The Relationship Between Composition of Undisturbed Grassland Cover and the Presence of the Ring-necked Pheasant (*Phasianus colchicus*) in Northern Ohio

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Abstract:
Pheasant research has largely looked at grassland habitat throughout the landscape as an indicator of suitability of ring-necked pheasant habitat. Empirical and anecdotal evidence shows that increased grasslands percentages has a positive affect on pheasant presence or abundance. This study examines the differences in grassland percentages in two study areas in Northern Ohio, Williams/Defiance and Erie/Ottawa/Sandusky, to suggest reasons for the lack of pheasant presence in the Erie, Ottawa, and Sandusky area. The results showed no significant difference between the mean grassland percentages in the two areas (α=0.05, d.f.=3, p=.1175), however in comparison to the literature and qualitatively there seems to be a difference. These results will be useful in habitat management recommendations in the area of Erie, Ottawa, and Sandusky counties.

Introduction

The ring-necked pheasant *(Phasianus colchicums)* is a North American exotic gamebird introduced from China and Europe to North America during the late 19th and early 20th century. Pheasant numbers increased throughout the agricultural landscape of Ohio through private and state introductions (Harmon 1986). Pheasants are commonly found today in the rural countryside, but lack of suitable habitat in some areas has caused their failed establishment (Peterjohn 1989). Pheasants reached their highest level of abundance in Ohio from 1936 to 1947 (Leedy and Hendershot 1947) and ranged from western Ohio, as far east as Ottawa county and south to Marion county. Wood County, in northern Ohio reported 480 pheasants per km^2 in 1940 (Leite 1971).

Changes in the agricultural industry are a serious limitation to population growth in most regions (Giudance and Ratti 2001). Similarly, Farris and Cole (1981) concluded the indicators of farmland wildlife habitat change are a direct result of urbanization of

agriculture land, larger farm size, changes in types of crops planted, and the loss of fence row, idle land, and wetland habitats. The landscape changed from seed production and legumes, which remained undisturbed through the pheasant nesting season to row-crop monoculture during 1940-1967 (Harmon 1986). Drought and depression, commercial fertilizer application, hybrid corn use, and pesticide use became widespread during the 1930's - 1950's. Furthermore, changes in wetland drainage and conversion to tillable acreage played a role in the decline of pheasant populations (Harmon 1986).

Throughout the country our once sustainable pheasant populations began to see a decline. Similar to most states in the ring-necked pheasant range, Ohio's pheasant population declined, but to a greater extent. During 1960 and 1979, the population declined 96% in Ohio (Farris and Cole 1981). The majority of the states felt that the long-term trend of pheasant population levels would continue to be static or declining, subject to the well-known fluctuations of pheasant numbers (MacMullan 1961).

The raising and releasing of hand-reared birds was the primary means of management for ring-necked pheasant populations in the past. Although pheasant releases are still used during the fall hunting to sustain wild populations through the fall hunting season (Hill and Robertson 1988), survival rates are too low to establish a breeding population. Emphasis was put into research and management after low survival was determined for the state and local hand reared releases.

The Ohio Division of Wildlife manages wildlife areas for grassland habitat and cooperates with landowners and conservation organizations to establish quality nesting habitat within the pheasants range in Ohio (Ohio Department of Natural Resources Pub 92). Management for the ring-necked pheasant habitat is difficult in Ohio due to the large

production farms. MacMullan (1961) generalizes the problem as differences in revenue of planting corn and raising pheasants. A land manager will likely plant corn in that acreage because of the money. Farm bill programs such as the Conservation Reserve Program (CRP), Conservation Reserve Enhancement Program (CREP), and Wetland Reserve Program (WRP) have provided money for farmers to established large tracts of grasslands, wetlands, and buffers. Soil and water conservation goals may be integrated to meet wildlife habitat initiative goals (Warner and Etter 1985). Gates and Ostrom (1966) found that soil bank programs lands (59%), similar to our CRP lands of today, had better hatching success than other covers (26%) in Wisconsin. In the past, set aside lands were thought to ignore management and pheasant habitat needs (Gates and Ostrom 1966). Recently, management for wildlife has been highly considered in the management of these lands. A new mid-term management has come into effect with regards to these retired lands remaining good habitat. Mid-term management is required portion of CRP signups at the middle of their contract where clients are required to perform activities such as thinning, forb establishment, or control of unwanted vegetation to keep their grassland in proper structure and function to benefit wildlife. Starting a pheasant population may be done by a fairly new trap and transfer of wild hens used to establish a population in areas that have habitat to sustain them.

Despite considerable efforts to implementing and managing grassland habitat throughout Northern Ohio, ring-necked pheasant populations have not responded in Erie, Ottawa, and Sandusky counties. The purpose of the study is to compare reasons why pheasants are not occupying areas that have had considerable grassland establishment and how do areas in Erie, Ottawa, and Sandusky county sites differ from sites in Williams

and Defiance counties in Northwest Ohio that consist of higher densities of pheasants. I hypothesized that the lack of grasslands within the landscape has a negative affect on the presence of pheasants within Erie, Ottawa, and Sandusky counties. In order to find the reasons that might be affecting population numbers, several objectives will be met:

1.) Determine the presence of pheasants on both Northern Ohio study sites.

