Long Range Plan
For The
Ring-necked Pheasant
In
Minnesota

Approved
March 8th, 2005

Minnesota Department of Natural Resources

Ring-necked Pheasant

STRATEGIC VISION

By the year 2025, stakeholders envision a Minnesota pheasant harvest averaging 750,000 roosters (range 400,000 – 1.1 million), which is double the average harvest during 1987-2000. This vision assumes a sufficient habitat base to support an average fall population of 3 million birds. These populations would provide 175,000 hunters with an annual opportunity of more than 1 million days afield in pursuit of this popular game bird. Average retail purchases from these hunters will approach $45 million/year, much of which will be funneled into the economy of rural Minnesota.

High pheasant populations will serve as an indicator of a healthier agricultural ecosystem, with prime farmlands under crop production and environmentally-sensitive lands carefully managed to conserve soil, water, and a broad range of game and nongame wildlife. To accomplish such a comprehensive vision will require 1.56 million additional acres of habitat development at a minimal cost of $1.6 billion over the 22-year period. Although the price tag for this vision seems daunting, it is achievable with an increased emphasis on conservation within future farm programs plus a significant source of new conservation funding (e.g., a dedicated sales tax).

The following long range plan represents one component of the larger vision. This plan describes strategies to achieve a pheasant harvest of 450,000 roosters primarily by capitalizing on a suite of well-funded farm programs available through 2008.

INTRODUCTION

The ring-necked pheasant (*Phasianus colchicus*) competes with the ruffed grouse (*Bonasa umbellus*) as the most popular upland game bird in Minnesota. A native of Asia, pheasants were introduced to Minnesota after native prairie grouse declined to low numbers. The pheasant is a grassland-dependent species that thrives in farmlands containing a mixture of cultivated grains, grasslands, and lesser amounts of wetlands or brushy habitats.

Prior to European settlement, the most common gallinaceous bird in Minnesota's prairie region was the sharp-tailed grouse (*Tympanuchus phasianus*). In the mid-1800s, immigrant farmers arrived in large numbers and began to convert the prairies and

wetlands to cropland. The resulting mosaic of grasslands, small grains, and wetlands provided ideal habitat for prairie chickens (*Tympanuchus cupido*). Prairie chicken populations flourished through the late 1800s and early 1900s in Minnesota's developing farmland region. During the prairie-chicken heyday, Minnesota became a popular destination for non-resident hunters, who traveled from eastern states to partake in the 50-100 bird daily bags that were common during that time.

As more and more prairie and wetlands were converted to cropland, prairie grouse declined in distribution and abundance. News of Oregon's highly successful pheasant introduction spread to Minnesota. Pheasants were first stocked in Minnesota in 1905, but none of the released birds survived. A self-sustaining population was established in 1916-18 after 4,000 adults were released and another 6,000 eggs were given to farmers and hunters interested in rearing pheasants.

By 1922, pheasants had been released in 78 of the state's 87 counties, and the population was growing rapidly. The altered prairie landscape that was too intensively farmed for sharp-tailed grouse and prairie chickens proved ideal for ring-necked pheasants. Between 50% and 70% of the land was being cropped for grains, significant amounts of which were left over the winter. These food sources coupled with the remaining wetlands and the brushy shelterbelts surrounding farmsteads and livestock yards provided winter cover. Numerous late-mowed hayfields, pastures, wetlands, and weedy small-grain fields provided secure nesting and brooding areas.

In 1931, less than 15 years after releases of a few thousand birds, the fall pheasant population in Minnesota yielded a harvest of 1 million roosters (estimated population of over 4 million pheasants), and harvest averaged that level through 1964 (Figure 1). Within this 34-year period, the population (as reflected in the harvest) fluctuated $\pm$50% depending on extremes in weather and habitat, but always returned to the average.

However, the population began declining in 1964 and crashed in 1965 following a devastating winter, and never fully recovered (Fig. 1). The reason for the decline and failed recovery was a dramatic change in land use caused by new federal commodity-control and conservation programs (Feed Grain and Wheat Programs, Agricultural Conservation Program, and Public Law 566) that encouraged wholesale conversion of wetlands, haylands, pastures, and woodlands to feed-grain production, and did not require adequate cover on the cropland retired under the annual commodity-control program. These sudden land-use changes were over and above other harmful changes in farming practices that had gradually accumulated over decades (e.g., horses to

tractors, native hay to alfalfa, small grains to row crops, use of pesticides). The combined result of all land-use changes was a 74% reduction in the average pheasant harvest during 1965-86 compared to the 1931-64 average.

