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(L) Downy Woodpecker, 2000; (R) Hairy Woodpecker, 2001, both Holtville, N.B.
(photos by Dorothy McFarlane)

A Newfoundland acquaintance called them "Wood-knockers b'ating their face up on trees";
editors sometimes feel like that too, but can work off frustration better by writing something...

Society of Canadian Ornithologists Société des Ornithologistes du Canada

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2001 Joint Meeting of American Ornithologists' Union and Society of Canadian Ornithologists

University of Washington, Seattle, Wash., U.S.A.
15-18 August 2001

The S.C.O. Council meeting and AGM will be held during the conference; check at S.C.O. information table there for other information; for times & places of these meetings, see the conference circular (inserted with this issue, unless you'll receive it directly as an A.O.U. member), or for more details, check AOU Seattle website at
<http://depts.washington.edu/bird2001>

The conference program line-up includes

Plenary topics (& chairs):

- Molecular methods to study population divergence - the first steps of speciation (Steffan Bensch)
- Seabird Conservation (Dee Boersma)
- Current issues in mate choice and sexual selection (Marion Petrie)
- The physiology-life history nexus (Robert Ricklefs)
- Maternal steroid hormones in the egg: functions, mechanisms, and implications (Hubert Schwabel)

Symposia

- Bird collections: Development and use of a scientific resource;
- The science, management and policy of seabird conservation;
- New perspectives in evolution of sexual traits.

Workshops and Roundtables

- Migration monitoring in the Americas;
- Introduction to Band Manager, and Advanced Band Manager;
- Funding opportunities for ornithology at National Science Foundation;
- The wave of the future: Using recorded sound to monitor avian diversity and abundance;
- New opportunities for research on the National Wildlife Refuges;
- Field optics.

Travel Discounts: As SCO is co-sponsoring the Seattle conference, Air Canada offers travel discounts. Contact Air Canada (toll-free) at 1-800-361-7585, or (in Montréal) 1-514-393-9494, or a travel agent, citing convention no. CV809782.

19th ANNUAL MEETING and 5th CONFERENCE of the SOCIETY OF CANADIAN ORNITHOLOGISTS/SOCIÉTÉ D'ORNITHOLOGISTES DU CANADA,
held in conjunction with the A.O.U. and the B.O.U. (concluded)

Memorial University of Newfoundland, St. John's, Nfld.
14-19 August 2000

The complete Scientific program will be published as a supplement to *The Auk*, and is not repeated here.

Abstracts [begun in vol. 13(2) and continued below] are published in *Picoides* only for presentations dealing primarily with birds in Canada, and (mostly) by Canadian authors.

The Abstract Book of BIRDS 2000 included the following disclaimer: "The abstracts in this work are not issued for the permanent scientific record."

ABSTRACTS

Contributed Papers (continued)

242. Common Murre harvests of capelin in Newfoundland: Interannual variation in capelin characteristics and ocean climate change. Davoren, Gail K. and Montevocchi, William A. (Biopsych. Prog., Memorial Univ. Nfld., St. John's, Nfld.)

We present a 10-yr data series on the diets of Common Murre (*Uria aalge*) chicks on Funk Island, the largest seabird colony in the Northwest Atlantic. Chick diets were dominated by female capelin (*Mallotus villosus*), primarily gravid and spent females, with small percentages of sand lance and other species. Capelin is a small schooling fish that spawns on coastal beaches and in shallow water during the summer in Newfoundland. During the 1990s, spawning capelin were small and spawned later compared to historical accounts. We investigate whether murre harvests of capelin reflect these changes in capelin biology. Specifically, interannual variation in the characteristics of capelin harvested by murre (length, mass, condition) are compared to annual sea surface temperature anomalies, spawning dates of capelin, and characteristics of spawning capelin independently collected in commercial harvests and in beach-spawning surveys conducted by Fisheries and Oceans Canada. Mean lengths of spawning female capelin collected during beach surveys were highly correlated with those harvested by murre and showed similar interannual trends. The date capelin first spawned on beaches and the percentage of gravid females harvested by murre were negatively correlated with sea-surface temperature anomalies. This suggests that murre harvests reliably indicate local stock conditions of spawning female capelin. Finally, the trophic implications of (female) sex-biased predation by Common Murre, the dominant seabird consumer of capelin in the Northwest Atlantic, are considered.

243. The protection of seabird colonies in Newfoundland and Labrador. Ballam, Douglas G. (Govt. Nfld. & Labr., St. John's, Nfld.)

The coastal islands of Newfoundland and Labrador support some of the largest and most important seabird colonies in the world. Major colonies are protected as Provincial Ecological Reserves. These include Funk Island, Witless Bay, Gannet Islands, Baccalieu Island, and Cape St. Mary's. These reserves protect over 90% of the total breeding seabird population of the Province (over 5,000,000 pairs). A gap analysis was conducted to identify those species that are currently unprotected. Although auk colonies are well represented, few larid colonies have any protection. Also, several large colonies remain

unprotected (populations in the fourth or fifth order of magnitude). A list of candidate ecological reserves was compiled to address these gaps.

246. Geographic variation and genetic structure in global populations of the Black-legged Kittiwake. Patirana, Anoma, Friesen, Vicki L. (Dep. Biol., Queen's Univ., Kingston, Ont.), and Chardine, John (Can. Wildl. Serv., Sackville, N.B.)

Black-legged Kittiwakes (*Rissa tridactyla*) are small, pelagic cliff-nesting gulls with a sub-arctic and arctic breeding distribution. Generally, 2 subspecies are recognized; *R. t. pollicaris* which is confined to the North Pacific, Bering and Chukchi seas, and *R. t. tridactyla* which is restricted to the north Atlantic. Studies examining plumage variation in the North Atlantic have illustrated colony-specific differences in melanism suggesting that significant genetic differences and restricted gene flow may exist among kittiwakes from different colonies. The primary objective of this study is to determine the extent to which clinal variation in plumage reflects geographic distribution of neutral genetic variation in the mitochondrial control region and a nuclear intron. We found evidence for clinal variation in the ne Atlantic in the more rapidly evolving control region, but not for the more slowly evolving intron, suggesting that geographic variation in morphology in the Atlantic is a more recently evolved phenomenon. In addition, regional groupings of Atlantic populations revealed significant genetic structuring and restricted gene flow between the ne Atlantic, nw Atlantic, and Arctic. Furthermore, we found no overlap between Atlantic and Pacific haplotypes, supporting previous subspecies designations. A star phylogeny of control region DNA sequences suggests recent origin of Atlantic *R. t. tridactyla* and Pacific *R. t. pollicaris* subspecies.

247. Loafing as a behavioural buffer for environmental change. Paquet, Julie (Can. Wildl. Serv., Sackville, N.B.) and Diamond, Antony W. (ACWERN, Dept. Biol., Univ. New Brunswick, Fredericton, N.B.)

The concept of "behavioural buffering" was studied using Arctic Tern (*Sterna paradisaea*) time-budgets compiled during the 1998 breeding season on Machias Seal Island, Canada. Results show that as chicks get older, parental attendance decreases and foraging time increases. As time allocated to loafing remains similar throughout chick rearing, it appears that time added to foraging is directly transferred from time

allocated to attending the chicks. This supports the hypothesis that activities necessary for the care of young are mutually exclusive, and an increase in one activity will directly cause the decrease of another (Uttley 1992, *Ardea* 80: 83-91). When analysed in relation to weather, time-budgets show that, during rainfall, although foraging time remains similar, nest attendance increases and loafing in the roost decreases. This suggests that behavioural buffering with loafing time may occur for rapid unpredictable changes, when activities necessary to chick care, like foraging and attending, must not be compromised. Such a mechanism may make it possible for Arctic Terns and other seabirds to adjust, within certain limits, to stochastic changes in weather, predator pressure or prey availability, and thereby maintain breeding success.

248. The relative effects of colony geography and Pleistocene glaciation on the population structure of Common Murres in the Atlantic and Pacific Oceans. Warheit, Kenneth (Wash. Dep. Fish Wildl., Olympia, Wash.) and Friesen, Vicki L. (Queen's Univ., Kingston, Ont.)

Common Murres (*Uria aalge*) are north temperate to subarctic seabirds and occur in both the Atlantic and Pacific basins. Although murre distribution in the Pacific is linear and continuous from central California to northern Japan, their distribution in the Atlantic is discontinuous, with western Atlantic colonies separate from those in the eastern Atlantic. We used a 307 bp fragment of cytochrome b to assess the relative effects of this geography and Pleistocene glaciation on population differentiation among colonies within both the Atlantic and Pacific basins. As previously discussed by Friesen et al. (1996, *Mol. Evol.* 5: 793-805), the Pacific and Atlantic populations of Common Murres are effectively isolated. An analysis of molecular variance indicates that over 62% of allelic variation can be explained by this Pacific versus Atlantic division. Within each basin, Atlantic colonies are more divergent than those in the Pacific, with among-colony allelic variation equal to 8.35% and 3.53% of total variation, respectively. The two basins also differed dramatically in their relative levels of nucleotide divergence: (1) the Pacific and Atlantic populations show a nucleotide divergence of 0.612% (300,000 yr ago assuming 2% per my); (2) the average within-Atlantic divergence of 0.097% (48,500 yr ago); and (3) the average within-Pacific divergence of 0.008% (4,000 yr ago), and these differences are not a function of inter-colony distance within each basin. We speculate that these differences in within-basin inter-colony allelic and nucleotide divergence are due to different patterns of glaciation in the north Atlantic, compared with that in the north Pacific.

250. Significant decline in weights of Semipalmated Sandpipers in the Bay of Fundy in 1999. Hicklin, Peter W. (Can. Wildl. Serv., Sackville, N.B.)

The fresh weights of Semipalmated Sandpipers (*Calidris pusilla*) captured at Johnson Mills in the upper Bay of Fundy in 1999 (n=1,576) were significantly lower than the fresh weights of Semipalmated Sandpipers captured in the upper bay over 8 field seasons between 1981 and 1998 (n=14,378). The maximum daily fresh weights of the birds in 1999 were, on average, 28% less than the maximum daily fresh weights recorded in all previous years. This suggests a significant reduction in fat deposits, needed to allow the birds to complete their overseas migration to the northeastern coast of South America. Earlier studies estimated that the sandpipers required 18 g of fat to complete non-stop overseas migration between the Bay of Fundy and South American staging/wintering areas; in 1999, the birds departed the Bay of Fundy with average deposits estimated at <8 g. Between 75% and 96% of the world's population of this species stages in the Bay of Fundy each year during the southward migration, and it is therefore estimated that either i) significant levels of mortality

occurred in 1999, as many birds would have been unable to complete their migration, or ii) the sandpipers modified their migration route to allow for at least one stopover along the coast of the Americas. These possibilities are discussed. Declines in the birds' favoured prey (*Corophium volutator*) in the Bay of Fundy may explain the birds' low weights measured in 1999. Consequently a new group of banders in Caribbean islands, Suriname, French Guyana, Brazil and Argentina joined forces to simultaneously measure weights and body condition of Semipalmated Sandpipers during the fall migration each year from the Bay of Fundy to staging areas in the Caribbean islands, the Guyanas and wintering sites in Brazil and Argentina.

251. Fall migratory behavior of the Greater Snow Goose in southern Quebec. Olson, Jonathan M., Giroux, Jean-François (Dep. Sci. biol., UQAM, Montreal, Qué.), and Gauthier, Gilles (Dep. Biol. & Cen. d'Étu. nord., U. Laval, Ste-Foy, Qué.)

The entire Greater Snow Goose (*Chen caerulescens atlantica*) population passes through Québec during its fall migration, and a majority of the geese stopover in the southern part of the province. To follow the movements of the geese during their stay in s Québec, 330 radio collars were placed on adult females captured at Bylot Island, Nunavut, between 1996 and 1999. Males were marked with standard plastic collars. We radio-tracked the geese daily and observed them to determine their social status (presence of young or of a male). We found that 21 to 40% of the marked geese passed straight through to the U.S. without stopping in Québec. We found no difference between the length of stay of geese with young (28.7 d, SE=3.23, n=22) or without young (26.6 d, SE=1.49, n=78). Geese not accompanied by a male had an average length of stay (24.6 d, SE=1.85, n=24.6) which was longer than that of females with a mate (18.1 d, SE=1.47, n=125), but we believe this difference can be best explained by a known bias in our data. The length of stay of individual geese was not correlated from one year to the next, and in many cases geese passed through one year and stopped the other, indicating that variation in behaviour was not due to intrinsic characteristics of the birds. The disturbance rate, calculated from detailed habitat use data, experienced by the geese in 1999 (0.79 disturbances/hour) was significantly higher than rates recorded in 1997 (0.35 d/h) or 1998 (0.42 d/h). This increase was likely due to a change in hunting regulations in 1999, allowing hunters to approach geese in the fields.

255. Biennial redpoll invasions of Saskatchewan and Manitoba. Houston, C. Stuart (Saskatoon, Sask.) and Smith, Alan R. (Can. Wildl. Serv., Saskatoon, Sask.)

The largest redpoll invasion in history, January-March 2000, is confirmed by Cornell's Backyard Feederwatch results. In Saskatoon, sightings of banded birds at feeding stations, persistence of sporadic repeats up to 10 wk after banding, and sampling at a second station, led us to estimate a loose winter flock of >10,000 redpolls, 10 times higher than would have been predicted without banding. Since 1960, with 1 exception (1969), Common (*Carduelis flammea*) and Hoary Redpolls (*C. hornemanni*) appeared at a Saskatoon winter feeding station only in even-numbered years. Confirmation of the statistically significant biennial eruptions, and of the 1969 exception, is evident from Saskatoon Christmas Bird Count (CBC) numbers and from Winnipeg, where Leroy and Myrtle Simmons banded 22,504 Common and 830 Hoary Redpolls in 1964-1978. Hoary Redpolls constitute 1.3% of the Saskatoon redpoll population, both at banding and in CBCs. Two independent reports in 1970 indicated that the birch seed crop in the Arctic is biennial.

256. A cross-Canada comparison of mass change in birds during migration stopover. Dunn, Erica H. (Can. Wildl. Serv., Hull, Qué.)

Whether birds gain mass during migration stopover is an index of site

quality. Studies of 48 species at 3 sites on Long Point, Lake Erie, showed that the tip of the Long Point peninsula was poor for migrants in spring, but otherwise most species gained mass in both seasons. Mass gain was assessed by regressing size-corrected mass on time of day, and also with a multiple regression model that included temporal variables. Mass gain estimates did not differ between methods. The simple regression method was used to compare mass gain of 14 species at 10 additional sites across Canada. In the broader geographic context, the tip of Long Point in spring still stands out as a poor site, and Long Point in fall supports comparatively high mass gains. All sites in the study sampled migrants at about the same dates and stage of migration, and migrants were close to their breeding range. It would be interesting to do a similar comparison on a north-south transect along (rather than across) the migration path, to see if mass gain varies more widely at different stages of migration.

