

Changes in the Population and Habitat of Spruce Grouse (*Falcapennis canadensis*) on the Yellow Dog Plains

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A. Statement of Problem, Project Objectives, and Significance

Introduction

Maintaining native species diversity in forest lands is an important objective in wildlife management, especially in areas of timber harvest, mining, and human recreation. Michigan harbors about 665 rare plant and animal species, 25 of which are federally listed as endangered, threatened, proposed, or candidate species (USFWS 2012). The spruce grouse (*Falcapennis canadensis*), also known as “fool hen” by hunters because of its unique tameness, is listed as a “species of concern” in Michigan and threatened in Wisconsin (MIDNR 2009, WIDNR 2011). Spruce grouse are also considered “species of greatest conservation need” in Minnesota, Manitoba, Ontario and Quebec (Williamson et al. 2008).

Spruce grouse are widely distributed across the northern United States and Canada. The range extends from Alaska to Labrador, across the northwestern states of the U.S. and south into New England (Boag and Schroeder 1992, Williamson et al. 2008). Important forest types used by spruce grouse include the ecotones around bogs with low-lying black spruce (*Picea mariana*) and tamarack (*Larix laricina*), cedar forests (*Thuja occidentalis*), upland jack pine (*Pinus banksiana*) and areas rich with ericaceous shrubs. In Michigan, spruce grouse are found almost exclusively in the Upper Peninsula. In Marquette County, the Yellow Dog Plains are a favored area for spruce grouse.

The Yellow Dog Plains are located on a glacial outwash site. Sandy soils are prevalent among the gravel and boulders that were dropped from glaciation. The forest industry owns the

majority of property on the plains; a satellite image shows a distinct checkerboard pattern resulting from timber harvest. Jack pine forest dominates the plain.

In the mid 1960's, Dr. Bill Robinson of Northern Michigan University began research on the habitat selection by spruce grouse on the Yellow Dog Plains (Robinson 1969, 1980). Data were collected on grouse occurrence and habitat composition and published in the book "Fool Hen". Robinson's results are available and provide an exceptionally rare opportunity to study how this general population and the associated habitats have changed over the past 30-40 years.

The Yellow Dog Plains have seemingly changed since Robinson's study. Human disturbance has increased with the development of additional road systems, camps and ATV trails. Parcels of jack pine plantation have been harvested and Rio Tinto is establishing a new nickel-copper mine. Have these changes affected spruce grouse populations? The goal of this research project is to compare the changes in spruce grouse population and habitat in relation to the cumulative habitat modifications over the last 40 years.

Research Objectives:

- Quantify land changes on the Yellow Dog Plains using past and present satellite and aerial imagery.
- Describe habitat fragments using forest and vegetation structure indices.
- Determine the value of habitat fragments to spruce grouse using grouse observations and pellet counts as an index to habitat preference.
- Determine if habitat fragments act as islands by analyzing data using FRAGSTATS version 4.2.

B. Project Rationale and Literature Review

The spruce grouse is widely distributed across a vast range, but lives in scattered, often isolated, low density populations tied to specific habitat features. Movement between separate breeding and wintering ranges occurs at the individual level; 75% remain sedentary throughout life. Most of the spruce grouse that exhibit seasonal movements return to the same breeding sites each year (Boag and Schroeder 1992). This behavior, coupled with increased habitat fragmentation by roads and silviculture practices may increase spruce grouse vulnerability to local extinction.

In Michigan, typical spruce grouse habitat consists of upland jack pine and low-lying spruce (*Picea spp.*) near bogs, generally interspersed with ericaceous shrub cover. In all reaches of its range, spruce grouse are found in conifer-dominated forests. Jack pine and lodgepole pine (*Pinus contorta*) are common in the boreal and western range (Boag and Schroeder 1992). A widespread characteristic of spruce grouse habitat is the preference of branches and/or shrubs 2-8m above ground (Storch 2007). Relatively young (<30 years) forests with ericaceous shrubs are generally preferred. The characteristics of spruce grouse habitat are so specific, that changes in forest structure may lead to population declines or local extinction.

In addition to the particular habitat preference, the spruce grouse is at the southern margin of its range in Michigan and may be influenced by global climate change. Increasing temperatures may lead to the loss of valuable lowland spruce habitat in the Upper Peninsula. Even though the effects of global warming are likely, there has been little to no effort to measure the impacts on spruce grouse.

Spruce grouse are threatened by habitat fragmentation and degradation, small population size and global climate change. This study seeks to investigate the current spruce grouse

population density and habitat status on the Yellow Dog Plains in relation to current and cumulative human disturbance.

C. Project Plan

Study Area

This research is primarily conducted on the Yellow Dog Plains in northern Marquette County. State forest covers about 1,538 ha in scattered parcels. The study area is dominated by jack pine cover additional cover types include northern hardwood, white pine, upland open/semi-open lands, lowland open/semi-open lands (MIDNR 2012).

Portions of this study are also being conducted within the land holdings of the Huron Mountain Club. In 1938, Aldo Leopold reported that spruce grouse were found at the HMC but were rapidly disappearing from the lake states (Leopold 1938). He suggested that the Club may serve as a potential refuge. Spruce grouse were listed as rare in the Club in 1938, and preliminary data suggest that they are still rare there today.

Research Design

Each study unit will be systematically searched, using a variation of Robinson's (1980) method. I will walk transects at a slow pace about 100 meters apart, depending on the density of the cover, and sweep back and forth from one edge to the other. I will quantitatively describe the forest structure and vegetation at 150 meter intervals, where the location of the first plot on each transect is determined by a random number generator.

