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COOPERATIVE UPLAND WILDLIFE PROJECT (PHASE III)

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W-106-R-9

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FINAL REPORT

Federal Aid Project W-106-R-9

Submitted by:

Cooperative Wildlife Research Laboratory, SIUC

Presented to:

Division of Wildlife Resources
Illinois Department of Natural Resources

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FINAL REPORT

STATE OF ILLINOIS

W-106-R-9

Project Period: 1 July 1995 through 30 June 1998

Project: Cooperative Upland Wildlife Project (Phase III)

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NEED: The amount and quality of upland wildlife habitat in Illinois is determined primarily by agricultural land use. Consequently, the fortunes of upland wildlife are closely related to agricultural programs and policies. The 1985 and 1990 Farm Bills provided for some integration of wildlife and agricultural interests. However, this opportunity may be diminished in coming years. To optimize potential benefits, wildlife management efforts must focus on areas of critical need, and also where there is greatest opportunity for success. This approach will require a thorough understanding of the needs of individual species and communities in an agricultural environment and the means to inventory and evaluate habitat conditions at various spatial scales. Because of the low vagility of most upland species, traditional management practices often focus on local or site conditions. However, increasing habitat fragmentation has necessitated consideration of landscape and regional conditions as well. Satellite imagery can be used to classify and map land use/land cover over large geographic areas, and tools are evolving to synthesize this information and relate it to the needs of wildlife species and communities. The proposed project seeks to expand these capabilities and their utility to the Illinois Department of Natural Resources.

OBJECTIVES:

1. To inventory and quantify land use/land cover on a county basis and relate to relative abundance and distribution of selected upland wildlife species.
2. To develop pattern recognition (PATREC) habitat suitability models for selected upland wildlife species and communities.

3. To validate models and determine the geographic scale(s) at which they are appropriate.

4. To incorporate model parameters into the Habitat Analysis and Modeling System (HAMS).

EXECUTIVE SUMMARY

Study 1. Landscape Level Upland Wildlife/Habitat Relationships

Study 1 encompassed 4 objectives that were addressed in Jobs 1.1 and 1.2. Findings and results are analyzed and presented in Job 1.3 (Analysis and Report) that largely consists of this Final Performance Report and the attached manuscripts and related products. Following is a brief description of the major accomplishments and findings of Jobs 1.1 and 1.2, Study 1.

Job 1.1. Landscape Characteristics and Upland Wildlife.–The objective was to inventory and quantify land use/land cover on a county basis and relate to relative abundance and distribution of selected upland wildlife species. To accomplish this objective, we used the spatial analysis program FRAGSTATS (McGarigal and Marks 1995) to quantify landscape composition and pattern from a digital land cover map of Illinois derived from classified satellite imagery (Illinois Dep. Natural Resources 1996). We related landscape structure at various geographic scales to the distribution and abundance of northern bobwhite (*Colinus virginianus*), ring-necked pheasant (*Phasianus colchicus*), cottontail rabbit (*Sylvilagus floridanus*), and a variety of non-game bird species and communities (guilds) based on hunter harvest data (Anderson et al. 1995), Illinois Department of Natural Resources call-count routes, and the North American Breeding Birds Survey (BBS; Droege 1990).

A thesis (Sudkamp 1997), and 4 draft manuscripts (Roseberry 1998, Roseberry and Sudkamp 1998, Stone and Roseberry 1998*a* and 1998*b*) constitute the final report for this job. Also, digital files (tape and floppy disks) of statewide habitat maps for northern bobwhite and breeding bird species richness were produced in formats suitable for use with HAMS (Roseberry

and Hao 1996) and ArcView (ESRI, Redlands, CA) software. Those files were provided to appropriate IDNR staff as additional products of Job 1.1. Hardcopy maps are attached.

Job 1.2. PATREC Habitat Models.–Objectives of this job were to (1) develop pattern recognition (PATREC) habitat suitability models for selected upland wildlife species and communities; (2) validate models and determine the geographic scale at which they are appropriate; and (3) incorporate model parameters into the Habitat Analysis and Modeling System (HAMS). To meet Objectives 1 and 2, PATREC models that utilize the digital Illinois land cover database were developed to identify potentially suitable landscapes for northern bobwhite and cottontail rabbit and predict avian species richness and diversity. Individual models, and their validation, are described in 3 attached manuscripts (Roseberry 1998, Roseberry and Sudkamp 1998, Stone and Roseberry 1998*b*). In addition, an updated version of the Habitat Analysis and Modeling System (HAMS) software containing the bobwhite, cottontail, and avian richness models was provided to appropriate IDNR staff to meet Objective 3 of Job 1.2.

LITERATURE CITED

Anderson, W. L., L. K. Campbell, and D. M. Witzany. 1995. Hunter activity and wildlife harvest in Illinois: county averages for 1989-1993. Illinois Department of Conservation Division of Wildlife Resources Administrative Report, Springfield, Illinois, USA.

