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Dark-eyed Junco - Garibaldi Park, B.C., August 1998
(photo by Steve Ogle)

[Our first B.C. cover picture, to accompany reports on our first B.C. Conference - see pp. 2-23]

Society of Canadian Ornithologists Société des Ornithologistes du Canada

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M. Ross Lein (1982-85), Spencer G. Sealy (1986-87), Erica H. Dunn (1988-89), Jon C. Barlow (1990-91), J. Bruce Falls (1992-93), Henri R. Ouellet (1994-95), David N. Nettleship (1996-97).

1999 SCIENTIFIC AND ANNUAL GENERAL MEETING "THE SCIENCE OF SAVING BIRD SPECIES" MCGILL UNIVERSITY, MONTREAL, QUÉBEC

The S.C.O. is delighted to announce that the 1999 meeting will be held at McGill University, Montréal, 4-6 August. The symposium focus of endangered species is expected to attract many excellent speakers and to provide the core of an S.C.O. publication. Organizers can provide opportunities for meetings of special interest groups before the S.C.O. meeting but need to be informed early.

Further details will be provided in the spring *Picoides* and *Ornithological Newsletter*. Meanwhile, mark these dates in your calendar and plan to be there.

For further information, please contact

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PRESIDENT'S MESSAGE

Those of you who were unable to make the Vancouver Meeting missed a fine series of talks, and also some excellent field trips and remarkable weather. I was lucky enough to find a place on the Gulf Islands trip that explored the seas around Mandarte Island and spent several hours ashore on Sidney Island, field site for the work described in Rob Butler's fine book *The Great Blue Heron*. This was a priceless opportunity to visit some field sites famous in Canadian ornithology as well as to see some remarkable birds that we easterners only read of. To see a tight pack of 50+ Rhinoceros Auklets diving almost in unison, and many scattered pairs of Marbled Murrelets, in the same day was a truly memorable experience. The two days of talks were rounded off by a fine banquet in an incredible setting overlooking Vancouver; the presentation of awards culminated in the revelation that Jamie Smith's trademark Scottish accent is really an affectation - he does know how to speak in a proper English accent!

The fun component of any meeting is important, but we also made some changes to the Society that move us forward. We agreed to join the Ornithological Council, which will host a Web site for us, and are looking for volunteers to set up that Web site. To help us launch a journal in the near future we increased membership fees, but took care to establish a student

rate that will ensure there is no financial barrier to younger ornithologists joining the Society. We also have been very fortunate to secure the enthusiastic agreement of members in Québec, notably Gilles Seutin and Jean-Pierre Savard, to host next year's meeting in Montréal. We hope that the theme of Endangered Species, and the location, will attract not only sponsors and a high quality of papers, but an increased attendance by members.

In view of the increased importance of the Annual Meeting to the Society, your Council has established a Meetings Committee which will be chaired by the President and will include the organizers of the previous meeting and the next, to maintain continuity and ensure that hard lessons of meeting organization learnt by one set of organizers do not have to be re-learned by the next.

I repeat my challenge to you all to recruit at least two new members by the end of the year. We all know active ornithologists who are not S.C.O. members but have a lot to contribute to the Society. To build on our increasing commitment to annual meetings, publications, and membership in the wider North American ornithological community, we MUST increase our membership and the revenues it brings - so please get out there and recruit!

**17th ANNUAL MEETING and 3rd CONFERENCE
of the
SOCIETY OF CANADIAN ORNITHOLOGISTS**

University of British Columbia, Vancouver, B.C.

1-4 August 1998

Scientific Program

K. Martin & D. Lank (Co-Chairs)

MONDAY, 3 AUGUST 1998 (H.R. MacMillan Bldg., rm.166)

SYMPOSIUM - NEW HORIZONS IN ORNITHOLOGY (chair: K. Martin)

- 0905-0945 Using stable isotope measurement in ornithological research: on the benefits of crossing discipline boundaries - K.A. Hobson
0945-1025 Physiological approaches to avian studies: opportunities and obstacles - T.D. Williams
[1025-1055 Coffee break]
1055-1135 Songbird population dynamics: adding space to time - J.N.M. Smith
1135-1215 Future landscapes in ornithological research - A.W. Diamond; response by F. Cooke
[1215-1330 Lunch break]

ORAL PAPER SESSION - Physiology and Migration (chair: R. Butler)

- 1330-1350 Using daily mass gain to compare quality of stopover sites for Magnolia Warblers - E. Dunn
1350-1410 Endogenous control of body mass in Western Sandpipers wintering in Panama - P.D. O'Hara & F.S. Delgado
1410-1430 Physiological and biochemical modulation for migration in Western Sandpipers; clues to behavioural strategy - C.G. Guglielmo, T.D. Williams and O. Egeler

POSTER SESSION (H.R. MacMillan Bldg., rm.160)

- 1430-1530 Posters (Authors present for discussion; see abstracts for titles & authors)
[and Coffee break]

ORAL PAPER SESSION - Forest Birds in Managed Landscapes (chair: J.-P. Savard)

- 1530-1550 Predation on cavity nests in the boreal mixedwood forest: effects of location in a harvested landscape - J.P. Pierre & C.A. Paszkowski
1550-1610 Landscape connectivity and its effect on the population processes of Spruce Grouse - S. Harrison

1610-1800 ANNUAL GENERAL BUSINESS MEETING

[1800- "Dispersal & foraging" (activities, not a session!)]

THURSDAY, 4 AUGUST

0900-1000 THE DORIS HUESTIS SPEIRS AWARD

- presentation by D.N. Nettleship (past-president, S.C.O.).

The 1998 Award was presented to **Dr. Ian McTaggart-Cowan**, Dean Emeritus (Graduate Studies) and Professor of Zoology (Retired) of University of British Columbia, for his outstanding contributions to Canadian ornithology. Dr. McTaggart-Cowan gave a short address following the presentation of the Award (see below - Speirs Lecture).

