

**Marine Bird Winter Surveys in Prince William Sound**

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**MA Bishop and AL Schaefer**

*Prince William Sound Science Center, PO Box 705, Cordova, AK*

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The opinions expressed in this Prince William Sound Regional Citizens' Advisory Council commissioned report are not necessarily those of the Council.

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## **Acronym List**

ERMA: Environmental Response Management Application, NOAA

ESI: Environmental Sensitivity Index, NOAA

EVOS: Exxon Valdez oil spill

EVOSTC: *Exxon Valdez* Oil Spill Trustee Council

GOA: Gulf of Alaska

GPS: Global positioning system

GWA: Gulf Watch Alaska, a survey program funded by EVOSTC

km: Kilometers

m: Meters

NOAA: National Oceanic and Atmospheric Administration

NW: Northwest

PWS: Prince William Sound

PWSRCAC: Prince William Sound Regional Citizens' Advisory Council

s: Second

sd: Standard Deviation

USFWS: U. S. Fish and Wildlife Service

## **Executive Summary**

Of the marine birds that overwinter in Prince William Sound (PWS), Alaska, nine species and one species group were initially injured by the 1989 Exxon Valdez oil spill (EVOS; *Exxon Valdez Oil Spill Trustee Council*, 2014). This Prince William Sound Regional Citizens' Advisory Council (PWSRCAC) commissioned study, now in its fifth year, conducted marine bird and marine mammal surveys in and around the PWS tanker escort zone, the Alyeska Pipeline Service Company's Valdez Marine Terminal, and the tanker anchorage by Knowles Head. Our study objective is to determine distribution and density of marine birds and mammals during the non-breeding season in these under-surveyed areas. Our surveys are designed to complement the *Exxon Valdez Oil Spill Trustee Council* (EVOSTC) funded Gulf Watch Alaska surveys conducted from 2007-2022 by the PWS Science Center.

During 2025, we conducted at-sea transect surveys during September (fall) and November (early winter), recording all marine birds and marine mammals observed within a 300-meter (m) survey strip. Using the PWS Science Center's New Wave research vessel, we surveyed 12 transects that varied in length from 7.3 kilometers (km) at Rocky Bay to 31.0 km at Port Valdez. During September, 2820 birds representing 21 species were counted across the transects. Black-legged kittiwake (*Rissa tridactyla*) was the most abundant species (58.7% of observations), followed by dark shearwaters (*Ardenna spp.* 9.7%) and large gulls (primarily glaucous-winged gull *Larus glaucescens*, 8.7%). During November surveys, a total of 792 birds (26 species) were counted across these same transects. During November, the most recorded species was the marbled murrelet (*Brachyramphus marmoratus*, 18.4% of observations), followed by glaucous-winged gull (13.4%) and pelagic cormorant (*Urile pelagicus*, 13.1% of observations). In September, harbor seals (*Phoca vitulina*) and Steller sea lions (*Eumetopias jubatus*) were the most abundant marine mammals, occurring primarily in Port Valdez. Sea otters (*Enhydra lutris*) were the most abundant and widespread marine mammal observed during our November surveys.

The 2025 survey results provide further support for special protection of the marine and nearshore waters at the head of Port Valdez and the bays and island coastlines around Hinchinbrook Entrance. These two areas host consistently high numbers of marine birds and marine mammals, including species that have yet to recover from the 1989 oil spill. Importantly, the head of Port Valdez is vulnerable to disturbance due to the proximity to human infrastructure, including the Valdez Marine Terminal, harbor, and fuel dock. Hinchinbrook Entrance is also particularly vulnerable to anthropogenic disturbance because it is where tankers enter and exit PWS. Our surveys do not include all areas that potentially may be impacted by an oil spill such as the shallow intertidal zone, nor do they capture all the variations in marine bird phenology, species composition, and habitat use across the non-breeding season. Continued monitoring in and around the tanker escort lane is important for understanding marine bird and marine mammal vulnerability to environmental change and anthropogenic disturbance, and could be used to update oil spill response planning tools and refine response efforts during the non-breeding season.

## **Introduction**

In Alaska, and specifically Prince William Sound (PWS), most studies on marine birds have been conducted during the breeding season when birds congregate at or near colonies to nest and forage. However, breeding season dynamics are not representative of the community composition or spatial distribution during the fall and winter. The non-breeding season is a critical period of survival for marine birds overwintering at higher latitudes as food tends to be relatively scarce or inaccessible, the climate more extreme, light levels and day-length reduced, and water temperatures cooler.

From 2007-2022, as part of the *Exxon Valdez* Oil Spill Trustee Council (EVOSTC) funded Gulf Watch Alaska (GWA) program, personnel from the PWS Science Center conducted marine bird surveys in PWS during fall and winter (September – March). Results from 15 seasons of fall/winter surveys demonstrated seasonal differences for all 11 focal avian species groups, indicating movements into and out of PWS over the course of the non-breeding season (Schaefer and Bishop, 2023). For the most abundant marine bird species, including common murre (*Uria aalge*), marbled murrelet (*Brachyramphus marmoratus*), black-legged kittiwake (*Rissa tridactyla*), and large gulls (*Larus* spp.), consistent temporal and spatial patterns were documented (Zuur et al. 2012; Dawson et al. 2015; Stocking et al. 2018; Schaefer et al. 2020; Schaefer and Bishop 2023).

Nevertheless, many regions of PWS remain under-surveyed during winter, including the areas in and around the Alyeska Pipeline Service Company's Valdez Marine Terminal, the associated tanker escort zone, and the tanker anchorage by Knowles Head (Figure 1). To address this information need, the Prince William Sound Regional Citizens' Advisory Council (PWSRCAC) contracted with the PWS Science Center to conduct marine bird and marine mammal surveys in areas in and around the PWS tanker escort zone, Valdez Arm, and Port Valdez. From 2021-2023, fixed-transect surveys were conducted during late winter (March).

Beginning in 2024 the fixed-transect surveys were conducted during fall and early winter to address intra-seasonal differences within the non-breeding season. This report describes the density, distribution, and community composition of marine birds and marine mammals during September and November 2025 fixed-transect surveys including in and around the Valdez Marine Terminal, the PWS tanker escort zone, and the tanker anchorage by Knowles Head. The report compares the September and November PWSRCAC transect results with 2024 data, and with seasonal patterns previously identified during the 15 years of EVOSTC GWA transects. Lastly, our report provides recommendations for prioritizing oil spill response efforts in and around the tanker escort during September and November.

## **Methods**

At-sea marine bird and marine mammal transect surveys were conducted during daylight hours in September (fall) and November (early winter), and followed established U.S. Fish

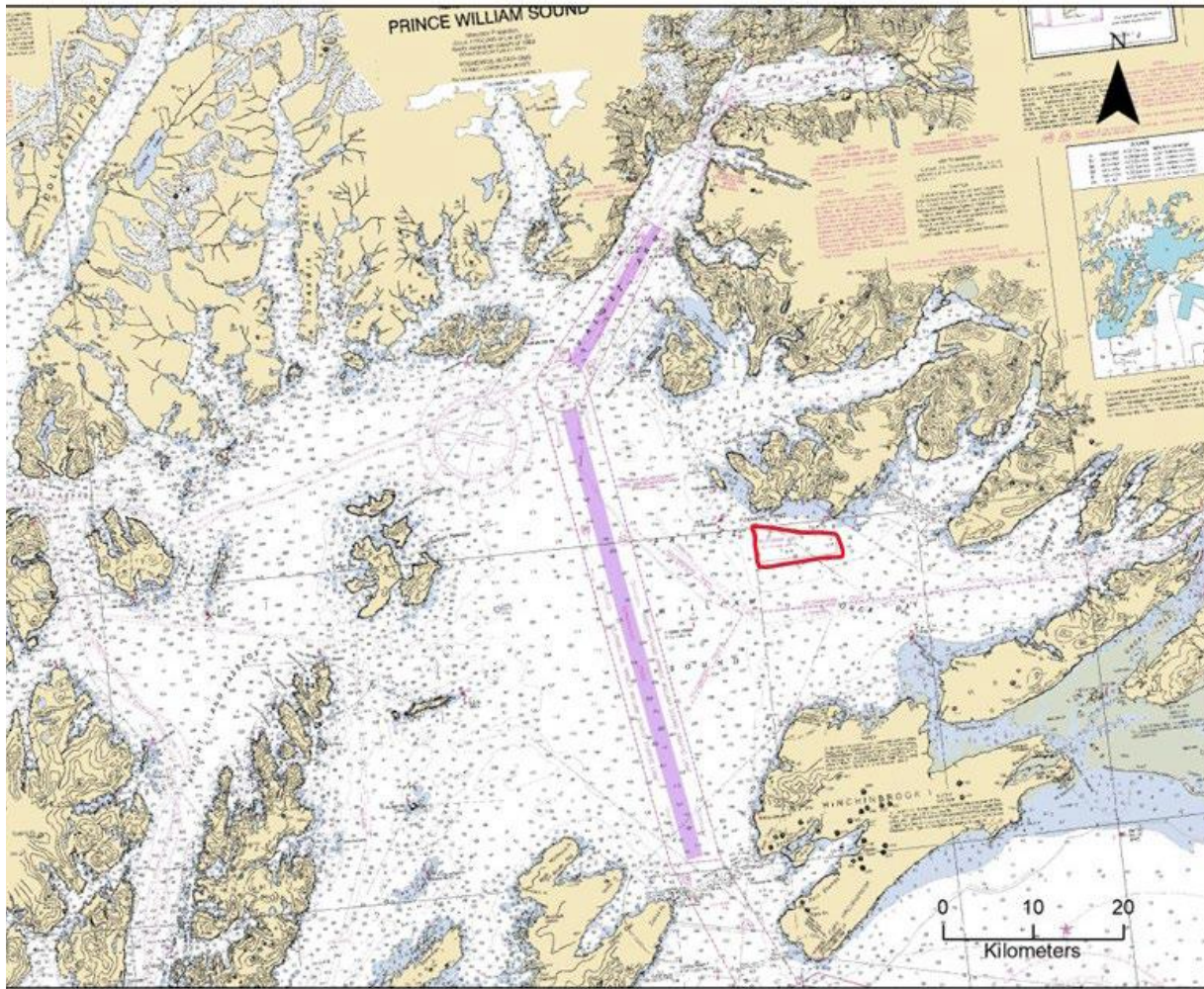


Figure 1. Map of Prince William Sound showing the oil tanker escort lane (purple) and the tanker anchorage by Knowles Head (outlined in red).

and Wildlife Service (USFWS) protocols (USFWS 2007). We repeated the same 11 fixed-transects as the March 2023 surveys (Figure 2). Beginning with the November 2024 survey, we added a 13.7 kilometer (km) transect located in the vicinity of the tanker anchorage by Knowles Head (Figures 1 & 2). The Knowles Head transect area had previously been surveyed as part of the EVOSTC GWA program that ended in 2022.

For the surveys, one observer using 10x binoculars recorded the number, species, and behavior of all marine birds and mammals occurring within a 300-meter (m) fixed-width strip (150-m both sides and ahead of boat) from an observation platform mounted on the PWS Science Center's vessel, *New Wave*, ~3 m above the water line. The survey vessel traveled at a constant speed between 5 and 10 knots. Marine mammals and forage flocks with >10 birds were recorded out to 1 km. Observations were recorded into a laptop

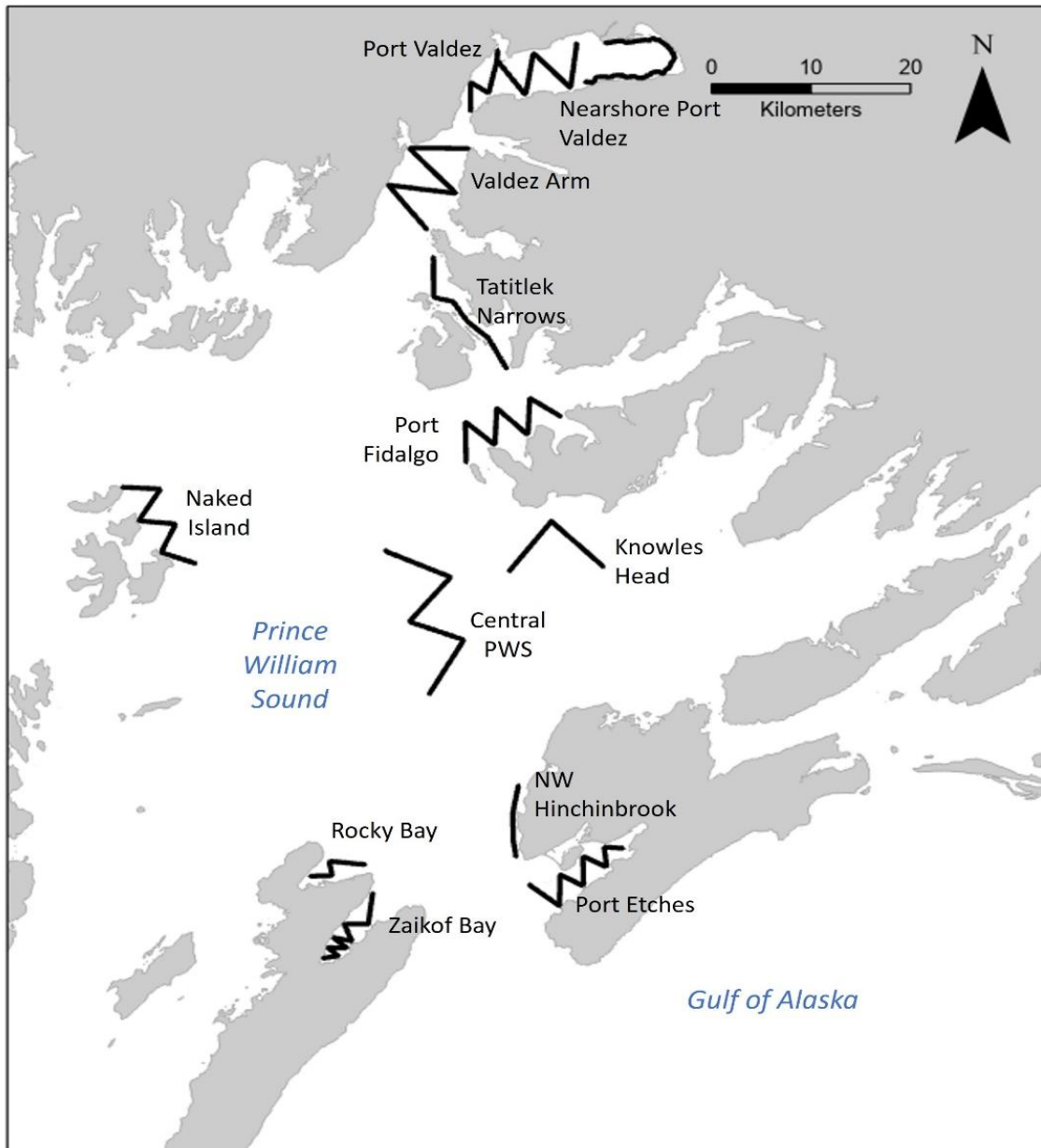


Figure 2. Map of marine bird and marine mammal transects surveyed in and around the Alyeska Pipeline Service Company's Valdez Marine Terminal, Prince William Sound tanker escort zone, and tanker anchorage by Knowles Head, September and November 2025.

computer integrated with a global positioning system (GPS) using the program SeaLog (ABR, Inc). Location data (latitude, longitude) were automatically recorded at 15-second (s) intervals and for every entered observation. Additionally, sea state and weather conditions were tracked on-site by the observer.

