

**Introduction.**

Welcome to this special issue of the Newsletter of the Diver/Loon Specialist Group of Wetlands International. It contains the Abstracts or Extended Abstracts of the papers presented at the International Loon Seminar "Loons / Divers – Research and Management" held at Viskadalen, Sweden, 20-22 August 1999. The Swedish Society for Nature Conservation and The Swedish Ornithological Union sponsored the event. Drs. Mats O.G. Eriksson and Peter Lindberg organised the event, Dr. Mats O.G. is the editor of these Proceedings.:

The abstracts listed in alphabetical order by the name of the first author. A table of contents with the name of authors and the title of the paper is given before the Abstracts.

These abstracts may be quoted as:

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Joseph Kerekes  
Coordinator,  
Diver/Loon Specialist Group, Wetlands  
International

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**Proceedings  
International Loon Seminar  
M.O.G. Eriksson, Editor**

**Loons / Divers – Research  
and Management**

**Viskadalens Folkhögskola,  
Seglora, Sweden, August 20-22,  
1999**

**Organisers: Mats O.G.  
Eriksson and Peter Lindberg**

***Abstracts***

The following abstracts were presented at a workshop on the theme "Loons / Divers - Research and Management", arranged by The Swedish Society for Nature Conservation and The Swedish Ornithological Union. Around 40 persons attended, including participants from Canada, Denmark United Kingdom and USA.

**Elevated mercury exposure  
associated with reproductive  
impairment in Common  
Loons (*Gavia immer*) in  
Atlantic Canada**

(Poster presentation)

**Neil Burgess**, Canadian Wildlife Service, Environment Canada, Sackville, New Brunswick, Canada  
**Dave Evers & Joe Kaplan**, BioDiversity Research Institute, Freeport, Maine, USA

**Joseph Kerekes**, Canadian Wildlife Service, Environment Canada, Dartmouth, Nova Scotia, Canada

Common Loon (*Gavia immer*) reproduction was monitored on 24 lakes in Kejimikujik National Park, Nova Scotia, Canada since 1988 and 1986, respectively. In August 1995, 1996 and 1997, breeding loons and their young were captured and blood samples collected for total mercury analysis.

Blood mercury levels (mean  $\pm$  SD) in adult loons in Kejimikujik park ( $5.7 \pm 1.5$  ug/g) were more than double those in New Brunswick ( $2.3 \pm 1.0$  ug/g) and four other regions of North America (means, 0.7 - 2.3 ug/g). Average reproductive success of territorial adults appeared to be limited by their blood mercury levels. Looking at different phases of the breeding cycle, mercury appeared to limit the nesting rate of territorial loon pairs. Mercury did not appear to limit hatching success or the survival of hatched chicks, except at high levels of exposure. These preliminary findings need to be confirmed at other study lakes. Loon reproductive success also appeared to be limited by total mercury levels in their yellow perch (*Perca flavescens*) prey. From initial assessment, loon reproduction appeared normal when mean mercury levels in whole yellow perch (5-75 g) were below 0.1 ug/g (wet wt.). Loon productivity appeared to be reduced by 50% when perch mercury levels exceeded 0.3 ug/g. The importance of observed reproductive impairment in loons to their long-term population status needs to be assessed in eastern Canada and the Northeast United States.

## Loon mortality in New England

**Jennifer Caldwell**, College of Math, Engineering, and Science, University of Alaska, Fairbanks, Alaska, 99775, USA

**Mark Pokras, D.V.M.**, Tufts University School of Veterinary Medicine Wildlife Clinic, 200 Westboro Road, North Grafton, MA 01536, USA

The New England population of the common loon *Gavia immer* has been declining in size during recent decades. Prior to this study, little was understood about the general mortality of these elusive birds that serve as valuable indicator species for aquatic ecosystem conditions. Between

Spring 1989 and Spring of 1999, Tufts University School of Veterinary Medicine (TUSVM) Wildlife Clinic acquired 438 dead and moribund loons that were found throughout New England. The carcasses were characterised by weight, sex, age, body condition, leanness, location, and date; they were then necropsied, and the likely causes of death (omphilitis, toxicosis, parasites, trauma, etc.) were determined. Coexisting pathologies for each bird were also noted. Leading causes of death are trauma, lead and aspergilosis. Loons most likely to breed are primarily killed by ingestion of lead fishing gear, as evident from their location and age of cadavers. Systemic study on loon mortality issues offers possible solutions and further research direction to promote loon preservation efforts.

