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WE NEED YOUR HELP TO FIND
THE BLACK-FOOTED FERRET

Photo by LuRay Parker© 1985
Wyoming Game and Fish Department

Text by Richard Laing

WE NEED YOUR HELP

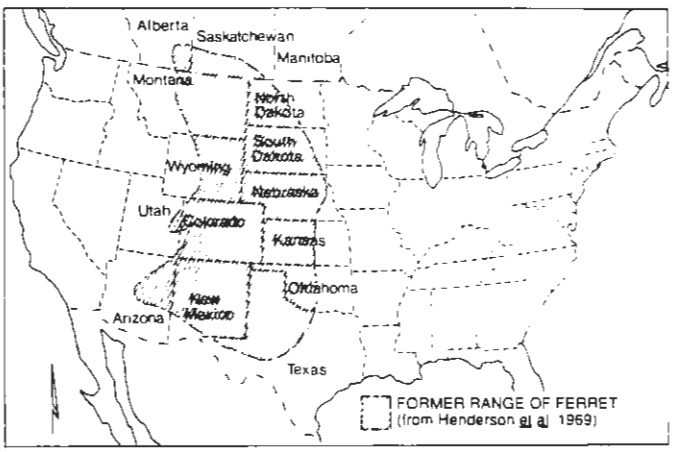
We need your help to determine if black-footed ferrets still exist in the prairie region of Canada. Conservation efforts are being implemented throughout the world to protect natural ecosystems. The black-footed ferret is part of the natural prairie ecosystem. Your assistance is important in the search for black-footed ferrets and in the conservation of prairie wildlife and habitat.

STATUS: PAST AND PRESENT

Currently, the black-footed ferret (*Mustela nigripes*) is one of the most endangered wildlife species in North America. Its decline probably resulted from habitat destruction and rodent control programs.

Historically, the range of black-footed ferrets extended from Texas to Saskatchewan. Their distribution closely corresponded with the range of three species of prairie dogs (*Cynomys spp.*). In Canada, they occurred beyond the historic range of prairie dogs. Between 1900 and 1937, black-footed ferrets were present throughout much of southern Saskatchewan. They may have lived in Alberta and Manitoba, but this has never been well documented. The last black-footed ferret collected in Canada was in 1937 near Climax, Saskatchewan.

Black-footed ferrets were feared to be extinct in the 1970's, but in 1981 they were rediscovered in northwest Wyoming. This discovery renewed hope for their survival. Unfortunately, in 1985 the number of Wyoming ferrets was severely reduced by disease. Researchers, fearing the loss of the entire population, began capturing the remaining wild ferrets. A total of 19 were caught and transferred to a captive breeding facility in Laramie, Wyoming. The recovery of the black-footed ferret depends on the survival of this small captive population, unless other populations can be found in the wild.



DESCRIPTION

Adult black-footed ferrets range in total length from 450 to 600 mm (18-24 in.). The tail of the black-footed ferret is approximately one-quarter the length of the body. Adult male black-footed ferrets weigh from 645 to 1125 g (1.4-2.5 lbs.). Adult females are slightly shorter than males and generally lighter, weighing from 645 to 850 g (1.4-1.9 lbs.).

Black-footed ferrets have distinctive body markings including a black face-mask, black feet and legs, and a black-tipped tail. These features contrast sharply with the yellow-tan body colour. Their fur does not change colour in winter.

Black-footed ferrets are often confused with long-tailed weasels (*M. frenata*), European ferrets (*M. putorius*), and domestic ferrets (*M. furo*), despite different appearances.

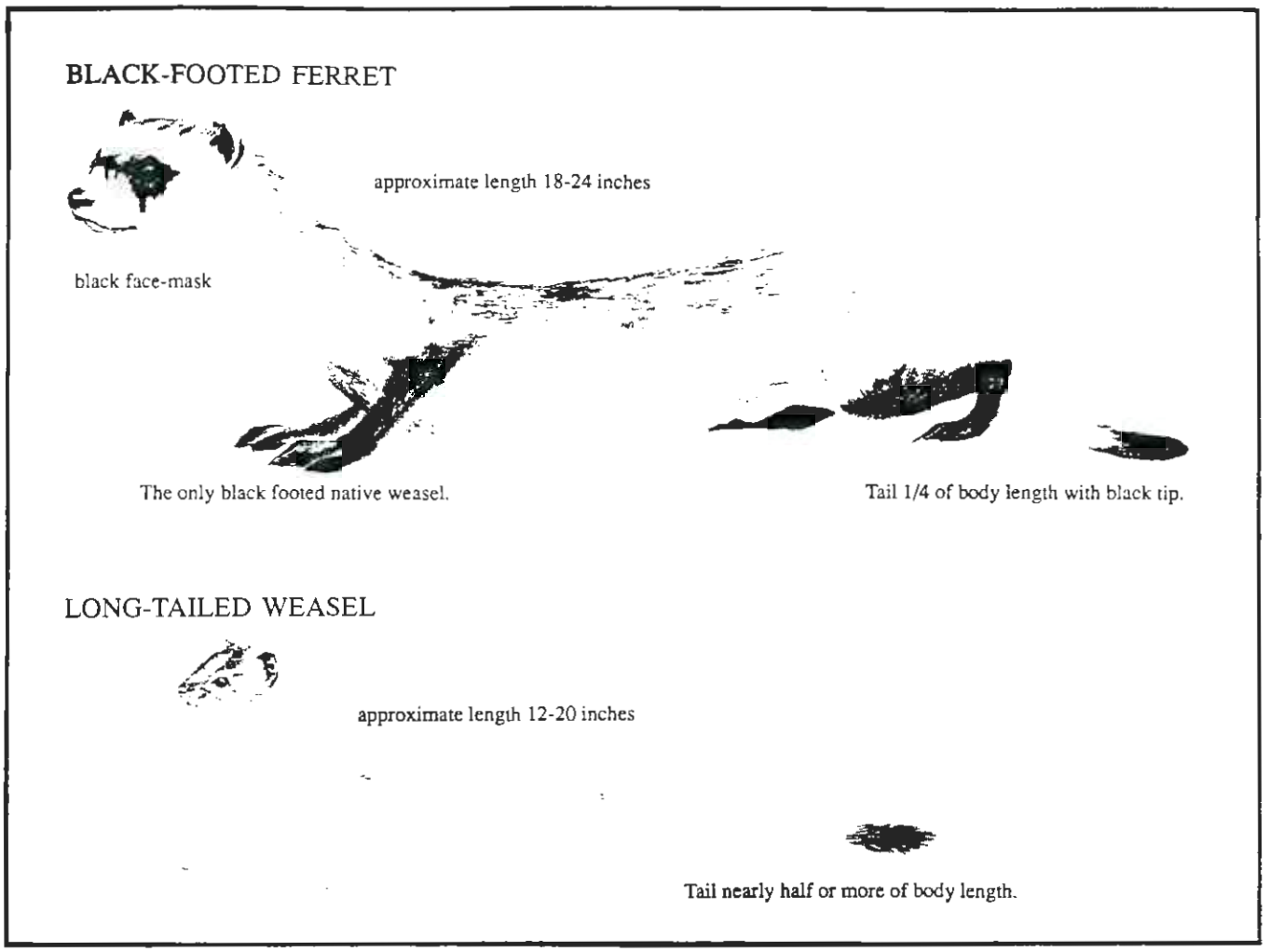
Long-tailed weasels are quite different from black-footed ferrets. They are much smaller with a length from 300 to 500 mm (12-20 in.) and a weight from 200 to 340 g (7-12 oz.). The only dark body marking on the long-tailed weasel is a black-tipped tail. The black tip is most noticeable in winter when the fur of the long-tailed weasel has turned white. The tail of the long-tailed weasel is one-half or greater than the total length of the body of the animal. The proportionately longer tail of the long-tailed weasel readily distinguishes it from the black-footed ferret.

The European ferret could easily be confused with the black-footed ferret. It is approximately the same size and may have a faint face mask. European ferrets range from yellow to black in body colour and often have dark legs. Dark coarse guard hairs and a completely dark tail on the European ferret are features that distinguish it from the black-footed ferret. The European ferret also has a more pointed muzzle.

European ferrets have been bred in captivity and are sold as domestic pets. These animals are similar in appearance to their wild ancestors, but the dark fur markings are less distinguishable or are absent.

DO NOT BE CONFUSED

Differences between the species are:



BLACK-FOOTED FERRET SIGNS

A black-footed ferret search usually begins by looking for field signs. Areas are checked for soil diggings, tracks, scats, and skeletal remains. Black-footed ferrets excavate soil from rodent burrows creating mounds of subsoil that are most visible during winter. Diggings alone are not conclusive evidence of the presence of ferrets but, in association with ferret-like tracks, are reliable field signs.

Searches should also include tracking during winter. Footprints in snow average 3.1 cm (1.2 in.) wide and 5.5 cm (2.2 in.) long. Ferrets often make a twin print pattern that is characteristic of the weasel family.

Black-footed ferret scats are long and thin and are either linear or folded back. They are generally tapered at both ends. Unfolded scats average 5.8 cm (2.3 in.) in length and folded scats average 4.2 cm (1.7 in.).

Skulls of black-footed ferrets are similar to those of mink. Small carnivore skulls that are found near ground squirrel colonies should be taken to local wildlife offices for identification.

THE SEARCH FOR BLACK-FOOTED FERRETS IN CANADA

In 1978, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), formally designated black-footed ferrets as extirpated, meaning they no longer exist in Canada but occur elsewhere in North America. Several, unconfirmed ferret sightings have occurred in Saskatchewan, Alberta, and Manitoba. Further investigation of these and new sightings is required to determine if ferrets still exist in Canada.

The Canadian Wildlife Service and the World Wildlife Fund Canada (Wild West) have initiated a search for black-footed ferrets in cooperation with the Saskatchewan Wildlife Branch and Alberta Fish and Wildlife Division. Researchers in the United States have developed search techniques for black-footed ferrets that are being used in Canada. Winter and summer searches will be conducted in areas where there are prairie dog colonies and concentrations of Richardson's ground squirrels (*Spermophilus richardsoni*). All new sightings that are reported will be investigated with the permission and cooperation of landowners.

SUMMARY

It is possible that black-footed ferrets still exist in Canada. Their former range in Saskatchewan was extensive. Large areas with potential ferret habitat still occur in the southern Canadian prairies. Recent reports of ferret sightings are encouraging and are being investigated. Public action is required to save this fascinating and secretive prairie carnivore and to ensure its survival.

WE NEED YOUR HELP! Please assist the search for black-footed ferrets. If you have seen or think you have seen a black-footed ferret, please contact the Canadian Wildlife Service or your nearest provincial wildlife office.

PLEASE REPORT BLACK-FOOTED FERRET SIGHTINGS TO

Mr. Garry Erickson
Alberta Fish & Wildlife
Sun Centre, 530-8th St South
Lethbridge, AB. T1J 2J8
Tel: (403)-381-5269

Dr. Roger Edwards
Canadian Wildlife Service
2nd Floor, 4999 - 98 Ave
Edmonton, Alberta T6B 2X3
Tel: (403)-468-8928

Environment Canada / Environnement Canada
Canadian Wildlife Service / Service canadien de la faune

WWF
World Wildlife Fund Canada
Fonds Mondial Pour La Nature Canada

(Aussi disponible en francaise)

B

W18

Potential Trumpeter Swan Restoration in Saskatchewan

On 26 June, 1986 Dale Hjertaas, Project Wild, Wildlife Branch, Saskatchewan Parks and Renewable Resources, asked me if I would consider looking at Saskatchewan's potential Trumpeter Swan restoration habitat while going to and from our summer assignments in Alberta. It seems that World Wildlife Fund's Wildwest project was interested in restoring Trumpeters to the Canadian prairies and Ducks Unlimited (Canada) was interested in restoring this high profile symbol of quality wetlands on their leased waters.

I retrieved " A List of Potential Trumpeter Swan Release Sites in Western Canada." R.Kent Brace, TTSS Newsletter #12, Mar. 1977. Kent, working with provincial waterfowl technical committees and other knowledgeable waterfowl biologists, had drawn up a list of potential sites for Alberta, British Columbia, Manitoba, Ontario and Saskatchewan in 1975. He had further prioritised these. The top six for Saskatchewan are 1. Cypress Hills 2. Midnight Lake 3. Duck and Moose Mountains Provincial Parks 4. Last Mountain Lake 5. Kitako Lake and 6. Middle and Lenore Lakes.

On 6 July, Ruth Burgess and I travelled by Saskatchewan Highway 9 and 48, surveyed the wetlands from Northgate through Moose Mountain Provincial Park to Regina and talked with Dale and Paule Hjertaas. On 7 July we continued west on Trans-Canada Highway 1, surveying wetlands enroute, stopping at Swift Current to talk with Regional Ecologist Marlon Killaby and to accompany him to Reedy and Andrews Lakes near Gull Lake, to Maple Creek and the west Cypress Hills.

On 9 September we returned to Saskatchewan on Yellowhead Highway 16 via Lloydminster, the North Saskatchewan River and the Battlefords to Saskatoon, surveying wetlands enroute. We talked with Dale Hjertaas that night and accompanied him the next morning to the Canadian Wildlife Centre to confer with Habitat Biologist Dan Nieman and with R. Kent Brace regarding Trumpeter restoration.

During the afternoon of 10 September we accompanied Hjertaas on Highways 16, M763, and S397 to Watrous and C-2 to Simpson, then east to the Last Mountain Federal Bird Sanctuary Administration Building. We met and conferred with Habitat Biologist Phil Taylor, Stan Wynesk and Area Manager Clint Jorgenson and accompanied them to survey their wetlands.

That night I accompanied Dale Hjertaas to Yorkton. On 11 September I met Ducks Unlimited (Canada) Biologists Fred Thornton and Jocelyn Bowman and accompanied Thornton and Hjertaas on an aerial survey of the Horseshoe Lake and Yorkton Wetland Complexes.

In midday 11 September I accompanied Hjertaas on C10 through part of the Yorkton wetland complex to Melville Regional Provincial Office and met Biologist Adam Smidt and Technician Ray Longmuir. In the afternoon we continued south on C-47 to Grenfell and west on Trans-Canada 1 to Regina. We searched Hjertaas library during the evening for historical references to Trumpeter Swan in Saskatchewan.

On 12 September Ruth Burgess and I travelled on Trans-Canada Highway 1 east by Indian Head to C47 and then south to Moose Mountain and Gooseberry Lakes. (We tried to find the Trumpeter Swan family reported to Nieman without success, although the habitat is adequate.) We continued on to Estavan, Saskatchewan

port of entry to U.S.A., west to Crosby, east to Bowbell and south to Minot looking for potential Trumpeter Swan migration routes.

We consider our cursory surveys as supplements to the work of R.Kent Brace and the Saskatchewan Waterfowl Technical Committee in 1975 (Brace 1977).

1. Cypress Hills and surrounding areas.

Our Cypress Hills survey was described in our letter of 11 July,1986 to Dale Hjertaas. We consider that the restoration of undisturbed Swan nesting habitat, habitat enhancement, and the expansion of Saskatchewan's only known Trumpeter Swan nesting flock a top priority. We suggest that provincial and CWS biologists survey further the potentials for restoring this flock through the eastern Cypress Hills and the surrounding areas.

2. Midnight and surrounding lakes.

Midnight Lake has been deleted from the list of potential Trumpeter Swan restoration sites. It was first included onthe basis of misidentification of nesting Tundra Swans as Trumpeters. Ecologically it would be counter productive to replace these unique southern-nesting Tundra Swans with Trumpeters.

3a. Duck Mountain Provincial Park.

We did not have the opportunity to look at this area.

3b. Moose Mountain Provincial Park area.

On 11 July 1986 we reported that the wetlands that we had seen along Highways 9 and 48 on 5 July would not be particularly attractive for nesting Trumpeters. Since then we heard a rumor that swans were nesting near Corning, Saskatchewan. We surveyed Moose Mountain and Gooseberry Lakes on 12 September and found their upper reaches adequate for nesting swans. To be more specific, Gooseberry Lake has sufficient margins and islands of bulrush for nesting Trumpeters and is currently used by dabbling ducks, geese and coot. The upper west arm of Moose Mountain Lake had good cattail and bulrush margins, some islands, visible submergents, some beaver activity and many dabbling ducks and coot. The east arm, however, has a gravelly bottom,is worked for gravel and has few apparent aquatic plants. The main lake as viewed from the dam, is wide open, has few apparent aquatic plants, is bordered by boulders and is managed as a recreation area by the Wild Horse Hills Community and Regina Hunting and Fishing Club. If in fact, Trumpeters are found to be using this area, a great effort should be made to enhance this area by cooperating with local organizations and people, the Moose Mountain Provincial Park staff, the White Bear Lake Indian Reservation and Treaty Indians to reduce disturbances.

4. Last Mountain Federal Wildlife Management Unit and Bird Sanctuary.

In our inspection of Last Mountain Wildlife Management Unit, we found an ideal interspersion of emergent and submerged aquatic vegetation and some bulrush-covered islands for restored nesting Trumpeter Swans. The area appeared similar to Lacreek National Wildlife Refuge's productive swan habitat in South Dakota. Current use by the many fledgelings and post-molting ducks indicates

an abundance of aquatic invertebrate food for Trumpeter cygnets. I have some reservation for using shot-over areas for swans because spent lead and disturbances can cause Trumpeter restoration problems. But some changes in federal management in exchange for including a regional park within its Sanctuary could no doubt accomodate this concern.

PoolB, with the adjacent CWS administrative office and residence, seems the ideal site for a pair of pinioned or wing-clipped Trumpeters. The Stalwart National Wildlife Area also has ideal habitat for Trumpeters and would serve as one of the many ideal expansion areas once Trumpeters are restored to Last Mountain Lake area.

Last Mountain Federal Sanctuary will be 100 years old in 1987. It would be fitting and a high profile media event if Trumpeter Swans were restored there next year. It should have top priority for 1987.

5. Kitako Lake area.

We regreat that we did not have an opportunity to visit this area.

6. Middle and Lenore Lakes area.

We regret that we had no opportunity to survey this area. However, restored Trumpeters at Last Mountain Lake could expand into this area. We see no problem of restored Trumpeters competing with established breeding Canada Geese. Our experience at Lacreek indicates that Trumpeters will occupy their selected site but Canada Geese may nest as close as 30 yards.

7. Horseshoe Lake and Yorkton DU Complexes.

These units were added at the suggestion of Trumpeter Swan Society member and Ducks Unlimited (Canada) Biologist Fred Thornton of Yorkton. Our aerial survey indicates that the soils are more sandy and alkaline than Last Mountain soils. Waterfowl and aquatic vegetation were less abundant.

Horseshoe Lake Complex

Segment 2 had some good margins and bays of bulrush for nesting Trumpeters. There were also some other bays of bulrush where muskrats were building houses satisfactory for swan nest sites. At least one beaver lodge exists as a potential nest site.

Yorkton Wetland Complex

This complex had some good bulrush bays and margins. But Leach Lake is alkaline and quite bare. Some small lakes and ponds appeared better swan habitat than the larger lakes. A 15 acre pond on Thornton's land appeared ideal for a pair of swans. The Lower Rousay Lake bulrush bays, margins and island look better from the car than from the air indicating an aerial bias. I reserve judgment as to whether these complexes should be considered potential restoration areas until further aquatic food studies are made. There is certainly plenty of expansion area in these complexes and beyond.

8. Cumberland Delta Saskatchewan River Area.

Based on Dr. Stuart Houston's conclusions that most of the historical swan sightings reported at Cumberland House were of spring arriving Trumpeters and that Whistling (Tundra) Swans were later migrants and birds of passage in that area, Cumberland Delta should be considered a potential Trumpeter Swan restoration area. Recent rumors of Trumpeters in the Lake Winnepegosis (Manitoba) area and the December 24,1985 sighting of an adult Trumpeter at Squaw Rapids, Saskatchewan indicate straggler Trumpeters in the Cumberland Delta area. Weather data should be studied for average frost-free and ice-free periods compared with other areas. (Grande Prairie has 116 and Regina has 83 (?) average frost-free days). Extensive habitat surveys should evaluate the area for breeding Trumpeter Swan. If adequate, restoration should be recommended. Routine restoration efforts, however, would be insignificant in those vast wetlands. Big scale restoration is recommended in "A Reintroduction Plan for Trumpeter Swan in Ontario" (Lumsden 1985) is needed.

Wintering Migration and Habitat.

Inadequate wintering habitat is the primary limiting factor to Trumpeter Swan expansion. Restored Lacreek and Hennepin Flock Trumpeters are successfully pioneering into south central United States impoundments and reoccupying rivers of milfoil and other aquatics in the south.

Natural waterways and migration routes lead southward from Saskatchewan for the swans to follow, starting with tributaries to the Milk and Missouri Rivers on the west to the Missouri Coteau lakes in south central Saskatchewan and the Des Lac and Upper Souris Rivers and Missouri River to the southeast.Saskatchewan Trumpeters then have a choice of following the Missouri-waterway to the Mississippi River and south or proceeding south on their own guiding system.

Restoration and Techniques.

Trumpeter Swan restorations vary with their objectives, habitat and availability of stocks. Trumpeters are rare in Canada and available restoration stocks are scarce. A very few pairs may be available from the wild or from aviculturists for high-profile media restoration events but Saskatchewan's success with restoration may depend on its agency's efforts to propagate its own stocks over the long haul. Guidelines for the Propagation of Trumpeter Swans by Gillette and Dyre,TTSS.may be useful for this consideration.

Summary.

We suggest that priorities be given to enhancing the Trumpeter Swan habitat in the Cypress Hills and to restoring the Trumpeter Swan in the Last Mountain Area in 1987. Extensive habitat surveys should be made in the Duck Mountain, Kitako Lake and Cumberland Delta Area. Further studies should be made in the Horseshoe Lake- Yorkton Wetland Complexes to evaluate them for Trumpeter Swan production.

Monitoring other experimental Trumpeter Swan restoration studies across North America can be done through The Trumpeter Swan Society and could help increase the efficiency of Saskatchewan efforts. Trumpeter Swan brood stock should be obtained when available for both short and long-term restorations.

Respectfully submitted 16/9/86 Harold H Burgess
Harold H. Burgess, Chairman Restoration Committee and Past President,
The Trumpeter Swan Society

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PROJECT SUMMARY - BURROWING OWL 1987

The Burrowing Owl project of 1987 consists of two phases, the reintroduction program at Oak Hammock Wildlife Management Area, and the continued monitoring of Manitoba's resident population of burrowing owls in the southwest.

The first step in the reintroduction program was to contact various individuals in British Columbia, Saskatchewan, Ontario, and Minnesota who had worked with burrowing owls to obtain information on methods and equipment for a transplant. Next several materials and designs for holding pens, artificial burrows, and traps were evaluated regarding feasibility and cost. Eventually two holding pens (20' X 25') were constructed along a ridge running through the north, grazed pasture of Oak Hammock. A pen consisted of a wooden frame covered by tent mosquito netting and surrounded along the bottom edge with chicken wire to prevent the entry of predators. Although there were some natural burrows at the site, eighteen artificial burrows were constructed and placed in the pens and surrounding area to guarantee suitable nest burrows and satellite holes. The burrows were modified versions of those described by Collins and Landry (1977) and consisted of a ½' X 6' tunnel of either wood or drainage pipe with an attached wooden nest box (12'' X 12'' X 8''). Theses burrows were dug into the ground so there was at least a 6'' layer of soil on top to provide insulation. On June 22 a trip was made to Moosejaw, Saskatchewan and one family of burrowing owls (1 male, 1 female, 7 young) was captured. This family was immediatly transferred to a pen

at Oak Hammock. Care of this family included daily feedings of approximately 10 lab mice. The pen will be dismantled when the young appear above ground which is expected to occur the week of July 13. At this stage the young will be banded. Mice will continue to be provided until the birds are capturing enough food for themselves and ignoring the supplement. A second family was obtained from Kranau , Saskatchewan. However it was missing a female and therefore nine recently orphaned owlets were received. The orphans were held indoors for one week in a large box and hand fed finely chopped mice four times per day. Subsequently these birds have been moved to a small outdoor cage containing four quasi-artificial burrows. Currently the owlets are being fed large mice pieces twice a day. It is expected by the week of July 13 they will be able to tear up whole mice and can be placed in the second large pen at Oak Hammock. During this transplant the young birds will be banded. The orphans will be held in this pen for approximately two weeks to habituate to their new surroundings, after which the pen will be dismantled and food supplements decreased accordingly. The St. Lazare Community Pasture has been partially scrutinized and assessed as a proposed release site for the reintroduction program for the summer of 1988. Further visits are planned for the end of July. It is hoped the local wildlife society will become involved by building 20 artificial burrows to be used at the release site and participating with various phases of the release.

Fieldwork in southwestern Manitoba on the wild burrowing

owl population began the first week of May. Sites used the previous year by burrowing owls were scouted for returning birds and the artificial burrows placed in pastures the previous fall (1986) were checked. Seven active sites were identified with one bird utilizing an artificial burrow. Hundreds of other suitable pasture and native prairie areas have since been checked and sources from earlier burrowing owl surveys have been contacted regarding any new sites. These efforts have turned up less than ten new sites. By the end of June three of the sites that had been previously active were abandoned. Six family groups have been identified and about 30 of their young banded. Less than half a dozen other sites remain active and may produce young this year. These, too, will be banded. Landowners were invited to participate in the banding of the owlets and all accepted, showing a greater interest in the birds after the experience. Information sheets were given to all landowners and interested people.

Media coverage of the burrowing owl project includes aired interviews on CFQX, the Selkirk radio station, articles in the Shoal Lake Star and Deloraine Times, and a spot in a film featuring the endangered species of Manitoba.

D

LONG-TAILED WEASELS (MUSTELA FRENATA) IN MANITOBA - A STATUS REPORT

by

Kay Harvey

A Practicum Submitted
in Partial Fulfillment of the
Requirements for the Degree,
Master of Natural Resources Management

Natural Resources Institute
The University of Manitoba
Winnipeg, Manitoba, Canada
April, 1988

P.O. Box 185
Pinawa
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ROE 1LO

July 27, 1988

Mr. Miles Scott-Brown
Executive Coordinator, Wild West
World Wildlife Fund Canada
#204-1422 Kensington Rd. N.W.
Calgary
Alberta. T2N 3P9

Dear Sir,

Re:Long-tailed weasel population status
in Manitoba (WWF file:W21).

Please find enclosed a copy of my final report on long-tailed weasels in Manitoba. I would like to apologize for the delay in sending this to you - I have been out of the country for a while so it has taken a little extra time to get my copies organized.

I would also like to apologize for the progress report you received last December. I had no idea that it was to be delivered to you, or I would have made it much more extensive - I was under the impression that it was an internal report for the use of the Manitoba Wildlife Branch only, so it was a very brief summary of the results of my survey. I am sorry you were given such an incomplete document. I hope the enclosed final copy is more acceptable.

In reply to your question regarding the research done by LLoyd Gamble - my research had no connection whatsoever with his work, and any contact with him was actively discouraged by the Manitoba Department of Natural Resources. Results from his Masters thesis have been included in my report, but his more recent unpublished research has not. I hope this clears up any misunderstanding about a relationship between his research and mine.

I would like to take this opportunity to thank you for your generous funding of my research - without it the pesticide analysis would not have been possible. I deeply appreciated your support.

Sincerely,

Kay Harvey

Kay Harvey.

LONG-TAILED WEASELS (Mustela frenata) IN MANITOBA -- A STATUS REPORT

by

Ms. Kay Harvey

A practicum submitted to the Faculty of Graduate Studies of the University of Manitoba in partial fulfillment of the requirements of the degree of Master of Natural Resources Management.

The University of Manitoba
Natural Resources Institute
177 Dysart Road Winnipeg Manitoba R3T 2N2

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a practicum entitled:

LONG-TAILED WEASEL POPULATION STATUS IN MANITOBA

Submitted by: Ms. Kay Harvey
in partial fulfillment of the requirements for the degree, Master of Natural Resources Management (M.N.R.M).

Faculty Advisor: Dr. Rick Baydack _____ *Signature*

Advisor: Mr. John E. Dubois _____ *Signature*

Advisor: Dr. Jacek Romanowski _____ *Signature*

Advisor: Mr. R. Stardom _____ *Signature*

Chairman of the Oral Examination:

Dr. Walter Henson _____ *Signature*

Director, ***Natural Resources Institute:***

Dr. W. R. Henson _____ *Signature*

Date: April 7, 1988

ABSTRACT

Concern regarding reduced pelt harvests of long-tailed weasels (*Mustela frenata*) in the prairie provinces, together with research suggesting that this species was becoming rare in parts of Manitoba, resulted in the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) placing it on the list of animals classified as "threatened". This study was undertaken to determine whether there had been a decline in long-tailed weasels numbers in Manitoba, and if so, to identify possible causes and suggest management strategies to stabilize and encourage population growth of the species.

The main avenue of data collection was a trapper questionnaire. Carcass analysis was used to collect biological (age, sex, size) and toxicological data. Conclusions were that long-tailed weasel numbers are much lower than 30 years ago, but that reduced pelt harvests are largely due to lack of trapper interest in the species commercially. The most probable causes of reduction in the numbers are habitat loss due to land clearing for agriculture, and food loss due to similar habitat loss of the prey species. Toxicological studies showed no accumulation of organochloride pesticides or PCB in the tissues, but the study was inconclusive concerning pesticide impact as carcasses were only available from areas with low pesticide usage.

Suggested management strategies include closing the trapping season for the species; providing increased information on habitat protection for the species to everyone concerned with agriculture, and establishing a wildlife refuge in an area where they are still relatively abundant. Suggestions are made as to the need for further studies of the species.

ACKNOWLEDGMENTS

I would like to thank the members of my committee for their time, constructive criticism, direction and patience. To Mr. Dick Stardom, Biological Services, Manitoba Department of Natural Resources, whose helpful direction and quiet faith in me was an inspiration. To Dr. Rick Baydack, my faculty advisor, for his advice, constant support and encouragement. To Mr. Jack Dubois, Manitoba Museum of Man and Nature, for guidance, understanding, provision of much helpful advice and information, and constructive criticism which helped to produce a much improved document. To Dr. Jack Romanowski, for his editoral help, sound questions, and for being such a good listener when I had problems.

A very special thanks to Cathy Johnson, without whose practical help and endless patience this project would never have been successful. A special thanks also to Dr. Merlin Shoesmith for initially suggesting this study to me, for his continued support and advice throughout the project, and his assistance in obtaining funding from the World Wildlife Fund "Wild West" program, and through the Department of Natural Resources. To World Wildlife Fund and Manitoba Department of Natural Resources for providing funding, and Biological Services for the use of their facilities and covering the costs of the survey.

To Dr. W.O. Pruitt, Jr. for lending me mounted samples of long-tailed, short-tailed and least weasels. To Dr. R. Currie, for advice in setting up my questionnaire. To Dr. B. Webster, for shedding some light on the complex world of pesticide analysis.

A big "thank you" to all the trappers who took the time to

complete the questionnaire, in particular, those who cared enough to provide much more information than was requested. Also, to all the trappers who donated carcasses for the study.

To all the staff at N.R.I. To Chris and Emily for their willing help and unfailing cheerfulness, and to Dr. W. Henson and Professor Tom Henley for their genuine interest and helpful advice. To my fellow students and friends at N.R.I. for treating me the same as everyone else despite the age-gap! Also for their encouragement and valuable help in finding my way through the intricacies of university procedures. In particular, Bev. Hathaway for her friendship and support, Ken Thomson, Cyndi Kohuska, Bruno Rosenburg and Bob Berger for providing much useful information.

A big thank you to Sandra Ramsay for all her help in putting together my final copy, and to my neighbors, Chris and Egon Frech for the use of their IBM.

Thanks also to the many people in government offices, laboratories, Ducks Unlimited, Canadian Wildlife Service, and others too numerous to mention, for their unfailing courtesy and willingness to help. To Atomic Energy of Canada for unwittingly introducing me to the N.R.I. program.

Lastly, but most importantly, to my long-suffering family, who have endured rushed meals, dusty rooms, and endless late nights, but who have always supported and encouraged me. Special thanks to my son, Neil, for many hours of computer work on my behalf, and to my husband, Keith, for financial and moral support, without whom I could never have completed the program.

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CHAPTER 1

INTRODUCTION

Concern was expressed about declining populations of long-tailed or prairie weasels (Mustela frenata) in the southern prairies in a report prepared by the Canadian Department of Industry, Trade and Commerce (1977). Research carried out by Gamble (1981) suggested that this concern was justified and that long-tailed weasel numbers were much lower than in the past. These factors, together with the low number of pelts taken in previous seasons, led to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) placing the long-tailed weasel on the list of animals classified as "threatened" (1982 April 6).

1.1 PROBLEM STATEMENT

In Manitoba, there are three species of weasel, though only two are trapped for their fur, the bush or short-tailed weasel (M. erminea), and the prairie or long-tailed weasel. The least weasel (M. rixosa) is caught rarely and is of low value due to its small size. There are a number of sub-species of long-tailed weasel in Canada, Mustela frenata longicauda being the one most commonly found in Manitoba (Hall 1951).

At present, neither the distribution nor population densities in Manitoba are well known. Accurate estimates of trapper harvests

for long-tailed weasels have not been available from records of pelt takes because trappers have traditionally caught both species of weasel, with no separate records being kept of the numbers of each type. Official records for weasel harvents list "weasels" as one category, with a ratio of 10:1 short-tailed to long-tailed weasels being suggested as a method of estimating the number of long-tailed weasels trapped per season (pers. comm. R. Chin, Dominion-Soudack 1987, Simms 1979). Therefore, the estimated numbers are very approximate. However, the total number of weasel pelts taken in the 1985-86 season is approximately one tenth of the number taken in 1945-46 (Table 1.1), implying that both long-tailed and short-tailed weasel populations may be much smaller than in the past, or that trapper effort in taking weasels is much reduced. (From 1974 to 1981 there was a slight increase in the pelts taken but after this the numbers continued to decrease. As short-tailed weasel populations exhibit periodic fluctuations this may account for the increase and following decrease (Osgood 1935, Lakemoen and Higgins 1972)).

Numerous factors may have contributed to the decline in the take of long-tailed weasels. Changing farm practices, for example, reduction in grain sheaves and haystacks, land clearing, and pothole draining may have been responsible by reducing den sites, prey availability and drinking water (Hall 1951, Gamble 1981). Due to reduced habitat and prey availability there may be increased competition from mink (Mustela vison) and badger (Taxidea taxus), which occupy the same range and utilize the same prey species (Banfield 1974). There may also be increased mortality or reduced reproductive capacity as a result of pesticide build-up in body tissues (Moore 1977). It is also

TABLE 1.1

ESTIMATED TOTAL HARVEST FIGURES FOR LONG- AND SHORT-TAILED WEASELS IN MANITOBA

(Department of Natural Resources records)

Season	RTL Area	Open Area	Provincial Total
1945/46			109,613
1947/48			91,600
1949/50			152,800
1951/52			79,049
1953/54			62,578
1955/56			95,641
1957/58			61,002
1959/60			45,205
1961/62			29,600
1963/64			24,527
1965/66			32,034
1967/68			26,394
1969/70			10,613
1970/71	720	4,323	5,043
1971/72	1,067	2,698	3,765
1972/73	5,825	4,308	10,133
1973/74	2,149	3,720	5,869
1974/75	5,958	12,247	18,205
1975/76	6,544	6,386	12,930
1976/77	5,368	11,570	16,938
1977/78	4,122	6,876	10,998
1978/79	4,901	9,958	14,859
1979/80	7,397	13,917	21,314
1980/81	5,796	9,724	15,520
1981/82	3,921	5,957	9,878
1982/83	2,839	3,152	5,991
1983/84	2,218	2,994	5,212
1984/85	5,084	5,575	10,699
1985/86	5,352	3,656	9,011

A 10:1 proportion can be used to estimate long-tailed weasel numbers (R. Chin, Dominion-Soudack 1987, Simms 1979) in the Open Area (area surveyed consisted mostly of Open Area - Duck Mountain and Porcupine Mountain were the only registered trapline areas included - see Fig. 1.2).

possible that the improved standard of living of most trappers (Appendix 1), together with relatively low pelt prices, have resulted in low trapper effort with a correspondingly low number of pelts taken. These factors, combined with a lack of historical records of previous population levels, make it difficult to ascertain whether a population decline indeed occurred.

This study was motivated by the need for more information to allow rational decisions to be made concerning harvest and habitat.

1.2 RESEARCH OBJECTIVES

The purpose of this study was to clarify whether the long-tailed weasel population in Manitoba has declined over the past 40 years, and if so, to identify some possible contributory factors.

Research objectives were:-

(i) to estimate present distribution and relative abundance of long-tailed weasels in Manitoba, and any changes that may have occurred over the past 40 years.

(ii) to estimate the number of long-tailed weasels being trapped at present in comparison to previous years, and current trapper interest in the species.

(iii) to identify habitat changes that may have contributed to a decline in long-tailed weasel numbers.

(iv) to determine age, sex, and size of carcasses donated by trappers, and the level of organochloride pesticide and polychlorinated biphenyl (PCB) accumulation in the tissues of a sample of the carcasses.

(v) to determine whether special status for long-tailed weasels is warranted, to recommend management strategies that would help to stabilize long-tailed weasel populations, and to suggest land management practices that would enhance weasel habitat.

1.3 BACKGROUND INFORMATION

1.3.1 General Description

Long-tailed weasels are small, slim, long-bodied carnivores belonging to the family Mustelidae (includes mink, otter (Lontra canadensis), skunks (Mephitis mephitis). Adult males weigh 184 to 345g and reach lengths of 33 to 56 cm, while adult females weigh from 71 to 198 g and attain lengths of 28 to 38 cm (Deems and Pursley 1983). They are easily recognized by their very long black-tipped tail (at least one-third of the body length), and in summer by their rich, buffy-yellow underparts. The rest of the pelt is a yellowish chocolate brown (Fig. 1.1). In winter, the pelt is pure white except for the tip of the tail which remains black. It is during winter, when the pelage is white and weasels are known as ermine, that they are trapped for their pelts (during the summer short-tailed weasels are usually called bush weasels and long-tailed weasels, prairie weasels). Both males and females have

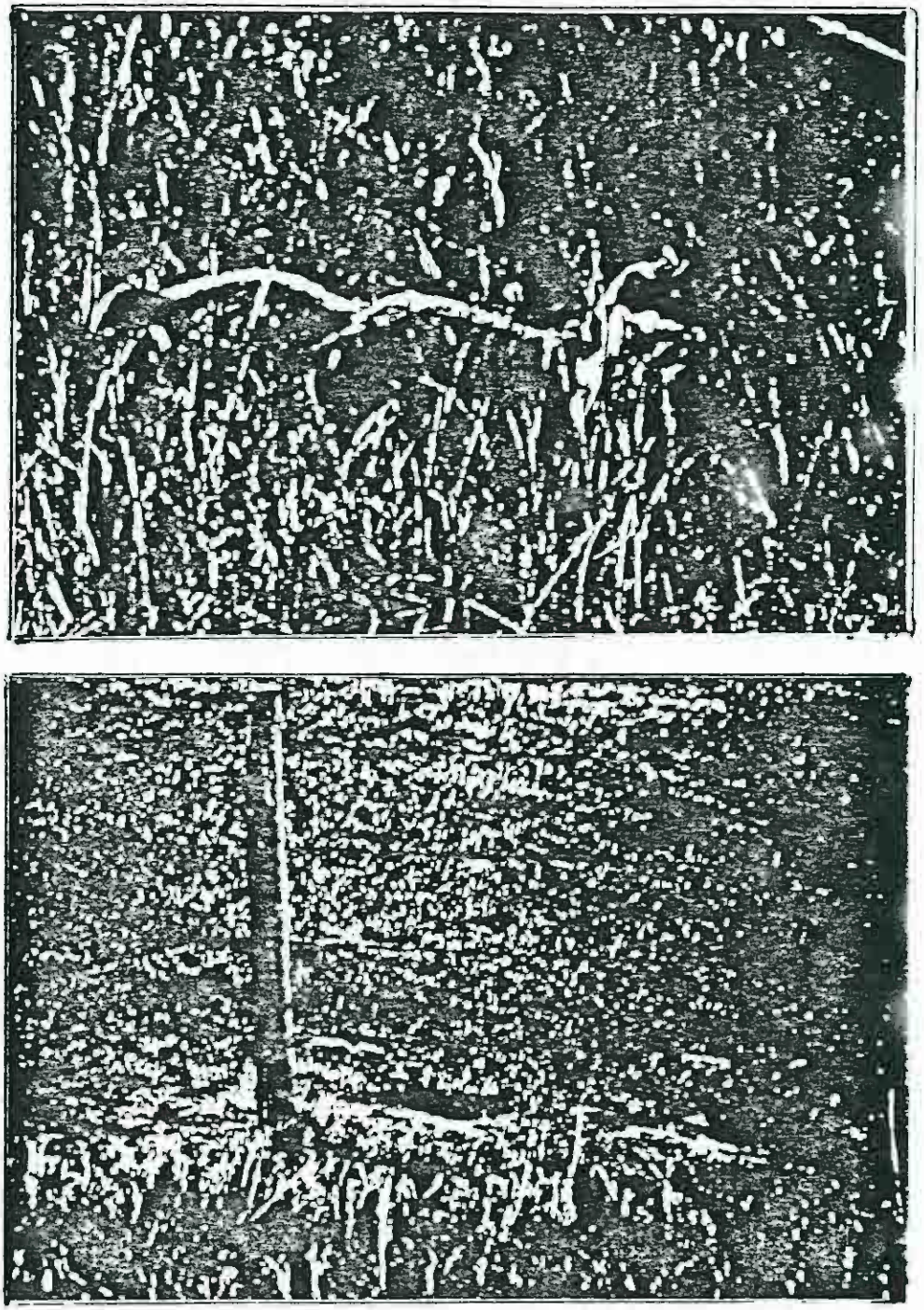


Fig. 1.1 Long-tailed weasel showing black-tipped tail and natural habitat.

the same coloring, with males being much larger than females (Seton 1909, Soper 1919, Hamilton 1939, Hall 1951).

1.3.2 Distribution

There is little literature documenting the distribution of long-tailed weasels in Manitoba in any detail. Short-tailed weasels are found throughout Manitoba, whereas long-tailed weasels are thought to occur throughout southern Manitoba from approximately 75-km west of the Ontario border to Saskatchewan. Northern limits of their range are the lower edges of Lakes Winnipeg and Manitoba, along the western side of Lakes Manitoba and Winnipegosis to The Pas (Fig. 1.2). The northern coniferous forest forms the northernmost limits of its range (Banfield 1974, Gamble 1981, Hall 1981). In 1909, Seton reported that the long-tailed weasel was abundant on the prairies. Soper (1961) stated that it was seen mostly on the treeless prairies, but occasionally in aspen groveland and mixed forests.

Hall (1951), Banfield (1974) and Gamble (1980) produced general distribution maps of long-tailed weasels in Manitoba (Fig. 1.3). Examination of these maps shows there have been some changes over recent years. However, long-tailed weasels are not present uniformly throughout the area, but tend to occur in "pockets" (Gambel 1980). There is no documentation that gives any indication of where there are concentrations of any consequence. Gamble (1980) claimed that the actual area of distribution is almost twice that recorded by Banfield (1974).

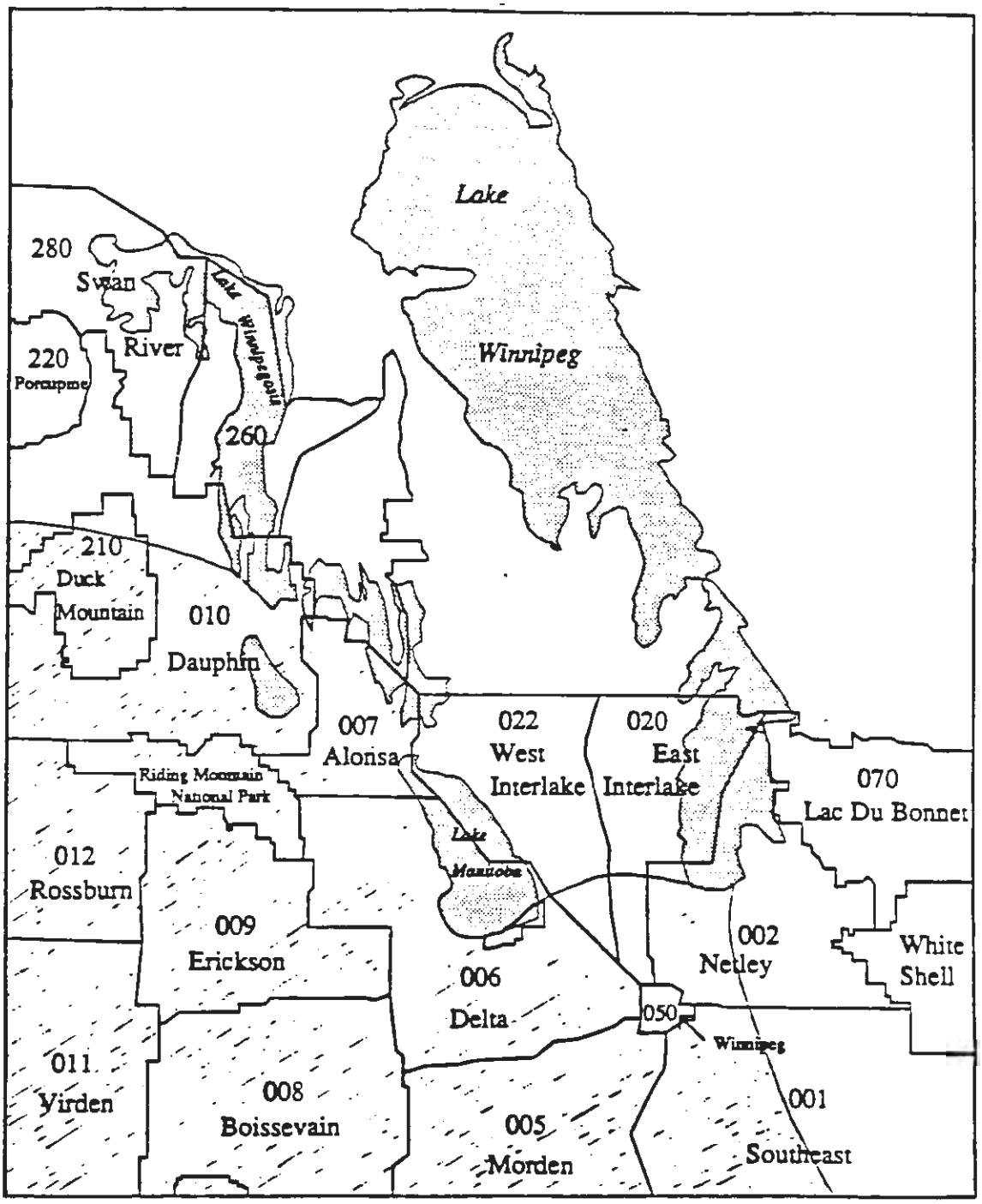
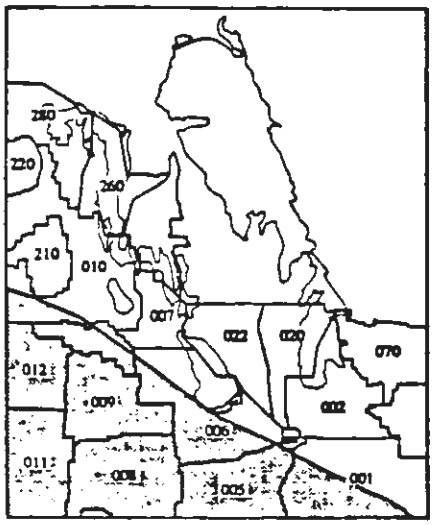
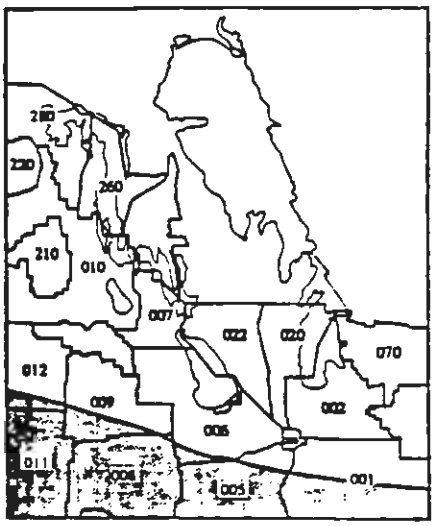


Figure 1.2 The range of the long-tailed weasel in Manitoba. (Deems and Pursley 1983)



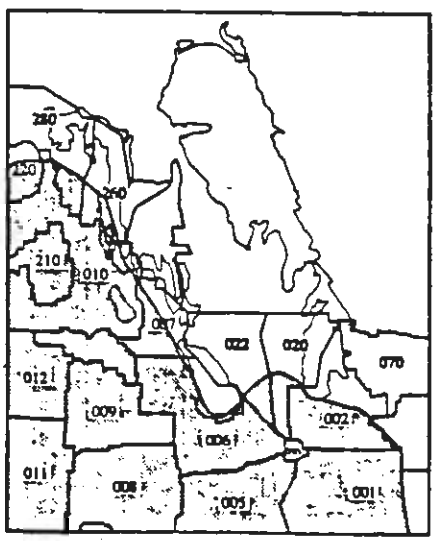
Distribution map of *Mustela frenata longicauda*.
From Hall and Kelson - 1959.

Figure 1.3(a)



Distribution map of *Mustela frenata longicauda*.
From Banfield - 1974.

Figure 1.3(b)



Distribution map of *Mustela frenata longicauda*.
From Gamble - 1981.

Figure 1.3(c)

Figure 1.3 Distribution maps of Mustela frenata longicauda in Manitoba.

1.3.3 Habitat

Long-tailed weasels are ecotonal (transitional) species and occupy a wide variety of habitats, such as coniferous and deciduous forest edges, brushland, marshes and agricultural areas. They are found in short-grass plains, the more northern prairies and parkland, and are described as typical species of the transition zone which coincides with the Aspen parkland area (Soper 1964). The parkland area is also well suited to agriculture, and botanists have estimated that 95% of this biome has been removed (Bird 1930 and 1961, Kiel et al. 1972, Merriam 1978) due to agricultural activities. This is a severe reduction in habitat and may have caused the species to become fragmented over the prairies (COSEWIC 1982). River banks and wetlands provide habitat where a diversity of prey are found, but these are also being drained and cleared (Kiel et al. 1972).

1.3.4 Food Habits

Long-tailed weasels are generalist feeders utilizing a wide variety of prey such as pocket gophers (Geomyidae), rabbits (Leporidae), mice and voles (Cricetidae), squirrels (Sciuridae), grasshoppers (Orthoptera), beetles (Coleoptera), and earthworms (Lumbricidae) (Osgood 1935, Hamilton 1939, Hall 1974). Garter snakes (Thamnophis sirtalis), muskrats (Ondatra zibethicus), ground-nesting birds (particularly the red-winged blackbird (Agelaius phoeniceus) and their eggs also form part of their diet (Hamilton 1933, Errington 1936, Hall 1951, Simms 1979, Gamble 1980). It has been suggested that a source of free-standing water is also necessary (Gamble 1980).

CHAPTER 2

METHODS OF INVENTORY

Methods of data collection can be divided into four sections:-

1. Trapper survey;
2. Personal interviews;
3. Analysis of museum and auction records; and
4. Carcass analysis.

2.1 TRAPPER SURVEY

A trapper survey (Appendix 2) was used as the main avenue of data collection for a number of reasons:-

(i) the area to be considered was very large (more than a quarter of the province);

(ii) because long-tailed weasels tend to be fragmented throughout their range (COSEWIC 1982) rather than uniformly distributed, studying a small area would not produce results that could be applied to the whole of the long-tailed weasel range;

(iii) trappers are usually very observant and aware of their surroundings when trapping;

(iv) trappers are active continuously in all areas of the province at the same time allowing comparison of a wide area simultaneously;

(v) many trappers have been active for 40 or more years and can provide valuable information of past population distribution and levels of abundance;

(vi) it is an advantage to know trapper attitudes before designing a management plan for a species (these attitudes can be the difference between success and failure of any management plan (Bailey 1980)).

Based on Manitoba Registered Trappers Association Local Fur Council (LFC) sections (Fig. 2.1), areas were identified where long-tailed weasels were known to have occurred. In November, 1986, a questionnaire was prepared and mailed to a random 25% sample of trappers from each of these LFC areas (approximately 2,500 total). By the end of April 1987, a total of 856 questionnaires had been returned. Surveys were sorted into LFC areas and responses for each area analyzed. The results were used:-

(i) to estimate present distribution and relative abundance compared to previous years, and trapper opinions as to possible causes for any changes that may have taken place;

(ii) to estimate the numbers of long-tailed weasels being trapper now compared with previous years, and to estimate whether trappers are interested in trapping them at present; and

(iii) to identify habitat changes that may have contributed to a decline in the long-tailed weasel.

Preferred habitat for each LFC area was estimated and some indication obtained of habitat changes over the years from trapper observations. Other information such as whether trappers normally sold their pelts, and if not, what they did with them, and number of years they had been trapping was also obtained.

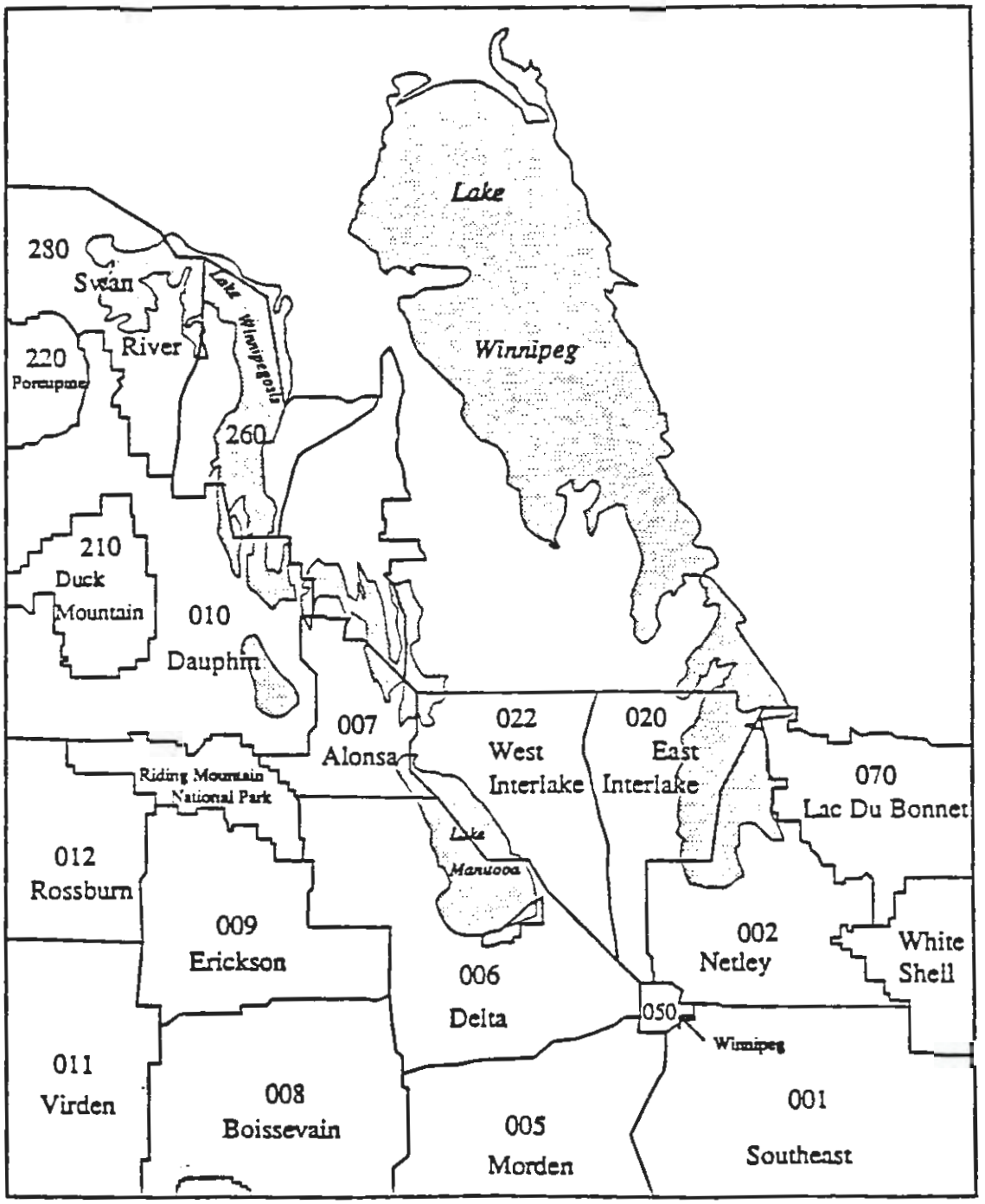


Figure 2.1 Local Fur Council Areas - Manitoba

A map (Appendix 2) was included with each survey and the trapper was requested to mark his trapping area so that a more accurate distribution range could be calculated.

A question was included concerning sightings of badgers in the same areas. The Department of Natural Resources has received numerous reports in recent years that badgers have declined considerably (pers. comm. C. Johnson, Department of Natural Resources, 1987). As badgers occupy similar habitat and utilize some of the same prey species as long-tailed weasels, this was used as a cross-reference to determine possible changes in abundance of badgers and factors that may be affecting both species. Information received for badgers has been recorded in Appendix 7.

Responses to all questions were calculated as a percentage of total responses for that LFC area. Results were tabulated and presented as bar charts for easier visual comparison. General distribution maps were prepared showing the variation in density of long-tailed weasels in different time periods, and a more specific map showing areas where long-tailed weasels were seen or caught over the 1985-86 and 1984-85 seasons (i.e., the present range).

2.2 PERSONAL INTERVIEWS

Survey results were supplemented by personal interviews at Trapper Workshops (held by the Department of Natural Resources) as follows:-

(i) Ashern, West Interlake, on 1986 October 11, which was attended by 22 trappers;

(ii) Ste. Rose du Lac, Dauphin area, on 1986 November 13, which was attended by 27 trappers.

Other trappers were interviewed at a Trapper Association annual meeting held in Rennie, Whiteshell, on 1986 October 15. Approximately 50 trappers were present at this meeting.

Individual trappers were also interviewed, four in the Whiteshell/Lac du Bonnet area, three in the Altona/Morden area, one in Virden, two in Boissevain, and one in The Pas. The original intention had been to follow up, by telephone, any trappers whose survey showed considerable knowledge of the species. However, after the surveys were analyzed, it was noted that any trappers with detailed information had taken the time to write extra information either on the questionnaire or as separate letters. Thus, a follow-up was an unnecessary expenditure of time and money.

2.3 ANALYSIS OF MUSEUM AND AUCTION RECORDS

A batch of large pelts (from Manitoba) at Dominion-Soudack Fur Auction, Winnipeg, were measured and their sex determined where possible (position of the nipples on a female, and in males the mark on the pelt indicating the presence of the penis, but these marks are not always easy to identify once a pelt has been formed). Measurements were also difficult to determine accurately after forming as forming methods and boards differ considerably amongst trappers.

Manitoba Museum of Man and Nature maintains a collection of long-tailed weasel specimens donated to them, and capture locations from 1970 to 1984 were analyzed. A distribution map resulted which was compared with results from the trapper survey.

2.4 CARCASS ANALYSIS

A request was sent out with the questionnaire for trappers to donate any carcasses of long-tailed weasels thay may acquire to the Department of Natural Resources for analysis. At the same time, posters (Appendix 3) were distributed to all area offices of the Department, and posted in as many places as possible. A shorter version of the poster (Appendix 4) was placed in community newspapers in the LFC areas (Appendix 5), and a radio broadcast made from the Brandon studios (December 1986) describing the study being done and requesting carcasses and any information regarding sightings.

A total of 45 carcasses were donated, 21 during the 1986-87 season and a further 24 in the 1987-88 season. These were measured and the ratio of tail to body length calculated (ratio for long-tailed weasels is 1:3). Two male carcasses with the tails equalling 30% of the body length were likely short-tailed and not long-tailed weasels (these were not included in the analysis). The sex of the carcasses was also recorded.

Carcasses were aged using two methods:-

(i) Tooth sectioning

This method is based on the progressive closure of the root of the canine teeth which leaves a series of distinct annuli which can be used to determine the age of the animal (van Nostrand 1964, Marks and Erickson 1966). The method can distinguish between juveniles (young of the year) and young adults (one to one and a half years) and adults, and is 95% accurate (Matson's laboratory standards).

The canine teeth were removed, after first boiling the carcass head to loosen them, then sent to Matson's laboratory, Milltown, Montana, to be sectioned and aged.

(ii) Baculum measurements

The baculum is the penis bone found in all male members of the genus Mustela. Bacula of juvenile weasels are small and light-weight, those of the mature animals being much larger and heavier (Wright 1947 and 1951, Petrides 1950). Weight is considered a more reliable criterion for aging than length with an 85 to 90% accuracy being quoted (Elder 1951).

Bacula were cleaned by boiling in an enzyme solution, then dried, weighed and measured. The weights were then plotted against the length which shows an obvious separation between juveniles and adults.

To determine the levels of organochloride pesticides and PCBs in the tissues, the livers were removed from the carcasses and a sample of 20 (10 from the 1986-87 season and 10 from the 1987-88 season) sent to Zenon Environmental Inc. laboratories, Burlington, Ontario, for analysis. The analytical method, gas chromatography, was carried out as follows:-

Approximately 2 g of each liver was spiked with hexabromobenzene as surrogate to monitor extraction. The samples were digested with hydrochloric acid and the resulting solution was extracted with 1:3 dichloromethane/hexane. The extract was cleaned up by gel permeation chromatography (GPC) and silica gel column chromatography prior to analysis by gas chromatography/electron capture detection (GC/ECD). (Most of the p,p'-DDT is converted by the acid digestion to

p.p'-DDD. so results will show a low recovery of p.p'-DDT and a high recovery of p,p'-DDD).

The analysis was able to indicate the presence or absence of 14 organochloride residues and PCBs.

CHAPTER 3

RESULTS AND DISCUSSION

3.1 POPULATION ABUNDANCE AND DISTRIBUTION

A combination of the information from the trapper survey, interviews, museum and auction records, and trapping location of donated carcasses was used to estimate long-tailed weasel population abundance and distribution. Unless specifically stated otherwise, all results of the survey were expressed as a percentage of the total trapper response for that LFC area. Names of the LFC areas have been used in the text rather than number codes to facilitate area recognition without constant referral to the guide map.

3.1.1 Trapper Survey Respondent Data

A survey was mailed to approximately 25% of trappers from each LFC area. The response varied from 92% in the East Interlake to 4% in Duck Bay (LFC area 260) in the northwest. Duck Mountain and Netley response was fairly high (79% and 60% respectively), with the majority in the southern half of the province having about 30% response. All areas north of Dauphin LFC area had a low response, with Swan River 10% (three responses), Duck Bay 4% (one response), and Porcupine Mountain 13% (one response), as did Lac du Bonnet with 18% (two responses) in the east of the province. As the actual number of responses were so low for

these northwestern areas and Lac du Bonnet, the results may not accurately represent those areas. Table 3.1 summarizes the numbers of trappers surveyed, the number of responses for each LFC area, and the percentage response.

TABLE 3.1

SAMPLE NUMBERS, AND RESPONSES OF TRAPPERS SURVEYED

LFC Area Code	Total No. Trappers in LFC Area	Number Sampled	Number of Responses	Percent Response
001	1879	473	143	30
002	240	60	36	60
005	966	222	78	35
006	832	208	61	29
007	424	101	18	18
008	1916	413	127	31
009	523	117	54	46
010	1752	430	119	28
011	960	243	66	27
012	548	141	45	32
020	100	25	23	92
022	440	110	42	38
050	608	142	16	11
070	44	11	2	18
210	50	14	11	79
220	25	8	1	13
260	91	23	1	4
280	116	29	3	10

Trappers were asked to record their number of years trapping experience. The length of time that respondents had been trapping varied from one year to over 70 years (Appendix 6, Table 6.1). The largest percentage of trappers were in the "less than 10 years trapping" category, with an average of 36%. In most areas around 30% of the trappers had been trapping for 30 or more years. In the Netley and Duck Mountain areas the percentage of trappers with more than 30 years

experience was high (47% and 66% respectively). The percentage of older trappers (those with more than 30 years experience) in each section was a useful cross-reference when analyzing data for previous time periods.

3.1.2 Long-Tailed Weasel Distribution and Population Abundance

In most LFC areas, the response for sightings was mixed. However, it was possible to detect certain trends, and by grouping LFC areas in parts of the province the overall pattern for larger areas could be seen (Fig. 3.1 and Appendix 6, Tables 6.2 and 6.3, and Figs. 6.1 and 6.2). In the southwestern corner of the province (Virden, Boissevain, Rossburn, and Erickson), there appears to have been an upward trend in the number of sightings in recent years, particularly in the last season (1985-86). This increase in sightings is also apparent in other areas, such as Morden and Delta (South Central), Alonsa, Dauphin and Duck Mountain (East Central), but to a lesser extent. However, there has not been a corresponding increase in pelt takes.

The more eastern areas, such as the Southeast and Netley, show that the number of sightings has never been very high (long-tailed weasels were fairly common more than 20 years ago in the Netley area). A small number of sightings were reported in the Interlake area (17% in East Interlake, 21% in West Interlake in the last season), but most respondents (including those interviewed) had never seen long-tailed weasels in this area. Sightings in the Duck Mountain area were reasonably consistent over the years, but with a small drop around 15 years ago, and again in the last five years. In the more northern areas of Porcupine Mountain and Swan River, long-tailed weasels were seen 20 or more years ago, but not since, and Duck Bay responses were negative

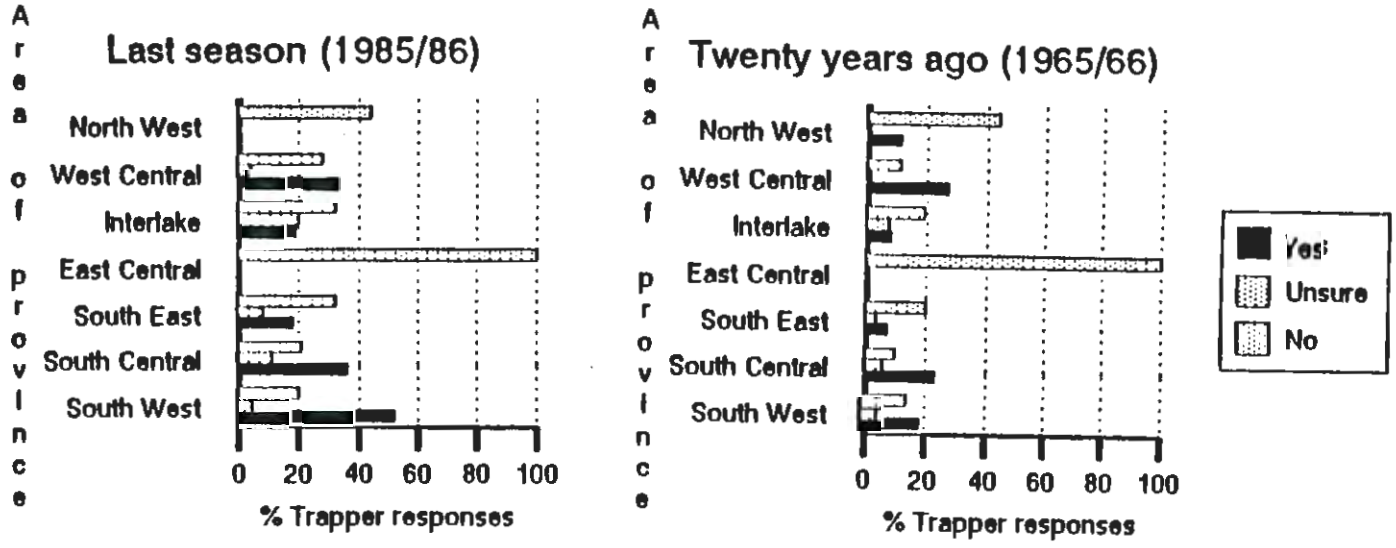


Figure 3.1 Trapper sightings of long-tailed weasels in Manitoba in the 1985-86 and 1965-66 seasons

for all time periods. The occasional sighting has been reported from The Pas, but this appears to be the limit of their range (it is possible that these animals have crossed over from Saskatchewan). One trapper who has been trapping for over 30 years, and was raised in the Churchill area, was adamant that long-tailed weasels were common almost as far north as Churchill until DDT spraying in the 1950s killed them all, but there are no other records of sightings in this area. Only a very small percentage of respondents in the Winnipeg area reported sightings (6%), with the vast majority never having seen a long-tailed weasel either recently, or in the past.

Generalized distribution maps (Fig. 3.2) show that (with the exception of the mid-1960s) long-tailed weasels have always been seen frequently in the southwestern corner of the province, and likewise have always been more uncommon in the southeastern corner. Areas where the most fluctuations appear to have occurred are Dauphin and Alonsa, near the northernmost part of the species range.

A map was included with the survey and trappers asked to mark their trapping area, and also to name their trapping area on the survey. Where trappers had reported sightings during the last two seasons (1984-85 and 1985-86), this information was used to produce an up-to-date distribution map (Fig. 3.3). Comparison of the range of long-tailed weasels indicated by this map with those of Hall and Kelson (1959) and Banfield (1974), (Fig. 1.3), suggests that they actually occur much further north than earlier records indicated. In particular, Banfield's map shows them occurring only across the southern part of the province, in the Virden, Boissevain, Morden, and the southern half of the Southeast areas. The distribution according to the current study appears to agree more with Gamble (1981) (Fig. 1.3c), and with Deems and

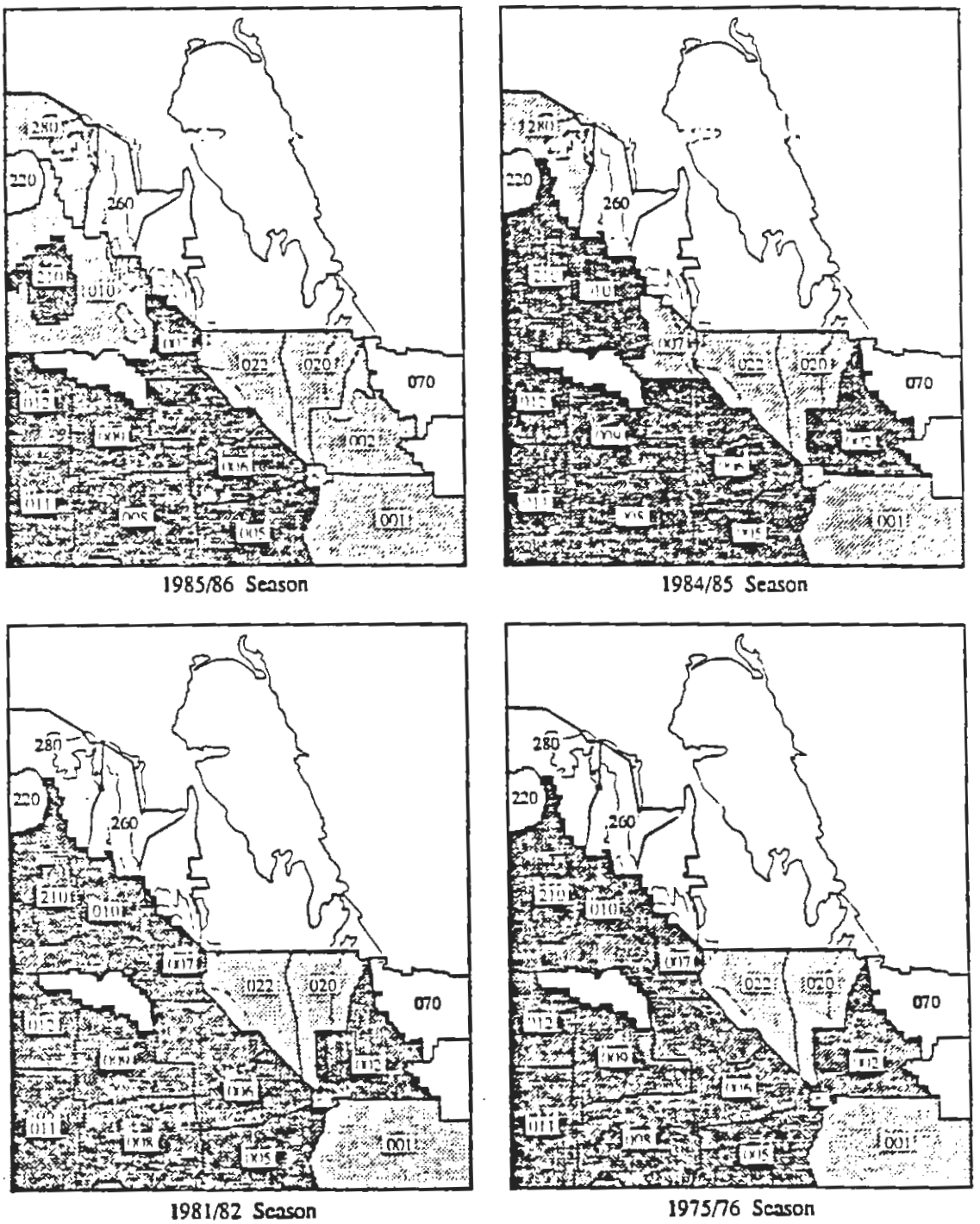


Figure 3.2 Long-tailed Weasel Sightings in Manitoba

Local Fur Council Areas, Manitoba

- Areas where majority of trapper responses +'ve
- Areas where majority of trapper responses -'ve
- 50/50 response
- 100% -'ve response or no +'ve response

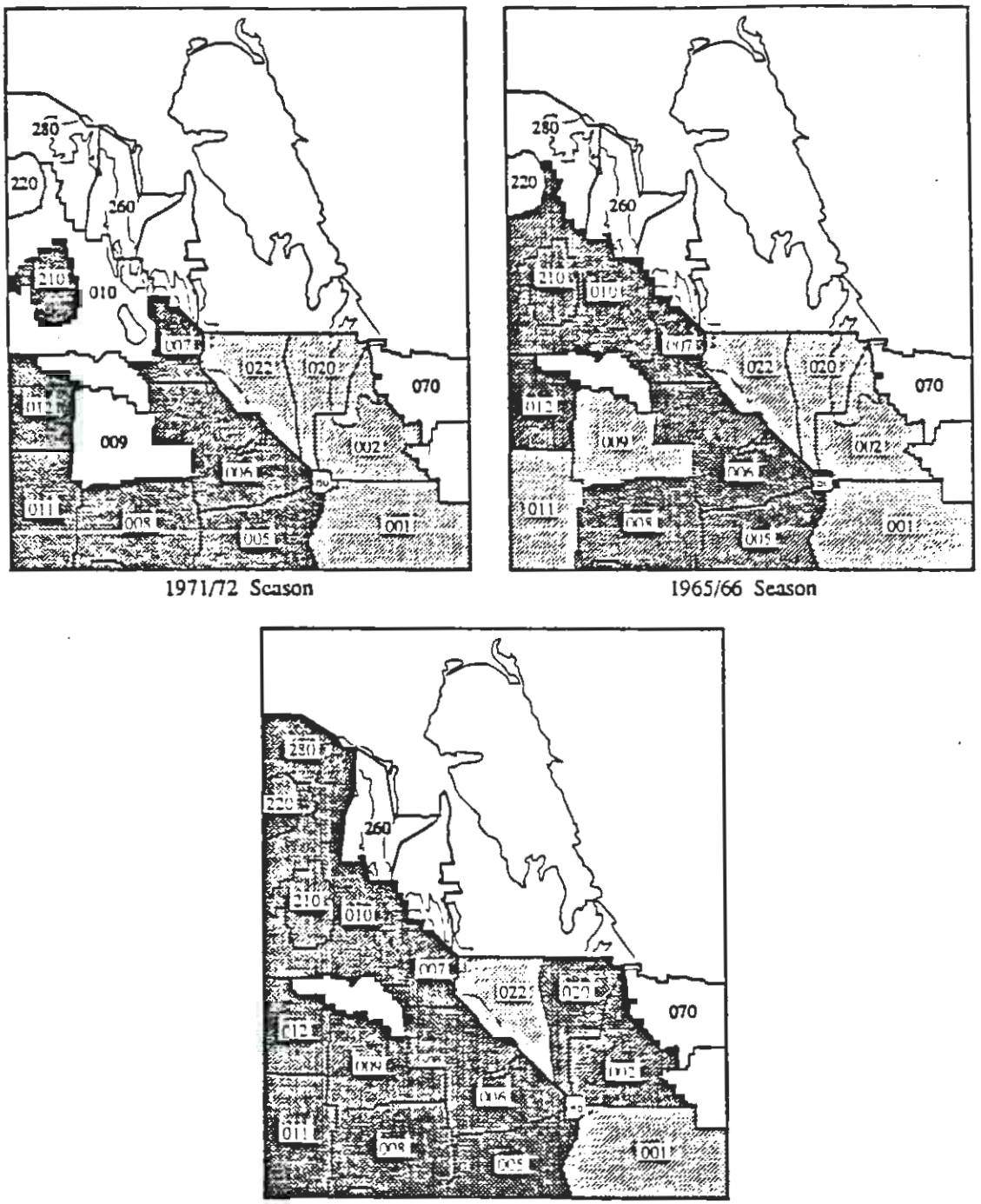


Figure 3.2 (continued) Long-tailed Weasel Sightings in Manitoba

Local Fur Council Areas, Manitoba

- Areas where majority of trapper responses +'ve
- Areas where majority of trapper responses -'ve
- 50/50 response
- 100% -'ve response or no +'ve response

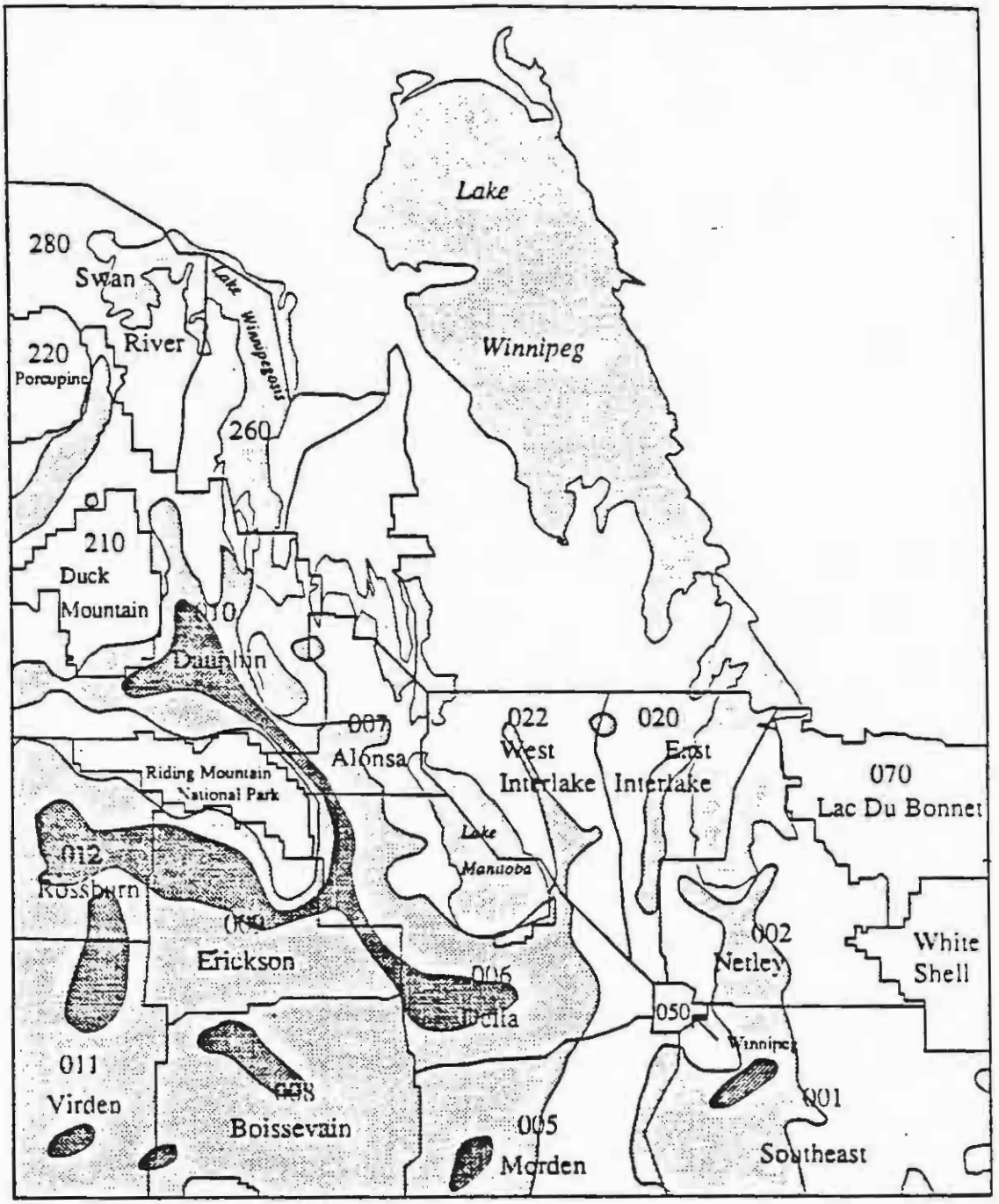


Figure 3.3 Present Distribution of Long-tailed Weasels in Manitoba According to Trapper Sightings

(1984/85 and 1985/86 seasons)

☐ present range ▩ areas of greater density

Pursley (1983) (Fig. 1.2), with the exception that Gamble showed long-tailed weasels occurring further north on the western side of the province, extending into Porcupine Mountain, and slightly further east into the Southeast area, but not quite so far into the Interlake area.

From the sightings recorded, long-tailed weasels are obviously still present in many areas of the province, and if examined in isolation, they seem to imply that there has not been any marked decrease in sightings over the past 20 years (Appendix 6, Table 6.3 and Figs. 6.1 and 6.2.). However, these results may be misleading in that the proportion of older trappers (those with more than 30 years trapping experience) in the respondents is only about 30%, so records of sightings in the past are correspondingly smaller. If this is taken into account and the results weighted accordingly, it seems likely that the number of sightings has indeed declined over the last 20 or so years. It must also be realized that this question asked for sightings in different seasons, but not for how many, so gives no indication of population abundance.

Table 3.2 and Appendix 6, Table 6.4 and Fig. 6.3, are better guides to trapper opinions of the abundance of long-tailed weasels, and show that trappers, in all areas, without exception, are overwhelmingly of the opinion that there are less now than at any time in the past. Trappers interviewed confirmed this opinion.

TABLE 3.2

OVERALL TRAPPER OPINION AS TO WHETHER THERE ARE MORE, THE SAME NUMBER, OR LESS LONG-TAILED WEASELS NOW THAN IN PREVIOUS YEARS

Time Period	% Trapper responses		
	More	Same	Less
5 years ago	4	14	32
10 years ago	3	6	26
20 years ago	3	4	27
30 years ago	2	4	25
More than 30	2	4	26 years ago

3.1.3 Museum and Auction Records

Museum records

The Manitoba Museum of Man and Nature keeps all long-tailed weasels donated to them over the years. Records from 1970 to 1984 (the majority were between 1977 and 1979), show that a considerable number of long-tailed weasel specimens were acquired just south of the Porcupine Mountains, in the Dauphin area south and east of Duck Mountain, and in the Virden and Boissevain areas (Appendix 6, Table 6.5). There were fewer records of specimens from the Delta, Morden and Southeast areas. One specimen was reported from the Netley area, and one just south of Riding Mountain. In all areas, except Morden, records showed that approximately two-thirds of the specimens were males. A distribution map (Fig. 3.4) shows the range of long-tailed weasels according to these records.

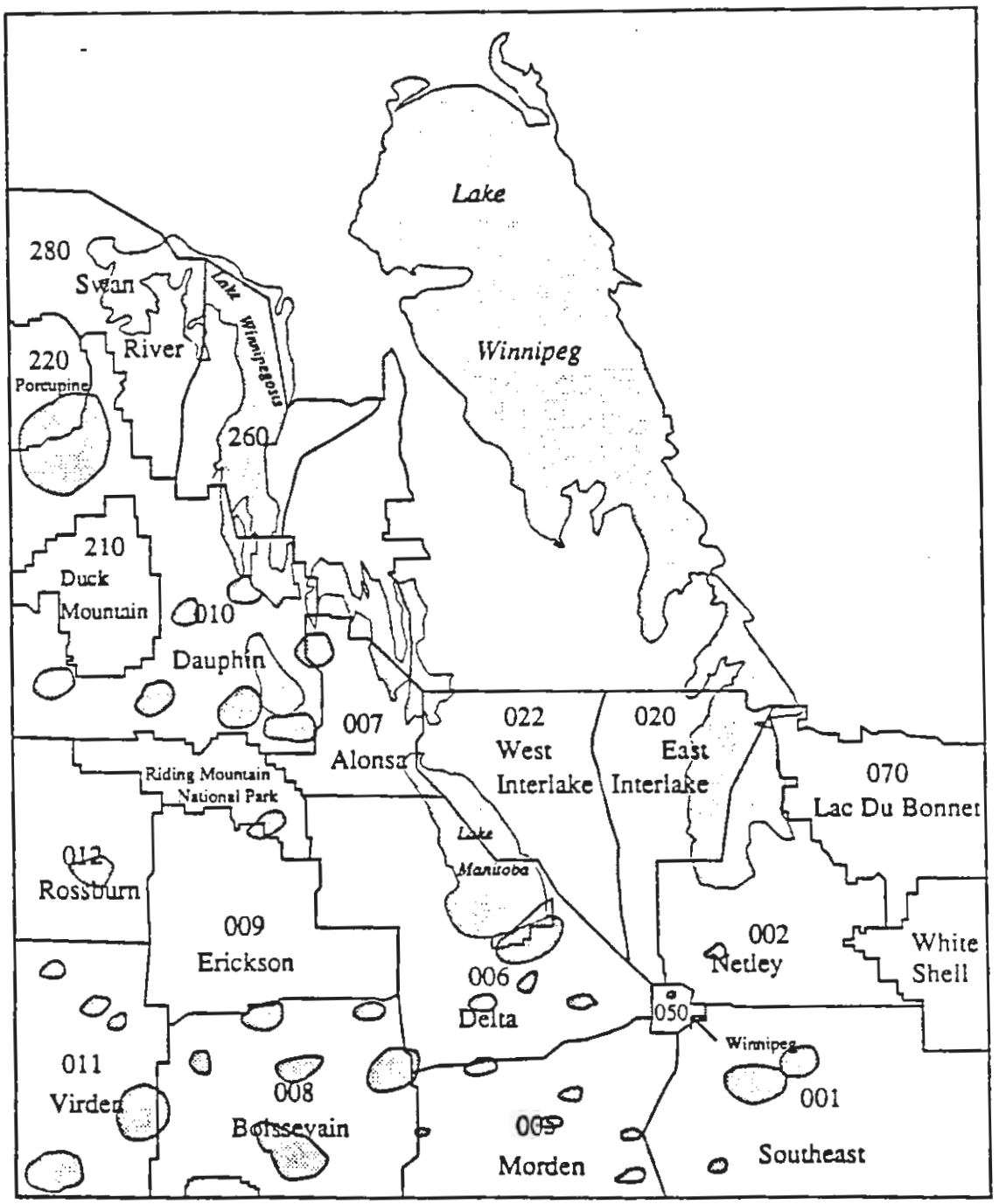


Figure 3.4 Manitoba Museum of Man and Nature Records of Long-tailed Weasel Specimens From 1970 to 1984.

☐ areas where specimens recorded

Auction records

Domonion-Soudack auction is the major fur handling and sales facility in Manitoba. Their records do not differentiate between long-tailed and short-tailed weasels, but measurements of one batch of large pelts (from Manitoba) showed approximately 20% in the 1986-87 season were long-tailed (57 to 222 short-tailed) (Appendix 6, Table 6.6). All of the pelts examined were males. However, this batch was not representative of the overall take as it was a collection of large pelts. The company quoted approximately 10% long-tailed weasels as the usual proportion (pers. comm. R. Chin, 1987). The capture location (either registered trapline area, or address of trapper when more specific locations were absent) of these weasels were incorporated into the distribution map for recent sightings (Fig. 3.3). As in the museum records, the highest number came from the Boissevain and Dauphin areas.

3.1.4 Trapping Data

The data gathered about trapping habits indicated that the majority of trappers had not been setting traps for long-tailed weasels for more than 30 years, in most cases 50% to 75%, and in recent years as many as 90% (Appendix 6, Table 6.7). The number of trappers trapping the species was slightly higher 15 or more years ago (in the northwestern areas, the majority of trappers who responded were setting traps 30 years ago). However, there are still a small number of trappers who intentionally trap long-tailed weasels, in particular in the Alonsa (17%) and Duck Mountain (10%) areas. In other LFC areas, less than 10% intentionally trap the species (Appendix 6, Figs 6.4 and 6.5). Table 3.3 shows the overall trend for the province.

TABLE 3.3

OVERALL TRAPPER RESPONSES AS TO WHETHER THEY WERE SETTING OR NOT SETTING TRAPS FOR LONG-TAILED WEASELS IN MANITOBA

Trapping Season	% Trapper Response	
	Yes	No
1986-87	8	90
1985-86	8	80
1984-85	9	77
1983-84	11	74
1982-83	11	72
1981-82	11	71
1980-81	10	70
1975-80	11	67
1970-75	11	65
1965-70	13	63
1955-65	15	53
1945-55	15	54
Before 1945	21	54

The main reasons (Appendix 6, Table 6.8) given for not trapping were:-

(i) too few around and wish to conserve;

(ii) uneconomic; and

(iii) more valuable alive than dead for rodent control.

In all areas, between 4% and 20% of all respondents bought a trapping licence to allow them to carry a firearm (to shoot coyote and fox), not to trap. In the Winnipeg area more than 60% of the respondents were not true trappers.

Data gathered from the questionnaire shows that the number of long-tailed weasels trappers remember catching each season decreased considerably during the late 1960s and early 1970s (Appendix 6, Table 6.9). Areas where the greatest number appear to be taken at present are

Dauphin and Boissevain, where the catch is about 25% of the number that trappers remember taking in the seasons between 1945 and 1955. In Virden and the Southeast. the number caught at present is about one-third the number taken between 1945 and 1955, and in Erickson, one-sixth. Trappers in the Duck Mountain area recall catching as many as 250 per season before 1945, but in 1986 were only catching around seven. These results correspond to Table 1.1, where pelt takes show a marked reduction from the 1950s to the present.

In most areas about 35% of trappers reported that they had caught long-tailed weasels accidentally in traps set for other animals (Appendix 6, Table 6.10). All types of traps, for all sorts of target animals from barn rats (Rattus norvegicus) to wolves (Canis lupus), had caught long-tailed weasels accidentally, but traps set for mink (33%), fox (Canidae), (13%), coyote (Canis latrans) (10%), and squirrel (9%) seem to be where they are most often caught (Appendix 6, Tables 6.11, 6.12, and 6.13).

When trappers caught long-tailed weasels, almost all of the pelts were sold. The few not sold were those damaged by predators, road kills, or were not prime. The occasional one was kept and mounted (Appendix 6, Table 6.14).

3.2 HABITAT DATA

3.2.1 Habitat Types Where Long-Tailed Weasels Were Sighted Or Caught

As for population abundance and distribution, all survey data were calculated as a percentage of total trapper responses for that LFC area. Bar charts comparing sightings and catches for different habitat

types for each LFC area are shown in Appendix 6, Fig. 6.6. Table 3.4 and Fig. 3.5 show the overall habitat types where long-tailed weasels have been seen or caught in Manitoba.

TABLE 3.4

OVERALL RESPONSES FOR TYPES OF HABITAT WHERE LONG-TAILED WEASELS WERE USUALLY SEEN OR CAUGHT BY TRAPPERS

	% Trapper Response	
Habitat Type	Seen	Caught
Never seen or caught	21	33
Cultivated field	15	9
Uncultivated field	21	10
Ditch	37	15
Shelterbelt	15	9
Marsh	33	21
Pothole	9	7
Creek	25	21
Forest	19	13
Farmyard	34	17

In most LFC areas, long-tailed weasels were reported either sighted or caught in all the habitat types listed. Most frequently mentioned were farmyards (25% to 55%), except in the East Interlake and Winnipeg, where the most frequent sightings were in marshland and ditches (25% to 52%), (Appendix 6, Tables 6.15 and 6.16). Marshes and riparian areas also seem to be popular habitat. Sightings around potholes and in cultivated fields were low (18% for potholes in Boissevain and Erickson areas and lower in all other areas, and 10 to 23% for cultivated fields), whereas sightings in uncultivated fields and pasturelands were slightly higher.

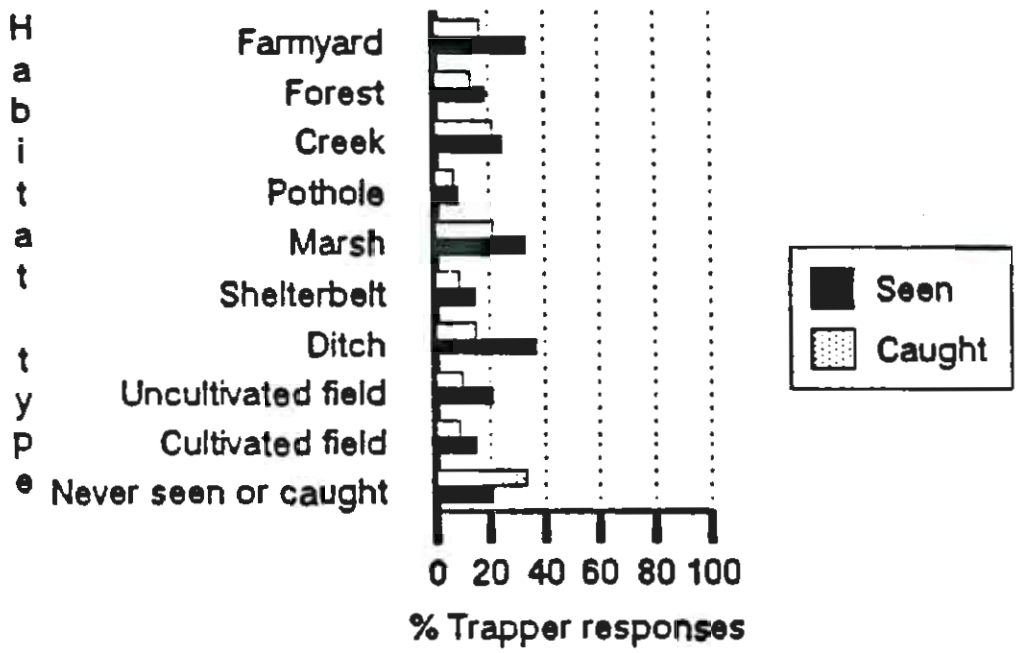


Figure 3.5 Habitat types where long-tailed weasels usually seen or caught by trappers

Other habitat types that trappers frequently added to those listed in the survey were stone piles, brush piles, field edges, and along fence lines. Modern machinery enables large scale intensive farming which involves clearing and levelling extensive areas of land, removing these field edges, stone piles, small patches of bush, potholes, and sloughs. These all appear to be habitat frequented by long-tailed weasels.

The change most often noted in areas where trappers usually saw or caught weasels was bush clearing (Table 3.5 and Fig. 3.6). Pothole draining and new roadways were the next most frequently mentioned. More houses and different crops were noted only by a small number of trappers.

TABLE 3.5

OVERALL TRAPPER RESPONSES TO CHANGES IN HABITAT NOTICED IN AREAS WHERE LONG-TAILED WEASELS USUALLY SIGHTED

Habitat Change	% Trapper Response
Bush clearing	38
Pothole draining	30
New roadways	22
More houses built	15
Different crops	8
No changes	22

Other changes specifically noted by trappers were draining of marshes and wetlands; fire damage, particularly burning of brush piles, roadsides, and stubble; and more intensive farming with changed methods (e.g., no haystacks, no free-range hens). Some of these practices such

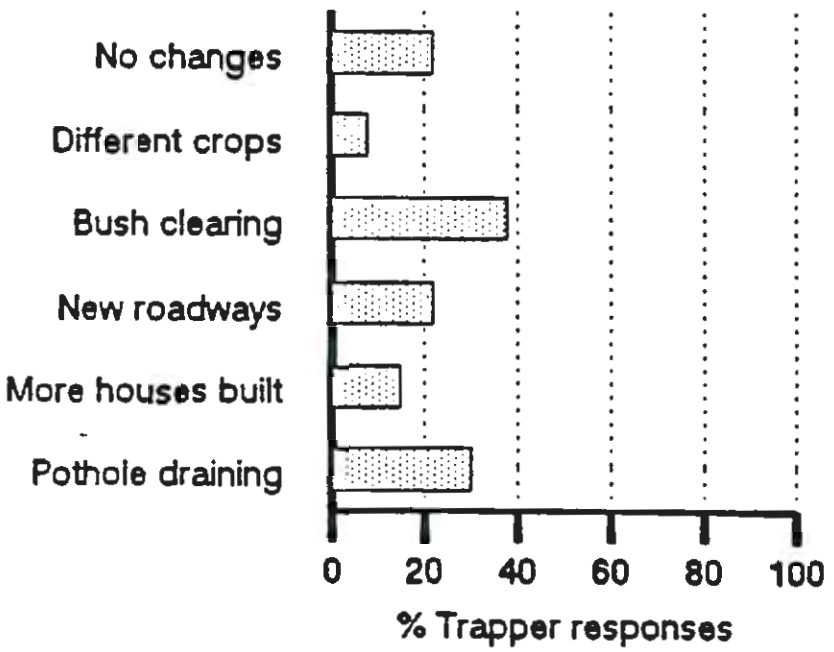
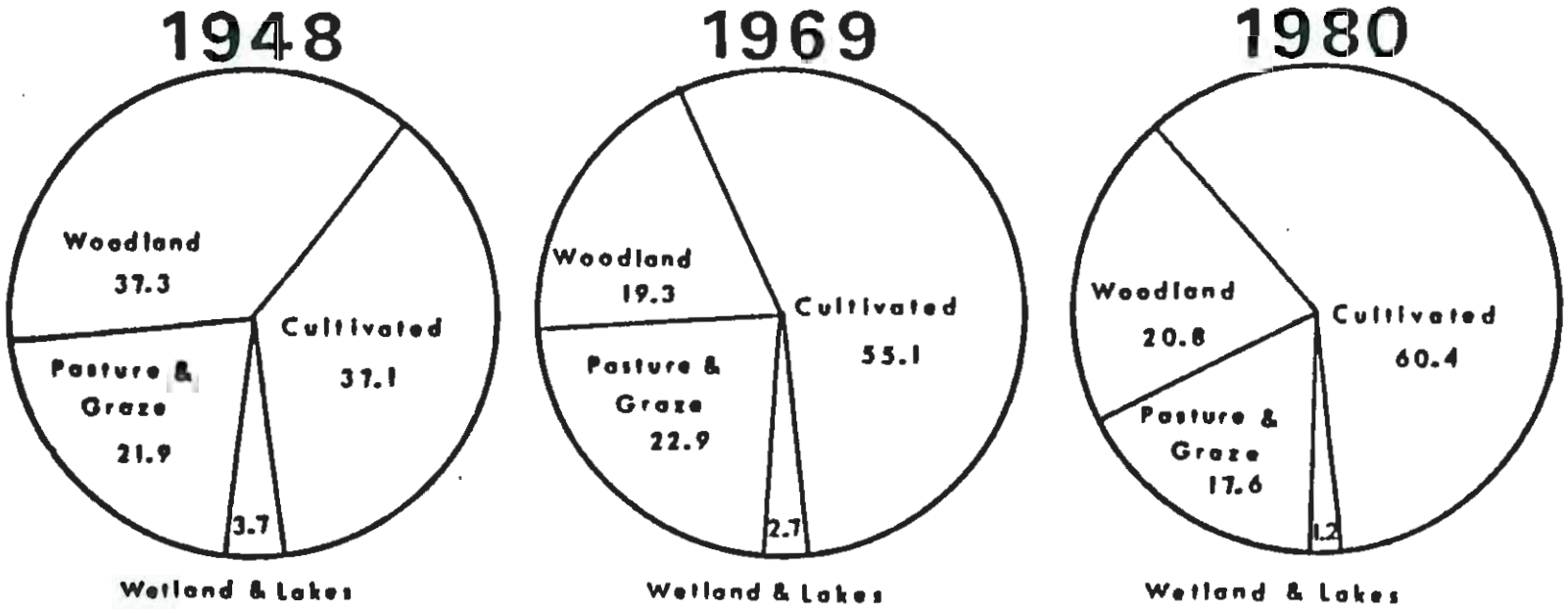


Figure 3.6 Overall habitat changes noticed by trappers in areas where they are active

as clearing rock piles and bulldozing and burning brushpiles remove habitat along with the prey species that were abundant in those areas.

