

Key Site 66: Southwestern Bay of Fundy, New Brunswick

Location: 45°1'46"N, 66°51'57"W

Size: 611 km²

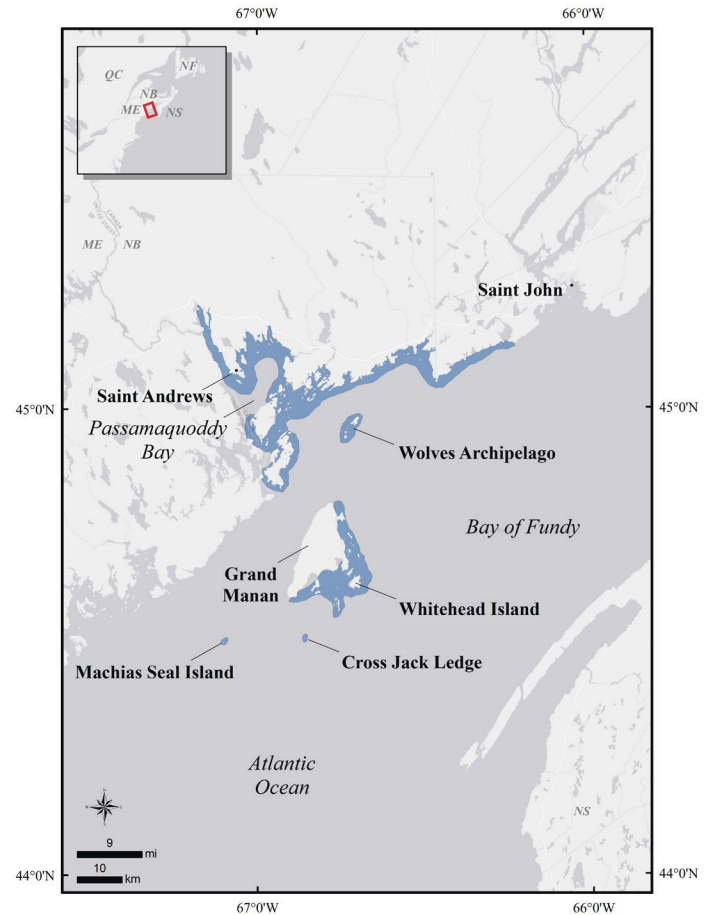
Description: The Southwestern Bay of Fundy key habitat site is located on the southwest coast of New Brunswick between Grand Manan Island in the south to St. Andrews in the northwest, and Musquash Estuary to the northeast. It encompasses coastal areas, islands, and many estuaries, harbors, and bays around Machias Seal Island, Cross Jack Ledge, Grand Manan, Whitehead Island, the Wolves Archipelago, Saint George, Black's Harbour, and Maces Bay. Several rivers flow into the area, including the St. Croix River, Digdeguash River, Magaguadavic River, New River, and the Musquash River.

Precision and Correction of Abundance

Estimates Presented: Abundance estimates presented for this key habitat site have been adjusted only for Common Eider (*Somateria mollissima dresseri*) to account for incomplete detection, by applying species-specific visibility correction factors estimated for surveys estimated from other similar areas and surveys. A VCF of 1.42 was applied to Common Eider counts and was calculated from a visual versus photo interpretation (Bordage et al. 1998). No adjustments were made for counts of Harlequin Duck. Because aerial surveys may cause birds to flush early or stay close to shore and flock in tight groups (Boyne 2008), maximum abundance of Harlequin Duck at this site is likely greater than reported counts.

Biological Value: This site is predominantly important to overwintering American Common Eider and Eastern Harlequin Ducks (*Histrionicus histrionicus*) from late fall through March.

Common Eider can be found in the southern Bay of Fundy throughout the year. During the breeding season, eiders nest in colonies along marine coasts, primarily on islands, islets, and narrow points of land (Goudie et al. 2000). During July and August eiders, primarily males, congregate in large molting flocks, as they do along the Atlantic coast (Milton et al. 2006), usually in the general area of nesting colonies but farther offshore (Goudie et al. 2000). Fall migration occurs in October and November,



and most wintering areas reach peak abundance by mid-December (Goudie et al. 2000). Adult eiders forage primarily on benthic invertebrates, including intertidal and subtidal mollusks (especially blue mussels, *Mytilus edulis*), crustaceans, and echinoderms (Goudie et al. 2000).