257. Relationships between breeding, molting and wintering areas of Barrow's Goldeneye in eastern North America. Robert, Michel and Savard, Jean-Pierre L. (Can. Wildl. Serv., Ste-Foy, Qué.)

Eighteen Barrow's Goldeneye drakes were implanted with satellite radios on wintering areas in the St. Lawrence estuary, Québec. Fourteen were tracked to 8 different molting areas - 2 on the Labrador coast, 2 in Ungava Bay, 1 on Baffin Island, 2 in Hudson Bay and 1 inland near Quebec-Labrador border. One bird moved during the summer from Ungava Bay to Hudson Bay, 720 km away, and 1 moved to the Labrador coast before continuing to its molting site in Ungava Bay. Distances between wintering and breeding areas averaged 278 km (range: 90-480 km, $n = 14$) and between breeding and molting areas averaged 1,004 km (range: 680-1250 km, $n = 14$). Movements between breeding, molting, and wintering areas were direct and fast, 1 bird covering 1,200 km in <2 d. Birds remained on molting sites until mid-Oct and Nov and then flew to the St. Lawrence estuary where they winter. Departure from breeding areas to molting sites varied between 1998 and 1999, being about 10 d earlier in 1999, a year of early snow melt. All marked birds bred within 150 km of the St. Lawrence on high-elevation lakes inland from the north shore of its estuary and gulf. One adult female probably molted close to her breeding area suggesting that females do not have a long northern molt migration as males do. Use of different molting sites by males and females suggested they are subject to different natural and hunting mortality. This study emphasises the spatial and temporal complexity related to a holistic conservation approach for a given population.

259. Avian brood parasitism on an elevation gradient in southern British Columbia. Fonnesebeck, Christopher J. (Ga. Coop. Wildl. Unit, Univ. Georgia, Athens, Ga.) and Smith, James N. M. (Dep. Zool., Univ. Brit. Col., Vancouver, B.C.)

We examined community patterns of Brown-headed Cowbird (*Molothrus ater*) brood parasitism along an elevation gradient in the South Okanagan region of British Columbia. This analysis integrates point-count data and 822 nest records from two consecutive studies conducted in 1992-95 and 1996-97. Parasitism was consistently infrequent among the passerine community at higher (>100 m) elevations relative to current and historical parasitism levels in the neighboring valley. Likewise, as elevation increased there was a sharp drop in the ratio of female cowbirds to hosts. The only species strongly affected by parasitism at high elevations was Warbling Vireo (*Vireo gilvus*). At low cowbird density, female cowbirds may be able to exercise stronger host selection, thus selecting Warbling Vireo as a preferred, easily-detected host. Contrary to our expectations, parasitism rates were not correlated with either distance from the valley, number of local cowbird census detections, or presence of grazing cattle.

260. Patterns of multiple parasitism on Song Sparrows by Brown-headed Cowbirds. McLaren, Celia M. (Dep. Zool., Univ. Man., Winnipeg, Man.)

I investigated patterns of multiple parasitism by Brown-headed Cowbirds (*Molothrus ater*) on Song Sparrows (*Melospiza melodia*) at Delta Marsh, Manitoba. Using molecular genetic techniques, multiply parasitized nests were classified as having all cowbird eggs laid by the same female or eggs laid by >1 female. Multiple parasitism was the result of a single female re-parasitizing a nest (15 nests) almost as often as it is a result of >1 female parasitizing the same nest (21 nests). Parasitisms unsynchronized with the host cycle were frequent (42 of 140 eggs). Three major findings were associated with multiple parasitism: 1) inappropriately timed eggs tended to be those laid in nests parasitized by >1 female ($p = 0.08$), 2) inappropriately timed eggs were laid significantly later in the season than synchronized eggs ($p = 0.03$), and 3) fewer nests were available when eggs were laid in nests parasitized more than once by the same female ($p = 0.03$). These results suggested that the two types of multiple parasitism may result from different factors: nests multiply parasitized by 1 female involve females facing low nest availability, whereas nests parasitized by >1 female often resulted from females laying indiscriminately.

261. Can Warbling Vireos grasp-eject Brown-headed Cowbird eggs? A test of bill-size constraints and the evolutionary equilibrium hypothesis. Underwood, Todd J. (Dep. Zool., Univ. Man., Winnipeg, Man.)

Why do about 90% of host species of the Brown-headed Cowbird (*Molothrus ater*) accept the cost of raising a cowbird? The evolutionary equilibrium hypothesis predicts that egg acceptance is an adaptive response because costs of rejecting a cowbird's egg outweigh the cost of acceptance. A major assumption of this hypothesis is that bill-size constraints prevent small hosts from grasp-ejecting cowbird eggs. Small hosts should be capable only of puncture-ejection, which can be costly because hosts may damage their own eggs while attempting to pierce the thick cowbird eggshell. I tested the bill-size constraints assumption by determining whether Warbling Vireos (*Vireo gilvus*), the smallest known puncture-ejector, are capable of grasp-ejecting cowbird eggs. Warbling Vireos ejected 91% ($n=22$) of plaster model cowbird eggs added to their nests. These solid eggs could not be punctured, thus significantly more eggs were grasp-ejected than accepted ($p<0.001$). No host eggs were damaged in any nests where the plaster egg was ejected. Video analysis confirmed grasp-ejection. Warbling Vireos have a grasp-index well below that of other grasp-ejectors. Thus, small bill size is not a constraint against egg ejection. Many more species should be able to grasp-eject cowbird eggs with a low cost, which provides indirect support for the evolutionary lag hypothesis.

262. Sex, lies and genotypes: The mating system of the Brown-headed Cowbird. Woolfenden, Bonnie E. (Dep. Biol. York Univ., Toronto, Ont.)

I used a combination of observational and genetic techniques to describe the genetic mating system and quantify variance in individual reproductive success for a marked population of Brown-headed Cowbirds (*Molothrus ater*) at Delta Marsh, Manitoba. Using 6 yr of data, I attempted to determine the number of offspring produced and the number of genetic mates for males and females in the population. In general, the mating system was variable across years with more females (69%) than males (42%) having a single genetic mate for the duration of the breeding season, but neither sex was strictly genetically monogamous. Standardized variance in reproductive success was 2.2 times higher for males than females and standardized variance in mating success was 2.3 times higher for males than females, indicating that the opportunity for selection on males was higher. Reproductive

success was dependent on mating success for both sexes and there were no differences in the sexual selection gradients for males and females. This suggests that mating success may be positively related to reproductive success but other explanations are also consistent with the data. Further investigation is required to determine the causative factors in the relationship between MS and RS in cowbirds. Actual sexual selection acting on males and females was similar despite the higher opportunity for sexual selection to act on males. These findings contradict previous studies that documented monogamy as the predominant social and genetic mating system for cowbirds and suggest that both males and females may be subject to sexual selection pressures that result from individual variance in mating success.

265. An experimental proof that predation and parasitism by Brown-headed Cowbirds causes sink population dynamics in Song Sparrows. Smith, James N. M., Taitt, Mary J., and Zanette, Liana (Dep. Zool., Univ. Brit. Col., Vancouver, B.C.)

Conservation biologists in the early 1990s frequently blamed Brown-headed Cowbirds (*Molothrus ater*) for declines in songbird populations. Most evidence that cowbirds cause demographic losses in hosts has come from correlations between the frequency of cowbird parasitism at a site and low rates of fledgling production per host nest. Cowbird removal programs planned as controlled experiments (e.g. Whitfield et al., *Stud. Avian Biol.* 18: 260-266, 1999), however, provide stronger evidence. We report here results of a 5-yr study where cowbirds were removed at 2 of 3 study sites over 3 yr in the lower Fraser Valley, British Columbia. Cowbird removal consistently doubled seasonal fecundity of Song Sparrows (*Melospiza melodia*) compared to reference controls, and converted the 2 populations where removals took place from population sinks to sources. Improved host performance was due to two principal causes, reduced rates of total nest failure (i.e. reduced 'predation' by cowbirds) and of lowered production from successful nests because cowbird nestlings were reared in place of hosts (i.e. lower parasitism). Most past estimates of impacts of cowbirds on their hosts ignored effects of predation by cowbirds. Our analysis confirms that total impacts of cowbirds on seasonal fecundity of Song Sparrows are large, and that predatory impacts of cowbirds are of serious management concern for this host. If our results apply broadly to species of management concern, demographic threats posed by cowbirds may have been systematically underestimated by past researchers.

268. Divorce and extra-pair mating in female Black-capped Chickadees: Separate strategies with a common target. Ramsay, Scott M. (Dep. Biol., Queen's Univ., Kingston, Ont.), Otter, Ken (Biol., Univ. No. Brit. Col., Prince George, B.C.), Mennill, Daniel J. and Ratcliffe, Laurene (Dep. Biol., Queen's Univ.)

By considering patterns of divorce and extrapair mating it may be possible to identify the targets of female choice in free-living birds. We examined natural patterns of divorce and extra-pair mating in a long-term study of Black-capped Chickadees (*Poecile atricapilla*) to distinguish between the comparable hypotheses of good genes and future partnerships. Divorce occurred in 13 out of 144 partnerships over 8 yr. Females usually divorced between their first and second breeding seasons for males of higher social rank than their previous partners, had reproductive success prior to divorce similar to females who retained previous partners, and did not improve their reproductive success following divorce. Females who divorced were significantly more likely to have had mixed paternity broods prior to divorce than females who stayed with previous partners. Females did not divorce in favour of previous extrapair partners. These results support a good genes hypothesis for extrapair mating, suggesting that female chickadees use divorce and multiple mating as separate strategies sharing a common target.

266. The timing of pair formation in sea ducks. Robertson, Gregory J. (Can. Wildl. Serv., Mount Pearl, Nfld.), Cooke, Fred (Dep. Biol. Sci., Simon Fraser Univ., Burnaby, B.C.), and Gilchrist, H. Grant (Can. Wildl. Serv., Yellowknife, N.W.T.)

There is considerable variation within and among waterfowl species in timing of pair formation. We evaluate the male cost hypothesis for explaining variation in timing of pairing in sea ducks. This hypothesis suggests that males attempt to form pair bonds as early as possible, constrained by their ability to expend the extra energy required for activities associated with courtship and pair-bond maintenance. Among the sea ducks, larger species and the smaller species that use stable, predictable food sources and energetically inexpensive foraging techniques (shallow divers) form pair bonds in the fall. Either of these attributes reduces the costs of foraging during the winter months. Smaller and deeper-diving species, or species that forage on ephemeral sources (such as the mergansers which feed on fish) do not pair until spring. Males in these species possibly pair later because they can not afford to expend the extra energy needed for courtship and pair-bond maintenance during the winter. Within species, male Harlequin Ducks (*Histrionicus histrionicus*) reforming established pair bonds pair earlier than males establishing new pair bonds. Among Common Eiders (*Somateria mollissima*), resident populations tend to reform pair bonds and pair early, whereas populations wintering in northern areas, and highly migratory populations, appear to pair in spring. Once again, it appears that in circumstances where males may be energetically stressed, pairing takes place at a later date. Thus, the male costs hypothesis for timing of pairing in sea ducks is supported by the available data.

270. Breeding philopatry by female Red-breasted Mergansers. Titman, Rodger D. (Dep. Nat. Res. Sci., McGill Univ., Ste-Anne-de-Bellevue, Qué.)

Among ducks, females typically show philopatry to natal and breeding areas. A breeding population of Red-breasted Mergansers (*Mergus serrator*) which nests colonially in a coastal estuary of Kouchibouguac National Park, New Brunswick, has been monitored closely since 1992. Although a principal objective has been to demonstrate relatedness among females accepting eggs and young during pre- and post-hatch brood amalgamation, one aim of my research has been to determine whether adults are philopatric. Females captured using nest traps were banded, and blood or feather samples were taken. During 3 summers young were web-tagged prior to hatching. Of 81 females marked before the summer of 1999, 21 returned to nest on Tern Island, a rate of philopatry of 26%. An expected return of <4 web-tagged females (n=180) yielded 3, proving that these females exhibit natal philopatry as well as breeding philopatry. Philopatric females tended to be more reproductively successful than females whose origin was unknown. There was a high rate of intraspecific brood parasitism ranging from 14 to 67% annually, and post-hatch brood amalgamation has been observed. It is hypothesized that females caring for donated eggs and young are closely related to the donors, as the strong evidence of philopatry suggests. Knowledge about movements and philopatry of males is lacking but it appears that inbreeding is avoided because of male dispersal.

283. The flight speed of provisioning Common Terns in relation to brood energy requirement and foraging currencies. Moore, Dave, and Ydenberg, Ron (Dep. Biol. Sci., Simon Fraser Univ., Burnaby, B.C.)

One tactic parent birds can employ to increase delivery is to fly faster as they travel between foraging areas and their centrally located brood. To assess whether parental workload affects flight speed, we manipulated brood size (creating broods of 1, 3, and 5 nestlings) and measured the flight speed of provisioning Common Tern (*Sterna*

hirundo) parents. Parents reduced their airspeed with increasing wind effect, sidewind angle, flight altitude, and payload mass. Inbound (delivery) flights were faster than outbound (to foraging area) flights. However, parents did not adjust their flight speed as a function of parental workload. A second objective of this study was to evaluate provisioning performance by comparing measured airspeeds with the predictions made by three provisioning currencies. We used a simulation model to find the combination of outbound and inbound airspeeds that, under a given set of wind conditions, maximized (i) efficiency (EFF), (ii) delivery rate (R), or (iii) balanced delivery (D, the rate of delivery subject to parents maintaining an energy balance). One prediction of the balanced delivery model is that parents should fly faster as self-feeding rate increases (here varied from 8 to 58 W). Measured airspeeds were markedly slower than predicted by either the R or D (58 W) currencies. For inbound flight, measured airspeeds were intermediate between those predicted by EFF and D (8 W). For outbound flight, the D (8 W) currency provided a better fit with measured airspeeds than did EFF. Flying at a speed that maximizes EFF (or an efficiency-like currency; D at 8 W), is the only option that allows parents to forage for the entire daylight period without exceeding the theoretical limit to daily energy expenditure (DEEmax).

Poster Presentations

302. Does host coloniality influence the population structure of ectoparasites of four auk species (Alcidae)? *Muzaffar, Sabir B.* (Dep. Biol., Memorial Univ. Nfld., St. Johns, Nfld.)