1000-1030 Posters
[and Coffee break]

ORAL PAPER SESSION - SEABIRD AND LANDBIRD CONSERVATION (chair: E. Nol)

- 1030-1050 The nest success and characteristics of 23 Marbled Murrelet nests located by radio telemetry - L.W. Lougheed
[also given as a poster presentation]
- 1050-1110 Preliminary analysis of winter distribution of the Razorbill, *Alca torda*, and auk assemblages in the lower Bay of Fundy, New Brunswick - F. Huettmann, T. Diamond, K. MacIntosh, B. Dalzell, T. Lock, D. Nettleship
- 1110-1130 Prioritizing landbird species for conservation in the Georgia Basin - W. Easton & K. Moore
- 1130-1150 Are peatlands important in the southern Québec landscape? The point of view of birds - S. Calmé, A. Desrochers, J.-P.L. Savard
[1150-1330 Lunch break]

ORAL PAPER SESSION - REPRODUCTIVE BIOLOGY (chair: N. Mahoney)

- 1330-1350 Sources of intraclutch egg-size variation in the Common Tern - D.J. Moore and G.J. Robertson
- 1350-1410 Productivity and survival of Willets and Marbled Godwits - C.L. Gratto-Trevor
- 1410-1430 A test of the cowbird predation hypothesis for two frequently parasitized hosts at Delta Marsh, MB - C. McLaren & S.G. Sealy
- 1430-1450 The effects of long-term removal of Brown-headed Cowbirds on communities of breeding songbirds - K.L. DeGroot
- 1450-1510 Avian brood parasitism - A. Lindholm
[1510-1540 Coffee break]

ORAL PAPER SESSION - THE BIOLOGY OF WATERBIRDS (chair: A. Lindholm)

- 1540-1600 New horizons in ornithology: satellite tracking of Barrow's Goldeneye in eastern North America - M. Robert & J.-P.L. Savard
- 1600-1620 Long-term pair bonds in Harlequin Ducks - C. Smith, F. Cooke, G.J. Robertson, R.I. Goudie, W.S. Boyd
- 1620-1640 The effect of body condition and duckling survival on adult female crèche attendance in Common Eiders (*Somateria mollissima*) - K. Mawhinney & T. Diamond
- 1640-1700 Behaviorally dimorphic male Ruffs have extremely long, but monomorphic, sperm - D.B. Lank, B. Crawford, C. Croton

ABSTRACTS

Are peatlands important in the southern Québec landscape? The point of view of birds. Calmé, Sophie, André Desrochers (Cen. Rech. Biol. For., Univ. Laval, Ste-Foy, Qué. G1K 7P4) and Jean-Pierre L. Savard (Can. Wildl. Serv., Québec reg., Ste-Foy, Qué. G1V 4H5) (SC: aac872@agora.ulaval.ca)

Peatland bird assemblages in southern Québec are made of a unique blend of forest, agricultural and wetland species. But do peatland bird assemblages on a given location differ from those found in surrounding habitats? Do the birds view peatlands as discontinuities in the landscape or are peatlands "contaminated" by birds from the surroundings? To address these questions, we sampled during one breeding season 112 peatlands distributed along the St. Lawrence river. We then

used the Atlas of Birds breeding in Québec and compared peatland bird assemblages to the species list of neighbouring 10x10 breeding bird atlas squares. Also, for a subsample of 23 peatlands, we characterized from satellite imagery the surrounding landscape for radius of 2 and 5 km. We then compared peatland birds occurrence according to the types and amounts of habitats surrounding the peatlands for both distances radius. Some bird species consistently preferred peatlands throughout the study area, but the presence of other species appeared to be more regional. The occurrence of Palm Warbler (*Dendroica palmarum*), a peatland specialist, depended strongly on the availability of peatlands, stressing the importance of conserving peatlands for the maintenance of this species' populations. Peatlands

enhanced both the local and regional bird diversity of southern Québec.

The effects of long-term removal of Brown-headed Cowbirds on communities of breeding songbirds. *De Groot, K.L.* (Univ. Brit. Col., Dep. Zool., 6270 University Blvd., Vancouver, B.C., V6T 1Z4; degroot@zoology.ubc.ca)

Removal of the brood-parasitic Brown-headed Cowbird (*Molothrus ater*) has been increasingly employed as a management tool to protect songbird populations. Cowbirds have been removed annually from the breeding grounds of the endangered Kirtland's Warbler (*Dendroica kirtlandii*) in the jack-pine forests of Northern Michigan since 1972. Long-term cowbird removal provides an experimental context to test the hypothesis that cowbirds alter the composition of songbird communities through intense nest parasitism of suitable host species. Cowbird pressure on host species may reduce abundance of suitable host populations, relative to the abundance of host species with which the cowbird does not interact strongly, e.g., species that have evolved egg ejection. In 1996 and 1997, I compared songbird abundance and species composition in Northern Michigan where cowbirds had been removed for 5-11 years, to carefully matched habitats where there had been no recent cowbird removal. As predicted, communities at cowbird removal sites had a higher percentage of suitable hosts in the community relative to control sites at least >5 km from cowbird traps. The proportion of suitable hosts present in control sites >10 km from cowbird traps did not increase significantly from sites at intermediate distance (>5 km) from cowbird traps. This occurred despite higher cowbird densities at the more distant control sites. However, cowbird numbers were low even on control sites >10 km from cowbird traps. Mean cowbird abundance detected during ten-minute point counts on these sites was 0.174 cowbird females and 0.583 males per count station. A greater shift in community composition may be more likely in areas that support higher cowbird densities.

Future landscapes in ornithological research. *Diamond, Antony W.* (Atl. Coop. Wildl. Ecol. Res. Netw. [ACWERN], Univ. New Bruns., P.O. Box 45111, Fredericton, N.B. E3B 6E1; diamond@unb.ca)

There is an exciting resurgence of bird research in Canada, in universities, government, and private organisations such as the Delta Waterfowl Foundation and the Institute for Waterfowl and Wetland Research. A characteristic of the current scene is the proliferation of partnerships between sectors which have traditionally been more clearly separate. The Wildlife Chairs established on the west and east coasts are recent and innovative examples of such partnerships. They are challenging traditional approaches by all the partners involved and have great potential to provide 'hybrid

vigour' to the research community and to break down barriers which still hinder creative research. A common difficulty that will likely continue is to maintain long-term high-quality research on focal populations, places or problems, in the face of national changes in priorities; how can bird research capitalize on potential opportunities offered by internationally-driven issues such as global change and biodiversity conservation? Can we maintain credibility and integrity if we jump from one band-wagon to the next? I sketch some personal views on the directions that bird research is likely to take as traditionally separate agendas are increasingly challenged to focus on common objectives, as science responds to increasing public pressure to help solve problems of the planet.

