

develop upstream of the barrage as the tide goes out below it. When a sufficient head of water has built up, the water in the basin is allowed to drive the generators and so generate electricity.

The effects on the ecosystem in general, and birds in particular, would be complex. By holding back the receding tide, the barrage would reduce the area of the mudflats available to birds at low tide upstream of the barrage and reduce the time available for them to feed. But there is another side. The Severn estuary is a high energy estuary with unstable mud and sand flats and very turbid water, both conditions that many invertebrates find difficult to deal with. By obstructing the strong tidal currents, the barrage could make the environment more suitable to invertebrates and so increase the density of food available in the reduced areas that remain. There is therefore both a debit and credit side to the effects of the barrage on the waders and it is our job to develop a methodology which will enable us to predict the net effects of these two opposing factors on the birds.

Barry Pearson, Ed Rispin and myself are involved in this project which, also involves scientists from several other institutions.

DRILLING FOR OIL IN POOLE HARBOUR

Drilling for oil in Poole Harbour, Dorset in the south of England is set to increase many fold and there is concern that this might disturb the birds, including waders. We are therefore comparing the behaviour and distribution of birds before, during and after the work is being done, to measure any effect the work has on the birds.

This project is being conducted by Barry Pearson and myself.

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NEW WORLD SECTION

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SOME UNUSUAL OBSERVATIONS OF DUNLINS IN WASHINGTON

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Three unusual observations concerning Dunlins wintering in western Washington are described. These involve retention of breeding plumage, pre-copulatory type mounting, and cavity entering.

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The Dunlin *Calidris alpina* is one of the most intensively studied Calidridine species in the world. Much of the current knowledge of the ecology of this species has been summarized by Cramp and Simmons (1983). In this note I will describe 3 unusual occurrences during winter in western Washington: 1. retention of breeding plumage, 2. precopulatory-type mounting, and 3. cavity entering. To my knowledge, none of these occurrences have been reported for this species in North America during winter.

MOLT

On 18 November 1979, a brightly-coloured individual was observed in a mixed flock of Dunlins and Sanderlings *C. alba* on the outer beach at Leadbetter Point National Wildlife

Refuge (124°05'W, 46°37'N), on the outer coast of Washington state. The belly of this bird was approximately 90% black with only a few scattered white feathers showing, a plumage characteristic typical of an adult in breeding plumage, although juveniles occasionally exhibit this feature (Cramp and Simmons 1983). The plumage of the head and mantle appeared faded, the head predominantly a light rust, and the mantle a dull brown with light buff-rusty feather margins. This aspect of the plumage is typical of juveniles (Prater et al. 1977, Cramp and Simmons 1983) and it seems likely that the bird was a juvenile with an inordinately large black belly patch.

Dunlins of the subspecies *pacifica* molt almost entirely before departure from the Arctic. Adults molt flight feathers beginning in June,

followed about one month later by the onset of body feather molt (Holmes 1966). This molt is completed in September before arrival at wintering areas (Holmes 1971). Postjuvenile molt occurs slightly later (August) and is largely complete before arrival at wintering areas (Holmes 1966). Subspecies which molt at migratory or wintering areas (e.g. *schinzii*, *arctica*) complete their molt by late November. The probable juvenile observed on 18 November showed no sign of postjuvenile molt at a time one month after molt is generally complete in juveniles of the *pacifica* subspecies.

MOUNTING

Precopulatory-type mounting was observed at Totten Inlet (123°03'W, 47°06'N) on 13 January 1987 during a rising tide. The two Dunlins involved were foraging near water's edge in a flock of several hundred birds. The sequence began with the presumed male hovering a few cm above the mud flats while the other flock member foraged. It settled down onto the back of a Dunlin next to where it had hovered, and then raised its wings to a nearly vertical position. After a brief pause, the wings were flapped several times as it to retain balance, and then the wings were raised again to a nearly vertical position. Immediately following this the male hopped off and both birds resumed foraging. The hover phase lasted about 3 sec, the mount 4 sec. There was no cloacal contact. This sequence of events is identical to copulation activities described for *pacifica* by Holmes (1966).

Pair formation is thought to occur at or near breeding territories or possibly during spring migration in years of late snow melt (Holmes 1966). Copulation has been reported occurring at communal feeding grounds (see Cramp and Simmons 1983) or at the breeding territory (Holmes 1966) but it is not known to occur south of the breeding grounds. It is probable that the behaviour observed at Totten Inlet represented a form of territorial aggression. However, nothing unusual was noted in the behaviour of either bird before or after the mounting.

CAVITY ENTERING

On several occasions I have seen Dunlins roost on pilings during high tide when salt marsh roosting habitat was unavailable. This is common behaviour by Black-bellied Plovers *Pluvialis squatarola* in some areas in western Washington (pers. obs.). Other shorebird species have been reported using similar artificial structures for roosting purposes (see e.g. Atkinson 1976). On 31 January 1987, 117 Dunlins roosted on 21 pilings (range 1 to 10, \bar{x} = 5.57, S.D. = 3.26) at Totten Inlet at 0943 while the remaining 2 600 Dunlins at this site engaged in "high tide flight" (continuous flocking flight during high tide; see Brennan et al. 1985). Mud flats were not exposed at that time, but the salt marsh roosts < 150 m away were readily available. During the next 45 minutes the number of birds roosting on the pilings slowly diminished and the final 8 birds departed and flew to salt marsh when the first mud flats were exposed at 1027. On a piling (15 cm dia.) which supported 8 Dunlins at 0943 one bird was perched on a small branch about 0.2 m below the piling top where 6 other birds were crowded together. On the opposite side of this piling a Dunlin which had been displaced from an adjacent piling 2.5 m away landed at the circular opening of a cavity used during summer

by European Starlings *Sturnus vulgaris* and Purple Martins *Progne subis*. It quickly hopped into the cavity and for a moment was lost from view before reappearing at the entrance. Only its bill, head and neck were visible. This bird remained perched in the cavity for two minutes before flying to another piling. Cramp and Simmons (1983) refer to two published accounts of Dunlins roosting on branches of a dead tree or an unspecified wooden structure. However, to my knowledge there are no records of Dunlins entering or roosting in cavities, although this might be expected in areas where roosting is limited to wooded pilings.

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