

## Key Site 70: Sleeping Bear Dunes National Lakeshore, Michigan

**Location:** 45°09'02"N, 85°55'47"W

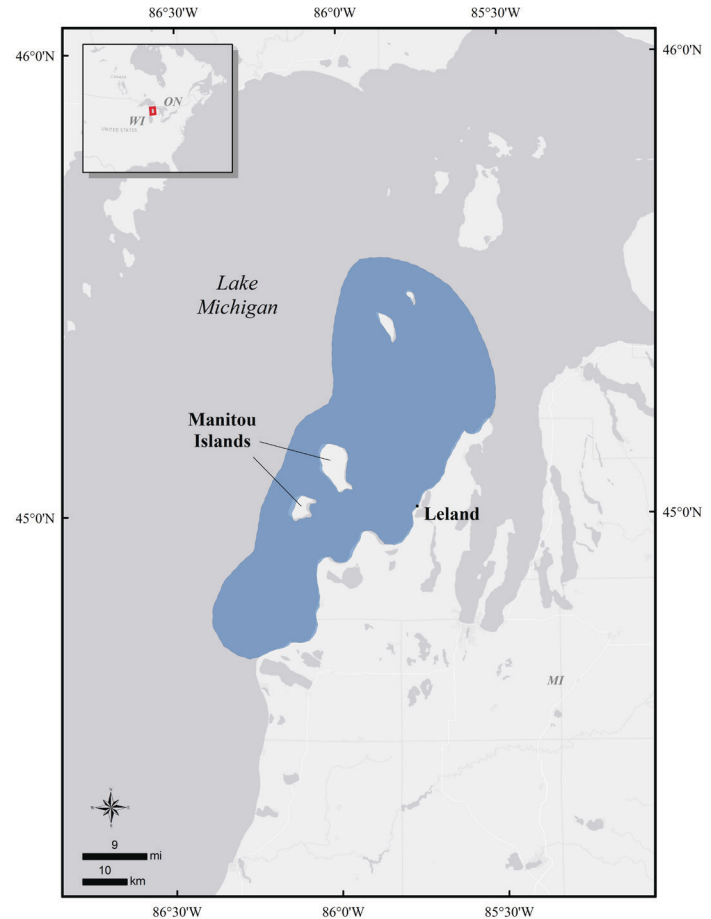
**Size:** 2945 km<sup>2</sup>

**Description:** Lake Michigan is one of the Laurentian Great Lakes and the only Great Lake located entirely within the United States, bounded by the states of Illinois, Indiana, Michigan, and Wisconsin. The Sleeping Bear Dunes National Lakeshore portion of Lake Michigan that constitutes this key site extends north along the shoreline from Point Betsie Lighthouse (50 km southwest of Leland, Michigan) to Grand Traverse Lighthouse (25 km north-northeast of Leland, Michigan) and extends 15–50 km offshore, encompassing North Fox, South Fox, North Manitou, and South Manitou Islands. This area includes only one minor port at Leland, Michigan. For more detailed information about waterfowl in the Great Lakes region, Sleeping Bear Dunes National Lakeshore, and the benthic community, limnology, and geomorphology of Lake Michigan, see Prince et al. (1992), National Park Service (2019), National Oceanic and Atmospheric Administration (2006), Nalepa et al. (2009), Madenjian et al. (2015), Yurista et al. (2015), and Rowe et al. (2017).

### Precision and Correction of Abundance

**Estimates Presented:** Abundance estimates are based on the peak number of all species of sea duck observed during aerial surveys of waterbirds conducted during fall through spring (i.e., September–May) 2009–2014 (Kenow et al. 2021). Observed counts were adjusted by species-specific or species group detection rates estimated for aerial fixed-wing surveys by Hodges et al. (2008) for coastal surveys in Alaska. Observed and visibility-adjusted abundance estimates, as well as distribution maps by month, are included in [Appendix 1](#).

**Biological Value:** This site is important for Long-tailed Ducks (*Clangula hyemalis*) but does support a good number of White-winged Scoters (*Melanitta deglandi*), Common Goldeneyes (*Bucephala clangula*), and Common Mergansers (*Mergus merganser*). Other sea ducks, such as Bufflehead (*Bucephala albeola*), Black Scoter (*Melanitta americana*), Surf Scoter (*Melanitta perspicillata*), and Red-breasted



Mergansers (*Mergus serrator*) migrate through and winter here in smaller numbers.

Use of this area was documented by one radiomarked Long-tailed Duck from December 2016 through May 2017 (Fara 2018). This duck exhibited diel movements, using shallower water closer to shore during the day and deeper water farther from shore at night. This record is consistent with the observed distribution of Long-tailed Ducks during aerial surveys in this region of Lake Michigan.

Aerial survey data (Kenow et al. 2021) indicate that Long-tailed Ducks were the most abundant species wintering within this site, with total numbers estimated at roughly 65,000 birds (December–February, 2010–2014) when corrected for visibility (Hodges et al. 2008). Lesser numbers of wintering sea ducks included White-winged Scoter (~12,000 est. birds), Common Goldeneye (~5000 est. birds), and Common Merganser (~3500 est. birds). White-winged Scoters and Common Mergansers each represented approximately 81% of total scoters and total mergansers

tallied, respectively. Buffleheads were infrequently encountered. The total winter density estimate for surveys in this key site was 49.3 sea ducks/km<sup>2</sup>, with individual surveys ranging from 18.3 (December 6, 2011) to 77.6 (December 1–2, 2009) sea ducks/km<sup>2</sup>.

