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THE FEASIBILITY OF RESTORING RUFFED GROUSE INTO ILLINOIS

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THE FEASIBILITY OF RESTORING RUFFED GROUSE INTO ILLINOIS

FINAL REPORT

Federal Aid Project W-140-R-3

Submitted by:

Cooperative Wildlife Research Laboratory, SIUC

Presented to:

**Division of Wildlife Resources
Illinois Department of Natural Resources**

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Thesis - Adams 2003

FINAL REPORT

STATE OF ILLINOIS

W-140-R (1-3)

Project Period: 1 July 2000 through 30 June 2003

Project: The Feasibility of Restoring Ruffed Grouse into Illinois

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NEED: Very specific habitat requirements have limited the success of past efforts by the Illinois Department of Natural Resources to reestablish viable populations of ruffed grouse (*Bonasa umbellus*) in Illinois. In addition, disturbance factors and management practices that create ruffed grouse habitat have been greatly reduced or restricted. Therefore, statewide analysis of current and future potential ruffed grouse habitat is essential to evaluate feasibility of future reintroduction efforts.

OBJECTIVES:

1. To review the specific habitat (nesting, brood rearing, drumming, foraging, etc.) requirements of ruffed grouse and evaluate relative area, interspersion, juxtaposition, and connectivity of cover types required to support viable populations of grouse and allow for dispersal/range expansion.
2. Use digital geographic/land cover data to construct a Geographic Information System (GIS)-based model of available ruffed grouse habitat in Illinois for more in-depth screening of potentially suitable habitats.
3. Evaluate, via ground verification, whether the existing geographic/land cover data are of high enough resolution to adequately detect specific grouse habitat components (e.g., forest stand age, structure, and size), and to propose changes or alternate methods to circumvent deficiencies in this methodology.
4. Evaluate current and future timber management practice on areas identified as suitable grouse habitat relative to supporting ruffed grouse populations into the future.
5. Provide recommendations on the feasibility of ruffed grouse reintroduction in Illinois.

EXECUTIVE SUMMARY

Job 1.1. Review Habitat Requirements

The objective of this job was to review the specific habitat (nesting, brood rearing, drumming, foraging, etc.) requirements of ruffed grouse and evaluate relative area, interspersions, juxtaposition, and connectivity of cover types required to support viable populations of grouse and allow for dispersal/range expansion. A literature review summarizing findings from this job is incorporated in a thesis (Adams 2003) appended to this final report.

Job 1.2. Model Potential Grouse Habitat

The objective was to use digital geographic/land cover data to construct a Geographic Information System-based model of available ruffed grouse habitat in Illinois for more in-depth screening of potentially suitable habitats. Digital land cover data, published information on the habitat use and requirements of ruffed grouse, and a landscape-level evaluation of the range of ruffed grouse in Indiana were used to create a general model to accommodate ecological differences across Illinois; spatial extent and configuration of forested land was a primary consideration.

The largest block of potential habitat identified was 19,544 km² within the 18 county southern Illinois region. A 14,150 km² area encompassing 9 counties in west-central Illinois, and 3 individual northern Illinois counties (Jo Daviess, Lake, and Rock Island) also included potential habitat. Details of the habitat model construction, results, and application are presented in the attached thesis by Adams (2003).

Job 1.3. Evaluate Resolution of Existing Data

The objective of this job was to evaluate, via ground verification, whether the existing geographic/land cover data are of high enough resolution to adequately detect specific grouse habitat components (e.g., forest stand age, structure, and size), and to propose changes or alternate methods to circumvent deficiencies in this methodology. Our evaluations confirmed

that existing geographic/land cover data lack resolution to detect specific grouse habitat components. Other means explored were not practical to reliably and efficiently incorporate into a wide scale model.

Job 1.4. Evaluate Timber Management Practices

The objective was to evaluate current and future timber management practices on areas identified as suitable grouse habitat relative to supporting ruffed grouse populations into the future. Eighty-two percent of Illinois' forests are owned by individuals (Schmidt et al. 2000); unfortunately, <1% of these forests are >200 ha (Bretthauer and Edgington 2002). As the average size of forest tracts decrease, so do opportunities for coordinated management (Trani et al. 2001). Furthermore, even under the most optimistic criteria, all patches identified by our habitat model as being large enough (2,100 ha) to support a viable grouse population occur on public lands. The largest parcels of potential habitat as identified in Job 1.2 are owned by the Shawnee National Forest (SNF) where as a result of litigation and court injunctions, no significant timber harvest has occurred since 1993. Thus production and maintenance of the ephemeral early forest succession habitat on which ruffed grouse depend has all but ceased in SNF and there is no indication these management constraints are likely to change.

