Exxon Valdez **Oil Spill Restoration Project Final Report**

Black Oystercatcher Surveys in Prince William Sound, Alaska

Aaron J. Poe, Erin E. Cooper, and Jillian C. Jablonski

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STUDY HISTORY: This project was initiated in 2007 to catalog black oystercatcher territories in previously unsurveyed areas in Prince William Sound, Alaska. Focus areas for this project were Hinchinbrook Island, Hawkins Island, College Fiord/Port Wells, Cochrane Bay, Blackstone Bay, and the shoreline between eastern Valdez Arm and Cordova. This project tiers to the *Exxon Valdez* Restoration Project: Assessment of Human Use and Associated Risk to Sensitive Resources in Prince William Sound, Alaska.

ABSTRACT: The black oystercatcher (*Haematopus bachmani*) is a USDA Forest Service designated sensitive species whose reproductive success is negatively impacted by disturbance. Oystercatchers exhibit high nest site fidelity and return to the same territory each year, with over 50% of the population breeding in southcoastal Alaska. Black oystercatchers are considered a recovering resource by the *Exxon Valdez* Oil Spill Trustee Council as a result of the 1989 *Exxon Valdez* oil spill. As recreation and tourism services in PWS continue to recover and grow, it is becoming increasingly important to identify oystercatcher breeding territories so that appropriate management actions can be taken to allow these services to grow, while minimizing disturbances. In 2007, several important areas of PWS remained unsurveyed for Black Oystercatchers: Hinchinbrook Island, Hawkins Island, College Fiord/Port Wells, Cochrane Bay, and Blackstone Bay. From 2007 to 2009, we surveyed over 1300 km of shoreline in eastern and western PWS to record oystercatcher nesting territories. A total of 101 breeding territories were mapped. These data, along with nesting territories from 1999 to 2006, were compiled in a black oystercatcher Geographic Information System (GIS) and included as part of the USFS Chugach National Forest Sensitive Areas database. This spatial database (geodatabase) will be used to identify interaction hotspots between oystercatchers and humans in order to adequately manage sustainable wildlife, tourism, and subsistence resources in PWS. The geodatabase is published online and available to the EVOS Trustees and the public at large.

KEY WORDS: Black Oystercatcher, Prince William Sound, Geographic Information System, breeding territories, Alaska, *Haematopus bachmani*, Exxon Valdez Oil Spill Trustee Council

PROJECT DATA: Project data from this report are available on the Chugach National Forest website:**http://www.fs.usda.gov/detail/chugach/landmanagement/planning/?cid=stelprdb5143533**

Additional information can be requested from Erin Cooper, ecooper@fs.fed.us. Cordova Ranger District, PO Box 280, Cordova, AK.

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EXECUTIVE SUMMARY

On March 24, 1989 the T/V *Exxon Valdez* grounded on Bligh Reef in northeastern Prince William Sound in south-central Alaska, releasing 41 million liters of crude oil into the surrounding waters. The effects on avian and mammalian life dependent on the Sound were immediate and deleterious. Nine black oystercatcher (*Haematopus bachmani*) carcasses were recovered following the spill, but it is estimated that more were killed as a direct and indirect result of oil (Andres 1994).

The US Forest Service began an inventory program for the black oystercatcher in 1999, but in 2007 several important areas of PWS had remained unmonitored. Many of the areas left to be inventoried occurred within areas with high levels of human use (Gimblett and Itami 2006), specifically Hinchinbrook Island, Hawkins Island, College Fjord/Port Wells, Cochrane Bay, and Blackstone Bay. As part of this project, we surveyed over 1300 km of PWS shoreline for black oystercatchers and mapped 101 territories.

Data compiled from these surveys were used to determine distribution of territories used by breeding populations, with the end product of a spatial database (geodatabase) of oystercatcher nesting areas. Spatial data collected from the Chugach National Forest and US Fish and Wildlife Service from 1999 to 2006 were reviewed and synthesized into a single database of legacy territories. These data were combined with the results from the 2007 to 2009 EVOS funded surveys and the final spatial database is included in the USFS Chugach National Forest Sensitive Areas Database published online.

INTRODUCTION

Over 50% of the black oystercatcher population worldwide breeds in southcoastal Alaska (Andres and Falxa 1995), with 800 to 1,200 individuals inhabiting the rocky beaches and islets of Prince William Sound (Isleib and Kessel 1973). On March 24, 1989, *T/V Exxon Valdez* ran aground on Bligh Reef in northeastern PWS, discharging approximately 41 million liters of crude oil into the surrounding waters. The spill devastated the marine environment, with an immediate adverse effect on seabirds and shorebirds dependent on oceanic resources. Storm winds and strong currents spread the oil throughout the region, oiling beaches on the Kenai Peninsula, the Gulf of Alaska, the Kodiak Archipelago and the Alaska Peninsula; up to 600 miles away from the grounding site (EVOS Trustee Council 1994). Oiling was heaviest on the islands in central PWS (Andres 1994).

The black oystercatcher is an obligate user of marine shorelines. Oystercatchers nest on gravel beaches and feed in the intertidal zone (Andres 1994). Their dependence on marine beaches put the PWS Black Oystercatcher population at particular risk of experiencing acute effects from oil exposure. Directly following the spill, only nine black oystercatcher carcasses were found, but it is estimated that anywhere from 4-57% of the population was killed as a direct result of oil and greater than 39% were displaced by the spill (Andres 1994).

Oystercatchers have high nest site fidelity and return to the same area each year, but disturbance can cause them to abandon an area (Andres and Falxa 1995) or can potentially lead to nest failure. Nest failure rates have shown to be elevated in areas accessible by humans, presumably due to increased levels of disturbance (E. Elliot-Smith, cited as personal communication in Tessler et al. 2010). Directly following the *Exxon Valdez* oil spill, shoreline disturbance caused by cleanup operations near Black Oystercatcher nest sites further slowed recovery of the species. Once shoreline cleanup operations concluded, oystercatcher productivity began to increase (Andres 1997).

The PWS population of black oystercatchers had been declared *Recovered* by the late 1990's, however, analysis of long-term data from 1989 to 2005 showed no increase in population density and no trend of recovery (McKnight et al. 2006). In addition, continued exposure to oil within the population was documented in 2004 with the biochemical marker cytochrome P4501A (EVOS Trustee Council 2006). Chronic exposure to oil may result in continuing biological consequences, preventing black oystercatchers from adopting a positive trend of recovery. These findings led to downgrading the population to *Recovering* in 2006.