During the wintering period (mid-February surveys), Common Eider abundance at this site reached 24,774 birds in 2006, representing approximately 8.3% of the continental population of American Common Eider (NAWMP 2012). More recent numbers are lower, with 8835 and 10,937 observed in 2012 and 2016, respectively, although 18,201 birds were observed in 2018. During winter, flocks concentrate along the coastline; highest concentrations of birds vary among years but are usually along the western part of Grand Manan Island, in Passamaquoddy Bay, and Maces Bay.

This site is important for breeding Common Eider, although they have experienced declines of about 3% per year over a long term (K. Connor, New Brunswick Department Natural Resources

unpublished data). Male Common Eider counts for The Wolves Archipelago were 709 in 1998 and declined to 129 and 132 males in 2014 and 2017, respectively (Canadian Wildlife Service New Brunswick unpublished data). Grand Manan Archipelago also supported breeding populations of Common Eider estimated at more than 3300 pairs in 2001 (Ronconi and Wong 2003) but with recent declines. Male counts for the entire key site for the years 1996–2000 included approximately 4000 males, but 2014 and 2017 counts included 2285 and 1990 males, respectively (Canadian Wildlife Service New Brunswick unpublished data).

American Common Eiders appear to be declining in the southern part of their breeding and wintering range in New Brunswick, Nova Scotia, and Maine (Noel et al. 2021), including at this site. Potential causes of decline include Wellfleet Bay virus (Ballard et al. 2017); increasing predator populations on breeding grounds, including mink, river otter, bald eagles, and greater black-backed gulls (Canadian Wildlife Service 2017); large, long-term declines of their preferred prey, blue mussels, in the Gulf of Maine (Sorte et al. 2017) and within this key habitat site (Canadian Wildlife Service 2017).

This site is also continentally important for the eastern North American population of Harlequin Ducks. Harlequin Ducks breed in only a very small number of rivers in the Maritime Provinces (Stewart 2015) and no molting sites have been found here (Boyne 2008); however, a third of the eastern North American population winters in Nova Scotia and New Brunswick (Boyne 2008). During winter, Harlequins use shallow, coastal rocky shorelines at exposed headlands and over subtidal ledges where suitable prey (primarily marine invertebrates including crabs, amphipods, and gastropods) is found. They may also use boulders, rocks, and shorelines as haul outs (Robertson and Goudie 1999, Gutowsky et al. 2019). They may roost on open water farther from shore at night (Robertson and Goudie 1999).

Surveys since 1994 by boat, plane, and helicopter have identified a number of locations at which Harlequin Ducks regularly congregate between December and April (Bird Studies Canada 2015; Canadian Wildlife Service unpublished data, Gutowsky et al. 2019). The highest concentrations of Harlequin Ducks occur off The Wolves Archipelago,

White Head Island, Cross Jack Ledge, and Machias Seal Island (Appendix 1). A maximum of 229 Harlequin Ducks were detected across the key site on March 6, 2013, representing approximately 5.7% of the eastern population (NAWMP 2012).

Other sea duck species found here during winter include Hooded Merganser (*Lophodytes cucullatus*), Common Merganser (*Mergus merganser*), Red-breasted Merganser (*Mergus serrator*), Surf Scoter (*Melanitta perspicillata*), Black Scoter (*Melanitta americana*), White-winged Scoter (*Melanitta deglandi*), Long-tailed Duck (*Clangula hyemalis*), Bufflehead (*Bucephala albeola*), Common Goldeneye (*Bucephala clangula*), and Barrow's Goldeneye (*Bucephala islandica*) (Bird Studies Canada 2015, eBird 2019). This site is also a major spring migration corridor for sea ducks, especially for scoters. Spring survey average estimates (1996–2004) were 175,254, 89,708, and 5896 for Black, Surf, and White-winged Scoters respectively (Bond et al. 2007).

Sensitivities: Waterfowl are sensitive to human disturbance, particularly small vessel or ship traffic, during winter. Food availability and quality could be influenced by industrial, urban, and agricultural pollution and invasive species such as European green crab (*Carcinus maenas*), which feed on traditional waterfowl foods such as mollusks, worms, and small crustaceans. Because Common Eiders aggregate in dense flocks, they can be susceptible to hunting pressure, local environmental threats, and disease outbreaks.

