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**Success of two feeding methods of the Black-legged Kittiwake.**—The Black-legged Kittiwake (*Rissa tridactyla*) frequently dives below the water's surface to capture prey (Townsend and Morrill 1907, Rich *in* Bent 1921). Belopol'skii (1957) noted that kittiwakes collect food from the surface water, but are capable of diving to depths of 0.5-1.0 m, dropping into the water directly from the air. No detailed description of the kittiwake's predatory methods exists, nor are there data on the relative success of these methods. Twice during the summer of 1972 I watched kittiwakes using two different methods of fishing in Landing Cove, Great Island, Newfoundland.

At 15:12 on 4 July, adult kittiwakes from the nesting cliffs surrounding Landing Cove gathered above the water's surface about 40 m below where I sat watching them through a 30× telescope and 8 × 30 binoculars. From my position I could look into the water and down to kelp beds and rocks several meters below the surface. Some 20-30 kittiwakes flew slowly back and forth 2-4 m above an estimated 16 m<sup>2</sup> area where incoming waves passed over submerged rocks creating eddies and upwellings. They flew with the body at a 60°-70° pitch angle above the horizontal; the partially expanded tail was depressed below the body's long axis. The feet hung below the belly and moved back on the wings' forward stroke and forward on the recovery stroke. The wings, from the shoulder to the wrist, were held vertically with the manus extended at right angles to the forearm, the wing tips pointing away from the body. At midstroke the manus had a pitch angle of 30°-60° above the horizontal, moving up to 90° at the end of the forward stroke, then rotating so that in rearward motion the "leading edge" was again 30°-60° above the horizontal at midstroke. The birds moved forward, but at less than an estimated 3 m/second.

Of 42 capture attempts by the birds, 16 were dives below the surface, from the air, whereas on 26 they dropped to the surface and submerged only the head. Both methods were used simultaneously by different individuals, but I do not know if a particular bird used one method exclusively.

The diving kittiwake depressed the pitch angle of its body to nearly zero and extended the wings horizontally. Then the bird depressed the leading edge of one wing, rolled slightly to one side, tilted forward, and fell head first. The kittiwake entered the water with the wings partially folded and angled back slightly. The

manus was held with the outside edge of the primaries parallel to the direction of travel. The tail was folded. The feet were not visible and presumably were drawn into the belly feathers. The birds did not appear to go more than 1–2 m below the surface. I never saw the kittiwakes use their wings under water though I could plainly see Common Murres (*Uria aalge*) in the same place using their wings for underwater propulsion. The kittiwakes flew immediately upon surfacing. The bird flew away from the feeding assembly while swallowing prey or, if unsuccessful, rejoined the birds flying slowly over the 16 m<sup>2</sup> area.

When dropping to the surface the bird ceased flapping and raised the manus to the vertical position of the forearms. The feet stopped moving, but remained below the body; the toes were spread as widely as the webbing allowed. The tail was fanned and depressed. In this position the bird dropped to the surface of the water, feet first. Immediately upon landing the head and neck were thrust under the surface, the tail raised at about 45°, and the wings remained vertically extended. After raising its head the kittiwake took off and either left the others while swallowing prey or flew up and rejoined the flock. No bird remained in the water more than 15 seconds in either method.

The prey—probably capelin (*Mallotus villosus*) or lance fish (*Ammodytes americanus*) (Maunder and Threlfall 1972)—was held crosswise in the bill when the kittiwake's head emerged from the water. The fish was grasped near the head or less often near the middle, allowing a reliable means of recording the relative success of the two predatory methods. The birds caught one fish at a time. Nine of 16 dives for fish were successful. A bird that submerged only its head captured fish on 11 of 26 attempts. The data indicate no difference in the probability of capture of the two methods ( $\chi^2 = 0.79$ ,  $df = 1$ ). Success of diving birds may be underestimated, since they may have time to complete swallowing underwater before surfacing.

I watched a similar feeding assembly on 6 July 1972. Again I saw both foraging methods used, but recorded no quantitative data.

Several species of gulls capture prey by diving (Cummings 1914, Brown 1949, Steiniger 1952, Tinbergen 1960), but with the possible exception of the Iceland Gull (*Larus glaucooides*), they do so infrequently. Competition from larger, surface feeding gulls or from subsurface feeding terns, whose diet is very similar to that of the kittiwake (Pearson 1968), may force the kittiwake to forage farther seaward (Bent 1921, Pearson 1968). Once at sea and in the absence of competition from these species the kittiwake may be able to crop two food resources, surface dwelling and subsurface dwelling fish.

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**Three more cases of White-crowned Sparrows parasitized by Brown-headed Cowbirds.**—In a recent note Lewis (1973, *Auk* 90: 429) documents a case of a Puget Sound White-crowned Sparrow (*Zonotrichia leucophrys pugetensis*) parasitized by the Brown-headed Cowbird (*Molothrus ater*). Lewis concludes: "Cowbird parasitism of *Z. leucophrys* is rare and, to my knowledge, the above is the first recognized and fully documented case of such parasitism of the race *pugetensis* to be published." In view of this, perhaps my observation of three further cases is worthy of note.

Samish Island, Skagit County, western Washington is about 30 miles north of Lewis's study plots in a region where presumably only *pugetensis* breeds. In the 3 years I have lived on the island, I have seen adult White-crowns feeding young cowbirds out of the nest three times. On 6 July 1971 I saw a single White-crown accompanied by and feeding a single cowbird near my house. In 1972 I was away all summer. On 2 July 1973 about ½ mile from the 1971 locality, I saw an adult White-crown feeding, or being clamorously pursued by, a young White-crown and three young cowbirds (possibly four—it was difficult to be certain in the confusion). As individual cowbirds rarely lay more than two eggs in the same nest (Bent 1958, U.S. Natl. Mus. Bull. 211: 434, 437), the three or more young cowbirds I saw possibly constitute parasitism of this brood by at least two different cowbirds. Then from 16-20 August 1973 a third White-crown brought two young cowbirds regularly to a feeder near my house where it fed them bird seed.

If cowbird parasitism of *pugetensis* is indeed rare, then these three (or four?) occurrences 2 years apart in the same place (considering I was not present during the intervening year) may indicate that the original cowbird or perhaps some of its offspring have imprinted on the host species—as the Common Cuckoo (*Cuculus canorus*) is known to do. Recent evidence shows host specificity does occasionally occur in cowbirds (Friedmann 1971, *Auk* 88: 238).

Another explanation for the paucity of records exists. The A.O.U. Check-list (1957, fifth ed., Baltimore, Amer. Ornithol. Union) shows that as recently as 1957 the ranges of *pugetensis* and *M. ater artemisiae* (the northwestern race of the cowbird) overlapped very little—so limited opportunity for interaction. From approximately 1960-65 cowbirds spread rapidly over the range of *pugetensis* (Larrison 1968, Washington birds: their location and identification, Seattle, Washington, Seattle Audubon Soc., p. 227) until they may now be considered abundant in western Washington.