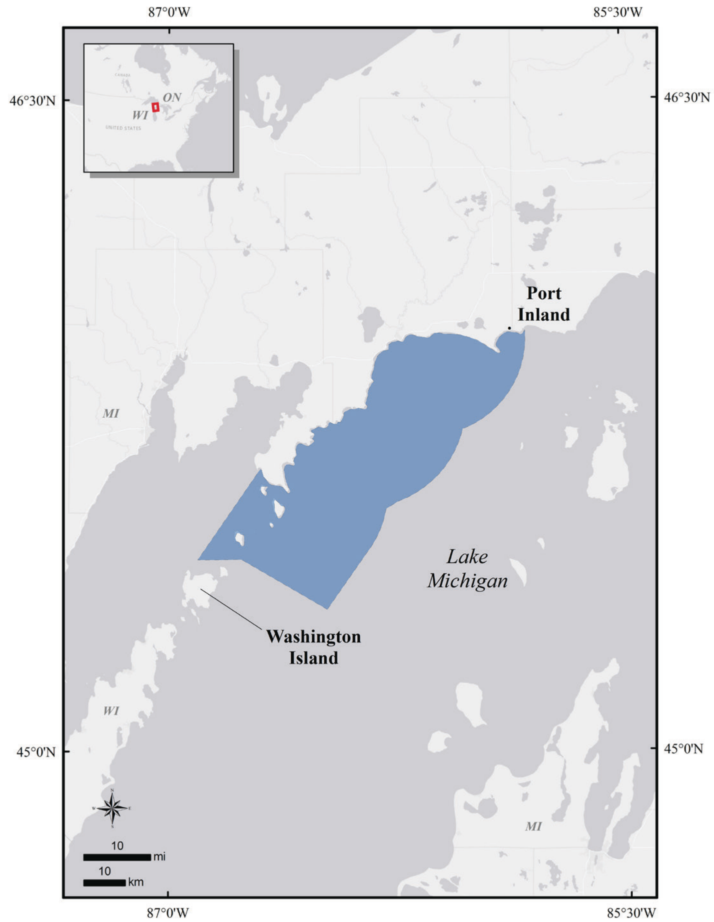
Key Site 69: Garden Peninsula, Michigan

Location: 45°40'05"N, 86°20'37"W

Size: 2391 km^2



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, USA. The Garden Peninsula, of Lake Michigan that constitutes this key site extends southwest along the shoreline from 3 km east of Port Inland, Michigan, to the Michigan–Wisconsin border (4 km north of Washington Island, Wisconsin) and extends 25 km offshore. The site encompasses islands and shoals in Michigan waters south of the Garden Peninsula. The only major port within the key site is Port Inland, Michigan, and minor ports can be found at Fairport and Manistique, Michigan. For more detailed information about waterfowl in the Great Lakes region and the benthic community, limnology, and geomorphology of Lake Michigan, see Prince et al. (1992), 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 other sea ducks, such as Common Goldeneye (*Bucephala clangula*), Bufflehead (*Bucephala albeola*), Common Merganser (*Mergus merganser*), Red-breasted Merganser (*Mergus serrator*), Black Scoter (*Melanitta americana*), White-winged Scoter (*Melanitta deglandi*), and Surf Scoter (*Melanitta perspicillata*) migrate through and winter here in smaller numbers. High use of this area was documented among radiomarked Long-tailed Ducks during fall (November) and spring (March–May), with no observed use during the wintering months (December–February; Fara 2018). These Long-tailed Ducks exhibited diel movements, using shallower water closer to shore during the day and deeper water farther from shore at night.

Aerial survey data (Kenow et al. 2021) indicate that Long-tailed Ducks were the most abundant species during spring migration with total numbers estimated at least 33,000 birds (April, 2011–2012) when corrected for visibility (Hodges et al. 2008); nearly all these birds were encountered in 2011 and represented 92% of all sea ducks tallied during spring surveys. Total mergansers were estimated at slightly more than 1950 birds within the same period. Approximately three-quarters of all mergansers were identified as Common Mergansers. Numbers of most other sea duck species were generally considered low. The total spring density estimate for surveys in this key site was 66.9 sea ducks per km^2.

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 more than 12,000 birds (December–February, 2011–2012) when corrected for visibility (Hodges et al. 2008). Common Merganser numbers were estimated at slightly more than 4000 birds within the same period (92% of all mergansers tallied), and most other wintering sea ducks had species counts of less than 1000 birds each. Scoters, particularly White-winged, were infrequently detected during winter. The total winter density estimate for surveys in this key site was 22.6 sea ducks per km^2, with individual surveys ranging from 11.2 (February 14, 2012) to 26.5 (January 13, 2011) sea ducks per km^2.

Fall migration survey data indicate that the total number of Long-tailed Ducks was estimated at greater than 25,300 birds (September–November, 2010–2014) when corrected for visibility (Hodges et al. 2008). Common Mergansers (~1860 est. birds) represented at least 60% of total mergansers tallied during fall migration at this site. Most other sea duck species had fall counts totaling less than 600 birds over 11 surveys. The total fall density estimate for surveys in this key site was 10.6 sea ducks per km^2, with individual surveys ranging from 0.2 (October 5, 2011) to 90.4 (October 21, 2014) sea ducks per km^2.

Few sea ducks were present at this site during September, but large concentrations were observed during October surveys, with the highest concentrations located near Manistique, Michigan (Kenow et al. 2021). During November, sea ducks tended to occupy most of the key site and were evenly distributed throughout with no major concentrations. Sea duck concentrations decreased after November, and concentrations were generally lower from December through February. The one exception was a January 2011 flight that indicated large concentrations near Manistique, Michigan. Ice cover during winter likely forces birds out of this area from December through February. Surveys conducted in April indicate that sea duck numbers increased throughout the key site with the heaviest concentrations near Manistique, Michigan.

Sensitivities: Waterfowl and other waterbirds are sensitive to human disturbance, mostly small vessel and 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: Ellarson (1956) estimated that by-catch of Long-tailed Ducks in large mesh gill nets could reach 100,000 (see also Baldassare 2014) individuals. 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 (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 food web dynamics have had a negative effect 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 contamination 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 occurrence in northern Lake Michigan since the early 2000s (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 a 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 Garden Peninsula 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 near-shore and offshore wind energy development, and effects from commercial fishing operations remain potential conflicts at this site.

Status: This key site encompasses the Rocky Island (Lake Michigan) Important Bird Area (IBA) in Michigan (Audubon 2017). 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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