

ABSTRACTS OF PAPERS ON SHOREBIRD TOPICS PRESENTED AT THE MEETING OF THE AMERICAN ORNITHOLOGISTS' UNION AT COLORADO STATE UNIVERSITY, FORT COLLINS, COLORADO, 11-15 AUGUST 1980.

Migration of Semipalmated Sandpipers: a comparative study

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Eastern and western populations of Semipalmated Sandpipers *Calidris pusilla* follow fall migratory routes which involve different migratory strategies. Alaskan birds fly southeast to midwestern ponds and lakes and continue southeast over land. Eastern arctic breeders stage primarily in northeast coastal marine areas and make a 40-60 hour flight over the Atlantic Ocean to the West Indies. Behaviour of birds at staging areas in North Dakota was compared with that of migrants in New Brunswick. Compared with North Dakota birds, New Brunswick birds 1) were more faithful to the local area, 2) rarely departed in small flocks (less than 10), 3) had nearly identical departure directions, 4) had a tidal influence on departure timing, 5) were more selective about departure weather, and 6) left with higher fat stores. The increased specialization of eastern birds reflects the relative stability of coastal feeding habitat as well as the greater metabolic demands of successful transoceanic flight. Consideration of these results and the locations of breeding grounds during the last glacial retreat provides insight on the evolution of transoceanic flight.

On cross-seasonal interactions in the evolution of sandpiper social systems

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Evolutionary interpretations of breeding social systems almost invariably focus on ecological factors within the breeding season, yet for most temperate and arctic species this season occupies only a small period within their annual cycle. In this paper I analyse the relationships between the migration ecology of calidridine sandpipers and their mating and parental care systems. Across the calidridines, species with greater distances between breeding and wintering grounds are more likely to have single parent care of young or early departure by one of the sexes, and they are also more likely to have a mating system with polygamous or promiscuous characteristics. These patterns are not easily predicted by within-season hypotheses but instead may relate to increased risks of long-distance migrations.

Oiling of shorebirds in South Texas following the IXTOC-1 oil spill

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A two-year study of birds on the seaward side of a barrier island is discussed in the light of the IXTOC-1 blowout. Fall 1978 shorebird population density averaged 80 per km (counted along an 11.8 km beachfront) and included Sanderling *Calidris alba*, Red Knot *Calidris canutus*, Piping Plover *Charadrius melodus*, Willet *Catoptrophorus semipalmatus*, Black-bellied Plover *Pluvialis squatarola* and Ruddy Turnstone *Arenaria interpres*. IXTOC oil beached during the peak of the fall 1979 shorebird migration. Shorebirds feeding at the strandlines became oiled, particularly on the feet, bill, belly, neck and head; at the same time, very few gulls or terns were oiled. Sanderling, Piping Plover and, initially, Willet were especially vulnerable. At the height of the spill, 60% of all shorebirds were oiled. No obvious oil-related mortalities were observed. Four periods of oiling were noted through January 1980; these were related to storms and the erosion of IXTOC oil that had formed oil "reefs" on offshore sandbars. A fifth period of oiling occurred in early May 1980 coincident with "fresh" oil coming ashore (possibly IXTOC oil that had remained at sea during the winter).

Red Phalarope (*Phalaropus fulicarius*) responses to thin oil films in foraging experiments

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Red Phalaropes occur in high densities along arctic coastlines in late summer, where encounters with spilled oil are likely as development proceeds. In experiments using shallow pans of water containing brine shrimp, juvenile Red Phalaropes were presented with a choice of foraging on pans with a thin surface film of oil or on pans with a clear surface. Results indicate that naive birds were equally likely to enter oiled or clear pans on the first choice. However, subsequent choices favoured pans without oil, and the duration of the feeding bouts differed: birds remained longer on clear pans than on oiled pans ($p < 0.01$, Mann-Whitney test). A related experiment demonstrated that the intensity of escape behaviour was correlated with oil film thickness. These results suggest that phalaropes can quickly learn to distinguish and to avoid oiled surfaces: however, even brief contact with oil at sea may decrease survival.

Correlates of flocking, foraging and vigilance behaviour in the Ruddy Turnstone (*Arenaria interpres*)

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Ruddy Turnstone foraging, flocking and vigilance behaviour was observed on a tidal clay flat at Sirena, Corcovado National Park, Costa Rica. 305 observations averaged about 90 seconds each. Observed food items were sampled by transects. The lowering and rising of the tide was related to flock breakup, substrate peck rate, success rate, efficiency and velocity. In turn, flock size changes were related to vigilance behaviour. The clay flat exhibited changes with distance from shore in clam density and probability of encounter; hole size, variability and density; crab density; crabs greater than 1 cm density; water cover; small fish density, and presence of algae. Turnstones were observed to prey on crabs where crab density was highest. Tidal flat heterogeneity in resource dispersion will be related to the observed foraging changes.

