# The impact and mitigation strategies of Canada's West Coast fisheries on Black-footed albatross

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## Foreword

This portfolio was created to fulfill the requirements of the degree of Master in Environmental Studies at York University. I undertook two literature reviews and collected data at local supermarkets in the Greater Toronto area to gain an understanding of how Black-footed albatross (*Phoebastria nigripes*) were being impacted in Canadian fisheries. This information provided me with unique insight into my topic as it brought the issue to a local scale. I also discuss seabird bycatch mitigation methods in longline fisheries, with a focus on the most effective methods that reduce Black-footed albatross bycatch in longline fisheries. This portfolio highlights the need for legally binding seabird bycatch mitigation methods in fisheries in Canada and analyses why these methods are voluntary.


## Abstract

Black-footed albatross (*Phoebastria nigripes*) experience high mortality rates due to conflict with fisheries both in Canada and globally. Their behaviour, biology, life history traits and dietary needs put them at an increased risk for becoming bycatch in longline fisheries. Despite scientific evidence that demonstrates the success of seabird bycatch mitigation methods in global fisheries, Canada does not have legally binding laws that demand these methods be implemented in fisheries. Vulnerable seabird populations are declining, altering the well-being of marine ecosystems in Canada and globally. Additional policies and laws must be implemented to help reduce Black-footed albatross bycatch in longline fisheries.

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I would like to thank Jesse for his patience and support. An amazing father and partner, this work exists because of him. Lydia River, how did I get so lucky? Your curiosity for nature warms my heart. I love you. Laura Bay, Shannon Bernhardt, and David Bay, thank you for the walks, talks and coffee.

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## 1.0 Introduction

### Seabird bycatch in fisheries

Increased human fishing intensity combined with the decline in seabird prey abundance has led to elevated interactions between fishing vessels and seabirds seeking food (Burger & Schreiber, 2001; Gilman et al., 2016). Attracted to the bait and offal that surround fishing vessels (Eich et al., 2016, p. 14), seabirds attempt to scavenge for food (COSEWIC, 2006) and accidentally become hooked or entangled in fishing gear (Fitzgerald, 2013, p. 151). As a result, "[h]undreds of thousands of seabirds are killed each year as bycatch in longline fisheries" (Brothers et al., 2010).

Seabird populations are declining due to fisheries-related mortalities (Lewison & Crowder, 2003). It is estimated that in pelagic longline fisheries alone there are 160, 000 to 320, 000 seabird mortalities annually (Anderson et al., 2011). The International Union for Conservation of Nature (IUCN) has identified 100 species of seabirds that are negatively impacted by fisheries operations (Dias et al., 2019). High rates of bycatch incur in global fisheries (Gilman, 2001; Gladics et al., 2017; Granadeiro et al., 2011; Klaer, 2002) perpetuating the decline of seabird populations. Although there are mitigation methods that can be implemented in fisheries that are known to successfully reduce seabird bycatch (Eich et al., 2016; Løkkeborg, 2011; Melvin et al., 1999), they are rarely monitored or enforced after implementation (Fitzgerald, 2013, p. 15). Seabird bycatch continues to persist in fisheries in Canada (Smith & Morgan, 2005) and globally (ACAP, 2017).

### Albatross

Albatross species are one of the most common seabirds affected by fisheries (Anderson et al., 2011, p. 91; COSEWIC, 2006, p. vii). All of the world's species of albatross are ranked as

vulnerable, threatened or endangered (IUCN) as a combination of human induced mortality and their k-selected life history strategies (Furness, 2003; Naughton et al., 2007; COSEWIC, 2007). Although many anthropogenic activities endanger the well-being of seabird populations (Arata et al., 2009; Burger & Schreiber, 2001), pelagic long-line fisheries pose the biggest risk to albatross (Brothers et al., 2010; COSEWIC, 2006; Environment and Climate Change Canada, 2017).

Well known as ship followers (Granadeiro et al., 2011), albatross forage around longline fishing vessels (COSEWIC, 2006; Jiménez et al., 2012; Anderson et al., 2011), using shallow dives to capture bait on hooks (e.g., squid; Kazama et al., 2019). These behaviours place them at risk of becoming hooked and drowning (Jiménez et al., 2012; Robertson et al., 2003).

**Black-footed albatross: species at risk**

Although longline fisheries are "[s]pectacularly nonselective" (Fitzgerald, 2013, p. 151), studies have shown that Black-footed albatross are exceptionally vulnerable to longline fisheries (Arata et al., 2009; Brothers et al., 2010; Eich et al., 2016; Fitzgerald, 2013; Gilman et al., 2014); and their behaviour is altered by the presence of commercial fisheries (Government of Canada, 2015, p. 5; Jiménez et al., 2012). Black-footed albatross are more likely to come into conflict with fisheries due to their foraging behaviours (ACAP, 2017; Løkkeborg, 2011) and life history traits (Smith & Morgan, 2005). Like most seabirds, Black-footed albatross are long-lived (Environment and Climate Change Canada, 2017), not breeding until 8.6 years of age on average (Awkerman et al., 2020), each monogamous pair laying one egg per year. Adult survivorship is high (81-99.4%; Awkerman et al., 2020).

While Canada has no breeding albatross, the Black-footed albatross frequents Pacific Coast waters (Environment and Climate Change Canada, 2017). The Committee on the Status of Endangered Wildlife in Canada listed the Black-footed albatross population in Canada as a

species of special concern (COSEWIC, 2006). One of the drivers of this vulnerability are fisheries operations (Environment and Climate Change Canada, 2017; Gilman et al., 2016; Melvin et al., 2013). Other potential factors relevant to when they are in Canadian waters are contaminants from chemical pollution (Naughton et al., 2007), plastic ingestion (Frond et al., 2019), exposure to oil pollution (Naughton et al., 2007) and climate change (Burger & Schreiber, 2001; Hutchings et al., 2012).