Effects of timber harvesting on songbirds in British Columbia's high-elevation forests. *Dickinson, Thomas E., Ernest Leupin, and Nancy J. Flood* (Dept. Biol. Sci., Univ. Coll. Cariboo, Kamloops, B.C. V2C 5N3; (TD) tdickinson@cariboo.bc.ca) [POSTER PAPER]

Numerous studies have shown that harvesting activities can have dramatic effects on the diversity and abundance of songbirds in forested ecosystems. Yet it has often proven difficult to identify the particular feature of forest development (habitat loss, fragmentation, etc.) that has had the greatest impact. This paper presents results of a controlled experiment in which one factor (opening size) was systematically varied using four treatment (10 ha, 1 ha, 0.1 ha, and selection cutting) and control areas in a high-elevation forest near Sicamous B.C. When pre- and post-harvest inventories were compared, several significant differences were evident. Resident species (e.g. Red-breasted Nuthatches *Sitta canadensis*) and short-distance migrants (e.g. Golden-crowned Kinglets *Regulus satrapa*) were more strongly affected by harvesting activities than were other groups. Certain species were affected most in the forest immediately adjacent to experimental openings, whereas others were more uniformly affected across the entire 2000-ha experimental area.

Using daily mass gain to compare quality of stopover sites for Magnolia Warblers. *Dunn, Erica* (Can. Wildl. Serv., 100 Gamelin Blvd., Hull, PQ K1A 0H3; Erica.Dunn@ec.gc.ca)

Whether or not migrants gain mass at a stopover site is a direct measure of site quality. Previous studies have shown that mass gain of retrapped birds may not be representative, and regressing mass at first capture (corrected for body size) on hour of day generally gives higher estimates of mass gain. I used multiple regression to examine the effects on mass, of wing length, date in season, hour of day, and various interaction variables, for Magnolia Warblers (*Dendroica magnolia*) at 3 sites on Long Point, Ontario.

Results showed that a) using mass as the dependent variable is preferable to using size-corrected mass; b) mass gain varies with date in the season and among years; c) on average, mass gain at the 3 Long Point sites is sufficient for net gain over 24-hrs in fall, but only at 2 of 3 sites in spring. If we had similar information on many more stopover sites, we could learn the effects on site quality of habitat type, patch size and geographic location, all important for making decisions on conservation of habitat for migrants.

Prioritizing landbird species for conservation in the Georgia Basin. *Easton, Wendy E., and Kathleen Moore* (Can. Wildl. Serv., Delta, BC V4K 3N2; (WE) wendy.easton@ec.gc.ca)

We evaluated the seasonal status and habitats of landbird species within the Georgia Basin. To assess the vulnerability of each landbird species to declines in their populations, we considered their population trends, distributions, risks of habitat loss, and flexibility in their use of resources. Of the 145 native, regularly occurring landbird species in the Georgia Basin, most species have resident individuals (95), many are Neotropical migrants (34), and some are short-distance migrants (16). Of the 95 species with resident individuals, 42 of these species are usually migratory when they reside outside of the Georgia Basin. Habitats within the Georgia Basin support a high diversity of BC's landbird species during winter and migratory periods. Most species with a high concern use forested (riparian, mature coniferous, Garry Oak *Quercus garryana*) or field/ grassland habitats. Few patches of old coniferous forest (>140 years) remain in lowlands. Lowland agricultural/grassland habitats cover <3% of the Georgia Basin and are threatened by urbanization and the construction of greenhouses. Several species of high concern are vulnerable to human disturbance, parasitism from Brown-headed Cowbirds (*Molothrus ater*), predation by edge and exotic species, loss of large habitat patches and snags.

Development of statistical methods and multimedia tools to aid in the comparison of oil samples. *El-Shaarawi, Abdel, Geoff Howell, Art Cook, Tom Pollock and Peter Hennigar* (Envir. Canada. 45 Alderney Dr., Dartmouth, N.S. B2Y 2N6 [POSTER PAPER])

The ocean off the east coast of Canada is, in a very real sense, the crossroads of the western North Atlantic. At all times of the year, there is heavy shipping traffic sharing the habitat of a large number (>40 million) of pelagic seabirds. The effects of even a small amount of oil being discharged from ocean-going vessels can be devastating to pelagic seabirds. Monitoring of beaches along the south coast of Newfoundland indicates that tens of thousands of seabirds, principally puffins, Razorbills and murres, are killed by oil

discharges each year. In an effort to protect seabirds from chronic and acute discharges of oil, Canada has begun to enhance enforcement activities in the critical seabird habitat areas of the North Atlantic. An integral part of this effort is the development of visual exploration tools and statistical methods that can be used to compare samples from suspect vessels with samples recovered from the environment (i.e. oil slicks, beaches, and seabird carcasses). An interactive multimedia application has been developed which imports analytical results from the gas chromatograph and allows the user to interactively compare fragmentograms of selected samples. This application also reformats the data into a matrix form, suitable for use in a statistical package. A number of statistical methods were evaluated with the goal of developing suitable methods to group oil samples and to quantify the probability that individual samples are related to each other.

Productivity and survival of Willets and Marbled Godwits. *Gratto-Trevor, Cheri L.* (Can. Wildl. Serv., Env. Canada, 115 Perimeter Road, Saskatoon, SK S7N 0X4; cheri.gratto-trevor@ec.gc.ca)

Historic and ongoing habitat loss and environmental change have led to concern about population stability in many prairie breeding species, including shorebirds. Western Willets (*Catoptrophorus semipalmatus inornatus*) and Marbled Godwits (*Limosa fedoa*) are large sandpipers that have been very little studied on their prairie breeding grounds. I present preliminary estimates of productivity and survival for marked populations of Willets and Marbled Godwits from 1995 to 1998 in southern Alberta. Nest success varied from 44 to 81% between 1995 and 1997. Most nest failure was due to egg loss by avian or mammalian predators. Renesting is common only if nests are lost early in the breeding season. In 1996 and 1997, 63 to 85% of willets and godwits successfully hatched nests, and 47 to 64% of pairs with successful nests fledged at least one young. Therefore, 34 to 46% of pairs fledged at least one chick. Annual adult survival rates are upwards of 94% for godwits and at least 85% for willets. Known adult or fledgling mortality on the breeding grounds were from raptor kills or hitting powerlines.