The role of avian predators in an Oregon rocky intertidal community

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The role of avian predators in an Oregon rocky intertidal community was investigated by 1) constructing a food web for bird species in the community, and 2) excluding birds from patches and recording changes in prey densities. Seven of the eight common bird species regularly preyed upon invertebrates that were either important space occupiers or functionally important predators or herbivores in the community. Comparisons of protected and unprotected clearings in mussel *Mytilus californianus* beds demonstrated that birds (primarily Surf-birds *Afriza virgata*) were responsible for lower mussel densities in unprotected clearings. Percent mussel mortality attributed to bird predation was estimated to range from 17% to 88%. Conditions under which bird predation is heaviest and the implications of differential bird predation of community structure are discussed.

Growth and development of endothermy in shorebirds (Charadriidae and Scolopacidae)

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Growth, body temperatures, and oxygen consumption were measured on chicks of 10 species of shorebirds reared from eggs collected at Churchill, Manitoba. Growth rates were intermediate between passerines (altricial) and galliformes (precocial) of the same adult weight. Large species (Whimbrel *Numenius phaeopus*) had longer development periods than small species (Least Sandpiper *Calidris minutilla*). Plovers and the Northern Phalarope *Lobipes lobatus* grew more slowly than sandpipers. Neonates of large species had greater capacity for endothermy and acquired adult levels of endothermy at an earlier age. Body size, growth rate, and the development of endothermy are related in a model of the economics of temperature regulation. Ken Baker, Larry Clark and Dave Goldstein assisted in the field.

Incubation patterns in Wilson's Plover (*Charadrius wilsonia*)

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Observations of incubating Wilson's Plovers over two seasons in Texas show that there are marked differences in incubation bout length at different times of day, and in the amount of time the two parents spend on the nest. Incubation bouts are longer in the hotter middle part of the day, which is when the female usually incubates; the male is on the nest for short periods in the morning and evening. Records of nest temperature, made along with movie records of nest attendance show that over-heating of the eggs may occur during midday absences, and the longest absences occur when the air temperatures are moderate (about 31°C), at about 1000 and 1630. Belly-soaking to cool the eggs was seen at two nests late in the season, but bouts were still long as frequent trips for soaking were not made. The significance of these incubation patterns is discussed in relation to temperature tolerances of the eggs, feeding schedules of the parents, and the breeding season as a whole.

Reproductive success and mortality patterns of Long-billed Curlews (*Numenius americanus*) in S.W. Idaho

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During three consecutive breeding seasons (1977-79) we found 118 active Long-billed Curlew nests. Probability of nest survival for 28 days of incubation was highest (46%) in 1977 and lowest in 1979 (40%). Mammalian carnivores dominated curlew egg predation in all three years. Within this group and between years we attributed 58% (7/12) of the destroyed clutches in 1977 to badgers, and 64% (7/11) and 67% (10/15) to canids in 1978 and 1979 respectively. Magpies and grazing livestock were other important agents in curlew nest destruction. Survival to fledging of radio-marked curlew chicks was highly variable: 75% (9/12) fledged in 1977, 15% (2/13) in 1978, and 28% (7/25) in 1979. Parental care patterns coincident with the intensity of raptor predation in a given year contributed most to this variability. All evidence suggests that Long-billed Curlews are a relatively long-lived and K-selected species.

Some behavioural adaptations to short grass rangeland habitat in the Long-billed Curlew (*Numenius americanus*)

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I observed Long-billed Curlews on the Black Canyon Planning Unit in southwestern Idaho during 1978 and 1979. Curlews occur in high densities along stock driveways which are heavily grazed by sheep. Analysis of activity budget and census data indicate that physical characteristics of vegetation influence behaviour and distribution throughout the breeding season. Curlews localise the majority of their activities in areas with vegetation less than 3 dm in height and vertical coverage values less than 80 percent. I observed a significantly lower frequency of alert postures and aerial displays in territories characterized by short vegetation than in territories with significantly taller vegetation. Behavioural data indicate that curlews opt to inhabit areas which increase their visual field thereby facilitating inter-specific communication and anti-predatory vigilance.

Acoustic communication of the Northern Jacana (*Jacana spinosa*)

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Two types of Jacana calls may be identified on the basis of the cadence of the notes. Some calls consist of a variable number of regularly repeated notes (repeated-note calls) while other calls consist of a variable number of regularly repeated groups of rapidly repeated notes (note-group calls). The measured parameters of each call type are continuously variable and stereotyped vocalizations cannot be identified accurately within either type. Repeated-note calls occur in a wide variety of contexts ranging from low intensity attentiveness to outright physical attacks. Information is made available through the length of note used in the repeated-note calls and the cadence of the notes provides information supplemental to the basic message. The message of the note-group calls is to establish and/or maintain contact between kin. The calls accompanying most contexts do not elicit any overt response by recipients. If a response is elicited, it is correlated with the duration of the call and the reproductive status of the sender and/or recipient.

Seasonality of polyandry in the Wattled Jacana (*Jacana jacana*)

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The pattern of breeding in relation to food resources of jacanas was studied in coastal Guyana. The number of clutches initiated did not differ from season to season. Monogamy occurred throughout both seasons, but polyandry, documented here for the first time in this species, was restricted to the dry season. Females consumed significantly larger volumes of insects than did males during the wet season. Diets of both sexes shifted from insects to plant seeds in the dry season despite the fact that emergence of insect food items did not differ according to season. These results suggest that seasonality of polyandry may be related to other environmental resources rather than directly to food abundance.