2.) Compare relative amounts of land-use cover

3.) Compare overall distribution of grassland cover

5.) Make habitat management recommendations for Erie, Ottawa, and Sandusky counties

This project will allow for measurement of land use coverage to help determine suitable habitat for future possible trap and transfer projects with the ring-necked pheasant in Ohio. We will have an understanding of factors and habitat that might be limiting pheasant presence in Erie, Ottawa, and Sandusky counties.

Methods

Study Area

The study took place in two study areas in northern Ohio, one encompassing Williams and Defiance counties believed to have pheasants present and the other covering Erie, Ottawa, and Sandusky counties without the presence of pheasants (Figure 1 & 2). Land use on both areas is dominated by intensive agriculture, with areas of Federal farm program, CRP (Conservation Reserve Program) and WRP (Wetland Reserve Program) lands spaced throughout.

Pheasant Surveys

Pheasant call count survey data collected from 2001 to 2005 by Division of wildlife personnel shows the distribution and densities across Ohio's glaciated region.

Each year one survey consisting 58 routes were conducted from April 23 to May 15. Pheasant abundance was determined by the number of pheasants recorded per stop (Kimball 1949).

Breeding bird survey (BBS) data from 2000 to 2006 was also looked at to determine a difference in birds recorded on particular stops on the BBS routes within the two study areas. The abundance was then compared using a two sample t-test.

Study sites

Four sites were chosen from Erie, Ottawa, and Sandusky, as well as from William and Defiance counties that were predominantly private land (Figure 3 & 4). The size of each site was approximately 2,500 ha. Similarly, Gates and Hale (1974) suggest as a minimum of a 2331 ha area to support a viable population. The process of laying out sites in Erie, Ottawa, and Sandusky counties included determining the townships that with the highest potential for grassland habitat. This was done through communication with the local Division of Wildlife, Wildlife Specialist and National Land Coverage Database (NLCD) coverage. Further communication with the local Wildlife Specialist in each county soil and water office was used to determine what townships they believe had the most grassland program establishments. They are knowledgeable about the townships containing the a majority of the acres currently enrolled in conservation programs, due to their involvement in writing the management plans and establishment of the native grasses within the county. Grassland habitat was then mapped out in the chosen townships for every contracted plot of land that went into the conservation programs of CRP, CREP, and WHIP dating back 10 years. This required the use of printed aerial photographs of the townships to transfer the grassland areas from tract

photos obtained from the local NRCS offices. Sites were then chosen based on visual analysis of the areas of concentrated grassland acres. These sites are meant to represent the areas with the greatest amount of undisturbed grassland cover and therefore the most potential for pheasant numbers in the area. The areas outside the sites chosen had minimal grasslands with greater isolation.

The four sites selected in Williams and Defiance counties were determined through the presence of pheasants on a recent call count survey on 2006. The survey was conducted by Division of Wildlife personnel and occurred on pre-existing quail count survey routes. Stops that pheasants were recorded were contained within my four sites in Williams and Defiance counties (Figure 6). Grassland areas within the sites were recorded through driving the roads and marking the grassland fields on printed aerial photos of the areas.

Land Use Cover Mapping and Analysis

Next, percent cover types were determined within each site in Erie, Ottawa, and Sandusky, as well as Williams and Defiance. Grassland tracts from each site were layed out in Arcview GIS. Cover types were determined from the grasslands and GAP land coverage of the sites. The major cover types compared include undisturbed grasslands, cropland, forest, herbaceous and woody wetland, and development. Percentages of each land cover were determined for each site to see abundance of each. Percent grassland cover in Erie, Ottawa, and Sandusky county sites were compared to the sites in Williams and Defiance counties using a simple T-test. In other studies, undisturbed grassland cover and wetland herbaceous have been found to have a positive relationship with presence of pheasants, while cropland and woody cover is thought to have a negative relationship to

their presence. Landscapes that contained a higher proportion of grasslands found a higher survival hen presence of hens. A lower ratio of linear edge to landscape area was found to have higher survival (Schmitz and Clark 1996).

Finally, factors were examined that differ between the sites with pheasants and those without. My results are not conclusive, but rather indictors of what might be limiting pheasant presence in Erie, Ottawa, and Sandusky counties.

Results

Pheasant numbers that were heard on the breeding bird survey routes within Erie, Ottawa, and Sandusky counties totaled 3 birds since the year 2000. The numbers of birds heard in Williams and Defiance counties since 2000 totaled 38 birds.