Droege, S. 1990. The North American Breeding Bird Survey. Pages 1-4 *in* J. R. Sauer and S. Droege, editors. Survey designs and statistical methods for the estimation of avian population trends. U.S. Fish and Wildlife Service Biological Report 90(1).

McGarigal, K., and B. J. Marks. 1995. FRAGSTATS: spatial pattern analysis program for quantifying landscape structure. U.S. Forest Service General Technical Report PNW-351.

Roseberry, J. L. 1998. Landscape characteristics and spatial patterns of eastern cottontail abundance in Illinois. Transactions of the Illinois State Academy of Science (accepted).

Roseberry, J. L., and Q. Hao. 1996. Interactive computer program for landscape-level habitat analysis. Wildlife Society Bulletin 24:340-341.

Roseberry, J. L., and S. D. Sudkamp. 1998. Assessing the suitability of landscapes for northern bobwhite. Journal of Wildlife Management 62:895-902.

Stone, W. E., and J. L. Roseberry 1998*a*. Ordination of breeding birds along an environmental gradient of landscape attributes in Illinois. Condor (submitted).

Stone, W. E., and J. L. Roseberry 1998*b*. Landscape suitability modeling of Illinois breeding bird diversity. (Unpubl. manuscript)

Sudkamp, S. D. 1997. A landscape-level assessment of upland habitat in Illinois. M.S. Thesis, Southern Illinois University at Carbondale, Illinois, USA.

STUDY 1: LANDSCAPE LEVEL UPLAND WILDLIFE/HABITAT RELATIONSHIPS

JOB 1.1. LANDSCAPE CHARACTERISTICS AND UPLAND WILDLIFE

Objective: To inventory and quantify land use/land cover on a county basis and relate to relative abundance of selected upland wildlife species.

Digital files of habitat maps and data were provided to agency staff as products that meet all job objectives. These files include the following: 102 county-level habitat maps for northern bobwhite, breeding bird richness, and breeding bird diversity suitable for incorporation into the Habitat Analysis and Modeling System (HAMS); and statewide habitat maps for northern bobwhite and breeding bird richness formatted for ArcView® and compatible with the Illinois GIS (hardcopy maps attached).

A thesis (Sudkamp 1997) and 4 draft manuscripts (Roseberry 1998, Roseberry and Sudkamp 1998, Stone and Roseberry 1998*a* and 1998*b*) that describe and discuss methods and findings for this job are attached.

JOB 1.2. PATREC HABITAT MODELS

Objectives: (1) To develop pattern recognition (PATREC) habitat suitability models for selected upland wildlife species and communities; (2) to validate models and determine the geographic scale at which they are appropriate; and (3) to incorporate model parameters into the Habitat Analysis and Modeling System (HAMS).

PATREC models that utilize the digital Illinois land cover database were developed to identify potentially suitable landscapes for northern bobwhite and cottontail rabbit and predict avian species richness and diversity. We were unable to develop a satisfactory model for ring-necked pheasant using the currently available land cover classification. Individual models, and their validation, are described in 3 attached manuscripts cited above (Roseberry 1998, Roseberry and Sudkamp 1998, Stone and Roseberry 1998*b*). In addition, an updated version of the Habitat Analysis and Modeling System (HAMS) software containing the bobwhite, cottontail, and avian

richness and diversity models was provided to appropriate IDNR staff to meet Objective 3 of Job 1.2.

LITERATURE CITED

Roseberry, J. L. 1998. Landscape characteristics and spatial patterns of eastern cottontail abundance in Illinois. Transactions of the Illinois State Academy of Science (accepted).

Roseberry, J. L., and S. D. Sudkamp. 1998. Assessing the suitability of landscapes for northern bobwhite. Journal of Wildlife Management 62:895-902.

Stone, W. E., and J. L. Roseberry 1998*a*. Ordination of breeding birds along an environmental gradient of landscape attributes in Illinois. Condor (submitted).

Stone, W. E., and J. L. Roseberry 1998*b*. Landscape suitability modeling of Illinois breeding bird diversity. (Unpubl. manuscript)

Sudkamp, S. D. 1997. A landscape-level assessment of upland habitat in Illinois. M.S. Thesis, Southern Illinois University at Carbondale, Illinois, USA.

JOB 1.3. ANALYZE AND REPORT

Objectives: To analyze results and prepare reports for Job 1.3 in a timely manner.

Objectives of this job were met through preparation of quarterly, annual, and this final report.

Sudkamp, S. D. 1997. A landscape-level assessment of upland habitat in Illinois. M.S. Thesis, Southern Illinois University at Carbondale, Illinois, USA.

Roseberry, J. L. 1998. Landscape characteristics and spatial patterns of eastern cottontail abundance in Illinois. Transactions of the Illinois State Academy of Science (accepted).

Roseberry, J. L., and S. D. Sudkamp. 1998. Assessing the suitability of landscapes for northern bobwhite. Journal Wildlife Management 62:895-902.

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Statewide Bobwhite Habitat Map

Statewide Avian Richness Habitat Map