Northern Fulmar Breeding Range Extended to Baccalieu Island, Newfoundland

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Montevecchi, W. A., E. Blundon, G. Coombes, J. Porter, and P. Rice. 1978. Northern Fulmar breeding range extended to Baccalieu Island, Newfoundland. Canadian Field-Naturalist 92(1): 80–82.

The numbers of Northern Fulmars (*Fulmarus glacialis*) have been increasing in the boreal regions of the Northeast Atlantic for more than two centuries, and though population growth appears to have slowed recently (Fisher 1952, 1966; Salomonsen 1965) the breeding range of the species continues to expand. In the past few years Northern Fulmars have been found breeding in two locations off Newfoundland: Great Island (47°11′N, 52°49′W) in Witless Bay (Nettleship and Montgomerie 1974) and Funk Island (49°46′N, 54°12′W), as documented in Nettleship's recent (1976) film, "The Funks."

During visits by land and boat on 27 May, 1 and 11 June 1977, to the cliffs just south of Jackson's Gulch on the northeast end of Baccalieu Island (48°07′N, 54°12′W) we sighted five single, light-phased fulmars sitting on ledges (Figure 1); two sites that we could see from the cliff top each had an egg. On 10 August a chick, judged to be 3–4 weeks posthatch, was found; the other site where the egg had been within our reach was empty. Some evidence suggested that predation or predatory disturbance may have been involved. A decapitated, eviscerated adult Northern Fulmar was found nearby on 11 June, and there were signs of Red Fox (*Vulpes vulpes*) activity (digging at Leach's Storm-Petrel (*Oceanodroma leucorhoa*) burrows; dead petrel chick) in the area.

FIGURE 1. Incubating Northern Fulmar on a ledge near the top of a cliff on Baccalieu Island, 27 May 1977.

FIGURE 2. Newly hatched Northern Fulmar on Funk Island, 10 July 1977.

Four pairs of fulmars were seen occupying four cliff-ledge sites on 1, 3, and 8 June in Bull Gulch just north of Gannet Head on the east side of the island about 1.5 km south of Jackson Gulch. No fulmars were seen in this area from 7 to 12 August. The behavior and temporary site tenacity of these birds suggested they were "prospecting" (Fisher 1952; Nettleship and Lock 1973). Northern Fulmars have been observed on Baccalieu Island as long ago as 1959 (Rice). Future checks on colonization in this area will be made.

On 9–10 July 1977 Montevecchi and Porter found three fulmars with eggs on Funk Island, two nesting on flat ground, the other on a ledge about 1.5 m above ground. In the two nests checked, one egg hatched on 10 July (Figure 2), the other pipped on 11 July, indicating that egg-laying occurred toward the end of May. This is consistent with the timing of egg-laying on Baccalieu and in the boreal North Atlantic in general (Fisher 1952).

Baccalieu Island is the third island off Newfoundland where Northern Fulmars have been found breeding in 4 years, and breeding attempts in Labrador (Nettleship and Lock 1973) and along the Avalon Peninsula of Newfoundland (L.M. Tuck, personal communication) seem likely. The Northern Fulmars' potential for massive and sustained population increase as evidenced at colonies in Great Britain during the past and present centuries (Fisher 1952) leaves open the possibility that we may be witnessing the initial stages of what may soon be a population explosion of the species in the boreal Atlantic regions of Canada. Close watch should be kept for further breeding range expansion of these birds, and breeding censuses at known nesting areas should be made regularly. The light-phase plumage of all Northern Fulmars found nesting or "prospecting" in Newfoundland-Labrador suggests that these birds may be immigrating from colonies in western Greenland, Iceland, or Great Britain (Fisher 1952; Salomonsen 1965; Brown 1970; Tuck 1971) rather than from the Canadian arctic region. Banding data and/or body (especially culmen) measurements (Salomonsen 1965) may help clarify this matter in the future.

We are grateful to the Newfoundland Wildlife Division and the Canadian Wildlife Service for permission to work in these locations, to Bruce Bursey and Dr. Leslie M. Tuck for helpful suggestions, and to Raymond Hyde, Felix Noonan, and Linus Walsh for their hospitality on Baccalieu Island. Financial support was provided by National Research Council of Canada Grant No. A0687 awarded to W. A. Montevecchi.

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Received 15 September 1977
Accepted 21 October 1977

Life History Observations on the Nudibranch Mollusc *Onchidoris bilamellata* in the Intertidal Zone of Nova Scotia

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Bleakney, J. Sherman and Constance L. Saunders. 1978. Life history observations on the nudibranch mollusc *Onchidoris bilamellata* in the intertidal zone of Nova Scotia. Canadian Field-Naturalist 92(1): 82–85.

Analysis of Nova Scotia collections of the nudibranch *Onchidoris bilamellata* (L., 1767) from 1967 to 1977 demonstrates an annual die-off of the adult population between May and July. This is also observed in European populations of this species. Spawning normally extends from January to May but juveniles could not be found before late July or August.

Key Words: dorid nudibranch, *Onchidoris bilamellata,* life history, annual species, Nova Scotia, Minas Basin.

Dorid nudibranchs are carnivorous gastropod molluscs found in a great variety of marine habitats. *Onchidoris bilamellata* (L., 1767) is a seasonally common intertidal species of rocky shores, where it preys upon *Balanus balanoides* and other species of barnacles. It is a widely distributed species of boreal and sub-arctic seas of the Northern Hemisphere with a northern limit near 70° N. On the European coast it appears as far south as Sandgate, South Kent, England, and at Winereux, Pat de Calais, France. Along the northwest Atlantic shores Connecticut is evidently the southern limit.

This dorid is evidently an annual and the adults reportedly die in early summer after spawning. Therefore, it is rarely encountered in summer when field survey crews are most active. As the basic life history of this major winter predator of barnacles has been investigated only in England, our Nova Scotia data represent the first comparative study of populations from the western Atlantic.

Recent literature includes distributional reports from the northeast and northwest Atlantic coasts (Miller 1961; Swennen 1961; Franz 1970; Potts 1970; Meyer 1971). The life cycle of *O. bilamellata* in Europe, however, has been studied only in England and that was based on data from fewer than 3 years, 1964–1966 (Potts 1970). Clark (1975) described the life cycles of 24 species of Atlantic nudibranchs, including *O. bilamellata,* based on 4 years of observation of the Connecticut fauna. Unfortunately this species is rare at that latitude and Clark's data are inadequate for critical comparison with those of Potts and the present study. The seasonal occurrence of *O. bilamellata* on the Pacific coast of Washington State was mentioned incidentally by Connell (1970) and Dayton (1971) in connection with their *Balanus* studies.

Study Areas

Our collections are from Annapolis and Kings Counties, Nova Scotia, particularly along the western shores of the Minas Basin area (Figure 1). The Bay of Fundy coast of southwestern Nova Scotia is composed of basalt, an ideal substrate for barnacles, and rocks from this ridge are scattered over the sandstone, sands, and muds of the extensive eulittoral zone of the Minas Basin and Annapolis Basin. The most conspicuous and consistently present barnacle predator on these rocks is the dogwinkle *Nucella lapillus.* Purple and white varieties of the predaceous dorid *Acanthodoris pilosa* are often associated with *O. bilamellata,* but they are feeding solely upon the encrusting ectoproct colonies of *Alcyonidium polyoum.* More extensive descriptions of the two