Although all aforementioned threats are problematic and work simultaneously to exacerbate Black-footed albatross population decline, fisheries pose the biggest threat to Black-footed albatross (Brothers et al., 2010; Bull, 2007; COSEWIC, 2006; Environment and Climate Change Canada, 2017; Fitzgerald, 2013; Furness, 2003; Gilman et al., 2016; Melvin et al., 2013). Black-footed albatross populations are declining throughout their range, primarily due to high mortality in fisheries (Louise et al., 2017). The total annual fisheries related mortality for Black-footed albatross is unknown (Véran et al., 2007), but in Canada average bycatch is 117 birds per year (range 0 – 248; Ellis et al., 2013).

The current global population of the Black-footed albatross "is estimated between 278,000 and 300,000 individuals" (Government of Canada, 2015), with an estimated 71,592 breeding pairs (ACAP, 2014). Due to mortality rates in global fisheries, the Black-footed albatross population is declining (Birdlife International, 2000, as cited in Lewison & Crowder, 2003; Gilman et al., 2016) and the International Union for Conservation of Nature (IUCN) has deemed the Black-footed albatross "near threatened" (IUCN, 2013). Black-footed albatross are "the most common seabird species reported as bycatch" in longline fisheries in British Columbia (Smith & Morgan, 2005, p. 28). Annual seabird bycatch rates from British Columbia's rockfish and halibut fisheries were reported between 95 to 178 individuals from 1995 to 2002 (Smith and

Morgan, 2005, p. 17; see also Ellis et al., 2013), the majority of which were Black-footed albatross. Although it is difficult to know exactly how many Black-footed albatross are captured in fisheries on a global scale, studies have shown that Black-footed albatross are commonly found as bycatch in longline fisheries in Canada (Smith & Morgan, 2005; COSEWIC, 2006; Ellis et al., 2013).

During the nesting season on the Northwestern Hawaiian Islands (Naughton & Zimmerman, 2007) Black-footed albatross will forage as far as "Canada's Pacific EEZ" (Environment and Climate Change Canada, 2017), where overlap with longline fisheries often occur (Gilman et al., 2016). Environment Canada (2006) states "[i]n Canada, the Black-footed [a]lbatross is the seabird species most at risk of bycatch due to a high degree of spatial and temporal overlap with longline fishing effort[s]" (Smith & Morgan, 2005; Wiese & Smith, 2003, as cited in COSEWIC, 2006) and Gilman et al (2005) reports "over 3000 pelagic longline vessels operating in the North Pacific" (p. 37) which is where Black-footed albatross often forage for food (Environment and Climate Change Canada, 2017).

In this paper, I will provide a brief overview of how seabirds are killed in longline fisheries, describe the mitigation measures on vessels known to reduce seabird bycatch and describe certification processes for sustainable fisheries with a focus on if seabird bycatch is incorporated into certifications. While other fisheries kill seabirds (Boggs, 2001; Gilman et al., 2016; Gladics et al., 2017; Melvin et al., 2014), I focus specifically on pelagic longline fisheries operations in this paper. I aim to assess the following: 1) What is the current status of the implementation of seabird bycatch mitigation measures for Canadian West Coast longline fisheries? 2) How many Canadian West Coast longline fish species make it to market in the Greater Toronto Area? 3) What are the legal obligations or options to enforce on vessel

mitigation in Canada? 4) Are there other incentives that can be used to encourage fishers to voluntarily implement seabird bycatch mitigation methods in fisheries?

## 2.0 Methods

I undertook a literature review that focused on seabird bycatch in longline fisheries with a focus on Black-footed albatross bycatch in Canada. I explored Canada's laws pertaining to fisheries operations and looked at how eco-labeling certification programs push longline fisheries to be more sustainable (ex. reduce seabird bycatch and impacts on marine ecosystems).

I wanted to understand if British Columbia's longline fisheries products were being sold in the Greater Toronto Area (GTA) and if labeling was being used that could help determine if Black-footed albatross are being killed in said fisheries. To begin, I collected data in supermarkets in the GTA to understand how accessible the fish were that were directly impacting Black-footed albatross. I selected seven large supermarket chains that were established throughout Canada and went into their seafood departments to gather information regarding the name of the fish species being sold, the geographical location it came from, the sustainability labels it had (if any), and if it was farmed or wild-caught. I compiled this information into a table for each supermarket, focusing on which species was labeled with an eco-label, as well as which species could have come from a fishery that impacts Black-footed albatross.

To gain more insight, I gathered additional data from the Government of Canada's department of Fisheries and Oceans website to understand how seabird bycatch is being handled from a policy perspective in Canada, as well as information on how global ENGOs are participating in the movement toward sustainable fisheries. Literature that pertained to solutions for reducing seabird bycatch in global fisheries argued the importance of passing laws and

policies that demand the implementation of mitigation methods in every fishery globally through "international standards" (Gilman et al., 2005) and collaboration across geographical boundaries (Gilman et al., 2005; WWF, 2015, p. 2).

## 3.0 Longline fisheries and seabird bycatch

Responsible for an estimated 320,000 seabird deaths annually (Anderson et al., 2011, p. 91), pelagic longline fisheries have a large impact on non-target species (Løkkeborg, 2011; Žydelis et al., 2013). Fishing lines are deployed behind fishing vessels equipped with "baited hooks . . . at intervals to attract the target species" (Marine Stewardship Council, 2020). Offal is bait or waste discharged overboard that has either become unattached from the fishing gear or has been thrown into the ocean by fishermen to attract target species (Lokkeborg, 2017). As the fishing vessel moves forward, the weighted fishing line is pulled under the water, and scavenging seabirds that tried to take the bait become caught on fishing hooks and eventually drown (Fitzgerald, 2013, p. 151; Robertson et al., 2003).

