

Dramatic changes in the number of Black Oystercatchers nesting in Sitka Sound, Alaska

BRAD A. ANDRES¹ & ROBERT E. CHRISTENSEN²

¹ U.S. Fish and Wildlife Service, Division of Migratory Bird Management, PO Box 25486, DFC, Denver, CO 80225, USA. brad_andres@fws.gov

² Southeast Alaska Wilderness Exploration, Analysis and Discovery, 3845 North Douglas Highway, Juneau, AK 99801, USA

Andres, B.A. & Christensen, R.E. 2009. Dramatic changes in the number of Black Oystercatchers nesting in Sitka Sound, Alaska. *Wader Study Group Bull.* 116(3): 181–184.

Keywords: Black Oystercatcher, breeding, *Haematopus bachmani*, human disturbance, population declines, south-eastern Alaska

In 2007, we re-surveyed Sitka Sound, Alaska, to determine changes in nesting Black Oystercatchers that were first studied in 1940; we found an almost 80% decline in the number of nesting pairs between the two years. Whereas human development and the beaching of sawmill logs clearly eliminated nesting habitat, the lack of occupancy by pairs at other historic nest sites was more perplexing. Ancillary evidence suggests that the population has been depressed for at least 13 years, and additional, more intensive study is needed to determine what is limiting Black Oystercatcher population growth or use of Sitka Sound.

INTRODUCTION

The Black Oystercatcher *Haematopus bachmani* nests and feeds exclusively along marine shorelines of the Pacific Ocean coast of North America. Total population size is about 10,000 individuals, and >50% of the population breeds in Alaska (Andres & Falxa 1995, Tessler *et al.* 2009). Because Black Oystercatchers are dependent upon marine shorelines for their life's requirements, they are vulnerable to a variety of anthropogenic shoreline disturbances, natural shoreline changes, and coastal ecological shifts (Tessler *et al.* 2009). These vulnerabilities and their small population size have caused the Black Oystercatcher to be considered a species of high conservation concern, at multiple scales, by numerous agencies and organizations in the U.S. and Canada. As a result, interest in the conservation and management of Black Oystercatchers has increased in recent years.

In 1940, J. Dan Webster, as part of his Cornell University Master of Science degree, conducted the first intensive study of Black Oystercatchers breeding in Sitka Sound, Alaska (Webster 1941a). He produced several papers describing the breeding biology, chick growth, and feeding habits of Black Oystercatchers (Webster 1941b, 1941c, 1942, 1943). During his investigations, he surveyed Sitka Sound's shoreline between Fred's Creek and Kita Island (Fig. 1) to estimate the number of breeding-season Black Oystercatchers, which was accomplished by rowboat with his brother's help. He also recorded breeding status of oystercatchers he encountered and the characteristics of the nest sites he discovered. Results of the survey work yielded 76 breeding (38 pairs) and 26 non-breeding Black Oystercatchers in his study area.

Returning to Sitka Sound in 1994, Webster briefly re-surveyed part of his 1941 study area and found a dramatic decrease in the population of breeding Black Oystercatchers (perhaps only 4 pairs; J.D. Webster, pers. comm.). He was not able, however, to thoroughly cover his study area or measure any shoreline variables that might have explained the decrease in Black Oystercatcher numbers.