Land use change causing loss of habitat and its associated food is considered to be one of the major problems for wildlife (Smith 1980, Storm and Tzilkouski 1982). Changes in agricultural practices and their impact on long-tailed weasels were first noted by Ruttle (1968). In the prairie provinces, from 1971 to 1981, there was a 10% increase in cropland area from 18,121,909 ha to 19,934,100 ha (Bird and Rapport 1986). This provides some insight into the sort of changes that have occurred, but, generally, information on land use changes tends to be fragmented, with a few detailed studies concentrated on specific areas or problems, but with no overall picture. A study carried out by the Manitoba Surveys and Mapping Department used Landsat data to calculate land use changes in the Valley River watershed (this area drains into the western side of Lake Dauphin) between 1948 and 1981 (Pokrant and Gaboury 1983). As long-tailed weasels are frequently seen in this area, the results of this study provide relevant information for changes that may affect them. The study showed that the amount of cultivated land in that area increased dramatically from 37% in 1948 to 60% in 1981, resulting in a reduction in woodlands from 37% to 21%, pasture and grazing land from 22% to 18%, and wetlands and lakes from 4% to 1% (Fig. 3.7). The study concluded that with larger farm implements and increased economic incentives, land owners were clearing land much closer to tributary edges, and clearing small bluffs and agriculturally unproductive potholes. Improved machinery also allowed farmers to clear land much closer to streams and creeks, removing cover and small rodent habitat (a major long-tailed weasel food source). This appears to be comfirmed by the observations of trappers as to changes noticed in areas



PERCENTAGE OF TOTAL STUDY AREA OCCUPIED BY EACH COVER TYPE BY YEAR

Figure 3.7 Land use changes in the Valley River watershed

(from Pokrant and Gaboury 1983)

where they are active (Appendix 6. Table 6.17 and Figs. 6.7 and 6.8). Habitat loss due to increased agricultural land use, and the bush clearing that accompanies it, was also the major habitat change mentioned by those interviewed.

A study undertaken by the Canadian Wildlife Service (Caswell 1987) has shown that drainage of ponds and cultivation of drained areas has also removed large areas of habitat. This study monitored the ponds of southwestern Manitoba from 1980 to 1987 to estimate the impact of agriculture on the basins and margins of these ponds. In 1980, 8.4% of pond basins and 43.7% of pond margins had been impacted (out of 465 ponds sampled). By 1987, 35% of pond basins and 90.3% of pond margins had been impacted (out of 899 ponds sampled) (Fig. 3.8). This demonstrates the impact of farm practices on weasel habitat in the southwest of the province over a very short period of time.

In addition to increased agricultural use, there has also been a large increase in the amount of land used for building, with an overall increase of 63% from 1951 to 1981. This includes land used for rural and urban development, road building, and farmsteads (Bird and Rapport 1986).

For long-tailed weasels, the bush clearing, pothole and wetland draining, removal of stone piles, and clearing close to field and stream edges associated with intensive farming and modern machinery have all impacted on their habitat. The result is either loss of cover, loss of areas where they build their dens, or the removal of habitat of their prey species (thus losing their food source). This has undoubtedly caused them to have become concentrated in the remaining areas of suitable habitat.

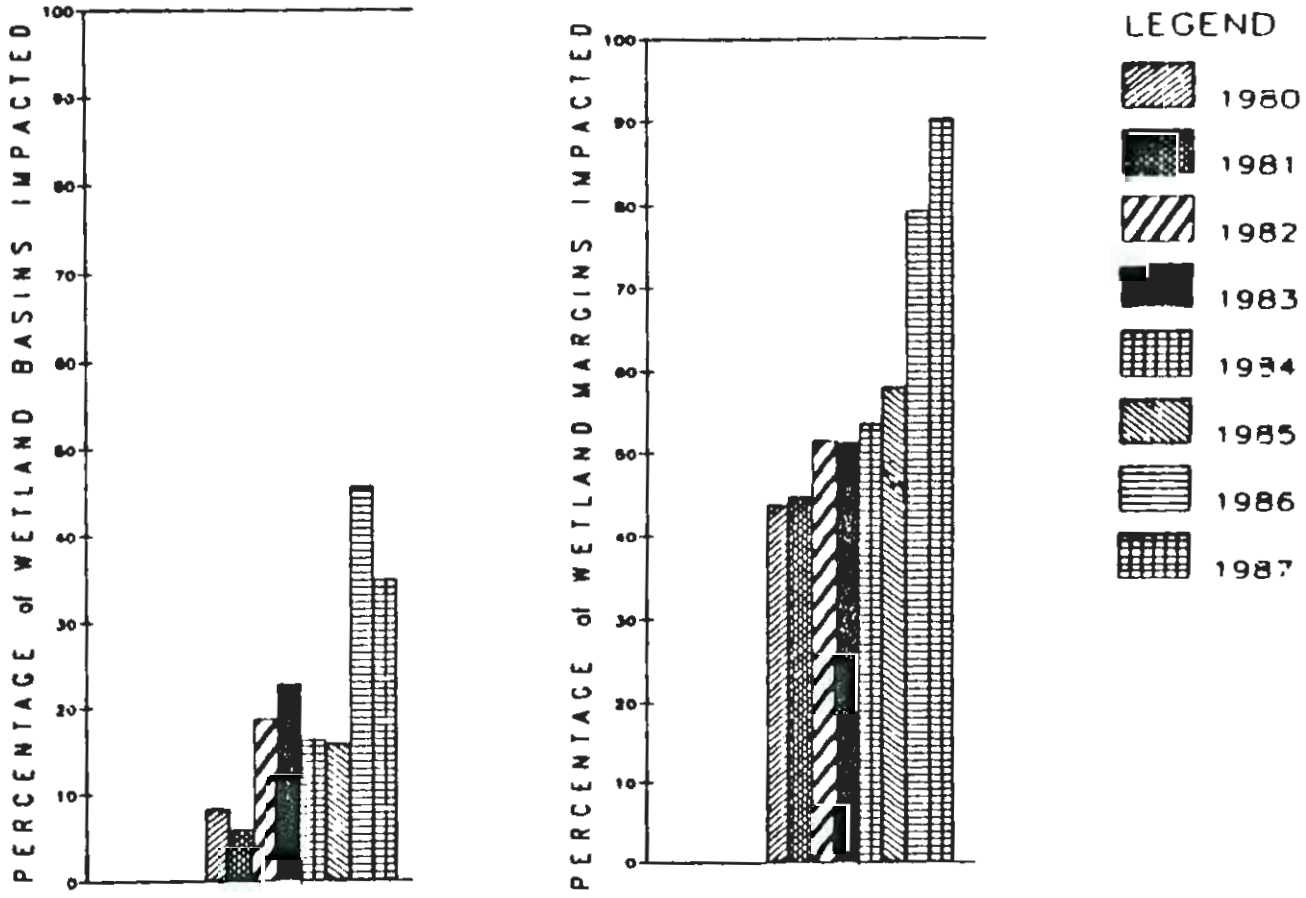


Figure 3.8 Agricultural impactions on the basins and margins of ponds in southwestern Manitoba (from Caswell 1987)

3.2.2 Trapper Opinions as to Possible Causes of a Reduction in Long-Tailed Weasel Numbers

Trappers considered the main causes of a reduction in long-tailed weasel numbers to be (Table 3.6, Fig. 3.9, Appendix 6, Table 6.18 and Fig. 6.9):-

(i) Changes in the countryside (36%) - such as no haystacks, fewer field edges, less bush;

(ii) Increased use of pesticides (31%) - all the people interviewed considered the enormous increase in the use of insecticides and herbicides to be a major factor in the decline of weasels, and all other forms of wildlife;

(iii) Pest control (for example, poisoning of gophers and barn rats) (31%);

(iv) A large increase in ravens and all owls and hawks were thought to be a contributory cause (27%), with a number of trappers commenting that raptors were often seen killing weasels, but did not eat them. A considerable number of respondents added comments in the survey margins to the effect that until the last few years ravens were relatively uncommon, but had increased enormously since then. One trapper (who was around 75 years old) reported that he had watched a raven kill a weasel in his farmyard; and

(v) Loss of food (partly from poisoning and partly due to pesticides) (21%) - a few trappers who considered that loss of food was not a problem added that there were lots of mice in the last couple of years, and also that gophers were re-establishing themselves in areas where farmers had stopped

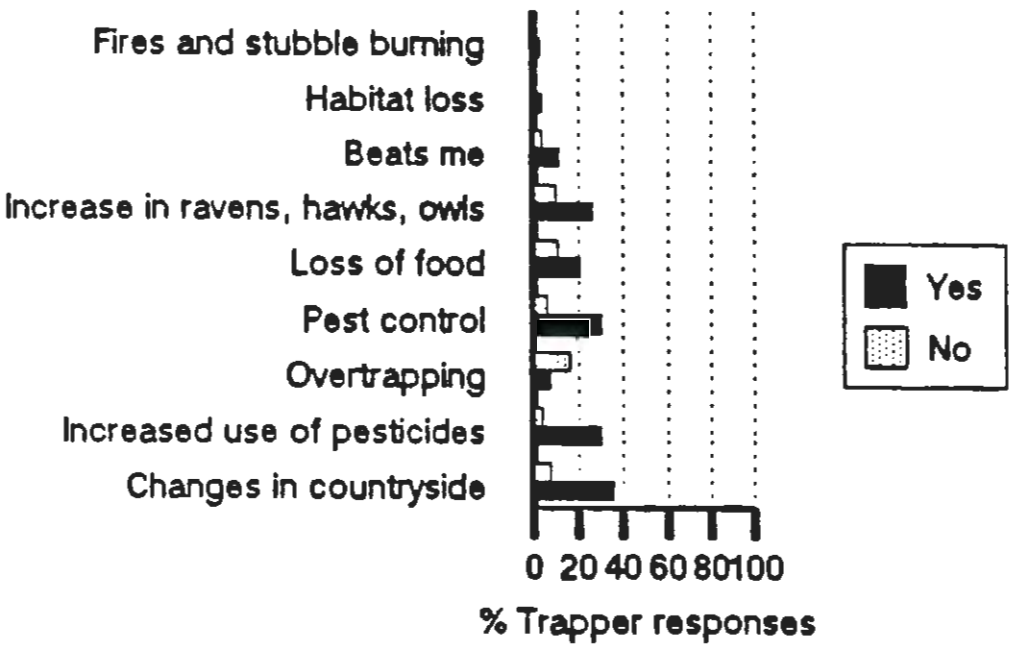


Figure 3.9 Trapper opinions as to the main causes of reduction in long-tailed weasel numbers in Manitoba

poisoning. As small mammals such as microtine rodents exhibit population cycling (Southern 1979), it is possible that recent years have been on the up-side of the population cycle.

TABLE 3.6

OVERALL TRAPPER OPINIONS AS TO POSSIBLE CAUSES OF A REDUCTION IN LONG-TAILED WEASEL NUMBERS

	% Trapper Response	
Habitat Changes	Yes	No
Changes in countryside	36	8
Increased pesticide use	31	4
Pest control	31	6
Increase in ravens, owls and hawks	27	10
Loss of food	21	11
Overtrapping	8	17
Beats me	12	4

Few trappers (6%) considered overtrapping to be a problem except in the Delta area where 18% considered overtrapping a contributory cause, against 13% who considered it to be no problem. Spring amd fall stubble and peat moss burning, and burning of brush piles were specifically mentioned as a serious problem, particularly in the spring when the young were born. Brush piles were cited as places where weasel often make their dens, and are favorite homes of mice and other small mammals. Thus, it is likely the weasel and its young are destroyed, together with its prey and their young.

One respondent in the Duck Mountain area pointed out that fire control had changed the habitat in that area totally. Where it was once open areas within forest, and ideal long-tailed weasel habitat, it had

changed to full forest cover, with the result that a whole area of suitable habitat had been removed.

3.3 CARCASS ANALYSIS

3.3.1 Carcass Measurements

Twenty-one carcasses were donated to the Department of Natural Resources during the 1986-87 season, and a further 24 in the 1987-88 season.

Of those donated in 1986-87 the majority were male, and all but one were juveniles (Table 3.7). However, the adult identified by the baculum measurements was different from that identified by the tooth cementum measurement. It is likely that the baculum measurements were more accurate, as there was a considerable difference in the weight of the adult baculum from all the others, and tooth measurements are more prone to error due to irregularities in the annuli. Baculum weights were plotted against their length, when the adult weasel was easily identified (Fig. 3.10).

Carcasses donated in the 1987-88 season had a higher percentage of females (almost a third). Baculum measurements showed that four of the males were adults (Table 3.8 and Fig. 3.11). As these carcasses were received at the end of this study, tooth analysis for the 1987-88 season will not be included.

The presence of such a high proportion of juveniles in the carcasses donated for both seasons was considered by the Department of Natural Resources to be a sign of a viable population (pers. comm. R. Stardom). However, it could also be a sign of an exploited population

TABLE 3.7

CARCASS ANALYSIS (1986-87)

Laboratory Specimen Number	Measurement (cm)		Sex	Baculum Measurement		Age from	
	Total	Tail		Weight(g)	Length(cm)	Baculum	Teeth
1214	44	15	M	0.0032	2.3887	J	J
1215	28	-	M	0.0118	2.5056	J	J
1216	41	14	M	0.0014	2.4465	J	J
1217	43	15	M	0.0006	2.4418	J	J
1218	23		F	-	-	-	J
1219	43	14	M	0.0012	2.4415	J	J
1220	34	10	M				J
1221	42	14	M	0.0002	2.2776	J	J
1222	42	15	F				J
1223	37	13	F	-	-	-	J
1224	46	19	M	-	-	-	J
1225	43	15	M	0.0057	2.3894	J	IA
1226	36	11	F	-	-	-	J
1227	40	14	M	0.0102	2.3869	J	J
1228	39	16	M	-	-	-	J
1229	44	17	F	0.0408	2.5015	A	J
1230	42	15	M	0.0019	2.0011	J	J
1231	38	13	F	-	-	-	J
1232	39	14	F	-	-	-	J
1233	43	15	M	0.0002	2.3295	J	J
1234	40	16	M	-	-	-	J

IA = Immature adult approximately 1.5 years
A = Adult
J = Juvenile

TABLE 3.8

CARCASS ANALYSIS (1987-1988 SEASON)

Lab Specimen Number	Measurement (cm)		Sex	Baculum Measurements		Age From Baculum
	Total	Tail		Weight (g)	Length (cm)	
1474	47	18	M	0.0308	2.4431	Juvenile
1475	46	18	M	-	-	-
1476	48	18	M	0.0661	2.7185	Adult
1477	36	13	F	-	-	-
1478	40	13	M	0.0206	2.3307	Juvenile
1479	42	18	F	-	-	-
1480	43	17	M	-	-	-
1481	44	18	M	0.0657	2.7245	Adult
1482	41	15	M	0.0247	2.2188	Juvenile
1483	43	16	M	0.0335	2.2780	Juvenile
1484	41	17	M	0.0202	2.2236	Juvenile
1485	44	16	M	0.0333	2.4964	Juvenile
1486	40	15	M	0.0219	2.3290	Juvenile
1487	40	15	F	-	-	-
1488	45	17	M	0.1004	2.9384	Adult
1489	42	16	M	0.0749	2.8382	Adult
1511	42	15	M	0.0295	2.3980	Juvenile
1512	42	14	F	-	-	-
1513	42	14	M	0.0265	2.3304	Juvenile
1514	34	12	F	-	-	-
1515	42	17	M	0.0303	2.4416	Juvenile
1516	46	18	M	0.0299	2.5548	Juvenile
1517	25	14	F	-	-	-
1518	43	16	F	-	-	-

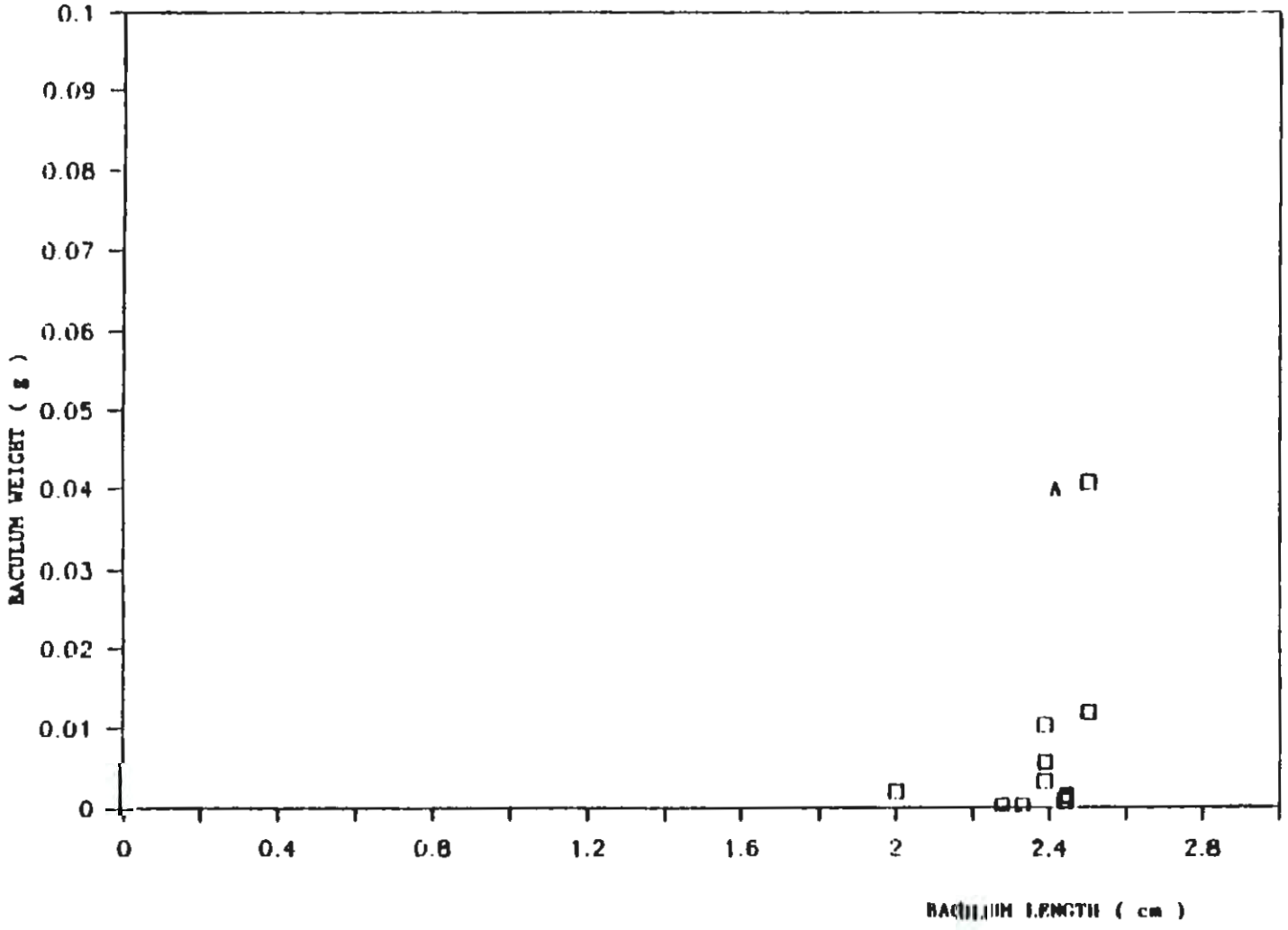


Figure 3.10 Baculum weight (g) v. length (cm), showing one adult (A) (1986-87 season)

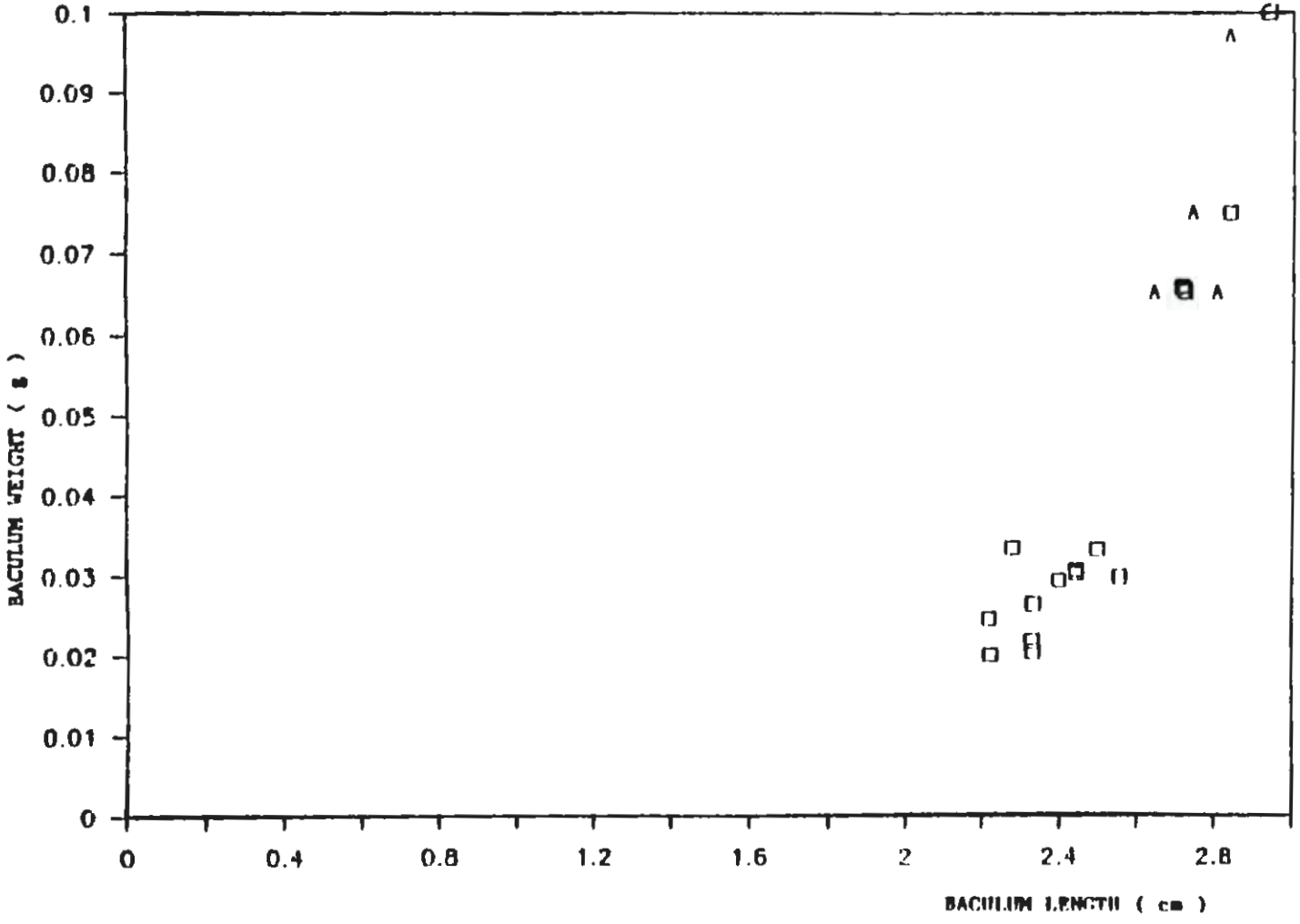


Figure 3.11 Baculum weight (g) v. length (cm), showing four adults (A)

(1987-88 season)

(Smith 1980), or that young weasels may be less wary than adults, and are caught more easily.

3.3.2 Pesticide and PCB Analysis

At the end of the 1939-45 war, there was a very limited number of pesticides available, but since the introduction of DDT at that time, the number of products on the market has increased to hundreds of different chemicals (Sly 1977). There are over 500 pesticides registered at present in Manitoba alone (Federal Dept. Agriculture 1988). From 1971 to 1981 there was a 95% increase in the area treated with insecticides in the prairie provinces (from 456,923 ha to 891,000 ha) (Bird and Rapport 1986). The increase since the early 1950s has been cited as a factor that could have contributed to the decline in long-tailed weasel populations (COSEWIC 1982).

In the past, the most widely used, least expensive, and probably the most harmful insecticide to wildlife generally, was DDT. This insecticide was first available in the early 1940s, but was not widely used in Canada until the early 1950s. It would seem to be more than coincidence that the pelt takes of long-tailed weasels began to drop quite rapidly around 1955 (Table 1.1). (Total weasel pelt takes per season dropped from approximately 60,000 to 10,500 in the twelve years from 1957 to 1969). The persistence of DDT in the soil (its degradation products are still being found in almost all biological analyses (pers. comm. E. Chorniuk, Technical Services Laboratories, Winnipeg, 1988)), toxicity to non-target organisms (Dimond and Sherburne 1969, Herman and Buglar 1979), and the build-up of resistance to the chemical by some insects, led to its being banned from widespread use in

Canada in 1972 (Bird and Rapport 1986). Organochloride pesticides such as aldrin, dieldrin, endrin, and endosulfan (DDT and its degradation products are included in this group) are readily absorbed in fat, and are known to build up in the body tissues through each level of the food chain, so that the long-tailed weasel, at the top of a food chain, would be expected to be particularly vulnerable to this type of build-up (Aulerich et al. 1986). They include some of the most toxic chemicals and, in general, their use was discontinued in Canada in the mid-1970s (pers. comm. D. Smith, Manitoba Dept. of Entomology 1987). Dieldrin is still registered for commercial use for mite control (Bird and Rapport 1986), and like DDT and other organochlorides, is persistent in the soil for at least 15 years (McEwan and Stephenson 1979). Endrin, the most toxic organochloride, is 80 times as toxic (to rats) as DDT (Fleming et al. 1982).

PCBs and Mirex belong to the group of synthetic substances known as chlorinated organic compounds, and similarly become more concentrated as they rise through the food chain (Envir. Canada 1979, Bird and Rapport 1986). These substances have been manufactured commercially since 1929, but were not widely recognized as potentially toxic until around 1970. Mirex, which has very similar chemical and biological properties to PCB, has not been manufactured in or imported into Canada since 1969, and its use has been controlled since 1978 (Bird and Rapport 1986). Both PCBs and Mirex are extremely persistent and mobile in the environment, and are fat-soluble, so are dissolved and accumulated in the fatty tissues of animals (Envir. Canada 1979). In animals at the top of the food chain (weasels, mink), PCBs and organochlorides can cause impaired reproductive capacity or total reproductive failure (Proulx et al. 1987, Moore 1977).

Much of the literature relating to pesticide toxicity deals with laboratory rats, birds, and other small mammals (Dimond and Sherburne 1969, Herman and Buglar 1979, Cholakis et al. 1980, McCann et al. 1980, Havera and Duzan 1982, Heinz and Johnson 1980, Henny et al. 1983, May 1983). As many of these small mammals are herbivores (feeding mainly on seeds), or insectivores, and the birds are mostly raptors with very different metabolic reactions than weasels, the results may not be directly applicable when attempting to assess the probable toxic levels in long-tailed weasels. Some work has been done on the effects of organochlorides and PCBs on mink (Aulerich and Ringer 1977, Frank et al. 1979, Henny et al. 1980, Aulerich et al. 1986, Proulx et al. 1987) which are more likely to approximate the effects on long-tailed weasels. Mink are members of the same family (Mustelidae) and are not very much larger than a long-tailed weasel, so that it is possible that their response to these chemicals could be similar.

However, the few studies that have been carried out on mink provide only very limited data. A study by Aulerich and Ringer (1970) showed that mink reproduction was unaffected by levels of 100 ppm DDT, but Bleavins et al. (1984) showed that HCB (Lindane) had adverse effects on kit survival even at levels as low as 1 ppm. Other organochloride pesticides have not been evaluated experimentally, so tolerance levels are not known (Proulx et al. 1987). Studies on wild mammals in Ontario found that mink were contaminated with organochlorides, but below the level where reproduction was inhibited (Frank et al. 1979). Other studies carried out on mink (Aulerich and Ringer 1970) found that they were much more sensitive to PCBs than to organochloride pesticides. Aulerich and Ringer (1977) showed that PCB (Aroclor 1254) at a level of 1 ppm resulted in depressed reproductive success, and total reproductive

failure at 2 ppm, or when fed a diet containing 0.64 ppm over a period of 160 days.

Other insecticides, such as the carbamate group of chemicals, may also be toxic to long-tailed weasels. Carbaryl and Carbofuran are the main carbamate insecticides used, mostly in southwestern Manitoba, for grasshopper control, and for roadside spraying as this is where many insects breed (in long grasses). When controlled in this area, crop spraying can often be prevented (pers. comm. Gadawski 1988). The oral toxicity for rats, expressed as LD50, for some organochlorides and carbamates are listed in Table 3.9 (from Pimental 1971).

TABLE 3.9

LD50 VALUES FOR RATS OF SOME ORGANOCHLORIDE AND CARBAMATE INSECTICIDES

Organochlorides	LD50
Chlordane*	200-590 mg/kg***
Heptachlor	100-162 mg/kg (very high)***
Endrin	<5-43 mg/kg (extremely high)
Dieldrin	50-55 mg/kg (very high)
Aldrin	54-56 mg/kg (very high)
Lindane	125-200 mg/kg
Mirex	300-600 mg/kg
Endosulfan	100 mg/kg
Methoxychlor	5,000-6,000 mg/kg
Carbamates	
Carbaryl (Sevin)	850 mg/kg***
Carbofuran (Furadan)	14 mg/kg (extremely high)**
Aldicarb	0.9 mg/kg (extremsly high)**
Propoxur (Baygon)	90-128 mg/kg (very high)***

* some forms of technical chlordane are much more toxic.
** values from Moore (1977).
*** values from Taylor (1983).
(Most studies are carried out using laboratory animals, when toxicity is expressed as the LD50 (mg/kg of body weight of the test animal), which is the dose that kills 50% of the experimental population).

Pesticides may be applied by aerial spraying, which does not discriminate between crops and the surrounding bush, streams, ponds, or field edges, or at ground level, where there is slightly more control over the target area. In 1985, the Manitoba Department of Agriculture carried out a census of agricultural practices which lists the number of farms that reported spraying to control insects and disease, together with the acreage covered for the southern half of Manitoba. The area is divided into crop districts, which are not the same as LFC areas, but can be used to estimate approximate spraying activities in these areas, as shown in Table 3.10.

TABLE 3.10

SPRAYING ACTIVITY FOR INSECTS AND DISEASE IN SOUTHERN MANITOBA DURING 1985

Crop District #	LFC #	# Farms reporting	Acreage sprayed
1 & 2	011 & 008	1,346	289,399
7	006 & 007	988	208,280
8	005	1,338	256,316
10	001 & 070	90	17,761
11	020 & 022	152	24,271

Although no figures were listed for crop districts further north, this table shows that the highest proportion of farms spraying in the southern half of the province were in the southwest (Virden, Boissevain and Morden - LFC areas 011, 008 and 005), with much less spraying activity in the Southeast (LFC 001 and 070) and Interlake areas (LFC 020 and 022). This would be expected, as the areas which were most extensively sprayed are predominantly crop farms, whereas the other

areas are more mixed farming and require less insect control. In all, over a million acres were sprayed or dusted for control of insects or disease, a total of 5,300 farms (Manitoba Dept. Agric. 1986).

There are no details in the census as to which chemicals were used, but the City of Winnipeg Insect Control Branch (pers. comm. Gadawski 1988) stated that only two organochloride insecticides are still used in Manitoba, Lindane (HCB), and Methoxychlor. Lindane is used to treat seeds to prevent wireworm, but is not used on the soil, and although still recommended, Methoxychlor is not as widely used as in the past.

Thomson (1988) found that spraying was done by municipalities as well as by farmers. Pesticide spraying for two rural municipalities in the Virden area are shown in Table 3.11 (Thomson 1988).

TABLE 3.11

1985 PESTICIDE SPRAYING IN MANITOBA RURAL MUNICIPALITIES

	R.M. Edward	R.M. Brenda
Carbaryl 7XLR (Sevin) (sprayed aerially)	5437 litres	4100 litres
Carbofuran (Furadan) (sprayed roadside)	850 litres	NIL

As was seen in Table 3.9, Carbofuran is much more toxic to rats than Carbaryl. It is also very toxic to burrowing owls (Athene cunicularia). James and Fox (1986) found that reproductive success was reduced significantly when Carbofuran was sprayed close to the nests

(Table 3.12), whereas Carbaryl was equally effective for the control of grasshoppers, but was much less toxic to the burrowing owls.

TABLE 3.12

REPRODUCTIVE SUCCESS OF BURROWING OWLS IN THREE PASTURES NEAR REGINA, TWO OF WHICH WERE AERIALLY SPRAYED WITH INSECTICIDES (FROM JAMES AND FOX 1986)

	Insecticide aerially sprayed		
	Carbofuran	Carbaryl	None
Number of active nest burrows at time of spraying	5	10	14
Proportion of nests producing one or more young	0%	70%	93%
Maximum number of young per nesting attempt	0	2.9	4.3

The effect of these carbamate insecticides on long-tailed weasels is not known, but it would be reasonable to assume that Carbofuran is toxic to this species also. Riegert (1968) and Gage and Mukerjie (1978) reported that despite their extensive use, insecticides have not reduced the frequency or intensity of regional grasshopper infestations; they have merely conferred a measure of crop protection or salvage. Weather, parasites, disease and natural predators were considered to have been the primary instruments reducing populations. It would seem that substituting Carbaryl for Carbofuran for grasshopper control, and using only when absolutely necessary, would benefit

burrowing owls. and may also benefit long-tailed weasels and other wildlife. It would also reduce the costs of spraying when, at best. the resulting success is dubious.

Other chemicals which may have an impact on long-tailed weasels are rodenticides such as strychnine and warfarin (sold under trade names such as Ratak, Mouser and Gopher-cop), commonly used to kill gophers and barn rats (pers. comm. D. Plewes, Manitoba Department of Environment). These have a two-fold effect on long-tailed weasels:

(i) eating a poisoned carcass causes secondary poisoning of the weasel if it consumes the stomach contents (Hegdal et al. 1980); and

(ii) it removes an important food source (COSEWIC 1982).

If rat poisoning is a necessity (according to survey comments from trappers, if long-tailed weasels are present they will keep a barn clear of rats), zinc phosphide has been shown to produce little secondary poisoning of mammalian predators such as domestic cats and mink (Hegdal et al. 1980).

Data on quantities used in Manitoba are difficult to obtain for two reasons:-

(i) This data is commercial information and is potentially useful to competitors, so companies are unwilling to provide it; and

(ii) Even if the data were available, it would not be particularly useful for this study because much of these compounds are sold for domestic use, so would provide no information as to how much is used by farmers.

There are other chemicals, such as fertilizers, herbicides, fungicides, and heavy metals (such as cadmium and mercury), and other insecticides such as organophosphates, that may impact on long-tailed

weasels, but these have not been included in this study for a number of reasons:-

(i) To carry out an analysis, approximately five grams of tissue sample is required. Livers of many of the carcasses were small and shrivelled from being kept too long before freezing, so that there was only enough tissue for one group of chemicals to be analyzed;

(ii) Each analysis is extremely expensive, so a decision was needed as to which group of chemicals was most likely to have caused problems; and

(iii) Even without the financial constraints, to cover all chemicals that may impact on long-tailed weasels is beyond the scope of this study.

To date no studies have been done to evaluate the effects of any chemicals on long-tailed weasels. As organochloride pesticides and PCBs are so persistent in the environment and accumulate through the food chain, they were chosen for analysis.

To establish levels of pesticides in tissues, the liver is the organ most frequently analysed, using gas chromatography (Heinz and Johnson 1980). Livers from a sample of the carcasses donated by trappers were removed and sent to the laboratories of Zenon Environmental Inc., Burlington, Ontario, for analysis. They were analysed for the organochloride pesticides and PCBs listed in Table 3.13 at the minimum detection limits shown.

TABLE 3.13

ORGANOCHLORIDE INSECTICIDES AND PCBs,

SHOWING MINIMUM DETECTION LIMITS

Compound	Minimum Detection Limits (ppm)
Hexachlorobenzene	0.005
a-benzenehexachloride	0.005
Lindane	0.005
Heptachlor	0.005
g-Chlordane	0.005
a-Chlordane	0.005
p,p'-DDE	0.005
p,p'-DDD	0.005
o,p'-DDT	0.005
p,p'-DDT	0.005
Methoxychlor	0.02
Mirex	0.005
Photomirex	0.005
Toxaphene	0.1
Total PCB	0.02

Ten samples were analyzed from the carcasses donated in the 1986-87 season, and 10 from the 1987-88 season. The samples were chosen to represent as many areas of the range as possible, but the carcasses donated came almost exclusively from an area covering a large circle around Riding Mountian National Park. The few exceptions were one from the northwest side of Duck Mountain, one from just south of Brandon, two from the area between Neepawa and Gladstone, and two from Birtle, in the Rossburn area. Table 3.14 shows the area where the carcasses originated, and the corresponding LFC area code.

For all samples, excepting one from Gilbert Plains - sample number 1223 (LFC area 010, in the Valley River watershed), the analysis for all organochlorides and PCBs was negative, with no compounds being observed about the detection limit. The one exception showed 0.006 ppm

of p,p'-DDE, a degradation product of DDT, and this was only just above the detection limit. Thus, within the limits of the analysis, there was no detectable buildup of organochloride insecticides or PCBs in the samples analysed.

TABLE 3.14

AREA WHERE SPECIMENS FOR PESTICIDE ANALYSIS WERE CAUGHT

Sample #	Area Where Caught	LFC Code
1986-87 season		
1214	Ste. Rose du Lac	007
1219	Makinak	010
1222	Grandview	010
1223	Gilbert Plains	010
1224	Birtle	012
1225	Sandy Lake	009
1228	Birtle	012
1229	Riding Mountain	010
1233	Grandview	010
1234	Duck Mountain	210
1987-88 season		
1474	Strathclair	009
1477	Ste. Rose du Lac	007
1480	Durban	010
1483	Edrans	006
1484	Brandon	008
1487	Arden	006
1511	Mountain Road	009
1516	Birtle	012
1517	Shellmouth	012
1518	Mountain Road	009

There are a number of possible explanations for the low levels of these compounds in the samples:-

(i) Most of the farming in the areas where the samples were caught is mixed farming with quite a large amount of livestock, where

less spraying and less intensive farming methods are used. Therefore, the results from the pesticide analysis may not be truly representative of other areas of the province, in particular the southwest, where the majority of intensive crop farming is done;

(ii) All but one of the samples were juveniles, so that there may have been insufficient time for a buildup of chemicals to take place; and

(iii) For efficient analytical results, samples should have been freshly caught, and must be stored at between -35°C and -40°C. If stored above -18°C there is a steady loss due to chemical breakdown, particularly in chemicals such as Methoxychlor, which breaks down fairly rapidly. Many of the samples received from trappers had been kept for some time before freezing, as was apparent from their dessicated condition, and household freezers generally operate at around -15°C, so this would have affected the efficiency of residue recovery (pers. comm. B. Webster, University of Manitoba 1988).

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

4.1 SUMMARY

The general distribution map developed from results of the survey shows that the present distribution of long-tailed weasels in Manitoba agrees largely with the maps shown by Gamble (1980) (Fig. 1.3) and Deems and Pursley (1983) (Fig. 1.2). Swan River, Duck Bay and Porcupine Mountain in the far northwestern part of their range all reported that long-tailed weasels had not been seen there for at least twenty years. However, records from the Museum of Man and Nature showed that a considerable number of their specimens came from the area on the south side of Porcupine Mountain during 1978 and 1979, so the opinion of the single trapper who responded from Porcupine Mountain may only represent a small part of that area. There has been the occasional sighting in the area around The Pas, which is even further north (pers. comm. A. Sanderson 1987). This suggests that there may still be a small number present in this area, or that these animals are coming from Saskatchewan.

Within the range, there are areas where long-tailed weasels are more commonly seen, and similarly, areas where there appear to be very few. For example, there were no sightings reported for an area approximately 50-km wide stretching directly south from Winnipeg to the

American border, even though they were present on either side of this strip. On the other hand, there appears to be viable populations around the southern side of Duck Mountain in the Dauphin region, and in a large horseshoe-shaped area around Riding Mountain National Park (the base of the horseshoe being on the eastern side of the park). In general, they are more abundant on the western side of the province, where they have always been more common.

The opinion of the vast majority of trappers, both in the survey and those interviewed, was that long-tailed weasel numbers were very much reduced from 30 or more years ago. In some areas, such as the Southeast, numbers were never very high, and the situation is the same at present.

Only a small number (around 5% of the total trapper response) actively trap the species at present. Even though more people trapped them in the past, the majority had not trapped them for over 30 years. However, most trappers reported having caught them accidentally in traps set for other animals. Mink traps showed the highest proportion of accidental catches but they were also found in traps set for anything from barn rats to wolves. The type of set and trap appeared to be unimportant, with accidental catches in all sorts of traps and sets. Apart from the 5% who still trap long-tailed weasels, trappers in general are not interested in trapping the species. Many are aware of the reduced numbers and are interested in conserving the species. Those who are farmers also appreciate the potential of weasels for rodent control on their property. Last but not least, most trappers consider the pelt value to be too low to be worth the effort of trapping and skinning.

The most obvious environmental change, in all areas surveyed, that occurred coincidentally with the decline of long-tailed weasels was habitat loss resulting from the use of modern farm machinery and the clearing and levelling of large areas of land. Trappers considered the bush clearing and bulldozing of stone and brush piles that occurs during land clearing to be the main reason for the drop in weasel numbers. The work of Caswell (1986) (showed that since 1980 there had been an increase from 8% to 44% of pond basins and from 35% to 90% of pond margins that had been affected by agricultural practices) reinforces this perception. Even though viable populations still appear to be present in the area north of Riding Mountain National Park (Valley River watershed) the work of Pokrant and Gaboury (1983) (Fig. 3.9) showed that agricultural practices are also impacting on that area. Unless practices that conserve habitat for long-tailed weasels are encouraged in that area, the situation will soon be the same as other areas of the province where long-tailed weasel habitat is much reduced.

Other concurrent factors were increased use of pesticides, and, in the opinion of trappers, loss of food as a result of poisoning by farmers for rodent control. However, pesticides are not used with uniform intensity across the province, but tend to be highest in areas of intensive crop farming, such as the southwest. Unfortunately, no carcasses were donated from this area (Virden, Boissevain, Morden), the Southeast, or the Interlake areas. All the carcasses were from the west central area (surrounding Riding Mountain National Park), where there is less crop and more livestock farming. Analyses for organochloride pesticides and PCBs on the liver samples showed there were no detectable pesticide residues or PCBs present (with the exception of one sample

that shoved 0.006 ppm of p,p'-DDE, a DDT metabolite, which was only just above the detection limit). It is not possible to draw conclusions from these results as to the effect of pesticide use for the whole range, as this area, being predominantly mixed farming, would be assumed to have a lower level of pesticide usage than the southwest (Man. Dept. Agric. census, 1986, does not record any farms reporting spraying for insects in this area).

Data on rodenticide use was not available, but the Department of the Environment stated that the use of warfarin and strychnine for pest control was common practice, with strychnine being the most commonly used (pers. comm. D. Pleves 1988), so potential food loss and the possibility of secondary poisoning may be a problem.

Carcass analysis shoved a high proportion of juveniles to adults (five adults to 40 juveniles over two seasons) which has been assumed to indicate that, in the west central areas of the province, there are viable populations. This seems to contradict the opinions that long-tailed weasels are "threatened". However, a high proportion of juveniles can also indicate an exploited population (Smith 1980). Due to the lack of carcasses, it is not possible to draw any conclusions concerning other areas of the range.

Possible causes for the reduction in pelt takes may be:-

(i) long-tailed weasel numbers are reduced due to habitat loss and pesticide use;

(ii) trapper effort may have been reduced as employment opportunities with higher salaries increased;

(iii) the value of the pelt is low; and

(iv) during the years from 1960 to 1969, Manitoba began closing small country schools and transporting children by bus to larger centres for schooling (pers. comm. R. Ledoux, Superintendent, Pinawa School District, 1988). As many of these children checked their traps on their journey to and from school when school was within walking distance, this change may have caused a reduction in schoolboy trapping (pers. comm. R. Stardom, Manitoba Dept. Natural Resources 1988).

4.2 CONCLUSIONS

(1) According to trapper sightings, museum and auction records, the range of the long-tailed weasel in Manitoba appears to be roughly the same as that shown in Fig. 1.2 by Deems and Pursley (1983). For all practical purposes, the range along the western side of the province extends to the northern edge of the Porcupine Mountains, any sightings further north are occasional. Some sightings have been reported in the Interlake area, but these have not yet been substantiated with either a carcass or a photograph - until then it would be reasonable to consider their range to stop at the lower edge of the region (however, these sightings have been included in Fig. 3.3).

The distribution of long-tailed weasels, according to trapper sightings, has not changed over the past 20 years, apart from some fluctuations at the northernmost part of their range.

(2) Total weasel pelt takes have dropped from approximately 110,000 in 1946 to 9,000 in 1986. Four hundred long-tailed weasels were estimated to have been taken during the 1985 to 1986 season. (A breakdown of pelt takes into Open Area and Registered Trapline Areas is not available for before 1970, but it is assumed that the decline in takes is represented by the total figures). The vast majority of trappers in all areas considered the number of long-tailed weasels to be much reduced from 30 or more years ago. Trappers recall trapping from three times to nearly 40 times as many long-tailed weasels at that time. Thus, it is concluded that long-tailed weasels have declined considerably during the past 30 to 40 years.

(3) Although about 5% of trappers still set traps for long-tailed weasels, in general they are not interested in trapping the species, most animals being caught accidentally in traps set for other animals. Trapping pressure in the last 30 years has not contributed to the decline of long-tailed weasels. However, if population numbers are reduced to critical levels, even a small amount of trapping could be an important factor.

(4) The most important environmental changes that have coincided with the reduction in numbers of long-tailed weasels are habitat loss due to increased agricultural land use, increased pesticide use, and, in the opinion of trappers, pest poisoning. Pesticide use is a potential problem in that it

has been shown to cause reproductive problems and cancers in mink, a closely related species. However, for the area represented by the carcass analyses, there was no detectable accumulation of organochloride pesticides or PCBs, but these samples were from areas where farming is mixed, and pesticide use is assumed to be lower. Therefore, these samples may not be representative of the range as a whole. Little data was available on the use of rodenticides for barn rat and gopher control, but trappers considered their use to be a contributary cause in the reduction of long-tailed weasel numbers. The Department of the Environment agreed that strychnine and warfarin are still commonly used, so it is possible there is some food loss and secondary poisoning of long-tailed weasels resulting from this practice which may be contributing to their decline.

(5) Of the 45 carcasses donated over two seasons, five were adults, and the majority males (approximately one third females). The high proportion of juveniles can be considered as indicative of growing populations, or alternatively, as a sign of exploited populations. It is possible that in areas where suitable habitat remains, the numbers are compatible with the carrying capacity of the area, but, as numbers are very much reduced from 30 years ago, it would seem reasonable to be sceptical that these results indicate growing populations.

4.3 RECOMMENDATIONS

(1) The Department of Natural Resources should establish a Wildlife Refuge where long-tailed weasels are reasonably abundant at present, and where there is still suitable habitat. It is suggested the area between Duck Mountain and Riding Mountain National Park would be a good area for the establishment of such a refuge, as there are no other wildlife projects in that area, and long-tailed weasels are still relatively abundant in the area at present. Other refuges should also be established in areas where long-tailed weasels were once abundant, such as the southwestern corner of the province, in the Pierson area. Inclusion of long-tailed weasel habitat requirements into current enhancement programs such as Wildlife Management Areas and refuges is also recommended. Ducks Unlimited projects also frequently provide enhanced habitat for long-tailed weasels.

(2) It is recommended that the Department of Natural Resources close the season for long-tailed weasels for at least five years to monitor what effect this action would have. Even though many long-tailed weasels are caught accidentally, there are still about 5% of trappers who trap the species intentionally. Closing the season would remove the incentive for this 5%, and is an important part of public education when attempting to protect a species.

(3) The COSEWIC "threatened" status for the species should be retained. It is possible that present numbers are consistent with the carrying capacity of the remaining suitable habitat, but this does not change the fact that present long-tailed weasels populations are "threatened".

(4) Development of an information package by the Departments of Natural Resources and Agriculture, (a booklet or leaflet) for distribution to farmers (through the Department of Agriculture), and to trappers (handed out with the trapper licence and at Trapper Education Workshops), to draw attention to the situation of long-tailed weasels, and the need to conserve their habitat. Emphasis should be put on the long-tailed weasels' potential for rodent control which provides economic benefits for the farmer in reduction of crop losses, lower repair costs to buildings, and reduction in costs of pest control products. The provision of a "one species" leaflet will provide more impact for the long-tailed weasel than a multi-species book, but this information could also be included in a book developed by the Department of Natural Resources that provides information on all wildlife that is either threatened or endangered in Manitoba at present.

Specific information concerning long-tailed weasels should be incorporated with other information circulated through such projects as Project Wild provided through the Department of Education by Department of Natural Resources.

Information leaflets or booklets describing land management

practices that enhance wildlife habitat should be distributed to secondary school science teachers to encourage inclusion of this information in the classroom.

(5) The Department of Natural Resources should recommend that the insect and weed control guide published by the Department of Agriculture includes adequate information on toxicity of the recommended chemicals to wildlife. As municipalities are often responsible for spraying to control grasshoppers, the Department of Natural Resources should also ensure the Pest Control Branch, Department of Agriculture, circulates information concerning toxicity levels of pesticides, and alternatives with lower levels, to all local government offices, together with background information describing the effects of certain chemicals on wildlife.

(6) Further studies are necessary to establish pesticide levels in long-tailed weasels in areas of the province where intensive farming is practiced (in particular, in the southwest). As the results in this study covered only a limited area of the range, they are not useful for establishing levels in other areas. It is recommended that the Department of Natural Resources, Wildlife Branch, carry out a very small amount of strictly controlled trapping in the southwest of the province, preferably in the fall, so that there is less risk of removing a nursing female, and at the end of the crop spraying season. Adult carcasses should be stored immediately at below -35°C

and tested as soon as possible to prevent any loss of chemicals.

Analysis for chemicals other than organochlorides and PCBs are also necessary, for example, heavy metals such as cadmium and lead, organophosphates and rodenticides.

At the same time, laboratory studies should be carried out to establish toxicity of insecticides, herbicides and fertilizers to long-tailed weasels.

Research is also necessary to establish a database of information on the amounts of pesticides, fertilizers, rodenticides and fungicides used annually in Manitoba.

(7) Other studies needed include:

(i) A follow-up trapper survey in five or ten years time is essential to indicate whether the strategies employed prove successful;

(ii) Field studies on census methods to determine actual population levels as compared with pelt returns;

(iii) The relationship of fur returns with socio-economic trends, such as school consolidation, rural population trends, pelt values and the cost of living index;

(iv) Detailed habitat studies that would establish minimum habitat requirements for long-tailed weasels; and

(v) Evaluation of present habitat retention and enhancement programs to assess their suitability for long-tailed weasels, for example, provincial government programs, HELP programs, and Ducks Unlimited projects.

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APPENDICES

APPENDIX 1

ECONOMIC DATA

Based on an industrial aggregate:

Average weekly wage in 1939 = $ 23.44

Average weekly wage in 1961 = $ 73.66

Average weekly wage in 1976 = $208.55

Average weekly wage in 1977 = $227.95

Average weekly wage in 1978 = $239.71

Average weekly wage in 1979 = $259.00

Average weekly wage in 1987 = $443.29

Unemployment rate in 1939 = 14.1%

Unemployment rate in 1987 = 7.0%

If they are employed, trappers enjoy a much higher standard of living than fifty years ago, and the chances that they are employed are much higher.

Average pelt prices for weasels have remained fairly constant over the years, so the relative values in the 1930s would be much higher than today. The lovest value for pelts experienced was in 1920/21, when the average price was 42 cents and the highest in 1945/46, with an

average price of $3.05 (these values are averages for both long and short-tailed weasels).

At $2.00 per pelt, one long-tailed weasel provided 8.5% of the weekly wage in 1939. Twelve pelts equalled a weeks' wage. As trappers reported, in some instances, catching as many as two hundred in a season, this could represent a third of a years earnings.

At present, a good pelt sells for around $15.00. This is 3.4% of the average weekly wage, and few trappers catch more than six long-tailed weasels in a season, so that represents a mere 20% of one weeks wage.

Thus, it can be seen that long-tailed weasels are not really worth the effort to trap and skin.

The information quoted in this appendix was supplied by Statistics Canada Information Service, Winnipeg, 1987, and Readers Digest Atlas of Canada, Ed. A.R. Byers, 1981.

APPENDIX 2

TRAPPER QUESTIONNAIRE

Long Tailed or Prairie Weasel Survey

Even long-time trappers and scientific experts sometimes find it difficult to know the difference between prairie and bush (short-tailed) weasels. To help you be sure of identifying the prairie weasel, attached to this questionnaire is a sheet with the measurements of the two weasels.

For each question, please check as many answers as apply.

1. Have you ever seen a prairie weasel in Manitoba?

	Yes Definitely	Not Sure	No Definitely
last season			
2 years ago			
5 years ago			
10 years ago			
15 years ago			
20 years ago			
Before that			

2. In what sort of surroundings did you see them? (Check as many as apply)

[ ] I have never seen one
[ ] Cultivated field
[ ] Uncultivated field
[ ] Ditch
[ ] Shelter belt
[ ] Marsh
[ ] Pothole
[ ] Creek
[ ] Forest
[ ] Farmyard
[ ] Other (please explain)_____

_____

_____

_____

3. Are you setting traps for prairie weasels in the 1986/87 season?
[ ] Yes [ ] No

If not, is there a particular reason why not? Please explain:

_____

_____

_____

4. Did you set traps for prairie weasels in:

1985/86 season	[ ] Yes	[ ] No
1984/85 season	[ ] Yes	[ ] No
1983/84 season	[ ] Yes	[ ] No
1982/83 season	[ ] Yes	[ ] No
1981/82 season	[ ] Yes	[ ] No
1980/81 season	[ ] Yes	[ ] No
Between 1975 - 1980	[ ] Yes	[ ] No
Between 1970 - 1975	[ ] Yes	[ ] No
Between 1965 - 1970	[ ] Yes	[ ] No
Between 1955 - 1965	[ ] Yes	[ ] No
Between 1945 - 1955	[ ] Yes	[ ] No
Before 1945	[ ] Yes	[ ] No

5. How many prairie weasels did you catch in each of the following seasons?

1985/86 _____

1984/85 _____

1983/84 _____

1982/83 _____

1981/82 _____

1980/81 _____

Average catch each season between 1975 - 1980 _____

Average catch each season between 1970 - 1975 _____

Average catch each season between 1965 - 1970 _____

Average catch each season between 1955 - 1965 _____

Average catch each season before 1955 _____

6. Did you catch any accidentally in traps set for other animals:
   [ ] Yes [ ] No

   In what kind of trap and set for what animal did they get caught?

   Trap Type:_____

   Set Type: _____

   Target Animal: _____

7. In what sort of surroundings did you catch them?
   (Check as many as apply)

   [ ] I have never caught one

   [ ] Cultivated field

   [ ] Uncultivated field

   [ ] Ditch

   [ ] Shelterbelt

   [ ] Marsh

   [ ] Pothole

   [ ] Creek

   [ ] Forest

   [ ] Farmyard

   [ ] Other, please explain_____

   _____

   _____

   _____

8. Were your weasel pelts sold?

   All_____

   Some_____

   None_____

   If not sold, please explain what happened to them_____

   _____

   _____

   _____

9. During your years as a trapper have you noticed any changes in the areas where you catch or see prairie weasels, such as (check as many as apply):

[ ] Pothole draining

[ ] More houses being built

[ ] New roadways

[ ] Bush clearing

[ ] Different crops planted

[ ] No change

[ ] Other, please explain _____

_____

_____

_____

10. If you have been trapping for five years or more would you say there has been a change in prairie weasel numbers? Are there

more_____ less_____ same number_____ as 5 years ago

more_____ less_____ same number_____ as 10 years ago

more_____ less_____ same number_____ as 20 years ago

more_____ less_____ same number_____ as 30 years ago

more_____ less_____ same number_____ as more than 30 years ago

If you think there are less now, do you think any of the following could have caused this? (Check as many as apply)

Changes in the countryside	[ ] Yes	[ ] No
Use of pesticides/herbicides	[ ] Yes	[ ] No
Overtrapping	[ ] Yes	[ ] No
Pest Control (poisoning)	[ ] Yes	[ ] No
Loss of food (less gophers)	[ ] Yes	[ ] No
Increase in ravens	[ ] Yes	[ ] No
Beats me	[ ] Yes	[ ] No

Other, please explain_____

_____

_____

_____

11. Have you noticed if there has been a change in the number of badgers in your area? (Check as many as apply)

[ ] Increase

[ ] Decrease

[ ] Don't know

[ ] There are no badgers in my area.

If there has been a change has this occurred:

[ ] in the last 5 years

[ ] 5 - 10 years ago

[ ] 10 - 20 years ago

[ ] 20 - 30 years ago

[ ] before that

Please add any comments you think may be helpful_____

_____

_____

12. How long have you been trapping? _____ Yrs.

13. Where do you trap? Please give names of nearest town, general area, or trapline section and mark it on the attached map._____

_____

_____

14. Have you ever changed your trapline section? [ ] Yes [ ] No

If yes, when did you change your section? Year_____

What was your previous trapline section or area?_____

_____

15. **Would you be willing to give us further help if needed?**

[ ] Yes [ ] No

Name:_____

Phone number: _____

Address:_____

_____

_____

15. General comments: _____

_____

_____

_____

_____

_____

_____

In the coming year please donate the carcasses of prairie weasles to your local Department of Natural Resources Office so that studies can be done to check the levels of chemicals in their bodies, and measurements taken. Please tag your carcasses with your name, the area and the type of surroundings where caught, trap type, and keep it frozen.

You will be supplied with the results on your donation and be acknowledged for your contribution.

Please keep and use the enclosed sheet so that you can be sure of separating prairie (long-tail) and the bush (short-tail) weasel or ermine.

Thank you for your co-operation.

SHORT-TAILED (BUSH) WEASEL

Female	overall length LESS than 12 inches
	body length LESS than 8 inches
Male	overall length LESS than 14 inches
	body length LESS than 10 inches

LONG-TAILED (PRAIRIE) WEASEL

Female	overall length MORE than 12 inches
	body length MORE than 8 inches
Male	overall length MORE than 14 inches
	body length MORE than 10 inches


Department of Natural Resources
MANITOBA
REGISTERED TRAPLINE SECTIONS
1986
CROSS LAKE
NORWAY HOUSE
MOOSE LAKE
EASTERVILLE
GRAND RAPIDS
LAKE WINNIPEG
POPLAR RIVER
SWAN RIVER
BLOCK C
BERENS RIVER
GYPSUM VILLE
DUCK MOUNTAIN
DAUPHIN
DALLAS
ALONSA
WEST INTERLAKE
EAST INTERLAKE
LAC DU BONNET
ROSSBURN
DELTA
ERICKSON
VIRDEN
BOISSEVAIN
MORDEN
SOUTHEAST
TURTLE MOUNTAIN
MAN 137

APPENDIX 3

TRAPPERS

LEND A HAND TO SCIENCE

GET INVOLVED IN A FURBEARER STUDY:

This trapping season, 1986-87, the Department of Natural Resources will be co-operating with a University of Manitoba student to obtain more information on the distribution of the prairie long-tailed weasel in Manitoba. All trappers are asked to save the carcasses of every long-tailed weasel caught. Guideline measurements are as follows:

Females: total length, including the tail, 30cm (12 inches), body length 20cm (8 inches)

Males: total length, including the tail, 35cm (14 inches), body length 25cm (10 inches)

Please take all carcasses in a frozen state to your local Natural Resources office with the following information:

1) Your name and address
2) Date of capture
3) Location and habitat caught in
4) Trap type and set

You will be acknowledged for your contribution.

For further information contact your Fur Manager or Natural Resources Officer.

Please note that all current trapping regulations apply to this project.

Manitoba
Natural Resources

MG-4214

APPENDIX 4

NEWSPAPER ADVERTISEMENT

Weasels Wanted

Manitoba Natural Resources is currently trying to learn more about the distribution of prairie long-tailed weasels. Trappers can assist this study by taking the frozen carcass of every long-tailed weasel they catch to the nearest Natural Resources Office.

Each carcass should be identified as to when and where it was taken, the type of habitat where it was taken, and a description of the habitat where it was caught, the type of trap and the set used.

The easiest way to recognize a long-tailed weasel is by size. Adult males have an average body length of 25 cm (10 inches), a total length of 35 cm (14 inches) including tail. Females have an average body length of 20 cm (8 inches), with a total length of 30 cm (12 inches).

For further information, contact a Fur Manager or Natural Resources Officer.

MANITOBA NATURAL RESOURCES

APPENDIX 5

Manitoba Community Newspapers where the long-tailed weasel advertisement was placed

Boissevain Recorder

Melita New Era

Minnedosa Tribune

Shoal Lake Star

Rossburn Review

Gladstone-Neepawa Press

Altona-Red River Valley Echo

Morris River Scratching Post

Steinbach Carillon

Swan River Star and Times

Interlake Spectator

Stonewall Argus and Teulon Times

APPENDIX 6

ADDITIONAL TABLES AND FIGURES FOR CHAPTER 3

CONTENTS

TABLE 6.1

NUMBER OF YEARS TRAPPING EXPERIENCE

LFC Area Code	Actual Number of Trapper Responses	Percent of Total Trapper Responses	Number of Years Trapping				Average No. of Years Trapping
			Over 30 yrs	20-30 yrs	10-20 yrs	Under 10 yrs	
001	107	75	19	14	22	52	15
002	32	89	15	03	04	10	26
005	58	74	14	12	12	20	20
006	45	74	11	05	09	20	17
007	15	83	05	02	03	05	21
008	92	72	21	15	19	37	18
009	48	89	14	06	12	16	20
010	92	77	26	08	27	31	18
011	51	77	07	06	14	24	13
012	39	87	15	11	02	11	25
020	19	83	06	-	06	07	19
022	39	93	15	07	06	11	25
050	03	19	-	01	-	02	09
070	-	-	-	-	-	-	-
210	09	82	06	-	02	01	34
220	-	-	-	-	-	-	-
260	-	-	-	-	-	-	-
280	03	100	01	01	01	-	25

TABLE 6.2

TRAPPER SIGHTINGS OF LONG-TAILED WEASELS IN MANITOBA

IN THE 1965-66 AND 1985-86 SEASON

	Trapping Season					
	Last Season (1985/86)			Twenty Years Ago (1965/66)		
Area of Province	Yes	Unsure	No	Yes	Unsure	No
South West (Virden, Rossburn, Boissevain, Erickson)	52	06	20	10	05	14
South Central (Morden, Delta)	36	11	21	23	06	10
South East (South East, Netley)	18	08	32	07	03	20
East Central (Lac du Bonnet)	-	-	100	-	-	100
Interlake (West & East)	19	20	32	08	07	19
West Central (Alonsa, Dauphin, Duck Mountain)	34	04	28	27	01	11
North West (Porcupine Mountain, Duck Bay, Red Deer)	-	-	44	11	-	44

TABLE 6.3

TRAPPER SIGHTINGS OF LONG-TAILED WEASELS IN MANITOBA

	Trapping Seasons																				
	Last Season			2 Years Ago			5 Years Ago			10 Years Ago			15 Years Ago			20 Years Ago			Before That		
LFC	Yes	Unsure	No	Yes	Unsure	No	Yes	Unsure	No	Yes	Unsure	No	Yes	Unsure	No	Yes	Unsure	No	Yes	Unsure	No
001	17	13	41	19	11	34	20	10	27	12	07	31	10	05	29	08	06	29	09	06	28
002	19	03	22	22	03	17	19	06	14	17	06	08	06	-	11	06	-	11	39	-	14
005	31	14	21	24	13	17	30	14	13	21	13	10	17	12	09	15	09	08	14	08	08
006	41	08	21	39	07	20	39	08	15	30	08	13	28	07	15	30	03	12	25	07	13
007	39	11	28	22	-	33	28	06	17	33	-	06	17	06	11	17	-	06	33	-	06
008	46	10	14	33	05	13	33	06	10	28	08	09	17	07	10	14	04	12	16	03	10
009	48	04	22	32	06	22	35	06	22	26	02	20	20	04	20	15	02	17	22	04	13
010	28	01	30	31	04	23	29	08	15	20	04	17	18	04	18	19	03	17	19	03	15
011	56	08	15	33	12	15	27	15	14	24	09	11	14	06	12	11	08	12	15	06	11
012	58	02	30	36	11	16	40	11	18	36	07	16	33	04	16	31	04	16	29	04	13
020	17	26	35	09	13	35	13	09	26	04	09	22	09	09	17	04	09	17	22	09	13
022	21	14	29	-	07	31	12	10	26	12	12	24	10	05	21	12	05	21	19	02	21
050	06	-	56	-	-	56	13	-	56	-	06	56	-	-	56	-	-	56	06	-	56
070	-	-	100	-	-	100	-	-	100	-	-	100	-	-	100	-	-	100	-	-	100
210	36	-	27	46	-	18	55	-	09	55	-	09	36	-	09	46	-	09	55	-	-
220	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-
260	-	-	100	-	-	100	-	-	100	-	-	100	-	-	100	-	-	100	-	-	100
280	-	-	33	-	-	33	-	-	33	-	-	33	-	-	33	33	-	33	67	-	33

TABLE 6.4

TRAPPER OPINIONS AS TO POPULATION ABUNDANCE OF LONG-TAILED WEASELS IN MANITOBA

	5 Years Ago			10 Years Ago			20 Years Ago			30 Years Ago			Over 30 Years		
LFC	More	Less	Same	More	Less	Same	More	Less	Same	More	Less	Same	More	Less	Same
001	01	30	08	01	17	04	01	14	02	-	09	04	-	09	04
002	-	31	11	-	27	-	-	19	-	-	14	06	-	25	06
005	03	34	13	01	35	04	01	28	03	01	24	01	01	22	01
006	02	34	21	03	23	08	02	23	03	02	21	02	02	21	02
007	06	22	22	-	17	11	-	17	-	-	17	06	-	17	-
008	03	29	21	03	24	09	02	16	06	02	15	02	02	14	02
009	04	37	17	-	30	06	-	24	04	02	15	02	-	22	02
010	03	38	10	01	31	04	02	21	03	03	18	03	03	14	03
011	02	36	17	02	20	06	-	12	05	-	14	05	-	15	05
012	07	43	11	02	36	04	02	39	02	02	34	-	02	23	02
020	09	17	-	04	09	-	-	04	-	-	09	-	-	17	-
022	07	31	02	02	24	02	02	21	-	-	17	-	-	21	-
050	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
070	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
210	-	36	18	09	36	-	09	27	-	-	27	09	-	36	09
220	-	-	-	-	-	-	-	100	-	-	100	-	-	100	-
260	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
280	-	33	-	-	33	-	-	33	-	-	33	-	-	33	-

TABLE 6.5
MANITOBA MUSEUM OF MAN AND NATURE RECORDS OF
LONG-TAILED WEASEL SPECIMENS FROM 1970 TO 1984

Local Fur Council Area	Place	Date	Number Caught	Number Males	Number Females
001 (South East)	Ross	Nov 1977	05	02	03
	Ross	Nov 1978	03	03	-
	Steinbach	Dec 1977	10	05	05
	Rosa	Dec 1977	01	01	-
	Marchand	Jan 1978	01	01	-
		TOTALS	20	12	08
002 (Netley)	Libau	Nov 1984	01	01	-
		TOTALS	01	01	-
005 (Morden)	Altona	Nov 1977	02	-	02
	Rathwell	Nov 1977	03	02	01
	Sperling	Dec 1979	01	-	01
	Morris	Mar 1981	01	01	-
		TOTALS	07	02	04
006 (Delta)	Delta	Jul 1977	01	-	-
	Delta	Nov 1977	01	-	-
	Delta	-	01	01	-
	Delta	Jun 1978	01	01	-
	Delta Oxbow	Aug 1978	01	01	-
	Delta Field Station	Aug 1978	02	02	-
	Delta Field Station	Nov 1978	01	-	01
	Rossendale	Dec 1977	02	02	-
	Oakville	Dec 1978	01	-	-
	Portage la Prairie	Aug 1979	01	01	-
		TOTALS	12	08	01
007 (Alonsa)	Ste. Rose du Lac	Jan 1978	01	01	-
	Ste. Amelie	Jan 1978	01	-	01
	Rorketon	Jan/Feb 1978	03	02	01
		TOTALS	05	03	02
008 (Boissevain)	Dunrea	Nov 1977	01	01	-
	Ninette	Dec 1977	01	-	01
	Wavanesa	Dec 1977	01	-	01
	Holland	Dec 1977	13	11	02
	Killarney	Dec 1977	03	02	01
	Killarney	Jan 1978	04	04	-
	Swan Lake	Jan 1978	01	01	-
	Brandon	Feb 1978	03	02	01
	Cypress River	Nov 1980	01	01	-
	Sidney	Oct 1984	02	02	-
	Treesbank	-	01	01	-
		TOTALS	31	25	06

TABLE 6.5 (continued)

Local Fur Council Area	Place	Date	Number Caught	Number Males	Number Females
009 (Erickson)	*	Nov 1977	01	01	-
		TOTALS	01	01	-
010 (Dauphin)	Brokenpipe Lake	Dec 1977	01	-	01
	Swan River	Nov 1977	05	05	-
	Swan River	Dec 1977	04	03	01
	Swan River	Jan 1978	05	04	01
	Swan River	Feb 1978	02	02	-
	Dauphin	Nov 1977	05	04	01
	Dauphin	Dec 1977	02	01	01
	Dauphin	Jan 1978	01	-	01
	Bowsman	Nov 1977	06	05	01
	Bowsman	Dec 1977	09	06	03
	Bowsman	Jan 1978	10	10	-
	Bowsman	Dec 1978	02	02	-
	Venlaw	Nov 1977	02	01	01
	Venlaw	Jan 1978	01	01	-
	Venlaw	Feb 1978	01	-	01
	Winnipegosis	Dec 1977	01	01	-
	**	Dec 1977	01	-	01
	Roblin	Dec 1977	05	04	01
	Makinak	Dec 1977	02	01	01
	Grandview	1977-1978	02	-	02
	Ethelbert	Feb 1978	03	02	01
		TOTALS	70	52	18
011 (Virden)	Pierson	1970	01	01	-
	Pierson	Jan 1974	01	01	-
	Pierson	Dec 1974	01	-	01
	Pierson	Aug 1975	01	-	01
	Pierson	Jan 1979	01	-	01
	Pierson	Aug 1979	01	01	-
	Oak Lake	Nov 1970	01	01	-
	Lyleton	Jun 1975	01	01	-
	Lyleton	Aug 1977	01	-	01
	Elkhorn	Nov 1977	01	-	01
	Virden	Dec 1977	01	-	01
	Lauder	Dec 1977	09	07	02
		TOTALS	20	12	08

TABLE 6.5 (Concluded)

Local Fur Council Area	Place	Date	Number Caught	Number Males	Number Females
012 (Rossburn)	Birtle	-	02	01	01
	Shell Valley	Dec 1977	01	-	01
		TOTALS	03	01	02
050 (Winnipeg)	Little Mountain Park	Dec 1979	01	01	-
	St. James	-	01	-	-
		TOTALS	02	01	-
220 (Porc. Mtn.)	Porcupine Hills	Nov 1977	04	04	-
	Porcupine Hills	Dec 1977	10	06	04
	Porcupine Hills	Feb 1978	01	-	01
		TOTALS	15	10	05

* Stony Point Beach on Lake Dauphin
** South edge of Riding Mountain National Park

TABLE 6.6
ANALYSIS OF WEASEL PELTS AT DOMINION-SOUDACK FUR AUCTION (JAN. 1987)

LFC Code	Place	Sex of LT	# LT Pelts	# ST Pelts
001	Vita	-	-	01
	St. Peirre Jolys	M	02	-
	Steinbach	M	03	06
005	St. Claude	M	01	-
006	Gladstone	M	01	-
	Elie	M	01	-
	Delta Marsh	-	-	28
	Garland/Delta Marsh	-	-	10
	Oakville	M	01	-
007	Ste. Rose du Lac	M	01	03
008	Brandon	M	03	-
	Cartwright	M	01	-
	Kemnay	M	01	01
	Wawanesa	M	13	59
	Souris	M	06	07
009	Sandy Lake	M	01	01
	Erickson	M	03	-
010	Dauphin	M	03	04
	Roblin	M	01	02
	Cowan	-	-	07
	Grandview	M	02	10
	Bowsman	M	03	10
	Swan River	M	01	07
	Makinak	M	01	-
	Durban	M	02	32
012	Russel	M	01	08
	Birtle	M	03	02
	Angusville	M	01	-
	Rossburn	M	01	-
022	Chatfield	-	-	01
Other	Flin Flon	-	-	05
	Oxford House	-	-	06
	Matheson Island	-	-	09
	Thompson	-	-	02
	Berens River	-	-	01
TOTALS			57	222

ST = Short-tailed weasel, LT = Long-tailed weasel

TABLE 6.7

PERCENTAGE OF TRAPPERS TRAPPING LONG-TAILED WEASELS

	Trapping Seasons																							
	86/87		85/86		84/85		83/84		82/83		81/82		80/81		75-80		70-75		65-70		55-65		45-55		45*	
LFC	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
001	04	93	08	71	11	67	09	67	08	65	06	64	07	62	07	62	06	60	09	58	09	57	07	59	06	88
002	08	86	03	61	08	58	11	53	14	50	11	50	11	50	06	44	03	47	-	44	06	42	17	36	19	36
005	04	95	04	89	06	87	08	86	09	80	10	77	13	72	17	67	14	63	17	58	17	53	17	51	14	51
006	07	85	10	74	08	74	13	69	13	71	12	67	10	68	13	66	13	57	10	56	16	44	08	51	08	51
007	17	78	17	72	11	72	17	61	11	61	11	61	11	61	17	44	11	50	06	50	11	44	22	39	06	50
008	04	91	03	79	07	73	10	73	08	71	06	71	08	69	10	65	09	61	07	65	12	54	11	54	11	55
009	06	94	07	80	11	72	15	67	11	69	15	65	17	63	11	59	15	56	19	46	17	46	11	54	13	52
010	07	89	11	61	14	57	15	55	14	53	17	49	13	47	15	48	17	41	14	40	14	39	08	39	11	40
011	-	97	03	82	08	73	05	74	03	76	03	76	02	74	06	74	09	68	06	68	15	58	11	61	09	64
012	04	91	02	80	04	78	09	76	09	71	07	71	04	73	09	76	16	62	16	60	22	49	13	51	16	49
020	-	100	-	91	09	70	09	70	09	65	13	57	13	52	09	52	04	52	-	52	04	48	04	48	13	44
022	07	91	12	60	07	57	07	57	10	57	07	57	10	50	07	50	07	48	05	48	12	41	12	41	10	43
050	-	100	-	88	-	81	-	81	-	75	-	75	-	75	-	75	-	75	-	75	-	75	-	63	-	63
070	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
210	18	73	18	73	18	73	18	73	27	64	27	64	09	73	18	64	18	64	36	46	27	46	36	18	36	18
220	-	100	-	100	-	100	-	100	-	100	-	100	-	100	-	100	-	100	-	100	-	100	-	100	100	-
260	-	100	-	100	-	100	-	100	-	100	-	100	-	100	-	100	-	100	-	100	-	100	-	100	-	100
280	-	67	-	100	-	100	-	100	-	100	-	100	-	100	-	100	-	100	-	100	33	-	33	-	33	-

* Before 1945

TABLE 6.8
TRAPPERS' REASONS FOR NOT TRAPPING LONG-TAILED WEASELS

Reasons for not Trapping Long-Tailed Weasels	Local Fur Council Area Codes																	
	001	002	005	006	007	008	009	010	011	012	020	022	050	070	210	220	260	280
Good for rodent control	02	03	08	04	06	13	07	09	23	33	04	05	-	-	09	-	-	-
Uneconomic	13	14	09	10	11	10	22	13	24	16	09	17	-	-	-	-	-	-
None in area	16	-	-	-	22	05	04	13	-	-	22	19	-	-	27	-	-	67
Not a trapper	13	08	21	07	-	13	07	13	05	04	13	-	63	-	-	-	-	-
Don't trap weasels	08	11	06	04	28	07	06	08	17	13	04	10	06	-	09	-	100	-
Retired or ill-health	04	-	-	-	-	02	02	-	-	-	-	-	-	-	-	-	-	-
Too few and wish to conserve	17	45	26	38	17	17	20	17	14	36	-	21	13	-	27	-	-	-
Only trap larger animals (fox, coyote, etc.)	05	07	08	10	-	09	02	09	08	07	09	07	25	-	-	-	-	-
Not interested	04	-	03	-	-	-	-	-	02	04	-	-	-	-	-	-	-	-
Don't know anything about long-tailed weasels	01	03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
No time	03	03	01	05	-	05	07	02	03	04	-	05	-	-	-	-	-	-

TABLE 6.9
NUMBER OF LONG-TAILED WEASELS CAUGHT EACH TRAPPING SEASON

Local Fur Council Area	Trapping Season											
	85/86	84/85	83/84	82/83	81/82	80/81	75-80	70-75	65-70	55-65	45-55	Before 1945
001	25	53	28	26	39	33	41	21	61	68	80	04
002	02	14	20	19	24	22	05	-	01	21	37	18
005	20	25	25	39	30	34	66	40	64	75	112	58
006	07	08	05	09	28	24	44	35	37	90	66	-
007	14	07	51	01	02	08	46	50	65	102	115	100
008	37	44	68	67	62	60	105	111	89	106	131	19
009	25	34	38	38	48	44	42	59	56	84	158	162
010	55	45	86	69	34	31	43	183	123	179	263	-
011	28	12	13	16	08	06	13	19	28	75	64	-
012	01	02	04	06	07	04	17	33	60	141	40	-
020	-	17	20	10	11	40	34	03	-	02	-	25
022	14	01	-	-	-	05	15	13	12	80	49	50
050	-	-	-	-	-	-	-	-	-	-	-	-
070	-	-	-	-	-	-	-	-	-	-	-	-
210	07	04	03	05	03	07	25	33	42	24	52	250
220	-	-	-	-	-	-	-	-	-	-	-	-
260	-	-	-	-	-	-	-	-	-	-	-	-
280	-	-	-	-	-	-	-	-	01	10	01	01

TABLE 6.10

ACCIDENTAL CATCHES OF LONG-TAILED WEASELS IN TRAPS SET FOR OTHER ANIMALS

Local Fur Council Area Code	Yes	No
001	26	63
002	31	64
005	30	56
006	31	57
007	39	56
008	24	66
009	37	52
010	35	53
011	30	61
012	40	51
020	39	39
022	26	62
058	-	58
070	-	-
210	46	46
220	-	-
260	-	100
280	-	100

TABLE 6.11

TRAP TYPES USED WHEN LONG-TAILED WEASELS WERE CAUGHT ACCIDENTALLY

1. Leghold (long spring).

#2	Newhouse	#3	Coyote trap
#1	leghold	#4	Coyote-wolf trap
#1½	leghold	#0	long spring
#2½	leghold	#1	long spring
#1½	Victor	#1½	long spring
#2	Victor	#2	long spring
		#3	double spring

2. Leghold (coil spring).

#1	jump trap	#1½	jump trap
#2	jump trap	#4	jump trap
#1½	coil spring	#2	coil spring
#3	coil spring		

3. Stoploss.
   Modified leghold used for drowning set only (for muskrat and mink).

4. "Humane" trap
   1½ coil soft catch (padded jaws - used for fox).

5. Conibear.
   #110 - muskrat size.
   #220 - fisher, underwater beaver, lynx.

6. Live trap - a box or cage.

TABLE 6.12

SET TYPES WHERE LONG-TAILED WEASELS HAVE BEEN CAUCHT ACCIDENTALLY

1. Cubby
2. Box
3. Skunk den
4. Runway
5. Under willows
6. Runs in creeks
7. Tunnel entrance
8. Snare
9. River banks
10. Beaver dams
11. Mink entrance
12. Dirt cellar
13. Under wood floors
14. Hollow logs
15. Drainage ditches
16. Old shed

TABLE 6.13

TARGET ANIMAL AND PERCENTAGE OF TRAPPERS WHO CAUGHT LONG-TAILED WEASELS IN SETS FOR THESE ANIMALS

Target Animal	% Trappers
Mink	32.5
Fox	13.6
Coyote	9.5
Squirrel	8.8
Rat	5.9
Raccoon	5.9
Muskrat	4.7
Fisher	2.4
Short-tailed weasel	2.4
Skunk	1.8
Gopher	1.8
Marten	1.8
Lynx	1.2
Rabbit	1.2
Beaver	0.6
Magpie	0.6
Badger	0.6

TABLE 6.14

PERCENTAGE OF TRAPPERS SELLING THEIR PELTS

LFC Area Code	All	Some	None	Discarded/ Damaged	Mounted	Other
001	32	06	02	04	04	Not prime 01
002	47	03	11	-	-	-
005	40	03	03	04	01	Not prime 01
006	43	-	05	03	-	Not prime 02
007	67	-	-	-	-	-
008	39	02	03	01	01	Not prime 02
009	50	04	06	-	-	Not prime 02, Kept 02
010	51	04	-	02	01	Given away 01
011	33	-	05	05	-	-
012	47	04	11	09	-	Road kill 02, Kept 02, Released 04
020	30	09	09	-	-	-
022	43	02	05	-	-	-
050	-	-	-	-	-	-
070	-	-	-	-	-	-
210	73	-	-	-	-	-
220	-	-	-	-	-	-
260	-	-	-	-	-	-
280	33	-	-	-	-	-

TABLE 6.15

TYPE OF SURROUNDINGS WHERE LONG-TAILED WEASELS WERE MOST FREQUENTLY SIGHTED

Types of Areas Where Long-Tailed Weasels Sighted	Local Fur Council Area Codes																	
	001	002	005	006	007	008	009	010	011	012	020	022	050	070	210	220	260	280
Never seen or caught on	33	17	12	10	06	09	13	18	09	09	22	21	31	100	09	-	-	33
Cultivated field	10	14	12	23	17	17	20	16	17	16	-	02	-	-	18	-	-	33
Uncultivated field	12	14	22	26	28	28	13	15	31	47	09	10	06	-	36	-	-	-
Ditch	14	39	39	49	39	43	44	25	52	33	13	10	06	-	46	100	-	33
Shelterbelt	12	14	17	30	06	21	20	16	18	11	04	02	06	-	18	-	-	-
Marsh	23	28	19	23	39	24	20	26	24	31	35	43	19	-	36	-	-	67
Pothole	04	06	15	05	06	05	19	06	18	16	-	05	06	-	09	-	-	-
Creek	17	17	32	23	17	26	33	33	31	31	17	05	06	-	55	-	-	33
Forest	23	17	08	23	22	13	15	18	06	16	13	19	-	-	36	-	-	33
Farmyard	25	28	45	34	39	43	41	40	41	56	13	29	13	-	27	-	-	33

TABLE 6.16

TYPE OF SURROUNDINGS WHERE LONG-TAILED WEASELS WERE MOST FREQUENTLY CAUGHT

Habitat Type Where Long-Tailed Weasels Usually Caught	Local Fur Council Area Code																	
	001	002	005	006	007	008	009	010	011	012	020	022	050	070	210	220	260	280
Never caught a long-tailed weasel	32	31	37	25	17	29	19	21	27	16	22	36	25	100	18	-	-	67
Cultivated field	04	08	06	05	06	05	02	04	09	07	04	-	-	-	18	-	-	33
Uncultivated field	07	08	06	10	17	07	02	03	11	16	09	05	-	-	27	-	-	-
Ditch	12	14	10	18	22	15	19	14	12	16	13	05	-	-	18	-	-	-
Shelterbelt	08	06	10	20	06	10	13	09	02	07	13	02	-	-	-	-	-	-
Marsh	17	17	14	10	39	10	28	24	14	21	35	19	-	-	18	-	-	-
Pothole	04	03	09	03	11	06	07	04	09	11	04	-	-	-	-	-	-	-
Creek	16	11	22	21	22	20	28	31	20	31	13	05	-	-	36	-	-	-
Forest	18	11	12	12	11	07	17	20	03	07	13	07	-	-	36	-	-	-
Farmyard	16	19	21	15	17	19	20	23	08	22	13	02	-	-	09	-	-	33
Stone piles	-	-	01	02	06	03	07	-	02	02	04	02	-	-	09	-	-	-
Fence lines and field edges	-	03	01	03	-	03	06	01	-	04	-	02	-	-	-	-	-	-
Brush piles	-	03	-	-	06	-	-	01	02	-	-	02	-	-	-	-	-	-
Old farm buildings	-	-	01	-	-	02	-	-	-	-	-	-	-	-	-	-	-	-
Roads and railway lines	-	-	03	-	-	-	02	-	-	-	-	-	-	-	-	-	-	-
Riverbanks	-	-	-	-	-	-	-	02	05	02	-	-	-	-	-	-	-	-
Haystacks	-	-	-	-	-	-	-	-	-	-	-	-	-	-	09	-	-	-
Open ridges	01	-	-	-	-	-	-	-	-	-	04	-	-	-		-	-	-
Bush swamp	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	02	-	-
Curling rink	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Culvert	-	-	-	-	-	-	-	01	-	-	-	-	-	-	-	-	-	-
Willow buff	-	-	-	-	-	-	-	01	-	-	-	-	-	-	-	-	-	-
Gravel pit	-	-	-	-	-	-	-	01	-	-	-	-	-	-	-	-	-	-
Beaver dam	-	-	-	-	-	-	-	-	02	-	-	-	-	-	-	-	-	-
Car garage	-	-	-	-	-	-	-	-	02	-	-	-	-	-	-	-	-	-
Ground-hog holes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	09	-	-	-

TABLE 6.17

HABITAT CHANGES NOTICED IN AREAS WHERE LONG-TAILED WEASELS USUALLY SIGHTED

Changes	Local Fur Council Area Codes																	
Survey Categories	001	002	005	006	007	008	009	010	011	012	020	022	050	070	210	220	260	280
Pothole draining	12	14	23	23	22	23	30	14	24	31	70	21	-	-	36	100	-	-
More houses built	11	14	05	08	-	05	06	06	02	02	22	02	-	-	-	100	-	-
New roadways	13	19	10	13	28	12	17	13	14	16	22	10	-	-	36	100	-	-
Bush clearing	29	42	35	41	33	32	37	34	35	44	35	31	06	-	46	100	-	33
Different crops	07	06	08	10	11	09	09	11	03	09	04	02	-	-	09	-	-	-
No changes	20	11	18	23	28	23	30	22	26	31	09	17	-	-	09	-	-	33

Other Changes Mentioned	001	002	005	006	008	009	010	011	012	020	022	210
Wetlands drained	01	-	-	-	01	-	01	-	-	04	02	-
Fire damage	01	-	01	-	02	-	02	-	-	04	02	-
Out-of-Season trapping	01	-	-	-	-	-	-	-	-	-	-	-
More old farm buildings	-	-	01	-	02	-	-	-	-	-	-	-
More intensive farming	-	-	-	-	01	02	01	02	-	-	02	-
Increased pesticides	-	-	-	-	01	02	-	-	02	-	-	09
Fewer free-range hens	-	03	-	-	-	-	-	-	-	-	-	-
Drought damage	-	-	-	-	-	-	-	02	-	-	02	-
Brush pile burning	-	-	-	-	-	-	-	-	-	-	02	-
Fence line, creek, and road side clearing	-	03	-	-	-	02	03	-	-	-	-	-
No haystacks	-	-	-	-	-	-	01	-	-	-	-	-
Forest fire control	-	-	-	-	-	-	-	-	-	-	-	09
More pastureland and livestock spoiling creeks	-	-	-	02	-	-	-	-	-	-	-	09

TABLE 6.18
POSSIBLE CAUSES FOR CHANGES IN NUMBERS OF LONG-TAILED WEASELS

Possible Causes	Local Fur Council Area Codes																		
	Yes/No	001	002	005	006	007	008	009	010	011	012	020	022	050	070	210	220	260	280
Changes in countryside	Yes	22	36	33	31	28	31	37	31	36	38	30	36	13	-	36	100	-	33
	No	09	06	05	-	17	06	11	08	05	07	-	05	-	-	09	-	-	-
Increased pesticide use	Yes	25	33	33	28	39	22	35	35	30	40	30	21	06	-	55	-	-	-
	No	05	03	04	03	06	06	02	03	03	04	04	02	-	-	09	-	-	-
Over-trapping	Yes	08	03	04	18	06	10	09	07	05	11	04	10	06	-	-	-	-	-
	No	13	14	13	13	11	14	20	19	18	20	17	14	-	-	36	-	-	-
Pest control (poisoning)	Yes	24	19	30	18	17	26	26	29	33	38	09	24	06	-	64	100	-	33
	No	05	06	03	08	06	08	07	06	08	04	04	05	-	-	09	-	-	-
Less food (gophers, mice)	Yes	18	22	13	18	28	04	17	25	17	13	26	24	06	-	55	-	-	33
	No	08	11	10	10	11	13	15	06	17	16	-	05	-	-	09	-	-	-
More ravens, havks, ovls	Yes	18	19	09	21	28	11	33	33	05	22	26	19	13	-	36	100	-	33
	No	08	06	08	12	06	10	11	03	18	11	04	05	-	-	27	-	-	-
Beats me	Yes	11	19	13	10	11	16	11	13	18	07	09	12	-	-	09	-	-	-
	No	06	-	01	-	11	02	04	03	03	02	-	07	-	-	-	-	-	-
Habitat loss	Yes	03	-	06	03	-	01	06	-	02	-	04	02	-	-	09	-	-	-
	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stubble burning	Yes	01	03	01	02	06	01	-	-	-	02	04	02	-	-	18	-	-	-
	No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

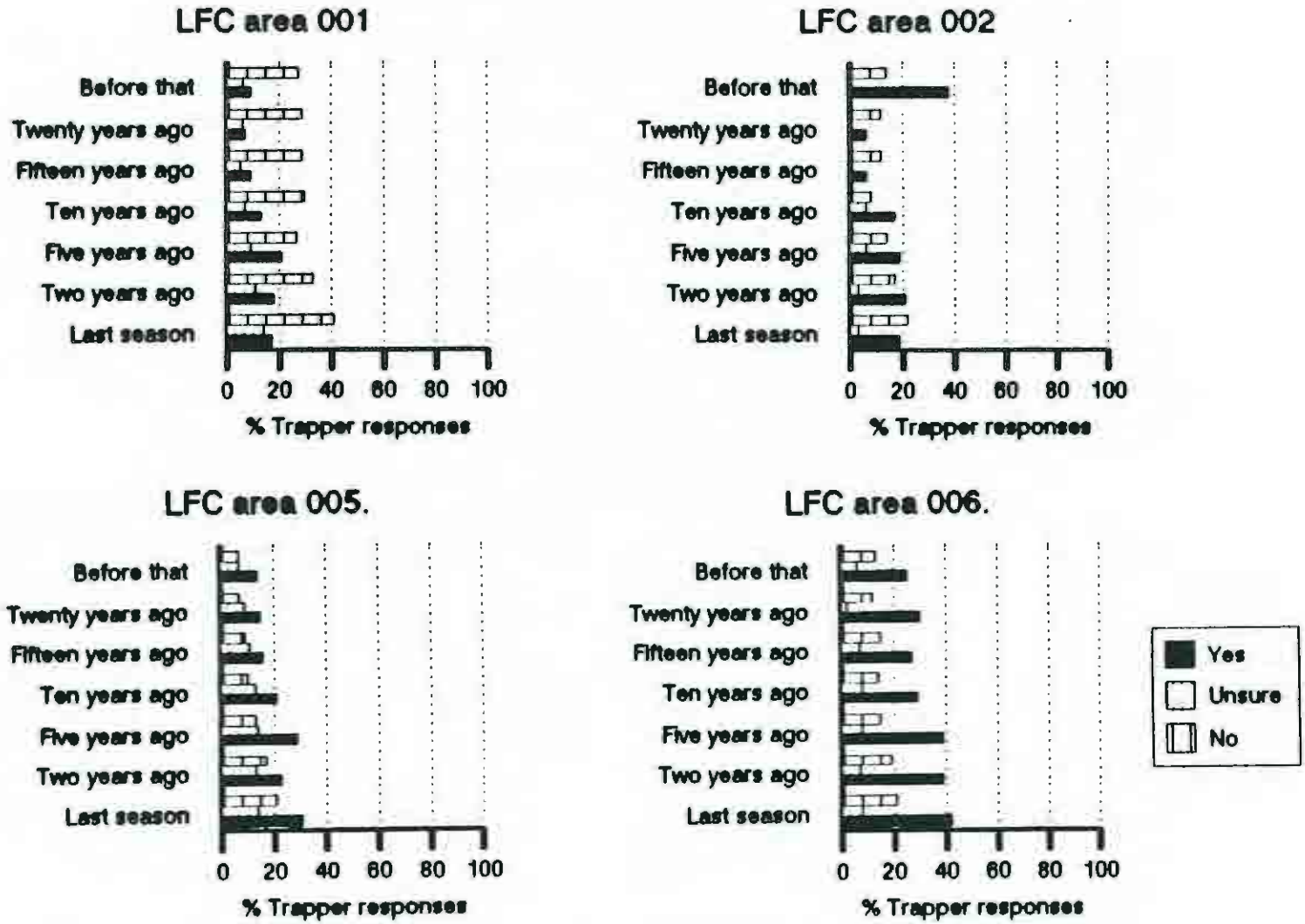


Figure 6.1 Trapper sightings in each LFC area in different time periods

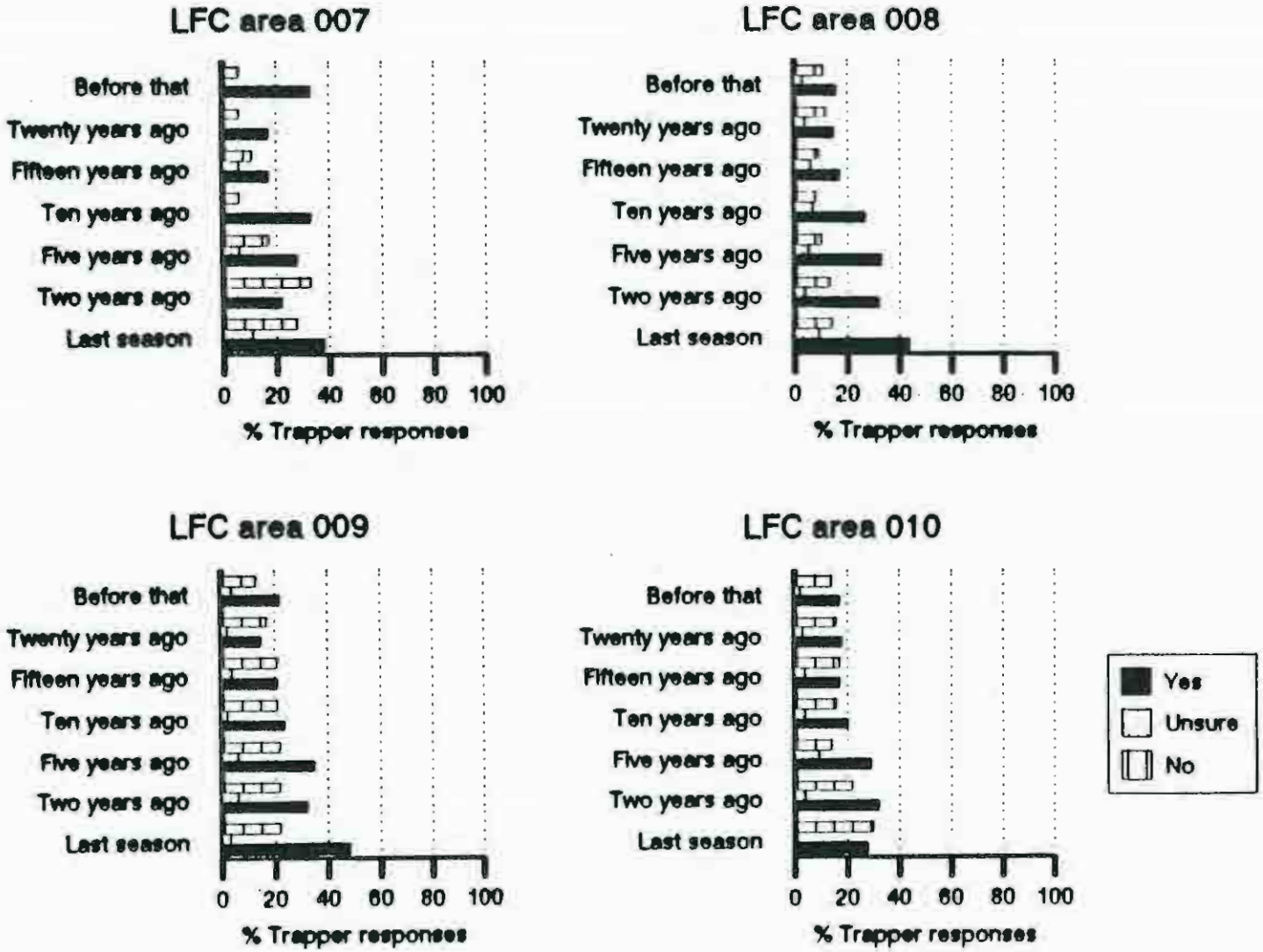


Figure 6.1 (continued)