Recreation and tourism services in PWS continue to recover following the oil spill with a dramatic increase in visitors recreating in the Sound. Fuel efficient boats have made remote areas of PWS more accessible to recreationists, and the opening of the Anton Anderson Memorial Tunnel in Whittier, Alaska in 2001 allowed greater access from the Kenai Peninsula and Anchorage metropolitan area to PWS. An increase in visitors on the Sound leads to a higher probability of interaction between oystercatchers and humans, especially given that recreational users in PWS show a preference to visit gravel beaches, the same beaches which are preferred nesting sites of black oystercatchers (Poe et al. 2009). Increased recreational users on the rocky beaches of the Sound can lead to inadvertent nest and egg destruction, and can attract greater numbers of predators such as ravens, bald eagles and gulls (Poe et al. 2009). Boat wakes generated during high tides by recreation and commercial vessels can create waves that wash away shoreline nests (Tessler et al. 2010), resulting in lower fitness for the species. Increased use of the areas by kayakers, private vessels and sightseeing ships could cause sufficient disturbance to result in nest abandonment (Tessler et al. 2010), impeding breeding and preventing the recovery of the population.

Proper management for the recovery of recreation and black oystercatcher resources in Prince William Sound requires comprehensive knowledge of black oystercatcher nesting areas. Many areas in PWS have been surveyed for black oystercatcher territories prior to 2007, but many key areas remained unmonitored. Mapping territories in these unsurveyed areas of PWS enables resource managers to make informed decisions and take appropriate actions to support the full recovery of this species as well as improve management of injured human services.

OBJECTIVES

- Survey the PWS shoreline in areas which have had incomplete or no prior inventory for nesting black oystercatchers
- Determine baseline distribution of territories used by the breeding population in PWS

- Develop complete Geographic Information System (GIS) database (geodatabase) of all black oystercatcher nesting areas for PWS to be made available to the Trustees at large

STUDY AREA

Prince William Sound is located in south-central Alaska (Fig.1). The Sound is bordered in the north and west by the Chugach and Kenai Mountains, and to the south and east by Montague, Hinchinbrook, Latouche and other large islands. The rugged coastline of Prince William Sound is approximately 7,000 km and includes gravel beaches, tidal flats, rocky outcroppings and tall rocky cliffs. This area experiences large tidal fluctuations, ranging as high as 6 meters, which produce strong currents (McKnight et al. 2008).

The study area consisted of waters and shorelines of both western and eastern Prince William Sound and included the previously unsurveyed areas of Hinchinbrook and Hawkins Islands in eastern PWS and College Fiord, Port Wells, Blackstone Bay and Cochrane Bay in western PWS. Additional biological and recreational hotspots in eastern PWS were surveyed, such as Ports Gravina and Fidalgo, Sheep and Simpson Bays and areas along the Valdez Arm.

METHODS

Survey Methods

Methods used for the 2007 to 2009 surveys followed those developed by the Black Oystercatcher Working Group (Poe et al. 2004) based on those developed by Klosiewski and Laing (1994) to conduct shoreline waterbird surveys in PWS following the oil spill.. Surveys were conducted during the peak of nesting, but before hatch began. For PWS this includes the 3-week period encompassing the last week of May through the second week in June.

Shoreline survey units were based on logical physical boundaries that resulted in natural breaks in shoreline segments such that there was a natural separation affecting human use patterns (e.g., bays, islands, and archipelagos) following the methods of prior oystercatcher inventory work in PWS (as described in Poe et al. 2009).Two observers visually surveyed the entire shoreline of each survey unit using small inflatable boats powered by outboard motor. Surveys were conducted at speeds of 5 km/hr within 50 m of shoreline between 0800-1900 h, (Alaska Daylight Time) at various tidal stages. For shorelines in which near-shore boat use is impractical (high surf or rocky areas), surveys were conducted by walking the high-tide line. Boat surveys were conducted within 2 hours of high tide in shallow areas that prevented approach of <50 m from the shoreline.

When we detected black oystercatchers, we went ashore to determine breeding status. For each bird located we assigned status as non-reproductive or reproductive. Non-reproductive status includes a single individual, pair, or > 2 birds not engaged in reproductive behavior. We defined a reproductive pair (territory) by the presence of eggs or chicks or behaviors such as courting, nest-building, or copulation. Territory locations were mapped on an aerial photo or 1:63,360 topographic map, and recorded using global positioning systems (GPS; Trimble GeoXT, Trimble Navigation Ltd., Sunnyvale, CA) then added to a GIS.

In order to avoid disturbance, observers spent <30 minutes evaluating each territory including all nest search time and habitat data collection. Additional consideration was given during periods of severe weather (e.g. less time at nest or reduced search time). Territories were not searched or evaluated in the presence of known oystercatcher nest predators,

GIS Database

All territories were entered into a GIS and then included in a larger multi species geodatabase under the PWS Sensitive Areas GIS Database (Poe and Greenwood 2012). Metadata was created for that larger database in ArcCatalog describing the methodologies used, restrictions on use and descriptions of the codes used for attribution.

In addition to the survey, nesting territories documented during inventory efforts by the Chugach National Forest and U.S. Fish and Wildlife Service (e.g., Poe et al. 2004) from 1999-2006 were also compiled into this database using the same series of attributes.

RESULTS

Black oystercatcher surveys were conducted in Prince William Sound from 2007 to 2009. Approximately 1,300 km of shoreline were surveyed resulting in the identification of 101 Black oystercatcher territories.

In 2007, surveys were conducted from June 1 to June 14 in both eastern and western PWS. A total of 341 km of shoreline were surveyed in eastern PWS on Hinchinbrook and Hawkins Islands (Fig. 2). A total of 72 black oystercatchers were observed and 45 territories were identified and mapped (Fig. 3, Table 1). In western PWS, approximately 240 km of shoreline were surveyed in in Port Wells, College Fjord, Blackstone Bay and Cochrane Bay (Fig. 4) and 18 oystercatcher territories were identified and mapped (Fig. 5, Table 2). The total number of black oystercatchers observed is unavailable for these areas.

In 2008, surveys were conducted from June 2 to June 12. A total of 188 km were surveyed in eastern PWS in Nelson, Simpson and Sheep Bays (Fig. 6). A total 35 black oystercatchers and 14 territories were identified and mapped (Fig. 7, Table 3,).

In 2009, surveys were conducted from May 18 to June 12. A total of 532 km of shoreline were surveyed in eastern PWS including Nelson Bay, Simpson Bay, Sheep Bay, Port Gravina, Port Fidalgo and Valdez Arm (Fig. 8).. A total of 109 black oystercatchers and 24 territories were identified and mapped (Fig. 9, Table 4). It is important to note that Sheep and Simpson Bays were surveyed in both 2008 and 2009. Territories were identified in similar locations across years indicating that these territories are likely from the same pair.

The nesting territories were digitized in the Chugach National Forest Corporate Database. Spatial data layers of oystercatcher territories from 1999 to 2006 were compiled from the Chugach

National Forest and U.S. Fish and Wildlife Service for the creation of a comprehensive GIS database of nest sites in PWS (Fig. 10, Poe and Greenwood 2012).

DISCUSSION

Survey locations selected provide additional territory locations essential for a comprehensive black oystercatcher inventory of Prince William Sound. With the completion of these surveys over 90% of the shoreline has been monitored and mapped for nesting territories. Nesting black oystercatchers were present in all target monitoring locations. These data along with previous years' surveys will provide valuable information for biologists and land managers in key decisions making processes. Data compiled in the Sensitive Areas geodatabase (Poe and Greenwood 2012) will be used to monitor the recovery of oystercatcher populations in PWS as well as to direct management on areas where interactions between oystercatchers and recreationists may occur.