### 3.1 Successful mitigation methods used in longline fisheries

Studies have been conducted in global longline fisheries using different mitigation methods to help reduce seabird bycatch (Gilman et al., 2003; Gladics et al., 2017). Implemented mitigation methods include bird-scaring lines, camouflaging bait with dyes, underwater setting chutes, side-setting and night-setting.

#### *3.1.1 Bird-scaring lines*

Bird-scaring lines are "streamers that [are] towed from a high point near the stern as baited hooks are deployed" (BirdLife International, 2014). The scaring line and hanging streamers are released over the fishing line, designed to scare seabirds "away from baited hooks"

(BirdLife International, 2014), thereby reducing seabird bycatch.

Bird-scaring lines were tested and reported successful in the U.S. West Coast demersal longline sablefish (*Anoplopoma fimbria*) fishery (Gladics et al., 2017), the groundfish and halibut (*Hippoglossus*) fisheries in Alaska (Eich et al., 2016), the swordfish (*Xiphias gladius*) and tuna (*Thunnus*) fisheries in Hawaii (Boggs, 2001; Gilman et al., 2016) and the Japanese longline tuna fisheries in the South African Exclusive Economic Zone (Melvin et al., 2014).

### *3.1.2 Camouflaged bait*

Camouflaged bait is dyed blue and is used in fisheries to prevent seabirds from being able to distinguish the difference between the ocean and the bait (Cocking et al., 2008; Gilman et al., 2007). Camouflaged bait has helped reduce seabird bycatch in the Hawaiian swordfish longline fishery (Boggs, 2001) and Hawaiian longline tuna fishery (Gilman et al., 2008).

### *3.1.3 Adding additional weights to longline fishing gear*

Seabird bycatch most commonly occurs in fisheries during line setting (Fitzgerald, 2013, p. 153; Gladics et al., 2017, p. 89; Jiménez et al., 2012, p. 437 & Yokota et al., 2011, p. 479) due to the slow sink rates of fishing lines (Jiménez et al., 2012). While all longlines are weighted to sink the line, with few weights once deployed, the fishing line remains on the surface of the water where seabirds attempt to scavenge the bait (Jiménez et al., 2012).

To reduce seabird bycatch during line setting, additional weights are added to fishing lines at intervals (Roberston et al., 2003) that allow the fishing line to sink more quickly beneath the ocean's surface and out of reach of scavenging and diving seabirds (Løkkeborg, 2011). Studies have shown that adding weight to pelagic longlines cause the baited hooks to sink "two to three times faster" than their unweighted counterpart (Roberston et al., 2003).

Weighted fishing lines have been successfully implemented and shown to reduce seabird bycatch in an Antarctic toothfish (*Dissostichus mawsoni*) fishery (Robertson et al., 2003). Weighted fishing lines were also successfully implemented in the U.S. West Coast sablefish fishery, significantly reducing Black-footed albatross attacks on fishing lines (Gladics et al., 2017). Studies show that Black-footed albatross attacked floating baited hooks 2.7 times per every 1000 hooks, versus baited hooks that had additional weights added to them with 0.20 attacks per every 1000 hooks (Gladics et al., 2017, p. 91).

#### *3.1.4 Underwater chutes*

Another approach is to set the line using an underwater chute (Løkkeborg, 1998). The bait and weighted line are deployed underwater rather than at the surface, reducing seabird access to the baited hooks. This method is recognized as a viable option for reducing seabird bycatch in various fisheries (Løkkeborg, 1998) and have been known to reduce bycatch up to 95% in the Hawaiian pelagic longline tuna fishery (Gilman et al., 2003, p. 10).

#### *3.1.5 Side-setting*

Side-setting occurs when fishing lines are deployed to the side of the fishing vessel instead of the "traditional stern setting" (Løkkeborg, 2011, p. 288). Seabirds are "unable or unwilling" to attempt to get the baited hooks that sit close to the side of the fishing vessel (Gilman et al., 2007). As the vessel moves forward, the baited hooks sink out of reach of seabirds (Gilman et al., 2007). Side-setting used with a combination of other mitigation methods have been shown to be effective in the Hawaii longline tuna fishery (Gilman et al., 2008).

#### *3.1.6 Night-setting*

Fisheries use night-setting as a mitigation method for reducing seabird bycatch. The majority of seabirds feed through the day (BirdLife International & ACAP, 2019), so deploying

fishing lines after nautical dusk (BirdLife International & ACAP, 2019) is an effective way of avoiding vulnerable albatross populations. In a document published by BirdLife International and ACAP (2019) they discuss the importance of timing for night-setting; the window to set and haul fishing lines is very limited in the summer depending on where the fishery is located. BirdLife International and ACAP (2019) suggest that using night-setting with a combination of bird-scaring lines and integrated weights is most effective.

Melvin et al. (2013) measured the difference in seabird bycatch on fishing lines set during the day vs the night and found "seabird mortality rate was 4.6 times higher in the line segments set during daylight hours (2.00 birds/1000 hooks) than those set at night (0.439 birds/1000 hooks)" (Melvin et al., 2013, p. 77; see also Baker & Wise, 2005). Used in conjunction with other mitigation methods like bird-scaring lines or weighted longlines (Løkkeborg, 2011), night-setting can be highly effective at minimizing seabird mortalities.