Potential Conflicts: Commercial fisheries, aquaculture, and rockweed harvesting might reduce habitat quality and quantity (Bird Studies Canada 2015). Sport hunting along the Atlantic Coast is estimated at 18,000 Common Eiders (2011–2014 average), which is below the estimated sustainable harvest (Canadian Wildlife Service 2017). Disturbance and bird collisions associated with small vessel and ship traffic remain a potential conflict. The impact on birds from whale-watching and seabird-watching boat operations from Grand Manan is unknown. Chemical and oil spills and water contamination from several sources, including shipping, urban, and industry are of concern. Coastal development could reduce habitat quantity and quality in near-shore areas or on shorelines where Harlequin Ducks haul out (Boyne 2008). The existing shipping route to

Saint John, New Brunswick, increases the risk of oil pollution and spills. Contaminants from the Point Lepreau Nuclear Plant in New Brunswick and other industrial sources could threaten bird survival or degrade habitat quality. Despite a ban on hunting of Harlequin Ducks in eastern Canada, some are still shot by hunters that misidentify Harlequin Ducks as other species or lack vigilance when hunting.

Status: This area is part of Bird Conservation Region 14, Atlantic Northern Forest, and Marine Biogeographic Unit 11, Scotian Shelf and Bay of Fundy (Environment Canada 2013). The site intersects four Important Bird Areas (IBAs; IBA Canada 2021): Point Lepreau/Maces Bay, The Wolves Archipelago, Quoddy Region, and Grand Manan Archipelago. It falls immediately adjacent to the Machias Seal Island, Manawagonish Island and Saint's Rest Marsh, and Beach IBAs. It also intersects four Ecologically or Biologically Significant Areas (EBSAs): Machias Seal Island, Southwest Grand Manan, The Wolves, White Island, and the Whole of Quoddy Region (Westhead et al. 2013).

The site includes both Grand Manan and Machias Seal Island Migratory Bird Sanctuaries (managed by Environment and Climate Change Canada [2021]) as well as Musquash Estuary Marine Protected Area (managed by the Department of Fisheries and Ocean [2021]).

Literature Cited

- Ballard, J. R., R. Mickley, S. E. J. Gibbs, C. Dwyer, C. Soos, N. J. Harms, H. G. Gilchrist, J. S. Hall, J. C. Franson, G. R. Milton, G. Parsons, B. Allen, J-F. Giroux, S. Lair, D. G. Mead, and J. R. Fischer. 2017. Prevalence and Distribution of Wellfleet Bay Virus Exposure in the Common Eider (*Somateria mollissima*). *Journal of Wildlife Diseases* 53:81–90.
- Bird Studies Canada. 2015. Important Bird Areas of Canada Database. Port Rowan, Ontario: Bird Studies Canada. <http://www.ibacanada.org>.
- Bond, A. L., P. W. Hicklin, and M. R. Evans. 2007. Daytime Spring Migration of Scoters (*Melanitta* spp.) in the Bay of Fundy (plus ERRATUM). *Waterbirds* 30:566–572.
- Bordage, D., N. Plante, A. Bourget, and S. Paradis. 1998. Use of ratio estimators to estimate the size of Common Eider populations in winter. *Journal of Wildlife Management* 62:185–192.
- Boyne, A. 2008. Harlequin Ducks in the Canadian Maritime Provinces. *Waterbirds* 31:50–57.
- Canadian Wildlife Service Waterfowl Committee. 2017. Population Status of Migratory Gamebirds in Canada. CWS Migratory Birds Regulatory Report Number 49.
- Department of Fisheries and Oceans. 2021. Marine Protected Areas. <https://www.dfo-mpo.gc.ca/oceans/mpa-zpm/index-eng.html>.
- eBird. 2019. eBird: An online database of bird distribution and abundance [web application]. eBird, Ithaca, New York. <http://www.ebird.org>. (Accessed March 5, 2019.)
- Environment Canada. 2013. Bird Conservation Strategy for Bird Conservation Region 14 and Marine Biogeographic Units 11 and 12 in New Brunswick: Atlantic Northern Forest, Bay of Fundy and Gulf of St. Lawrence. Canadian Wildlife Service, Environment Canada. Sackville, New Brunswick. iv + 177 pp. + appendices.
- Environment and Climate Change Canada. Migratory Bird Sanctuaries. 2021. <https://www.canada.ca/en/environment-climate-change/services/migratory-bird-sanctuaries/locations/grand-manan-island.html>.
- Goudie, R. I., G. J. Robertson, and A. Reed. 2000. Common Eider (*Somateria mollissima*), version 2.0. In A. F. Poole and F. B. Gill (eds.), *The Birds of North America*. Cornell Lab of Ornithology, Ithaca, NY. <https://doi.org/10.2173/bna.546>.
- Gutowsky, S. E., R. Ronconi, L. F. G. Gutowsky, M. Elderkin, J. Paquet, and M. L. Mallory. 2019. Winter Habitat Associations of Purple Sandpiper (*Calidris maritima*) and Harlequin Duck (*Histrionicus histrionicus*) in Atlantic Canada. *Estuarine, Coastal and Shelf Science* 222:214–225.
- IBA Canada. 2021. <https://www.ibacanada.com/>.
- Milton, G. R., P. Illsley, and F. M. MacKinnon. 2006. An Effective Survey Technique for Large Groups of Moulting Sea Ducks. In G. C. Boere, C. A. Galbraith, and D. A. Stroud (eds.), *Waterbirds Around the World*, pp. 756–757. Stationery Office, Edinburgh, UK.
- Milton, G. R., S. A. Iverson, P. A. Smith, M. D. Tomlik, G. J. Parsons, and M. L. Mallory. 2016.

