also. The fill that plugged your drain should be seeded down, and it is possible that the shore line will need protection.

FINISH THE FARM POND: Too often the farm pond is constructed just to hold water for some purpose. No effort is made to develop any recreational aspect or to provide cover even for the newly exposed soil on cuts and fills. Weeds then become the only defense against erosion. Our water resources in Wyoming are not so
plentiful that we can abandon the recreational potential of a pond simply because it is not adequate for production of fish.

Your opportunities here may include seeding the dam, spillway, shore line and adjoining areas as well as the watercourses leading to and from the pond. Fencing will likely be appropriate to protect the area. Trees and shrubs may be used in clumps or in a complete belt.

**FISH ATTRACTORS:** Sand pits provide a great many hours of fishing fun. Most of the pits could be improved. Generally you will find a lack of vegetation.

Weedy or brushy areas are a favored hangout for fish. A brushpile bound together and weighted to the bottom will concentrate the fish for the angler. A good attractor will be at least six feet in length, width, and depth. Construct the device right on the shore. Choose a site with a steep bank so that you can roll the whole thing right into water of six to ten feet in depth.

A tree on the shore line may serve the same purpose if it is simply cut to fall into the water.

**WINTER FOOD, INSTANT STYLE:** When a hard winter comes you have a natural concern for the welfare of creatures of the wild. The public often demands the impossible—that our game birds be fed artificially, with grain delivered to each and every roost.

It is much easier to provide a little insurance before the winter comes. If your favorite game cover has an adjacent corn field, the table is set. Make an agreement with the farmer to leave a few rows of corn standing through the winter.

Your payment for the corn he contributes might be to salvage an equal volume of corn that has dropped to the ground at picking time. Some other job, such as
fence repair, may be more important to the farmer. Certainly milo or grain sorghum will also be good game feed if left standing above the snow.

FENCING: Most any unit of land that you can fence will thus be improved for wildlife purposes. If you can exclude livestock and other causes of disturbance, a plot of bare ground will have wildlife cover in short order. An application of seed may help you escape the weed stage and obtain a type of cover that you prefer, but often the fence is all that is needed.

Protection from livestock is vital to the effective windbreak and the properly managed woodland as well as the healing erosion scar.

SUGGEST HABITAT IMPROVEMENT PRACTICES TO "YOUR" LANDOWNER. Proper agricultural practices enhance wildlife habitat and in turn increase wildlife numbers. Pursuade the owner of your "acre" to follow these suggestions to help the wildlife:

1. Leave small patches of field crops standing and unharvested for wildlife.
2. Leave nesting cover undisturbed whenever practical; i.e., plow land before large-scale nesting; not after nesting is over.
3. Plant areas not suited for farming to trees, shrubs, and permanent cover crops so as to have an interspersion of cover types (edge effect).
4. Establish living hedges around field boundaries to reduce soil erosion and provide nesting cover, travel lanes, and food.
5. Keep certain fields open on old farmland by mowing hayfields or keeping certain areas in cultivation.
6. Construct proper fences so migration patterns are not altered.
7. Avoid spring burning and overgrazing.

-10-
Pheasant Release Program

Pheasants may be released under the 4-H Conservation and Wildlife Program. Proper habitat is essential. Under proper game management, the creation and maintenance of cover crops and protected areas is of utmost importance.

Limited numbers of pheasants may be available for spring releases in June. These birds are released for breeding and nesting purposes.

The Game and Fish Department will supply pheasants for those 4-H members who fill out proper application forms and where the habitat is appropriate for breeding birds. Forms may be obtained from:

Education Section
Wyoming Game and Fish Department
5400 Bishop Boulevard
Cheyenne, Wyoming 82002

Completed forms should be mailed or delivered to the Department no later than December 31 for a spring release. Birds for this release are usually available in June.

Leaders and 4-H members are encouraged to visit the bird farm prior to bird release time, to learn how birds are raised and handled.

Sheridan Bird Farm -- Bud Campbell, Superintendent
Route 1, Box 40
Sheridan, Wyoming 82801
Phone: 674-7701

Downar Bird Farm -- Garland Potts, Superintendent
Route 1
Yoder, Wyoming 82244
Phone: 532-3449

The county agent may elect to have 4-H clubs request pheasants through his office for referral to the Game and Fish Department.
References

Wildlife
(habitat, food, identification)


Food of Game in the United States. U.S. Department of Agriculture, Division of Wildlife, Washington, D.C.


Homes for Wildlife, 1975. Cooperative Extension Service, University of Nebraska, Lincoln, Nebraska, 10 pages. Suggested activities that may improve wildlife environment in your area.

Improving the Land for Wildlife, 1972. By Earl R. Cadw, Agricultural Extension Service, University of Tennessee, Knoxville, Tennessee. A 4-H manual showing the interrelationships within the natural community between plants, animals, and the elements, how to evaluate wildlife potential of a land unit, and how to plan wildlife improvements on the land.


