

Ship-Strike Reduction Rules: Are they enough to allow the North Atlantic Right Whale Population in the Gulf of St. Lawrence to recover?

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Abstract

Between June and October 2017, an extreme North Atlantic Right Whale (NARW) mortality event occurred in the Gulf of St. Lawrence (GSL). There are only approximately 458 NARWs remaining, and the death of twelve individuals within a five-month period is detrimental to the survival of the population. Following necropsies conducted on NARWs found in the GSL, vessel collisions and fishing entanglements were determined to be the primary causes of death. Removing the risk of fatal collisions by ensuring compliance to ship-strike reduction rules is essential. Strict prevention measures involving entanglements in fishing gear are also crucial to right whale recovery. Lastly, to address the previously mentioned issues and implement the necessary conservation strategies, greater research on NARW habitat is needed to understand how and why right whales are appearing in unprecedented numbers in the GSL. Overall, the paper will aim to support the hypothesis that in order to mitigate risks of human-caused mortality and allow the NARW population to recover, there must be stricter fishing regulations and more habitat research in addition to ship-strike reduction rules in the GSL.

1. Introduction

The North Atlantic Right Whale (NARW) is a migratory species that resides in coastal waters. NARWs are slow-moving and often feed at the ocean surface, making the species particularly vulnerable to vessel collisions. In the late 1800s, the NARW population was in danger of extinction due to commercial whaling. Although the population began to increase towards 500 individuals after the League of Nations banned hunting of NARWs in 1935, the species is still listed as the most endangered large cetacean under the Species at Risk Act (Baumgartner et al, 2017). The recent NAWR mortality event in the Gulf of St. Lawrence (GSL) wiped out 2% of the total population, posing serious threats to the slowly recovering species (Daoust et al, 2017). Since early June 2017, twelve NARWs were found dead in the GSL and five live-entanglements were reported. Necropsies were conducted on six of the NARW carcasses. The results indicated negative impacts of human activity on the whales, as four whales died due to blunt-force trauma from ship-strikes and one whale died due to long-term entanglement (Daoust et al, 2017). A complete review of fishing gear, right whale habitat shifts, and shipping lanes is critical to ensure a chance of recovery.

Surveying efforts in the GSL have been inconsistent in recent years, and there have not been frequent NARW sightings in the region for the past four decades. It is unknown why the number of right whales seen in the GSL have more than doubled this year. It may be due to increased surveillance efforts conducted this year, or a result of a NARW habitat shift (Daoust et al, 2017). Nonetheless, there is a major knowledge gap on right whale distribution in the GSL. In addition, there is a lack of knowledge on the specific types of ships and fishing gear that pose the greatest threats to the whales. These knowledge gaps require attention because the NARW is a species that plays a critical ecological role in helping to maintain a healthy ocean environment by offsetting carbon and helping to maintain a stable food chain. In addition, NARWs play a

significant role in helping sustain economies that rely on whale-watching to bring in money. Lastly, it is a moral imperative to safeguard NARWs and ensure future generations have the opportunity to observe this iconic animal. Overall, the future of the NARW is in the hands of the human species, and their recovery is possible.

To address the right whale mortality event in the GSL, this paper will support the hypothesis that GSL ship-strike reduction rules alone are not enough to allow the NARW population to recover. The paper will describe the importance of further studies on right whale habitat and fishing entanglements in the GSL in addition to strict ship regulations. A comprehensive recovery plan will help ensure complete protection. Through examinations of a variety of studies, the paper will demonstrate the urgency of putting effective conservation strategies into place. This paper will investigate and connect three categories of principal threats: 1. ship-strike reduction rules, 2. lack of habitat research, and 3. fishing regulations.

2. Ship-strike reduction rules

Maritime traffic in the GSL poses serious risks to NARW protection. The GSL is a widely used marine corridor with over six thousand commercial vessels passing through the main entrance and exit point, known as the Cabot Strait, annually (Daoust et al, 2017). Although the marine transportation industry is an important economic contributor to coastal communities along the GSL, a study conducted on NARW foraging ecology determined NARWs spend, on average, 72% of their time in the upper ten meters of the ocean (Baumgartner et al, 2017). At this depth, the whales are within reach of a majority of large commercial vessels travelling through the GSL. In addition, a study conducted by Dalhousie University revealed a clear link between vessel speed increase and an increase in the probability of death of a vessel-struck whale (Vanderlaan and Taggart, 2007). The study revealed the following relationship: 80% rate of lethal injury at 15 knots, 50% rate of lethal injury at 11.8 knots and 20% rate of lethal injury at 8.6 knots. However, Taggart says that speed reductions will only lower the likelihood of death by 50% (Vanderlaan and Taggart, 2007). Taggart argues that re-routing ships is more effective than reduction rules. There is a 62% reduction in overall vessel-strike risk when shipping lanes are moved out of areas where NARWs aggregate, compared to a 52% reduction in overall risk when speed reduction rules are implemented (Vanderlaan and Taggart, 2017). This counter-argument is important as it reveals that ship-strike reduction rules are vital to implement while vessel re-routing options are thoroughly examined, and that reductions need to combine with vessel re-routing to ensure complete protection. It is evident that although ship speed restrictions alone are insufficient to allow the NARW population to rebound, they are required in the GSL habitat to help promote right whale recovery.