## Lead objects ingested by Common Loons (*Gavia immer*)

**Jennifer Caldwell**, College of Math, Engineering, and Science, University of Alaska, Fairbanks, Alaska, 99775, USA

**Mark Pokras, D.V.M.**, Tufts University School of Veterinary Medicine Wildlife Clinic, 200 Westboro Road, North Grafton, MA 01536, USA

Necropsies revealed lead and non-lead foreign objects – primarily fishing gear – were detected in the gastrointestinal tracts of common loons (*Gavia immer*). An associated, concurrent loon mortality examination of 396 carcasses collected throughout New England between 1987 and 1998 revealed that lead inhibits loon population growth. Among the 396 carcasses, 198 are adult breeding loons, 103 of these (52%) were evidently killed by lead ingestion. All 103 carcasses 1) have liver lead levels consistent with lead poisoning

and 2) contain a total of 133 lead objects in their GI tracts, as some birds ingested multiple objects. This study examines the types, sizes, and shapes of the 133 lead objects shown responsible for lead toxicosis via ingestion. The lead object dimensions suggested apparent size limits to what loons ingest, and such limits may offer guidelines on fishing gear standards that prevent ingestion and consequential mortality. Approximately 95% of the ingested objects are: 1) < 2.5 cm-long, 2) < 1.0 cm-wide, and 3) weighed < 1.0 g. Loon mortality should be reduced if current fishing gear were replaced with either non-toxic metal or lead objects too large to be ingested by most loons.

### Breeding success of Red-throated Diver *Gavia stellata* in the core area of the Swedish population

**Börje Dahlén**, Strandvägen 6, SE-782 35 Malung, Sweden

Red-throated Diver was surveyed, and breeding success investigated, 1991-1998, in a coniferous forest and mire area of 1,830 km<sup>2</sup> in the core area of the Swedish population. The breeding population was assessed to 70-80 pairs, and 39-80 breedings were investigated each year. The 91 breeding sites were described with reference to surface area, distance to closest fishing lake (large freshwater lakes), distance to road (indication on human disturbance), occurrence of suitable breeding islets and water-flow through the tarn. For 434 breeding records, data on incubation, number of chicks, size of chicks, number of "almost fledged" chicks and if breeding occurred in a new nest or one earlier used during previous years. 215 nests were investigated with reference to location at the tarn, size, distance to water, height above

water surface and distance from mainland shire to breeding islet.

Average breeding success was 0.81 "large" chicks per pair and year. Distance to nearest fishing lake was on average shorter than 1 km, and there was no relationship between that distance and breeding success. If breeding failed a single year, there was a clearer tendency to change to a new nesting site at the same tarn next year. After a failure, also the disposition to refrain from breeding the following year increased. Large-sized birds (large nests) have a better breeding success. Perhaps also the distance from mainland shore to breeding islet is of importance for the breeding success.

### Divers and freshwater acidification - a Swedish perspective

**Mats O.G. Eriksson**, MK Natur- och Miljökonsult, Tommered 6483, SE-437 92 Lindome, Sweden

	Red-throated Diver <i>Gavia stellata</i>
Decline of fish stocks on foraging lakes	- (salmonid and cyprinid)
Increased water transparency	0
Increased abundance of pelagic insects	0
Overgrowth of Sphagnum mosses in breeding tarns	-
Exposure to mercury	- ?

### Loons / Divers - Names - Myths - Scandinavian perspective

**Mats O.G. Eriksson**, MK Natur- och Miljökonsult, Tommered 6483, SE-437 92 Lindome, Sweden

In northern Europe, Siberia and North America, divers have been an important element on human mind since long. Pictures of divers exist on North American rock paintings that are 5000-8000 years old, and on a Norwegian rock carving of approximately the same age. The "Loon" name can be traced back to Viking Age, and is formally documented in Swedish text since around 1500.

The different kinds of names on divers can be grouped as follows:

- The birds move clumsy ashore; Icelandic "luenn", Swedish "lam"
- The calls; Swedish "lomhörd", "loon heard"
- Skilful divers; Latin *Colymbus*; "Diver", "Taucher", "Plongeon"
- Call imitating; Finnish "Kuikka", Russian "Gagara"; Sw. dialects "Lalare" etc.
- The plumage; "Grålom" for *G. stellata*, "Rutlom" for *G. arctica*.
- Weather forecasting; "Weather Goose", "Rain Goose"
- Sturdy bill; various Inuit names, e.g. "Tool-lik"
- Other names of unclear origin; "Immer", "Hymber" etc in northern Sweden and Norway, cf. modern Icelandic "Himbrini" for *Gavia immer*

Modern Swedish names, "Smålom" and "Storlom", are constructions of the 19<sup>th</sup> century, proposed by Sven Nilsson in his classical "Skandinavisk Fauna" (1835).

In myths and legends, divers act in various roles:

- Medium - shamanism, forecasting death, forecasting weather
- Creator of Earth and Life

The important roles of divers was manifested by the use of various articles made in diver skin, e.g. hats for ritual purposes and that Same shamans stored their tools in small sacks made of diver skin.