Due to oystercatchers' high fidelity for nesting sites, mapped locations of territories can allow for education and management practices that will reduce threats to breeding areas. Utilizing data collected from these surveys, 24 areas across PWS have since been identified as human and oystercatcher interaction hot spots in the U.S. Forest Service's "Assessment of Human Use and Associated Risk to Sensitive Resources in Prince William Sound, Alaska" (Suring and Poe 2010). Locations identified from the 2007 to 2009 EVOS funded surveys are included as table 5. In addition, data collected by these EVOS funded surveys and included in the Sensitive Areas GIS database will be utilized to evaluate existing recommended mitigations for EVOS sensitive resources in order to produce suggested mitigation measures for sensitive areas in PWS (Poe and Greenwood 2012).

Actions such as placing educational materials at USFS cabins to inform recreational users about nesting oystercatchers as well as establishing permanent campsites away from known nesting territories can reduce disturbances that result in low fitness, nest abandonment and predation. Furthermore, as PWS recreation/tourism continues to recover, the demand for additional recreational facilities on the Sound will increase. Knowing where black oystercatchers are concentrated during the nesting season will guide the development of recreation management applications such as where to locate the recreational facilities needed to address increasing recreational visitor days while simultaneously avoiding impacts to this recovering species.

The USFS Chugach National Forest Sensitive Areas database and other data resulting from this project have been made available to the EVOS Trustees and the public at large.

Data for black oystercatcher nests and incidental data collected on seabird colonies was also shared with the U.S. Fish and Wildlife Service for entry into the Beringian Seabird Colony Catalog.

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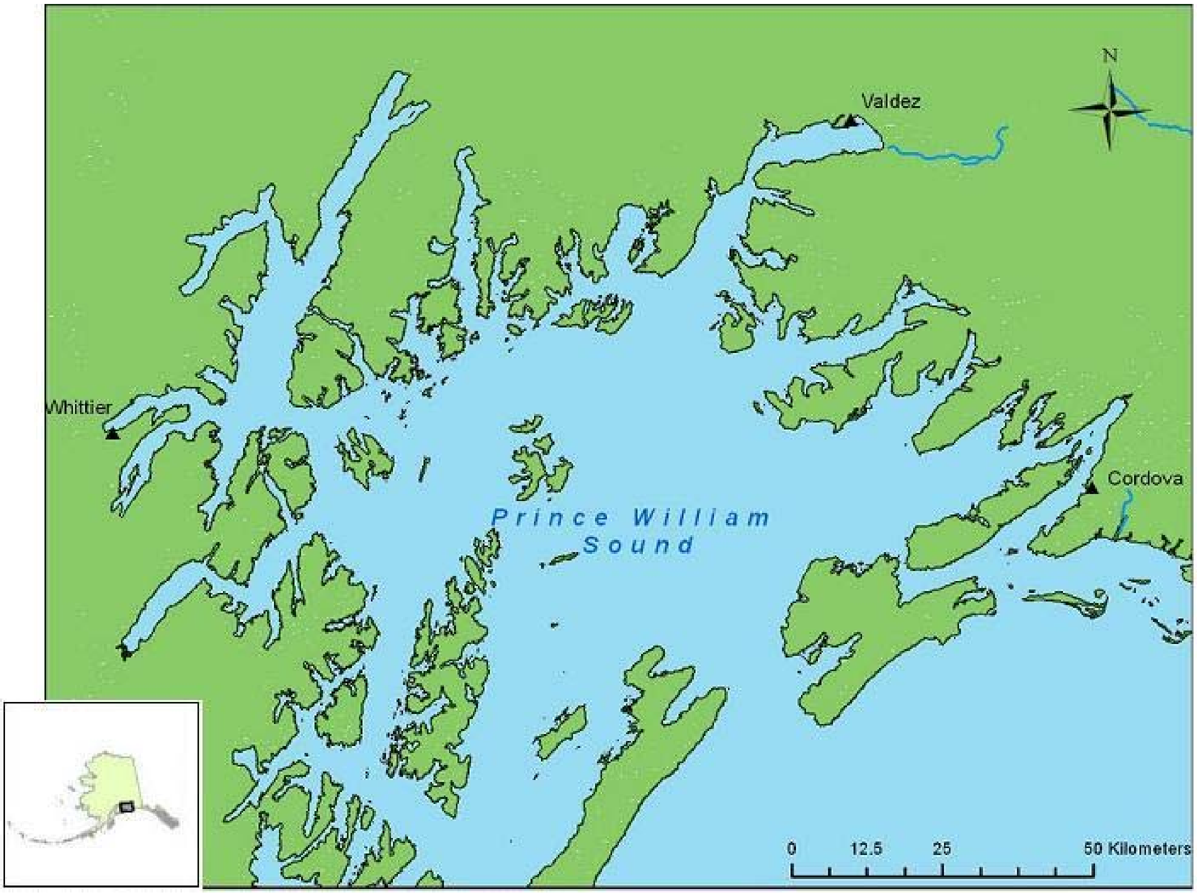

