

VA76036



National Research
Council Canada

Conseil national
de recherches Canada

FIELD NOTE NO. 72

ASSESSMENT OF SMALL MAMMAL AND RAPTOR
POPULATIONS ON TORONTO INTERNATIONAL AIRPORT
AND RECOMMENDATIONS FOR REDUCTION AND
CONTROL OF THESE POPULATIONS

A SUMMARY REPORT

Ronald J. Brooks, James A. Baker, Robert W. Steele

Department of Zoology
University of Guelph
Guelph, Ontario.

OCTOBER 1976

FIELD NOTE NO. 72

Assessment of Small Mammal and Raptor Populations
on Toronto International Airport
and Recommendations for Reduction and Control
of These Populations

In the belief that rapid exchange of information is of the utmost importance to a solution of the bird problem, the Associate Committee on Bird Hazards to Aircraft has decided to release rough field notes as soon as they are produced, rather than to wait until these data would normally appear in formal reports.

These field notes are produced for information and will not usually receive the editorial care given to formal reports.

It is hoped that other groups will contribute similar notes on an exchange basis.



V.E.F. Solman, Chairman
Associate Committee on
Bird Hazards to Aircraft.

Assessment of Small Mammal and Raptor
Populations on Toronto International Airport
and Recommendations for Reduction and
Control of These Populations

A Summary Report

Ronald J. Brooks, James A. Baker
and Robert W. Steele

Dept. of Zoology, University of Guelph
Guelph, Ontario. N1G 2W1

ACKNOWLEDGEMENTS

We gratefully acknowledge the assistance and cooperation of E. McKellup, Supt. of Field Maintenance, W. Hogg, Supervisor, F. Jessop and the rest of the Airport maintenance staff and the personnel at Air Traffic Control and Telecommunications. These people helped make our task much easier than it would otherwise have been. Special thanks to J.E. (Red) Mason of Imperial Oil and to U. Watermann and D. Dicarolo who were responsible for the raptor trapping program at the Airport and who contributed much helpful advice and assistance to our raptor project. We also acknowledge the cooperation of Mr. R.B. Baroni of C.W.S. for allowing us to color-mark raptors. Mr. R.M. MacGibbon and W.H. Bird also deserve commendation for their cheerful and able assistance and advice throughout the project. Lastly, we thank K. Myers who contributed immeasurably during the early stages of our work and E.B. Hartwick who initiated the raptor study and directed the early stages of that work.

Financial support for this project was provided by the National Research Council of Canada through its Associate Committee on Bird Hazards to Aircraft.

INTRODUCTION

Over the past several years, large raptors, especially Snowy Owls (Nyctea scandiaca), Red-tailed Hawks (Buteo jamaicensis) and, Rough-legged Hawks (Buteo lagopus) have represented a real or potential hazard to jet aircraft using Toronto International Airport. At certain times of year, particularly during the period beginning at the autumn migration and lasting through the winter months, relatively large numbers of these birds may be seen on the Airport and on open agricultural land west of the Airport. These birds often hunt in the vicinity of the runways, and, as they are large and rather slow-moving in level flight, they may be struck by aircraft with costly results.

From casual observation, it seemed possible that one reason raptors concentrated in large numbers on the airport was that they were attracted there by an abundance of small mammal prey. Therefore, studies were undertaken to test this hypothesis and, if the data supported the hypothesis, to recommend methods to reduce both small mammal and raptor populations on the Airport.

More specifically, the major objectives of these studies were:

1. To survey small mammal and raptor populations on the Airport and to determine their species composition and distribution.
2. To survey and map the various major habitats on the Airport.
3. To relate species and population densities of small mammals to distribution of habitat types and to distribution of vegetative and litter cover within each habitat type.
4. To determine the effects of seasonal changes and current management practices employed on the Airport on parameters described in Objectives 1-3.

5. To recommend steps to reduce or eliminate small mammal populations on the Airport and to recommend management practices which would maintain these populations at minimal levels.
6. To identify major prey items of raptors on the Airport.
7. To relate raptor density to season and habitat and to density of their major prey species on the Airport.
8. To evaluate present control methods applied to raptors on the Airport and to recommend, new or additional methods to reduce raptor populations and to maintain these populations at minimal levels.

