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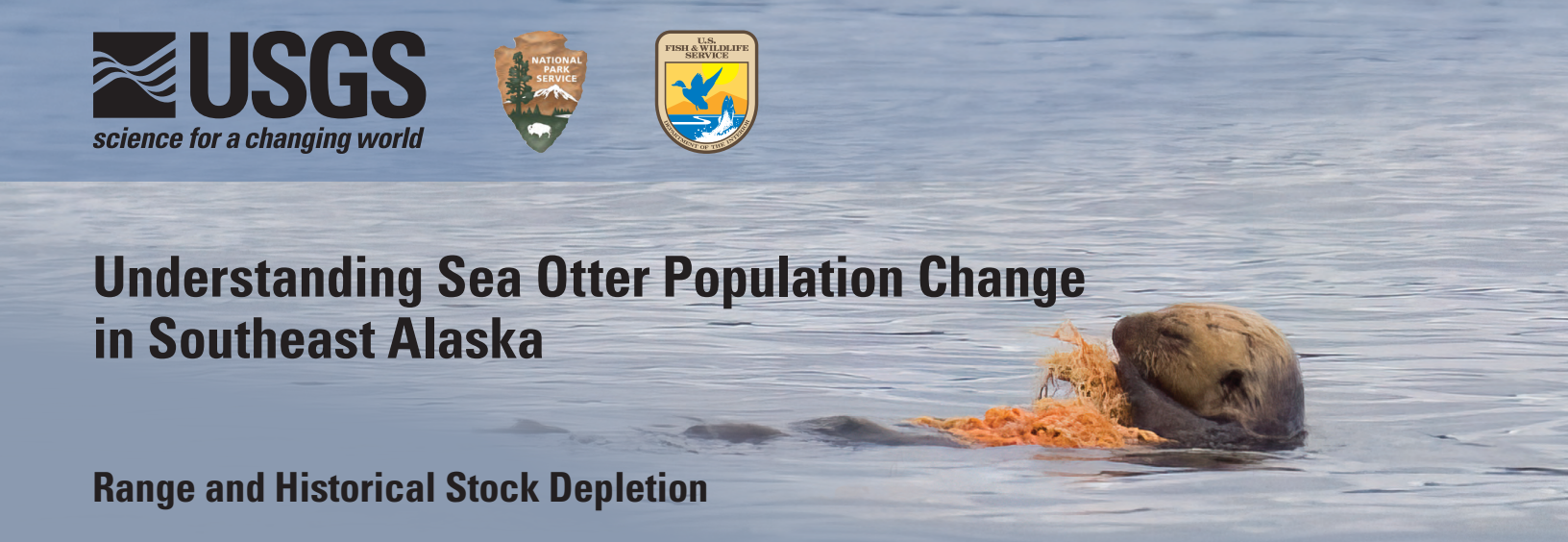
Understanding Sea Otter Population Change in Southeast Alaska



Range and Historical Stock Depletion

The Southeast Alaska (SE) stock of northern sea otters (*Enhydra lutris kenyoni*) ranges from Cape Yakataga on the north to the Dixon Entrance on the south (figs. 1 and 2). During the maritime fur trade, sea otters were commercially harvested to near extinction in SE for their pelts and were presumed unlikely to naturally repopulate the region (Kenyon, 1969).

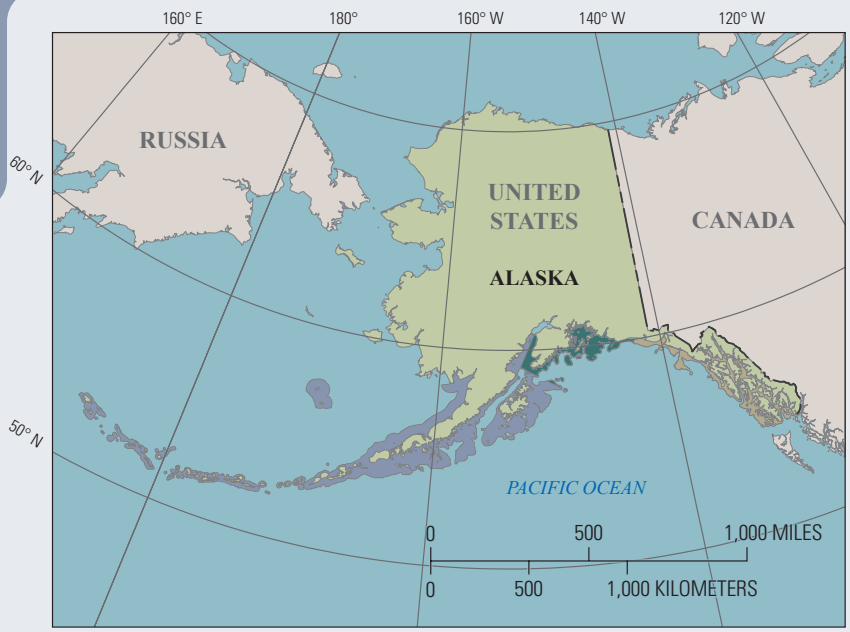


Figure 1. Northern sea otter stock regions, shown within the 100-meter depth contour, managed by the U.S. Fish and Wildlife Service in Alaska.