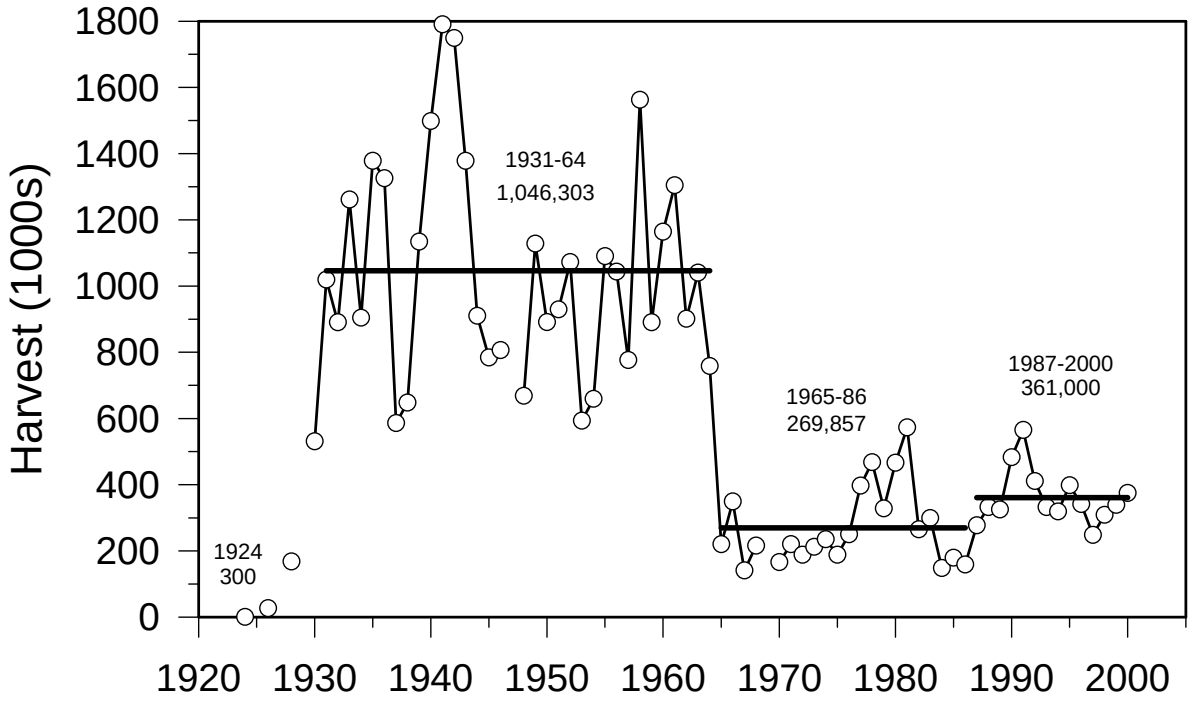

Figure 1. Estimated pheasant harvest in Minnesota during 1924-2000. Horizontal bars indicate average harvest for the period labeled. The pheasant season was closed in 1925, 1927, 1929, 1947, and 1969.

The history of sharp-tailed grouse, prairie chicken, and pheasant population changes in Minnesota demonstrates 2 key management lessons: (1) Minnesota is capable of sustaining high densities of upland game birds, and (2) changes in farming practices on private lands strongly influence the amount of habitat available and, consequently, grassland bird abundance.

RESOURCE MANAGEMENT

From 1916 (considered the year pheasants were successfully introduced) to 1968,

pheasant management in Minnesota consisted of setting hunting seasons, enforcing hunting regulations, stocking adult pheasants, paying predator bounties, monitoring population trends, estimating harvest, providing interested people with day-old chicks, and providing technical assistance in developing and preserving habitat. In the late 1940s and early 1950s, free plant material was provided to interested landowners to establish woody-cover plantings. Of these management activities, setting hunting seasons, enforcing hunting regulations, monitoring population trends, estimating harvest, and providing technical assistance in developing and preserving habitat continue today.

Since 1951, the state has been acquiring wetlands and adjacent uplands for Wildlife Management Areas (WMAs). In many cases, these acquisitions preserve critical pheasant habitat and provide public lands that can be managed for pheasants. In addition to establishing tame and native grasslands, trees and shrubs are often planted on these lands to create or enhance winter cover, and food plots are established to provide winter food.

From 1968 to present, the Division of Wildlife provided cost-sharing funds for habitat establishment on private lands. This cost-share program provides partial payments to landowners for developing and maintaining winter cover, reproductive cover, and food plots. Whenever possible, payments were meshed with similar cost-sharing practices under various federal agricultural conservation programs.

In 1982, a national pheasant organization, Pheasants Forever, was formed in Minnesota. With the help of this fledgling organization and other interested persons and organizations, a $5.00 pheasant stamp was legislated in 1983. Pheasant Stamp revenues have expanded the pheasant management program by an additional $405,000 to $667,000 annually (present appropriation $468,000). This funding source also allowed the Division of Wildlife to implement a roadside-habitat program, provide needed educational materials, and partially support National Agricultural Program Representatives with the Wildlife Management Institute, International Association of Fish and Wildlife Agencies, and Pheasants Forever. These representatives work in Washington, D.C. to monitor federal programs and legislation affecting wildlife habitat in farmland areas and coordinate input from wildlife interests to federal legislators. This strategy, which began in 1961, has strengthened our continued involvement in influencing the direction of federal farm programs.

Many conservation organizations, hunting clubs, and private landowners accomplish

important habitat work. For example, moneys generated through fund raising by 64 local Pheasants Forever chapters provide from $800,000 to over $1.6 million annually in addition to pheasant stamp revenues. These moneys are primarily used for acquiring public lands and developing habitat on public and private lands.

Farm programs affect pheasant abundance primarily by influencing the amount of safe reproductive habitat on private lands, which constitute >95% of Minnesota's pheasant range. During 1936-42, the Federal Agricultural Conservation Program (ACP) diverted about two million acres of cropland to grass and/or legumes per year, and the fall pheasant harvest increased to a peak of 1.7 million birds in 1941-42 (Fig. 1). However, with the onset of World War II, ACP was eliminated, and pheasant populations declined to pre-ACP levels.

Other harmful changes in farming practices also began in the 1940s, and these changes gradually accumulated to reduce Minnesota's ability to produce pheasants. Encouraged by advances in technology and federal cost-share programs for ditching and tiling, wetland drainage increased significantly in the late 1940s and continues today. The introduction of artificial fertilizers, pesticides to control weeds and insects, and soybeans as a commercial crop replaced the traditional crop rotation of corn, small grains, and hay with a rotation of corn and soybeans. The loss of small grains and hay eliminated critical nesting and brood-rearing habitat. Furthermore, hay crops were converted from grass/clover mixtures, which are harvested after mid-June, to alfalfa, which is first cut in late May or early June. Alfalfa is very attractive to nesting hens but the first mowing occurs when most hens are still incubating, resulting in a tremendous loss of nests and hens.

The importance of federal cropland retirement programs to pheasant production was demonstrated a second time from 1958 to 1964. During that period, farmers enrolled from one to two million acres per year in the Soil Bank Conservation Reserve. Under long-term contracts, farmers were required to plant legumes and grasses, and leave them undisturbed. Minnesota's pheasant harvest reached its second highest peak (>1.5 million) since the ACP and averaged 1.1 million birds during the Soil Bank years (Figure 1).

In 1961 the federal government instituted a program to limit surplus production of feed grain (corn and oats) in an attempt to boost crop prices. This and subsequent programs retired cropland on an annual basis instead of over multiple years (as had the Soil Bank Conservation Reserve). To the detriment of nesting pheasants, the majority of annual

set-aside fields in Minnesota were not seeded to a cover crop or the cover was disturbed during the nesting season. Furthermore, the new programs encouraged the conversion of many acres of hay, pasture, and wetland to crops supported by the federal program. The net effect of annual farm programs and intensive farming practices was a reduction of Minnesota's pheasant harvest to an average of about 270,000 roosters from 1965-86 (Fig. 1).