To conclude mitigation measures, there are many techniques that can be used to reduce seabird bycatch, but combining measures is likely the best approach (see Boggs, 2001; Cocking et al., 2008). For example, Boggs (2001) showed that streamers, camouflage and increased weights used in a Hawaiian swordfish fishery, reducing Black-footed albatross bycatch by roughly 90% (Boggs, 2001). But differing seabird behaviours, ecosystems, weather systems and ocean currents inevitably impact the success of mitigation techniques and dictate how fisheries impact seabird populations. Although there have been many trials to test the success of bycatch mitigation strategies in fisheries, there is not a single strategy that can be applied to fisheries on a global scale (Bull, 2007, p. 31).

### 3.2 Other options for reducing seabird bycatch in fisheries

Current laws and regulations in Canada do not enforce the use of seabird bycatch mitigation methods. As a result, fisheries incorporate seabird bycatch mitigation methods on a voluntary basis (Fisheries and Oceans Canada, 2007, p. 14). Certification programs like the Marine Stewardship Council (MSC) include bycatch monitoring in their certification criteria. MSC states that although bycatch is inevitable in fisheries operations, scientists will look at bycatch data to determine if a fishery is environmentally sustainable (Marine Stewardship Council, 2020c). Through the use of mitigation methods, MSC determines if the fishery can be certified based on the level of bycatch being caught. MSC notes that acceptable levels of bycatch will vary based on the fishery location and the species of bycatch (Marine Stewardship Council, 2020c).

MSC also offers research grants to fisheries that are striving toward environmental sustainability through their Ocean Stewardship Fund. For example, the South African Hake Trawl Fleet was awarded $59,486.76 USD through MSC's Ocean Stewardship Fund to research how effective seabird bycatch mitigation methods are onboard the fishing vessel (Marine Stewardship Council, 2018). MSC partnered with BirdLife South Africa to carry out the research, and the fishing vessel received "bird barriers, new [bird-scaring lines], structural alterations, changes to offal management and the installation of electronic monitoring devices to monitor bird bycatch" (Marine Stewardship Council, 2018).

Other forms of incentives that might encourage fishers to implement seabird bycatch mitigation methods and strive to become a certified sustainable fishery could be the decrease in the amount of bait lost (Løkkeborg, 1998) to scavenging seabirds. By implementing mitigation methods such as bird-scaring lines (BirdLife International, 2014), adding additional weights to baited hooks (Løkkeborg, 2011) or side-setting, bait is less accessible to seabirds (Gilman et al.,

2007). A reduction in the loss of fishing bait might yield a higher number of target-species and reduce seabird bycatch.

Although various acts and management plans in Canada help to protect seabirds, laws that pertain specifically to the implementation of seabird bycatch mitigation methods in fisheries do not exist in Canada. It is important that certification programs like the MSC continue to offer incentives and programs to fisheries so that fishers will voluntarily implement seabird bycatch mitigation methods onboard fishing vessels.

## 4.0 Enforcement challenges and other management options

Although there are many successful seabird bycatch mitigation methods used in fisheries operations in the U.S.A. (Gladics et al., 2017; Melvin et al., 1999), Alaska (Eich et al., 2016) and in Canada (Løkkeborg, 2011), mitigation methods are not legally binding and are rarely monitored or enforced after implementation (Fitzgerald, 2013). Without strict enforcement and monitoring, fisheries will continue to operate without mitigation. Fitzgerald (2013 p. 151) argues that a combination of "government legislation, regulation, and enforcement in conjunction with incentives for the fishing industry" is needed to reduce seabird bycatch.

Laws and policies that demand the implementation of seabird bycatch mitigation methods, alongside onboard and dock-side monitoring and surveillance, would help reduce seabird bycatch. Market-oriented pressures through sustainability labeling campaigns (Travaille et al., 2019) would also influence fisheries to implement seabird bycatch mitigation methods. I will address each of these in this section.

### 4.1 Canada policy tools

Fisheries and Oceans Canada manages fisheries operations based on conservation and sustainability goals while ensuring that there is economic growth (Fisheries and Oceans Canada, 2016), but Environment and Climate Change Canada are responsible for the protection of migratory birds (Government of Canada, 2021).

In 2016 Canada's Commissioner of the Environment and Sustainable Development guided Fisheries and Oceans Canada to implement steps toward enforcing laws within fisheries to help protect the natural environment and preserve fish stocks. The *Sustainable Fisheries Framework Work Plan* set forth tools and "reference points" (Fisheries and Oceans Canada, 2020) for being able to measure if fish stocks are healthy, and what to do if they reach critical levels (Fisheries and Oceans Canada, 2020). The framework ensures that fisheries in Canada are implementing practices that "support conservation and sustainable use of resources" (Government of Canada, 2020).

Through the application of the *Sustainable Fisheries Framework*, "Integrated Fisheries Management Plans" (Fisheries and Oceans Canada, 2009) are created that pertain to an individual fishery. Fisheries and Oceans Canada creates management plans based on what is achievable and applicable to a fishery while taking steps to ensure abundant and healthy fish stocks, the protection of valuable marine ecosystems and biodiversity, and ensuring productive fisheries (Fisheries and Oceans Canada, 2020). Management plans address environmental issues within fisheries operations and serve to ensure that there is continued economic growth alongside the protection of fish stocks and fish habitat.

Both fish stock and bycatch data are collected through "observer programs" (Fisheries and Oceans Canada, 2016) and the integrated management plans that are implemented in an individual fishery. Observer programs include dockside monitoring programs or onboard sea

observers. In a report titled “Sustaining Canada’s Major Fish Stocks” the Government of Canada (2016) states:

In several regions, departmental officials did not have timely access to third-party data on bycatch and discarded fish. This meant the Department did not have a complete record of total catch for the year, which compromised its ability to make timely fisheries management decisions.

