WING-SPREADING BEHAVIOR IN PACIFIC COAST CORMORANTS

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Wing-spreading upon returning to a roost site occurs in a variety of bird species, such as Turkey Vultures (*Cathartes aura*; Clark and Ohmart 1985), storks (Kahl 1971), and cormorants (Johnsgard 1993). Repeated and lengthy observations over a 30-yr period of the 3 species of cormorant common to the Pacific coast of North America (Double-crested (Phalacrocorax auritus), Pelagic (*P. pelagicus*), and Brandt’s (*P. penicillatus*)) by the 2nd author suggested that only the Double-crested Comorant frequently spreads its wings. It was puzzling that although these 3 species share similar habitats and often roost together, they seemed to show a different expression of wing-spreading behavior. To further explore this observation, we attempted to quantify wing-spreading behavior for the 3 species of cormorant.

We observed and analyzed the behavior of Double-crested, Pelagic, and Brandt’s cormorants throughout the summer and fall of 1996 and the spring of 1997 at various locations in the Puget Sound and along the coast of Washington State. These observations were generally conducted from midday through late afternoon. At every site, we observed roosting birds from the shore using a spotting scope.

We began observations of a given bird as soon as it arrived at a roost site from the water. Each bird was observed for a maximum of 30 min, starting immediately after landing. We noted the time (to the nearest second) when the bird would begin or cease spreading its wings. Each individual would have to engage in a new behavior for at least 3 s before we considered this a switch to that behavior.

Wing-spreading behavior occurred in a variety of contexts, including a small amount of aggressive and pre-flight behaviors. The aggressive behaviors we recorded were similar to those described by Johnsgard (1993) for cormorants and their relatives such as aggressive competition for roost sites. While these were the primary contexts for wing-spreading in Brandt’s Cormorants (see below), the majority of wing-spreading recorded for Double-crested and Pelagic Cormorants did not appear restricted to these 2 behaviors, was of highly variable duration, and was interspersed among other behaviors.

We observed Double-crested Cormorants for a total of 6 h and 40 min, Pelagic Cormorants for 5 h, and Brandt’s Cormorants for 3 h and 5 min. However, not all cormorants remained at their roosts for the entire 30-min observation period. Sometimes they were forced to leave their roost by an aggressive intruder, while others departed for no apparent reason. We observed 11 Double-crested Cormorants, 9 Pelagic Cormorants, and 5 Brandt’s Cormorants for the entire 30 min (Table 1). Double-crested and Pelagic Cormorants differed, though not significantly, in the number and duration of individual bouts of wing-spreading (Table 1). Taken over the entire 30-min observation period, however, Double-crested Cormorants spread their wings significantly longer than Pelagic Cormorants (*t* = 4.14, *df* = 11, *P* < 0.01), and the total percentage of Pelagic Cormorants engaged in wing-spreading was smaller (Table 1). Although we intermittently observed brief bouts of wing-spreading in Brandt’s Cormorants, it occurred almost entirely during aggressive and pre-flight behavior in these birds, and it never occurred in the 5 birds that we monitored for the full 30 min (Table 1).

While low sample sizes prevent making definitive statements about the extent of wing-spreading behavior among these species (particularly with respect to Brandt’s Cormorants), the data provide some quantification of the second author’s (DP) non-quantitative but extensive observations that suggest there are differ-