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STATUS OF BREEDING BLACK OYSTERCATCHERS, *HAEMATOPUS BACHMANI*, IN THE STRAIT OF GEORGIA, BRITISH COLUMBIA

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There is growing interest among some conservation agencies to use the Black Oystercatcher (*Haematopus bachmani*) as an indicator of coastal ecosystem health. Its propensity to reside year-round on the seashore of the North Pacific, the relative ease of assessing population sizes and reproductive success, and its dependency on intertidal food make it a good candidate to measure change to rocky shore ecological communities (Hartwick 1978; Hartwick and Blaylock 1979; Wootton 1992; Andres and Falxa 1995; Hazlitt and Butler 2001; Hazlitt and Gaston 2003). The species also is nowhere abundant and data are scant to assess changes in abundance. Vermeer and others (1989) conducted the only region-wide survey of nesting Black Oystercatchers in the Strait of Georgia in 1987. Hazlitt (2001) suggested the Strait of Georgia population was undergoing an increase based on Christmas Bird Counts and the number of nesting birds on a few islands.

One measure of how well a population is faring can be assessed by how it uses its breeding habitat. Populations that are reproducing and surviving well should fully occupy the best habitat, periodically use marginal habitats, and have a surplus of sexually mature non-breeding individuals ('floaters'). We should expect an oystercatcher population that is faring well to occupy the best nesting islands each year and marginal islands in some but not all years, with sexually mature non-breeding individuals being present in the region. Oystercatcher pairs were more successful when they nested on gentle slopes close to intertidal foraging areas than when they nested in steeper areas with little intertidal foraging habitat (Hazlitt 2002). In populations that are faring poorly we might expect fewer islands to be occupied each year with a disproportional loss occurring on marginal islands, and mature non-breeding individuals to be absent.

To assess the state of the oystercatcher population in southern British Columbia we visited all suitable nesting islands in the Strait of Georgia in 2005 and 2006 to count breeding and non-breeding oystercatchers. Vermeer and others (1989) showed that suitable nest sites for oystercatchers in the Strait of Georgia were small islands uninhabited by humans with few or no trees and extensive barren ground. Breeding oystercatchers on these islands can be easily counted from a boat or on foot. In the Strait of Georgia, British Columbia, 284 potential nesting islands were visited by Vermeer and others (1989) in 1987 to count oystercatchers. Their data provided us with a comparative measure to estimate change in the distribution, site occupancy, and size of the breeding population. We considered the population to be robust if we found evidence that all nest sites used in 1987 (Vermeer and others 1989) were occupied in our survey, sites not used in 1987 were occupied in our survey, and non-breeding adults were present.

The Strait of Georgia is a 150 km long body of water separating the mainland of British Columbia from Vancouver Island in southern British Columbia. Most of the oystercatchers in the Strait nest on small islands and islets (Figs. 1 & 2 in Vermeer and others 1989; Hazlitt and Butler 2001).

We visited all islands in the Strait of Georgia used by nesting oystercatchers during the Vermeer and others (1989) survey, and all small, bare rocky islands with little vegetation that potentially were good nesting sites (Vermeer and others 1989). We searched between the Chain Islands in Oak Bay in the south and Porlier Pass in the north from 13 to 16 June 2005 using a 17-m boat with a 4-m elevated deck. We landed on all islands in the Gulf Islands that looked suitable for nesting to search for nests,

eggs, and chicks. Along the eastern shore of the Strait of Georgia we visited islands between Vancouver and Cortez Island, including Howe Sound, from 12 to 16 June 2006. We did not land but searched for oystercatchers from offshore from the elevated deck of the boat. Following Vermeer and others (1989), we did not survey Saanich and Jervis inlets or Indian Arm where small islands are few. We included for completeness a survey of a few islands near Nanaimo in 1997 and 1999 (M Lemon, Canadian Wildlife Service, Delta BC, unpublished data).

We categorized islands as used for nesting if we saw eggs or chicks, copulating pairs, or pairs that were displaying behaviors such as feigning injury, squatting, uttering alarm or ''whinny'' call while flying toward us, or piping in the presence of other oystercatchers, all of which indicate territorial and nesting behavior (Andres and Falxa 1995). We noted any flocks of oystercatchers that were away from nesting islands and tallied the number of individuals with fully red bills (after-first-year) and dark bill tips (first-year; Andres and Falxa 1995). Oystercatcher age-classes are indistinguishable after the 2nd year. We assumed that oystercatchers with dark bill tips were non-breeding individuals.

Many nest sites used in 1987 were occupied in 2005–06. Several sites not used in 1987 also were occupied in our survey and non-breeding birds were present. A combined total of 64 islands were used by oystercatchers in 1987, 1997–99 and 2005–06 (Table 1). In 1987, 41 islands were occupied versus 45 in 2005–06. Of 58 islands surveyed in 1987 and 2005–06, 13 (22.4%) were used by nesting oystercatchers only in 1987 and 21 (36.2%) were used only in 2005–06 (Table1). Oystercatchers were present on 24 (41.4%) islands in both surveys. In the Gulf Islands, 29 islands surveyed in 1987 and 2005–06 had 37 pairs in 1987 and 29 pairs in 2005–06 (Table 1). Between Cortez Island and Vancouver, 21 islands surveyed in 1987 and in 2005–06 had 13 pairs in 1987 and 42 pairs in 2005–06 (Table 1). Our results indicate that overall the 2005–06 oystercatcher population in the Strait of Georgia remained stable or possibly increased somewhat compared to 1987, from 64 nesting pairs in 1987 to 80 nesting pairs in 2005–06 minus the Nanaimo region (Table 1). Assuming that the 12 pairs that nested in the Nanaimo region in 1997–99 were present in 2005–06, the total number of oystercatchers in the Strait of Georgia would be 92 pairs.

