TIMING AND SUCCESS OF BREEDING IN PELAGIC CORMORANTS AT TRIANGLE ISLAND, BRITISH COLUMBIA, 2003–2008

J MARK HIPFNER AND JENNIFER L GREENWOOD

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Of the 6 cormorant species that inhabit the North Pacific, the Pelagic Cormorant (- *t*( ) is the smallest and most widely distributed (Hobson 1997). Pelagic Cormorants breed from Baja California in the eastern Pacific north to the Bering and Chukchi Seas, and south across the western Pacific to southern China. North America supports an estimated one-third of the global population of 400,000 birds (Johnsgard 1993), with the bulk breeding in Alaska. Campbell and others (1990) estimated that only about 4200 pairs bred in British Columbia, mostly at small and widely dispersed sites centered within the Strait of Georgia.

Information on the population status of Pelagic Cormorants in British Columbia is limited. Populations appear to have declined over recent decades in the Haida Gwaii archipelago (Fraser and others 1999), although there is some question about the reliability of the baseline data (Harfenist and others 2002). More conclusive evidence suggests that dramatic declines have occurred in the southern Strait of Georgia (by about 50% since 1987; Chatwin and others 2002), and along the west coast of Vancouver Island (by about 85% since 1969; Carter and others 2007). The declines have been attributed to disturbance at breeding colonies by humans and Bald Eagles (*t*(-), and reductions in prey availability due to oceanographic change (Chatwin and others 2002; Carter and others 2007). Persistent contamination and mortality due to oiling and fisheries practices might also be contributing factors (Harris and others 2005; Smith and Morgan 2005).

There is at present very little information on the timing and success of Pelagic Cormorant breeding at colony sites in British Columbia, especially for regions outside of the Strait of Georgia (Drent and others 1964; Harris and others 2005). This information is pertinent to understanding causes

was no longer present. We used these observations to determine hatching success (the proportion of active nests in which at least 1 egg hatched), fledging success (the proportion of nests in which at least 1 nestling survived at least 30 d), and breeding success (the proportion of nests in which at least 1 nestling survived to fledge). To facilitate comparisons of overall production among colonies, however, we also report frequency distributions for clutch size (total eggs), and the number of fledglings produced per nest. Because Pelagic Cormorants often replace lost clutches, we followed failed nests and recorded the same set of parameters if a replacement clutch was laid.

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The number of active Pelagic Cormorant nests on our monitoring plot varied from 0 (2008) to 24 (2003) across the 6 y, with lower numbers in more recent years (Table 1). The season's 1st egg was laid as early as 15 May in 2003 (day 135) and as late as 4 June in 2007 (day 155), while median laying dates varied from 30 May in 2003 (day 150) to 19 June in 2006 (day

87% of egg-laying pairs hatched 1 or more eggs, and 0 to 65% of pairs that hatched at least 1 egg had 1 or more chick survive to fledge (Table 1). Overall, at least 1 chick fledged from 0 to 65% of 1st clutches, depending on year. Only 2 of 8 pairs that re-laid after losing their 1st clutch fledged a chick, both in 2004. Including replacement clutches, 0 to 75% of pairs succeeded annually (Table 1). Of note, no pairs bred successfully in 2005, a year of widespread failure for seabird breeding across the California Current system (Sydeman and others 2006). In addition, the lack of breeding on the study plot in 2008 apparently was due to constant disturbance from Bald Eagles, possibly associated with inactivity at a Peregrine Falcon (*t*( ) eyrie near the cormorant plot. In other years, the falcon parents kept Bald Eagles

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