Following the standard methods used for seabird survey data processing across the region, we divided each transect into 3-km segments and aggregated marine bird observations within each segment for summary. We grouped taxonomically similar species into 15 focal marine bird species groups, adding dark shearwaters, puffins, and phalaropes for the first time since surveys began. All three groups occurred in relatively high numbers and in the case of puffins and phalaropes, are local breeders (Table 1). We calculated relative density (birds/km<sup>2</sup>) for each 3-km segment. We then averaged ( $\pm$  standard deviation) all segments for each transect. Data processing was performed using the program QA/QSea (ABR, Inc) and analyzed using the program R v. 4.4.1 (R Core Team, 2024). Marine mammals were not aggregated by 3-km segment, but are presented as total recorded along the transect and the total recorded beyond the survey strip out to 1-km.

Table 1. Taxonomically similar focal marine bird species observed during 2025 fall and early winter surveys combined into species group for density analysis and mapping. Prince William Sound, Alaska.

<b>Species group</b>	<b>Common Name(s)</b>
Loons	Common, Pacific, Red-throated
Grebes	Horned, Red-necked
Cormorants	Double-crested, Pelagic
Deep Diving Ducks	Surf, White-winged, & Black Scoters; Long-tailed Duck
Inshore Ducks	Barrow's Goldeneye; Bufflehead, Harlequin Duck
Mergansers	Common, Red-breasted
Large Gulls	Glaucous-winged, American Herring
Small Gulls	Short-billed
Kittiwakes	Black-legged
Puffins	Horned Puffin; Rhinoceros Auklet
Murres	Common
Murrelets	Marbled
Guillemots	Pigeon
Shearwaters	Sooty, Short-tailed
Phalaropes	Red-necked

## **Results & Discussion**

Marine bird and marine mammal transect surveys were conducted from September 8-10, and 13, 2025 (fall), and November 4-5, 7, 12-14, 2025 (early winter), in and around the PWS tanker escort zone, the Valdez Marine Terminal, and the tanker anchorage by Knowles Head. While we aimed to conduct each fall and winter survey across continuous days, weather and boat mechanical issues forced breaks in the timing of our 2025 surveys. Overall, we surveyed 229 km in September and 221 km in November (Table 2). Data from the 2025 survey has been uploaded to the Alaska Ocean Observing System data portal and is available at <https://gulf-of-alaska.portal.aos.org/#metadata/771492cd-94b6-47ab-952a-02b152a535cf/project/files>.

### *Marine Birds*

In September 2025, we recorded 2820 birds representing 21 species on transects (Table 3). Three of the 21 fall-recorded species - horned puffin (*Fratercula corniculata*,  $n = 75$ ), rhinoceros auklet (*Cerorhinca monocerata*,  $n = 20$ ), and red-necked phalarope (*Phalaropus lobatus*,  $n = 95$ ) - were not recorded on the subsequent November 2025 transects as these local breeders migrate to other areas for winter. Among the transects, the largest marine bird densities in September occurred on the nearshore Port Valdez transect located at the head of the bay ( $n \pm sd = 286 \pm 360$  birds/km<sup>2</sup>), followed by two transects in Hinchinbrook Entrance - Rocky Bay ( $n \pm sd = 93.9 \pm 74.5$  birds/km<sup>2</sup>) and Zaikof Bay ( $n \pm sd = 55.9 \pm 33.6$  birds/km<sup>2</sup>; Table 2; Figure 3). No forage flocks were recorded on September transects,

Three species groups - kittiwakes, dark shearwaters, and large gulls - comprised 77% of all September observations. Similar to 2024, the black-legged kittiwake was the dominant species (58.7% of observations) and was recorded on all 12 transects (Figure A-9). Highest kittiwake densities occurred in Port Valdez, an area with four kittiwake breeding colonies. Dark shearwaters, including sooty shearwaters (*Ardenna grisea*), were the second most numerous bird group on transects (9.7%) and were observed primarily near the entrance and in central PWS (Figure A-14). Large gulls, primarily the Glaucous-winged gull (*Larus glaucescens*), were the third most numerous species group (8.7%) and were widespread, occurring on all but one transect. Similar to kittiwakes, highest densities for glaucous-winged gull were recorded on the nearshore Port Valdez transect, located at the head of the bay (Figure A-7).

In November 2025, we recorded 792 birds representing 26 species on the 12 PWSRCAC transects (Table 3). Evident during surveys was the arrival of wintering birds including pelagic cormorants (*Urile pelagicus*), grebes, mergansers, and deep diving ducks. Compared to the September survey, there were relatively few black-legged kittiwakes due to their winter outmigration (Table 3; Appendix 1; McKnight et al. 2011). Among transects, the largest densities in November occurred at Tatitlek Narrows ( $n \pm sd = 36.2 \pm 41.9$  birds/km<sup>2</sup>), followed by nearshore Port Valdez ( $34.1 \pm 21.9$  birds/km<sup>2</sup>) and the northwest shore of Hinchinbrook Island ( $n \pm sd = 29.1 \pm 12.8$  birds/km<sup>2</sup>; Table 2; Figure 3). We recorded two

Table 2. Average ( $\pm$  standard deviation, sd) density of marine birds (birds/km<sup>2</sup>) and total number of marine mammals within 300 m transect (number in parentheses = number observed from transect edge out to 1 km) by transect and survey month. Prince William Sound, Alaska. Sep = September; Nov = November.

Region/Transect Name	Km Length, (no. segments)	X birds/km <sup>2</sup> , (sd)	X birds/km <sup>2</sup> , (sd)	Mammals, (w/in 1 km)	Mammals, (w/in 1 km)
	Sep, Nov	Sep	Nov	Sep	Nov
<b>Port Valdez to Valdez Arm</b>					
Nearshore Port Valdez	18.3, 18.4	286 (360)	34.1 (21.9)	147 (42)	24 (2)
Port Valdez	31.0, 29.3	9.54 (7.0)	2.8 (2.7)	16 (5)	4 (3)
Valdez Arm	25.6, 25.7	7.9 (11.2)	1.9 (3.1)	1 (0)	3 (3)
<b>Mid-Sound</b>					
Naked Island	18.2, 18.6	20.7 (25.6)	3.3 (3.0)	0 (4)	0 (0)
Central PWS	26.1	0.93 (1.2)	0.6 (0.6)	0 (0)	0 (0)
<b>Northeast Sound</b>					
Tatitlek Narrows	15.4, 14.7	18.1 (16.3)	36.2 (41.9)	8 (0)	11 (6)
Port Fidalgo	23.9	6.0 (6.0)	2.7 (3.9)	0 (0)	1 (1)
Knowles Head	17.5, 13.8	14.5 (14.9)	25.9 (23.9)	3 (0)	1 (0)
<b>Hinchinbrook Entrance</b>					
NW Hinchinbrook Island	9.1, 8.0	49.6 (11.2)	29.1 (12.8)	0 (1)	8 (2)
Rocky Bay	7.4, 7.3	93.9 (74.5)	13.5 (12.9)	2 (1)	4 (5)
Zaikof Bay	16.1	55.9 (33.6)	18.9 (9.8)	19 (2)	18 (9)
Port Etches	19.8, 19.5	23.8 (14.7)	11.7 (6.9)	2 (2)	16 (9)

Table 3. Total number of birds observed by species group/species on 300 m transects during September (Sep) and November (Nov) 2025. Refer to Appendix A for density and distribution of each species group by specific transect.

<b>Species Group/ Common name</b>	<b>Scientific name</b>	<b>Count Sep</b>	<b>Count Nov</b>
<b>Loons</b>		<b>26</b>	<b>15</b>
Common Loon	<i>Gavia immer</i>	1	1
Pacific Loon	<i>Gavia pacifica</i>	3	10
Red-throated Loon	<i>Gavia stellata</i>	2	0
Unidentified Loon		20	4
<b>Grebes</b>		<b>4</b>	<b>31</b>
Horned Grebe	<i>Podiceps auritus</i>	3	30
Red-necked Grebe	<i>Podiceps grisegena</i>	0	1
Unidentified Grebe		1	0
<b>Cormorants</b>		<b>93</b>	<b>104</b>
Double-crested Cormorant	<i>Nannopterum auritum</i>	0	1
Pelagic Cormorant	<i>Urile pelagicus</i>	93	103
<b>Deep Diving Ducks</b>		<b>11</b>	<b>109</b>
Long-tailed Duck	<i>Clangula hyemalis</i>	0	16
Black Scoter	<i>Melanitta americana</i>	0	3
Surf Scoter	<i>Melanitta perspicillata</i>	10	49
White-winged Scoter	<i>Melanitta fusca</i>	0	37
Unidentified Scoter		1	4
<b>Inshore Ducks</b>		<b>8</b>	<b>11</b>
Barrow's Goldeneye	<i>Bucephala islandica</i>	0	4
Bufflehead	<i>Bucephala albeola</i>	0	1
Harlequin Duck	<i>Histrionicus histrionicus</i>	8	6
<b>Mergansers</b>		<b>0</b>	<b>43</b>
Common Merganser	<i>Mergus merganser</i>	0	3
Red-breasted Merganser	<i>Mergus serrator</i>	0	33
Unidentified Merganser		0	7
<b>Large Gulls</b>		<b>246</b>	<b>111</b>
American Herring Gull	<i>Larus smithsonianus</i>	0	5
Glaucous-winged Gull	<i>Larus glaucescens</i>	243	106
Unidentified Large Gull		3	0
<b>Small Gulls</b>		<b>116</b>	<b>68</b>
Short-billed Gull	<i>Larus brachyrhynchus</i>	116	68
<b>Kittiwakes</b>		<b>1654</b>	<b>39</b>
Black-legged Kittiwake	<i>Rissa tridactyla</i>	1654	39

<b>Puffins</b>		<b>95</b>	<b>0</b>
Horned Puffin	<i>Fratercula corniculata</i>	75	0
Rhinoceros Auklet	<i>Cerorhinca monocerata</i>	20	0
<b>Murres</b>		<b>106</b>	<b>37</b>
Common Murre	<i>Uria aalge</i>	106	37
<b>Murrelets</b>		<b>65</b>	<b>154</b>
Marbled Murrelet	<i>Brachyramphus marmoratus</i>	2	146
<i>Brachyramphus</i> Murrelet		63	8
<b>Guillemots</b>		<b>8</b>	<b>4</b>
Pigeon Guillemot	<i>Cephus columba</i>	8	4
<b>Dark Shearwaters</b>		<b>273</b>	<b>58</b>
Sooty Shearwater	<i>Ardenna grisea</i>	54	18
Unidentified Dark Shearwater		219	40
<b>Phalaropes</b>		<b>95</b>	<b>0</b>
Red-necked Phalarope	<i>Phalaropus lobatus</i>	95	0
<b>Other species</b>		<b>20</b>	<b>8</b>
American Crow	<i>Corvus brachyrhynchos</i>	0	3
Bald Eagle	<i>Haliaeetus leucocephalus</i>	0	1
Black Oystercatcher	<i>Haematopus bachmani</i>	0	4
Fork-tailed Storm-Petrel	<i>Hydrobates furcatus</i>	3	0
Gadwall	<i>Mareca strepera</i>	5	0
Great Blue Heron	<i>Ardea herodias</i>	1	0
Mallard	<i>Anas platyrhynchos</i>	2	0
Unidentified Duck		7	0
Unidentified Gull		2	0
<b>Grand Total</b>		<b>2820</b>	<b>792</b>

forage flocks in November, both at Tatitlek Narrows. One flock consisted of 11 Glaucous-winged gulls while the second was a mixed foraging flock of 81 birds dominated by gulls (large and small) and cormorants. There were no marine mammals associated with either of these forage flocks.

During November transect surveys, we recorded marbled murrelet most often (18.4% of observations), followed by glaucous-winged gull (13.4%) and pelagic cormorant (13.1% of observations). Of these three species, glaucous-winged gull was recorded on all 12 transects, with highest densities occurring in Port Valdez (Figure A-7). Marbled murrelet and pelagic cormorants were recorded on nine and eight transects, respectively (Figures A-3, A-12).

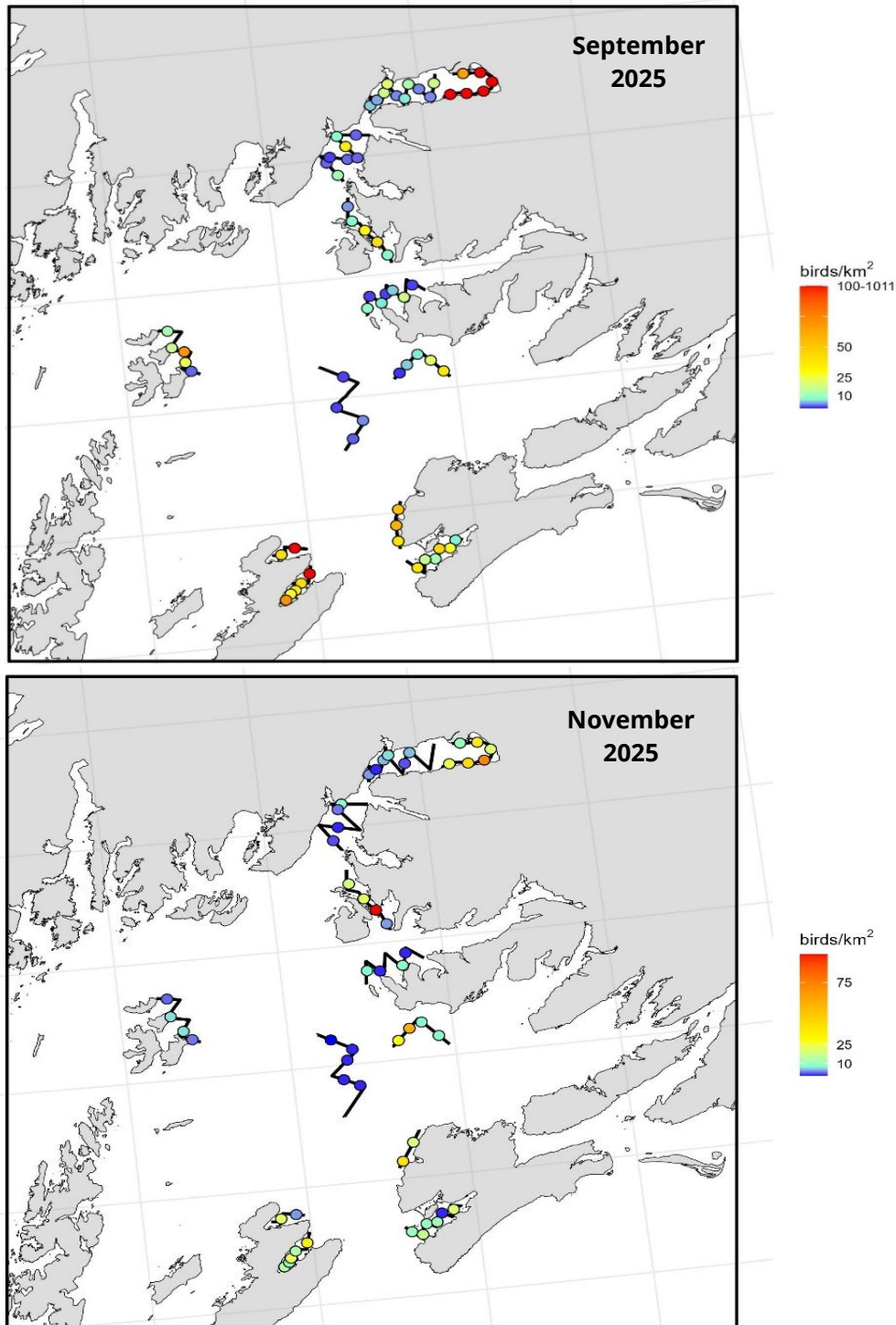


Figure 3. Density (birds/km<sup>2</sup>) and distribution of marine birds observed on PWSRCAC fixed-transects during September (top) and November (bottom) 2025. Note that density scales are different for each map.