Land coverage composition in all eight focus areas was dominated by row crops. Additional major land uses quantified were grassland, water, urban, herbaceous wetland, forest, forested wetland, and other (Figure 3 & 4). Mean grassland percentages for the two areas were analyzed through the use of a two sample t-test with unequal variance and found to not be statistically different from zero (Figure 5, α=0.05, d.f.=3, p=.1175). There was no assumption of equal variance, therefore the variance was determined not to be homogeneous (α=0.05).

Discussion

Comparisons of habitat in an area needed to be validated by first determining if there was a difference in pheasant abundance within the to areas of interest. The breeding bird survey data validates that there is a difference in numbers. The call count surveys speculate to the abundance in the varying areas. There seems to be that there is presence of pheasants on the Erie, Ottawa, and Sandusky areas but minimal. From this

point, I looked at grassland composition as a possible reason for the differences in bird abundance.

The shortage of grassland cover type is a major limiting factor for the establishment of pheasant (MacMullan 1961). Although there was no statistical difference in grassland percentages between the areas of Williams and Defiance counties and Erie, Ottawa, and Sandusky counties, I believe that there is a qualitative difference when compared to current literature. The area of Williams and Defiance counties sites had a mean grassland percentage of 20.5%. For optimal nesting and brood rearing habitat 30-50% of the management unit is highly suggested (Meyer 1987). Although the percentages of grasslands in the areas where pheasants occur have less than this, it is more than the mean grassland percentages from the sites in Erie, Ottawa, and Sandusky counties. Dunning et al. (1992) simulations found that large amounts of grasslands (>26% of landscape) affected habitat selection as well as survival. Although Gates and Hale (1975) in Wisconsin put the minimum brood rearing and nesting cover at 5% of management unit, they also mention that reproductive success will increase with greater breeding habitat. Farris et al. (1977) showed significantly lower pheasant numbers in landscapes with <15% (~864acres of MU) undisturbed grass cover. Size and percent of land cover changes from state to state, but in general the acres of winter cover and nesting habitat provide an idea of optimal percentages within the landscape.

Other landscape characteristics might be co-factors in the lack of abundance of pheasants in an area. Robertson (1995) stated in North America, considerable research emphasis has been placed on pheasant behavior and habitat selection during the nesting season. Although provision of nesting cover is the most widely used management

technique, it may not increase local breeding densities, but rather increases productivity (Robertson 1995). Throughout numerous studies, idle herbaceous cover (Wilson and Drobney 1990, Leif 2005, Labisky 1968, Trautman 1982, Riley et al. 1998, Gates and Hale 1974), alfalfa fields (Hanson and Progulske 1973), strip vegetation (Haensy et al 1987,), woody habitat (Robertson 1995, Leif 2005), and wetlands (Gatti et al. 1989), have all been used by pheasants. Meyer (et al. 1988) lists the cover types having the greatest pheasant abundance as first, residual vegetation (strip cover, idle areas and dry wetlands) then second, dense new vegetation (hayfields). Alfalfa fields serve as nesting grounds (Hanson and Progulske 1973), but provide minimal cover during March and April (Leif 2005). Hay fields have low nest success due to mowing during the nesting season (Meyer et al. 1988, Leedy and Hendershot 1947, Kimball 1926).

Leif (2005) states whether woody or herbaceous, some type of cover with vertical structure is necessary to conceal pheasants from predators and provide escape habitat if detected. Loper (2005) found that woody cover was negatively correlated with presence of pheasants. Among all of the cover requirements, nesting cover is probably the most important (MacMullan 1961). Although hens may use and nest in hay, other small grain crops, strip vegetation, or woody areas the success may be less due to mowing, harvest, or predation. Gates and Ostrom (1966) found that their pheasant populations depend on wetland cover (idle lowlands) for nesting and unharvested hayfields in Wisconsin. Residual cover, associated with unharvested stands between growing seasons, may be responsible for the increased nesting use (Gates and Ostrum 1966). Although idle fields may be the optimal place to nest, many hens nest in strip cover. A study in Oregon found that nest density in strip vegetation well exceeded the density in non-strip habitat (53/100

ha – strip, 6/100 ha – non strip) (Haensly et al. 1987). Though the strip vegetation was the preferred nesting habitat in Oregon, the success rates almost half that of non strip habitat, and predation was little more than 3X that of non strip habitat (Haensly et al. 1987).

Time of the year plays a critical role in cover type. Warm season grasses, with their rigid stems, provide good winter cover (Leif 2005), but cool-season grasslands might be better food sources for broods than warm season (Eggebo 2001, Trautman 1982, Leif 2005). Hull (2003) found that all nests were found in timothy (*Phleum pretence L.*) fields rather than in mono-cultured switchgrass (*Panicum virgatum*) fields in central Ohio. Historically, Timothy and orchard grass plantings were thought to be less desirable due to the lack of the flower component (Frank and Woehler 1969). Recent plantings of these cool season grasses have added a forb mix to the grass mix. A diverse stand may be more suitable to a pheasant chick, because of the possible diversity of bugs throughout the season allowing for substitutions. Leif (2005) states although levels of benefits may differ, both warm and cool season grasses meet similar pheasant habitat requirements and managers will be most effective by establishing fields of both types within management units.