In 1985, a major change in federal land-retirement programs gave pheasants an opportunity to recover some of the losses experienced over the previous 25 years. Annual land-retirement programs were gradually phased out in favor of a 10-year Conservation Reserve Program (CRP). With the addition of 1.2 million acres of potential nesting and brood cover available during 1987-96, average fall pheasant harvest increased 34% compared to the period 1965-86 (Fig. 1). The pheasant response to CRP could have been larger, but habitat gains from CRP were partially offset by the continued conversion of wetlands, idle grasslands, hay, pasture, and small grains to row crops.

The 1996 Farm Bill modified CRP enrollment rules, resulting in the loss of one-third of the CRP acreage in Minnesota's pheasant range. However, the Conservation Reserve Enhancement Program (CREP), the Wetlands Reserve Program (WRP), and Reinvest in Minnesota (RIM) program enabled the permanent retirement of 170,000 acres of environmentally-sensitive cropland. The 2002 Farm Bill offers more opportunity to restore or protect wildlife habitat than any previous farm bill. Programs with habitat potential include CRP, CREP, WRP, Farmable Wetlands Pilot Program (FWP), Wildlife Habitat Incentives Program (WHIP), Grassland Reserve Program (GRP), Conservation Security Program (CSP), and possibly Environmental Quality Incentives Program (EQIP).

RESOURCE ANALYSIS

Habitat Needs

The pheasant is a grassland-dependent species that thrives in farmlands containing a mixture of cultivated grains, undisturbed grasslands, and wetlands. Undisturbed grass habitats are required for nesting and brood rearing. Emergent or shrub-scrub wetlands or other dense, woody habitats are needed for winter cover, especially during severe weather. Because most pheasants move <2 miles between summer and winter range, both reproductive habitat and at least 1 winter area must be available within a 9-square-

mile landscape to sustain a population over the long term.

Pheasant densities increase as the proportion of undisturbed grass in the landscape increases, up to a maximum of about 50% grass. Grass habitats should provide residual cover or new growth at least 10 inches high by April 15 (when hens begin nesting), and remain undisturbed until at least August 1 (when most renesting is completed). The best reproductive habitat contains a mixture of perennial grasses and broad-leaved forbs. Small grains, hay, and pasture are also used as nesting and brood habitat, but reproductive success is lower than in undisturbed grasslands because of inadequate cover in early spring and untimely harvest. Although alfalfa is very attractive to hens and broods, it is considered hostile reproductive habitat because the early and repeated mowing for hay destroys nests, nesting hens, and broods.

The primary functions of winter cover are to provide protection from weather and predators when grass habitats are buried by snow. These functions can be provided by large blocks of heavy herbaceous or woody vegetation. Emergent wetlands with large stands (≥10 acres) of cattail, *Phragmites*, or sandbar willow provide excellent winter cover, although the size of the stands generally varies from year to year depending on water levels and muskrat populations. Where wetlands are not available, large (3-5 acre) shelterbelts containing ≥10 rows of shrubs and conifers can be established where they will protect heavy grass cover (e.g., 10-acre blocks of switchgrass). A reliable source of food (e.g., corn food plot) located within ¼ mile of winter cover will hold pheasants in the winter cover, thereby reducing exposure to predators and weather.

Prior to the mid-1960s, pheasant habitat was provided as a byproduct of contemporary farming practices. In 1954, small grains, haylands, and pasture formed 38% of the south central Minnesota landscape, which was the state's most important pheasant region. Furthermore, farm fields were small and surrounded by weedy fencerows, and wetlands were common. But by 1997, small grains, hay, and pasture formed only 5% of the landscape, having been replaced by rowcrops. Fencerows were removed to consolidate farm fields, and most wetlands that were not legally protected were drained. Also, farmstead shelterbelts were eliminated by farm expansion or have deteriorated as winter cover because of aging, poor composition, or incompatible grazing. Extensive fall plowing has eliminated winter food. The transformation from small, diversified farms to intensive row cropping and confined livestock has dramatically reduced reproductive and winter habitat on current farming operations. Similar land-use changes occurred throughout the pheasant range, but to a lesser extent.

Most of the habitat used by pheasants today is available only because it has been rented or acquired specifically for conservation. The most important source of undisturbed habitat is from cropland retirement programs. About 3.3% (910,000 acres) of the pheasant range is currently enrolled in long-term (10-year to permanent) contracts under the CRP, CREP, WRP, or RIM program (Table 1). Undisturbed grass constitutes most of the farm-program habitat, but some marshes have been restored and woody cover areas developed for winter habitat. Another 2.2% (608,000 acres) of the pheasant range has been permanently conserved by DNR and U.S. Fish and Wildlife Service acquisitions and easements (Table 1). Small grains, haylands, and pasture form about 15.7% (4,332,000 acres) of the pheasant range (Table 1), but most small-grain fields are large and treated with herbicides and most hay has been converted to alfalfa, reducing the value as reproductive cover. Furthermore, these "disturbed" habitats continue to be lost at a rate of about 6% per year.

Increasing pheasant numbers will require increasing the amount of reproductive and winter habitat. To roughly estimate habitat needs, the following simple models can be used:

1. One pheasant will be added to the fall population for every 1 acre of undisturbed grass added to a 9 mile^2 landscape, up to a maximum of 50% grass (assuming all other parameters remain constant).
2. Pheasant populations will be more stable from year to year with the addition of winter cover and food to the habitat base of undisturbed grass. One block of winter cover and associated food is needed per 600 acres (10%) of undisturbed grass in a 9 mile^2 landscape.
3. One rooster harvested = 4 pheasants in the fall population. This estimate is based on a sex ratio of 46% males and harvest estimates of 65% of the roosters killed and 85% of these retrieved (0.46 x 0.65 x 0.85 = 0.25).