Across the two years of surveys, we have observed a pattern of consistently low bird densities on three of the 12 transects. During both September and November, the Valdez Arm, Port Fidalgo, and central PWS transects regularly record  $< 6.0$  birds/km<sup>2</sup>. We suggest these low densities are because these are unprotected, exposed, and deep waters. In contrast, the nearshore Port Valdez transect supported the highest bird densities. We recorded 151.6 birds/km<sup>2</sup> and 286 birds/km<sup>2</sup> during September 2024 and 2025 surveys, respectively. For comparison, the next highest densities during September surveys included 35.9 birds/km<sup>2</sup> (Zaikof Bay) in 2024, and 93.9 birds/km<sup>2</sup> (Rocky Bay) in 2025 (Figure 3). Both years, the extremely high densities during September in the nearshore Port Valdez transect were a result of high numbers of black-legged kittiwakes and to a lesser extent glaucous-winged gulls. This same nearshore Port Valdez transect also supported the highest densities of birds during November 2024 (40.5 birds/km<sup>2</sup>), and the second highest densities in 2025 (34.1 birds/km<sup>2</sup>), with pelagic cormorants and waterfowl (inshore ducks in 2024, and deep diving ducks in 2025) comprising the dominant species groups.

We compared species composition between the 2024 and 2025 surveys (Figure 4). During September of both years, black-legged kittiwakes and glaucous-winged gulls were the dominant species. This was to be expected as there are at least 20 active kittiwake colonies in PWS (D. Irons, unpubl. data), and numerous glaucous-winged gull colonies in PWS and the Copper River Delta (Seabirds.Net: North Pacific Seabird Portal). In comparison to September, the November surveys have a much more mixed species composition and have not had a numerically-dominant species. However, both in 2024 and 2025, cormorants (almost exclusively pelagic cormorant) and deep-diving ducks (primarily scoters) were among the most numerous species groups.

Interestingly, during both September and November 2025 surveys, there was a striking presence of dark shearwaters (sooty shearwater, *Ardenna grisea*, and possibly the similar short-tailed shearwater, *A. tenuirostris*). Both shearwater species breed in enormous colonies in the southern Pacific and Atlantic Oceans (sooty shearwaters), and Australian waters (short-tailed), and make some of the largest known mass migrations. During the North American summer, both species move northward to western North America, and in the case of sooty shearwater also to Europe to overwinter, before migrating south again towards their breeding grounds (Carboneras et al. 2020a; Carboneras et al. 2020b). While not uncommon in September, shearwaters typically are found during this time closer to the entrances between PWS and the Gulf of Alaska (GOA). The November 2025 occurrence of shearwaters on transects was exceptional (Figure A-14). Previously, our only November records of shearwaters occurred in November 2019, on GWA transects when we recorded ~300 birds in Montague Strait. The November 2019 occurrence of shearwaters in PWS followed a shearwater die-off in western Alaska during summer/fall of 2019, which was also concurrent with a heatwave in the GOA (Amaya et al. 2020). In 2025, there was another heatwave event (the NEP25A) in the GOA and Bering Sea (<https://www.integratedecosystemassessment.noaa.gov/> suggesting that shearwater

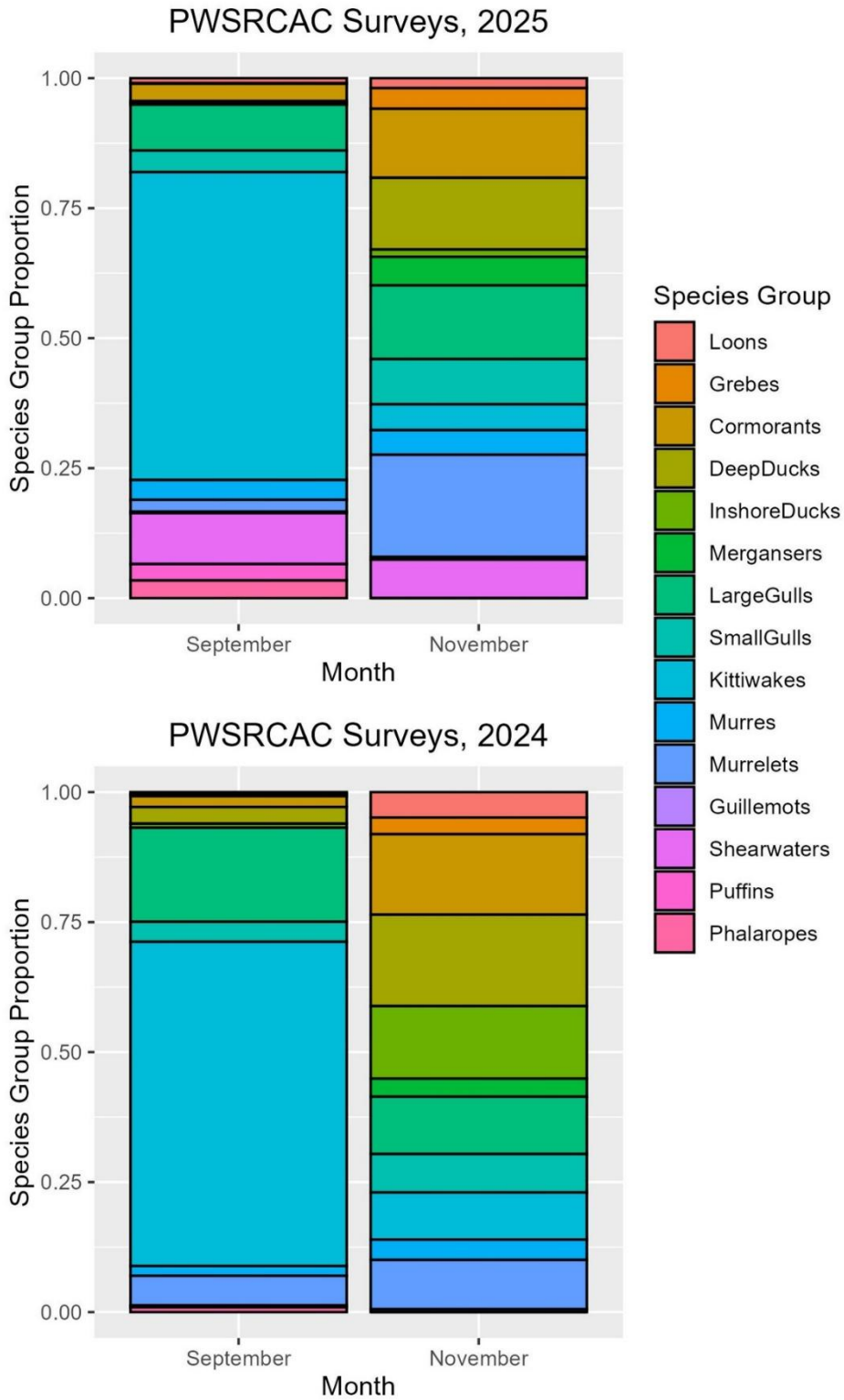


Figure 3. Marine bird species group composition on PWSRCAC transects by month and survey year. Most abundant species groups are labeled.

presence in PWS could be related to shifts in the marine food web associated with persistent warm waters.

### Marine Mammals

In addition to marine birds, we also recorded marine mammals within the 300-m strip during the surveys. When possible, we recorded marine mammal observations out to 1 km. However, detectability varied by species as whales are much easier to observe at longer distances compared to sea otter (*Enhydra lutris*), harbor seal (*Phoca vitulina*), Steller sea lion (*Eumetopias jubatus*), or porpoises (*Phocoenoides dalli* or *Phocoena phocoena*). Observations recorded beyond the 300-m strip should be considered minimum counts for these species in these areas (Table 4).

Table 4. Total number of marine mammals observed by species on PWSRCAC transects within the 300-m survey strip and beyond the survey strip, and out to 1 km. September (Sep) and November (Nov) 2025, Prince William Sound, Alaska.

Common name	Scientific name	Sep	Nov
		Count w/in 300m (count beyond)	Count w/in 300m (count beyond)
Dall's Porpoise	<i>Phocoenoides dalli</i>	1 (3)	0 (5)
Harbor Seal	<i>Phoca vitulina</i>	77 (40)	0 (0)
Humpback Whale	<i>Megaptera novaengliae</i>	0 (1)	0 (0)
Sea Otter	<i>Enhydra lutris</i>	49 (7)	74 (34)
Steller Sea Lion	<i>Eumetopias jubatus</i>	71 (6)	16 (1)
<b>Grand Total</b>		<b>198 (57)</b>	<b>90 (40)</b>

In September, almost 200 marine mammals were observed on the PWSRCAC transects, with harbor seals the most numerous (38.9% of observations), followed by Steller sea lions (35.9% of observations; Table 4). Harbor seals were observed almost exclusively on the nearshore Port Valdez transect (75 of 77 seals observed) and out to a km of the transect (40 seals observed; Figure B-2). Similarly, Steller sea lions were observed only in Port Valdez, including 54 sea lions on the nearshore Port Valdez transect and 16 on the Port Valdez transect (Figure B-3). We suggest the seal and sea lion concentrations we observed during September are related to adult coho salmon, *Oncorhynchus kisutch*, returning to the nearby Solomon Gulch Hatchery serving as a concentrated food resource.

Sea otters were also numerous in September and, compared to the harbor seals and sea lions, were much more widespread, occurring on or near eight of the 12 transects. Similarly, in November, sea otters were recorded on or near 10 of the 12 transects and were the most abundant marine mammal (Table 4). During both fall and early winter

surveys, sea otters were recorded in small groups (range = 1- 4 individuals). No sea otters were recorded during either survey on or near the offshore central PWS transect (Figure B-2).

Dall's porpoise were recorded in small numbers during both surveys. In September, the porpoises were recorded on or near the Naked Island (n = 3) and Port Etches (n = 1) transects, while in November porpoises were recorded near the Valdez Arm transect (n = 1) and the Rocky Bay transect (n = 3; Figure B-5). Interestingly, we observed no killer whales (*Orcinus orca*) during either September or November surveys. In total across the two surveys, only one humpback whale (*Megaptera novaengliae*) was observed, which was recorded near the northwest Hinchinbrook Island transect in September (Figure B-1).

### **Conclusions and Recommendations**

Black-legged kittiwake was the most abundant species on the September transects and were found on all transects. This was to be expected as there at least 20 active kittiwake colonies throughout PWS, including four colonies in Port Valdez representing over 3,000 nesting pairs (D. Irons, unpubl. data). Although no species dominated the community composition in November, marbled murrelet was the most abundant species recorded during surveys. Compared with previous GWA surveys, there was a relatively smaller proportion of common murre. Recent analyses of our 2007 – 2022 EVOSTC/GWA surveys determined that since the 2014-2016 marine heatwave that led to a massive murre dieoff (Piatt et al. 2020; Renner et al. 2024), murre survey densities in PWS have decreased. While murre numbers have remained depressed, marbled murrelet densities have increased likely due to immigration and because murrelets may be more effective at shifting to warmer-water zooplankton during marine heatwave events (Hoepfner et al. 2025). Compared to our previous GWA surveys, the relatively larger proportion of inshore and deep-diving ducks during November surveys are likely because our GWA surveys covered a much larger area of PWS and were often located in deeper, more pelagic waters compared to the nearshore, bay-centric PWSRCAC surveys.

During this second year of fall (September) and early winter (November) PWSRCAC surveys, we identified multiple areas of consistently high and low marine bird densities, and other areas that warrant continued evaluation. Because marine bird density and distribution can vary widely across years, multiple years of surveys are necessary to understand natural variation. The highest densities of birds were recorded in bays and nearshore areas (e.g., head of Port Valdez, Rocky Bay, Tatitlek Narrows, Zaikof Bay), while the lowest densities were recorded in exposed and/or deep, offshore habitats (Valdez Arm and central PWS transects). These results are consistent with patterns observed during the GWA surveys that indicated marine birds in PWS tend to prefer shallow and protected habitats that are closer to shore compared to deep, offshore habitats or exposed habitats (Dawson et al. 2015; Stocking et al. 2018; Schaefer et al. 2020; Schaefer and Bishop, 2023).

The September and November 2025 results provide further support for special protection of the marine and nearshore waters around the head of Port Valdez as well as the bays and

island coastlines around Hinchinbrook Entrance. These two areas host consistently high numbers of marine birds and marine mammals, including species that have yet to recover from the 1989 Exxon Valdez oil spill (EVOS). Importantly, the head of Port Valdez is vulnerable to disturbance because of the proximity to human infrastructure, including the Valdez Marine Terminal, Valdez harbor, and fuel dock. Hinchinbrook Entrance is particularly vulnerable to anthropogenic disturbance because it is where tankers enter and exit PWS, and because of the importance of Porpoise Rocks to marine wildlife as a breeding colony, roosting area, and marine mammal rookery and haul out. Compared to other surveyed areas, Hinchinbrook Entrance also supports high numbers of marbled murrelets and pigeon guillemots (Figures A-12, A-13), two species that were injured by EVOS and whose populations have not yet recovered (EVOSTC 2014).

While this is only our second year of fall/early winter surveys, our surveys suggest that the area around the tanker anchorage at Knowles Head is important during both September and November (Figure 3). Alcids (including both common murre and murrelets), gulls, and loons are regularly observed on this transect. Given the proximity to juvenile Pacific herring (*Clupea pallasii*) nurseries, this area will most likely continue to host relatively high densities of birds during early winter.

Our survey results can be used to update oil spill response planning tools and refine response efforts in and around the tanker escort lane during the non-breeding season. As with our previous March 2021-2023 PWSRCAC survey data, our fall and early winter data will be submitted for inclusion in National Oceanic and Atmospheric Administration (NOAA) Environmental Response Management Application (ERMA) annually. ERMA is an online tool to aid resource managers to make informed decisions for environmental response, damage assessment, and recovery/restoration. Our data could also be used to update the NOAA Environmental Sensitivity Index (ESI) maps, which are used by responders, managers, and planners to identify coastal resources at risk in the case of oil or chemical spills. Unfortunately, the ESI maps for PWS are over 20 years old, and contain very limited winter bird and mammal information for many of the areas identified here or previously for prioritized protection (e.g., Zaikof Bay, Rocky Bay, Port Etches, NW Hinchinbrook Island coastline, Port Gravina, Port Fidalgo, Tatitlek Narrows, Port Valdez).

Our surveys do not include all areas that potentially may be impacted by an oil spill, nor do they capture all the variation in marine bird phenology, species composition, and habitat use across the non-breeding season. For example, the extensive tidal mudflats at the head of Port Valdez often preclude reliable identification and enumeration of the hundreds of waterfowl using this habitat. With that said, continued monitoring in and around the tanker escort lane, the Valdez Marine Terminal, and the Knowles Head anchorage is important for understanding marine bird and marine mammal vulnerability to environmental change and anthropogenic disturbance, and could be used to update oil spill response planning tools and refine response efforts during the non-breeding season.

