Preliminary Project Outline

# Determinants of Faunal Composition in Prairie-Parkland Ecosystems

Project Number: 374-4524

by

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# Preliminary Project Outline *

## Determinants of Faunal Composition

### Introduction

Recent literature on land evaluation has emphasized the importance of primary bio-physical inventory as a basis for resource planning (Jeffery, et al. 1970; Rowe 1970; Stewart 1968). This emphasis is well placed since holistic consideration of basic landscape components is mandatory for integrative resource management and assured environmental quality. Reference to the interaction of primary ecosystem features provides an appropriate basis for determining the faunal composition of broad ecological systems.

Integrative bio-physical approaches to resource analysis have been developed in a variety of climatic and biotic regions (Grant 1968; Ollier, et al. 1969, Lacate 1969). In western Canada, holistic approaches of this type currently are employed in the ecological evaluation of the Peace-Athabasca Delta (Dirschl 1970, 1971) and in the terrain sensititively analysis of the McKenzie Valley (C.F.S., personal communication). However, due mainly to disciplinary and jurisdictional divisions of responsibility wildlife considerations are applied to such systems on a secondary level based on externally derived criteria. The study proposed herein will examine the fauna of a transition prairie-parkland ecosystem as a primary landscape feature in order (a) to identify the seasonal determinants of faunal composition and distribution, and (b) to develop a predictive scheme for seasonally localizing wildlife within landscape units.

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* A conceptual and functional eloboration of a research problem analysed earlier in a separate format; to be followed upon ratification by a detailed project plan.

It is not the intention of this study to reclassify land in faunal terms, e.g., as a mallard-muskrat association or a roadrunner-jack rabbit association. Rather, it will identify the landscape features and environmental factors which determine the composition and distribution of fauna within pre-defined landscape units. The determinants of ecosystem faunal composition will be examined in relation to the ecological role of the animal species to develop a predictive model for localizing wildlife in time and space.

## Literature considerations

A thorough review of the literature in the pertinent areas of faunal ecology including habitat selection, niche requirements, and ecological separation is currently in progress. This exercise will be completed upon ratification of this preliminary project proposal and submitted with a final revised project plan.

## Project objectives

The basic objective of this study is to identify the determinants of faunal composition of landscape units enabling the prediction of seasonal faunal distribution within ecosystems.

The specific project objectives are:

1. To determine the seasonal distribution, diversity, and relative abundance of vertebrate fauna occurring within bio-physical landscape units in a transitional prairie-parkland ecosystem;

2. To identify the landscape features, environmental factors and other phenomena determining faunal composition in each landscape unit;

3. To examine the ecological role of vertebrate fauna in relation to their distribution in the landscape and the bio-physical determinants thereof;

4. To develop a predictive model of faunal-landscape affinity.

## Study site

Last Mountain Lake Wildlife Area, Saskatchewan has been selected as the location for this study. The Area comprises approximately 25,000 acres of circumlimnal lowland plain at the edge of the prairie-parkland ecotone. As part of the transition zone between grassland and forest it is characterized by broad environmental diversity. Its most notable feature is the variety and abundance of migratory and resident birds (Hatfield 1965, 1969). Various additional factors reinforce this choice of site including its accessibility and the presence of logistical facilities and equipment. An existing preliminary data base also is available (Anweiler 1969a, 1969b; Hatfield 1969; Stephen 1965). Current and projected management of the Wildlife Area (Staines and Hatfield 1971) provides an opportunity to examine the effects of environmental manipulation on faunal composition and its determinants.

## Logistic perspective

The present project outline is directed broadly at all vertebrate fauna in all landscape types within the ecosystem surrounding Last Mountain Lake. However, it is recognized that logistical limitations, statistical requirements and other related factors may necessitate a narrowing of focus. It therefore is anticipated that this study may concentrate its efforts within several selected landscape types and/or confine its emphasis to avian fauna only.

## Proposed aerial methods

Employing aerial photographs, existing basic data,and site reconnaissance the terrestrial ecosystem surrounding Last Mountain Lake

will be classified into biologically functional landscape units (see Lacate 1969). Gridded transects will be established within each landscape unit. The landscape features within each transect will be detailed and monitored throughout the study.

The study design will feature three transects within each (probably 5) landscape unit in five seasons within each year. Seasons will be divided into 10 day periods within which biological events on the study site are assumed to be uniform. The day will be divided into four six hour sessions. Each transect will be surveyed once per session per 10 day interval for presence, abundance, location and activity of fauna. The landscape and environmental features associated with each observation will be noted. Specific faunal survey methods have not yet been confirmed. Modifications of the methods of Anderson (1970) and Bond (1957) are under consideration.