Job 1.5. Analysis and Report

The objective was to provide recommendations on the feasibility of ruffed grouse reintroduction in Illinois. We used a combined population viability analysis/GIS approach to examine feasibility of reintroductions. Only 1 of 3 models resulted in a minimum viable population, but the population parameter set in that model was too optimistic for Illinois grouse habitat. Given the low predicted viability of ruffed grouse in Illinois and the current and foreseeable forest-wide restrictions on timber harvest in SNF, we believe that successful grouse reintroductions are unlikely.

LITERATURE CITED

- Adams, D. W. 2003. A habitat-based viability study for ruffed grouse (*Bonasa umbellus*) in Illinois. Thesis, Southern Illinois University, Carbondale, USA.
- Bretthauer, S. M., and J. M. Edgington. 2002. The forest resources of Illinois: 2002. Department of Natural Resources and Environmental Sciences, University of Illinois, Urbana, USA.
- Schmidt, T. L., M. H. Hansen, and J. A. Solomakos. 2000. Illinois' forests in 1998. U.S. Forest Service, North Central Forest Experiment Station Bulletin NC-198.
- Trani, M. K., R. T. Brooks, T. L. Schmidt, V. A. Rudis, and C. M. Gabbard. 2001. Patterns and trends of early successional forests in the eastern United States. Wildlife Society Bulletin 29:413-424.

STUDY 1. THE FEASIBILITY OF RESTORING RUFFED GROUSE INTO ILLINOIS

Problem: Past efforts by the Illinois Department of Natural Resources to reestablish viable populations of ruffed grouse (*Bonasa umbellus*) in Illinois have not succeeded, presumably due to habitat limitations. Further, disturbance factors and management practices that create ruffed grouse habitat have been greatly reduced or restricted. Therefore, statewide analysis of current and future potential ruffed grouse habitat is essential to evaluate feasibility of future reintroduction efforts.

Objectives:

1. Review the specific habitat (nesting, brood rearing, drumming, foraging, etc.) requirements of ruffed grouse and evaluate relative area, interspersions, juxtaposition, and connectivity of cover types required to support viable populations of grouse and allow for dispersal/range expansion.
2. Use digital geographic/land cover data to construct a Geographic Information System (GIS)-based model of available ruffed grouse habitat in Illinois for more in-depth screening of potentially suitable habitats.
3. Evaluate, via ground verification, whether the existing geographic/land cover data are of high enough resolution to adequately detect specific grouse habitat components (e.g., forest stand age, structure, and size), and to propose changes or alternate methods to circumvent deficiencies in this methodology.
4. Evaluate current and future timber management practice on areas identified as suitable grouse habitat relative to supporting ruffed grouse populations into the future.
5. Provide recommendations on the feasibility of ruffed grouse reintroduction in Illinois.

JOB 1.1. REVIEW HABITAT REQUIREMENTS

Objective: Review the specific habitat (nesting, brood rearing, drumming, foraging, etc.) requirements of ruffed grouse and evaluate relative area, interspersions, juxtaposition, and connectivity of cover types required to support viable populations of grouse and allow for dispersal/range expansion.

A thesis by Adams (2003) that includes a literature cited section that fulfills the objective for this job is appended to this report.

JOB 1.2. MODEL POTENTIAL GROUSE HABITAT

Objective: Use digital geographic/land cover data to construct a Geographic Information System (GIS)-based model of available ruffed grouse habitat in Illinois for more in-depth screening of potentially suitable habitats.

Assessment of potential habitat in Illinois was based on existing digital land cover data, published information on the habitat use and requirements of ruffed grouse, and a landscape-level evaluation of the range of ruffed grouse in Indiana. Given the scale of assessment, the model was general to accommodate ecological differences across Illinois. This allowed for rapid, reliable assessment with results that could broadly identify potential habitat. The spatial extent and configuration of forested land was a primary consideration.

Application of model criteria eliminated 74% of Illinois from consideration as potential habitat. The largest block of potential habitat identified was 19,544 km² within the 18 county southern Illinois region. A 14,150 km² region encompassing 9 counties in west-central Illinois and 3 individual northern Illinois counties (Jo Daviess, Lake, and Rock Island) also included potential habitat. Details of the habitat model construction, results, and application are presented in the attached thesis by Adams (2003).