Our Wildlife Heritage, 1979. By Wyoming Game and Fish Department, Cheyenne, Wyo. Includes identification and habitat information for big game, trophy, small game, protected, predatory, and fur-bearing animals, upland game birds and waterfowl, and fishes of Wyoming. Order from State 4-H Department.

Our Wildlife Legacy, 1954. By Durward L. Allen, Funk and Wagnalls Company, New York, New York, 422 pages. U.S. Science Library, Reference No. SK 361 A66. c. 2. Wildlife is a renewable resource that must be managed if we are to have continued benefits from it.
Placing American Wildlife Management in Perspective. Wyoming Game and Fish Department, Published by Wildlife Management Institute, 1000 Vermont Avenue, NW, 709 Wire Building, Washington, D.C. 20005. 27 pages. Proper management of wildlife habitat can make the difference in having adequate wildlife in our lives.

Fond Guide, 1975. Outdoor Biology Instructional Strategies, Lawrence Hall of Science, University of California, Berkeley, California 94720. A guide for identifying organisms found in and around the pond.

Providing for the Needs of Wildlife. By Earl R. Cady, Assistant Professor, Forestry, Agricultural Extension Service, University of Tennessee, Knoxville, Tennessee. 24 pages. How to establish a "natural" feeding area by planting a wildlife food patch.

Providing Needs of Wildlife, 1979. By Southern Regional 4-H Wildlife Literature Committee. There are things you can do to help the continued existence of many forms of wildlife. Order from State 4-H Department.

Small Game and Waterfowl, 1978. Cooperative Extension Service, Colorado State University, Fort Collins, Colorado. 51 pages. Helps you learn about Colorado's small game and waterfowl, their value to us today, principles involved in their management, their life requirements, and the laws and regulations that protect them.


Western Browse Research. Various western Game and Fish agencies.

Wildlife and Water Management: Striking a Balance. Soil Conservation Society of America, 7515 NE Ankeny Road, Ankeny, Iowa 50021.


Wildlife Conservation, 1963. By Ira N. Bagrielson, The MacMillan Company, New York. Emphasizes that the various programs for the conservation of soil, water, forests, and wildlife are so closely interwoven that each vitally affects one or more of the others. All are phases of a single problem—that concerned with the restoration and future wise use of our renewable natural resources. U.W. Science Library, Reference No. SK 353 GS 1963. 244 pages.


Wildlife Project: Raccoon, Squirrel, Beaver Ponds. Information on each of these animals, including food and habitat. A series of leaflets by Southern Regional 4-H Literature Committee. Order from State 4-H Department.


Wildlife Project--Urban and Backyard Wildlife. By Southern Regional 4-H Wildlife Literature Committee. Activities for feeding wildlife and habitat improvement for urban and backyard environments. Order from State 4-H Department.


Song Birds, Upland Game Birds, Waterfowl


Wildlife Project: Wild Turkey, Quail. By Southern Regional 4-H Literature Committee. Information on each of these birds, including food and habitat. Order from State 4-H Department.


Wyoming Audubon Society Check List. Doctor Oliver K. Scott, Editor, Casper. A check list of Wyoming's birds for birdwatchers.


Plants


Grasses of Laramie County. A. A. Beetle, University of Wyoming, Laramie, Wyo.

Grassland Seeds. Wheeler and Hill, Grassland Farm Series.


Range Improvement Notes. Intermountain Forest and Range Experiment.


Wildland Shrubs - Their Biology and Utilization. Intermountain Forest and Range Experiment Station, Ogden, Utah.


Fish


Wyoming Fishes, 1951. Revised, 1970. Wyoming Game and Fish Department. This book has photographs and describes all varieties of fishes known to occur in Wyoming. It is also a workable guide for fish identification.
Sources of Help

Wyoming Game and Fish Department -- Write to Education Section, Wyoming Game and Fish Department, 5400 Bishop Boulevard, Cheyenne, Wyoming 82002; or call (307) 777-7735.

Wyoming Association of Conservation Districts, Steve Adams, Box 98, Baggs, Wyoming 82321. Phone: (307) 383-2277. Or contact the office in your county.

Agricultural Extension Service -- Contact your local county Extension office.

State 4-H Department -- Some 4-H wildlife information is available from the State 4-H Bulletin Room, Box 3313, University Station, Laramie, Wyoming 82071; phone: (307) 766-2115 or from the State 4-H Office, Box 3554, University Station, Laramie, Wyoming 82071; phone (307) 766-3170.

Sportsmen's clubs -- Don't overlook experienced, responsible sportsmen as a source of information and help.

Associations -- There are many associations in Wyoming that are interested in wildlife and other natural resources. Here is a partial list of such associations and a few addresses. You may know of others or names of people affiliated. Check in your phone book to help you locate people that will be of help to you.