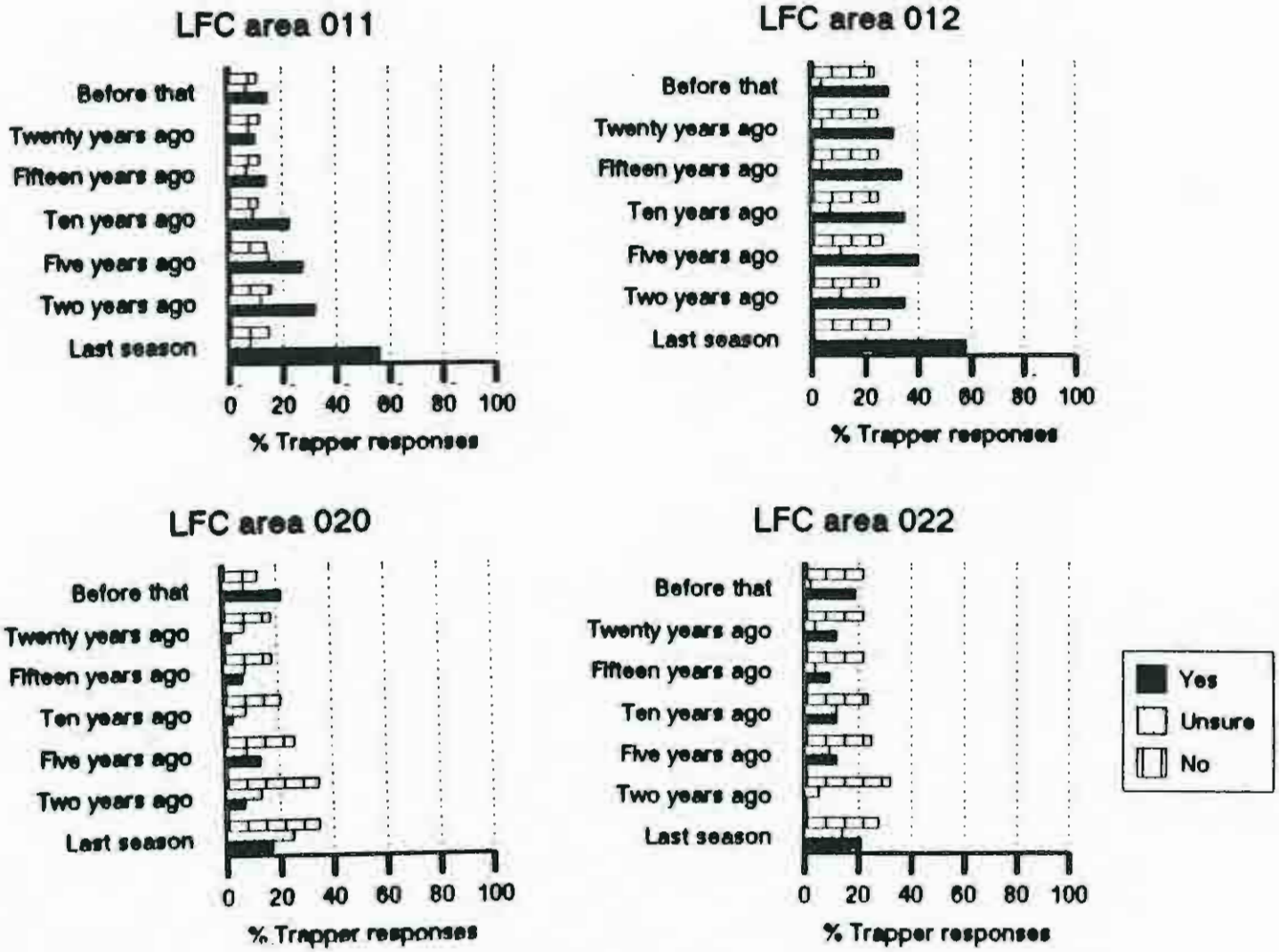


Figure 6.1 (continued)

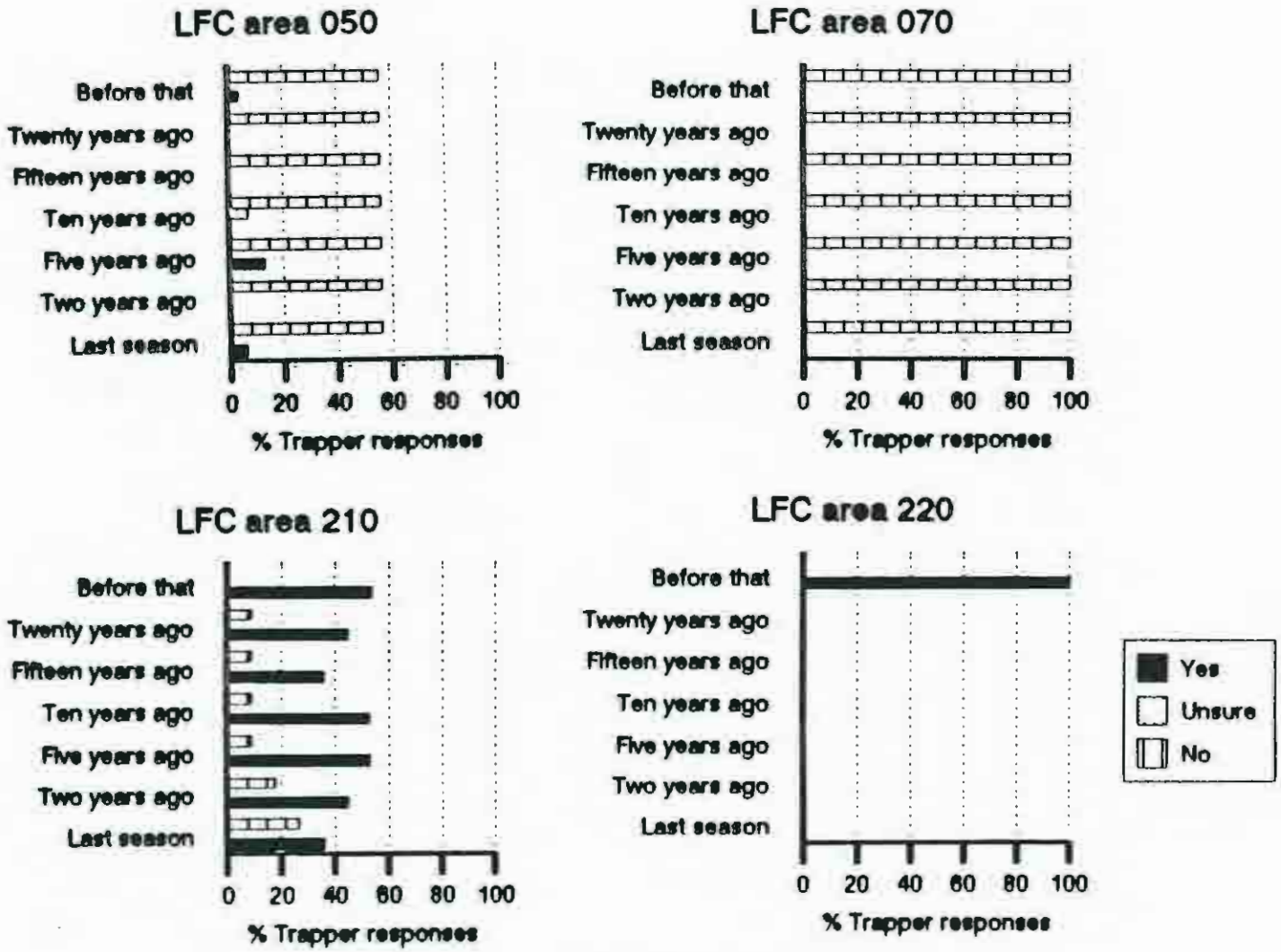


Figure 6.1 (continued)

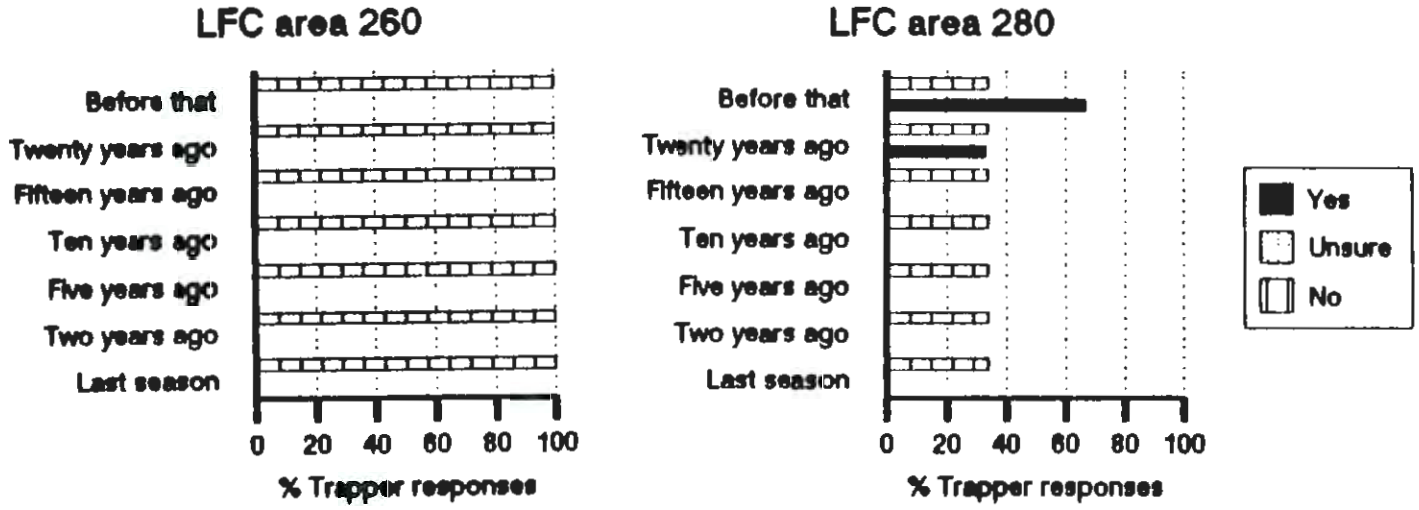


Figure 6.1 (continued)

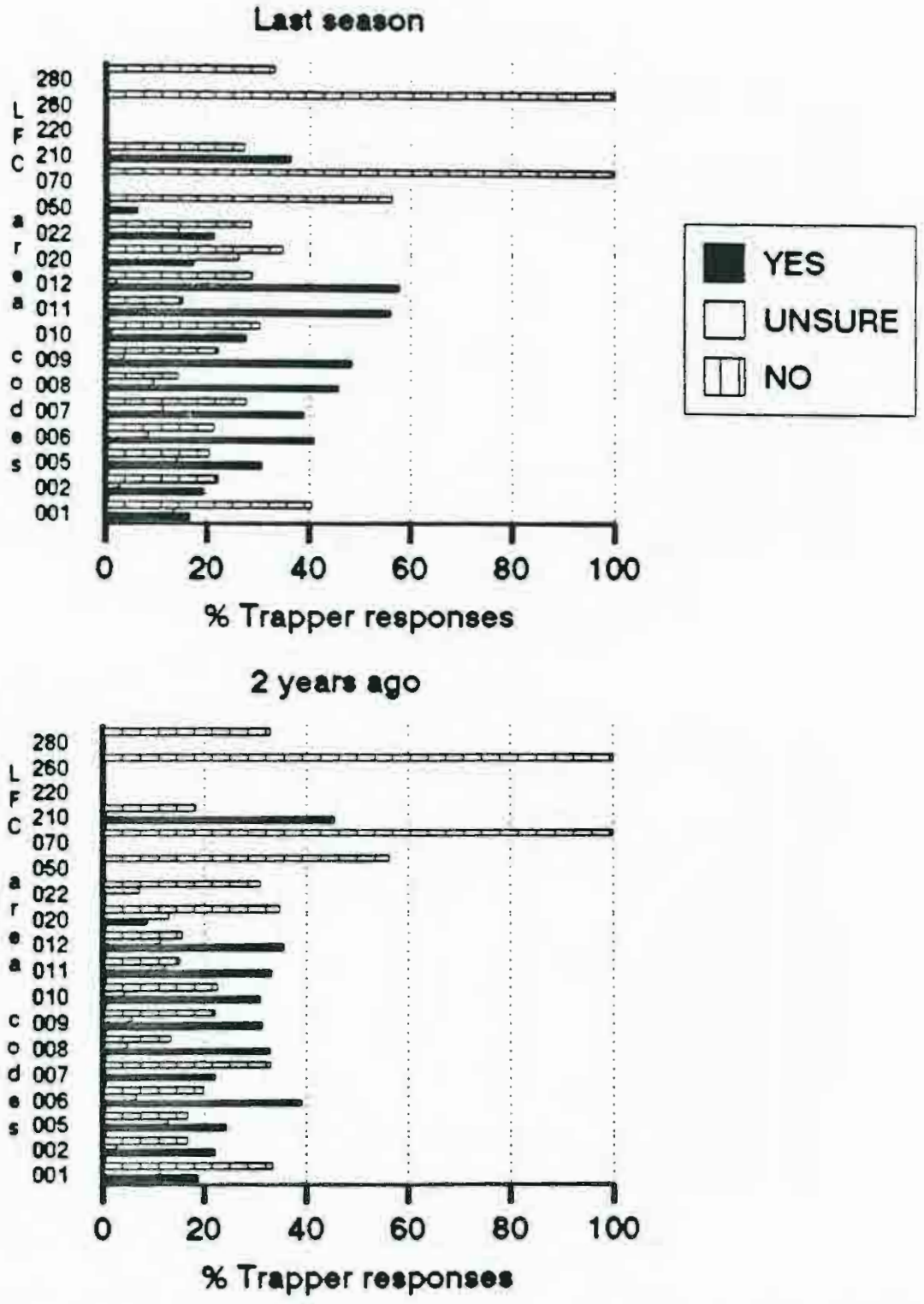


Figure 6.2 Trapper sightings of long-tailed weasels in Manitoba

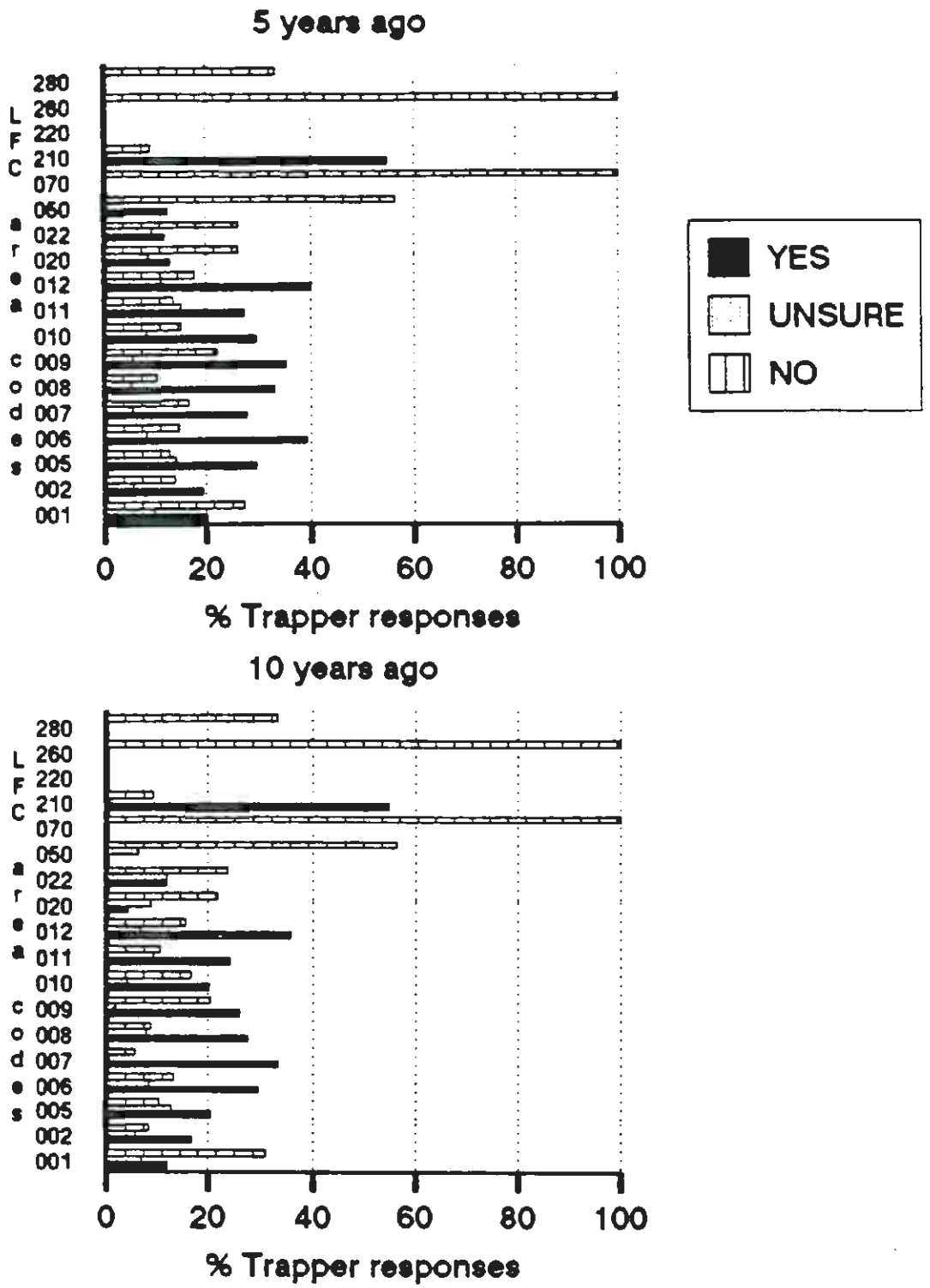


Figure 6.2 (continued)

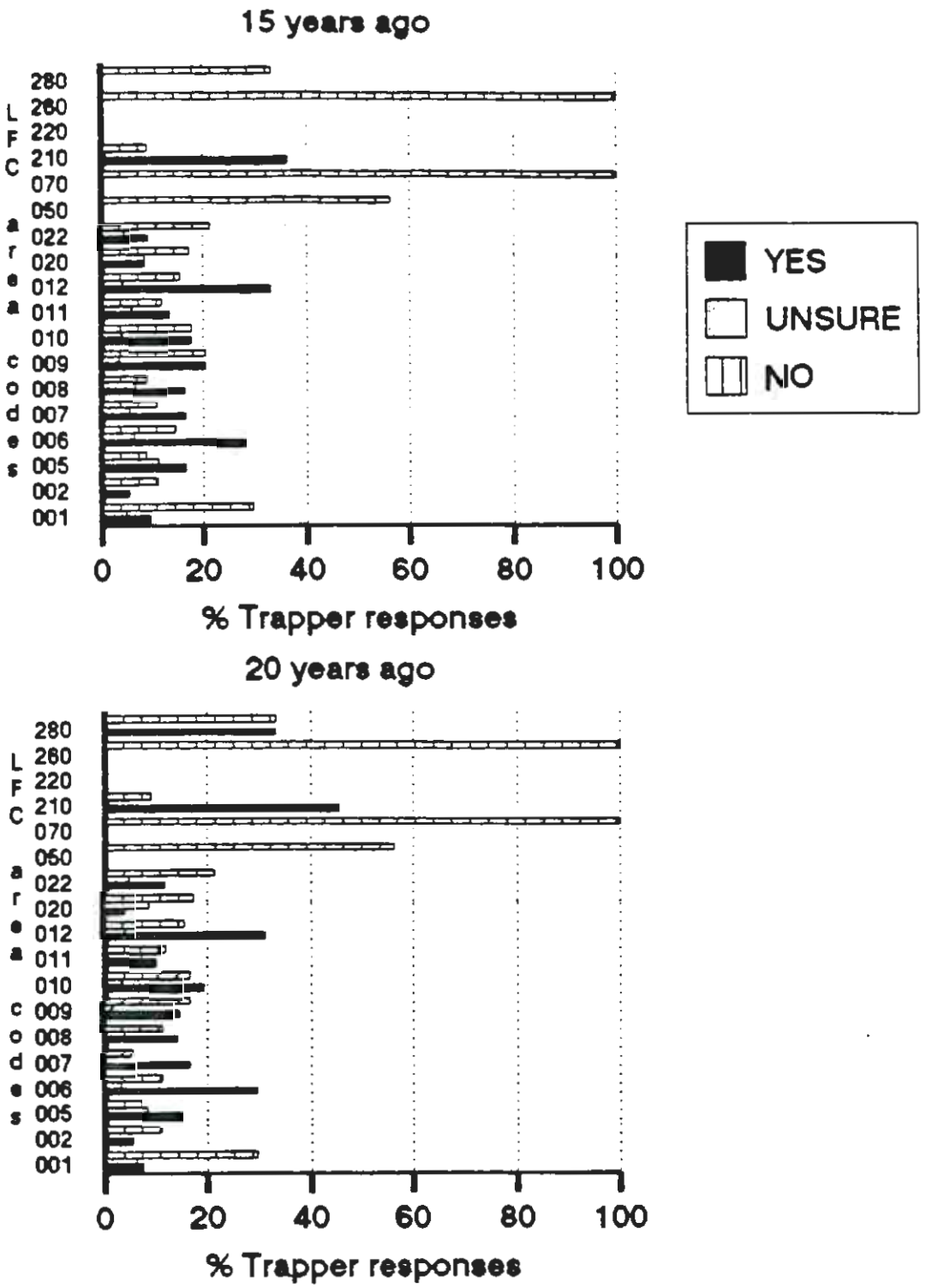


Figure 6.2 (continued)

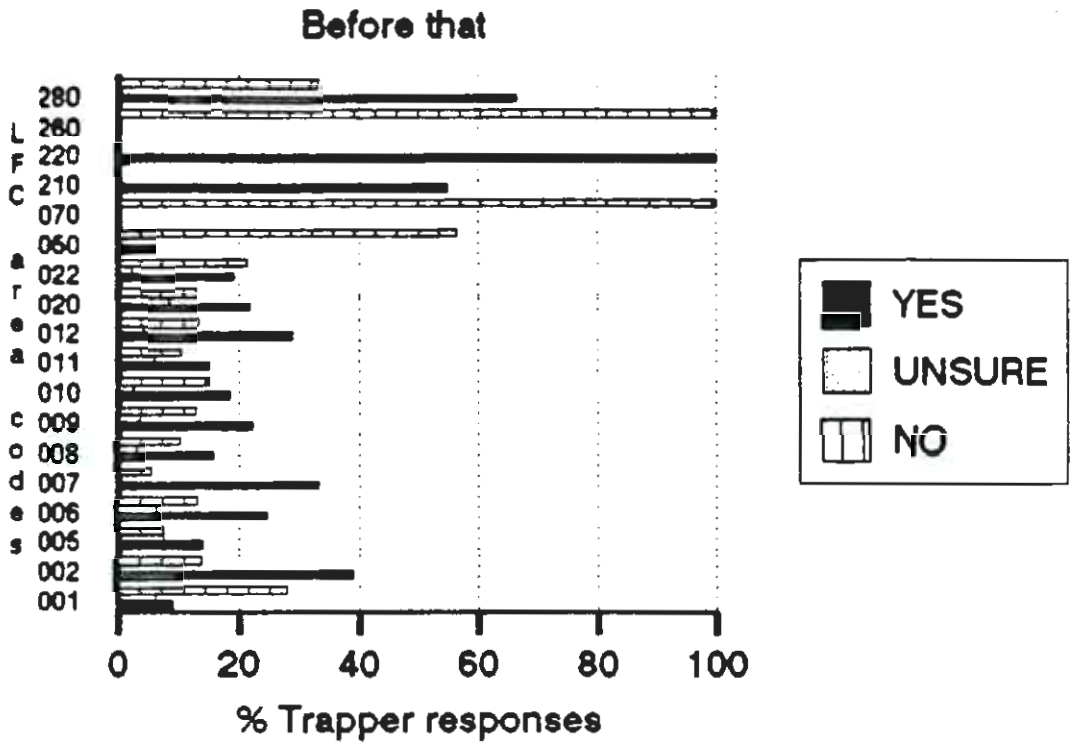


Figure 6.2 (continued)

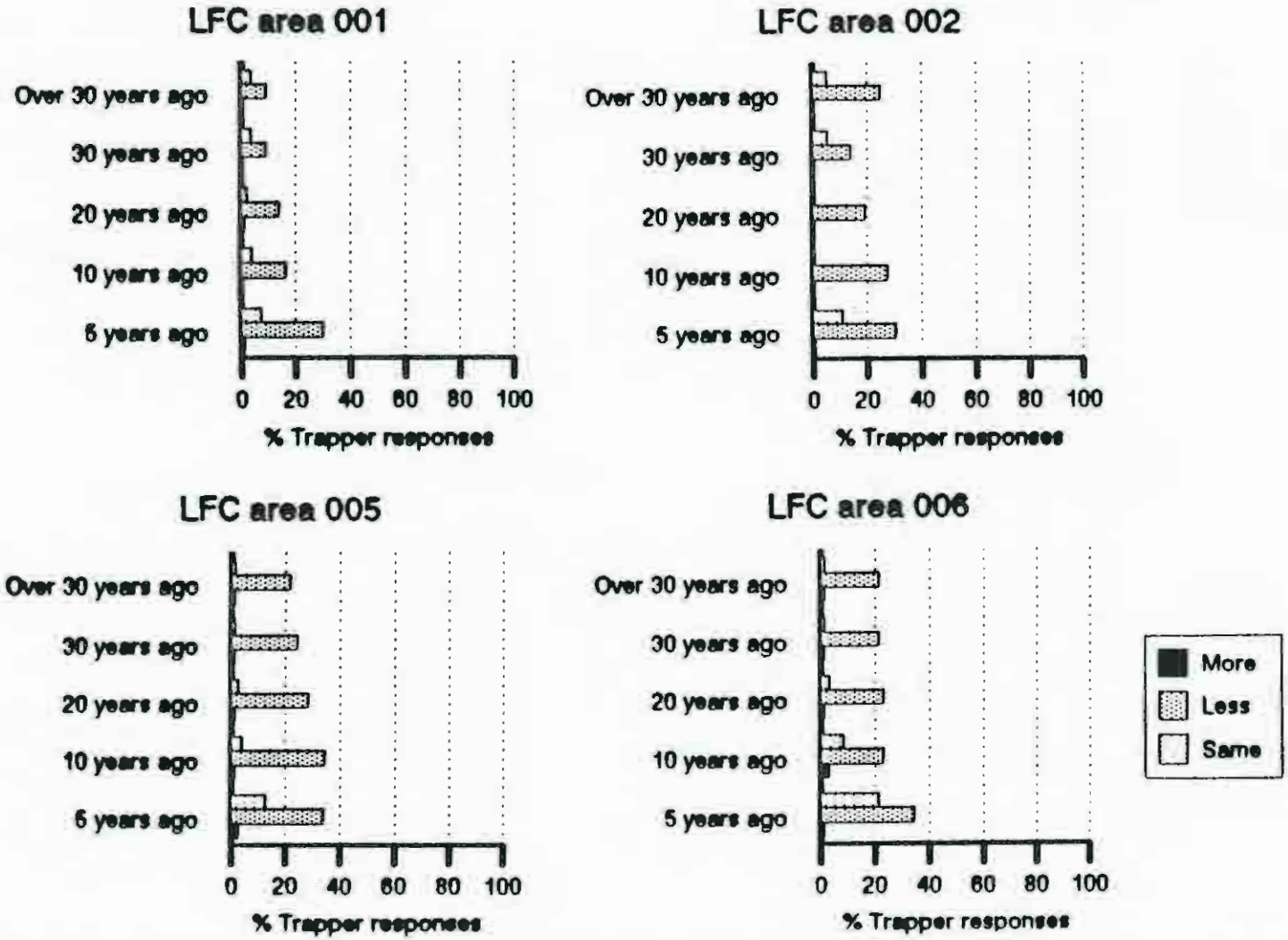
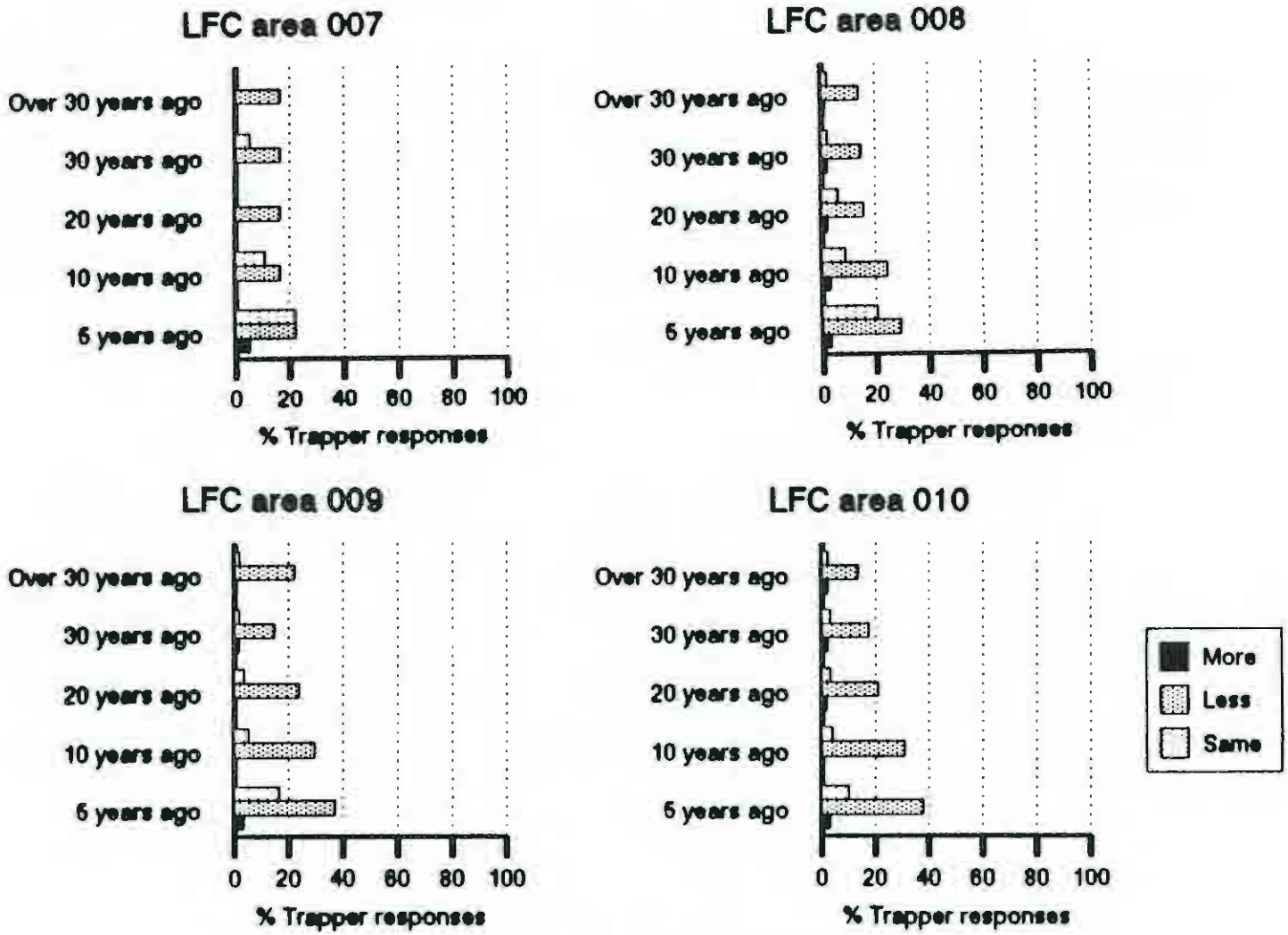


Figure 6.3 Trapper opinions of long-tailed weasel population abundance over different time periods



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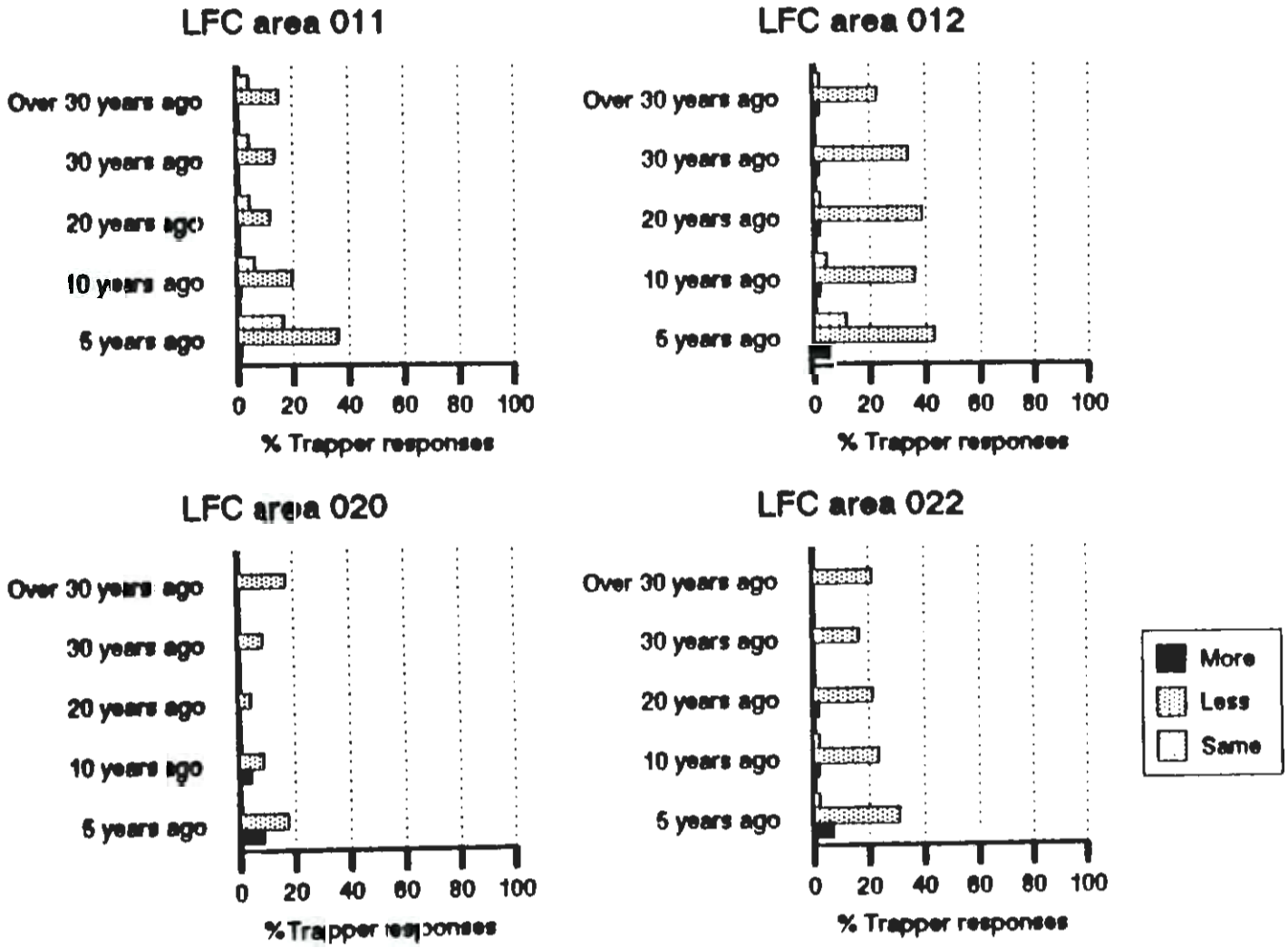

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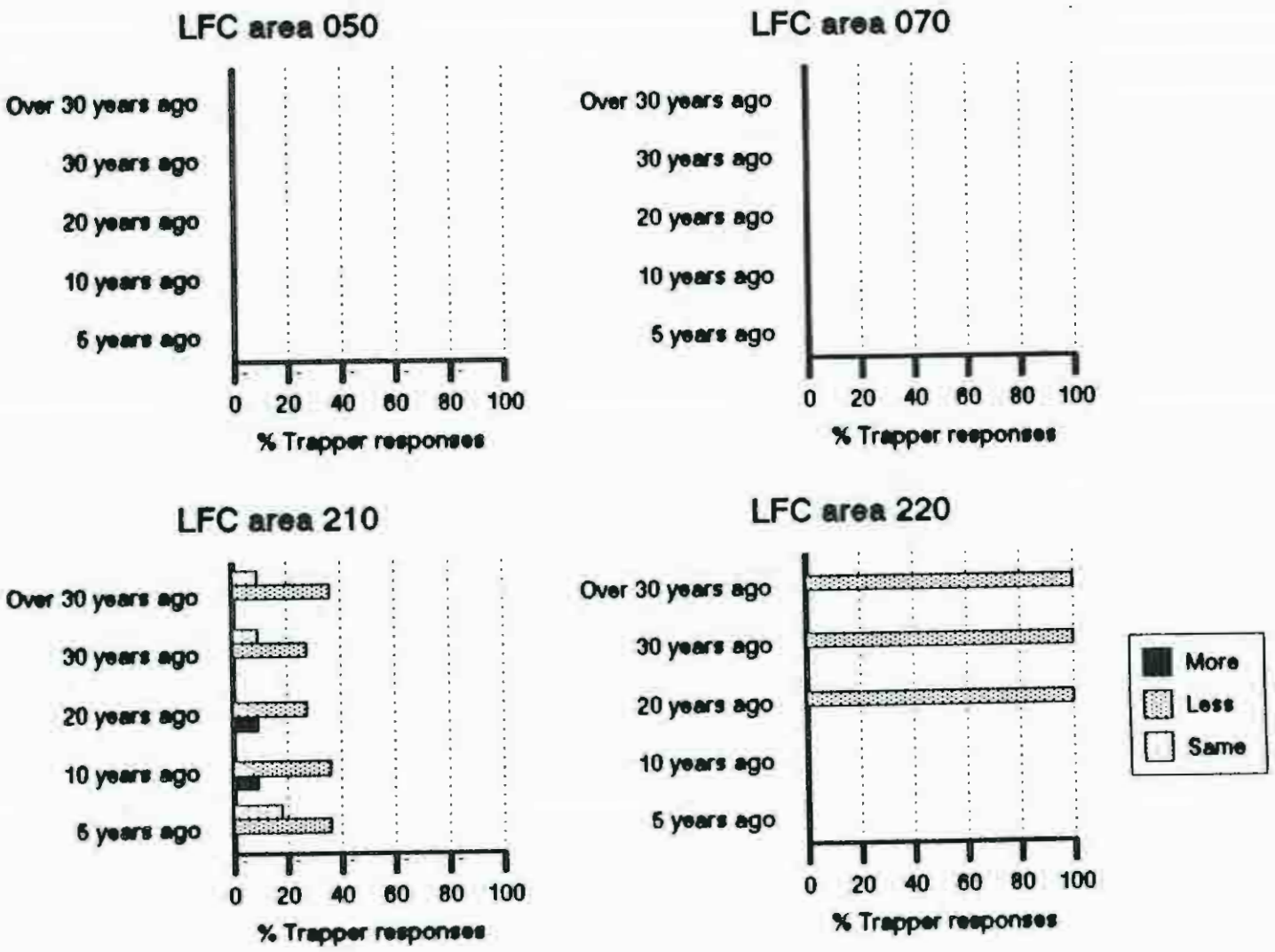

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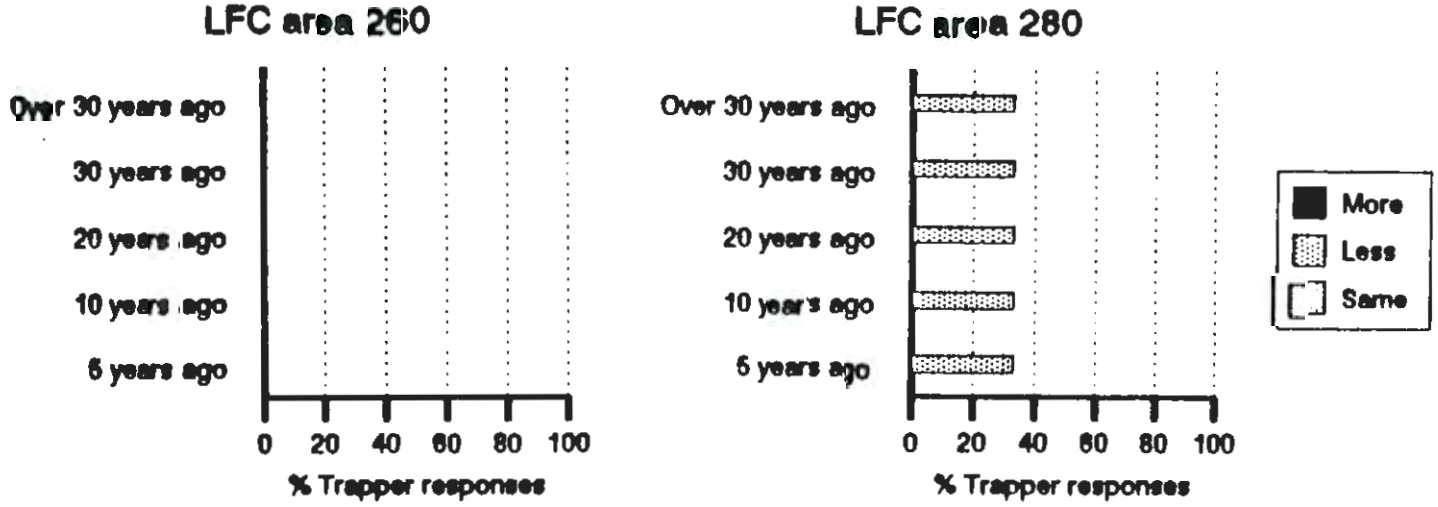

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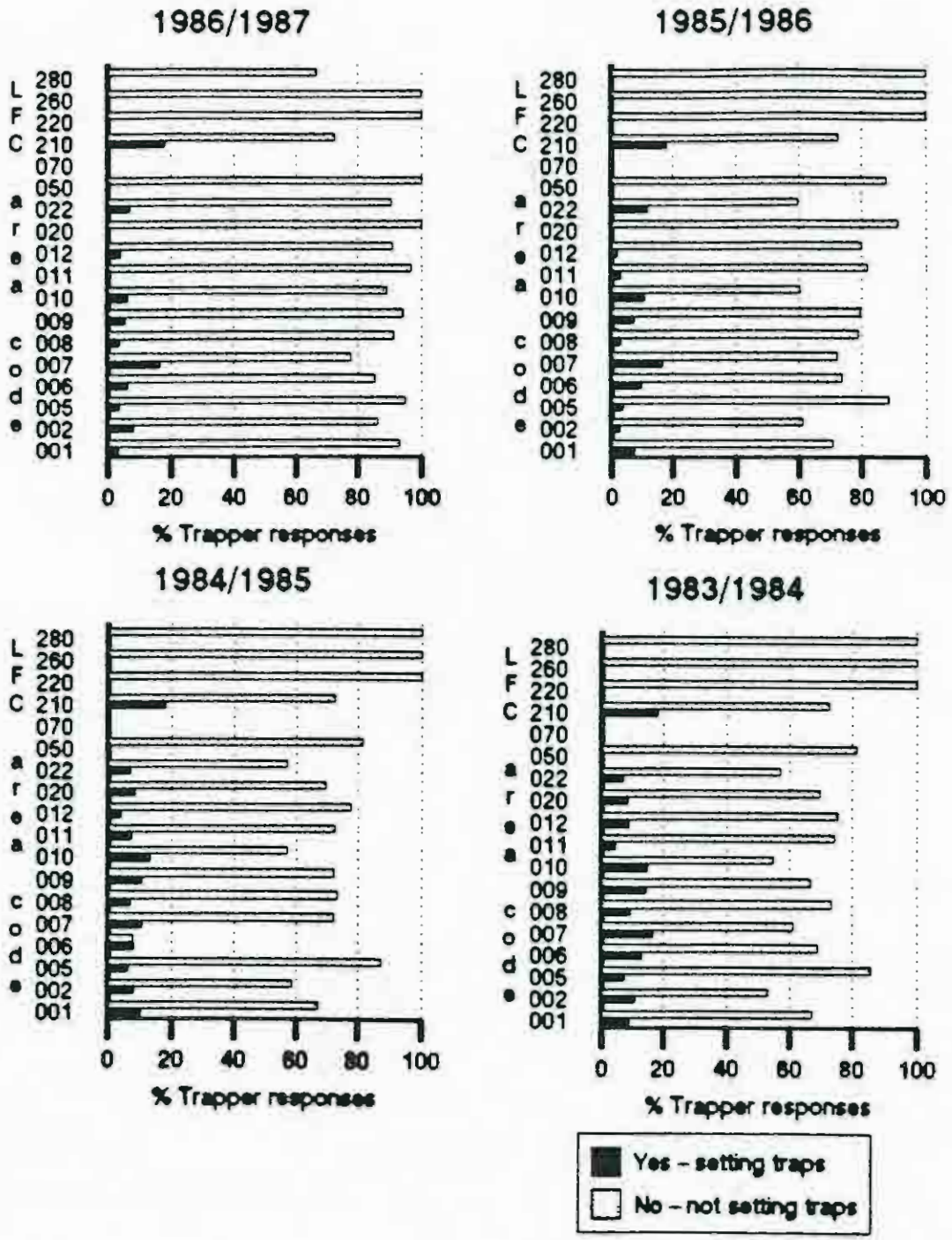
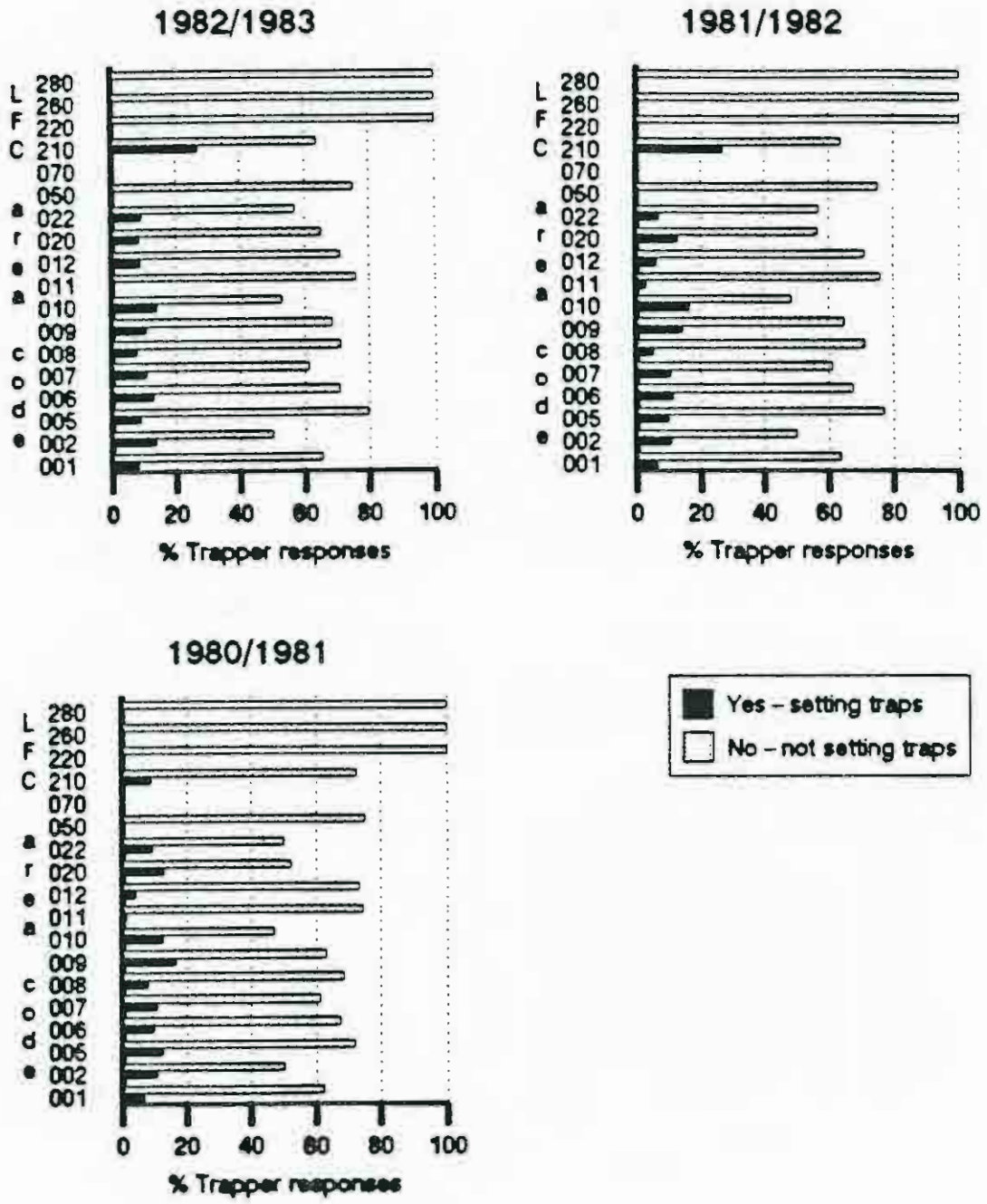


Figure 6.4 Trapper responses as to whether they were or were not setting traps for long-tailed weasels



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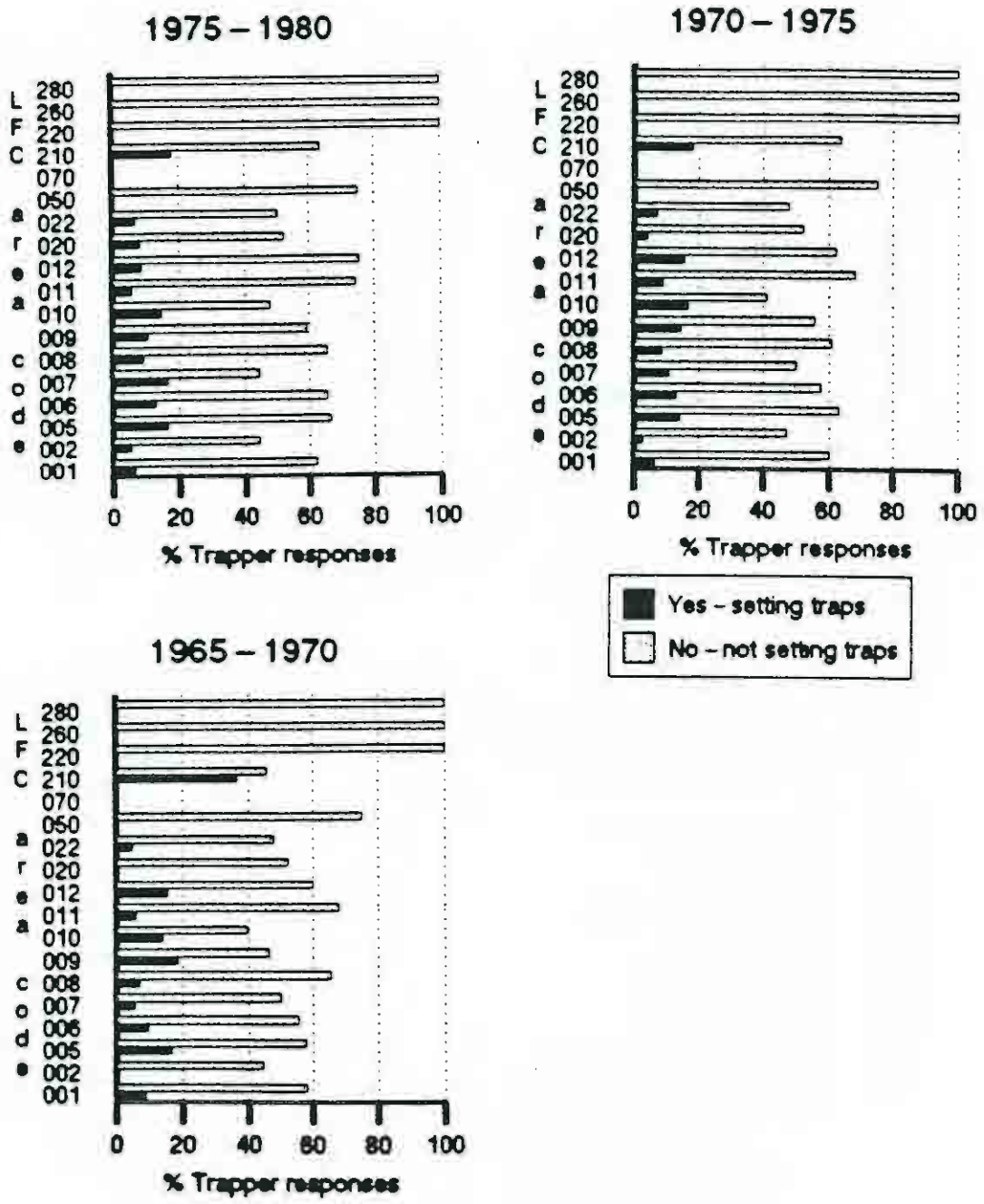

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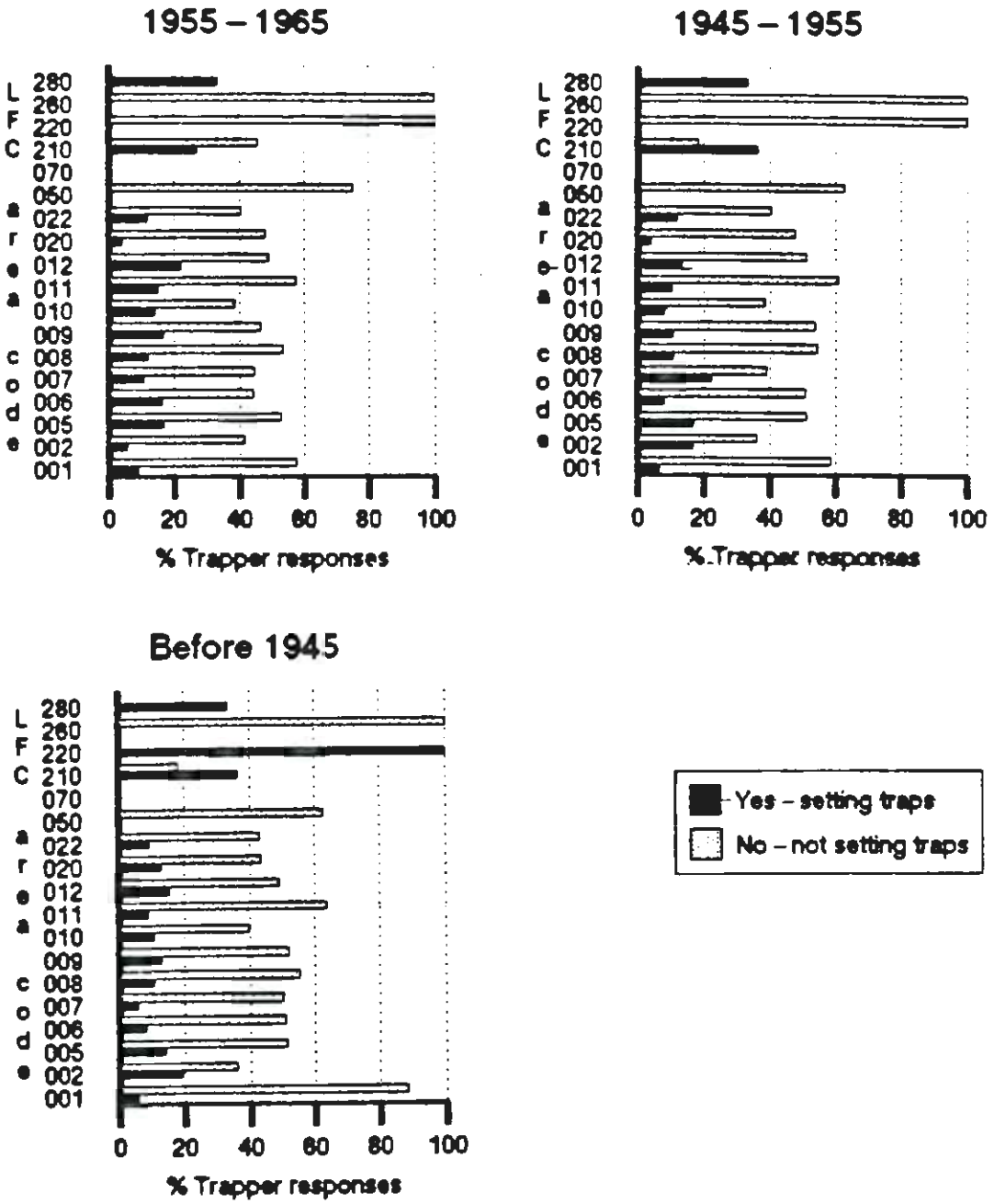

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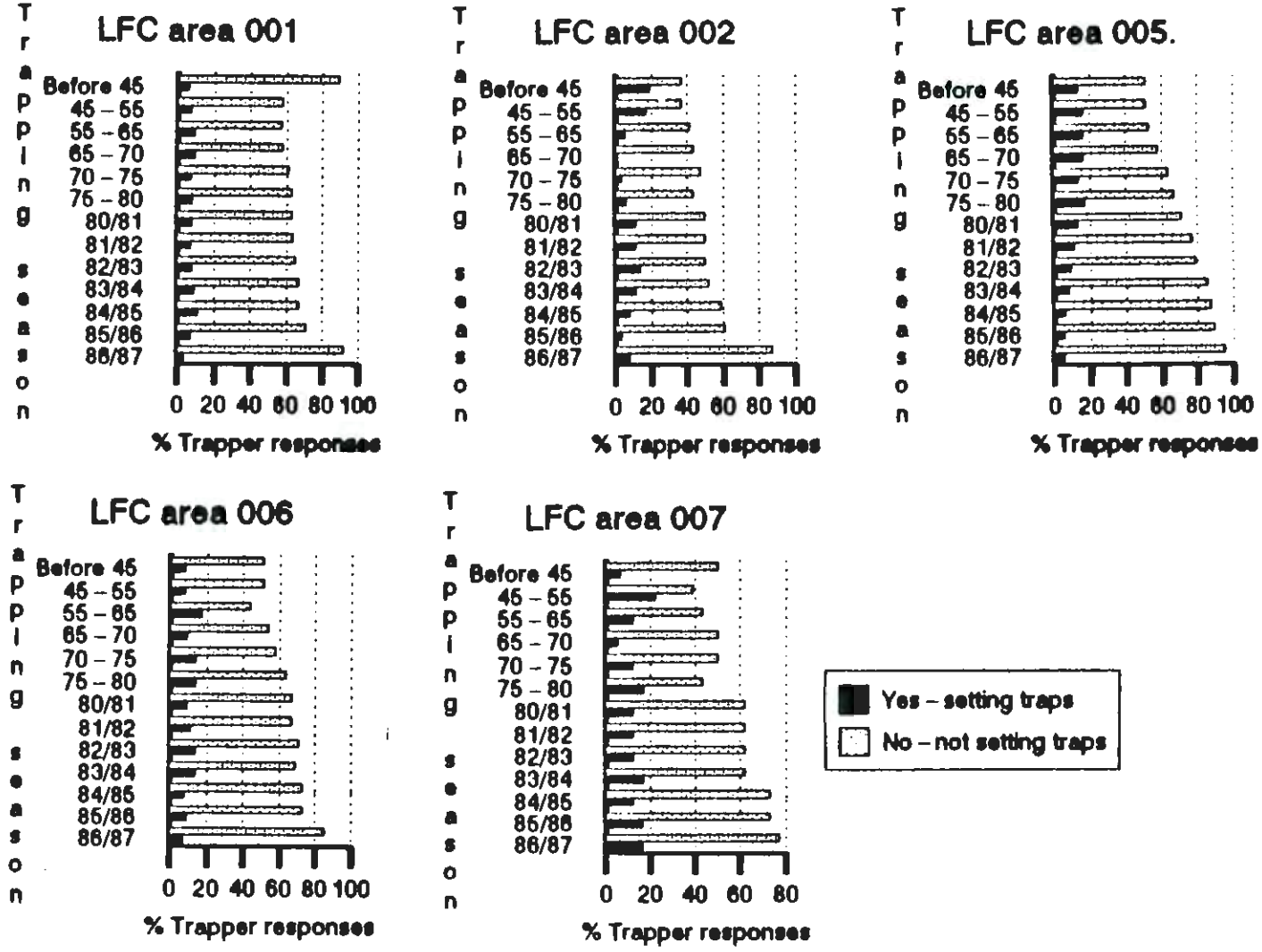
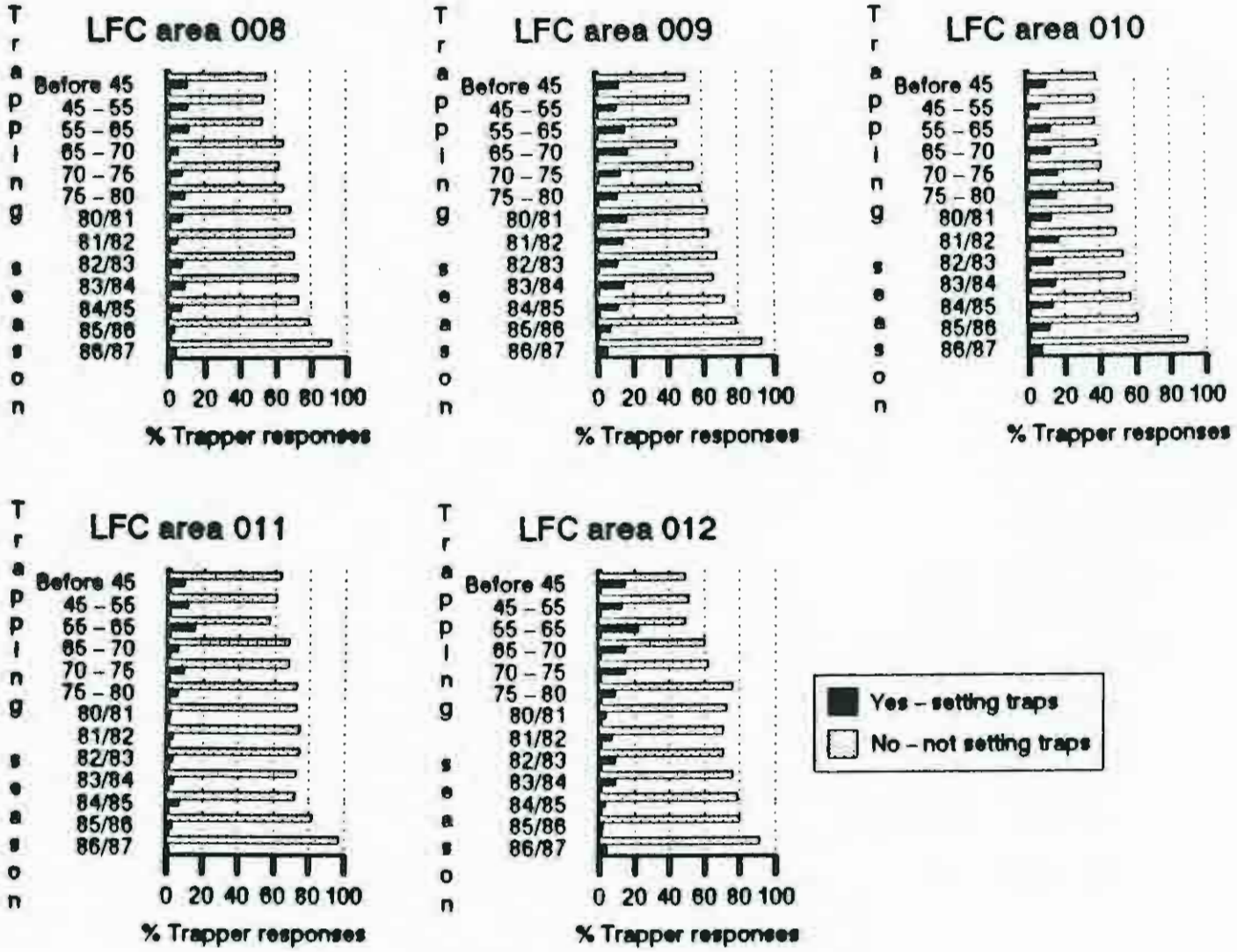


Figure 6.5 Comparison of number of trappers setting traps in each area over different time periods



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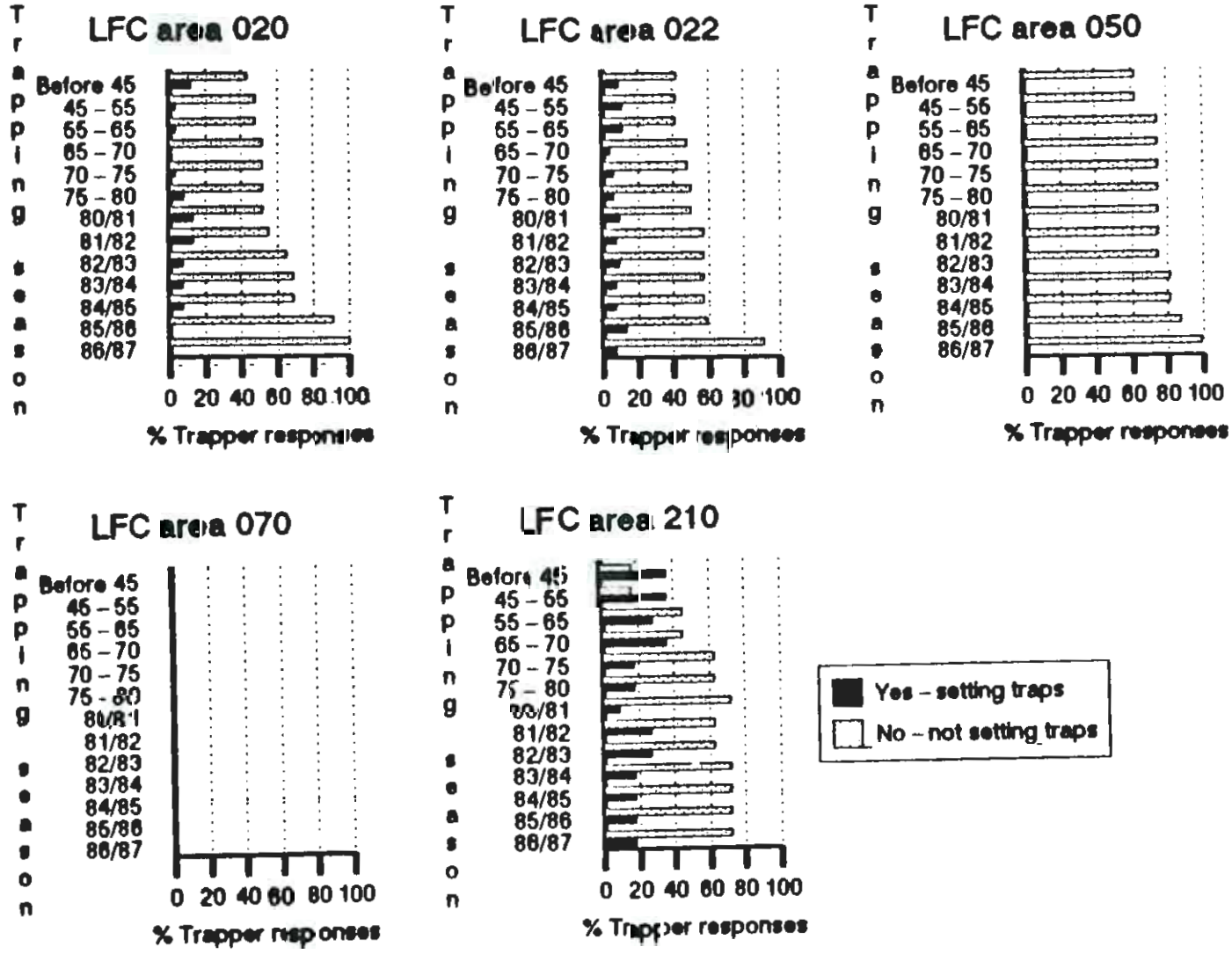

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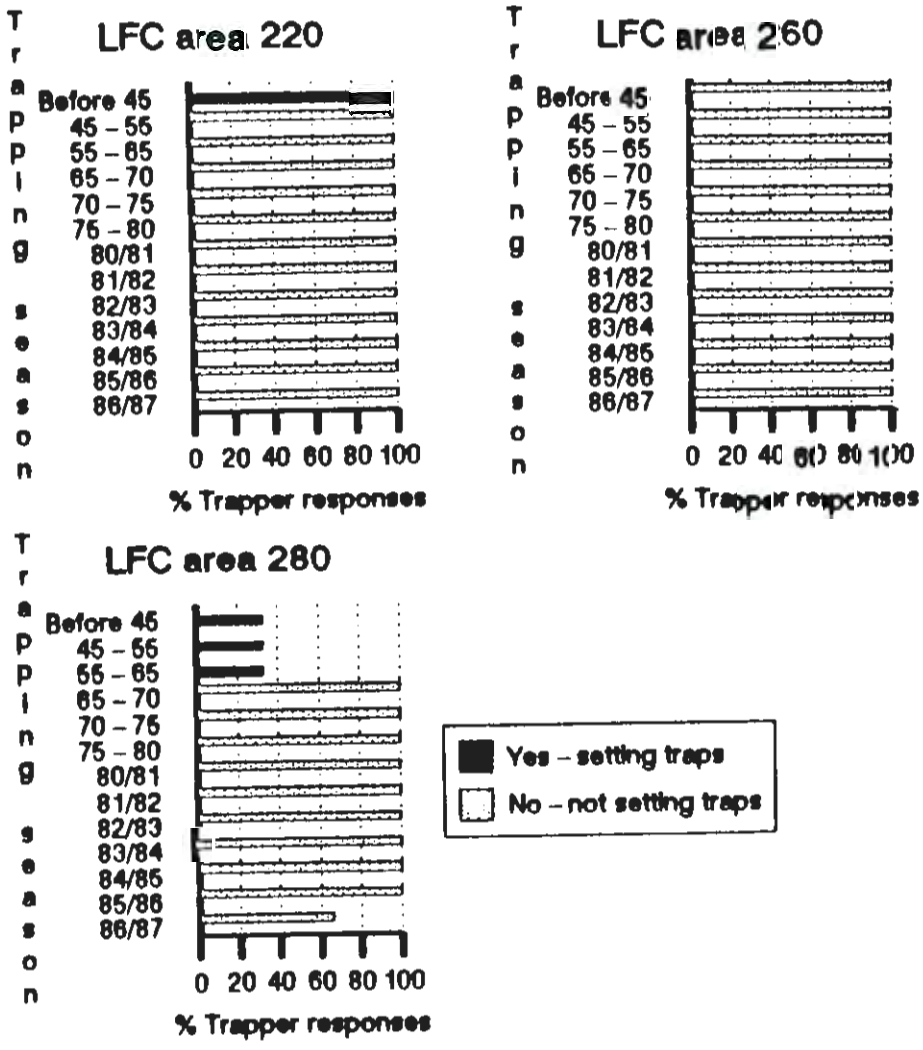

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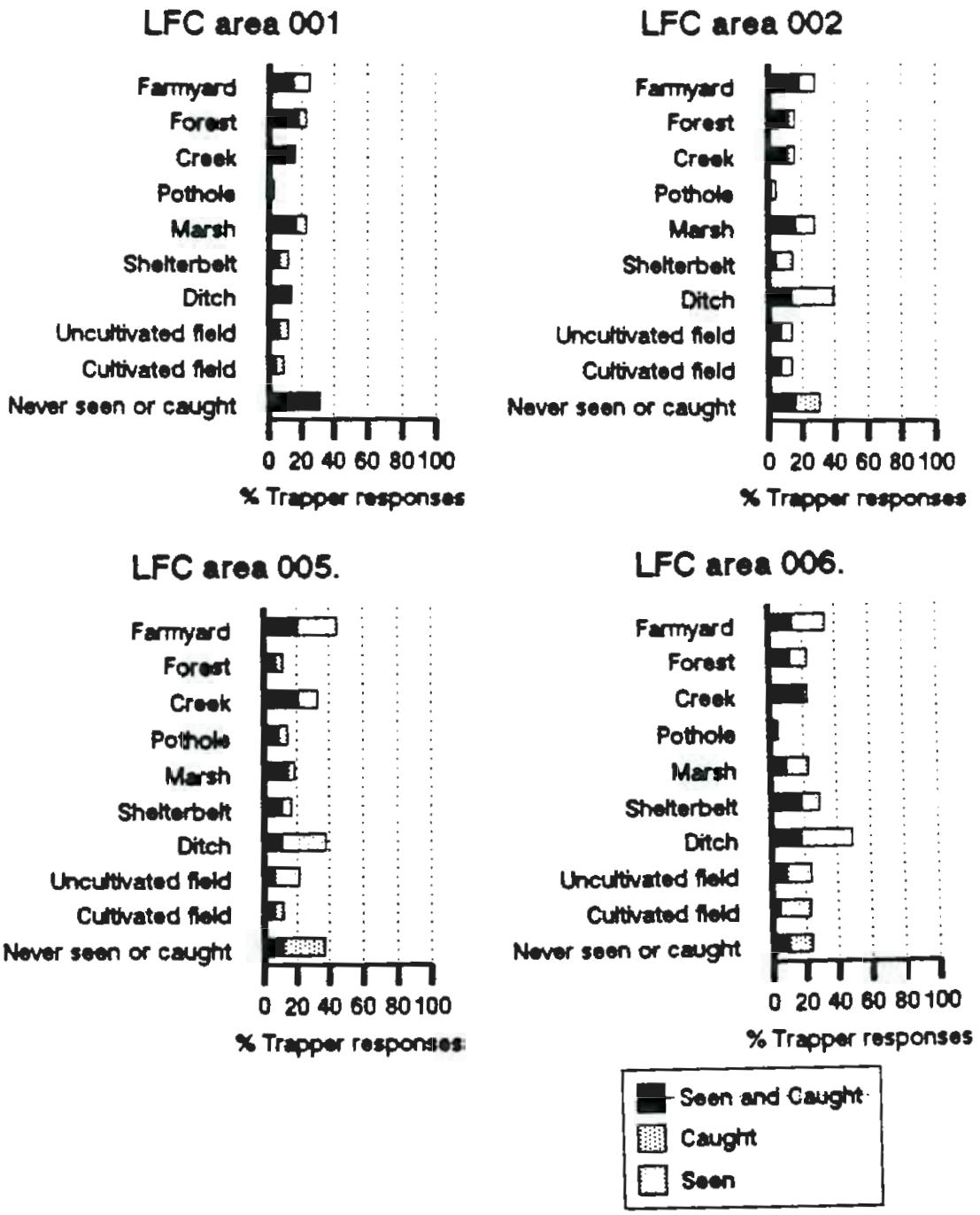
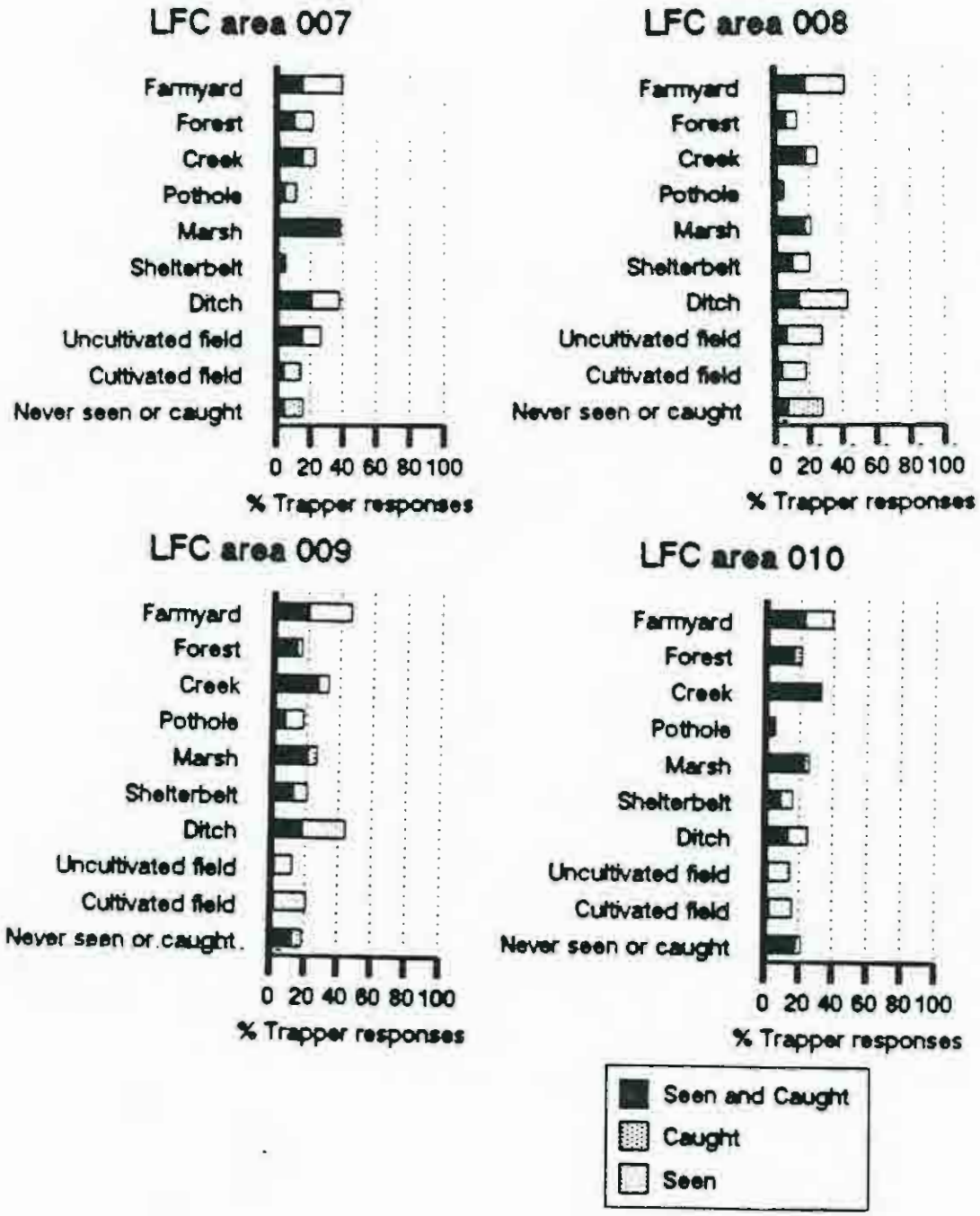


Figure 6.6 Habitat types where long-tailed weasels were usually seen or caught by trappers



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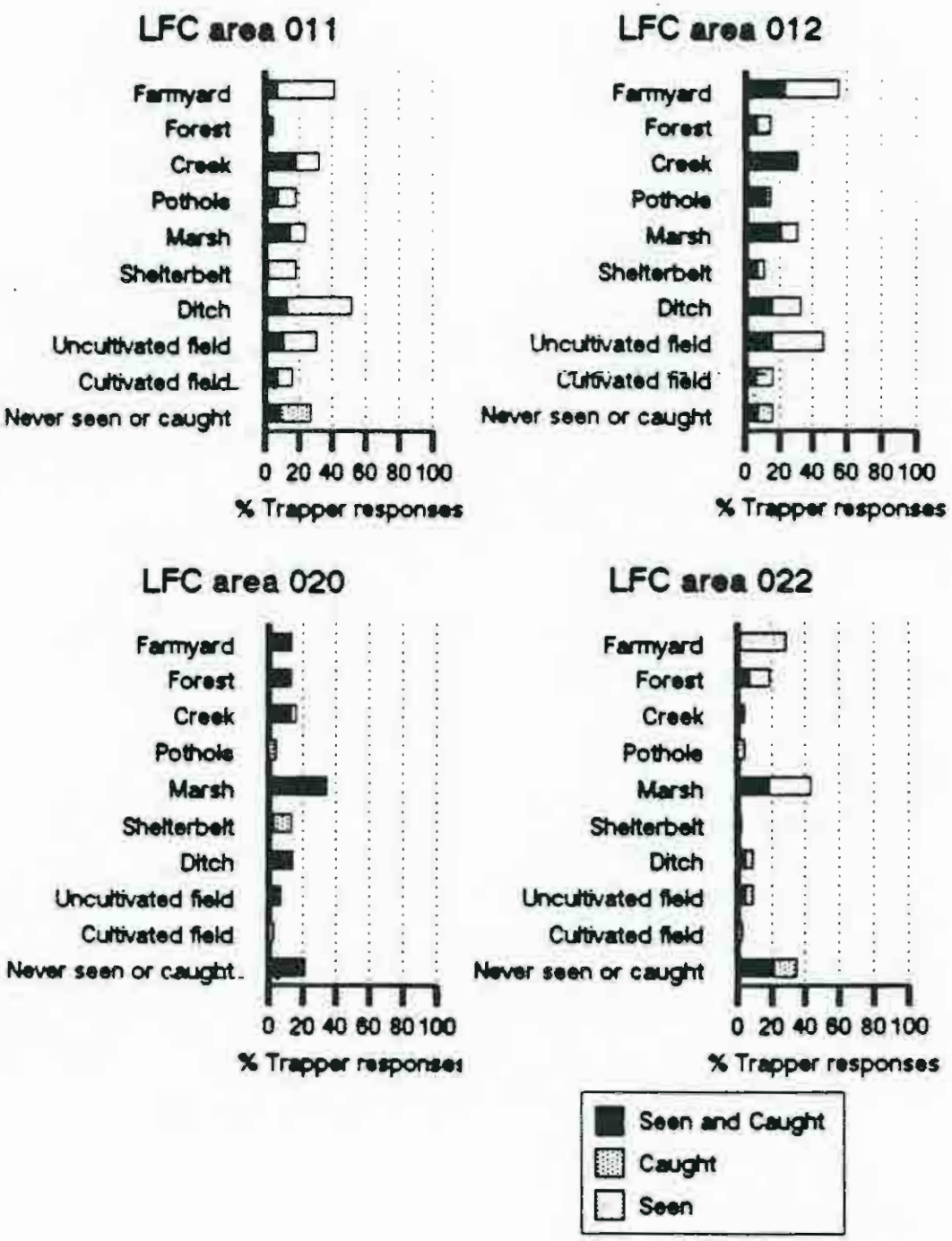

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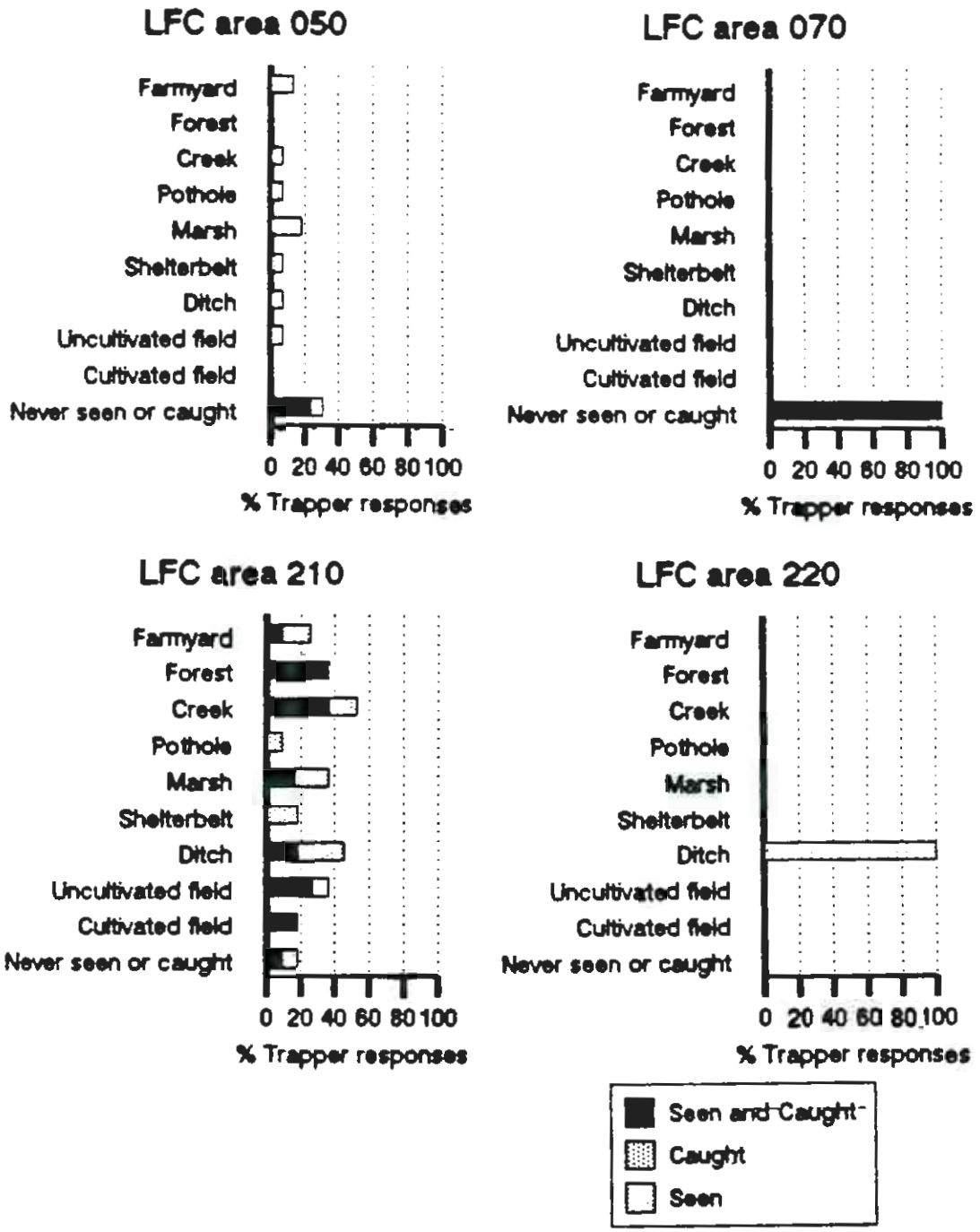

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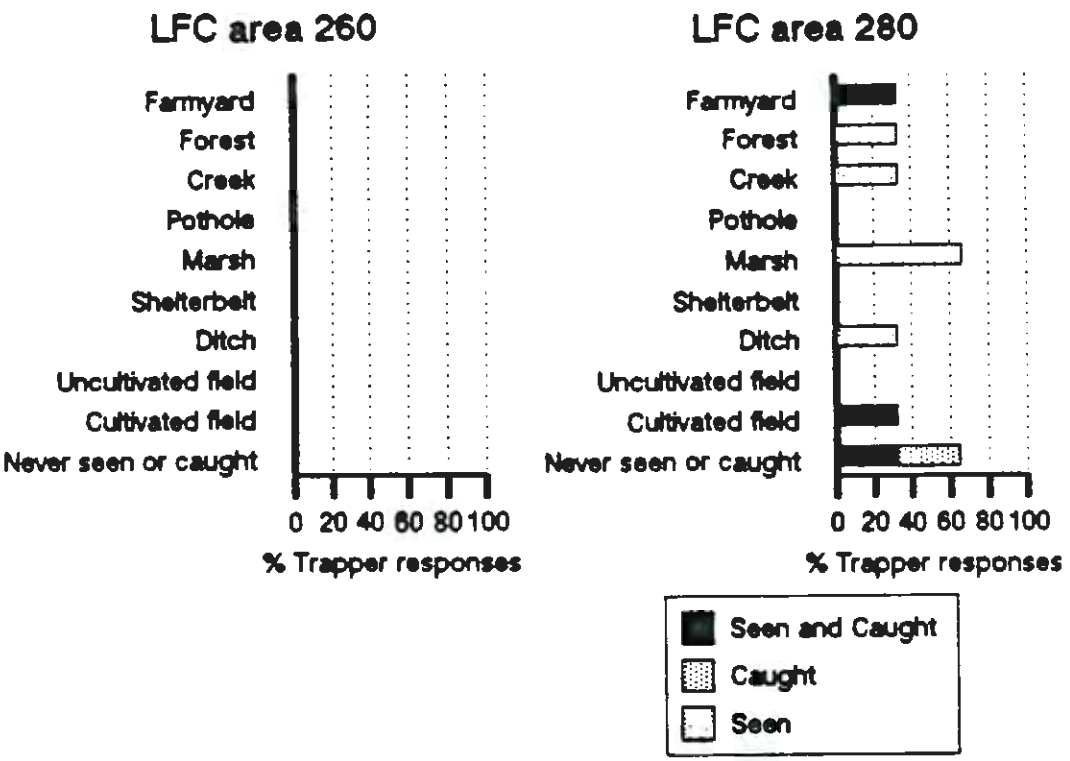

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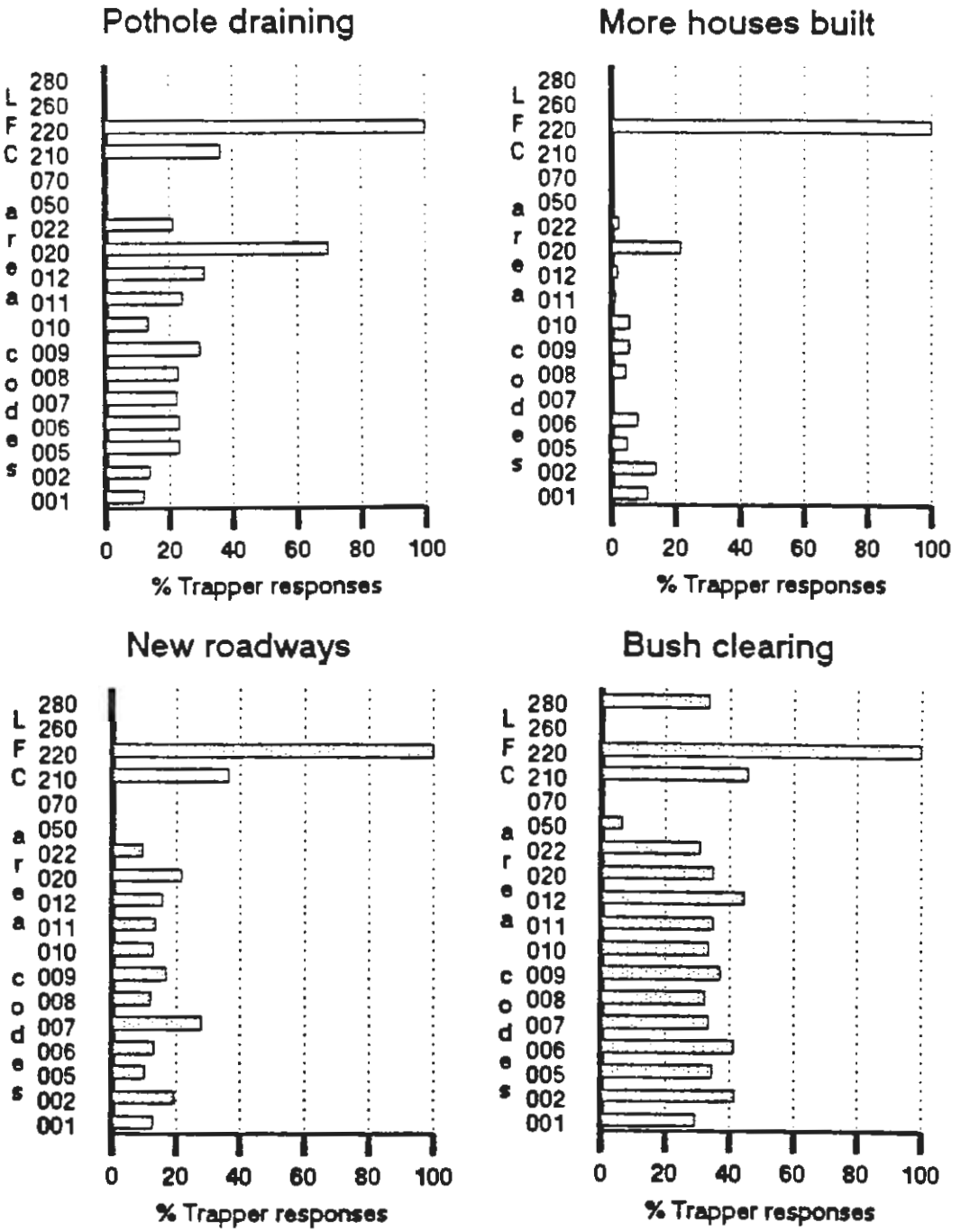
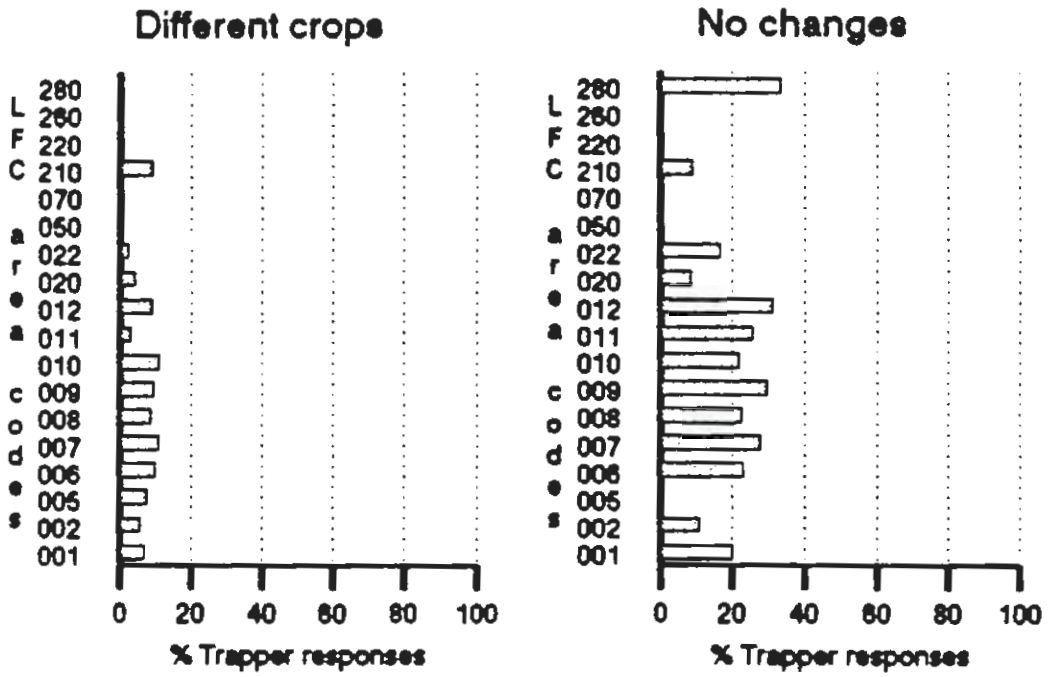