Figure 1. Prince William Sound, South Central Alaska

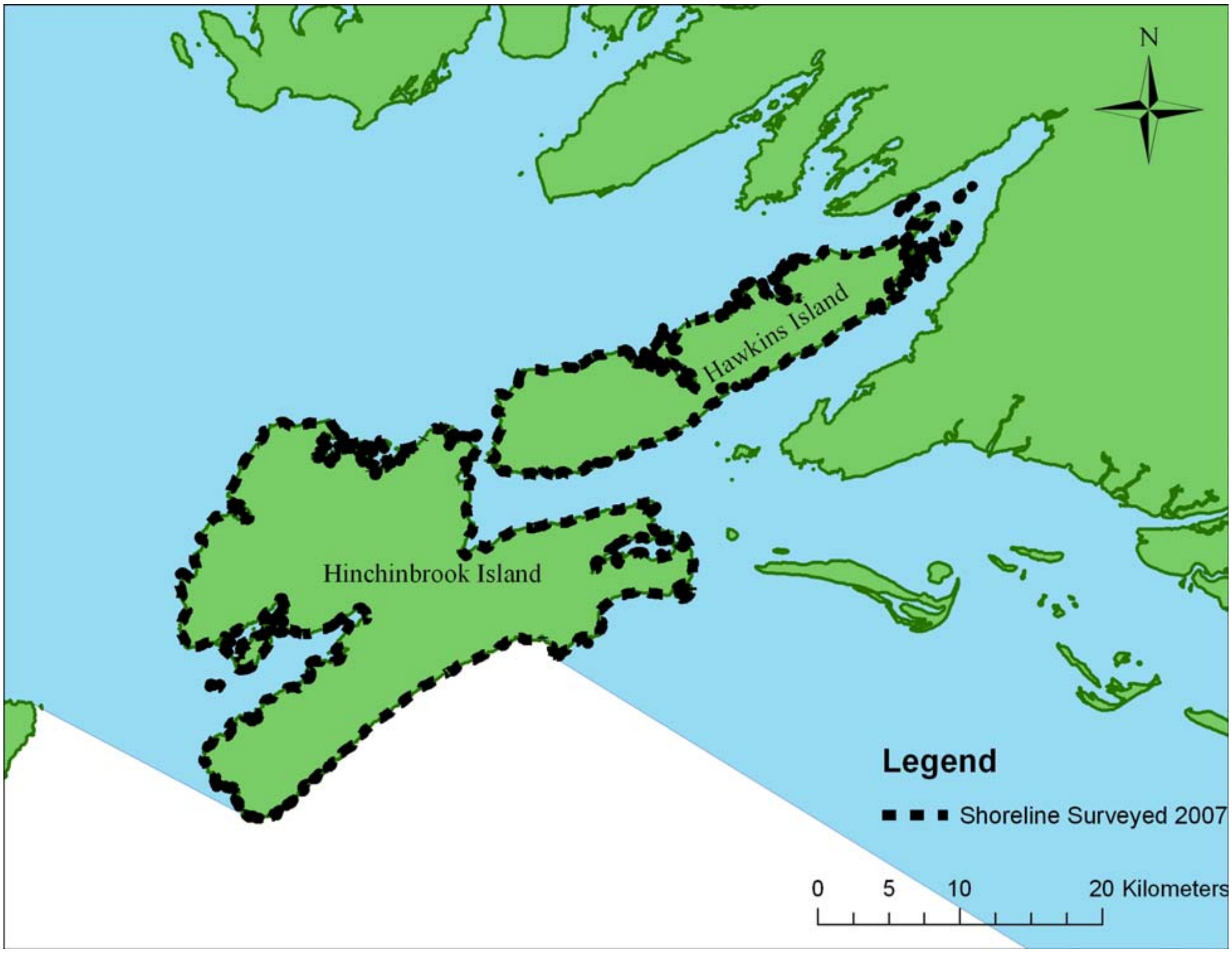

Figure 2. Location of black oystercatcher survey area in eastern Prince William Sound, Alaska , 2007.

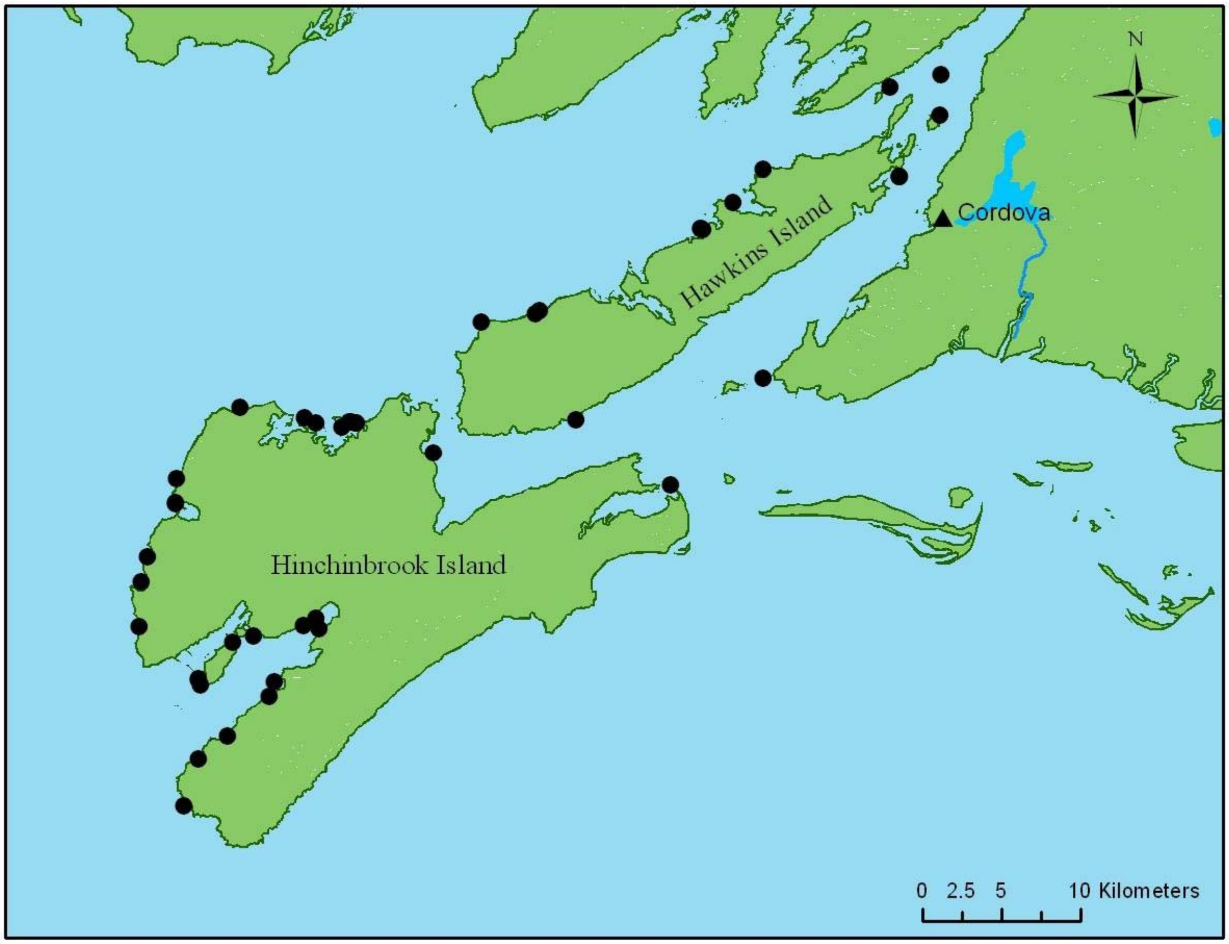

Figure 3. Location of black oystercatcher territories in eastern Prince William Sound, Alaska, 2007.