An important source of error in estimates of nesting pairs based on single visits by observers is overlooking pairs hidden from view and omitting oystercatchers that are temporarily off the nesting islands. Hazlitt (1999) estimated that the error associated with single visits was about 32%. We did not measure our detectability error but we assume that it could have been similar to that of Vermeer and others (1989) because we used similar methods. If detectability bias is similar between observers, then single censuses used in this study can be used as a measure of relative change in populations of oystercatchers. However, results from single censuses should be reported as a conservative estimate of total population size.

It is possible that in 2005–06 some oystercatchers chose not to breed when some nesting islands used in previous years were vacant. We observed 29 individuals in 2 flocks away from breeding islands that included adults and at least 2 immature individuals (based on bill-tip coloration, Andres and Falxa 1995). These individuals might have included breeders away from their nesting islands, failed breeders, and non-breeding individuals.

Our results for 1987 to 2006 support, somewhat, Hazlitt's (2001) conclusion, based on her tally of the number of nesting pairs on 2 large seabird islands and an analysis of Christmas Bird Count data, that the number of oystercatchers increased in the Strait of Georgia between the 1960s and 1990s. She also documented a range expansion to the Lower Mainland near Vancouver, British Columbia, where at least 1 pair has nested since 1994. The reasons for an increase are unclear. Gulls and oystercatchers often nest in close association on small islands. Oystercatcher nesting success is negatively correlated with the density of island-nesting gulls as a consequence of crowding and predation (Nysewander 1977, Vermeer and others 1992). The nesting population of gulls in the Strait of Georgia has retracted since 1987 (Sullivan and others 2003) and we expected oystercatchers to have expanded into gull-reduced habitats. However, our evidence is equivocal. Of 4 islands vacated by nesting gulls after 1987, 1 island lost 4 oystercatcher pairs whereas 3 islands increased from no pairs in 1987 to 17 nesting pairs in 2005–06. Moreover,

TABLE 1. Number of known or suspected nesting pairs of Black Oystercatchers in the Strait of Georgia in 1987 (Vermeer and others 1989), 1997–99, and 2005–06. NS = not surveyed.

Location	1987	1997–99	2005–06
Cortez Island to Vancouver			
Three Islets	1	NS	2
Cortez Bay	0	NS	1
Little Rock	1	NS	2
Powell Islets	2	NS	2
Major Islets	1	NS	2
Copeland Islands	0	NS	2
Mitlenatch Island	2	NS	6
Sister Islets	1	NS	0
Vivian Island	0	NS	3
Rebecca Island	0	NS	1
Mouat Islands	0	NS	3
Finnerty Islands	0	NS	2
Fegan Islands	0	NS	4
Merry Island	1	NS	1
White Islets	2	NS	0
Trail Island	0	NS	3
Whitestone Islet	0	NS	1
Paisley Island (south rock)	0	NS	1
Christie Islets & Pam Rock	2	4	2
Hodgson rock	0	NS	3
Tswwassen Ferry spit	0	NS	1
Nanaimo Area			
Ballenas Island	1	NS	NS
Five Finger Island	3	2	NS
Hudson Rocks	2	4	NS
Brandon Rocks	0	2	NS
Snake Island	0	4	NS
Gulf Islands			
Ruxton Islets	1	NS	NS
Canoe Islets	1	NS	1
Rose Islets	3	NS	0
Wallace Island rock	0	NS	1
Ballingal Islets	1	NS	1
Unnamed Islet	1	NS	0
Turtle Rock	0	NS	1
Belle Chain Islands	3	NS	3
Minx Reef Rock	1	NS	1
Pine Island	2	NS	1
Cabbage Island	1	NS	0
Java Islets	4	NS	1
Unnamed Islet (Jackson Rock)	1	NS	1
Unnamed Islet	2	NS	0
Unit Rock	0	NS	1
Tortoise Islets	1	NS	1
Arbutus Islands	1	2	2
Jackson Rocks	0	NS	1
Pym Island	1	0	0
Imrie Island	2	5	1
Unnamed Island	1	NS	0
Dock Island	1	5	2
Unnamed (Greig)	1	2	2
Rubly Island	1	1	0
Unnamed (Reay)	1	1	1
Mandarte Island	3	6	2
Halibut Island	2	4	0
Harris Islet	0	NS	1
Sallas Rocks	1	4	0
Little D'Arcy Islets	1	2	4
Victoria Region			
Flower Island	1	NS	0
Jemmy Jones Island	1	NS	0
Mary Tod Island	1	NS	1
Chain Island	4	NS	4
Harris Island	0	NS	1
Chatham Island	0	NS	1
Chatham Rock	0	NS	1
Discovery Island	0	NS	1
Total	64	48	80

most of the increased use by oystercatchers occurred on islands that were never used by nesting gulls.

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