Figure 6.7 Comparison between LFC areas of habitat changes noticed by trappers



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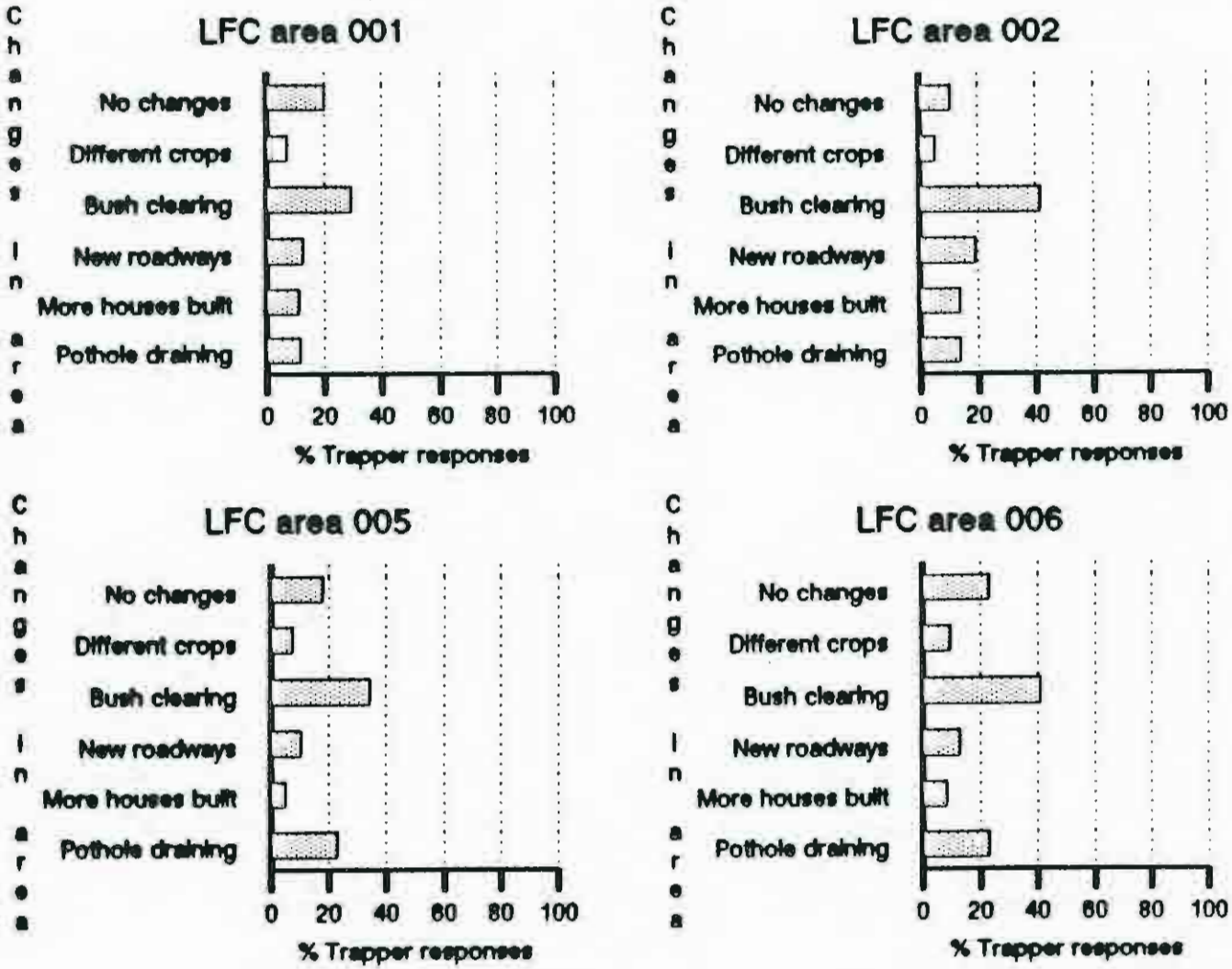
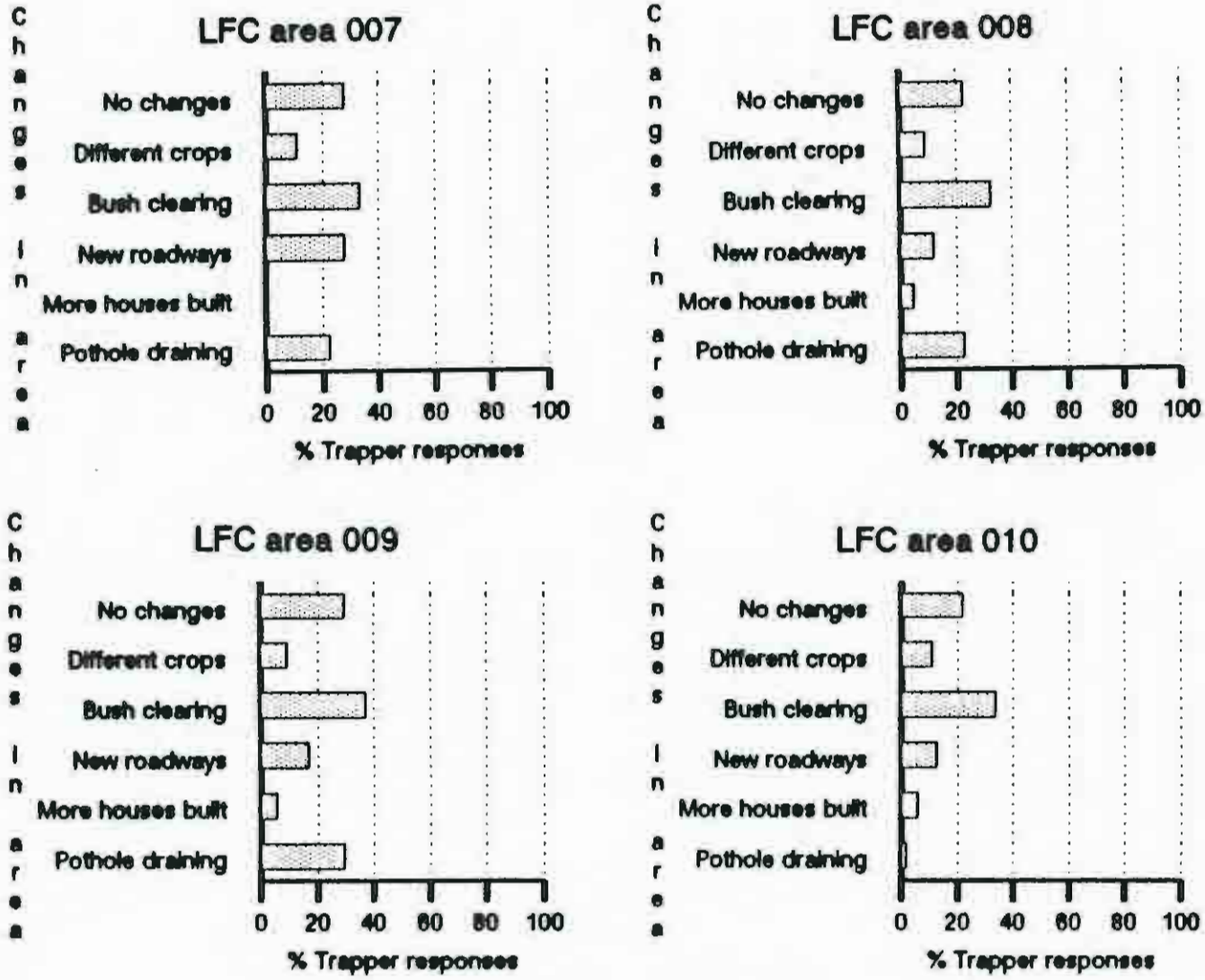


Figure 6.8 Habitat changes noticed by trappers in areas where they trap



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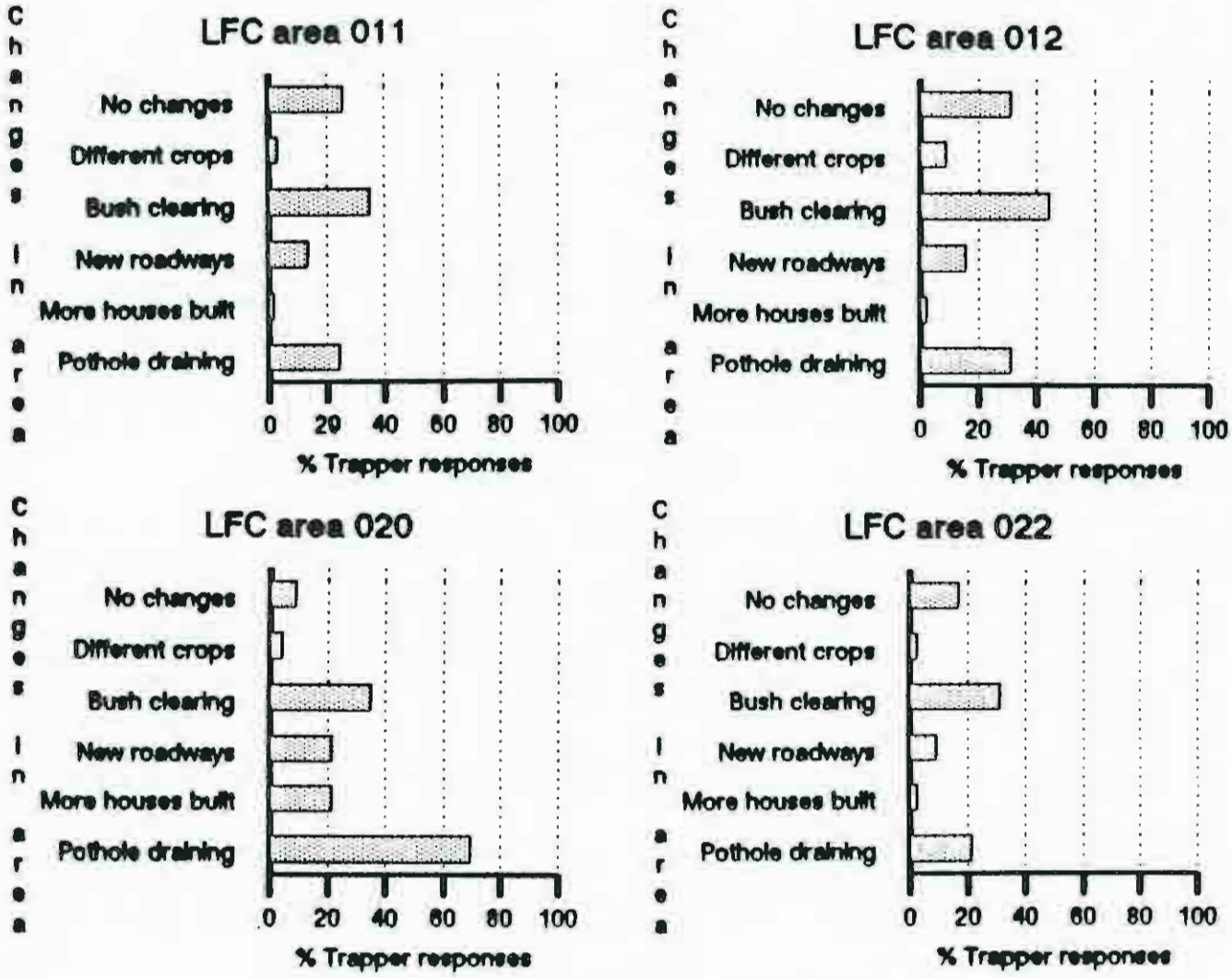

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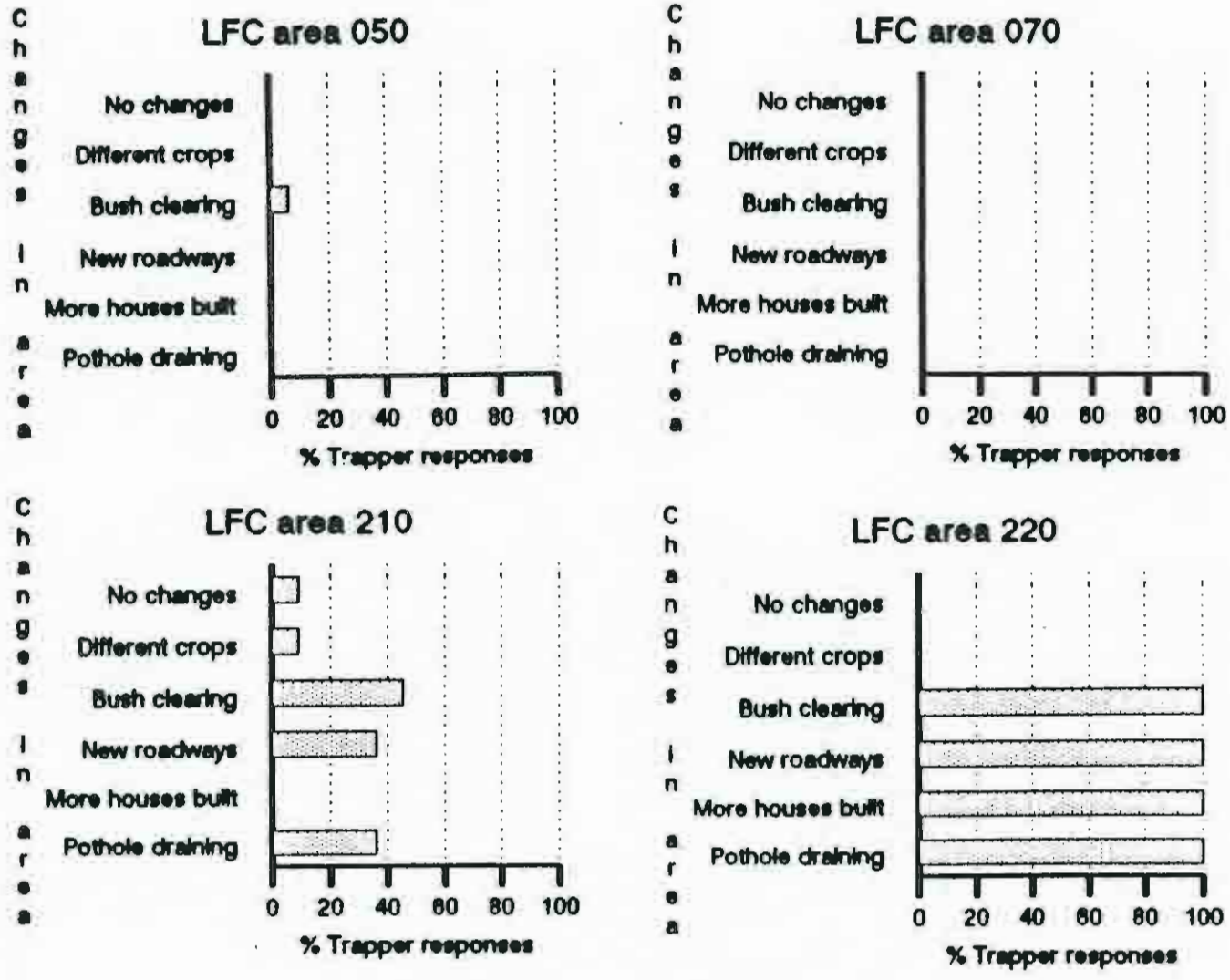

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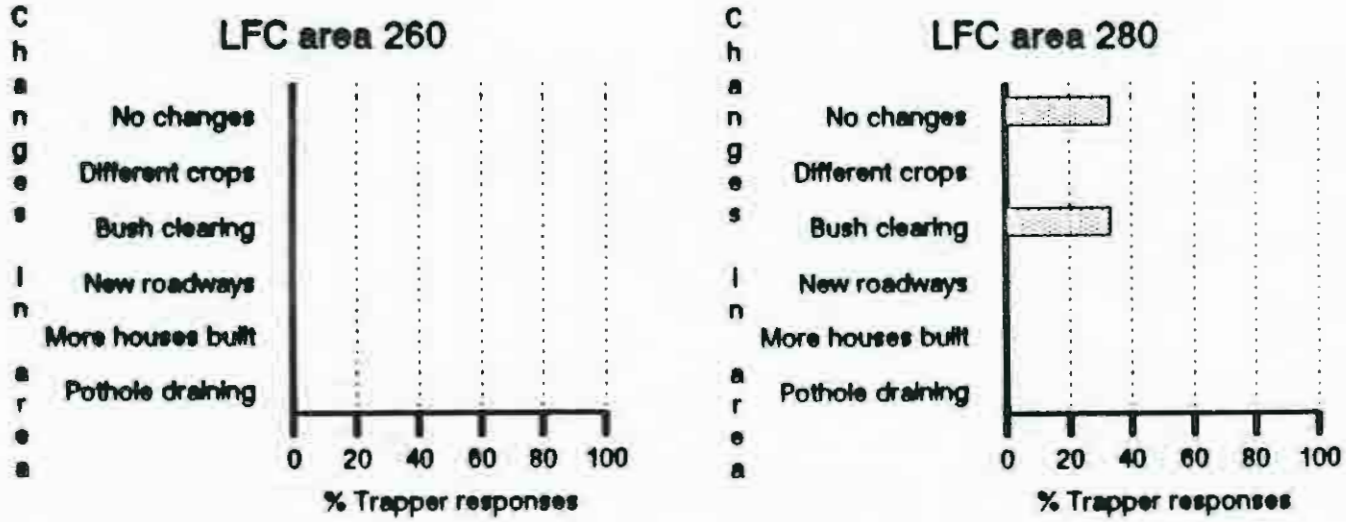

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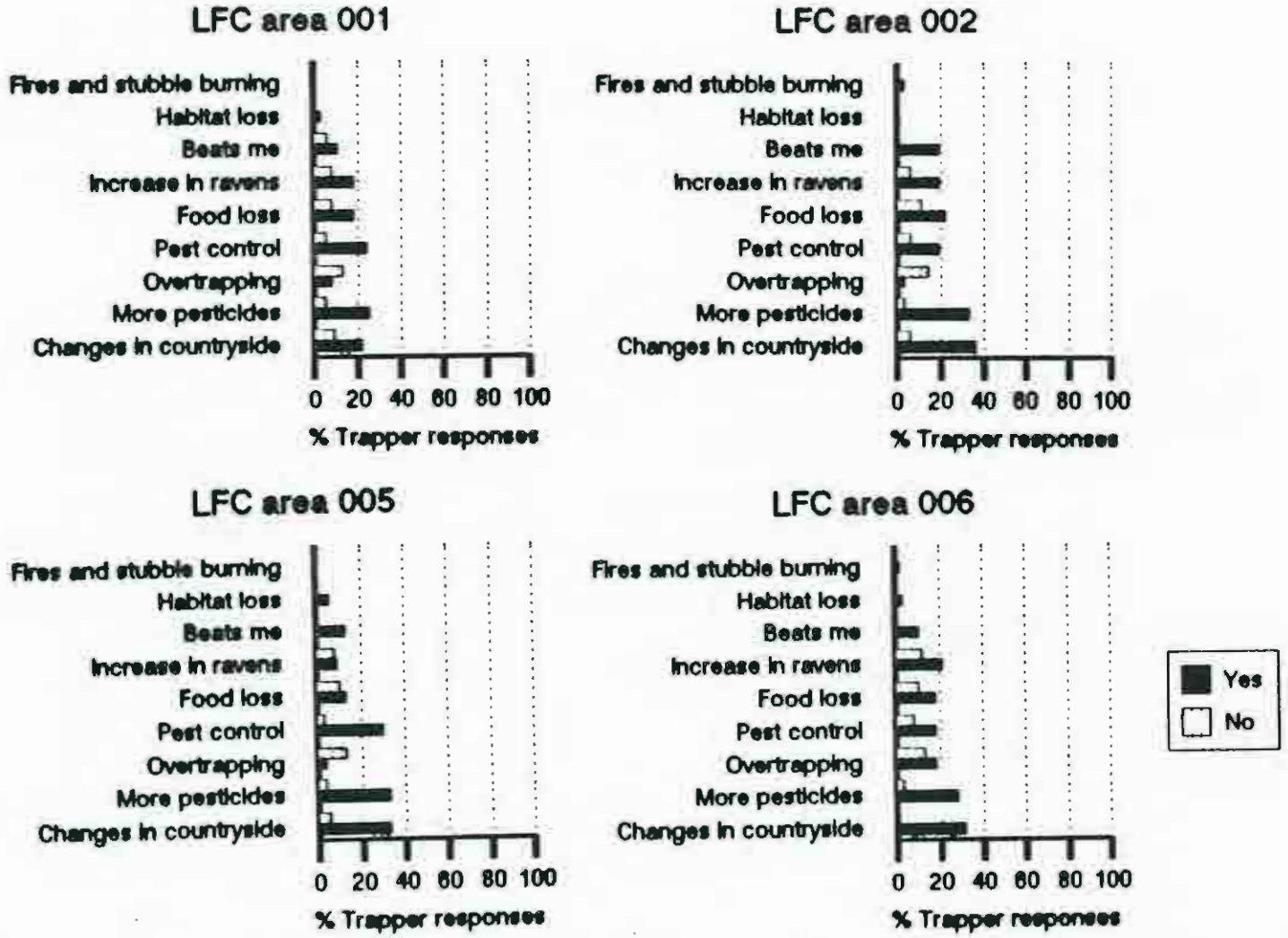
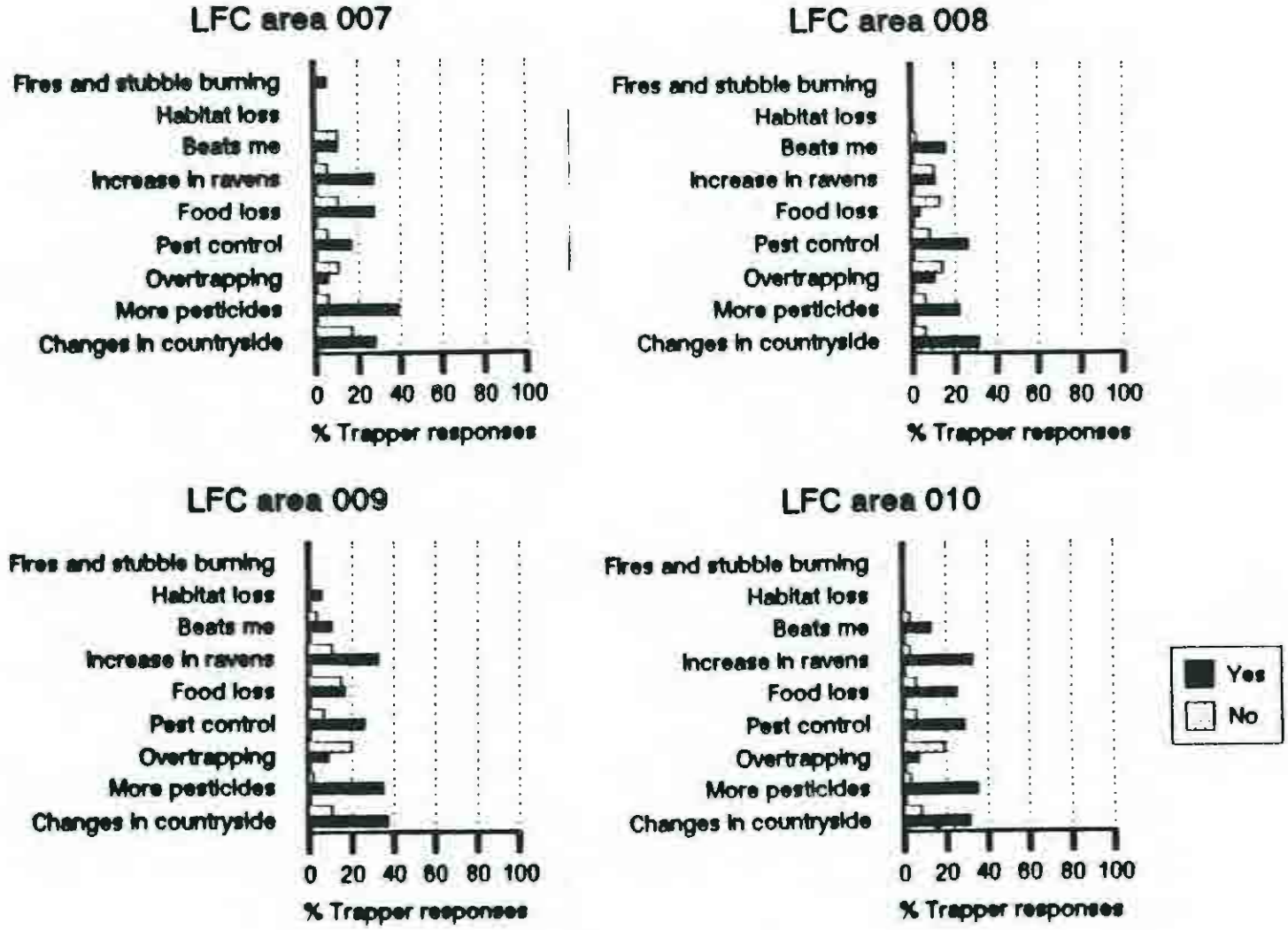


Figure 6.9 Trapper opinions as to possible causes for changes in long-tailed weasel numbers



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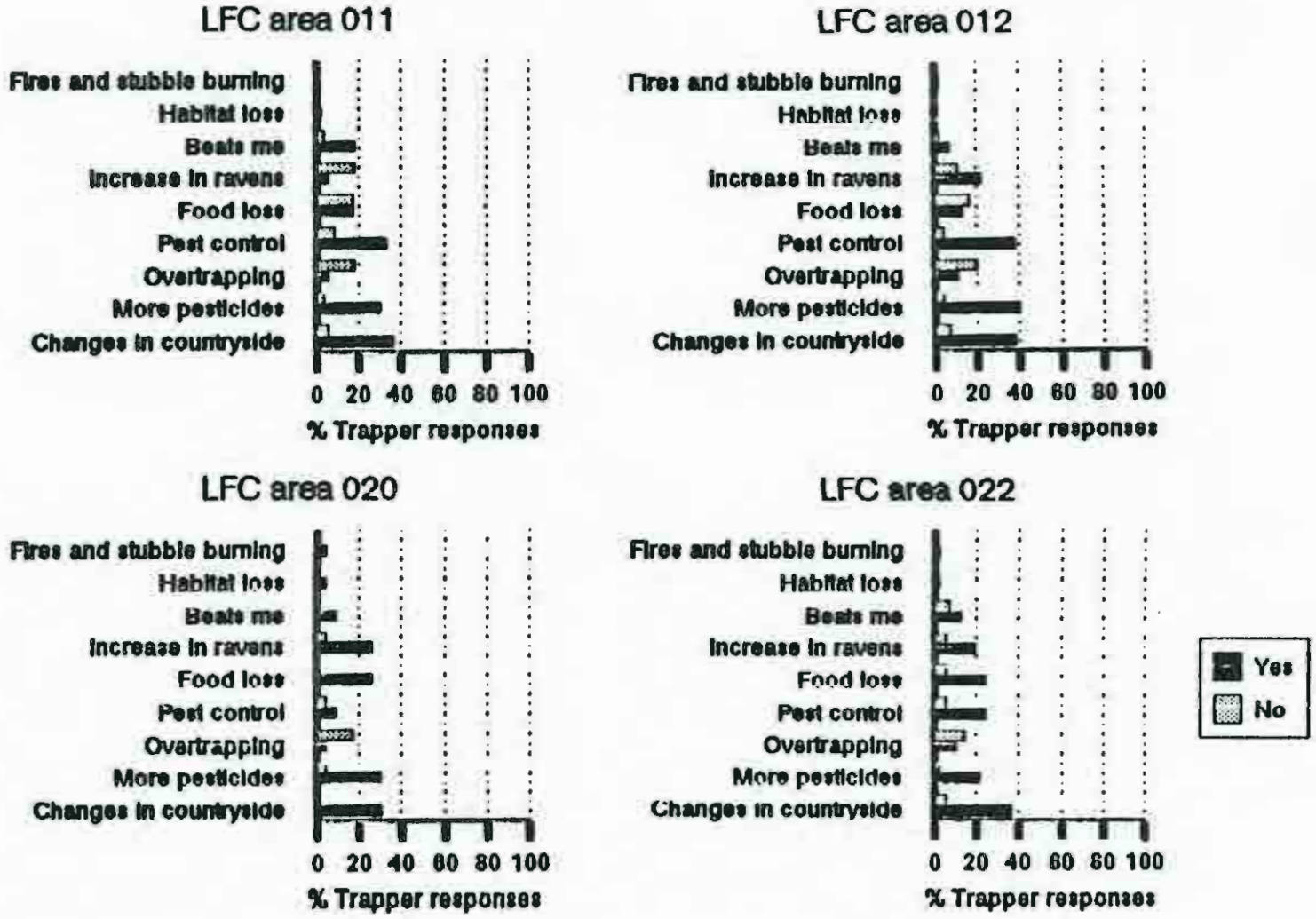

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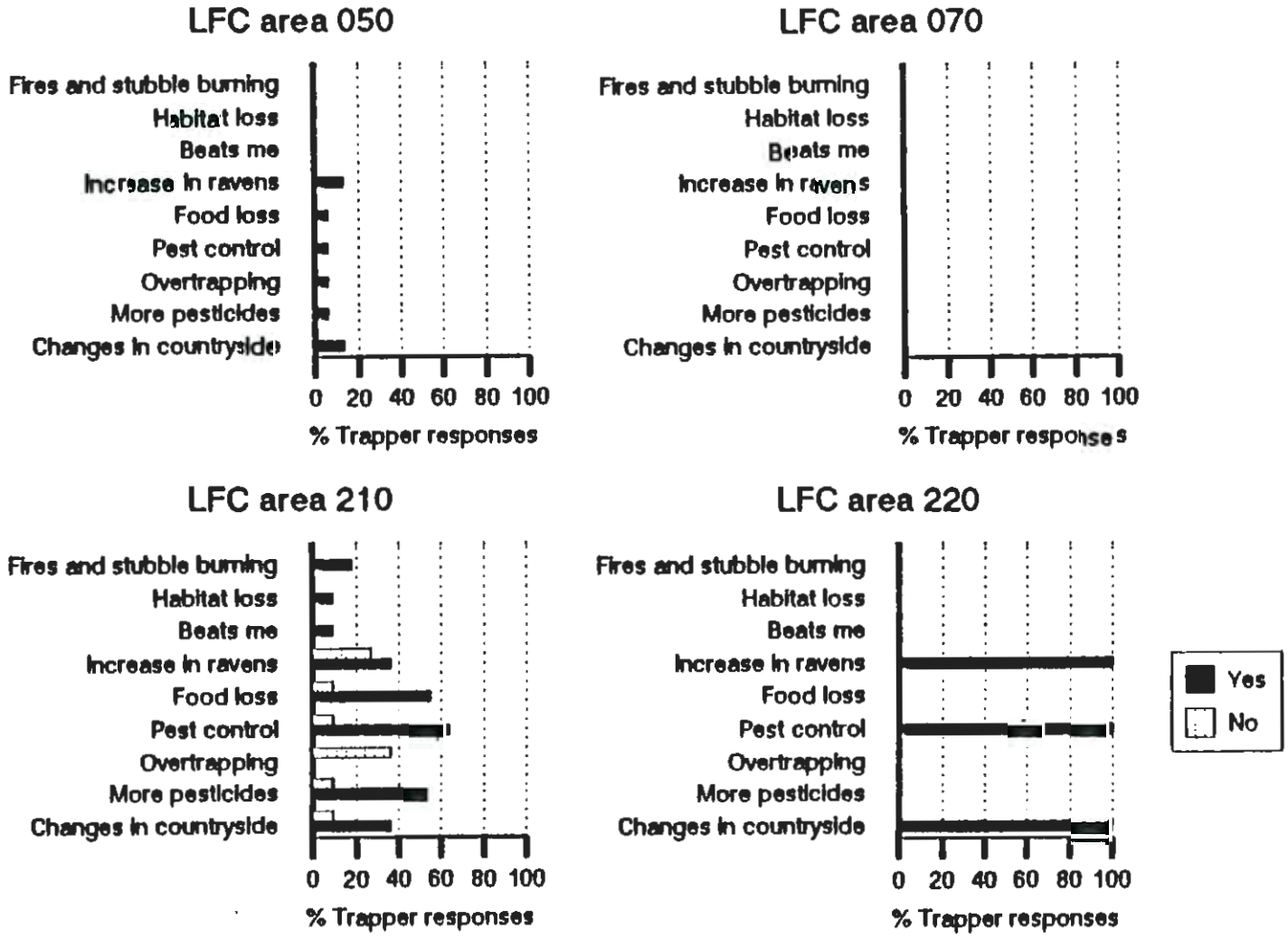

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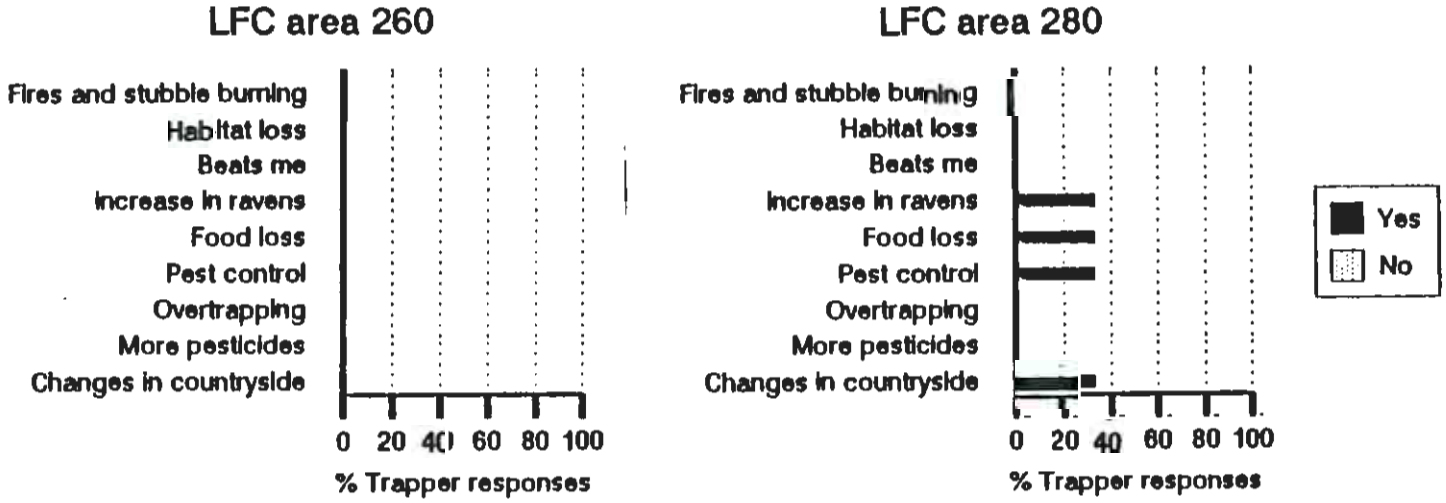


Figure 6.9 (continued)

APPENDIX 7

ADDITIONAL INFORMATION ON BADGERS

CONTENTS

APPENDIX 7

ADDITIONAL INFORMATION ON BADGERS

Opinions on the badger populations were fairly evenly split, with a small spread between the number of trappers who consider they have increased, and those who say they have decreased. (Appendix 7, Table 7.1 and Fig. 7.1). In both cases the change was considered to have occurred mostly in the last five years (Appendix 7, Table 7.2).

Reasons cited for a decrease in numbers were:-

(i) Overtrapping when pelt prices were high;

(ii) Loss of food through pesticides and poisoning; and

(iii) Increase in land clearing, with subsequent loss of cover.

Reasons cited for an increase in numbers were:-

(1) Increase in gophers because fewer farmers are poisoning them; and

(ii) No trapping now that pelt prices have dropped.

One trapper commented that he had noticed that badgers often seemed to start coughing and wheezing, then numbers would drop for a few years and then slowly start building up again. It is possible that they may be susceptible to Tuberculosis, as is the case with European badgers. Table 7.3 shows the number of badger pelt takes, and pelt values, for the ten years from 1975 to 1985.

TABLE 7.1

OVERALL CHANGES IN BADGER POPULATIONS FROM PREVIOUS YEARS

LFC Area	More	Less	No change	Don't know	No badgers
001	13	22	04	37	11
002	22	19	03	33	17
005	31	28	09	15	03
006	25	25	20	16	08
007	22	28	11	28	06
008	33	19	06	26	24
009	30	24	06	33	02
010	20	27	07	22	14
011	29	33	06	24	02
012	40	29	07	13	02
020	17	22	-	30	09
022	21	26	10	24	14
050	-	-	-	28	06
070	-	-	-	-	-
210	09	46	-	09	27
220	100	-	-	-	-
260	-	-	100	-	-
280	-	-	-	-	100

TABLE 7.2

TRAPPER OPINIONS AS TO WHEN CHANGES IN BADGER NUMBERS TOOK PLACE

	LFC Code	001	002	005	006	007	008	009	010	011	012	020	022	050	070	210	220	260	280
5 yrs. ago	More	11	17	24	20	11	24	20	10	24	31	09	12	-	-	-	100	-	-
	Less	13	03	14	13	22	10	13	13	23	07	13	10	-	-	18	-	-	-
	No change	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-
	Don't know	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	No badgers	-	-	-	-	-	01	-	-	-	-	-	-	-	-	-	-	-	100
5-10 yrs ago	More	01	08	04	02	06	08	09	08	08	07	-	05	-	-	09	-	-	-
	Less	06	03	10	10	06	07	11	11	08	18	-	12	-	-	09	-	-	-
	No change	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Don't know	-	-	-	-	-	-	-	01	-	-	-	-	-	-	-	-	-	-
	No badgers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10-20 yrs ago	More	01	-	-	02	06	-	02	-	-	02	09	-	-	-	-	-	-	-
	Less	06	06	05	03	06	03	02	02	02	04	-	05	-	-	18	-	-	-
	No change	-	-	-	02	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Don't know	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	No badgers	-	-	-	02	-	-	02	-	-	-	-	-	-	-	-	-	-	-
20-30 yrs ago	More	01	-	-	-	-	-	-	-	-	-	04	02	-	-	-	-	-	-
	Less	01	03	-	02	-	-	-	-	03	02	-	-	-	-	-	-	-	-
	No change	-	-	-	-	-	-	-	-	02	-	-	-	-	-	-	-	-	-
	Don't know	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	No badgers	-	-	-	-	-	01	-	01	-	-	-	-	-	-	-	-	-	-
Before 30 yrs ago	More	-	-	-	-	-	-	-	01	-	-	04	02	-	-	-	-	-	-
	Less	-	03	-	02	-	-	-	-	02	-	-	-	-	-	-	-	-	-
	No change	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Don't know	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	No badgers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 7.3

NUMBER OF BADGER PELTS TAKEN AND AVERAGE VALUES FROM 1975 TO 1985

Trapping Season	Pelts Taken	Average Value ($)
1974-75	608	18.03
1975-76	858	34.50
1976-77	1,463	48.62
1977-78	1,022	56.05
1978-79	1,405	65.00
1979-80	1,132	37.00
1980-81	462	50.00
1981-82	519	48.00
1982-83	458	34.00
1983-84	489	28.00
1984-85	499	25.00

Examination of the above table shows that pelt takes dropped considerably after a period of high avarage prices, suggesting that the trapper opinions of overtrapping when pelt price is high as a cause of low badger numbers may be justified.

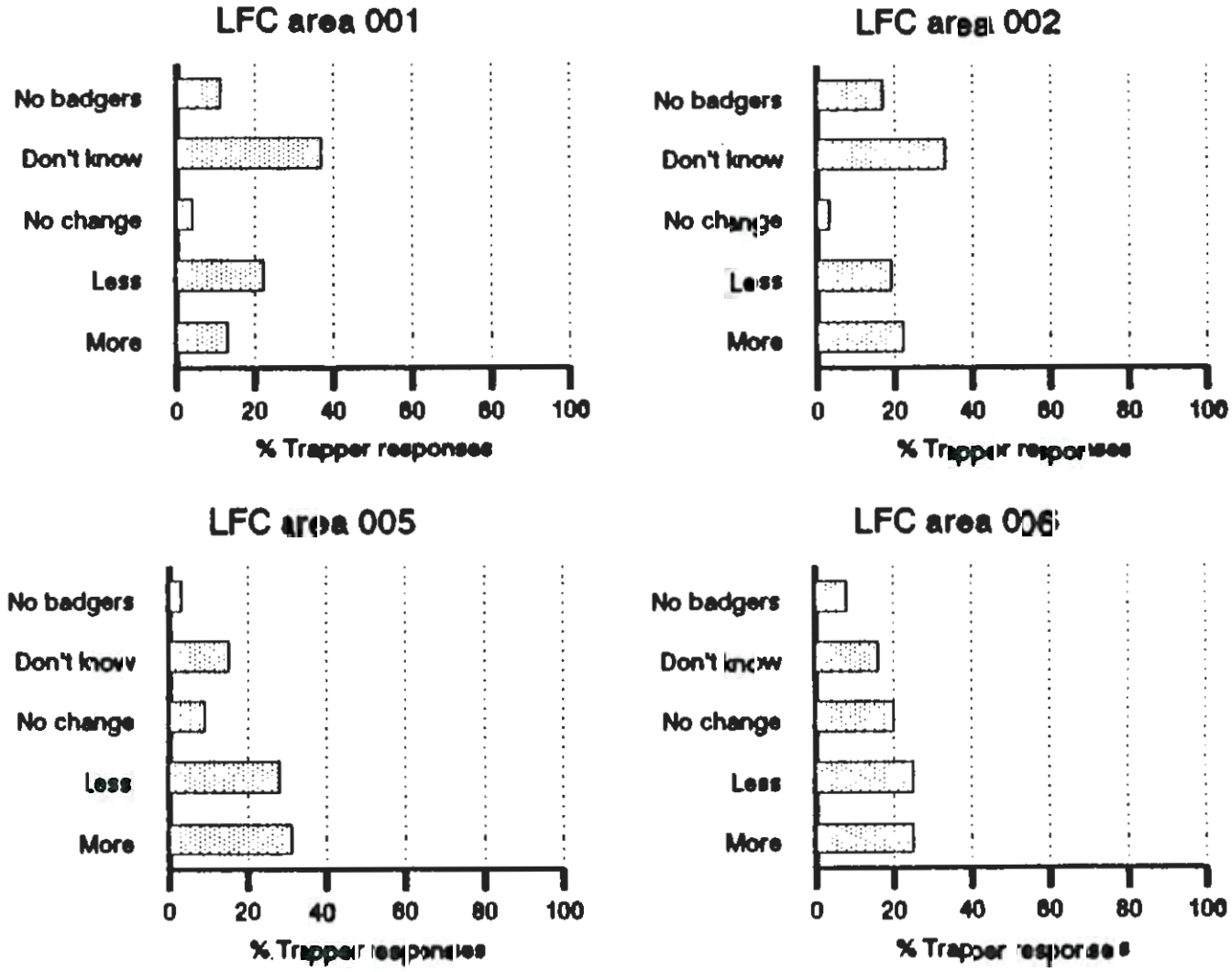


Figure 7.1 Trapper opinions of changes in badger populations from previous years

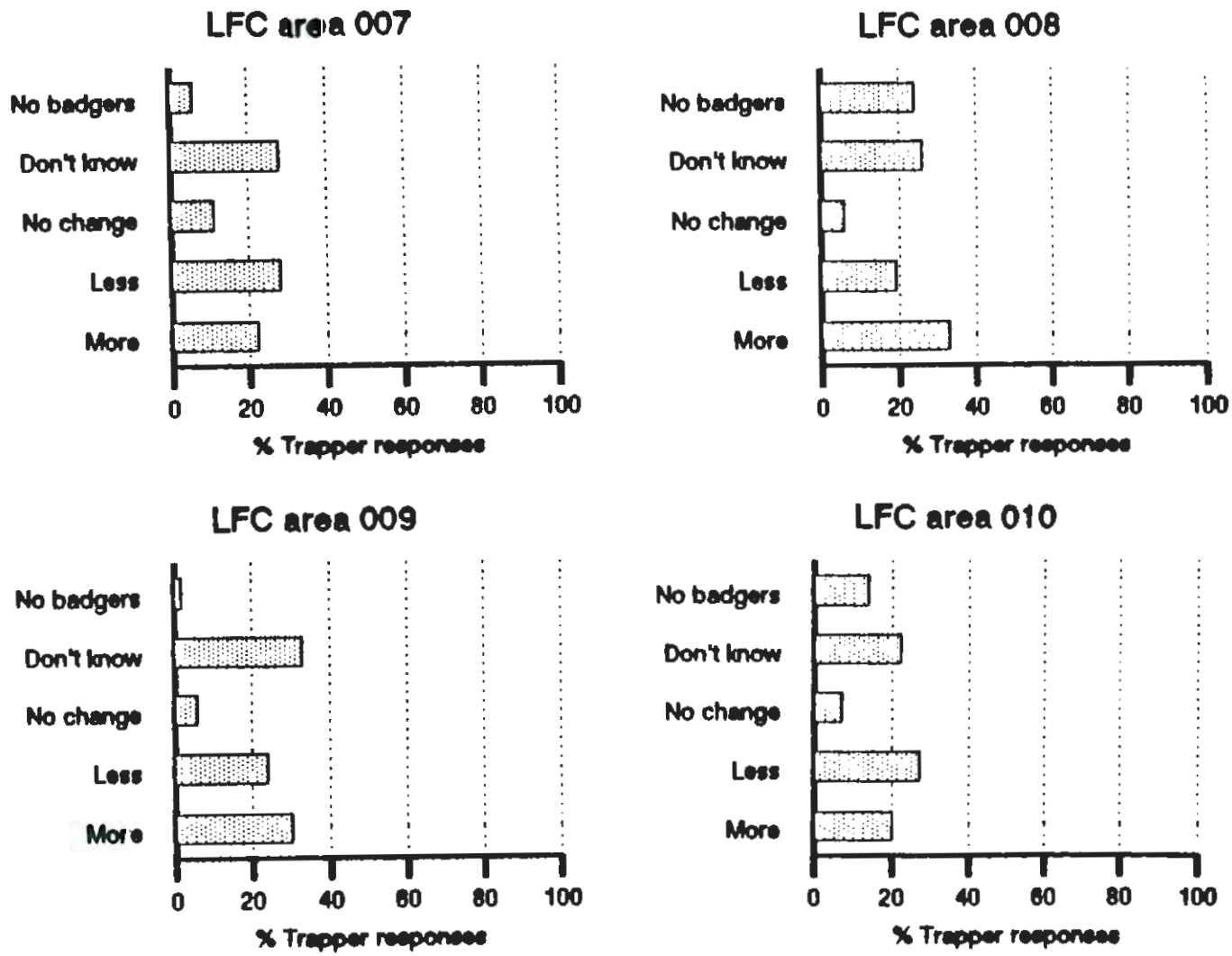


Figure 7.1 (continued)

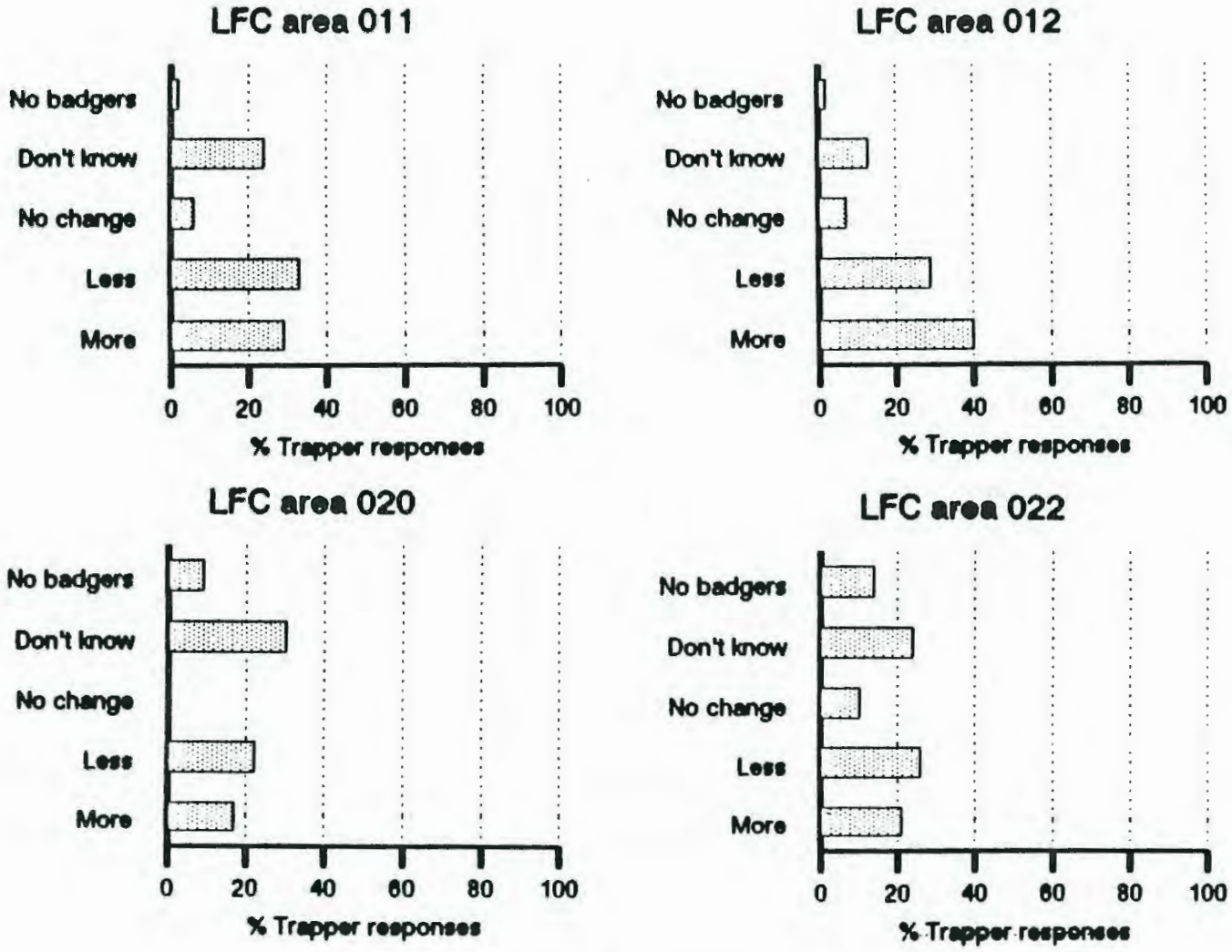
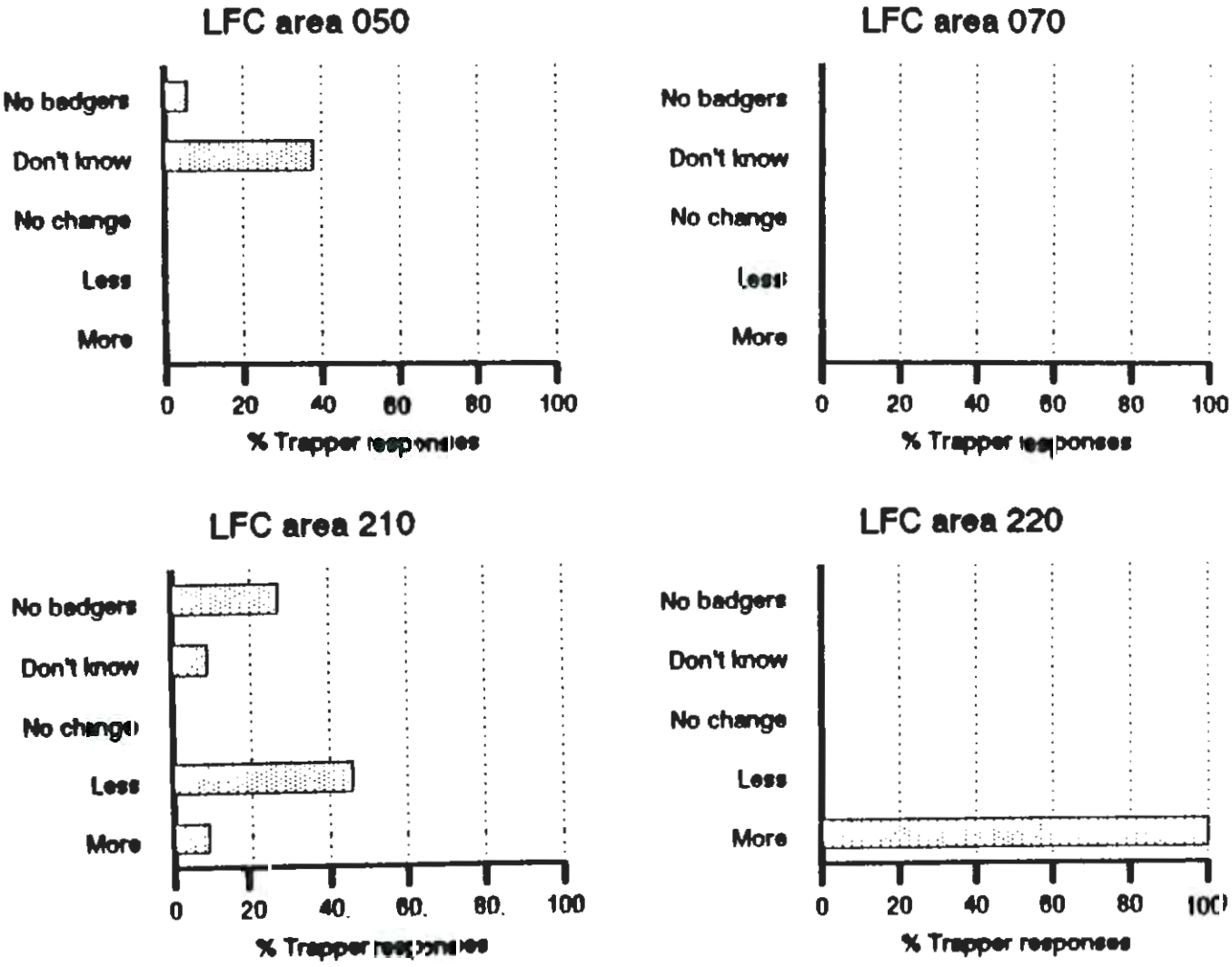


Figure 7.1 (continued)



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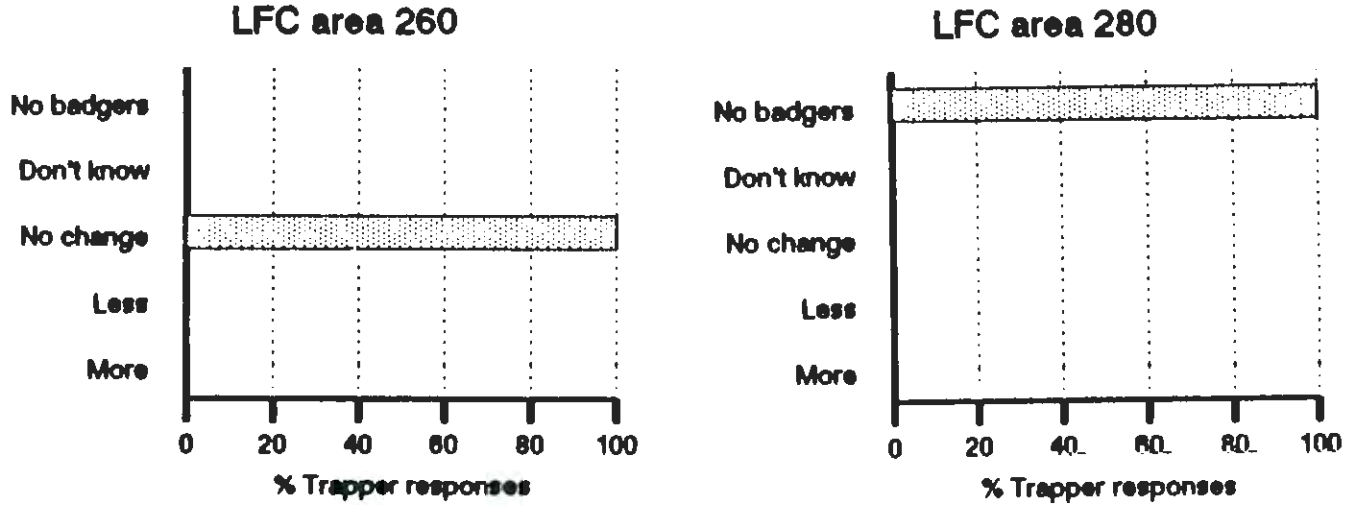

Figure 7.1 (continued)

THE NATURAL RESOURCES INSTITUTE

The Natural Resources Institute at The University of Manitoba was established in 1968 as a degree granting, interdisciplinary unit with a threefold purpose, namely: (a) to teach management skills leading to a graduate degree of Master of Natural Resources Management (MNRM); (b) to conduct useful research on actual resource problems; and (c) to provide a forum for examining problems in resource use. The Institute attempts to expose graduate students to the realities and practice of natural resource management and to open up greater access to expertise, within and outside the University, that can be used to deal with vital emerging issues of public concern.

The degree program, of two years duration, is interdisciplinary in nature and provides training in four areas: resources, economics, administration and analysis. Course work in the program is complemented by a Practicum — a research project dealing with an actual problem in resource management resulting in the preparation of an official report.

Through the practicum and through a limited number of contract research projects, the Institute is involved in a wide range of research on natural resource problems. Research is conducted in conjunction with government, business and private groups. The Institute's research process allows for sustained involvement of client groups during the course of the research and provides a valuable outreach function for the university by bringing together university expertise and resource professionals from the larger society. All research conducted at the Institute is made available to the public.

The Institute's forum function is achieved by circulation of published research and through the organization of conferences, workshops and seminars on diverse resource topics.

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ELK ISLAND NATIONAL PARK TRUMPETER SWAN RE-INTRODUCTION 1987

PROGRESS REPORT

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Canadian Wildlife Service
Edmonton, Alberta

and

Terry Winkler
Elk Island National Park
Fort Saskatchewan, Alberta

February 1988

ABSTRACT

A three year Wildlife - 87 re-introduction project was developed to restore the Trumpeter Swan (Cygnus buccinator) as a free flying migratory breeding bird in Elk Island National Park (EINP). This project is supported and sponsored by: Canadian Parks Service, Canadian Wildlife Service, World Wildlife Fund - Wild West, Alberta Recreation, Parks and Wildlife Foundation, The Friends of Elk Island National Park Society, the Department of Forestry - University of Alberta, Alberta Fish and Wildlife Division and the Camrose Veterinary Clinic. The objectives of this project are to diversify summering and breeding range of Trumpeter Swans in Alberta, and secondly, to diversify migration and wintering tradition.

During mid July four family groups of Trumpeter Swans were captured in the Saddle Hills of Alberta with the aid of a helicopter. Eight adults and eighteen cygnets were transported directly to EINP for release on individual wetlands. At EINP ground monitoring of transplanted family groups was conducted weekly by Parks staff. By mid November eight adults and five cygnets migrated from EINP to the U.S. Tristate region. U.S. biologists have confirmed the wintering location of five of the 13 birds that migrated. It is anticipated that a mid February complete range survey of wintering swans in the Tristate will locate more of the EINP transplants.

Impact of the transplant on the Grande Prairie population has been minimal. The major components and methods of the project worked well and we are satisfied with the results attained to date. Certain techniques will be adjusted to try to improve on the number of cygnets fledged from EINP in subsequent years of the project.

ACKNOWLEDGEMENTS

We wish to acknowledge the assistance and support of the following groups and organizations:

The pilots and staff of Associated and Okanogan Helicopters and Wapiti Aviation who provided excellent air support and service.

The staff of Elk Island National Park, Alberta Fish and Wildlife Division, Ducks Unlimited and Canadian Wildlife Service who assisted and supported all facets of this project.

World Wildlife Fund - Wild West and Alberta Recreation Parks, and Wildlife Foundation who provided the majority of funding for this project.

And the administrative support of the Friends of Elk Island National Park Society and the Dept. of Forestry, University of Alberta.

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1.0 INTRODUCTION:

A three year re-introduction project was designed to restore the Trumpeter Swan (Cygnus buccinator) as a free-flying migratory breeding bird in Elk Island National Park, Alberta. A pilot transplant project which tested and evaluated methods and techniques was conducted in 1983 and 1984, (Shandruk 1986). The suitability of Park habitat for the Trumpeter Swan has been evaluated by Graham (1983) and Burgess and Burgess (1986). As a Wildlife-87 initiative, Canadian Wildlife Service, Canadian Parks Service, University of Alberta - Forestry Department, and the Friends of Elk Island Society requested and obtained support for a Trumpeter Swan restoration project from World Wildlife Fund, Alberta Recreation, Parks and Wildlife Foundation, Alberta Fish and Wildlife and the Camrose Veterinary Clinic.

The primary objective of this project is to diversify summering and breeding range of Trumpeter Swans in Alberta. A secondary objective is to diversify migration and wintering tradition.

Project goals are:

1. To transplant 12 family groups of trumpeter swans over the next 3 years from the Grande Prairie flock, to suitable wetlands within Elk Island National Park.
2. To refine capture and transplant techniques and determine which are the most efficient and meet the above goal most adequately.
3. To determine if cygnets released on marshes at Elk Island National Park will home to these areas and to assess the impact that the relocation will have on both cygnets and guide birds.

4. To reintroduce a base population of Trumpeter Swans which will result in the establishment of ten breeding pairs in Elk Island National Park.
5. To evaluate the impact that swans will have on the existing biotic resources should swans become seasonal residents.

This progress report outlines the methods utilized and results attained during year 1, (1987) of this re-introduction project. Suggested modification in techniques for year 2 will also be discussed.

2.0 METHODOLOGY:

2.1 Project Approval and Funding:

Based on preliminary efforts to re-introduce Trumpeter Swans to Elk Island National Park in 1983 and 1984 (Shandruk 1986) and the evaluation of favorable habitat carried out by Burgess and Burgess (1986); Canadian Wildlife Service and Canadian Parks Service staff were encouraged to develop a Wildlife '87 project proposal. This Trumpeter Swan re-introduction proposal was submitted to World Wildlife Fund - Wild West, Alberta Parks, Recreation and Wildlife Foundation, Canadian Wildlife Service, and Canadian Parks Service for funding. During the fall of 1986 favorable funding responses were received from these agencies and a total of $27,000 was committed for year one of the project. The Camrose Veterinary Clinic agreed to provide veterinary support up to $500. The transplant project was also submitted to the Pacific Flyway Trumpeter Swan Technical Subcommittee and Alberta Fish and Wildlife Division for review

and approval. Capture, transport and transplant permits were obtained from Canadian Wildlife Service and Alberta Fish and Wildlife Division. The detailed basis for this three year cooperative project is outlined in a letter of understanding between Canadian Wildlife Service and Canadian Parks Service (See Appendix 1).

2.2 Project Guidelines:

Implementation and management of this project follows the guidelines and recommendations for Trumpeter Swan transplants outlined by the Pacific Flyway Council (1985) and Turner and McKelvey (1983). No transplant will occur if the number of Trumpeter Swan nests in the Grande Prairie flock falls below 25. The proponent of the project is responsible for evaluation of the breeding population and the effects of the removals. The project proponent is also required to produce a report on the fate of the swans or eggs removed.

This project also conforms to management guidelines for cooperative activities set out by Parks Canada, June, 1980 and February 1981. It has been undertaken in the spirit of the Elk Island National Park management plan and Park Conservation plan. It also complies with the federal Migratory Birds Convention Act regulations and the Alberta Wildlife Act.

2.3 Project Administration:

The overall administration of the project is the responsibility of the Canadian Wildlife Service. Parks Canada provides support and assistance to

all phases of the project. Parks provides the lead role in the management and monitoring of Trumpeter Swans at Elk Island National Park. They have also assumed the lead in the development of the public relations activities associated with the project. More detailed responsibilites of specific agencies is outlined in Appendix 1. Assistance in administration and management of funds has been provided through the Friends of Elk Island Society and the University of Alberta - Forestry Department. A summary of 1987-88 project expenditures and status of project funds is provided in Appendix 2.

2.4 Public Relations:

Parks Canada and Canadian Wildlife Service held meetings in June 1987 to formalize a public relations plan for the project. It was intended to generate support and understanding of the project and to ensure that public information releases were accurate. Parks interpretation personnel provided media contact for the project. A public relations plan was developed to target the general media, local naturalists, hunters, and landowners in the area of the Park, all interested observers along the suspected migration route and U.S. state and federal biologists within the suspected and adjacent wintering areas. Media news releases were concentrated on three major periods during the year.

1. Pre-capture - to explain the project.
2. Capture/Transplant - to explain the project and increase awareness of Albertans to the project.
3. Pre and post migration - to solicit assistance in observation of swan movements during migration and use of wintering habitat.

Local newspapers and radio stations were very supportive and ran articles and interviews which increased local awareness of the project and Trumpeter Swans. A media package, information poster and a swan identification brochure were developed and distributed as key components to the public relations effort. Specific organizations targeted and contacts made are listed in Appendix 3.

2.5 Field Methods:

2.5.1 Aerial Surveys:

In order to comply with transplant guidelines it was necessary to assess the spring breeding status of Trumpeter Swans in the Grande Prairie flock. This survey also provided assistance in the selection of candidate pairs for the transplant. A fall production survey was also flown to aid in assessing the impact of the transplant on the Grande Prairie Trumpeter Swan flock and to determine flock status. The aerial surveys were conducted using fixed wing aircraft (Cessna 182) flying along designated routes 100-150 m agl at 150 - 200 kph. An observer - navigator and an observer plus the pilot participated in each survey. Repeated passes were made over groups of swans or families until both observers agreed upon the number of swans. Swans were recorded as paired birds with or without broods, cygnets, single swans or flocks. Single swans accompanied by cygnets were recorded on data sheets, but were considered as breeding pairs in the results.

2.5.2 Capture and Transplant:

Prior to the capture of family groups, a short reconnaissance flight using a Bell 206 helicopter was undertaken on July 16, 1987. This determined the status of molt of the candidate family groups and the accessibility of specific wetlands for helicopter capture.

Capture of swans was conducted during the morning of July 17. A central staging area in the Saddle Hills was chosen where vehicles and the capture helicopter rendezvoused. An A-Star helicopter was used for the capture while a Parks truck and horse trailer were used to transport birds to Elk Island. In order to facilitate capture, the rear door on the pilot's side and both rear seats were removed. A safety harness was affixed to the interior of the helicopter, allowing a person holding a salmon landing net enough mobility to step out onto the helicopter skid and net the swans. Once the helicopter was modified and required equipment stowed away, the pilot, netman and assistant proceeded from the staging area to the potential capture site. The helicopter approached the family group of swans from the shore side of the wetland and usually down wind. An initial pass was used to assess whether both adults were unable to fly. If one of the adult pair was able to fly or there were less than three cygnets in the brood or the family group was in an area where they could not be safely approached or captured, the helicopter proceeded to an alternate capture lake. Actual capture of swans was accomplished by hovering the helicopter over the swans at about 1.5 meters and netting a swan with the salmon net from the skid of the helicopter. The netted swan was then brought into the helicopter and restrained by the assistant. This procedure was repeated until the total family group was captured. The helicopter then returned to

the staging area were the swan families were processed by the ground crew. Swans were sexed, weighed, measured, banded and placed in plastic kennels for transport to Elk Island. It was originally planned to band and mark cygnets, however, all cygnets captured were to small for any form of marking.

After capture of the four family groups was completed, they were transported directly to Elk Island National Park. A press conference was held at the Park prior to release of the swans. The late arrival of the swan radio collars resulted in delay of the releases until after dark. It was decided to release two family groups during the night and hold the other two for release during the early morning of July 18th.

Prior to release radio collars were installed on adult swans. Collar codes and radio frequencies are listed in Table 1. Once the epoxy used to fasten the collars was set, the adults and cygnets were placed into release pens situated on the shore of the wetland. The family groups were held in the release pens for about 15 to 20 minutes prior to their release onto the wetlands. This was done to calm the adults, re-establish the family group bond and orient the swans to the wetland. Similiar procedures were used to release the remaining two family groups the following morning. One change during the morning release procedure was not to place the cygnets with the adults until the adults were ready to be released from the holding pen.

To facilitate marking of cygnets a re-capture, using the helicopter technique, was carried out in the Park during early September. The basic capture technique was the same as used for the family group capture except that a Bell 206 helicopter was used. Cygnets were banded, weighed and

Table 1. Status of Trumpeter Swans Transplanted to Elk Island National Park, September, 1987.

Swan	Sex	Collar No.	Leg Band No.	Radio Freq.	Lake
Adult	M	01AC	193900008	151.032	Walter
Adult	F	07AC	61905016	151.174	Walter
Cygnet	M	20AC	193900019	-	Walter
Cygnet	M	25AC	193900024	-	Walter
Adult	M	03AC	193900009	151.108	Bailey
Adult	F	11AC	193900010	151.520	Bailey
Cygnet	F	04AC	193900020	151.154	Bailey
Cygnet	M	18AC	193900015	-	Bailey
Cygnet	M	13AC	193900016	-	Bailey
Adult	M	10AC	193900011	151.500	Flyingshot
Adult	F	02AC	193900012	151.081	Flyingshot
Adult	M	09AC	193900014	151.194	South Bailey
Adult	F	05AC	193900013	151.163	South Bailey

measured at this time. One female cygnet was equiped with a radio collar (Table 1).

2.5.3 Summer and Migration Monitoring:

At Elk Island National Park monitoring of transplanted family groups was conducted weekly by the Park Warden Service using a Telonics Tr-2 receiver and a hand held yagi antenna. Access to transplant lakes was accomplished by canoe, horseback or foot and observations were made from a distance to keep disturbance of the swans to a minimum. Locations of swans and their movements was recorded on a data form and plotted on a 1:15,000 scale map. With the onset of freeze-up and possible migration of swans, monitoring frequency was increased to every two to three days.

When it was observed that the cygnets were flying and family groups became much more mobile, aerial monitoring was initiated. Aerial monitoring was conducted using a Cessna 182 equipped with two, four element yagi antennae and a Telonics scanner receiver. Swan family locations were also monitored on the ground by project personnel and input from local observers until larger staging wetlands were frozen. Immediately after total freeze-up a final aerial survey was conducted over all major staging lakes in the vicinity of the Park to ensure that swans had migrated.

2.5.4 Winter and Spring Habitat Monitoring:

Through the public information component and personal contacts a network of observers in western Canada and northwestern U.S.A. is being developed. It is anticipated that this network of observers will provide one method of

tracking and determining habitat use by migrating and wintering swans. All Trumpeter Swan collar numbers and radio frequencies were forwarded to the U.S. Sightings of collared swans have been requested from state and federal personnel conducting swan and/or waterfowl surveys throughout the Tristate and adjoining areas. The project has supplemented some of these surveys with some partial funding. All reports of collared swans, their location, status and other pertinent information is tabulated and stored on an electronic data base using an IBM micro-computer. One or more aerial surveys of Elk Island National Park and the surrounding wetland habitats is planned for the spring seasons to assess whether any Trumpeter Swans are returning to the area. The breeding pair survey during June will determine whether collared transplant swans are returning to the Saddle Hills.

3.0 RESULTS and DISCUSSION:

3.1 Aerial Surveys:

A total of 209 Trumpeter Swans was observed during the June 4, 1987 survey. Forty-two pairs (84) swans were observed nesting in the Alberta portion of the survey. Forty-eight swans were observed as pairs without nests and 77 swans were observed as singles or in flocks. These observations are above the five year mean for breeding pairs but are below the high numbers observed in 1984.

During the September 17-18 survey, a total of 357 Trumpeter Swans was observed (Table 2). This total was marginally greater than the previous record number of swans (n=347) observed in 1986. The number of lakes and the survey route was similiar during these two years. Although the 1987

Table 2. Fall Flock Status of Trumpeter Swans in the Grande Prairie Region.

Year	Paired	Cygnets	Other Adults	Total
Alberta				
1985	50	93(25)	141	262
1986	66	124(33)	157	347
1987*	48	83(25)	178	357
British Columbia				
1985	8	16(5)	16	36
1986	16	24(8)	15	55
1987	13	24(9)	1	38

( ) Number of broods

*Not included-8 adults and 18 cygnets removed for EINP transplant

total flock size was greater than previous observations the number of pairs with cygnets (n=25), the number of cygnets (n=83) and the average brood size (n=3.32) was lower than observed in 1986 and the five-year averages. A Student-t test indicated that the 1987 observations were not significantly different from the five year means at the 0.05 level. The observed increase in the total flock size in 1987 is probably due to the high cygnet production and survival in 1986 which is reflected in the high numbers observed in the "other adult" (n=224) category. The removal of 8 adults and 18 cygnets from the flock for the transplant and lower numbers of breeding pairs than in 1986, could partially account for the lower numbers of cygnets observed in the 1987 fall survey.

3.2 Capture and Transplant:

On the morning of July 17th, over a period of approximately five hours, four family groups of swans were captured from lakes in the Saddle Hills northwest of Grande Prairie (Table 3). Capture time varied from 13 to 47 minutes per family. The time required was mainly dependent upon ferrying time to capture lakes, location of swans on the wetlands, condition of the molt of the adult pairs, size of the family and the time required for the actual capture. One pair with five cygnets were taken from Boone, E.Boone, and Albright lakes. A fourth pair with three cygnets was taken from a small lake near the British Columbia border, which we named Lost Cygnet Lake. Weights and measurements of swans can be found in a report by Winkler (1987).

Transport of family groups by horse trailer, to Elk Island required about eight hours. Because of technical difficulties it was decided to split the release of swans into two separate times. Prior to the releases

Table 3. 1987 Elk Island National Park Transplant Summary.

Source Lake	Family Group Captured 17/07/87	Release Lake	Status 18/07/87	Status 15/09/87
Boone	2 + 5*	Walter	2 + 5	2 + 2
E. Boone	2 + 5	Flyingshot	2 + 2	2 + 0
Albright	2 + 5	S. Bailey	2 + 5	2 + 0
Lost Cygnet	2 + 3	Bailey	2 + 3	2 + 3

*Adults + Cygnets

adults were collared with radio transmitters. Two family groups were released during the night of July 17 onto Flyingshot and Walter lakes. The other two families were released on Bailey and S.Bailey lakes during the early morning of July 18. Problems due to adults trampling cygnets were encountered during the night release. This was probably the major reason for the early mortality of the three cygnets at Flyingshot Lake. To remedy this problem cygnets were not placed in the release pens until the adults were about to be released at the Bailey lakes sites. During the morning releases cygnets oriented to and followed the adults out onto the wetlands without difficulty. Observations of the morning releases indicated that they worked well.

3.3 Summer and Migration Monitoring:

After family groups were released, they were allowed one day to adjust to their respective transplant sites. Initial monitoring commenced on the second day after the release and revealed a high cygnet mortality. By the third day after the release eight of the remaining 15 cygnets were missing from the family groups. Potential causes of mortality could include; transport stress, release methods, predation, and/or lack of parental care. Two more of the surviving cygnets were missing by mid-August. The remaining cygnets grew rapidly and were in good condition when recaptured in mid-September. Mean weight of the male cygnets was 9.5 kg while the one female weighed 7.5 kg.

All swans appeared to prefer small ponds and moved from the larger release lakes to small beaver ponds and channels within several weeks of their release. The Walter Lake group was the widest ranging, moving

approximately 3.5 km from their release site.

The two pairs which lost all their cygnets remained in the Park until onset of migration. They were the first to move to the surrounding lakes out of the Park, but returned to the release lakes occassionally. Due to warm weather throughout the fall swans remained in the Park until the period October 6th to 10th. On October 20th an observer reported the collar numbers of the two adults and three cygnets from Bailey Lake, on Beaverhill Lake.

On October 23rd a monitoring survey was flown over Elk Island and the surrounding area. Three of the four family groups were located on Beaverhill Lake about 20 km southeast of the Park. The S. Bailey pair was not located. Mild weather conditions continued until early November. Freeze-up finally occurred on most lakes between November 10th to 15th. No Trumpeter Swans were observed nor were any of the radio frequencies monitored during the November 18th aerial survey of major staging lakes in the area.

3.4 Winter Habitat Monitoring

On November 15th an Idaho state biologist observed the Bailey Lake family, yellow collared 03 and 11 adults and collar 04 and 13 cygnets on Hebgen Lake in southeastern Montana. The cygnet collar number 18 was not observed and was presumed missing. A November 18th aerial survey of the major Trumpeter Swan wintering areas, conducted by U.S. biologists in the Tristate, yielded no observations of the Elk Island transplants. The same Bailey Lake family was again observed at Red Rocks Lake National Wildlife Refuge on McDonald pond on November 20th. Another adult, yellow collar 05

from S.Bailey Lake, was observed by a U.S. Forest Service Biologist on the Teton River near Driggs, Idaho on Nov. 27th. In early January, Wyoming biologists reported a family group of four collared swans wintering on the Snake River in Grand Teton National Park. No collar numbers were obtained.

To date only five of a potential 13 Elk Island transplants have been accounted for. But we now know that transplanted swans are able to migrate from transplant areas to wintering habitat. Icing of collars has been a major problem in the Tristate and this may be one of the problems which has resulted in the low numbers of collars reported. Should the four swans in Grand Teton be the Walter Lake group then nine of the 13 would be accounted for. Another extensive aerial survey with capacity to monitor radio frequencies of the transplants is planned for mid-February. This survey should provide us with more information on the wintering location of Elk Island National Park transplants.

3.5 Transplant Impact:

To date it has not been possible to determine the impact of the transplant on the eight adult Trumpeter Swans that were moved to Elk Island. It is anticipated that the adult transplants will return to their original breeding lakes in the Saddle Hills. The other possibility would be that they may choose to return to Elk Island, although this is highly unlikely.

The transplant has had an impact on the 18 cygnets removed from the Grande Prairie flock. If we assume a 40% mortality factor (Turner 1981) on cygnets up to fledging, then the Elk Island transplants should have

fledged about 11 cygnets. The 1987 transplant theoretically reduced the fledging population by six individual or 6/94 = 6.4% of the Alberta Grande Prairie flock. We feel confident that with a modification of techniques we can fledge at least 60% of the cygnets we transplant in 1988.

4.0 CONCLUSIONS and RECOMMENDATIONS:

The major components and methods of this project have operated well and we are satisfied with the results attained to date. One area which we hope to improve upon during year two of the project is the number of cygnets fledged from the Park. By delaying our capture of family groups, we hope to obtain larger cygnets. We will attempt to capture the same adults as in 1987; these swans will have been exposed to the Park environs and should be better able to rear cygnets than inexperienced transplants. Funding permitting we would like to transport transplants by aircraft from the Saddle Hills to Elk Island. This will reduce the travel and holding time which will reduce the stress on the cygnets. In addition to providing cygnets water during transport, fresh aquatic vegetation will be collected and made available to the cygnets. Release of family groups will follow the procedures used in the morning release in 1987. This will reduce the chances of adults trampling and stressing cygnets. Family groups will only be released during daylight hours. This will allow for better observation of released birds and immediate recovery of cygnets should problems arise. Budget and manpower requirements for the 1988/89 field season are summarized in Appendix 4.

5.0 LITERATURE CITED:

Burgess, H. and R. Burgess. 1986. Trumpeter Swan Restoration Experimental Project - Elk Island National Park, Wetlands Evaluation. Unpubl. Rept. Elk Island National Park. 30 pp.

Graham, D. 1983. Trumpeter Swan Re-introduction Pre-inventory, E.I.N.P. Parks Canada. Unpubl. report. 33 pp.

Shandruk, L.J. 1986. Elk Island National Park Trumpeter Swan Transplant Pilot Project - Final Report. The 10th Trumpeter Swan Society Conference, Grande Prairie. 25 pp.

Turner, B.C. 1981. An Evaluation of Trumpeter Swan Breeding Habitat in the Grande Prairie Region of Alberta. The 6th Trumpeter Swan Society Conference. :28 -33.

Turner, B. and R. McKelvey. 1983. Proposed Guidelines for Transplanting Trumpeter Swans in Canada. Unpubl. Rept., Can. Wildl. Serv., Edmonton. 6 pp.

Winkler, T. 1987. Trumpeter Swan Re-introduction E.I.N.P. Project Status Report. Unpubl. Rept. Elk Island National Park. 13 pp.

Appendix 1. TRUMPETER SWAN RE-INTRODUCTION LETTER OF UNDERSTANDING

These articles of agreement, together with Schedules "A" and "B" attached hereto, made on the fourth day of June, 1987 constitute the entire Letter of Understanding.

Between:

the Director, Canadian Wildlife Service (C.W.S.), Western and Northern Region, Conservation and Protection, Environment Canada.

OF THE FIRST PART

AND

the Superintendent, Elk Island National Park, Environment Canada, Parks (herein after referred to as "the Park").

OF THE SECOND PART

In consideration of the mutual payments and contributions made by C.W.S. and the Park, and the donations received for the betterment of the project, pursuant to Section V and Schedule "B" attached hereto, and in consideration of the covenants herein contained.

I. PERFORMANCE

A. C.W.S. agrees to assist in the program pursuant to Schedule "A" attached hereto and be responsible for:

1. overall project co-ordination and implementation;
2. survey, capture and transplant of swans;
3. monitoring of swans while outside Elk Island National Park;
4. co-operating agency liaison, including Regional and International agencies dealing with swans and obtaining the co-operation and assistance of Alberta Fish and Wildlife in surveying and family group capture within the Grande Prairie flock;
5. joint preparation of project status reports and final reports;
6. up-date the re-introduction plan yearly; and
7. assist in co-operative agreement development.

B. The Park agrees to assist in the program pursuant to Schedule "A" attached hereto and be responsible for:

1. assist in transplant and release of swans;
2. liaison with outside agencies;
3. management and monitoring of swans while <u>in</u> Elk Island National Park;
4. co-operative agreement development;
5. development and implementation of a public relations program;
6. liaison with the Friends of Elk Island Society; and
7. joint preparation of status and final report.

II. ADVISORY COMMITTEE

The advisory committee shall be composed of Gerald McKeating and Len Shandruk of C.W.S. and Jack Willman, Terry Winkler, Norm Cool and Dave Pick of the Park.

III. DATE OF COMPLETION

A. The first phase of this project shall be completed and final reports handed in by June 30, 1990. Should it be deemed desirable this project may be extended beyond the above date.
Interim progress reports (as per Schedule "A") will be submitted to all co-operaing agencies on or before February 1 of each year following re-introduction.
Reports will be submitted to:

Parks Canada
c/o Elk Island National Park
Site 4, R.R.1
Fort Saskatchewan, Alberta
T8L 2N7
Attn. Dave Pick, Superintendent

Canadian Wildlife Service
2nd. Floor, 4999 98th Avenue
Edmonton, Alberta
T6B 2X3
Attn. Gordon Kerr, Director

World Wildlife Fund

204 1422 Kinsington Road N.W.

Calgary, Alberta

T8N 3P9

Attn. Miles Scott-Brown

Executive Co-ordinator

Recreation, Parks and Wildlife Foundation

7th. Floor, 10045-111 Street

Edmonton, Alberta

T5K 1K4

Attn. Chuck Moser Ex. Director

Alberta Fish and Wildlife

Bag 900-38

River Drive Mall

Peace River, Alberta

TOH 2XO

Attn. Gord Holton

Trumpeter Swan Society

3800 Country Road 24

Maple Plain, Minnesota

55359

Attn. Dave Weaver Sec. Tres.

Friends of Elk Island Society
Site 4, R.R. 1
Fort Saskatchewan, Alberta
T8L 2N7
Attn. Dr. Allan Yuill

University of Alberta
Department of Forestry
817 General Services Building
89 Avenue & 114 Street
Edmonton, Alberta
T6G 2H1
Attn. Geoff Holroyd

Pacific Flyway, Trumpeter Swan Sub-Committee
c/o Trumpeter Swan Society
3800 Country Road 24
Maple Plain, Minnesota 55359
Attn. Dave Lockman

B. C.W.S. and Park project officers will conduct one (1) staff training seminar each spring.

IV. PUBLICATIONS AND COPYRIGHT RIGHTS

A. The copyright of the final report shall rest jointly in the Park and C.W.S.

B. Any correspondence, news releases, and reporting shall acknowledge co-authorship and the support and funding received from co-operating agencies (World Wildlife Fund, Recreation, Parks and Wildlife Foundation, Friends of Elk Island Society, and University of Alberta Forestry Department.)

V. PAYMENTS AND CONTRIBUTION

Major sources of funding available from World Wildlife Fund and Recreation, Parks and Wildlife Foundation will be administered by the University of Alberta Forestry Department and The Friends of Elk Island Society, respectively (schedule "B"). These funds will be drawn upon jointly by Parks Canada and C.W.S. during the implementation of the project. The University of Alberta Foresty Department and the Friends of Elk Island Society will establish individual bank accounts for management of project funding and will be responsible for drawing upon these funds for payment of bills during the project. Bills received by C.W.S. or Parks during the course of the project will be delivered personally or by registered mail to:

Friends of Elk Island Society
Site 4, R.R. 1
Fort Saskatchewan, Alberta
T8L 2N7
Attn. Dr. Allan Yuill
E.I.N.P. Trumpeter Swan Re-Introduction Project

or

University of Alberta
Department of Forestry
817 General Services Building
89 Avenue & 114 Street
Edmonton, Alberta
T6G 2H1
Attn. Dr. Geoff Holroyd

Funding received through the Camrose Veterinary Clinic will be in the form of veterinary services for the swans should it be required during the course of the project. Alberta Fish and Wildlife will provide manpower assistance during aerial surveys and capture in the Grande Prairie area. C.W.S. and Parks will provide funds and manpower as listed per Schedule"B". Terry Winkler, Parks Canada and Len Shandruk, C.W.S. will be the project officers and will be responsible for implementing the project as outlined.

VI. AMENDMENT

This agreement may be amended in writing by mutual consent of C.W.S. and Parks.

VII. DISPUTES

All disputes or differences whatsoever that arise at any time

during the performance of this Agreement, or after its termination, concerning the interpretation of the Agreement, or rights, duties, or liabilities of the parties hereto, shall be settled between Mr. Len Shandruk on behalf of C.W.S. and Mr. Jack Willman on behalf of the Park.

If the parties cannot agree, then the dispute shall be determined by a single arbitrator, if the parties agree upon one, otherwise by three arbitrators, one to be appointed by each party and the third to be chosen by the first two named, and the decision shall be binding upon the parties thereto.

VIII. WARRANTY OF AUTHORITY AND COMPETENCE

The parties represent and warrant, each for itself, that it has full legal capacity and authority to enter into this Agreement, and that each is competent and able to perform its express and implied obligations under the Agreement.

IX. TERMINATION

A. Without limiting any other rights or remedies each party has the right to terminate the Agreement for non-performance or breach by the other by written notice delivered to such party effective two (2) weeks from the date of delivery.

B. Either party reserves the right of voluntary cancellation or suspension of the project by notice to be delivered by such

party effective two (2) months from the date of delivery.

C. Any funds unused at the date of delivery of the notice of termination shall be returned forthwith to the contributing party.

X. UNUSED FUNDS

At the completion of this agreement, all unused funds shall be returned forthwith to the contributing party.

Any funds unused in any one fiscal year may be transferred to the subsequent operating year, if so desired.

XI. NOTICES

Notices of termination to be given under this Agreement shall be in writing to the other party and shall be either delivered personally or sent by prepaid, registered mail to:

Elk Island National Park
c/o Terry Winkler
Site 4, R.R. 1
Fort Saskatchewan, Alberta
T8L 2N7

for the Park

and

Canadian Wildlife Service
c/o Len Shandruk
2nd. Floor
4999-98 Avenue
Edmonton, Alberta
T6B 2X3

for C.W.S.

Notice delivered by prepaid, registered mail shall be deemed received within seven (7) calendar days, following the date of mailing. In the event of postal disruption, actual or threatened, notices shall be delivered personally.

XII. CONTACT PERSONS

For the purposes of the Program and guidance to be provided by the Advisory Committee, the contact persons are:

- Len Shandruk (495-2525), and
- Terry Winkler (992-1796)

XII. BOOKS OF ACCOUNT

All parties will maintain proper accounts and records for all funding that they are responsible for. Each will permit the other to inspect

the books and records at all reasonable times and to take extracts therefrom.

XIV. DISPOSAL OF EQUIPMENT

Upon completion of the project, any equipment purchased by external funds will be divided beween Parks Canada and C.W.S. upon agreement of the advisory committee.

XV. INDEMNITY

C.W.S. will indemnify the Park and hold it harmless from and against all loss, damages, claims, suits, costs, and expenses arising out of this agreement unless the same is caused by negligence of the Park.

In reverse, the Park will indemnify C.W.S. in the same manner.

SCHEDULE "A"

TERMS OF REFERENCE

ELK ISLAND NATIONAL PARK TRUMPETER SWAN RE-INTRODUCTION

I. INTRODUCTION

This project is designed to restore the trumpeter swan as a free-flying migratory breeding bird in Elk Island National Park, Alberta. A pilot transplant project which tested and evaluated methods and techniques was conducted in 1983 and 1984, (Shandruk, 1986). The suitability of Park habitat for the trumpeter swan has been evaluated by Graham (1983)and Burgess (1986). As a Wildlife - 87 initiative, Canadian Wildlife Service, Parks Canada, University of Alberta - Forestry Department, and the Friends of Elk Island Society requested and obtained support for a trumpeter swan restoration project from World Wildlife Fund, Alberta Recreation, Parks and Wildlife Foundation, Alberta Fish and Wildlife, and the Camrose Veterinary Clinic. With the above background, co-operation and support, we are now confident that over the next three years this project will be successful.

II. PROJECT GOALS AND OBJECTIVES

The primary objective of this project is to diversify summering and breeding range of trumpeter swans in Alberta. A secondary objective is to diversify migration and wintering tradition.

The primary goals of this project are:

1. To transplant 12 family groups of trumpeter swans over the next 3 years from the Grande Prairie flock, to suitable wetlands within Elk Island National Park.
2. To refine capture and transplant techniques and determine which are the most efficient and meet the above goal most adequately.
3. To determine if cygnets released on marshes at E.I.N.P. will home to these areas and to assess the impact that the relocation will have on both cygnets and guide birds.
4. To reintroduce a base population of trumpeter swans which will result in the establishment of ten breeding pairs in E.I.N.P.
5. To evaluate the impact that swans will have on the existing biotic resources should swans become seasonal residents.

PROJECT AREA

The project area comprises all lands within the gazetted boundaries of Elk Island National Park (refer to N.T.S. topographic map sheets 83H/10 Elk Island Park) and includes the Shirley Lake addition.

MANAGEMENT MECHANISM

1. The project will be undertaken as a co-operative activity conforming to Management Guidelines for Co-operative Activities set by Parks Canada, June, 1980 and February, 1981.

2. The project will be undertaken in the spirit of the Elk Island National Park Management Plan and Park Conservation Plan.

3. The co-operative agreement will involve field work and funding supplied by Parks Canada and C.W.S. and funding supplied by World Wildlife Fund, Parks, Recreation and Wildlife Foundation, Camrose Veterinary Clinic, and Alberta Fish and Wildlife. Assistance in administration of funds will be received through the Friends of Elk Island Society and the University of Alberta - Forestry Department.

III. PROGRAM DESIGN AND METHODOLOGY

1. Obtain sanction for the project from the Pacific Flyway trumpeter swan technical sub-committee. Obtain appropriate permits from C.W.S. and A.F.W.D.

2. Develop a co-operative implementation agreement between C.W.S. and E.I.N.P. Develop lines of communication and co-ordination with funding agencies and support groups (Friends of Elk Island Society and Univ. of Alberta - Forestry).

3. Outline and implement a public relations component for the project in co-operation with E.I.N.P. and A.F.W.D.

4. Conduct a June breeding pair survey of the Grande Prairie flock to select candidate pairs for transplant as well as assess total breeding pairs. Should breeding pair numbers fall below twenty-five (25),

no transplant will occur. Candidate lakes for transplant will be located in the green zone and have a short history of being swan breeding lakes.

5. A precapture survey of candidate lakes will be made using a fixed-wing aircraft during mid-July. Capture of four family groups (8 adults and 16 cygnets) using a helicopter will coincide with moult of the adults about July 15th.

6. Captured family groups will be separated into adults and cygnets and placed into appropriate carrying crates for expedient transport to E.I.N.P. Prior to release on wetlands, swans will be weighed, measured, banded and collared or tagged. Radio collars will be placed on adult swans to aid in their relocation and cygnets will be marked with patagium wing markers and tarsal bands. Transplant family groups will be released annually on Flyingshot, Bailey, and Walter Lakes, with a fourth alternate lake to be selected at a later date.

7. Aerial surveys of the total Grande Prairie flock will also be conducted during early September to determine annual production and assess impact of the family group removals.

8. Family groups of swans released on individual wetlands will be monitored at E.I.N.P. on a weekly basis during July to October by E.I.N.P. Warden Service. More frequent monitoring will be conducted during the onset of freeze-up of wetlands in the Park.

9. Aerial monitoring of swans in and around E.I.N.P. will be conducted during fall and spring migration as the need arises, and source lakes in the Grande Prairie area will be monitored in the spring to assess the impact of swan removal (in conjunction with the spring breeding survey). A network of volunteer observers will be developed along the suspected migration route. U.S. biologists will be notified and requested to co-operate in the location and identification of transplants. Should funds be available, a small contract may be issued to an individual to search wintering habitats in the Tri-State for transplants.

10. Vegetation and nesting waterfowl will be monitored should Trumpeter swans become seasonal breeding residents (E.A.R.P. 83-1). Should any birds fail to leave E.I.N.P., they will be recaptured and given to an appropriate agency.

11. A project status report will be written by February 1 of each year outlining the results of the previous years efforts and recommending procedures for the next field season in conjunction with the Advisory committee.

SCHEDULE "B"

PROJECT MANPOWER AND BUDGET NEEDS

TASKS	C.W.S	PARKS	A.F.W.D.	COSTS
1.Spring Survey (10hrs Cessna 185)	5.0 Pd	-	2.0 Pd	$2500
2.Project Planning and Co-ordination	10.0	6.0	-	500
3.Public Relations	3.0	10.0	1.5	1000
4.Pre-capture survey (6hrs Cessna)	2.0	-	1.0	1500
5.Family group capture (6hrs Bell 206)	6.0	-	2.0	5000
6.Transport and release E.I.N.P.	1.0	1.0	-	1000
7.Release site monitoring	3.0	20.0	-	1250
8.Migration monitoring (4hrs Cessna)	6.0	10.0	-	1000
9.Fall survey of Grande Prairie flock (12 hrs)	5.0	-	2.0	3500
10.Winter habitat surveys	3.0	-	-	3000
11.Support group liaison	3.0	5.0	-	250
12.Spring surveys E.I.N.P./G.P.	5.0	8.0	-	2000
13.Supplies and Equipment	-	-	-	*6000
14.Project Contingency				2500
TOTALS	52.0	60.0	8.5	*31000

* Majority of items required were purchased by C.W.S. funds in 1986.

SCHEDULE "B"

PROJECT FUNDING TO DATE

AGENCIES	FUNDS COMMITTED
World Wildlife Fund via U.of A. Forestry	10.0 K
Recreation, Parks and Wildlife Foundation c/o F.E.I.N.P.S.	10.0 K
Canadian Wildlife Service	5.0 K
Parks Canada	2.0 K
Camrose Veterinary Clinic	0.5 K
Alberta Fish and Wildlife Division	0
TOTAL	27.5 K

SIGNATURES

C.W.S

Len Shandruk _____

Gordon Kerr _____

ELK ISLAND NAT. PARK

Jack Willman _____

Dave Pick _____

AFFIRMED BY THE FOLLOWING COOPERATING AGENCIES

University of Alberta (Dept. of Forestry) _____

Friends of Elk Island Society _____

Camrose Veterinary Clinic_____

Alberta Fish and Wildlife Div._____

APPENDIX 2. SUMMARY OF PROJECT EXPENDITURES FOR 1986/87.

	Expenditures	Committed
Spring Survey	$ 1,035.75	
Project Planning and Coordination	450.00	
Public Relations	1,657.76	
Pre-capture Survey	900.08	
Family Group Capture	4,446.50	
Transport and Release	400.00	
Release Site Monitoring	2,000.00	
Migration Monitoring	570.00	
Fall Survey of Grande Prairie flock	1,289.40	
Winter Habitat Surveys	1,525.00	$ 1,475.00
Support Group Liaison	500.00	
Spring Survey EINP/GP		2,000.00
Supplies and Equipment	6,118.04	1,632.47
Project Contingency	1,000.00	
Totals	$21,892.53	$5,107.47

APPENDIX 3. PROJECT PUBLIC RELATION EFFORTS AND CONTACTS.

1. Pre-capture Information Package

Newspapers	6

2. Capture Transplant (Media Kit, Interviews, or Onsite Report)

Newspapers	12
Television Stations	5
Radio Stations	5
Magazines	2

3. Pre and Post Migration (Information Package, Poster and/or Swan ID Brochure)

Swan Spotter Flyer (local distribution)	5500
Newspaper/Magazine	44
Natural History Organizations and Societies	9
Nature Centres/Museums	10
Fish and Game Associations	77
Alberta Fish and Wildlife Divisions (includes Hunter Education and Project Wild)	70
Provincial Parks	30
Provincial Bird Recorder	7
National Parks	2
US Contacts	100+

4. Summer/ongoing

Talks to School Groups
Bird Banding Workshops
Transplant Program Explained during Park Interpretive Programs

APPENDIX 4. MANPOWER AND BUDGET NEEDS FOR 1988/89.

	CWS	Parks	AFWD	Cost
Spring Survey	6			$ 1,500
Project Planning and Coordination	10	6		500
Public Relations	3	10		1,500
Pre-capture Survey	2		1	1,000
Family Group Capture	6	2	2	5,000
Transport and Release EINP	1	1		3,000
Release Site Monitoring	3	20		1,000
Migration Monitoring	6	10		1,500
Fall Survey of Grande Prairie Flock	6			2,000
Winter Habitat Surveys	3			2,500
Support Group Liaison	3	5		500
Spring Survey EINP/GP	5	6		2,000
Supplies and Equipment				3,000
Project Contingency				2,500
Totals	54	60	3	$27,500

F

ALBERTA SNAKE HIBERNACULA SURVEY

-1987-

A PROJECT FUNDED BY:

WORLD WILDLIFE FUND CANADA
WILD WEST PROGRAM

PREPARED BY:

COTTONWOOD CONSULTANTS LTD.
615 DEER CROFT WAY SE
CALGARY, AB T2J 5V4
(403) 271-1408

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ACKNOWLEDGEMENTS

We would like to acknowledge the cooperation of the dozens of organizations and persons throughout Alberta and parts of Saskatchewan who are named in the contact list (see section 2. METHODS). These people freely contributed time and information which has given us many insights into the problems of snake conservation and other natural history phenomena in southern Alberta. Logistical support and information referrals were provided by Alberta Fish and Wildlife head, regional and district offices, for which we are also grateful.

We are very appreciative of the generous support of World Wildlife Fund Canada's "Wild West" Program which was instrumental in bringing about this project and seeing it to its successful conclusion.

1. INTRODUCTION

Overwintering sites or "hibernacula" are one of the most critical limiting factors for many snake species yet there has been very little documentation of snake hibernacula in Alberta. The purpose of this project was to identify locations of snake hibernacula (especially for Prairie Rattlesnake, Bull Snake and Plains Hognose Snake) in the drier Mixed Grassland Region of Alberta.

In order to raise the public profile of the importance of snake hibernacula and to determine additional hibernacula locations, we undertook a program involving broad-scale solicitation as well as telephone and on-site interviews.

There was good response from most of the areas of interest with almost 50 dens having been located and described as a result of this project.

Responses to the survey generally indicate a positive attitude towards conserving snake dens and snakes in general. While snake populations appear to be thriving in several areas, past persecution and ongoing habitat destruction have eliminated several snake dens or greatly reduced local snake populations.

While they have always been scarce, Plains Hognose Snakes appear to have experienced a significant population decrease during this century. In many areas, Bull Snakes were also noted to have declined relative to Prairie Rattlesnakes. Prairie Rattlesnake populations seem to have remained stable in several localities but have experienced local declines or increases. Garter Snakes were not extensively surveyed as part of this study, however, their populations seem to be in no immediate danger.

Major ongoing threats to Alberta snake populations include road and pipeline construction and increased vehicle use as well as breaking and cultivation of natural grassland, especially for irrigation purposes. Fortunately, persecution of snakes and destruction of dens appear to be very local phenomena, much of which occurred decades ago.

Protection of snake dens and surrounding natural habitat is critical to the future survival of many species. Education programs and recognition for snake conservation efforts would complement habitat protection efforts. More research into the ecology of Plains Hognose Snake is required.

2. METHODS

The project was divided into two phases: broad-scale solicitation and interviews.

Phase I: Broad-scale Solicitation

This phase of the project involved the preparation of a newspaper article and posting of information in post offices. Both the article and poster (Appendix 3) provided background on "Wild West". The value of snakes and the importance of overwintering sites was emphasized.

People were encouraged to either write or phone collect with any information that they had on snake hibernacula or other individuals who may be knowledgeable on the subject. The article and the poster stressed that the program respected local landowners' rights and concerns and that information provided would be kept confidential.

Newspapers were approached first and those which responded by running our article (Appendix 3) included:

The Bassano Times
Forty Mile County Commentator
Brooks Bulletin
Lethbridge Herald
Medicine Hat News
Raymond Review
Taber Times
Vauxhall Advance
Oyen Echo
Sunny South News
Hanna Herald

The newspaper articles served as the first contact with local landowners and other knowledgeable persons. In subsequent phases this was helpful in overcoming much of the apprehension that landowners may have felt about dealing with "outsiders".

The next part of Phase I of the project entailed the posting of the "Wanted" poster (Appendix 3) in Post Offices throughout southern Alberta. Towns where postings were made included:

RED DEER RIVER DISTRICT

Duchess
Millicent
Patricia
Wardlow
Iddesleigh
Jenner
Bindloss
Empress

SOUTH SASKATCHEWAN RIVER DISTRICT (NORTH OF MEDICINE HAT)

Hilda
Schuler

BOW/SOUTH SASKATCHEWAN RIVER DISTRICT (WEST OF MEOICINE HAT)

Ralston
Rolling Hills
Hays
Seven Persons
Maleb
Bow Island
Burdett
Grassy Lake
Purple Springs

MILK RIVER DISTRICT

Seven Persons
Manyberries
Orion
Etzikom
Skiff

OLDMAN RIVER DISTRICT

Barnwell
Diamond City
Iron Springs
Shaughnessy
Taber
Turin
Welling

Phase II: Interviews

Land ownership maps in areas of high potential were searched and owners/managers were contacted by telephone. Areas of high potential included:

- entire length of the South Saskatchewan River
- Red Deer River in Dinosaur Provincial Park/Jenner district
- lower Red Deer River (Buffalo to Empress)
- Milk River Canyon
- Writing-on-Stone area

As in the article, we discussed with the landowners the Wild West program; the current sponsored research on reptiles and amphibians; and the value of snakes and the importance of hibernacula. The confidentiality of the information provided was noted.