Physiological and biochemical modulation for migration in Western Sandpipers: clues to behavioural strategy. *Guglielmo, Christopher G., Tony D. Williams and Oliver Egeler* (CWS/NSERC Wildl. Ecol. Chair, Dept. Biol. Sci., Simon Fraser Univ., Burnaby, BC V5A 1S6; cgugliel@sfu.ca)

At a tropical wintering site in Panama, only adult Western Sandpipers (*Calidris mauri*) undergo premigratory mass gain, molt into breeding plumage, and migrate north in

spring (O'Hara and Delgado, this meeting). We are studying the magnitude and sequence of changes in body composition, and muscle and liver biochemistry in these birds and those migrating through British Columbia. Before departure, adults in Panama become as heavy and fat as fully migratory birds passing through Canada several weeks later. Lean body components associated with both digestive capacity (e.g. gut, pancreas) and flight performance (e.g. pectoralis muscle and heart) are substantially larger (up to 50%) in full migrants, but do not hypertrophy during the premigratory mass gain, and do not differ from those of juveniles which do not migrate. Liver enzymes associated with fat deposition (fatty acid synthetase and Δ -9-desaturase) show the same pattern. These results indicate: 1) During premigratory fattening, adult sandpipers may not increase instantaneous feeding rate to levels experienced at migratory stop-overs, and instead may rely on behavioural mechanisms such as lowered activity or extended daily feeding time. 2) Wing loading increases without an apparent increase in muscular power output calling into question the importance of a trade-off between predation risk and fat storage (i.e. environmental variability). Alternatively, endurance flight training may be required for the hypertrophy of flight-related components and may act as a physiological constraint on the optimization of body composition.

Landscape connectivity and its effect on the population processes of Spruce Grouse. *Harrison, Scott* (Univ. Brit. Col., Cen. Appl. Cons. Biol., 852 Wellington Dr., North Vancouver, B.C. V7K 1K7; sharriso@unixg.ubc.ca)

We are studying how the level of habitat connectivity affects Spruce Grouse (*Falci pennis canadensis*) natality, mortality, juvenile dispersal, and adult movement rates. We also are investigating how hierarchies of scale affect these ecological processes and aspects of metapopulation theory. We intend to link the demographic and genetic parameters of population by tracking micro-satellites in the population of radio-tagged individuals. The study area encompasses 450 000 ha east of Prince George, British Columbia, in the sub-boreal spruce biogeoclimatic zone. The Bowron and Willow River valleys have been logged extensively in the past 30 years. The logging in some parts of the study area is a dispersed-cut with 100-300 ha clear-cuts that create a checkerboard pattern with 100 ha patches of unlogged forest. This landscape represents the "medium" connectivity treatment. In the other part of the study area, the landscape is an aggregate 55 000 ha clear-cut with 100 ha patches of forest remaining. This landscape represents the "low" connectivity treatment. Spruce Grouse are being radio-tagged, and population parameters are being measured in 8 study sites, each 100 ha.

Territory quality and reproductive performance of Black Oystercatchers in the Strait of Georgia, B.C. *Hazlitt, Stephanie L.* (Dept. Biol. Sci., Simon Fraser Univ., Burnaby, B.C. V5A 1S6; shazlitt@sfu.ca) [POSTER PAPER]

In the Strait of Georgia, Black Oystercatchers (*Haematopus bachmani*) are resident shorebirds, which defend discrete breeding territories in the rocky intertidal habitat. The objective of my study is to understand how the physical components of the habitat relate to reproductive performance of oystercatchers. As the bulk of chick provisioning is done within the territory, I expected food availability during the chick-rearing period to be the primary determinant of variation in oystercatcher fecundity. Six territory characteristics were chosen as measures of food availability, predation risk and intra-specific competition. Intertidal slope is a predictor of reproductive success (no. fledglings/no. eggs laid; $n=30$, $r^2=0.17$, $P=0.024$), with success being greater on territories with gradual slopes. Controlling for brood size, chicks grow more quickly on territories with gradual slopes ($n=22$, $r^2=0.32$, $P=0.014$). Variation in reproductive success is primarily determined by hatching success ($n=30$, $r^2=0.17$, $P=0.027$) rather than fledging success ($n=22$, $r^2=0.12$, $P=0.11$). This suggests that another mechanism acts in conjunction with food availability to determine that higher reproductive success occurs on gradual slopes. I speculate that intertidal slope may play a structural role such that gradual slopes facilitate increased vigilance by the non-incubating bird during the egg stage, and allow chicks to remain closer to foraging parents during the chick-rearing period.

Using stable isotope measurements in ornithological research: on the benefits of crossing discipline boundaries. *Hobson, Keith A.* (Can. Wildl. Serv., Envir. Canada, 115 Perimeter Rd, Saskatoon, SK, S7N 0X4; Keith.Hobson@ec.gc.ca)

The measurement of naturally occurring stable isotopes of various elements that are present in foodwebs provides a new means of tracing feeding source and trophic level of individuals. In ornithological applications, this approach has been used successfully to delineate feeding relationships among marine bird communities and to quantify relative protein inputs from terrestrial and marine sources to diets of several species. More recently, the analysis of deuterium content in feathers has been used to link breeding origins and wintering sites of neotropical migrant songbirds. Recent technological advances in mass spectrometry, in particular the advent of continuous-flow isotope ratio mass spectrometry (CFIRMS), have now made stable isotope analyses accessible to a wide range of researchers. Stable-isotope analyses in ornithological research will become routine, especially in those studies contemplating the role of

birds in ecosystems. Other applications will involve the tracing of endogenous vs. exogenous reserves to reproduction and the refinement of migration tracking through the use of several other stable isotopes. In this paper, I will provide an overview of the stable isotope technique and suggest new areas where developmental research is needed. As with all new technological advances, the challenge will be to apply the technology appropriately and to clarify those areas where further developmental research is needed. However, the development of this field over the last decade underlines some of the benefits of a multidisciplinary approach to solving ecological questions.