Figure 1: A congregation of NARWs sighted from July 3 to 31, 2017, in the GSL. Shipping lanes are shown in close proximity.

Ships moving through critical NARW habitat create deadly ocean highways. For example, the NARW frequents the Bay of Fundy, which is in the Grand Manan Basin. Due to vessel re-routing and vessel speed reductions in this area, there has been increased NARW sightings in recent years (CWI, 2017). By shifting shipping lanes in the Bay of Fundy four nautical miles to the east, the risk of collision involving a vessel and a right whale was reduced by 90% in overlapping travel areas (CWI, 2017). A precedent setting measurement has been placed in the Bay of Fundy, and now minimizing the probability of vessel-strikes in the GSL is a necessary step in safeguarding the NARW population. In August 2017, Transport Canada implemented a mandatory speed reduction of, at most, ten knots in the western GSL to vessels 20 meters or greater. The marine traffic in the GSL is monitored to ensure compliance, but there have been some cases of vessels not following the speed limit. Non-compliance can mean an unnecessary and avoidable death of an extremely endangered NARW (Transport Canada, 2017). As seen in Figure 1, strict enforcement of regulations is vital in the GSL as there is an abundance of NARWs in an area of the southern Gulf of St. Lawrence that ships come close to, or travel through, each year (Jones, 2017). To preserve NARWs throughout the GSL, devoted habitat research is essential to learn more about areas of NARW congregation and execute mitigation measures to prevent not only ship-strikes, but fishing entanglements as well. Overall, the number

of whales seen in the GSL calls for ship-strike reductions rules to be implemented in addition to the two other conservation strategies that will be discussed further in this paper.

3. Habitat Research

There is a connection between habitat research and administering effective vessel speed reductions in the GSL (Daoust et al, 2017). Additional analyses of the abundance of NARWs in the GSL are important to make sense of the reasons many deaths occurred due to vessel collisions. By studying NARW habitat and exploring areas of potential aggregation, information can be gained on a possible right whale habitat shift or a change in GSL vessel dispersion. With this knowledge, it will be easier to predict where and when NARW will appear, and move shipping lanes away from critical areas in the GSL and implement specific speed restrictions. Additionally, drone surveillance can be a useful tool to find out when NARWs arrive in the GSL and where areas of congregation are. Overall, as a result of the lack of knowledge on critical NARW habitat in the GSL, it is challenging to put effective and timely ship-strike reduction rules in place.

Habitat research is also needed to provide adequate protection to NARWs from fishing entanglements. It is often difficult to determine the origin of fishing gear, and it is important to be aware of the areas in the GSL where the whales are most vulnerable to entanglement. In 2017, at least seven NARWs have become entangled in the GSL, and two cases ended in death (Daoust et al, 2017). To regulate the timing and location of fishing seasons, an increase of aerial and on-the-water surveying efforts are needed to determine the species movements and habits in the GSL. With an increase of real-time data, appropriate modifications can be made to fishing gear and fishing practices in core NARW habitat in the GSL. It is evident through the high number of NARW entanglements that ship-strike reduction rules alone are not enough to allow the species to recover, habitat research is essential as well to protect NARWs from the prevalent threat of gear entanglement.

4. Fishing Entanglements

Extensive commercial fishing in the GSL leads to fatal NARW entanglements. Since the southern GSL contains a multitude of shellfish and groundfish, it accounts for 15% of the total catch in Canadian fisheries (Fisheries and Oceans, 2005). However, the western side of the southern GSL was also the area of highest NARW concentration in 2017. The fishing industry brings economic prosperity to coastal communities, but without safe management, these activities adversely impact NARWs (Daoust et al, 2017). For example, a study of NARWs revealed a high occurrence of near seafloor dives, suggesting that they are active in the entire water-column (Baumgartner et al, 2017). These findings indicate that NARWs are not only susceptible to ship threats on the surface, but other threats such as fixed fishing gear practices deeper in the ocean. Specifically, NARWs are particularly vulnerable to snow crab fisheries that scale a majority of the GSL (White, 2017). The snow crab fishery quota has increased by 101% since 2016 (DFO, 2017). Examinations of the two NARWs that died due to entanglements as well as observations of four out of the five live-entangled NARWs indicate involvement of snow

crab fishing gear (Daoust et al, 2017). A complete understanding of factors that contributed to the unprecedented number of deaths due to entanglement in the GSL is vital to approach the issue boldly and accurately. The severity of this human-induced threat must be addressed, and research on safer types of fishing gear along with mitigation measures are necessary in addition to ship-strike reduction rules.