## Project LOON / DIVER in Sweden

**Mats O.G. Eriksson**, MK Natur- och Miljökonsult, Tommered 6483, SE-437 92 Lindome, Sweden

**Peter Lindberg**, University of Göteborg, Department of Zoology, P.O. Box 463, SE-405 30 Göteborg, Sweden

Project LOON / DIVER started in 1994, and has been run jointly by The Swedish Society for Conservation of Nature and The Swedish Ornithological Union. The project was initiated against the background of a complex pattern of threats and fear for a too low recruitment to compensate for mortality among adult birds. Moreover, Sweden, together with Finland and Norway, has an international responsibility for the Black-throated Diver, as the main part of the European population outside Russia breeds in these countries. Important aims have been monitoring of trends and breeding success for Red-throated Diver and Black-throated Diver in Sweden, and to initiate and coordinate local and regional activities. More the 300 persons are on the mailing-list of the project, and around 250 of them have participated in fieldwork during one or (more often) several years.

For both diver species, we judge the situation in Sweden to be slightly more positive than at the start of project. Continued actions for the two species should include:

- Priority for lime treatment of fishing lakes for Red-throated Diver, when affected of acidification.

- Better adjustments of water-level regulation schemes in breeding lakes for Black-throated Diver.
- Better information to out-door life and recreation.
- Continued monitoring of the Swedish diver populations, if possible to be coordinated with official environmental monitoring.
- Immediate measures to replace lead in fishing gears with non-toxic alternatives.
- Extended research and monitoring of the exposure of heavy metals (mercury, lead) and organochlorines.

### **Do Canada Geese affect the breeding result of Red-throated Diver and Black-throated Diver?**

**Mats O.G. Eriksson**, MK Natur- och Miljökonsult, Tommered 6483, SE-437 92 Lindome, Sweden

**Peter Lindberg**, University of Göteborg, Department of Zoology, P.O. Box 463, SE-405 30 Göteborg, Sweden

During the latest decades, Canada Geese has increased in numbers and expanded their distribution area over large parts of Northern Europe. Hitherto, the risk for adverse effects on the native bird fauna has been assessed to be negligible, although single records of divers having failed or abandoned the breeding site after the establishment of Canada Geese exist. Against this background, we carried out, 1996-98, an inquiry in order to collect information on breeding success and nest location of divers and geese in Sweden.

For Red-throated Diver, we found no indications of any negative effects of breeding success among pairs nesting together with Canada Geese in the same tarn. For Black-throated Diver, breeding

success did not differ between pairs with and without Canada Geese nesting on the same islet, but there was an insignificant indication of lower median distance to the closest goose nest on an other islet for failed diver nests compared to successful ones.

We judge that the expansion of Canada geese is no threat on national or regional scales, although single pairs certainly suffer from having Canada Geese as close neighbours. But also the potential benefits from the presence of Canada geese, e.g. if the geese keep other predators away, must not be overlooked.

### **A detailed study of the breeding success of Black-throated Divers *Gavia arctica* in south-west Sweden - implications for management of the Swedish population**

**Mikael Hake**, Grimsö Wildlife Research Station, Department of Conservation Biology, SLU, SE-730 91 Riddarhyttan, Sweden

The reproduction of Black-throated Divers in southwest Sweden was studied in one multi-lake area (Lake Fegen + Svansjöarna, MLA) and one multi-pair area (MPA) in 1996-97 and 1997, respectively. Special attention was paid to effects of water-level fluctuations and bird sanctuaries with limited public access. Detailed breeding data were collected for a total of 53 pairs in 50 lakes in the MLA and 17 pairs in one large lake in the MPA. Hence, this study involves more pairs and a closer follow-up of breedings than previous studies on the Swedish population. First clutches were initiated between late April and the end of June, with a peak in mid-May. Replacement clutches were laid between mid May and early July. Hatching took place between late

May and the end of July, with most occurring in the first half of June. Clutch size in the MLA 1996-1997 was 1.86 and 1.67, respectively, which was similar to the 1.75 recorded in the MPA. Overall, about 43% of the breedings were successful, with little variation between years and areas. Also the reproduction, taken as the number of produced "large" chicks, was similar between years and areas; 0.46-0.57 per active nest. Breeding success for replacement clutches tended to be lower than for first clutches in both areas. Most failures of first clutches occurred within 1-2 and 2-3 weeks after the start of incubation in the MPA and MLA, respectively. Moreover, there was a clear tendency that early failures were more likely to be followed by replacement clutches. Nest failures were mainly due to water level fluctuations. This was particularly obvious in the MLA during 1996, when the breeding of 35 pairs was closely followed. This confirms earlier conclusions that flooding or stranding during incubation may severely affect the reproduction, at least in some years. The effect of outdoor recreation activities on the breeding success was more difficult to determine. However, there was a tendency for birds breeding within sanctuaries in the MPA to reproduce better than birds breeding outside these areas. Thus, the results indicate that two important means of enhancing the reproduction of the Black-throated Diver in Sweden are to restrict water-level regulations and public access to some areas during April-July.