Seabird colony locations and environmental determination of seabird distribution: towards a seabird breeding model in the Canadian North Atlantic.

Huettmann, Falk and Tony Diamond (Atl. Coop. Wildl. Ecol. Res. Netw., Univ. New Bruns. (UNB), P.O. Box 45111, Fredericton N.B., E3B 6E1; k9wk@unb.ca) [POSTER PAPER]

The breeding season constrains movements of breeding seabirds at sea to the feeding range of their colonies. Non-breeders potentially are dispersed at sea wherever they find food; nevertheless, most of them also are found close to colonies. The locations of most major Canadian seabird colonies are well-known and we hypothesize that this is the driving force for seabird distribution in summer in the Canadian North Atlantic. This paper investigates the relevance of seabird colony proximity for seabirds at sea, based on the PIROP (Programme Intégré de recherches sur les oiseaux pélagiques) data base. 21 Environmental data sets for the marine environment from a variety of sources, grouped into biological, oceanographical and geographical factors, are used in this study. A specific foraging range is drawn around these seabird colonies, and the environmental factors are characterized and analysed for their contribution to explaining the distribution of adults, juveniles and non-breeders. Logistic regression and CART (Classification and Regression Trees) are used to explore the influence of these factors on seabird distribution. The results also allow a modelling approach, which enables an evaluation of the quality and type of seabird colonies in relation to their marine environment, potential food sources and species composition, e.g. seabird richness and colony size.

Preliminary analysis of winter distribution of the Razorbill, *Alca torda*, and auk assemblages in the lower Bay of Fundy, New Brunswick. *Huettmann, Falk, Tony Diamond and Ken MacIntosh* (Atl. Coop. Wildl. Ecol. Res. Netw., Univ. New Bruns., P.O. Box 45111, Fredericton, N.B. E3B 6E1; FH: k9wk@unb.ca, 506 452 6033), *Brian Dalzell* (Grand Manan Bird Obs., P.O. Box 179, Castalia, Grand

Manan, NB E0G 1L0), *Tony Lock* (Can. Wildl. Serv., Env. Canada, 45 Alderney Dr., Dartmouth, N.S. B3J 2S7), and *David Nettleship* (Bedford Inst. Oceanogr., Dartmouth, N.S., B2Y 4A2).

Wintering areas of Razorbills, *Alca torda*, in the Northwest Atlantic are poorly known (Chapdelaine 1997, Nettleship and Birkhead 1985). Small numbers breed at the mouth of the Bay of Fundy, perhaps a few hundred pairs at three discrete areas (Mawhinney and Sears 1996, Kress and Wheelwright pers. com.). Beginning in early winter, many Razorbills begin to appear off Grand Manan, certainly many more than can be accounted for by local breeders. Casual observations in 1992-97 indicated as many as 25,000 may be found, with 2500-5000 individuals being an average number present between December and February. We conducted standardized surveys for seabirds on 26 days between November 1997 and March 1998 on which we counted up to 53,000 auks off Grand Manan; extrapolated numbers based on identified auk observations suggest that ca. 52,000 Razorbills may have been encountered during a transect 23 January (ca.74% of the North American population); this number dropped 8 days later to 64 identified Razorbills, suggesting strong movement patterns of auks in the Gulf of Maine. Other auks and seabirds were found showing distinct patterns of occurrence, but absolute numbers fluctuated. Counting results for auks, their distribution and possible explanations are presented. A distinct core zone of auk distribution was found around the Old Proprietor Shoals.

Behaviorally dimorphic male Ruffs have extremely long, but monomorphic, sperm. *Lank, David B., Bryan Crawford and Christina Croton* (Behav. Ecol. Res. Group, Dep. Biol. Sci., Simon Fraser Univ., Burnaby, B.C. V5A 1S6; DL: dlank@sfu.ca)

Sperm tails are longer in passerine bird species with higher rates of mixed paternity, suggesting that sperm morphology adapts to rates of sperm competition (Briskie et al. 1997, *Evolution* 51: 937-945). To test whether a similar relationship might exist in other taxa, we measured sperm size in Ruffs, *Philomachus pugnax*, and compared it with existing measurements from other shorebirds. Mixed paternity rates are higher in Ruffs than in any other shorebird, with over half of female clutches containing eggs fathered by more than one male. We obtained sperm samples from 9 male Ruffs that mated with a stuffed dummy female. Ruffs have the longest sperm known for shorebirds, averaging ca.130 μ , compared with values of ca.45 μ for socially monogamous Semipalmated Sandpipers, *Calidris pusilla*, and values of ca.100 μ for polyandrous phalaropes and jacanas (Johnson & Briskie, unpubl.). Although male Ruffs come in two genetic morphs, with slightly different copulation strategies, all sperm look alike, perhaps because they compete to occupy sperm storage tubules in females.

Oiled seabirds on the east coast of Canada. *Lock, Tony, Peter Wells, Art Cook, Peter Hennigar, Geoff Howell, Doug Bliss, Dave Wilson* (Envir. Canada, 45 Alderney Dr., Dartmouth, N.S. B2Y 2N6), *Jim Osbourne* (Envir. Canada, Place Vincent Massey, Ottawa, Ont. K1A 0H3), *Terry Harvey* (DFO, St. John's, Nfld) [POSTER PAPER]

The seabirds of the continental shelf of eastern Canada are not just a national resource, they are in fact the patrimony of many nations in both hemispheres, and Canada has responsibility for them while they occupy Canadian waters. Bird numbers are often highest far offshore, out towards the edge of the continental shelf where there is enhanced productivity due to upwelling. Oil discharged in this area, far from shore, can cause major seabird mortalities. Canada is concerned that the discharge of oil and oil products in this very sensitive area could affect the long-term viability of some seabird populations. Addressing this issue requires the development of improved hazard assessment techniques, enhanced capacity to determine the minimum lethal dose of oil for seabirds, and better estimates of bird mortality at sea. In an effort to control the incidence of seabird oiling, the Government of Canada is increasing its airborne and satellite surveillance over the Grand Banks area. Where appropriate, Canada will take action to charge the vessels concerned or to forward evidence to the flag state of the vessel concerned in order to protect the seabird populations of the area. This increased surveillance and enforcement will continue as long as necessary to ensure compliance with MARPOL discharge requirements and reduce or eliminate the incidences of oiled birds in the area.