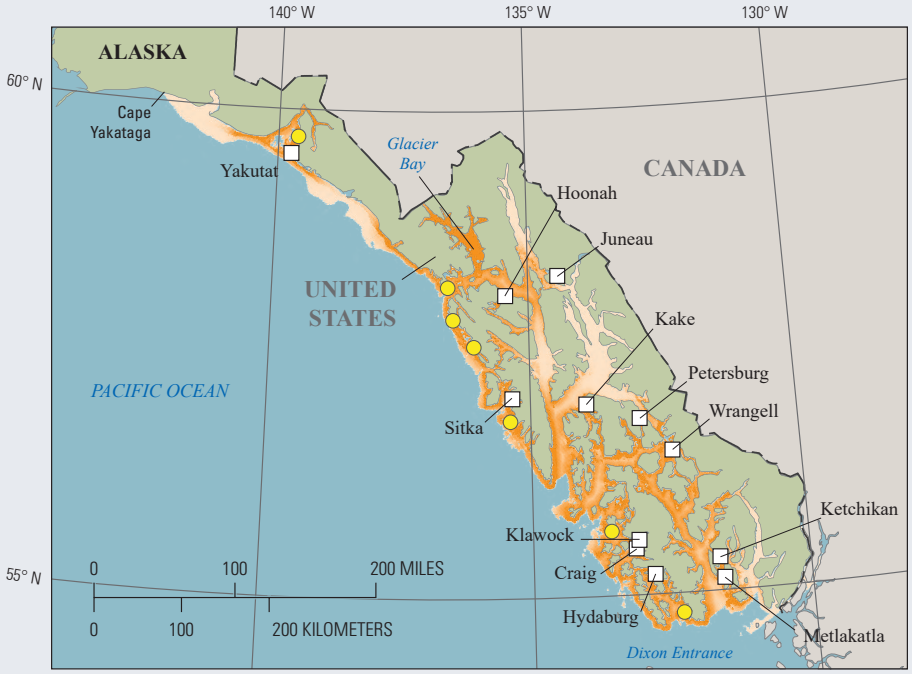


Figure 2. Southeast Alaska sea otter stock region showing sea otter estimated 2022 occupancy probability and previous reintroduction sites. Adapted from Schuette and others (2023).

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Reintroduction and Long-Term Monitoring

During the decades in which sea otters were absent, their prey (for example, clams, sea urchins, crabs) increased in size and abundance, setting the stage for rapid sea otter population growth if sea otters returned. From 1965 to 1969, the Alaska Department of Fish and Game and U.S. Atomic Energy Commission reintroduced 413 sea otters from Amchitka Island and Prince William Sound to seven sites along the outer coast of SE (Burris and McKnight, 1973; Jameson and others, 1982).

Since the reintroductions, surveys from boats and aircraft have estimated sea otter abundance and range expansion (fig. 3). Early population surveys (1975–94) consisted of minimum counts or crude estimates because the number of sea otters missed by observers or hidden from view—such as when sea otters dove—was unknown when the surveys were conducted (fig. 3). Recent surveys (2002–22) included additional search effort to estimate the percentage of sea otters not detected, improving the accuracy of abundance estimates (fig. 3). Beginning in 1993, the U.S. Geological Survey and National Park Service have regularly surveyed Glacier Bay from aircraft, indicating that about one-third of all sea otters in SE may live in the bay