To sample trees, I will use the random pairs method and point-centered quarter method as described by Cottam and Curtis (1956). Tree species, diameters, height and distance between them will be recorded. The analysis of these data will provide species importance and density of trees.

Three-dimensional vegetation classification (Releve` method) will be used to determine the abundance of a given life form at various height groups (MDNR 2007). Analyses of the data obtained using the Releve` method will aid in the classification of forest structure.

Horizontal canopy density will be quantified using a hand-held densitometer (convex model A, Forestry Suppliers spherical crown densitometer). Vertical vegetative density and topographical obstruction will be quantified using a 2-m Nudd's vegetation profile board (Nudds 1997).

Observations of spruce grouse presence and estimates of fecal pellet counts will be used as an index to habitat preference. Pellet counts will be estimated during a three minute designated search interval during each plot survey. Signs and presence of spruce grouse will determine the importance of habitat types.

D. Permits and Permissions

This research is conducted in accordance with the Institutional Animal Care and Use Committee. This project falls under USDA Pain Category B: Animals being bred, acclimatized, or held for use in teaching, testing, experiments, research, or surgery but not yet used for such purposes. Non-invasive observation only of animals in the wild. In this study, the animal is observed under normal conditions with no manipulation; a waiver has been obtained through Northern Michigan University.

This research takes place on private, public and commercial land holdings. Permissions for land access have been granted by land holders on the Yellow Dog Plains and in the Huron Mountain Club.

E. Time-line of Completed and Expected Outcomes

Timeline	Outcome	Status
August-December 2012	Begin research on spruce grouse literature.	Done
December-February 2013	Complete project proposal.	Done
February- March 2013	Present proposed research at MiBCI. Apply for Huron Mountain land access.	Done
March-May 2013	Present project to Eagle Mine and obtain land access. Obtain land access from private land holders. Obtain an IACUC waiver to observe spruce grouse.	Done
May- August 2013	Systematically survey study units and compile data.	Done
August-January 2014	Compile data and begin FRAGSTATS. Continue to survey study units.	In Progress
January- February 2014	Continue to survey study units. Obtain aerial photography for analyses	
February-March 2014	Continue to survey study units. Present 2013 research at MiBCI.	
March-May 2014	Continue to survey study units. Draft Thesis.	
May-August 2014	Systematically survey study units and compile data.	
August-November 2014	Complete draft of thesis and review with committee.	
November-March 2015	Start drafting manuscripts to send out for publishing. Present at MiBCI. Complete a final draft of thesis.	
March-April 2015	Send completed thesis to the review board and defend thesis. Send manuscripts out for publishing.	
Project Conclusion	Final results will be submitted for presentation at the next International Grouse Conference in 2015.	

F. Budget and Statement of Resource Availability

No funding or grants have been awarded for field work in 2014 at this time. An overall project budget is shown below.

<i>Project Expenses</i>	<i>Cost</i>
Travel/Mileage expenses based on field work in 2013. Estimated 4,336 miles at \$.55/mile	\$2,385
Meals \$40 per week for the 4-month summer field season	\$640
Total	\$3,025

If funding is received, I plan to use all the proceeds to defray Travel/mileage expenses.

G. References

- Boag, D. A. and M. A. Schroeder. 1992. Spruce grouse (*Falciennis canadensis*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online:
<http://ezpolson.nmu.edu:5451/bna/species/005doi:10.2173/bna.5>
- Cottam, G., & Curtis, J. T. 1956. The use of distance measures in phytosociological sampling. *Ecology*, 37(3), 451-460.
- Leopold, A. 1938. Report on Huron mountain club. 18.
- Michigan Department of Natural Resources, MSU Extension. 2009. Michigan's special animals. Lansing, Michigan
- Michigan Department of Natural Resources. Yellow dog plains management area. 2012. Lansing, Michigan.
- Minnesota Department of Natural Resources 2007. A handbook for collecting vegetation plot data in Minnesota: The releve` method. Minnesota County Biological Survey, Minnesota Natural Heritage and Nongame Research Program, and Ecological Classification Program St. Paul: Minnesota Department of Natural Resources.
- Nudds, T 1977. Quantifying the vegetative structure of wildlife cover. *Wildlife Society Bulletin*.
- Robinson, W. L. 1969. Habitat selection by spruce grouse in northern Michigan. *The Journal of Wildlife Management*, 33(1), 113-120.
- Robinson, W. 1980. *Fool Hen*. Madison, Wisconsin: The University of Wisconsin Press.
- Storch, I. (Compiled by). 2007. *Grouse. Status survey and conservation action plan 2006-2010*. IUCN, Gland, Switzerland and Cambridge, UK and World Pheasant Association, Fordingbridge, UK. 114 pp. ISBN 978-2-8317-1009-9

United States Fish and Wildlife Service. 2012. Federally Endangered, Threatened, Proposed and Candidate Species in Michigan. Lansing, Michigan.

Williamson, S.J., D. Keppie, R. Davison, D. Budeau, S. Carriere, D. Rabe and M. Schroeder. 2008. Spruce grouse conservation plan. Association of Fish and Wildlife Agencies. Washington, DC. 73 pages.

Wisconsin Department of Natural Resources, Endangered Resources Program. 2011. Wisconsin endangered and threatened species laws and list. Madison, Wisconsin.