*Sustainable Fisheries Framework* also states that management plans were “up-to-date” in 110 of the Canada’s 154 “major fish stocks” (Fisheries and Oceans Canada, 2016); 44 fisheries had missing or expired plans (Fisheries and Oceans Canada, 2016). This suggests sufficient planning is needed to ensure that sea observers provide the department with data in a timely manner (Fisheries and Oceans Canada, 2016). Without bycatch data, fisheries management plans cannot accurately reflect the necessary mitigation methods need to help reduce negative impacts on marine ecosystems.

### *4.1.1 Fisheries observer programs*

In 2019 Canada set forth the *Fishery Monitoring Policy* to help reduce the degradation of marine ecosystems and decrease bycatch rates. Each wild capture fishery is monitored individually through methods that rely on the fishers to report the activities occurring on the fishing vessel, or outside monitoring which includes surveillance of activities on the fishing vessel, dockside monitoring, and fishery observers (Fisheries and Oceans Canada, 2019a).

Fishery observers collect data onboard fishing vessels and report if fisheries are complying with laws and regulations (Porter, 2010). Fishery observers relay information to governing bodies regarding catch composition (Ewell et al., 2020), bycatch data (National Oceanic and Atmospheric Administration, 2021), and illegal activities onboard fishing vessels

that indicate if bycatch has been unreported or discarded (Porter, 2010), or if any fish have been illegally kept that exceed quotas and do not match the legal catch composition (Porter, 2010). Data collected through a fishery observer can be used to understand how fisheries impact marine ecosystems and "protected species" (National Oceanic and Atmospheric Administration, 2021) or provide information for "population assessments of fish stocks" and other marine species (National Oceanic and Atmospheric Administration, 2021). Data obtained through an observer can also be used to understand how effective bycatch mitigation methods are in an individual fishery (National Oceanic and Atmospheric Administration, 2021). To understand which seabird bycatch mitigation methods would be most beneficial for individual fisheries, fishery observer certification programs should include extensive bycatch-identification training (Smith & Morgan, 2005) so that species-specific information can help aid decision-making when deciding which methods to implement.

#### *4.1.2 Legislation and regulations*

Currently, Canada's laws and policies do not demand that seabird bycatch mitigation methods be implemented in fisheries in Canada, leaving Black-footed albatross populations at risk of becoming bycatch in pelagic longline fisheries. But the *Migratory Bird Convention Act 1994*, created to protect and conserve migratory bird species and their nests from human activity (Government of Canada, 2021; Table 1), provides legal protection. Some protection is also provided through the *Species at Risk Act* (2002) (Environment and Climate Change Canada, 2017; Table 1). While the IUCN (2013) reported that there was no action recovery plans for the species, in 2017, the Government of Canada has proposed conservation measures specific to Black-footed albatross, identifying the following management objective:

To help to increase global population numbers and maintain the population throughout its

documented distribution in Canadian waters, by reducing at-sea mortality and otherwise augmenting international conservation efforts. (Environment and Climate Change Canada, 2017, p. 8)

The *Policy on Managing Bycatch (*Fisheries and Oceans Canada, 2019*)*, which is a part of the *Sustainable Fisheries Framework*, addresses accidental bycatch in Canadian fisheries. The policy outlines two main objectives:

1. to ensure that Canadian fisheries are managed in a manner that supports the sustainable harvesting of aquatic species and that minimizes the risk of fisheries causing serious or irreversible harm to bycatch species; and
2. to account for total catch, including retained and non-retained bycatch. (p. 5)

This policy is to be implemented through management plans that pertain to individual fisheries and work in conjunction with other management plans like the "National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries" (Fisheries and Oceans Canada, 2007), which addresses "Canada's integrated fisheries management framework" (p. 1) and explains the importance of mitigation methods in longline fisheries to help reduce seabird bycatch. The document states that mitigation measures will be taken "in all Canadian longline fisheries" (Fisheries and Oceans Canada, 2007, p. 14), and that various programs will be available to fishers to explain voluntary measures that can be taken in fisheries to help reduce seabird bycatch. Suggestions include bird-scaring lines, and other methods that help reduce the length of time bait sits at the surface of the water (Fisheries and Oceans Canada, 2007, p. 14).

#### *4.1.3 Fishery Monitoring Policy*

The *Fishery Monitoring Policy* was created to monitor wild capture fisheries. Each wild capture fishery is monitored individually. Monitoring can be implemented through methods that

rely on the fishers to report the activities occurring on the fishing vessel, or outside monitoring which includes surveillance of activities on the fishing vessel, onboard observers, and dockside monitoring (Fisheries and Oceans Canada, 2019a). Fisheries and Oceans Canada may also ask for a report regarding specific numbers of bycatch, as well as species-specific data pertaining to bycatch (Fisheries and Oceans Canada, 2019a). Collecting this information provides insight into where fisheries might be exacerbating significant levels of bycatch or fish stock depletion so that additional mitigation measures can be implemented within a fishery.

The aforementioned policies and practices are implemented within fisheries practices and throughout government conservation initiatives to help reduce bycatch of non-target species, protect fish stocks, and help protect vulnerable seabird populations.

**4.2 ENGOs collaborating with scientists**

ENGOs and scientists work collaboratively to reduce the impacts that anthropogenic activities have on marine ecosystems. ENGOs can lobby bodies of government to make policy changes and inform the public about various environmental issues. BirdLife International is the world's largest conglomerate of global NGOs that share environmental conservation goals. They focus on the conservation, protection and restoration of bird populations and habitats. Through science-based research, they aim to propel "people towards sustainability in the use of natural resources" (BirdLife International, 2021a).