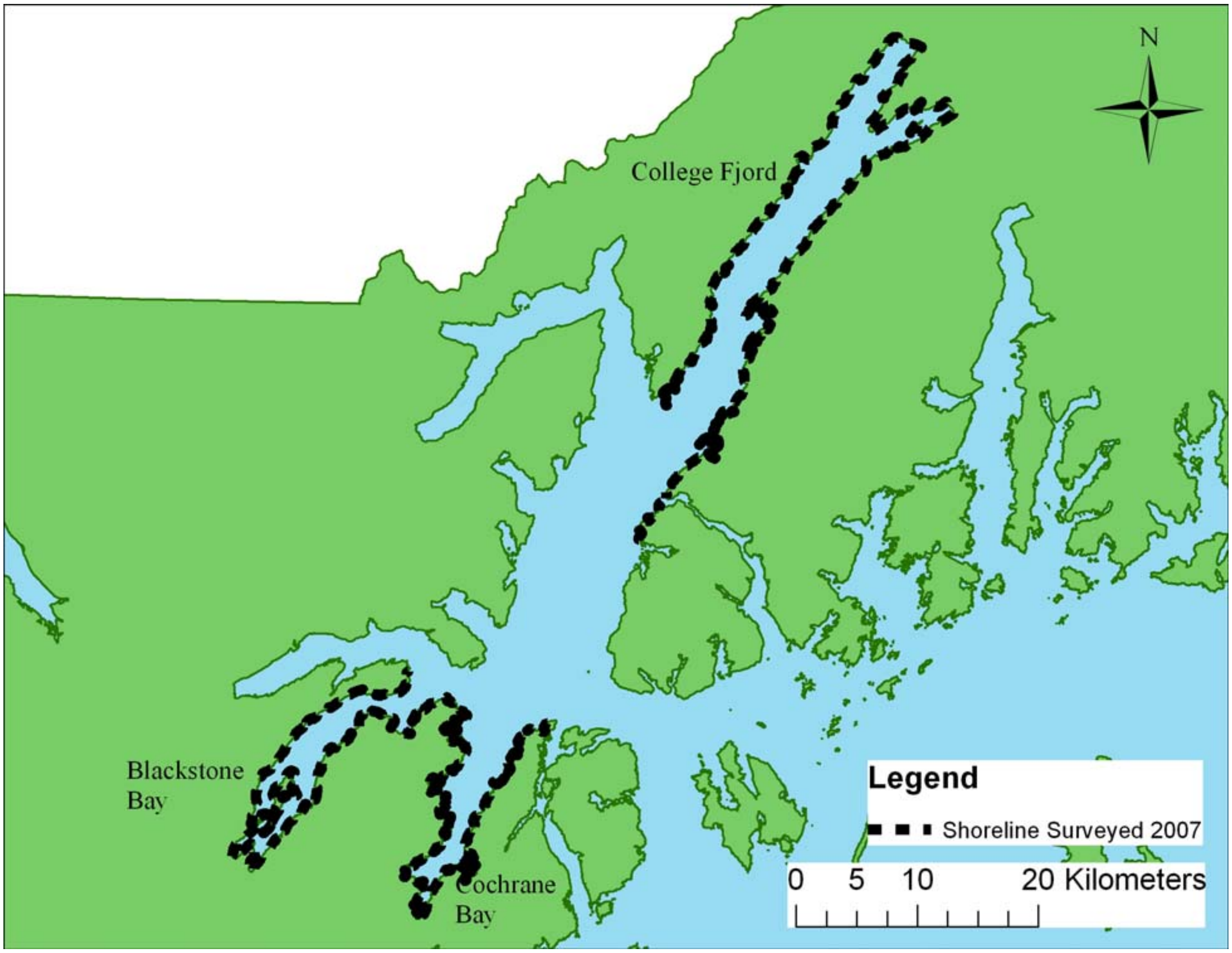

Figure 4. Location of black oystercatcher survey area in western Prince William Sound, Alaska , 2007.

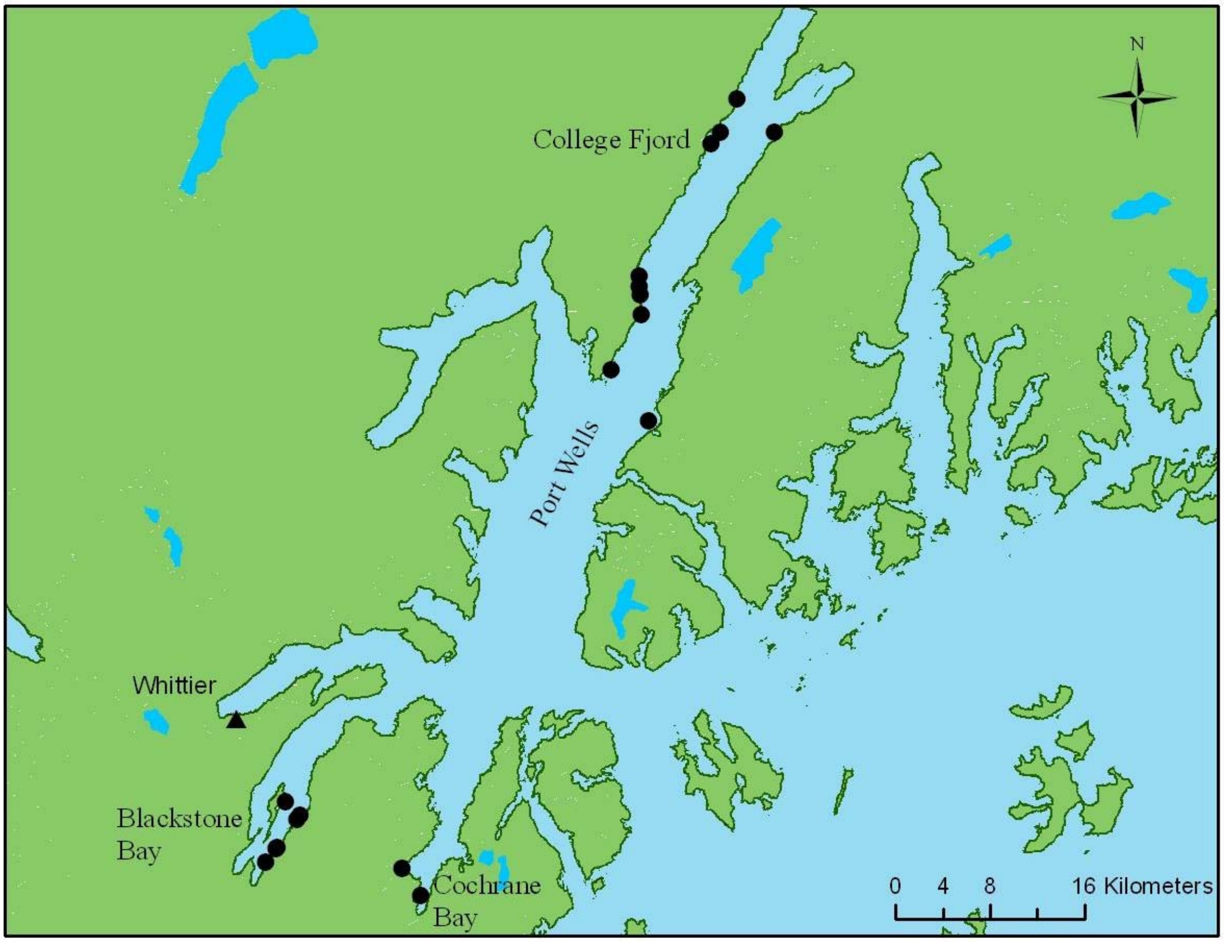

Figure 5. Location of black oystercatcher territories in western Prince William Sound, Alaska, 2007.