## **Literature Cited**

- Amaya, D.J., Miller, A.J., Xie, S.P., Kosaka, Y. (2020). Physical drivers of the summer 2019 North Pacific marine heatwave. *Nature communications* 11, 903.
- Carboneras, C, Jutglar, F, and Kirwan, GM. 2020a. Sooty Shearwater (*Ardenna grisea*), version 1.0. In *Birds of the World* (del Hoyo, J, Elliott, A, Sargatal, J, Christie, DA, and de Juana, E, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. <https://doi.org/10.2173/bow.sooshe.01>
- Carboneras, C, Jutglar, F, and Kirwan, GM. 2020b. Short-tailed shearwater (*Ardenna tenuirostris*), version 1.0. In *Birds of the World* (del Hoyo, J, Elliott, A, Sargatal, J, Christie, DA, and de Juana, E, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. <https://doi.org/10.2173/bow.shtshe.01>
- Dawson, NM, Bishop, MA, Kuletz, KJ, and Zuur, AF. 2015. Using ships of opportunity to assess winter habitat associations of seabirds in subarctic coastal Alaska. *Northwest Science* 89: 111–128.
- Exxon Valdez Oil Spill Trustee Council. 2014. 2014 Updated injured resources and services list. Anchorage, Alaska.
- Hoepfner, SA, Schaefer, AL and Bishop, MA. 2025. Shifts in marine bird abundance and species composition following the 2014– 2016 Pacific marine heatwave. *Frontiers in Marine Science*, 12, p.1575748.
- McKnight, A, Irons, DB, Allyn, AJ, Sullivan, KM, Suryan, RM. 2011. Winter dispersal and activity patterns of post-breeding black-legged kittiwakes *Rissa tridactyla* from Prince William Sound, Alaska. *Marine Ecology Progress Series* 442:241-253. <https://doi.org/10.3354/meps09373>
- Piatt JF, Parrish JK, Renner HM, Schoen SK, Jones TT, Arimitsu ML, Sydeman WJ. 2020. Extreme mortality and reproductive failure of common murres resulting from the northeast Pacific marine heatwave of 2014-2016. *PloS one* 15 e0226087.
- R Core Team. 2024. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. <https://www.R-project.org/>
- Renner HM, Piatt JF, Renner M, Drummond BA, Laufenberg JS, Parrish JK. 2024. Catastrophic and persistent loss of common murres after a marine heatwave. *Science* 386:1272-1276.
- Schaefer, A, Bishop, MA, and Thorne, R. 2020. Marine bird response to forage fish during winter in subarctic bays. *Fisheries Oceanography* 29: 297-308. <https://doi.org/10.1111/fog.12472>
- Schaefer, AL and Bishop, MA. 2023. Long-term monitoring of marine bird abundance and habitat associations during fall and winter in Prince William Sound. Exxon Valdez Oil Spill Long-term Monitoring Program (Gulf Watch Alaska) Final Report (Exxon Valdez Oil Spill Trustee Council Project 21120114-E), Exxon Valdez Oil Spill Trustee Council Project, Anchorage, Alaska.
- Stocking, J, Bishop, MA, and Arab, A. 2018. Spatio-temporal distributions of piscivorous birds in a subarctic sound during the non-breeding season. *Deep-Sea Research Part II* 147: 138-147.

- U. S. Fish and Wildlife Service. 2007. North Pacific pelagic seabird observer program observer's manual, inshore/small vessel version, November 2007. U. S. Fish and Wildlife Service, Migratory Bird Management Nongame Program, Anchorage, Alaska. Unpublished protocol manual, 25 pp.
- Zuur AF, Dawson, N, Bishop, MA, Kuletz, K, Saveliev, AA, and Ieno, EN. 2012. Two-stage GAMM applied to zero inflated common murre density data. *In* Zuur, AF, Saveliev, AA, and Ieno, EN (editors), *Inflated and Generalized Linear Mixed Models with R*. Highland Statistics Ltd. Newburgh, United Kingdom. Pp. 149-182.

**Appendix A.** Marine bird density and distribution by species group in Prince William Sound, Alaska, during September and November 2025.

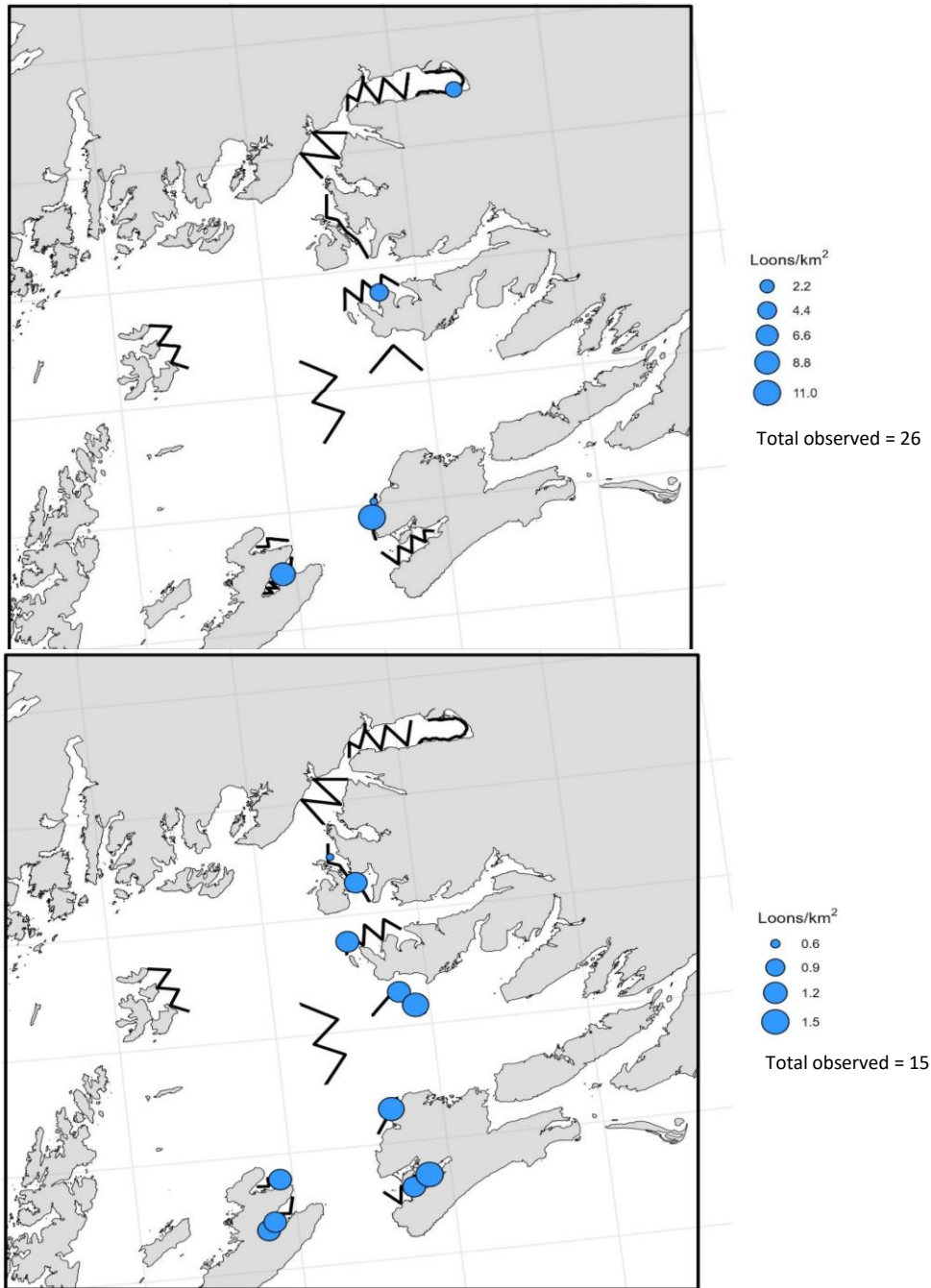


Figure A-1. Distribution of loons (common, Pacific, red-throated, unidentified) by density (birds/km<sup>2</sup>) during September (top) and November (bottom) 2025 surveys.

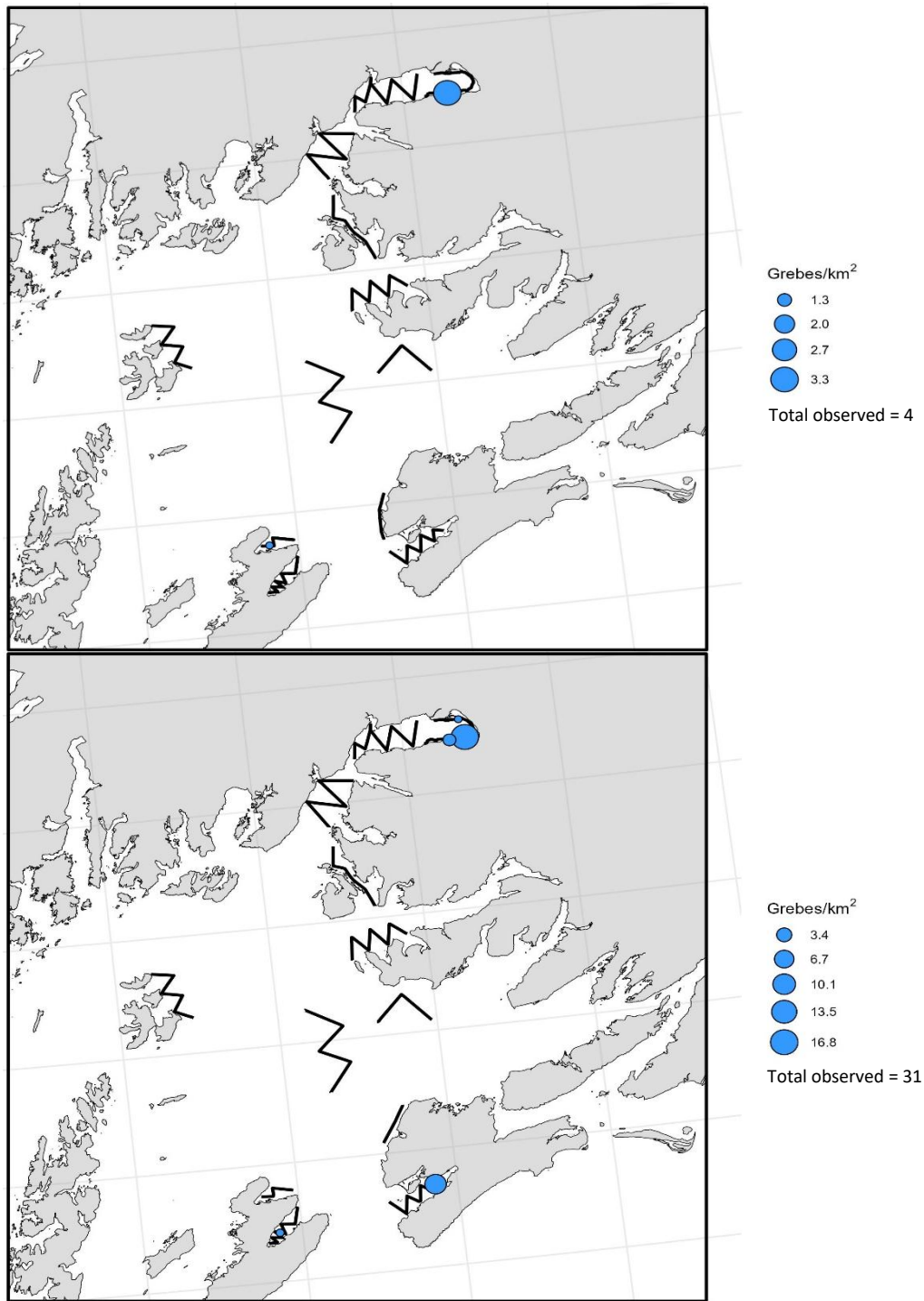


Figure A-2. Distribution of grebes (horned, red-necked, unidentified) by density (birds/km<sup>2</sup>) during September (top) and November (bottom) 2025 surveys.

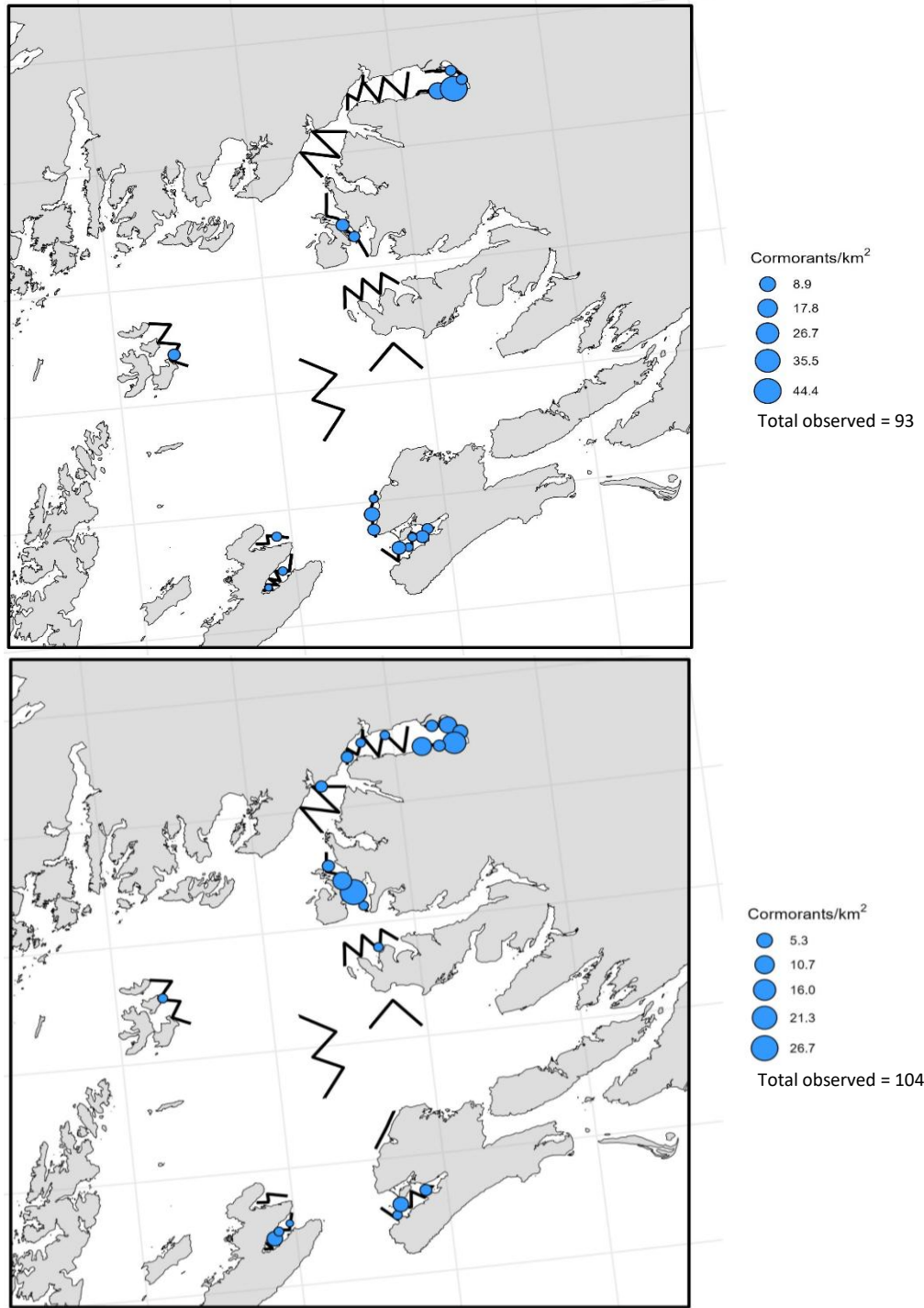


Figure A-3. Distribution of cormorants (double-crested, pelagic, unidentified) by density (birds/km<sup>2</sup>) during September (top) and November (bottom) 2025 surveys.

