

## Ship Speed Watch Methodology

Data for *Ship Speed Watch*\* was obtained from Global Fishing Watch's (GFW) database via Google's BigQuery platform. The GFW database contains information from AIS transmissions such as the vessel Maritime Mobile Service Identity (MMSI), location, speed, class, length, flag state, timestamp, and date. The locational coordinates for the speed restriction zones and the time periods when they were active were obtained from the U.S. National Oceanic and Atmospheric Administration (NOAA) and Fisheries and Oceans Canada (DFO)'s respective websites:

NOAA - <https://www.fisheries.noaa.gov/national/endangered-species-conservation/reducing-ship-strikes-north-atlantic-right-whales>

DFO - <https://www.dfo-mpo.gc.ca/fisheries-peches/commercial-commerciale/atl-arc/narw-bnan/2020/right-whale-baleine-noires-0429-eng.html#restricted-area>

In all active U.S. and Canadian speed restriction zones, the mandatory speed limit is 10 knots. These speed limits apply to vessels 13 metres (43 feet) or greater in Canadian zones, and 19.8-metres (65 feet) or greater in U.S. zones – which is reflected in the data displayed in *Ship Speed Watch*. The only exceptions are U.S. Dynamic Management Areas and the Canadian Cabot Strait Voluntary Area where the 10-knot speed limit is voluntary. Faulty AIS devices, user error, intentional manipulation, crowded areas, poor satellite reception, and transmission flaws are factors that contribute to noise and errors in AIS data, and sometimes those inaccuracies can be reflected in the speed and location of a vessel. Speeds greater than 40 knots were filtered out of the dataset as the majority of vessels cannot travel that fast, and many signals over 40 knots can be attributed to AIS or satellite errors.

The GFW data is then moved to the R-Shiny programming software, which displays the data on an interactive map. The Data tab includes the vessel's MMSI, name, flag state, class, length, speed, zone, timestamp, and date.

Detailed information about the locational coordinates and active time periods of the speed restriction zones can be found on the Information tab, with links to both the NOAA and DFO regulations. Additionally, the Information tab contains an overview of NOAA's North Atlantic right whale sightings map and the associated link to that map.

The EEZ boundaries on the *Ship Speed Watch* map were downloaded from MarineRegions.org (Flanders Marine Institute (2019). Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11. Available online at <https://www.marineregions.org/>. <https://doi.org/10.14284/386>):

MarineRegions - <https://www.marineregions.org/eezsearch.php>

The ShinyApp is then published onto a remote server via shinyapps.io. This makes the app available to anyone with internet access.

\**Ship Speed Watch* uses vessel information in the Global Fishing Watch database. This information is transmitted from a vessel's Automatic Identification System (AIS) device, which is collected via satellites and terrestrial receivers. Faulty AIS devices, user error, intentional manipulation, crowded areas, poor satellite reception, and transmission flaws are factors that contribute to noise and errors in AIS data, and sometimes those inaccuracies can be reflected in the speed and location of a vessel. Vessel operators can accidentally or purposefully enter false information into their ship's AIS thus concealing their identity or location. In crowded areas, such as ports, the massive number of radio transmissions can crowd the bandwidth of satellite and terrestrial receivers, leading to inaccuracies as well. For these reasons, *Ship Speed Watch* information must be relied upon solely at your own risk.