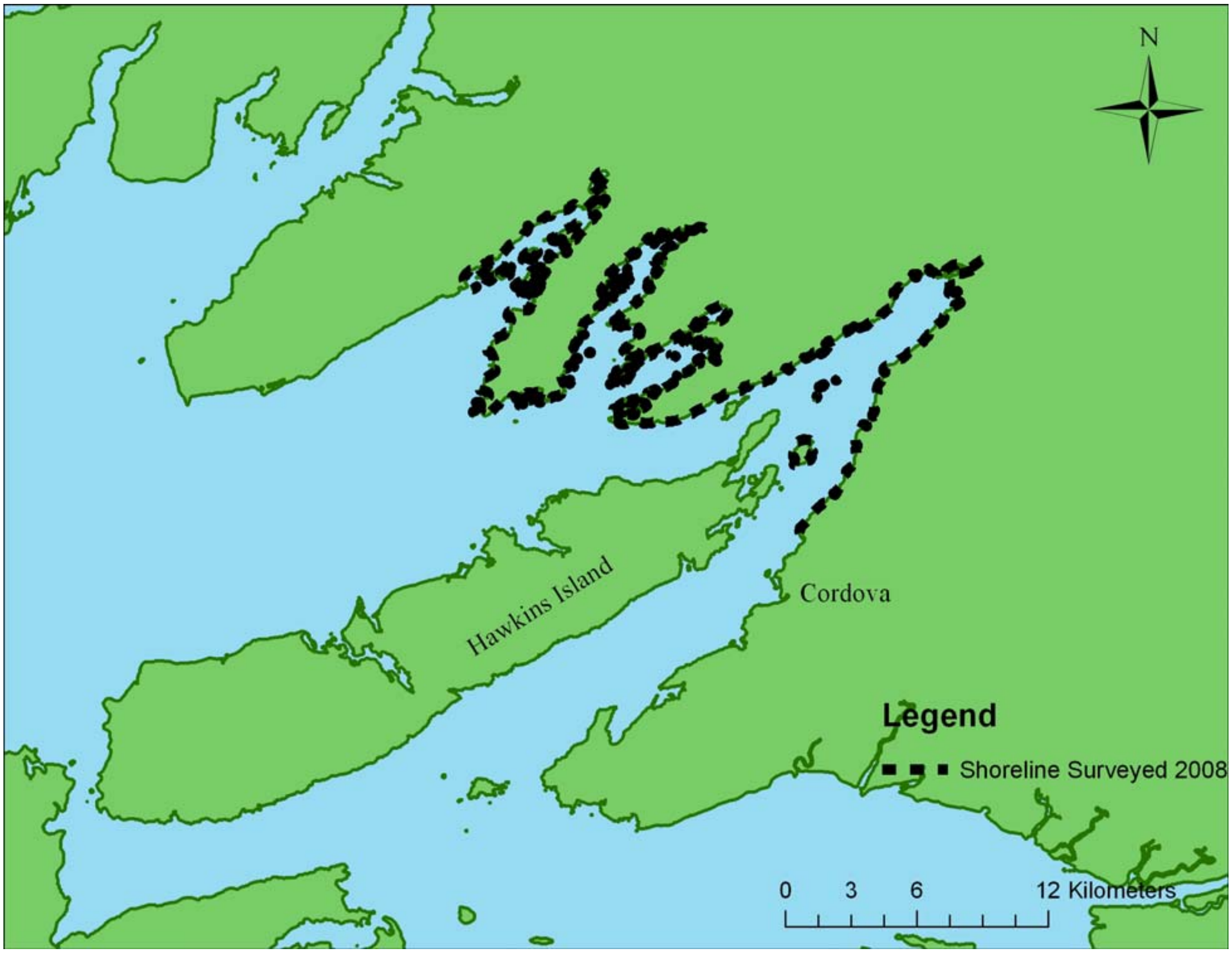

Figure 6.Location of black oystercatcher survey areas in eastern Prince William Sound, Alaska, 2008.

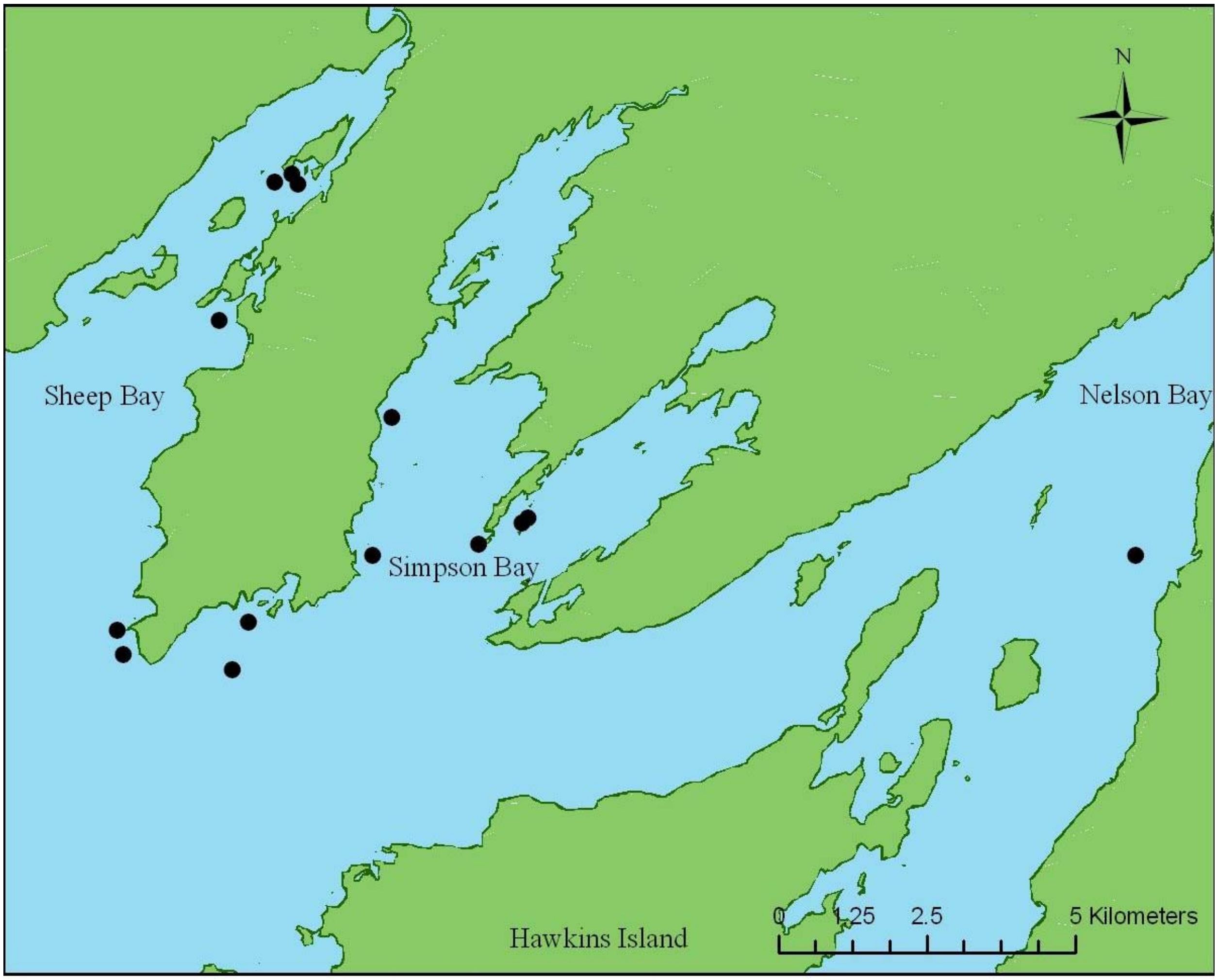

Figure 7. Location of black oystercatcher territories in eastern Prince William Sound, Alaska, 2008.