Aerial survey data (Kenow et al. 2021) indicate that Long-tailed Ducks were the most abundant species during fall migration, with total numbers estimated at roughly 35,000 birds (September–November, 2009–2014) when corrected for visibility (Hodges et al. 2008). White-winged Scoters represented at least 18% of total sea duck numbers counted within the same period at this site (~9200 est. birds). Other sea duck species tended to be more abundant during fall migration than during the spring season; however, there was greater survey effort during the fall months and sea duck numbers were generally much higher in years where survey data included late October to late November flights. Spring data were limited to the same calendar day in April between two consecutive years (2012–2013), with total numbers of Long-tailed Ducks estimated at approximately 3500 birds when corrected for visibility (Hodges et al. 2008). Merganser species, when combined, were the only other sea ducks to exceed 1000 birds in total for spring (~1700 est. birds), and White-winged Scoters were infrequently encountered by early April at this site. The total fall density estimate for surveys in this key site was 16.6 sea ducks/km<sup>2</sup>, while the total spring density estimate was 12.8 sea ducks/km<sup>2</sup>. Fall density estimates for individual surveys ranged from 0.1 (September 18–19, 2013) to 79.7 (November 28–29, 2012) sea ducks/km<sup>2</sup>, and individual spring survey density estimates ranged from 5.4 (April 5, 2012) to 20.2 (April 5, 2013) sea ducks/km<sup>2</sup>.

Few sea ducks were present at this site during September and the few concentrations present tended to be near the Fox Islands and Manitou Islands. Sea duck numbers increased during October and November, but concentrations were generally small and well-spaced, with only a few larger concentrations found southwest of South Manitou Island and near Pyramid Point, Michigan (~15 km southwest of Leland, Michigan). December provided the highest counts for this key site, and large concentrations of sea ducks were near the shoals of South Fox Island, around North and South Manitou Islands, within Sleeping Bear Bay (~25 km southwest of Leland, Michigan), and near Leland,

Michigan. Sea duck numbers declined in January and concentrations present were reduced to the southern portion of the key site. Concentrations were smaller and more evenly distributed throughout the site during February and April. It is important to note that ice cover could greatly affect the distribution of birds within this site and even preclude sea duck use during severe winters.

**Sensitivities:** Waterfowl and other waterbirds are sensitive to human disturbance, mostly small vessel and/or shipping traffic during migration and the wintering period on the Great Lakes (Prince et al. 1992). By-catch from commercial fishing operations is of concern, as Ellarson (1956) estimated that by-catch of Long-tailed Ducks in large-mesh gill nets could reach 100,000 individuals (see also Baldassare 2014). Commercial fishing operations have declined dramatically over the last 50 years in Michigan (Michigan Department of Natural Resources 2019), but commercial and tribal fishing operations still occur north of Grand Haven, Michigan, and this area is subject to commercial operations from both state and tribal operations (Michigan Department of Technology, Management and Budget 2013). Although entrapment methods have for the most part changed from gill nets to trap nets, there is still concern about by-catch of Common Loons (*Gavia immer*; Johnson et al. 2004) and perhaps other waterbirds, including sea ducks.

Food resource availability and aquatic functions in Lake Michigan appear to be changing due to invasive and introduced species (Nalepa et al. 2009), and shifts in the energy balance have had a negative impact on the health of predatory fish species (Pothoven et al. 2001, Madenjian et al. 2006, Nalepa et al. 2009, Mandenjian et al. 2015) and perhaps waterfowl. Food resource availability and quality could also be influenced by pollution from industrial activities, urban development, and agricultural practices that occur near the lakeshore or within the Lake Michigan watershed (U.S. Environmental Protection Agency 2008).

Type E botulism (*Clostridium botulinum*) outbreaks occur periodically in Lake Michigan and have been associated with the mortality of more than 100,000 birds throughout the Great Lakes since the 1960s, including sea ducks (Chipault et al. 2015). Outbreaks of type E avian botulism have been a common occur-

rence in northern Lake Michigan since the early 2000's (Lafrancois et al. 2011, Chipault et al. 2015).

Lake Michigan has been identified as a suitable location, with above adequate wind resources, for nearshore and offshore wind energy development (Beiter et al. 2017) and although no offshore wind energy sites have been developed, there is potential for negative effects to sea ducks and other birds through displacement and/or direct mortality (Arnett et al. 2007).

Extensive ice cover during severe winters can have a strong effect on the presence, survival, distribution, and movements of sea ducks and waterbirds that winter on Lake Michigan (Ellarson 1956, Prince et al. 1992). The Sleeping Bear Dunes National Lakeshore area of Lake Michigan, representing this key site, experiences a range of ice coverages from limited ice coverage during mild winters to completely frozen during severe winters (U.S. Department of Commerce 2020).

**Potential Conflicts:** Disturbance associated with small vessel and shipping traffic, potential for nearshore and offshore wind energy development, and effects from commercial fishing operations remain potential conflicts at this site.

**Status:** The southern portion of this key site includes the northernmost portion of the Lake Michigan Long-tailed Duck Important Bird Area (IBA), a global priority, that extends along the eastern shore of Lake Michigan from Empire to South Haven, Michigan (Audubon 2017a). The key site also abuts the Sleeping Bear Dunes National Lakeshore IBA, which is considered a global priority (Audubon 2017b) and the Grand Traverse Bay basin IBA, which is considered a state priority (Audubon 2017c). The open waters of Lake Michigan and connecting waterbodies are managed by the state of Michigan for this key site, but oversight is provided by the United States government to regulate navigation, interstate commerce, access, contamination, and water quality and use. Due to their sovereignty from federal and state governments, tribal nations also provide input on the management and utilization of Lake Michigan resources, including governance provided through the Chippewa Ottawa Resource Authority and the Great Lakes Indian Fish and Wildlife Commission (Hall and Houston 2014).

Uplands surrounding this key site are managed by a variety of parties including federal, state, county, city, and private land owners.

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