Clearly, the recommendations for controlling small mammals would also be effective in reducing numbers of raptors, if these small mammals constitute a major factor attracting hawks and owls to the Airport. Also, one must take into account, as far as possible, that the recommended changes will not make the Airport more attractive to other avian species which would constitute a hazard to aircraft.

METHODS AND MATERIALS

Field studies commenced in March 1974 and continued until March 1976.

I The Study Area

The Airport property (12.2 km²) was subdivided into three major land-use categories: (a) Land under active management by the Airport Maintenance Crew (574 ha); (b) Land leased for farming (406 ha); (c) Land not under any form of management or agriculture (232 ha).

Within these three categories seven distinct habitats were identified: short-grass areas, cultivated fields, pasture, old fields, wetland meadow, flood plain, and eroded areas. In some instances, these habitats were further subdivided to examine specific problems.

II Sampling Small Mammals

Population densities of small mammals were estimated using standard capture-mark-recapture techniques. Folding Sherman live traps were employed. All animals were marked individually by toe-clipping and actual population estimates were derived by the Schnabel Method. Snap-trap lines were used to check results. Standard measurements and reproductive data were collected from all captures.

Home range and movements were examined by radio telemetry and by sequential data from live-trap recaptures.

III Analysis of Vegetation

Habitats were examined to determine structural and pattern differences in vegetation between habitats and to relate these differences to variations in small mammal density. Parameters examined were litter depth, litter per cent cover, species per cent cover, species frequency and species height. Three major sampling methods were used to evaluate seasonal changes.

IV Sampling Raptor Populations

Raptors were censused systematically twice per week on all habitat types over most of the Airport. Species, behavior and location were recorded. Detailed behavior observations were conducted from strategically placed blinds. Food habits were examined through pellet analysis and direct observations. Microtus and raptor densities were derived from the same study areas to see if any relationship could be found. Effectiveness of existing raptor control methods were evaluated.

Summary of Major Findings

1. Microtus pennsylvanicus was by far the most numerous small mammal on the Airport.
2. Microtus has the potential to reach very high numbers on the Airport under existing conditions.
3. In general, Microtus populations peaked in late summer and reached lowest levels in early winter.
4. Highest densities of Microtus occurred on lowland, moist, old fields.
5. Old fields and wheat fields from which straw was not removed after harvest also provided excellent habitat for Microtus. On these areas, Microtus had good cover and excellent food supply, and if snow cover was sufficient could breed there virtually throughout the year. Therefore, even if numbers fell drastically on less suitable habitat, Microtus from these 'good' habitats could rapidly repopulate other areas through dispersal.
6. On pasture, cultivated fields with crops such as soybeans and fields of fall wheat, Microtus were few in number and had low reproductive rates. In winter, virtually no Microtus occupied these areas.
7. On mowed short-grass habitats, Microtus were more successful on those areas mowed with least frequency. Summer populations were high, winter mortality was high and reproduction was non-existent in winter.
8. Mowing itself did not drive Microtus away, nor were the voles usually killed by mowers.
9. Evidence from direct observations of hunting behavior, from analysis of pellets and from correlations of raptor and Microtus density, all indicated strongly that all important raptors on the Airport fed almost exclusively on Microtus.

10. Red-tailed Hawks and Rough-legged Hawks were the most common raptors on the Airport. Snowy and Short-eared Owls were less common, but still numerous enough to represent a significant problem.
11. Numbers of Red-tailed and Rough-legged Hawks increased most during fall migration, but remained relatively high over winter and sometimes increased again in spring. Short-eared Owls were most numerous in fall and Snowy Owls were commonest in winter. Only Red-tails were present in summer.
12. Numbers of Red-tailed and Rough-legged Hawks and Short-eared Owls showed strong relationships to Microtus numbers. Snowy Owls did not.
13. Snowy Owls were the most efficient raptors hunting Microtus and this may explain why they were less affected by changes in Microtus numbers.
14. The present control method (trap and removal) for raptors was judged to be rather ineffective, for although none of the removed birds returned, most were almost immediately replaced by others. With respect to Snowy Owls which are relatively easy to trap, a more intensive trapping program combined with a much reduced Microtus population would probably reduce their numbers.
15. None of the problem species of raptors nested on the Airport to any significant extent.