Host-parasite interactions are complex, and a wide range of factors may influence their maintenance. One such factor, coloniality of hosts, has been shown to structure patterns of ectoparasite abundance among individual avian hosts. I investigated the role of colonial aggregations of four auk hosts (Atlantic Puffin *Fratercula arctica*, Razorbill *Alca torda*, Thick-billed Murre *Uria lomvia* and Common Murre *U. aalge*) in determining aggregation, prevalence and relative abundance of their ectoparasites at the Gannet Islands, Labrador. Aggregation, as measured by the k parameter, variance-to-mean ratio and Green's index, showed that pooled ectoparasite distributions were aggregated. Selected ectoparasitic taxa had uniform, random and aggregated distributions. Taxa that were aggregated, however, showed low levels of aggregation as values of the Green's indices ranged from 0.012 to 0.396. Prevalence and relative abundance were compared for selected ectoparasitic taxa among the four hosts. Prevalence of ectoparasites was generally low for most taxa, values ranging from 0 to 20%. Prevalence of *Quadraceps* and *Austromenopon* were high (77 and 100% respectively) on Common Murre chicks. Chicks of Atlantic Puffins and Razorbills (less aggregated hosts) had much lower prevalence of these two louse genera (5 and 33% for *Quadraceps*; 0 and 43% for *Austromenopon*, respectively). Relative abundance of the same genera on chicks showed a similar pattern, with the Common Murre chicks harbouring significantly more lice than Atlantic Puffin and Razorbill chicks. Feather mite prevalence was significantly higher on adult Atlantic Puffins and Razorbills (less aggregated hosts) (93 and 83%, respectively) compared to the two murre (45% in both cases). Relative abundance showed the same pattern with Atlantic Puffins and Razorbills harbouring 39 and 36 feather mites/bird, respectively, which was significantly higher than the relative abundance of feather mites of Thick-billed and Common Murres (1 and 6 feather mites/bird, respectively). A hypothetical framework for the observed feather mite and louse distributions is presented based on the assumption that high louse- and feather mite-loads reduce reproductive success of hosts. Coloniality did affect distributions of some ectoparasitic taxa, but it apparently did not have a general role in

288. Parasites of eiders (*Somateria* spp.) from Baffin Island. *Khan, R. A.* (Dep. Biol., Memorial Univ. Nfld., St. John's, Nfld.), *Jamieson, S.* (Dep. Psych., Memorial Univ. Nfld.), and *Robertson, G.* (Can. Wildl. Serv., Mount Pearl, Nfld.)

Two species of eiders from Baffin Island were examined for endoparasites as potential bioindicators of age. Two species of trematodes, 1 cestode and 1 acanthocephalan were recovered from frozen specimens. The latter infected all birds whereas the prevalence of the others varied from 16 to 24%. The mean number of acanthi was considerably greater in the King (*Somateria spectabilis*; 83 ± 10) than in the Common Eider (*S. mollissima*; 10 ± 2). Two sizes of worms were noted and, coupled with abundance, might be related to the age of the birds. Additionally, large modular scars on the external intestinal wall appeared to be more abundant when large numbers of worms were encountered in contrast to few worms and small scars. Because the parasite is acquired by feeding on a bivalve mollusc (*Mytilus edulis*) mainly during winter and spring, as reported in other studies, it is likely that birds harbouring numerous large and small worms are >1 yr old. This implied that 28% of Common and all of 9 King Eiders were >1 yr old. Future studies relating morphological characters of the birds to acanth size and abundance will be useful for age determination of the 2 species of eiders.

generating most ectoparasitic distributions at the Gannet Islands.

306. Genetic population differentiation in Pigeon Guillemots: Implications for recovery in the Exxon Valdez oil spill area. *Poland, Veronica F.* (Dep. Biol., Queen's Univ., Kingston, Ont.)

Pigeon Guillemots (*Cepphus columba*) are natally philopatric seabirds that nest in small colonies on the Pacific coast of North America and northern Asia. The Exxon Valdez oil spill in Prince William Sound caused already declining populations of Pigeon Guillemots to become even less abundant, and this species may have shown the most persistent negative response to the oil spill of all species of seabirds affected. For conservation purposes, the genetic structure of the populations needs to be determined, and management units need to be defined. Variation in the mitochondrial DNA control region was analysed for 159 Pigeon Guillemots from 2 subspecies, *C. c. adianta* and *C. c. eureka*. Most haplotypes were private and most regions were highly differentiated. Using F-statistics, a division of Pigeon Guillemots into 3 groups (Alaska, British Columbia, and Oregon/California) was found to represent best the mitochondrial data. This does not agree with current taxonomy. Populations appear to be in equilibrium between mutation and drift with gene flow occurring in a predominantly northwesterly direction. Pigeon Guillemots from 3 groups (Alaska, British Columbia, and Oregon/California) are thought to represent separate management units. Nuclear data are needed to confirm these results.

309. Sexing hatching-year Yellow Warblers using plumage characteristics: Insights using a sex-specific microsatellite locus. *den Haan, Heidi* (Delta Marsh Bird Obs., Portage la Prairie, Man.), *Hobson, Keith A.* (Can. Wildl. Serv., Saskatoon, Sask.), and *Gibbs, H. Lisle* (Dep. Biol., McMaster Univ., Hamilton, Ont.)

Genetic techniques are potentially valuable tools for refining methods of sexing birds based on plumage. We used a female-specific microsatellite locus isolated from Yellow Warblers (*Dendroica petechia*) to evaluate a technique of sexing HY (<2 mon) birds based on both overall brightness of yellow body plumage and the ratio of yellow to dull brown in the outer rectrix. All bright-plumaged hatch-year birds were males and all dull-plumaged hatch-year birds were

females. All birds of intermediate bright plumage were male and 78% of intermediate pale birds were female. Canonical discriminant analysis based on measured proportions of yellow and dull brown in the outer rectrix correctly classified 86% of both females and males. Scores of 10 observers asked to sex birds based on rectrices were improved from 76% to 87% by using the relative brightness of yellow in the rectrix and the presence of yellow along the narrow edge of this feather. Thus, the use of this sex-specific DNA marker revealed a plumage characteristic that can be used to sex a significant component of HY birds of this species.

311. The effect of habitat disturbance on demographics, territorial size and shape in the Black-capped Chickadee: Potential limitations on female extra-pair mate choice. Fort, Kevin T., and Otter, Ken A. (Dep. Biol., Univ. No. Brit. Col., Prince George, B.C.)

Birds breeding in disturbed habitats may be constrained by the size and shape of available breeding territories. In disturbed sites, competition for preferred territories may favour high-ranking birds, with low-ranking birds relegated to long, thin territories along habitat edges. This may reduce the number of immediate neighbours of low-ranking pairs in disturbed habitats. Thus, a low-ranking female may be limited by the geometry of her territory both in terms of the availability of extra-pair mates and her ability to assess their quality. We use GPS imagery to compare territory shape, inter-nest distances and accessibility of neighbouring territories to females in a population of chickadees in both disturbed and undisturbed habitat. We compare shape factors of territories with transmission distances of song in various habitats to suggest that females in disturbed areas are limited in the number of males that can be assessed for alternative mating strategies.

315. Female eavesdropping and extra-pair mate choice in the Black-capped Chickadee. Mennill, Daniel J., and Ratcliffe, Laurene (Dep. Biol., Queen's Univ., Kingston, Ont.)

Within a network of communicating individuals, a receiver may gain information by listening to the vocal interactions of others through eavesdropping. Female songbirds may eavesdrop on the vocal interactions of males to assess relative male quality, and may select extra-pair copulation partners based on information gained through eavesdropping. We assessed female eavesdropping on male song contests in the Black-capped Chickadee (*Parus atricapilla*), a resident songbird found throughout North America. Black-capped Chickadees follow a mixed reproductive strategy, where females seek extra-pair copulations from males who occupy high-ranking positions in winter-flock dominance hierarchies. We used interactive playback to promote or demote 40 males of known dominance rank during the female chickadees' fertile period. We assessed female eavesdropping on these interactions through behavioural observations, radio telemetry and genetic techniques. Results from genetic analyses reveal that females eavesdrop on male vocal contests to assess the quality of extra-pair copulation partners.

318. How do Brown-headed Cowbirds locate nests? The roles of concealment and host activity. McLaren, Celia M. (Dep. Zool., Univ. Man., Winnipeg, Man.)

I investigated patterns of host nest use by Brown-headed Cowbirds (*Molothrus ater*) parasitizing 2 common hosts, Song Sparrow (*Melospiza melodia*) and Yellow Warbler (*Dendroica petechia*). I assessed the influence of nest habitat and host activity on the likelihood of parasitism by measuring several characteristics of nests that were unparasitized, parasitized once, and parasitized more than once by the same female, or parasitized by >1 female. My goals were 1) to identify a measure of nest concealment that accurately represents the view of a nest-searching cowbird by (a) measuring vegetation

when a nest is susceptible to parasitism and (b) characterizing several measures of concealment in the microhabitat of the nest and within the broader nest habitat,

2) to assess whether surreptitious behaviour of hosts reduces susceptibility to parasitism and what aspects of behaviour might provide cues to nest-searching cowbirds, and 3) to examine the relationship between habitat and behaviour in determining susceptibility of nests to parasitism. None of the variables measured was significantly related to parasitism (all $p > 0.05$), but non-significant trends consistent across years and between species suggest that these factors may be important although their quantification is difficult and complex. A significant relationship between nest mass and parasitism probability ($p = 0.006$) provides further support that nest mass represents the intensity of nest-building activity as a whole.

330. Is feather-gathering ability a good indicator of male quality in Tree Swallows? Barber, Colleen A. (Dep. Biol., St. Mary's Univ., Halifax, N.S.), and Robertson, Raleigh J. (Dep. Biol., Queen's Univ., Kingston, Ont.)

In Tree Swallows (*Tachycineta bicolor*), females build the nest, and males gather most of the feathers with which to line the nest cup. We monitored feather numbers on a daily basis in 72 Tree Swallow nests over the 1993 breeding season, from nest initiation until the end of incubation when males stop gathering feathers. We hypothesized that the number of feathers within a nest would be negatively correlated with the frequency of extra-pair paternity present in the nest. We also examined whether increased feather numbers were associated with increased reproductive success in this species. These results will be discussed.

331. Breeding parameters of Atlantic Puffins at colonies in southern Labrador and Newfoundland. Baillie, Shauna (Dep. Biol., Memorial Univ. Nfld., St. John's, Nfld.)

I investigated variation in nestling diet and growth, breeding success, phenology, and adult mass of Atlantic Puffins (*Fratercula arctica*) breeding at the Gannet Islands, Labrador, and Gull Island, Witless Bay, Newfoundland. My aim was to quantify variation in puffin reproductive performance and their use of alternate prey across temporal periods and between regions of high and low capelin abundance. First, I compared puffin feeding and breeding performance at the Gannet Islands during 1996-98, after capelin had evacuated that coast, to a previous study in 1981-83 when capelin were plentiful. Second, I contrasted inter-colony seabird-prey parameters at the Gannet Islands in 1996-98 and Gull Island in 1997-98. At the Gannet Islands in 1996-98, puffin chick diet biomass included 3-25% capelin and 18-48% post-larval sandlance. At Gull Island in 1997-98, nestling diet biomass included 60-70% capelin and 3-34% post-larval sandlance. Puffins at both colonies in the early 1980s typically delivered 70-80% capelin in nestling diet biomass. Though Atlantic Puffins experienced a reduction in some reproductive parameters at the Labrador colony, breeding success was not affected and overall reproductive performance was on par with that at Gull Island, a colony not under apparent food stress. Atlantic Puffins exhibited behavioural plasticity with respect to foraging and reproduction, allowing the species to thrive in a temporally and spatially highly variable environment.

332. Debunking a paradigm: The onset of incubation in waterfowl. Loos, Elizabeth R. (Delta Waterfowl and Wetlands Res. Sta., Portage la Prairie, Man., and Dep. Biol., Univ. La., Lafayette, La.), and Rohwer, Frank C. (Delta Waterfowl and Wetlands Res. Sta., and La. State Univ. Agric. Cen.)

Many precocial birds lay large clutches (10+ eggs), yet all eggs hatch over a period of several hours. This synchronous hatch has led to the

widely held belief that incubation begins only after all eggs within the clutch are laid. We documented patterns of laying-stage nest attendance and egg temperatures using micro-computer data loggers for 6 species of dabbling ducks (Tribe Anatini): Blue-winged Teal, Gadwall, Green-winged Teal, Mallard, Northern Pintail, and Northern Shoveler (*Anas discors*, *A. strepera*, *A. crecca*, *A. platyrhynchos*, *A. acuta*, *A. clypeata*). In all species, females spent an increasing amount of time on the nest as laying progressed. Furthermore, females heated eggs to temperatures sufficient for embryonic development as early as egg 2 in a 10-egg clutch. This effective incubation during the laying period resulted in a developmental skew among embryos within a clutch of 2-3 d at the start of incubation, suggesting that some mechanisms exist to synchronize hatch. The laying-stage nest attendance that we documented may be relevant to the debate regarding the limits to clutch size in waterfowl. The dominant energetics hypothesis postulates that females lay as many eggs as they can physically produce, given energetic and nutritional limitations. This hypothesis predicts that females would minimize time spent at the nest during the laying stage to maximize foraging opportunities. The egg-viability/nest predation hypothesis suggests that clutch size is limited by a combination of declining viability of earlier-laid eggs as well as an increased risk of predation. Our data are consistent with the egg-viability hypothesis if we assume that effective incubation during the laying stage can help maintain egg viability.

333. Effects of wetland management on Marbled Godwits and Western Willets. *Gratto-Trevor, Cheri L.* (Can. Wildl. Serv., Prairie & N. Wildl. Res. Ctr., Saskatoon, Sask.)

Although grassland alteration in North America has resulted in significant range reductions of most prairie-breeding shorebirds, sandpipers have seldom been considered in prairie research and management studies. In particular, it is not known how changes in water regime and grassland cover due to water management for waterfowl, cattle grazing or tourism, or to climate change, will affect populations of upland-breeding shorebirds. The objective of this study was to examine densities and nest success of Marbled Godwits (*Limosa fedoa*) and Willets (*Catoptrophorus semipalmatus*) in areas of managed, natural, and no wetland basins in grazed mixed prairie habitat of s. Alberta. ATV surveys were carried out at 21 sites 3 times per year since 1995, and 9-10 of these areas (each 2 km²) were searched for nests once per year since 1998. Numbers of Willets and godwits were always highest in areas with managed wetlands: almost all natural wetland basins were dry in this region in most years. Numbers of Willet and godwit nests were also highest in areas of managed wetlands (but not always significantly so, especially for Willets). Wetlands may attract large numbers of avian and mammalian predators in response to increased numbers of ground-nesting birds (especially waterfowl). However, overall there was no difference in Mayfield nest success between areas with (1998: 15; 1999: 36) and without (1998: 18; 1999: 32) managed wetlands. Shallow managed wetlands appear beneficial to these upland-breeding sandpipers in this region.