During the peak of CRP enrollment in Minnesota (1987-97), about 1.2 million acres of cropland in the pheasant range was retired, 95% of which was planted to grass. Applying the models, we expected an extra 1.1 million birds in the population (1.2 million acres x 95% grass x 1 bird/grass acre) and 275,000 roosters in the harvest (1.1 million birds x 1 rooster harvested/4 pheasants in population). In reality, average harvest increased by only 62,200 compared to the period before CRP (1974-86), which suggests that CRP added only about 1 bird per 4 acres of habitat. However, CRP was frequently disturbed ("emergency" haying was common). Furthermore, for every acre of CRP established during 1987-97, about 3 acres of hay, small grains, and pasture were lost. These alternate habitats produce only about 1/4 the chicks as CRP. If the

negative effects of losing these alternate habitats are subtracted, it appears that CRP added about 1 bird/acre.

To raise Minnesota's current harvest from 360,000 to 1 million roosters (i.e., increase harvest by 640,000 roosters) would require adding 2.56 million pheasants to the fall population, which may be accomplished by adding 2.56 million acres (9.7%) of undisturbed grass to the pheasant range (or greater amounts of small grains, pasture, and hay). Alternately, the current harvest could be raised to 750,000 (i.e., increase harvest by 390,000 roosters) by adding 1.56 million birds to the fall population, which would require adding 1.56 million acres (5.9%) of undisturbed grass of the pheasant range. Given the limits of current farm programs and acquisition funding, a maximum of 330,000 new acres (1.2%) of undisturbed grass might be established by 2008, yielding a projected increase of about 80,000 roosters in the annual harvest. An additional 10,000 roosters may be added to the harvest by maintaining and improving quality of existing habitats. Thus, a realistic goal is to raise the average annual harvest to 450,000 roosters by 2008.

Table 1. Current habitat density, recent (1992-01) and benchmark (1955-64) mean population indices, and average winter severity indices for the primary counties of Minnesota's pheasant range, by agricultural region.

Agricultural Region[1]	Area (Square Miles)	Habitat Density (% of landscape)				Mean Population Index[6]		Winter Severity Index[7]
		Farm Program[2]	Wildlife Agency[3]	Disturbed[4]	Total[5]	1992-01	1955-64	
NW	674	6.6	2.9	43.2	52.7	4.3	76.4	111.9
WC	9,263	5.6	3.9	20.2	29.7	29.4	390.2	87.8
C	9,439	2.6	1.9	17.9	22.4	37.9	186.1	90.9
EC	3,871	0.2	2.9	13.8	16.8	40.9	164.6	99.3
SW	5,912	3.8	1.7	8.0	13.4	60.5	349.4	70.8
SC	6,315	3.0	0.9	5.4	9.3	69.0	404.0	74.3
SE	5,791	2.5	1.2	20.6	24.2	59.5	129.5	77.2
Range-wide	41,265	3.3	2.2	15.7	21.2	47.8	283.3	84.0

[1]Agricultural region boundaries are depicted in Fig. 2.
[2] CRP, CREP, WRP, and RIM enrollments in 2002, reported by the Farm Service Agency (CRP), Natural Resources Conservation Service (WRP), and Board of Water and Soil Resources (CREP, RIM).
[3] WMAs and USFWS WPAs, refuges, and easements in 2002.
[4]Small grains, hay, and pasture reported in 1997 Census of Agriculture.
[5]Sum of farm program, wildlife agency, and disturbed habitats. This total does not include habitats maintained by private landowners without government support, which are especially common throughout the EC region and the northern counties of the C region.
[6]Pheasants counted per 100 miles driven during August roadside surveys.
[7]Average number of winter days (1955-2000) with snowdepth $\geq$6 inches plus days with temperature $\leq 0^{o}$F.

Supply

Using harvest as an indicator, Minnesota consistently ranks in the top 8 states (ranging from 5th to 8th) that have huntable populations of wild ring-necked pheasants. A well-established pheasant population exists in the southern two-thirds of Minnesota (41,265 square miles) and occupies all or parts of 68 counties (Figure 2). Pheasant habitat management is targeted toward the 63 counties that represent the primary pheasant range (excludes Becker, Wadena, Cass, Crow Wing, and Ramsey Counties).

Since 1987, fall population estimates (based on harvest) have varied from 1.0 to 2.3 million birds or about 24-54 birds per square mile of range (Table 2). This is 34% higher than the 0.6 to 2.3 million birds (mean density of 13-55 birds per square mile) from 1965-86 (Table 2). However, the current population is 65% less than the 2.3 to 7.2 million birds (mean density of 56-171 pheasants per square mile) that sustained pheasant harvests in the vicinity of 1 million birds during 1931-64. To achieve the harvest goal of 450,000 roosters will require a fall population of 1.8 million birds (density of 44 pheasants per square mile), which equates to an August population index of roughly 90 birds counted per 100 miles of roadside survey.

Only 2%, or 674 square miles, of Minnesota's pheasant range is located in the NW agricultural region (Fig. 2). This represents a sizable contraction from the early 1960s, when the northern range limit extended into Polk County. Habitat density is higher in the NW than any other region, with 9.5% of the land in undisturbed habitat protected by farm programs and wildlife agencies, and another 43.2% in small grains, hay, or pasture (Table 1). However, severe winter weather at this northern fringe of the pheasant range extends over a longer period than in any other region (Table 1). Furthermore, wet weather since the early 1990s has raised water levels in wetlands and greatly reduced coverage of emergent vegetation (i.e., winter cover). As a result, the 1992-01 population index averaged only 4.3 birds per 100 miles. The NW region is capable of supporting much higher pheasant numbers (1955-64 population index averaged 76.4 birds per 100 miles, Table 1), and may be able to sustain the statewide goal of 90 birds per 100 miles.

The WC agricultural region forms 22% (9,263 square miles) of the pheasant range (Fig. 2). Habitat density is comparatively high in the region with 9.5% of the area in undisturbed habitat protected by farm programs and wildlife agencies, and another 20.2% in small grains, hay, or pasture (Table 1). Winters tend to be long and severe (Table 1). The WC region ranks second in potential to produce pheasants (1955-64 population index averaged 390.2 birds per 100 miles), but the recent (1992-01) population index (29.4 birds per 100 miles) is far below the 1955-64 benchmark.

