

RESEARCH HIGHLIGHTS

February 2003

HARLEQUIN DUCK RESEARCH PROJECT

In 2002, the Atlantic Cooperative Wildlife Ecology Research Network (ACWERN) of Memorial University of Newfoundland (MUN) under contract to the Institute for Environmental Monitoring and Research (IEMR) successfully completed the experimental effects research designed to assess the effects of military jet noise on behaviours of Harlequin Ducks breeding at Fig Lake in central Labrador. Through close collaboration between the Department of National Defence (DND) at 5 Wing Goose Bay, and the IEMR, mock army tanks were constructed and air-lifted to positions proximate to the Fig River study area. Allied pilots filed daily operation plans with the Military Coordination Centre (MCC) at 5 Wing Goose Bay that provided a predicted Time On Target (TOT) for military jets attempting to register the targets at the Fig River study area. Daily communication between the MCC and the Harlequin Duck research team was maintained via satellite phone, and included e-mail transfers of spreadsheets of general sortie forecasts for following days, and exchanged with timing of over-flights registered at the study site.

Between 19 May and 19 June 2002, 94 military jet over-flights were registered by the research crew at Fig River. Numbers of over-flights varied from 0 to 17 per day with about half of these occurring in the 10:00 - 11:00 time window and one third in the 16:00 - 17:00 time window. Sound and noise data were collected using sophisticated stationary and hand-held digital sound meters. Hundreds of hours of data on behaviours of

individual Harlequin Ducks were collected. We were able to compare behaviours of Harlequin Ducks during military jet over-flights with behaviours in the absence of over-flights at Fig River, and concurrently to behaviours at a control site at Crooked River outside of the Military Training Area (MTA). This is a powerful statistical approach known as Before-After-Control-Impact (BACI) that is able to conclusively verify an environmental impact because it controls for variation that may be associated with the study site (spatial) and/or time (temporal).



Ph. D. student, Ian Goudie weighs an adult male Harlequin Duck at Crooked River. Photo C. Jones

The results demonstrated an impact of military jet over-flights on behaviours of adult Harlequin Ducks breeding at Fig River. Individuals responded to jet over-flights by increasing alert behaviours that were sometimes exemplified by flushing, panic diving, and alert posturing with agitation movements. The magnitude of behavioural response increased with increasing noise levels gener-

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ated from jets that frequently exceeded 100 dBA. The sudden onset loud noise greatly exceeded the background noise levels (50 – 70 dBA) generated by the river, and appeared to elicit startle responses in the Harlequin Ducks. However, when there were successive over-flights less than 60 sec. apart, the Harlequin Ducks rapidly habituated, and by the third successive military jet over-flight there were no detectable behavioural responses.

Behavioural responses by adult Harlequin Ducks to military jet over-flights at Fig River were of short duration, and generally lasted less than 60 seconds. Even at the above average intensity of jet over-flights experienced at Fig River in 2002, it is unlikely that direct response behaviours could impair the ability of breeding pairs to budget time to critical behaviours such as feeding. We did detect what appeared to be a residual effect of military jet over-flights in that there was increased aggression and reduced courtship lasting up to 1.5 hours following over-flight events. Implications of such residual effects are potentially greater than the direct behavioural responses because: (i) they are more protracted and therefore could negatively affect time budgeted to critical behaviours, and (ii) reduced time to behaviours such as courtship could have negative consequences to reproduction. Therefore residual impacts of military jet over-flights on Harlequin Ducks may require further study.

Loud noise can induce stress responses in wildlife, and in birds stress is associated with rising levels of corticosterone being secreted into the blood by the adrenal glands. Chronic elevated levels of this hormone can impair reproductive potential, immune function and ultimately survival. This hormone is eventually shed through the waste products. We are completing biochemical analyses of feces left on rocks by Harlequin Ducks on days without and following military jet over-flights. These assays will help us determine if there is a detectable physiological response by Harlequin Ducks to noise generated from low-level jet over-flights at Fig River in central Labrador.