335. Climate and satellite-derived land cover for predicting breeding bird distribution in the Great Lakes Basin. *Venier, Lisa A., McKee, Janice E., Pearce, Jennie L., McKenney, Dan W.* (Can. For. Serv., Sault Ste. Marie, Ont.), and *Niemi, Gerald J.* (Nat. Res. Research Inst., Duluth, Minn.)

We examined relationships between distribution of 10 forest songbirds in the Great Lakes Basin, large-scale climate and the distribution of land cover types. Specifically we addressed the following questions: (1) how well do AVHRR and MSS data capture the variation in distribution of bird species (as measured by Breeding Bird Atlas data)? (2) is one resolution of land cover data more useful than the other for

predicting distribution? (3) does climate add to the predictive ability of these models? Single-variable logistic regression with the forest classes of AVHRR and MSS land cover using evidence of breeding as the response variable (based on compiled Breeding Bird Atlas data) found that, with some exceptions, species responded to both AVHRR and MSS land cover types in the direction expected based on the known local habitat use of the species. Results from multiple logistic regression found that AVHRR land cover, MSS land cover, and climate each explain about the same variation in the distribution of evidence of breeding. Although the best models appear to be ones where climate and land cover are combined, the difference is not great. We conclude that both land cover and climate models can be used to generate good predictions of species distribution and explain very similar variation in distribution at this scale.

342. The indirect effects of fire suppression on avian biodiversity in eastern Newfoundland. *Lewis, Keith P.* (Biopsych. Progr., Memorial Univ. Nfld., St. John's, Nfld.)

Fire is the most important natural disturbance in many parts of the boreal forest, and many avian species rely on post-fire habitat. Many anthropogenic influences can interrupt natural successional patterns and alter local avian population dynamics (e.g. clear-cutting). Although rarely studied, fire suppression can also disrupt natural patterns of succession by reducing nutrient cycling and minimizing removal of the organic soil. This has direct effects on regeneration of black spruce (*Picea mariana*) as this tree requires exposed mineral soil for seeds to germinate. In Newfoundland, fire suppression may indirectly lead to the increase in the dwarf ericaceous shrub *Kalmia angustifolia* (*Kalmia* hereafter), which forms a thick, vigorous forest understory in open canopy black spruce forests. *Kalmia* can also form dense heaths that persist for decades, are resistant to herbivory, and inhibit forest regeneration. Few passerine species have been observed in *Kalmia* heaths. I report results of two experiments. First, a comparison of avian richness and abundance in *Kalmia* heaths, black spruce forest, black spruce forest with *Kalmia* understory, and open lands such as clear-cuts. Second, fire intensity in *Kalmia* heaths may influence avian assemblages by creating more exposed mineral soil for black spruce germination. This in turn could mean more niches for breeding and foraging birds. This study will isolate and identify an important gap in our knowledge of how boreal forest birds respond to altered patterns of vegetation succession and how landscape management can indirectly influence avian populations.

343. Monitoring songbird migration at Gros Morne National Park, Newfoundland. *Warkentin, Ian G.* (Envir. Sci., Memorial Univ. Nfld., Corner Brook, Nfld.), and *Flemming, Stephen P.* (Gros Morne Nat. Park, Rocky Harbour, Nfld.)

The Gros Morne Migration Monitoring Station was established to assess long-term changes in population levels of migratory birds moving along the west coast of insular Newfoundland. Located within Gros Morne National Park, it is the northernmost migration monitoring station in eastern North America. Because of its location in relation to the Atlantic Migration Monitoring Station on Bon Portage Island, Nova Scotia, data from the Gros Morne Station will help to identify numerical patterns associated with population changes in the Maritimes (Nova Scotia and New Brunswick) and eastern Québec vs. Newfoundland and Labrador. In the first two full years of operation (1998-1999), we banded 3270 birds of 46 species during approximately 4400 mist-net hours. Most birds moved through the Station in Jul (1.05 birds/mist-net hour) and Aug (2.11 birds/mist-net hour) with the three most common species being Northern Waterthrush (*Seiurus noveboracensis*; n=440, 13%), Blackpoll Warbler (*Dendroica striata*; n=432, 13%) and Ruby-crowned Kinglet (*Regulus calendula*; n=249, 8%). The Station is well-situated to collect

population trend data on several species from the region which are otherwise poorly monitored by the Breeding Bird Survey.

350. Cultural evolution in an isolated population of White-crowned Sparrows. *Chilton, Glen* (Dep. Biol., St. Mary's Coll., Calgary, Alta.)

In 1978, Lein (1979, *Can. Field-Nat.* 93: 272-275) recorded songs of 15 male White-crowned Sparrows (*Zonotrichia leucophrys oriantha*) in the west block of the Cypress Hills of Alberta. This group is separated from the next nearest population by ca. 270 km. Although the song of Cypress Hills males is similar in structure to other *oriantha* songs (whistle; complex syllables; 2 buzzes; terminal trill), the complex syllables and terminal trill are characteristic of the population. I recorded 51 males in the west and centre blocks of the Cypress Hills in 1999. The song was transmitted to the present essentially unchanged. The only difference was additional notes in the terminal trill, a feature of songs of all males recorded in 1999. Recordings made between 1978 and 1999 suggest that this change may have occurred rapidly. Songs of males in the west and centre blocks did not differ. When compared to other populations of White-crowned Sparrows, songs in the Cypress Hills show very little variation among males. This may be either a consequence of their isolation from other populations, or a feature of the subspecies.

352. Song types of Townsend's Warblers. *Innes, Douglas W.* (Courtenay, B.C.)

Song types are determined from an analysis of songs recorded for a species from different localities. What has been discovered about Townsend's Warbler (*Dendroica townsendi*) song types appears to be a result of research not specifically to study the song types found at a particular location. Beginning in 1992 I began recording songs of Townsend's Warbler from various localities on Vancouver Island and the neighbouring Gulf Islands, Strait of Georgia, British Columbia. An analysis of 440 sonograms has been made to determine the number of distinct song types that appear to be established at a particular locality, and song types that may not be established. Localities for the recordings for this study come from the Ecoregions classification system for British Columbia with the smallest unit being an ecoregion, which for this study is a large area with smaller units such as a valley or mountain range. My recordings come from 8 of the Gulf Islands in the Strait of Georgia Ecoregion; three Ecoregions from the Western Vancouver Island Ecoregion, and two Ecoregions from the Eastern Vancouver Island Ecoregion. Seven distinct song types appear to be established within this study area, and several other distinct song types may not be established. It appears that several populations of Townsend's Warblers with distinct song types are distributed on Vancouver Island and neighbouring Gulf Islands.

355. Song variation in a population of Willow Flycatchers. *Lein, M. Ross* (Dep. Biol. Sci., Univ. Calgary, Calgary, Alta.)

The nature of song variation in birds has been investigated extensively over the past half-century. However, few studies have addressed song variation in suboscine passerines, and detailed quantitative analysis of intra-individual and inter-individual song variation within local populations is lacking entirely. Such information is necessary for investigating the functional roles of song in communication by suboscines, and for assessing the evolutionary significance of possible geographic variation in song. I examined variation in the "fitz-bew" and "high fitz-bew" song types in a population of Willow Flycatchers (*Empidonax traillii*) in Alberta. Songs of individual males were recorded throughout the breeding seasons of 1996 and 1997. I measured temporal and frequency variables of songs using SIGNAL bioacoustical analysis software and conducted multivariate statistical analyses (PCA, DFA) to characterize patterns of variation within and

among individuals. Individual males showed limited variation in songs of the same type during single recordings, and across recordings made throughout the breeding season. However, there was substantial variation among males, permitting discrimination of songs of different individuals within the population. This suggests that individual recognition by song occurs in Willow Flycatchers. Future work will explore whether inter-population variation is sufficient to characterize the songs of Willow Flycatchers from different geographical areas.

360. Living among Murres: One Razorbill's Story. *Walsh, Carolyn J., Wilhelm, Sabina I., Stenhouse, Ian J.* (Biopsych. Progr., Memorial Univ. Nfld., St. John's, Nfld.), and *Storey, Anne E.* (Dep. Psych., Memorial Univ. Nfld.)

Since 1996, we have observed a male Razorbill (*Alca torda*) residing among a group of Common Murres (*Uria aalge*) on Great Island, Nfld.. Although there have been anecdotal reports of heterospecific colonial seabirds living and cooperatively interacting, and even reports of successful hybridizations among congeneric species (e.g. Common and Thick-billed (*U. lomvia*) Murres, Friesen et al. 1993, *Can J. Zool.* 71: 1474-1477), both the incidence and consequences of such events are generally unknown. We observed a Razorbill over 4 field seasons and recorded his interactions with marked Murres in our study plot. Behaviours recorded included (1) affiliative behaviours, such as allopreening and copulation attempts with females, (2) agonistic behaviours, such as fighting and chasing, and (3) chick-directed behaviours, including 4 separate incidents of "chick-napping". The presence of the Razorbill in the murre plot appeared to have negative impact on reproductive success of at least 2 pairs of murres by directly contributing to divorce of 1 pair and failure of another pair's egg. Costs to neighbours might also include increased energetic demands from antagonistic interactions that may arise from the Razorbill's need for greater spatial segregation within the plot. Thus, another consequence of the presence of a heterospecific resident in a colonial seabird plot may be decreased reproductive success for individuals breeding nearby.

363. Brood-rearing habitat selection by Barrow's Goldeneye and its effect on duckling growth, survival, and return rates. *Evans, Matthew* (Cen. for Wildl. Ecol., Simon Fraser Univ., Burnaby, B.C.)

Obtaining a suitable nest site is generally of paramount importance to breeding success in secondary cavity-nesting birds. Barrow's Goldeneye (*Bucephala islandica*), however, is a cavity-nesting duck that defends exclusive brood-rearing areas on ponds, and this defense has been interpreted as defense of food, suggesting that variation in pond quality is also quite important. We indexed the aquatic macroinvertebrate prey abundance available to goldeneye ducklings on 30 ponds in 1997, 1998 and 1999. Variation in invertebrate abundance among ponds was consistent between years, thus ponds vary predictably in their probable annual productivity. Neither initial clutch size nor pre-fledging duckling survivorship correlated with a pond's invertebrate abundance. However, ducklings raised on ponds with higher productivity had substantially higher body weights at 45 d old, and were more likely to return to the breeding grounds the following year. We conclude that food abundance in brood-rearing ponds has an immediate influence on duckling growth, which appears to affect post-fledging survival, making a substantial contribution to fitness differences among females. Predictable variation in pond productivity will strongly select for annual philopatry and territorial defense of more productive ponds by breeders, whereas birds breeding on less productive ponds would be expected to move to more productive sites in succeeding years. In this species, variation in duckling food, as well as nest-site availability, are strong components of fitness variation.

366. Seabird migration in the Canadian North Atlantic: Moulting locations and movement patterns of immatures. Huetmann, Falk (Can. Wildl. Ecol., Simon Fraser Univ., Burnaby, B.C.), and Diamond, Antony W. (Atl. Coop. Wildl. Ecol. Res. Network, Univ. New Brunswick, Fredericton, N.B.)

All seabirds in the Northwest Atlantic migrate, but timing and routes are not well understood. We evaluate existing knowledge on seabird migration with data from the PIROP (Programme Intégré de recherches sur les oiseaux pélagiques) database using observations of immature and moulting seabirds to track seabird migration for the following species: Northern Fulmar, Greater Shearwater, Northern Gannet, Herring Gull, Iceland Gull, Glaucous Gull, Great Black-backed Gull, Black-legged Kittiwake, Thick-billed Murre (*Fulmarus glacialis*, *Puffinus gravis*, *Morus bassanus*, *Larus argentatus*, *L. glaucoideus*, *L. hyperboreus*, *L. marinus*, *Rissa tridactyla*, *Uria lomvia*). The distributions of immature and moulting birds showed strong seasonal patterns; new transition zones and clear biological borderlines for seabird distribution were found. New data on timing and location of moulting Thick-billed Murres are presented. The southern Labrador Banks and Grand Banks (Thick-billed Murre, Northern Fulmar), and se Newfoundland and Georges Bank (Greater Shearwater) were identified as moulting grounds. In terms of marine conservation, the following areas seem to be important for parts of the life cycles of the species named: western Greenland, Cape Cod, Grand Banks, Labrador Banks, sw Newfoundland, and Grand Manan area.

369. Contaminants in nestling Tree Swallows from Atlantic Coastal Action Program (ACAP) sites in Atlantic Canada. Burgess, Neil M. (Can. Wildl. Serv., Envir. Can., Mt. Pearl, Nfld.), Bredin, Katherine A. (Can. Wildl. Serv., Sackville, N.B.), and Donaldson, Garry M. (Chelsea Creek Consulting, Chelsea, Qué.)

Tree Swallows (*Tachycineta bicolor*) have been used as biomonitors of sediment contamination across North America. The objective of this study was to determine the concentrations of PCBs, organochlorine pesticides, polychlorinated dibenzo-p-dioxins (dioxins), dibenzofurans (furans), and metals in Tree Swallow nestlings collected at 5 ACAP sites and two reference sites. Nest boxes were erected at each site and 2 nestlings were collected from each box when they were 16 d old. A single composite sample of whole-body swallow homogenate was analysed for organic contaminants from each site. A single composite sample of liver homogenate was analysed for trace metals from each site. PCB concentrations were elevated at St. Croix, Sydney and Miramichi (307, 269 and 142 ng/g wet wt, respectively) compared to the reference sites (39 & 43 ng/g). DDE levels were elevated at both Miramichi sites (84 and 89 ng/g) compared to all other sites (12-39 ng/g). Total dioxin concentrations were highest at Miramichi (Strawberry Marsh) and St. Croix (9160 and 1819 pg/g, respectively), as were total furan levels (555 and 142 pg/g). Dioxin-like toxicity, calculated as toxic equivalents (TEQs), was highest in swallows from Miramichi (Strawberry Marsh, 573 pg/g), primarily due to elevated concentrations of 1,2,3,7,8-PCDD. Selenium concentrations in swallow livers were elevated at Letang and Sydney (6.1 and 5.4 ng/g dry wt) compared to all other sites (2.0-2.9 ng/g). Tree Swallows from all sites in this study were less contaminated than swallows collected at polluted sites in the Great Lakes, St. Lawrence and Hudson Rivers.

370. Trends in organochlorine contaminants in seabird eggs from Atlantic Canada, 1972-1996. Burgess, Neil M. (Can. Wildl. Serv., Envir. Can., Mt. Pearl, Nfld.), and Garrity, Neville (Can. Wildl. Serv., Envir. Can., Sackville, N.B.)