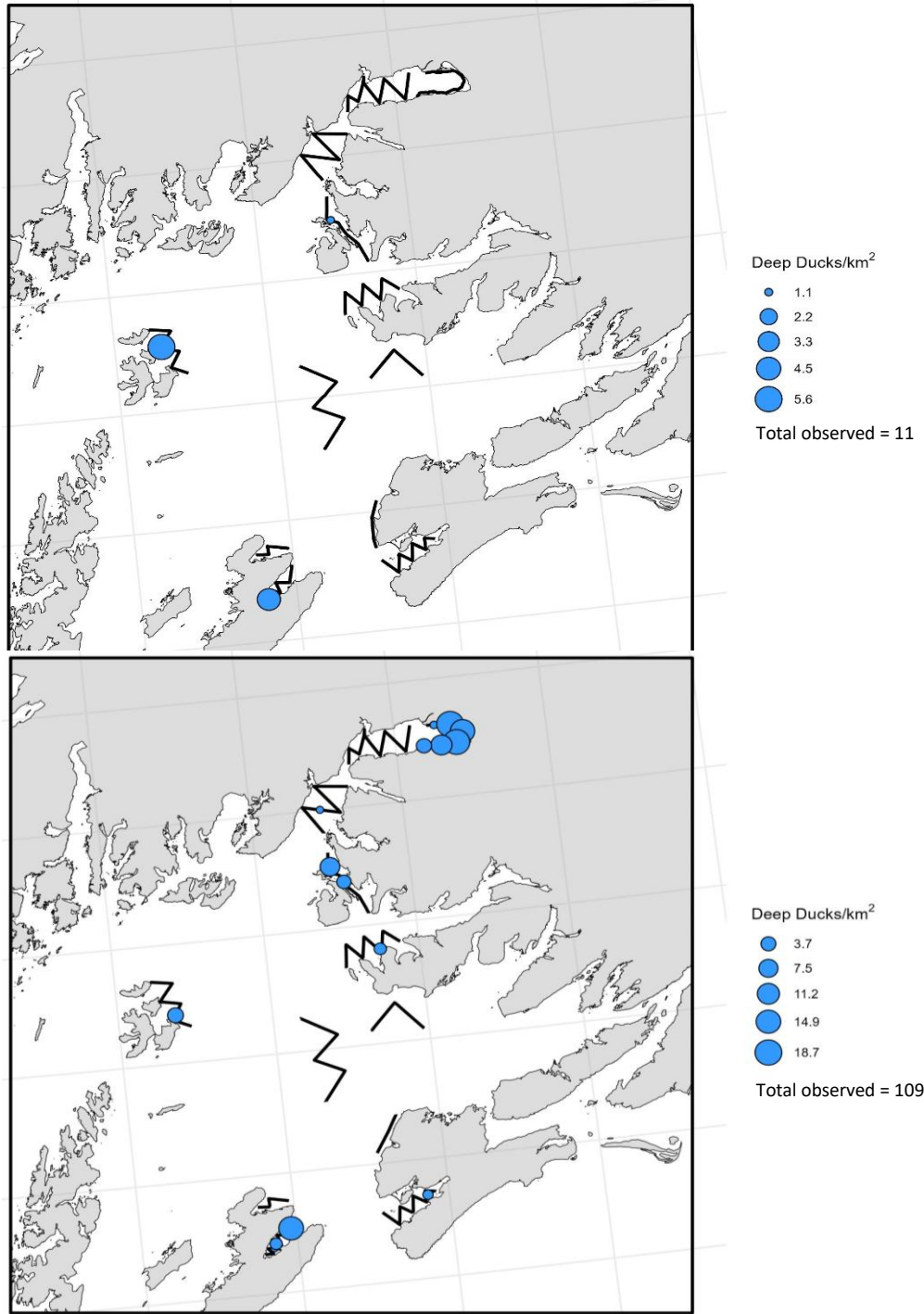


Figure A-4. Distribution of deep-diving ducks (long-tailed ducks and scoters) by density (birds/km<sup>2</sup>; top) during September (top) and November (bottom) 2025 surveys.

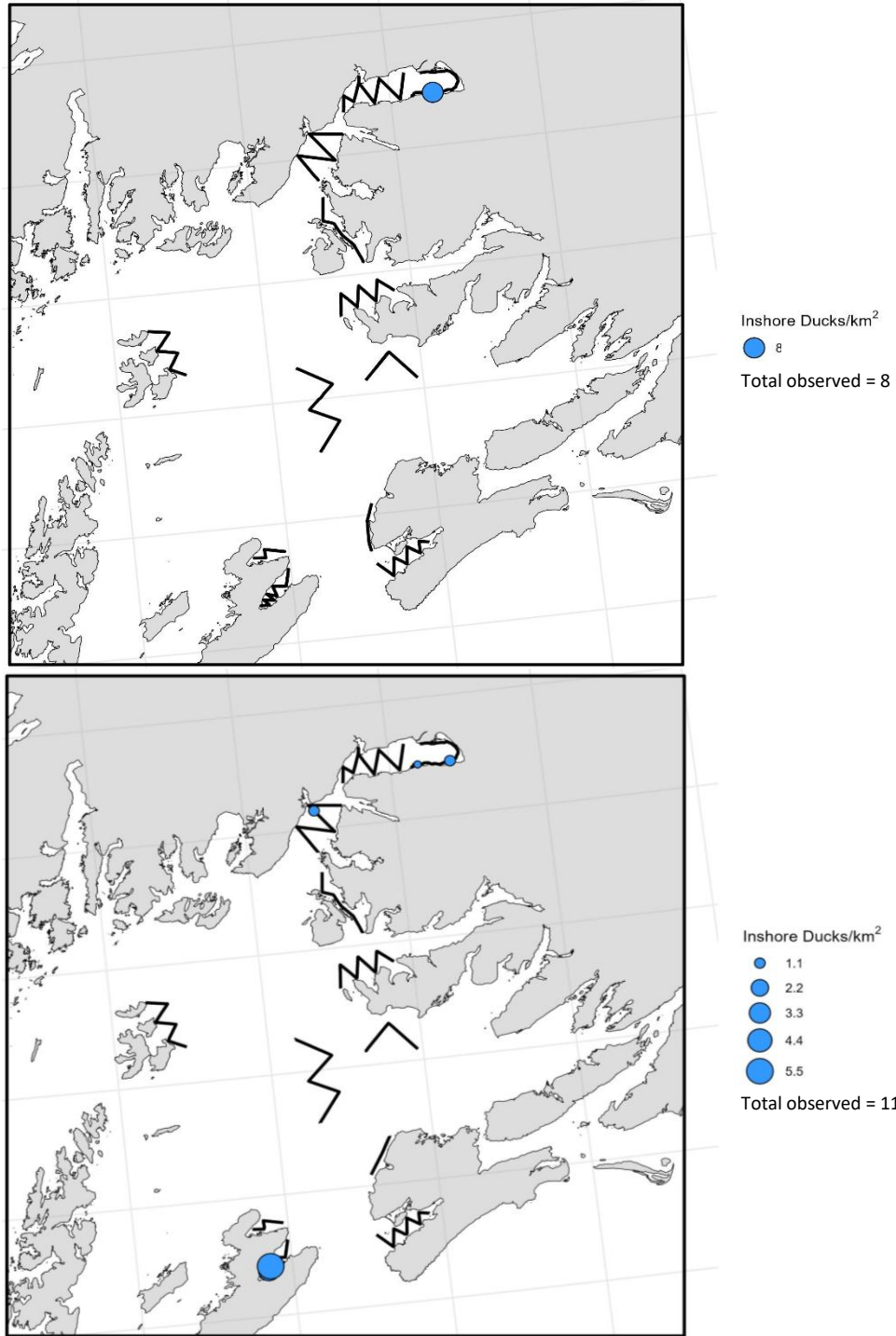


Figure A-5. Distribution of inshore ducks (Barrow's goldeneyes, buffleheads, harlequin duck) by density (birds/km<sup>2</sup>) during September (top) and November (bottom) 2025 surveys.

Merganser Duck Density  
November 2025

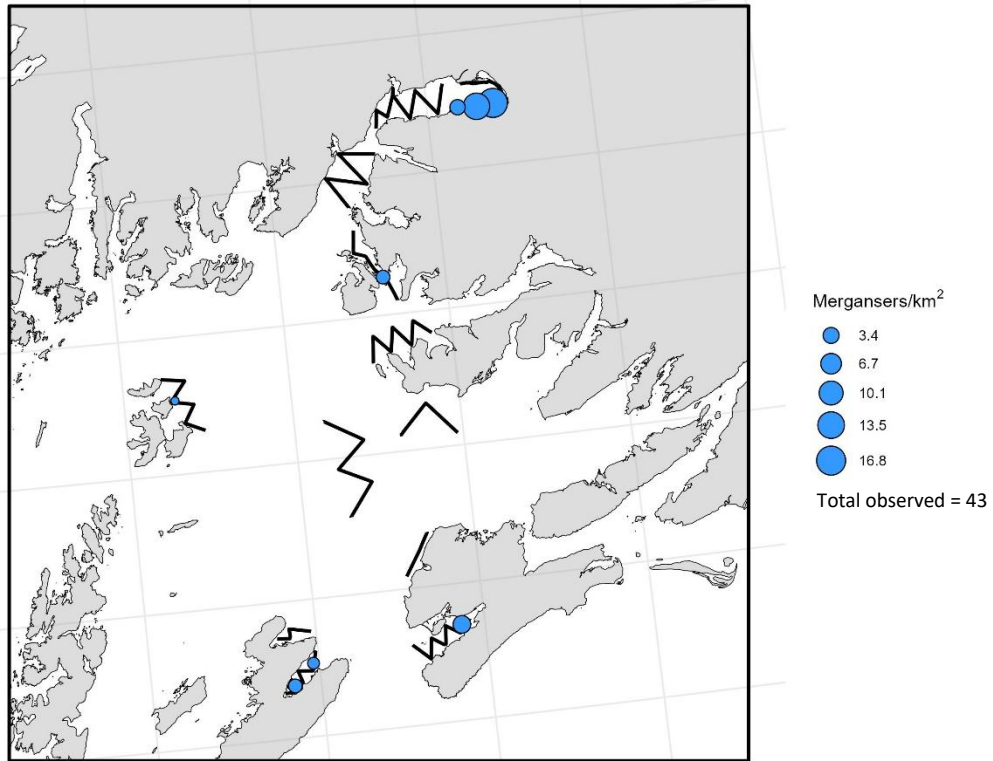


Figure A-6. Distribution of mergansers (common, red-breasted, unidentified) by density (birds/km<sup>2</sup>) during November 2025. Note, no mergansers were observed on transect during September 2025.

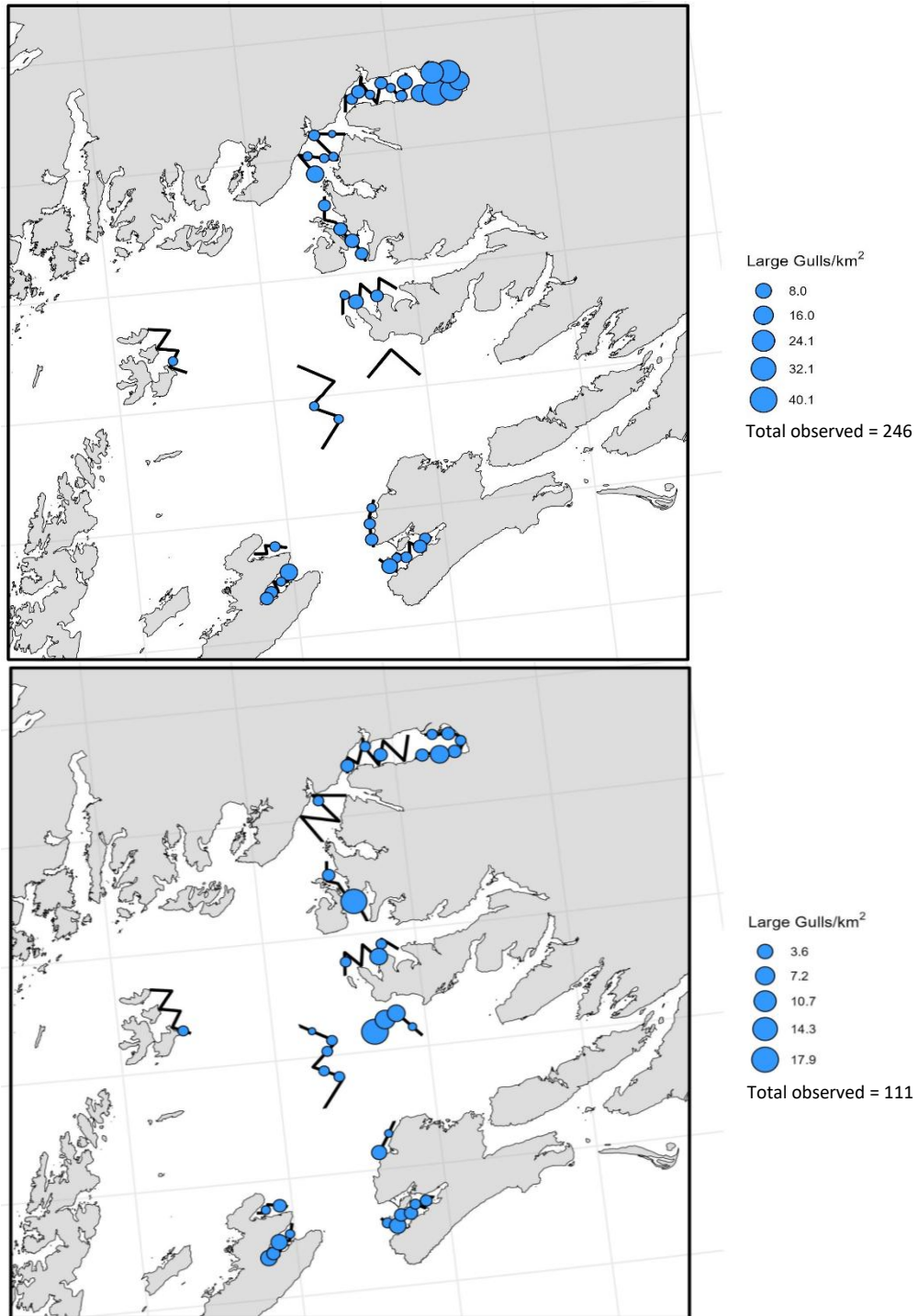


Figure A-7. Distribution of large gulls (glaucous-winged, American herring, unidentified) by density (birds/km<sup>2</sup>) during September (top) and November (bottom) 2025.