## Ringling and migration among Scandinavian divers

*Erik Hemmingsson, Fuxvägen 25, SE-857 52 Sundsvall, Sweden*

It is first during the last 15-20 years, that Red-throated Diver *Gavia stellata* has been ringed in a systematic way in Sweden and

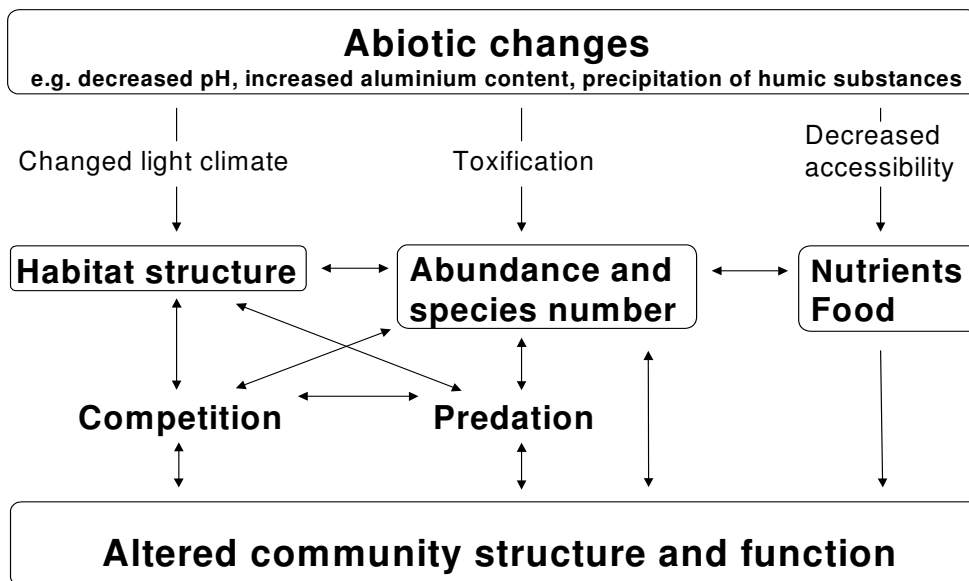
Finland. In Norway, no organised ringling of Red-throated Divers has started, as yet. In total, less than ten ringers have ringed around 1,000 Red-throated Divers in Sweden and Finland, and this effort has resulted in a bit more than 100 recoveries. They have given us a quite good picture of migration routes, migration speed, wintering areas and threats during migration for Nordic Red-throated Divers. The wintering area, which extends from Denmark down to France and British Isles, used is in common by the Red-throated Diver population of northern Europe. Thus, the majority of European Red-throated Divers are found in this area during winter. The most important threats at the wintering sites are oil and other pollutants. On the migration route to and from the wintering sites, capture in fishing-gear is the most important danger. No pair-formation occurs at the wintering site, but first-time-breeders return single to their natal sites in the third summer, for pair-formation and breeding. Young Red-throated Divers spend the second summer at the breeding site or adjacent areas at sea. In Sweden and Finland, there are no recoveries of one-year old birds at freshwater habitats. From the ringling data, we cannot find any mix of individuals between the different sub-populations of Red-throated Diver.

For Black-throated Diver *Gavia arctica* no systematic ringling has been done in Sweden, as we still do not have any convenient method for safe capturing of them, when at the right age for ringling. A new method is now tested, after American pattern.

## Biological impacts of freshwater acidification in the Nordic countries

**Lennart Henrikson,**  
 Skogsvårdsstyrelsen (Regional Forestry Board) Västra Götaland, P.O. Box 343,  
 SE-503 11 Borås, Sweden

Acidification of freshwater ecosystems induce abiotic changes, like increased toxicity due to low pH or high content of aluminium. These changes will affect the abundance of species and the species number, the habitat structure and the availability of nutrients or food. Biotic mechanisms, i.e. predation and competition will be altered. The interaction among the structural changes and mechanisms, which will give a "new" community structure which will alter the function of the ecosystem.



## Update on the Wetland International Diver/Loon Specialist Group.

**Joseph Kerekes**, Canadian Wildlife Service, Environment Canada, Dartmouth, Nova Scotia, Canada

The Diver/Loon Specialist Group was established in 1992. The first main objective of the SG was to facilitate communication among loon researchers world wide and to develop a co-operative network of interested diver/loon researchers and managers. For this objective the first Newsletter was produced in 1977, along with a Members Directory to maintain a mailing list on a world wide basis. The Directory includes the name, address and research/management interest of members.

Example:

**Eriksson, Mats O. G.**

MK Natur- och Miljökonsult, Tommered 6483

SE-437 92 Lindome  
Sweden

**Tel:** +46 31 94 87 91

**Fax:** +46 3194 87 91

**Email:** mke.eriksson@swipnet.se

### Research and management interests

Monitoring of *Gavia arctica* and *G. stellata* in Sweden. Ecology and exposure to metals in freshwater affected of acidification.