Ecological and physiological data used to study the breeding chronology of the Marbled Murrelet. *Lougheed, Cecilia, Brett A. Vanderkist and Lynn W. Lougheed* (CWS/NSERC Wildl. Ecol. Chair, Dept. Biol. Sci., Simon Fraser Univ., Burnaby, B.C. V5A 1S6; cloughee@sfu.ca) [POSTER PAPER]

Unlike other members of the alcid family that are colonial nesters, the Marbled Murrelet (*Brachyramphus marmoratus*) nests solitarily in the old-growth forest. The solitary and elusive habits of the species have made it difficult to study certain basic characteristics of its life history, such as timing of breeding. The purpose of this paper is to study the timing of breeding and construct a breeding chronology chart for the Marbled Murrelet by integrating data collected in various aspects of the breeding biology of this species at one geographical location, Desolation Sound, British Columbia. We integrate data collected at sea during surveys, physiological data from blood samples of captured birds and behaviour of individually marked birds. Data from at sea surveys capture part of the breeding season by using presence of adults holding fish and appearance of HY birds

on the water. Using plasma samples from captured birds and measuring the amount of vitellogenin zinc, a direct measurement of a yolk precursor vitellogenin (VTG), we determined dates for egg-producing females. Finally, radio-tagged birds provided information on incubation and hatching dates. This is the first joint effort to understand the breeding chronology of the Marbled Murrelet.

The nest success and characteristics of 23 Marbled Murrelet nests located by radio telemetry. *Lougheed, Lynn W.* (SFU/NSERC Wild. Ecol. Chair, Dept. Biol. Sci., Simon Fraser Univ., Burnaby, B.C. V5A 1S6; lloughea@sfu.ca) [ORAL AND POSTER PAPERS]

During early May, 1998, 40 Marbled Murrelets (*Brachyramphus marmoratus*) were captured by dip-netting in Desolation Sound, British Columbia, and marked with 1.7g radio transmitters. Of these 40 birds, 24 were tracked to 23 inland nesting locations (both adults had radios at one nest). The general locations of nests included the Powell-Daniels drainage, the Bunster Range, E. Redonda Island, and Toba Inlet. One radio was tracked to the nest of a Bald Eagle (*Haliaeetus leucocephalus*). There are 15 birds with radios that have not yet been linked to nest-sites. These birds were either consistently on the water and were not obviously breeding, or their status is unknown. The nests were all located within old-growth stands, but these stands were quite variable in tree species composition and topography. All nests that were tracked on the ground were located in trees.

Scale-dependent selectivity for cover at Marbled Murrelet nest-sites. *Manley, Irene A.* (Wildl. Ecol. Chair, Dep. Biol. Sci., Simon Fraser Univ., 8888 University Dr., Burnaby, B.C. V5A 1S6; iamanley@sfu.ca) [POSTER PAPER]

I investigated the nesting ecology of Marbled Murrelets (*Brachyramphus marmoratus*) in high-elevation coastal forests on the Sunshine Coast of southwestern British Columbia. Marbled Murrelets are a threatened species that nests in old-growth forests and has low nesting success largely due to predation. I examined nest-site selectivity at nest-patch, nest-tree and nest-site scales at 52 nests to determine how scale influences selectivity for cover. Murrelet nest-patches (0.2 ha) did not differ in total canopy cover or tree density from randomly selected non-use patches. However, nest-trees were associated with canopy gaps used by murrelets to access the nest-site. These nest-access gaps were significantly larger (158m² vs. 69m²) than other gaps available in nest-patches. Nest-patches and nest-trees had more potential nest-platforms (limbs >15cm in diameter) than non-use sites. Murrelets selected nest-sites on large mossy branches with high vertical cover. Successful nest sites were located significantly farther from forest edges

(254m vs. 79m) and closer to the tree-bole (9cm vs. 34cm) than predated nests. Cover at the nest-site and in the nest-patch did not differ between successful and predated nests. I suggest that cover was avoided at the nest-tree level because murrelets require canopy gaps adjacent to nest-trees in order to approach nests from below nest height and land at nests using a stall flight. The lack of selectivity for openings at the patch level suggests that selection for gaps at the tree level does not outweigh the need for cover at other scales. Cover at the landscape level, measured by distance to edge, has more influence on nesting success than cover measurements at smaller scales.

The effect of body condition and duckling survival on adult female crèche attendance in Common Eiders (*Somateria mollissima*) Mawhinney, K. and A.W. Diamond (Atl. Coop. Wildl. Ecol. Res. Netw., Univ. New Bruns., Fredericton, N.B., E3B 6E1; n9bi@unb.ca)

The formation of crèches (groups containing any number of adult female[s] and duckling[s], two or more of which are parentally unrelated) is a conspicuous feature of eider biology. In 1997, 132 adult females breeding on Green Island in Maine were nasal-tagged. Following hatch, more than 70 nasal-tagged females were observed to have abandoned their ducklings to another female; lost their ducklings as a result of gull depredation; become the primary adult of a crèche, or an "auntie" assisting the primary adult of a crèche. In addition, the clutches of 10 nasal-tagged females 20-25 days into incubation were switched with clutches of 10 nasal-tagged females 15-20 days into incubation to produce a sample of 10 females hatching 5 days earlier than expected and therefore in good condition at hatch and a sample of 10 females hatching 5 days later than expected and therefore in poor condition at hatch. More than 185 ducklings fledged in the immediate vicinity of the breeding colony, and large crèches of up to 75 ducklings and 12-25 tenders were observed consistently. The body condition of adult females at hatch will be compared among all nasal-tagged females observed to have abandoned or tended a crèche. Several authors have suggested that the body condition of ducks is a determining factor in parental care and that females in poor condition more readily abandon their young. Although abandonment leads to a lower survival rate of the female's own young, it may benefit lifetime reproduction by increasing the likelihood of the females' own survival.

