

attached radio-transmitter equipment had any negative effect on the adults, their clutches or chicks (Morris and Black, *J. Field Ornith.* 51:110–118, 1980; Morris et al., *J. Field Ornith.* 52:242–244, 1981). Birds at both colonies were aware of observers in the blinds but always settled down and exhibited normal incubation and chick feeding behavior a few minutes after entry of the blind by the observer. Despite the apparent lack of negative effects of trapping and harnessing procedures, the act of egg eating at the Lighthouse was most likely a result of these disturbances. An alternative explanation, possibly applicable to the Fighting Island observation, is that an incubating adult unattended for long periods by its mate eventually experiences simultaneous drives to incubate and to leave the nest. The resulting displacement activity is egg eating. These observations may explain some incidences of egg disappearance noted by several workers at gull colonies (e.g., Gilbertson, *Can. Field-Nat.* 88:356–358, 1974; Morris and Haymes, *Can. J. Zool.* 55:796–805, 1977; Teeple, *Can. Field-Nat.* 91:148–157, 1977).

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**Opportunistic feeding on whale fat by Wilson's Storm-Petrels in the western North Atlantic.**—Species of Procellariiformes have often been observed feeding on the carcasses of whales at South Atlantic whaling stations (Murphy, *Bull. Am. Mus. Nat. Hist.* 38:117–145, 1918; Bierman and Voous, *Ardea*, Supple., 1950). In northern latitudes, Gill (*Auk* 94:385–386, 1977) collected a Fork-tailed Storm-Petrel (*Oceanodroma furcata*) at Nelson Lagoon, Alaska, that was feeding on decayed fat from a stranded gray whale (*Eschrichtius robustus*). Although anecdotal information is available, our observations provide the first positive documentation of feeding on whale fat for procellariids in the western North Atlantic.

On 11 July 1978, while we were surveying the pelagic distributions of marine birds from Cape Hatteras to Nova Scotia, a recently killed fin whale (*Balaenoptera physalus*) was seen at 41°10'N, 68°48'W. No birds were seen with the carcass at this time. Three days later, the carcass was resighted in a bloated condition. Blue sharks (*Prionace glauca*) were seen eating its flesh and approximately 400 Wilson's Storm-Petrels (*Oceanites oceanicus*) were feeding on floating bits of carrion around the whale. On 24 August 1979, several hundred Wilson's Storm-Petrels were seen feeding on pieces of decayed fatty tissue from the carcass of a dead fin whale at 41°48'N, 67°55'W. Two of these birds were collected and their proventriculi contained whale fat. Except for a skua (*Catharacta* sp.), which was seen in the vicinity of the latter sighting, no other birds were associated with these carcasses. In view of this limited evidence that Wilson's Storm-Petrels and other procellariids may on occasion be associated with and selectively feed upon the fatty tissue of dead cetaceans, we feel it appropriate to identify possible reasons for this opportunistic feeding behavior.

Recent evidence indicates that procellariids use the sense of smell to find food. The size-ratio of the olfactory bulb to cerebral hemisphere is high in procellariids and suggests an increase in function (Bang, *Acta. Anat.* 65:391–415, 1966). Grubb (*Nature* 237:404–405, 1972) found that procellariids are able to determine odor trails at night as well as in daylight. Controlled observations by Hutchinson and Wenzel (*Condor* 82:314–319, 1980) also supported the view that procellariids use olfaction to locate food. Since foraging by smell is based on

the ability to follow an airborne odor-gradient (Wenzel, pp. 41–64 in *Behavior of Marine Animals*, Vol. 4, Burger et al., eds., Plenum Press, New York, New York, 1980), it follows that a decaying whale would provide a strong stimulus as a potential food item.

Ashmole and Ashmole (*Peabody Mus. Nat. Hist., Yale Univ. Bull.* 24:1–131, 1967) suggested that it is disadvantageous for procellariiformes to transport intact food containing a large percentage of water. By digesting food as it is caught and then excreting the excess water, these birds can build up large food reserves. Dermal whale tissue in whales has a low ratio of water relative to fat content (Arai and Sakai, *Sci. Repts. Whale Res. Inst.* 7:51–67, 1952); such food can be converted to stomach oil quickly and carried with a minimum demand for water excretion. Thus, we suggest that decaying whale fat, which is detectable by smell and is easily digestible with a high caloric value, would be a most desirable food item when available to procellariids at sea.

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**Enhanced foraging efficiency in Forster's Terns.**—Light winds have been considered to be detrimental to the feeding efficiency (i.e., no. of successful prey captures/no. of attempts for prey) of Great Blue Herons (*Ardea herodias*) (Bovino and Burt, *Auk* 96:628–630, 1979), but apparently have no effect on Common Murre (*Uria aalge*) foraging (Birkhead, *Br. Birds* 69:490–492, 1976). Grubb found no direct wind effects on Osprey (*Pandion haliaetus*) feeding efficiency, although he did find a reduction in efficiency due to rippling of the water surface (Grubb, *Auk* 94:146–149, 1977). However, for Common Terns (*Sterna hirundo*) and Sandwich Terns (*S. sandvicensis*) Dunn (*Nature* 244:520–521, 1973) found that a mild wind and rippling water increased feeding-success rates. We studied the effects of mild wind, water surface condition, and direction of tidal flow on feeding efficiency of Forster's Terns (*S. forsteri*).

A total of 212 min of observation were made primarily between 06:00 and 11:00. Data were collected from 4–23 August 1980. The study-site was a bridge over a causeway leading from the mainland to Chincoteague Island, Accomack Co., Virginia (75.5°W, 38°N). Eighty-two individual observations of Forster's Terns were made. For each individual the feeding method used was recorded, as was the total number of dives for fish and the number of captures. Wind speed was estimated every 30 min using a Beaufort wind scale (BWS). Also, direction of tidal flow and water surface condition (i.e., height of waves: smooth, 1 cm, 2 cm, etc.) were recorded for the same interval.

Terns were considered to be actively foraging when the head and bill were oriented downward (Salt and Willard, *Ecology* 52:989–998, 1971), and this method was used for both styles of foraging. A description of perching behavior may be found in Reed et al. (*Wilson Bull.* 94:567–569, 1982). Terns dived from a height of approximately 4–6 m. Only actively foraging terns were included in the analysis.

Efficiency comparisons for Forster's Terns were made between individuals feeding under no-wind (BWS 0) and mild (BWS 1 and 2) wind conditions using a contingency  $\chi^2$  test. The same test was used to compare successes/h and attempts/h of foraging. Because the feeding efficiency of Forster's Terns varies significantly with feeding strategy (i.e., aerial vs perched