Organochlorine contaminants were measured in eggs of 3 seabird species from 1972 to 1996, to monitor trends in marine environmental quality and assess possible risks to seabird health. Eggs were collected at 4-yr intervals from colonies of Double-crested Cormorant, Leach's

Storm-Petrel, and Atlantic Puffin (*Phalacrocorax auritus*, *Oceanodroma leucorhoa*, *Fratercula arctica*) in the Bay of Fundy, the St. Lawrence River estuary, and the east coast of Newfoundland. Organochlorine compounds monitored included DDE, PCBs, hexachlorobenzene, dieldrin, oxychlordane, beta-hexachlorocyclohexane and mirex. PCBs and DDE dominated the organochlorines found in the eggs. Concentrations of total organochlorines have decreased exponentially since the 1970s in all species and locations. For both PCBs and DDE, Double-crested Cormorant eggs had the highest concentrations followed by Leach's Storm-Petrel and then Atlantic Puffin. These differences reflect the different food habits and spatial distributions of the 3 species throughout the year. PCB and DDE concentrations were higher in seabird eggs from the Bay of Fundy and the St. Lawrence Estuary than those collected in eastern Newfoundland. The data suggest that Leach's Storm-Petrel may be an effective indicator of long-range atmospheric transport of persistent organic pollutants, as it feeds in the mid-Atlantic on surface crustaceans for much of the year. Current levels of organochlorine contaminants do not appear to be having significant impacts on seabird populations in Atlantic Canada. Further egg collections are planned for 2000 and will help confirm whether organic contaminant levels in Atlantic coast food webs are continuing to decline or have stabilized.

371. Lead exposure and poisoning in terrestrial raptors in southern Ontario. Martin, Pamela A., Bishop, Christine A. (Can. Wildl. Serv., Burlington, Ont.), Scheuhammer, Tony M. (Can. Wildl. Serv., Nat. Wildl. Res. Cen., Hull, Qué.), and Campbell, Douglas (Dep. Pathobiol. Univ. Guelph, Guelph, Ont.)

Secondary poisoning of raptors with lead shot from waterfowl hunting has been well documented. In contrast, the degree of lead (Pb) exposure and poisoning in the raptorial predators of upland species has been little studied, although a recent study of American Woodcock (*Scolopax minor*) revealed a high incidence of Pb accumulation. In a survey of approximately 120 raptors submitted to the Canadian Cooperative Wildlife Health Centre in so. Ontario in 1993-95, 4 birds contained concentrations of Pb in liver and kidney indicative of Pb poisoning as the cause of death. Twenty-eight birds had detectable low levels of Pb in the bone, indicating life-long exposures to lead, but not recent acute exposure. Within this group however, an American Kestrel (*Falco sparverius*), a Sharp-shinned Hawk (*Accipiter striatus*) and a Great Horned Owl (*Bubo virginianus*) also contained elevated liver and kidney levels indicating recent though probably sublethal lead exposure. Overall, approximately 30% of Red-tailed Hawks (*Buteo jamaicensis*) and Great Horned Owls and 50% of kestrels contained detectable lead levels. Of 5 Cooper's Hawks (*A. cooperii*) and 15 smaller owls, a single Eastern Screech-Owl (*Otus asio*) contained detectable bone lead. The sole Turkey Vulture (*Cathartes aura*) submitted had very high levels of bone lead. Sources of lead in these various species may include the consumption of roadside prey contaminated with lead from historic gasoline combustion, as well as hunter-crippled upland game.

372. Exposure of terrestrial raptors to environmental lead - determining sources using stable isotope ratios. Martin, Pamela A., and Barrett, Glenn (Can. Wildl. Serv., Burlington, Ont.)

Secondary poisoning of raptors with lead shot from waterfowl hunting has been well documented; however, the exposure of upland-feeding terrestrial raptors to dietary lead (Pb) has received less attention. A recent investigation of lead levels in the tissues of dead terrestrial raptors submitted by the public indicated that at least half of all American Kestrels (*Falco sparverius*), Red-tailed Hawks (*Buteo jamaicensis*) and Great Horned Owls (*Bubo virginianus*) had low but detectable levels of Pb in the bone, and a handful had much higher

levels in liver indicating recent acute exposure. The sources of Pb exposure to these species is uncertain. In autumn 1999 we took blood samples from apparently healthy hawks trapped during migration at the banding station at Hawk Cliff, on the north shore of Lake Erie; we also obtained blood from raptors submitted to rehabilitation centres in so. Ontario. Total Pb and stable Pb isotopes were measured. The use of stable Pb isotope ratios is useful in determining the source of Pb exposure to wildlife. None of the birds sampled had levels that indicated Pb poisoning (>1 ppm). Of migrating birds, 2/8 American Kestrels, 0/3 Merlins (*Falco columbarius*), 1/9 Cooper's Hawks (*Accipiter cooperii*), 3/16 Sharp-shinned Hawks (*A. striatus*), 1/6 Northern Goshawks (*A. gentilis*), 2/14 Northern Harriers (*Circus cyaneus*) and 1/23 Red-tailed Hawks had levels indicating sub-lethal Pb exposure (0.15-1 ppm wet weight). Many additional migrants had detectable but low levels of Pb (0.04-0.15 ppm). The stable Pb isotope ratios for most samples fell within the range of Pb shot pellets; 3 were within the range for leaded gasoline.

373. Reproductive success, environmental contaminants and diets of nesting Bald Eagles from Placentia and Bonavista Bays, Newfoundland. Dominguez, L., Montevicchi, W. A. (Biopsych. Progr., Memorial Univ. Nfld., St. John's, Nfld.), Brazil, J. (Dep. For. Res. & Agrifoods, St. John's, Nfld.), and Burgess, N. M. (Can. Wildl. Ser., Mount Pearl, Nfld.)

We investigated contaminant levels and reproductive success of Bald Eagles (*Haliaeetus leucocephalus*) breeding in Placentia and in Bonavista Bays, Newfoundland. The main objectives of the study were: (1) to provide the first data on contaminant levels and reproductive success of Bald Eagles in Newfoundland, (2) to compare contaminant levels of Bald Eagles in a relatively industrialized area (Placentia Bay) and in a non-industrialized area (Bonavista Bay). Both study areas had high Bald Eagle breeding densities and reproductive success. Organochlorine and metal concentrations in nestling tissues and in addled eggs were relatively low in both areas. Mean concentrations of PCBs and DDE in nestling plasma were significantly higher in Placentia Bay than in Bonavista Bay. Blood concentrations of mercury and other metals were not significantly different between bays. In Placentia Bay, nests that were located nearer a former U.S. naval base had higher mean concentrations of PCBs and DDE than nests located further away, but metal concentrations were not significantly different. Frequencies of occurrence of fish and bird prey remains collected at nest sites, and nestling blood concentrations of stable nitrogen isotope ^{15}N were not significantly different between Placentia and Bonavista Bays, or between the nests closer to and more distant from the naval base. There were no significant relationships between contaminant and ^{15}N blood concentrations. These results suggest that the observed differences in organochlorine levels are not due to differences in dietary trophic level of the breeding pairs and could be related to local sources of pollution. Contaminant burdens in Bald Eagles from Newfoundland were lower than levels associated with impairment of reproduction.

374. Permeability of three boreal landscapes to forest bird movements. Gobeil, Jean-François, and Villard, Marc-André (Dép. biol., Univ. Moncton, Moncton, N.B.)

The structure of boreal forest landscapes largely reflects their fire history. To persist, boreal species have had to adapt to disturbances, some occurring over large areas. In regions such as north-central Alberta, anthropogenic activities have rapidly progressed northward. As a result, agriculture, forestry and gas exploration are now the main agents of landscape change. However, the associated changes are different in nature and occur at faster rates than those resulting from fires. Organisms might not have had the time to adapt, and key ecological processes might be hindered. This may be the case for the

dispersal of certain forest bird species. To assess this, we undertook a 2-yr study to determine the relative permeability of forest landscapes to the movements of the Ovenbird (*Seiurus aurocapillus*), a habitat specialist, and the White-throated Sparrow (*Zonotrichia albicollis*), a habitat generalist. We compared movements in three types of forest landscapes: (1) agricultural, (2) harvested, and (3) unbroken. These landscapes varied with respect to the proportion of mature forest present, its spatial configuration, and matrix characteristics. We captured territorial males, and banded and displaced them from their territories. We measured return time and return success of individuals by monitoring their territory. Individuals of both species were more likely to return and returned faster to their territories in the harvested than in the agricultural landscape, suggesting that matrix characteristics influence movements. Ovenbird return times were shortest and return probability was highest in the unbroken landscape whereas we found the opposite for the White-throated Sparrow. Other variables (e.g. landscape metrics) could explain differences observed between landscapes.

380. Impact of an extreme ice storm on birds. Blais, Jonathan (Dep. Biol., Laval Univ.), Savard, Jean-Pierre L., and Gauthier, Jean (Can. Wildl. Serv., Sainte-Foy, Qué.)

The ice storm of early Jan 1998 in Québec was quite dramatic with nearly non-stop freezing rain during the 7 d of the storm and with temperatures below 0°C. We compared the results of Christmas Bird Counts (complete counts conducted within a 12-km radius by volunteers in winter) conducted before (1998) and after (1999) the storm in control areas (16 sites) and in affected areas (15 sites). Abundance ratios (after/before) were significantly higher in control vs. affected sites for Rock Dove, Mourning Dove, Hairy Woodpecker, Blue Jay, Black-capped Chickadee and House Sparrow (*Columba livia*, *Zenaida macroura*, *Dendrocopos villosus*, *Cyanocitta cristata*, *Poecile atricapilla*, *Passer domesticus*). Paired 't' tests also indicated that the abundances of Brown Creeper (*Certhia americana*) and Downy Woodpecker (*D. pubescens*) were also lower in affected sites following the storm. Only 1 species, European Starling (*Sturnus vulgaris*), increased significantly in affected sites. Species from open habitats, that forage mostly on the ground, were less affected by the storm than tree foragers. The impact of the storm on bird populations was judged quite significant as it was detected by such a crude survey technique. Increased frequency of such storms could have drastic consequences on bird populations.

381. Habitat relationships of boreal forest birds in managed mixedwood forests. Bismanis, Andra, and Kessler, Winifred (For. Progr., Univ. No. Brit. Col., Prince George, B.C.)

Changes in the bird community in response to partial-cutting treatments applied in the boreal forest in the Fort Nelson Forest District, British Columbia, are being documented. This information and an independent data set from the Dawson Creek Forest District will be used to test how well bird species-habitat models developed for Alberta explain boreal forest/bird habitat relationships in different geographic areas and habitat situations in British Columbia. After 1 field season, bird species composition and frequency of detection were compared between 4 partial-cut sites and 2 uncut sites. Preliminary results showed that there was a difference in species composition between cut and uncut sites and that the frequency of detection was higher in the cut sites than in the uncut sites.

382. The effects of gull control on gull dispersal and predation at a Roseate Tern colony. Smith, Tasha (Dep. Biol., Dalhousie Univ., Halifax, N.S.)

A core breeding colony for endangered Roseate Terns (*Sterna dougallii*) in Canada is Country Island, Nova Scotia. Following heavy

predation by corvids and larid gulls in 1996, this site was abandoned. In response, a non-lethal gull control program was initiated to disperse gulls from the island. However, the effects of gull control on predator and prey populations outside the target site are poorly understood. There is little information about where displaced gulls re-locate and if subsequently they attempt to breed. Furthermore, little is known about the characteristics of gulls responsible for continued predation. The purpose of my study is to examine whether gulls displaced from Country Island re-nest at nearby islands or if they leave the area, and to determine the geographical source, identity and characteristics of gull predators on Country Island terns. In my first field season (summer 2000), to examine gull dispersal, I trapped, banded and dyed Country Island gulls, and surveyed the local area bi-weekly to determine the location, breeding status and success of gulls marked on Country Island. Furthermore, I investigated whether gull species and characteristics of the post-dispersal site affect gull dispersal patterns. To identify individual predators, I marked gulls on Country Island and on nearby gull colonies, and monitored the tern colony for marked gulls. This information may be useful in assessing the effectiveness and local impacts of gull control on Country Island. For instance, knowing the locations of gulls displaced from Country Island may help assess the risk that non-lethal control may pose to other seabird populations in the area.

385. Trends in Northern Gannet colonies in Atlantic Canada and a novel method for counting aerial photographs of gannets and other seabirds. Chardine, John W. (Can. Wildl. Serv., Sackville N.B.) There are currently 6 Northern Gannet (*Morus bassanus*) colonies in North America, 3 of which occur in Atlantic Canada (all in Newfoundland). The colonies at Cape St. Mary's, Baccalieu Island, and Funk Island have been overflown, photographed, and the photographs counted, every 5 yr since the early 1970s. Survey results show that numbers of site-holding pairs at the 3 colonies have been increasing at a rate of about 4% per annum, and that the colonies have more than doubled in size since the early 1970s. If a large proportion of the site-holding pairs observed on photographs are actually breeding, the current North American breeding population numbers close to 80,000 pairs. The 1999 survey photographs were counted with the help of a computer. Medium format negatives were scanned onto Kodak Pro Photo CD, at various resolutions up to a maximum of about 100 pixels/mm. Only the highest resolution scans were counted. Each scan was read by Adobe Photoshop, ver. 4, and adjusted to optimise brightness, contrast, and other image attributes. In preparation for counting, a new, transparent, "count" layer was created above the scan, through which the image could be viewed on the computer monitor. If necessary, colony outlines were drawn on another transparent layer. Onto the "count" layer, a square dot of a 3 x 3 black pixels was placed above each site-holding bird or pair with a click of the mouse using the Photoshop pencil tool. Once all targets were "dotted", the Histogram command in Photoshop was used to count the number of pixels on the new layer. The pixel count was divided by the number of pixels per dot (9) to obtain a count of the total number of dots on the image. This method has the advantages of combining human decisions about targets with the ability of the computer to provide repeatable counts, quickly. An added bonus is that the photograph, and the count and outline layers can be saved in a computer file and archived on CD.

389. An examination of population structure in Brewer's Sparrows using DNA microsatellites. Croteau, E., Lougheed, S.C. (Dep. Biol., Queen's Univ. Kingston, Ont.), Krannitz, P. (Can. Wildl. Serv., Delta, B.C.), Mahoney, N. (Cen. Appl. Cons. Biol., Univ. Brit. Col., Vancouver, B.C.), Boag, P.T., and Davila, J. (Dep. Biol., Queen's Univ.)