A test of the cowbird predation hypothesis for two frequently parasitized hosts at Delta Marsh, MB. McLaren, C.M. and S.G. Sealy (Dept. Zool., Univ. Man., Winnipeg, MB R3T 2N2; (CMM) ummcla00@cc.UManitoba.ca)

The cowbird predation hypothesis (Arcese et al., Proc.

Nati. Acad. Sci. USA 93: 4608-4611, 1996) has been suggested to explain the frequently observed link between nest predation and interspecific brood parasitism in many passerine birds. Brown-headed Cowbirds (*Molothrus ater*) may exert an impact on the demography of host populations if nests discovered too late in the hosts' nesting cycle for successful parasitism are depredated to create future opportunities for parasitism, by causing hosts to re-nest. Evidence in support of this hypothesis is limited to two populations of a single host species, the Song Sparrow (*Melospiza melodia*). We evaluated this hypothesis for two frequently parasitized hosts that nest in the Delta Marsh region of southern Manitoba, the Song Sparrow and the Yellow Warbler (*Dendroica petechia*). The main prediction of the hypothesis, that parasitized nests fail less often than unparasitized nests, was not supported for either host.

Sources of intraclutch egg-size variation in the Common Tern. Moore, David J. (Dept. Biol. Sci., Simon Fraser Univ., Burnaby, BC V5A 1S6; mooren@sfu.ca) and Gregory J. Robertson (Can. Wildl. Serv., 6 Bruce St., Mount Pearl, NF A1N 4T3).

In species that exhibit brood reduction, last-laid eggs are assumed to be relatively small to facilitate brood reduction. Alternatively, egg-size variation within a clutch may be a function of the ambient conditions during the period eggs are formed or a function of the condition of the female. We examined the pattern of intraclutch egg-size variation (ICESV) in Common Terns breeding near Hamilton ON over 5 years (1992, 94-97). There was a significant difference in the size of eggs laid in the 5 years; in 1992 relatively large eggs were laid, whereas in 1994 eggs were relatively small. Furthermore, the pattern of ICESV was different across years; in 1992, the second-laid egg, as opposed to the first-laid egg, was largest. In 1994, the last-laid egg was disproportionately smaller than the rest of the clutch compared to other years. The period prior to egg-laying was the warmest, calmest and driest in 1992, conditions were moderate in 1994, while the other years were colder, windier and wetter. Within years, weather conditions during the period of clutch formation were related to the size of the eggs laid: larger eggs were laid when the weather was warmer and calmer/drier. Therefore, environmental conditions during egg formation are related to egg size. Environmental conditions during egg-laying may affect egg size by (1) directly affecting a female's metabolic costs, (2) affecting foraging conditions and therefore female body condition and/or the availability of resources for egg formation, and (3) by serving as a predictor of conditions during chick-rearing, information which females use to optimize the size of the eggs they lay. Our data suggest that all three mechanisms may be influencing egg size variation.

Endogeneous control of body mass in Western Sandpipers wintering in Panama. *O'Hara, Patrick D. and F.S. Delgado* (Wildl. Ecol. Chair, Dept. Biol. Sci., Simon Fraser Univ., Burnaby, B.C. V5A 1S6; (PDO'H) pdohara@sfu.ca)

Results from several studies on captive individuals and in the field support the hypothesis that body mass is endogenously controlled in wintering birds. Western Sandpipers wintering in Panama also appear to regulate their body mass. Population data from two winters at two sites in Panama show little difference in mean population mass and little difference in date of premigratory mass gain onset. Furthermore, before premigratory mass gain begins, adults and first-year birds do not differ in mean mass, which would not be expected if bird foraging was affected by availability of prey. During premigratory mass gain, adults gain weight quickly and at similar rates between years; whereas, first-year birds remain relatively the same. Onset of contour feather moult into breeding plumage in adults begins at about the same time as premigratory mass gain. Repeat sampling of individual birds supports the above patterns. These results support the idea that birds maintain an optimal body mass, and they may be regulating their weights as a reaction to a trade-off between environmental variability and risk of predation.

Predation on cavity-nests in the boreal mixedwood forest: effects of location in a harvested landscape.

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Habitat loss has been recognised as the greatest threat to waterfowl in North America. The boreal forest of western Canada is an important breeding and summering area for waterfowl, and was relatively undisturbed until forest harvesting began in the 1990s. Forestry reduces the number of nest sites available to cavity-nesting waterfowl. Harvesting is also expected to change the distribution and abundance of nest predators, possibly increasing predation rates and impacting populations significantly. We placed 4 artificial cavity nests with eggs in each of 5 low-residual clearcuts, 5 buffer strips and 30 uncut forest areas around boreal lakes in Alberta, in June-July 1997, to document relative predation levels. A nest was 'depredated' if an egg was punctured or removed. Mean predation in buffer strips was 8.3% (\pm 4.8, SE), compared to 21.2% (\pm 2.8) in comparable contiguous forest. Predation in clearcuts was 37.5% (\pm 12.0), compared to 12.2% (\pm 1.3) in comparable contiguous forest. The difference in nest predation between clearcuts and other treatments was significant. Our results suggest that the risk of predation for cavity-nesting waterfowl is dependent on where a nest is located in a harvested landscape.

New horizons in ornithology: satellite tracking of Barrow's Goldeneye in eastern North America. *Robert, Michel, Jean-Pierre L. Savard* (Can. Wildl. Serv., 1141 Rte de l'église, P.O. Box 10100, Ste-Foy (Québec) G1V 4H5; (MR) michel.robert@ec.gc.ca) and *Guy Fitzgérald* (UQROP, P.O. Box 246, St-Hyacinthe (Québec) J2S 7B6)

Satellite tracking is revolutionizing our understanding of waterfowl ecology. For the first time, breeding, molting and wintering areas can be linked together, allowing comprehensive management of a species. In February and March 1998, seven Barrow's Goldeneye (*Bucephala islandica*) drakes were captured in the St. Lawrence estuary and implanted with radio satellites; three in Baie-des-Rochers and four near Franklin, about 170 km and 375 km downstream from Québec City, respectively. Results indicated important (up to 120 km) local movements on wintering areas and confirmed the clumped distribution of Barrow's Goldeneyes in the St. Lawrence estuary. Two birds started their movements towards breeding areas in the last week of April and two others in the first week of May. Birds remained on the breeding areas until at least the first week of June. They were dispersed on small high-elevation lakes located 60 to 200 km inland, from Tadoussac to east of Sept-Iles. From there birds will be tracked to their molting areas. The information provided by satellite tracking should prove crucial in the elaboration of a recovery plan for this population, estimated at 2,000 - 4,000 birds.