BirdLife International works with scientists and researchers to gather scientific data about the impacts that human activities have on bird species and their habitats. They focus on "promot[ing] and encourage[ing] synergies between key stakeholders and policy processes, to improve implementation of international biodiversity obligations and guidance" (Birdlife International, 2021b). BirdLife International advocates for change through forums, campaigns,

policies and national legislation (BirdLife International, 2019b). They been involved in major environmental agreements such as the Convention of Biological Diversity, the Convention on Migratory Species and the United Nations Framework Convention on Climate Change (BirdLife International, 2019b). Birdlife International recently collaborated with scientists and researchers to present a report on the impact that anthropogenic activity is having on "359 species of seabirds" (Dias et al., 2019, p. 525). The paper delivered information on "invasive alien species, bycatch and climate change" (Dias et al., 2019, p. 530), advocating for action plans to be created and implemented to help conserve declining seabird populations. BirdLife International continues to work toward sustainability and conservation goals to help protect vulnerable bird populations.

#### *4.2.1 Local ENGOs*

Nature Canada partners with BirdLife International to protect the natural environment. Their key activities include conserving birds and bird habitat through community-based efforts, lobbying for changes in laws and policies that ensure the protection of vulnerable bird populations, and creating awareness throughout the public to help conservation efforts (Nature Canada, 2021). An article titled "Nature Canada calls on Fisheries and Oceans Committee to Strengthen the Fisheries Act" (2016) discusses the need for stricter laws that enforce the protection of fish and fish habitat and argue that fisheries need to be managed sustainably (Nature Canada, 2016). Although Nature Canada's focus for this particular discussion is to achieve more legal protection for all fish ecosystems and not just the fish targeted by fisheries (Nature Canada, 2016), improving fisheries management and making fisheries practices more sustainable overall could create momentum for reducing bycatch numbers in fisheries.

Birds Canada partners with BirdLife International and citizen scientists to understand how habitat and bird populations are changing. They have proclaimed their organization "Canada's voice for birds" (Birds Canada) and try to advocate for change for bird populations through scientific publications, programs and conservation efforts. Their data collections are available to the public and also inform scientific papers. Birds Canada has worked with scientists and researchers to publish peer-reviewed scientific papers that look at how birds are being impacted by anthropogenic activities (Birds Canada). Birds Canada leads science-based research to understand how birds are being impacted by anthropogenic activities, including collision with human-made structures, fisheries, and habitat loss.

### 4.3 Certification processes for fishing

The methods used in fisheries operations often lead to the degradation of marine ecosystems (Nature Canada, 2016) and high levels of non-target species bycatch (Fitzgerald, 2013), perpetuating the decline of many vulnerable marine species. To help reduce the mortality of non-target species, sustainable fishing methods must be implemented in fisheries on a global scale.

The World Wildlife Fund (WWF) published a document titled "Traceability Principles for Wild-Caught Fish Products" (2015) which provides key principles that work toward "transparency in wild-caught fish product supply chains" (WWF, 2015, p. 3). These principles were created to guide fisheries toward more sustainable practices, to guide consumers toward sustainable seafood choices, and to try and keep "illegal, unreported, and unregulated (IUU)" (WWF, 2015, p. 2) fish out of the supply chain.

Tracing the supply chain of a particular fish species would include being able to identify the fishing vessel, vessel operator, species of fish caught, fishing methods used, and what the fish

will be labelled as in markets (WWF, 2015). Ensuring that information is electronically traceable at any part of the supply chain is ultimately what WWF wants stakeholders to strive for (WWF, 2015). To be able to achieve transparent, traceable food systems, there must be a complete understanding of, and compliance with, the principles that are laid out by WWF across geographical boundaries (WWF, 2015, p. 2). These principles in conjunction with the implementation of bycatch mitigation methods in fisheries can help ensure that ocean ecosystems are being managed so marine environments can thrive without severe anthropogenic interference.

### 4.4 Seafood eco-certifications

Fisheries can voluntarily comply with criteria that ensures fishing practices are sustainable. Seafood-eco certifications demonstrate that a fishery is complying with various standards and implementing sustainable practices. Eco-certification programs are created and enforced by government, industry or non-government organizations (SeaChoice). There are many different certification programs for fisheries, but the most commonly recognized eco-certification for wild-catch fisheries is the Marine Stewardship Council and Ocean Wise.

#### *4.4.1 Marine Stewardship Council*

The Marine Stewardship Council (MSC) is a globally recognized wild fisheries certification program. MSC created a set of standards that fisheries can voluntarily comply with to become an MSC certified fishery. MSC certified fisheries must comply with three main principals: 1) ensuring fish stocks are stable, 2) minimizing environmental impacts while fishing, and 3) managing fisheries effectively (The MSC Fisheries Standard, 2020). The MSC label informs consumers that they are purchasing fish stock that has been fished sustainably and responsibly. Becoming an MSC certified fishery can be obtained by any fishery that catches "marine or freshwater organisms in the wild" (The MSC Fisheries Standard, 2020) and fulfills

the required actions needed to comply with MSC's three main principles.

Once a fishery is MSC-certified, fish stock can be sold with the iconic blue label. MSC states that their blue label is important because it demonstrates that fisheries support the protection of oceans, it helps reduce the pressure on marine ecosystems, and it helps support "independently certified sustainable fisheries" which in turn allows fish populations and habitats to remain healthy (The MSC Fisheries Standard, 2020). Their standards are based on assessments that have been performed by "scientists and marine experts" (The MSC Fisheries Standard, 2020), allowing standards to reflect the state of the ocean and the need for sustainable fishing. Fisheries can apply for certification once they have met the standards of the program.

### *4.4.2 Ocean Wise*

Ocean Wise (OW) is a global conservation organization that created a sustainable seafood program to help businesses in the food industry "make sustainable seafood purchasing decisions" (Ocean Wise, 2021). They base their program off of a set of methodologies established by the "Monterey Bay Aquarium Seafood Watch" program which defines 10 principles for establishing sustainable wild-caught fisheries (Monterey Bay Aquarium Seafood Watch, 2016). Becoming a partner with OW allows businesses to display the OW sustainability label on seafood products, indicating that seafood is from a sustainable fishery.