This study examines the genetic structure of B.C. populations of

Brewer's Sparrows (BRSP; *Spizella breweri*) using genetic markers from DNA from contour feathers, with the ultimate goal of providing inputs into conservation of this species. Breeding Bird Survey data suggest that over the last 30 yr Brewer's Sparrow populations have declined at an average of 4% per year. Detailed regional analyses indicate that the species is collapsing at the center of its range, making the peripheral populations a potentially important refuge for the species. Beginning in 1997, demographic data from 4 subpopulations of Brewer's Sparrow will be used to develop a model of population viability. An assessment of levels of genetic differentiation, inbreeding and gene flow is key to an accurate population viability analysis. To this end, we are using high-resolution DNA microsatellite markers to quantify levels of genetic diversity within and among BRSP populations. DNA was obtained from 125 contour feathers collected from BRSP from 7 populations: 4 populations from the demographic study, 2 other populations in BC, and 1 from adjacent Washington State. These data will provide robust estimates of genetic connectivity, demographic independence among populations, and intrapopulation genetic diversity. Combined with demographic information, these genetic data will result in a comprehensive conservation strategy.

393. Eggs of Spruce Grouse dry at a faster rate than those of Ruffed Grouse. Bendell, J.F. (Clayton, Ont.)

A clutch of eggs of Spruce Grouse (*Falcapennis canadensis*; n=6 eggs) and 4 clutches of Ruffed Grouse (*Bonasa umbellus*; n=22 eggs) were kept in a drying chamber and weighed every 2-3 d for 2 mon. Ruffed Grouse eggs lost moisture at a slower rate than eggs of Spruce Grouse. This may have relevance to habitat selection.

396. An analysis of continental and regional abundance patterns of boreal finches from Christmas Bird Count data. Wren, L. Sarah, Montevicchi, William A. (Biopsych. Progr., Memorial Univ. Nfld., St. John's, Nfld.), and Hermanutz, Luise A. (Dep. Biol., Memorial Univ. Nfld.)

Christmas Bird Count (CBC) data are useful in the study of winter population trends and spatial abundance patterns of many species of birds across broad temporal and geographic scales. The CBC provides the most comprehensive long-term and broad-scaled population data for many North American taxa, such as boreal finches that are found in northern latitudes. Previous map-based studies of the spatial abundance patterns of boreal finches have demonstrated an inter-specific synchronicity in their periodic irruptive movements. The present study incorporates CBC data from higher latitude boreal forest zones, which are year-round boreal finch habitat and have been excluded from previously published studies. Results show inter-specific synchronicity between large irruption years, which correlates with the periodic nature of boreal cone crops. Abundances of boreal finches were also examined from CBC counts in varied boreal forest habitats in Newfoundland. On such a regional scale, CBC counts are a useful tool for the analysis of population trends between and within habitats, as illustrated by the CBC data that indicate a recent and precipitous decline of the Newfoundland Red Crossbill, *Loxia curvirostra perna*. Integrating CBC data with more intensive research on the population dynamics and winter ecology of these cone-dependent finches can provide useful tools that can assist in the conservation of boreal forest ecosystems.

397. Within home-range space-use patterns of Cerulean Warblers breeding in southeastern Ontario. Barg, Jennifer J., and Robertson, Raleigh J. (Dep. Biol., Queen's Univ., Kingston, Ont.)

Space-use patterns are derived from spatial coordinate data sampled sequentially in time, usually collected via radio-telemetry studies. Such investigations are commonly reported in the wildlife management literature on large organisms capable of bearing the

weight of a transmitter, and frequently examine population level patterns at large scales. When used in combination with resource availability data, space-use patterns go one step further and reveal selection or preference for resources for the target population. These types of investigations are equally important at small scales, such as the home-range, and are especially important for the continuing preservation of critical populations. Here we examine within home-range space-use patterns, specifically home-range size, utilization distribution, and core area, for individuals in a population of Cerulean Warblers (*Dendroica cerulea*) breeding in se. Ontario during 1999 and 2000. Little is known about Cerulean Warbler space use and habitat selection at the scale of the home-range. We used direct observations of Cerulean Warblers in lieu of radio-telemetry data, as this species is incapable of carrying even the lightest transmitters currently available. These patterns will eventually be examined together with foliage data to reveal whether some within home-range habitat selection might be at work. This is especially important for se. Ontario populations which are experiencing unparalleled reproductive success.

399. Inshore arrival time of capelin and the productivity of Black-legged Kittiwakes: A new look at the match/mismatch hypothesis. Jamieson, Sarah E., and Montevecchi, William A. (Dep. Biol. & Psychol., Memorial Univ. Nfld., St. John's, Nfld.)

According to the Match/Mismatch Hypothesis, the year-class strength of many fish species depends on whether or not larval fish and planktonic prey are temporally and spatially matched. This study investigates whether or not the same principle can be applied to Black-legged Kittiwakes (*Rissa tridactyla*) and capelin (*Mallotus villosus*), the dominant forage fish in the Northwest Atlantic. Relationships among kittiwake productivity, hatch dates, capelin inshore arrival dates, and sea-surface temperature were examined. Kittiwake data were collected during the 1990s from Funk Island, Baccalieu Island, Witless Bay and Cape St. Mary's Ecological Reserves. There were no

significant correlations among these variables, but several trends were evident. In years when kittiwake productivity was low, both hatching date and capelin inshore spawning date tended to be late. In addition, when sea-surface temperatures were higher than 'normal', capelin spawned inshore earlier and kittiwake productivity was high. These trends suggest that the Match/Mismatch hypothesis can be applied to higher trophic levels in the marine ecosystem, but that large sample sizes of annual data points will be needed to demonstrate these relationships.

405. Seabird monitoring design and results - Terra Nova Development, Grand Banks. Williams, U., Knox, K., Graham, G., White, P., and Burke, R. (Terra Nova Dev't, Petro-Canada, St. John's, Nfld.)

The Terra Nova Development is an offshore oil project on the Grand Banks 350 km east of St. John's, Nfld. The Terra Nova field will be developed using a Floating Production Storage and Offloading platform, with production scheduled to commence in the first quarter of 2001. In 1999, a monitoring program, to collect data on occurrence of seabirds at the development, was implemented, with drilling activity to commence in March 2000. Concurrent with the monitoring was a program (started in 1998) to assist recovery of Leach's Storm-Petrels that, confused by lights, may land aboard the Terra Nova offshore facilities. In 1999, 4,858 seabirds were observed in the vicinity of the Terra Nova Development. Greater Shearwaters (*Puffinus gravis*) were the most abundant species; Black-legged Kittiwakes, Northern Fulmars, Leach's Storm-Petrels, and murrelets (*Rissa tridactyla*, *Fulmarus glacialis*, *Oceanodroma leucorhoa*, *Uria* spp.) were also observed. In March-June 2000 about 900 seabirds were observed at the site; once again Greater Shearwaters were the most numerous species. In 1998-99, 81 storm-petrels were found on board Terra Nova vessels; 76 were successfully released.

Business arising from 2000 A.G.M. of S.C.O.

- New Editor

Upon recommendation from the Publications Committee & executive approval, the next Editor of *Picoides* will be Dorothy McFarlane. Dorothy completed her M.Sc. at U.N.B. last year, as a 'mature student'. In this new appointment, she will need all the cooperation and assistance members have extended to previous Editors of this bulletin - and more. She provided covers for two previous issues of *Picoides*, and also for this one. Thank you, Dorothy!

Contact Dorothy at:

521 Holtville Rd., Holtville, N.B. E6A 1Y4

Voice: 506-369-2604; e-mail: mandd@nbnet.nb.ca

- Election results

The new Councillor is Dr. Gilles Gauthier (contact as on inside front cover). Congratulations, Gilles!

- S.C.O. to find nominations to I.O.C. 'Committee of 100'

The International Ornithological Committee (the group that organizes the Congresses every 4 years) seeks nominations of additional Canadian members, replacing those age 65 or over who no longer count in the country's 'quota'. S.C.O. has been asked to seek and coordinate nominations to the Committee. We can

nominate 4-5 new members; it would be helpful to give the selection committee a choice among a larger number. A good number of potential candidates have suitable stature in ornithology; another criterion is that they be able and ready to attend most future congresses - which may entail major travel (next Congress, 2002, is in Beijing; the last was in Durban).

Please send suggestions to:

Dr. Fred Cooke,

CWS/NSERC Chair - Wildlife Ecology, Simon Fraser University, Burnaby, B.C. V5A 1S6;
phone 604-291-5610; fax 604-291-3496; e-mail fcooke@fraser.sfu.ca

Those already on I.O.C., NOT to be re-nominated, are:

SENIOR MEMBERS (over 65, not part of quota)

- Tony Erskine, Bruce Falls, Allen Keast;

Dave Boag also was, but has resigned;

NATIONAL MEMBERS

- Allan Baker, Jon Barlow, David Bird, Hans Blokpoel, Peter Boag, Fred Cooke, Raymond McNeil,
David Nettleship; Fred Cooke turns 65 this year, thus will be in Senior category by 2002
Beijing congress.

S.C.O. STUDENT AWARDS

Reports from 2000 Awardees

(a) James L. Baillie Student Research Award

“Vocal communication in Black-capped Chickadees: eavesdropping affects reproductive performance” (title added by Editor).

Daniel Mennill, Queen's University.

We often think of animal communication as the exchange of information between two individuals, where one individual sends a signal and a second individual receives and interprets that signal. For example, we believe that bird song serves two main purposes. Under a territory defense model we assume that male birds sing so that male receivers will know their willingness to defend a breeding territory. Under a mate attraction model we assume that males send information to female receivers in order to attract a mate. An alternative way to think about animal communication is to consider information exchange within a network of individuals, where many signallers and receivers

send information back and forth simultaneously with all other individuals within hearing range. Given that many animal vocalizations, including bird song, travel very far relative to the distance between individuals, a communication network model may be an appropriate one to help us understand the ecology and evolution of animal communication.

My research focuses on one type of receiver behaviour that occurs within a communication network: eavesdropping. Eavesdropping occurs when one individual extracts relative information from an exchange between two other individuals without being directly involved in that interaction. Specifically, I am interested in whether females assess males' relative quality by eavesdropping on male-male song contests. In 1999 and 2000 I used interactive playback to engage pairs of high-ranking and low-ranking male Black-capped Chickadees (*Poecile atricapilla*) in singing contests with simulated intruders. I followed females to test whether their behaviour changed after hearing their mates 'win' or 'lose' song contests with a simulated intruder, and I collected blood samples to test

whether females changed their copulation strategies following playback.

In January of both 1999 and 2000 I banded ~150 adult chickadees at Queen's University Biological Station north of Kingston, Ontario. Throughout February and March I determined the chickadees' winter flock hierarchies by watching colour-banded birds interact at experimental dominance feeders. At the onset of the breeding season in early April, I chose dyads of neighbouring high-ranking and low-ranking males for playback. Using Syrinx sound analysis software on a laptop computer connected to a loudspeaker, I performed interactive playback which allowed me to pitch-match and overlap the songs of territorial male chickadees. In experimental treatments I demoted high-ranking males by pitch-matching and overlapping their songs during playback, and I promoted low-ranking males by avoiding both pitch-matching and overlapping.

To investigate whether females eavesdropped on the interactions between focal males and simulated intruders, I followed both females in each dyad on the morning of playback and the morning after playback to see if they preferentially forayed into the territory of the neighbour who was promoted through playback. I used radiotelemetry to follow several experimental females and obtained over 100 hours of behavioural observations before and after playback trials. This is the first time radiotelemetry has been used to study Black-capped Chickadees. Throughout all observation periods, both with and without the use of radiotelemetry, I found very few instances of extra-territorial forays or extra-pair copulations. Hence the behavioural observations did not indicate support for the female eavesdropping hypothesis. The results from my first two field seasons of radiotelemetry indicated that extra-pair copulations are highly covert behaviours in Black-capped Chickadees.

Results from paternity analyses revealed a very different picture of female eavesdropping. In Queen's University Molecular Ecology Lab I conducted microsatellite paternity analyses on blood samples collected from nestlings. Preliminary results suggested that females altered their reproductive decisions after eavesdropping on song contests

where their mate 'lost' to a simulated intruder. Although females paired to high-ranking males do not typically seek copulations outside of their social partnership, microsatellite paternity analyses reveal that females sought such copulations following experimental playback treatments. This is an important result which suggests that females indeed eavesdrop, that eavesdropping influences female mating strategies, and that short playback sessions may alter reproductive success of playback subjects. Furthermore, these preliminary results suggest that territory defense and mate attraction may be concurrent functions of signals that reach the ears of many different receivers within a communication network. In the coming months I will undertake a third field season and complete paternity analyses to examine further the female eavesdropping hypothesis.

I anticipate completion of my dissertation by August 2002. My first publication based on this research recently appeared in the journal *Bioacoustics*; preliminary results were presented in a poster at the A.O.U./S.C.O. conference in St. John's, Nfld.. You can learn more about my research on female eavesdropping and Black-capped Chickadees at <http://biology.queensu.ca/~mennilld>.

I am very grateful for support through Society of Canadian Ornithologists. I also acknowledge support by American Ornithologists' Union, Animal Behavior Society, Frank M. Chapman Memorial Fund, Association of Field Ornithologists, for research funding, and Queen's University and Natural Sciences and Engineering Research Council of Canada scholarship funding.

(b) Percy A. Taverner Awards

(i) **"Phylogenetic relationships of the Charadriiform superfamily Laroidea (gulls, terns, skimmers, skuas and alcids)"**, Tara A. Paton, R.O.M. and Univ. Toronto

The most comprehensive study of evolutionary relationships among all extant families of birds (Sibley & Ahlquist 1990) used DNA-DNA hybridization. In that study, families of order

Charadriiformes were arranged into three phylogenetic groups: 1) a basal clade, parvorder Scolopacida, with superfamilies Jacanoidea (Jacanas and Painted-snipes) and Scolopacoidea (Plains-wanderer, Seedsnipes, and Sandpipers, Snipes and allies); 2) a clade of superfamilies Chionidoidea (Sheathbills) and Charadrioidae (Thick-knees, Plovers, Avocets and Stilts, and Oystercatchers); and 3) a clade with superfamily Laroidae (Coursers and Pratincoles, Crab Plovers, and the family Laridae combining gulls, skuas and jaegers, alcids, skimmers and terns). Current thought now considers Laridae to encompass only gulls, the other groups having separate familial status: Sternidae (Terns), Stercorariidae (Skuas and Jaegers), Rynchopidae (Skimmers) and Alcidae (Alcids and allies).

Objectives of this study were 1) to determine phylogenetic placement of the Laroidae superfamily relative to other Charadriiform groups; 2) to determine evolutionary relationships among Laridae, Sternidae, Rynchopidae, Stercorariidae and Alcidae; and 3) to investigate and compare phylogenetic signal from mitochondrial and nuclear sequences from these families. Previous studies using morphological and biochemical evidence showed little congruence, especially on deep-branch phylogenetic relationships within Charadriiformes. Osteological and chemical evidence suggested Alcidae are the basal family of Charadriiformes but showed little agreement or resolution on relationships of the remaining families. Alternatively, biochemical evidence suggested Alcidae should be grouped with gulls and allies, and that this group is either the basal clade or related to Chionidoidea & Charadrioidae rather than to Scolopacida. There is no consensus on relationships among Laridae, Sternidae, Rynchopidae, Stercorariidae and Alcidae from these forms of evidence. Further examination of these families is indicated.