The scientific workshops are the major media of communication among members of the D/L Specialist Group. The first such workshop was held during the North American Lake Management Society Annual Meeting "Aquatic Ecosystem Stewardship" in Toronto, Ontario, Canada, November, 1995. A full day session, "Loons, Status, Management and Research" attracted participants from Canada, United States and Sweden. There were oral and

poster presentations on loons. The abstracts were published in the Journal of Lake and Reservoir Management (1995). These abstracts were also reprinted in the first Diver/Loon Specialist Group Newsletter.

A session, "Common Loons", was held during the annual meeting of the Society of Canadian Ornithologists, Fredericton, New Brunswick, Canada, August, 1996. The abstracts of the session were published in the society's newsletter (Picoides 9).

A symposium, "Loons: Old History and New Findings" was held during the American Ornithologists' Union Meeting, in Minneapolis, Minnesota, USA, August, 1997. The abstracts of the papers presented were included in the second Newsletter of the Diver/Loon Specialist Group

?? (<http://www.briloon.org/Diver.html>).

The Proceedings of this symposium will be published by the North American Loon Fund ??

(<http://www.uww.edu/biology/nalf/ANalfHOMEPAGE.HTML>). Our Specialist Group maintains close contact with the Scientific Committee of the North American Loon Fund, a nonprofit conservation organization, dedicated to the preservation of the loon in North America.

Members of the Specialist Group completed the first draft of status reports of four loon species (Common Loon, Yellow-billed Loon, Red-throated Loon and Pacific Loon) for COSEWIC, the Committee on the Status of Endangered Wildlife in Canada. When finalized and published, these status reports could be used for Action Plans and Management Plans for these species.

The Diver/Loon Specialist group provides input to improve the Wetlands International world loon population estimates since 1993. For more information concerning Wetlands

International, see:

?? <http://www.wetlands.agro.nl>.

## Loons from a limnologist's perspective.

**Joseph Kerekes**, *Canadian Wildlife Service, Environment Canada, Dartmouth, Nova Scotia, Canada*

Palmgren (1936), more than 60 years ago, quite successfully related the trophic state of lakes (e.g. eutrophic, oligotrophic), based on the contemporary concept of Thieneman, Nauman and Järenfelt, to bird communities, which included loons and their abundance in some 60 waterbodies in Åland, Finland. This pioneering work, although noted by many, was not followed up and was not developed further. Lakes were considered as microcosm, each lake had to be understood on its own. Waterbirds, such as loons, were not included in limnological considerations. The introduction of the nutrient loading concept (Vollenweider 1976) and the consequent development of the nutrient-trophic response relationships such as phosphorus vs. chlorophyll, zooplankton, benthos and fish (Oglesby 1977, Vollenweider and Kerekes 1980, Yan 1986, Schell and Kerekes 1989) changed that. Considering these relationships and the amount of fish Common Loon (*Gavia immer*) require to raise their young, Kerekes (1990) suggested that the phosphorus supply controls the lake size (surface area) that is required for loons to breed successfully. It was shown subsequently that in eutrophic lakes, high in phosphorus concentration and fish production in northern Alberta, Canada, loons may breed successfully in lakes as small as four hectares (Gringas 1997). By contrast in oligotrophic lakes such as those in Nova Scotia, Canada, the requirement to raise a loon chick successfully is  $\geq 40$  ha (Kerekes et al 1994). In very unproductive

ultra-oligotrophic lakes (e.g. Newfoundland) a loon pair may need a lake  $\geq 100$  ha, or several smaller lakes for successful breeding (Kerekes et al 1999). Smaller lakes may support breeding loons if located close to the sea or near to larger lakes where the adult birds can fly to forage (Clay and Clay 1997; Kerekes et al 1999). Hoyer and Canfield (1994) explored the relationship between waterbird biomass and total phosphorus in lakes in Florida. It appears that a good empirical relationship could be developed to estimate the potential waterbird biomass that bodies of water can support. It is a "potential" relationship because of the possible modifying effects of birds' mobility, the relative abundance of wetland in relation to dry land and the juxtaposition of the wetlands. Birds may be absent on the account of disturbance or more numerous than that the body of water can support, because of their ability to feed elsewhere.

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## Loon population monitoring on a voluntarily basis in North America.