There is much to be known about the composition and configuration of habitat structures in relation to the feasibility of ring-necked pheasants in Ohio. Many hunters and wildlife watchers appreciate seeing the pheasant in Ohio. There is no doubt that number have declined in recent years. Pheasant populations stabilized around 1985 when the CRP program was initiated increasing undisturbed grassland on the landscape (Sauer et al. 1999).

Management Implication

Management recommendations for increasing the percentage the grasslands within Ohio would be to use the federal farm bill programs and other avenues. Although adding percentage of quality habitat to the landscape can increase population, studies in Iowa found that a 2-12% increase of grassland in the landscape had no effect on the population if grasslands were in small patches with lots of edge (Schmitz and Clark 1996). Therefore, large blocks of undisturbed grassland cover would be helpful in the survival of the pheasants present in both areas. Use of several farm bill programs within the area may help with monetary costs, such as the Lake Erie CREP program and the general CRP signup.

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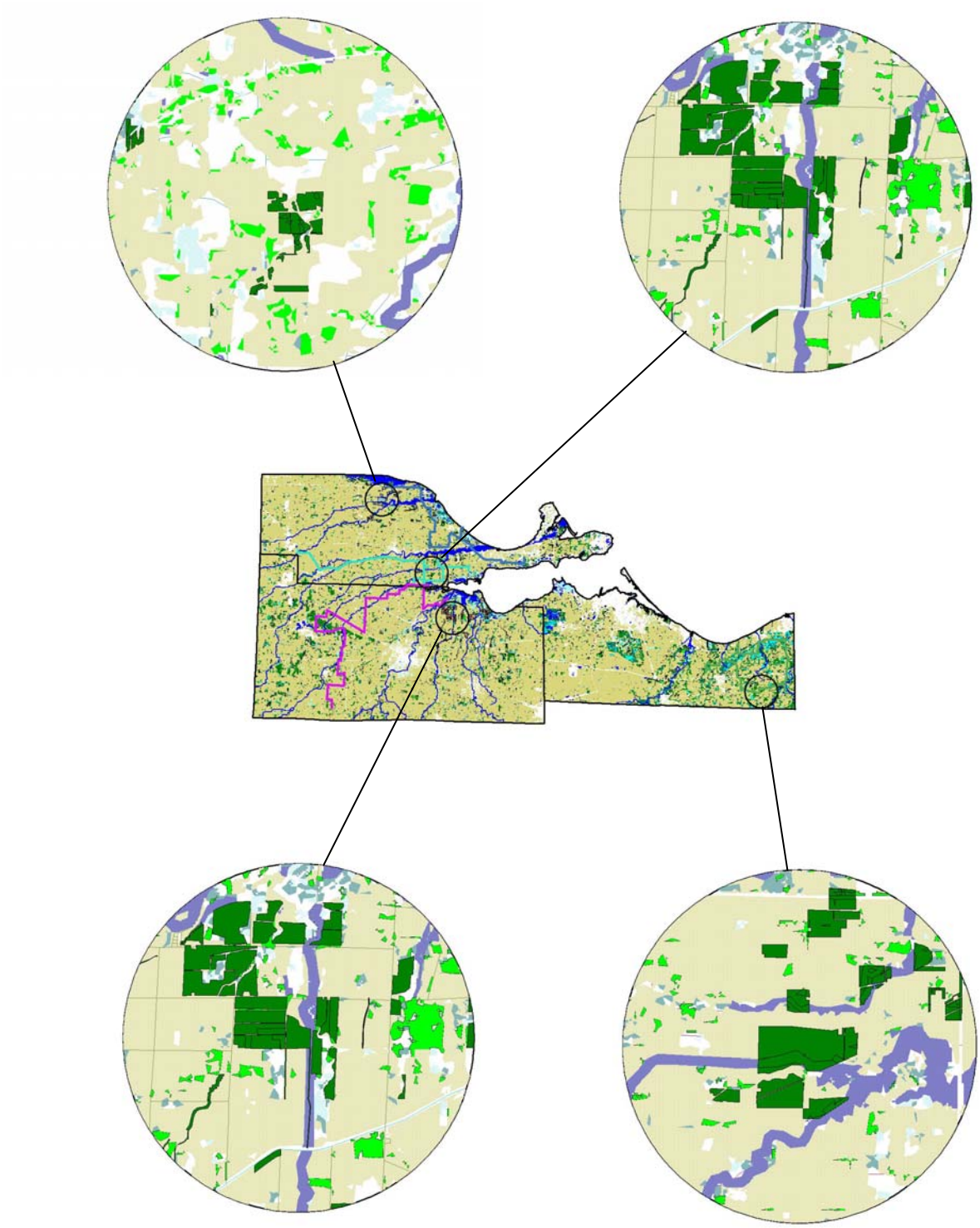
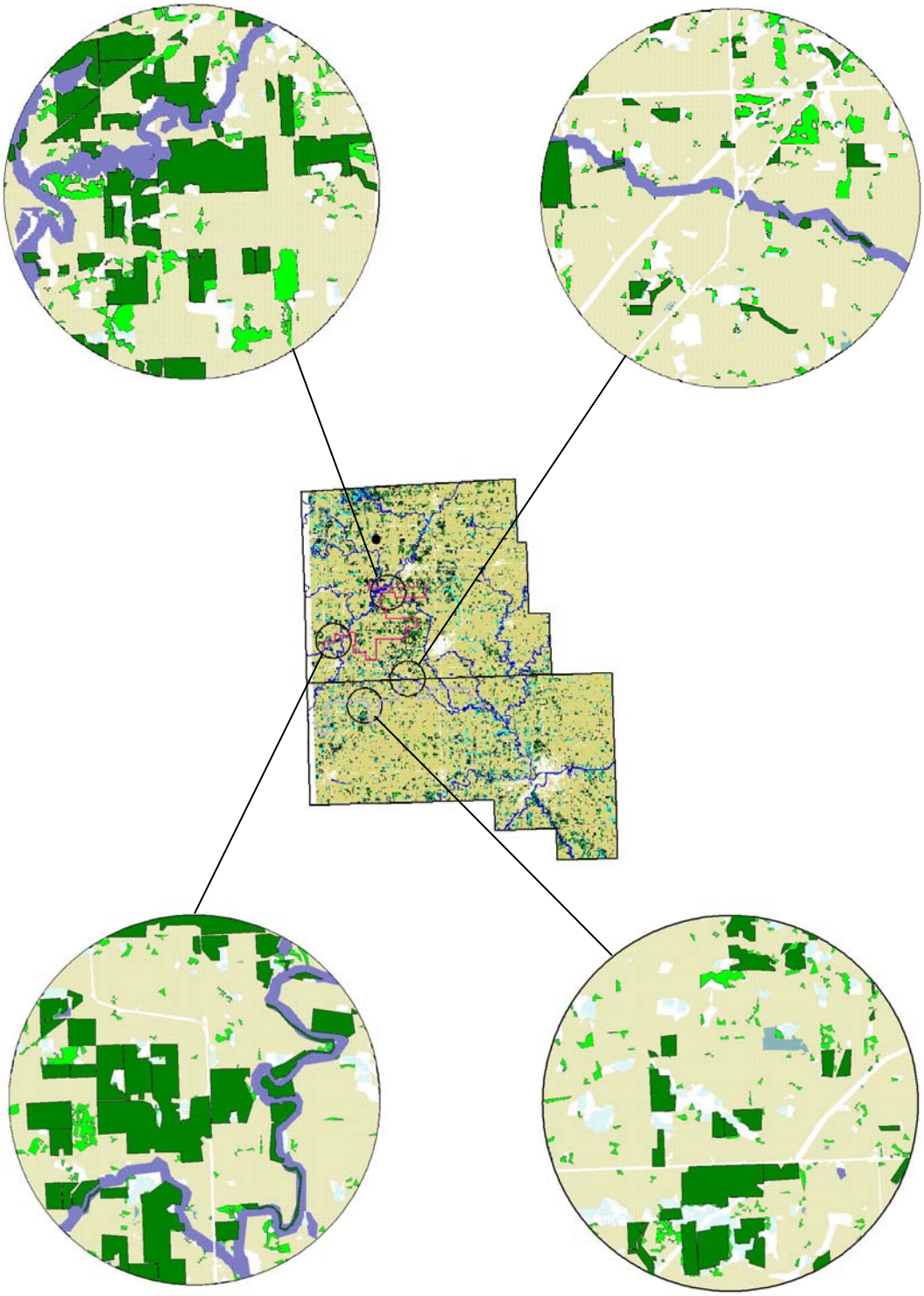
Focus 1





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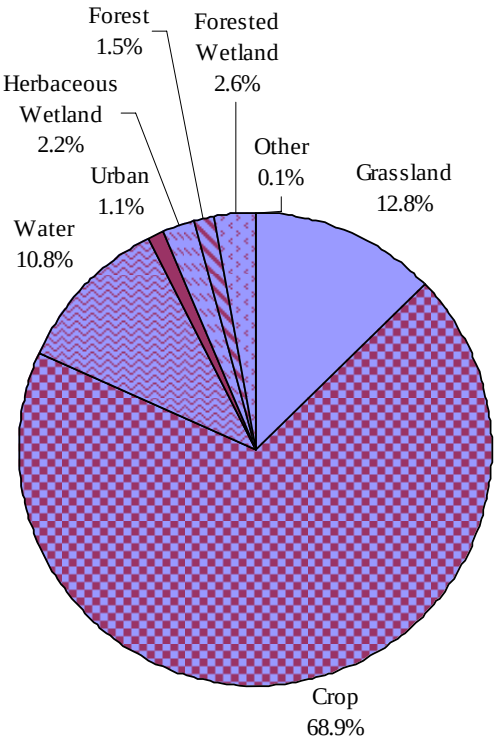