JOB 1.3. EVALUATE RESOLUTION OF EXISTING DATA

Objective: Evaluate, via ground verification, whether the existing geographic/land cover data are of high enough resolution to adequately detect specific grouse habitat components (e.g., forest stand age, structure, and size), and to propose changes or alternate methods to circumvent deficiencies in this methodology.

INTRODUCTION

The need to assess large geographic areas precluded the direct measurement of vegetative structure (e.g., woody stem density) in developing and applying a habitat model (Job 1.2) and these important characteristics are generally not discernible from remotely sensed data (Roseberry and Sudkamp 1998). On a state-wide scale, practicality dictates that such components be inferred from other conditions (e.g., forest stand age, proximity to high contrast

edge). For example, the high stem densities required by adult ruffed grouse are most reliably found in hardwood forest stands 7-15 years of age. In order to incorporate stem density into a wide scale model, an efficient and reliable method must be found to assess the extent and spatial distribution of young forest stands on a study area.

METHODS

We conducted site visits, aerial reconnaissance, and reviewed aerial photographs to investigate their potential to assess extent and distribution of desired habitat components. Timber harvest records and stand maps also were sought and examined. Finally, we reviewed availability and application of digital stand maps that might be suitable for direct importation into a GIS and overlaid on the map generated in Job 1.2.

RESULTS

The National Land Cover Data set (U.S. Geological Survey 2000) used in the habitat model (Job 1.2) includes a shrub class and a transitional barren class which can indicate recent clearcuts among other conditions. Although these classes would seem to indicate the potential presence of early successional forest, they were not explicitly included as variables due to the scarcity of the shrub class (151 ha total in modeled counties, all in Lake County) and the difficulties encountered in classifying the transitional barren class (described in the metadata, U.S. Geological Survey 2000). Recent site visits to the 1982 grouse release areas revealed variability in the composition and structure of the understory that was not discernible from the land cover data set used in Job 1.2. We concluded that collection of timber harvest records could not efficiently assess large areas under multiple ownership due to differences in record keeping practices among landowners (Charles Ruffner, SIUC Department of Forestry, personal communication). Further, harvest alone will not account for other potential sources of early successional habitat (e.g., old field succession, maintained wildlife openings). Finally, digitized timber stand maps and data were not available for the Shawnee National Forest (SNF) or other public forest lands precluding their use to infer stem density from stand composition and age.

CONCLUSION

We concluded as did others (Roseberry and Sudkamp 1998) that existing data did lack resolution to adequately detect specific grouse habitat components such as stand age and structure. Further, alternative methods and data sets do not currently exist to improve model resolution at landscape and greater scales.

JOB 1.4. EVALUATE TIMBER MANAGEMENT PRACTICES

Objective: Evaluate current and future timber management practices on areas identified as suitable grouse habitat relative to supporting ruffed grouse populations into the future.

INTRODUCTION

Cover requirements and dispersal habits of ruffed grouse reflect their adaptation to dynamic forest systems. Wiggers et al. (1992) found that ruffed grouse were most abundant where the amount of disturbed (7-15 year old regeneration) habitat was >14%. Stoll et al. (1999) found a positive response (50-100% increase) in grouse abundance to small clearcuts (12 cuts averaging 5 ha each) that collectively affected 12% of one study area and a similar response on another where 18% was affected by more intensive management (twice as many smaller clearcuts). In oak forests managed for timber, an 80 year cutting rotation is often prescribed. This schedule maintains about 15% of the forest in ruffed grouse brood or adult cover (3-15 year old forest, Thompson and Dessecker (1997). Kurzejeski and Thompson (1999) believed that grouse numbers declined on the Daniel Boone Conservation Area and the Thomas S. Baskett Wildlife Education and Research Center in Missouri because even on the managed sites, young forest constituted <7% of the area. Researchers in other Midwestern states likewise blamed a lack of timber management for a decline in grouse populations since the mid-1980's (Mike Hubbard, Missouri Department of Conservation, personal communication; Steve Backs, Indiana Department of Natural Resources, personal communication). Given the necessity of young forests in maintaining populations of ruffed grouse, the locations that can be considered for reintroduction in Illinois are limited by ownership and potential for management. We considered

timber management potential when we characterized potential restoration sites identified in Job 1.2.

METHODS

We identified land ownership (federal, state, private) on the potential habitat map created in Job 1.2 and then determined current and future timber management practices. Agency personnel and foresters were to determine probable management alternatives and methods. We identified sites where a minimum level of future management could not be assured and eliminated such areas from consideration as potential grouse restoration sites.