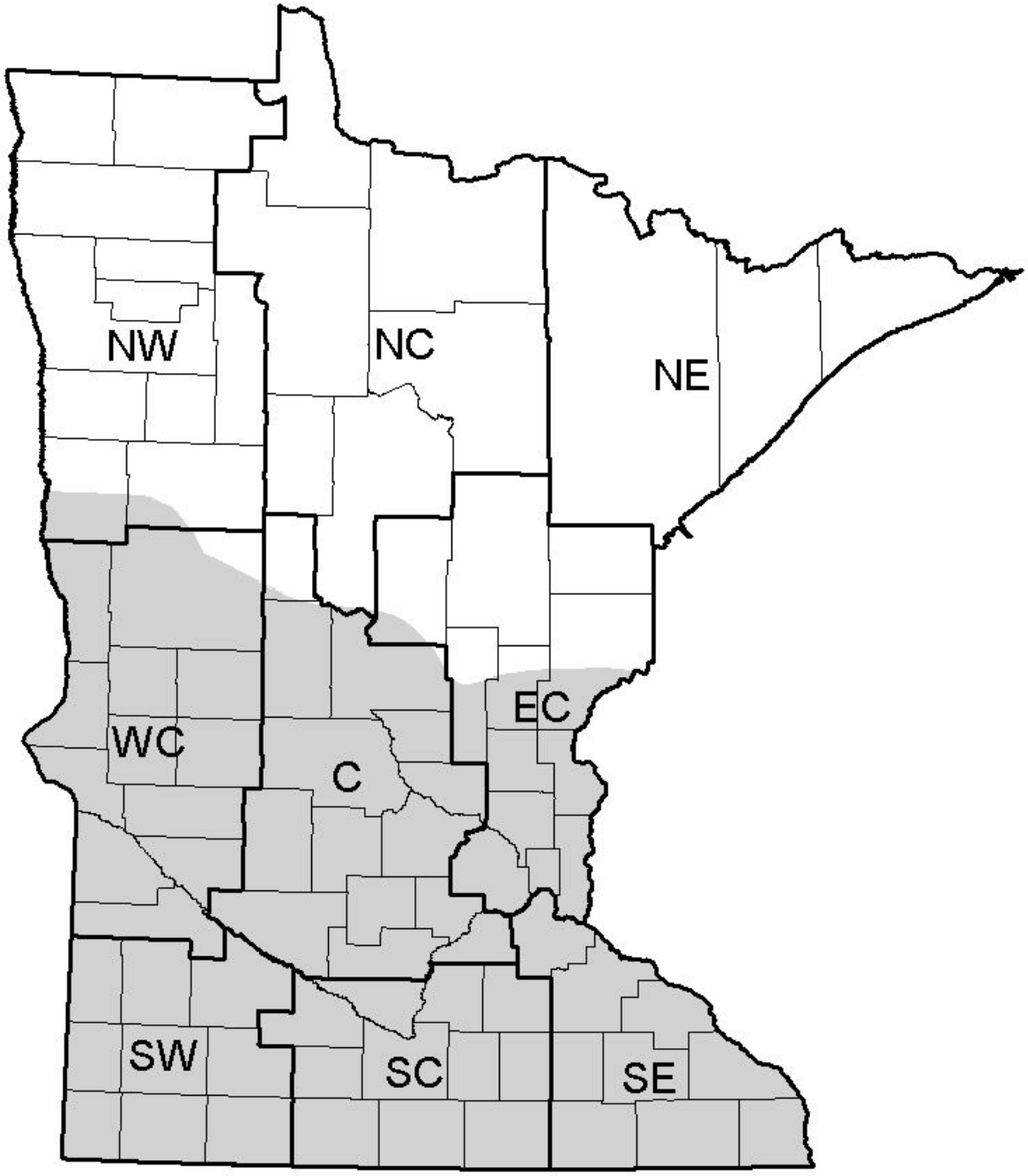

Figure 2. The distribution of pheasants (shading) in Minnesota as of 2002. The bold lines delineate Agriculture Regions, and the light lines delineate counties.

Table 2. Estimated pheasant harvest, pre-hunt population, pre-hunt density, and number of hunters during 3 time intervals in Minnesota.

Years	Statistic	Harvest	Fall Population[1]	Fall Density[2]	Hunters
1931-64[3,4]	Mean	1,046,000	4,185,212	99.6	229,000
	Maximum	1,790,000	7,160,000	170.5	270,000
	Minimum	586,000	2,344,000	55.8	190,000
1965-86[5]	Mean	269,857	1,079,429	25.7	103,952
	Maximum	573,000	2,292,000	54.6	173,000
	Minimum	141,000	564,000	13.4	47,000
1987-00	Mean	361,000	1,444,000	34.4	94,071
	Maximum	565,000	2,260,000	53.8	122,000
	Minimum	248,000	992,000	23.6	80,000

[1]Estimated by multiplying harvest by 4, based on the assumption that the number of birds killed and reported by hunters is a constant proportion (25%) of the total population. Variation in season length and bag limits probably change this relationship. For example, the fall population was likely overestimated during years when one hen was allowed in the daily bag (1930, 1933, 1935-37, and 1941-43).
[2]Total pheasants per square mile of range, estimated by dividing the estimated fall population by 41,265 square miles (the size of the current pheasant range).
[3]Hunter estimates based on 1960-64 data only because earlier estimates were not available.
[4]Mean and minimum values exclude 1947 when the pheasant season was closed.
[5]Mean and minimum values exclude 1969 when the pheasant season was closed.

The C agricultural region forms 23% (9,439 square miles) of the pheasant range (Fig. 2). Less than 5% of the area is in undisturbed habitat protected by farm programs and wildlife agencies (Table 1), but the northern counties contain considerable (but unmeasured) undisturbed habitat that is not protected by a habitat program. Disturbed habitat forms 17.9% of the area, much of which is intensively managed for dairy farming. Winters are frequently long and severe. The recent population index averaged 37.9 birds per 100 miles, but the region has supported an index 5 times larger (benchmark index averaged 186.1 birds per 100 miles, Table 1).