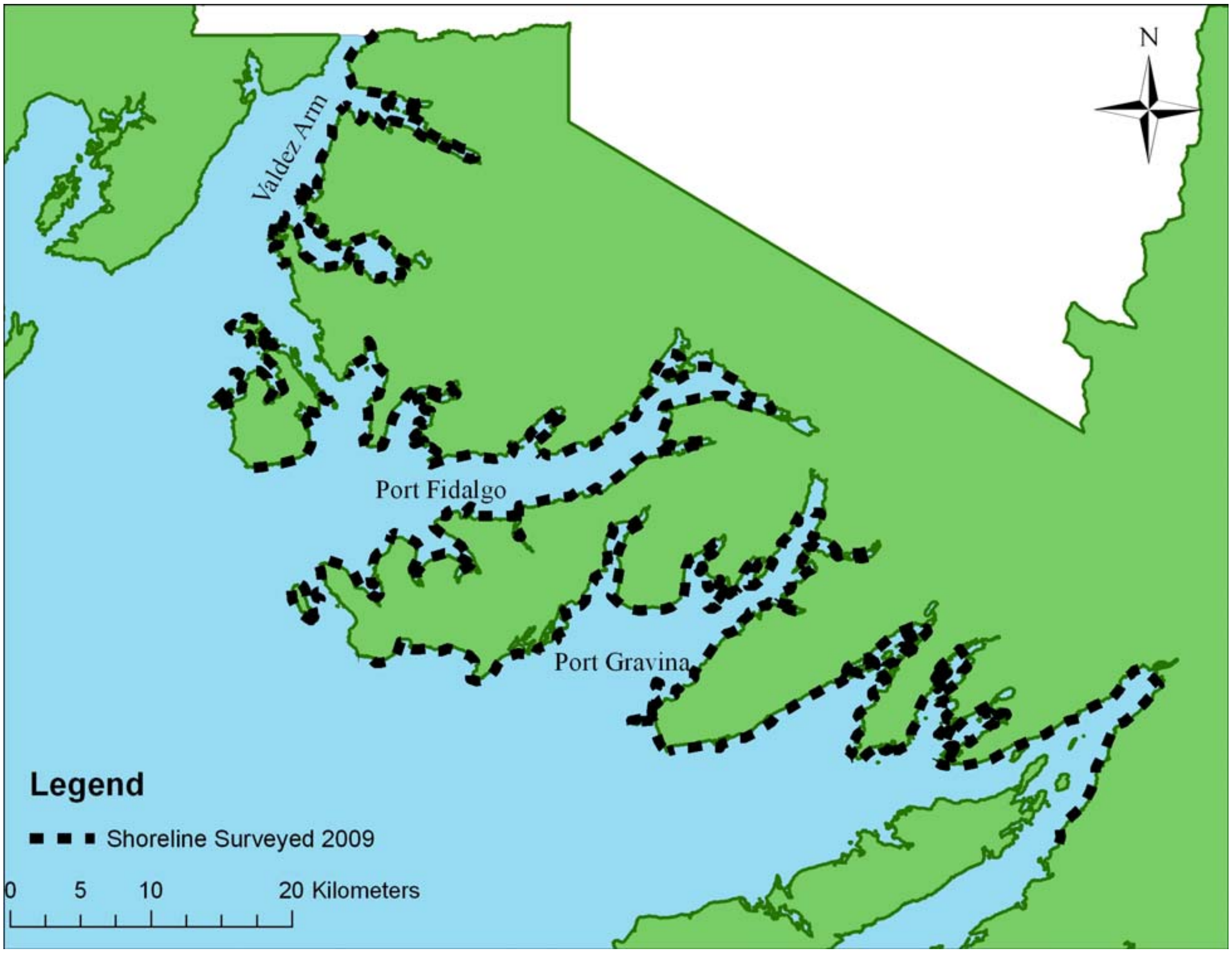

Figure 8. Location of black oystercatcher survey areas in eastern Prince William Sound, Alaska, 2009.