- Sex-specific Survival of Adult Common Eiders in Nova Scotia, Canada. *Journal of Wildlife Management* 80:1427–1436.
- Noel, K., N. R. McLellan, S. Gilliland, K. A. Allard, B. Allen, S. Craik, A. Demagny, M. D. English, A. Diamond, J-F. Giroux, A. Hanson, H. W. Heusmann, L. E. King, C. Lepage, H. Major, D. McAuley, D. E. Meattay, G. R. Milton, J. Osenkowski, A. Roberts, G. J. Robertson, M-C. Roy, L. Savoy, K. Sullivan, and M. L. Mallory. 2021. Expert Opinion on American Common Eiders in Eastern North America: International Information Needs for Future Conservation. *Socio-Ecological Practice Research*. <https://doi.org/10.1007/s42532-021-00083-6>.
- North American Waterfowl Management Plan [NAWMP]. 2012. North American Waterfowl Management Plan: People Conserving Waterfowl and Wetlands. U.S. Fish and Wildlife Service, Arlington, VA. <https://nawmp.org/content/north-american-waterfowl-management-plan>.
- Robertson, G. J., and R. I. Goudie. 1999. Harlequin Duck (*Histrionicus histrionicus*), version 2.0. In A. F. Poole and F. B. Gill (eds.), *The Birds of North America*, Cornell Lab of Ornithology, Ithaca, NY. <https://doi.org/10.2173/bna.466>.
- Ronconi, R. A., and S. N. P. Wong. 2003. Estimates of Changes in Seabird Numbers in the Grand Manan Archipelago, New Brunswick, Canada. *Waterbirds* 26:462–472.
- Sorte, C. J. B., V. E. Davidson, M. C. Franklin, K. M. Benes, M. M. Doellman, R. J. Etter, R. E. Hannigan, J. Lubchenco, and B. A. Menge. 2017. Long Term Declines in an Intertidal Foundation Species Parallel Shifts in Community Composition. *Global Change Biology* 23:341–352. doi: 10.1111/gcb.13425.
- Stewart, R. L. M. 2015. Harlequin Duck. In R. L. M. Stewart, K. A. Bredin, A. R. Couturier, A. G. Horn, D. Lepage, S. Makepeace, P. D. Taylor, M.-A. Villard, and R. M. Whittam (eds), *Second Atlas of Breeding Birds of the Maritime Provinces*, pp. 122–123. Bird Studies Canada, Environment Canada, Natural History Society of Prince Edward Island, Nature New Brunswick, New Brunswick Department of Natural Resources, Nova Scotia Bird Society, Nova Scotia Department of Natural Resources, and Prince Edward Island Department of Agriculture and Forestry, Sackville. 528 + 28 pp. www.mba-aom.ca.
- Westhead, M., M. King, and G. Herbert. 2013. Marine Protected Area Network Planning in the Scotian Shelf Bioregion: Context and Conservation Objectives. DFO Can. Sci. Advis. Sec. Res. Doc. 2012/126. ii + 11 p.