Through the marking program established at the Fig River study are commencing in 1999, about 100 Harlequin Ducks are now individually identifiable when re-sighted through 20-60X spotting scopes by researchers. This permits the analysis and calculation of annual survival rates, a key vital rate affecting the demography of sea ducks. It is proposed that monitoring of returning individuals be continued in order to assess the impact of military jet over-flights on survival rates of Harlequin Ducks at Fig River.

OSPREY MONITORING

In 2002 a draft report on the post mitigation of ospreys in the low-level training area of Labrador was submitted to the IEMR for review outlining the work completed by Jacques Whitford Environment Limited (JWEL) on behalf of DND from 1999 to 2002. As raptors are considered a valued ecosystem component, a workshop to review the work to date and to discuss future directions was arranged in early 2003.

A steering committee has been commissioned to further evaluate the future of IEMR led osprey monitoring. As a result of the Osprey work since 1999, the following conclusions were made:

- There were no significant effects of Low Level Flights on Osprey during monitoring and treatment studies.
- In the Low Level Training Area without mitigation, Osprey had production of young consistent with the control area.
- Osprey in the Labrador region are at the northern extent of their range, with reproduction influenced primarily by weather and related factors such as wind, temperature and precipitation.
- The position of DND is that the option B impact prediction in the 1994 EIS was overstated (i.e. minor before mitigation).
- The impact to Osprey is considered negligible without mitigation, and there is a low uncertainty of impact.
- The IEMR will assume a lead role in continued monitoring of Osprey in the Low Level Training Area and DND will pursue removal of any mitigation measures because of the low risk and lack of demonstrated impacts on Osprey.

Northern Solutions Conference

In November, Maureen Baker and Tony Parr attended the Northern Solutions Conference 2002 sponsored by Smart Labrador in Happy Valley-Goose Bay. The conference showcased innovative broadband models and innovative applications including tele-health, tele-justice, government online, online education initiatives, and smart communities. Highlights of the conference included a session on Enabling Technology in Canadian Aboriginal Communities and a virtual school exchange between students from Goose Bay and Iqaluit, Nunavut. In follow up to discussions started at the conference, Smart Labrador staff has been investigating the possibility of having video link capabilities available at the North Star Building in Goose Bay.

River Valley 2002

In 2002, the IEMR completed a 2nd pilot study year focusing research efforts on the Churchill River in Labrador. The Institute has completed interim reports for research efforts in 2001 and 2002. Future collaborative work with the Province of Quebec on directed studies is planned to further the effects research mandate of IEMR. The goal of the 2002 field program of the River Valley Ecosystem Project was to obtain general information on the fauna and habitat types within a river valley that could be used as a Before-After Control-Impact study. The reconnaissance program of 2002 was in anticipation of university-lead studies of cause-and-effect relationships between the abundance, diversity, behaviour, and/or reproductive success of selected wildlife species and low-level over flights.

Assessment of the 2002 data indicates that the Churchill River Valley study area has overall comparable habitat sites and would be suitable for an effects study. With respect to species suitable for directed studies within an ecosystem approach, red back voles and squirrels were ubiquitous and easily monitored. Similarly, studies involving songbird species such as Gray Jays, Boreal Chickadees, Swainson's Thrush, Myrtle Warbler, and Ruby Crowned Kinglet would be possible based on their occurrence throughout the study area. The Churchill River Valley offered an excellent logistic choice with regard to access among sample sites and in terms of proximity to Happy Valley – Goose Bay.



Live trapping was successful in terms of trap ability of small mammals, and could allow assessment of life history changes such as number of litters, growth rates, survival rates and other demographic variables. Several species present in the 2001-2002 pilot studies are suitable for future directed effects research. Although very good habitat and monitoring work can be achieved in this study area, we do not recommend a continued monitoring project related to noise effects. Instead, we are pursuing the selection of 1 or 2 resident bird species, including gray jays to conduct directed research. In addition, we plan to conduct directed studies complimentary to those proposed with the province of Quebec looking at Boreal Owls, bats and possibly flying squirrels that might use nest boxes. Small mammal trapping would be conducted in support of the Boreal Owl nest box study.

Future work on river valleys in 2003 will be highly dependent on the level of over flight support that is possible. Directed effects studies are proposed for Boreal Owls and Gray Jays on the Churchill River and for Boreal Owls on control and treatment sites in the Quebec portion of the low level training area.

