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The Bay of Fundy
Migrant Shorebirds and Intertidal Invertebrates
Progress Note by
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I Shorebirds

(i) Historical account

It has always been "known" by competent observers that large numbers of shorebirds occur along the sandy beaches of the Bay of Fundy; however, the actual magnitude of birds passing through the Bay of Fundy during the fall migration has never been accurately determined. Squires (The Birds of New Brunswick, 1976) mentions a report of "1000s" of Semipalmated Sandpipers seen near Hopewell Hill in Albert Co., N.B., on August 7, 1952 and that "about" 30,000 were reported at Dorchester Cape on August 13, 1966. Tufts (The Birds of Nova Scotia, 1961) writes of "immense congregations" of shorebirds at Evangeline Beach along the Minas Basin which at that time appeared, as he states, "to be as impressively large as they were when I watched them as a boy."

A clearer picture of the overall abundance of shorebirds in the Bay of Fundy emerged with the initiation of the Maritimes Shorebird Survey in 1974. That survey, co-ordinated by Dr. Guy Morrison from CWS, Ottawa, has continued each summer since. In 1975 Morrison conducted a series of aerial surveys over the Bay which delineated areas of importance to shorebirds and their related abundance. He found the Upper Bay of Fundy (Shepody Bay and Cumberland Basin) and the Minas Basin to be especially important areas.

(ii) Recent observations and research

During the late summer and early fall of 1976, the Canadian Wildlife Service conducted a series of ten aerial surveys over the Bay of Fundy, throughout the shorebird migratory period of six to eight weeks, in order to assess the relative numbers of birds present in the Upper Bay of Fundy and Minas Basin areas during that period. From this survey, a maximum of 566,000 "peeps" (90 per cent of which are Semipalmated Sandpipers) were recorded on the flight of July 29, 1976.

The high magnitude of shorebirds occurring in those areas of the Bay of Fundy were indeed found to substantiate the claims of past observers, who contributed to the CWS's Maritime Shorebird Survey.

Also during 1976 the CWS, via contract with Acadia University, initiated work on the use of substrates and their respective invertebrate fauna by shorebirds in the Minas Basin.

(iii) Current research

Of present research interest is the question of how the intertidal mudflats of the Bay of Fundy are being used by such large numbers of birds. Work is presently being conducted by the CWS in association with Acadia University on the invertebrate fauna inhabiting the mudflats with emphasis on the species present, their abundance and distribution in relation to the foraging activities of shorebirds. Details of this work are discussed below.

II The Invertebrate Fauna

(i) Mud sampling

During the summer period (June to August) of 1977, the CWS established a series of transects along the mudflats of the Upper Bay of Fundy (Shepody Bay and Cumberland Basin) where large assemblages of birds were known to forage. Two mud samples (10 x 10 x 10 cm) were taken at stations 100 m apart extending linearly from the high tide line to the low water mark. Each sample was passed through a sieve (Tyler #20) and the invertebrates therein extracted and preserved in jars with 10 per cent formaldehyde. Simiarly, students of Acadia University established ten identical transects in the western portion of the Minas Basin. As this work has only recently been completed, the results are not yet available. However, preliminary sampling undertaken during the summer of 1976, in association with the M.Sc. investigations of Peter Hicklin (Acadia University) and Ross K. Yeo (MacMaster University) has revealed interesting information on the species composition and densities of the intertidal invertebrates of the Minas Basin mudflats.

(ii) Preliminary results - 1976

Polychaetes and the amphipod *Corophium volutator* were found in high densities along the Minas Basin. The highest densities of *Corophium volutator* have been reported by Risk (1976) at 63,000/m^2 at one transect along the Noel shore, the average for all transects being 8 - 15,000/m^2. Densities of 20 - 30,000/m^2 were reported in the western portion of the Minas Basin, the maximum density for one

sample being 42,000/m^2 (Hicklin, unpub. data).

Polychaetes appear to be dominated by the tubiculous genus *Spiophanes*. Risk (1976) reported densities of *S. wigleyi* at 330,000/m^2 and similar densities were reported by Hicklin (1976, unpub. data). The thin deposit-feeding polychaete *Heteromastus filiformis* also appears abundant although no estimate of their numbers is yet available. Large carnivorous errant polychaetes such as *Glycera dibranchiata*, *Nereis diversicolor*, and *Neanthes virens* were also present but in comparatively lower numbers.

The eastern portion of the Minas Basin (Noel Shore) appears to sustain large populations of bivalves, namely *Macoma balthica* and *Mya arenaria*, whereas these rarely occur in the western portion. This may simply reflect the occurrence of different substrate types for each region.

III Foraging Activities of Shorebirds and their Food

(i) Field observations

As the tide recedes and shorebirds leave the high tide roost sites, the birds quickly gather along the receding edge of the tide line. On July 23, 1977, at the Starrs Point mudflat (Minas Basin) I watched in earnest as approximately 2,000 Dowitchers, 500 Black-bellied Plovers, and possibly 50 - 60,000 "peeps" (these include Semipalmated Plovers, Least Sandpipers, Semipalmated Sandpipers - the most abundant species) darkened the water's edge in a fanatical search for food. "Sheets" of shorebirds appeared to continuously peel off the flats toward the quickly-retreating tide line. By the

time the water reached its outermost boundaries, all the birds spread out evenly over the flat, foraging less excitedly, but just as actively, occasionally preening and bathing.

Close observations of single birds revealed interesting variations in the types of prey species being captured. The longer-billed birds, such as Dowitchers, probed deeply, extracting large polychaetes such as *Nereis*, *Neanthes*, and *Glycera* (accurate identification being difficult due to the short time the prey is exposed before being swallowed). Four Semipalmated Plovers observed in succession, were observed taking large *Glycera dibranchiata*. In each case, the birds had difficulty ingesting the large worm and were chased away by the observer, forcing them to leave their prey behind. One such polychaete measured 8 cm in length. Most times, however, the Semipalmated Plovers were observed taking *Heteromastus filiformis* and the amphipod *Corophium volutator* along the surface.

Semipalmated Sandpipers both probe into the mud as well as peck at the surface for food. They were seen taking both *Corophium volutator* and small polychaetes.

(ii) Stomach analysis

As visual observations rarely allow for identification of the prey species concerned, a small number of birds were collected irregularly on the mudflat for analysis of the stomach contents. Preliminary results indicate that all species feed to varying degrees of intensity on *Corophium* (particularly Semipalmated Sandpipers) as well as on polychaetes (notably Semipalmated Plovers and Dowitchers).

However, the full extent of predation on each group is not yet fully known until the analysis is completed.

IV The Possible Effects of a Tidal Barrage on Migrant Shorebird Populations in the Bay of Fundy

Too little is yet known on the feeding ecology of migrating shorebirds in the Bay of Fundy for any predictions to be accurate. Essentially, a detrimental effect, if any, would first be recognized by fluctuations in the invertebrate populations; for example, changes in rates of sedimentation would induce changes in the invertebrate species composition. It is therefore imperative that we first recognize what changes would occur in the invertebrate populations before predicting any subsequent changes in the shorebird populations. For this information to be of any value, the feeding ecology of the birds themselves must be more clearly understood.

For a better insight on the possible effects of Tidal Power developments on the existing invertebrate populations, the reader is referred to the discussion by Risk (Possible effects of tidal power development; Proceedings of a Workshop on the Environmental Implications of Fundy Tidal Power. The Acadia University Institute. 1977. pp.173).

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