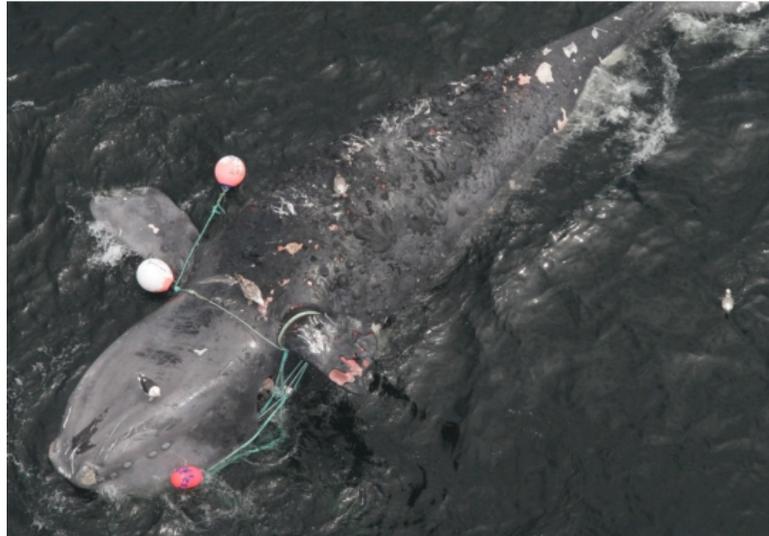


Figure 2: Carcass of Catalog #3603 on June 22, 2017. The gear attached to the whale is from the commercial snow crab fishery.

A recent study by NARW scientists provides evidence of the extreme suffering that occurs as a result of entanglement in fishing gear. The feces of 125 NARWs were collected over 15 years. Following examination, it was revealed that very high levels of a stress hormone, cortisol, were present in the individuals that had prolonged death due to entanglements in fishing gear. The hormone levels in the feces examined from the NARWs that died quickly due to a vessel collision were significantly lower (PHYS, 2017). As seen in Figure 2, an entangled NARW carcass was found in the GSL at the same time a snow crab fishery was active in Area 12 of the Southern GSL. The issue of fishing entanglements is an animal-welfare issue. Overall, the findings from NARW observations and necropsies in the GSL reveal evidence of a high incidence of fishing entanglements, indicating the urgency of the situation in the region.

5. Conclusion

The human threats present in the GSL have led to an unprecedented rate of NARW deaths in 2017. Effective ship-strike reduction rules are critical to ensure NARW survival, but additional measures must be taken to allow the NARW population to recover. Habitat research is also important to determine NARW movement in the GSL, and to ensure specific and beneficial fishing and shipping regulations are put into place. The signs of entanglement and trauma evident in whale carcasses coincide with both excessive fishing activity and shipping traffic in the GSL. NARWs are highly susceptible to ship-strikes, and reduction rules are a vital component to providing a path to recovery. However, NARWs are active in the entire water-column and require protection at various depths. Fishing entanglements that occur below the surface present serious dangers to the species and this issue must also be immediately addressed. Overall, habitat research is needed to make adjustments to fishing areas, shipping lanes, and

shipping restrictions accordingly. It is imperative that whale scientists, fishing and marine industries, and the government come together to put forth solutions and regulations to prevent another mass mortality event in the future.

In terms of future research, innovations in safer fishing gear must be a major focal point of study. Fishing entanglements appear to be an escalating issue, and in the GSL, it is snow crab gear that appears to be threatening the recovery of NARWs. With new technologies, fishing gear can be constructed in a way that is less harmful to the whales. Using rope-less fishing gear in NARW waters or using color-specific rope for easy traceability can help reduce lethal NARW entanglements. In addition, increased drone and on-the-water surveillance is needed to research NARW patterns in the gulf. Along with increased surveying efforts, a real-time reporting system of NARW sightings in the GSL is necessary to provide alerts for vessels. An advanced ocean instrument, underwater gliders, can also be used to search the ocean to listen for NARWs and help determine where they are. Overall, by using the above strategies in future research, it is possible to protect the NARWs in the GSL that face grave peril.

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