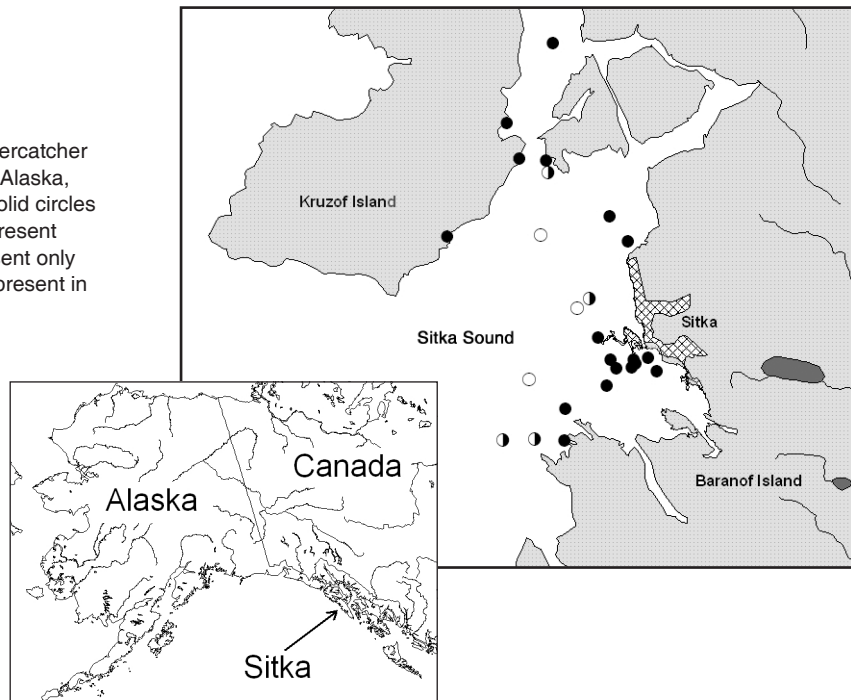
Since the 1940s, there have been numerous anthropogenic changes to Sitka Sound. The human population of Sitka increased from 2,000 individuals to 8,889 in 2008, and there was also a large, temporary population increase during World War II. In addition, an off-shore airport was constructed during World War II, marine recreation activities greatly expanded, a pulp mill was constructed and operated for 35 years, and Sitka became a major cruise ship destination. Because of these changes and Webster's preliminary finding of dramatically fewer Black Oystercatchers inhabiting Sitka Sound, we initiated a study in 2007 to estimate the magnitude of the decrease in the breeding-season population of Black Oystercatchers inhabiting Sitka Sound and to determine whether changes in the shoreline environment had reduced availability of Black Oystercatcher nest sites in Sitka Sound.

METHODS

In summer 2007, using maps and descriptions provided in Webster's thesis (1941a), we visited all off-shore rocks or beach segments that were previously identified in his study area as being used by nesting Black Oystercatchers, and we explored previously unused locations that appeared suitable for nesting by oystercatchers (N = 25 total sites). Many of these locations had been used by multiple nesting pairs in 1940. For each nest site at each current and historic nesting location, we recorded breeding activity as one of the following: no birds, non-territorial birds (number), territorial pair, nest with eggs (enumerated if present), or pair with chicks (enumerated if present). Coordinates of all nest sites and locations were recorded, and we photographed several nest rocks to compare with Webster's thesis photos (1941a). At each current or historical nest site, we also recorded the presence or absence of logs washed ashore into the supratidal zone, vegetation successional stage, and the presence or absence of human structures.

To assess temporal changes in Black Oystercatcher

Fig. 1. Location of Black Oystercatcher breeding area in Sitka Sound, Alaska, surveyed in 1940 and 2007. Solid circles indicate breeding pairs were present only in 1940, open circles present only in 2007, and half-filled circles present in both years.



numbers, we used a paired *t*-test and binomial test to compare the numbers of pairs and occupancy of pairs on individual rocks, or beach segments, between 1940 and 2007; locations represented the primary sampling unit. A paired test was used because oystercatchers at a specific location would likely be exposed to similar environmental stresses. Although we intended to use logistic regression to examine effects of environmental shoreline conditions, the sparse number of pairs recorded in 2007 prohibited this approach.

RESULTS

Webster (1941a) located 38 Black Oystercatcher pairs breeding in Sitka Sound in 1940, but we found only eight pairs in 2007, a near 80% decline (Table 1). Similarly, significantly

fewer (binomial test, $p = 0.0007$) nesting locations were occupied by breeding pairs in 2007 than in 1940 (Table 2). Only four locations were occupied in both years, and we found pairs at three locations not recorded by Webster in 1940. There was a significant ($p = 0.0001$) loss of 1.2 pairs ($SE = 0.3$) from each historic nesting location ($t = -4.77, p < 0.0001, df = 24$). Reductions in the number and occupancy of pairs were greatest (100%) at nesting locations close to Sitka and those where rogue mill logs had washed ashore (Table 1). We believe that washed-up logs eliminated nesting habitat for four breeding Black Oystercatcher pairs on Kruzof Island, and development and disturbance by humans eliminated 18 nesting pairs close to Sitka. Although breeding pairs disappeared at nesting locations distant from Sitka, losses were not as great (a net loss of eight pairs). We

Table 1. Differences in the number of Black Oystercatcher pairs breeding in Sitka Sound, Alaska, between 1940 and 2007. Beached logs appeared only after a sawmill began operation in 1959. Degrees of freedom for the paired test are based on the number of breeding locations used in either or both years (total N = 25).