OW standards encompass what a sustainable or unsustainable fishery looks like based on their criteria for wild-caught or farmed fisheries. OW wild-caught fisheries standards look at how the fishery impacts fish stocks, how a fishery impacts non-target species, how a fishery is being managed, and how the fishery is impacting surrounding ecosystems and habitats (Ocean Wise, 2021). If seafood comes from a fishery that meets each of these requirements at a level that is acceptable to the OW standards, seafood can be sold with the OW label.

Seafood eco-certifications push fisheries to operate more sustainably. Market-oriented pressures through sustainability labeling campaigns (Travaille et al., 2019) influence fisheries to implement measures that make fisheries operate more sustainably. Sustainability measures include the certification program looking at how other non-target species are impacted by the fishery (Ocean Wise, 2021). Seabird bycatch mitigation methods might be more likely to be implemented on fishing vessels if eco-certifications require them to be.

**5.0 Sustainability labeling and fish being sold in the GTA**

While gathering information on fish available in supermarkets in the GTA, I found that many fish had vague information on the package (Table 2). I discovered that fish mislabeling (Warner, 2013), or vague indication of fish species was common during data collection, even if fish were labelled with a sustainability label. Labels were often limited to fish species name, and some labels included the geographical location of the fishery (Table 2). I gathered additional information pertaining to the fish species through an online database called Fish Base, as the majority of sustainably labelled fish did not have information beyond the fish species name (Table 2).

**6.0 Discussion**

Black-footed albatross are threatened by commercial longline fishing operations (Anderson et al., 2011). Steps are being taken to help reduce the impacts that fisheries have on the species, but laws and regulations must be passed that demand the implementation of seabird bycatch mitigation methods on fishing vessels in Canada and globally. Conservation acts that work to reduce the conflict between seabirds and fishing vessels have been slow to be proposed

and passed, but through the new Biden administration and Trudeau's government, conservation initiatives are once again being presented.

### 6.1 Legal protection for Black-footed albatross

In 2006 a report was published by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) on the status of Black-footed albatross in Canada (Table 1). The report discusses the most detrimental threats to the Black-footed albatross including fisheries operations and plastic ingestion (COSEWIC, 2006, p. iii). In 2007 Canada officially listed the Black-footed albatross as a "species of Special Concern" (ACAP, 2018). A management plan for the Black-footed albatross was proposed eight years later. The *Management Plan for the Black-footed Albatross* (Phoebastria nigripes) *in Canada* was finalized in 2017 under the *Species at Risk Act* (SARA) (2002). The plan recognizes that fisheries cause Black-footed albatross mortality (Environment and Climate Change Canada, 2017) and list various ways that Canada can begin to shift toward becoming more informed about how fisheries impact seabird populations. This includes collecting more data to understand how humans directly impact seabirds in longline fisheries (Environment and Climate Change Canada, 2017).

To reduce Black-footed albatross bycatch in fisheries, the *Management Plan for the Black-footed Albatross* (Phoebastria nigripes) *in Canada* (2017) also suggests implementing current strategies set out by Canada's *National Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries* (NPOA-seabirds). NPOA-seabirds (2007) uses an ecosystem approach that looks at "all the interactions the target fish stock has with predators, competitors and prey species" (Environment and Climate Change Canada, 2017, p. 13). This would extend to the seabirds that are impacted by fisheries operations. NPOA-seabirds (2007) proposes that more education should be provided to fishers about the voluntary measures they can take to help

"reduce their impact on seabird populations" (Fisheries and Oceans Canada, 2007, p. 14). Although numerous scientific studies indicate the negative impacts that fisheries have on seabirds (Fitzgerald, 2013, p. 151; Jiménez et al., 2012; Lewison & Crowder, 2003; Løkkeborg, 2011; Robertson et al., 2003; Smith & Morgan, 2005; Žydelis et al., 2013), as well as the success of seabird bycatch mitigation methods in global fisheries (Boggs, 2001; Cocking et al., 2008; Eich et al., 2016; Gilman et al., 2016; Gladics et al., 2017; Melvin et al., 2014), mitigation methods still remain voluntary in Canada.

### 6.2 Canada's conservative government

In May 2011 Stephen Harper's majority conservative government won the election in Canada. One year later the *Jobs, Growth and Long Term Prosperity Act* (2012) was passed which compromised the well-being of the natural environment in Canada. Canada's environmental laws and regulations were undermined as Harper's government made changes to increase economic prosperity through easier access to natural resources. In a paper by MacNeil (2014) they list the acts that Harper's government altered, including:

> [T]he federal Environmental Assessment Act, Species at Risk Act, Fisheries Act, National Energy Board Act, Navigable Waters Protection Act, and the complete elimination of the country's National Roundtable on the Environment and Economy and Kyoto Implementation Act. (p. 176)

Harper's government aimed to weaken the protection of "fish and wildlife habitats" (MacNeil, 2014, p. 177) so that fisheries could expand their operations without the constraints of environmental laws and regulations. Any prior seabird bycatch mitigation methods that were voluntarily implemented on fishing vessels in Canada would not become legally binding while Harper worked to reduce the protection of the natural environment. Harper's government

delayed effective species recovery plans from coming into fruition and ensured that vulnerable seabirds like the Black-footed albatross would have a management plan nearly a decade after being listed as a special concern.

