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## Predator avoidance behaviour of a solitary Willet attacked by a Peregrine Falcon

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During the non-breeding season, Willets *Catoptrophorus semipalmatus* use a variety of tactics to avoid predators and have been reported to take flight, submerge themselves in water, and hide in or near marsh vegetation (see Lowther *et al.* 2001). In this note I describe the behaviour of a Willet that was attacked by a Peregrine Falcon *Falco peregrinus pealei* during autumn migration in Washington, USA.

On 19 October 2003, I observed a solitary Willet on exposed tidal flats at Totten Inlet, a small inlet at the southern end of Puget Sound, Washington, USA. At 1046h, a female Peregrine Falcon in immature plumage flew rapidly westwards across the inlet at about 20 m. The falcon was quickly lost from view over the adjacent uplands but returned at 1057h and, in low flight, made a fairly high speed attack at the Willet which at this time stood on exposed mud, 25 m from a small saltmarsh island. At this and each subsequent approach and attack by the falcon, the Willet issued a high-pitched, jittery squeal. As the falcon approached, the Willet stood erect (more so than its usual posture) and, at the last instant before potential capture, quickly ducked its body, neck and head to an almost horizontal position while throwing its wings upward vertically. The falcon passed by about one metre overhead, slowed and circled. The Willet then ran about 10 m to where 7–10 cm of water was pooled in a slight depression on the flats. There, it resumed a normal gait but held one wing drooping as if injured.

After circling twice, the Peregrine Falcon attacked again and the Willet repeated its earlier avoidance tactic of ducking and throwing its wings upward, this time creating a noticeable splash as it did so. These manoeuvres were repeated during two subsequent attacks after which, at 1059h, the falcon landed on the saltmarsh, 40 m from the Willet.

At 1100h, the falcon flew and attacked the Willet twice more, each time circling slowly before making a low approach in slow flight. The Willet responded as it had previously. After the second of these attacks, the Peregrine Falcon broke off and flew high to the northeast where at 1102h it eventually attacked other prey about 1 km distant. At that time, I looked back and saw that the Willet had flown 40 m to the nearest saltmarsh where it stood on exposed mud within 20 cm of the saltmarsh edge. Due to the slightly elevated marsh, the Willet was probably invisible to the falcon at that time. The Willet remained fairly hidden like this until 1120h when it hopped up onto the edge of the marsh. Unlike its behaviour before and during the attacks by the falcon, the Willet now bobbed vigorously.

The predator avoidance behaviour I observed included two tactics – partly submerging in water and hiding – that were described by Lowther *et al.* (2001). Equally prominent in the encounter I observed was the use of a rapid wing-up movement. This motion was done at the same instant the bird ducked to a horizontal position. A notable feature of this manoeuvre was the flash of contrasting dark and light colours on the underwing surface (see Hayman *et al.* 1986). On each pass at the Willet, the Peregrine Falcon approached to within 1–1.5 m. The attacks were not rapid, but on each occasion the falcon passed so close that capture seemed imminent. I suspect that the Willet's wing-up manoeuvre was intended to prevent the falcon from striking its body by distracting the falcon. This may have been achieved through the motion of the wings or by flashing the dramatic wing patterns or, more probably, by a combination of both.

I have no explanation for the brief wing-drooping. It looked similar to injury feigning but this was the non-breeding season so it was not a ploy to protect young. I was unable to associate the vocalizations I heard with any mentioned by Lowther *et al.* (2001).

The Willet is rare in Washington where typically fewer than 15 birds occur during the non-breeding period (Buchanan in press). Although Willets often take flight when attacked by avian predators (Lowther *et al.* 2001), this tactic may only be really effective when other Willets are present. The Willet I observed was by itself. Very few other shorebirds (12 Black-bellied Plovers *Pluvialis squatarola*, two Dunlins *Calidris alpina*, 40 Western Sandpipers *C. mauri*, and six Long-billed Dowitchers *Limnodromus griseus*) were present at the time of the attack, and all of them flushed and quickly moved away. Given the absence of other Willets or similar-sized birds that might have provided safety through numbers while in flight, it appears that the best strategy was to remain on the ground. If solitary Willets are more susceptible to attack by avian predators than those in flocks, birds outside the species' primary range might be expected to make regular use of ground-based avoidance strategies.

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