We visited several respondents and attempted to pinpoint the locations of hibernacula on 1:50,000 topographic maps. In some cases, this was not possible due to respondents' unfamiliarity with topographic maps or their desire to keep the information totally confidential. In most cases, people were willing to provide a legal description which was accurate to the quarter section or section.

Information gathered from all interviews included:

1. numbers and species of snakes
2. history of the hibernacula
3. location
4. general description of habitat
5. attitudes regarding conservation of snakes in the area
6. other natural history information relevant to snakes

People contacted or who provided information during the interview stages included the following:

Note: the designation "no information" indicates that the contact person could provide no information on snakes or snake dens -- these were all landowners within the priority areas

Red Deer River in Dinosaur Provincial Park/Jenner Area

Carl Beasly, landowner, Wardlow, phone 566-2248
John Fryberger, landowner, Wardlow, phone 566-2158
Albert Irwin, landowner, Patricia, phone 378-4609, no information
Walter Olson, landowner, Jenner, phone 898-2342
Ernest Pierson, landowner, Jenner, phone 566-2192
Margaret Reil, Rosemary, phone 378-4283
John Wolper, Dinosaur Provincial Park, phone 378-4587

Lower Red Deer River

Ian Barnes, landowner, Bindloss, phone 379-2316
Bill Campbell, landowner, Buffalo, phone 379-2116, no information
John Gattey, landowner, Bindloss, phone 379-2408
Benjamin Habich, landowner, Empress, phone 565-3781 or 565-2223, no information
Murray Houston, Sibbald, phone 676-2217
George Howe, landowner, Buffalo, phone 379-2115, no information
Reg Howe, landowner, Buffalo, phone 379-2216, no information
Mr. Johnson, former Majestic Ranch owner, Brooks, phone 362-4834
Stanley Krause, landowner, Atlee, phone 898-2118 or 898-2209
Oliver "Buster" Leach, landowner, Empress, phone 565-3799
Jack Longmuir, landowner, Empress, phone 565-3740 or 565-3858
Joe Niwa, Acadia Valley, phone 972-2217
Al and Doreen Rauch, Empress Hotel, phone 5653952
Clarence Rinker, landowner, Buffalo, phone 379-2140
Henry Rinker, landowner, Buffalo, phone 379-2148
Leonard Rinker, landowner, Buffalo, phone 379-2153, no information
Mr. Schornhofer, Majestic Ranch, Atlee, phone 379-2372
Frank Spath, Acadia Valley, phone 972-2135
Clarence Wenz, landowner, Empress, phone 838-2111
Bernie York, Hanna, phone 854-3229

Writing-on-Stone District

Alva Bair, Milk River, phone 647-2108
Ellen Gasser, Calgary, phone 295-1880
Tom Gilchrist, landowner, Aden, phone 647-2304
Robert Hulit, landowner, Aden, phone 344-2222, no information
Lysbeth Krisjansons, landowner, Coutts, phone 344-4424
Bob McCulloch, landowner, Coutts, phone 344-4462
Ed Turner, landowner, Coutts, phone 647-2401
Writing-on-Stone Provincial Park, phone 647-2364

Lower Milk River/Lost River

John Dyck, Pinhorn Grazing Reserve, phone 868-2417
Ray Pearson, landowner, Orion, phone 868-2318
Leonard Piotrowski, landowner, Manyberries, phone 868-3940
Allan Ross, Agriculture Canada Research Station at Onefour, phone 868-2374

Bow/South Saskatchewan River (west of Medicine Hat)

Lorne Laidlaw, landowner, Bow Island, phone 545-2653
Ira Lapp, former landowner, Brooks, phone 362-2673
McDougald Livestock, landowner, Medicine Hat, phone 548-6629
Douglas Murray, landowner, Redcliff, phone 548-3591
Larry Nelson, landowner, Burdett, phone 655-2411
Anthony Schlacter, landowner, Bow Island, phone 545-6985

South Saskatchewan River (north of Medicine Hat)

Floyd Wolfer, landowner, Burstall, phone 838-2201
Ron Haas, landowner, Hilda, phone 838-2206
Cliff Smith, landowner, Mendham, Saskatchewan, phone (306) 628-4214
Norm Rubelki, former landowner, Burstall, Saskatchewan,
phone (306) 679-2245 or 679-2063
Stanley Schlenker, landowner, Hilda, phone 838-2242
N. Bauer, landowner, Hilda, phone 838-2141
Elsie Diebert, landowner, Medicine Hat, phone 526-3338
Robert Dockrell, Medicine Hat, phone 526-1260
Bert Hargrave, landowner, Walsh, phone 937-2128
H. Krause, landowner, Medicine Hat, phone 838-2270
Ian Mitchell, landowner, Medicine Hat, phone 536-0233
Neil Mitchell, landowner, Medicine Hat, phone 548-6463
Larry Roeder, landowner, Hilda, phone 838-2243

Oldman River

David Bly, Taber, phone 223-2266, or 223-9127
Frank Buckley, former landowner, Taber, phone 223-9157
Malcolm Stark, Lethbridge, phone 320-3210

Other

Jan Allen (Fish and Wildlife, Pincher Creek), phone
Cheryl Bradley, Calgary, phone 246-9127
Ms. Gerry Hoffmann, District Resource Analyst, Fish and Wildlife,
Lethbridge, phone 381-5487
Deborah Keller, Raymond, phone 752-4249 or 752-3635
George Pendlebury, Calgary, phone 272-4383
Wayne Roberts, Edmonton, phone 432-4622
Andrea Sissons, Edmonton, phone 467-8302

3. SUMMARY OF RESULTS

3.1 Geographic Distribution

Snake hibernacula (dens) were reported from the Front Range of the Rocky Mountains east to the Saskatchewan border and from the Red Deer River south to the United States boundary.

Dens of the larger snake species (Prairie Rattlesnake, Bull Snake and Plains Hognose Snake) are basically confined to the major valleys where there are eroding slopes. Along the Red Deer River, dens of these species have only been noted in the Dinosaur Provincial Park-Jenner district and in the Majestic-Bindloss area. Dens have been reported from all sections of the South Saskatchewan River valley. Along the Oldman River, only the Lethbridge and Taber areas appear to have active hibernacula. Along the Milk River, dens have only been reported in the Writing-on-Stone and Milk River Canyon districts.

Garter Snake hibernacula have been noted in a variety of upland and valley sites throughout the area. The Plains Garter Snake is the most widely distributed species and has been found in most parts of the study area. Wandering Garter Snakes appear to be confined to the major river valleys and to valleys in the Front Range of the Rocky Mountains. Although they are presumed to occur in southwestern Alberta, the only reported den of Red-sided Garter Snakes is from the Cypress Hills.

3.2 Habitat

The greatest number of active dens are located in or adjacent to extensive tracts of native Mixed Grassland. With only two exceptions, all dens of the larger snake species (Prairie Rattlesnake, Bull Snake and Plains Hognose Snake) are located along major valleys and associated coulees. The exceptions include one mine shaft in the Forty Mile Coulee area and Black Butte, an isolated intrusion of igneous rock south of the Milk River Canyon.

Although the habitat varies from site to site, most dens are located in areas of eroding bedrock or slumped glacial deposits. The most prevalent habitats are fissures in harder bedrock (massive sandstone) and holes (often abandoned animal burrows) in old slump blocks. Surprisingly, there is little evidence of the use of extensive piping holes in major badland areas. In most badland areas, snakes appear to be using slumped areas or sandstone outcrops. Many of the best slump sites are located where thick beds of fine glacial lake deposits are found along the major valleys. In many of the slump areas, several holes are usually involved. These multiple den holes are often described as badger burrows or similar sized erosion holes.

Most sites have south or west-facing aspects although there are a handful of sites apparently located on or adjacent to slopes with east or north-facing aspects.

While Garter Snakes appear to use many of the same valley sites as the larger snake species, they are also able to use upland areas created by mammal burrowing or by human activity. Garter Snakes seem to prefer sites close to wet areas.

3.3 Land Ownership

Thirty-five of the dens are located on Crown Lands administered by the Special Areas Board, Alberta Public Lands Division or Alberta Parks. Thirteen of the dens, about half of which are Garter Snake dens, are found on privately held lands. All records of Plains Hognose Snakes were in dens on Crown Lands.

3.4 Species' Accounts

3.4.1 Prairie Rattlesnake

Most (thirty-nine) of the reported dens contain Prairie Rattlesnakes. They generally had "tens" of this species but historical numbers into the "thousands" have been reported. It is likely that most dens contain less than a hundred individuals, although some of the larger dens may, at one time, have contained several hundred of this species.

Half of the Prairie Rattlesnake hibernacula are communal dens which also have Bull Snakes and Garter Snakes (Plains and Wandering) and, in three cases, Plains Hognose Snakes.

With the exceptions of some local short-term declines or increases, populations of Prairie Rattlesnakes appear to have remained fairly stable along the Bow River and along the South Saskatchewan River from the Bow River to the area just north of Medicine Hat. The only area where Rattlesnakes appear to be genuinely increasing is in the Dinosaur Provincial Park area. All other reporting localities (Sandy Point, lower Red Deer River, Milk River, Oldman River) generally indicate recent or long-term declines.

3.4.2 Bull Snake

Twenty of the reported snake dens contain Bull Snakes. Most dens had "tens" of this species. No dens with "hundreds" of Bull Snakes have been noted in recent times although historical accounts indicate that there were larger numbers of Bull Snakes in some dens.

With the possible exception of one den, all Bull Snake hibernacula are communal dens containing Prairie Rattlesnakes, occasionally Garter Snakes (Plains and Wandering) and, in three cases, Plains Hognose Snakes.

Populations of Bull Snakes appear to have remained stable only in the South Saskatchewan River area near Medicine Hat. All other reports

indicate declines, possibly even in the Dinosaur Provincial Park area where Prairie Rattlesnakes are increasing.

3.4.3 Plains Hognose Snake

Only three dens were reported to have had Plains Hognose Snakes, however, no recent records of Plains Hognose Snakes at dens were noted. Respondents indicated that this species has always been rare but that it has disappeared in several areas or has not been observed for many years in areas where it once occurred.

All three Plains Hognose Snake hibernacula were communal dens containing Bull Snakes, Prairie Rattlesnakes and Garter Snakes.

One of the dens (lower Red Deer, Minor's) has been heavily impacted and many snakes were eliminated. However, there have been recent reports of Plains Hognose Snakes in natural habitats in the vicinity.

Another den (lower Red Deer, Majestic Ranch) lies near the westernmost recent record of a Plains Hognose Snake along the Red Deer River. Snakes were subject to human disturbance in former years but the site is now protected by the landowner. However, Plains Hognose Snakes have not been seen at this den in recent years and they were always rare there.

A hibernaculum along the South Saskatchewan River in the Suffield Military Reserve has not been checked recently but it lies within an environmentally sensitive zone which receives a considerable degree of protection.

3.4.4 Garter Snakes

Although Garter Snakes are the most widespread snake species, they have only been reported at eighteen of the dens. Numbers generally are in the "tens" although we have a report of "millions" which probably indicates numbers in the low thousands.

There is insufficient information to determine population trends, however, Garter Snake populations do appear to have remained fairly stable in many areas. The only increase noted was of Wandering Garter Snakes along the Oldman River in the Taber district.

3.5 Attitudes to Conservation

We were generally encouraged by the attitudes which local landowners displayed towards conserving snakes, including Prairie Rattlesnakes, and their overwintering dens. A few people still kill Rattlesnakes and other snakes on sight, but it seems that the vast majority of people appreciate the beneficial aspects of snakes, even if they don't personally like them. Most landowners are willing to show to researchers the den sites they know about.

Many respondents believe that snakes, especially Rattlesnakes, keep Richardson's Ground Squirrel populations down in the vicinity of dens. There is almost universal belief that ground squirrel numbers are reduced within two or three kilometres from the edges of river valleys in the vicinity of snake dens.

After he became aware of disturbance at one of his snake dens, a rancher along the lower Red Deer fenced off a truck trail to prevent further public access to the den site.

It is unclear whether these positive attitudes reflect only on those ranchers which, through conservation efforts or non-destructive tolerance, still have snake dens. It is possible that dens have been completely destroyed by some landowners and they are not willing to divulge this information.

3.6 Threats

While there are still local problems with people dynamiting, burning and shooting out snakes from dens, most of this kind of activity seems to be characteristic of a time now past. Most dens seem to enjoy protection, or at least freedom from harassment, by current landowners or leaseholders.

Principal ongoing threats include road and pipeline construction across eroding valley slopes. While these are relatively small developments they can have significant local impacts. There are several reports of major dens being disrupted or completely destroyed by such activity.

Increased vehicular traffic along truck trails and major highways has also been cited as a major problem -- more snakes are being killed on their journeys between summering and wintering sites.

Oil and gas industry personnel have been cited for their ongoing killing of snakes around industry facilities in natural habitats. While this may be a generally correct impression, we have some recent reports of industry personnel taking more care not to harm snakes which they find.

Another longer-term problem appears to be the ongoing breaking and cultivation of native grasslands, including the conversion of some sites to irrigation (Pendlebury 1977). Native grasslands still offer the best habitat for the larger snake species. Snakes do not appear to move large distances from the den sites. With continued destruction of natural habitat surrounding the hibernacula, snake populations will continue to decline.

3.7 Information Deficiencies

There are a few major gaps in the snake den distribution maps in areas where snakes are known to occur. The most striking case is the Milk River Canyon district where we have not one report of an active snake hibernaculum along the valley. This may be due to the low density of

people in the area and to the fact that many potential areas are located away from major roads and truck trails.

While there are several snake dens known from the South Saskatchewan River, there must be many more which are unreported or unknown, especially in the Suffield Military Reserve.

There continues to be a problem in determining the denning requirements of Plains Hognose Snakes at the northern edge of their range. While we have three reports of communal denning in the range of the northern colour morph, there are no recent records and there are no reports of dens of the southern colour morph.

There has been no systematic monitoring of most of the dens and many of the records are at least a decade old. No recent visits to many of the sites have been made.

4. RECOMMENDATIONS

The following recommendations would be helpful in ensuring the long-term survival of snake populations in southern Alberta. Most are very low cost and relatively easy to implement. Discussions will be held with Alberta Fish and Wildlife to seek ways of implementing many of these recommendations. World Wildlife Fund Canada may have a role to play in cooperatively funding some of these programs.

4.1 Information and Education Programs

A pamphlet on the value of snakes and the importance of snake dens could be produced. This could be based on the snake den article which was prepared for the newspapers as part of this project. Distribution to all landowners and oil and gas companies servicing areas where there are snake dens could be ensured by providing copies in boxes at all rural post offices in these districts.

Where the landowners agree, recognition of their efforts in protecting snake dens would also be useful in educating other local residents, both rural and urban. Presentation of a conservation certificate to deserving landowners would create some publicity if the local media was notified.

Road-kills of Plains Hognose Snakes are thought to represent a significant impact on populations of this rare species (Cottonwood Consultants 1986). In certain key areas, education programs for oil and gas industry personnel may be useful in reducing road kills on trails leading to oil and gas wells. The most significant habitat for northern populations of Plains Hognose Snakes appears to be the Middle Sand Hills-Bindloss-Cavendish area. Southern populations are more limited but appear to be most prevalent in sandy soils along the lower Milk River.

Strategically placed snake crossing signs on major highways combined with signage indicating the importance of snakes (e.g. rodent control) may also be useful in limiting road kills. The most significant area of road-killed snakes is in the Sandy Point area along the South Saskatchewan River.

Lastly, it is important for Alberta Fish and Wildlife to continue to maintain and expand its data base on snake dens. There should be ongoing solicitation of snake den information from local residents so that additional sites can be added to the data base. This data should also be incorporated into the Recreation-Conservation Information System being developed by Alberta Forestry Lands and Wildlife.

4.2 Habitat Protection and Monitoring

Wherever possible, agreements should be made with landowners or leaseholders to ensure continued protection and monitoring of snake

dens. Costs for monitoring could be greatly reduced if local landowners and leaseholders can be encouraged to participate in the ongoing monitoring of each den site to provide information on the security of the site and relative indications of usage levels by each species. In Alberta, snake species are few in number and, with the aid of a simple guide, they are relatively easy to identify. In addition, a representative cross-section of dens should be monitored on a five year basis by experienced researchers to establish more accurate long-term population trends. This would involve detailed counts of each species.

In addition to protection of the overwintering sites, conservation of surrounding natural grassland habitat (up to 10 km from den sites) is essential to the long-term health of many snake species. Recommendations made by Cottonwood Consultants (1986) regarding protection of natural habitats are still applicable. The recent designation of Kennedy Coulee/Milk River Canyon is a significant step in the right direction. Legal protection for the Middle Sand Hills would be a major addition to conservation areas within the grassland region and would benefit numerous species including several snakes, including Plains Hognose Snakes.

Since many hibernacula occur on Crown Land, long-term protection of these habitats from cultivation should be much easier to accomplish than on many private lands. Formal protection could come under any number of legal or policy instruments available through the Alberta government (land conservation notation, legal designation as a protected area). Most current land uses could continue without harming snake populations, but some restrictions on vehicle traffic may be helpful. A major part of habitat protection should be the designation and maintenance of several road-free areas adjacent snake dens in natural grassland habitats. The designated route system which is now being fostered by Alberta Public Lands could prove useful in keeping vehicle traffic away from valley rims and in preventing a proliferation of trails in open grasslands.

Environmental impact assessments prior to construction of roads or pipelines in known snake den habitats could help in relocating such facilities on less destructive routes.

4.3 Further Research

The denning requirements and biology of Plains Hognose Snakes at the northern limit of their range is still largely unknown and unstudied. To gather this information, extensive contacts with local residents would be required. Radio-tracking and other techniques could be used to determine denning requirements, activity cycles, migration routes and prey items. A considerable amount of time would be required to gather a very limited amount of data. Therefore, it is recommended that graduate students in herpetology be encouraged to consider research on this species.

5. LITERATURE CITED

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APPENDIX 1. SNAKE HIBERNACULA DATA

The following is a summary of all information on known and presumed snake hibernacula gathered during this survey. The information is quite variable since it has been gathered from numerous sources. Reports of "millions" of snakes can probably be discounted, however, impressions of the respondents should indicate relative population sizes.

A general location with respect to a major valley and town or landmark is provided. This is followed by a legal description (usually section, township, range, meridian). Several respondents did not want to give specific locations or were unclear of the exact legal description. In many cases, they were willing to take researchers to the site or give more explicit directions should someone want to get to the site.

All details of habitat, species, numbers, history of the site and other notes are those of the respondents. The appropriate contact persons or landowners and their addresses or phone numbers are indicated. The land status section indicates whether the den site is on Crown or privately owned land. The section "other notes" is used to provide more explicit directions for location or to expand on features of the site, document other interesting natural history observations, or provide some insight into local residents' attitudes towards snakes.

The den locations are broken down by larger land districts (e.g. Bow River/South Saskatchewan River west of Medicine Hat, Lower Red Deer River, Dinosaur Provincial Park/Jenner area, South Saskatchewan River north of Medicine Hat, Oldman River, Milk River). All dens are located in the area of southern Alberta between the Red Deer River and the United States boundary.

A. BOW RIVER/SOUTH SASKATCHEWAN RIVER DISTRICT WEST OF MEDICINE HAT

LOCATION: Bow River east of Hays

LEGAL DESCRIPTION: NW34-12-12-W4

HABITAT DESCRIPTION: eroding west-facing slope of Bow River valley

HISTORY: six years ago there was a den near here

SPECIES/NUMBERS: "dozens" of Prairie Rattlesnakes

LANDOWNER/CONTACT: Douglas Murray, Box 71, Redcliff, phone 548-3591

LAND STATUS: Public Lands Crown Grazing Lease

OTHER NOTES: large numbers of Rattlesnakes indicated a den site, however, the actual den was never found

LOCATION: Bow River east of Hays

LEGAL DESCRIPTION: 21-12-12-W4

HABITAT DESCRIPTION: several holes near the top of a steep badland slope

SPECIES/NUMBERS: "tens" of Prairie Rattlesnakes and Bull Snakes

HISTORY: the site has been known for about 40 years

LANDOWNER/CONTACT: Lorne Laidlaw, Bow Island, phone 545-2653

LAND STATUS: Public Lands Crown Grazing Lease

OTHER NOTES: located 10 km north and 5 km west of L. Laidlaw residence, near boundary between Murray Ranching Company and Forty Mile Grazing Association. The holes are reportedly the result of erosion, perhaps initiated by badger diggings.

LOCATION: Forty Mile Coulee south of Bow Island

LEGAL DESCRIPTION: SE27-8-11-W4

HABITAT DESCRIPTION: old mine shaft

SPECIES/NUMBERS: "tens" of Bull Snakes, Prairie Rattlesnakes, Garter Snakes (unidentified, but presumed Plains)

LANDOWNER/CONTACT: Anthony Schlacter (landowner), Box 448, Bow Island, phone 545-6985

LAND STATUS: Private Land

OTHER NOTES: respondent believes snakes are still using the den

LOCATION: 10 km NE of Grassy Lake

LEGAL DESCRIPTION: NW7-11-12-W4

HABITAT DESCRIPTION: about 20 feet from water; flat area with rocks, river bottom and bank; lots of little holes on uplands, apparently adjacent a north-facing slope

HISTORY: known for 38 years (and existed prior to this owner); population has stayed about the same all along

SPECIES/NUMBERS: Prairie Rattlesnakes, Bull Snakes, Garter Snakes; estimated as less than 50 snakes; Bull Snakes not as common as Rattlesnakes.

LANDOWNER/CONTACT: Larry Nelson, phone 655-2411, Box 53, Burdett, TOK 0J0

LAND STATUS: Public Lands Crown Grazing Lease

OTHER NOTES: located by big flat rock; from cairn (Cairn Hill) go west and northwest along fence to rocks. This den has probably not been disturbed much because it is hard to get to. It has not been visited in last few years. There are also dens at the bridge over the South Saskatchewan and west of Bow Island on north side of the Oldman River.

There have never been many ground squirrels, but there are some. Some people do kill Rattlesnakes and sometimes calves get bit. Mr. Nelson has seen Rattlesnakes south of the railway and 5 km east of his homeplace along Forty Mile Coulee where he has also seen Short-horned Lizards. He has also seen Bull and Rattlesnakes at Yellow Lake in the past. Plains Hognose Snakes have been seen on his property but not at den -- only north of railroad tracks in sandy soil.

LOCATION: 10 km nor ıwest of Burdett along South Saskatchewan River

LEGAL DESCRIPTION: ?-11-12-W4

HABITAT DESCRIPTION: several holes located near the top of a steep badland slope. The holes reportedly are the result of water erosion, perhaps initiated by badger diggings.

HISTORY: the site h s been known for 8 to 10 years

SPECIES/NUMBERS: "t ns" of Prairie Rattlesnakes and Bull Snakes

LANDOWNER/CONTACT: orne Laidlaw, Bow Island, phone 545-2653

LAND STATUS: Public .ands Crown Grazing Lease

OTHER NOTES: locate 5 km downstream from L. Laidlaw residence on north side c South Saskatchewan. Except for the occasional sighti g, ground squirrels have been absent from this area for at .east 55 years. However, up to late May 1987, at least alf a dozen have been seen, causing some residents to bel eve that there might be fewer snakes.

LOCATION: west of P cliff along South Saskatchewan Rive:

LEGAL DESCRIPTIO: -8-W4

HABITAT DESCRIPTI .th-facing slope of South Saskatchewan valley

HISTORY: up to fi ears ago there were good numbers of snakes; no recent re

SPECIES/NUME : "h dreds" of Prairie Rattlesnakes and Bull Snakes

LANDOWNER/C CT: a Lapp (contact, former landowner), Brooks, one 362-2673, 548-5 St SW

LAND STATUS: Public .ands Crown Grazing Lease

OTHER NOTES: site h s not been visited in last 15 years

LOCATION: west of Redcliff along South Saskatchewan River

LEGAL DESCRIPTION: 12-8-W4

HABITAT DESCRIPTION: root cellar

HISTORY: up to fifteen years ago there were good numbers of snakes, no recent data; always were lots of snakes (since 1910)

SPECIES/NUMBERS: "hundreds" of Prairie Rattlesnakes and Bull Snakes

LANDOWNER/CONTACT: Ira Lapp (contact, former landowner), Brooks, phone 362-2673, 548-S St SW

LAND STATUS: Public Lands Crown Grazing Lease

OTHER NOTES: site has not been visited in last 15 years. No badgers or ground squirrels were known in this area.

LOCATION: west of Medicine Hat along South Saskatchewan River

LEGAL DESCRIPTION: W33-12-7-W4

HABITAT DESCRIPTION: west-facing eroding coulee slope

HISTORY: known since 1985

SPECIES/NUMBERS: "tens" of Prairie Rattlesnakes

LANDOWNER/CONTACT: Robert Dockrell (not landowner), Medicine Hat, phone 526-1260

LAND STATUS: Private Land

OTHER NOTES: den presumed nearby, not located. There are always Rattlesnakes here, including some seen swimming across the South Saskatchewan River. The snake population was on the upswing to 1985 then levelled off in 1986.

LOCATION: south of Redcliff along South Saskatchewan River

LEGAL DESCRIPTION: SE4-12-6-W4

HABITAT DESCRIPTION: south-facing eroding slope

HISTORY: known since 1985

SPECIES/NUMBERS: "tens" of Prairie Rattlesnakes

LANDOWNER/CONTACT: Robert Dockrell (not landowner), Medicine Hat, phone 526-1260; landowner is Mrs. Ewell

LAND STATUS: Private Land

OTHER NOTES: den presumed nearby, not located. There are always Rattlesnakes here through the summer. Some have been seen active when snow is on the ground. They are apparently not going after adjacent ground squirrels! About 2 km northeast of this site, Rattlesnakes have been seen in May.

LOCATION: south of Redcliff along South Saskatchewan River

LEGAL DESCRIPTION: SW12 and SE11-13-7-W4

HABITAT DESCRIPTION: south-facing eroding coulee slope with slumps; numerous holes at interface between upland grassland and coulee slump

HISTORY: known since the 1960's

SPECIES/NUMBERS: "tens" of Prairie Rattlesnakes

LANDOWNER/CONTACT: George Pendlebury (not landowner), Calgary, phone 272-4383; landowner is Mr. Pederzolli

LAND STATUS: Private Land

OTHER NOTES: George Pendlebury studied this site for a number of years and mapped out 14 discrete holes from which Prairie Rattlesnakes were emerging. This site is known as the "Pederzolli Dens".

B. SOUTH SASKATCHEWAN RIVER DISTRICT NORTH OF MEDICINE HAT

LOCATION: south side of South Saskatchewan River, Medicine Hat

LEGAL DESCRIPTION: SE2-14-5-W4M

HABITAT DESCRIPTION: major slump block

SPECIES/NUMBERS: "tens" of Prairie Rattlesnakes and Bull Snakes

HISTORY: known for at least 20 years

LANDOWNER/CONTACT: Neil and Ian Mitchell, Medicine Hat; call Ian (phone 526-0233) for access

LAND STATUS: Public Lands Crown Grazing Lease

OTHER NOTES: just east of City Dump. The landowner believes that there are no ground squirrels in the area because of the presence of snakes.

LOCATION: north of Medicine Hat along South Saskatchewan River

LEGAL DESCRIPTION: NW20-13-5-W4

HABITAT DESCRIPTION: south-facing eroding slump site, on east side of river

HISTORY: site known for about 10 years

SPECIES/NUMBERS: can see 10 to 25 Prairie Rattlesnakes in a day

LANDOWNER/CONTACT: Robert Dockrell (not landowner), Medicine Hat, phone 526-1260

LAND STATUS: Public Lands Crown Grazing Lease

OTHER NOTES: located just west of a fence and covers about 200 metres of a slump block. Frost forms around the mouth of the holes and one can see "steam" rising in the morning on cold days. To get a good look at the dens requires climbing equipment. Some holes are up to 2 metres across, most are less than .5 metres, about 10 metres from river. Snakes have eradicated ground squirrels from this area. Snakes surfaced at 11 AM in October 1986 and were very lethargic when out. This is Dockrell Site A.

LOCATION: north of Medicine Hat along South Saskatchewan River

LEGAL DESCRIPTION: SW25-13-6-W4

HABITAT DESCRIPTION: south-facing eroding coulee slope

HISTORY: first documented in 1985

SPECIES/NUMBERS: "tens" of Prairie Rattlesnakes

LANDOWNER/CONTACT: Robert Dockrell (not landowner), Medicine Hat, phone 526-1260

LAND STATUS: Private Land

OTHER NOTES: den presumed nearby, not located; could get 8 or 9 Rattlesnakes in one walk through the area

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LOCATION: north of Medicine Hat along South Saskatchewan River

LEGAL DESCRIPTION: SE24-14-5-W4

HABITAT DESCRIPTION: south facing eroding coulee slope

HISTORY: unknown

SPECIES/NUMBERS: Bull Snakes and Prairie Rattlesnakes

LANDOWNER/CONTACT: Robert Dockrell (not landowner), Medicine Hat, phone 526-1260

LAND STATUS: Public Lands Crown Grazing Lease

OTHER NOTES: den presumed nearby, not located; snakes are so numerous that the landowner accidentally bales up snakes when haying

LOCATION: South Saskatchewan River north of Medicine Hat

LEGAL DESCRIPTION: W30-17-4-W4

HABITAT DESCRIPTION: west facing badlands at edge of grasslands

HISTORY: active during 1940's; no recent data

SPECIES/NUMBERS: formerly "thousands" of Prairie Rattlesnakes and Bull Snakes; mainly Rattlesnakes with good numbers of Bull Snakes and some Garter Snakes (unidentified); Plains Hognose Snake reported

LANDOWNER/CONTACT: Norm Rubelki (not landowner), Burstall, Saskatchewan, phone (306) 679-2245 or 679-2063

LAND STATUS: Suffield Military Reserve; Provincial Crown Land

OTHER NOTES: located near "Tinney's" former homestead on Suffield Military Reserve in Drowning Ford area. This was one of the largest known dens known in the entire South Saskatchewan River and lower Red Deer River area. Steam could be seen rising from the vent hole during the winter. Residents could not run cattle near here because of the snake density. They tried dynamiting the den and burning it out with diesel but could not drive the snakes out.

One used to see about 300 Rattlesnakes for every Plains Hognose Snake. This site is of note as it is one of a handful of sites which has Plains Hognose Snakes reported denning communally with other snakes.

LOCATION: west of Hilda, north of Whiterock Coulee

HABITAT DESCRIPTION: holes in isolated sandstone rock outcrop in upland grassland near edge of South Saskatchewan River valley

LEGAL DESCRIPTION: LSD12-SW30-17-3-W4

SPECIES/NUMBERS: tens of Prairie Rattlesnakes

HISTORY: unknown

LANDOWNER/CONTACT: Cliff Wallis, Calgary, phone 271-1408; landowner is Norm Bauer, Hilda, phone 838-2141

LAND STATUS: Public Lands Crown Grazing Lease

OTHER NOTES: presumed small Rattlesnake den; Rattlesnakes were observed during late April, 1987 at this site.

LOCATION: west of Hilda, north side of Whiterock Coulee

HABITAT DESCRIPTION: holes in south-facing slumped area

LEGAL DESCRIPTION: SW15 & SE16-17-3-W4

SPECIES/NUMBERS: "tens" of Prairie Rattlesnakes

HISTORY: not active for the last 15 or 20 years

LANDOWNER/CONTACT: Norm Bauer, Hilda, is the contact, phone 838-2141 but the site is on either Mitchell's or Ellis' land

LAND STATUS: Public Lands Crown Grazing Lease

OTHER NOTES: located northeast of compressor station. Rattlesnakes have declined in the region in recent years -- some people will still kill them on sight.

LOCATION: Rapid Narrows, South Saskatchewan River, west of Schuler

LEGAL DESCRIPTION: 7-17-3-W4M

HABITAT DESCRIPTION: steep badland slope

SPECIES/NUMBERS: Prairie Rattlesnake; numbers are not known but it is thought that there are a number of dens on the steep badland valley slope

HISTORY: known for 40 to 50 years

LANDOWNER/CONTACT: Bert Hargrave, Walsh, phone 937-2128

LAND STATUS: Public Lands Crown Grazing Lease

OTHER NOTES: Rattlesnakes have declined in numbers in the region because of killing by oil and gas well crews. Since they have begun to work in the area, Richardson's Ground Squirrels have started to move in to areas where they were formerly absent. Rattlesnakes move maybe 16 to 20 km away from the river. A couple of Plains Hognose Snakes have been seen in upland grassland but none in the last few years.

LOCATION: North of Sandy Point, east side of South Saskatchewan River

LEGAL DESCRIPTION: NW2, W11, SE15-21-1-W4

HABITAT DESCRIPTION: west and south-facing badlands at edge of grasslands; old badger holes

HISTORY: active from 1951-1970, no recent data

SPECIES/NUMBERS: formerly "thousands" of Prairie Rattlesnakes and Bull Snakes

LANDOWNER/CONTACT: Norm Rubelki (not landowner), Burstall, Saskatchewan, phone (306) 679-2245 or 679-2063

LAND STATUS: Public Lands Crown Grazing Lease

OTHER NOTES: numerous small dens with up to 100 snakes in each. No ground squirrels or badgers were present nearby. Natural grassland surrounded the site when it was active but according to Mr. Rubelki, numbers went way down and these dens were heavily impacted by human disturbance.

LOCATION: North of Sandy Point, east side of South Saskatchewan River

LEGAL DESCRIPTION: 2-21-1-W4

HABITAT DESCRIPTION: badger hole on northeast-facing semi-badland slope; in grassland with scattered sagebrush

SPECIES/NUMBERS: approximately 25 Prairie Rattlesnakes; numbers down to 6 at one time in recent years

HISTORY: known for 30 to 40 years

LANDOWNER/CONTACT: Crown land leased by Cliff Smith, phone (306) 628-4214; another contact is Clarence Wenz who formerly leased the land, phone 838-2111.

LAND STATUS: Public Lands Crown Grazing Lease

OTHER NOTES: 2 km downstream from Sandy Point Bridge on east side of South Saskatchewan River; 3 km north of Floyd Wolfer's place. Snake numbers appear to be down in recent years. Because of more people in the area, Mr. Wenz feels that Rattlesnakes are down in numbers due to mortality on roads. There are no Richardson's Ground Squirrels in the area but there are Thirteen-lined Ground Squirrels. This single den is part of the larger complex cited by Rubelki (see immediately preceding den description).

LOCATION: Sandy Point on south side of South Saskatchewan River

LEGAL DESCRIPTION: NE27-20-1-W4

HABITAT DESCRIPTION: hole in grassland, half way down slope on middle bench of slumped area along valley

SPECIES/NUMBERS: maximum seen is 20 or more, mostly Prairie Rattlesnakes but also a few Bull Snakes. 5 Prairie Rattlesnakes and 2 Bull Snakes were seen 25 April, 1985.

HISTORY: known for over 50 years

LANDOWNER/CONTACT: Floyd Wolfer, Sandy Point, phone 838-2201; also Norm Rubelki (not landowner), Burstall, Saskatchewan, phone (306) 679-2245 or 679-2063. Den is accessible by car.

LAND STATUS: Public Lands Crown Grazing Lease

OTHER NOTES: 1 km west of Wolfer residence, near Sandy Point. Bull Snakes and Rattlesnakes appear to be down in numbers. In 1970 or 1971, a Plains Hognose Snake was observed to eat a toad in the garden at the Wolfer residence.

LOCATION: Sandy Point on south side of South Saskatchewan River

LEGAL DESCRIPTION: 28-20-1-W4

HABITAT DESCRIPTION: piping hole in badlands

HISTORY: destroyed by highway construction

SPECIES/NUMBERS: "hundreds" of Rattlesnakes and Bull Snakes

LANDOWNER/CONTACT: Norm Rubelki (contact), Burstall, Saskatchewan, phone (306) 679-2245 or 679-2063

LAND STATUS: Public Lands Crown Grazing Lease

OTHER NOTES: den had 3 to 5 m throat with big cavern underneath

C. RED DEER RIVER IN DINOSAUR PROVINCIAL PARK-JENNER DISTRICT

LOCATION: Rosemary

LEGAL DESCRIPTION: NE1-21-16-W4

HABITAT DESCRIPTION: broken concrete piles

HISTORY: recent; four years ago torn up sidewalk was placed in vacant field

SPECIES/NUMBERS: "tens" of Plains Garter Snakes

LANDOWNER/CONTACT: Margaret Reil, Rosemary, (not landowner) at 378-4283

LAND STATUS: Private Land

OTHER NOTES: Located by ditch and pumphouse south of Mrs. Reil's residence in Rosemary. Garter Snakes at her Magrath home were killed by renters in her rockery on a sunny west-facing slope. Her husband dislikes snakes but he will not kill them. She likes to have snakes around.

LOCATION: Red Deer River, Dinosaur Provincial Park

LEGAL DESCRIPTION: N34-21-12-W4

HABITAT DESCRIPTION: rolling grassy terrain at edge of badlands, north side of river

HISTORY: first found in 1987

SPECIES/NUMBERS: 30 Prairie Rattlesnakes

LANDOWNER/CONTACT: John Wolper, Dinosaur Park, phone 378-4587

LAND STATUS: Special Areas Crown Grazing Lease, Dinosaur Provincial Park

OTHER NOTES: west end of park by Steveville, north of river. Rattlesnakes appear to be coming back into this area. They were once common around Steveville but were apparently absent for thirty or forty years until the late 1970's.

LOCATION: Red Deer River, Dinosaur Provincial Park

LEGAL DESCRIPTION: SW8-21-11-W4

HABITAT DESCRIPTION: sandstone rock outcrop in badlands

HISTORY: first found in 1987

SPECIES/NUMBERS: six Bull Snakes

LANDOWNER/CONTACT: John Wolper, Dinosaur Park, phone 378-4587

LAND STATUS: Crown Land, Dinosaur Provincial Park

OTHER NOTES: Dinosaur Park, south of river, near #1 display; Den presumed nearby as snakes were observed from late April to mid-June. Snakes were up to 1.8 m in length. Shed Bull Snake skins and fifteen egg "shells" were also found here.

LOCATION: Red Deer River, Dinosaur Provincial Park

LEGAL DESCRIPTION: NE7-21-11-W4

HABITAT DESCRIPTION: grassland-badland interface

SPECIES/NUMBERS: "tens" of Prairie Rattlesnakes

HISTORY: unknown

LANDOWNER/CONTACT: John Fryberger, Wardlow, phone 566-2158

LAND STATUS: Special Areas Crown Grazing Lease, Dinosaur Provincial Park

OTHER NOTES: frequent sightings along the valley rim indicate that there is probably a den in the area. The site is approximately 1.5 km downstream from Mr. Fryberger's ranch buildings. A different "type" of Rattlesnake is now seen compared to earlier years -- a stubby aggressive type instead of a long green type which used to flee more readily. No Bull Snakes have been seen in the last several years. Two Plains Hognose Snakes have been seen in the region, 20 years and 10 years ago respectively.

LOCATION: Red Deer River, Dinosaur Provincial Park

LEGAL DESCRIPTION: SE6-21-11W4

HABITAT DESCRIPTION: holes on the topland close to the breaks

SPECIES/NUMBERS: 4 or 5 Prairie Rattlesnakes seen at a time

HISTORY: 1986 was the first year that this site was used

LANDOWNER/CONTACT: Carl Beasly, Wardlow, phone 566-2248

LAND STATUS: Special Areas Crown Grazing Lease, Dinosaur Provincial Park

OTHER NOTES: located just south of the Beasly residence. There are more Rattlesnakes seen in the area than Bull Snakes.

D. LOWER RED DEER RIVER

LOCATION: Majestic Ranch, west of Buffalo

LEGAL DESCRIPTION: LSD11-7-22-6-W4

HABITAT DESCRIPTION: south-facing ancient slump blocks with numerous holes; in small coulee leading into Red Deer River valley; holes are along ridge on mid-slope

SPECIES/NUMBERS: diverse communal den containing Prairie Rattlesnakes, Bull Snakes and Wandering and Plains Garter Snakes; current landowner estimates that there are at least 100 snakes at this site -- number actually seen, but there could be more. Landowner also indicates that Plains Hognose Snakes have been seen here.

HISTORY: This site has been known since the first families ranched in the area.

LANDOWNER/CONTACT: on property of Majestic Ranch, contact is Mr. Schornhofer, phone 379-2372. Former landowner is Mr. Johnson who now lives near Brooks, phone 362-4834. Wayne Roberts of Edmonton, phone 432-4622, and Cliff Wallis, Calgary, phone 271-1408 are also familiar with this site.

LAND STATUS: Special Areas Crown Grazing Lease

OTHER NOTES: considerable numbers of Bull Snake egg "shells" in the vicinity. This site was visited in late April of 1987 and most snakes had already left the site. There were still several Prairie Rattlesnakes, Bull Snakes and Wandering Garter Snakes present. This is one of a handful of sites where Plains Hognose Snakes have been reported to den communally with other snakes.

The landowner is very protective of the site and snakes in general. When he learned that one of his hired hands and other people were shooting snakes, he took steps to stop it, including fencing off the former access road. He has used Bull Snakes to keep mice numbers in his haystacks down. Mr. Schornhofer has resided here for 18 years. The landowner indicated that ground squirrels are virtually absent withing 2 to 3 km of the den site. At greater distances, there is a balance between snakes and ground squirrels. In the spring, ground squirrels apparently move into grasslands in the den site area but are eaten out or forced out when snakes emerge and begin feeding.

LOCATION: Bar TH Ranch, 11 km N of Bindloss

LEGAL DESCRIPTION: NW21-23-2-W4M (one report lists NE21-23-2-W4)

HABITAT DESCRIPTION: bedrock ledge (about 6 m wide) on hillside which slipped about 15 m; dens are in 2 places; east-facing slope

SPECIES/NUMBERS: mostly Prairie Rattlesnakes but also Bull Snakes and Garter Snakes (species unknown). About 30 snakes have been seen at each site

HISTORY: site known for 20 years -- more active in earlier years. About 8 to 10 years ago, some snakes were killed at the site, but now people in the area appear to have a better appreciation of the value of Rattlesnakes. Some empty shotgun shells were found at the site in 1986.

LANDOWNER/CONTACT: on property of Bar TH Ranch, contacts are Frank Spath (not landowner), Acadia Valley, phone 972-2135, and John Gattey (landowner), Bindloss, phone 379-2408; a neighboring rancher, Joe Niwa, Acadia Valley, has known about the site for 20 years, phone 972-2217; another contact is Bernie York, Box 1619, Hanna, AB T0J 1P0, phone 854-3229

LAND STATUS: Public Lands Crown Grazing Lease

OTHER NOTES: west side of Kennedy Coulee. Rattlesnakes seem to have increased in recent years. The area also has a few Bull Snakes and a healthy population of Burrowing Owls. If the weather is mild, the first week in October is a good time to see the snakes at the dens.

LOCATION: Red Deer River between Buffalo and Cavendish

LEGAL DESCRIPTION: NW5-22-4-W4

HABITAT DESCRIPTION: grassy coulee ridge, probably using several holes

SPECIES/NUMBERS: Prairie Rattlesnakes and Bull Snakes in a ratio of approximately 1:1

HISTORY: the site has been used for at least 40 years

LANDOWNER/CONTACT: Clarence Rinker, Buffalo, phone 379-2140

LAND STATUS: Special Areas Crown Grazing Lease

OTHER NOTES: north and west of Bill Campbell residence on south side of river. Snakes in general have gone down in numbers since pipeline activity started up in the area. Rattlesnakes and other species were killed whenever they were found near the pipeline route during construction.

LOCATION: Red Deer River between Buffalo and Cavendish

LEGAL DESCRIPTION: W4-22-5-W4

HABITAT DESCRIPTION: grassy ridge between coulees, west-facing slope

SPECIES/NUMBERS: "tens" of Prairie Rattlesnakes and Bull Snakes

HISTORY: the site has been used for at least 30 years

LANDOWNER/CONTACT: Norm Rubelki (not landowner), Burstall, Saskatchewan, phone (306) 679-2245 or 679-2063.

LAND STATUS: Private Land

OTHER NOTES: located east of truck trail on grassy ridge between two coulees. This site has not been visited recently.

LOCATION: Red Deer River between Buffalo and Cavendish

LEGAL DESCRIPTION: N5-22-5-W4

HABITAT DESCRIPTION: edge of coulee on lower terrace above Red Deer River floodplain

SPECIES/NUMBERS: "tens" of Prairie Rattlesnakes and Bull Snakes

HISTORY: the site has been used for at least 30 years

LANDOWNER/CONTACT: Norm Rubelki (not landowner), Burstall, Saskatchewan, phone (306) 679-2245 or 679-2063

LAND STATUS: Special Areas Crown Grazing Lease

OTHER NOTES: this site has not been visited recently

LOCATION: north side of Red Deer River between Buffalo and Cavendish

LEGAL DESCRIPTION: 24-22-6-W4

HABITAT DESCRIPTION: pile of rocks at edge of escarpment; edge of south-facing slope

SPECIES/NUMBERS: "tens" of Prairie Rattlesnakes

HISTORY: unknown

LANDOWNER/CONTACT: Murray Houston (not landowner), Windermere Herefords, Sibbald, phone 676-2217

LAND STATUS: Special Areas Crown Grazing Lease

OTHER NOTES: take Highway 886 north from Buffalo over Red Deer River, take truck trail east through gate and follow top of escarpment to abandoned farm and pile of rocks. There are numerous coulees in this area.

LOCATION: south side of Red Deer River between Buffalo and Cavendish

LEGAL DESCRIPTION: SE9-22-4-W4

HABITAT DESCRIPTION: several badger-like holes on the grassy side hill of a coulee

SPECIES/NUMBERS: "tens" of Bull Snakes, Prairie Rattlesnakes, and Garter Snakes (species unknown)

HISTORY: The site has apparently not been used since the early 1970's. No snakes were seen at the site in the spring in 1986 but the site was not checked in 1987.

LANDOWNER/CONTACT: Leonard Rinker, Buffalo, phone 379-2316

LAND STATUS: Special Areas Crown Grazing Lease

OTHER NOTES: located near the Leonard Rinker residence. Some residents of the region believe that snake numbers seem to be down in recent years.

LOCATION: south side of Red Deer River north of Cavendish

LEGAL DESCRIPTION: E24-22-4-W4

HABITAT DESCRIPTION: eroded south and west-facing coulee slopes; about mid-slope

SPECIES/NUMBERS: "hundreds" of Bull Snakes, Prairie Rattlesnakes, Plains and Wandering Garter Snakes and, formerly, Plains Hognose Snakes

HISTORY: site has been known for over 30 years

LANDOWNER/CONTACT: Tony Minor (landowner), Bindloss, phone 379-2309; Norm Rubelki (not landowner), Burstall, Saskatchewan, phone (306) 679-2245 or 679-2063

LAND STATUS: Special Areas Crown Grazing Lease

OTHER NOTES: this site was the location for "hundreds" of snakes but numbers have gone down considerably. Tony Minor believes that ground squirrels are now increasing because of that. At least part of the reason stated for the decline in snakes was due to local residents shooting out snakes at the site. Tony Minor indicated a positive attitude towards snakes and has had people bring snakes from Medicine Hat to be released on his land. This is one of a handful of sites where respondents have indicated that Plains Hognose Snakes den communally with other snakes.

E. MILK RIVER DISTRICT

LOCATION: Black Butte east of Aden

LEGAL DESCRIPTION: NW9-1-8-W4

HABITAT DESCRIPTION: mammal burrows in igneous rock intrusion in upland grassland

HISTORY: unknown

SPECIES/NUMBERS: tens of Prairie Rattlesnakes

LANDOWNER/CONTACT: Cliff Wallis (not landowner), Calgary, phone 271-1408

LAND STATUS: Public Lands Crown Grazing Lease

OTHER NOTES: two pairs of Prairie Rattlesnakes were observed mating at this site in early August 1983. It is the only suitable den site in the vicinity and there are historical records of snakes from this site (Williams 1946).

LOCATION: north of Writing-on-Stone Provincial Park

LEGAL DESCRIPTION: 14-2-13-W4

HABITAT DESCRIPTION: farmstead

HISTORY: unknown

SPECIES/NUMBERS: Garter Snakes

LANDOWNER/CONTACT: Cliff Mellom (not landowner), Coleman, phone 563-5565

LAND STATUS: Private Land

OTHER NOTES: Garter Snake hibernaculum; person not contacted

LOCATION: Writing-on-Stone Provincial Park

LEGAL DESCRIPTION: 35-1-13-W4

HABITAT DESCRIPTION: badger hole at edge of valley

HISTORY: unknown

SPECIES/NUMBERS: Prairie Rattlesnake, numbers unknown

LANDOWNER/CONTACT: Ellen Gasser (former park naturalist), Calgary, phone 295-1880

LAND STATUS: Writing-on-Stone Provincial Park

OTHER NOTES: east of viewpoint parking lot

LOCATION: Writing-on-Stone Provincial Park

LEGAL DESCRIPTION: NW36-1-13-W4

HABITAT DESCRIPTION: sandstone outcrops

HISTORY: unknown

SPECIES/NUMBERS: Prairie Rattlesnakes, numbers unknown

LANDOWNER/CONTACT: Ellen Gasser (former park naturalist), Calgary, phone 295-1880

LAND STATUS: Writing-on-Stone Provincial Park

OTHER NOTES: east of viewpoint towards river, in sandstone formations; possibly two dens are present here

LOCATION: west of Writing-on-Stone Provincial Park

LEGAL DESCRIPTION: SW34-1-13-W4

HABITAT DESCRIPTION: sandstone outcrops

HISTORY: active until 1979

SPECIES/NUMBERS: "tens" of Prairie Rattlesnakes, some Bull Snakes

LANDOWNER/CONTACT: Alva Bair (not landowner), Milk River, phone 647-2108

LAND STATUS: Public Lands Crown Grazing Lease

OTHER NOTES: north side of Van Cleeve Coulee; snakes possibly shot out in 1979

LOCATION: Deer Creek Bridge, Milk River

LEGAL DESCRIPTION: 3-2-12-W4

HABITAT DESCRIPTION: sandstone ledges along river

HISTORY: unknown

SPECIES/NUMBERS: Garter Snakes

LANDOWNER/CONTACT: Cliff Mellom (not landowner), Coleman, phone 563-5565

LAND STATUS: Public Lands Crown Grazing Lease

OTHER NOTES: Garter Snake hibernaculum; person not contacted

F. OLDMAN RIVER

LOCATION: Rattlesnake Coulee, south of Lethbridge

LEGAL DESCRIPTION: SE11-8-22-W4

HABITAT DESCRIPTION: edge of coulee, south-facing slope; old sink hole where snakes can get below frost line

SPECIES/NUMBERS: "tens" of Prairie Rattlesnakes

HISTORY: approximately 10 years of recent data. Reports from 1923 indicate that this was the site of "scores" of Prairie Rattlesnakes (Williams 1946).

LANDOWNER/CONTACT: Malcolm Stark, Lethbridge Community College, phone 320-3210

LAND STATUS: Private Land

OTHER NOTES: snakes can be seen in the last week of April or first week in May. There is one active hibernaculum and seven old hibernacula. There are high mice populations nearby. Females may be triennial breeding. Snakes are decreasing at Lethbridge. Body temperature measured at 10-12°C. Ten years ago could see 3 or 4 in a day but now only 1 seen all year. Foxes moved into one hibernaculum. He notes that snakes move from 1 to 5 km from hibernacula.

LOCATION: Oldman River at Fort Macleod

LEGAL DESCRIPTION: 11-9-26-W4

HABITAT DESCRIPTION: unknown, presumably rock outcrops along the Oldman River behind the Fort

HISTORY: unknown

SPECIES/NUMBERS: Garter Snakes

LANDOWNER/CONTACT: Mr. Jack Cullen, Fort Macleod, via Jan Allen, Fish and Wildlife, Pincher Creek

LAND STATUS: Private Land

OTHER NOTES: presumed Garter Snake hibernaculum; person not contacted. Snakes appear in early spring and are present until fall. They are considered to be a real problem at the Fort.

LOCATION: Oldman River north of Taber

LEGAL DESCRIPTION: SW2-12-16-W4

HABITAT DESCRIPTION: south-facing eroding slope

HISTORY: 65 years of observation. Population has stayed relatively stable although composition has changed. 25 years ago there were never Wandering Garter Snakes but there are now.

SPECIES/NUMBERS: used to be 50% Prairie Rattlesnakes and 50% Bull Snakes, now about 80% Rattlesnakes; some Garter Snakes; less than 100 snakes in total for each den

LANDOWNER/CONTACT: F. Buckley (not landowner), 5305-45 Ave, Taber, phone 223-9157; also David Bly, Taber, phone 223-9127

LAND STATUS: Public Lands Crown Grazing Lease

OTHER NOTES: one hibernaculum is located 10 m from the water and can be seen from the Highway 36 bridge. Another is higher in an old slump. At another den there were 54 snakes once -- this was considered a big den. Snakes are not considered a problem now.

In the past, people used gasoline to set snake dens on fire. Mr. Buckley's grandfather would not kill snakes. Mr. Buckley does not seem to think the snakes overwinter except in the valley, even though he has seen them use Burrowing Owl burrows on the upland at one time. Live snakes push dead snakes out of the hole. There are no ground squirrels in this area. Snakes have been found in the town of Taber. There are no Plains Hognose Snakes here. There used to be Rattlesnakes at Hays.

G. CROWSNEST PASS

LOCATION: Bellevue

LEGAL DESCRIPTION: junction of sections 20,21,28 and 29-7-3-W5

HABITAT DESCRIPTION: rock outcrop, south-facing

HISTORY: unknown

SPECIES/NUMBERS: "hundreds" of Wandering Garter Snakes and some other species (only stated it was colored, perhaps Red-sided)

LANDOWNER/CONTACT: Deborah Keller (not landowner), Raymond, phone 752-4249 or 752-3635

LAND STATUS: Private Land

OTHER NOTES: go to old graveyard, take road down to a sedge pond south of graveyard. The den site is north of this pond along a cutline. Snakes are also seen in broken rock scree on the hillside on the east side of the cutline. On the west side of the cutline is a "sinkhole" which is probably the hibernaculum site. There is a moist sedge meadow between the sinkhole and the scree slope.

LOCATION: west of Lundbreck Falls

LEGAL DESCRIPTION: NE21-7-2-W5

HABITAT DESCRIPTION: rockcut where railroad passes through

HISTORY: unknown

SPECIES/NUMBERS: "millions" of garter snakes

LANDOWNER/CONTACT: Jan Allen (Fish and Wildlife, Pincher Creek)

LAND STATUS: Private Land

OTHER NOTES: .4 km west of train bridge; they are known to mate here; Garter Snake hibernaculum, person not contacted

H. CYPRESS HILLS DISTRICT

LOCATION: south of Medicine Hat near Bullshead Creek

LEGAL DESCRIPTION: N12-11-6-W4

HABITAT DESCRIPTION: edge of valley

HISTORY: unknown

SPECIES/NUMBERS: Prairie Rattlesnake

LANDOWNER/CONTACT: landowners did not want reported; reported by unnamed party who has seen the site; not interviewed

LAND STATUS: Public Lands Crown Grazing Lease

OTHER NOTES: located just northwest of a haystack; along tributary of Bullshead Creek

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LOCATION: Cypress Hills

LEGAL DESCRIPTION: SE1-9-2-W4

HABITAT DESCRIPTION: coulee slope with gravels

HISTORY: The only report for this site is of hundreds of Red-sided Garter Snakes on the morning of April 27, 1978. By the afternoon only one live snake and two dead snakes were found.

SPECIES/NUMBERS: "hundreds" of Red-sided Garter Snakes

LANDOWNER/CONTACT: Cheryl Bradley (not landowner), Calgary, phone 246-9127

LAND STATUS: Private Land

OTHER NOTES: Landowner also reports Wandering Garter Snakes and Bull Snakes in the vicinity. This site is of considerable interest as it is the only reported Red-sided Garter Snake hibernaculum in southeastern Alberta.

LOCATION: Red Rock Coulee Natural Area, south of Medicine Hat

LEGAL DESCRIPTION: SW22 or NW15-8-7-W4

HABITAT DESCRIPTION: eroded bedrock area on edge of cliff on south and southwest-facing slopes; amongst exposed sagebrush roots; cactus surrounded den openings

HISTORY: unknown

SPECIES/NUMBERS: two dens - 6 and 16 Prairie Rattlesnakes

LANDOWNER/CONTACT: Andrea Sissons (not landowner), Edmonton, phone 467-8302

LAND STATUS: Red Rock Coulee Natural Area

OTHER NOTES: to get to the den, go southwest from washrooms to western end of Natural Area. Dens are directly east of wildlife sanctuary sign on western boundary fence. North of the sign on the fence is a clump of trees which are visible from the washrooms. One den is marked with dry roots stacked above it and standing about .5 m high. Approximately 200 m west of the first den is another along the same ridge of the same coulee on a south-west facing slope.

Of considerable interest is the use of these dens during the heat of the summer. These dens were being used on July 20 and 21, 1987 when temperatures were in the 25°C range. Up to six Rattlesnakes were visible in den #1 and more were present. There were also many shed skins. In den #2 there were up to 16 Rattlesnakes and more were present. Shed skins and a few more live individuals were found nearby in small holes.

An old "eagle's" nest (possibly Ferruginous Hawk) was located close to den #1.

APPENDIX 2. SASKATCHEWAN DATA

The following data was encountered during the Alberta study and is included here for information purposes.

LOCATION: in Saskatchewan, a couple of km south of Empress just east of the cemetery, near the forks of the South Saskatchewan and Red Deer Rivers

HABITAT DESCRIPTION: one third the way down a southeast-facing badland slope in two badger holes

SPECIES/NUMBERS: Prairie Rattlesnakes and Bull Snakes -- no more than 8 seen at one time but there could be many more

HISTORY: according to an elderly Indian, the site has been used since 1905 or 1906

LANDOWNER/CONTACT: the landowner is not known but the contact is Jack Longmuir, Empress, phone 565-3740

OTHER NOTES: Rattlesnakes may have increased in the last few years. There are no Richardson's Ground Squirrels between the two rivers and it is Mr. Longmuir's opinion that they are controlled by snakes. He is not aware of any control programs or persecution of Rattlesnakes in the area, except around buildings. No Plains Hognose Snakes have been seen in the last ten years, and before that date they were not common.

APPENDIX 3. NEWSPAPER ARTICLE AND POSTER

BIOLOGISTS SEEK INFORMATION ON SNAKE DENS

In the spring of 1986, World Wildlife Fund Canada began a program named "Wild West". This is an ambitious conservation effort aimed at the grasslands and parklands of the Prairie Provinces. Here, much of the natural habitat has disappeared and many native animals have become rare. As part of this program, biologists are researching the status of grassland habitats and rare and endangered plants and animals.

One area of concern is the welfare of reptiles and amphibians, including the six species of snakes which inhabit southern Alberta. For centuries these secretive creatures have been prominent figures in myths and folklore. Although revered as gods in some cultures, they have not been so well treated in our society. Even in recent times, there have been rattlesnake roundups in Alberta where hundreds of snakes were destroyed. Following many years of misunderstanding and persecution, attitudes towards snakes are slowly changing. Most snakes are harmless. While a few people are bitten by rattlesnakes each year, these rarely lead to serious complications. By consuming countless thousands of rodents every year, snakes occupy a valuable place in the grassland scene. In addition to this economic value, many people find snakes fascinating subjects for study and enjoyment.

One of the most interesting features of snake life is the phenomenon of overwintering in communal dens called hibernacula. These are usually natural holes or crevices in rock outcrops and badlands along valleys and coulees. Occasionally they use ground squirrel and badger burrows. In these refuges, snakes can crawl below the frost line to escape the killing temperatures of winter. Five out of the six species of snakes in southern Alberta rely on the availability of these

sites for their survival. These include three types of garter snakes, the bull snake and the rattlesnake. Little is known on the wintering habitats of the rare hognose snake. As many as four species of snakes, sometimes numbering in the hundreds, have been found using the same den. In the last warm days of autumn and the first warm days of spring, snakes can often be seen in groups sunning themselves near the den site. Den sites are traditional and are used for many years provided they remain undisturbed.

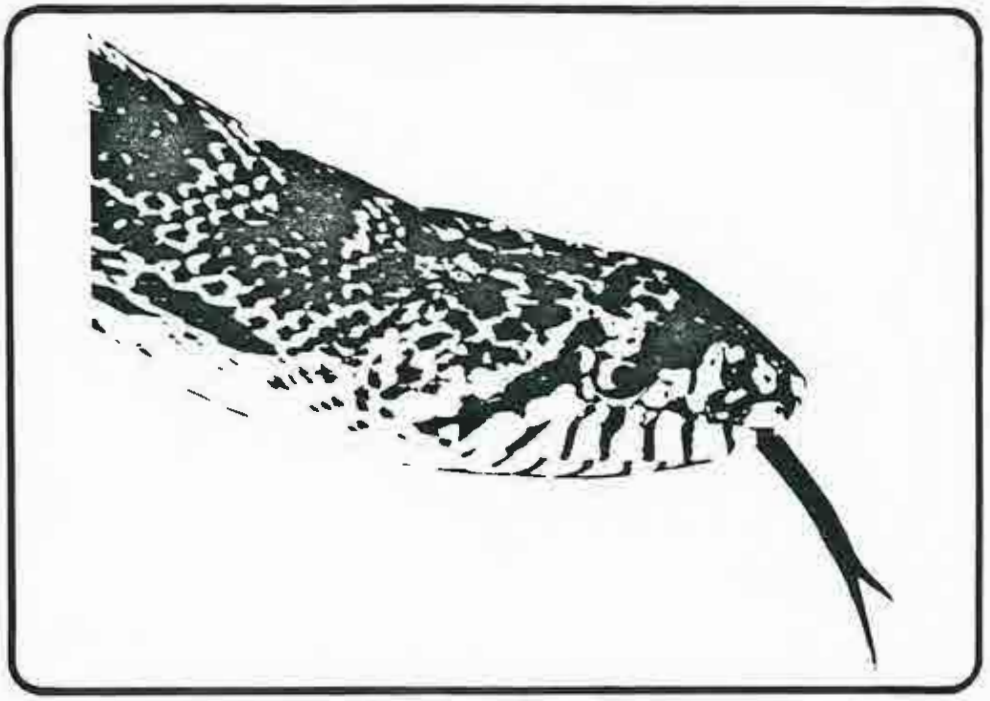
Recognizing the value of snakes, several farmers and ranchers have protected snake dens on their lands. Unfortunately, some people still hold the belief that "the only good snake is a dead snake". The killing of snakes at overwintering sites, combined with habitat destruction, has resulted in the elimination of thousands of these beneficial creatures.

A survey is being conducted to locate overwintering dens throughout southern Alberta in order to get a better idea of snake populations and distribution. Information regarding the rare hognose snake, locally known as the "puff adder" would also be welcomed -- this species frequents sandy soils and sand hills but there have been few documented Alberta records.

The study is being conducted with financial support from the World Wildlife Fund and in cooperation with Alberta Fish and Wildlife. Anyone having information on snake dens or numbers of snakes seen in spring and fall is asked to contact **Cliff Wallis** (call collect) at 271-1408 in Calgary or write to him at **615 Deer Croft Way SE, Calgary, Alberta, T2J 5V4.** Your local Alberta Fish and Wildlife office would also be happy to take down the information.

In the near future, researchers will be doing follow-up interviews with local area residents. Because of the sensitivity of these overwintering sites, information will be kept in the strictest confidence. Even if a landowner does not wish to reveal the exact location of a site, it would be worthwhile to receive general information about the site.

WANTED!



SNAKE DENS

Three types of garter snakes, the bull snake, rattlesnake and rare hognose snake live in the grasslands of Alberta. During our cold winters, snakes find protection in badlands and rock outcrops, and in animal burrows. These overwintering sites are critical to their survival.

Recognizing the value of snakes in rodent control, several farmers and ranchers protect snake dens on their lands. Unfortunately, others have destroyed these important refuges. Combined with habitat destruction, this has resulted in the loss of thousands of these beneficial creatures.

Little is known about Alberta's snake dens. The "Wild West" program of World Wildlife Fund Canada, with cooperation from Alberta Fish and Wildlife, is supporting research to determine the location, size and history of snake dens in southern Alberta. If you have any information on snake dens (including sightings of groups of snakes in spring or fall), please contact:

Cliff Wallis - phone: 271-1408 (call collect)
or write: 615 Deer Croft Way SE, Calgary, AB T2J 5V4

Your local Alberta Fish and Wildlife office would also be happy to take down the information. Because of the sensitivity of these overwintering sites, information will be kept in the strictest confidence.

APPENDIX 4. OTHER NOTES

The following notes relate to snakes within the study area. They are based on interviews with respondents to the snake den survey and are additional to the information provided in Appendix 1.

Other Notes of Norm Rubelki, Burstall, Saskatchewan:

He used to get $5 for Bull Snake and $10 for Rattlesnake as specimens for museums.

Rattlesnakes are now north of the Red Deer River but were not there in the old days.

Other Notes of Ira Lapp, Brooks:

In 1918, at East Springs, right in Suffield Block, in sandy soil, Plains Hognose Snakes were sufficiently common that all the kids knew them. They would burrow in sand to escape. East of East Springs were a fair number of ground squirrels and Rattlesnakes and Bull Snakes together in sandy country.

He says there were always lots of snakes. Since 1910 there have been no badgers or ground squirrels in several areas (always absent).

George Simpson of Bindloss had a picture of a ball of Bull and Rattlesnakes which was 1.5 feet across -- he rode for McLennan.

Cows and horses were bitten by Rattlesnakes. Cows bitten on udder and side of head.

Other Notes of Mr. Buckley, Taber:

He used to get lots of Rattlesnakes and Bullsnakes when he ploughed fireguards from Lomond to Suffield.

Animals he has seen bitten by snakes include horse (hind leg), cow (died), dog (lived), pigs (seem protected by fat layer). He had a sow that ate snakes.

Twenty-five years ago he said he never saw Wandering Garter Snakes.

He used to sell Rattlesnakes in Medicine Hat for $1 each.

Other Notes of Robert Dockrell, Medicine Hat:

Conquerville area south of Bow Island has very few rattlesnakes.

He has had experience with two snakebites -- one bite resulted in no

problems.

There were three to five snakes per day encountered on the Lower Spencer, Milk River in August of 1986.

When farmers put a pipeline to the river north of Medicine Hat they were turning over balls of snakes when digging.

He has never seen a Rattlesnake at Irvine but has seen Bull and Garter Snakes.

An equipment operator, Harvey Hiddle, works for Alberta Energy Company. They used to whack snakes with a shovel at their compressor station but now they take them out and release them.

Mr. Dockrell says the ranchers he talks to say they would rather live with a few Rattlesnakes than a few ground squirrels.

Other Notes:

South Saskatchewan River Area

Elsie Diebert (South Saskatchewan west of Hilda) says snakes have been down in last few years.

Forty Mile Grazing Association along South Saskatchewan River west of Medicine Hat says there are no ground squirrels, the odd Bull Snakes and more Rattlesnakes in recent years

Rob Gardner of Medicine Hat reported that really big snakes (especially Rattlesnakes) are not seen by people around Medicine Hat anymore, and that 1987 is the first year since Police Point Park has opened that good numbers of snakes have been seen in the park.

Oldman River Area

Michel at Lethbridge, phone 381-4612, found Garter and Rattlesnakes by the water treatment plant and speculates that there could be dens on coulees on other side.

We have reports from a "Rattlesnake Coulee" of a Rattlesnake hibernacula on the Blood Reserve just west of Lethbridge in the vicinity of sandstone outcrops. The respondent, Ray Harper of the Oldman Regional Planning Commission, believed that this site had been destroyed.

Milk River Area

Ray Pearson at Pakowki Lake has Rattlesnakes and Bull Snakes several miles from the nearest badlands.

Lysbeth Krisjansons of the Writing-on-Stone area thought that there were

1 or 2 Rattlesnake dens on her land but did not know the details.

Bob McCulloch of the Writing-on-Stone area said that there were quite a few Rattlesnakes around 3 years ago but that numbers were down in the last couple of years.

Ken Kultgen of Foremost says that populations of snakes peaked recently in the Foremost area.

Leonard Piotrowski of the Milk River Canyon area says that Bull Snake and Rattlesnake populations have gone down and ground squirrels have risen in the Lost River/Milk River canyon.

Red Deer River Area

North of the Jenner bridge, 80 snakes (mostly Rattlesnakes) were killed during road construction. A resident of the general area, Ernest Pierson, mentioned that he knows of people who regularly kill snakes. According to Walter Olson, another local resident, Rattlesnakes have been around for at least 40 years and that in recent years Bull Snakes have declined and Rattlesnakes have increased.

Mr. Fryberger (Dinosaur Provincial Park) hasn't seen a Bull Snake in several years and indicates Bull Snakes are down while Rattlesnakes are up in numbers.

Ian Barnes of Buffalo area says snake numbers are down but he has seen Plains Hognose Snakes in recent years.

Ed Haddock of Buffalo has had a Plains Hognose Snake on his cultivated land in recent years.

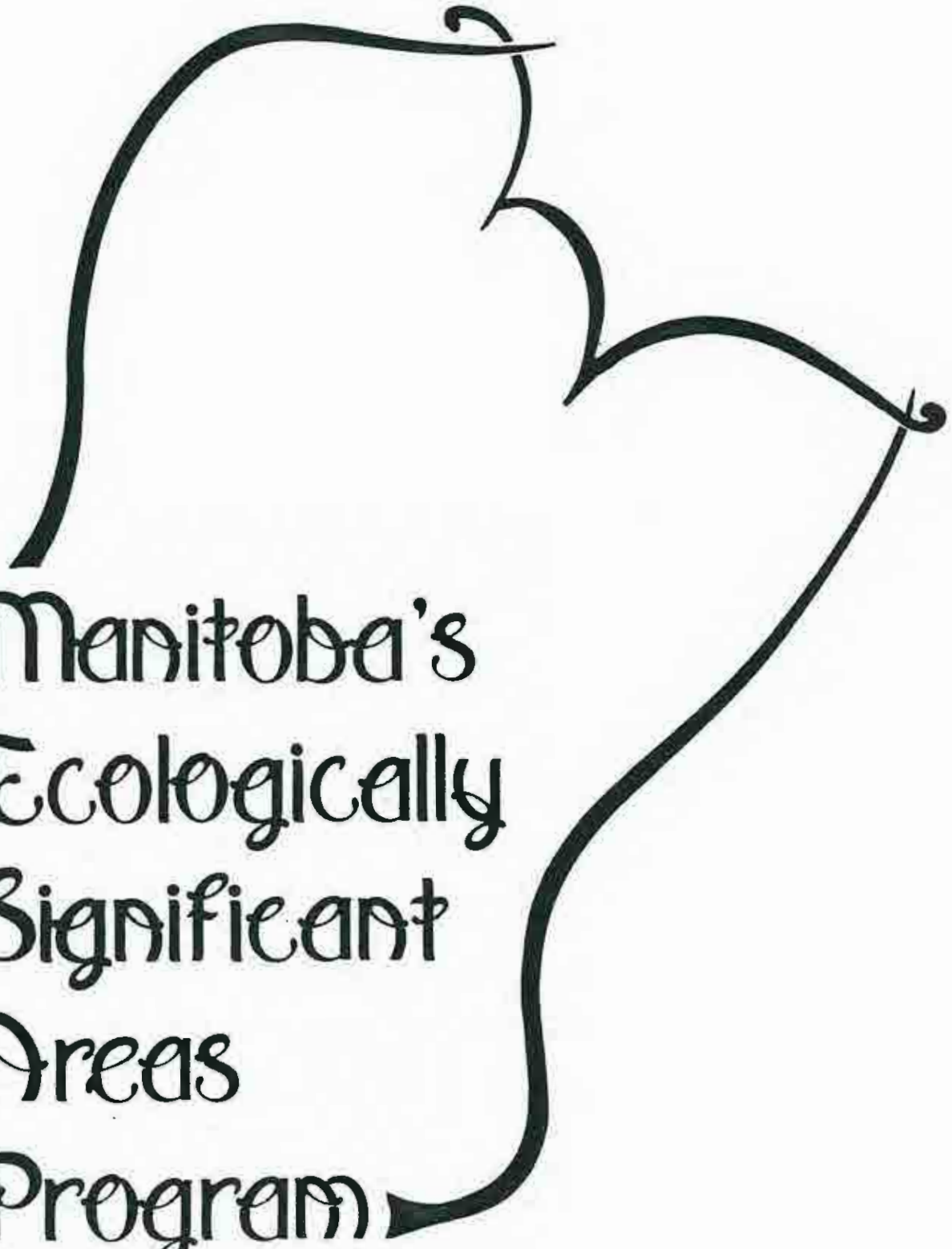
Stanley Krause of Atlee believes that Rattlesnakes are more numerous in his area in the last couple of years.

Henry Rinker of Buffalo stated that, ever since Richardson's Ground Squirrels declined in numbers, so did snakes.

Ian Barnes of Buffalo has seen small numbers of Plains Hognose Snakes on a regular basis on his land in recent years.

G

Manitoba
Natural Resources



Manitoba's Ecologically Significant Areas Program

Manitoba's Ecologically Significant Areas Program

Introduction

The Ecologically Significant Areas program is an expansion of the earlier Ecological Reserves program. The expansion permits recognition of private land and administrator protected allocated Crown land through its voluntary protection activity.

The original Ecological Reserves program was established in 1973 to protect ecologically significant areas of unallocated Crown land as a follow-up to the International Biological Program which was active from 1964 to 1974. Highlights of the Ecological Reserves program to date include the establishment of nine Ecological Reserves encompassing 17,800 hectares, passage of The Ecological Reserves Act and its amendment and identification of potential ecological reserves. All established and potential ecological reserves are located on Crown land; none is on private land.

Both the original Ecological Reserves program and the current Ecologically Significant Areas program directly support key elements of the World Conservation Strategy (WCS). There is a particularly close relationship to Section 6 which considers priority requirements relative to genetic diversity. This section specifically identifies the need to:

> "Ensure that on site preservation programmes protect: the wild relatives of economically valuable and other useful plants and animals and their habitats; the habitats of threatened and unique species; unique ecosystems; and representative samples of ecosystem types."

Furthermore, the WCS checklist of priority requirements identifies the following which are directly related to ecologically significant areas:

- "prevention of species extinctions (6.1 - 6.3);
- preservation of as many varieties as possible of domesticated and other economic or useful plants, animals and microorganisms and their wild relatives (6.4 - 6.7);
- establishment of a comprehensive network of protected areas, securing the habitats of threatened, unique and other important species, unique ecosystems, and representative samples of ecosystem types (6.8 - 6.12);"

Additional items in the WCS which the Ecologically Significant Areas program supports indirectly are:

- "maintenance of the habitats of utilized species (7.7);
- preparation of ecosystem evaluations (10.3 - 10.5);

- increased research to improve the management of living resources (12.9 - 12.13);
- environmental education campaigns and programmes, particularly for the users of living resources, legislators and decision makers, school children and students (13.6 - 13.14);"

The successful beginning of Manitoba's program, as reflected in its activities and progress to date, resulted in its expansion to achieve the major program goal, i.e., to preserve examples of unique, rare and representative ecosystems of the province. In order to achieve this goal private land and Crown land designated by Order-in-Council to uses other than Ecological Reserves are included in the program. Activity is also underway to search for and document unidentified ecologically significant areas.

To overcome the limitations of the original program (i.e., no private land thrust, no systematic search for ecologically significant areas, no use permissive designation of ecologically significant areas) and to strengthen its relevance to WCS the program recognizes voluntary protection of ecologically significant areas* (ESAs). These areas would qualify for ecological reserve status except for private ownership and/or the need to be use permissive, i.e., permit managed consumptive use not directly impacting the area's ecological significance. Preparation of a directory of ecologically significant areas is an additional activity aimed at publicizing the program and stimulating appropriate use of protected areas.

Program Goal

To preserve directly and indirectly for posterity unique and rare natural features of the province, habitats of rare and/or endangered plants and animals, examples of natural and modified ecosystems for study, research, education and aesthetic benefit of Manitobans and visitors to Manitoba.

Goal Statement

"To preserve directly and indirectly" means to preserve by establishing ecological reserves on Crown land and to document ecologically significant areas which are voluntarily protected on private land and on Crown lands allocated by Order-in-Council where it is inappropriate to establish the area as an ecological reserve. The terms "unique, rare and endangered" require definition on a species specific and ongoing basis with scarcity and habitat threat being the prime criteria. Due to the subjectivity involved in assessing scarcity and habitat threat protective initiatives may be undertaken prior to formal recognition of rare or endangered status.

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* ecologically significant areas include ecological reserves and voluntarily protected areas.

"Natural habitats" and "natural ecosystems" require definition in terms of plant/animal communities and disturbance levels. Appendix I identifies the major vegetation zones and plant communities of Manitoba. It is intended that at least one example of each major plant community be preserved directly or indirectly in the appropriate vegetation zone(s). The definition of "modified ecosystem" and the desirability of including such ecosystems in the program is assessed from time to time by the Ecological Reserve Advisory Committee.

Use of ecologically significant areas for "study, research, education and aesthetic benefits" has the same degree of importance as preservation of the areas. Such use, however, need not be continuous but may be periodic resulting in a series of scientific "snapshots" against which change within and outside of an area may be described qualitatively and quantitatively. This use is encouraged on a non-consumptive; minimal disturbance basis and is controlled as necessary to ensure preservation of each area.

Objectives

a) Establishment of a Manitoba system of ecologically significant areas as a component of a Canadian system.

b) Protection of as many ecologically significant areas as possible by designation as ecological reserves.

c) Voluntary protection by landowners and government administrators of ecologically significant areas which do not qualify for ecological reserve status.

d) Use of ecologically significant areas for study, research, education and aesthetic benefits in keeping with the ecological and administrative characteristics of the area. (Administrative characteristics refers to ownership and legislated commitments such as Orders-in-Council.)

e) Documentation of ecologically significant areas in an Ecologically Significant Areas Directory to encourage their preservation and appropriate use.

Program Components

a) Ecological Reserves Advisory Committee - this committee provides advice regarding the establishment of ecologically significant areas and their stewardship.

b) Establishment of Ecological Reserves - existing reserves are maintained and additional reserves will be established for administration under The Ecological Reserves Act. These reserves receive a very high degree of protection, are use-restrictive and vital to achievement of the "preservation for posterity" aspect of the program. It is intended that each major plant community be represented in at least one ecological reserve.

c) Voluntary Protection

i) Private Lands - participation in the voluntary protection activity is a formal means of recognizing a landowner's* desire and efforts to protect and maintain ecologically significant areas while retaining ownership of the land. Crucial to this component is assessment of the ecological significance of proposed areas, recognition of the landowner and of landowner efforts to protect the area. Long term benefits include protection and possible future donation of private ecologically significant areas to the province.

Key elements of this sub-component are:

a) A non-binding, "hand shake" agreement between the landowner and the department.

b) Recognition of the landowner's co-operation with the department through:

i) presentation of a plaque and a certificate to the landowner identifying the ecologically significant area, expressing the appreciation of the people of Manitoba and signed by the Minister of Natural Resources.

ii) presentation of the plaque and certificate at an appropriate public function in order to acknowledge the landowner's co-operation.

iii) provision of ecologically significant areas signs upon request for signing of the area by the landowner. (Number of signs to be provided would not exceed one sign per 200m of perimeter length.)

c) Provision of management advice to the landowner by department staff on request and as feasible.

d) Annual inspection of each area and contact with the landowner by a program representative.

ii) Order-in-Council Lands - voluntary protection is implemented through agreement between the administering branch and Resource Allocation and Economics Branch. It need not lead to ecological reserve establishment but may do so where appropriate.

Agreements are tailored to the area and to administrative issues associated with the area and branches involved.

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* landowner includes private individuals, corporations, local governments and other groups owning land.

d) Identification of Ecologically Significant Areas on Unallocated Crown land - this aspect of the program is vital to achievement of its goal since most of the provincial land base is unallocated Crown land.

Current practices of assessing areas identified by the Ecological Reserves Advisory Committee, private citizens, government employees and program staff are ongoing. Designation as ecologically significant areas may be an early step in efforts aimed at ecological reserve designation.

If ecological reserve designation is not possible, establishment of a long term Crown Land Reservation in the Crown Lands Registry is sought. This ensures staff an opportunity to comment on proposed use/disposition prior to land sale, lease and development. In the area covered by the Crown Land Classification Committee appropriate coding is also requested.

e) Research - one of the major reasons for identifying and protecting ecologically significant areas is to provide benchmarks against which man induced changes to unprotected areas can be compared and to provide sites for research into biological communities and ecological processes.

Ecological reserves are available as research sites with approval of the Minister of Natural Resources. Voluntarily protected areas may be available at the discretion of the landowner/administrator. The Ecological Reserves Advisory Committee will review projects undertaken in Ecological Reserves and may review projects using voluntarily protected areas.

f) Stewardship Strategies - long term stewardship (management) strategies are required for ecological reserves. These strategies are developed by staff, reviewed by the Ecological Reserves Advisory Committee and forwarded to the Minister for approval. Similar strategies may be prepared for voluntarily protected areas of Crown land. These strategies would be approved by the appropriate directors. Owners of private land who participate in the voluntary protection activity would under this component, be offered advice regarding management of their ecologically significant areas. This advice may or may not be in the form of a stewardship strategy depending on circumstances.

Summary

The Ecologically Significant Areas program is an expansion of the earlier Ecological Reserves program. It allows for recognition of private land and Crown land designated to use by Order-in-Council which was previously not the case.

The program is directly supportive of key elements of the World Conservation Strategy and aims to protect examples of ecosystems for study, research, education and aesthetic benefits. Program components include ecological reserves, voluntarily protected private land, voluntarily protected allocated Crown land and use of ecological reserves for appropriate research projects.

Nine ecological reserves and seven voluntarily protected areas have been established. These include 17,800 ha and 270 ha of land respestively. Activities to establish new ecological reserves and voluntarily protected areas continue.

Further information can be obtained from:

Ecologically Significant Areas Program
Resource Allocation and Economics Branch
Department of Natural Resources
Box 38, 1495 St. James St.
Winnipeg, Manitoba
R3H 0W9

October 1, 1987

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SMALL WHITE LADY'S SLIPPER
PROTECTION PLAN

A Proposal for Funding

Submitted to:

Wildlife Habitat Canada

World Wildlife Fund Canada

BY:

The Manitoba Naturalists' Society

October 1, 1986

Author: John P. Morgan

EXECUTIVE SUMMARY

The small white lady's slipper is an endangered orchid of the tall grass prairie. Manitoba has most of the remaining sites where this plant is known to occur. The largest and most endangered population of small white lady's slippers is near Lake Francis, 55 km northwest of Winnipeg.

The site is privately owned pasture where the orchids are in danger of being grazed out by cattle. The landowner is very keen to protect the site, but is unwilling to donate or sell the land. He has agreed to help fence it, and sign a management agreement that would give complete control over the site to the Manitoba Naturalists Society and Manitoba Museum. The MNS also will take out a Right of First Refusal on the surrounding quarter section that would enable the Society to purchase the land should it ever be offered for sale. Fencing of the site will be completed in the fall of 1986.

PROJECT COSTS:

Manitoba Naturalists Society	$1,000.00
Wildlife Habitat Canada	$1,000.00
World Wildlife Fund	$1,000.00
Total	$3,000.00

SMALL WHITE LADY'S SLIPPER PROTECTION PLAN

1.0 INTRODUCTION

The small white lady's slipper (Cypripedium candidum) is an endangered species of orchid, listed by the Committee on the Status of Endangered Wildlife in Canada (C.O.S.E.W.I.C.). A plant of the tall grass prairie biome, the small white lady's slipper has been eliminated from much of its former range by the conversion of native prairies to agricultural and residential uses (Brownell 1982). Only isolated pockets of this delicate wildflower remain in Canada.

Manitoba contains four of the six known sites in Canada where the small white lady's slipper still occurs. The largest and most important of these sites in the province is near Lake Francis, 55 km northwest of Winnipeg in the Interlake Region. This 2 ha privately owned parcel of aspen parkland contains over 300 small white lady's slippers.

Until 1984, this area was idle native prairie and was hayed only occasionally. In that year, however, the land was purchased by S and S Ranchers Inc. and fenced for cattle pasture. Small white lady's slippers are a preferred food species of domestic cattle and tend to be eliminated quickly in pastures for this reason. The population at Lake Francis likely will be wiped out within the near future if action is not taken to protect the site.

2.0 SITE CHARACTERISTICS

The small white lady's slipper site is located on the southeast quarter of section 2, township 16, range 4 west of the principal meridian (SE 2-16-4W1), UTM location 14U NL7876 (Map 1). It is 55 km northwest of the city of Winnipeg, or 5 km north and 4 km west of the village of Lake Francis. Access to the site is via Provincial Trunk Highway #6 north from Winnipeg to its junction with Provincial Road #414 at the village of Lake Francis. Turn west on PR #414 for 4.8 km until this road makes a right angle turn to the south. Continue west on the section road at this point for 1.6 km, then northwest 3.5 km along the same road. At this point a locked gate marked #5 is visible on the east side. Proceed east from the gate on a field trail 1 km, then north on another trail 0.5 km to a fieldstone house foundation. The small white lady's slipper site is 40 m northwest of the foundation in a meadow enclosed by trembling aspen trees.

The site is known locally as the old Gareau homestead, after the family that first settled the land. Soils are of the Lundar Series which is a Gleyed Rego Black Chernozemic, developed on very calcareous, waterworked glacial till (Pratt et al 1961). Surface texture is a silty clay loam. Topography is very gently rolling, and the elevation is 248 m ASL. The area is typical aspen parkland with a mixture of tall grass prairie, seasonal wetlands and trembling aspen. The flowers are located in an irregularly shaped 2 ha meadow surrounded by aspen except for a narrow opening at the north end.

3.0 PROJECT GOALS

The main objective of the small white lady's slipper protection plan is to provide immediate security for the Lake Francis population of this species. Secondary objectives include establishing a management plan to ensure the continued viability of this population, and providing an opportunity for scientific research on the species.

4.0 PROJECT BACKGROUND AND IMPLEMENTATION

The lady's slippers occurrence on the site first was discovered by M. Peikoff of Lake Francis in 1981. The area then was brought to the attention of Dr. K. L. Johnson, Curator of Botany at the Manitoba Museum of Man and Nature, Winnipeg, who has monitored the site since that time. In June, 1986, a group of interested volunteers from the Manitoba Naturalists Society led by Dr. Johnson visited the site to make an intensive search of the area. All small white lady's slippers present were marked with metal tags placed nearby on the ground, and their locations recorded. A total of 334 stems were identified. Seed pod production by the plants was determined by Dr. Johnson in late August to be 10% of the flowers recorded, an excellent rate of seed productivity. This indicates a healthy population.

The protection plan began in June 1986 with inspection of the site and marking all small white lady's slippers present. In addition, S and S Ranchers owner, Mr. Dino Gorinni, agreed to not graze the entire 150 ha pasture surrounding the site for the 1986 grazing season to protect the flowers. Fencing of the site will be done in the fall of 1986, with a managed burn to be undertaken in 1987. Annual checks of the site to determine health of the population and condition of the fence will be carried out by volunteers from the Manitoba Naturalists Society and staff of the Manitoba Museum.

5.0 FUTURE MANAGEMENT NEEDS

The lady's slipper meadow will be fenced with 4 strands of barbed wire to protect it from cattle grazing. Posts will be one wooden alternating with 2 metal posts, a combination recommended by Mr. Gorinni that provides maximum strength, longevity, and protection from fire. Fence height will be 1.5 m. A locked gate in the fence will be made to restrict access. Mr. Gorinni has agreed to prevent anyone from entering the area without prior permission of the Manitoba Naturalists Society or Manitoba Museum.

Managed burns will be necessary every 7 to 10 years to control the natural spread of trembling aspen which presently is taking over the meadow. The first burn is scheduled for the spring of 1987. In the absence of fires, aspen tends to overgrow prairie areas in the aspen parkland (Bird 1961). If allowed to proceed unchecked, this plant succession eventually would eliminate the prairie loving small white lady's slippers at Lake Francis.

Equipment needed for the burn such as drip torches, backpack water sprayers, and water tankers are available on loan from the Manitoba Department of Natural Resources office in Portage la Prairie. Natural Resources Officers experienced in managed burns also will be available to supervise and assist in these operations. Additional personnel for the burning crews will consist of volunteers from the Manitoba Naturalists Society. Timing and frequency of the managed burns will depend on the results of the annual inspections.

Title of the property will be retained by S and S Ranchers Inc. A management agreement will be drawn up that will allow fencing the site, controlled access, and whatever management is necessary to keep the small white lady's slipper population healthy. The agreement will specify that the Manitoba Naturalists Society receive 6 months notice of any proposed change in land use of the site (i.e. conversion from pasture to cropland).

The Society also will take out a Right of First Refusal on the quarter section that the site is on (SE 2-16-4W1). This will ensure that in the event the land is transferred to another owner, the Society would have first chance to match the purchase price of the proposed owner or enter into a similar management agreement. The Right of First Refusal will be a properly registered caveat upon that quarter section on file with the Manitoba Land Titles Office. Purchase of the quarter, if it becomes necessary, would require the financial assistance of Wildlife Habitat Canada, World

Wildlife Fund, and possibly the Nature Conservancy of Canada, the Manitoba Wildlife Federation, and the Manitoba Habitat Heritage Corporation. Present market value of the land is around $240/ha or $16,000 for the entire quarter section. The remaining 62 ha of the quarter contain significant amounts of tall grass prairie, aspen parkland, and seasonal wetlands (Map 2).

Human use of the site will be restricted to scientific study, observation and photography. No disturbance or removal of the natural vegetation will be permitted except that which is necessary for management (ie. controlled burns or selected aspen removal). No agricultural use of the site will be allowed. Due to the rarity of the small white lady's slippers, no signage or other identification of the site is planned. Anyone wishing to visit the site must agree to protect the plants, and have the permission of the Manitoba Naturalists Society or Manitoba Museum.

6.0 PROJECT COSTS

Manitoba Naturalists Society	$1,000.00
Wildlife Habitat Canada	$1,000.00
World Wildife Fund	$1,000.00
Total	$3,000.00

*Detailed costs:

Fencing materials	$1,000.00
Labour	$1,500.00
Legal fees	$ 500.00
Total	$3,000.00

*Does not include fencing equipment supplied by S and S Ranchers Inc., and staff time of Manitoba Museum and Department of Natural Resources personnel contributed at no cost to the project.

7.0 AGENCY BACKGROUND

The Manitoba Naturalists Society is a group of 2,500 people concerned with the well-being of Manitoba nature. Founded in 1920, the Society supports and organizes programs that enhance public awareness and appreciation of natural resources. Included in these programs are lecture presentations by a variety of specialists on all aspects of natural history, workshops on outdoor skills, field trips to natural areas in Manitoba and around the world, and monthly publication of the BULLETIN, an informative magazine on Society activities and environmental concerns.

The MNS is active in the habitat conservation field as well, being a charter member of the National Habitat Coalition. We have cooperated in one Wildlife Habitat Canada project to date, the Kissick Property acquisition in southwestern Manitoba. The Society actively promoted the 1985 Wildlife Habitat Conservation Stamp and Print Program, and presently is expanding its promotion of the 1986 Conservation Stamp and Print. The Habitat Conservation Fund Committee of the MNS has been active since 1984 raising money for habitat projects and advising the board of directors on matters relating to habitat retention in Manitoba. The small white lady's slipper protection plan marks the first time in its history that the MNS will enter into an agreement with a landowner to protect an endangered species.

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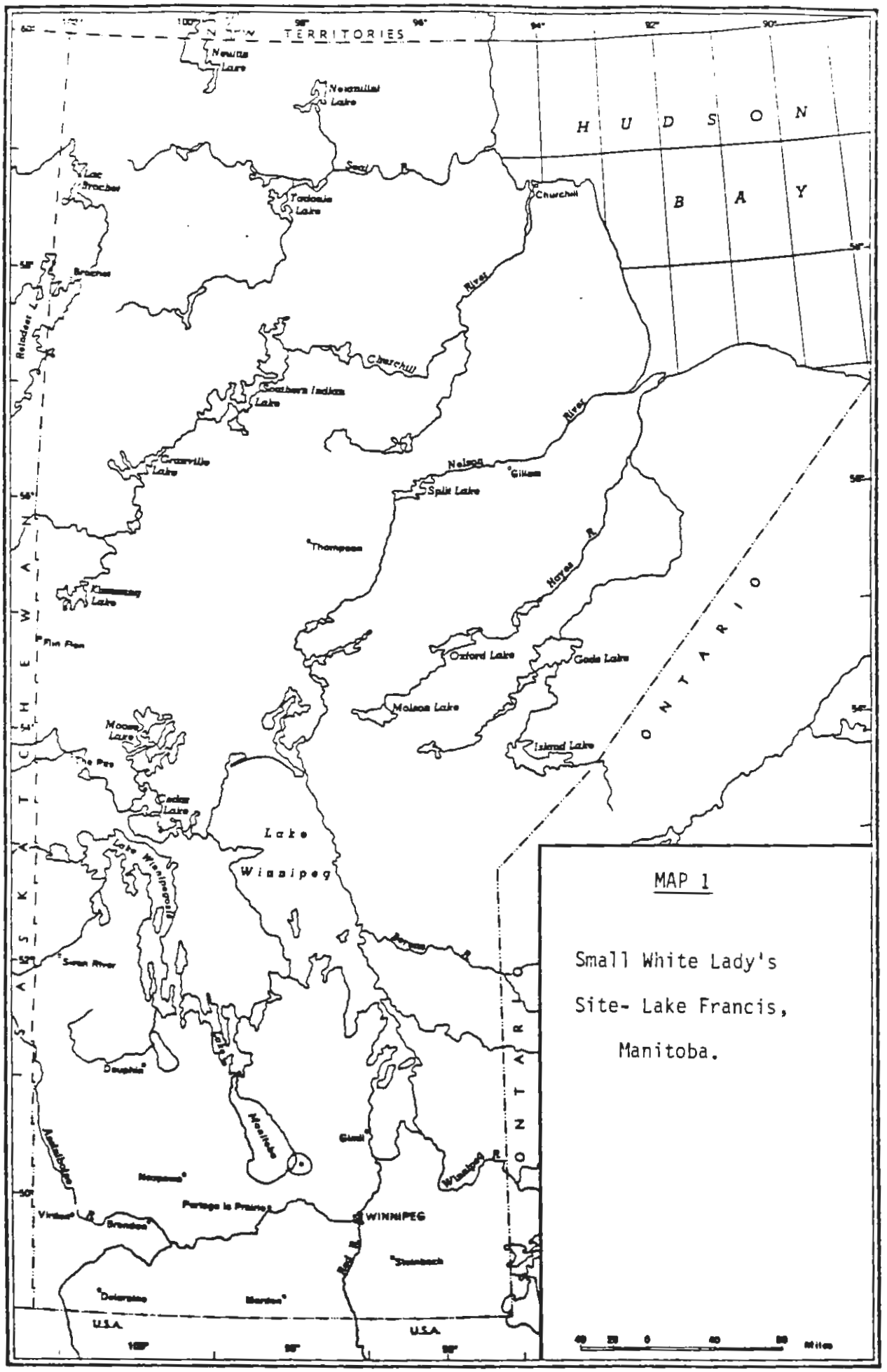
N.W.T. TERRITORIES
Newtok Lake
Nevamillat Lake
Seal R.
Churchill
H U D S O N
B A Y
Lac Brochet
Tadoule Lake
Brochet
Reindeer L.
Churchill River
Southern Indian Lake
Granville Lake
Nelson River
Gillam
Split Lake
Thompson
Hayes R.
Kississing Lake
Flin Flon
Oxford Lake
Gods Lake
Molson Lake
Island Lake
ONTARIO
Moose Lake
The Pas
Cedar Lake
Lake Winnipeg
Lake Winnipegosis
Swan River
Dauphin
Manitoba
Assiniboine R.
Neepawa
Portage la Prairie
Virden
Brandon
WINNIPEG
Red R.
Steinbach
Deloraine
Morden
U.S.A.
U.S.A.
SASKATCHEWAN
ONTARIO
MAP 1
Small White Lady's
Site- Lake Francis,
Manitoba.

Map 2.