	Breeding pairs		Pairs/location		Change in breeding pairs				
	1940 ¹	2007	1940 ¹	2007	difference	SE	<i>t</i>	<i>P</i>	df
All sites	38	8	1.52	0.32	-1.20	0.25	-4.77	<0.0001	24
Near Sitka/logs on beach	22	0	1.83	0.00	-1.83	0.32	-5.70	<0.0001	11
>5 km from Sitka	16	8	1.23	0.62	-0.62	0.31	-1.98	0.0711	12

¹ from Webster 1941a

Table 2. Differences in occupancy of nesting locations by Black Oystercatchers breeding in Sitka Sound, Alaska, in 1940 and 2007. Beached logs appeared only after a sawmill began operation in 1959. Degrees of freedom for the binomial test are based on the number of breeding locations used in 1940 only or 2007 only. For stability, loss and gains in occupancy should be equal after discounting the locations that were occupied in both years.

	1940 ¹ only	2007 only	Both years	Prop. of all locations only occupied in 2007 ($H_0 = 0.5$)	<i>P</i>	<i>N</i>
All sites	18	3	4	0.14	0.0007	21
Near Sitka/logs on beach	12	0	0	0.00	0.0002	12
>5 km from Sitka	6	3	4	0.33	0.2539	9

¹ from Webster 1941a

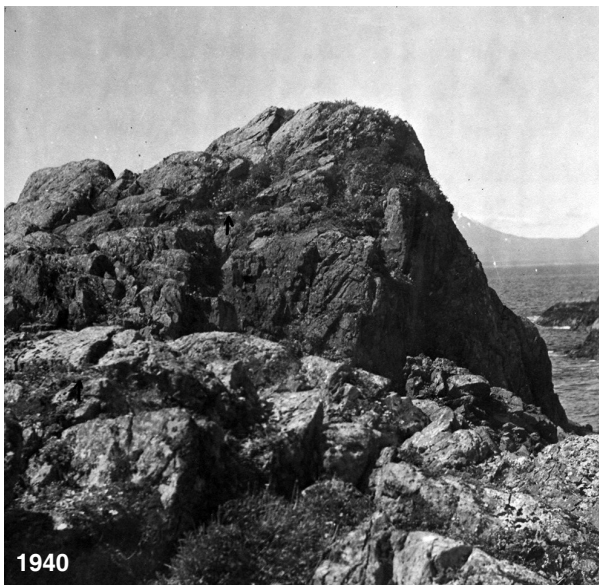


Fig. 2. Example of lack of plant succession on rocks used by Black Oystercatchers nesting in Sitka Sound, Alaska. Images were taken at the same site in 1940 and 2007 from different angles.

do not believe that vegetation succession on nest rocks had eliminated nest site potential (see Fig. 2 for an example).

DISCUSSION

Clearly, human development caused the loss of the majority of breeding Black Oystercatcher pairs in Sitka Sound. This occurred through the beaching of logs that escaped from mill operations, and the construction of the airport, homes, and other facilities around Sitka. The logs washed ashore on Kruzof Island occurred at a density that eliminated nesting substrate. Building of recreation cabins on the Kruzof Island shoreline might have also increased disturbance to a level that made the beach undesirable for nesting Black Oystercatchers. Close to Sitka, several homes were constructed on islands where Webster found Black Oystercatchers nesting in 1940. Constant boat traffic by residents and recreationists may also have caused other pairs to abandon nesting locations close to town; human activities have caused Black Oystercatchers to abandon nesting locations in other parts of their range (Andres & Falxa 1995, see Tessler *et al.* 2007).

Away from the town of Sitka, we are less certain about what factors have caused abandonment of nesting locations used by Black Oystercatcher. We have no evidence that vegetation succession caused formerly used nest sites to become unsuitable. Although past pulp mill operations in Silver Bay negatively affected water quality, and possibly oystercatcher prey, effects were localized in areas not used by oystercatchers, and water quality has improved in the last decade (Alaska Department of Environmental Conservation 1999). The role that predation plays in limiting oystercatcher population growth is not fully known, but predators appear to strongly influence nest success in Prince William Sound and Middleton Island, Alaska (Andres 1999, Guzzetti 2008; see Tessler *et al.* 2007). Because most Black Oystercatchers nest on offshore rocks in Sitka Sound, they are likely more vulnerable to predation by birds than mammals. Although there is little information on changes in avian predator numbers, Bald Eagles *Haliaeetus leucocephalus*, which were killed for bounty in Alaska between 1917 and 1952, increased in south-east Alaska from 7,000 to 12,000 individuals between 1967 and 1997 (Jacobson & Hodges 1999).