To resolve this systematic uncertainty, 12 protein-coding and two ribosomal RNA genes from mitochondrial DNA (approx. 11,000 bp) were sequenced from Great Skua (*Stercorarius skua*), Atlantic Puffin (*Fratercula arctica*), Black-legged Kittiwake (*Rissa tridactyla*) and Black Skimmer

(*Rynchops niger*) and 9000 bp from South American Tern (*Sterna hirundinacea*). Sequences from these families were analyzed with those from other families including Scolopacidae, Haematopodidae (provided by A.J. Baker), Pedionomidae, Thinocoridae, and Chionidae. Nucleotide diversity among these five Laroidae families ranged from 12.7% (*S. skua* & *F. arctica*) to 14.3% (*S. skua* & *R. niger*), comparable to that seen among other Charadriiform families. As examination of sequences revealed unequal base compositions and rates of substitution between families, phylogenetic tree-building methods that correct or are unaffected by these biases were used. Phylogenetic trees were constructed using log-determinant distances with neighbour-joining and maximum likelihood. The phylogenetic hypotheses generated, with those from morphological and biochemical evidence, were tested by comparing log-likelihood scores under a non-homogenous maximum likelihood framework. Evolutionary relationships inferred from this molecular evidence would not be biased by different rates or modes of evolution between families.

Contrary to other evidence, the most likely phylogenetic hypothesis using mitochondrial DNA sequences is that Laroidae (gulls, terns, skimmers, skuas and alcids) are sister clade to Scolopacida (jacanas, sandpipers, Plains-wanderer, seedsnipes, etc.), and that Chionidoidea/Charadrioidae (plovers, oystercatchers, sheathbills, etc.) are the basal clade in Charadriiformes. This phylogenetic arrangement has not been recovered using other forms of evidence. Among the Laroidae, the best-supported relationships are that Laridae and Sternidae are each other's closest relatives, followed by Rynchopidae, Stercorariidae and Alcidae. Stercorariidae and Alcidae were sister groups in this analysis, but this may reflect taxon sampling as *S. skua* is considered aberrant in Stercorariidae. Analysis of other species might allow clarification of placement of this family. Except for placement of Stercorariidae, these relationships agree with those found by DNA/DNA hybridization.

DNA sequences were also collected for these Charadriiform families for approx. 2900 bp of nuclear RAG-1 gene (MS in prep.). Phylogenetic

analysis revealed relationships among the Laroidae identical to those found using mitochondrial sequences. As nuclear genes evolve slower than mitochondrial genes, phylogenetic placement of closely related families (as those examined here) is less well supported.

Future work will involve completion of mitochondrial genome sequencing for the families discussed here as well as other families in this order. A larger amount of sequence and sufficient taxon sampling will assist in generating a well-supported Charadriiform phylogeny that will be of use in studies of shorebird biology and behaviour.

I thank the Society of Canadian Ornithologists for a Taverner Award to assist my research funding. I also acknowledge other funding from Frank M. Chapman Memorial Fund and Natural Sciences and Engineering Research Council of Canada (under A.J. Baker). I am grateful for assistance and helpful discussions from A.J. Baker, O. Haddrath, S. Pereira, G. Ybazeta, M. Burbidge and A. Given.

(ii) **"Factors affecting foraging behaviour of the endangered Harlequin Duck (*Histrionicus histrionicus*) in winter"**, Joel P. Heath, Memorial University of Newfoundland

The eastern North American population of Harlequin Ducks (*Histrionicus histrionicus*) is classed as endangered. Little is known about their behavioural ecology and habitat requirements. Populations are estimated at about 1800 birds, which is below or near minimum effective population size. Harlequin Ducks are highly philopatric and tend to localize at few wintering sites, making them vulnerable to disturbance, oil contamination, and illegal hunting. The purpose of this project was to investigate foraging strategies and daily movement patterns of the Newfoundland population during winter.

Cape St. Mary's Ecological Reserve (46°48'N, 54°14'W), a headland area in southeastern Newfoundland, supports approx. 100 Harlequin Ducks in winter, localized in Golden Bay. Topographic features of this south-facing, horseshoe-shaped bay provide sheltered locations where

Harlequin Ducks haul out of water onto the rocky shoreline. These localities may be particularly important for behavioural thermoregulation, as Cape St. Mary's has some of the highest reported wind speeds in Canada, and winter air temperatures are usually below freezing.

To determine daily movement patterns in relation to environmental conditions, weekly surveys were conducted along coastlines of Golden Bay in October-March 1998-2000. Harlequin Duck locations were plotted on topographic maps, and weather conditions (wind speed & direction, sea state, temperature, precipitation) were recorded. Continuous observations of flock foraging behaviour (dive durations, surface pauses, foraging & resting bouts) were also recorded dawn to dusk, whenever birds were present. Foraging observations were made during 21 complete days January-April in 1999 and 2000.

Weekly surveys indicated that Harlequin Ducks selected micro-habitats in response to wind speed and direction. Adjacent haul-out and foraging sites were used at locations that provided maximum protection from wind that day. This suggested wind and related sea state are important determinants of haul-out and foraging site selection. Preliminary SCUBA surveys indicated that foraging patches were similar in both depth and prey composition. Topographic features are likely important in localizing the Harlequin population within this region. Golden Bay has a variety of foraging and haul-out sites within short distances, that allow protection from prevalent wind and sea state conditions. A bay with similar topographic features at Isle au Haut in Maine is the primary locality for wintering Harlequin Ducks in eastern North America.

Preliminary analysis of full-day foraging activities indicated a variety of behavioural strategies used during harsh winter conditions. Foraging effort exhibited cyclicity, and increased as daylight remaining decreased, the last foraging bout of the day being substantially longer than previous ones. These patterns are consistent with current risk-sensitive foraging theories and suggest that flexible behaviour through the day is important in allowing

Harlequin Ducks to balance daily energy budgets.

This research provided quantification of sequential daily foraging behaviour in these waterfowl and indicated the importance of available microclimates for wintering Harlequin Ducks in eastern North America. This information is important for conservation and management of this endangered population, as previous research suggested that, to survive the winter months, Harlequin Ducks in the

North Atlantic may be pushed to their physiological limits.

Thank you to the Society of Canadian Ornithologists for support of this project through a Taverner Award. Funding was also provided by World Wildlife Fund of Canada Endangered Species Recovery Fund grant (to W. A. Montevecchi), and Mountain Equipment Co-op Environment Fund support to JPH.

Call for Nominations - DORIS HUESTIS SPEIRS AWARD

The Doris Huestis Speirs Award is the Society of Canadian Ornithologists' most prestigious honour, presented annually to an individual who has made significant lifetime contributions to Canadian ornithology. Previous awards were presented to W. Earl Godfrey (1986), F. Graham Cooch (1987), H. Albert Hochbaum (1988), C. Stuart Houston (1989), J. Bruce Falls (1990), Louise de K. Lawrence (1991), Thomas H. Manning (1992), Fred Cooke (1993), Anthony J. Erskine (1994), Robert W. Nero (1995), James Murray (1996), Hugh J. Boyd (1997), Ian McTaggart-Cowan (1998), Henri R. Ouellet (1999), James N.M. Smith (2000).

To nominate a candidate, with or without supporting data, please contact the committee chair for the Doris Huestis Speirs Award:

Dr. Erica Nol, Dept. of Biology,
Trent University, Peterborough, Ont. K9J 7B8
(PH: 705-748-1011,x1640; FX: 705-748-1205; EM: enol@trentu.ca)

RECENT DEVELOPMENTS AT BIRD STUDIES CANADA (BSC)

by Charles M. Francis, BSC, P.O. Box 160, Port Rowan, Ontario N0E 1M0

Bird Studies Canada (BSC), formerly Long Point Bird Observatory (LPBO), has expanded greatly since 1960. Established to study and monitor bird migration at Long Point, it now coordinates various local, regional and national programs. Several thousand people contribute to these programs annually. The operating budget for FY2000-2001 exceeds \$2 million, and more than 20 full-time staff are located in three provinces. The Board of Directors has representatives from several provinces, and the National Council, providing advice and guidance on scientific matters, includes prominent ornithologists from government and academia across Canada. BSC works with other organizations and individuals to deliver its programs, and has active roles in Birdlife International, North American Bird Conservation Initiative, and Partners in Flight.

Most S.C.O. members probably encountered one

or more BSC programs (including the fund-raising Birdathon), but many may not be aware of the breadth of the programs or the potential for cooperation between academic organizations and BSC. This article was written to outline the mission and strategic plan of BSC, to review the programs, with emphasis on recent developments, and to highlight ways in which professional scientists, including S.C.O. members, can contribute to and benefit from BSC programs.

Strategic Plan

Shortly after reorganization in 1998 (when name changed to Bird Studies Canada), the board and staff developed a strategic plan for the next five years. The complete plan may be viewed on BSC web page (below, under 'Further information'); a few highlights follow.

The plan is guided by BSC's mission: "to advance understanding, appreciation and conservation of wild birds and their habitats, in Canada and elsewhere, through studies that engage skills, enthusiasm and support of members, volunteers, staff and the public." The focus is on statistically sound, well-designed studies that provide data potentially useful for conservation, and that involve participation by volunteers.

The role of BSC projects in conservation activities is guided by a five-step Integrated Population Approach adapted from the British Trust for Ornithology (Baillie 1990), summarized as follows:

- 1. monitor population trends of each species, to identify those that may need conservation action;
- 2. identify stages of life cycle or times of year associated with changes in population size (e.g. nesting success, immature or adult mortality, migration, breeding or wintering grounds);
- 3. identify human or other causes that may be associated with these changes;
- 4. suggest appropriate remedial or conservation actions;
- 5. work with appropriate partners to implement those actions.

This process is a cycle, with monitoring used both to evaluate conservation actions, and to modify them, and so on. Although BSC contributes to all stages of the process, its greatest strength is working with partners on national-level long-term monitoring programs that contribute to the first two steps. Evaluation of potential causes, through directed research (step 3), and design, analysis and interpretation of monitoring, can often benefit from partnerships with other research organizations. The 4th, and especially the 5th step, may require lobbying for changes in legislation; land acquisition or management programs; or collaboration with land owners and other stake-holders to implement actions - roles that are more appropriate for other conservation organizations or government agencies.

BSC Programs

Within this framework, BSC coordinates or has a role in various local, regional, and national programs. Its most distinctive program is the Canadian Migration Monitoring Network (CMMN), in cooperation with Canadian Wildlife Service (CWS) and member stations. Most run

independently but Long Point Bird Observatory is still operated by BSC. Migration monitoring may contribute to the Integrated Population Approach by providing data on population trends for birds breeding in northern Canada, especially boreal areas, that are not adequately monitored by other surveys, such as Breeding Bird Survey (BBS). Annual indices and population trends from Long Point, with comparisons to BBS data, were published recently (Francis & Hussell 1998). Most other stations only have 5-10 years of data and, although annual indices are posted on the BSC web site, these generally have low precision. A critical evaluation of the network is required to consider precision and potential sources of bias in trend estimates, the breeding origins of monitored species, and how many stations are required, for how long, to achieve adequate coverage. Data collected during banding may be useful to monitor annual variation in productivity (contributing to step 2), although this also requires evaluation. Migration data have been used for studies of bird migration and ecology. Recent and ongoing studies include rates of mass gain of migrants (Dunn 2000), differential migration by age- or sex- classes, impact of light design on lighthouse attraction, effects of climate change on timing of bird migration, and use of stable isotope analysis to assess origins of migrants (Hobson 1999).

BSC is also involved in running two large winter bird-counting programs in Canada. Project FeederWatch was started by BSC in Ontario in 1976 and expanded across North America in 1987 with Cornell Laboratory of Ornithology. It involves over 15,000 participants each year, including 2,500 in Canada, and is the only large-scale program of its kind contributing quantitative data using relatively standardized methods throughout the winter season. These data can be valuable for studying winter finch dynamics (Hochachka et al. 1999). Lepage and Francis (in prep.) show that annual indices and population trends for many species in Ontario were well correlated with Christmas Bird Count data. However, not all species agreed; using multiple, independent surveys to estimate trends is important as all surveys have some limitations. Starting in 2000/2001, BSC is working with National Audubon Society in coordinating Christmas Bird Counts in Canada. This new role may encourage greater participation by Canadians, especially through

appropriate and relevant feedback to participants in both French and English. BSC also hopes to work with Audubon to enhance the value of the data for monitoring bird populations.

The Canadian Lakes Loon Survey was initiated in 1981 in Ontario to monitor impacts of lake acidification on productivity of loons, and expanded across Canada in 1989. Cottagers and other volunteers monitor pairs and breeding success of loons on local lakes. Recent analyses of Ontario data indicate that loons on acidified lakes have lower nesting success than those on more alkaline lakes, and the discrepancy has increased over time (Weeber et al. in prep.). Analyses are underway to assess impacts of human disturbance (e.g. cottage development, boating) on loon productivity, and relationships with lake chemistry in Atlantic Canada.

The Marsh Monitoring Program involves volunteers making point-counts at selected stations across the Great Lakes basin to monitor bird and amphibian populations. This was begun to evaluate restoration activities at Great Lakes marshes, but it also provides data on habitat associations and population trends. There is interest in expanding marsh monitoring programs across the continent, and several organizations, including BSC and Patuxent Wildlife Research Center, are evaluating aspects of survey design.

The Important Bird Areas (IBA) program, developed by Birdlife International, is being implemented here by BSC in cooperation with Canadian Nature Federation (CNF). BSC is gathering, compiling and evaluating data, identifying sites, and posting results in an interactive data base on our web page. CNF, with regional staff and regional/local partners, is developing management plans for selected IBAs.

BSC is also involved in regional programs. In Ontario, these include roadside surveys for Red-shouldered Hawks and woodpeckers, or for nocturnal owls, the Second Ontario Breeding Bird Atlas, the Ontario Nest Records Scheme, and recovery plans for threatened or endangered species including Loggerhead Shrike, Barn Owl and Prothonotary Warbler. In British Columbia, a nocturnal owl survey, and a coastal waterbirds survey, were recently developed. The latter, in cooperation with C.W.S., is a year-round project to monitor and study waterbird populations along the

B.C. coast. In New Brunswick, a new owl monitoring program, with N.B. Department of Natural Resources & Energy, is beginning in 2001.