Cover Map: SE2-16-4W1

Small White Lady's Slipper Site, Lake Francis, Manitoba

LEGEND

1- tall grass prairie
2- aspen forest
3- seasonal wetland
--------- field trail
- . - . - . - proposed fenceline around lady's slipper site
4- improved pasture (alfalfa-brome)
5- abandoned farmstead
6- dugout
Scale: 1:4000

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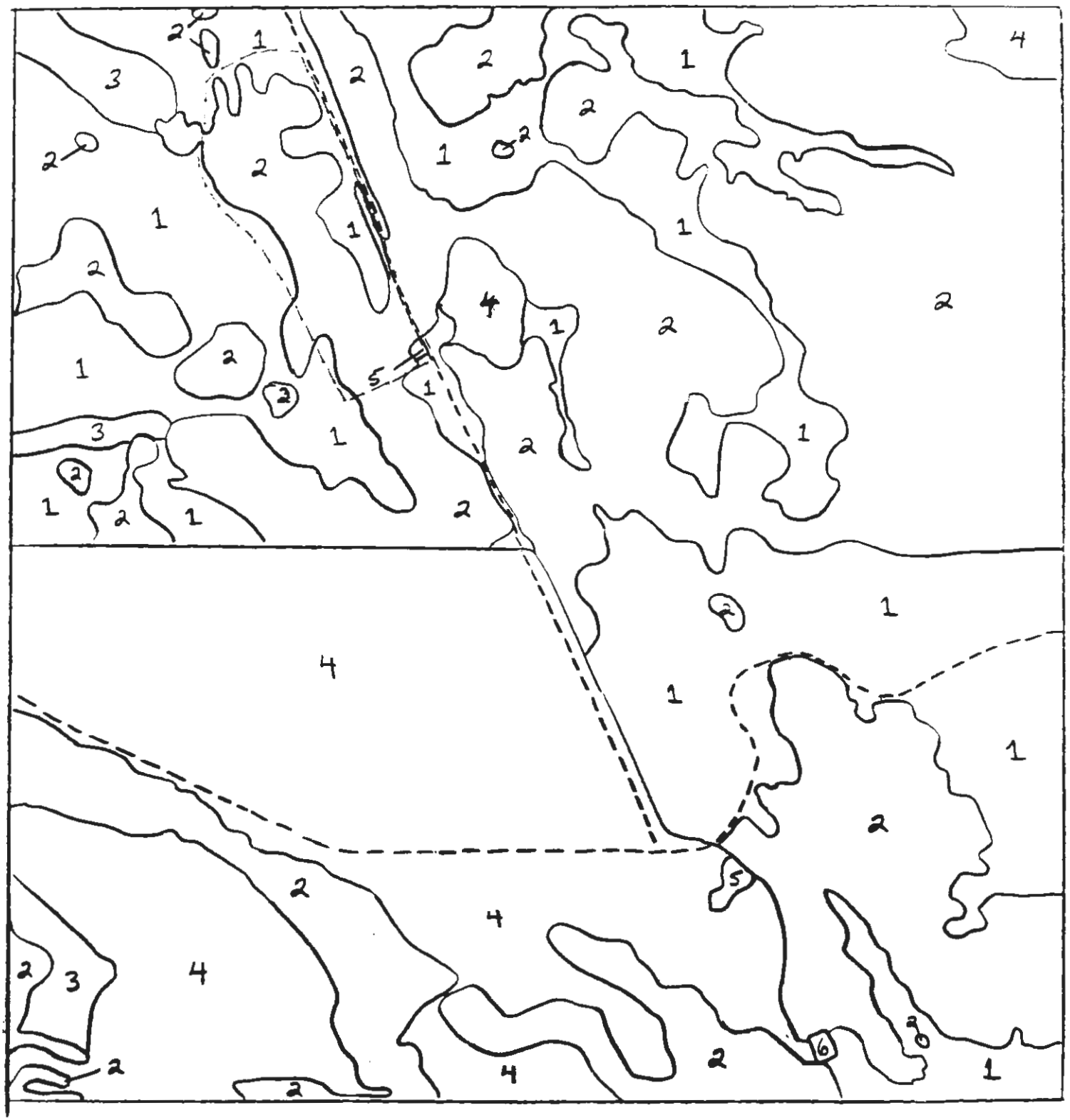


Air Photo of Small White Lady's Slipper Site. Scale 1:4000
extent of lady's slippers
proposed fenceline
boundary of SE2-16-4W1

W35

"OPERATION GROUND OWL"

ALBERTA BURROWING OWL SURVEY
1986 to 1988

1988 was the final year of a three year project to study the Burrowing Owl in the province of Alberta. The objectives of the study were as follows.

1. Identify key areas used by existing breeding populations.

2. To reach a conclusion as to the status of the Burrowing Owl in Alberta

3. To make recommendations regarding future land use/habitat protection and species management policies to ensure the protection of existing and future populations.

WORK PLAN USED

1. Public awareness campaign (promotion, advertising, etc.) encouraging the public to report active nesting sites
2. Field work: -following up reported sitings
   -meeting land owners
   -banding owls at nest sites
3. Follow up Communication with respondents

NEED FOR A PUBLIC AWARENESS CAMPAIGN

Locating nesting sites of Burrowing Owls is very difficult compared to other species of raptors. Nesting underground, their burrows are indistinguishable (at a distance) from those of burrowing mammals. Also, their geographical nesting distribution is highly unpredictable. To maximize the utility of extremely limited resources in manpower, finances and the short time span of the breeding season, the participation of the public was critical to the success of the project.

PUBLICITY/PROMOTION METHODS USED

-radio interviews
-newspaper interviews/articles
-posting flyers in high traffic areas such as rural post offices
-direct mail distribution of flyers in more remote/less populated areas
-distribution of posters to people who work in rural areas e.g. fish & wildlife personnel, AGT/CWNG/TRANSALTA/Dept of Agriculture employees etc.

The distributed flyers were actually old fashioned wild

west style "WANTED" posters. Although this is a departure from what would be expected of a scientific study, publicity had to appeal to the rural public rather than the naturalist community. For this same reason the project was christened "OPERATION GROUND OWL". The word ground owl is a more commonly used term by the rural public in reference to the Burrowing Owl. The name of the program as well as the poster had to be simple, easy to remember, popular with the media and have mass appeal to the rural public.

ADDITIONAL BENEFITS FROM PUBLIC AWARENESS CAMPAIGN

Although the primary goal of the publicity campaign was to locate active nesting sites there were other benefits being realized such as:

-promotion of wildlife conservation in general
-public education with respect to the status of the Burrowing Owl
-good public relations for the major supporting sponsors Alberta Fish & Wildlife & World Wildlife Fund Canada

The extensive advertising aspect of the project generated a lot of interest from rural citizens who became sincerely interested and appreciative that something was being done to help the Burrowing Owl.

Observations on Nesting Characteristics:

All nests verified were located on native grassland areas with a few exceptions when a few burrows were discovered in cultivated fields. Human disturbance does not appear to be a factor in nesting preference as many of the nest sites were located quite close to areas of human activity such as highways, farmhouses, oil pumping stations and in one case a residential neighbourhood. In the Crescent Heights area of Medicine Hat active burrows have been in existence for many years even though they are within a few hundred yards of a subdivision and high school.

The greatest areas of nesting density appeared in regions of mixed dryland cultivation and pasture. In these locations nesting populations along with burrowing mammals appear to have been fragmented into small pockets of activity as cultivation squeezes them into decreasing areas of suitable nesting habitat. Many nesting sites verified were located on small pastures (approximatley 10-50 acres) in areas surrounded by thousands of acres

of dryland/irrigated cultivation. This does illustrate a positive aspect, that with proper land management practices, the Burrowing Owl can survive with the encroachment and activities of modern farming operations.

Limiting Factors

Although the primary goal of the project was the documentation of active nesting sites the comments and observations of the rural public were equally important in assessing the current status and problems confronting the Burrowing Owl. Over the past several years there has been a great deal of speculation concerning the factors which are the greatest detriment to Burrowing Owl populations. Generally they are as follows: chemical contamination (rodentcides and pesticides), shooting, road kills, predation, destruction of burrowing mammals and the cultivation of natvie prairie grassland for agricultural production.

Pesticides

Although there was no analysis done regarding pesticides a number of nest sites close to areas of heavy chemical application appear to be unaffected. Discussions with farmers revealed that these nests have been active for a number of years with many offspring produced each year. Juveniles observed over the three years of the study did not contradict this observation. It must be emphasized, this is only a superficial observation but at least the current pesticide situation does not appear to have the catastrophic consequences that DDT produced in the 1960's. Although farmers may be villainized by some for the use of pesticides, many of them demonstrated genuine concern over the welfare of "their owls". In a number of instances farmers indicated that they had modified their farming practices/-decisions in such a way as to preserve the Burrowing Owls nest sites on their property.

Road Kills and Shooting

Interviews with farmers indicated that the shooting of Burrowing Owls may have been a problem prior to the 1960's but with changing attitudes towards wildlife it was no longer a serious factor. Of the several hundred people interviewed over the three years none could recall any recent shooting incidents in their regions. In some areas, farmers felt that the loss of burrowing owls through road kills could be a significant factor but as many nest sites were not adjacent to busy highways this probably would not be a significant factor on a province wide basis.

Eradication of Burrowing Mammals and Habitat Destruction

Although the decline in Burrowing Owls is probably the cumulative effect of many factors over the past fifty years, the eradication of burrowing mammals and habitat destruction are probably the two most significant factors that exist today. Without question, the Burrowing Owl is looked upon quite positively in rural Alberta, while badgers and ground squirrels are widely exterminated. The cultivation of native prairie habitat for agricultural production is also a serious threat to the long term future of the Burrowing Owl in Alberta. Compounding the situation is the continuing expansion of irrigation projects which will further accelerate this habitat loss. This specific problem was dramatized in one episode near Brooks. I was summoned to a farm where I was told a nest site was in danger, due to a pasture being graded for irrigation purposes. As I arrived at the site earthmovers were only a few hundred feet from the burrow and the parents had already abandoned the nest. As the area was to be buried in a few minutes and not knowing if there were any young down the burrow I decided to excavate the nest as a precaution. Excavation of the burrow revealed there were eight terrified juveniles huddled in the nest chamber. They were subsequently removed and transplanted in a nearby active burrow, all were accepted and fledged successfully. It was due to publicity from a recent newspaper article (on OPERATION GROUND OWL) and a concerned public works foreman that these birds were saved. This episode did dramatize the seriousness of our disappearing grasslands and raised the questions of how many active nests are buried and destroyed each year that we are unaware of.

Documented Nesting Activity

Over the three years of the project, posters were distributed to the public throughout the entire short grass prairie region of Alberta. During that period there were 380 different nesting sites reported of which 198 nest locations were physically confirmed during 1988. All confirmed nest locations were sent to the Alberta Fish & Wildlife Divison nongame management unit for documentation and analysis. Defining a nesting site does pose a problem in the survey work since from year to year a nesting pair may move from one burrow to another and be double counted. For this report such reports were counted as only one documented nest siting. This is quite important for any comparison to historical nesting records because it could be interpreted as a decline in population when in fact only a change of nest location has occurred.

Even with the information on nesting activity produced by this report, estimating the number of Burrowing Owls in the province would be quite difficult. Making population estimates based on habitat availability would not produce an accurate estimate since their nesting density did not appear proportional to the habitat available. In some regions of suitable habitat, where numerous vacant badger holes existed, no Burrowing Owls were observed. While in other regions with apparently less suitable habitat available there was a greater nesting density.

Although there were 380 nest locations reported there is no question many more exist that were not documented, for a number of reasons. There were a number of cases where ranchers did not report nest locations for fear of the owls being disturbed. Also many of the nest locations that were reported were quite close to roads and other areas of higher public traffic. There of course were many remoter regions of the province that were not surveyed but offered excellent nesting habitat.

Geographically, the region that had the greatest number of nesting pairs was the area north of the Oldman river, bounded by Claresholm to west, Medicine Hat to the east and Brooks and Bassanno to the north. Although the nest sites were always fragmented into clusters, this area still has a considerable amount of open grassland used for grazing, mixed with dryland cultivation. Regions with intensive irrigation farming operatons produced the lowest numbers of active nest sites.

RECOMMENDATIONS

1. Privately owned land, designated as critical for existing nesting sites and for future breeding populations should be purchased by the government.

2. Establish varying degrees of environmental protection for areas where high density nesting activity occurs.

3. Initiate ongoing public awareness programs.

4. Wildlife educational programming should be more available in public school systems.

5. Fish & Wildlife Divisions should implement a program where burrowing owl populations are monitored on an ongoning basis.

Discussion of Recommendations

Purchasing Privately Owned Land

Many thousands of acres of privately owned land contain some of Alberta's most valuable native prairie habitats and nesting sites for Burrowing Owls. For some of these areas, as long as they are privately owned they will always be at risk of being cultivated. A mechanism should be designed where the most environmentally sensitive prairie grasslands can be purchased by the government. In many cases these same areas could be leased back to the respective farmers on the condition that the agricultural activities are compatible with wildlife needs.

Although making lease payments to farmers for preserving wildlife habitat is being done in some cases, this alternative does have its drawbacks. First, it is not a permanent solution and secondly, the possibility of future goverment cutbacks would put these types of arrangements at risk of being terminated.

Establishment of Areas with Varying Degrees of Environmental Protection

There are specific locations in the province that contain a much greater nesting density of Burrowing Owls than others but unfortunately are not afforded any particular protection. Oil and gas drilling or farming activities could pose a variety of serious threats to critical nesting areas. Control areas should be established where there would be absolutely no access and therefore no disturbance to prairie ecosystems. These control areas would provide a wealth of information on the impact of human activity on Burrowing Owl populations.

Public Education & Awareness

Over the three years of my program I have found virtually all of the people that I spoke to, were quite interested and concerned with the status of the Burrowing Owl. Unfortunately these same people did not realize the related importance of prairie habitat and badger populations to the Burrowing Owl. An action plan to mobilize public awareness and appreciation about prairie wildlife and habitat is needed immediately. A public awareness program should be developed for the present time and for the longer term, action steps should be developed to integrate more environmental studies in our public school education curriculum.

The best agency for initiating a public awareness program is probably the Alberta Fish & Wildlife Division. Many provincial

agencies in Alberta such as Tourism and Utilities & Communications periodically send out educational newsletters and advertisements but unfortunately the Fish & Wildlife Division does not. I would like to see a seasonal newsletter sent to all government agencies (e.g. irrigation districts), resource companies and rural Alberta residents since they have the greatest direct involvement with prairie habitat. Many of these people may never go to a zoo or nature center and of course will never benefit from environmental education classes at schools. Topics could include the Burrowing Owl's dependence on native prairie habitat and on Badger populations, pesticide use, conservation farming or grazing practices. This could also be a good public relations tool and communicative mechanism for the Fish & Wildlife Division.

Continued Field Studies

Periodic monitoring of wild populations will be necessary to guarantee the long-term survival of the Burrowing Owl in Alberta. In addition to province-wide surveys wildlife agencies should encourage more in-depth studies on other aspects to the Burrowing Owl such as species movement, behaviour, effects of pesticides etc.

Conclusions

Although the facts suggested in this study indicate the Burrowing Owl populations may be in better shape than originally thought, the warning signs are still present, that corrective action must be taken. In my opinion the Burrowing Owl in Alberta should still be classified as a "Threatened" species and its current population levels do not suggest it becoming "Endangered" in the near future. The key factors to the survival of the Burrowing Owl in Alberta will be public education concerning the species and its needs, and the cooperation of Alberta Fish & Wildlife and various agricultural agencies in protecting the prairie ecosystem on which it depends.

ACKNOWLEGEMENTS
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The following people/groups should be acknowledged for their support in making this project possible and for their assistance during field studies.

Alberta Fish & Wildlife Division

-Habitat & Nongame Management Unit
    -Doug Culbert
    -Gary Erickson
    -Dave Moore

-Ron Bjorge, Alberta Fish & Wildlife Division, Red Deer, Alberta

-World Wildlife Fund Canada

-Dan Wood, Castor, Alberta

-Alberta Recreation, Parks and Wildlife Foundation

Statement of Income & Expenses

Income:

-Recreation Parks & Wildlife Foundation	$3,500.00
-World Wildlife Fund Canada	$5,000.00
Total Income	$8,500.00

Expenses:

-Postage	$638.37
-Printing	$354.25
-Long Distance Calls, Photocopying	$100.00
-Mileage Allowance 42,000 km @ $.25 per km.	$10,500.00
-Per Diem Travel Allowance for Field Work 60 Days @ $10.00 per day	$600.00
Total Expenses	$12,192.62

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CURRENT STATUS OF THE PLAINS POCKET GOPHER (*Geomys bursarius*) IN CANADA

Submitted to Wild West Program

World Wildlife Fund Canada

September 1987

by J. E. Dubois and M. Oberpichler

Manitoba Museum of Man and Nature

190 Rupert Avenue

Winnipeg, Manitoba R3B 0N2

Current Status of the Plains Pocket Gopher

SUMMARY

The range of the plains pocket gopher has expanded in the last fifteen years, five to six km north and east of the Roseau River, Manitoba. Their slow expansion is probably due to several factors. Suitable soil exists only on a front 12.9 km across, with the river, the northern pocket gopher, and humans all acting as barriers. Preferred soil type is sandy loam, with no significant subtype being chosen over others. The few occurrences outside sandy loam are likely due to saturation of primary habitat. Alfalfa and pasture crops are preferred over cereal and fallow-cropped areas.

The main ectoparasite is the flea Foxella ignota, with gophers on the periphery of the range more likely to be infested. Peripheral gophers are hosts also to Opisocrotis bruneri, ordinarily a ground squirrel flea. Infestation rates are low.

Canadian gophers are heavier and larger than southern populations. Individuals caught in live traps average lighter in weight than those caught in Macabee traps, indicating a possible bias. The ratio of females to males is 76.4% (adults), which may be due to collector bias, interspecific aggression, misadventure during the breeding season, or a combination of these factors.

Reproduction is consistent with the literature, with an average of 3.46 young per female. Breeding is inferred to take place from about 10 April to 21 June. This period may be extended with further sampling. From life history data gathered we estimate a minimum population of 800 plains pocket gophers in Canada. More rigourous sampling is needed before better estimates can be made.

The plains pocket gopher is controlled by individual farmers to varying degrees dependent upon each situation. Questionnaire returns indicate an annual kill on the order of 570+ gophers. One farmer has invested over $700.00 in an artificial burrow-maker to poison pocket gophers in his alfalfa fields. Several people would like the provincial government to initiate a broad control program along the lines of one proposed in 1985, but so far the Department of Agriculture has not formally done anything, beyond the preliminary work of some of their forage specialists and the "Ag. Reps." in the more seriously affected areas. Loss caused by both species of pocket gophers in Manitoba has been estimated at $11 - $13 million, but this figure and the portion of it ascribable to the plains species require a great deal of research to pass from the rough estimate stage. There is no denying however, the seriousness of the effect of the plains pocket gopher on agriculture in the range. Small initiatives like the purchase of poisoning equipment, experimentation with anhydrous ammonia, and the payment of bounties just over the border, could have large impacts on the Canadian gopher population in the near future.

RECOMMENDATIONS

1. Further studies be undertaken in two areas:

   i. life history:

      - actual population size
      - reproductive season
      - sex ratio
      - ongoing monitoring of range changes

   ii. management and control:

      - rodenticides
      - traps and trapping methods
      - cultural and biological control techniques, e.g. buffer strips, parasites, tolerant varieties of alfalfa, crop rotation, etc.
      - cost-effectiveness of all techniques
      - how to achieve more accurate loss estimates
      - how to estimate the economic benefits of pocket gophers, e.g. increased soil fertility, aeration, water infiltration and rate of formation, etc.
      - feasibility/desireability of setting up a sanctuary to guarantee the future of the species in Canada.

These studies could be cooperative projects of various agencies such as World Wildlife Fund, Manitoba Museum of Man and Nature, University of Manitoba, and the federal and provincial departments of Agriculture. Results of all studies should be made available widely and quickly, especially to affected farmers.

2. A program to raise public awareness of the plains pocket gopher should be undertaken. This could include pamphlets, travelling slide shows and possibly interpretive signage at a demonstration site (see below) or preserve. Again, this would seem to be a multi-agency responsibility/opportunity.

3. All of the above would seem to be best accomplished by setting up a demonstration project(s) on either/both a heavily-infested private farm or the Gardenton Community Pasture (federal). This project could act not only as the research site but as the interpretive site as well, saving the cost of setting aside a sanctuary. The emphasis would have to be on the coexistence of agriculture and the gopher of course, and well-handled, but would help alleviate tension between "preservationists" and "controllers".

PLAINS POCKET GOPHER DISTRIBUTION

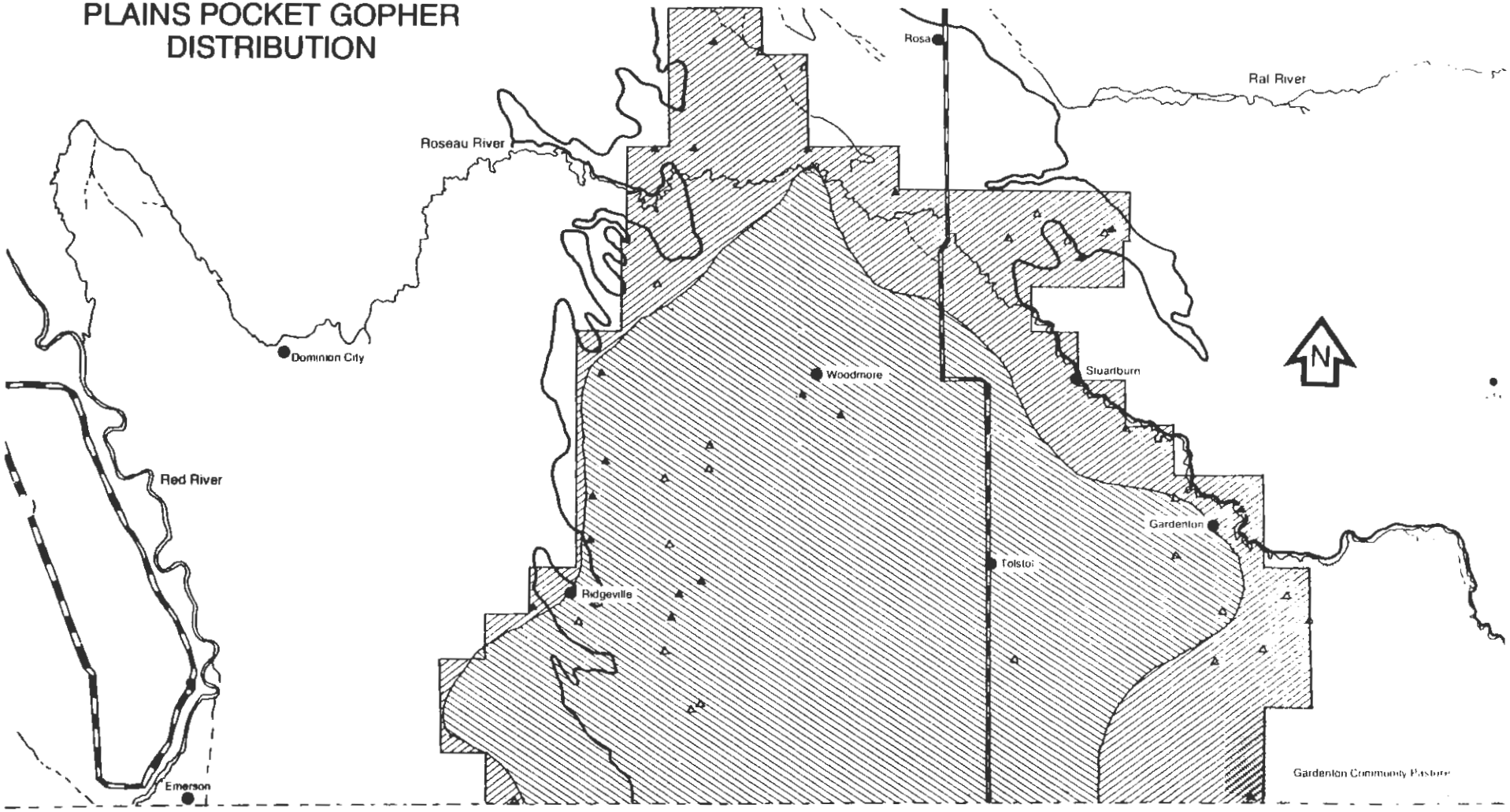

FIGURE 1

Introduction

The plains pocket gopher Geomys bursarius is a small fossorial rodent occurring in Canada only on 51,800 hectares in south-central Manitoba. Due to the restricted distribution, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has assigned to the species the status "Rare" (Cook and Moore 1984). We at the Manitoba Museum of Man and Nature (MMMN) have been monitoring the species as part of our work on the fauna of the province. We looked at the plains pocket gopher most closely in 1971 and 1972 (Wrigley and Dubois 1973).

Early in 1986, the World Wildlife Fund of Canada announced the launching of "Wild West: A Prairie Conservation Program". In the spring of 1987 this review of the status of the plains pocket gopher was proposed and funding subsequently granted.

The study proposed a number of objectives: to delineate the species' range; to study habitat requirements, concentrating on soil and vegetation; to collect and identify ectoparasites; and to determine reproductive seasons and rates. The plains pocket gopher is a major concern to farmers and thus a survey was suggested to determine present control methods and attitudes of the farm community. Programs to control gophers at the municipal and provincial levels were also to be reviewed. The final objective was to formulate management recommendations that would support the continued existence of the plains pocket gopher in Canada.

Methodology

Specimens were obtained using Macabee traps and live traps slightly

modified from Hart (1973). Field work was initiated by Dr. R.E. Wrigley, Manitoba Museum of Man and Nature, on April 22, 1987. These specimens were collected for reproductive data. The bulk of the field work was carried out from 3 - 26 June 1987. Collected individuals were immediately cooled and were frozen within a few hours for later preparation and analysis in the laboratory. Live-trapped individuals were weighed, sexed, checked for reproductive status, tattooed with green ink on a hind toe, and released. These permanently marked gophers may form the basis of future studies. The habitat of the burrow site was noted after every trap set, especially soil type and cultivation practice. In July, the collected individuals were prepared as museum specimens and are now part of the MMMN collection. Chi-square statistical testing was used in the soil, habitat, and reproductive assessments. Ectoparasites were removed and identified by Dr. Terry Galloway, (Entomology Department, University of Manitoba). A questionnaire (appended) designed for landowners to find out their views concerning pocket gopher populations, control methods, and damage, was distributed in the field or from the Vita office of Manitoba Agriculture. Nineteen completed questionnaires were received by the end of July and subsequently analysed. A computer literature search was conducted in May with further follow up in July and August. A preliminary report was completed in early August for Mr. Dave Leman, Wild West Action Plan Coordinator.

Range

The plains pocket gopher was first officially recorded in Manitoba by Bailey (1926). Soper (1944) captured 10 specimens on May 15th, 1943.

He believed, on the basis of mounds only, that the gopher occurred from just east of the Red River at Emerson to 32 km east of Emerson and to a maximum distance of 5 km north of the Canada - United States border. In the revised report of the Mammals of Manitoba (Soper 1961) he maintained this distribution, although he had only captured the species 18.4 km east of Emerson. The distribution was more accurately mapped by Wrigley and Dubois in 1971 and 1972 (Wrigley and Dubois 1973). They showed that Geomys was found 21 km north of the Canada - United States border and that the species' most westerly extension was 10 km east of Emerson, not at Emerson as Soper had assumed (Fig.1.). As the map also shows, the present study found Geomys across the Roseau River to the north, to a maximum of 5 km, and east, about 6.4 km. This expansion, however, is not very extensive, representing 5 to 6 km in 15 years. As observed by Museum personnel, Thomomys talpoides, the northern pocket gopher, during the 1970's extended its range further north and west by a few kilometers every year in Manitoba.

Why has the plains pocket gopher expanded its range so slowly? The answer may in part be due to the interaction between the two species. The plains pocket gopher population in Canada is entirely surrounded by the northern species (see Wrigley and Dubois 1973). Geomys is more aggressive, as was demonstrated by live-trap captures of both species. A plains pocket gopher would make hissing noises and attempt to bite the wire of the cage. The whole time it would also put on a threat display, gaping its mouth and prominently displaying its long claws. Upon placing an individual back in its burrow, the animal would continue with burrowing activities rather than trying to flee. Thomomys was much more docile in the trap, and upon being placed back in the burrow, would make

a speedy effort to scramble for the safety of its home. Juvenile dispersing G. bursarius are of about the same size and weight as adult T. talpoides. Thus, while an adult would have no trouble, a young plains pocket gopher may or may not be successful in displacing an adult northern pocket gopher from its burrow (see also Hickman 1977b).

The Roseau River may have hindered the species' expansion northward for several years, since G. bursarius are only average swimmers (Hickman 1977a). Sudman et al (1987) found the Platte River to be an effective barrier between subspecies of Geomys in Nebraska. Along much of its length in southern Manitoba the Roseau River is also the boundary between preferred and non-preferred soil types, so that when river crossings occurred, an unsuitable soil type was likely to have been encountered (see next section). Human control of the gophers undoubtedly has a dampening effect on range increase as well (see Control section).

Habitat - soil

Studies on the main range have shown that the plains pocket gopher inhabits only those soils that have a sand content of at least 40% (Downhower and Hall 1966), ranging at times as high as 64 - 92% (Moulton et al 1983). Clay and silt each usually make up only 18% of the preferred soil type (Moulton et al 1983) and are never higher than 30% (Downhower and Hall 1966). Other factors such as organic matter, phosphorous content or particle size do not appear important (Hirsch et al 1984). In Manitoba the gophers are found in soil generally referred to as sandy loam. In our study, we found that Geomys preferred sandy

loams in 80 of 91 capture sites. There are many different subtypes of sandy loams in the study area (Ehrlich et al 1953), varying from fine-textured sand to deeply-mantled gravel. Many also have a fairly high silt and organic content, but the number of captures in a particular sandy loam was not statistically different ($p>0.05$) from another. Pocket gophers avoid those soils high in silt, clay and organic content perhaps because these are not sufficienty aerated (Moulton et al 1983). Compaction may also be a factor that would discourage pocket gophers from these soils, since burrowing would be more difficult. The fact that 11 captures were not in sandy loams may be accounted for by habitat saturation. These captures were on the periphery of the range where individuals may have been forced into less optimal soil due to population pressure.

Habitat - vegetation

The plains pocket gopher actively seeks out forb species (Reichman and Smith 1985). Thus, it has been suggested that this vegetative type is a critical habitat determinant. Forbs are a major food source and in some instances make up more than 98% of a gopher's diet in the form of roots, stems, and leaves (Luce and Case 1977, 1978). Most mounds are seen in alfalfa fields and pasture land since these areas are infrequently cultivated and have many forb species (Foster and Stubbendieck 1980, Luce et al 1981, Hirsch et al 1984, Reichman and Smith 1985).

In our study, mounds were located in or near alfalfa/hay fields and pasture land 33 and 30 of 98, respectively. These vegetative types were significantly preferred ($X^2= 17.007$, $X^2= 11.435$ respectively, $p<0.005$)

and those of broadleaf (X^2= 12.580; p 0.005) and fallow (X^2= 14.395; p<0.005) cultivation types were significantly avoided. Thus, the preferred habitat of the Canadian population concurs with the literature.

Biology - general

A total of 54 individuals were collected, using the Macabee gopher trap, on April 22 and from 11-26 June 1987. The average and extreme external measurements and weights for all individuals may be seen in the following table:

	males n=12			females n=34			juveniles n=8		
	max	min.	(avg)	max.	min.	(avg)	max.	min.	(avg)
length (mm)									
total	302	260	(286.6)	273	240	(253.9)	209	779	(196.4)
tail	98	74	(89.2)	85	65	(77.7)	70	58	(63.1)
foot	40	36	(38.0)	37	33	(36.3)	32	29	(30.5)
ear	8	7	(7.8)	7	6	(6.8)	6	6	(6.0)
weight (g)	431.6	206.1	(346.3)	278.4	186.5	(238.5)	116.1	77.6	(103.8)

These dimensions and weights are larger than those generally observed for more southern individuals (Jones et al 1983). The larger size of our population may be attributed to Bergmann's rule (that mammals become larger the further one proceeds to their northern limit), but this is not necessarily accepted by everyone (see Forsyth 1985).

Live-trapped adult males averaged 285g and adult females 181g; suggesting that these traps may be limited to catching smaller individuals. It was noticed that gophers live-trapped by Hickman(1977a, 1977b) were also smaller than collected specimens, but this possible trap bias was not noted by Hickman.

We caught many more females than males (50 to 20), similar to the ratio in the MMMN collection. In total, with this year's captures, 110 of 144 (76.4%) specimens are adult females. An additional 8 of 11 (72.7%) juveniles are also females. Why this is so requires further study. One can only suggest that perhaps there is a bias for capturing female gophers at this time of the year since the female is forced to consume more food to nourish her young. More feeding tunnels are excavated and thus more mounds are made. Seeking fresh mounds, we trap these gophers, thus possibly creating a sampling bias. Higher male mortality due to fighting and to being exposed to predators and accidents while actively seeking out females during the mating season, may also account for the uneven sex ratio (see also Vaughan 1962, Hurly 1987). Vaughan (1962) found that 57% of his specimens were female and that the only time of the year male captures outnumbered female captures was May. He also noted that many more males than females had injuries such as limb lacerations, deep cuts on the head, and minor cuts on the body; all presumably caused by fighting. Thus he concluded that more males would die since more were injured. Such injuries were seen on four individuals (2 females, 2 males) in our study.

Biology - Reproduction

More data were obtained this summer on reproduction than any of the

previous studies of the Canadian population. The earliest pregnant specimen was caught on April 22 with four 25mm embryos. The projected conception date was April 10 (Vaughan 1962). Births and/or pregnancies have been recorded in March and early April in Colorado, Nebraska, and Kansas populations (Vaughan 1962, Kennedy et al 1976, Desy and Druecker 1979, Sudman et al 1986). The latest pregnant female caught was on June 26, revealing three embryos averaging 6mm in length. The projected conception date was June 21. Vaughan (1962) caught pregnant females in August so that further sampling may extend the known reproductive season both later and earlier for the Canadian population. Canadian plains pocket gophers have not been sampled between July 27 - October 8 or between October 20 - April 22.

Placental scars or actual embryos in adult females almost always occurred in 3's or 4's with the average being 3.46 young per female. This is comparable to the findings in the literature, since Vaughan (1962) noted 3.43 young/placental scars per female for Colorado plains pocket gophers and Kennedy et al (1976) recorded 3.6 young/placental scars per female for a Nebraska population.

Males with scrotal testes were first caught on April 22. This was the earliest ever recorded for this population. The last scrotal male was captured on June 23. Sperm production usually starts in January and lasts until May for Nebraska specimens (Kennedy et al 1976), but it has been shown in a Colorado population that sperm production may last longer and that the testes do not have to be scrotal for the animal to be in breeding condition (Vaughan 1962). We collected and live-trapped only four males out of 20 with scrotal testes, which would seem to support this point. Specimens in our study were not tested for sperm

production.

Biology - Ectoparasites

It was determined by Dr. Terry Galloway that our plains pocket gophers harboured the flea, Foxella ignota. This ectoparasite is considered to be a true pocket gopher flea as it predominates on both G. bursarius and T. talpoides (Holland 1986). Dr. Galloway has not had the time to distinguish the subspecies, but he believes that the majority of the fleas are F. i. albertensis. It was noticed that F. ignota infestation of this gopher population was not great (1 to 3 fleas per individual with only 20% of our collected sample being affected) and that most infested individuals occurred on the periphery of the range (8/10). It was also noted that only peripheral Geomys had the predominately ground squirrel flea, Opisocrotis bruneri. It would seem that peripheral Geomys encounter more ground squirrel burrows.

Control

Control methods for the plains pocket gopher may be divided into three categories; provincial, municipal, and private. There does not appear to be much control at the provincial level at this moment, but a general pocket gopher control program, for both Geomys and Thomomys, has been suggested recently (Bonnefoy 1985). The author briefly outlined the ecology of pocket gophers and tried to assess the damage that they cause. He estimated that, in terms of yield loss due to consumption and raising the cutting bar to clear mounds, mounds themselves smothering alfalfa crops, reduced alfalfa stand longevity and machine breakdown because of mounds, pocket gophers in Manitoba (including T. talpoides)

cause $11-$13 million loss to forage producers annually. He suggested an overall organization to coordinate community-action groups. The organization would investigate improving alfalfa field longevity, reducing forage losses, and provide information to forage producers about pocket gophers. The organization could also look at such activities as a literature review on pocket gophers, poison bait effectiveness, trapping feasibility, analysis of natural controls, demonstrating poison application and field-levelling techniques, and finally, evaluating cost-benefit ratios of the various methods of control and providing this information to forage producers. Once the initial analysis is complete, local community action groups should be formed to actually control pocket gophers. Only the decided control method, as determined by the group's members, should be used for best results. The number of hectares that need to be treated, funds, and the actual application are all duties of this local group. The results of their efforts should be evaluated and relayed back to the members of the organization.

This control plan was first proposed in 1985, but has not been approved for funding to date (Dave Campbell, Manitoba Agriculture, personal comm.). The main species of concern is T. talpoides which covers much of southern Manitoba and is quite plentiful (MMMN records), but the plains pocket gopher is of equal concern where locally abundant.

At the municipal level, less action has taken place. None of the Manitoba Agriculture representatives we contacted knew of any formal groups actively controlling pocket gophers. At a trapping and information session near Woodmore, Manitoba, we were able to inform farmers of pocket gopher ecology and of the differences between species.

The Agricultural representatives showed poison bait applicators of the "pogo-stick" and artificial burrow-maker varieties. Although this session only drew a dozen farmers (it was haying time), many agreed that the meeting was useful in clearing up some of the questions they had about pocket gopher ecology and control.

It is interesting to note that a farmer told us that just south of the Canadian population, in Minnesota, local officials are currently paying a bounty of one dollar per pair of pocket gopher front feet.

Questionnaire

A questionnaire was given out to individual farmers asking them to assess the pocket gopher population and damage on their land. Most farmers (14/19) said that pocket gophers had always been on their land and that they use some type of control method, mostly trapping (17), but some poisoning (8) and cultivating (7). Over half (10) also claimed that they killed between 11-50 gophers per year. Yet with this number of gophers being killed per farmer per year, nine farmers believe that they have just as many gophers. Many farmers believed that pocket gophers caused loss in terms of consumption (7), cutter-bar raising to clear mounds (18), and machine damage by mounds (13). In general, the respondents feel that pocket gophers are a nuisance. They would like the species eliminated from all property, including crown-owned land, ditches, and unused portions of their property.

Recently, anhydrous ammonia (a plant fertilizer used in a concentrated gaseous form) was placed into a few plains pocket gopher burrow systems to see the effects. The plants immediately above the

burrows died and pocket gopher activity stopped (no fresh mounds were seen). However, it was unknown whether the pocket gopher had been killed or had simply moved to another locality (George Bonnefoy, Manitoba Agriculture, personal comm.). If a concentration lethal to pocket gophers and not to plants above the burrows is found, this technique may become very popular in the near future, as it is readily available to most farmers.

Pocket gophers are part of the diet of predatory mammals, snakes and birds (Banfield 1974). Pocket gophers were estimated to comprise 30-40% of the diet of long-tailed weasels (Mustela frenata) in Manitoba in one study (Lloyd Gamble, personal comm.), making it a major predator. Farmer Cliff Grier said he once caught a long-tailed weasel in a pocket gopher burrow near Woodmore, Manitoba. Manitoba Agricultural representative George Bonnefoy claimed that he saw an ermine (Mustela erminea) emerge from a gopher hole. Several farmers stated that badgers (Taxidea taxis) are important predators of Canadian plains pocket gophers. We saw three badgers, a mother and her young, near gopher mounds during our study, as well as old and new badger holes among gopher burrows at several locations. Both of these "natural controls" however, are at low numbers in the area (R. Stardom, Manitoba Fur Biologist, personal comm.), the long-tailed weasel being currently classified as "Threatened" (Cook and Moore 1984).

Acknowledgements

We would like to thank everyone who aided in this summer's work, particularly the sponsoring organizations - Wild West Project, World Wildlife Fund Canada and the Manitoba Museum of Man and Nature. All personnel of the Manitoba Department of Agriculture we dealt with were very helpful. The landowners in the study were very cooperative and anxious to help. We are particularly grateful to the Seward family of Ridgeville, Manitoba for their hospitality.

Plains Pocket Gopher - budget 1987

Expenses

salaries and employee benefits	$5322.00
travel	$ 674.00
materials and supplies	$ 7.00
general administrative expenses (includes some travel)	$ 493.00
collecting supplies	$ 122.00
other	$ 158.28
total	$6776.28

Revenue

Wild West	$5015.00
Careerstart	$1429.50
Manitoba Museum, Mammalogy	$ 331.78
total	$6776.28

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June 1987

Name _____

Address _____

Phone _____

(Please check the appropriate boxes)

1. Have pocket gophers ever been on your property?

- ☐ always
- ☐ last 10 years
- ☐ last 5 years
- ☐ last year
- ☐ this year
- ☐ never

2. If yes, what type(s) of control do you use to keep the population in check?

- ☐ none
- ☐ trapping
- ☐ poisoning
- ☐ shooting
- ☐ cultivating

3. How many gophers do you kill per year?

- ☐ 0
- ☐ 1-10
- ☐ 11-50
- ☐ over 50

4. What do you feel is happening to the gopher population on your farm? Is it

- ☐ increasing
- ☐ decreasing
- ☐ about the same
- ☐ don't know

5. Do you believe that gophers do significant damage to your crops by

- ☐ consuming crops
- ☐ their mounds damaging your machines (e.g., swather)
- ☐ reducing harvest (raise cutter bar to clear mounds)

6. Additional comments: _____

_____

_____

_____

Manitoba

Agriculture

Date: October 1984
Agdex No. 682

Pest Facts

POCKET GOPHERS

Description

Members of the Pocket Gopher family are small to medium sized rodents. Their key characteristic is fur-lined, reversible external cheek pouches (pockets) which open on either side of the mouth. Their large yellowish incisor teeth are always exposed in front of the mouth opening. Front claws are large and curved forming efficient digging tools. The naked or scantily haired tail is always shorter than the head and body. Eyes and ears are small.

There are two species of pocket gophers in Manitoba:

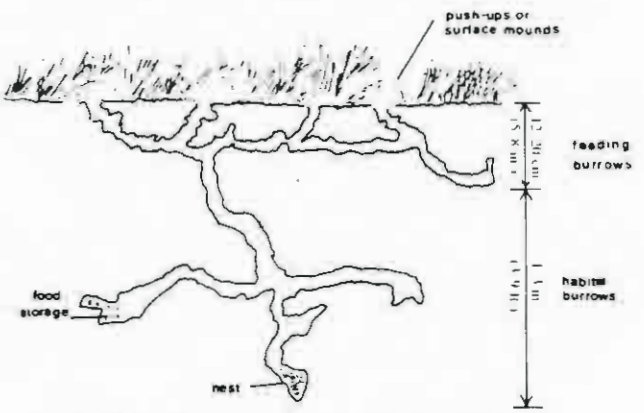
Plains Pocket Gopher — *Geomys bursarius*
Head and Body — 140 - 229 mm (5½ - 9 in)
Tail — 13 - 51 mm (½ - 2 in)
Colour — tawny to brown (may be spotted or albino)
Distinguishing Features — 2 distinct grooves down front of upper incisors
Young — usually 3 - 5 , 1 litter a year, gestation period of 18 - 19 days
Range — restricted to a small area east of the Red River and south of the Rouseau River

Northern Pocket Gopher — *Thomomys talpoides*
Head and Body — 127 - 165 mm (5 - 6½ in)
Tail — 44 — 76 mm (1.7 - 3 in)
Colour — grayish, sometimes washed with black or brown, black patches behind round ears
Distinguishing Features — a single indistinct groove near inner border of each upper incisor
Young — usually 4 — 7, 1 or 2 litters per year
Range — widespread in the grasslands of southern Manitoba.

Habits

Presence of pocket gophers is easily detected by mounds of earth pushed out during excavation of subterranean tunnels. These mounds are fan shaped with the position of the opening indicated by a round earth plug, the last dirt pushed to the surface. Pocket gophers never leave burrows open for long.

General habits of both species are similar. They are solitary for much of their lives and seldom seen above ground. Pocket gophers are active day and night all year round. These burrowers prefer soil that is slightly moist and easy to work with. Pocket gophers feed largely on roots, tubers and some surface vegetation. They occasionally forage, but often pull plants down into the tunnel system. Tunnel systems are extensive with the nesting compartment as deep as 3 m (9.8 ft).



The burrow system of a pocket gopher.

conomic Status

Pocket gophers are harmful in cultivated areas hey are particularly bad in alfalfa fields, where they onsume vegetation and their mounds hinder crop arvesting. Root crops and gardens also suffer from eir depredations.

On the positive side, pocket gophers can be iportant soil forming agents, aiding in water nservation and soil aeration. In overgrazed istures they feed on the larger roots of weeds, stening the return of grasses (if over grazing is ntrolled).

ontrol

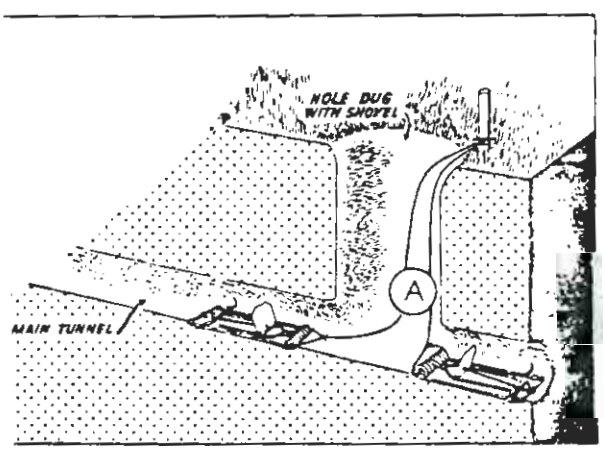
The characteristic of underground solitude makes ntrol methods difficult and expensive. Control is ost effective in the spring when green surface getation starts to grow. Although, trapping is ommended for control in the fall when gophers most active bringing soil up to the surface. apping and poisoning are the two most practical thods. Fumigation has very limited effectiveness ainst pocket gophers.

apping

The most successful types of traps are firstly the cabee and next the box type with choker loop. ps, quick and positive when properly used, last efinitely. However, they are labor intensive and tly to use in a large area.

cedures:

Locate newest mound in area.
Probe to locate main runway. It will be about 38 — 46 cm (15 to 18 inches) away from the mound on the same side as the plug.
Dig down to main run and remove soil so that traps can be placed far back in the tunnel.
Attach a wire to each trap and fasten other end to a metal stake to serve as an anchor.
Set and place two traps, one in each direction.
Place trigger away from excavation.
Partially cover openings as the gopher will instinctively close all open burrows. Avoid letting in too much light as the gopher may push a plug of dirt ahead of it setting off trap.
7. Visit each trap setting morning and evening for best results.



Poisoning

Control of pocket gophers is best accomplished by poisoning. Over large areas heavily infested with gophers, poison bait is the most inexpensive control method. This can be accomplished by a number of methods:

1. Probing to locate main tunnel and baiting by hand.
2. Using one of several hand machine dispenser probes which automatically drop bait into gopher runway.
3. The United States Fish and Wildlife Service has developed a tractor-drawn "Burrow-Builder" for use on large scale acreages. It creates an artificial burrow system intersecting natural burrows depositing bait in one operation.

Rodenticides

There are three rodenticides presently registered for pocket gopher control:

1. Chlorphacinone (Rozol)
2. Strychnine
3. Zinc phosphide

Strychnine is effective for a quick reduction of numbers and is a relatively safe poison. It can be mixed with barley or wheat and should remain effective for up to two weeks. However, it is possible for non-target animals to obtain a lethal dose of strychnine by eating the entire gopher because of undigested bait in the stomach or bait in the cheek pouches.

REFER TO THE LABELS FOR COMPLETE INFORMATION AND PRECAUTIONS. THESE ARE AVAILABLE THROUGH LICENSED PESTICIDE DEALERS.

Information prepared by:

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PIPING PLOVER CENSUS AND EVALUATION OF THE EFFECTS OF EXPERIMENTAL HABITAT ENHANCEMENT AT CHAPLIN LAKE, SASKATCHEWAN

Prepared for
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November, 1988

Executive Summary

During the summer of 1988, Chaplin Lake was surveyed to assess the current Piping Plover population and to evaluate the effects of artificial nesting beach placement on this population. A maximum of 17 adult Piping Plovers were found and these birds produced a total of 3 young. This represents only 29% of the 1987 and only 3% of the 1984 adult population. The number of young produced was only 13% of that recorded in 1987. Evaluation of the habitat indicated that virtually none of the available natural habitat or the artificial habitat was being utilised. It is speculated that the reduction in the population may be a reflection of the decreasing water levels. It is felt that the evaluation of the impact of the artificial beaches cannot be made until such time as water levels increase in Chaplin Lake.

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1.0 Introduction

Since 1984, Chaplin Lake has been recognised as one of the major breeding areas for Piping plovers in Saskatchewan [and also in North America] (Harris et al. 1984). This lake is a series of relatively large, interconnected, saline basins located half-way between Swift Current and Moose Jaw adjacent to the trans-Canada highway (Figure 1).

A complete Piping Plover population census was carried out during the summer of 1987 (Harris et al 1987). During this census areas of gravel beaches were mapped in an attempt to determine the extent of suitable nesting habitat on this lake for Piping Plovers.

During the winter of 1987-88 gravel was hauled into two areas where no suitable gravel beaches were found in an attempt to increase the area suitable for this species. The gravel was deposited in low ridges with a truck, perpendicular to the water's edge.

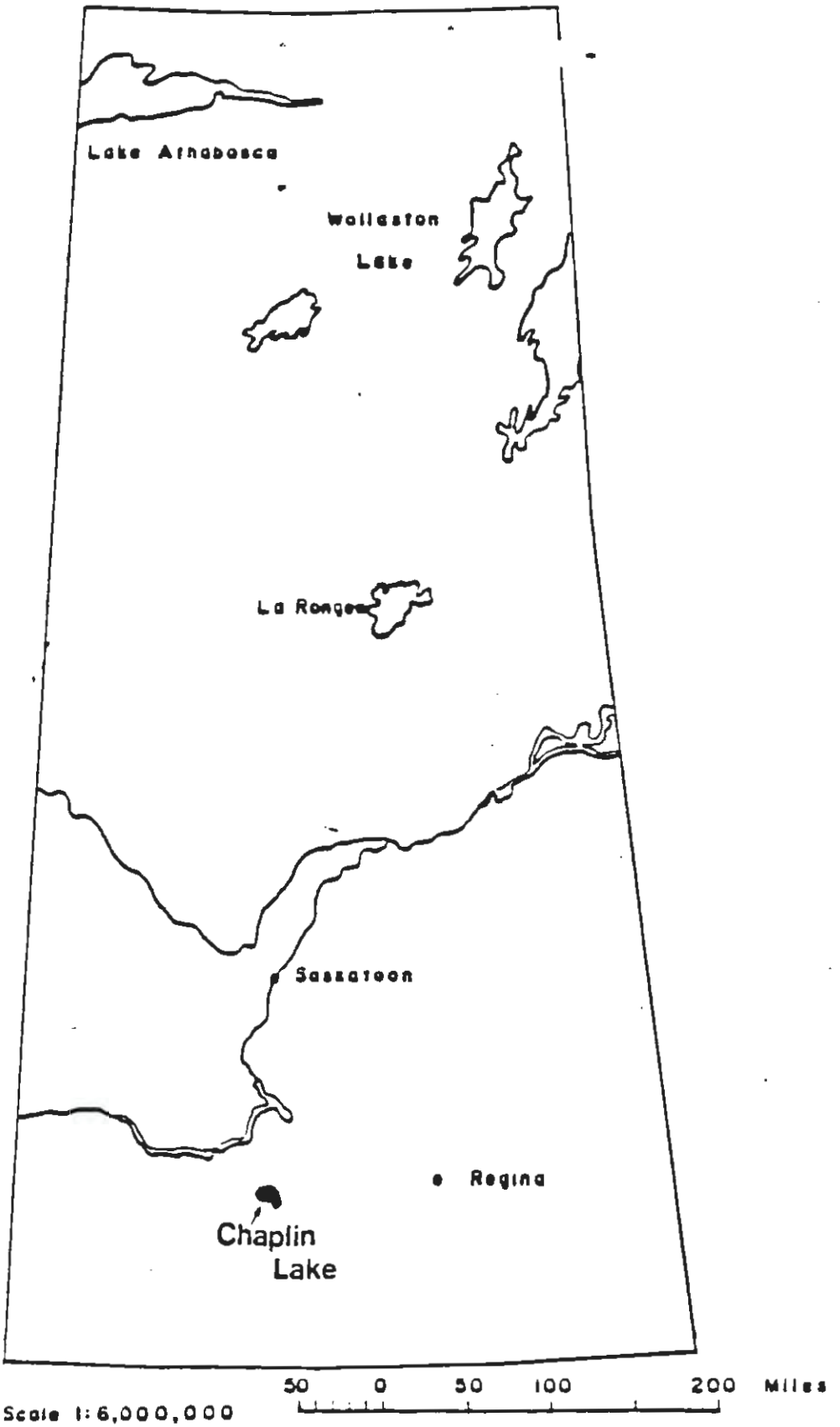
The primary purposes of conducting this survey were to:

a) monitor the status of the Piping Plover population on an important breeding area

b) determine the extent to which existing habitat was being used

c) and to determine what, if any, effects the placement of artificial gravel beaches may have on Piping Plover breeding populations.

Figure 1. Geographical location of Chaplin Lake



2.0 Methodology

Chaplin Lake was surveyed four times during the breeding season, on May 26, June 6, 18 and July 13, 1988 to assess the breeding population of Piping Plovers. The entire lake was surveyed on both May 26 and July 13. During the remaining two visits only the areas containing water, the control beaches, experimental beaches and those sites which had adult Piping Plovers during the May census were surveyed.

Location of all adults was plotted on maps of the lake during each visit. Each time a Piping Plover was encountered a check was made to determine whether or not the bird was paired, and, if paired whether or not the birds were territorial. At all locations where birds were seen attempts were made to locate nests or young.

Travel on the lake shores was by trimoto or on foot. Searches concentrated in the areas of suitable gravel nesting beaches rather than closer to the water, or in the case of dry basins, the silty flats. Frequent stops were made and the areas farther out were scanned using binoculars.

Two types of beaches were censused to evaluate the effect of the placement of artificial beaches for Piping Plover habitat enhancement. Two stretches of beach were selected in two different areas of the lake (Figure 2). Each of these areas contained an experimental section, which had gravel ridges placed on them in an attempt to improve the area for Piping Plover nesting, and an adjacent control area which had been left untouched. The populations on each of these sections were monitored to evaluate the success of the gravel ridges.

The selection of these beaches and the experimental habitat enhancement was coordinated by Dale Hjertaas, Endangered Species Biologist with Saskatchewan Parks, Recreation and Culture - Wildlife Branch. The experimental beaches received gravel placed in strips 10 -20 cm thick perpendicular to the water's edge. These strips were 4 - 6 metres wide and varied in length from 55 - 150 metres. The strips were placed 80 - 100 metres apart along the shore. On the southernmost area of experimental beach there were 22 strips placed while the northern area only had five.

3.0 Results

A maximum one day count of 17 adult Piping Plovers was found during the population census (Table 1). Only two pairs attempted nesting in 1988 and these raised 3 young. The number of individuals found on each survey is given in Table 1 and the location of these individuals is shown in Figure 2.

Table 1. Chaplin Lake adult Piping Plover numbers and sites at which they were found as depicted in Figure 2.

Location	May 26	June 6	June 18	July 13
1	-	-	1[T]	1[*]
2	2	3	-	3
3	3	2	1	-
4	2	2	-	-
5	4[T]	3	-	-
6	3	-	4	-
7	1	-	2	-
8	-	1	-	-
9	1	-	2	-
10	-	NC	NC	1[**]
11	1	1	-	-
TOTAL	17	12	10	5

T= territorial behaviour observed
*= 1 young also present
**= 2 young also present
NC= not checked on this date

No birds used the experimental or the control beaches as breeding areas. In the areas where nesting was documented the birds nested about one month later than is normal for this species with young birds being less than one week old in mid-July rather than being almost fledged (W. C. Harris unpub. data, Big Quill Lake 1985 - 1988)

During the last census in June (June 18) no nest was found at site 1. Yet on the last census downy 1-2 day old young were found. These birds would have been in the first stages of incubation during the June census and may have been reluctant to return to the nest with an intruder nearby, thus a possible reason for our failure to find the nest. Site 10 was not checked

during the June counts due to the lack of water and the fact that there were no birds present during the initial survey. However 2-3 day old young were seen at this site in mid-July.

4.0 Discussion

The number of adult Piping Plovers has declined to 29% of the 1987 population, and to only 3% of the 1984 population (Table 2). This drastic decline has corresponded to a decline in the quality of habitat on the lake as a result of the prolonged drought in the area. Water conditions this year were severely low, even during the first census in late May. Aside from a bit of water in the canals associated with the sodium sulfate plant at the north end of the lake, the only basin which contained water in late May was the basin referred to as Midtskogen Lake on the topographic maps of the area (locations 4-9, Figure 2). Although this basin still had some water in mid-July it appeared as if it, too, would be dry by the end of the summer unless significant rainfall occurred to replenish the water.

The evaluation of the artificial beaches showed no response to these gravel areas. Although four territorial birds were seen at one of these areas (location 5, Figure 2) no evidence of breeding was recorded. These birds were feeding at a seepage area, not on the artificial gravel beaches. The territorial behavior noted at this site (Table 1) may have been in defence of a feeding area rather than a potential nesting site.

There were two sites where Piping Plovers did successfully nest. At site 10 the birds were associated with a seepage area and there was no water in the nearby basin. At site 1, the birds were associated with the canals used for water intake for the sodium sulfate plant.

Most of the available natural habitat and nesting beaches were not used during the 1988 season. Thus the evaluation of the potential for placement of artificial beaches for Piping Plover habitat enhancement can not be properly conducted when water conditions are severely reduced as was the case in 1988. The severe reduction in the water levels precludes a valid comparison of nesting success on the experimental and control beaches and the decision on the suitability of such gravel beaches should be delayed until such time as the water levels are restored to a more stable level. Further monitoring of the plovers for evaluating the success of the artificial beaches should be delayed until the return of more favourable water conditions.

Table 2. Comparison of Piping Plover numbers between 1984, 1987 and 1988 surveys.

Year	Total Shoreline (km)[a]	Shoreline Surveyed (km)[b]	# birds paired[c]	# birds unpaired	Total Seen	Est. Pop.
1984	248.7	119.4	240	13	253	527
1987	248.7	235.0	48	9[d]	57	57
1988	248.7	248.7	8[e]	13	17	17

[a] This is a measurement of the lake's shoreline as depicted on the national topographic series of maps. It does not reflect the actual water line but instead the historic high water line.

[b] This is the area of the total shoreline which was surveyed. It again does not reflect the actual water line but the area surveyed would generally be from the historic high water line as depicted on the topographic maps to the current water line or in the case of 1987 when much of the lake was dry from the historic high water line as far out on the exposed flats as possible without becoming stuck in the mud.

[c] This figure represents the actual number of birds, not the number of pairs. To obtain the number of pairs divide by two. A pair was defined as two birds, one male and one female which remained together during feeding or when flushed but did not necessarily display territoriality.

[d] This figure includes a female at a nest for which no mate could be found. No single males were found within one kilometre of this site. Either this had lost its mate or the individual was much further from the home territory than would be expected or we missed finding it in spite of a thorough search.

[e] This figure represents the maximum number of paired birds seen during census with the highest number of adults.

5.0 References

Harris, W.C., S.M. McAdam and D.A. Weidl. 1987. Chaplin Lake, Saskatchewan Piping Plover census and habitat evaluation. Unpublished report prepared for Saskatchewan Natural History Society, Box 4348, Regina, by Prairie Environmental Services. 8 pp.

Harris, W. C., G. Wapple, R. Wapple, K. DeSmet and S. M. Lamont. 1985. Saskatchewan Piping Plovers - 1984. Unpublished report prepared for the Saskatchewan Natural History Society and Saskatchewan Parks and Renewable Resources by Prairie Environmental Services.

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OPERATION BURROWING OWL
1987 PROGRESS REPORT

INTRODUCTION

Operation Burrowing Owl was initiated in Saskatchewan in 1987 by Saskatchewan Parks, Recreation and Culture, Saskatchewan Natural History Society, Saskatchewan Wildlife Federation, World Wildlife Fund Canada and Wildlife Habitat Canada as a step in the conservation and recovery of the burrowing owl in Saskatchewan.

The objectives of Operation Burrowing Owl were:

1. To survey burrowing owl populations across Saskatchewan and estimate provincial and regional populations.

2. To initiate a habitat retention program for burrowing owl nesting areas and to protect 300 sites in 1987.

3. To enhance and facilitate research on the burrowing owl by placing nest boxes in suitable protected breeding areas.

4. To establish a method for annual census of the owl population on protected habitats and for reinforcing the importance of burrowing owls to the landowner.

5. To increase public awareness that the burrowing owl is a threatened species.

Project Area

The project accepted and investigated reports of burrowing owls across Saskatchewan. However the principal study area was defined by postal districts to basically follow the burrowing owl range defined by Wedgewood (1978).

METHOD

A questionnaire (Appendix I) was mailed to each farm address in the study area in May. Replies from these questionnaires were a principal source of burrowing owl sites. Other sightings were reported through conservation officers or to the Wildlife Branch due to publicity about the project. We also checked sites known from our 1987 project in the southeast and investigated sites located during travel.

Project staff members Wendy Lyon, Craig Palmer and John Pollack visited each site between May 15 and September 29 to determine the number of owl pairs present. Later in the summer young owls had occupied new holes. Observers used cues such as the amount of debris at nest holes to assess which sites were original breeding sites.

For sites where burrowing owls were present the location, landowner, and number of pair were recorded and burrow locations plotted on a map of the area. The following features of the habitat were also recorded:

1. size of the nesting area
2. presence of water
3. presence of trees
4. number of Richardson Ground Squirrel and badger holes present as possible nest sites.
5. Dominant vegetation and condition of the vegetation.
6. soil type according to soil survey maps
7. land system according to the Wildlife Branch's Terrestrial Wildlife Habitat Inventory maps
8. origin of holes used as nest sites.

Landowners were then contacted and asked if they would be interested in participating in the Operation Burrowing Owl Program. The sign and later in the summer, a pamphlet were shown to landowners. Field staff explained the voluntary agreement with the Saskatchewan Wildlife Federation (Appendix 2) and, if 5 or more pair of owls were present, the paid agreement with the Wildlife Development Fund (Appendix 3). If possible, agreements were signed

on the spot. In some cases repeat visits or telephone follow-up were necessary.

When landowners enrolled, the possibility of habitat improvements, especially nest boxes, was assessed. Landowners were given information on building boxes and project staff placed nest boxes in some areas.

Data from field forms were entered onto a dbase computer file at the Wildlife Branch. Signed agreements were forwarded to the Saskatchewan Wildlife Federation. Federation staff ordered Operation Burrowing Owl signs and mailed them to the landowners.

On June 4, 1987 His Royal Highness Prince Philip visited the farm of Grant and Sheila Fahlman at Kronau to officially initiate Operation Burrowing Owl. During the ceremony he presented Operation Burrowing Owl signs to eight landowners who had enrolled in the program. Press coverage of this event was the largest publicity component of the program.

RESULTS

Program

As of December 31, 1987 we had received 850 reports of burrowing owls plus various responses with historical information or the fact that burrowing owls were not present. During the summer the 3 project staff members visited 418 sites which were occupied by burrowing owls. 729 pair of burrowing owls nested on the 418 plots visited.

Habitat protection agreements were negotiated to cover 288 of these 418 sites. One additional agreement was signed for a site used by burrowing owls in 1986 but not in 1987. These agreements protect 18,081 acres of habitat occupied by 572 pair of burrowing owls. Forty-four sites were not eligible for the agreement because the owls nested in a road ditch, cultivated field or community pasture. Ninety owners did not wish to enroll in the program. The reasons for not enrolling ranged from lack of interest in the owls to not wanting them disturbed and not needing outside help to protect them.

Most landowners had less than 5 pair of owls and were therefore only eligible for voluntary agreements. Twenty-five sites supported 5 or more pair and were eligible for the paid agreement. Five landowners opted for the paid agreement. Two of these agreements cover more than 1 site, with a total of 55 pair of owls protected by paid agreements. In addition Grant and Sheila Fahlman had signed a separate paid agreement to protect their owl colony of 8 pair before Operation Burrowing Owl was initiated and so were not eligible for an additional agreement.

Of the remaining 18 colonies with 5 or more pair of owls, 16 are protected by voluntary agreements. One site on a PFRA pasture was not eligible for an agreement, and one landowner could not be located before the summer ended. The majority of landowners selected the voluntary agreement either because it was less restrictive and allowed them to use pesticides or because they would protect the area anyway without payment from the project.

Late in the summer 168 nest boxes were constructed for the project by the Saskatchewan Correctional Centre and an additional eighteen boxes were constructed by Boy Scouts. Forty boxes were placed at 11 sites in addition to the 12 boxes that had been previously placed at Grant Fahlman's farm. The remaining boxes are in storage and will be placed in 1988.

HABITAT USE

The mean number of owl pair observed per occupied site was 2.96. However, the majority of sites (62%) supported only 1 pair and large colonies were relatively rare (Table 1). Only 2 colonies supported more than 10 nests.

Because all reported sites have not yet been visited, any conclusion about selection for a particular land system or other feature of the habitat would be premature. The largest numbers of owls nested on lacustrine, solonetzic and moraine land systems as mapped by the Wildlife Branch's Terrestrial Wildlife Habitat Inventory (Table 2).

The soils most often selected for nest sites were heavy clay, clay loam, and loam (Table 3). Nests were located in both native and domestic grasses (Table 4), but usually on pasture land (Table 5). One surprising finding was 39 pair nesting in burrows in cultivated fields.

DISCUSSION

Response to our questionnaire was positive and the general reception of the program has also been positive. While the actual agreements signed with landowners can be cancelled at any time and so offer no real security to the habitat, we hope the expression of interest in the owls will influence the farmer's attitude to burrowing owls. During the summer at least 1 landowner did alter his plans to break land because of our program.

Awareness of the burrowing owl is a first step to public concern for and protection of the species. HRH Prince Philip's visit to Grant Fahlman's burrowing owl colony and the extensive media coverage of that event certainly raised public awareness that the burrowing owl is threatened. The increase in awareness was apparent during field contacts and should contribute to protection of the burrowing owls' habitat.

We located 759 pair of burrowing owls. As an equal number of sites were not visited, and we know that some pairs of owls were not reported, Saskatchewan probably has 2000 to 2500 pair of burrowing owls. This number is encouraging as Wedgewood (1978) estimated a total Canadian population of 2000 pair and predicted significant declines. This apparently larger population may, of course, not be realized when the survey is completed in 1988. If a population of 2000 or more birds in Saskatchewan is proven out, it likely indicates that Wedgewood (1978) underestimated the population rather than that the population is increasing.

LITERATURE CITED

Wedgewood, J.A. 1978. The Status of the Burrowing Owl in Canada. Report to Committee on the Status of Endangered Wildlife in Canada.

Table 1. Number of pair of burrowing owls in colonies of different sizes observed by Operation Burrowing Owl staff in 1987.

Number of Pair In Colony	Number of Colonies	Number of Pairs of Owls Total
1	256	256
2	88	176
3	31	93
4	18	72
5	11	55
6	7	42
8	5	40
10	1	10
15	1	15

Table 2. Land system selected by nesting burrowing owls in Saskatchewan in 1987.

Land System	Number of Sites	Number of Owl Pairs	Mean Colony Size
Moraine	134	184	1.4
Washed Moraine	7	7	1.0
Fluvial	14	20	1.4
Fluvial Lacustrine	26	52	2.0
Lacustrine	111	244	2.2
Aeolian	1	1	1.0
Solonetzic	66	136	2.0
Eroded	8	14	1.75
Meltwater Channel	9	11	1.25
Drainage	12	23	1.9
Alluvium	17	34	2.0
Saline	6	11	1.8
Bedrock (General)	6	15	2.5
Unknown	5	13	2.6

Table 3. Soil type selected by nesting burrowing owls in Saskatchewan in 1987.

Soil Type	Number of Sites	Number of Pairs
Unknown	4	4
Heavy clay	98	223
Clay	16	31
Silty clay	3	4
Silty clay loam	5	8
Clay loam	124	197
Loam	5	7
Sandy clay loam	3	3
Loam	102	175
Light loam	10	14
Very fine sandy loam	1	2
Fine sandy loam	12	23
Gravelly loam	2	3
Mixed gravelly & sandy loam	5	5
Sandy loam	10	26
Sand	3	3
Gravel	1	1
Alluvium	6	13
Alkali	3	3
Sand	1	1
Eroded	5	8
Loamy sand	3	5

Table 4. Type of vegetation at burrowing owl nesting areas in Saskatchewan in 1987.

Type of Vegetation	Number of Sites	Number of Pairs
Cultivated	33	39
Native Grass	107	159
Native Grass & Shrubs	42	72
Brome Grass +/- Alfalfa	26	36
Other Domestic Grass	150	330
Mix of Native & Domestic Grass	64	123

Table 5. Condition and use of vegetation at burrowing owl nesting areas in Saskatchewan in 1987.

Type of Vegetation	Number of Sites	Number of Pairs
Cultivated field	33	39
Not mowed or grazed in a long time, grass thick & fairly tall	21	27
Recently mowed	31	60
Mowed last year, not yet this year	14	19
Pasture, grazing heavy, grass less than 1 inch tall	51	120
Pasture, moderate grazing gives mix of short and taller grass bunches	189	352
Pasture, grass uniformly more than 1 inch tall	38	66
Pasture, most grass 6 inches or taller	45	76

AN INTRODUCTION TO WILDLIFE PLANNING IN SASKATCHEWAN

January 1988

Introduction

Saskatchewan's game species are an important economic and ecological resource. Hunters spend more than $60,000,000 on their sport in Saskatchewan each year. Our major game species support more than half a million days of hunting recreation as well as many days of nonconsumption outdoor recreation. Development of management plans for major game species is part of this department's commitment to better management of both the provinces wildlife resources and our fiscal and personnel resources.

Inventory

In order to decide where to go, one must first know where you are! The first phase of planning is thus inventory of populations, harvest data, days of recreation, areas of occupied habitat and similar data to identify the status and use of the wildlife resource. A perfect data set is not essential to start planning, best estimates from available data are used.

Strategic Plan

The strategic plan is based on current inventory. It states the agency's goals and objectives for managing wildlife. Major problems are also identified and the major strategies which will be used to address them.

The Wildlife Action Plan for Saskatchewan is a major component of strategic planning, setting broad goals and strategies. The species management plan is the second part of the strategic plan, identifying specific objectives and strategies for each species.

Operational Plan

Operational planning has 2 annual components for game species. The first is an annual allocation of the agency's financial and personnel resources to various tasks. These resources are assigned to projects selected as the most effective means of achieving the objectives identified in the strategic plan. Each management project will usually address one or more of the strategies

identified in the strategic plan.

To ensure resources are allocated most effectively, projects such as survey work, habitat enhancement or publicity projects should be proposed with estimates of costs and benefits in a format similar to Figure 2. Each project can then be evaluated as to feasibility, cost effectiveness in meeting objectives, ecological importance and public political interest. Individual projects will be approved according to their overall rating compared to all other projects and total Branch resources available.

The second component of operational planning is preparing the regulations which control hunting. Each proposal for regulatory change should be designed to help meet the objectives for that species and should be explained to the Wildlife Advisory Committee on that basis.

Evaluation

Evaluation is the final and essential step in any planning process. It consists of collecting data for comparison with the stated objectives and last years status to determine if we are making any progress. Evaluation should also show the costs of producing these products.

Because the primary purpose of planning is to become more cost effective in meeting our legislated mandate and producing our various wildlife products, regular evaluation is essential. This comparison with objectives must be done annually and formally to force annual checks on programs. Without this phase the Department cannot determine if its strategies are working and its money is being well spent. It cannot effectively fine tune its programs. In short, it cannot plan effectively.

Benefits of Planning

Planning takes a substantial effort. If not used properly this effort devoted to planning is almost totally wasted. However it is also true that wildlife managers in Saskatchewan are facing very substantial challenges as various interests compete for both the wildlife and the land base wildlife depends on.

This challenge is complicated by a period of fiscal austerity. An effective planning system should help management get the most benefit from available budgetary resources by assigning them to high priority, cost effective projects and evaluating their success

Crowe (1983) suggests a good planning system will also provide these benefits:

1. Promote action instead of reaction by focusing on the future objective instead of today's crisis;

2. Help to deal with the ever increasing rate of change in the agency and in society generally;

3. Alert other resource users to the needs of wildlife, in effect staking our claim;

4. Help deal with the increased complexity of wildlife management by providing a logical structure for decision making;

5. Provide greater accountability to senior management, the government and the public.

The Department will only continue this level of planning if these benefits prove real and worth the cost of the planning exercise.

Appendix I

Operation Burrowing Owl

Have you seen a burrowing owl?

Also called the ground owl, the burrowing owl is easily identified by its long legs and characteristic habitat of bobbing up and down when approached. It usually nests in old badger or gopher holes and lays from five to seven eggs. The owl hunts over pasture and cultivated fields, but prefers a plot of grass for nesting. It feeds on mice, grasshoppers, crickets and similar prey. These attractive little birds are harmless to people and are in fact helpful to the environment and the farmer.

Recently, the loss of pasture land combined with pesticide use and thoughtless shooting has led to a decline in numbers of this species. The burrowing owl is now classed as a threatened species in Canada. Saskatchewan Parks, Recreation and Culture, in cooperation with Saskatchewan Natural History Society, Saskatchewan Wildlife Federation, World Wildlife Fund and Wildlife Habitat Canada have initiated Operation Burrowing Owl to ensure this threatened species survives in Saskatchewan.

As a first step, we want to locate and visit all burrowing owl nesting sites. If you have seen any burrowing owls, please fill in this questionnaire and return it to us.

How many? _____ When? (date) _____

Where? _____1/4 of Sec _____Twp. _____ Range _____ W of _____ M

Nearest town _____

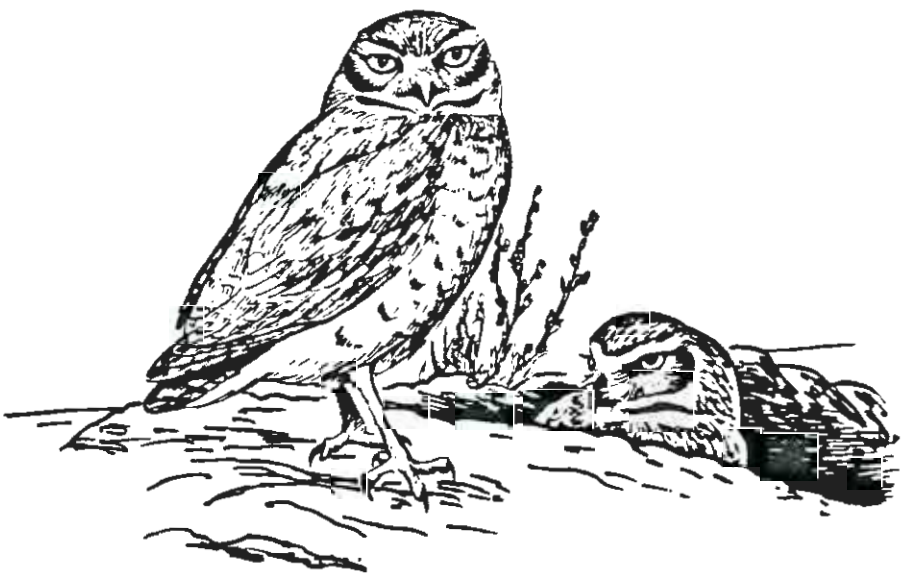
Name _____ Phone _____

Address _____

Thank you for helping us with "Operation Burrowing Owl". Please fold this questionnaire so that our address shows, staple or tape closed and mail it to us.

36¢
STAMP

Operation Burrowing Owl
c/o Saskatchewan Parks, Recreation & Culture
3211 Albert Street
REGINA, Saskatchewan
S4S 5W6

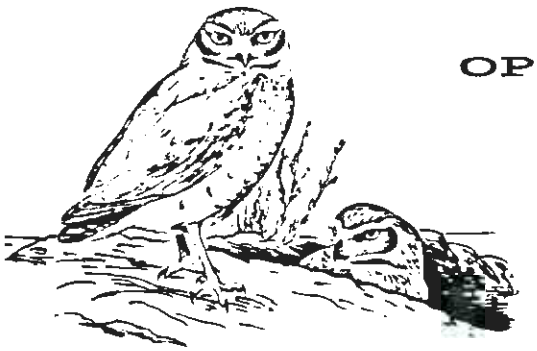


TO THE FARM RESIDENT

FROM OPERATION BURROWING OWL

Appendix 2

** Please complete in duplicate: 1 each for Central Office, Landowner.



OPERATION BURROWING OWL

VOLUNTARY HABITAT PROTECTION AGREEMENT

Co-sponsored by: Saskatchewan Wildlife Federation, Saskatchewan Natural History Society, World Wildlife Fund, Saskatchewan Parks, Recreation and Culture and Wildlife Habitat Canada

Name _____ Phone _____

Address _____

_____

check applicable box: NEW AGREEMENT RENEWAL

DESCRIBE THE PROPOSED NESTING AREA:

(e.g. pasture land, w/wo shrub, roadside etc.) _____

_____

_____

_____

APPROXIMATE SIZE LOCATION (see reverse)

_____ ACRES ___ part of ___ ¼ of sec. ___ Tp. ___ Rge. ___ W of ___ Mer.

NUMBER OF OWL PAIRS PRESENT? _____

_____

SPECIAL REQUIREMENTS OR PROJECTED IMPROVEMENTS:

_____

_____

_____

OPERATION BURROWING OWL SIGN REQUIRED? _____

CONDITIONS OF AGREEMENT:

1. Landowner agrees not to break the nesting area for 5 years from date of signing.
2. Landowner agrees to report the number of nesting pair annually if requested.
3. Saskatchewan Wildlife Federation agrees to provide a gate sign recognizing the landowner as a participant in Operation Burrowing Owl.
4. The Saskatchewan Natural History Society agrees to provide an annual newsletter reporting the status of the Burrowing Owl.
5. The landowner may cancel this agreement by notifying: The Saskatchewan Wildlife Federation, Box 788, Moose Jaw, Saskatchewan, S6H 4P5.

_____ _____

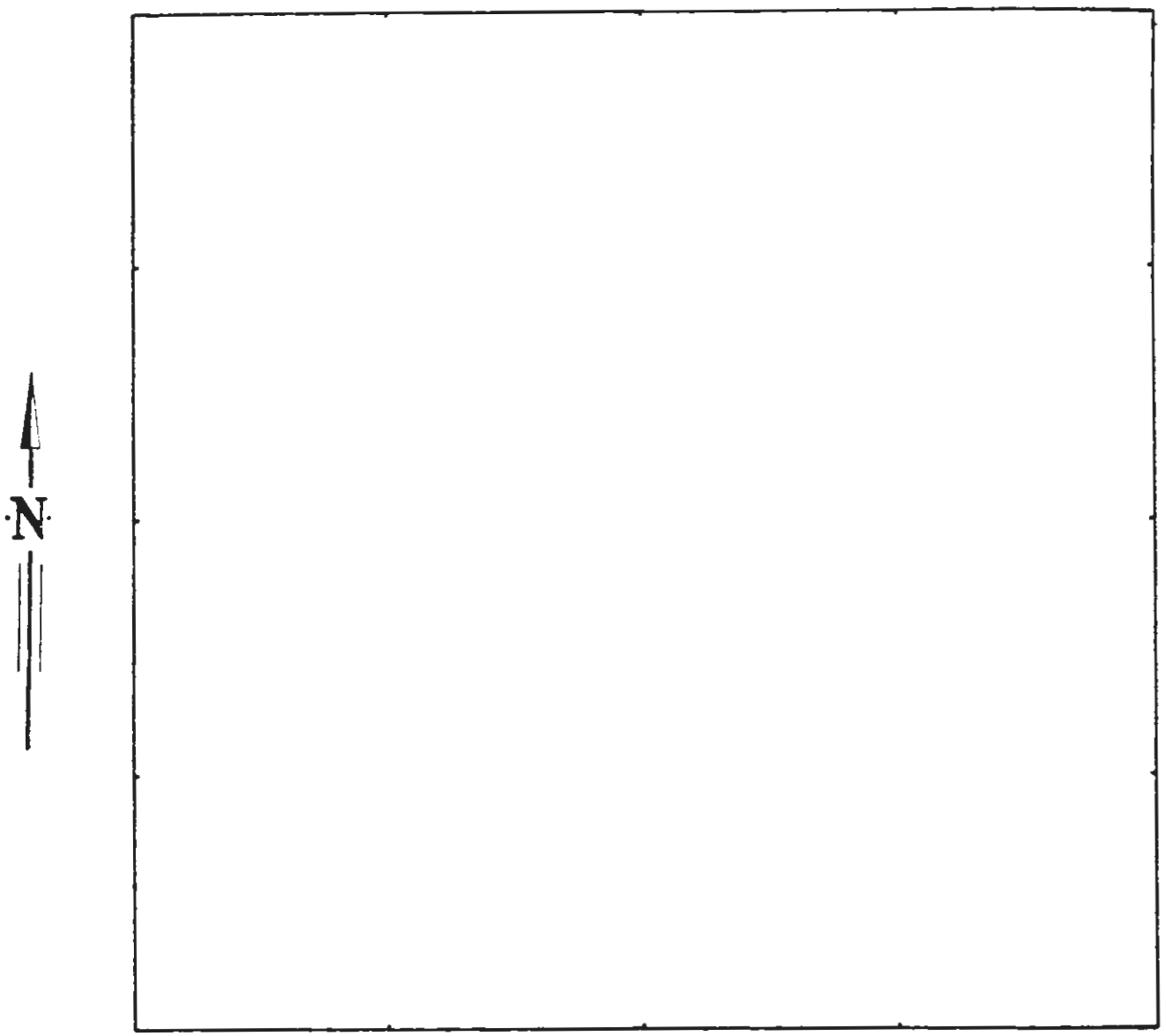
Signature of Operation Burrowing Owl Representative

Signature of Applicant

Date _____

002

Show locations of Roads, Buildings, Prominent Features or Landmarks, Water Bodies, Etc.



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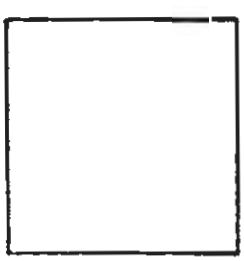
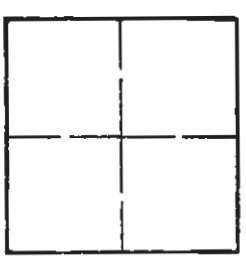


A ¼ Section



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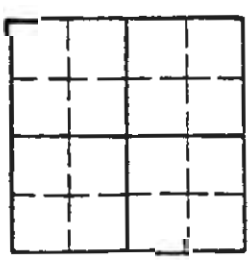

Four Sections

Mark it as required using examples shown. Identify the area by indicating: ¼ Section, (if required), Section(s), Township, Range, West of _____ Meridian.

WESTERN BLUE FLAG (*IRIS MISSOURIENSIS*) MONITORING PROGRAM IN SOUTHWESTERN ALBERTA

by

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ABSTRACT

In 1987, six permanent sample plots were established in southwestern Alberta to monitor populations of the endangered western blue flag, *Iris missouriensis*. Populations were censused and habitat characteristics were noted. There are estimated to be 5000 to 6000 *Iris* "stems" in the study area, the only naturally occurring populations of *Iris missouriensis* in Canada.

Limiting factors include heavy grazing pressure, loss of spring flow and natural drought. Threats to potential habitat include cultivation and invasion by non-native species.

Recommendations include: purchase of property or landowner agreements to protect populations on private land; yearly inspection and triennial population census; protection of the Provincial Park site from development; a study of the impact of groundwater withdrawals on spring flow; and maintaining livestock grazing at light levels.

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1. INTRODUCTION

The need for consideration of rare plants in land use decisions is becoming increasingly important. Alberta's flora is being put at increasing risk through the spread of man's activities -- urban centres, road networks, forestry operations, irrigation and water storage projects, grazing of domestic livestock and conversion of native habitats to cropland. There are a number of sites which are under consideration for designation as natural areas or ecological reserves and additional information is needed for boundary definition and management. Endangered species which occur on privately owned lands can be protected through landowner agreements and outright purchase for conservation purposes.

In 1986 a pilot project was initiated to assess and monitor known populations of numerous rare plants in southern Alberta (Wallis et al. 1986). That study recommended further work on several rare plants which are found in southwestern Alberta. This is a botanically diverse area where there are numerous rare plants, several of which occur nowhere else in Canada. One of the species which naturally occurs nowhere else in Canada is the western blue flag, Iris missouriensis. It was cited in the pilot monitoring study as one of three species which should be treated as endangered and it was recommended for the preparation of a recovery and monitoring plan.

Iris missouriensis occurs in very small populations, often less than one hectare in size and its Foothills Parkland and Foothills Grassland habitats are still being impacted by human activities. Major features of the habitat are the presence of groundwater flow just below the surface and lush forb and graminoid meadow vegetation. Iris missouriensis is a showy species which appears tolerant of and may actually benefit from some grazing by cattle. Historical populations have been lost due to cultivation of habitat and planting of introduced grasses and forbs for hay crops. Modification of these habitats, competition from non-native plants, and heavy cattle grazing pose continuing threats.

As part of a recovery and monitoring plan, known populations of Iris missouriensis were censused and permanent monitoring plots were established and surveyed in 1987.

2. STUDY AREA

Three Alberta sites were studied. All are located within seven km of the Canada-United States international boundary, between the Milk River Ridge and the foothills of the Rocky Mountains. Elevations range from 1325 m in the Milk River Ridge area to 1375 m at Police Outpost Provincial Park. The sites have been named Police Outpost, Hendry and Whiskey Gap.

The Police Outpost site is located in Police Outpost Provincial Park in the northeast quarter of Section 6, Township 1, Range 26, west of the 4th Meridian.

The Hendry site consists of several stands 6.5 km north-northwest of Carway in the east half of Section 24, Township 1, Range 26, west of the 4th Meridian.

The Whiskey Gap site is situated in the northeast quarter of Section 17, Township 1, Range 23, west of the 4th Meridian.

3. METHODS

A preliminary visit was made to all sites in May and June to seek the advice and permission of the landowners and Alberta Parks' staff at Police Outpost Provincial Park prior to establishing the permanent monitoring plots.

The following numbers of permanent plots were established in the study sites:

Hendry - four
Police Outpost Provincial Park - one
Whiskey Gap - one

Plots at the Hendry site were selected to sample a cross-section of approximately twelve discreet populations. The sites were found in slightly different topographic positions and reflected the two grazing regimes employed by Mr. Hendry, the landowner. The Police Outpost and Whiskey Gap plots encompassed a high proportion of the total Iris missouriensis population at each of these sites.

All plots were 2.5 m by 3.5 m rectangles, laid out to include the maximum number of Iris plants in each of the populations selected. Each corner of each plot was permanently marked with a 1 dm long piece of iron tubing and screw-on cap or with a 3 dm long piece of copper tubing which had an aluminum cap epoxyed to the end. The tubing and caps were driven into the ground until the caps were flush with the ground surface. Large rocks were used to mark key plot corners and flagging tape and rocks were used as nearby identification markers when fenceposts or large shrubs were unavailable. Measurements were taken to help in relocation of plots. Once the permanent plot corners were installed, the entire plot was gridded into 250 mm squares using large steel nails and twine.

During the June survey, the number of Iris stems in each square was counted and recorded on a data sheet, indicating how many were flowering and how many were non-flowering stems. A stem was considered to be a discrete cluster of leaves arising from the ground. Significant shrub growth was also recorded in the squares on the data sheet. Other notes were taken on site topography and aspect, location in relation to other vegetation, associated plants, nearby Iris populations and land use. Each plot was photographed for future reference. Care was taken to avoid trampling Iris plants and virtually all disturbance was confined to the perimeter of the plot. The nails and twine were removed following the survey.

Each site was revisited in August to determine the success of seed set and seasonal changes in the vegetation composition and quality.

In addition to the permanent plots, adjacent terrain was surveyed to locate new populations and determine the total population size.

4. RESULTS

4.1 Population Size

There were estimated to be 5000 to 6000 Iris missouriensis stems in all sites. Numbers recorded at each site were:

Hendry - 4500 to 5250
Police Outpost - 600 to 650
Whiskey Gap - 200

The numbers of stems counted at each permanent plot and the ratio of non-flowering to flowering stems was:

Hendry #1 - 157 non-flowering and 11 flowering stems (14:1)
Hendry #2 - 421 non-flowering and 7 flowering stems (60:1)
Hendry #3 - 694 non-flowering and 115 flowering stems (6:1)
Hendry #4 - 261 non-flowering and 22 flowering stems (12:1)
Police Outpost - 249 non-flowering and 18 flowering stems (14:1)
Whiskey Gap - 103 non-flowering stems (103:0)

Estimates of populations made outside the permanent plots were:

Hendry #5 - 75
Hendry #6 - 100
Hendry #7 - 500
Hendry #8 and #9 - 150
Hendry #10 - 100
Hendry #11 - 325
Hendry #12 - 1500 to 2000
Police Outpost - 325 to 375
Whiskey Gap - 100

4.2 Vigour and Vitality

Growth was vigorous in all populations at Hendry and Police Outpost. Many Iris missouriensis plants were three to four dm tall. Leaves were beginning to turn brown in early August at Hendry while at Police Outpost they were still fresh and green. All flowering heads had good seed set. The phenology at the Hendry site appears to be somewhat

advanced compared to Police Outpost.

In contrast to the healthy populations at the previous sites, plants at Whiskey Gap were very stunted, only four to 6 cm high, and very difficult to find after May. By June, the plants were chlorotic and many of the leaf tips had been nipped off by cattle grazing in the area. No flowering stems have been noted at the Whiskey Gap site in at least 20 years (G. Scotter, personal communication).

There was no indication of any significant plant diseases or damaging insects at any of the sites.

4.3 Habitat Characteristics

The Police Outpost and Hendry sites shared a number of habitat characteristics in their topographic position and vegetation composition. All sites were on relatively level terrain and there was abundant subsurface moisture associated with adjacent wet meadows. Most Iris populations were found close to willow stands around moist depressions, generally in slightly upslope positions but, in two areas (Police Outpost and Hendry #6), slightly downslope from the willows. Two populations (Hendry #3 and #4) occurred in open moist meadows well away from any willow stands.

The Whiskey Gap site was unique in its location on a 5% south-southwest facing slope. It was noticeably drier than any of the other sites although, in wetter years, it is apparent that it would be much moister due to discharge from springs which lie upslope.

The vegetation appears to be transitional between the Potentilla fruticosa/Festuca scabrella and Deschampsia cespitosa habitat types described for northwestern Montana (Mueggler and Stewart 1980). Poa spp. were dominant at Whiskey Gap (Poa interior) and most of the Hendry sites (Poa interior and pratensis), although Deschampsia cespitosa formed a significant and sometimes dominant cover in two stands in moister meadows on the Hendry property. Both grasses were important at Police Outpost. There was a diversity of forbs at the Whiskey Gap site but the cover was relatively low and there was some bare ground. In most other populations, forbs occupied a significant portion of the ground cover. The dominant forbs at Hendry and Police Outpost were Solidago canadensis and Zizia aptera. Other important or frequent species at both Hendry and Police Outpost included:

Potentilla diversifolia
Carex sp., including praegracilis
Phleum pratense
Hedysarum alpinum
Galium boreale
Fragaria virginiana

Minor associates found at both Hendry and Police Outpost included:

Aster ericoides
Achillea millefolium
Taraxacum officinale
Thalictrum venulosum
Phleum alpinum
Crepis tectorum
Dodecatheon pulchellum

Species which were important or frequent only at Hendry included:

Potentilla fruticosa
Potentilla anserina
Aster laevis
Gentiana affinis

Minor associates found at Hendry and not at Police Outpost included:

Agropyron trachycaulum var. *unilaterale*
Vicia americana
Aster campestris
Agoseris glauca
Castilleja miniata
Cirsium sp.
Campanula rotundifolia
Arabis hirsuta
Senecio pseudaureus
Orthocarpus luteus
Koeleria macrantha

Species which were important only at Police Outpost included:

Allium schoenophrasum
Calamagrostis inexpansa

Minor species noted only at Police Outpost included:

Juncus longistylis
Agrostis sp.
Rosa sp.
Hierochloe odorata
Zigadenus elegans
Salix sp.

Associated plants at Whiskey Gap which also occurred at Police Outpost or Hendry included:

Potentilla fruticosa
Potentilla anserina
Achillea millefolium
Taraxacum officinale
Dodecatheon pulchellum
Orthocarpus luteus

Minor species noted only at the Whiskey Gap site included:

Antennaria parvifolia
Potentilla gracilis
Phlox alyssifolia
Aster ascendens
Grindelia squarrosa
Viola adunca

5. DISCUSSION

Once natural habitat is legally protected it should not be thought of as static. This ignores what we know about ecosystem dynamics, disturbance and succession, geological time, natural selection, population genetics and human influence (Bratton and White 1981). Changes in preserves can be initiated by either direct or indirect human or natural causes, or by interaction of the two.

Knudsen (1987) and Dawson (1987) recommend the development of recovery or management plans for endangered and threatened species. These are needed to maintain and enhance habitats and ecosystems. The ultimate aim is to get plants off of rare, threatened and endangered species lists. The recovery plan identifies limiting factors then works to overcome them. Falk (1987) proposes an integrated system of conservation strategies which looks at a variety of on-site and off-site programs to ensure the survival of plant species. The priorities in Alberta should be with on-site conservation and long-term demographic monitoring programs as defined by Pavlik (1987). These should be followed by research studies into aspects of the biology of the species and the hydrological regime on which it depends. Dunn (1987) suggests caution in enhancing habitat for only one species. In most cases, it is a habitat complex that is endangered and a variety of habitat requires protection to meet the needs of a variety of species.

This is indeed the case for the Iris missouriensis stands which are parts of significant remnants of moist meadow habitats which have been cultivated or heavily grazed and invaded by non-native species in most other sites in the Foothills Grassland and Foothills Parkland of southwestern Alberta. Land uses are continuing to alter the natural habitats of this region.

It is apparent from the 1987 data that some Iris stands are more productive than others. The main limiting factors in native habitats appear to be grazing intensity combined with moisture regime. The ratio of non-flowering stems to flowering stems ranged from a high of 6:1 in a spring and fall grazed moist depression to a low of 60:1 in a spring and fall grazed upland slope. The level moist depressions appeared to be the most prolific flowering sites while the slightly drier uplands were less productive.

Lightly grazed areas (Hendry #3) had significantly greater flower production than ungrazed or very lightly grazed (Police Outpost and Site #1) or moderately grazed (Hendry #2 and #4) areas but it is unclear whether this relates more to the associated moisture regime than to grazing. Mueggler and Stewart (1980) note that Iris missouriensis was

absent from moderately to heavily used cattle range while there were plants on an adjacent exclosure. The continuing dry conditions and relatively heavy grazing pressure have made flowering impossible at the Whiskey Gap site. In other sites, natural drought may have been a major factor in the relatively low flower production. Overall, it appears that grazing at light levels is not detrimental and may be somewhat beneficial to Iris missouriensis. Moderate to heavy grazing may pose some threats, especially during extended periods of drought. However, it is interesting to note that the Whiskey Gap population has been able to survive for twenty years without setting seed (G. Scotter, personal communication).

Mr. Raymond Hodgdon, the owner of the Whiskey Gap site, stated that he would fence out cattle from the stand of Iris on his property. It will be useful to study recovery of this stand under a no-grazing regime to determine if the absence of cattle will offset the unusually dry conditions and lack of spring flow. Groundwater levels have dropped significantly in other parts of southern Alberta due to withdrawls for human consumption (Meyboom 1960). This may affect the surface flow of springs. If this is a factor at Whiskey Gap, it is possible that, without corrective action, the springs never flow sufficiently to effectively reestablish the Iris population there. While the Iris populations may be facing an uncertain future, the Hodgdon property has significant populations of other plants which are rare or threatened in Canada. Among these is one of the largest stands of Cusick's paintbrush, Castilleja cusickii known in Canada.

The Hendry site is the stronghold of Iris missouriensis in Canada. Current land management is excellent and the site appears to thrive through wet and dry periods. The current landowners are aware of the significance of their property and are interested in preserving the plant life. However, there is no formal protection for the area. A concern for the future would be changes in current land use or the transfer of ownership to someone who was less conservation-minded.

While the Hendry site is the most important of all the Iris sites, the Police Outpost population is still significant. The area at Police Outpost receives some degree of protection due to its location inside a Provincial Park. The lack of grazing does not appear to be a threat to the long-term survival of the population. While flowering is somewhat reduced compared to the most productive grazed stands, there is strong and vigorous growth and ample flowering and seed set for the establishment of new plants. Concerns for this site which have been expressed in the past include the formal or informal development of a trail through the site. A resource management plan that was being developed in 1987 recognized the significance of the Iris site and other rare plants which occur in the area.

The permanent plots will provide a reasonable means of assessing changes in population over a long period of time and whether experimental monitoring as defined by Travis and Sutter (1987) is required . The grid system facilitates counting of stems and provides a fairly accurate, but not too time-consuming, method of mapping the distribution of plants within the plot. A triennial population census

combined with an annual site inspection should be sufficient to define long-term population trends and to review the effects of short-term land use changes.

Research can have a significant impact on vegetation in the vicinity of the plot. While there was little trampling inside the plot, the perimeter of the plot was still plainly visible six weeks after the detailed stem count survey.

The tradition of land use in the region has been to eventually cultivate or heavily graze lowland sites. Changes in land ownership could severely alter the precarious balance which now exists. Over the long term, formal protection needs to be afforded these sites. However, there are short-term options such as the development of voluntary or paid landowner agreements to ensure land use does not change. Lozier (1987) suggests that voluntary agreements prevent destruction of habitat by:

1. educating landowners about the exceptional features of their property;
2. encouraging informed stewardship by landowners working with conservation agencies; and
3. building relationships between landowners and conservation agencies which can eventually be scaled up into stronger forms of protection.

Landowner agreements also reduce the need for immediate and significant cash outlays and this helps to buy time. The 1987 Alberta program of monitoring Iris missouriensis populations was a first step in this process. The landowners were informed about the significance of the sites and agreements to conduct monitoring programs were secured. It is hoped that the necessary follow-up work can be done to ensure long-term success.

6. RECOMMENDATIONS

Implementation of the following recommendations will ensure the long-term maintenance or recovery of *Iris missouriensis* populations.

General

1. inspect sites on a yearly basis to ensure review land use changes and meet with the landowners
2. census all permanent sample plots every three years

Hendry

3. negotiate landowner agreement for long-term protection, including possible option to purchase, or purchase property outright
4. ensure current grazing levels are not exceeded
5. maintain existing level of groundwater flow and prevent damage to the hydrologic regime

Police Outpost

6. clearly identify this site as an area of high significance in park resource management plans and ensure its long-term protection from development
7. monitor informal trail development and use through this area
8. should use exceed "safe" levels, then appropriate signage should be erected or trails developed to direct people away from the *Iris* stand

Whiskey Gap

9. erect and maintain a fence around *Iris* stand (this was suggested by the landowner and will probably be in place in the spring of 1988)
10. assess the impact of water withdrawals on the groundwater regime and spring flow
11. negotiate a landowner agreement and consider outright purchase based on an assessment of other rare species

In the future, it may be useful to search for additional potential habitat and attempt transplant of *Iris* plants into suitable sites. This would only be worthwhile if landowners agreed and the land use practices were compatible. However, developing landowner agreements for the naturally occurring populations should be a priority. A successful program with current landowners at the Hendry and Whiskey Gap sites will make it easier to expand the program to neighbouring properties.

APPENDIX 1

DATA SHEETS

The following data sheets include information gathered during the May to August field surveys. They are arranged as follows:

Hendry #1
Hendry #2
Hendry #3
Hendry #4
Police Outpost
Whiskey Gap

Data recorded includes: site name, location, legal description, date, compass orientation of plot corners, associated flora and cover, adjacent Iris plants, condition of the site, land use, topography and moisture regime. Numbers across the x and y axes of the data sheets are millimeters. Each plot is 2500 by 3500 mm.