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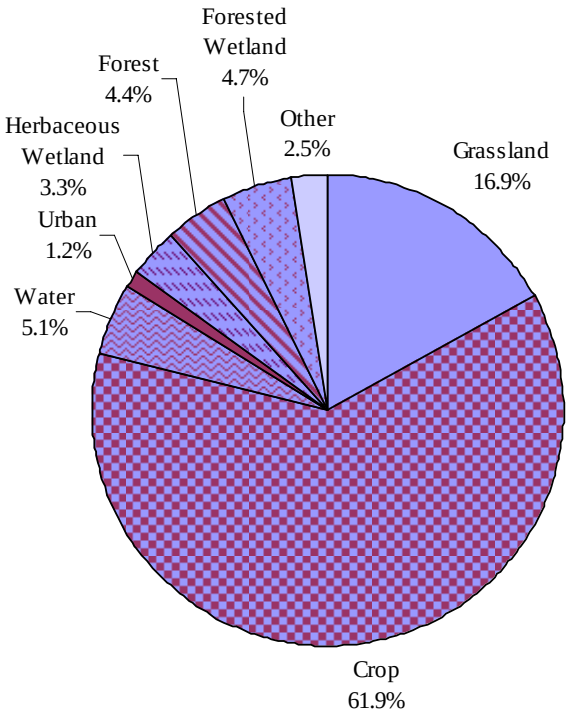

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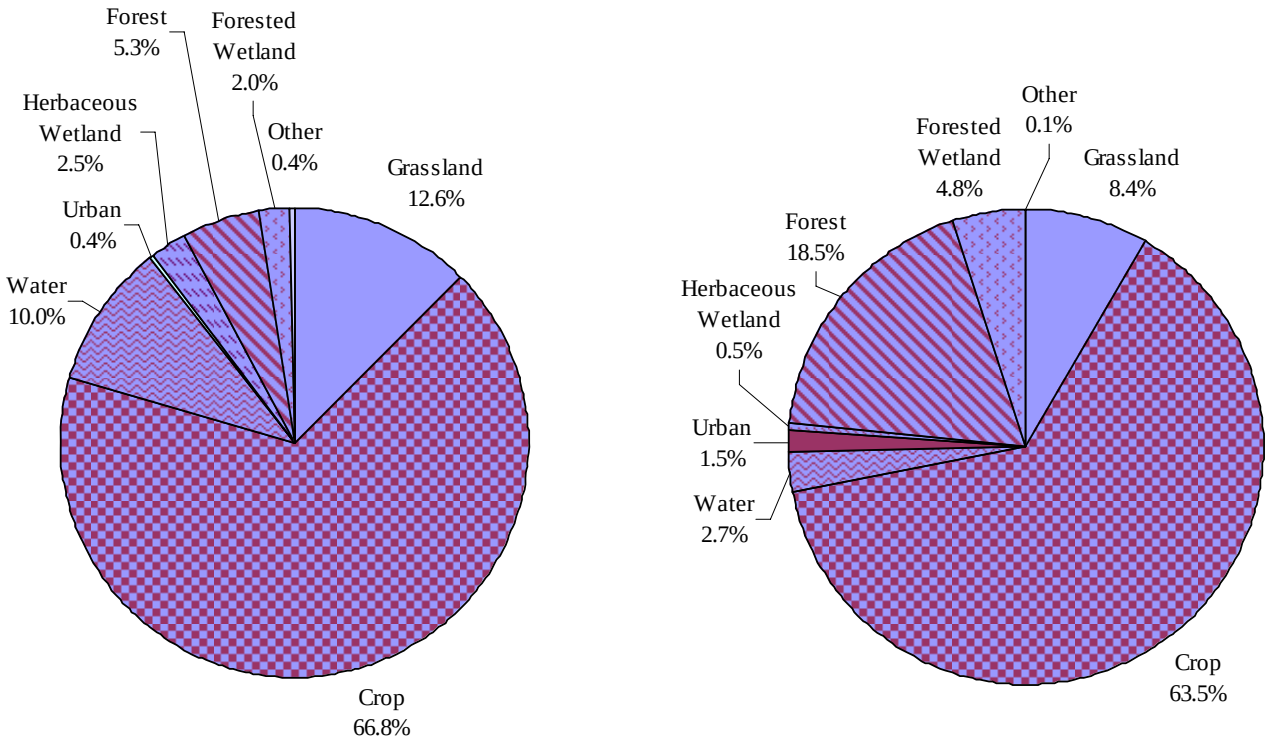
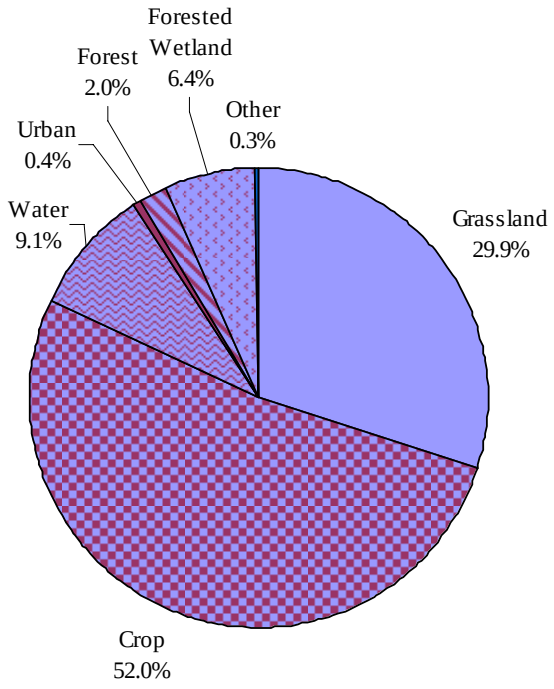