*Joseph Kerekes, Canadian Wildlife Service, Environment Canada, Dartmouth, Nova Scotia, Canada*

Volunteer monitoring of loon population was prompted by the obvious decline of local Common Loon populations in the Northern States bordering Canada. These areas are on the southern extremities of the distribution of this species in North America. Voluntarily loon monitoring goes back to 1976 in New Hampshire with the formation of a loon protection group. Similar groups were formed in several states, including Alaska and Canada. Two loon conferences were held in 1977 and 1979 with participation from various loon organizations, managers and loon researchers. There it became obvious that an organization was needed to serve as a clearinghouse for information on research and management in North America. This led to the formation of the North American Loon Fund (NALF) in December 1979. One of its principal instigators, Rawson Wood served as its first chairman for nine years. During the following years NALF developed an Annual Research Grants Program in support of research, education and management projects. NALF produced a host of loon education materials promoting loon preservation, available for schools, organizations and individuals. A list was developed of existing "Threats to Loons" with suggestions as how individuals could help "How You Can Help" as an individual. The annual members meeting

provides a forum for direct communication among members and some 19 affiliate loon organizations. During these meetings the results of annual loon population monitoring in different areas, done by volunteers, is reported. Several thousand persons are involved annually, mobilized by the affiliate loon organizations, in loon monitoring and protection activities as well as attending loon festivals. For more information about NALF see:

<http://www.uww.edu/biology/nalf/ANalfHOMEPAGE.HTML> ??????.

### **Abundance and distribution of fish-eating birds (1988 - 1995) in Kejimikujik National Park, Nova Scotia, Canada.**

**Kerekes, J., M. Duggan, R. Tordon, G. Boros, D. Bates and M. Bronkhorst.**  
Canadian Wildlife Service, Canadian Wildlife Service, Environment Canada, Dartmouth, Nova Scotia, Canada  
(Poster presentation)

The seven year breeding data obtained, starting in 1988 (except in 1991) in Kejimikujik National Park (385 km<sup>2</sup>), confirmed that the successful breeding of fish-eating birds such as the Common Loon (*Gavia immer*) and the Common Merganser (*Mergus merganser*) is controlled by the amount of fish available in a lake (Kerekes *et al.* 1994). At least 20 hectares of surface area is required in the oligotrophic lakes in the park to provide enough fish to support a residential pair of loons, ≥40 hectares are needed to support the breeding of either the Common Loon or Common Merganser, and ≥80 hectares are required to support two or more either of these two species of their combinations. The 7 years of breeding data shows that the number of residential loon pairs remain stable (~39 pairs) while the number of chicks fledged may vary

considerably from year to year (average 11.1, range 5 to 18). A large portion of the young non breeding population spend their summer in the ocean nearby (40 to 60 km in two directions). This seems to ensure that even marginal territories in these lakes are soon filled when they become vacant. On most of the small lakes (<40 ha) no attempt of breeding occurred. This may give a partial explanation of the low ratio (0.28) of loon chick/residential pair in Kejimikujik, compared to other more continental populations (>0.5) distant from the ocean. Some of the year to year fluctuations in breeding success of loons may be the result of changes in water levels during the nesting period, but other factors such as Black-backed Gull predation and human disturbance are suspected.

### **Are the divers affected of mercury and organochlorines? – analyses of eggs of Red-throated Diver and Black-throated Diver in Sweden**

**Peter Lindberg**, University of Göteborg, Department of Zoology, P.O. Box 463, SE-405 30 Göteborg, Sweden  
**Mats O.G. Eriksson**, MK Natur- och Miljökonsult, Tommered 6483, SE-437 92 Lindome, Sweden

Black-throated and Red-throated Diver can both be used as indicators of the pollutant status in limnic environments. Pesticide analyses of eggs reflect the female intake of pollutants the time before egg-laying. In the period 1981-1997 we collected and analysed 28 eggs from black-throated Diver and 17 eggs from Red-throated Diver on mercury and organochlorines.

Fish in acidified have increased levels of mercury. Eggs from Red-throated Diver in

an acidified area in SW Sweden had significant higher levels of mercury (mean 7.0 ug/g d.w.) than divers breeding in central Sweden (mean 2.7 ug/g d.w.). Black-throated divers breeding in SW Sweden had less mercury (mean 2 ug/g) than Red-throated in the same area. This is probably due to a different food-choice between the two diver species.

Elevated levels of DDE and PCBs are found in both species. In a long term monitoring study conducted by the Swedish Environment Protection Board the sum DDT's in pike has decreased since the 1970s. This positive trend is contradicted by the results of this study, with significant increased DDE-levels among divers during the last three years. This result might be related to recent findings of decreased fat content, and thus increased levels of toxic elements on fat weight basis among pike from Swedish lakes. Increased DDE-levels means thinner egg-shells giving reproduction failures. We think it is important to continue the monitoring of mercury and organochlorines in divers.

### **Lake Fegen and breeding Black-throated Divers – consequences of water-level regulation and outdoor life.**

**Peter Lindberg**, University of Göteborg, Department of Zoology, P.O. Box 463, SE-405 30 Göteborg, Sweden  
**Thomas Dahlgren**, Box 52, SE-3001 06 Heberg, Sweden

The lake system Fegen in SW Sweden has a population of 25 pairs Black-throated Divers of which ca 80% breed each year. Total lake-area is 33.7 km<sup>2</sup> and the lake have 118 islands/islets of which 48% are within bird protection areas. The lake is regulated with an amplitude of 1.75. Many of the nests were earlier destroyed by

increased water levels but since 1997 the water level is stable. Divers nests are on average situated 40 cm from wateredge and the eggs 7.5 cm above water level. Increased outdoor activities such as canoeing are the main reason for breeding failures. The Hooded crow is the most important nest predator.