Audubon Societies:
- High Plains Audubon, Ed Strader, Cheyenne
- Big Horn Audubon, Jim Strahan, Sheridan
- Fremont Audubon, Bob Oakleaf, Lander
- Hule Audubon, Charles Scott, Casper

Izaak Walton Leagues:
- Izaak Walton League of America, Wyoming Division, 4009 Snyder, Cheyenne 82001. Ph: (307) 632-6311
- Travelle Chapter, Ray Jacquot, 1972 Empinado, Laramie 82070
- Casper Izaak Walton League, Bruce Ward, Pt. Caspar Road, Casper 82601. Ph: (307) 265-9009
- Cheyenne Izaak Walton League, Jack Hayes

Powder River Basin Resource Council, Sara Gorin, P. O. Box 6221, Sheridan, Wyoming 82801. Ph: (307) 672-5809

The Wilderness Society
- John Colter Society
- Wyoming Outdoor Council, P. O. Box 1184 (1603 Capitol Avenue), Cheyenne, Wyoming 82001. Ph: (307) 635-3416
- Medicine Buttes Wildlife Association, Brent Berken, President, Uinta County
- National Wildlife Federation, George Kaminski, Route 1, Box 77, Cheyenne, Wyoming 82001. Ph: (307) 632-6110
- Outdoors Unlimited, Marlene Simons, Deulah, Wyoming
- Overthrust Wildlife Association, Jerry Borino, President, Kemmerer, Wyoming
- Sierra Club 177 North Third, Lander, Wyoming 82520. Ph: (307) 332-9824
- Wyoming Open Land Foundation, Inc.
- Wyoming Water Development Association, James Rumery, North Portal Route, Riverton, Wyoming 82041
- Wyoming Water Quality and Pollution Control, Perry Libby, 1304 Rawhide, Gillette, Wyoming 82716

Wyoming Wildlife Federation:
- Tom Dougherty, 6633 Bonar Drive, Cheyenne, WY 82009
- Fred Eisenman, 5018 Alcova Route, Box 28, Casper, WY 82604
- Bob Rogers, P. O. Box 25, Buffalo, WY 82834

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VITA
Shannon B. Heath
Candidate for the Degree of
Master of Landscape Architecture

OBJECTIVE: To obtain an entry level position which utilizes my undergraduate education and subsequent experience in Natural Resource Management in conjunction with my graduate education in Environmental Planning.

EDUCATION: BS Wildlife Biology - Colorado State University - 1975
MLA (3.7 on 4.0) Landscape Architecture and Environmental Planning - Utah State University - 1984

EMPLOYMENT RELATED SKILLS:
Good writing ability
Knowledge of Applied Statistics and Fortran Programming
Experience with computer graphics and computer data analysis
Extensive work with topographic maps
Aerial photo interpretation
Competent human relation skills
Supervisory experience
Graphics ability
Extensive experience driving four-wheel drive vehicles
Work well alone or with others
Knowledge of plant taxonomy
Extensive experience with horses; riding, packing, transporting
Knowledge of French; writing, reading, speaking

EXPERIENCE:
Environmental Planning - Have completed all requirements for a Masters degree in Landscape Architecture and Environmental Planning

Visual Resource Mgmt. - Assistant to the Bureau of Land Management, Utah State Landscape Architect - Concerned with Visual Resource Mgmt. Program (BLM, 6/81-9/81, Salt Lake City, UT, Supervisor - Reed Stalder)

Wildlife Inventory - Biological Technician - Participated in wildlife inventory - non-game birds, small mammals, rare and endangered species, raptor nest sites, sage grouse strutting grounds, and water sites. Mapped wildlife habitat, determined browse plant condition and trend, and participated in habitat improvement (BLM, 2/79-10/79, Susanville, CA, Supervisor - Stephan J. Hawks)

Range Conservation - Range Technician - Supervised grazing allotments; participated in watershed inventory to determine watershed condition and trend and erosion susceptibility (BLM, 6/77-12/77, 6/76-12/76, 6/75-12/75, Montrose, CO, Supervisors - John S. Denker, Warren M. Schwabel)

Timber Inventory - Forestry Aide - Examined timber stands on various units of the Illinois Valley National Forest (USFS, 6/74-9/74, Cave Jct., OR, Supervisor - David R. Milner)

HONORS:

1980 Outstanding Student of the Freshman Class, Dept. of Landscape Architecture and Environmental Planning, Utah State University
1982 Outstanding Third Year Graduate Student, Dept. of Landscape Architecture and Environmental Planning, Utah State University
1983 USDA Certificate of Merit for job performance substantially exceeding the requirements of the position
1984 Research Fund Award, Utah Chapter of the Wildlife Society, for thesis research