BSC is also involved in local programs at Long Point, Ontario, where its headquarters are located. Besides the migration monitoring station, these include a long-term study of Tree Swallow breeding ecology; studying changes in vegetation and bird communities on Long Point after a deer cull; development of a management plan for local woodlands (a possible template for management plans elsewhere); and studies of provincially rare Hooded Warblers and Acadian Flycatchers. The Long Point Waterfowl & Wetlands Research Fund, based at BSC, is engaged in research projects on waterfowl and vegetation changes in the Long Point area, including Tundra Swan migration ecology, spread of Phragmites at Long Point, toxins in Scaups, and annual monitoring of staging waterfowl.

New Directions

BSC is changing in many ways as it expands, but two aspects deserve particular emphasis. The first is hiring of staff outside Ontario, to develop BSC into a national organization. In 1999, two people were hired in British Columbia to develop regional programs, enhance communication with migration monitoring stations, and promote participation in other BSC programs. In fall 2000, a similar position in Atlantic Canada was filled. It is planned to establish similar positions in other parts of Canada, including Québec and the prairies. Regional activities are crucial to development of national programs across Canada.

A second major development is in Internet database technology. Project FeederWatch and Christmas Bird Counts already have interactive on-line data bases, currently managed by Cornell Lab of Ornithology under the BirdSource initiative. Many participants now enter data online, and results from both projects can be viewed in graphical or other display forms on the web, with capacity and flexibility growing yearly. The IBA data base is being transferred to Internet form that can be queried directly, and participants will be able to contribute observational data on sites over the web. BSC is building similar interactive on-line data bases for the second Ontario Breeding Bird Atlas, and for Canadian nest records schemes. For the latter, BSC

is working with existing schemes to devise standardized coding for computerization of data, new scannable data cards, and interactive on-line data entry. This will pave the way for large-scale analyses of nest data from across Canada to address annual variation in nesting productivity, relationships between climate and nesting date or success, geographic variation in habitat associations, etc.

Potential roles for S.C.O. members

S.C.O. members can make contributions to, and benefit from, BSC programs in many ways. All ornithologists and bird-watchers in Canada could help by participating in or promoting BSC programs, and many S.C.O. members already play active roles. Many researchers across Canada have benefited from funding through BSC's James L. Baillie Memorial Fund.

Professional ornithologists, including students, can benefit themselves and BSC by working with existing BSC data bases and projects to publish scientific papers. BSC is building capacity to analyze and publish scientific research, with three full-time Ph.D.-level scientists on staff, but potential for use of data greatly exceeds internal capacity for exploiting them. Most BSC resources currently are focused on project design, analyses of selected research questions, and development of sound, well-documented, and accessible data bases. BSC encourages outside researchers to use its data bases and facilities. Increasingly, students are involved; university students from U. Western Ontario, U. of Waterloo, Trent U. and Queen's U. are using BSC data towards theses or projects. Potential exists for similar collaboration elsewhere in Canada, by students or other researchers.

Further information

Information on BSC's programs, copies of many BSC reports, and policies on data release, etc., can be found at: <www.bsc-eoc.org>. The Ontario atlas and the Ontario nest records data bases, to be ready summer 2001, will be accessible through: <www.birdsontario.org>. For further information on potential collaborative projects, contact BSC staff responsible for individual projects, or the Senior Scientist, Charles Francis, by E-mail at <cfrancis@bsc-eoc.org> or by telephone at 519-586-3531.

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Moult during migration in Red-throated Loons

Moult and migration are usually considered energetically incompatible in birds, but this applies mainly to species that depend on flight for foraging and migration. Over 30 years ago, I wondered if Red-throated Loons (*Gavia stellata*) might moult during a swimming migration. Evidence for that hypothesis was and remains circumstantial. The species then was little studied on this continent, and even less in our region, so finding supportive data seemed unlikely, and I left the idea in my field log.

Recently, migration data on this species, that I summarized for another publication, revived the idea.

In early September 1968, I accompanied an ecology field course to northeastern New Brunswick. We spent three days exploring botany and ecological communities, including birds, around Miscou Island. On 9-11 September we noted 10+ Red-throated Loons, all in breeding plumage, which none of us had seen on the Atlantic (I saw birds in that plumage

off Washington state 27 Sep 1958 and 5 Oct 1959). This seemed an unusual sighting.

Soon after, 28 September 1968, I visited Jourimain Island (where the P.E.I. bridge now leaves N.B.), my first fall visit there. Among many birds alongshore were at least 42 Red-throated Loons, many apparently in moult from breeding to winter plumage. None of those loons was seen to fly, unlike those of that species I saw off Massachusetts in late October-early November 1963.

In fall I encountered many of these loons on Northumberland Strait, e.g. 14 off Merigomish I, N.S., 12 Nov 1964; several off Wallace, Amherst Shore & Tidnish, N.S., 28 Oct 1965; 30+ Cape Tormentine to Cadman Corner, N.B., 5 Nov 1966; etc.. My recurring impression was that the loons were swimming, diving as they went, eastward along the Strait. After my 1968 observations, I wondered if those birds were then flightless in moult, and could continue migration only by swimming? It seemed plausible.

More evidence was lacking until recently. In April-May, a few Red-throated Loons stop over on sea and nearshore ponds around Chignecto Bay (upper Bay of Fundy), where two summer sightings were also made of birds in breeding plumage that had failed to continue migration; in contrast, this species was recorded only once in fall in that area. Thus, some Red-throated Loons migrate (overland) across the Chignecto Isthmus in spring, but few if any in fall. The birds noted are only 'fall-out' from such migration. Marine birds, including loons, migrating north(east)ward in daytime presumably follow coasts (in turn) of Bay of Fundy, Chignecto Bay, and

Shepody Bay, until that avenue narrows into the Petitcodiac River estuary. The birds then must fly overland, turn back, or land in indecision; each alternative may be used by some. In fall, the 'leading line' of shores, that brings marine birds down the N.B. east coast from Miscou, turns eastward at Shediac Bay, without obvious cue (needed for birds on their first southward migration) that overland migration thence would save a detour of many hundred kilometres. But if loons arriving there were already flightless in moult, overland flight would be impossible, with swimming migration or lingering until moult were completed the only alternatives. Almost complete absence of Red-throated Loons around the upper Bay of Fundy in fall seems circumstantial evidence suggesting 'migration moult' by those birds.

Summarized knowledge of Red-throated Loons in this continent (Barr et al. 2000, Birds of North America, no. 513, AOU & ANSP, 28 pp; del Hoyo et al. 1992, Birds of the World, vol. 1) confirmed that those birds are flightless during fall wing-moult, but the possibility of swimming migration during moult and re-growth of flight-feathers was not mentioned. Bent (1919, U.S. Nat. Mus. Bull. 107, p.79) assumed fall migration started after adults moulted (flight-feathers?); Palmer (1962, Handbook of North American Birds, vol. I) placed moult of Basic I remiges in late summer, but that of Basic II remiges in winter. The 'last word' has not yet been written on this matter.

A.J. (Tony) Erskine
Sackville, N.B.

RECENT LITERATURE

Thesis abstracts

Title: Population dynamics of Semipalmated Plovers (*Charadrius semipalmatus*) breeding at Churchill, Manitoba

Debra S. Badzinski, M.Sc., Trent Univ. - November 2000

This thesis describes the population dynamics of breeding Semipalmated Plovers (*Charadrius semipalmatus*) at Churchill, Manitoba. The objectives of this study were: (1) estimate rates of

local survival and fecundity, (2) identify factors affecting survival and fecundity, (3) estimate population growth rate (λ) and determine sensitivity of λ to changes in demographic parameters. Local survival rates were not sex-specific, but there was significant annual variation that was correlated with hatching success. All reproductive parameters except fledging success showed significant annual variation. Pairs with an experienced male fledged more chicks than did all other pairs, but female experience did not affect reproductive success. Population growth rate ($\lambda = 0.8460 \pm 0.046$) was most sensitive to

changes in adult survival, juvenile post-fledging survival, and pre-fledging survival. The model predicted a population decline of >15%, but annual population censuses showed no population change.

Titles expected soon - needing review

The Birds of British Columbia, vol IV, by R.W. Campbell et al., Royal British Columbia Museum, completing the set of Canada's largest bird publication. Published early March 2001. Pre-publication price \$84.00, from Raincoast Books, Vancouver, B.C.

The earlier volumes of Birds of BC (vols I & II, 1990; vol III, 1997) were not reviewed for *Picoides*; a review of the full set would be appropriate (though one cannot do justice to this outstanding series in a page or two), as a service to Canadian ornithology.

The Birds of Manitoba, by Manitoba Avian Research Committee, Manitoba Naturalists Society, the first book publication on birds covering that province since 1891. Expected sometime 2002. Pre-publication price \$48.00, from the Committee, c/o the Society.

This too should be reviewed in *Picoides*, when it appears.

Threatened Birds of the World, by BirdLife International, the most authoritative and comprehensive assessment yet.

Appeared late 2000. Price \$199.00+GST (ouch!), from Canadian Nature Federation, at 1-800-267-4088. For more information, see:

<http://www.hbw.com/>

NEWS ITEMS AND ANNOUNCEMENTS

Dr. Fred Cooke - Order of Canada

Governor-General Adrienne Clarkson announced 14 February that Dr. Fred Cooke will be appointed a member of the Order of Canada at a ceremony in Ottawa. Dr. Cooke's appointment is in recognition of his outstanding research career, at Queen's University for 28 years, and since 1993 as CWS/NSERC Chair in Wildlife Ecology at Simon Fraser University. This latter unique model revolutionized how C.W.S. conducts research in P&Y Region. With annual investment of \$125K from Environment Canada, Dr. Cooke now attracts over \$2 million in funding, with over 50 faculty, staff and students making this the largest research program in science at the university. As a result, both SFU and Environment Canada research have achieved international significance. It is gratifying to know that Dr. Cooke's key role has been recognized by this prestigious national honour.

adapted from CWS-P&YR release

The application of ecological research to conservation: east meets west. Simon Fraser University, B.C., 19-22 August 2001.

The NSERC/CWS Chair in Wildlife Ecology (CWE) at SFU will be organizing and hosting this conference with the following aims: 1) to discuss the relevance and application of basic science to conservation and management;

2) to host a workshop on university/government collaboration, with the aim of extending the Canadian Wildlife Ecology Chair concept to other regions of Canada, and

3) to mark the retirement of Dr. Fred Cooke, who has been the Senior Chair of CWE for the first 8+ years.

For further information, please contact:

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25th anniversary of the Waterbird Society.

This anniversary will be celebrated at the the next annual meeting of that Society, at Sheraton Fallview Hotel & Conference Centre, Niagara Falls, Ontario, 7-11 November 2001. It will be hosted by Ontario

Ministry of Natural Resources and Bird Studies Canada, and chaired by President Rob Butler (of CWS-Pacific).

A number of symposia and workshops are being planned, and additional information will be found at the web page as it becomes available.

Preliminary information can be obtained from the web site <http://www.mp2-pwrc.usgs.gov/cws>

/annual_meeting.htm or through Chair of Local Committee:

Dr. D.V. (Chip) Weseloh,
Canadian Wildlife Service,
4905 Dufferin St., Downsview, Ont.
M3H 5T4 Canada
phone: 416-739-5846; fax: 416-739-5845;
e-mail: chip.weseloh@ec.gc.ca

EDITOR'S MUSINGS: a valedictory of sorts?

This issue completes my eighth year as Editor of *Picoides*, and will be the last for which I assume responsibility, unless recent arrangements "gang aft agley".

Being editor of a bulletin, even so small and occasional a one as *Picoides*, is a challenge, a chore, and a satisfaction. Only the President can tell you what to include and what to leave out; most of them are happy to have you do the job, on time, even if or when they'd rather you hadn't written something. Most features of *Picoides*, during my editorship, were put in place by my predecessor, Bruce McGillivray, or at the urging of the five Presidents who oversaw my work; I thank them all. The only regular feature I initiated was my editorial, 'Editor's Musings'. Much of my enjoyment of *Picoides* was this opportunity to publish things that no other outlet would have considered - thoughts and opinions that often might more suitably have come from an S.C.O. President. I thank the Presidents who, even if embarrassed by my presumptuousness, refrained from telling me to 'lay off'; only two asked to see the MSS before printing, and only one wanted many changes. Feeling that one is trusted is encouraging to

any editor.

Much material for *Picoides*, in this and earlier issues, was generated by our Society's activities, meetings, awards, and I thank everyone who reported on assigned tasks. An even bigger 'thank you' goes to people who volunteered material for our bulletin. Despite computers and statistics, words are still our primary mode of communicating information. An editor like me, who writes without having to be prompted, is appreciative of others with similar inclinations. Many others helped me with *Picoides* in various ways, from answering queries, to providing photographs - and adapting them, to supplying mailing labels, and so on. Your help was essential! And as I've thanked all of you here, this issue won't need an 'Acknowledgements' section!

Last, but not least, I really want to thank my successor, who thus will not be able to call the editorship 'a thankless task'. To have someone offer to take over, before I reached the point of saying, "This is the end. Good-bye!", is a good sign for the future of our bulletin and our Society. Yours is the torch.

The Editor

IN FUTURE ISSUES OF *PICOIDES*

The new Editor will determine content and structure of the next issue, in consultation with the Publications committee and the President. No doubt, the Seattle conference will occupy much of that number. As I foresaw, there wasn't space in the present issue for a listing of journal publications in 2000; if we had more members, we could afford a larger issue, with space for that - and more. More abstracts of Canadian theses will also need more space. I could go on, and on.

Deadline for copy for the fall 2001 issue - until you hear otherwise - will be 1 October. Sooner is better!

Society of Canadian Ornithologists Société des Ornithologistes du Canada

Standing Committees and Work Groups

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Doris Huestis Speirs Award Committee

(excellence in Canadian Ornithology)

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Research Awards Committee

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Kevin Teather (chair)	902-566-0325	902-566-0740	kteather@upei.ca
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Mandate: annual selection of candidates;

Actions: (a) fall call for applications, review, & announcement of awards 1 April each year; (b) membership appointment and maintenance of rotational committee structure.

Meetings Committee

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Ornithological Council (representatives)

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MEMBERSHIP INFORMATION

If you would like to be a member of the Society of Canadian Ornithologists, please send your name, address, phone number, and a cheque or money order (payable to S.C.O.) for \$15.00 to the Membership Secretary [Note Increased fee]:

Dr. Nancy Flood, Dept. of Biological Sciences,
University College of the Cariboo,
900 McGill Rd. (Box 3010), Kamloops, B.C. V2C 5N3

Si vous désirez devenir membre de la Société des ornithologistes du Canada, faites parvenir vos coordonnées ainsi qu'un chèque ou mandat-poste (à S.O.C.) au montant de 15,00\$ à l'adresse ci-haut [Attention: Les frais sont augmentés].

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