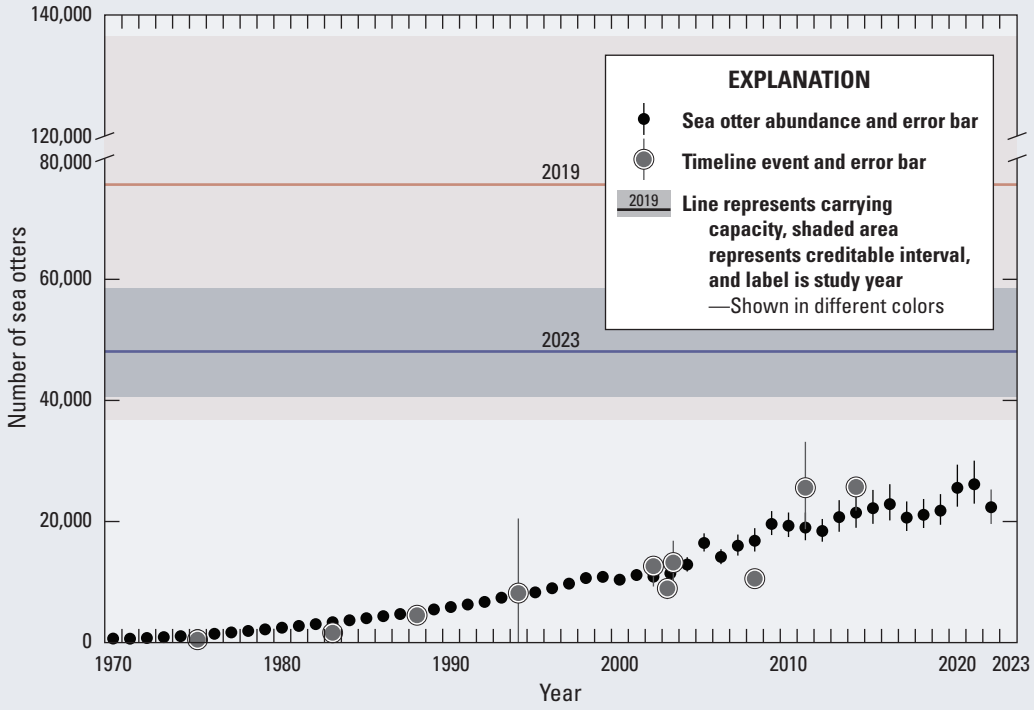

Figure 3. Current estimates (small black circles) and previously published estimates (large gray circles) of sea otter abundance and carrying capacity (K) in Southeast Alaska (SE). Error bars represent different measures of uncertainty, depending on the type of estimate, and are shown only to provide a general idea of the uncertainty around estimates. Not shown are years where sub-regional surveys occurred, such as National Park Service–U.S. Geological Survey Glacier Bay surveys in most years beginning in 1993. Adapted from Schuette and others (2023).

Further Population and Abundance Details—See Figure 3

Published estimates of sea otter abundance:

1975. 479 sea otters estimated in Southeast Alaska (SE), excluding stock area north of Cape Spencer (Jameson and others, 1982).

1983. 1,400–1,850 sea otters estimated in SE based on boat surveys south of Graves Harbor (Johnson and others, 1983).

1988. 4,521 sea otters counted in SE by combining maximum counts from boat surveys (Pitcher, 1989).

1994. 8,180 sea otters estimated in SE with large uncertainty of 6,286 based on boat surveys (Angler and others, 1995).

2002. U.S. Fish & Wildlife Service (USFWS) estimated 12,632 sea otters in SE with minimum population estimate of 9,266 (USFWS, 2002).

2003. 8,949 sea otters estimated in SE based on aerial surveys with uncertainty of 899 (Esslinger and Bodkin, 2009). Recent statistical model estimated 13,221 sea otters in SE (Tinker and others, 2019).

2008. USFWS estimated 10,563 sea otters in SE with a minimum population estimate of 9,136 (USFWS, 2008).

2011. Recent statistical model estimated 25,584 sea otters in SE (Tinker and others, 2019).

2014. USFWS estimated 25,712 sea otters in SE with a minimum population estimate of 21,798, primarily based on surveys done during 2010–12 (USFWS, 2014).

2022. USFWS and collaborators updated annual estimates of abundance since reintroduction (small black circles in fig. 3). Estimate of total abundance in 2022 was 22,359 (credible interval, 19,595–25,290) (Schuette and others, 2023; USFWS, 2023).

Recent estimates of sea otter abundance and carrying capacity:

2019. Estimated sea otter carrying capacity in SE of 75,650 (credible interval, 36,778–136,506) (Tinker and others, 2019).

2023. USFWS and collaborators estimated carrying capacity at 48,083 (credible interval, 40,575–58,570) (Schuette and others, 2023; USFWS, 2023).

(Williams and others, 2017, 2019; Esslinger, 2019, 2020; Tinker and others, 2019; Lu and others, 2020; Womble and Taylor, 2020; Eisaguirre and others, 2021, 2023). Over the years, advances have been made in the statistical methods used to develop a population estimate from the survey counts (Williams and others, 2017, 2019; Tinker and others, 2019; Lu and others, 2020; Eisaguirre and others, 2021, 2023) (fig. 3). Given these continuing advances, each analysis or re-analysis of historical data may provide different results depending on the methods and data used. For example, many historical estimates incorporated only a single year of data, whereas contemporary methods can use data from multiple or even all years. Schuette and others (2023) used all aerial survey data collected through 2022 and recently developed statistical methods to provide an updated understanding of sea otter population change in SE since reintroduction (fig. 3).