The diver population has been monitored since beginning of 1970s. The distribution of the diver-territories has not changed much during this period. About 50% of the breedings failed, especially close to canoe-routes. A restricted number of territories produced most of the young. Average reproduction is low varying between 0,3-0,6 young/breeding pair. Divers breeding within bird protection areas had better success. Population size has not changed since the 1970:s. High survival among breeding birds can be one explanation.

### **Twenty-one years with a Common Loon population in North America: What can one long-term study tell us?**

**Judith W. McIntyre**, Utica College, 1600 Burrstone Road, Utica, NY 13502, USA

This report details the annual productivity between 1977-1998 of a Common Loon (*Gavia immer*) population on the Stillwater Reservoir in the New York Adirondack Park. During that time there were 10 to 16 territorial pairs in any one season and an overall productivity of 0.522 fledged young per territorial pair as calculated using the total 289 pairs and 151 fledged young over 21 years.

Annual productivity varied extensively, from .071 to 1.07, and productivity crashes in two years were caused by late season nest wash-outs. Overall, there was a slight, but

not significant, decline in productivity between 1977-1998. Data were re-calculated to simulate 3-year and 5-year studies, and to simulate periodic surveys made at 5-year intervals. The first two modifications represented the three and five-year durations of many graduate student research projects, and the latter three emulated periodic government surveys. In no cases did results compare to those secured through surveys made every year throughout the entire breeding season, and varied so greatly that some suggested productivity had crashed, while other calculations said there had been a small increase over the same length of time. Graphs of theoretical results will be shown and compared with data for every year to illustrate the value of long-term systematic, annual records compared to periodic or short-term findings.

## Ringling Rain Geese in Shetland

*J. David Okill, Helinabretta, Trondra, Shetland ZE1 0XL, UK*

The bulk of the Red-throated Diver (RTD) population in Britain is concentrated in the North Isles, although pairs are scattered through the north-west of Scotland and the Western Isles, with a handful in Ireland. Food for chicks carried from sea.

Catching methods and ringling techniques have been successfully developed in Shetland, and ringling has progressed in last 20 years. From study areas for annual survey of numbers of successful pairs, we now have information on use of different sizes of lochs, and movement of chicks from one loch to another. Success differs for lochs of different sizes, small lochs being more successful than large lochs (conservation implications). Good/poor success in study areas and possible reasons for this will be reviewed, e.g. proportions of

1chick broods : 2 chick broods with years with high/low broods of two compared.

All British RTD recoveries are birds from studies in North Isles. Fishing netting being by far the most important recovery method (conservation implications). Peak of recoveries in summer (perhaps greater contact with humans) and in winter (may be associated with poor weather and moult). Colour rings used, to try to gauge age of first breeding. – All birds move south for the winter, recoveries widely distributed around coast with a lot of birds wintering in the wide bays and sea lochs of Ireland and the west coast of Scotland (conservation implications). First year birds move furthest from natal area, some as far south as central France. About a third of the immatures return to the Northern Isles in their first year, two-thirds in their second and all return for their third summer. Birds attain breeding plumage, even in first summer. – Foreign ringed birds have come from Greenland (east and west coasts) and Scandinavia. Most recoveries of these foreign ringed birds are from the SE of Britain - perhaps this is part of the large southern North Sea wintering population

Four birds, all males, have been caught bridge in their fourth year, whilst females have been trapper breeding in their sixth; this is the best indication of the age of first breeding.

Natal dispersal of breeding adults differ from males to females (sexes can be separated from on measurements). Males return to breed very close to natal loch, females are much more widely distributed (recent report of a Shetland female breeding in Orkney, conservation implications). Established breeding birds return to same loch, when birds do move lochs it is only to the adjacent site (conservation implications).

## **The non-breeding habitats of Red-throated and Black-throated Divers (*Gavia stellata* / *arctica*) in western Europe**

**Henrik Skov & Jan Durinck**, *Ornis Consult A/S, Vesterbrogade 140, DK-1620 København, Denmark*

Recent research and survey activities in the North Sea and the Baltic Sea have expanded the knowledge of the habitats of wintering Red-throated and Black-throated Divers in western Europe. As both species have small biogeographic populations and suffer general declines over large parts of their breeding ranges, the identification of important wintering habitats has become a conservation priority. Based on models for coarse scale habitat associations of divers combining fine-scale field data, optical remote sensing data and hydrographical data, it is shown that low-saline estuarine water masses form the key marine habitat for these divers. As estuarine water masses carry high loads of anthropogenic substances as compared to more pelagic water masses, the findings throw light on the potential environmental stress that may be imposed on these species during their stay at temperate latitudes.