Aerial photographs showing the locations of the permanent sample plots and other Iris missouriensis populations are on file with the Natural Areas Program in Edmonton.

1987 WESTERN BLUE FLAG (IRIS MISSOURIENSIS) MONITORING DATA SHEET

SITE NAME: Hendry #1

LOCATION: 7 km NNE of Carway

LEGAL DESCRIPTION: LS8-24-1-26-W4 DATE: June 18/August 4

* - 0/0 ORIENTATION: Southeast # - 0/3500 ORIENTATION: Southwest

	2500	2250	2000	1750	1500	1250	1000	750	500	250	0
0	0	0	0	0	0	0	0	0	0	0	*
250	0	0	0	0	0	0	0	0	0	0	
500	0	0	0 CINQ	0	0	0	0	0	0	0	
750	0	0	0 CINQ	0	0	0	0	0	0	0	
1000	0	0	0	0	12 2F	4	0	0	0	0	
1250	0	0 CINQ	0	1	4	9 1F	3 1F	0	0	0	
1500	0	0	0	0	2	10 1F	7 1F	0	0	0	
1750	0	0	0	1	0	1	5	1	0	0	
2000	0	0	0	9 1F	8	3	8	5 1F	0	0	
2250	0	0	0	6	14 2F	15 1F	8	6	0	0	
2500	0	0	0	0	11	4	0	0	0	0	
2750	0	0	0	0	0	0	0	0	0	0	
3000	0	0	0	0	0	0	0	0	0	0	
3250	0	0	0	0	0	0	0	0	0	0	
3500											#

F - Flowering Stems CINQ - Shrubby Cinquefoil

SITE NAME: Hendry #1 IRIS COVER: 10%

ASSOCIATED VEGETATION: (+ = present)

Associates include Poa sp. (pratensis/interior) (90%), Carex sp. (+) Zizia aptera (+), Potentilla fruticosa (2%), Potentilla diversifolia (2%), Hedysarum alpinum (+), Galium boreale (+), Vicia americana (+), Phleum pratense (5%). There is Salix bebbiana sprouting in the vicinity. Grass cover is denser than at other sites and there are less forbs.

ADJACENT WESTERN BLUE FLAG POPULATIONS:

No adjacent stands were noted.

DETAILED LOCATION NOTES:

Proceed west along fence between NE and SE 24 (located just south of pole line) past willow stand on north side of fence, past small grassy rise to willows on south side of fence. Northeast corner is located 3.5 m SSE of southernmost of the first willows in this stand (marked with orange and black flagging tape). Northeast corner has iron cap marked by a rock.

OTHER NOTES:

This site is in good ecological condition. The area south of the fence is less heavily grazed than north of the fence. There was good seed set; capsules open by August 4, leaves turning brown, June trampling around plot perimeter still evident. This area is grazed only in fall. The site is essentially level with moisture just below the surface.

1987 WESTERN BLUE FLAG (*IRIS MISSOURIENSIS*) MONITORING DATA SHEET

SITE NAME: Hendry #2

LOCATION: 7 km NNE of Carway

LEGAL DESCRIPTION: L59-24-1-26-W4 DATE: June 18/August 4

* - O/O ORIENTATION: East # - O/3500 ORIENTATION: South

	2500	2250	2000	1750	1500	1250	1000	750	500	250	0
0											*
	0	0	0	0	0	0	0	0	0 CINQ	0 CINQ	
250											
	0	0	0	0	0	0	0	0	0 CINQ	0 CINQ	
500											
	0	0	0	1	0	0	0	0	0	0	
750											
	0	0	0 CINQ	0	0	0	0	0	0	0	
1000											
	0	0	0 CINQ	10 1F	0	0	0	0	0	0	
1250											
	0	0	11	5	5	10	2	3	1	0	
1500											
	0	0	5	11	7	9	21	11	7	0	
1750											
	0	0	0	7	15	11	8	13	9	0	
2000											
	0	0	11	10	13	16 1F	8	4	2	0	
2250											
	0	2	9	6	12	7 1F	12 1F	6	0	0	
2500											
	0	0	15	15	12	13 1F	5	10	0	0	
2750											
	0	0	1	21 2F	17	5	0	0	0 CINQ	0 CINQ	
3000											
	0	0	0 CINQ	7	0	0	0	0	0	0	
3250											
	0	0	0 CINQ	0	0	0	0	0	0	0	
3500											#

F - Flowering Stems CINQ - Shrubby Cinquefoil

SITE NAME: Hendry #2 IRIS COVER: 20%

ASSOCIATED VEGETATION: (+ = present)

Associates include Poa interior (60%), Solidago candensis (10%), Potentilla fruticosa (10%), Aster campestris (+), Phleum alpinum (+), Calamagrostis inexpansa (+), Agoseris glauca (+), Gentiana affinis (+), Zizia aptera (+) Galium boreale (+), Potentilla diversifolia (+), Aster laevis (+), Hedysarum alpinum (+), Fragaria virginiana (+), Castilleja miniata (+), Achillea millefolium (+), Taraxacum officinale (+), Agropyron trachycaulum var. unilaterale (+), Cirsium sp.(white) (+), Campanula rotundifolia (+)

There is a diversity of forbs and cover is high, about 30 to 40%.

ADJACENT WESTERN BLUE FLAG POPULATIONS:

Ten plants to NE within 2 m of plot.

DETAILED LOCATION NOTES:

Proceed west along fence between NE and SE 24 (located just south of pole line) past willow stand on north side of fence, past small grassy rise to willows on south side of fence. Approximately 5 fence posts east is a larger fence post. South corner of plot is 3.5 m north of large post. North corner has iron cap marked by a rock.

OTHER NOTES:

This site is in good ecological condition. The area north of the fence is more heavily grazed than south of the fence. There was good seed set; capsules open by August 4, leaves turning brown. This area is grazed only in spring and fall. Grazing at this level and timing appears beneficial. There is a gentle northwest facing slope and ample subsurface moisture.

1987 WESTERN BLUE FLAG (IRIS MISSOURIENSIS) MONITORING DATA SHEET

SITE NAME: Hendry #3

LOCATION: 7 km NNE of Carway

LEGAL DESCRIPTION: LS9-24-1-26-W4 DATE: June 19/August 4

* - 0/0 ORIENTATION: North # - 0/3500 ORIENTATION: East

	2500	2250	2000	1750	1500	1250	1000	750	500	250	0
0											*
	0	4 1F	4 1F	14 3F	4 2F	0	0	0	0	1	
250											
	0	11	3	7	11 1F	5	5	0	5 1F	2 1F	
500											
	0	2	0	15	1	0	5 1F	0	3	2 2F	
750											
	7	10	6 1F	10 3F	10 2F	0	0	1	3 1F	0	
1000											
	5	16	3	8 1F	6 2F	11 1F	2 1F	0	6 1F	3	
1250											
	0	0	3 1F	5 1F	4 2F	5 2F	10	0	0	0	
1500											
	0	2	9	12 1F	16 3F	30 12F	19 4F	2	2	0	
1750											
	0	11	5 1F	7 3F	19 3F	29 5F	23 7F	7 3F	0	0	
2000											
	0	2 1F	0 0	5 1F	14 3F	17 5F	22 5F	11 3F	0	2 1F	
2250											
	0	0	4 1F	1	8 1F	15 2F	23 1F	5	4 1F	0	
2500											
	0	0	4 1F	5	11 1F	20 6F	7 1F	4	1	2	
2750											
	16 2F	14 CINQ	1	3	10 2F	11 1F	0	0	1	0	
3000											
	0	0	0	0	0	0	0	0	4	0	
3250											
	0	0	0	3	1	0	8 2F	0	4	2	
3500											#

F - Flowering Stems CINQ - Shrubby Cinquefoil

SITE NAME: Hendry #3 IRIS COVER: 30%

ASSOCIATED VEGETATION: (+ = present)

Associates include Poa sp. (pratensis/interior) (25%), Deschampsia cespitosa (50%), Carex sp. (including praegracilis) (10%), Fragaria virginiana (+), Potentilla fruticosa (+), Potentilla diversifolia (5%), Zizia aptera (5%), Thalictrum venulosum (+), Arabis hirsuta (+), Senecio pseudaureus (+), Gentiana affinis (+), Calamagrostis inexpansa (+). Grass cover is denser than at other sites and there is less forb variety.

ADJACENT WESTERN BLUE FLAG POPULATIONS:

Another stand of 150 healthy plants is located south of south corner of plot. 23 plants are just outside the plot in the northeast corner and another 75 plants occur in small clumps further out from this corner. There are 35 plants scattered near the southwest corner up to 3 m away from the plot. There are no additional plants near the northwest corner.

DETAILED LOCATION NOTES:

Proceed along old highway to area north of first snowfence north of northern dense willow stand in LS9. The plot is found about 80 m west of the barbed wire fence. It is in the centre of a large level wet depression and is the only major stand here. North corner has iron cap marked by a flat red rock.

OTHER NOTES:

This site is in good ecological condition. The area north of the fence is more heavily grazed than south of the fence. There was good seed set; capsules open by August 4, leaves turning brown. This area is grazed only in spring and fall. Grazing at this level and timing appears beneficial. This area is essentially flat and there is abundant subsurface moisture. The site is quite different from others in being located on a slight mound in the middle of a depression. Other sites are located on slopes leading to depressions. Many plants are robust, to 3 or 4 dm.

1987 WESTERN BLUE FLAG (IRIS MISSOURIENSIS) MONITORING DATA SHEET

SITE NAME: Hendry #4

LOCATION: 7 km NNE of Carway

LEGAL DESCRIPTION: LS10-24-1-26-W4 DATE: June 18/August 4

* - 0/0 ORIENTATION: Southeast # - 0/3500 ORIENTATION: Southwest

	2500	2250	2000	1750	1500	1250	1000	750	500	250	0
0	0	0	0	0	0	0	0	0	5 1F	0	*
250	0	0	0	0	0	0	0	3	8 3F	3	
500	0	0	0	0	0	0	0	3	2 1F	0	
750	0	0	0	0	0	0	0	0	0	0	
1000	0	0	0	0	0	0	0	0	0	0	
1250	0	0	0	0	0	0	0	0	0	0	
1500	0	0	0	0	0	0	0	0	0	0	
1750	0	0	0	0	0	0	0	0	0	0	
2000	0	0	0	0	8 1F	10 2F	11 2F	8	0	0	
2250	0	0	0	11 1F	18	10	11 1F	22 1F	15 2F	0	
2500	0	0	0	10 4F	6	10 1F	10	13 1F	12 2F	0	
2750	0	0	0	4	17 1F	11 1F	4	13 2F	6	0	
3000	0	0	0	0	0	0	0	0	0	0	
3250	0	0	0	0	0	0	0	0	0	0	
3500											#

F - Flowering Stems

SITE NAME: Hendry #4 IRIS COVER: 10%

ASSOCIATED VEGETATION: (+ = present)

Poa sp. (5%), Deschampsia cespitosa (50%), Carex including praegracilis (5%), Fragaria virginiana (+), Crepis tectorum (+), Potentilla anserina (10%), Agropyron trachycaulum var. unilaterale (+), Hedysarum alpinum (+), Zizia aptera (10%), Taraxacum officinale (+), Dodecatheon pulchellum (+), Galium boreale (+), Achillea millefolium (+), Solidago canadensis (10%), Thalictrum venulosum (+), Gentiana affinis (+), Orthocarpus luteus (+), Aster ericoides (2%), Aster laevis (5%), Phleum pratense (+), Koeleria macrantha (+). High diversity of forbs and high cover (about 40%).

ADJACENT WESTERN BLUE FLAG POPULATIONS:

All Iris at this location are in this plot.

DETAILED LOCATION NOTES:

See detailed map. Proceed south from Hendry's house along truck trail. Go through gate in barbed wire fence and stop at telephone pole line. Proceed west just south of pole line and across small creek. Stand is located 2 m from westward most loop in creek south of pole line. Each corner is marked with a rock. The southeast corner has an iron cap.

OTHER NOTES:

This site is in good ecological condition. There was good seed set; capsules open by August 4, leaves turning brown. This area is grazed only in spring and fall. Grazing at this level and timing appears beneficial. There is a gentle east facing slope and abundant subsurface moisture.

1987 WESTERN BLUE FLAG (IRIS MISSOURIENSIS) MONITORING DATA SHEET

SITE NAME: Police Outpost Provincial Park

LOCATION: 5.5 km west of Carway

LEGAL DESCRIPTION: LSB-6-1-26-W4 DATE: June 19/August 4

* - 0/0 ORIENTATION: East # - 0/3500 ORIENTATION: South

	2500	2250	2000	1750	1500	1250	1000	750	500	250	0	
0												*
	4	0	0	3	0	0	0	0	0	0		
250												
	8 1F	0	5	7	3	2	0	0	0	0		
500												
	4 1F	0	0	3	2	3	0	0	1	4		
750												
	14 2F	3	2	8	5	0	5	3	0	4		
1000												
	0	12	7	9	1 1F	3 1F	10 1F	1D 2F	2	0		
1250												
	0	0	1	3	2	0	8 1F	3	0	0		
1500												
	0	0	0	0	0	0	0	5 1F	3	0		
1750												
	0	0	0	0	3	1	1	0	8 1F	0		
2000												
	7	3 1F	0	0	0	3	0	0	3	0		
2250												
	7 1F	0	0	5	3 2F	3	0	0	0	0		
2500												
	14 2F	0	0	0	7	3	1	0	0	0		
2750												
	0	0	0	0	1	0	0	0	0	0		
3000												
	0	0	0	2	0	0	0	0	0	0		
3250												
	0	0	0	0	0	0	2	0	0	0 WILL		
3500												#

F - Flowering Stems WILL - Willow

SITE NAME: Police Outpost Provincial Park IRIS COVER: 15%

ASSOCIATED VEGETATION: (+ = present)

Poa sp. (pratensis/interior) (20%), Deschampsia cespitosa (30%), Carex incl. praegracilis (5%), Fragaria virginiana (+), Potentilla fruticosa (+), Potentilla diversifolia (5%), Zizia aptera (10%), Thalictrum venulosum (+) Calamagrostis inexpansa (10%), Crepis tectorum (+), Juncus longistylis (+) Agrostis sp. (+), Hedysarum alpinum (+), Taraxacum officinale (+) Dodecatheon pulchellum (+), Galium boreale (2-5%), Achillea millefolium (+) Solidago canadensis (25%), Allium schoenophrasum (5%), Rosa sp. (+), Aster ericoides (+), Phleum pratense (5-10%), Phleum alpinum (+), Hierochloe odorata (+), Zigadenus elegans (+), Salix sp. (+)

ADJACENT WESTERN BLUE FLAG POPULATIONS:

13 stems to NW along edge of plot. 125 stems up to 4 m away from plot to NE. 125 stems up to 4 m away from plot to SE. 75 stems up to 8 m away from plot to the SW.

DETAILED LOCATION NOTES:

Proceed around southeastern bay of Police Lake until you reach a break in the willows at the southeast corner of the bay near the eastern park boundary; standing at last willow before break, line up between isolated dead willows by lakeshore and Chief Mountain; plot corner is in line with Mountain. East corner of plot is marked with a rock.

OTHER NOTES:

This site is in good ecological condition. There was good seed set; capsules still unopened by August 4, leaves still green. This area is ungrazed. There is a gentle west facing slope and abundant subsurface moisture.

1987 WESTERN BLUE FLAG (IRIS MISSOURIENSIS) MONITORING DATA SHEET

SITE NAME: Whiskey Gap

LOCATION: 1 km NNW of Whiskey Gap

LEGAL DESCRIPTION: LS16-17-1-23-W4 DATE: May 16/June 18/August 4

* - 0/0 ORIENTATION: Southwest # - 0/3500 ORIENTATION: Northwest

	2500	2250	2000	1750	1500	1250	1000	750	500	250	0
0	0	0	0	0	0	0	0	0 CINQ	0	0	0 *
250	0	0	0	0	0	0	0	0	0	0	0
500	0	0	3	1	0	0	0	0	0	0	0
750	0	0	0	0	0	0	0	0	0	0	0
1000	0	0	0	0	0	5	4	0	1	0	
1250	0	0	0	0	5	0	0	0 CINQ	0	0	
1500	0	0	0	0	1	6	1	4	3	0	
1750	0	0	0	2	5	9	10	2	5	0	
2000	0	0	0	0	1	10	8	0	0	0	
2250	0	0	0	0	6	2	0	0	0	0	
2500	0	0	6	0	2	1	0	0	0	0	
2750	0	0	0	0	0	0	0	0	0	0	
3000	0	0	0	0	0	0	0	0	0	0	
3250	0	0	0	0	0	0	0	0	0	0 CINQ	
3500											#

CINQ - Shrubby Cinquefoil

SITE NAME: Whiskey Gap IRIS COVER: less than 5%

ASSOCIATED VEGETATION: (+ = present)

Associates include Poa interior (80%), Antennaria parvifolia (+), Potentilla fruticosa (1%), Potentilla gracilis (+), Achillea millefolium (+), Taraxacum officinale (+), Phlox alyssifolia (+), Aster ascendens (+), Dodecatheon pulchellum (+), Grindelia squarrosa (+), Orthocarpus luteus (+), Potentilla anserina (+), Viola adunca (+). There is a diversity of forbs but cover is low. The site is much drier than others with 10% bare ground.

ADJACENT WESTERN BLUE FLAG POPULATIONS:

It was very difficult to locate plants after May 16, but there were scattered plants downslope from the plot.

DETAILED LOCATION NOTES:

Get help from Mr. Hodgdon. Proceed through farmyard to NE corner fence post; Spot gravelly area to NNE and stay well to left of it, heading to the low rise NNW; follow low rise along right side of E side of major drainage that has lots of buckbrush, staying W of gravelly area; go through 1 small drainage and along major drainage to "waterfall-like" bank in stream (note: major drainage is eroded, others are grassy); cross over by balsamroot patch on left on E-facing slope, where there is a bare area in drainage; will see "cattle-stomped" springy area up eastmost of 2 major drainages; continue up ridge between 2 drainages; plot is adjacent a shrubby cinquefoil thicket west of bare alkaline areas below (S of) springy area. Rock pile on east-facing slope in grassland is 6 m west of NW corner. NE corner is marked with iron pipe; all corners marked with rocks. SE corner lies .6 m from lone shrubby cinquefoil in drainage. All shrubby cinquefoil in plot have black flagging tape in their bases. Small rock pile in bare area lines up with NW corner pin, adjacent shrubby cinquefoil and rock pile in grassland.

SITE NAME: Whiskey Gap

OTHER NOTES:

This site is in poor condition for Iris. The area is heavily grazed and the springs have virtually dried up. Iris plants were only 4-6 cm high in June; were somewhat chlorotic and the leaf tips were nipped off by cattle. This site is unique in being found on an upland with a 5% SSW slope. This area is grazed only during the growing season. Grazing at current levels and timing may be compounding the problem created by the drying of the springs. Doctor George Scotter has not seen any blooms here for 20 years.

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Rediscovery of Greater Prairie Chickens in Southern Saskatchewan

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Executive Summary

During the spring of 1987, a small population of Greater Prairie Chickens were discovered in the Val Marie - Killdeer area of southwestern Saskatchewan. These birds represent the last known individuals of this species in Canada.

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1.0 Introduction

During April, 1987, while carrying out a Sage Grouse census in southwestern Saskatchewan, the discovery of two single Greater Prairie Chickens was made. As this species was considered to be extirpated in Canada the find held special significance and an additional five days of intensive searching in the same area was carried out in hopes of finding more Greater Prairie Chickens. Figure 1 shows the general area in Saskatchewan in which birds were seen and where searches were carried out.

2.0 Methodology

The initial discoveries were made while counting Sage Grouse on leks in early morning. Additional survey time was spent covering Sharp-tailed Grouse leks in the same area.

Sage Grouse surveys began on April 4, 1987 on the Cypress Lake map sheet (an equal sized area and immediately to the west of the one depicted in Figure 1) and were completed on April 21, 1987 on the Wood Mountain map sheet. Sage Grouse leks were located in the field during the late afternoon or early evening. Any birds observed on these areas during this time were documented. This exercise was mainly to find the exact location of the lek and to facilitate rapid checking of the leks during the prime early morning hours. The areas were then surveyed again early the following morning generally starting before sunrise (0530-0630 hr). Access to the leks was obtained by using a vehicle, tri-moto or on foot dependent upon availability of access and viewed with 15-60 power spotting scope at varying distances but generally from an elevated viewpoint. An attempt was made to get only as close to the birds as would afford an accurate count and not to disturb the lek areas. Pasture managers and private landowners were contacted where access permission was needed and also to acquire information regarding other leks.

Similar techniques were used during further searches carried out May 7-11, 1987, only this time Sharp-tailed Grouse leks were the primary target.

3.0 Results

The location and number of Greater Prairie Chickens located are given in Figure 2 and Table 1. On April 17, 1987 a single hybrid male Greater Prairie Chicken was found on a Sage Grouse lek (Figure 2, location one). The bird was actively dancing near the centre of the lek and was seemingly the dominant, certainly the most aggressive male on the lek. It kept an area cleared of the larger Sage Grouse continually chasing any male Sage Grouse which infringed upon its "territory". The bird maintained an

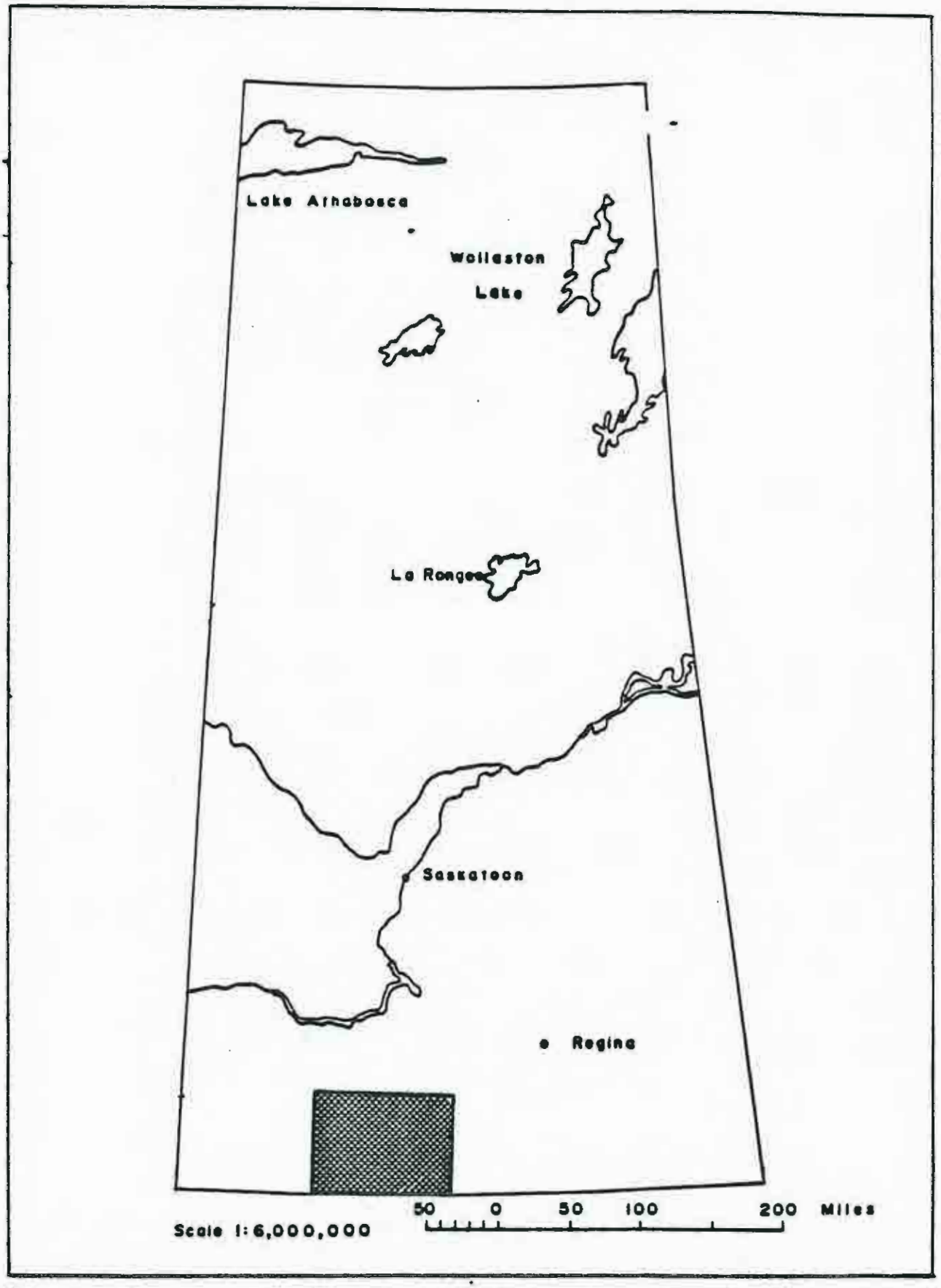

Figure 1. General location of the Greater Prairie Chicken observations (Wood Mountain 1:250,000 topographical map)

Table 1. Summary of Greater Prairie Chicken observations

Map Ref	Legal Land Description	Date	#	Comments
1	Sec 9-Twp1-Rg6-W3	17 Apr	1	Hybrid male on Sage Grouse lek.
2	Sec34-Twp-2-Rg12-W3	20 Apr	1	Female on Sage Grouse lek
3	Sec 5-Twp1-Rg7-W3	08 May	3	Males flushed from upland area; no lek known in the immediate area. Flew to Montana.

approximate 10 metre radius circle as its territory. A total of 58 Sage Grouse were also present (40 males, 18 females). This lek was checked again on May 7, 1987 when the hybrid Greater Prairie Chicken was still very active and 27 male and 6 female Sage Grouse were still present. Photographs of this male were obtained (Figures 3, 4, 5).

On April 20, 1987 a large Sage Grouse lek contained a single female Greater Prairie Chicken (Figure 2, location 2). Also present were 52 male and 11 female Sage Grouse. This bird was observed feeding near the edge of the lek in association with several female Sage Grouse. On one occasion this female Greater Prairie Chicken was courted briefly by a male Sage Grouse. After ten minutes of observation and just as the sun began to rise above the horizon this female flew from the lek accompanied by six female Sage Grouse. A check of this lek on May 9 failed to locate the bird.

On May 8, 1987 while travelling on a trail on the Montana-Saskatchewan border a group of three adult male Greater Prairie Chickens were flushed from the Saskatchewan side of the border and flew to a sage flat one half mile into Montana. A futile additional one hour was spent trying to re-locate these birds in an attempt to obtain photographs. Figure 2 (location 3) shows the location of this observation.

4.0 Discussion

All Greater Prairie Chickens seen were associated with Sagebrush habitat and when seen on leks were associated with Sage Grouse. The hybrid male found at location 1 may have been a hybrid with a Sage Grouse rather than the usual Sharp-tailed Grouse, however

Figure 2. Exact locations of Greater Prairie Chicken observations plotted on a Wood Mountain Topographic map reduced in size by 50% to scale of 1:500,000. (On following page)

the photographs have not yet been submitted to the appropriate authorities consequently this has not been confirmed to be the case. The searches carried out in May were unsuccessful primarily because most Sharp-tailed Grouse had ceased dancing andit was merely chance flushing of birds which resulted in finding any grouse. The five days spent searching in May did reveal 5 additional Sharp-tailed Grouse leks, however there were no Greater Prairie Chickens on these leks. In fact the three males that were found were not associated with or near any known Sharp-tailed or Sage Grouse lek and may very well have been from a lek located south of the international boundary.

All sightings of Greater Prairie Chickens were in relatively remote areas and with the exception of the three males found at location three, are within the boundaries of the proposed Grasslands National Park. Location three was only 3 miles outside the boundary of the proposed park.

Although this report only deals with the area in which the Greater Prairie Chickens were found it should be noted that the Sage Grouse census work was far more extensive in that it covered most of the known Sage Grouse leks (and involved fairly widespread searches for new leks) from the Alberta border and south of the Cypress Hills eastward to the Killdeer Badlands where the eastern most Greater Prairie Chickens were found. The result of this widespread search revealed Greater Prairie Chickens only in the Frenchman River valley (Val Marie) and the Killdeer Badlands areas. One must keep in mind however that the Sage Grouse are by far the least common grouse in southwestern Saskatchewan and that we probably looked at less than 10% of the grouse leks (the remainder would be Sharp-tailed Grouse leks and were not surveyed). This means that there is a real chance of a remnant population of Greater Prairie Chickens in this area, as work in other areas has shown that Greater Prairie Chickens readily use Sharp-tailed Grouse leks.

Further searches for Greater Prairie Chickens in this area must concentrate on all grouse leks if one is to feel confident that they are indeed censusing the populations in this area. Further, considering our experiences with searches in May, it is recommended that census work be carried out beginning as early in March as feasible to avoid running too late in the year and possibly missing females which may already be incubating in late April.

Figure 3, 4 and 5 (on following pages). Hybrid male Greater Prairie Chicken on Sage Grouse lek

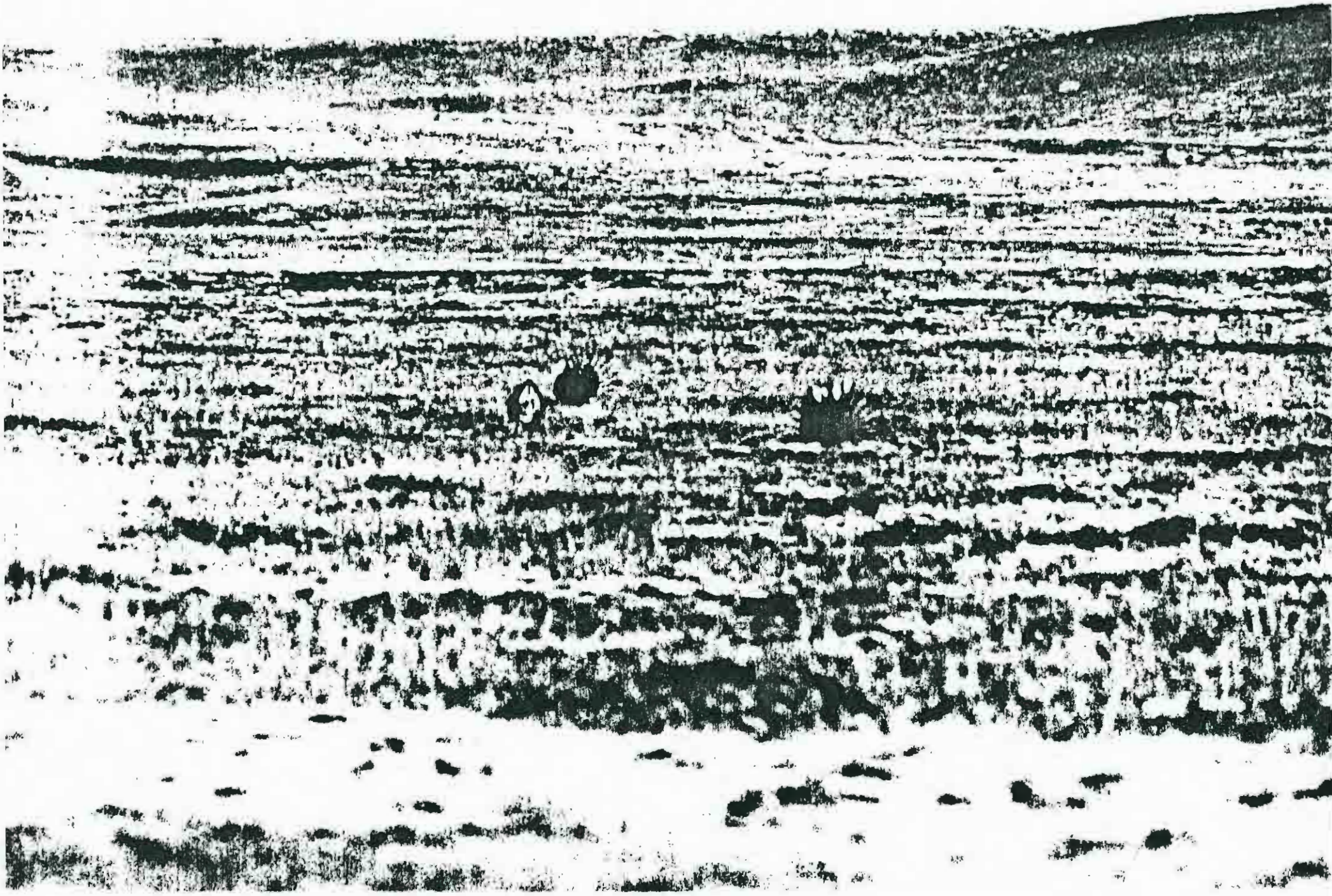

Figure 1. Locations where Greater Prairie Chickens and Hybrid Grouse were observed in 1987 and 1988 and boundary of area intensively searched in 1988.

- ● Sage Grouse lek with female Greater Prairie Chicken in 1987
- ▲ Greater Prairie Chickens observed, 1987
- ● Sage Grouse lek with Hybrid Grouse, 1988

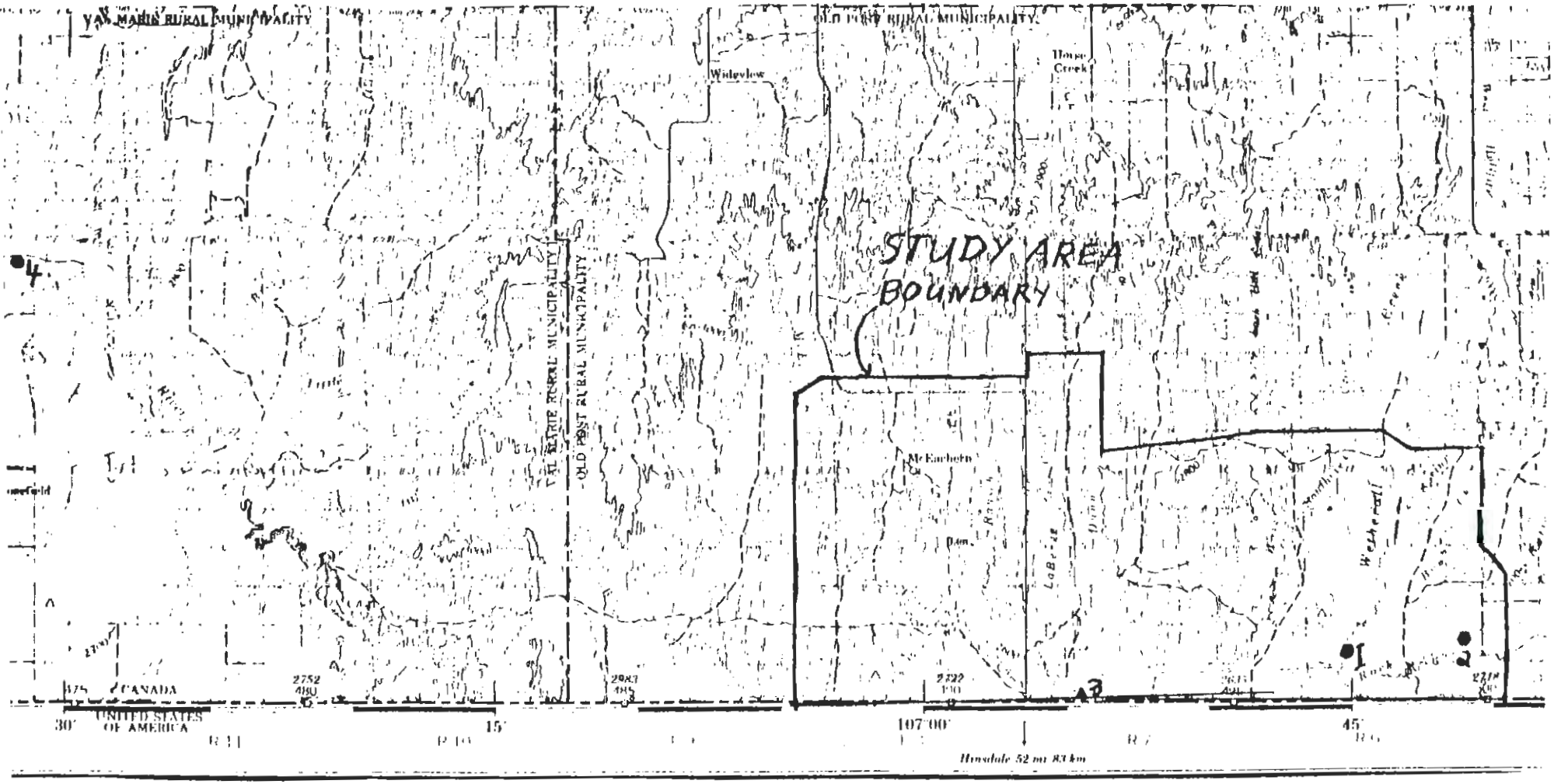

Table 1: Sage Grouse Leks Located in the Study Area During 1988.

Lek #	UTM Grid Reference	Land Location	Date	Time	# Males	# Females
1	CE722317	NE 9-1-6-W3	April 6	7:30 a.m.	33	15
2	CE761311	NW 12-1-6-W3	April 7	6:45 a.m.	46	43
3	CE755310	SE 11-1-6-W3	April 7	7:30 a.m.	12	0
4	CE754295	NE 2-1-6-W3	April 7	7:30 a.m.	2	0
6	CE779298	NW 6-1-5-W3	April 7	8:30 a.m.	3	0
7	CE735305	SW 10-1-6-W3	April 9	7:45 a.m.	4	0
8	CE722395	NE 4-2-6-W3	April 10	6:15 a.m.	10	7
10	CE696362	NW 29-1-6-W3	April 10	7:30 a.m.	1	8
11	CE673316	NE 12-1-7-W3	April 11	7:15 a.m.	26	14
13	CE678286	SE 1-1-7-W3	April 11	8:00 a.m.	1	4
14	CE713309	SW 9-1-6-W3	April 10	8:00 a.m.	3	0
15	CE693335	NE 18-1-6-W3	April 11	6:50 a.m.	2	0
21	CE691383	NE 31-1-6-W3	April 13	6:45 a.m.	2	0
23	CE549329	SW 14-1-8-W3	April 21	6:15 a.m.	50	7
25	CE543337	NE 15-1-8-W3	April 21	7:30 a.m.	7	3
28	CE578404	NE 1-2-8-W3	April 27	5:30 a.m.	27	1

Table 2: Sharp-tailed Grouse Leks Located in the Study Area During 1988

Lek #	UTM Grid Reference	Land Locations	Date	Time	# Males	# Females	Flush Count
5	CE766297	NW 1-1-6-W3	April 9	6:45 a.m.	35		46
9	CE694363	NE 30-1-6-W3	April 10	7:00 a.m.	4	0	8
12	CE697288	SW 5-1-6-W3	April 11	7:45 a.m.	5	0	21
16	CE733393	NW 3-2-6-W3	April 13	5:50 a.m.	2		16
17	CE720388	SW 4-2-6-W3	April 13	7:30 a.m.	1	2	4
18	CE695384	NE 31-1-6-W3	April 13	6:40 a.m.	3	0	3
19	CE669311	SW 12-1-7-W3	April 12	6:50 a.m.	15	4	23
20	CE724298	NE 4-1-6-W3	April 11	7:45 p.m.	0	0	14
22	CE590315	NE 7-1-7-W3	April 19	6:30 a.m.	11	2	20
22	CE590315	NE 7-1-7-W3	April 24	5:30 a.m.	10	4	14
24	CE551336	NW 14-1-8-W3	April 21	7:00 a.m.	5	2	11
26	CE487341	NW 18-1-8-W3	April 22	7:15 a.m.	2	2	10
27	CE616365	NW 28-1-7-W3	April 26	5:50 a.m.	14	3	27
29	CE611433	NE 17-2-7-W3	April 27	7:00 a.m.	14	2	25
30	CE516357	SE 29-1-8-W3	April 28	6:45 a.m.	0	0	23

O

WESTERN PAINTED TURTLE SURVEY

OF SOUTHEASTERN ALBERTA

1987

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Alberta Fish and Wildlife

January 1988

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World Wildlife Fund Canada's Wild West Program and Alberta Fish and Wildlife kindly supplied funding for this project.

INTRODUCTION

The 1987 Western Painted Turtle Survey was a project jointly funded by World Wildlife Fund Canada and the Alberta Fish and Wildlife Service. The main purpose of this survey was to determine the present status of the Western Painted Turtle (Chrysemys picta belli) in southeastern Alberta and to locate oxbow lakes and other potential habitats for turtle populations. In addition, management options with respect to maintaining or enhancing populations and protecting turtle habitat were considered. The potential effects of a proposed dam on the Milk River were reviewed.

SURVEY METHODS

Aerial photographs were analysed to determine field survey sites and to locate oxbow lakes which were in the process of being formed.

Two areas of southern Alberta, Battle Creek in the Cypress Hills and the lower Milk River, were chosen for field surveys during the summer of 1987. Both these areas had a frequent number of previous turtle records.

Milk River

Recent (1984) colour aerial photographs of the Milk River valley in extreme southeastern Alberta were studied to find oxbow lakes and other potential turtle habitat. Former observation sites were also noted (Cottonwood 1986). Field surveys were conducted in August 1987. Local residents were queried for turtle information during these surveys.

Surveys of potential wetlands were conducted on foot on warm afternoons when turtles bask in the sun and are most easily observed. Binoculars were used to scan, at a distance, shorelines and partially submerged logs for turtles. This was necessary as turtle eyesight is quite good and it is often difficult to approach them closely. Following an initial scan and short waiting period, the perimeters of key sites were walked to search for any sign of turtles.

Seven sites along the Milk River were surveyed. They are marked A to G on the enclosed 1:50,000 NTS 72E/2 mapsheet.

Battle Creek, Cypress Hills

Black and white aerial photographs of Battle Creek were studied to find oxbow lakes, ponds, and other quiet water which looked like potential turtle habitat.

Field surveys were conducted in July and August 1987 and local residents were interviewed for additional information. Medicine Hat Fish and Wildlife officers and Cypress Hills interpretive staff supplied data on several observations from the region.

Surveys were done on foot on very warm days when turtles should have been basking on logs or along the shorelines of wetlands. At a distance, binoculars were used to scan for turtles prior to walking around ponds and along slow-moving sections of Battle Creek.

Five sites in the Cypress Hills region were surveyed. They are marked A to E on the enclosed NTS 1:50,000 72E/9 mapsheet. An additional site F referred to an area from which there is a recent report but where there is apparently no suitable turtle habitat.

RESULTS

No Western Painted Turtles were observed during the 1987 field survey, however, several records were gathered from local residents and several areas of suitable habitat were found. The following is a discussion of all sites for which detailed information was gathered. All sites were visited during the field survey.

Milk River

Site A - This will become an oxbow lake in the near future. There is still approximately 50 m separating the two portions of the channel.
- On the north side of the river there is a reflooded oxbow lake. This channel, which lies partly in the United States, looks like good turtle habitat. There are many logs and rocks suitable for basking and there is abundant aquatic vegetation.
- Location: S6-1-4-W4.

Site B - This is a potential oxbow lake. There is approximately 75 m separating the two portions of the channel.
- Location: SW1-1-5-W4.

Site C - A new oxbow lake was formed at this site during the spring flood of 1987. Provided there is a good source for in-migration of Western Painted Turtles, this area should be prime turtle habitat in the years to come as the water level drops and more aquatic vegetation grows in. This site offers great potential for an introduction program.
- Location: NE2-1-5-W4.

Site D - This is an old oxbow lake which is now almost completely overgrown with vegetation. There is small amount of standing water on the northeast side but there is no turtle potential.
- This was the original site of turtle observations in the Milk River in the 1960's (Lewin 1963a and b).
- Location: NW2-1-5-W4.

Site E - This site has future potential for an oxbow lake. There is still more than 100 m between the two portions of the channel.
- Location: SE4-1-5-W4.

Site F - This site represents the best turtle habitat along this section of the Milk River. It is a reflooded oxbow lake with abundant aquatic vegetation and numerous basking logs.
- This is the site of turtle observations from 1975 and 1976 (Wallis 1976). It was dry for several years during the early 1980's (Cliff Wallis, personal communication).
- A local resident on the United States side of the border observed turtles here in 1987 and in the past.
- This site offers good potential for reintroducing turtles.
- Location: S5-1-5-W4.

Site G - There is some water in this old oxbow lake and it seems to have good potential for turtles.
- Despite repeated visits to the site since 1974, turtles have never been observed here (Cliff Wallis and Cleve Wershler, personal communication). The site lies close to the Pinhorn Grazing Reserve ranch buildings. The manager, John Dyck, had no personal knowledge of turtles in the area.
- Location: NE16-2-7-W4.

Cypress Hills

Site A - This is a slow-flowing stream with abundant aquatic vegetation, a soft muddy bottom, and many rocks and logs suitable for basking turtles. There are also some beaverponds nearby.
- There have been three to five sightings of Western Painted Turtles at this site, the last record being in 1985 (Cypress Hills park staff, personal communication).
- This site lies beneath some cliffs near Graburn Cairn.
- Location: 23-8-1-W4.

Site B - This is a small wooded pond on the north side of the Battle Creek Road. There is one sighting of a turtle here by former park interpreter M. Rosenhek.
- Location: NE22-8-1-W4

Site C - There is a 1987 sighting of a turtle crossing the road at the west end of Reesor Lake (as told to park interpreter M. Rosenhek).
- Location: SE30-8-1-W4.

Site D - This is a heavily-wooded semi-permanent pond system along upper Battle Creek. It did not seem suitable for turtles. One of the ponds had dried up by the time of the field survey.
- Location: N13-8-2-W4.

Site E - This is Spruce Coulee Reservoir. It is shallow with abundant aquatic vegetation and some muddy shores -- it looks suitable for turtles.
- There is one turtle record from this site (Cypress Hills park staff, personal communication).
- Location: SW26-8-2-W4.

Site F - This is Jackpot Road near the Cypress Hills Provincial Park boundary. A road-killed turtle was sent to the Medicine Hat

Site F - This is Jackpot Road near the Cypress Hills Provincial Park boundary. A road-killed turtle was sent to the Medicine Hat Fish and Wildlife office five years ago. There is apparently no suitable turtle habitat nearby.

- Location: near 16-8-3-W4.

DISCUSSION

Overall Status

From all reports, the numbers of naturally occurring Western Painted Turtles are very low. The total population is not expected to exceed 50 and it is probably much less. The Western Painted Turtle is a peripheral species in Alberta which apparently has always had low population numbers. This does not make it unimportant -- it is a part of a very complex, dynamic ecosystem that reaches it's northernmost limits in southern Alberta. Numerous plants, fish, and wildlife species which occur here are considered rare, either in Alberta or in Canada. The lower Milk River may have the only naturally occurring population of turtles in Alberta. With the possible exception of Cypress Hills records, all other Alberta records appear to be the result of human introductions. Most of these are individual records and do not appear to be of self-sustaining populations.

Cottonwood (1986) recommended classification of this species as "Endangered". Although there is revitalized and newly created habitat along the lower Milk River, there is continuing uncertainty about the status of the proposed Milk River dam. Therefore, it is felt that the status of the Western Painted Turtle should remain as "Endangered". If the Milk River dam is cancelled, this species' status could be downgraded to "Threatened".

Milk River

Along the lower Milk River, the Western Painted Turtle occurs in small numbers. These could be reduced or eliminated if a proposed upstream dam is constructed and operated like other flow regulation dams in southern Alberta. Upstream control of spring floods could be a threat to the whole riparian regime since these floodwaters are needed to

create new oxbow lakes and channels, to refill old channels, and to renew the important cottonwood stands (Bradley and Smith 1986). A unique ecosystem, including rare species such as the Western Painted Turtle, completely depends on maintenance of the current flow regime with its periodic spring floods.

Dams downstream in Montana may have made upstream migration of turtles much more difficult. Thus, upstream populations may not be able to get replenishment of numbers from southern, more stable turtle populations. The last several years prior to 1987 were very dry and most of the oxbow lakes dried up -- Western Painted Turtle numbers were severely affected (Cliff Wallis, personal communication). The downstream dams have been constructed since the last major drought in the 1930's so this is the first time that Alberta's turtles have been faced with serious man-made impediments to their migration. Ample precipitation late in 1986 and during 1987, combined with spring flooding, refilled many of the oxbow lakes along the lower Milk River. In addition, a new oxbow lake was created. Once again, there is a moderate amount of suitable Western Painted Turtle habitat in this region.

To offset low turtle numbers which might be related to drought or a lack of in-migration, introduction of Western Painted Turtles into suitable habitats along the lower Milk River could be considered. This would be an inexpensive and relatively simple operation. Sites C and F (on enclosed map) seem to hold the most potential for stable turtle populations since they have an abundant water supply at present and have very suitable turtle habitat. A simple habitat enhancement project could be undertaken at the same time since turtle numbers may be limited by the paucity of basking logs. It would be relatively simple to locate some fallen trees in the nearby riparian woodlands and put them into the oxbow lakes.

Accelerating the creation of oxbow lakes by dynamiting narrow necks of land separating portions of the river meanders would probably be counterproductive over the long-term. As oxbow lakes age and fill in,

there appears to be a natural periodic replacement of these habitats. Speeding up the process may create an abundance of habitat in the short-term but this may ultimately lead to a situation where there would be no turtle habitat at all.

It is interesting to note that all Western Painted Turtle records along the lower Milk River come from oxbow lakes which are not fouled by summer cattle grazing. All turtle records in this area come from sites which are winter grazed. Despite repeated visits by naturalists and the proximity of a year-round dwelling, there are no turtle records from an apparently suitable site (Site G) on the Pinhorn Grazing Reserve which receives summer grazing. It is unclear whether the absence of turtles is related to grazing, to distance from other turtle populations or some other factor.

Cypress Hills

The Cypress Hills region has had several records of the Western Painted Turtle in the past. The cool nature of these uplands seems generally unsuitable to a stable turtle population. It is possible that all of the observations are of released animals. However, turtles of this species have "been reported from the Qu'Appelle River and Souris River branches of the Assiniboine and the Frenchman River and Battle Creek tributaries of the Milk" (Secoy 1976). There could be upstream migrations of this species into Alberta but they may have difficulty establishing themselves. This is another location where turtle reintroductions are plausible. It would be quite interesting to see if a self-sustaining population could be established along lower Battle Creek in the Cypress Hills of Alberta.

Crowsnest Pass

The Crowsnest Pass region has turtles in a few locations, probably all man-introduced. Turtles have been seen at the east end of Crowsnest Lake, in three separate areas near Hillcrest, and on the eastern outskirts of Blairmore. One of these turtles had a name on its plastron and some in the Hillcrest region were definitely brought back from Elko, British Columbia by fishermen (Daryl Wig, Blairmore Fish and Wildlife).

Western Painted Turtles occur commonly just across the British Columbia border from the Crowsnest Pass (personal observation). It is remotely possible that there is a naturally occurring population of turtles in Alberta which is linked to the British Columbia populations via a migration corridor through the Crowsnest Pass.

There are several ponds in the Crowsnest Pass region which are suitable for turtles (personal observation 1987). A program of introducing Western Painted Turtles into suitable habitats would probably be successful in this region.

Other Areas

The Western Painted Turtle occurs and has occurred in several other areas throughout the province, including Edmonton, Hines Creek and Banff. All of these records are undoubtedly of introduced animals. There are several reports from southern Alberta at Lethbridge and Medicine Hat including seven at a par 3 golf course in Lethbridge on 7 July 1987. The Lethbridge population could be self-sustaining over the short-term but it is thought to have resulted from an introduction. A summer of 1967 record along the upper Milk River at the mouth of Verdigris Coulee is also thought to be an introduction (Tom Willock, personal communication).

Further Research

A detailed population survey would be required to accurately estimate the numbers of Western Painted Turtles in southeastern Alberta. Use of appropriate marking techniques and turtle traps would give a better indication of the reliability of visual surveys and provide a measure of the actual population size.

RECOMMENDATIONS

In decreasing order of importance, the following recommendations are made with respect to Western Painted Turtles in Alberta:

1. The formal designation of the Western Painted Turtle as "Endangered" in Alberta.

2. The protection of oxbow lake habitats, including continuation of current winter-only grazing practices along the lower Milk River.

3. A full assessment of the downstream impact of the proposed Milk River dam on riparian ecology and geomorphic processes.

*4. The introduction of Western Painted Turtles into suitable habitats along the lower Milk River, particularly at Sites C and F.

*5. The introduction of Western Painted Turtles into the lower Battle Creek, Cypress Hills.

*As part of the introduction program, some habitat enhancement work may be desired (placement of logs). Also, any detailed population studies should be undertaken at the same time.

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RARE WILDLIFE AND PLANT CONSERVATION STUDIES IN SANDHILL AND SAND PLAIN HABITATS OF SOUTHERN ALBERTA

by

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EXECUTIVE SUMMARY

Sandhill habitats contain a major concentration of significant features, including numerous rare, threatened and endangered species of plants and animals.

Based on recommendations from previous studies on reptiles and amphibians and rare plants in Alberta's Grassland and Parkland Natural Regions, a broad study on sandhill habitats was undertaken in 1987. The study area encompassed all sand plains and sandhill habitats from the Red Deer River south to the United States boundary, west to Highway 2 and east to the Saskatchewan border. In addition, several sites north of the Red Deer River north to the David Lake area were investigated.

Research in 1987 was undertaken on rare, threatened and endangered wildlife and plants. Rare, threatened and endangered plants were studied to map distributions and assess the degree to which dune stabilization was occurring and how this was affecting native plants.

Recommendations were developed for the management of key habitats and significant species.

Tradescantia occidentalis, Cyperus schweinitzii (Aspen Parkland only), Plains Hognose Snake and Great Plains Toad should be treated as endangered and detailed recovery and monitoring plans should be prepared for each.

Chenopodium subglabrum, Abronia micrantha, Astragalus lotiflorus and Lygodesmia rostrata (Aspen Parkland only) should be treated as threatened.

Cyperus schweinitzii (Mixed Grassland only), Eriogonum cernuum, Draba reptans, Polanisia dodecandra, Astragalus kentrophyta, Franseria acanthicarpa, Lygodesmia rostrata (Mixed Grassland only), Yucca glauca, Thellungiella salsuginea, Astragalus purshii, Psoralea argophylla, Oenothera andina, Asclepias viridiflora, Castilleja sessiliflora, and Ord's Kangaroo Rat should be considered rare, but not threatened.

Munroa squarrosa, Sporobolus neglectus, Cyperus squarrosus, Oenothera serrulata, Cryptantha minima, Hedeoma hispidum and Thelesperma marginatum should be classified as rare, but further research is needed to determine if they are "threatened" or "endangered".

Lupinus pusillus and Antennaria dimorpha have been classified as rare but should be considered uncommon.

Cryptantha fendleri, Vulpia octoflora, Androsace occidentalis and Grasshopper Sparrow occur in large numbers in most sandhill habitats and should be removed from rare species lists.

Principal threats to native plants relate to the encroachment of vegetation on active dunes. Threats to wildlife include natural drought, proliferation of road networks in natural habitats, drainage and cultivation of natural habitats, placement of dugouts in ephemeral wetlands, heavy summer grazing and stabilization of active dunes.

Key sand plain and sandhill habitats which have highly significant resources or concentrations of features and are worthy of formal protection through legislation include: Dune Point, Empress Dune C, Lost River, Lower Bow (at least Sites A and F), Pakowki Lake North, Remount (Bindloss Depression springs), Suffield North, Centre and South, Turin and Wolf Island (D,E).

Key sand plain habitats which should be retained in their natural condition by Crown land managers or through landowner agreements are: Atlee, Barnwell, Empress (in part), Gleichen, Hemaruka, Hilda, Lazy H, Little Rolling Hills East, Little Rolling Hills West, Lonesome Lake, Many Island Lake, Matzhiwin, Old Channel Lake, Pakowki Lake South, Purple Springs, Remount, Sandy Point and Wolf Island (in part).

Sandhill and sand plain habitats which can be dropped from further consideration for significant wildlife, plant or landscape features include: Carmangay, High River, Pearce, Rosebud River, Skiff and Vauxhall.

A recommendation is also made to prepare a comprehensive habitat management strategy, combining 1987 research information with other environmentally significant features data for utilization by Crown land management agencies and regional planning commissions.

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TABLE OF CONTENTS

1. INTRODUCTION

Sandhill habitats are key habitats in the Mixed Grassland region. They contain a major concentration of significant features, including numerous rare, threatened and endangered species of plants and animals.

A portion of the 1987 work was based on recommendations for research and management contained in the Cottonwood Consultants' (1986b) study on reptiles and amphibians in Alberta's Grassland and Parkland Natural Regions and which outlined the following priority projects:

1. an assessment of Great Plains Toad and Plains Hognose Snake populations and habitat in the Middle Sand Hills area of the Suffield Military Reserve and adjacent lands.

2. an assessment of Great Plains Toads numbers in natural and irrigated lands in the Hays-Vauxhall-Lake Newell district (Rolling Hills sand hills).

A second study on rare plant monitoring by Wallis et al. (1986) identified the following as a key concern:

1. Encroachment of surrounding vegetation into active sand habitat appears to be a major factor which limits the occurrence of a number of plants which are rare in Alberta or Canada, including Chenopodium subglabrum, Franseria acanthicarpa, Cyperus schweinitzii, Abronia micrantha, Lygodesmia rostrata, Eriogonum cernuum, Tradescantia occidentalis, Lupinus pusillus and, possibly, Astragalus lotiflorus and Thelesperma marginatum. These species appear to be largely dependent on areas of active sand.

While various aspects of the 1987 program were recommended as separate studies in previous research reports, it was recommended that all aspects be considered as elements for one broad study on sandhill habitats. This was due to the overlap in the locations for the recommended studies, and because the same personnel were involved in all parts of the field program.

As a result the following 1987 research was undertaken:

- Sand Hill Rare, Threatened and Endangered Wildlife

1. Continuation of research on Great Plains Toad and Plains Hognose Snake populations and habitat in the Middle Sandhills area.

2. Mapping of the most significant sites for Great Plains Toads and Plains Hognose Snakes, including breeding ponds, overwintering

sites, and concentrations of sightings and collection localitiies.

3. Recommendations for the management and conservation of the Great Plains Toad and Plains Hognose Sake.

4. Assessment of populations of Great Plains Toads in the Hays-Vauxhall-Lake Newell district to clarify the status of this species in this area, and the use of man-made habitats by this species.

Due to the dependence of Ord's Kangaroo Rats on sandhill habitats, notes on this and other sandhill species (Grasshopper Sparrow, Sharp-tailed Grouse) were taken. The distributions of these species were mapped and populations assessed. Unconfirmed reports of Greater Prairie Chickens in the grasslands north of Empress were investigated.

- Sand Hill Rare, Threatened and Endangered Plants

1. Assessment of trends in the dynamics of active sand dune areas in sandhill habitats in the following areas: Turin Dunes, Pakowki Dunes, Lost River, Middle Sandhills (including the Suffield Military Reserve) and Lower Red Deer River.

2. On-site inspections of vegetation in historic and recent active sand areas in order to:

   a. assess distribution and population sizes of rare plants in relation to active/inactive sand areas,
   b. assess the degree of encroachment by other vegetation in these sites, and
   c. determine whether these trends are stable or continuing.

3. Mapping of key areas of rare plants in active sand areas.

4. Development of recommendations for the management of these habitats to ensure long-term survival of the rare plants.

In addition to the species noted above, the researchers recorded other rare plants in both active and inactive sand dune areas. Concurrently, a biophysical overview study was conducted in the proposed Middle Sand Hills ecological reserve along the east side of the South Saskatchewan River in the Rapid Narrows area.

The sand hill areas studied were in the Grassland and Aspen Parkland regions and most were on Crown lands. As a result, it was felt that chances for successful implementation of recommendations for species and habitat management would be relatively high.

1.1 Study Area

The study area encompassed all sand plains and sandhill habitats from the Red Deer River south to the United States boundary, west to Highway 2 and east to the Saskatchewan border. In addition, several sites north of the Red Deer River north to the David Lake area were investigated.

The area includes all active sand dune habitats in the Aspen Parkland and Grassland regions which are known to contain rare plants.

Specific dune and sand plain systems included:

- in the Mixed Grassland:

1. Atlee
2. Barnwell
3. Carmangay
4. Craigmyle
5. Dune Point
6. Empress
7. Gleichen
8. Hemaruka
9. High River
10. Hilda
11. Lazy H
12. Little Rolling Hills East
13. Little Rolling Hills West
14. Lonesome Lake
15. Lost River
16. Lower Bow
17. Many Island Lake
18. Matzhiwin
19. Old Channel Lake
a0. Pakowki Lake North
21. Pakowki Lake South
22. Pearce
23. Purple Springs
24. Remount
25. Rosebud River
26. Sandy Point
27. Skiff
28. Suffield Centre
29. Suffield North
30. Suffield South
31. Turin

32. Vauxhall
33. Wolf Island

- in the Aspen Parkland

34. David Lake North and South

2. METHODS

2.1 Great Plains Toads

From late April to early June, 1987, surveys including the reconnaissance of water bodies for potential Great Plains Toad breeding ponds and census of potential water bodies for calling Great Plains Toads were conducted in a variety of sand plain and sandhill habitats throughout southeastern Alberta. These areas included sites where Great Plains Toads had been found in the past as well as new sites selected through an analysis of aerial photography and geological reports. Non-saline water bodies in areas of sandy surficial deposits were considered to have the highest potential.

Surveys were conducted in the following areas:

Remount - Empress
Hilda
Matzhiwin
Suffield
Old Channel Lake
Brooks - Vauxhall
Barnwell
Little Rolling Hills
Lake Newell
Lower Bow
Lost River
Pakowki Lake
Wildhorse - Manyberries (including Lost River)

Daytime surveys were conducted to determine the presence of water. Where applicable, these were followed up with nocturnal surveys beginning at about 20.00 hours. Once Great Plains Toads began calling or were known to be calling in other sites, the night surveys began and continued until about 02.00 hours. Where populations were high and difficult to estimate, detailed counts were made by walking along the shore or wading through the water.

2.2 Rare Plants

Aerial photography from sandhill areas previously identified by Mulira (1986) or surficial geology reports (Westgate 1965; McPherson 1972; Shetsen 1987; Stalker 1958, 1961 and 1965) was analyzed prior to commencement of the field program. Active and semi-active sand dunes were identified in the following areas:

Barnwell
Carmangay
David Lake North and South
Dune Point
Empress
Hilda
Little Rolling Hills East
Little Rolling Hills West
Lonesome Lake
Lost River
Lower Bow
Matzhiwin
Old Channel Lake
Pakowki Lake North
Pakowki Lake South
Pearce
Purple Springs
Remount
Suffield Centre
Suffield North
Suffield South
Turin
Wolf Island

Almost all active sand dunes in these areas were field checked. This involved a random wander through the dune to spot check a variety of microhabitats, followed by a traverse through the active portion of the dune into the stabilization zone and into the surrounding stabilized grassland. Where possible, actual counts of individual plants were done, but in most instances relative estimates of populations were made. Notes on distribution in relation to active, stabilization zone and stabilized portions of the dune were made. Other notes on associated vegetation and which species were invading the active sand areas were also kept.

The field information was supplemented by collection data provided by Dr. John Packer and field notes from previous research by Cliff Wallis.

Historic (1949-1952) aerial photography was analyzed to determine the extent of sand dune activity in past decades. The results of this survey were compared to that derived from more recent aerial photographs and 1987 ground survey data.

2.3 Other Wildlife

Wildlife surveys were undertaken from late April to November of 1987. All significant wildlife observed were recorded in field notes but particular attention was paid to Sharp-tailed Grouse, Loggerhead Shrikes, Ferruginous Hawks, Burrowing Owls, Ord's Kangaroo Rats, Plains Hognose Snakes and Grasshopper Sparrows.

Specific surveys for Ord's Kangaroo Rats were made in all the same active sand dunes as described under the heading "Rare Plants". Relative abundance was estimated for each site but no detailed trapping or counts were made. The numbers of runways and active burrows was compared with more detailed survey information gathered in the 1970's in the Empress and Dune Point areas to help arrive at an overall population estimate.

Careful attention was paid to all grouse observations on the belief that Greater Prairie Chicken might still persist in some sandhill areas. In addition, a specific survey for Greater Prairie Chicken was undertaken by traversing, on foot, a native grassland area where there was a recent unconfirmed record. Weather conditions were less than ideal for this survey.

Plains Hognose Snakes were searched for by travelling roads through suitable habitat at various times of the day and by carefully inspecting areas close to active sand blowouts. In addition, local ranchers and wellsite servicing personnel were interviewed to determine the extent of their knowledge of this rare species.

3. RESULTS

3.1 Rare Plants

The following species summary sheets outline the results of the 1987 field investigations. For plants, the following headings are employed:

Latin Name

Common Name

Brief Summary of Status

General Alberta Distribution

Occurrences - field observations and additional collection records

Habitat - brief overview of microhabitat position in dune system

Biology

Threats - major short-term and long-term threats to a species' survival

Population Size and Trend - estimate of overall Alberta population and stability of existing population

Protective Status - areas where plants receive formal protection

Recommendations/Management Action - includes recommendations for classification as "rare, threatened, or endangered" or for delisting; specific areas where habitat should be conserved; and management practices which might help in the long-term and short-term maintenance of populations.

Plants of active sand or gravel habitats are listed first (*Tradescantia occidentalis* to *Lygodesmia rostrata*). These are followed by listings of species which occur in sandy or gravelly substrate and sand plains in the Grassland region but not necessarily in active sand dunes (*Yucca glauca* to *Thelesperma marginatum*). While many of the last group of species were not actively searched for, the 1987 field program uncovered new localities for a number of these plants.

LATIN NAME: Tradescantia occidentalis (Britt.) Smyth

COMMON NAME: Western Spiderwort

BRIEF SUMMARY OF STATUS:

Endangered; very low populations in one locality; rare in Canada; midwestern species, rare at the northwestern limit of its range.

GENERAL ALBERTA DISTRIBUTION:

Only known from one dune in the Pakowki Lake North area.

OCCURRENCES:

Site Name	Population Size
Pakowki Lake North G (southeast corner)	2
Pakowki Lake North G (southeast corner)	1
Pakowki Lake North G (southeast corner)	12

Total Population: less than 50

HABITAT:

This species appears to be best adapted to partially stabilized sand in dune slack areas, although one plant was found growing in active sand. It occurs where there is 70% or more bare sand in an Oryzopsis hymenoides and Calamovilfa longifolia community associated with species such as Artemisia campestris, Rosa sp., Helianthus sp., Corispermum sp., Franseria acanthicarpa and Heterotheca villosa. The location of the largest "stand" is 14 fence posts west of the easternmost cottonwood tree along the east-west fence line of Pakowki Lake North dune G and south of fence line a short distance (5-8 m). Other occurrences are east of the cottonwood tree along the fence line in bare sand and west of the cottonwood tree and 15 m east of a patch of cottonwood and aspen, 7-8 m south of the fence line.

BIOLOGY:

Perennial; flowering July 5 in 1987.

THREATS:

The active sand areas have stabilized compared to conditions in the early 1950's. The positive or negative impacts of grazing at various seasons are unknown.

POPULATION SIZE AND TREND:

The total Alberta population is estimated to be less than 50 plants. Only 15 have been found despite intensive searching through all active dune areas and many stabilized dune areas at Pakowki Lake. Continued stabilization of the dunes would likely be detrimental to the long-term survival of this species.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "endangered". Designation and appropriate management of the Pakowki Lake North Dune G would help protect the only known population of this species in Alberta. This site is Crown land which is leased for grazing. Selective destabilization of some dune areas could benefit this species over the long-term. Collection of seed and research into its biology could be useful in attempts to establish other populations in the Pakowki North dunes.

REFERENCES:

Julie Hrapko (personal communication)

LATIN NAME: Cyperus schweinitzii Torr.

COMMON NAME: Sand Nut-grass

BRIEF SUMMARY OF STATUS:

Very localized but generally in good numbers where found; should be treated as rare, possibly threatened; widespread species, rare at the northwestern limit of its range.

GENERAL ALBERTA DISTRIBUTION:

Widely scattered occurrences in the Aspen Parkland and Mixed Grassland regions.

OCCURRENCES:

Site Name	Population Size
David Lake North	several hundred
David Lake South A	several hundred
David Lake South C	several hundred
Little Rolling Hills West C	hundreds
Pakowki Lake North A	hundreds
Pakowki Lake North C	thousands
Pakowki Lake North D	thousands
Pakowki Lake North E	thousands
Pakowki Lake North G	hundreds
Pakowki Lake North M	hundreds
Pakowki Lake South	thousands

Total Population: less than 30,000

HABITAT:

Occurs in a variety of stabilizing and active sand dune habitats on windward and lee slopes but shows a preference for semi-stabilized dune slacks where there is abundant loose sand. It occurs in gravelly sand in the Little Rolling Hills and coarse grained sand in other localities.

BIOLOGY:

Perennial with a short rhizome, forming corm-like branches.

THREATS:

All active dune habitats where it occurs are stabilizing to some extent. Dunes in the Aspen Parkland at David Lake are the most heavily stabilized and Cyperus populations in these areas are the most threatened. The Pakowki Lake dunes have considerable amounts of active and stabilizing sand and populations here are not in immediate danger.

POPULATION SIZE AND TREND:

Estimated total population is less than thirty thousand plants; populations are probably declining slightly in most southern dunes but

declining rapidly due to encroachment on the dunes in the Aspen Parkland.

PROTECTIVE STATUS:

Two small populations are protected in the Aspen Parkland at David Lake Ecological Reserve. None of the large Pakowki Lake populations have any formal protection.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "rare" in Alberta; "threatened" in the Aspen Parkland. Designation and appropriate management of the Pakowki Lake North dunes would help protect the largest populations of this species in Alberta. Destabilization of dunes would be beneficial in the short-term for the Aspen Parkland and over the long-term in the Mixed Grassland. Retention of natural habitats at Little Rolling Hills, Pakowki Lake North and South, and David Lake South would protect known populations of this species. With the exception of Little Rolling Hills, all these sites are on Crown land.

LATIN NAME: Eriogonum cernuum Nutt.

COMMON NAME: Nodding Umbrellaplant

BRIEF SUMMARY OF STATUS:

Very localized but with occasionally significant populations in those restricted habitats; should be treated as rare.

GENERAL ALBERTA DISTRIBUTION:

Widely scattered locations in the Mixed Grassland along the lower Red Deer, South Saskatchewan and Milk Rivers.

OCCURRENCES:

Site Name	Population Size
Dinosaur Provincial Park	less than 100
Dune Point B	300
Dune Point E	750
Empress A	10
Lost River A and C	100
Lost River/Milk River area	less than 5,000

Total Population: less than 10,000

This species is also known to occur in small numbers at Writing-on-Stone Provincial Park (Wallis 1986) and along the South Saskatchewan River (Cottonwood Consultants 1987).

HABITAT:

Active, but usually partially stabilized, sand in dunes and along valley rims, usually in association with massive sandstone outcrops; occurs on slopes and in dune slacks. It occurs in coarse-grained sand and gravelly sand.

BIOLOGY:

Annual.

THREATS:

Stabilization of dunes will eventually crowd out populations in dune areas. No detailed assessment of the degree of stabilization of valley rim sites has ever been made but these sites do not seem to have stabilized to any significant degree.

POPULATION SIZE AND TREND:

Less than 10,000 plants; probably declining due to stabilization in some dune areas but stable in valley sites.

PROTECTIVE STATUS:

Dinosaur and Writing-on-Stone Provincial Parks contain small populations but none of the larger populations are yet formally protected.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "rare" in Alberta. Designation and appropriate management of the Dune Point and Lost River areas would protect the largest known populations of this species in Canada. Both of these sites are on Crown land leased for grazing. Selective destablilization of parts of some dunes may be beneficial.

LATIN NAME: Chenopodium subglabrum (S. Wats.) A. Nels.

COMMON NAME: Smooth Goosefoot

BRIEF SUMMARY OF STATUS:

Threatened; rare in Canada; western species whose overall status is difficult to assess because of its inclusion in C. leptophyllum in many floras, but which appears to be rare in much of its range.

GENERAL ALBERTA DISTRIBUTION:

Widely scattered populations in the southern Mixed Grassland.

OCCURRENCES:

Site Name	Population Size
Barnwell A	B
Hilda A	3
Lonesome Lake	1
Lost River B	less than 5
Pakowki Lake North G	2
Pakowki Lake North J	1
Pakowki Lake North K	1
Purple Springs K	30
Turin A	low hundreds
Turin C	low hundreds

HABITAT:

Generally on south or west-facing actively eroding slopes at the edge of stabilizing sand; sometimes in dune slacks. Populations are highest in areas of finer and more compacted sand. It generally appears to be associated with Oryzopsis hymenoides. Rarely, this species grows in very active sand away from the stabilization zone and also in stabilized sand. Populations in the last two habitats are always very low.

BIOLOGY:

Annual; flowering June to July.

THREATS:

Encroachment of vegetation on active blowouts could eliminate major and minor populations of this species. The effect of cattle grazing is unknown but the only plant remaining at Lonesome Lake was one severely browsed individual. A dugout placed next to the active dune attracted numerous cattle to the dune. The dune slack at Barnwell A is being invaded by Agropyron cristatum and Melilotus sp.

POPULATION SIZE AND TREND:

The total Alberta population is estimated to be less than 1000 individuals. This population may be declining slowly in the Turin area and more rapidly in other sites due to dune encroachment and heavy

summer use by cattle.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "threatened" in Alberta. Designation and appropriate management of the Turin Dunes would protect the largest known populations of this species in Canada. Retention of natural habitat at Purple Springs K would protect another significant population. Both of these sites are on Crown land leased for grazing.

REFERENCES:

Wahl (1952-53)
Bassett and Crompton (1982)

LATIN NAME: Abronia micrantha Torr.

COMMON NAME: Sandverbena

BRIEF SUMMARY OF STATUS:

Threatened; low population size and ongoing loss of habitat through natural encroachment; rare in Canada; western species, rare at the northern limit of its range.

GENERAL ALBERTA DISTRIBUTION:

Widely scattered localities in the Mixed Grassland.

OCCURRENCES:

Site Name	Population Size
Lost River	200
Lower Bow E	12
Lower Bow F	250
Lower Bow G	3
Purple Springs G	30
South Saskatchewan River	less than 100*
Wolf Island D	100
Wolf Island E	10

Total Population: less than 1,000

*This site was not surveyed during the 1987 field season but it appears to have a moderate population (Hope Johnson, personal communication).

HABITAT:

Active sand, occasionally with Oryzopsis hymenoides and Psoralea lanceolata and Stipa comata. The largest populations are on hard packed finer sand on level terrain but it also occurs on south, west and east facing slopes and along dune ridge tops. Most sites surveyed in 1987 are on the uplands, however, there are two occurrences in the valleys of the Lost and South Saskatchewan Rivers where sand dunes extend down into the valleys.

BIOLOGY:

Annual.

THREATS:

Encroachment of vegetation on active blowouts could eliminate major and minor populations of this species. The Lower Bow Dune F is being stabilized by Salsola kali, Cleome serrulata and Hordeum jubatum.

POPULATION SIZE AND TREND:

The total Alberta population is estimated to be under 1000 plants. The amount of suitable habitat is declining due to encroachment on active

sand areas.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "threatened". Designation and appropriate management of the Lower Bow, Wolf Island and Lost River sites would help protect the most significant populations of this species. All these sites are on Crown land. Destabilization of the dunes may be beneficial in the long-term.

REFERENCES:

Johnson and Hallworth (1975)

LATIN NAME: Draba reptans (Lam.) Fern.

COMMON NAME: Carolina Whitlow-wort

BRIEF SUMMARY OF STATUS:

Rare and very local in Alberta.

GENERAL ALBERTA DISTRIBUTION:

Scattered localities in the Mixed Grassland region.

OCCURRENCES:	Site Name	Population Size
	Suffield Centre H	less than 100

This species is also known from the Milk River Ridge area (SW27-2-18-W4) in a proposed reservoir site and from the Turin Dunes area where it is rare.

HABITAT:

This is a species of stabilized or exposed sandy or gravelly areas in grasslands and on slopes. No specific surveys to assess this species in non-dune habitats were undertaken.

BIOLOGY:

Annual; flowers in May and early June (late April in 1987).

THREATS:

Cultivation of sandy soil areas for cropland is a potential threat. The Milk River site is near the location of a proposed dam. Further stabilization of loose sand by denser vegetation may pose a longer term threat in sites like Turin.

POPULATION SIZE AND TREND:

Unknown; sandy, gravelly habitats are quite localized and this species may be truly rare, however, Draba reptans is inconspicuous and easily overlooked.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "rare". Designation of the Suffield Centre site as part of the proposed Middle Sand Hills Ecological Reserve would help protect one of the largest known naturally occurring populations of Draba reptans in Alberta. Retention of natural habitat at Turin would protect another population of this species. All these sites are on Crown land.

REFERENCES:

Mulligan (1976)

LATIN NAME: Polanisia dodecandra (L.) DC.

COMMON NAME: Clammyweed

BRIEF SUMMARY OF STATUS:

Rare and very local in Alberta; generally rare in Canada; widespread species, rare at the northern limit of its range.

GENERAL ALBERTA DISTRIBUTION:

Scattered localities in the Mixed Grassland and Aspen Parkland regions.

OCCURRENCES:

Site Name	Population Size
Turin C	50
Suffield Centre H	350
Vauxhall 62, SE3-12-16-W4	2-3 thousand
Vauxhall 57, NW18-11-16-W4	200

Other Occurrences:

- University of Alberta Herbarium

  Steveville area, 50°52'N, 111°37'W, dry stony hillside near Red Deer River
  east of Calgary, railway tracks
  Medicine Hat, disturbed grassland in river valley
  Medicine Hat, eroded river valley slope
  Edmonton, south, CPR railway tracks

- Department of Agriculture, Ottawa Herbarium

  Calgary

HABITAT:

This is a species of exposed gravelly areas, a habitat which is very restricted in Alberta. No specific surveys to assess this species in non-dune habitats were undertaken. None of the other gravelly dunes had populations of this species. Populations in revegetating gravel pits along the Oldman River near Vauxhall appear to have spread from nearby gravelly slopes where natural populations are low.

It also occurs in disturbed gravelly soils along railway grades and in gravel pits.

BIOLOGY:

Annual; flowers late June and early July.

THREATS:

Populations at Turin Dunes may be threatened with encroachment over the

long term, however, most populations appear stable. Over the long-term, man-made exposed gravel areas will eventually revegetate and crowd out the Polanisia.

POPULATION SIZE AND TREND:

No accurate estimate; probably less than 10,000 individuals. It is possible that there are higher numbers of this species in man-made disturbances than in natural habitats.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "rare". Gravel operations cannot be expected to help in the maintenance of this species over the long term. Designation of the Suffield Centre site as part of the proposed Middle Sand Hills Ecological Reserve would help protect the largest naturally occurring population of Polanisia dodecandra in Alberta. Retention of natural habitat at Turin would protect another population of this species. Both of these sites are on Crown land.

Destabilization of Turin C would benefit this and other sand dune plants. Other natural gravelly sites along valleys in Alberta should be investigated to determine the total population of this species in Alberta and additional priorities for proection.

REFERENCES:

Iltis (1958)

LATIN NAME: Astragalus kentrophyta Gray

COMMON NAME: Prickly Milk-Vetch

BRIEF SUMMARY OF STATUS:

This species is very locally common along the Milk River and rare and very localized elsewhere in Alberta. It is considered rare in Canada. Var. kentrophyta, the Alberta taxon, is apparently rare throughout much of its restricted range, especially in the Great Plains. This is a western species, rare at the northern limit of its range.

GENERAL ALBERTA DISTRIBUTION:

Portions of the Milk, lower Bow, lower Red Deer and South Saskatchewan Rivers in the Mixed Grassland region.

OCCURRENCES:

Site Name	Population Size
Dune Point D	300
Dune Point E	400
Empress C	300
Lower Bow D	3
Lower Bow E	12
Suffield Centre G	10
Milk River*	tens of thousands
Total Population:	less than 30,000

*No surveys of populations along the Milk River valley were undertaken during 1987. Occurrences there are described in Wallis et al. (1986).

HABITAT:

Its principal habitat in areas north of the Milk River is hard-packed or gravelly exposed sand in sand blowout areas. It occurs very rarely and in very small numbers in man-made habitats on sandy soil.

Along the Milk River, it thrives in eroding sandy soils along the valley slopes and is particularly common in areas of Milk River sandstone.

BIOLOGY:

Perennial with a strong taprooot; flowers from June to September; known to form mycorrhizal fungal associations (Currah and van Dyck 1986).

THREATS:

Construction of a dam could flood some populations of this species along the North Milk River. Pedestrian traffic at Writing-on-Stone Provincial Park is having a minor impact on several plants in the hoodoo areas but the species appears to be quite resilient. Stabilization of open gravelly dunes is crowding out plants in northern populations.

POPULATION SIZE AND TREND:

Locally common along parts of the Milk River; rare along the South Saskatchewan; populations stable and major habitat is secure along the Milk River; populations declining due to dune invasion in more northern populations which have no formal protection.

PROTECTIVE STATUS:

Major population found at Writing-on-Stone Provincial Park.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "rare" in Alberta. Designation and wise management of the Verdigris Coulee Natural Area and Dune Point active dunes would protect significant additional populations of this species. Destabilization of dunes at Empress and Dune Point could be beneficial for this and other species. All these additional sites are on Crown land leased for grazing.

REFERENCES:

Barneby (1964)
Currah and Van Dyck (1986)

LATIN NAME: Astragalus lotiflorus Hook.

COMMON NAME: Low Milk-Vetch

BRIEF SUMMARY OF STATUS:

Threatened; rare and localized in Alberta; generally rare in Canada; western and midwestern species, rare at the northern limit of its range.

GENERAL ALBERTA DISTRIBUTION:

Widely scattered localities in the Mixed Grassland region along the lower Bow, lower Red Deer, Oldman, South Saskatchewan and Milk Rivers.

OCCURRENCES:

Site Name	Population Size
Dune Point D	12
Dune Point E	50
Dune Point open grassland	1
Empress C	12
Lower Bow D	1
Lower Bow E	12
South Saskatchewan River, NE5-18-3-W4	2
Travers Reservoir, NW19-14-20-W4	1
Turin A	75
Turin B	2
Turin D	1
Turin E	3
Vauxhall 62, SE3-12-16-W4	12
Vauxhall 57, NW18-11-16-W4	2

Other Occurrences:

- University of Alberta Herbarium

  4 miles east of Manyberries Experimental Station
  Turin, Cameron Ranch area, prairie
  Empress
  Grassy Lake
  Manyberries

- Department of Agriculture, Ottawa Herbarium

  Medicine Hat

- National Museums of Canada Herbarium

  Milk River, castellated rocks, July 15, 1885, in fruit
  Park Royal district, Lethbridge, west-facing valley rim of Oldman River, rare

Total Population: less than 1,000

HABITAT:

The principal habitat in Alberta is sandy-gravelly dune slacks in active blowout areas. It occurs in level to gently sloping portions of the dune slack. The species is most common in these very restricted kinds of habitats, the largest of which is Dune Point E. It does not occur in all exposed sandy gravelly dunes. There is a considerable amount of potential habitat in the Little Rolling Hills, however, no Astragalus lotiflorus have yet been found there. This species is very scarce and localized in sand plain areas. It is very rare in areas of man-made disturbance such as revegetating gravel pits.

BIOLOGY:

Perennial; can be cleistogamous.

THREATS:

Many sand plain areas where it undoubtedly occurred in low numbers have been cultivated. The principal sandy-gravelly dune slack habitats are threatened by encroachment of native and non-native species such as Russian thistle (Salsola kali).

POPULATION SIZE AND TREND:

Total Alberta population less than 1000. Very local, scarce where found; probably declining due to habitat destruction and encroachment of vegetation onto active blowouts.

PROTECTIVE STATUS:

No major populations are protected. There are reports of individual plants at Writing-on-Stone Provincial Park.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "threatened" in Alberta. Formal designation and protection of dunes a Turin A, Dune Point D and E, Lower Bow E and Empress C would protect the major natural populations. All these sites are on Crown land leased for grazing. Selective destabilization of the dunes may also be beneficial.

REFERENCES:

Barneby (1964)
Wallis et al. (1986)

LATIN NAME: Lupinus pusillus Pursh

COMMON NAME: Low Annual Lupine

BRIEF SUMMARY OF STATUS:

Very locally common in Alberta; rare in Canada; western species, rare at the northern limit of its range.

GENERAL ALBERTA DISTRIBUTION:

Widely scattered localities in the Mixed Grassland.

OCCURRENCES:

Site Name	Population Size
Dune Point C	5
Dune Point D	1
Dune Point E	75
Little Rolling Hills West	250
Lost River A, B, C	500
Purple Springs D	10
Suffield South (gate at Dugway)	2
Turin A, C, road cut	100
Wolf Island B	50
Wolf Island C	10
Wolf Island E	5
Total Population:	difficult to estimate (non-dune habitat not surveyed)

For a complete listing of other Alberta occurrences see Wallis et al. (1986).

HABITAT:

Sandhills, sandy shores and dry sandy eroded slopes. This species can grow in a variety of sandy sites including active sand and areas well back into the stabilization zone. It is most prevalent in semi-stabilized areas where there is considerable loose sand but abundant grassy vegetation.

BIOLOGY:

Annual. Flowers May to August.

THREATS:

Cultivation of natural habitats is a long-term threat but most areas seem secure at the present time.

POPULATION SIZE AND TREND:

Locally common over a wide range in southern Alberta; habitat seems mostly secure.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "uncommon". Maintenance of natural habitats in a variety of sandhill areas will protect populations of this species. Designation and protection of areas at Little Rolling Hills West, Dune Point, Turin and Lost River would protect significant populations of this species. With the exception of Little Rolling Hills West, all these sites are on Crown land leased for grazing.

REFERENCES:

Dunn and Gillett (1966)

LATIN NAME: Cryptantha fendleri (A. Gray) Greene

COMMON NAME: Fendler's Cryptanthe

BRIEF SUMMARY OF STATUS:

Locally abundant in sand dunes.

GENERAL ALBERTA DISTRIBUTION:

Widespread in Mixed Grassland sandhills from the Duchess area south to the United States border; also present in David Lake sandhills in the Aspen Parkland.

OCCURRENCES:

Site Name	Population Size
Barnwell B	7
Dune Point G	50
Dune Point A	30
Hilda A	9
Hilda B	10
Little Rolling Hills East F	250
Little Rolling Hills East G	50 (old heads)
Little Rolling Hills West A, B, E	75 (scattered)
Lonesome Lake	1000's
Lost River A, B and C	1000
Lower Bow C	1
Lower Bow F	8
Matzhiwin Dunes (north of Red Deer R.)	1000's
Pakowki North C	1000's
Pakowki North G	1000's
Pakowki North H	40
Pakowki North M	500
Pakowki North I (road cut)	4
Purple Springs G	30
Suffield North H	100's
Suffield North K	1
Suffield North L	1
Suffield South A	10
Wolf Island B	300

Total Population: tens of thousands

This species is also known from the David Lake sandhills.

HABITAT:

Loose sand usually at interface between stabilization and active zones, on mammal burrows or under shelter of shrubbery such as choke cherry.

BIOLOGY:

Annual. Populations appear to fluctuate greatly with moisture conditions. It has completely disappeared from areas where it had been

abundant before and appeared in large numbers in other areas where it had not previously been noted in significant quantities.

THREATS:

Stabilization of dunes is a long-term threat to maintenance of large populations of this species, however, it is unlike many other active sand species in that it adapts well to any mobilization of the sand and can survive on pocket gopher diggings.

POPULATION SIZE AND TREND:

While the 1987 figures do not reflect this, the total Alberta population of this species is estimated in the tens of thousands. This number fluctuates greatly between dry and wet years. Ongoing stabilization of the dunes will continue to reduce populations of this species.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Remove from rare species lists. Designation and protection of any one of several sand dune sites in southern Alberta will protect populations of this species. Destabilization of sand dunes should be beneficial to maintaining large populations of this species.

LATIN NAME: Franseria acanthicarpa (Hook.) Coville

COMMON NAME: Annual Bursage

BRIEF SUMMARY OF STATUS:

Rare; rare in Canada; western species, apparently rare or local through a significant part of its range; rare at the northern limit of its range.

GENERAL ALBERTA DISTRIBUTION:

Widely scattered locations in the Mixed Grassland region.

OCCURRENCES:

Site Name	Population Size
Dune Point C	30
Dune Point D	500
Dune Point E	1000
Empress A	2
Hilda B	1
Little Rolling Hills West A and B	500
Little Rolling Hills West C	50
Lost River A	900
Pakowki Lake North G	300
Pakowki Lake North K	10
Pakowki Lake North L	100
Purple Springs F	low hundreds
Purple Springs G	100
Purple Springs I	3
Wolf Island A	low hundreds
Wolf Island B	low hundreds
Wolf Island C	low hundreds
Wolf Island D	50

Total Population: less than 10,000

A collection at the Lethbridge Agriculture Station from the Bow Forest Preserve west of Turner Valley needs confirmation and is probably mislabelled.

HABITAT:

Flatter terrain in open active sand; occasionally in the semi-stabilized zone but always where there is abundant active sand; sometimes forming pure "stands". This species is able to colonize habitats from the active sand back to the edge of the stabilization zone. It rarely occurs in the stabilization zone. It appears to do best in areas which are harder packed finer sand, sometimes where it is gravelly.

BIOLOGY:

Annual.

THREATS:

Encroachment of vegetation on active blowouts is reducing habitat for this species.

POPULATION SIZE AND TREND:

Less than 10,000 plants overall. Populations are probably declining due to vegetation encroachment on active dune habitats.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "rare" in Alberta. Designation and appropriate management of Dune Point would protect the largest Albera populations of this species. Retention of natural habitats at Little Rolling Hills, Wolf Island, Pakowki Lake North and Purple Springs would protect other significant populations. Most of these sites are on Crown land leased for grazing. Destabilization of dunes may be beneficial for this species in the long-term.

LATIN NAME: Lygodesmia rostrata A. Gray

COMMON NAME: Annual Skeleton-weed

BRIEF SUMMARY OF STATUS:

Rare; possibly threatened. Generally rare in Canada; midwestern species, apparently rare or local through much of its range.

GENERAL ALBERTA DISTRIBUTION:

Widely scattered localities in the Mixed Grassland and Aspen Parkland regions.

OCCURRENCES:

Site Name	Population Size
David Lake South B	5
Dune Point A	several hundred
Dune Point B	several hundred
Dune Point D	200
Dune Point E	200
Empress A	2
Empress B	1
Hilda A	1
Hilda C	3
Little Rolling Hills West E	1
Lost River A, B and C	less than 100
Pakowki Lake North G	50
Pakowki Lake North J	10
Pakowki Lake North K	10
Pakowki Lake North L	3
Suffield North L	10
Suffield North N	low hundreds
Suffield North and Centre road cuts	odd plant
Suffield South A	4
Suffield South B	200

Other Occurrences:

- University of Alberta Herbarium

  west of Dilberry lake, 52°35'N, 110°01'W, sand dunes

It is also known to occur in at least one other dune at David Lake.

Total Population: less than 5,000

HABITAT:

Open west or south facing active sand slopes and dune slack gravels; occasionally on north or east exposures and in recently stabilized areas where there is considerable loose sand.

BIOLOGY:

Annual.

THREATS:

Encroachment of vegetation on active blowouts and dune slacks is reducing habitat for this species. Dune Point dune slacks are being invaded by Salsola kali, elsewhere native vegetation is invading active sand areas.

POPULATION SIZE AND TREND:

Less than 5,000 plants; habitat decreasing due to dune stabilization.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "rare" in Alberta; "threatened" in the Aspen Parkland. Designation and appropriate management of Dune Point would protect the largest Albera populations of this species. Retention of natural habitats at Pakowki Lake North and Suffield would protect other significant populations. All these sites are on Crown land leased for grazing or military purposes. Destabilization of dunes may be beneficial for this species in the short-term in the Aspen Parkland and in the long-term in the Mixed Grassland.

LATIN NAME: *Yucca glauca*

COMMON NAME: Yucca

BRIEF SUMMARY OF STATUS:

Very rare in Alberta and Canada; western and midwestern species, rare at the northern limit of its range.

GENERAL ALBERTA DISTRIBUTION:

Known only from the Milk River-Lost River area in two localities.

HABITAT:

Dry grassland, especially on gravelly or sandy slopes.

BIOLOGY:

Perennial. This species is dependent upon a yucca moth for pollination.

THREATS:

None.

POPULATION SIZE AND TREND:

For a full account of this species see Milner (1977). Populations appear to be stable and in some areas increasing into surrounding grasslands.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "rare" in Alberta. Designation and appropriate management of the Lost River and Milk River sites would protect the known populations of this species in Alberta. The Lost River is the most important of the two sites.

REFERENCES:

Milner (1977)
Wershler and Wallis (1986)

LATIN NAME: Munroa squarrosa (Nutt.) Torr.

COMMON NAME: False Buffalo-grass

BRIEF SUMMARY OF STATUS:

Very rare in Alberta; rare in Canada; western and midwestern species, rare at the northern limit of its range.

GENERAL ALBERTA DISTRIBUTION:

Known only from the Medicine Hat and Hardisty districts.

OCCURRENCES:

- University of Alberta Herbarium

Hardisty
Irvine
Medicine Hat

No plants of this species were found during 1988 surveys, although it is a plant which frequents sandy and gravelly habitats in other parts of its range.

HABITAT:

Grassland, probably disturbed gravelly? or sandy? sites.

BIOLOGY:

Low tufted annual.

THREATS:

Unknown.

POPULATION SIZE AND TREND:

Unknown. It is possible that drought conditions have reduced populations in some areas which were surveyed during 1987.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Attempts should be made to relocate the Medicine Hat and Hardisty populations.

REFERENCES:

Hitchcock and Chase (1950)

LATIN NAME: Sporobolus neglectus Nash

COMMON NAME: Annual Dropseed

BRIEF SUMMARY OF STATUS:

Very rare plant of sandy habitats; widespread species, rare at the northern limit of its range.

GENERAL ALBERTA DISTRIBUTION:

Known in natural habitat only from the Medicine Hat district.

OCCURRENCES: Site Name — Population Size

- University of Alberta Herbarium

  2 miles southwest of Medicine Hat, dry sandy bank at the bottom of a coulee slope
  A collection from the Mayerthorpe area along railroad tracks needs confirmation

No plants were observed during 1987 field surveys.

HABITAT:

Dry sandy soil.

BIOLOGY:

Annual.

THREATS:

Unknown.

POPULATION SIZE AND TREND:

Unknown.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Attempts to relocate the Medicine Hat population of this species should be made.

LATIN NAME: Vulpia octoflora (Walt.) Rydb.

COMMON NAME: Six-weeks Fescue

BRIEF SUMMARY OF STATUS:

Abundant plant of sandhills; had been considered rare in much of its Canadian range.

GENERAL ALBERTA DISTRIBUTION:

Occurs in sandhill and sandy areas from Verdigris Coulee east to the Lost River and north to the Little Rolling Hills and Middle Sand Hills.

OCCURRENCES:

This species is far more common than previously believed. It occurs in the tens of thousands in many areas including Pakowki, Lost River, Verdigris Coulee, Purple Springs, Little Rolling Hills and Middle Sand Hills.

HABITAT:

Stabilized sand dunes where there is abundant loose sandy soil; occasionally on depleted rangeland and sterile ground.

BIOLOGY:

Small tufted perennial; heads out in May or early June.

THREATS:

None known; appears quite adaptable to cattle grazing and disturbance.

POPULATION SIZE AND TREND:

Locally abundant in sandhills; habitat apparently secure.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Remove this species from rare plant lists. Designation and protection of virtually any sandhill area in southeastern Alberta would protect significant populations of this species.

REFERENCES:

Lonard and Gould (1974)

LATIN NAME: Cyperus squarrosus L.

COMMON NAME: Awned Nut-grass

BRIEF SUMMARY OF STATUS:

Very rare in Alberta; cosmopolitan temperate and tropical species, rare at the northwestern edge of its North American range.

GENERAL ALBERTA DISTRIBUTION:

Known only from the Medicine Hat district.

OCCURRENCES:

- University of Alberta Herbarium

10 miles south of Redcliff, border of large slough north of Seven Persons about 12 miles, southwest of Medicine Hat, margin of slough

No plants of this species were located in 1987 field surveys.

HABITAT:

Borders of sloughs in moist sandy? soil.

BIOLOGY:

Low tufted annual.

THREATS:

Unknown.

POPULATION SIZE AND TREND:

Unknown.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Attempts to relocate the known populations of this species should be made.

LATIN NAME: Thellungiella salsuginea (Pall.) Schulz

COMMON NAME: Mouse-ear Cress

BRIEF SUMMARY OF STATUS:

Very rare in Alberta and in Canada; a northern species which appears to be nowhere common in its North American range.

GENERAL ALBERTA DISTRIBUTION:

Known only from the Wood Buffalo Park area in the Peace River Lowlands and in the "Bindloss Depression" in the Mixed Grassland.

OCCURRENCES: Site Name	Population Size
Bindloss Depression (NE28-21-3-W4)	25
Total Population:	northern population not surveyed

HABITAT:

Moist saline ground at edge of ungrazed spring.

BIOLOGY:

Annual; flowering in late April in 1987.

THREATS:

Unknown. Unlike most other springs in the grassland region, the Bindloss depression site is fenced out from grazing. It is not clear whether the suitable habitat extended further in past years. The immediately adjacent habitat is extremely heavily grazed and no plants were noted in that area.

POPULATION SIZE AND TREND:

The total known grassland population in Alberta is 25, although no detailed and systematic survey of this large spring area was made.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "rare". Designation and wise management of the Bindloss depression site would protect the only known grassland population. Detailed surveys of the Bindloss depression and other spring areas should be made to determine the effect of cattle grazing on this species. This is Crown land which is used for grazing purposes.

REFERENCES:

Hulten (1968)

LATIN NAME: Astragalus purshii Dougl. ex Hook.

COMMON NAME: Pursh's Milkvetch

BRIEF SUMMARY OF STATUS:

Rare in Alberta and in Canada; western species, rare at the northeastern limit of its range.

GENERAL ALBERTA DISTRIBUTION:

Locally prevalent in sand plain grasslands in the Lost River-Sage Creek area. Northwards it appears to be very local and rare.

OCCURRENCES:	Site Name	Population Size
	Hilda E	less than 5

- University of Alberta Herbarium

Manyberries Experimental Station, rocky badlands
Sage Creek, 36-2-3-W4, mixed grassland, barren flats

- National Museum of Canada Herbarium

Medicine Hat

This species is known to be fairly common in the Lost River-Milk River area (Wershler and Wallis 1986) in extensive sand plain grasslands.