Long-term pair bonds in Harlequin Ducks. *Smith, Cyndi* (Parks Canada, Banff Nat. Park, Banff, AB T0L 0C0, and CWS/NSERC Res. Chair Wildl. Ecol., Dep. Biol. Sci., Simon Fraser Univ., Burnaby, BC V5A 1S6; cms@sfu.ca), *Fred Cooke* (CWS/NSERC Res. Chair Wildl. Ecol., Dep. Biol. Sci., Simon Fraser Univ., Burnaby, BC V5A 1S6), *Gregory J. Robertson* (Can. Wildl. Serv., 6 Bruce St., Mount Pearl, St. John's, Nfld. A1N 4T3), *R. Ian Goudie* (17 Waterfordbridge Rd., St. John's, Nfld. A1E 1C5), and *W. Sean Boyd* (Can. Wildl. Serv., RR 1, 5421 Robertson Rd., Delta, BC V4K 3N2)

Of 29 pairs of Harlequin Ducks (*Histrionicus histrionicus*) banded and resighted on the moulting and wintering area at White Rock, BC, in 1994-98, 23 pairs (79%) re-united the following year. From 1995 to 1997 nine of 15 pairs (60%) of Harlequin Ducks banded and resighted on breeding streams in Banff National Park, AB, re-united the next year on the breeding stream. Seven of these 15 pairs observed on the breeding stream have been observed re-united at the moulting or wintering area also. Pairs may re-unite even if the female was unsuccessful during the breeding season. In all pairs that exhibited mate change, the original mate has not been resighted. Males that do not relocate their previous mate at the usual wintering area may leave either to look for

her elsewhere or to look for a new mate elsewhere. If a male is unsuccessful in finding a mate at the wintering area he appears to return to the last breeding area, perhaps looking for his previous mate or looking for a new mate. Our observations suggest that if both members of a pair are alive they re-unite at the wintering area and return to the breeding stream together, and that this is the rule rather than the exception.

Songbird population dynamics: adding space to time.

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Avian population ecology has been dominated by long-term studies of single populations of well-studied species, like the Great Tit in Europe and the Florida Scrub Jay in North America. The results of such studies can not be generalized to other populations with confidence, particularly when they are conducted in true or habitat islands. Although recent analyses of data from the Breeding Bird Survey (BBS) have provided continental and regional population trends for many species, BBS data provide a very coarse demographic picture, and coverage of BBS routes is poor in much of Canada. Thus, there is a need for studies at intermediate to large spatial scales that include more demographic detail than provided by schemes like the BBS, and that retain a strong temporal component. Meta-analyses of existing data offer one possible approach. Because many avian populations are regulated at large spatial scales, a second and perhaps more fruitful approach is to undertake parallel studies of the same species in different places using common methods. I illustrate the potential of these ideas using demographic data on the Song Sparrow. Granting agencies in Canada have collaborative grants that could support such work, and that have yet to be used to full advantage by Canadian ornithologists.

Physiological indicators of reproductive status in wild populations of Marbled Murrelets and Cassin's Auklets.

Vanderkist, Brett A. and Tony D. Williams (CWS-SFU Wildl. Ecol. Chair, Dept. Biol. Sci., Simon Fraser Univ., Burnaby, B.C. V5A 1S6; (BAV) vanderki@sfu.ca) [POSTER PAPER]

Long-term demographic data such as adult survival, chick production, and chick survival for the Marbled Murrelet (*Brachyramphus marmoratus*) are as elusive as the nesting habits of this species. Because direct monitoring of large numbers of nests is difficult and usually very expensive, we

attempted to obtain demographic information indirectly by using physiological indicators of egg-production. We captured large numbers of Marbled Murrelets by mist-netting and dip-netting at two locations (Desolation Sound/Theodosia Inlet and Mussel Inlet) and obtained blood and plasma samples in 1996 and 1997 for analysis. Two yolk precursors, vitellogenin (VTG) and very low density lipoprotein (VLDL) are dramatically elevated during egg production, and we wished to use them to detect fecund females from our samples of wild birds whose reproductive status was unknown. We used vitellogenic zinc and total triglyceride as our measures of VTG and VLDL, respectively. Blood and plasma samples were also obtained from Cassin's Auklets (*Ptychoramphus aleuticus*) on Triangle Island for comparative analysis. All birds were sexed from red blood cells using a molecular technique. In both species, VTG was superior to VLDL in detecting fecund females. The proportion of egg-producing Marbled Murrelets was high in May and June, but decreased to 0 during the first half of July.

Physiological approaches to avian studies: opportunities and obstacles. *Williams, Tony D.* (Dept. Biol. Sci. and NSERC/CWS Chair Wildl. Ecol., Simon Fraser Univ., Burnaby, BC, V5A 1S6; tdwillia@sfu.ca)

In many areas of avian biology, theoretical ideas, frequently ingrained in the literature in the form of "conventional wisdom", extend way beyond relevant empirical data and, in particular, a sound understanding of the mechanisms (i.e. physiology) underlying such ideas. The negative effect of this is that it can lead to research being directed by theories and hypotheses which appear to be mechanistically impossible or, at least, very, very improbable. On the positive side, this has created immense *opportunities* for research aimed at understanding the mechanistic basis of, for example, many - if not all - life history traits and transitions (sensu Stearns 1992). Further understanding of mechanistic or functional aspects will have two other benefits: a) it will allow development of physiologically appropriate or relevant techniques for field manipulations, and b) it will allow robust and appropriate interpretation of data obtained using increasingly widely available, easy-to-use, and in vogue analytical techniques. Currently, these techniques sometimes appear to present *obstacles* rather than aids to rapid progress in understanding certain aspects of avian biology. I will demonstrate these points further with examples from my own research, focusing on variation in female reproductive effort.