Next Steps

Ongoing and upcoming research includes:

- Continuing to improve statistical modeling, including using harvest data directly in estimating abundance, as well as including other types of survey data, such as boat- and eventually drone-based data;
- Working toward incorporating biological data to evaluate how accounting for predator-prey dynamics between shellfish and sea otters may improve estimates of abundance and monitoring;
- Adapting monitoring plans to accommodate localized survey efforts—conducted by members of coastal communities, agency and academic partners, and Alaska Native Tribes—that may occur more regularly; and
- Developing streamlined ways to update abundance estimates efficiently as localized surveys occur.

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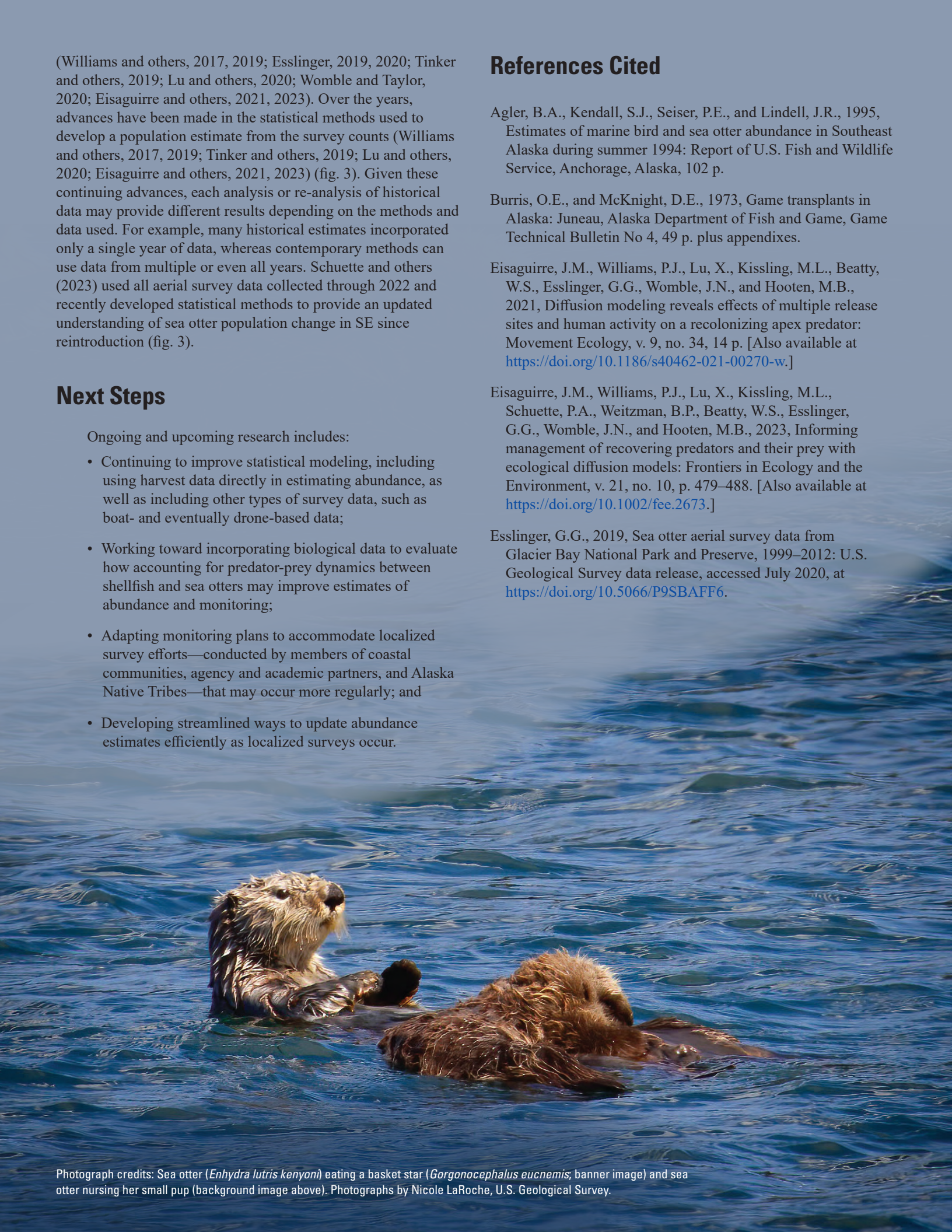

Photograph credits: Sea otter (*Enhydra lutris kenyoni*) eating a basket star (*Gorgonocephalus eucnemis*; banner image) and sea otter nursing her small pup (background image above). Photographs by Nicole LaRoche, U.S. Geological Survey.

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Authors:
Joseph M. Eisaguirre, Toshio D. Matsuoka, and George G. Esslinger (U.S. Geological Survey); Benjamin P. Weitzman and Paul A. Schuette (U.S. Fish and Wildlife Service); and Jamie N. Womble (National Park Service)

For more information:
Director, Alaska Science Center
4210 University Drive
Anchorage, Alaska 99508
https://www.usgs.gov/centers/alaska-science-center

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