## **Management implication of factors affecting Loon reproductive success in Ontario, Canada**

**Merilyn P. Twiss**, *Southcentral Sciences Section, Ministry of Natural resources, 3301 Trout Lake Road, North Bay, Ontario, P1A 4L7, Canada*

**David F. Hackett**, *Nipissing University, Box 5002, 100 College Drive, North Bay, Ontario, P1B 8L7, Canada*

The common loon (*Gavia immer*) has been designated as Ontario's avian emblem, and is a symbol of wilderness and healthy environments for many people. Despite this, little has been done to protect loon populations and nesting habitats in Ontario. Loon surveys conducted in central Ontario from 1990 to 1993 indicated that loons were present on many lakes, but that some pairs were not successfully producing chicks. A sub-set of 31 lakes ranging in size from 121 ha. to 1212 ha. was selected for more intensive study. These lakes were monitored throughout the breeding season in 1994 and 1995. Loon territories were mapped, nests were located, and habitat parameters of nest sites were recorded. Number of eggs laid and chicks hatched per nest were monitored. Whenever possible, reasons for nest abandonment or loss of eggs or chicks were determined. Other lake characteristics such as water chemistry, shoreline development, water clarity, boat traffic and water level fluctuations were assessed. Of 88 territories monitored in 1994, 24 territories produced a total of 34 chicks. Of 117 territories monitored in 1995, 40 territories produced a total of 53 chicks. Suitable nesting habitat had been lost on many lakes due to shoreline development. Disturbance by people, dogs, and boats also contributed to failure of some nest attempts. Changes in water levels resulted in some nests being flooded out, or exposed to predators when water levels dropped. Experiments with artificial nest platforms showed that the platforms were of use where suitable nesting habitat was limited. The platforms were not effective where good nesting habitat was available on lakes affected by water level fluctuations, as loons continued to select natural sites, only to have their nests flooded or stranded when water levels changed. Recommended management actions include the following: increased

public education efforts, development of partnerships with lake associations or conservation groups to promote education about loons and protection of nest sites; establishment of agreements with water regulatory agencies such as Ontario Hydro to control water level fluctuations; increased monitoring to map nest sites; preparation of habitat management guidelines for use in plan input and review processes; use of zoning restrictions under the Planning Act to limit shoreline development near nest sites; and installation of loon artificial nest platforms where suitable natural nest sites are limited.

## Prevention of lead toxicosis in Canadian Loon populations

**Merilyn P. Twiss**, *Southcentral Sciences Section, Ministry of Natural resources, 3301 Trout Lake Road, North Bay, Ontario, P1A 4L7, Canada*  
**Vernon G. Thomas**, *Department of Zoology, University of Guelph, Guelph, Ontario, N1TG 2W1, Canada*

Loons are vulnerable to lead toxicosis resulting from ingestion of fishing sinkers. Of 215 dead common loons (*Gavia immer*) collected in Canadian waters, 23% died of lead poisoning, mainly in Ontario. Suitable non-toxic substitutes for lead fishing sinkers are available. Regulations could be enacted under either federal or provincial legislation to prevent the use of lead fishing weights. In 1997, the Canadian government banned the use of lead fishing weights in National Parks and National Wildlife Areas. The majority of loon mortalities occur outside these protected areas, however, and there has been little action to address the problem elsewhere in the country. This is in part because of confusion over which level of government, and which government agency, has jurisdiction. In addition, there has not

been enough pressure exerted by the public, and by interest groups, to encourage governments to take action. A survey of principal interest groups and organisations in Canada and Ontario indicated that most were aware of the problem, and would support action to address the issue. Mechanisms must be developed to unite these groups in a common approach seeking action to solve the problem. Precedents have been set in other jurisdictions, and these can be used as an example for action in Canada. Both federal and provincial governments in Canada have a role to play in resolving this issue. A suitable approach would include continuation of education initiatives encouraging anglers to voluntarily switch to non-toxic alternatives for lead weights. This could be followed by a ban on the use of lead weights in provincial parks and wildlife or wilderness areas. The last step in addressing the problem would be a nation-wide ban on the use of lead fishing weights. This will not occur without further efforts by interest groups to bring the problem to the attention of politicians.

The Wetlands International Diver/Loon Specialist Group Newsletter is co-edited by Joseph Kerekes, Canadian Wildlife Service and Dave Evers of the private research group, BioDiversity, Inc. Send all correspondence or articles for submission to: Joseph Kerekes, Environment Canada, 45 Alderney Drive, Dartmouth N.S., B2Y 2N6, Canada, (902) 426-6356, Fax: (902) 426-4457, E-mail: [joe.kerekes@ec.gc.ca](mailto:joe.kerekes@ec.gc.ca)

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