INNU ENVIRONMENTAL GUARDIANS CONFERENCE AND STRATEGY SESSION FOR BUILDING CAPACITY

The Innu Nation of Labrador, the Gorsebrook Research Institute, Saint Mary's University, and Environment Canada, Atlantic Region hosted a two day workshop which IEMR participated in on February 11-12, 2003, in North West River, Labrador, on capacity development within the Innu Nation's Environmental Guardian Program.

Innu Nation's Environmental Guardians are presently involved in a range of environmental management initiatives, including: co-management of forestry resources, environmental management and monitoring at Voisey's Bay, and fisheries conservation and enforcement. In addition, Environmental Guardians are directly involved as co-researchers in research and monitoring partnerships with government and university-based researchers. However, it is widely recognized that as Innu Nation assumes greater responsibilities for environmental management, the Environmental Guardians will require ongoing training and professional development.

A number of present and potential partners including the IEMR were invited to this workshop to present an overview of the Environmental Guardian programs, and to strategize about how further training, informal linkages and formal partnerships with the Innu Environmental Guardians Program might be accomplished over the next three years. Participants invited to the workshop include representatives from the Innu community, educational institutions, provincial and federal government agencies, and locally based stewardship organizations.

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The Innu Nation recognizes the importance of incorporating the substantial body of Innu knowledge of the environment as well as the need for Innu Guardians to develop competency in Western technical and scientific disciplines relevant to environmental protection, management, and resource use. This means that Environmental Guardians must acquire a unique set of skills and competencies in both their own knowledge traditions as well as the technical and scientific disciplines recognized by formal educational institutions in North America. A central goal of the program is to build technical capacity in both of these areas in order for Innu Environmental Guardians to be effective environmental managers who can promote Innu values while working with a broad range of agencies and stakeholders.

Training Innu Environmental Guardians as future environmental managers and protectors of their traditional lands and resources is an important part of the Innu Nation's overall capacity-building objectives. The Innu Nation recognizes that environmental management is a crosscutting issue, and that environmental stewardship requires partnerships across jurisdictions and between communities and stakeholders.

Training programs for the Innu Environmental Guardians have been piloted over the past several years. Experience suggests that focused two to three week classroom and field modules based in the community, combined with on-the-job mentoring is an effective way to develop the knowledge and skills of the Guardians. Ongoing collaboration between the Guardians and project partners has shaped the direction of the training to date, and the involvement of the Innu leadership, elders and community members is actively being sought in determining future training requirements.

The objectives of the conference were to:

- Present an overview of the Environmental Guardians project;

- Hear from partner organizations, agencies, and others about opportunities for linking the Environmental Guardians Training Program to ongoing or proposed environmental projects and training initiatives;
- Present and discuss the program accreditation process and the proposed curriculum in light of university requirements, specifically those being developed in collaboration with Saint Mary's University;
- Begin development of a long term strategy to integrate Environmental Guardian training initiatives to other community-based capacity development projects within the Innu communities;
- Initiate dialogue to facilitate co-operation between Guardians, program partners, and organizations on capacity development and environmental stewardship in Labrador.



ECONOMIC IMPACT STUDY

In November 2002 an updated report on the "Economic Impact of Military Flight Training in Labrador and Northeastern Quebec" prepared by AMEC Earth and Environmental and Gardner Pinfold Consulting Economists was presented to and accepted by the Institute's Board. This study was commissioned to research and assess economic indicators and determine what changes had occurred in the intervening two years since an original study was completed in November 2000. It is the intent of these studies to build a series of updates on economic impacts of the flying activity. The report finds that the low level flying activities at 5 Wing Goose Bay accounts of 1,480 person-years of employment (direct, indirect, and induced) in Labrador which is a 9% increase over the 2000 figure and adds \$72.63 million (direct, indirect, and induced to the Gross Domestic Product which is a 6.5% increase over the 2000 figure. The Board has agreed to proceed with updating this report in 2003 to incorporate the most recent census data and changes in the training program at 5 Wing Goose Bay.

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Research Highlights

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