Black Oystercatcher nests are prone to flooding, and wakes

caused by large ships are known to flood nests (see Tessler *et al.* 2007). Increased cruise ship traffic might have a negative effect on nest success of Black Oystercatchers breeding in Sitka Sound; the three, novel nesting locations found in 2007 were all on very tall off-shore rocks, which may have offered some protection from flooding from ship wakes. As discussed in the Black Oystercatcher Conservation Action Plan (Tessler *et al.* 2007), more information is needed to fully understand the effects increased tour boat and cruise ship traffic have on flooding of Black Oystercatcher nest sites in southern Alaska and British Columbia.

Human presence where Black Oystercatchers nest has a well-established, negative influence on productivity of Black Oystercatchers, which operates through a variety of mechanisms such as home construction, free-ranging domestic animals, and egg trampling. Cruise ships and tour boats can extend these human-induced, negative effects on Black Oystercatchers into previously undisturbed areas. Coupled with deleterious effects of invasive predators and unknown effects of sea level change, continued assessment and evaluation of Black Oystercatcher response to these threats, through a well-constructed monitoring program, is clearly warranted.

ACKNOWLEDGEMENTS

Thanks to Dan Webster for stirring our interest in this project and to Corrie Bosman for field assistance. The project was funded by the U.S. Fish and Wildlife Service, Division of Migratory Bird Management. Jim Johnson, U.S. Fish and Wildlife Service, provided helpful comments on a draft of the manuscript.

REFERENCES

- Alaska Department of Environmental Conservation. 1999. *Total maximum daily load for residues in the waters of Herring Cover of Silver Bay, Alaska*. Unpubl. report, Juneau, Alaska.
- Andres, B.A. 1999. Effects of persistent shoreline oil on breeding success and chick growth in Black Oystercatchers. *Auk* 116: 640–650.
- Andres, B.A. & G.A. Falxa. 1995. Black Oystercatcher (*Haematopus bachmani*). In: *The Birds of North America* No. 155 (A. Poole & F. Gill, eds). Academy of Natural Sciences, Philadelphia, PA, and American Ornithologists' Union, Washington, DC.
- Guzzetti, B.M. 2008. *Structure and dynamics of a colonizing population of Black Oystercatchers on an isolated island*. M.Sc. thesis, University of

Alaska, Fairbanks, AK, USA.

- Jacobson, M.J. & J.I. Hodges.** 1999. Population trends of adult Bald Eagles in Southeast Alaska, 1967–97. *J. Raptor Res.* 33: 295–298.
- Tessler, D.F., J.A. Johnson, B.A. Andres, S. Thomas & R.B. Lanctot.** 2007. *Black Oystercatcher* (*Haematopus bachmani*) *Conservation Action Plan*. International Black Oystercatcher Working Group, Alaska Department of Fish and Game, Anchorage, Alaska, U.S. Fish and Wildlife Service, Anchorage, Alaska, and Manomet Center for Conservation Sciences, Manomet, Massachusetts. (http://www.whsrn.org/shorebirds/conservation_plans.html)
- Tessler, D.F., J.A. Johnson, B.A. Andres, S. Thomas & R. Lanctot.** 2009. A global assessment of the conservation status of the Black Oystercatcher

- (*Haematopus bachmani*). *International Wader Studies* 20: *in press*.
- Webster, J.D.** 1941a. *A study of the Black Oyster-catcher* *Haematopus bachmani* *Aud.* M. Sc. thesis, Cornell University, Ithaca, New York.
- Webster, J.D.** 1941b. The breeding of the black oyster-catcher. *Wilson Bull.* 53: 141–156.
- Webster, J.D.** 1941c. Feeding habitats of the black oyster-catcher. *Condor* 43: 175–180.
- Webster, J.D.** 1942. Notes on the growth and plumages of the black oyster-catcher. *Condor* 44: 205–213.
- Webster, J.D.** 1943. The downy young of oyster-catchers. *Wilson Bull.* 55: 40–46.



Black Oystercatcher on nest, Alaska, June 2005 (photo Brian M. Guzzetti).