HABITAT:

Mixed grasslands on sand plains.

BIOLOGY:

Low tufted perennial.

THREATS:

Cultivation of sand plains is a long-term threat.

POPULATION SIZE AND TREND:

Populations appear to be moderate in its principal range in the Lost River-Milk River and low elsewhere. Populations are thought to be declining slightly due to cultivation of sand plain habitats.

PROTECTIVE STATUS:

There are undoubtedly populations in the Kennedy Creek Ecological Reserve and Milk River Canyon Natural Area.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "rare" in Alberta. Designation and wise management of sand plain habitats in the Lost River area would protect this and several other significant species. This site is Crown land which is leased for grazing purposes.

REFERENCES:

Barneby (1964)

LATIN NAME: Psoralea argophylla Pursh

COMMON NAME: Silverleaf Scurfpea

BRIEF SUMMARY OF STATUS:

Uncommon, possibly rare, and local in Alberta.

GENERAL ALBERTA DISTRIBUTION:

Widely scattered localities in eastern Mixed Grassland and eastern Aspen Parkland regions; nowhere common.

OCCURRENCES: Site Name	Population Size
Empress D	250
Empress, SE11-23-1-W4	30

Other collections include:

- University of Alberta Herbarium

Battle River, dry prairie slope in valley, north of Wainwright
Medicine Hat, 5 miles east, railway tracks
5 km north of Empress, 51°00'N, 110°01'W, grassland
Walsh, 50°07'N, 110°04'W
Kinsella, 6 km north of town, 53°02'N, 111°35'W, open grassland in aspen parkland
Battle River Valley near Big Knife Provincial Park, 52°29'N, 112°11'W, dry grassy slope
south of Galahad
north of Irvine, sandy roadside
9 miles north, 2 miles east of Consort, 1-37-6-W4, dry open prairie

- Department of Agriculture, Lethbridge Herbarium

Bindloss
Dunmore Junction

HABITAT:

This is a species of level sand plain areas, especially around moist depressions. No specific surveys to assess this non-dune species were undertaken, however, a considerable amount of its habitat was traversed in 1987 and previous years. From those surveys, it appears to be very localized in the Grassland and Aspen Parkland regions. Other known occurrences include Pakowki Lake, Wainwright/David Lake and the northern Middle Sand Hills of the Suffield block. Many of the sand plain areas, particularly in the Aspen Parkland, where it undoubtedly used to occur have been cultivated.

BIOLOGY:

Perennial with creeping rhizomes.

THREATS:

Cultivation of sand plains is a long-term threat.

POPULATION SIZE AND TREND:

There is no accurate estimate of the total population but it is thought to be less than 20,000. This figure could be high. Populations are thought to be declining due to ongoing clearing and cultivation of sand plain habitats, especially in the Aspen Parkland.

PROTECTIVE STATUS:

A small population is located in the David Lake Ecological Reserve.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "rare" in Alberta. Additional surveys of sand plains and areas where there are previous records should be made to determine the full extent of habitat loss.

Retention of natural sand plain habitat at Empress, Empress Dunes, Suffield, Pakowki Lake, and Wainwright/David Lake sites would protect known populations of this species. All these sites are on Crown lands which are leased for grazing or military purposes.

Research into the biology of this species and the impact of different grazing regimes and fire would be useful and may help explain the relative scarcity of this species.

LATIN NAME: Oenothera andina Nutt.

COMMON NAME: Obscure Evening-primrose

BRIEF SUMMARY OF STATUS:

Very rare in Alberta and Canada; western species, rare at the northern limit of its somewhat limited range.

GENERAL ALBERTA DISTRIBUTION:

Known only from the Onefour-Manyberries area.

OCCURRENCES:

- University of Alberta Herbarium

Manyberries, gently sloping ground with sagebrush

Wershler and Wallis (1986) describe the Onefour site which lies just south of the old town of Onefour in a slight depression in grassland in W22-1-4-W4 where it is fairly common.

HABITAT:

Sandy plains, especially in slightly moister depressions.

BIOLOGY:

Annual.

THREATS:

Unknown.

POPULATION SIZE AND TREND:

Unknown but this species is thought to be very rare. Despite intensive searches in areas of known occurrence at Onefour, only one locality could be found.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "rare". Designation and protection of the Lost River area would protect individuals of this species. This is Crown land which is leased for grazing.

REFERENCES:

Raven (1969)

LATIN NAME: Oenothera serrulata Nutt.

COMMON NAME: Shrubby evening-primrose

BRIEF SUMMARY OF STATUS:

Rare in Alberta; western species, rare at the northwestern limit of its range.

GENERAL ALBERTA DISTRIBUTION:

Widely scattered localities in the Mixed Grassland but always rare where found.

OCCURRENCES: Site Name	Population Size
Dune Point F	less than 10

Other Occurrences:

- University of Alberta Herbarium

Medicine Hat, on plains and on river valley flats
Lost River Coulee, seven km west of Onefour, silt deposits in dried up floodplain, 49°06'N, 110°34'W
Empress, 5 km north of town, 51°00'N, 110°00'W, open grassland
west of Fort Macleod, dry plains
Fort Macleod, old stubble field
7 miles north of Sandy Point along Highway 41, 20-1-W4, dry south facing slope in patch of Juniperus horizontalis

- Department of Agriculture, Ottawa Herbarium

Dunmore

It is also known to occur at the yucca site along the Lost River and other locations in the Dune Point area.

HABITAT:

Sandy plains, apparently also occasionally in dunes.

BIOLOGY:

Perennial.

THREATS:

Cultivation of sand plains is a long-term threat.

POPULATION SIZE AND TREND:

Unknown. This non-dune species was not specifically surveyed for during 1987. From previous studies it appears to be rare and local.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Designation and protection of the Dune Point and Lost River areas would protect individuals of this species. These are Crown lands which are leased for grazing.

LATIN NAME: Androsace occidentalis Pursh

COMMON NAME: Western Pygmyflower

BRIEF SUMMARY OF STATUS:

Abundant in sand plain areas; formerly considered rare in Alberta.

GENERAL ALBERTA DISTRIBUTION:

Widespread in the Mixed Grassland.

OCCURRENCES:

This species was noted in every sand plain area from the Red Deer River in the Atlee and Bindloss districts south to the Milk River Canyon.

HABITAT:

Sandy plains.

BIOLOGY:

Annual, usually winter annual; flowering in May and early June (late April 1987).

THREATS:

Cultivation of sand plains is a long-term threat. Habitat generally seems secure over the short-term.

POPULATION SIZE AND TREND:

Hundreds of thousands of individuals occur in many sand plain areas. Population is abundant and stable.

PROTECTIVE STATUS:

None known, although this species probably occurs in the Kennedy Creek Ecological Reserve and Milk River Canyon Natural Area.

RECOMMENDATIONS:/MANAGEMENT ACTION:

This species should be removed from rare plant lists for Alberta. Maintenance of natural habitats in sand plains in southern Alberta would protect populations of this species.

REFERENCES:

Wallis et al. (1986)

LATIN NAME: Asclepias viridiflora Raf.

COMMON NAME: Green Milkweed

BRIEF SUMMARY OF STATUS:

Very locally common in Alberta; generally rare in Canada; midwestern and eastern species, rare at the northwestern limit of its range.

ALBERTA DISTRIBUTION:

Known only from Writing-on-Stone Provincial Park and the lower Lost River area in the vicinity of the yuccas.

HABITAT:

Eroding sandy or gravelly areas.

BIOLOGY:

Perennial.

THREATS:

Recreational use at Writing-on-Stone Provincial Park may impact some populations but generally their habitat seems secure.

POPULATION SIZE AND TREND:

The total Alberta population is estimated to be less than 1,000 plants but it is probably stable.

PROTECTIVE STATUS:

Writing-on-Stone Provincial Park.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "rare" in Alberta. Designation and wise management of the Lost River area would protect another population of this species. this is Crown land which is leased for grazing.

LATIN NAME: Cryptantha minima Rydb.

COMMON NAME: Low Cryptanthe

BRIEF SUMMARY OF STATUS:

Very rare in Alberta and Canada; midwestern species, rare at the northwestern limit of its range.

GENERAL ALBERTA DISTRIBUTION:

Known only from Medicine Hat.

OCCURRENCES:

- Department of Agriculture, Ottawa Herbarium

Medicine Hat

HABITAT:

Eroding areas.

BIOLOGY:

Annual.

THREATS:

Unknown.

POPULATION SIZE AND TREND:

Unknown. No surveys of this non-dune plant were undertaken in 1987.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Attempts should be made to relocate the Medicine Hat population.

LATIN NAME: Hedeoma hispidum Pursh

COMMON NAME: Rough Pennyroyal

BRIEF SUMMARY OF STATUS:

Rare in Alberta; midwestern and eastern species, rare at the northwestern limit of its range.

GENERAL ALBERTA DISTRIBUTION:

Widely scattered localities through the Mixed Grassland region but always rare.

OCCURRENCES:

- University of Alberta Herbarium

  Jenner Ferry, northeast of Brooks, open prairie by ferry landing
  southeast of Manyberries, dry slough bottom in prairie
  Fort Macleod, garden
  Walsh, dry prairie
  3 miles east of Irvine

- Department of Agriculture, Lethbridge Herbarium

  Bow Island Grazing Preserve

HABITAT:

Borders of sloughs in moist sandy? soil and sandy soil along grassy river terraces.

BIOLOGY:

Low tufted annual.

THREATS:

Unknown.

POPULATION SIZE AND TREND:

Unknown. No surveys for this non-dune species were undertaken in 1987.

PROTECTIVE STATUS:

Dinosaur Provincial Park.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Attempts to relocate the known populations of this species should be made.

REFERENCES:

Gill (1981)

LATIN NAME: Castilleja sessiliflora Pursh

COMMON NAME: Downy Paintbrush

BRIEF SUMMARY OF STATUS:

Rare, possibly threatened in Alberta; known only from three localities, populations very low.

GENERAL ALBERTA DISTRIBUTION:

Known only from an area just north of Writing-on-Stone Provincial Park and along the Lost River.

OCCURRENCES:

Site Name	Population Size
Lost River B	25
Writing-on-Stone	less than 10

A collection at the Lethbridge Agriculture Station from the Lomond district 50°21'N, 112°39'W needs confirmation and may represent a mislabelled collection.

HABITAT:

Stabilized sand in dunes and sand plain areas.

BIOLOGY:

Perennial.

THREATS:

Cultivation of sand plain areas may pose a threat in the long-term for the Writing-on-Stone population. Hay for supplemental winter cattle feed has recently been placed at the largest population at the Lost River. The winter grazing pressure may not be significant although there could be increased compaction or disturbance of this population. In addition to the increased grazing pressure on this site, there is concern regarding the invasion of this site by weedy species introduced in the hay.

POPULATION SIZE AND TREND:

Less than 50 plants are known in Alberta. The population appears to have been stable but recent changes in Lost River cattle use could stimulate a decline.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "rare"; "threatened" if further research indicates grazing and hay placement poses a problem. Designation and appropriate management of the Lost River area would protect the most significant Alberta population of this species. This is Crown land which is leased for grazing. Research into the biology of this species with respect to grazing and fire will help in its management.

LATIN NAME: Antennaria dimorpha (Nutt.) T. & G.

COMMON NAME: Cushion Everlasting

BRIEF SUMMARY OF STATUS:

Very locally abundant; generally rare in Canada; western species, rare at the northeastern edge of its somewhat limited range.

GENERAL ALBERTA DISTRIBUTION:

Widely scattered locations from Milk River Canyon to Dinosaur Provincial Park.

OCCURRENCES: Site Name	Population Size
Pakowki South	less than 100
Suffield Centre, sand plain above Sherwood Forest	less than 100
Suffield Centre H	less than 50
Suffield Centre I	less than 50

This is not a complete compilation of Alberta records. These represent additional records of this species from 1987 surveys.

HABITAT:

Sand plains.

BIOLOGY:

Perennial, mat-forming.

THREATS:

Cultivation of sand plain habitats is a long-term threat but habitat now seems secure.

POPULATION SIZE AND TREND:

This species is relatively common in sand plains in the Kennedy Creek, Lost River and Milk River Canyon areas but appears to only occur in low populations north of this district. Populations appear to be stable.

PROTECTIVE STATUS:

Dinosaur Provincial Park, Kennedy Creek Ecological Reserve and Milk River Canyon Natural Area.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "uncommon" in Alberta. Designation and appropriate management of the Lost River area would protect another significant Alberta population of this species. This is Crown land which is leased for grazing.

LATIN NAME: Thelesperma marginatum Rydb.

COMMON NAME: Tickseed

BRIEF SUMMARY OF STATUS:

Very rare in Alberta; rare in Canada; western species of limited distribution, apparently rare over most of its range; Medicine Hat is the type locality.

GENERAL ALBERTA DISTRIBUTION:

Known only from two sites along the valleys of the South Saskatchewan drainage in the Mixed Grassland; western species of restricted distribution, apparently rare in many parts of its range.

OCCURRENCES:

- National Museums of Canada Herbarium

Police Point, Medicine Hat, May 31, 1894
32 km west of Lethbridge, August 25-27, 1964, heads in seed, dry prairie and open slopes

HABITAT:

Eroding areas, presumably in sandy soil.

BIOLOGY:

Perennial; blooms late May and June.

THREATS:

Unknown but cultivation may have affected one population.

POPULATION SIZE AND TREND:

Apparently very rare and local. Despite intensive surveys in 1986 and 1987 in sandy plains and sand dunes in the Pearce (Monarch) dunes east of Fort Macleod, this species was not located. These sand plains have been heavily impacted over the last 30 years and it is unclear from collection data where populations of Thelesperma marginatum naturally occurred.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "rare". Further surveys in the Medicine Hat and Monarch areas should be undertaken to attempt to locate populations of this species.

REFERENCES:

Wallis et al. (1986)

3.2 Wildlife

The following species summary sheets outline the results of the 1987 field investigations. For wildlife, the following headings are employed:

Latin Name

Common Name

Brief Summary of Status

General Alberta Distribution

Occurrences - field observations and additional collection records

Habitat - brief overview

Threats - major short-term and long-term threats to a species' survival

Population Size and Trend - estimate of total Alberta population and stability of existing population

Protective Status - areas where wildlife receive formal protection

Recommendations/Management Action - includes recommendations for classification as "rare, threatened, or endangered" or for delisting; specific areas where habitat should be conserved; and management practices which might help in the long-term and short-term maintenance of populations.

LATIN NAME: Bufo cognatus

COMMON NAME: Great Plains Toad

BRIEF SUMMARY OF STATUS:

Endangered; populations have declined significantly; remaining population low and vulnerable.

GENERAL ALBERTA DISTRIBUTION:

Widely scattered localities in the Empress-Medicine Hat, Taber-Lake Newell and Lost River-Milk River districts.

OCCURRENCES:

For a complete listing of historical records see Cottonwood Consultants (1986b).

- Great Plains Toad breeding ponds, 1987

1. Little Rolling Hills East - small ponds in vicinity of Site A

Total: 6 calling

Habitat: three small, shallow ponds, the northern two being next to sandhills; water clear but a lot of algae growth; no emergent vegetation

Location: N 1/2 Sec. 32, Twp. 15, Rge. 13, W4M

Observations: May 8 - 2 & 3 in two ponds near pipeline; 1 in very small pond just south and west of these, towards irrigation canal

Notes:

- began calling 2130 hrs., very slowly at first when only individuals called but more rapidly later when all called in chorus
- Chorus Frogs called in all three ponds and were especially numerous in the two northern ponds
- migratory shorebirds, a few resident ducks and shorebirds, and a muskrat seen in northern ponds
- day was very warm and sunny; evening was cool, clear and relatively calm -- water in ponds was warm in comparison to air temperature
- Great Plains Toads called from clumps of algae

2. Little Rolling Hills East - pond at Site B

Total: maximum of approximately 25 calling, plus 2 on land

Habitat: shallow pond in series of depressions, some of which were dry; water clear but with considerable algae growth; no emergent vegetation

Location: NW 1/4 of Sec. 26, Twp. 15, Rge. 14, W4M

Observations:

May 28 (showery day; clear evening)

- 1815 hrs.: 1 calling intermittently
- 2145 hrs.: a few calling intermittently
- 2230 - 2245 hrs.: c.25 calling intensively, in two groups of 10-12, plus 2 individuals; 2 individuals on land (1 female moving across dry shore toward water; 1 jumping in water from slightly raised bank)

June 4 (warm clear evening)

- late afternoon: none calling
- 2210 hrs.: started calling
- by 2245 hrs.: 5-6 calling

Notes:

- numerous Chorus Frogs called on both nights
- migrant and nesting shorebirds and a variety of duck species also used the pond
- Great Plains Toads called from clumps of algae

3. Little Rolling Hills East - Site D

Total: maximum of 20+ calling

Habitat: large pond with higher than normal water level -- some of the grassland backshore looked recently flooded; at least a few toads called from this area; water was clear and no emergent vegetation was noted

Location: Sec. 34, Twp. 15, Rge. 14, W4M

Observations:

May 29

- just after midnight: 20+ calling

June 4

- 2330 hrs.: 10+ calling

Notes:

- 50+ Plains Spadefoot calling on May 28, but none on June 4
- a variety of waterfowl and nesting shorebirds also used the pond
- a few Great Plains Toads were also calling to the northeast of this site on the east side of the north-south trail, at Site E

4. Little Rolling Hills West - Site F

Total: 20-30 calling

Habitat: small shallow pond; shallows and shore trampled by cattle; water clear

Location: on border of Sec. 20 & 29, Twp. 15, Rge. 14, W4M

Observation: May 29 (0219 hrs.) - 20-30 calling

Notes:

- large spring, possibly partly influenced by irrigation development but situated 4 km from the nearest irrigation canal or reservoir
- potential "mother" pond; all other wetlands in the region were dry

5. Lake Newell (south shore)

Total: 4 or 5 calling

Habitat: intermittent wetland close to lakeshore; lake level high

Location: NW 1/4 Sec. 18, Twp. 16, Rge. 15, W4M

Observation: May 29 (0110 hrs.): 4 or 5 calling

Notes:

- 2+ Dakota Toads and numerous Chorus Frogs calling in same wetland
- Dakota Toads calling May 1 (0300 hrs.) during light rain, but no Great Plains Toads

6. Lake Newell (southeast shore)

Total: "a few" calling in distance

Habitat: either intermittent wetland next to lake or shallows of lake itself

Location: Sec. 5 or 6, Twp. 17, Rge. 14, W4M

Observation: May 1 (after midnight): more than 1 calling

7. Lower Bow (Wolf Island) Sandhills - pond north of Oldman River, east of Bow Island

Total: 30-50 calling

Habitat: large, spring-fed pond, unknown depth; water clear; no emergent vegetation; pond connected to irrigation canals on north and south sides

Location: NE 1/4 Sec. 19, N 1/2 Sec. 20, Sec. 29, SE 1/4 Sec. 30, Twp. 11, Rge.13, W4M

Observations: May 29 (2215-2230 hrs.): 30-50 calling in two large groups; still not completely dark by 2230 hrs., so there were potentially many more in the pond not yet calling

Notes:

- pond fed by a very large spring -- one of the largest in southern Alberta
- possible "mother pond" prior to irrigation development
- many Chorus Frogs also calling

8. Purple Springs Sandhills - Site B pond

Total: 6+ calling

Habitat: small, shallow pond with clear water

Location: NW 1/4 31, Twp. 10, Rge.14, W4M

Observation: May 29 (1035 hrs.) - 6+ calling

Notes:

- Chorus Frogs also calling
- potential of more calling after 1035 hrs.

9. Purple Springs Sandhills - Site I, along irrigation canal

Total: 50-100 calling

Habitat: small, shallow ponds with clear water

Location:

Observation: May 29 (before midnight): 50-100 calling

Notes:

- Chorus Frogs also calling

10. Purple Springs Sandhills - pond in vicinity of Site C, just south of Oldman River

Total: 6 calling

Habitat: small willow-ringed pond with clear water

Location: on border of Sec. 9 & 10, Twp. 11, Rge. 14, W4M

Observation: May 29 (before midnight): 6 calling

Notes: Chorus Frogs also calling

11. Purple Springs Sandhills - south of Site C

Total: 6 calling

Habitat: small pond with clear water

Location:

Observation: May 29 (before midnight): 6 calling

Notes: Chorus Frogs also calling

12. Purple Springs Sandhills - Site H, north of Purple Springs Grazing Reserve Headquarters

Total: 5+ calling

Habitat: 2 small, shallow ponds with clear water

Location: SW 1/4 Sec. 28, Twp.10, Rge. 14, W4M

Observation: May 29 (before midnight): 5+ calling

13. Purple Springs Sandhills - Site J

Total: 6 calling

Habitat: small, shallow pond with clear water

Location: S 1/2 Sec. 29, Twp. 10, Rge. 14, W4M

Observation: May 29 (before midnight): 6 calling

Notes: Chorus Frogs also calling

14. Purple Springs Sandhills - Site A pond, north of Purple Springs

Total: 2 calling

Habitat: small, shallow pond with clear water

Location: N 1/2 Sec. 13, Twp. 10, Rge. 15, W4M

Observation: May 29 (before midnight): 2 calling

Notes: Chorus Frogs and several Plains Spadefoot also calling

- Summary of Other Sites Surveyed in 1987

15. Bindloss - Empress

This area was previously productive in the 1970's. Since that time, previously productive sloughs have been continuously dried up and, in several cases, have been cultivated. Dugouts have also been placed in a significant number of natural wetlands. All wetlands in Townships 21 and 22, Ranges 1 to 4, south of the Red Deer River were surveyed. A few wetlands had some water but contained only breeding Chorus Frogs and in one area, Leopard Frogs (E28-21-3-W4). Good potential still remains in one previously productive ephemeral wetland (W29-21-1-W4) which is in natural grassland on Crown land leased for grazing.

Wetlands in the valley of the Red Deer appear to be too muddy and alkaline and the adjacent deposits are of too fine a texture to be of value to Great Plains Toads.

16. Hilda Sandhills

This area had reports of productive breeding ponds in the 1960's, however, virtually all wetlands are now dried up and, in a few instances, have been cultivated. Dugouts have also been placed in a large number of ephemeral wetlands. All wetlands in Townships 18 to 20 Ranges 1 to 3, on both sides of the South Saskatchewan River were surveyed. A few wetlands had some water but contained only breeding Chorus Frogs. Good potential still remains in several ephemeral wetlands which are in natural grassland on Crown land leased for grazing (SW4-20-2-W4; several wetlands in the centre of 18-3-W4; wetlands in the southwest corner of 19-2-W4).

17. Matzhiwin Sandhills

Ponds in Township 22, Range 15 were surveyed. This area had apparently good habitat with abundant shallow, clear water and adjacent sand deposits. However, only breeding Dakota Toads and Chorus Frogs occupied these ponds. There is no historical evidence of breeding Great Plains Toads here.

18. C. F. B. Suffield (South)

All wetlands in sand plains are now dried up and have been that way for a number of years. Fortunately, dugouts have not been placed in many of these ephemeral wetlands. All wetlands in Townships 15 and 16, Ranges 5 to 7, on the west side of the South Saskatchewan River were surveyed. No wetlands had any water.

Good potential remains in numerous ephemeral wetlands which are in natural grassland on Crown land leased to the federal government for military purposes (35 and 36-15-6-W4; Frog Ponds, 28 to 30-15-6-W4; 13-16-6-W4; several wetlands along the western edge of 16-5-W4). Wetlands north and west of this area appeared to be more alkali and with finer textured sediment and do not appear to be suitable for Great Plains Toads.

19. Old Channel Lake, North of Medicine Hat

This area may have been previously productive in the 1970's. Since that time, seasonally wet depressions and sloughs have been continuously dried up and, dugouts have been placed in a significant number of the natural wetlands. All wetlands in Townships 13 and 14, Ranges 5 to 6, west of the South Saskatchewan River and north of the Trans-Canada Highway were surveyed. No wetlands had any water. Potential remains in the north part of 14-6-W4. Much of this land is Crown land leased for grazing.

20. Brooks - Vauxhall

Wetlands in the areas between Duchess and Lake Newell and between Hays and Vauxhall were checked. Only Dakota Toads and Chorus Frogs were noted. The northern Duchess - Lake Newell is not considered to be a potential area due to the lack of suitable coarse textured substrates. It was surveyed as a "control" to confirm habitat preference in Great Plains Toads which were found in immediately adjacent wetlands in the Little Rolling Hills - South Lake Newell districts.

The southern Hays - Vauxhall district is known to have some suitable habitats in the area just south and east of Hays in natural sand plains in Townships 12 and 13, Ranges 13 and 14. Due to time constraints and the lack of suitable conditions on other survey dates, these areas were not checked. Wetlands in cultivated land closer to Vauxhall in Township 13, Range 15 were not productive for Great Plains Toads.

21. Barnwell Sandhills

This is probably the westernmost potential Great Plains Toad habitat along the Oldman River. All wetlands in Township 10, Ranges 17 to 18 north of the Oldman River were surveyed. None of the wetlands had any water and dugouts had been placed in several of the natural ephemeral wetlands. There is a mixture of private land and Crown land which is

leased for grazing.

22. Lost River Sandhills

This area had been previously productive for Great Plains Toads but had suffered through a number of years of drought. Water levels have returned to "normal", however, previously productive ponds have not yet been recolonized by Great Plains Toads. Good potential still exists in a number of wetlands in Township 1, Ranges 4 to 5. Chorus Frogs and Spadefoot Toads were found along the Lost River valley. This area is on Crown land leased for grazing and has a variety of other nationally significant features associated with it.

23. Pakowki Lake Sandhills

Despite apparently good habitat and surveys in previous years, we have never found Great Plains Toads in this area. There is clear shallow water and abundant sand substrate in both active dune and sand plain environments. Much of the suitable potential habitat is on Crown land leased for grazing. The area also has several other provincially significant natural features.

24. Wildhorse - Manyberries

All ponds along Highway 502 between Highway 41 and Onefour, Highway 41 between Highway 501 and Wildhorse, and Highway 501 between Highway 41 and the gravel road between Onefour and Manyberries between Seven Persons and Orion were surveyed. There was abundant water in the wetlands, however, the substrate appears to be too fine for Great Plains Toads. Only Chorus Frogs were found in these areas, despite the fact that Spadefoot Toads were calling at the Lost River. This area was surveyed as a "control" block to determine the effect of substrate on Great Plains Toads. Most of this land is Crown land leased for cattle grazing.

25. Seven Persons - Orion

All ponds along Highway 887 between Seven Persons and Orion were surveyed. There was abundant water in the wetlands, however, the substrate appears to be too fine for Great Plains Toads. Only Chorus Frogs were noted in these wetlands. This area was surveyed as a "control" block to determine the effect of substrate on Great Plains Toads.

HABITAT:

With one exception (Little Rolling Hills), all 1987 Great Plains Toad breeding sites were located in sand plain wetlands directly influenced by irrigatin water. Due to continued drought conditions in 1987, which have prevailed in much of the Mixed Grassland region for several years, most of the known or potential breeding ponds outside of irrigated regions were dry during the survey period. In the irrigated areas, there appears to have been a rise in the local water table (compared to pre-irrigation conditions) to the extent that small naturally ephemeral ponds were kept flooded during the survey period in 1987, even though numerous similar sized ponds in nearby areas were dessicated. In the Little Rolling Hills area, a Ducks Unlimited water control project has also helped to maintain some habitat for Great Plains Toads.

The vast majority of water bodies were small, shallow, relatively fresh ponds with no or very little growth of emergent vegetation. At least two sites were spring-fed. The ponds were not in sandhill areas proper, but rather on the edge of sandhills or in sand plain habitats close to sandhills. This was probably due to a lack of water in the dunes. In most of the sites which were checked more closely, algal growth in the water was used as perches for vocalizing males, and probably also plays an important role in providing cover for adults, tadpoles and eggs.

All ponds which contained Great Plains Toads were surrounded by natural vegetation. Similar sites in cultivated areas failed to be productive for Great Plains Toads, and often did not even contain Chorus Frogs.

The majority of the breeding ponds checked during daylight hours were also used by a variety of shorebirds (migratory and summer residents) and waterfowl. In most cases, the ponds were also used as breeding sites by Chorus Frogs and, in three instances, by Plains Spadefoots.

THREATS:

Great Plains Toads face threats which are both natural and man-made. Prolonged drought has kept once productive breeding ponds dry for most of the 1980's in northern populations. Refilled ponds in the south have not yet been recolonized and this may be related to high mortality in adults and no replacement by young during the long dry period.

It is noteworthy that even though most populations of Great Plains Toads found in 1987 appeared to be associated with irrigation, all ponds were situated in natural vegetation. As these areas become more developed for agriculture, cultivation will become a significant threat to the continued existence of viable Great Plains Toad habitat. Ponds in adjacent cultivated lands had no Great Plains Toads. Several dessicated former breeding ponds have now been cultivated and many sand plain wetlands are now drained or cultivated.

Also, as agricultural development intensifies, toxins in the water and salinization also pose potential threats. Breeding ponds were used despite heavy cattle use in at least one instance. Cattle use of

breeding ponds may be a longer term threat if heavy use during egg maturation reduces survivorship.

Development of deeper wetlands for waterfowl and rehabilitation of the irrigation canals also threatens the few breeding sites. Surveys of deeper wetlands showed little or no use of these ponds. Seepage and spillage from inefficient canal systems has been beneficial for Great Plains Toads in some instances (Purple Springs, Little Rolling Hills East). There is a massive program underway to rehabilitate the canal systems in southern Alberta so there will probably be a reduction in wetland habitats made available by irrigation.

Dugouts placed in natural ephemeral wetlands also pose a threat. Not only do they attract more cattle to a site, they produce a deep water habitat which is unsuitable for breeding toads. Hundreds of natural ephemeral wetlands in sand plains now have dugouts placed in the middle of them. Except in extremely wet periods when entire depressions and the dugout will be refilled, it is unlikely that many of these ephemeral ponds will be useful for Great Plains Toads as the spring runoff will collect in the deeper dugout rather than over a broader shallow depression.

POPULATION SIZE AND TREND:

A total of at least 186 (perhaps as many as 267) Great Plains Toads were counted in a total of four different areas:

Lake Newell - 6+ or 7+ in 2 sites
Little Rolling Hills Sandhills - between 75+ and 85+ 5 sites
Wolf Island Sandhills - between 30 and 50 in 1 site
Grassy Lake Sandhills - between 75+ and 125+ in 6 sites

With the exception of 1 or possibly 2 females, the toads found were vocalizing males.

The total Alberta population is estimated at less than 1000 individuals.

From historical records it is clear that Great Plains Toads have disappeared over a large portion of their Alberta range and, while irrigation water has maintained some populations, potential habitat may have been destroyed by cultivation of crops on sand plains and by dugouts placed in ephemeral wetlands.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Great Plains Toads should be classified as "endangered" in Alberta. Protection of the remaining natural habitats in the Hilda, Sandy Point, Suffield South, Lost River-Milk River and Little Rolling Hills areas should be a priority.

In each sandplain unit, several ephemeral wetlands should remain free of dugout developments.

Given that the Great Plains Toad breeds in relatively fresh or slightly alkaline water, and that at least some sites are known to be spring-fed, it is probable that in non-irrigated portions of the species' range in Alberta, the availability of springs probably plays a major role in the survival of populations during drought conditions. Efforts should be made to protect areas of springs from damage by cattle, by fencing key areas off from cattle. Even if Great Plains Toads do not use some of these habitats, they are very productive for many species of flora and fauna, many of which are local or rare in Alberta.

It is not known how long Great Plains Toads are able to survive in drought conditions, but it is conceivable that local populations might be seriously lowered during extended periods of dry years. Breeding ponds which are fed by major spring activity may serve as "mother ponds" -- sites where Great Plains Toads can survive major droughts, and which serve as population centres from which surrounding areas may be recolonized as habitat conditions improve. The Little Rolling Hills West site and the Lower Bow areas may have naturally been "mother ponds" prior to irrigation development. Both have strong spring flow and the Lower Bow site apparently was this way prior to irrigation development.

The Lost River and associated springs may serve as a repopulation centre for sand plains in the Milk River-Lost River area. While there have been no breeding records there for the last few years, it is possible that a few adults have survived in moister sites along the Lost River valley. It is unclear where Great Plains Toads could survive in the Middle Sand Hills-Sandy Point-Remount areas although there may be some repopulation from sites along the river valleys or springy areas in Saskatchewan. There is a major spring in the Bindloss Depression, however, it appears unsuitable for Great Plains Toads. Springs in the Middle Sand Hills along the South Saskatchewan River valley are too far removed from potential breeding ponds to be of much benefit.

Great Plains Toad populations in Alberta should be monitored in non-irrigated areas during consecutive wet years, in order to obtain a more complete picture of the status of this species in the province, and to help identify centres of abundance. If moisture conditions improve in southern Alberta wetlands and Great Plains Toads fail to appear in previously suitable habitat for two consecutive years, reintroduction of individuals from healthy populations should be considered to speed up the process of recolonization.

Condition and trend in habitats and populations in irrigated areas should also be regularly monitored. Should improvements in canal efficiency destroy man-made toad habitats, some allowance should be made to provide water in spring to reflood some breeding ponds.

Landowner/leaseholder agreements to protect toad habitat should be developed in the Little Rolling Hills, Lower Bow, Milk River-Lost River, Hilda, and Bindloss-Empress areas. These should prevent cultivation and drainage of wetlands, raising of water levels, and construction of

dugouts for cattle.

REFERENCES:

Cottonwood Consultants (1986b)

LATIN NAME: Heterodon nasicus

COMMON NAME: Plains Hognose Snake

BRIEF SUMMARY OF STATUS:

Endangered. Populations have historically been low but they continue to decline.

GENERAL ALBERTA DISTRIBUTION:

Two colour morphs inhabit Alberta - a checkered-bellied form which is found in the Dune Point-Remount-Middle Sand Hills-Sandy Point-Hilda-Medicine Hat area and a black-bellied form which occurs in the Lost River - Milk River Canyon - Pakowki Lake area.

OCCURRENCES:

Site Name	Notes
Remount A	1 Hognose Snake, found by Bill Picotte; Remount Community Pasture by windmill with cattle corrals and open sandy soil disturbed by cattle; late April
Remount B	1 Hognose Snake, found by June Picotte; Remount Community Pasture by headquarters along road to house; general habitat in vicinity is typical shrubby sandhill and sand plain vegetation; July 7
Sandy Point B	1 Hognose Snake, on Highway 41 west roadside; adjacent habitat is typical shrubby sandhill vegetation; July 3
Suffield South C	2 Hognose Snakes, one recently killed by petroleum industry service truck and one live in adjacent sandy ditch; surrounding habitat is lightly or ungrazed native grassland; June 25

Interviews with military and well-servicing personnel failed to turn up any knowledge of this species in the Middle Sand Hills area.

HABITAT:

Sand plains and sandhills with some loose patches of sand. The requirement for sandy habitats stems from its burrowing habits.

THREATS:

Killing of snakes remains the most significant threat. One hibernacula which had overwintering Plains Hognose Snakes was heavily impacted and that species apparently no longer uses the site (Cottonwood Consultants 1987). Two of the 1987 records are of road kills. The small and

isolated populations of Plains Hognose Snakes can ill-afford any loss. Continued development of wellsite service roads into key habitats will probably lead to further population declines.

Although large areas of sand plains have been cultivated, there is still considerable natural habitat which remains. Cultivation is seen as a longer-term threat.

POPULATION SIZE AND TREND:

The scarcity of records continues to suggest a very low Alberta population, however, the secretive nature of this species makes any definitive estimation difficult. From discussions with local ranchers and past residents of Plains Hognose Snake habitat, it appears that populations have declined (Cottonwood Consultants 1986b and 1987). The 1987 records are the first in six years so it is clear that they can survive through the driest years that southern Alberta has seen.

PROTECTIVE STATUS:

There is a record of a Plains Hognose Snake from the Milk River Canyon Natural Area. No northern populations of the checkered-bellied morph currently receive any formal protection.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "endangered" in Alberta. Designation and wise management of the Suffield North, Centre, and South, Dune Point and Lost River sites would protect a significant amount of natural sand plain and sandhill habitat where Plains Hognose Snakes have been reported. This includes one reported hibernaculum in the Drowning Ford area and a former hibernaculum in the Dune Point area. Retention of the natural habitat at Remount Community Pasture will also protect a significant area for Plains Hognose Snakes.

The designation and maintenance of several roadless areas in sand plain and sandhill habitats, especially adjacent snake dens, would help prevent further population declines due to road kills. Such programs should be more acceptable in the Suffield area where there is already some sensitivity to wildlife values and some structure for implementation of wildlife and habitat protection programs.

Programs to educate wellsite workers in areas like Suffield where access is tightly controlled may reduce road kills of snakes and intentional killing of snakes around wellsites. Such education programs could also be useful in helping workers recognize Plains Hognose Snakes and documenting additional records. As a last resort, seasonal closures of selected wellsite roads should be considered if road mortality is not curtailed.

LATIN NAME: Tympanuchus phasianellus

COMMON NAME: Sharp-tailed Grouse

BRIEF SUMMARY OF STATUS:

Locally fairly common in preferred sandhill habitats in the Mixed Grassland. Other habitats in Alberta were not intensively surveyed as part of this study but continuing cultivation of fescue grassland and aspen parkland sites is having an impact on the total population.

GENERAL ALBERTA DISTRIBUTION:

Found in a variety of semi-open and open Grassland, Aspen Parkland and Boreal Forest habitats from the Northwest Territories border south to the United States boundary.

SUMMARY OF 1987 OBSERVATIONS:

The highest density of Sharp-tailed Grouse observed was in the Middle Sand Hills (Suffield North) area. A lek was found at Suffield North G. Declines from the 1970's seemed to have occurred in the Dune Point and Hilda populations although these areas are still productive compared to many other sand hill sites.

This species appeared to do best where there was a variety of low shrub vegetation (Dune Point, Suffield, Pakowki Lake, Purple Springs). Populations were lower or non-existent on sandhill sites where there was less shrubbery and more grass cover (Lower Bow, Turin, Barnwell), where most of the natural vegetation had been removed from the area (Pearce, Carmangay), or where the sandhill habitats were very restricted (Lost River). Despite promising potential habitat, relatively low populations were indicated in the Little Rolling Hills and Matzhiwin areas.

POPULATION SIZE AND TREND:

Sharp-tailed Grouse populations appear to be doing quite well in several major sandhill areas in the Mixed Grassland. Populations in the Empress-Dune Point-Hilda areas had been down for several years during the drought but appeared to have rebounded somewhat in 1986-87 (V. Pharis, personal communication). From the 1987 surveys, it appears that numbers were still lower than in the 1970's in these areas.

Hunting pressure in the Dune Point area may have compounded the drought problem (W. Smith, personal communication). Numbers are still high in adjacent lands on the drought-stricken Middle Sand Hills on the Suffield Military Reserve.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Retention of natural sandhill and sandplain habitats will be a key element to maintenance of Sharp-tailed Grouse in the Mixed Grassland region. Most of these sites are on Crown land which is leased for grazing.

LATIN NAME: Tympanuchus cupido

COMMON NAME: Greater Prairie Chicken

BRIEF SUMMARY OF STATUS:

Extirpated in Alberta.

SUMMARY OF 1987 OBSERVATIONS:

No birds of this species were observed in 1987 despite considerable field survey time in sandhill habitats. There were recent unconfirmed reports from a natural grassland area 2 km south of Arneson on the north side of a small lake (east of Acadia Valley). The rolling grassland habitats there were checked but no Greater Prairie Chicken were noted.

RECOMMENDATIONS:/MANAGEMENT ACTION:

It is unclear why Greater Prairie Chicken have completely disappeared from Alberta. There appears to be abundant suitable habitat in areas like the Suffield Military Reserve. The restrictions on hunting and habitat disruption at Suffield make the area a likely candidate should reintroductions of the Greater Prairie Chicken be attempted.

LATIN NAME: Ammodramus savannarum

COMMON NAME: Grasshopper Sparrow

BRIEF SUMMARY OF STATUS:

Fairly common in its somewhat restricted habitat.

GENERAL ALBERTA DISTRIBUTION:

Found in all sandhill habitats south of the Red Deer River and east of Highway 36. These include: Matzhiwin, Little Rolling Hills, Dune Point, Remount, Empress, Hilda, Suffield (North, Centre and South), Old Channel Lake, Lost River, Pakowki Lake (North and South), Lower Bow, Lost River, Purple Springs and Turin. They have also been recorded in the sand plains around Chappice Lake and the Milk River Canyon.

HABITAT:

Tall grasses and open low shrubbery, especially rose, in rolling sandhill terrain; also occasionally in taller grasses in sandy plains during wetter years. Highest population densities are in areas with scattered low shrubbery such as rose. The most extensive and densely populated Grasshopper Sparrow habitats are in the Dune Point-Remount-Empress-Sandy Point-Suffield-Hilda sandhill and sandplain area.

THREATS:

Cultivation of sandplain and sandhill habitats and extremely heavy grazing are long-term threats, however, habitat generally seems secure and well-managed for this species.

POPULATION SIZE AND TREND:

This is a fairly common species in its preferred sandhill habitats. Its Alberta population is estimated in the tens of thousands. A permanent and relatively easy to monitor transect was established at Purple Springs along a truck access trail (see map for Purple Springs Transect). Stopping every .1 km, a total of 23 singing males were noted on a 4.2 km transect on June 23. A 2.4 km walking traverse on June 14 in sandhills in the northeast part of Suffield revealed 50 singing males.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Remove from lists of rare species. Maintenance of natural sandhill habitats will benefit this species.

LATIN NAME: Dipodyms ordii

COMMON NAME: Ord's Kangaroo Rat

BRIEF SUMMARY OF STATUS:

Fairly common within a very restricted range in Alberta.

GENERAL ALBERTA DISTRIBUTION:

Found only in the Middle Sand Hills, Dune Point, Empress and Hilda sandhills in the vicinity of the South Saskatchewan and Red Deer Rivers.

OCCURRENCES:

Site Name	Notes
Dune Point A,B	well-developed Kangaroo Rat runways and burrows in stabilization zone; fall/winter grazed
Dune Point C	small, mostly stabilized; low level of Kangaroo Rat activity; summer grazed
Dune Point D	some stabilization; moderate level of Kangaroo Rat use; fall/winter grazed
Dune Point E	some stabilization but still large active sand surface; extensive Kangaroo Rat activity from stabilization zone into adjacent stabilized grassland; fall/winter grazed
Dune Point G	stabilized dunes and non-dune sand sheets with abundant loose sand; this is the only area where there is a well-established Kangaroo Rat population in an area of sand which has been stabilized for many years; this is one of the most extensive Kangaroo Rat "colonies" in natural habitat in Alberta and the only area where activity extends into riparian cottonwood stands; some invasion of loose sand by Salsola kali; main Kangaroo Rat colonies seem to establish in loosest patches of sand and runways radiate out from these areas, especially to ant hills; fall/winter grazed
Empress A	large active sand sheet; little Kangaroo Rat activity; heavily summer grazed
Empress B	mostly stabilized; very little activity; abandoned burrows; lightly or fall grazed
Empress C	large active sand dune; moderate level of Kangaroo Rat activity; lightly or fall grazed
Hilda F	collection at U of A Museum by N. Panter; area checked in 1987, low level of Kangaroo Rat activity along roadside; rolling sand plain; ungrazed; no Kangaroo Rat activity in adjacent active sand dune; summer grazed

Hilda G	collection by Smith and Hampson (1969) at the Provincial Museum; low level of Kangaroo Rat activity; ditch not fenced off and heavily disturbed by cattle; in generally vegetated sandhill area
Hilda H	collection at U of A Museum by N. Panter; area checked in 1987 but no Kangaroo Rat sign found; summer grazed adjacent natural grassland on sand plain with ditches fenced off but no sandy areas
Sandy Point D	collection at U of A Museum by V. Lewin; area checked in 1987 and is completely cultivated, ditches fenced off but with no sandy areas; pocket gopher diggings in vegetated ditch
Suffield Centre A	active sand with Psoralea-Oryzopsis; considerable Kangaroo Rat activity; other dunes mostly stabilized in this area; ungrazed
Suffield Centre B	active sand with Psoralea-Oryzopsis; moderate activity by Kangaroo Rats; other dunes mostly stabilized in this area; ungrazed
Suffield Centre C	collection at U of A by H. Reynolds; several burrows in active road cuts; none in adjacent natural grassland; low numbers compared to roadcuts in Suffield North area; ungrazed
Suffield Centre D,E	several burrows in active road cuts with Psoralea; none in adjacent natural grassland; not as productive as roadcuts in Suffield North area; ungrazed
Suffield Centre I	several burrows along active fireguard cuts but only on backside adjacent natural grassland; disturbance appears to be too frequent to use "road" side of cut; not as productive as roadcuts in Suffield North area; ungrazed
Suffield North A	considerable Kangaroo Rat activity, Psoralea-Oryzopsis, dune stabilizing slightly, lots of open sand; ungrazed
Suffield North B	very active Kangaroo Rat colony, more extensive than Suffield North A, some stabilization of the dune; ungrazed
wellsite trail B-C	some active runways, Psoralea-Stipa; ungrazed
Suffield North C	low density of Kangaroo Rats; stabilized especially by grasses, Calamovilfa, Psoralea, Rumex venosus; ungrazed
Suffield North D	moderate Kangaroo Rat activity; lower populations than Suffield B; some stabilization by Calamovilfa and Elymus; ungrazed
Suffield North E	moderate Kangaroo Rat activity in Psoralea-Oryzopsis; some invasion of the dune but still quite open with some totally open sand; ungrazed
Suffield North F	considerable Kangaroo Rat activity; stabilizing with some open sand, Psoralea-Oryzopsis and Calamovilfa; ungrazed

Suffield North H	low density of Kangaroo Rat activity, some also along wellsite trail; mostly stabilized; ungrazed
Suffield North I	several Kangaroo Rat runways but not too much activity; still open on south end; ungrazed
Suffield North J	this is an unburned island in a recent burn; considerable Kangaroo Rat runways and fresh burrows; none in adjacent burned dunes; largely stabilized with one active face where Kangaroo Rats are; ungrazed
Suffield North N,K	low level of activity by Kangaroo Rats; considerable stabilization by Psoralea, Calamovilfa and Sporobolus; ungrazed
Suffield North L	only a couple of active Kangaroo Rat burrows; considerable stabilization; ungrazed
wellsite road L-M	some active runways; ungrazed
Suffield North M	only a couple of active runways; considerable stabilization by Psoralea, Oryzopsis, Elymus canadensis and Rumex venosus; ungrazed
Suffield North P	several burrows along active road cuts, especially where there are straw bales; rare in adjacent natural habitat, including active dunes; Kangaroo Rats appear to make long distance movements away from home burrows along the road; appears to be marginal habitat with only a few active burrows (2 to 20) at each road cut, however, the extent of the road network makes the total number of Kangaroo Rats substantial; Kangaroo Rats extend into adjacent sandy area of sagebrush outside the main dune area; ungrazed
Suffield North Q	several burrows along active fireguard cuts but only on the backside adjacent natural grassland; disturbance appears to be too frequent to use "road" side of cut; not as productive as other Suffield North sites; ungrazed
Suffield North R	numerous burrows on west side of road and in cattleguard, in grazed and ungrazed fenced roadcuts; just east of Suffield block; collection at U of A by N. Panter; ditch is fenced from road; summer grazed

There were no Kangaroo Rats along the Suffield northeast boundary fireguard, possibly due to the continual disturbance and widening of the fireguard.

HABITAT:

Natural habitat is generally associated with active dunes or loose sand in vegetated dunes or sand sheets. Kangaroo Rats also colonize active road cuts in sandy soil. Ungrazed or fall/winter grazed areas appear to be most suitable.

THREATS:

Stabilization of active dunes is an ongoing problem. Populations appear to decline once dunes are stabilized. Empress dune B had considerable Kangaroo Rat activity in the 1970's (C. Wallis field notes) when it had a large active component but there is very little activity there today now that it is stabilized. The impact of recent drought is not clearly understood, however, other populations appear to have maintained themselves through the dry years.

Despite the fact that Kangaroo Rats occur north and south of Remount Community Pasture, there were no active burrows or runways noted in the Remount area where all dunes have been stabilized. Only one large and somewhat unusual population occurs in stabilized sand at Dune Point.

While heavy summer grazing has not been directly linked to Kangaroo Rat declines in natural habitats, the anecdotal evidence suggests that there is some correlation. In the Hilda dunes, active sand sheets which are summer grazed are devoid of Kangaroo Rats while adjacent roadcuts which are fenced out from cattle grazing have a low level of Kangaroo Rat activity. In the Empress dunes, heavily summer grazed dunes with a large active sand surface have little Kangaroo Rat activity while adjacent lightly or fall grazed dunes have moderate levels of Kangaroo Rat use. The Remount area is summer grazed.

The impact of grazing on Kangaroo Rats along roadcuts may not be as significant due to the more consolidated nature of the sand in these areas. It is postulated that trampling by cattle in loose sand of dunes would be more detrimental to burrow systems than in the firm sand along roadcuts.

POPULATION SIZE AND TREND:

Based on the overall 1987 surveys and nocturnal research done in the 1970's in the Dune Point and Empress areas, the total Alberta population of Kangaroo Rats is estimated at less than 5,000 animals. Numbers appear to be increasing due to increased wellsite road access developments in the Middle Sand Hills but this may be offset by declines related to dune stabilization and heavy summer cattle use. Over the long-term, wellsite roadcuts will eventually stabilize, thereby eliminating those man-made habitats.

PROTECTIVE STATUS:

None.

RECOMMENDATIONS:/MANAGEMENT ACTION:

Classify as "rare". Designation and appropriate management of the Dune Point and Suffield North areas would protect the most significant populations of Kangaroo Rats. Research into the effects of level and season of cattle grazing using exclosures on dunes and roadcuts should be encouraged. Selective destabilization of the natural dune habitats may be beneficial over the long term.

3.3 Sandhill and Sand Plain Habitats

The habitat summary sheets outline the results of the 1987 analyses. The following headings are used:

Site - name of area

Location - general location

Legal Description - general location by township and range

Elevation

Aerial Photograph and Map Numbers

Description - landscape overview

Significant Features - major wildlife and plant features with emphasis on rare, threatened or endangered species

Habitat Changes - summary of changes in wetlands, active sand and uncultivated lands since aerial photographs taken in 1949-52

Recommendations - summary of additional research requirements, management considerations and protective measures required

SITE: Atlee

LOCATION: Atlee district

LEGAL DESCRIPTION: Tp. 21 to 22 - Rge. 6 to 7 - W4

ELEVATION: 775 m

MAP NO.: 72L/15

DESCRIPTION:

- hummocky sandy kame moraine
- native mixed grassland with moist depressions and ephemeral wetlands
- no sand dune terrain or active blow-outs

SIGNIFICANT FEATURES:

- Plains Hognose Snakes have been recorded in the vicinity of Atlee and have been reported at the Majestic den site
- high density of Loggerhead Shrikes in native thorny buffaloberry habitat
- part of one of the largest contiguous blocks of native mixed grassland in the plains of Canada, extending south into the Suffield Block
- Sharp-tailed Grouse and Pronghorn habitat
- Baird's Sparrows
- Androsace occidentalis

HABITAT CHANGES:

- depressions which held water in the 1970's have been perenially dry through the 1980's

RECOMMENDATIONS:

- principally Crown land leased for grazing; retain as native habitat

SITE: Barnwell

LOCATION: 9 km north of Barnwell

LEGAL DESCRIPTION: Tp. 10 - Rge. 17 to 18 - W4

ELEVATION: 820 m

AERIAL PHOTOGRAPH NO.: AS3201 254 to 257 MAP NO.: 82 H/16

DESCRIPTION:

- low relief dunes in mixed grassland terrain
- very small active blowouts, mostly stabilized
- Barnwell B is hard packed fine sand

SIGNIFICANT FEATURES:

- Chenopodium subglabrum at Barnwell A, SE30-10-17-W4
- Cryptantha fendleri at Barnwell B, SE33-10-17-W4
- two pairs of Burrowing Owls in NE35-10-18-W4
- Ferruginous Hawk feeding area
- ungrazed spring with plants uncommon to the grassland region
- some potential Great Plains Toad and Plains Spadefoot habitat but very limited

HABITAT CHANGES:

- 1951 aerial photographs clearly show eight small active blowouts while the 1987 field survey and 1985 photographs revealed only two active blowout sites which are smaller in extent than in 1951
- considerable invasion at Barnwell A by Agropyron cristatum and Melilotus spp., only a few bare areas remaining
- nine small shallow wetlands in 1951, none in 1987

RECOMMENDATIONS:

- mixture of Crown land leased for grazing and private land; retain as native habitat
- destabilization of dunes would improve rare plant habitat

SITE: Carmangay

LOCATION: Carmangay district

LEGAL DESCRIPTION: Tp. 11 to 14 - Rge. 22 to 25 - W4

ELEVATION: 925 m

AERIAL PHOTOGRAPH NO.: A53203 251 to 254 MAP NO.: 82I/3

DESCRIPTION:

- low relief sand dunes in mixed grassland terrain
- some large active sand sheets and blow-outs
- extremely heavily grazed or cultivated in most areas

SIGNIFICANT FEATURES:

- tree nesting Ferruginous Hawks in NW1-14-23-W4
- considerable numbers of ground squirrels
- no rare plants noted

RECOMMENDATIONS:

- private land; not of sufficient significance to retain

SITE: Craigmyle

LOCATION: north and south of Craigmyle

LEGAL DESCRIPTION: Tp. 30 to 33 - Rge. 15 to 17 - W4

DESCRIPTION:

- all dunes in this area have been converted to crop production
- remaining natural habitats are non-dune sites
- site not visited, assessment based on aerial photograph interpretation

RECOMMENDATIONS:

- no significance

SITE: Dune Point

LOCATION: 10 km northwest of Bindloss

LEGAL DESCRIPTION: Tp. 22 to 23 - Rge. 3 to 4 - W4

ELEVATION: 625 m

AERIAL PHOTOGRAPH NO.: AS3423 92 to 94 MAP NO.: 72L/16

DESCRIPTION:

- diverse valley habitats
- major springs
- extensive riparian woodland and tall and low shrubbery, sagebrush flats, rock outcrops and sandy mixed grassland
- large active sand blowouts, including gravelly types
- winter grazed

SIGNIFICANT FEATURES:

- part of highly significant river valley/spring/dune complex (Wallis 1977)
- most extensive gravelly sand blowouts in Alberta (15 m X 15 m and 15 m X 30 m)
- largest Alberta populations of Lygodesmia rostrata (Dunes A,B,D,E) and Franseria acanthicarpa (Dunes C,D,E),
- Astragalus lotiflorus (Dunes D,E), Eriogonum cernuum (Dunes B,E), Lupinus pusillus (Dunes C,D,E), Oenothera serrulata (Site F), Astragalus kentrophyta (largest Alberta dune populations at D,E), Cryptantha fendleri (Dunes A,G)
- Dune Point E is the most diverse and extensive rare plant dune, however, there are significant rare plant populations at all dunes
- former Plains Hognose Snake den along Red Deer River valley and several sightings (Sites B,F) in dune field and adjacent sand plain
- most extensive Ord's Kangaroo Rat "colony" in natural habitat in Alberta, including major populations in stabilized sand; possibly related to winter grazing regime
- diverse breeding bird populations
- Loggerhead Shrikes
- Grasshopper and Lark Sparrows
- key Mule Deer, Pronghorn and Sharp-tailed Grouse habitat
- rare plants in spring habitats (Acer negundo, Elymus virginicus, Osmorhiza longistylis, Dryzopsis micrantha)
- Burrowing Owls nest in upland grassland near Bindloss

HABITAT CHANGES:

- approximately 30 to 40% reduction in active sand surface from 1950 to 1987
- some ongoing trail bike activity, but land use generally compatible with sand dune features
- invasion by Salsola kali into gravelly dune areas
- Sharp-tailed Grouse numbers down (T. Minor, personal communication),

possibly related to hunting pressure (W. Smith, personal communication)

RECOMMENDATIONS:

- this area is deserving of formal protection
- Crown land leased for grazing; retain current land use, including winter grazing regime
- selective destabilization of dunes, particularly gravels, would be beneficial for most rare plants and possibly for Kangaroo Rats

SITE: Empress

LOCATION: 11 km south of Empress

LEGAL DESCRIPTION: Tp. 22 - Rge. 1 - W4

ELEVATION: 675 m

AERIAL PHOTOGRAPH NO.: AS3423 77 to 80 MAP NO.: 72L/16

DESCRIPTION:

- moderately rolling sand dune terrain, extensive sagebrush and mixed grassland; some tall shrub development
- upland and valley dunes with some large active blowouts

SIGNIFICANT FEATURES:

- some of the largest active dunes in southern Alberta
- gravelly sand blowouts along river valley
- Franseria acanthicarpa (Dune A), Lygodesmia rostrata (Dunes A,B), Eriogonum cernuum (Dune A), Astragalus lotiflorus (Dune E), Astragalus kentrophyta (Dune E), Psoralea argophylla (Site D) on sand plain uplands
- Ord's Kangaroo Rats (dunes A,B,C, most abundant in eastern dunes)
- Grasshopper Sparrows
- Sharp-tailed Grouse habitat
- western dunes summer grazed, eastern dunes lightly or fall grazed
- major Acer negundo springs just north of this area along the South Saskatchewan River with rare plants including Oryzopsis micrantha and Elymus virginicus; nesting Lazuli Buntings (Wallis 1977)

HABITAT CHANGES:

- most heavily grazed dune Empress A has not stabilized appreciably since 1950; Kangaroo Rat activity very low, possibly due to summer grazing
- lightly grazed dune Empress B, a large active dune in 1950 is now virtually 100% stabilized; Kangaroo Rat activity low
- the active area of lightly grazed dune Empress C has decreased by about 25%; Kangaroo Rat activity moderate; continuing invasion of gravelly sand by Salsola kali
- it is also interesting to note that just east of these dunes in Saskatchewan, there was an almost continuous series of active dunes with an open sand sheet that was virtually unbroken for two km; today all these dunes are stabilized and there are only minor active blowouts

RECOMMENDATIONS:

- selective destabilization of the dunes will be beneficial for rare plants and possibly for Kangaroo Rats
- research into the effects of summer or fall/winter grazing and fire on Ord's Kangaroo Rats is required; this site offers some good potential

for a comparative research program
- Crown land leased for grazing, retain as natural habitat
- formal protection for gravelly dune Empress C

SITE: Gleichen

LOCATION: south of Gleichen

LEGAL DESCRIPTION: Tp. 21 - Rge. 22 to 23 - W4

ELEVATION: 875 m

AERIAL PHOTOGRAPH NO.: AS2340 112 to 115 MAP NO.: 82 I/15

DESCRIPTION:

- dune field of moderate size north of Bow River
- native grassland and low shrubbery
- no significant active sand blowouts
- Blackfoot Indian Reservation, site not visited since late 1970's

SIGNIFICANT FEATURES:

- part of a significant habitat complex which includes the Bow River valley
- potential Sharp-tailed Grouse and deer habitat
- low potential for rare plants and wildlife due to geographic location outside the main range of most species

RECOMMENDATIONS:

- Indian Reserve, retain as natural habitat

SITE: Hemaruka Dunes

LOCATION: Hemaruka district

LEGAL DESCRIPTION: Tp. 30 to 34 - Rge. 8 to 9 - W4

ELEVATION: 750 m

AERIAL PHOTOGRAPH NO.: AS3413 48 to 51 MAP NO.: 72M/10, 11 & 14

DESCRIPTION:

- sand plain with no active dunes
- native aspen parkland vegetation with some cultivation
- heavily grazed in places

SIGNIFICANT FEATURES:

- level aspen parkland terrain
- some shorebird migration at Rushmere Lake
- Ferruginous Hawk nesting area
- Sharp-tailed Grouse and deer habitat
- no active sand dune species

RECOMMENDATIONS:

- Crown land leased for grazing, retain as natural habitat

SITE: High River

LOCATION: 6 km east of High River

LEGAL DESCRIPTION: Tp. 19 - Rge. 28 - W4

MAP NO.: 82 I/12

DESCRIPTION:

- all dunes in this area have been converted to crop production
- remaining natural habitats are non-dune sites
- site not visited, assessment based on aerial photograph interpretation

SITE: Hilda

LOCATION: 20 km northwest of Hilda

LEGAL DESCRIPTION: Tp. 19 - Rge. 1 to 2 - W4

ELEVATION: 725 m

AERIAL PHOTOGRAPH NO.: AS2123 161 to 171, 207-212 MAP NO.: 72L/16

DESCRIPTION:

- diverse sand plain, ephemeral wetland and dune vegetation ranging from aspen woodland to a variety of tall and low shrubbery and grassland
- small active blowouts

SIGNIFICANT FEATURES:

- Plains Hognose Snakes and Great Plains Toad breeding ponds (site O)
- key deer and Pronghorn habitat
- Sharp-tailed Grouse
- small populations of Franseria acanthicarpa (Dune B), Chenopodium subglabrum (Dune A), Astragalus purshii (Site E), Cryptantha fendleri (Dunes A,B) and Lygodesmia rostrata (Dunes A,C)
- Ord's Kangaroo Rats
- Upland Sandpipers, Grasshopper Sparrows, Baird's Sparrows

HABITAT CHANGES:

- of seven blowouts active in 1950 (including one of moderate size), only three remain active; approximately 35% reduction in the active surface area of the remaining dunes
- Hilda dune B has been damaged by placement of a stock-watering dugout in the middle of the dune
- summer grazing may be affecting Ord's Kangaroo Rats; they appear to be thriving only in active sand areas fenced out from grazing (e.g. ditches)
- there were hundreds of small wetlands in the sand plain and along the edge of the dune field in 1950; these potential Great Plains Toad ponds have been perennially dry through the 1980's
- dugouts have been placed in many of the remaining natural depressions and hundreds of small ephemeral wetlands which were present in 1950 are now cultivated in the sand plain which surrounds the dune field

RECOMMENDATIONS:

- mostly Crown land leased for grazing , retain as natural habitat
- selective destabilization of dunes would help rare plants
- research into the effects of summer or fall/winter grazing and fire on Ord's Kangaroo Rats is required

SITE: Lazy H

LOCATION: 8 km west of Milk River

LEGAL DESCRIPTION: Tp. 2 - Rge. 17 and 18 - W4

ELEVATION: 1075 m

MAP NO.: 82 H/1

DESCRIPTION:

- low vegetated sand dunes and sandy plains

SIGNIFICANT FEATURES:

- diverse invertebrate populations characteristic of sand plains
- key Pronghorn habitat
- some rare plant potential

RECOMMENDATIONS:

- Crown land leased for grazing; retain as natural habitat
- a reduction in grazing pressure would make this area more suitable for species such as Sharp-tailed Grouse

SITE: Little Rolling Hills East

LOCATION: 8 km north of Rolling Hills

LEGAL DESCRIPTION: Tp. 15 to 16 - Rge. 13 to 14 - W4

ELEVATION: 740 m

AERIAL PHOTOGRAPH NO.: AS2878 127 to 134, 178 to 186 MAP NO.: 72L/5

DESCRIPTION:

- low relief sand dune terrain with mixed grassland, sagebrush and rose
- shallow wetlands created by irrigation water

SIGNIFICANT FEATURES:

- Great Plains Toad (Sites A,B,D) and Plains Spadefoot (Sites D,C) breeding ponds
- shorebird migration area
- nesting Ferruginous Hawks (just north of site E by loop in ditch)
- Grasshopper Sparrows, Brewer's Sparrows, Lark Sparrows
- nesting Loggerhead Shrikes
- Cryptantha fendleri (Dunes F,G), Festuca octoflora
- Mule Deer and Sharp-tailed Grouse (low density) habitat
- productive marshes
- moderate Richardson's Ground Squirrel populations

HABITAT CHANGES:

- there were numerous small ephemeral wetlands in the area in 1951; with the exception of a few which rely on irrigation water, most have been perennially dry through the 1980's; hundreds of wetlands on the sand plain around the dune field have been cultivated and even when they have water do not support breeding populations of Great Plains Toads

RECOMMENDATIONS:

- maintenance of shallow water levels will ensure productivity for Great Plains Toads and Plains Spadefoots
- retain Crown land portions as natural habitat
- develop landowner agreements for major breeding ponds to ensure their long-term productivity

SITE: Little Rolling Hills West

LOCATION: Little Rolling Hills, 10 km northwest of Rolling Hills

LEGAL DESCRIPTION: Tp. 15 - Rge. 14 - W4

ELEVATION: 775 m

AERIAL PHOTOGRAPH NO.: A52878 176 to 178 MAP NO.: 72L/5

DESCRIPTION:

- strongly rolling upland with mixed grassland, low shrubbery and some low dune development
- numerous active blowouts or eroded sand sheets

SIGNIFICANT FEATURES:

- gravelly active blowouts and sand sheets
- Great Plains Toad breeding ponds (Rolling Hills West F) in natural springs
- Ferruginous Hawk feeding area
- Brewer's Sparrows
- Lupinus pusillus, Cyperus schweinitzii (Dune C), Cryptantha fendleri (Dunes A,B,E), Vulpia octoflora, Franseria acanthicarpa ((Dunes A,B,C), Lygodesmia rostrata (Dune E)
- key Pronghorn habitat

HABITAT CHANGES:

- dozens of small ephemeral wetlands were present in 1951; with the exception of the one major spring area, these are now all dry
- active sand has been reduced in surface area by at least 50%, particularly through the western portion where most dunes are now stabilized

RECOMMENDATIONS:

- formal protection for springs area (C), including fencing
- mostly private land, retain as natural habitat through landowner agreements

SITE: Lonesome Lake

LOCATION: west side of Bow River south of Bow City

LEGAL DESCRIPTION: Tp. 16 - Rge. 17 - W4

ELEVATION: 750 m

MAP: 82 I/8

DESCRIPTION:

- extensive mixed grassland with minor active sand blowouts

SIGNIFICANT FEATURES:

- small number of Chenopodium subglabrum, Cryptantha fendleri
- feeding area for several birds of prey including Ferruginous Hawk, Golden Eagle and Prairie Falcon
- moderate ground squirrel numbers in grasslands
- associated wetlands around Lonesome Lake are productive for waterfowl and marsh birds

RECOMMENDATIONS:

- Crown land leased for grazing; retain as natural habitat

SITE: Lost River

LOCATION: 10 km south of Onefour along Lost River valley

LEGAL DESCRIPTION: Sections 29 to 31 - Tp. 1 - Rge. 4 - W4

ELEVATION: 875 m

AERIAL PHOTOGRAPH NO.: AS3078 36 to 37 MAP NO.: 72E/2

DESCRIPTION:

- variety of low shrubbery, sand plain and mixed grassland vegetation
- mostly stabilized dunes along bottom, slope and top of Lost River valley
- one major active blowout along valley edge (Dune A)

SIGNIFICANT FEATURES:

- numerous nationally significant features in the general area including Mountain Plover populations on upland sand plain area and extensive Yucca glauca site along Lost River valley downstream (Wershler and Wallis 1986)
- other rare plants of sand plains or sandy soil include Asclepias viridiflora, Denothera andina, Denothera serrulata, and Antennaria dimorpha
- Franseria acanthicarpa (Dune A), Lygodesmia rostrata (Dunes A,B,C), Lupinus pusillus (Dunes A,B,C), Abronia micrantha (Dunes A,C), Chenopodium subglabrum (Dune B), Eriogonum cernuum (Dunes A,B,C and numerous coulee sites which have Alberta's largest populations of this species), Cryptantha fendleri (Dunes A,B,C), Vulpia octoflora and Castilleja sessiliflora (Dune B)
- Sharp-tailed Grouse
- Grasshopper Sparrows, Brewer's Sparrows and Baird's Sparrows
- key Pronghorn and Mule Deer area
- Great Plains Toad breeding ponds along uplands west of Lost River (site D)
- Plains Spadefoot breeding ponds along Lost River
- Plains Hognose Snakes have been reported from the adjacent sand plain

HABITAT CHANGES:

- very little change in active sand area; has always been a small area
- dozens of small ephemeral wetlands, present in 1951, dried up through the 1980's and refilled during 1986 and 1987; a few have been cultivated
- Great Plains Toads have not yet returned to former breeding ponds
- some invasion of dunes by non-native plants from hay put out for cattle feed; also hay placement in rare plant habitat (Dune B)

RECOMMENDATIONS:

- entire Lost River area is worthy of formal protection due to concentration of nationally significant ecological resources; Crown

land leased for grazing
- further documentation of Plains Hognose Snake distribution and abundance through this sand plain area to the Milk River Canyon is required
- attempts to reintroduce Great Plains Toads should be made if natural recolonization does not occur over the next two years and if wetlands remain refilled
- place hay in areas away from valley and away from rare plant habitats
- mechanical action of cattle grazing may be useful in maintaining active sand

SITE: Lower Bow

LOCATION: west of Bow River, north of junction with the Oldman River

LEGAL DESCRIPTION: Tp. 11 to 12 - Rge. 12 to 13 - W4

ELEVATION: 750 m

AERIAL PHOTOGRAPH NO.: AS2337 65 to 70 MAP NO.: 72E/13, 72L/4

DESCRIPTION:

- low relief sand dune terrain with mixed grassland and low shrubbery
- several small active blowouts

SIGNIFICANT FEATURES:

- gravelly sand blowouts
- major spring
- major and potential Great Plains Toad breeding ponds (Sites A and B); probably a significant source for recolonization
- Cryptantha fendleri (Dunes C,F), Astragalus lotiflorus (Dunes D,E), Astragalus kentrophyta (Dunes D,E), Abronia micrantha (Dunes E,F,G, including largest known population in Canada)
- key Pronghorn habitat
- Upland Sandpipers and Baird's Sparrows

HABITAT CHANGES:

- there were numerous small ephemeral ponds on the sand plain around the dune field in 1951; most of these are cultivated today or water levels have been raised making them unsuitable for Great Plains Toads
- wetlands have been created by irrigation through the western half of this area
- the major spring at the Great Plains Toad breeding pond appears to have been enhanced by irrigation development but it always had a significant flow (Borneuf 1976)
- there appears to have been only a minor reduction in the active sand dune area from 1951 to 1987; total active sand area has always been small
- there is considerable petroleum development in the area now

RECOMMENDATIONS:

- Great Plains Toad breeding ponds and active sand sites are worthy of formal protection
- retain natural habitats; Crown land leased for grazing

SITE: Many Island Lake

LOCATION: north and west of Many Island Lake

LEGAL DESCRIPTION: Tp. 14 - Rge. 1 to 2 - W4

ELEVATION: 750 m

MAP NO.: 72L/1

DESCRIPTION:

- mixed grassland on rolling sand plain terrain

SIGNIFICANT FEATURES:

- Plains Hognose Snakes have been reported from this area
- numerous Richardson's Ground Squirrels
- nesting Ferruginous Hawks
- Brewer's Sparrows

HABITAT CHANGES:

- numerous wetlands, present in this area in 1950 have all dried up

RECOMMENDATIONS:

- mostly Crown land, retain as natural habitat
- investigate wetlands for Great Plains Toads once they refill

SITE: Matzhiwin

LOCATION: 10 km east of Gem

LEGAL DESCRIPTION: Tp. 22 - Rge. 14 to 15 - W4

ELEVATION: 720 m

AERIAL PHOTOGRAPH NO.: AS2340 220 to 227 MAP NO.: 82I/16, 72L/13

DESCRIPTION:

- mixed grassland on slightly rolling sand dune terrain
- occasional patches of aspen and tall thorny buffaloberry shrubbery
- large active sand blowouts
- numerous wetlands associated with irrigation

SIGNIFICANT FEATURES:

- breeding Loggerhead Shrikes in thorny buffaloberry
- Upland Sandpipers, Baird's Sparrows and Grasshopper Sparrows
- abundant Richardson's Ground Squirrel populations
- nesting Merlins (Site A)
- wetlands are productive waterfowl and shorebird areas
- Prairie Falcon feeding area
- there are significant springs at Douglas Creek with nesting Cooper's Hawks and numerous plants which are uncommon or rare in the region (Wallis 1977)
- Sharp-tailed Grouse and Pronghorn habitat
- Androsace occidentalis, large numbers of Cryptantha fendleri

NOTES:

- despite intensive surveys in the dunes and wetlands, no rare plants of great significance or Great Plains Toads were found

RECOMMENDATIONS:

- mostly private (Eastern Irrigation District) land used for grazing; retain as natural habitat
- Douglas Creek springs is worthy of formal protection

SITE: Old Channel Lake

LOCATION: 20 km north of Medicine Hat, both sides of South Saskatchewan River

LEGAL DESCRIPTION: Tp. 14 to 15 - Rge. 4 to 6 - W4

ELEVATION: 700 m

AERIAL PHOTOGRAPH NO.: AS2217 263 to 267 MAP NO.: 72L/2, 7

DESCRIPTION:

- mixed grassland on slightly rolling sand dune terrain
- no active blowouts

SIGNIFICANT FEATURES:

- nesting Loggerhead Shrikes in thorny buffaloberry
- Plains Hognose Snakes have been reported here
- Grasshopper Sparrows, Brewer's Sparrows and a moderate population of Lark Buntings
- Prairie Falcon feeding area
- Abronia micrantha has been reported from the South Saskatchewan River valley

HABITAT CHANGES:

- numerous ephemeral wetlands (potential Great Plains Toad habitat) present in 1951 throughout this district are now dry

RECOMMENDATIONS:

- mostly Crown land, retain as natural habitat
- investigate reports of Abronia micrantha and determine extent of population in river valley

SITE: Pakowki Lake North

LOCATION: 10 km west of Manyberries

LEGAL DESCRIPTION: Tp. 5 - Rge. 7 - W4

ELEVATION: 875 m

AERIAL PHOTOGRAPH NO.: A53079 247 to 252 MAP NO.: 72E/7

DESCRIPTION:

- extensive sand dune terrain with a variety of topography
- diversity of vegetation ranging from dense aspen woods to a variety of tall and low shrub communities and grassland
- large active sand blowouts

SIGNIFICANT FEATURES:

- some of the most heavily wooded sand dunes in the Mixed Grassland
- high diversity of significant plants including Tradescantia occidentalis (only known Alberta record at Dune G) Lygodesmia rostrata (Dunes G,J,K,L), Franseria acanthicarpa (Dunes G,K,L), Cryptantha fendleri (Dunes C,G,H,I,M), Chenopodium subglabrum (Dunes G,J,K), Cyperus schweinitzii (highest populations in Alberta at Dunes A,C,D,E,G,M), Vulpia octoflora, Androsace occidentalis
- productive Sharp-tailed Grouse and key Pronghorn and deer habitat
- diversity of breeding birds
- Grasshopper Sparrows
- tree-nesting Ferruginous Hawks (at Site N and near Dunes A,E,I) and Golden Eagles and nesting Burrowing Owls (Site O)
- nesting Loggerhead Shrikes in thorny buffaloberry
- there are no records of Plains Hognose Snakes or Great Plains Toads from this area, however, it offers excellent potential habitat

HABITAT CHANGES:

- there has been little reduction in the active blowouts in the western sections; however significant changes have occurred in eastern portions. Dunes C, G and J have been subject to major invasion by shrubbery and, while there is still considerable active surface area, it has been reduced by 50% (dunes C and G) to 75% (dune J) since 1952
- there were numerous small ephemeral wetlands in the area, including the occasional one in the middle of the dunes; most are now dry and many in the adjacent sand plain have been cultivated

RECOMMENDATIONS:

- the eastern portion of this area, especially Tradescantia occidentalis Dune G, is worthy of formal protection; mostly Crown land leased for grazing
- a recovery plan for Tradescantia occidentalis should be developed as part of an overall habitat conservation strategy
- selective dune destabilization may be beneficial over the long-term

SITE: Pakowki Lake South

LOCATION: 20 km southwest of Manyberries

LEGAL DESCRIPTION: Tp. 4 - Rge. 6 - W4

ELEVATION: 875 m

AERIAL PHOTOGRAPH NO.: AS3079 59 to 61 MAP NO.: 72E/7

DESCRIPTION:

- mixed grassland, shrubbery and active blowouts on rolling sand dune terrain

SIGNIFICANT FEATURES:

- nesting Ferruginous Hawks (Site A)
- nesting Loggerhead Shrikes
- Sharp-tailed Grouse habitat
- Plains Hognose Snake record from the general area
- Cyperus schweinitzii, Vulpia octoflora, Antennaria dimorpha, Androsace occidentalis

HABITAT CHANGES:

- since 1951, the active sand surface has been reduced by about 75% overall
- some large blowouts which were active in 1951 are now largely stabilized
- there was the occasional small ephemeral wetland in the adjacent sand plain in 1951, however, these are now perennially dry and several have stock-watering dugouts in them

RECOMMENDATIONS:

- mostly Crown land, retain as natural habitat
- selective destabilization of the dunes would be beneficial for rare plants

SITE: Pearce

LOCATION: south of Pearce

LEGAL DESCRIPTION: Tp. 9 - Rge. 24 - W4

ELEVATION: 950 m

AERIAL PHOTOGRAPH NO.: AS3201 36 to 37 MAP NO.: 82H/14

DESCRIPTION:

- heavily grazed or cultivated mixed grassland
- some active sand blowouts

SIGNIFICANT FEATURES:

- no significant species or features noted
- Thelesperma marginatum was collected in the vicinity, however, it is unclear whether the collection was along the river valley or in the upland dunes, most of which are now cultivated or heavily impacted by cattle grazing

HABITAT CHANGES:

- very little of this dune system remains in natural condition

RECOMMENDATIONS:

- no significance

SITE: Purple Springs

LOCATION: northeast of Purple Springs

LEGAL DESCRIPTION: Tp. 10 and 11 - Rge. 13 to 15 - W4

ELEVATION: 750 m

AERIAL PHOTOGRAPH NO.: AS3201 264 to 269 MAP NO.: 72E/13

DESCRIPTION:

- rolling sand dune terrain with extensive sagebrush
- shallow sandy wetlands created by irrigation

SIGNIFICANT FEATURES:

- Great Plains Toad breeding ponds (Sites A,B,C,H,I,J)
- Plains Spadefoot breeding ponds (Sites A,J)
- Grasshopper Sparrows and Brewer's Sparrows
- productive Sharp-tailed Grouse habitat
- key deer and Pronghorn habitat
- rare plants including Franseria acanthicarpa (Dunes F,G,I), Abronia micrantha (Dune G), Cryptantha fendleri (Dune G), Chenopodium subglabrum (dune K), Lupinus pusillus (Dune D), Androsace occidentalis, Vulpia octoflora

HABITAT CHANGES:

- there were numerous small ephemeral ponds on the sand plain around the dune field in 1951; most of these are cultivated today and even when wet do not support breeding Great Plains Toads
- wetlands have been created by irrigation through the western half of this area
- there appears to have been a 25 to 40% reduction in the active sand dune area from 1951 to 1987; stabilization is proceeding in area G and dune D is fairly well stabilized
- heavy summer use by cattle

RECOMMENDATIONS:

- mixture of private and Crown land; retain as natural habitat and develop landowner agreements
- maintain existing land uses
- some wetlands should remain shallow for Great Plains Toads

SITE: Remount

LOCATION: 16 km southwest of Bindloss

LEGAL DESCRIPTION: Tp. 21 - Rge. 2 to 4 - W4

ELEVATION: 675 m

AERIAL PHOTOGRAPH NO.: AS3423 62 to 64 MAP NO.: 72L/16

DESCRIPTION:

- mixed grassland on rolling sand dune terrain
- stabilized dunes

SIGNIFICANT FEATURES:

- several records of Plains Hognose Snakes (Sites A,B,C)
- Great Plains Toad breeding ponds (Sites D,E)
- springs in the adjacent Bindloss depression are ungrazed and have a population of Thellungiella salsuginea (a very rare plant) as well as productive waterfowl and shorebird ponds, nesting Merlins and breeding Leopard Frogs
- Upland Sandpipers, Brewer's Sparrows, Grasshopper Sparrows
- Sharp-tailed Grouse habitat
- nesting Loggerhead Shrikes
- nesting Burrowing Owls (Site F)
- Androsace occidentalis

HABITAT CHANGES:

- all 16 sand blowouts which were active in 1950 are now stabilized
- there were numerous wetlands in the adjacent sand plain in 1950 which have been perennially dry through the 1980's; a significant number which were in natural vegetation have now been cultivated or have had cattle-watering dugouts placed in the middle of them

RECOMMENDATIONS:

- mostly Crown land, retain as natural habitat
- formally designate unique springs area in Bindloss Depression
- several ephemeral wetland depressions should be retained in native habitat and without stock-watering dugouts
- further investigations on Plains Hognose Snake ecology should be carried out in the Atlee-Buffalo-Bindloss-Remount-Suffield-Hilda area where there were known Plains Hognose Snake hibernacula and where there continue to be regular reports

SITE: Rosebud River

LOCATION: north of Strathmore to the Acme district

LEGAL DESCRIPTION: Tp. 24 to 31 - Rge. 24 to 27 - W4

DESCRIPTION:

- all dunes in this area have been converted to crop production
- remaining natural habitats are non-dune sites
- site not visited, assessment based on aerial photograph interpretation

RECOMMENDATIONS:

- no significance

SITE: Sandy Point

LOCATION: 20 km south of Empress

LEGAL DESCRIPTION: Tp. 21 - Rge. 1 to 2 - W4

ELEVATION: 725 m

AERIAL PHOTOGRAPH NO.: AS3423 62 to 64 MAP NO.: 72L/16

DESCRIPTION:

- mixed grassland and low shrubbery on rolling sand dune terrain
- no active dunes

SIGNIFICANT FEATURES:

- Plains Hognose Snake record (Site B)
- key Pronghorn habitat
- breeding ponds for Great Plains Toads (Site A)
- Grasshopper Sparrows, Lark Sparrows and Brewer's Sparrows
- only Alberta record of Cassin's Sparrow (Site C)

HABITAT CHANGES:

- several small ephemeral wetlands which were Great Plains Toad breeding ponds have been perennially dry through the 1980's

RECOMMENDATIONS:

- mostly Crown land, retain as natural habitat
- prevent placement of dugouts in ephemeral wetlands

SITE: Skiff

LOCATION: 20 km north of Skiff

LEGAL DESCRIPTION: Tp. 8 - Rge. 14 - W4

MAP NO.: 72E/12

DESCRIPTION:

- all dunes in this area have been converted to crop production
- remaining natural habitats are non-dune sites
- site not visited, assessment based on aerial photograph interpretation

RECOMMENDATIONS:

- no significance

SITE: Suffield Centre

LOCATION: 30 km west of Hilda

LEGAL DESCRIPTION: Tp. 18 - Rge. 4 - W4

ELEVATION: 725 m

AERIAL PHOTOGRAPH NO.: AS2123 117 to 120 MAP NO.: 72L/9

DESCRIPTION:

- mixed grassland and sagebrush on rolling sand dune terrain
- active blowouts and occasional patches of tall shrubbery

SIGNIFICANT FEATURES:

- Ord's Kangaroo Rats
- key Mule Deer and Pronghorn habitat
- nesting Burrowing Owls (Site F) and Golden Eagles (west of Site H)
- Upland Sandpipers, Grasshopper Sparrows, Lark Sparrows and Brewer's Sparrows; Violet-green Swallows along the South Saskatchewan River
- productive Sharp-tailed Grouse habitat
- Astragalus kentrophyta (Site G), Polanisia dodecandra (Site H), Oraba reptans (Site H), Antennaria dimorpha (Sites C,H,I), Androsace occidentalis, Lupinus pusillus,
- large snake hibernacula which has had Plains Hognose Snakes

HABITAT CHANGES:

- of 12 sand blowouts active in 1951, all but four are now stabilized
- one of the remaining four, a moderate size blowout in 1951, has been largely stabilized (about 90%); the other three have changed little since 1951
- there has been considerable development of truck trails to service wellsites over the last 10 years
- numerous abandoned Ferruginous Hawk eyries along the South Saskatchewan River

RECOMMENDATIONS:

- destabilization of dunes would be beneficial for Ord's Kangaroo Rats
- research into the link between food, shelter and dune destabilization for Kangaroo Rat's would be useful
- military reserve lease on Crown land, suggest formal designation as National Wildlife Area to ensure wildlife interests are adequately served
- road networks should be kept to a minimum because of the potential impact on Plains Hognose Snakes
- dugouts should not be constructed in moist depressions which have potential as Great Plains Toad habitat
- research into Ferruginous Hawk declines relative to Richardson's Ground Squirrels should be undertaken and, if applicable, information should be used to reestablish ground squirrel populations

SITE: Suffield North

LOCATION: 30 km south of Bindloss

LEGAL DESCRIPTION: Tp. 19 to 20 - Rge. 3 - W4

ELEVATION: 725 m

AERIAL PHOTOGRAPH NO.: AS2123 202 to 206, 240 to 245, 283 to 290

MAP NO.: 72L/9

DESCRIPTION:

- rolling sand dune terrain
- diverse sand dune vegetation from aspen woods to a variety of tall and low shrubbery, grasslands and active blowouts

SIGNIFICANT FEATURES:

- diverse breeding bird populations
- nesting Ferruginous Hawks (Site O) and possible nesting Cooper's Hawks
- nesting Loggerhead Shrikes
- the most extensive Ord's Kangaroo Rat habitat in Alberta
- key deer and Pronghorn habitat
- Grasshopper Sparrows, Baird's Sparrows, Lark Sparrows and Brewer's Sparrows
- some of the most productive Sharp-tailed Grouse habitat in Alberta
- Psoralea argophylla in sand plain grassland
- Lygodesmia rostrata (Dunes L,N), Astragalus kentrophyta, Cryptantha fendleri (Dunes H,K,L), Vulpia octoflora, Androsace occidentalis
- major ungrazed spring with rare plants, Oryzopsis micrantha, Sphenopholis obtusata, Betula papyrifera (Site N)

HABITAT CHANGES:

- of 39 sand blowouts active in 1951, twenty-three are now stabilized
- ten of the remaining nineteen are partly (40% more than 1950 levels) stabilized and six are mostly stabilized (about 90% more than in 1950)
- Dune I was largely active in 1979 and is now 50% stabilized
- there has been considerable development of truck trails to service wellsites over the last 10 years

RECOMMENDATIONS:

- selective dune destabilization may be beneficial for Kangaroo Rats
- research into the link between food, shelter and dune destabilization for Kangaroo Rat's would be useful
- military reserve lease on Crown land, now out of bounds to military training; worthy of formal designation as National Wildlife Area to ensure wildlife interests are adequately served
- road networks should be kept to a minimum because of the potential impact on Plains Hognose Snakes

SITE: Suffield South

LOCATION: 25 km north of Medicine Hat

LEGAL DESCRIPTION: Tp. 15 - Rge. 5 to 6 - W4

ELEVATION: 725 m

AERIAL PHOTOGRAPH NO.: AS2218 99 to 101 MAP NO.: 72L/9

DESCRIPTION:

- mixed grassland and sagebrush on rolling sand dune terrain
- open plains cottonwood and tall shrubbery near eastern end of this unit

SIGNIFICANT FEATURES:

- Plains Hognose Snakes (Site C)
- nesting Loggerhead Shrikes
- Lygodesmia rostrata (Dunes A,B), Lupinus pusillus, Cryptantha fendleri (Dune A)
- Grasshopper Sparrows and Upland Sandpipers
- Mule Deer habitat
- potential Great Plains Toad ponds (Site D)

HABITAT CHANGES:

- two sand blowouts, active in 1951, are now 75% stabilized
- there is considerable development of wellsite access trails and roads
- small to moderate size ephemeral wetlands in the sand plain around the periphery of the dune field have been dry through the 1980's

RECOMMENDATIONS:

- military reserve lease on Crown land, now out of bounds to military training; worthy of formal designation as National Wildlife Area to ensure wildlife interests are adequately served
- road networks should be kept to a minimum because of the potential impact on Plains Hognose Snakes
- dugouts should not be constructed in moist depressions which have potential as Great Plains Toad habitat

SITE: Turin

LOCATION: 10 km south of Turin

LEGAL DESCRIPTION: Tp. 11 - Rge. 19 - W4

ELEVATION: 850 m

AERIAL PHOTOGRAPH NO.: AS3201 248 to 250 MAP NO.: 82H/15

DESCRIPTION:

- mixed grassland on low relief sand dune terrain
- small active blowouts

SIGNIFICANT FEATURES:

- gravelly and hard-packed sand blowouts
- Polanisia dodecandra (Dune C), Chenopodium subglabrum (largest known populations in Canada at Dunes A,C), Astragalus lotiflorus (Dunes A,B,D,E), Androsace occidentalis, Draba reptans (Dune A), Lupinus pusillus (Dunes A,C)
- Grasshopper Sparrows

HABITAT CHANGES:

- active sand area has been reduced from 1951 levels by about 25% in the largest eastern dune; the other two dunes have apparently not stabilized to any significant degree
- some trail bike and OHV use

RECOMMENDATIONS:

- selective destabilization of eastern dune would be beneficial to rare plants
- Crown land leased for grazing; area is worthy of formal protection
- current land uses could continue

SITE: Vauxhall

LOCATION: 10 km northwest of Vauxhall

LEGAL DESCRIPTION: Tp. 13 - Rge 17 - W4

MAP NO.: 82I/1

DESCRIPTION:

- all dunes in this area have been converted to crop production
- remaining natural habitats are non-dune sites
- site not visited, assessment based on aerial photograph interpretation

RECOMMENDATIONS:

- no significance

SITE: Wolf Island

LOCATION: 7 km north of Wolf Island (20 km north of Purple Springs)

LEGAL DESCRIPTION: Tp. 12 - Rge. 14 to 15 - W4

ELEVATION: 775 m

AERIAL PHOTOGRAPH NO.: AS3202 172 to 176 MAP NO.: 72E/13

DESCRIPTION:

- mixed grassland and sagebrush on slightly rolling sand dune terrain

SIGNIFICANT FEATURES:

- nesting Burrowing Owls (Site E)
- Abronia micrantha (Dunes D,E), Lupinus pusillus (Dunes B,C,E), Franseria acanthicarpa (Dunes A,B,C,D), Cryptantha fendleri (Dune B)
- Grasshopper Sparrows and Brewer's Sparrows

HABITAT CHANGES:

- active dune area has remained largely the same since 1951

RECOMMENDATIONS:

- area is worthy of formal protection, particularly dune with Abronia stand
- retain remainder as natural habitat; Crown land leased for grazing
- current land uses appear compatible

SITE: David Lake South and North

LOCATION: north of Metiskow

LEGAL DESCRIPTION: Tp. 41 to 42 - Rge. 5 - W4

ELEVATION: 675 m

AERIAL PHOTOGRAPH NO.: AS2551 242 to 244 MAP NO.: 73D/10

DESCRIPTION:

- strongly rolling sand dune terrain
- aspen and poplar woodlands, tall and low shrubbery, grassland and small active blowouts

SIGNIFICANT FEATURES:

- part of the largest and most diverse sand dune terrain in the Aspen Parkland region of Alberta
- diverse breeding bird habitat
- rare plants of sand plains in the Aspen Parkland including Houstonia longiflora and Asclepias ovalifolia
- key deer habitat
- Cyperus schweinitzii (David Lake South Dunes A,B), Lygodesmia rostrata (David Lake South Dune B) and Hudsonia tomentosa
- productive American Avocet pond east of David Lake South A
- large boreal fens with potential Sandhill Crane nesting south of David Lake South B
- for a complete listing of significant features in the David Lake North area see Cottonwood Consultants (1986a)

HABITAT CHANGES:

- since 1949, dozens of active dune faces have become stabilized

RECOMMENDATIONS:

- ecological reserve will protect David Lake North sites
- selective destabilization of the dunes would be beneficial to the rare plants
- retain natural habitat in David Lake South with no range improvement involving clearing and cultivation; mostly Crown land leased for grazing

4. SUMMARY OF SPECIES' RECOMMENDATIONS

Based on literature, herbarium and field investigations, the plant and animal species surveyed this year have been divided into a number of categories:

1. endangered; recovery and monitoring plans required
2. threatened
3. rare, but not threatened
4. classify as rare but more information required
5. uncommon
6. remove from rare lists
7. other species whose status has not been determined
8. extirpated

Details of recommendations for each species can be found in the plant and animal species accounts in "3. Results". The following sections summarize those recommendations.

4.1 Endangered; Recovery and Monitoring Plans Required

Two plant species and two wildlife species should be treated as endangered and detailed recovery and monitoring plans should be prepared for each:

Tradescantia occidentalis
Cyperus schweinitzii (Aspen Parkland only)
Plains Hognose Snake
Great Plains Toad

Tradescantia occidentalis is confined to one small population in the Pakowki North dunes. Formal protection for this site and appropriate management are recommended. Collection of seed and research into the biology of this species may be useful in attempts to establish other populations in the Pakowki North dunes.

Cyperus schweinitzii is confined to a very few sites in Alberta, however, it is only threatened in the Aspen Parkland region where extensive stabilization of active dunes has taken place since the 1950's. Selective destablization of some dunes in the David Lake area would be beneficial for this species. Formal designation of Pakowki

North dunes would protect significant grassland populations of this species.

Great Plains Toad breeding populations have severely dropped over the last decade. Only a handful of breeding sites remain, most associated with irrigation developments. In addition to natural drought, Great Plains Toad breeding ponds have been drained, cultivated or had cattle watering dugouts placed in them. Future problems in irrigated areas could be created by further conversion of native rangeland to cropland and by rehabilitation of canals to prevent seepage. Reintroduction of Great Plains Toads from healthy populations into refilled wetlands in non-irrigated areas should be considered if natural recolonization does not take place within two years.

Plains Hognose Snake populations have continued to decline due to a number of factors including disturbance at overwintering sites and road kills. This species has always been rare in Alberta and its small and isolated populations can not afford further losses. Protection of key habitats in the Suffield-Remount-Dune Point and Lost River-Milk River Canyon areas and maintenance of substantial roadless areas, especially adjacent wintering sites, are seen as major requirements. Education programs to reduce road kills and killing at wellsites should also be introduced.

4.2 Threatened

Four species of plants should be treated as threatened:

Chenopodium subglabrum
Abronia micrantha
Astragalus lotiflorus
Lygodesmia rostrata (Aspen Parkland only)

Principal threats relate to the encroachment of vegetation on active dunes. This is a long-term process which could be reversed with climatic changes or through human interference with selective dune destabilization. Recommendations are made to formally designate key habitats for these species at Turin, Lower Bow, Lost River, Dune Point, Empress and Wolf Island. Retention of natural habitats at Purple Springs, Suffield and Pakowki Lake would also be beneficial.

4.3 Rare, but not Threatened

Thirteen species of plants and one mammal should be considered rare, but not threatened:

Cyperus schweinitzii (Mixed Grassland only)
Eriogonum cernuum
Draba reptans
Polanisia dodecandra
Astragalus kentrophyta
Franseria acanthicarpa
Lygodesmia rostrata (Mixed Grassland only)
Yucca glauca
Thellungiella salsuginea
Astragalus purshii
Psoralea argophylla
Oenothera andina
Asclepias viridiflora
Castilleja sessiliflora
Ord's Kangaroo Rat

Many of these species do not totally rely on active dune sand for their survival and their habitat generally seems secure. Continued stabilization of dunes could result in downgrading of the status of some species (Cyperus schweinitzii, Franseria acanthicarpa, Lygodesmia rostrata, Ord's Kangaroo Rat) to "threatened".

4.4 Rare, More Information Required

Six plant species should be classified as rare, but further research is needed to determine if they are "threatened" or "endangered":

Munroa squarrosa
Sporobolus neglectus
Cyperus squarrosus
Oenothera serrulata
Cryptantha minima
Hedeoma hispidum
Thelesperma marginatum

4.5 Uncommon

Two plants which have been classified as rare should be considered uncommon:

Lupinus pusillus
Antennaria dimorpha

These plants are widely distributed and occasionally in substantial numbers. Antennaria dimorpha is abundant in the Milk River Canyon-Lost River area and shows up in isolated areas northwards to Dinosaur Provincial Park. Lupinus pusillus populations fluctuate greatly depending on climatic conditions. While it is somewhat localized in distribution it inhabits a wide range of active and stabilized sandhill situations in numerous southern Alberta sites.

4.6 Remove from Rare Species Lists

Three plant and one bird species occur in large numbers in most sandhill habitats and should be removed from rare species lists:

Cryptantha fendleri
Vulpia octoflora
Androsace occidentalis
Grasshopper Sparrow

4.7 Status Undetermined

The Sharp-tailed Grouse was not classified. This species is locally fairly common in key sandhill habitats in the Mixed Grassland region but it has suffered regional declines. No assessment of this species outside of Mixed Grassland sandhill habitats was made.

4.8 Extirpated

The Greater Prairie Chicken is known to have been extirpated from natural habitats in Alberta. Despite the availability of apparently suitable habitat, no confirmed sightings have been made in recent years. The Suffield Military Reserve offers excellent possibilities for reintroduction of this species.

5. HABITAT RECOMMENDATIONS

Details of recommendations for each sand plain or sandhill habitat can be found in the habitat accounts in "3. Results". Those recommendations should be the cornerstone of a sandhill/sandplain habitat management strategy. This information should be combined with other environmentally significant features information and utilized by Crown land management agencies and regional planning commissions to conserve and protect representative and unique habitats.

Three classifications for the sandhill and sandplain habitats were developed:

1. formally designate
2. retain as natural habitat
3. no significance

The following summarizes the habitat recommendations based on 1987 analyses.

5.1 Formally Designate

Key sand plain and sandhill habitats which lie principally on Crown land and which should be formally protected through legislation include:

Dune Point
Empress Dune C
Lost River
Lower Bow (at least Sites A and F)
Pakowki Lake North
Remount (Bindloss Depression springs)
Suffield North, Centre and South
Turin
Wolf Island (D,E)

5.2 Retain as Natural Habitat

Key sand plain habitats which lie principally on Crown land and which should be retained in their natural condition are:

Atlee
Barnwell (in part)
Empress (in part)
Hemaruka
Hilda
Lazy H
Lonesome Lake
Many Island Lake
Old Channel Lake
Pakowki Lake South
Purple Springs (in part)
Remount
Sandy Point
Wolf Island (in part)

Significant natural habitats which are on Indian Reserves or private land include:

Barnwell (in part)
Gleichen
Little Rolling Hills East
Little Rolling Hills West
Matzhiwin
Purple Springs (in part)

It is suggested that landowner agreements be developed for the most significant of the sites in the Little Rolling Hills East (Great Plains Toad breeding ponds) and Little Rolling Hills West (Great Plains Toad breeding pond and rare plant habitat) areas.

5.3 No Significance

Sandhill and sand plain habitats which can be dropped from further consideration for significant wildlife, plant or landscape features include:

Carmangay
High River
Pearce
Rosebud River
Skiff
Vauxhall

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