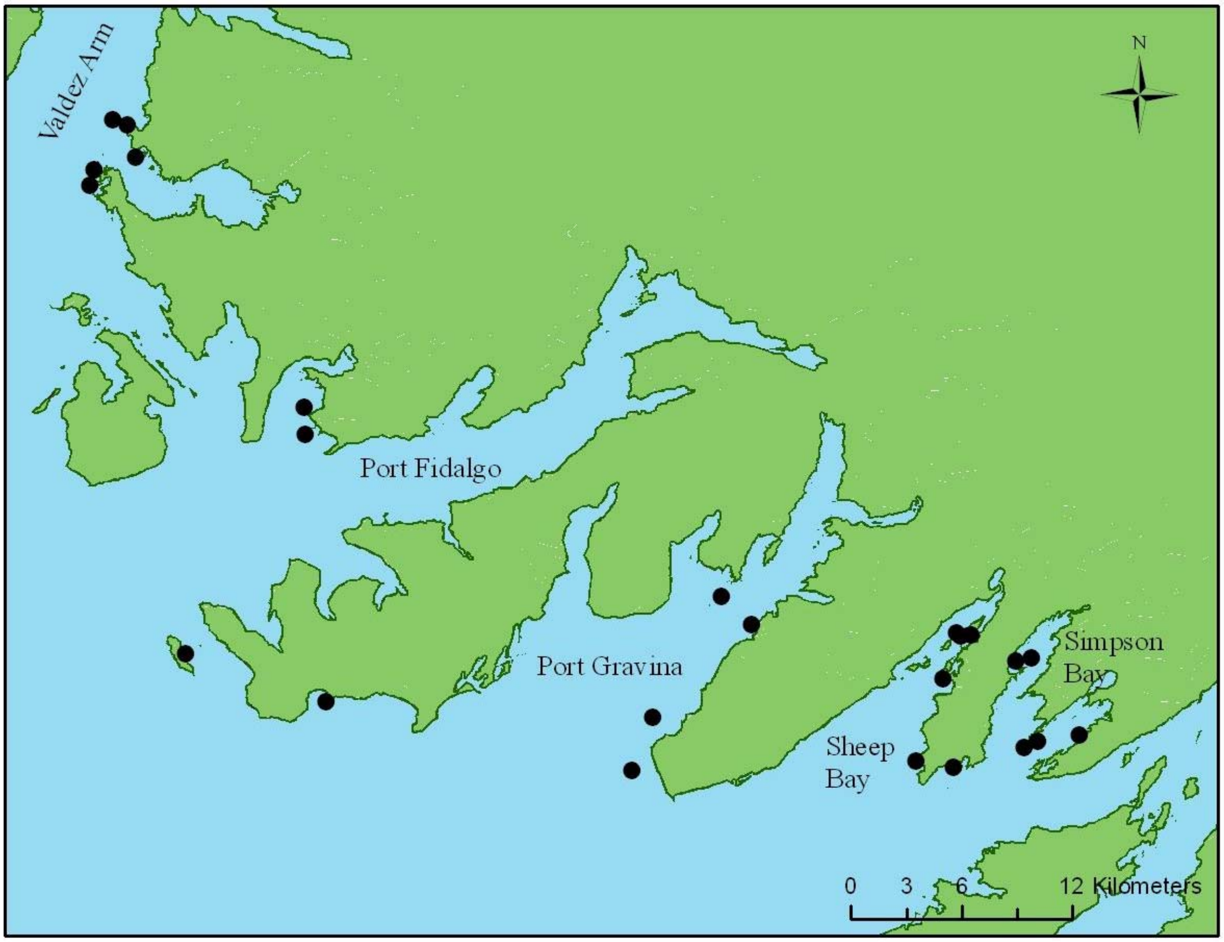

Figure 9. Location of black oystercatcher territories in eastern Prince William Sound, Alaska, 2009.

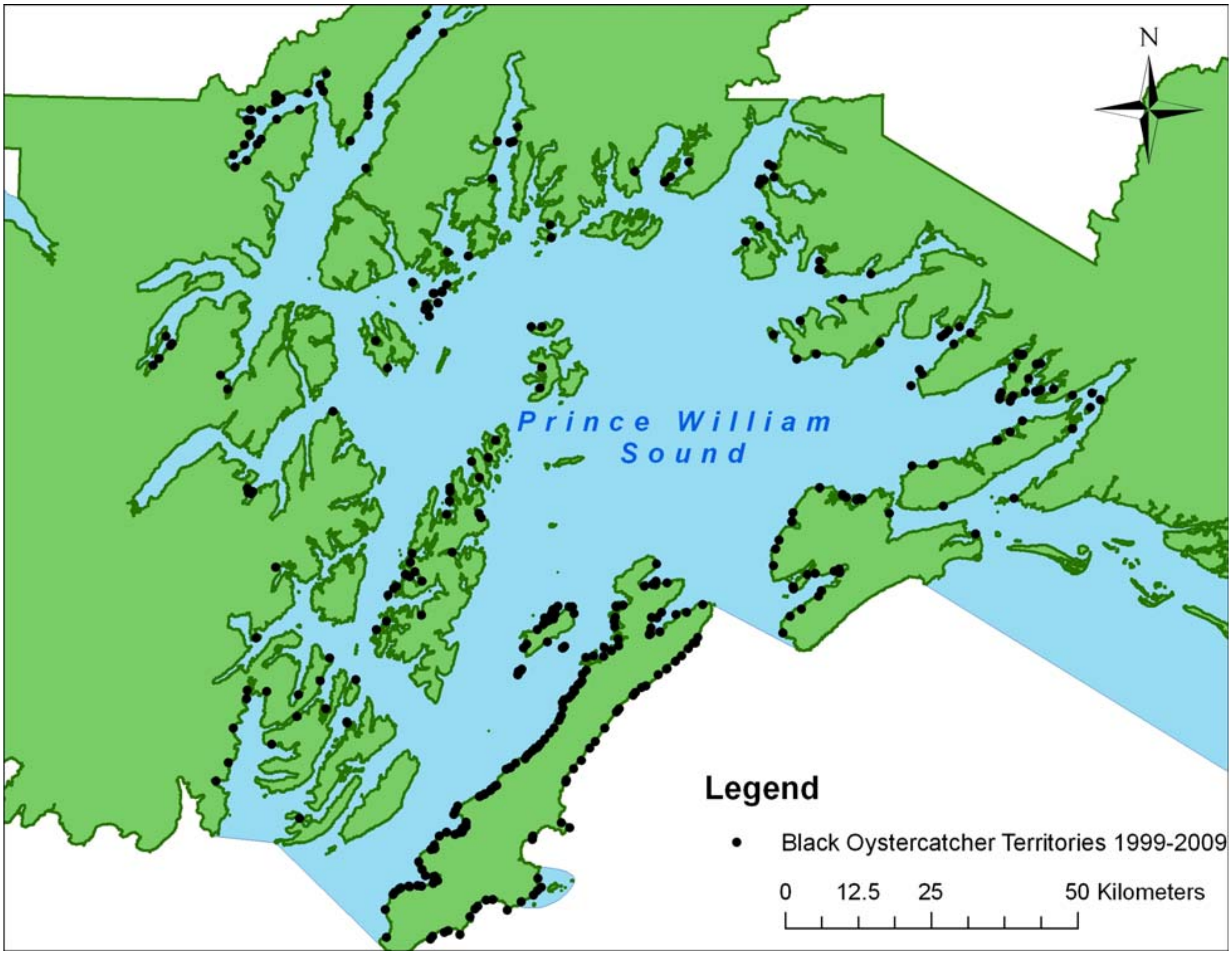

Figure 10. Location of black oystercatcher territories in Prince William Sound, Alaska, 1999-2009 (Poe and Greenwood 2012).

Table 1. Number of Eastern PWS Territories Mapped in 2007 by Location

Hinchinbrook Island	29
Hawkins Island	12
Observation Island	1
Channel Island	1
North Island	1
Shag Rock	1

Table 2. Number of Western PWS Territories Mapped in 2007 by Location

Blackstone Bay	6
Cochrane Bay	2
College Fiord	10

Table 3. Number of Eastern PWS Territories Mapped in 2008 by Location

Orca Inlet	1
Sheep Bay	6
Sheep Point	2
Simpson Bay	5

Table 4. Number of Eastern PWS Territories Mapped in 2009 by Location

Simpson Bay	5
Sheep Point	1
Sheep Bay	5
Port Gravina	4
Knowles Bay	1
Goose Island	1
Landlocked Bay	2
Rocky Point	2
Eastern Valdez Arm	3

Table 5. General Areas identified as potential areas for management of interactions between black oystercatchers and recreationists in Prince William Sound, Alaska (Suring and Poe 2010).

General Area	Percent of study area
Bear Cove	0.01
Bomb Point	0.00
Channel Islands The Narrows	0.00
Dalli Bay	0.00
Deep Bay	0.03
Deep Water Bay	0.03
Derickson Bay Nellie Juan	0.07
Disk Island Anchorage	0.00
Emerald Cove (Heather Bay)	0.01
Harriman Fjord	0.36
Harriman south shore complex	0.01
Hinge Beach (Doran Straight)	0.00
Hole-in-the-wall	0.00
Louis Bay	0.02
NE Galena Coves (Lethcoe)	0.01
Nellie Juan Glacier and spit	0.01
Nellie Juan Lagoon	0.02
Observation Island	0.00
Rocky Point (Lethcoe)	0.01
Serpentine Cove	0.02
Sheep Point	0.00