RESULTS AND DISCUSSION

Eighty-two percent of Illinois' forests are owned by individuals (Schmidt et al. 2000); unfortunately, <1% of these forests are >200 ha (Bretthauer and Edgington 2002). As the average size of forest tracts decrease, so do opportunities for coordinated management (Trani et al. 2001). Furthermore, even under the most optimistic criteria, all patches identified by the habitat model as being large enough (2,100 ha) to support a viable grouse population occur on public lands. The largest parcels of potential habitat as identified in Job 1.2 are owned by SNF. As a result of litigation and court injunctions, no significant timber harvest has occurred in SNF since 1993. Thus production and maintenance of the ephemeral early forest succession habitat on which ruffed grouse depend has all but ceased in SNF and there is no indication these management constraints are likely to change.

JOB 1.5. ANALYSIS AND REPORT

Objective: Provide recommendations on the feasibility of ruffed grouse reintroduction in Illinois.

A thesis by Adams (2003) that includes a literature-cited section that fulfills the objective for this job is appended to this report; following is the abstract:

Attempts to reintroduce ruffed grouse into Illinois have met with very limited success. Releases in Missouri and Indiana have been extensive and were initially successful. However,

since the mid-1980's, these populations too have been in decline. To evaluate the feasibility of further reintroduction attempts in Illinois, I combined a matrix-based, stochastic population viability analysis (PVA) with a state-wide assessment of potential habitat. Three models were parameterized with low, medium, and high estimates for annual survival and fecundity for 1-year-old and 2+year-old age classes based on studies from across the range of ruffed grouse. The medium estimates represented the most reasonable values for Illinois. Neither the low nor the medium model resulted in a viable population (median time to extinction = 5.4 years and 12.9 years, respectively). Neither model was sensitive to estimates of environmental stochasticity, initial age distribution, or use of demographic stochasticity. The high model resulted in a minimum viable population (MVP) of just 10 females in an environment with a minimum capacity of 150, but this parameter set is too optimistic for the southern edge of the range of ruffed grouse. Even at the highest density reported for the lower Midwest (14 birds/100 ha), such a population would require a minimum of 2,100 ha of good habitat. Seven patches of potential habitat meeting this size criterion exist in parts of the Shawnee National Forest where timber cutting is not expressly forbidden by the current management plan. Three of the 7 patches contain enough exotic pine plantations to provide high quality habitat if the plantations could be replaced and managed as early successional hardwoods. Given the low expected viability of ruffed grouse in Illinois and the current forest-wide restrictions on timber harvest, a successful reintroduction in the foreseeable future seems unlikely. The benefits of a combined PVA/GIS approach as a tool in conservation decision making are discussed.

LITERATURE CITED

- Adams, D. W. 2003. A habitat-based viability study for ruffed grouse (*Bonasa umbellus*) in Illinois. Thesis, Southern Illinois University, Carbondale, USA.
- Bretthauer, S. M., and J. M. Edgington. 2002. The forest resources of Illinois: 2002. Department of Natural Resources and Environmental Sciences, University of Illinois, Urbana, USA.
- Kurzejeski, E. W., and F. R. Thompson. 1999. Ruffed grouse status, hunting, and response to management in Missouri. U.S. Department of Agriculture Research Paper NC 333.

- Roseberry, J. L., and S. D. Sudkamp. 1998. Assessing the suitability of landscapes for northern bobwhite. *Journal of Wildlife Management* 62:895-902.
- Schmidt, T. L., M. H. Hansen, and J. A. Solomakos. 2000. Illinois' forests in 1998. U.S. Forest Service, North Central Forest Experiment Station Bulletin NC-198.
- Stoll, R. J., W. L. Culbertson, M. W. McClain, R. W. Donohoe, and G. Honchul. 1999. Effects of clearcutting on ruffed grouse in Ohio's oak-hickory forests. *Ohio Fish and Wildlife Report* 14.
- Thompson, F. R., and D. R. Dessecker. 1997. Management of early successional communities in central hardwood forests. U.S. Forest Service, North Central Forest Experiment Station General Technical Report NC-195.
- Trani, M. K., R. T. Brooks, T. L. Schmidt, V. A. Rudis, and C. M. Gabbard. 2001. Patterns and trends of early successional forests in the eastern United States. *Wildlife Society Bulletin* 29:413-424.
- U.S. Geological Survey. 2000. National land cover data. U.S. Geological Survey, Sioux Falls, South Dakota, USA.
- Wiggers, E. P., M. K. Laubhan, and D. A. Hamilton. 1992. Forest structure associated with ruffed grouse abundance. *Forest Ecology and Management* 49:211-218.

ATTACHMENT
ADAMS 2003