

BOREAL OWL STUDY– COMPONENT OF RIVER VALLEY ECOSYSTEMS STUDY

Project Partners

- Institute for Environmental Monitoring and Research
- Société de la faune et des parcs du Québec
- Natashquan Band Council

Background

The river valleys located in the Military Training Area (MTA) of Quebec-Labrador are particularly appealing for low-level flying because they provide a natural corridor appropriate for training routes and they enable pilots to practise avoiding radar detection. Given the relatively large number of low-level training flights occurring in river valleys and the biological importance of these valleys, the Institute has developed a research program over the past few years to investigate the impact of overflights on the ecological components of river valleys. The first work to be carried out was designed primarily to identify certain species closely associated with the river valleys that could be targeted for more specific studies.

Birds of prey are located at the top of the food chain, and this makes them vulnerable to stress and changes in their habitat. They are therefore excellent indicators of the health of the environment, and several species have been chosen as indicator species in a number of locations around the world. In the area of Quebec-Labrador used for low-level flying, studies have been carried out in an attempt to identify the effects of the flights on diurnal birds of prey. However, the increase in military activities at night has recently brought to light the need to initiate studies of nocturnal species as well. Searching for nocturnal raptor nests can involve considerable effort in the field and result in the discovery of only a limited number of nests, particularly in inaccessible regions. The best way to monitor an adequate number of nests with relatively little effort is to install nesting boxes for species that normally nest in natural cavities. In this context, the boreal owl is the most attractive target species in the Quebec-Labrador region. Not only does the boreal owl readily use nesting boxes, but it is recognized that, in northern latitudes, this owl is basically confined to riparian forests in view of the relative scarcity of appropriate breeding habitats outside the river valleys. Consequently, the home range of the boreal owl is along watercourses. Such habitat use by the boreal owl should therefore promote this species' occurrence in the ecosystems targeted for study in the low-level flying area.

Study Area

Stretches of the Natashquan and Aguanish rivers have been selected as study areas in order to assess the effects of low-level flying on the boreal owl. The following factors contributed to this choice:

- The habitats along the banks of these rivers are relatively homogeneous, and this makes it easier to select suitable sectors for the purpose of experimental/control comparisons.
- The Natashquan River is easily navigable over long distances, and the Aguanish River, particularly to the south of the low-level flying area, also has a good sector with no white water.
- The digital ecoforestry maps necessary for the selection of appropriate study sites do not exist for most of the other sectors of the North Shore.

- The mouth of these rivers is located near the village of Natashquan, which is accessible by road, thus making it easier to transport equipment.

The sectors of the rivers located to the south of the low-level flying area will serve as a control sector, while the stretch of the Natashquan River that is located in the flying area will serve as an experimental sector. The southern limit of the stretches of river selected outside the flying area is located around 40 km from the Gulf of St. Lawrence coast in order to reduce possible effects due to the different climatic conditions on the coast and in the interior.

Hypotheses and Methods

Low-level flying could affect boreal owls in various ways. First, the flights could affect the hearing ability of these owls, which greatly depend on this sense to hunt the small mammals they feed on. The number of eggs laid by the female depends to a large extent on her physical condition, which is related to the hunting efficiency of the male and female. Boreal owls live in the same area year-round, and the number of eggs laid serves as an indicator of the feeding conditions in their home range. Also, it has been shown that large clutches produce more young. During incubation and part of the rearing period, the female normally stays in the nest, and the male provides food for her and the young. Consequently, a reduction in hunting efficiency could have an impact on the nesting effort and the survival of the young.

In September 2003, 600 nesting boxes were installed on the banks of the selected stretches of river. Half of these boxes were installed within the limits of the low-level flying area along the Natashquan River, and the other 300 were distributed along the stretches located to the south of the flying area as follows: 145 on the Natashquan River and 155 on the Aguanish River.

During the springs of 2004 and 2005, regular visits will be paid to the boxes for the purpose of collecting the data required to make comparisons between the flying area and the control area. Different parameters could be compared to determine the possible effects of low-level flying.

- Nesting box occupancy rate
The repeated flights over the flying area over the years are likely to have a cumulative disruptive effect, making the territory uninteresting to birds, which might then simply leave the area. Should this happen, the percentage of nesting boxes occupied by boreal owls should be higher outside the low-level flying area. The birds occupying the nesting boxes will be banded, and the return rate the following year will make it possible to determine whether the disruption caused by the flights is pushing the birds outside the flying area.
- Nesting effort (number of eggs)
The number of eggs produced will be noted for each occupied nesting box. If the flights are affecting the hunting efficiency of the adults, the females nesting in the flying area will probably be in poorer condition and will therefore lay fewer eggs than the females nesting outside the flying area.
- Nest attentiveness of the female and food supply provided by the male
If the flights are affecting the male's hunting efficiency, then he may bring less food back to the nest, and this might force the female to leave the nest more often. Motion detectors will be placed in a few occupied nests, both in the flying area and outside it. This will make it possible to compare the number of times the detectors are activated and determine whether the number of visits to the nest is influenced by low-level flying. A few cameras will be installed as well to ascertain whether the activations of the motion detectors can be attributed to the female's leaving the nest more frequently, which could affect the survival of the young.
- Nesting success

If the effects mentioned above prove to be true, they are likely to lead to a reduction in hatching success and in the survival of the young in the nest. The regular visits to the occupied nesting boxes will make it possible to determine whether the eggs have hatched and to quantify the hatching percentage.

- **Survival of the young**
The young birds will be banded as soon as they are large enough, and a visit made at the end of the season will make it possible to determine whether the bands are still in the nesting boxes. The presence of bands will provide an indication of the mortality of the young in the nest.
- **Number and frequency of fault bars in the feathers**
Fault bars, which were particularly well documented in the scientific study of raptors, are malformations in the feathers of birds that may be caused by stress factors. The young birds produced in the nesting boxes will be examined to detect the presence of fault bars, which could then be used to compare stress levels between the different sectors of the rivers. Causes of stress during feather development in adult females may make it possible to predict their reproductive status; consequently, the presence of fault bars will also be examined in females in an effort to explain their nesting success.
- **Abundance of small mammals**
The number of eggs produced by females is often related to the abundance of the small mammals upon which boreal owls feed. In years where small mammal populations are at the bottom of their abundance cycle, owls may even fail to reproduce at all. Small mammal trapping campaigns are therefore planned in order to obtain an indication of the abundance of such prey.

Results of Exploratory Work Done in 2003

In 2003, some 100 nesting boxes were installed in the Sept-Îles region of the North Shore in order to fine-tune the methods used. Five of these nesting boxes were occupied by boreal owls, and this made it possible to develop certain devices that will be used in carrying out the study. Motion detectors were installed on three of the nesting boxes. As a result, it was possible to determine the ideal distance these devices should be installed from the nesting box entrance in order to get a proper count of the comings and goings of the birds. An infrared camera hooked up to a tape recorder was tested as a means of recording video images, and this should make it possible to better identify the contribution of the male and the female to the comings and goings noted by the detectors. This network of nesting boxes can continue to be used over the next few years. Experimenting with noise recordings as a control disruptive effect might make it possible to gain a better understanding of the impact on the birds.

The first small mammal trapping campaign, carried out in September 2003 along the Natashquan River, showed that voles, the main prey of the boreal owl, were particularly plentiful. Close to 700 were caught with an effort of nearly 3000 trap-nights. These results seem to promise an excellent nesting season in 2004, and consequently, excellent conditions for the carrying out of this study.

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