About 9% (3,871 square miles) of Minnesota's pheasant range is in the EC agricultural region (Fig. 2). Only 3.1% of the region is in undisturbed habitat protected by farm programs or wildlife agencies (Table 1), but a large number of hobby farms and recreational properties provide additional (but unmeasured) habitat, especially winter cover. Disturbed habitat forms 13.8% of the region. The average winter severity index ranks second only to the NW agricultural region (Table 1). Recent and benchmark population indices averaged 40.9 and 164.6 birds per 100 miles, respectively (Table 1).

The SW agricultural region contains 14% (5,912 square miles) of the pheasant range (Fig. 2). Farm program and wildlife agency habitats total 5.5% of the region, whereas disturbed habitats total only 8.0% (Table 1). The average duration of severe winter weather is shortest in the SW region. The SW region ranks third in potential to produce pheasants (benchmark population index averaged 349.4 pheasants per 100 miles), but the recent population index (60.5 birds per 100 miles) averaged only 17% of the benchmark (Table 1).

About 15% (6,315 square miles) of the pheasant range is in the SC agricultural region (Fig. 2). The rich soils of this region are the most intensively cultivated, with only 3.9% of the region protected by farm programs and wildlife agencies, and another 5.4% of the region in disturbed habitats (Table 1). The average duration of severe winter weather is shorter than all regions except the SW (Table 1). The SC region has Minnesota's greatest potential to produce pheasants (1955-64 population index averaged 404.0 birds per 100 miles); recent population indices averaged 69.0 birds per 100 miles (Table 1).

The SE agricultural region contains 14% (5,791 square miles) of Minnesota's pheasant range (Fig. 2). Only 3.7% of the region is protected by farm programs and wildlife agencies (Table 1). Small grains, hay, and pasture form 20.6% of the region, but these habitats tend to be intensively managed for dairy. Winters tend to be relatively mild in the SE region (Table 1). The recent and benchmark population indices averaged 59.5 and 129.5 birds per 100 miles, respectively.

Demand

Since 1960, the estimated number of licensed pheasant hunters in Minnesota has ranged from a high of 270,000 in 1961 to a low of 47,000 in 1975. Hunter numbers have varied in direct proportion to the size of the pheasant population; more pheasants mean more hunters. Prior to 1965, the number of pheasant hunters was the primary driving force in small-game license sales. Since pheasant populations crashed in 1965, however, pheasant hunters have represented a smaller proportion (16-47%) of small-game hunters.

The number of pheasant hunters averaged 94,071 during 1987-2000 (Table 2) but stamp sales averaged 106,521. About 99% of Minnesota's pheasant hunters are Minnesota residents. Minnesota has not attracted large numbers of nonresident hunters because hunting is usually better and bag limits and possession limits are less restrictive in neighboring states of Iowa and South Dakota. Likewise, many Minnesota residents travel to other states, especially Iowa and South Dakota, for pheasant hunting.

Pheasants are an important bird to landowners in Minnesota. Natural Resources Conservation Service and Soil and Water Conservation District staff report that a primary management goal of landowners enrolling in cropland-retirement programs is to increase pheasant numbers on their property.

Economic Value

Upland bird hunting is big business in Minnesota, generating almost $62 million in retail sales in 2001, the most recent reporting year for the National Survey of Fishing, Hunting and Wildlife-Associated Recreation. Assuming pheasant and grouse hunters have similar spending behaviors, pheasant hunters alone generated almost $22 million in retail sales to pay for their sport, including expenditures for guns, ammunition, travel, meals, lodging, and dog care. These expenditures then rippled through the economy, creating a total economic impact of nearly $43 million. The business of pheasant hunting employed 380 Minnesotans and produced $9.9 million in salaries and wages in 2001.

To demonstrate the potential for economic growth, a fall harvest of 450,000 rooster pheasants would provide a projected 850,000 days of recreation for 125,000 hunters. This number of hunters would be expected to spend $32 million to hunt pheasants in Minnesota's farmlands, with a total multiplier effect of almost $63 million, of which a significant amount would be in the rural areas of the state. An increase in the number of

pheasant hunters from the 1987-2000 level of 94,000 to at least 125,000 would generate a minimum of $682,000 in additional small game license and pheasant stamp revenues annually. The additional stamp funds ($155,000/year) would provide 33% of the funding prescribed by this plan to expand farm-program enrollment.

ECOSYSTEM CONSIDERATIONS

Interest in ring-necked pheasants is a major positive force behind habitat-conservation efforts in much of the farmland area of Minnesota and the nation. This plan emphasizes farm policy, conservation practices, and subsidies to achieve habitat and population goals. This plan meshes well with long-range plans for many other prairie and farmland wildlife species as well as plans for conservation of grassland and wetland habitats. Expanding grasslands and emergent- and shrub-dominated wetlands in intensively farmed areas will provide measurable benefits to many species including white-tailed deer, badgers, jack rabbits, herpetofauna, waterfowl, prairie grouse, songbirds, many wading birds, and raptors such as northern harriers and short-eared owls. Food plots and woody-cover plantings established for wintering pheasants will benefit an array of wildlife that winter in Minnesota (e.g., cottontail rabbits, squirrels, woodpeckers, dark-eyed juncos, field sparrows, wild turkeys, and deer).

However, some pheasant management practices may have adverse consequences for open landscapes and associated wildlife. Establishment of woody cover, particularly tall deciduous trees and conifers in previously open landscapes, attracts predators and habitat generalists while providing little or no benefit to wildlife dependent upon open grassland ecosystems that once dominated much of Minnesota's pheasant range. Habitat use, survival, and nest success are reduced in grasslands and wetlands adjacent to trees for most shorebirds, some waterfowl and other water birds, and numerous grassland birds, including pheasants. Tree cover can eliminate certain area-sensitive species such as prairie grouse from otherwise suitable grassland habitats. Tree plantings in open landscapes are also contributing to homogenization of wildlife populations across the middle of the continent. Negative impacts of trees planted for the benefit of pheasants may be minimized by careful placement of winter cover within the landscape, by emphasizing wetland and brushland restoration to meet winter-shelter requirements, and by choosing appropriate species (i.e., avoiding tall trees) in woody-cover plantings. On-going research on habitat requirements of grassland songbirds and winter-cover needs of pheasants will help managers balance competing habitat needs within open landscapes.

