CONTROL OF SMALL MAMMALS ON RECLAMATION AREAS IN THE AOSERP STUDY AREA

Submitted to

Alberta Oil Sands Environmental Research Program

by

Renewable Resources Consulting Services Ltd.

April, 1978

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April 26, 1978

Dr. S. Smith
AOSERP
15th Floor
Oxbridge Place
9820 - 106 Street
Edmonton, Alberta
T5K 2J6

Dear Dr. Smith:

Enclosed is an unsolicited proposal to conduct a study pertaining to the control of small mammals on areas in the AOSERP Study Area.

In order to further familiarize you and your staff with the expertise of Renewable Resources staff in the field of small mammal research, I have also enclosed a volume which outlines the small mammal monitoring program conducted at Chick Lake, N.W.T.

Sincerely,

RENEWABLE RESOURCES
CONSULTING SERVICES LTD.

G. Semenchuk

Glen Semenchuk
President

GS/vb
Enclosure

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INTRODUCTION

This proposal was prepared in response to Alberta Oil Sands Environmental Research Program proposed Project No LS 7.1.1, which concerns small mammal research on their revegetation study areas. AOSERP is concerned about the potential disruption by rodents of reclamation efforts on the leases of Syncrude and GCOS. Such disruption by rodents has been documented for other reforestation projects (Radvanyi, 1966, 1970, and 1971). AOSERP intends to evaulate this potential disruption in their study area and devise environmentally safe and efficient methods for reducing it.

Based on our understanding of this problem, we feel that two methods of reducing rodent caused disruption of reclamation should be considered. Both involve introducing reclamation efforts in an environment with low numbers of rodents. The methods are:

1. Planting trees and shrubs when rodent numbers are at the low or declining phase of their cycle. This is a non-manipulative approach, but will fullfil the objective of planting seedlings with a minimum of risk of "predation" from rodents.
2. Manipulating rodent numbers by manipulating vegetative cover.

To implement these methods several sets of data are required. Population "cycles" must be described so that lows can be predicted and

and the effect of vegetative cover on rodent numbers must be known before any manipulations are undertaken. The purpose of the proposed study is to provide data required for predicting population lows and determining the effects of vegetative cover on rodent numbers.

We are prepared to participate closely with AOSERP to refine our study plan according to their specific needs. The effective planning of control procedures and the implementation of experimental studies on long-term biological control methods should wait, and be based upon information gathered from the present study.

OBJECTIVES

AOSERP's ultimate objective is to reduce disruption of reclamation projects by rodents. This study is proposed to provide data necessary for the attainment of this main objective. The immediate goals are:

1. To determine species composition and densities of cricetid rodents on disturbed and undisturbed habitats during spring, summer, and fall
2. To determine the effects of vegetative ground cover on numbers and species composition of cricetid rodents during October 1978
3. To determine species composition and densities of cricetid rodents during July or October on recently revegetated areas

APPROACH

Species and densities of cricetid rodents will be determined on eight live-trapping grids. Two of these grids will be located in representative boreal habitat, with the other six located in various disturbed habitats. Densities and species composition will also be determined in recently revegetated areas.

The effects of plant cover on numbers of cricetid rodents will be examined using three approaches. These are:

1. Comparison of numbers of captures at individual trap sites (each with a different groundcover value) within each live-trapping grid (Douglass, 1977)
2. Comparison of densities of individuals among the eight live-trapping grids, each of which will have a different total vegetative cover (Douglass, 1976)
3. Comparison among selected trapping sites varying in cover from zero to 100%. This will be performed in October and will complete the examination of vegetative cover effects on numbers of rodents.

METHODS

Trapping

Data concerning cricetid rodent species composition and densities will be obtained by standard live-trapping techniques. Eight grids will be constructed: two in the major habitat type represented in the study area and six in disturbed habitats (two in each of three disturbed habitat types). Each grid will be constructed so there will be 10 columns and 10 rows of trapping stations at 15-m intervals. Each trapping station will be permanently marked with a surveyor's stake. Each grid will encompass 2.25 ha.

Sherman live-traps (7.5 x 7.5 x 23 cm) will be used, one per trap station, for the duration of the study. Each trap will be baited with oats and peanut butter and furnished with synthetic cotton for nesting material. All traps will be baited at the beginning of each trapping period and, when necessary, during the trapping period. Traps will be set on all grids for five consecutive days during early May, July, and early October. Grids will be sampled four at a time for two, 5-day periods. During one month, July or October, an additional 100 to 200 traps will be used to determine species composition and densities of cricetids on recently revegetated areas. Trapping plots will be selected in consultation with AOSERP personnel.