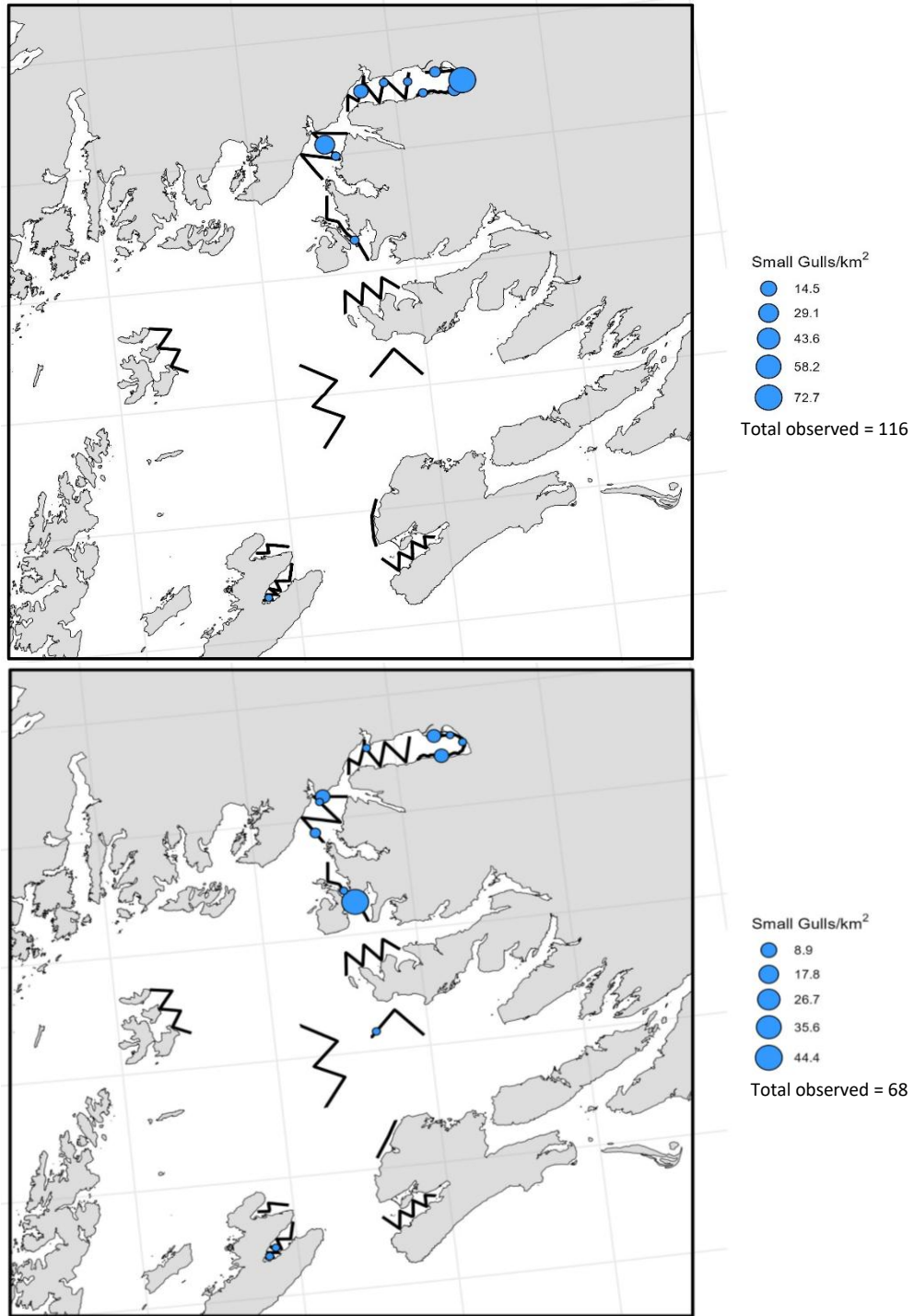


Figure A-8. Distribution of small gulls (short-billed, unidentified) by density (birds/km<sup>2</sup>) during September (top) and November (bottom) 2025 surveys.

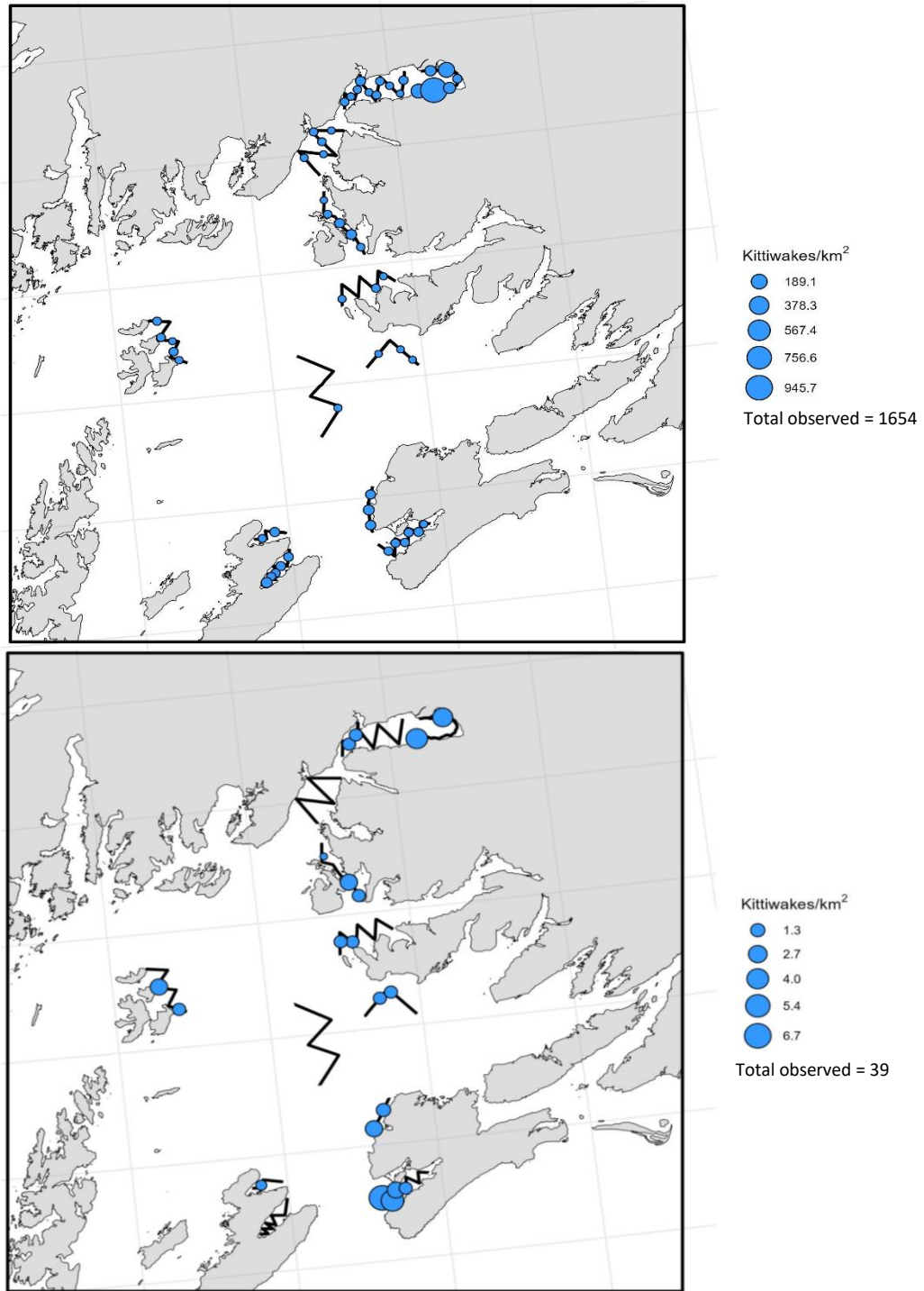


Figure A-9. Distribution of black-legged kittiwakes by density (birds/km<sup>2</sup>) during September (top) and November (bottom) 2025 surveys.

Puffin Density  
September 2025

on

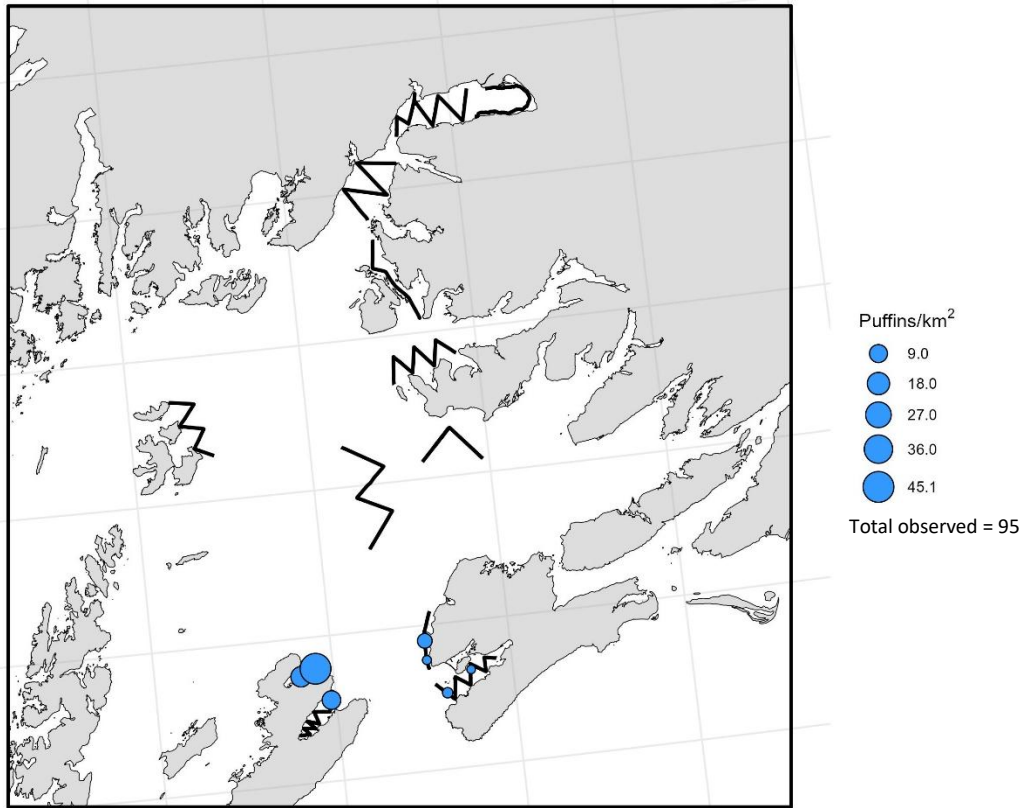


Figure A-10. Distribution of puffins (horned puffins and rhinoceros auklets) by density (birds/km<sup>2</sup>) during September 2025 surveys. Note that no puffins were observed on transects during November 2025 surveys.

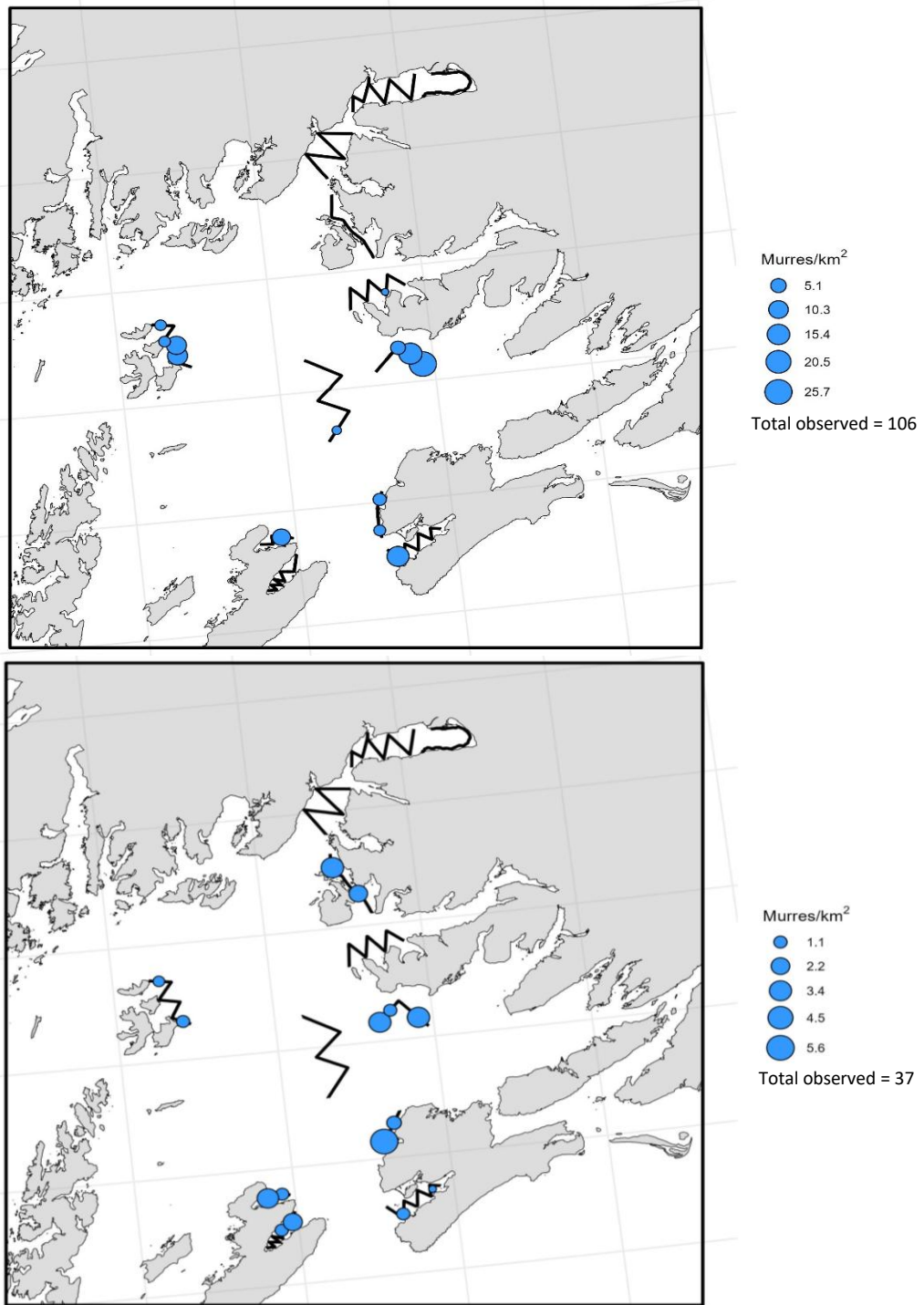


Figure A-11. Distribution of common murres by density (birds/km<sup>2</sup>) during September (top) and November (bottom) 2025 surveys.