Summary of Recommendations

A. To Reduce Microtus Populations

1. Chemical toxins and poisons are probably not feasible owing to cost, problems of toxic residues, effects on other species, possibilities of drainage of toxins away from the Airport and the probability they would have limited effectiveness.
2. Chemical repellents and chemosterilants have not been successfully applied to this sort of problem to date and cannot be recommended here.
3. Optimal habitats, particularly old fields and lowland areas should be eliminated as much as possible. This should be conducted so as to provide minimal attraction to other problem species, particularly birds such as gulls, starlings, red-winged blackbirds and common grackles. Old fields already provide food and nest sites to many species of birds. We recommend that these fields be converted to agriculture. Many vegetable crops, soybeans, and perhaps rye would attract few birds. Cultivation may attract birds and to reduce this attraction discing is preferable to ploughing, night ploughing is preferable to daytime and spring cultivation is preferable to fall cultivation. Manure applications should be ploughed under as soon as possible. Sewage sludge seems to attract many birds, especially gulls.
4. Grain crops, especially oats and barley, and corn should not be grown on the Airport. These crops attract small mammals and numerous birds, particularly blackbirds, and grackles.
5. Under no circumstances should straw etc. be left on the ground after harvest. This practice provides ideal habitat for Microtus

and attracts many birds to the seeds and to invertebrates which flourish under these conditions.

6. Pastures are poor habitat for Microtus, but may attract many birds especially starlings and rock doves. This latter effect was not particularly noticeable in pastures on the Airport, but if pastures were expanded they may elicit this problem.
7. Shorter grass in mowed areas reduces numbers of Microtus alongside runways, but may attract small birds to seeds and exposed invertebrates. We recommend that frequent (4-6 times per year) mowing be conducted on all short-grass areas. The possibility of planting vegetation unattractive to birds and Microtus should be considered. Potentilla tridentata is one species with potential to solve this problem.
8. Wet habitats should be drained and vegetation alongside water courses should be kept as low as possible. Drainage ditches should be undergrounded through pipes, or else the banks of the ditches should be made less steep so vegetation height can be reduced.
9. Burning of grassy habitats would be effective in reducing vole and bird populations at least temporarily (i.e. for several months). However, repeated burns could alter the habitat and favor the encroachment of more weed species. Therefore, we recommend that such burns be employed on a trial basis, in relatively small problem areas. If such burns are carried out, they should be done in the early fall (September - October) to reduce voles during the fall migration of raptors and, hence, to reduce the attractiveness of the Airport for these raptors.

10. One barn exists on the Airport at which cattle are fed outside the buildings. This practice attracts large numbers of seed-eating birds such as rock doves (Columbia livia), snow buntings (Plectrophenax nivalis), cowbirds (Molothrus ater), starlings (Sturnus vulgaris) and sparrows. In addition, cattle feed is stored in and adjacent to the barn and also attracts birds and, presumably, rodents as well. This problem could be eliminated by not allowing feed to be stored in the barn and having the cattle fed inside the barn or, preferably, somewhere outside the Airport.
11. All large trees should be removed from the Airport to eliminate potential nest sites, roost areas and perches for raptors and other birds. Although, the forested area in the west side of the Airport was not investigated intensively during this study, it ~~is~~ is a nesting and roosting area for many species of birds. The hawthorn forest produces large quantities of fruit which ~~attract~~ attract birds and small mammals. Furthermore, any new towers, posts etc. which are installed on the Airport in the future should be designed so large birds cannot use them as perches.
12. The present trapping program for raptors should be intensified to effect better control of Snowy Owls.
13. We recommend that a person with some expertise in wildlife management be hired to coordinate and direct control efforts on the Airport. Effects of some changes are unpredictable and this person could see potential problems developing and move quickly to minimize the hazards. Furthermore, many specific control programs would require full-time attention and effort. If we are to achieve a good measure of predictability of the effects

of various control measures long-term studies will be indispensable and this suggestion represents one means of conducting such studies.