Each live, captured animal will be given an individual number by toe clipping and a metal ear tag before it is released at the point of capture. The following data will be recorded each time an animal is captured: species, physical condition, number, sex, breeding condition, weight, age, and location of capture.

Population Estimates

In this study, population densities will be represented by the minimum number known to be alive per hectare for each grid. These estimates are used instead of Lincoln Index-type estimates because the prerequisites for these estimates are not met by small mammals, [i.e. the probability of being captured is not equal among individual animals (Krebs, 1966)].

Species Composition

Species composition will be presented by the number of species contained in each habitat and by a diversity index such as Brillouin's formula (Pielow, 1966).

Vegetative Cover Effects

Supplementary data for vegetative cover effects will be collected during the final sampling session on selected sites. An additional 200 live-traps will be used for this. Two sets of sampling sites will be selected so that there will be two replicates of a series of areas sampled. These areas will represent differing vegetative coverages ranging from zero to 100%. Six coverage values will be examined in each replicate, with 9 live-traps spaced at 2-m intervals in each area representative of one cover value.

DATA ANALYSIS

Computer Sorting and Calculations

Over the past 4 years, a standard, small mammal data analysis program package has been developed by Renewable Resources. All data collected in this project will be processed using this program. The program provides printouts with the following information:

FOR LIVE-TRAPPING GRIDS

Number of individuals of each sp/mo

Number of captures of each sp/mo

Numbers and percentages of three age groups by sp/mo

Numbers and percentages of breeding classes by sp/mo

Average weights for all individuals, ages, and sexes by sp/mo

Data from these programs will be used to calculate population densities and species composition.

PROJECT PERSONNEL

This project will be directed by Dr. Richard Douglass with most of the field-work conducted by Lorne Fisher and Marnie Williamson. Dr. Douglass has conducted extensive research on small mammals and has published several papers in *Ecology*, *American Midland Naturalist*, *Journal of Applied Ecology*, and the *Canadian Field-Naturalist*. Mr. Fisher and Ms. Williamson have been active in small mammal research since 1973 in the Northwest Territories and northern Alberta. For more detailed information concerning these biologists, please examine the enclosed resumes.

SPECIAL EXPERTISE

Renewable Resources has been involved in small mammal studies since 1973. Studies have dealt with ecological monitoring of the Mackenzie Valley Pipeline, effects of strip mining, and the effects of winter roads. Pertinent reports and project are:

Douglass, R.J. 1976. A study of the ecology of small mammals at Chick Lake, N.W.T., 1973-1975. Submitted to Canadian Arctic Gas Study Limited.

_____. 1976. A study of small mammals in relation to strip mining. Prog. Rep. Submitted to Decker Coal Company, Sheridan, Wyoming.

_____. 1977. Effects of winter roads on small mammals. J. of Appl. Ecology. Vol. 14. p.827.

A project on the effects of strip mining and reclamation on small mammals is in the initial stages. It is being conducted for the Montana Department of Natural Resources, Energy Planning Division, Helena, Montana.

SPECIAL EQUIPMENT

Renewable Resources has 700 Sherman live-traps, 500 snap-traps, and all miscellaneous equipment (scales, scissors, tagging pliers etc.) for small mammal projects. If necessary, a small mammal project of this nature could be initiated within 10 days of notice.

TENTATIVE TIME SCHEDULE

1978

1 May to 15 May	Site Selection plus first sampling
1 July to 13 July	Second sampling
1 October to 15 October	Third sampling plus additional sampling for effects of vegetation cover
November to December	Data analysis and report preparation

This schedule is subject to revision according to AOSERP's needs, clarification of the problem, and future studies required. However, we feel that this schedule represents the best timing for the study we have outlined.

COSTS

Personnel		
Senior Biologist	20 man days @ $260/day	$ 5,200.00
Technician	84 man days @ $150/day	12,600.00
TOTAL PERSONNEL		$ 17,800.00
Expenses		
Travel and freight		$ 1,000.00
Trap rental		400.00
Computer		400.00
Vehicle rental ($85/week @ 15¢/mile plus gas)		1,400.00
Food and lodging (AOSERP Research Camp - 93 man days @ $15/day)		1,395.00
TOTAL EXPENSES		$ 4,595.00
TOTAL COSTS		$ 22,395.00

Costs are subject to revision depending upon refinement of study.

LITERATURE CITED

Douglass, R.J. 1976. A study of the ecology of small mammals of Chick Lake, N.W.T., 1973-1975. Submitted to Canadian Arctic Gas Study Limited.

Douglass, R.J. 1977. Population Dynamics, home rangers, and habitat associations of the Yellow-cheeked Vole, *Microtus xanthognathus*, in the Northwest Territories. Can. Field-Nat. 91:237-247.