Pheasants also have direct impacts on other species. For example, pheasants may negatively impact numbers of prairie chickens, gray partridge, and possibly other

species through nest parasitism, habitat competition, aggressive behavior, and disease transmission. Pheasants are known to parasitize nests of many other species, and aggressively harass or even kill feeding or courting prairie chickens, gray partridge, and northern bobwhites. Pheasant tolerance of blackhead suggests the potential for pheasants to disseminate this disease to other gallinaceous birds.

A burgeoning suite of planning efforts have been initiated to coordinate conservation of all birds (e.g., the North American Bird Conservation Initiative). Pheasant conservation interests should join these efforts to help minimize conflicts, take advantage of partnership opportunities, and advance ecologically sound conservation. The Midwest Pheasant Study Group has been invited to contribute technical advice through the Midwest Association of Fish and Wildlife Agencies and the resident gamebird subcommittee of the International Association of Fish and Wildlife Agencies.

SUMMARY

Minnesota is capable of sustaining high densities of pheasants. Prior to the mid-1960s, pheasant habitat was provided as a byproduct of farming practices, resulting in abundant habitat and pheasants. But the transformation from small, diversified farms to intensive row cropping and confined livestock has dramatically reduced habitat and pheasant numbers. One proven method of increasing pheasant numbers is by increasing the amount of reproductive habitat (undisturbed grass). The conservation provisions of the 2002 Farm Bill offer the best potential opportunities in 40 years to establish undisturbed grasslands. This plan describes strategies and actions to add 330,000 acres of new grasslands by 2008 (i.e., through the life of the 2002 Farm Bill), raising the average harvest from 360,000 to 450,000 roosters.

Much additional work will be needed after this plan is implemented to achieve the strategic vision of a pheasant harvest averaging 750,000 roosters by 2025. This vision will require an additional 1.56 million acres of habitat development at a minimal cost of $1.6 billion. Such a daunting undertaking is only achievable with an increased emphasis on conservation within future farm programs plus a significant source of new conservation funding (e.g., a dedicated sales tax). To maximize efficiency, future habitat efforts should focus on balancing reproductive and winter habitat needs within small (9 square mile) landscapes, based on the research and inventory that will be completed under this long range plan.

LONG RANGE PLANNING FOR RING-NECKED PHEASANT

PRODUCT: Ring-necked pheasants for their recreational, economic, and intrinsic values.

GOAL: Manage wild ring-necked pheasants to provide opportunities for hunting and non-hunting recreation.

OBJECTIVES, PROBLEMS, STRATEGIES, AND ACTIONS:

OBJECTIVE 1: By the year 2008, sustain a mean statewide population of 1.8 million wild ring-necked pheasants yielding a harvest of 450,000 roosters.

PROBLEM 1. The amount of reproductive habitat in Minnesota's pheasant range needed to accomplish Objective 1 is deficient by 330,000 acres.

STRATEGY A. Protect, acquire, maintain, and improve reproductive habitat through Department of Natural Resources (DNR) programs.

Action 1. Expand the Wildlife Management Area (WMA) system by acquiring an additional 21,000 grassland acres (6.4% of need) in the pheasant range. (If the Accelerated WMA Acquisition Plan was adopted and funded, this value would increase to 74,000 grassland acres).

Action 2. Maintain and improve 50,000 acres of reproductive habitats per year on WMAs and other lands.

Action 3. Protect under Prairie Bank 2,400 acres of remnant prairie parcels in the pheasant range.

Action 3. Protect grass habitats on WMAs from destructive practices (e.g., recreational trails) through enforcement of public-use rules.

STRATEGY B. Provide technical and financial assistance for private land management through state and federal programs.

Action 1. Secure $500,000/year in new funding (e.g., increase the Minnesota Pheasant Stamp, Minnesota Waterfowl Stamp, use Heritage Funds, etc.) to promote the conservation provisions of federal and state farm programs in partnership with other agencies and organizations.

Increase enrollment of undisturbed, perennial grassland in the Conservation Reserve Enhancement Program (CREP), Reinvest in Minnesota (RIM), Wetlands Reserve Program (WRP), and other permanent easements by 99,000 acres (30.0% of need).

Increase enrollment of undisturbed, perennial grassland in the general Conservation Reserve Program (CRP) by 47,000 acres (14.2% of need) while maintaining the current base of 609,000 acres.

Increase enrollment of undisturbed, perennial grassland in the continuous CRP (including the FWP) by 154,000 acres (46.7% of need).

Influence management of farm program lands to improve cover quality for reproductive habitat. In particular, encourage practices that enhance the beneficial forb component of grasslands.

Influence management of working farmlands through the Conservation Security Program (CSP), Wildlife Habitat Improvement Program (WHIP), Grassland Reserve Program (GRP), and Environmental Quality Incentives Program (EQIP) to improve cover quality for reproductive habitat. In particular, protect and expand the existing 4.3 million acres of pasture, hayland, and small grains, especially where row crops form >80% of the landscape.

Action 2. Maintain and expand the DNR Private Lands Program. (Increase the number of Private Lands Specialists in the pheasant range from 3 to 6 and provide an annual budget of $50,000/specialist for cost-share practices on private lands).

Action 3. Maintain and expand the Roadsides for Wildlife Program.

STRATEGY C. Encourage other public and private land managers to protect, acquire, maintain and improve reproductive habitat.

Action 1. Support U.S. Fish and Wildlife Service (USFWS) expansion of the Waterfowl Production Area (WPA) system by an additional 9,000 grassland acres (2.7% of need) in the pheasant range through acquisition and permanent easements.

Action 2. Partner with road authorities to maintain legal right-of-ways and improve management of 1,200 acres of roadside grasslands.

Action 3. Partner with the International Association of Fish and Wildlife Agencies (IAFWA) to support the strengthening and enforcement of habitat protection provisions (e.g., Sodbuster, Swampbuster) in federal farm policy.

Action 4. Encourage protection of grasslands from fragmentation through proper siting of tree plantings (including short-rotation woody crops).