Linear multiple regression analysis will be applied to the above variables to identify the determinants of faunal composition by species for each landscape unit. Significant variation among determinants will be related to the ecological role of the species in question. A predictive model of seasonal faunal affinity for landscape type will be developed from these relationships.

Data from field observations will be collected in a computer coded format enabling transposition directly to cards for ready analysis. Analytical procedures and experimental design will be confirmed in conjunction with Biometrics Research Services.

Duration of project

Project 374-4524 is expected to require 21 months covering the period from April 1, 1972 through December 31, 1973. This would provide sufficient time and data to demonstrate the validity of the hypotheses in question. Detailed phasing of the project will be provided with the final project plan.

Personnel and cooperation required

Personnel: Principle Investigator

Technician (EG5 or equivalent)

2 summer students per season

Seasonal casual labor as required

Cooperation: Statistical consulting for experimental design and analytical procedures - Biometrics Research Services, Ottawa.

Computer programming assistance - PMBRC Computer Services Contractor plus a part-time casual programmer.

Financial requirements

To be specified in the final project plan.

## Literature Cited

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Anweiler, G. G. 1969a. The Birds of the Last Mountain Lake Wildlife Area. Canadian Wildlife Service. Mimeo 16 p.

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Dirschl, H. J. 1970. Ecological evaluation of the Peace-Athabasca Delta. Annual progress report. Canadian Wildlife Service. 66 p.

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Grant, K. 1968. A terrain evaluation system for engineering. CSIRO Australia. Div. Soil Mech. Paper Number 2.

Hatfield, J. P. 1969. The Last Mountain Lake Wildlife Area, Saskatchewan. Blue Jay 27:129-131.

Jeffrey, W. W. , et al. 1970. Towards integrated resource management. Canada Dep. Reg. Econ. Expan. 47 p.

Lacate, D. A. 1969. Guidelines for bio-physical land classification. Canadian Forest Service Publication No. 1264. 61 p.

Ollier, C. D., et al. 1969. Land systems of Uganda. Mil. Eng. Exp. Estab. Rep. No. 959. Christchurch, Hampshire, England.

Rowe, J. S. 1971. Why classify forest land? The Forestry Chronicle 47(3):1-5.

Staines, G. H. and J. P. Hatfield. 1971. Five Year Development and Management Plan. Last Mountain Lake Wildlife Area, Saskatchewan. Canadian Wildlife Service. Manuscript 40+ p.

Stephen, W. J. D. 1967. Bionomics of the Sandhill Crane. Canadian Wildlife Service Report Series. Number 2. 48 p.

Stewart, G. A. (ed.). Land Evaluation. MacMillan Company, Toronto. 1968.

# FORTRAN CODING FORM

Program _____
Coded By _____
Checked By _____

Date _____
Page _____ of _____

Identification (73–80)

C FOR COMMENT

Statement Number (1–5) | Cont. (6) | FORTRAN STATEMENT (7–72)

| Statement Number | Cont. | FORTRAN STATEMENT |
|---|---|---|
| | | YEAR 0→9 |
| | | MONTH 1→12 |
| | | CALENDAR DAY 1→31 |
| | | SEASON 1→5 |
| | | DAY WITHIN SEASON 1→155 |
| | | TIME 0000–2400 |
| | | COLLECTOR 0→9 |
| | | QUESTIONER 0→9 |
| | | LANDSCAPE CATEGORY |
| | | TRANSECT # |
| | | 4 letters + 3 numbers |
| | | ACTIVITY |
| | | GOOD TYPE |
| | | ASSOCIATED VEG |
| | | SPECIFIC ASSOC PLANTS A |
| | | SPECIFIC ASSOC PLANTS B |
| | | LOCATION (GRID COORDINATES) |
| | | VERTICAL LOCATION |
| | | SPECIES ABUNDANCE |
| | | AGE |
| | | SEX |
| | | MIGRANT VS RESIDENT |
| | | COMMON VS UNCOMMON |
| | | ENVIRONMENTAL VARIABLES [7#] (MEASURED OR RECORDED) |
| | | LANDSCAPE FEATURES AT LOCATION [7#] RECORDED |
| | | ECOLOGICAL ROLE 3 letters + 3 numbers |
| | | Other. |

SAMPLE DATA COLLECTION FORM *

* field observation;

* each horizontal row contains information from 1 observation

* a similar format will be used for monitoring environmental variables and for categorizing site locations prior to reducing the data for insertion in columns 46–52 and 53–59 respectively.

MERCURY