Hayne, D.W. 1950. Apparent home range of *Microtus* in relation to distance between traps. J. Mammal. 31:26-39.

Jenerich, R.I. and F.B. Turner. 1969. Measurements of non-circular home range. J. Theoret. Biol. 22:227-237.

Krebs, C.J. 1966. Demographic changes in fluctuating populations of *Microtus californicus*. Ecol. Mono. 36:239-273.

Pielou, E.C. 1966. The measurement of diversity in different types of biological collections. J. Theoret. Biol. 13:131-144.

Radvanyi, A. 1966. Destruction of radio-tagged seeds of white spruce by small mammals during summer months. Forest Science 12:307-315.

Radvanyi, A. 1970. Small mammals and regeneration of white spruce forests in western Alberta. Ecology 51:1102-1105.

Radvanyi, A. 1971. Lodgepole pine seed depredation by small mammals in western Alberta. Forest Sci. 17:213-215.

RESUMES

NAME: RICHARD J. DOUGLASS

POSITION: Vertebrate Ecologist

EDUCATION:

Ph.D. Zoology, Montana State University, 1973.
M.S. Biology, University of Utah, 1970.
B.S. Zoology, University of Utah, 1968.

EXPERIENCE:

Consultant to the Montana Department of Natural Resources. Designed a baseline wildlife inventory so that the data could be used to both predict impacts as well as monitor impacts. 1977.

Ecologist: Directing a study to monitor the ecological effects of a proposed natural gas pipeline on the environment of the boreal forest in the Northwest Territories, Canada. Duties included the design and implementation of a study of mammalian behavior, population dynamics and habitat selection before, during and after construction of a natural gas pipeline. The project involved big-game inventories but dealt mainly with intensive studies of small mammal population dynamics and habitat selection as well as population and habitat selection of various carnivores. The major emphasis of this study was to clearly and objectively describe the impacts of the pipeline on the mammals involved. 1973 to 1977.

Consultant: Designed a project to monitor the success of a strip-mine reclamation in relation to mammal populations. This is an on-going study, but my role at this point is strictly advisory. Peter Kiewit and Sons Coal Mining Division, Sheridan, Wyoming. Spring and Summer, 1974.

NAME: LORNE FISHER

POSITION: Wildlife Technician

EDUCATION: B.Sc. Zoology, University of Alberta, 1972.

EXPERIENCE: Aerial surveys for abundance, distribution, and habitat preference of the Porcupine Caribou herd in the Yukon Territories. Renewable Resources Consulting Services Ltd. 1978.

Waterfowl habitat and distribution surveys to assess the effect of dredging on waterfowl at Beaver Lake - Mackenzie River, N.W.T. Renewable Resources Consulting Services Ltd. 1977.

Waterfowl breeding pair surveys, browse surveys and small mammal trapping to assess the potential impact of a dam on wildlife in the McGregor and Parsnip River Basins near Prince George, B.C. Renewable Resources Consulting Services Ltd. 1977.

Woodland caribou and moose surveys in northeastern Manitoba and northwestern Ontario for abundance, distribution, and habitat preference along the proposed Polar Gas pipeline corridor. Renewable Resources Consulting Services Ltd. 1976-1977.

Aerial surveys on the Kaminuriak population of barren ground caribou in the district of Keewatin. Vegetation and pellet surveys were also completed. Renewable Resources Consulting Services Ltd. 1976.

NAME: MARNIE MAIR WILLIAMSON

POSITION: Wildlife Technician

EDUCATION: B.Sc. Honors in Zoology, University of Alberta, 1972.

EXPERIENCE:

Wildlife Technician: Aerial survey of the Porcupine caribou herd in northern Yukon for distribution, abundance, and habitat preference in relation to proposed Foothills pipeline corridor. Renewable Resources Consulting Services Ltd. 1978.

Senior Technician: An extensive review of environmental parameters of four regions in northern Canada and one in northeastern British Columbia, involving a multi-disciplinary literature review, and detailed drafting on 1:1,000,000 scale maps. Renewable Resources Consulting Services Ltd. 1977.

Senior Technician: Environmental impact assessment of proposed Edmonton Power coal mine and power plant at Genesee, Alberta. Duties included: beaver survey, small mammal trapping and bird inventory. Renewable Resources Consulting Services Ltd. 1977.

Senior Wildlife Technician: Survey of the Bluenose caribou herd on their winter range involving aerial surveys, data analysis, and literature review. Renewable Resources Consulting Services Ltd. 1977.

Wildlife Technician: Environmental impact assessment of offshore drilling in Lancaster Sound, N.W.T. on marine mammals. Duties involved a literature review and summary of pertinent articles on marine mammals, ocean currents, and sea ice conditions. Renewable Resources Consulting Services Ltd. 1976.