Figure 3: GAP coverage comparisons of the habitat composition within plots located in the area of Erie, Ottawa, and Sandusky counties in northern Ohio.

Focus 4



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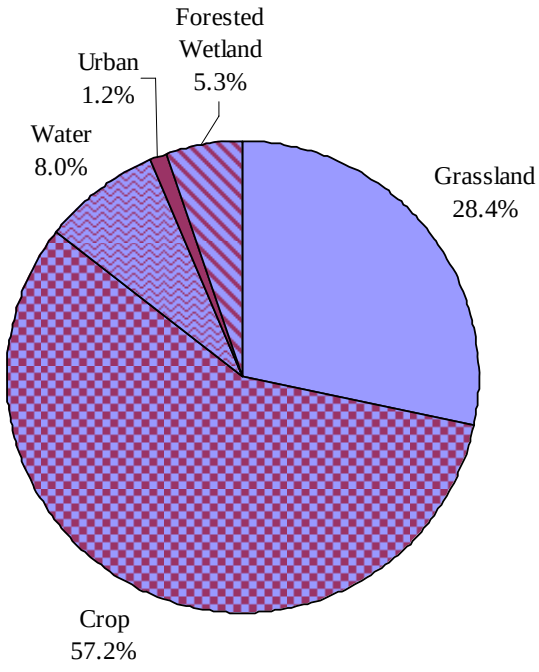