STRATEGY D. Encourage tax credits and incentives for developing or maintaining critical habitat.

STRATEGY E. Encourage research, development, and application of beneficial agricultural practices.

Action 1. Promote research to determine if noxious weed infestation on croplands managed under modern farming practices is significantly increased when weeds are not controlled on adjacent conservation lands.

Action 2. Promote research and development of sustainable farming practices that provide wildlife habitat.

PROBLEM 2. The lack of winter habitat can limit the use and productivity of nesting habitat by breeding hens.

STRATEGY A. Determine winter habitat needs.

Action 1. Conduct research to calibrate the relationship between pheasant abundance and winter habitat distribution and abundance.

Action 2. Inventory existing winter habitat throughout the pheasant range.

Action 3. Identify winter habitat needs and distribute this information to resource managers in all conservation organizations.

STRATEGY B. Clarify issues associated with trees in prairie landscapes and the role of woody cover plantings for winter habitat needs.

Action 1. Develop a background paper that discusses the issue of large trees

and winter cover and defines winter cover in terms of need, location, and appropriate species.

Action 2. Develop a WMA directive that assists in locating and properly designing winter cover. The directive should require the use of native species to meet these objectives whenever possible.

Action 3. Encourage other public and private land managers to apply the directive to their activities.

STRATEGY C. Where sufficient reproductive cover exists (≥10% of 9-mile^2 landscape), provide and maintain winter food and cover complexes on DNR lands within a 2-mile radius of reproductive cover.

Action 1. Protect 60 emergent wetlands through acquisition as WMAs.

Action 2. Develop 60 winter food and cover complexes on WMAs.

Action 3. Remove woody cover (e.g., volunteer trees) that causes negative impacts (e.g., increased predation risk) to an adjacent or surrounding grassland.

STRATEGY D. Encourage other public and private land managers to provide and maintain winter food and cover complexes within a 2-mile radius of reproductive cover.

Action 1. Promote development of 500 winter food and cover complexes.

Action 2. Encourage enhancement of inadequate winter food and cover complexes.

Action 3. Encourage removal of woody cover (e.g., volunteer trees) that causes negative impacts (e.g., increased predation risk) to an adjacent or surrounding grassland.

STRATEGY E. Support enforcement of regulations that protect critical winter habitats, such as Swampbuster and the Wetland Conservation Act.

STRATEGY F. Support changes in drainage laws to protect and restore wetland habitat.

PROBLEM 3. Commodity provisions of federal farm policy compete and conflict with conservation provisions.

STRATEGY A. Influence Congress and the U.S. Department of Agriculture to eliminate commodity program incentives that encourage conversion of resource-conserving crops (e.g., pasture, haylands) to resource-exploiting crops (e.g., row crops.

STRATEGY B. Influence Congress and the U.S. Department of Agriculture to maximize use of multiyear set-asides (3-5 year land retirement program requiring beneficial wildlife cover) and long-term retirement programs (e.g., CRP, CREP, WRP) so that critical habitat components can be established and managed for wildlife.

STRATEGY C. Continue to use Minnesota Pheasant Stamp revenues to influence good conservation in farm policy and programs.

STRATEGY D. Develop and distribute to the public and professional land management personnel clear and concise explanations of federal farm programs and their environmental effects.

PROBLEM 4. Effectiveness of pheasant management is limited by lack of information, public understanding, and dissemination of information.

STRATEGY A. Evaluate effects of specific management techniques and determine cost effectiveness.

STRATEGY B. Refine the model relating pheasant abundance to specific habitat features and distribute it to natural resource managers to guide management decisions.

STRATEGY C. Provide information to landowners, the public, and resource personnel on pheasant habitat needs.

Action 1. Host habitat training workshops for resource managers and landowners.

Action 2. Develop and distribute information through brochures, the DNR web site, and other media.

STRATEGY D. Improve the effectiveness of formulas used to allocate resource management funds (e.g., Pheasant Habitat Improvement Program (PHIP) allocation formula).

STRATEGY E. Monitor and evaluate the success of this plan.

Action 1. Monitor progress of the plan annually.

Action 2. Evaluate successes and failures of the plan at the mid-term and within 1 year of its expiration, and recommend appropriate changes in strategy.

PROBLEM 5. Efficiency of pheasant predators is excessively high in some landscapes, depending on landscape configuration.

STRATEGY A. Provide information on habitat configurations that reduce risk of predation to levels that allow pheasant populations to reach the habitat potential.

STRATEGY B. Monitor new research on predator ecology, and incorporate this information into pheasant management programs.

OBJECTIVE 2: Provide opportunity for 125,000 hunters to annually harvest 450,000 roosters.

PROBLEM 1. Demand for places to hunt exceeds supply.

STRATEGY A. Protect, acquire, maintain, and improve public hunting areas.

STRATEGY B. Encourage other public and private land managers to protect, acquire, maintain and improve hunting areas.

STRATEGY C. Explore development of a Walk-in Access Program.

Action 1. Implement a pilot project contingent upon new funding.

STRATEGY D. Continue to implement and promote programs to improve landowner/hunter relationships, hunter ethics, and compliance with trespass regulations (e.g., Advanced Hunter Education, Leopold Project).

STRATEGY E. Provide information to the public about hunting areas and

opportunities.

PROBLEM 2. Harvest opportunities are limited by current hunting regulations.

STRATEGY A. Gain public support for regulations that more fully use the legislated bag limits and season framework.

STRATEGY B. Change existing hunting regulations to provide additional harvest opportunity (e.g., extended season and/or shooting hours, increased possession limits).

STRATEGY C. Encourage recruitment of new hunters by promoting activities such as special youth hunts.

PROBLEM 3. The lack of information on hunting and hunters reduces management effectiveness.

STRATEGY A. Design and implement hunter and landowner surveys to determine hunting pressure patterns, recreational opportunity, preferences, satisfaction, and knowledge of management.

STRATEGY B. Quantify the economic and recreational value of pheasants to support expanding pheasant management activities.

STRATEGY C. Obtain better estimates of harvest, recovery, and reporting rates, which are critical parameters for estimating pheasant population size.