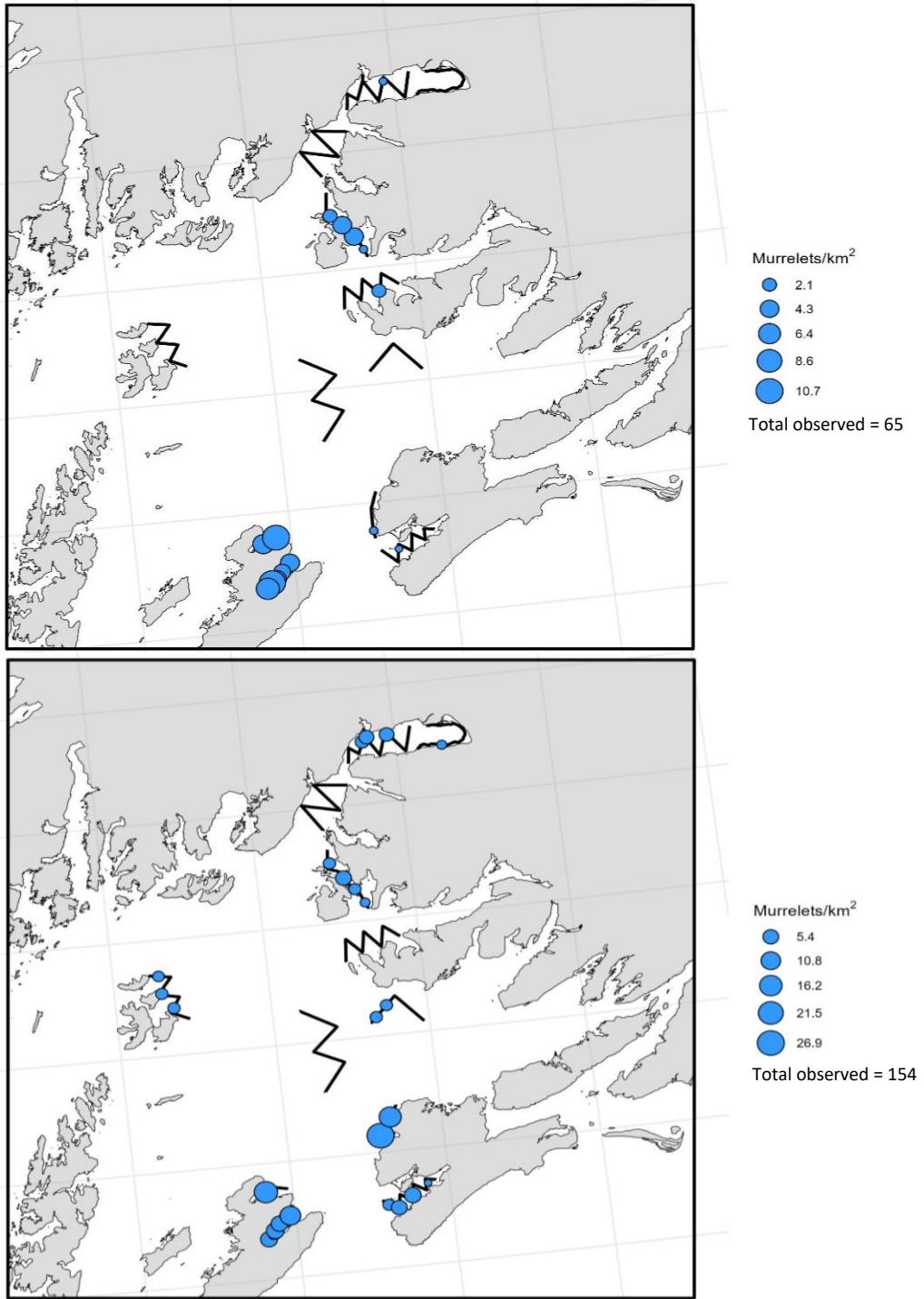


Figure A-12. Distribution of murrelets (marbled, unidentified) by density (birds/km<sup>2</sup>) during September (top) and November (bottom) 2025 surveys.

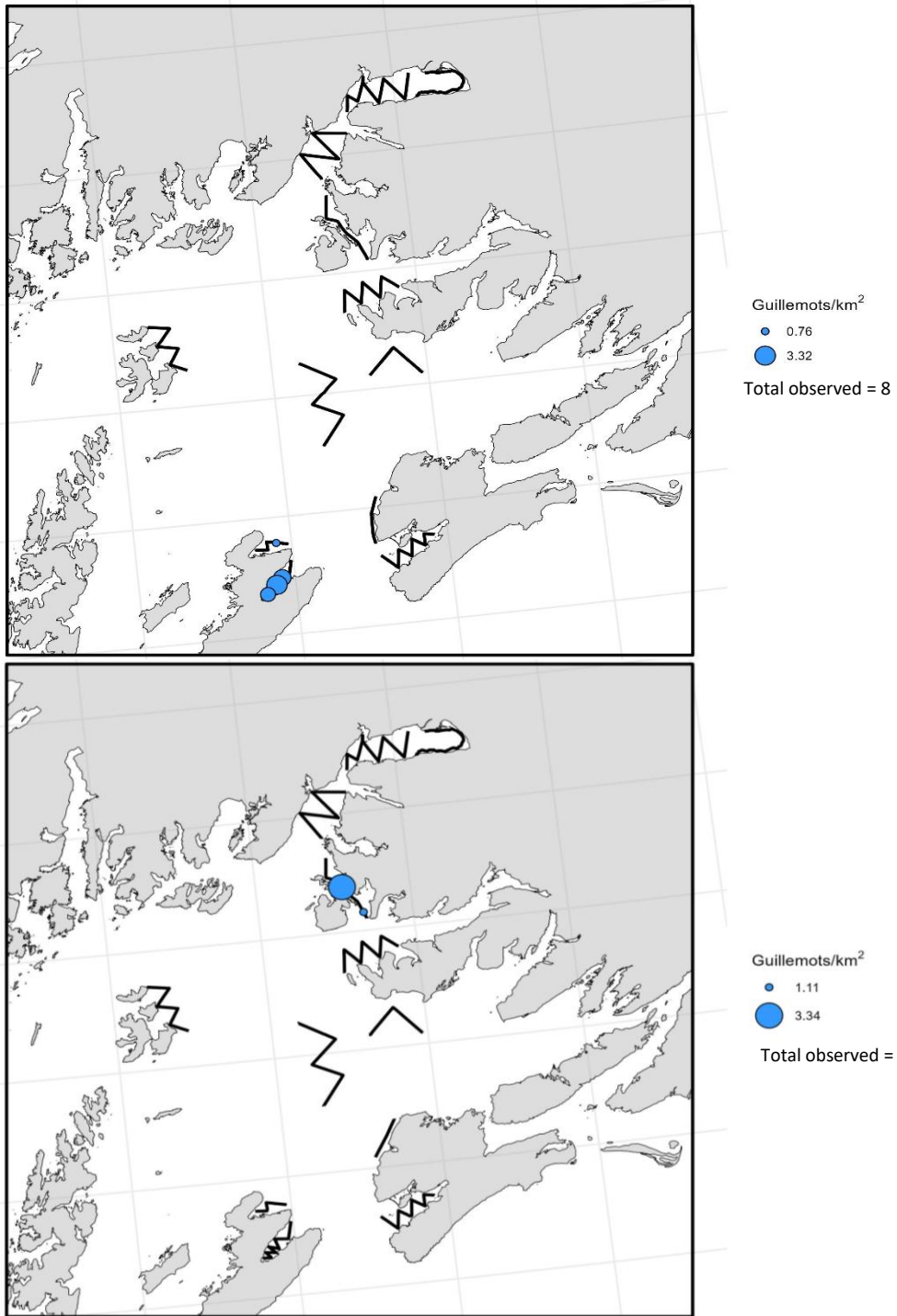


Figure A-13. Distribution of pigeon guillemots by density (birds/km<sup>2</sup>) during September (top) and November (bottom) 2025 surveys.

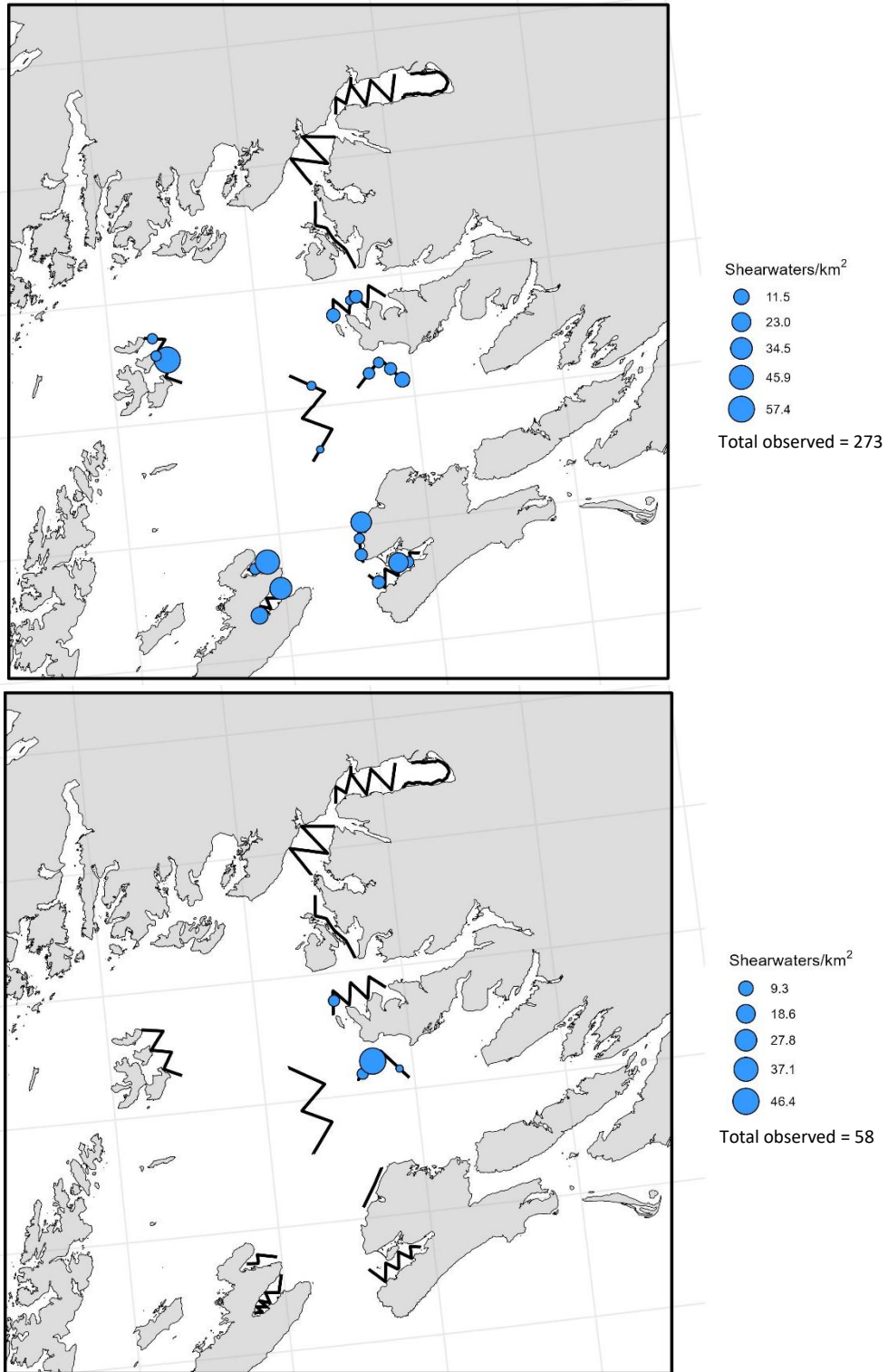


Figure A-14. Distribution of dark shearwaters (sooty, short-tailed, unidentified) by density (birds/km<sup>2</sup>) during September (top) and November (bottom) 2025 surveys.

Phalarope Density  
September 2025

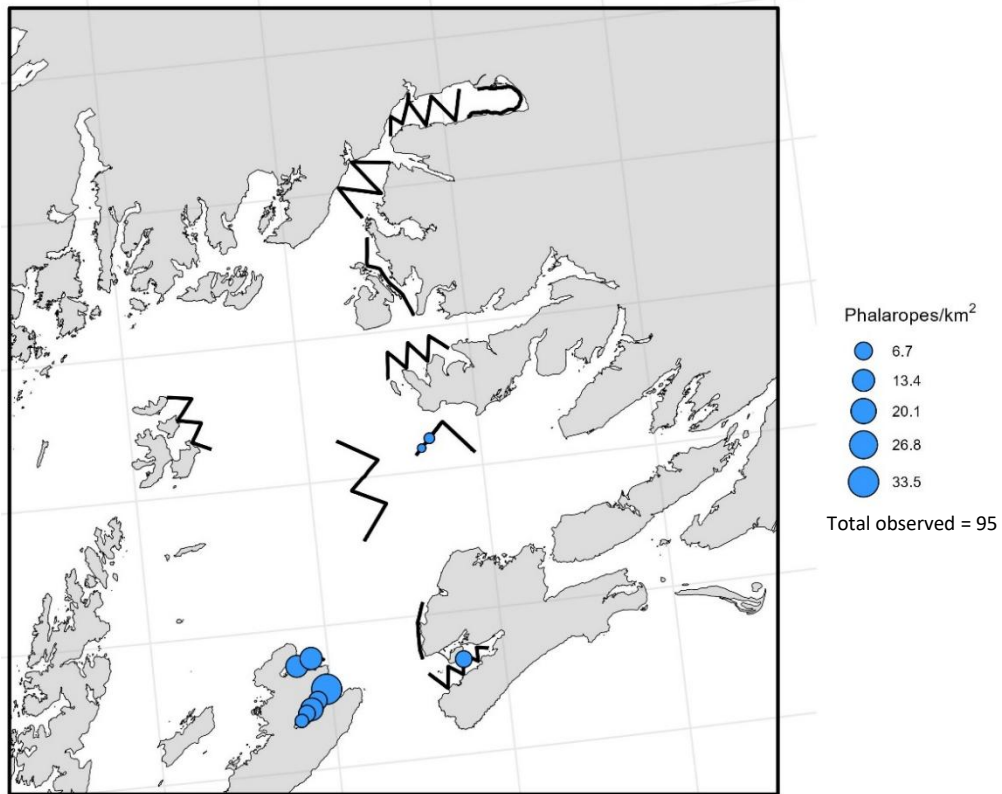


Figure A-10. Distribution of red-necked phalaropes by density (birds/km<sup>2</sup>) during September 2025 surveys. Note that no phalaropes were observed on transects during November 2025 surveys.

**Appendix B.** September and November 2025 Marine Mammal Observations by Species.

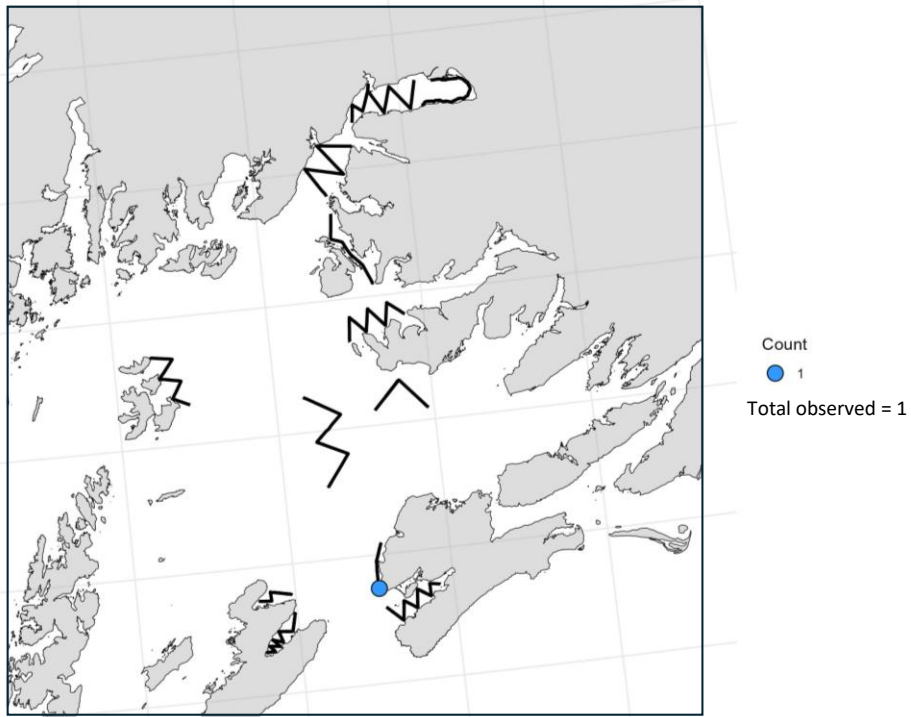


Figure B-1. Distribution and count of humpback whales observed during September 2025 surveys. No whales were observed during the November 2025 surveys.