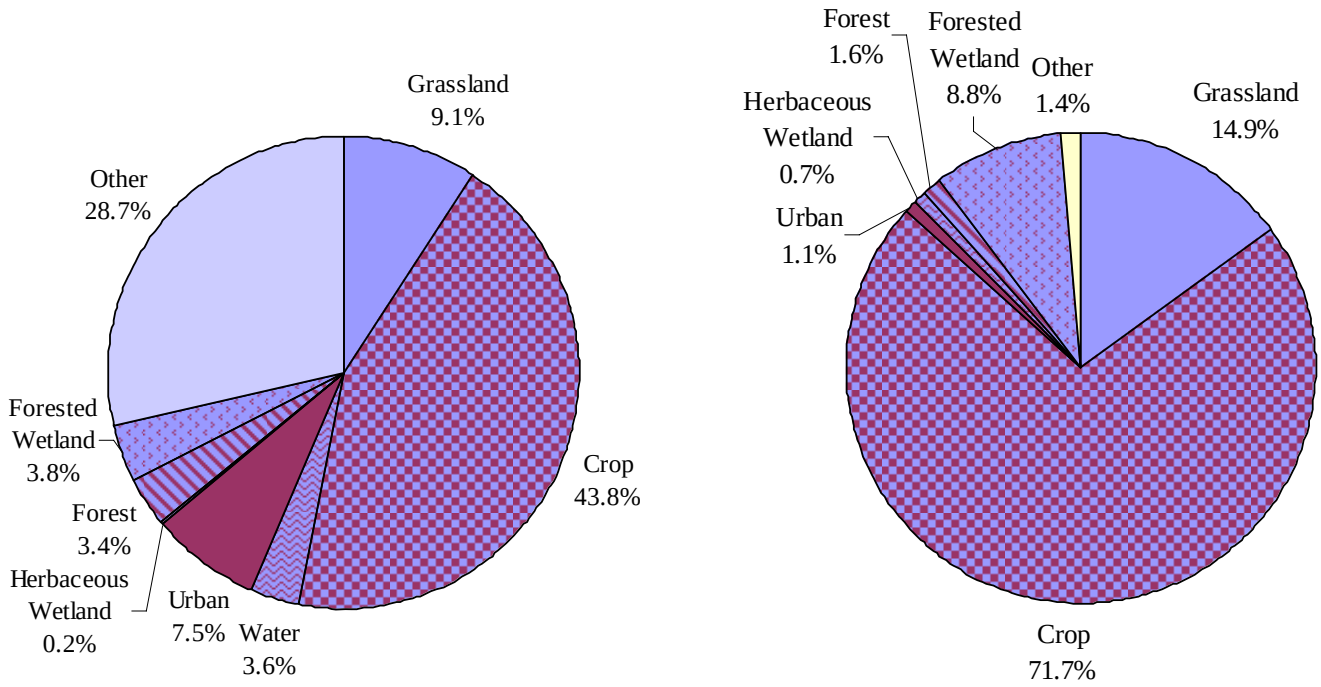

Figure 4: GAP coverage comparisons of the habitat composition within plots located in the area of Williams and Defiance counties in northern Ohio.

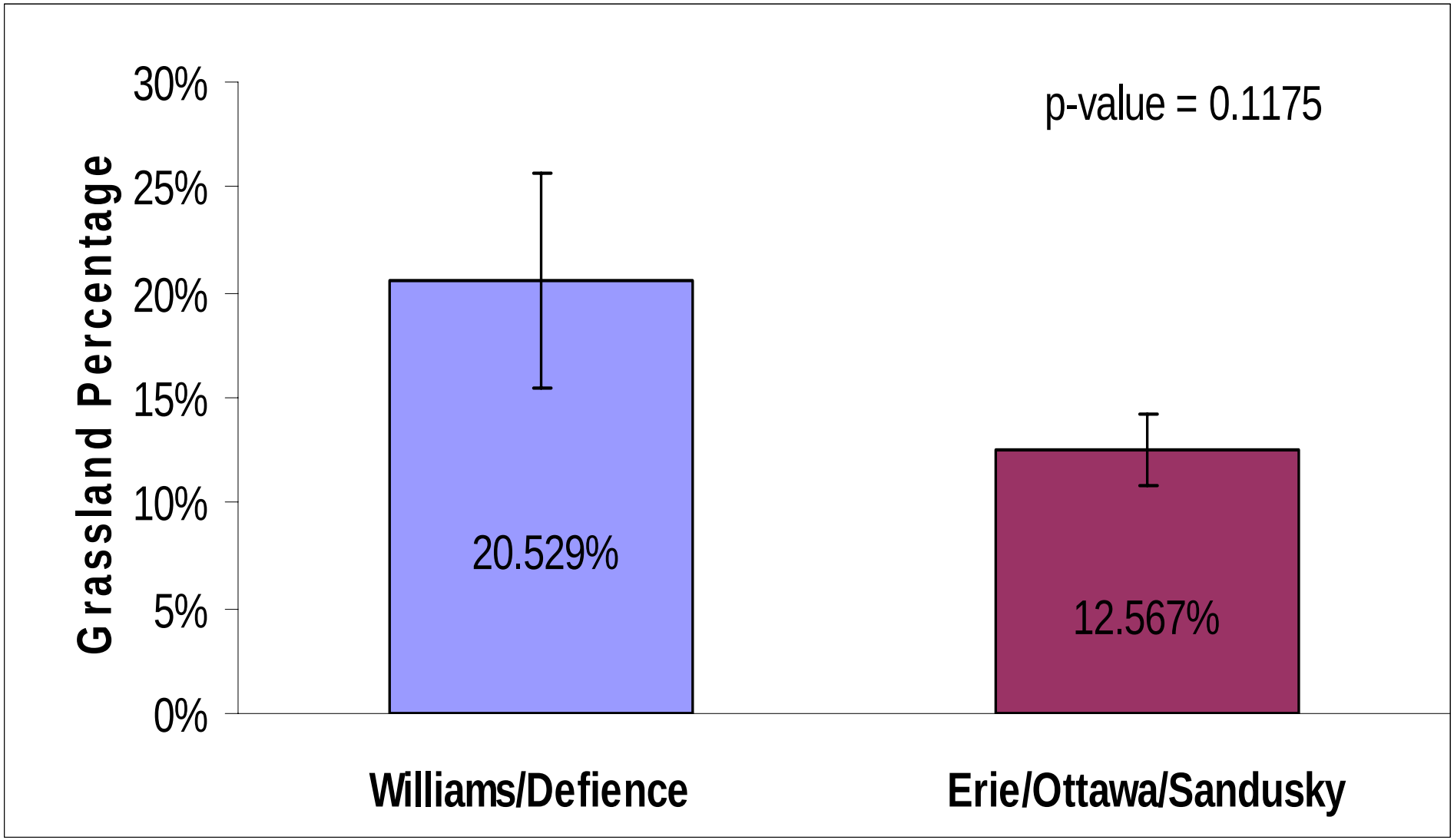

Figure 5. Mean grassland percent comparisons and errors between the areas of Williams and Defiance counties and Erie, Ottawa, and Sandusky counties in northern Ohio, using GAP land coverage and additional farm bill program lands.