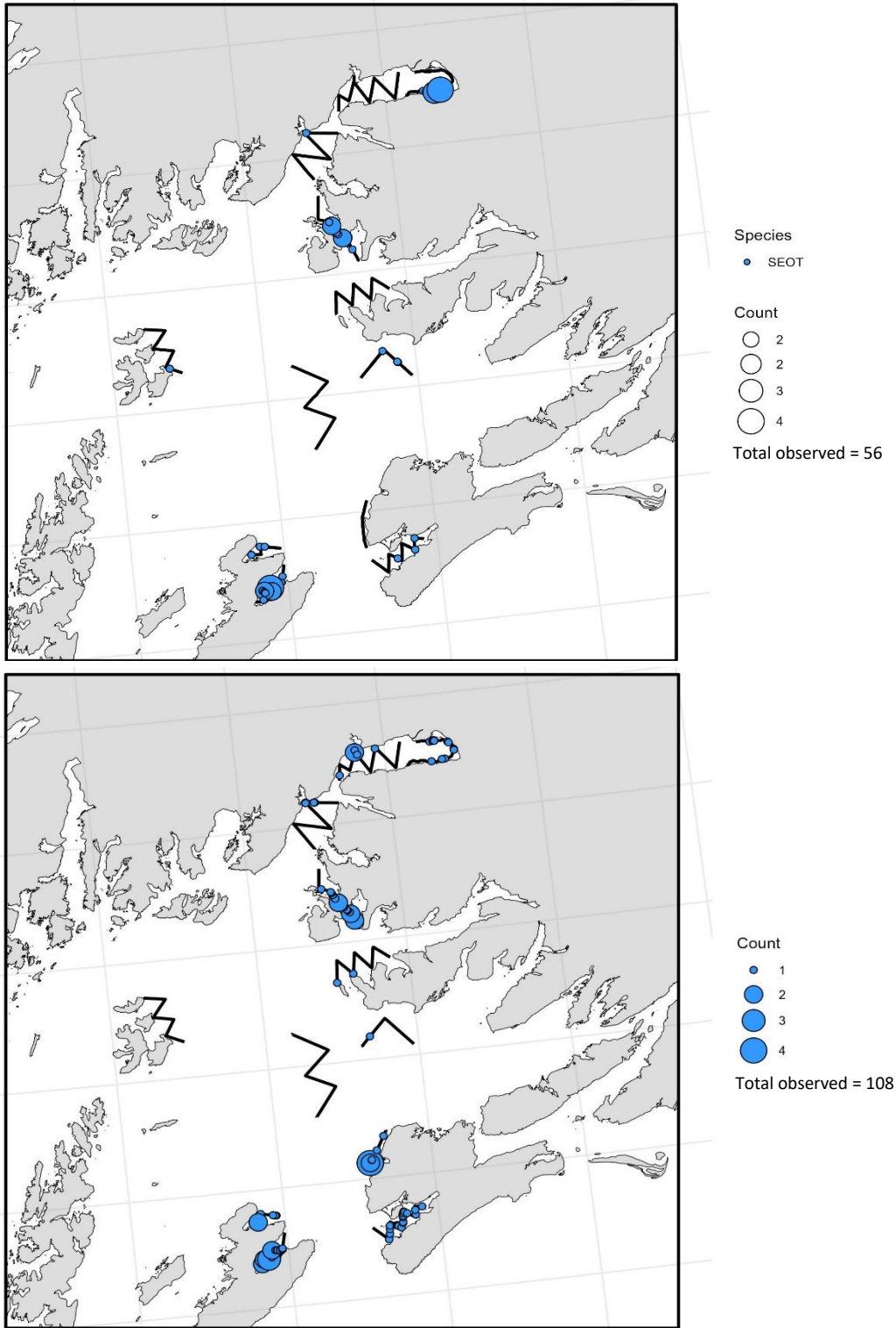


Figure B-2. Location and count of sea otters observed during September (top) and November (bottom) 2025 surveys.

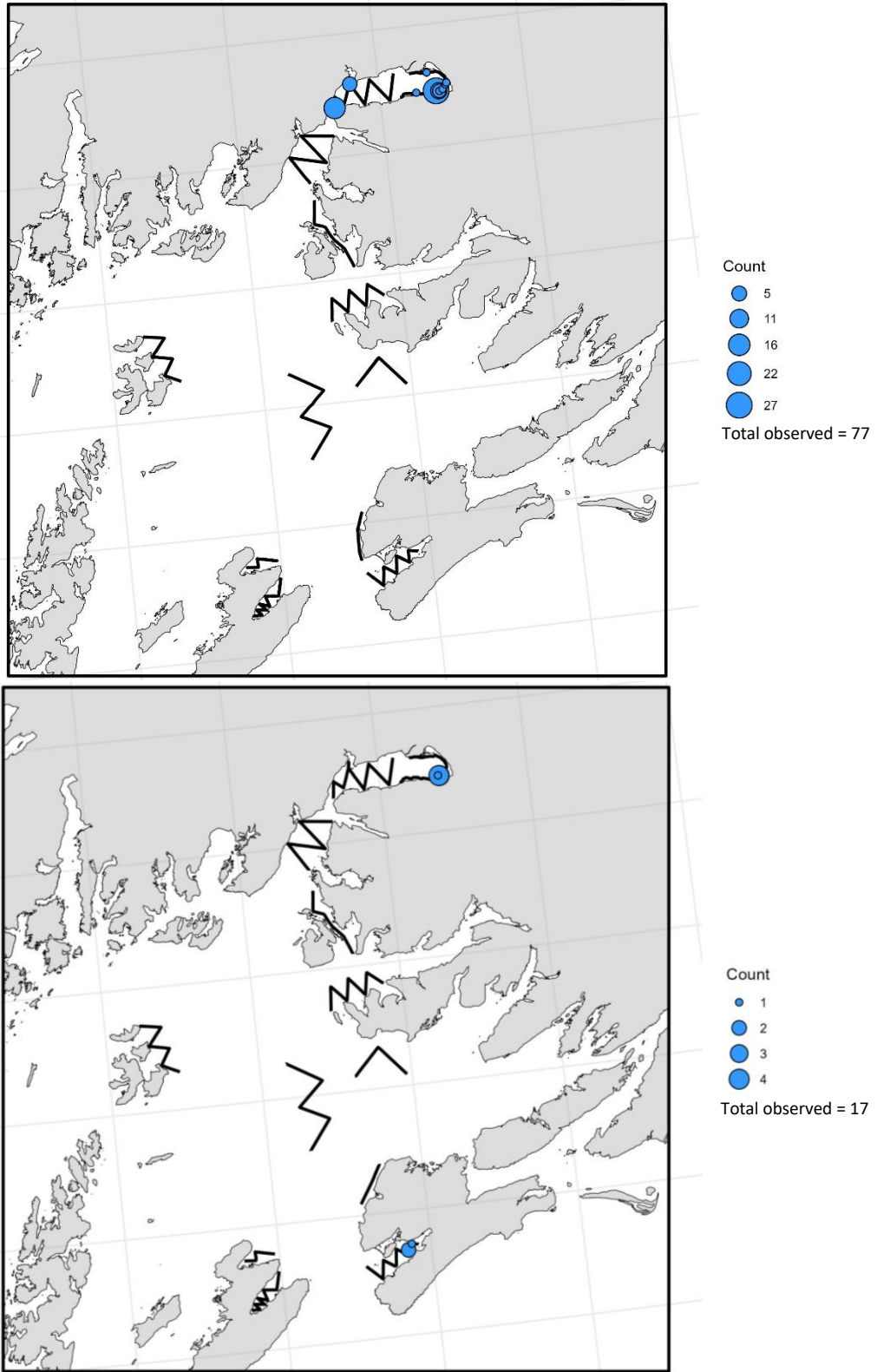


Figure B-3. Location and count of Steller sea lions observed during September (top) and November (bottom) 2025 surveys.

Seals  
September 2025

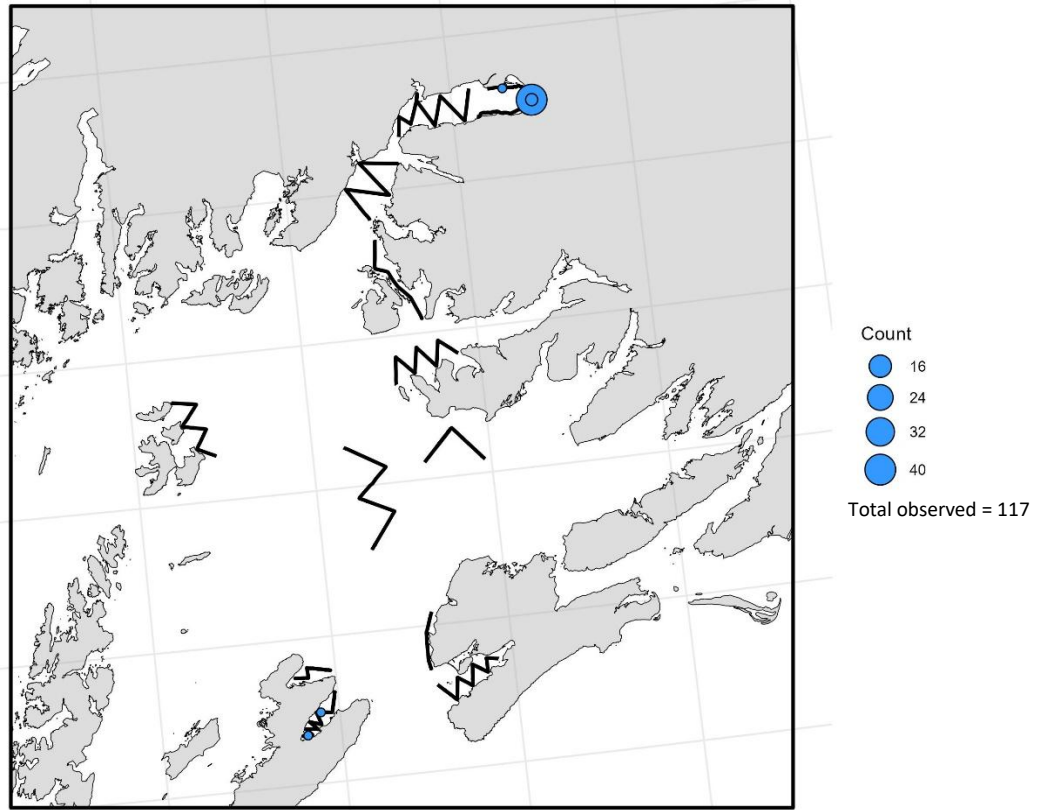


Figure B-4. Location and count of harbor seals observed during September 2025 surveys. No seals were observed during November 2025 surveys.

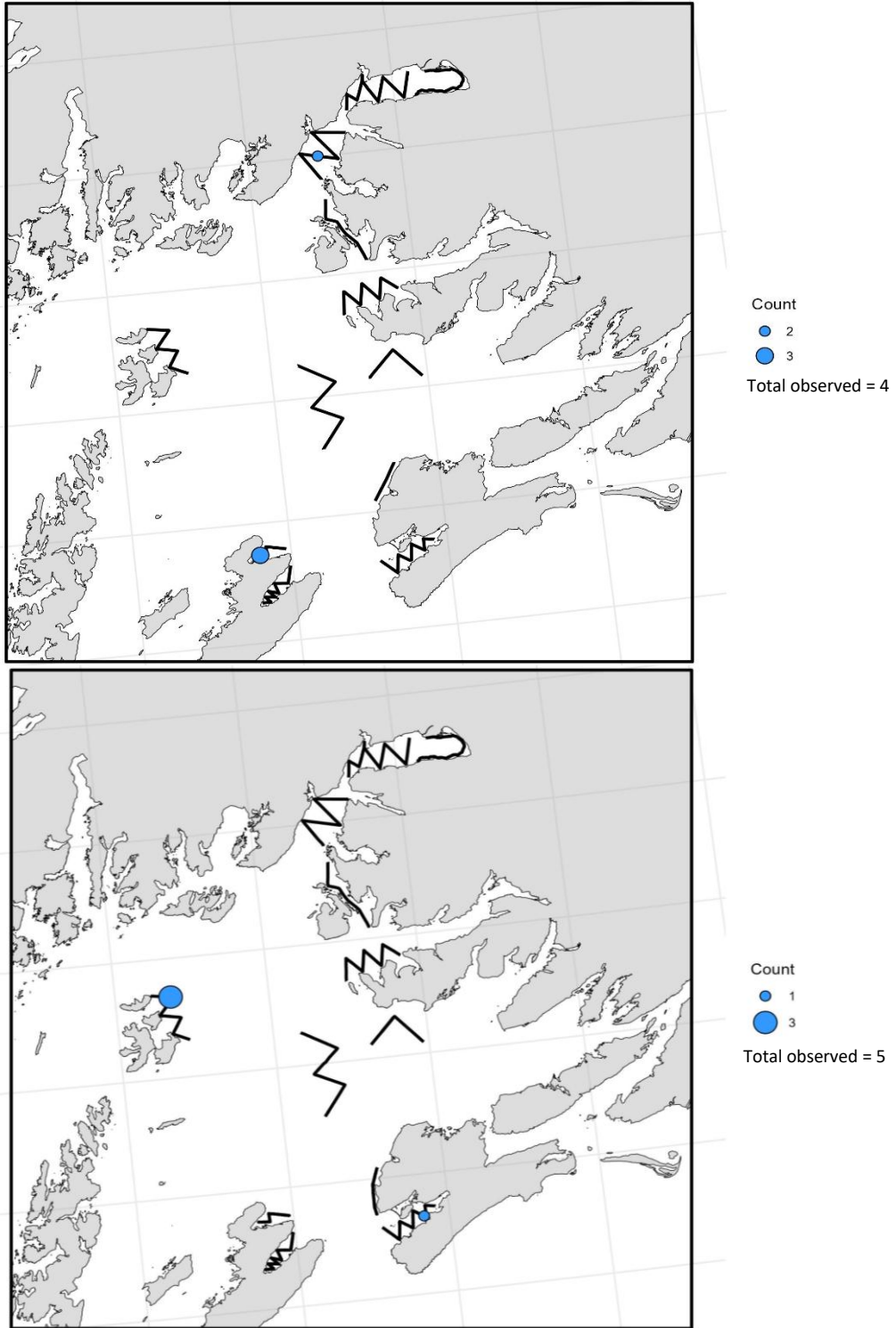


Figure B-5. Location and count of Dall's Porpoises observed during September (top) and November (bottom) 2025 surveys.