Despite a lack in national and international efforts to help reduce seabird bycatch in fisheries, the *National Bycatch Reduction Strategy* (2016) has been updated to cover steps and strategies that will be implemented between 2020-2024 (see Table 1). The *National Bycatch Reduction Strategy Implementation Plan* (2020) works toward using the most effective bycatch mitigation methods in fisheries based on previously published scientific studies, as well as what is cost-effective for the fishery (National Oceanic and Atmospheric Administration, 2020). The plan also aims to increase and improve bycatch mitigation methods on fishing vessels, making sure that fishermen are complying with bycatch mitigation requirements while continuously monitoring the success of mitigation methods (National Oceanic and Atmospheric Administration, 2020). This plan demonstrates that bodies of government are recognizing the damage that anthropogenic activities like commercial fishing can have on marine ecosystem. Individual species management plans such as Canada's *Management Plan for the Black-footed Albatross (*Phoebastria nigripes*) in Canada* (2017) discusses how detrimental fisheries operations are to the species. The *National Bycatch Reduction Strategy Implementation Plan* (2020) looks to reduce bycatch of all species in fisheries for 2020-2024.

**6.3 Sustainable fishing labels**

Data gathered at GTA supermarkets illustrated some of the challenges that consumers might experience while trying to make environmentally conscious seafood choices. Although supermarkets carry seafood with sustainability labels, information that informs the consumer about the lifecycle of the fish product is not easily accessible or available. Consumer confusion

has also been reported in studies that look at how sustainability labels impact the consumer during the decision-making process (Langer et al., 2007). Too many sustainability labels overwhelm the consumer and can potentially lead to dissatisfaction in their purchase (Langer et al., 2007).

Sustainable fishing programs present opportunities for fisheries to be a part of the movement toward a sustainable seafood industry (Marine Stewardship Council). Labels like the Marine Stewardship Council (MSC) and Ocean Wise (OW) relay to the consumer that they are choosing seafood from a sustainable fishery. But despite the efforts made to present consumers with more eco-friendly fish products, the information available to the consumer regarding the fish species being purchased is minimal.

To be able to deduce if a fish species sold in a supermarket in the GTA might have come from a fishery that incurs Black-footed albatross bycatch in West coast fisheries in Canada, I gathered additional information from online databases. Although some fish were labeled with the MSC or OW label, vague information regarding the fish species being sold was available and did not provide information about the geographic location of the fishery, the type of fishery, or the fishing methods that were used. Although fisheries must comply with various sets of criteria to be considered sustainable by MSC or OW, information beyond the species of fish was not available on the label and would take additional research on behalf of the consumer to be able to conclude what kind of environmental degradation is being inflicted upon marine ecosystems due to the fisheries practices in question.

**6.4 Supermarket data**

Black-footed albatross are known to be found as bycatch in cod, halibut, rockfish and sablefish longline fisheries in Canada (Fisheries and Oceans Canada, 2007a; Smith & Morgan,

2005). All seven GTA supermarkets I collected data from carried species of cod, and only three of these supermarkets carried sustainably labeled cod (see Table 2). One supermarket specified that their cod was fished from the Pacific Ocean, but additional information regarding the geographic location of the fishery of all other fish species being sold was not provided on both sustainably labeled and non-sustainably labeled cod. One supermarket carried sablefish which was labeled "wild-caught" but did not specify any other information.

Although it is challenging to try and trace fish back to the original fishery due to lack of information availability on packaging and labels, it is likely that the supermarkets I collected data from are carrying fish that come from fisheries that incur Black-footed albatross bycatch.

**Conclusion**

Although this paper addresses policy and science perspectives for reducing Black-footed albatross bycatch in longline fisheries, there are moral and ethical stances that should be considered. Anthropogenic activities degrade the natural environment. We are morally and ethically responsible for ensuring that marine ecosystems are protected from the degradation that fisheries operations inflict on marine ecosystems. Our needs should not overshadow the well-being of wildlife.

Fisheries continue to catch non-target species annually (Naughton et al., 2007), resulting in the mortality of Black-footed albatross. Numerous scientific publications exist that demonstrate that seabird mortalities in fisheries reduce significantly with the use of seabird bycatch mitigation methods (Gilman et al., 2003; Gladics et al., 2017). Along with these studies, the plans that work to protect Black-footed albatross like the *Management Plan for the Black-footed Albatross (*Phoebastria nigripes*) in Canada* (2017), the *National Bycatch Reduction Strategy Implementation Plan* (2020) and the *COSEWIC Assessment and Status Report on the*

*Black-footed Albatross* Phoebastria nigripes *in Canada* (2007) indicate that bycatch mitigation methods in fisheries can help reduce seabird bycatch. Despite available scientific data, seabird bycatch mitigation methods are still voluntary in Canada. Existing fisheries management plans propose that more data needs to be collected to be able to effectively decide which fishery should implement seabird bycatch mitigation methods (Table 1), but new scientific literature is published regularly that indicates a correlation between seabird bycatch reduction when mitigation methods are implemented on fishing vessels. Additional policies and laws that demand the use of seabird bycatch mitigation methods in fisheries must be implemented to help reduce Black-footed albatross bycatch in longline fisheries in Canada.

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## Tables

## Table 1. Bycatch policies in Canada that protect Black-footed albatross

| Policy/Act/Management Plan | What is the policy? | What does it address? | How does it protect Black-footed albatross? | What is required of fishers? | What is mandatory? |
|---|---|---|---|---|---|
| **Migratory Bird Convention Act (1994)** | Protect and conserve migratory bird populations and their nests. | Anthropogenic activity that impacts migratory bird species. | Meets all criteria to be protected under the act. | Cannot put a substance into the water that could harm a migratory bird. | Act is implemented in the exclusive economic zone of Canada. |
| **Species at Risk Act (2002)** | Prevent wildlife from becoming extirpated or extinct, help recover extirpated, endangered or threatened species as a result of anthropogenic activity. | Anthropogenic activities are driving species to extinction, extirpation or threatened. | Is listed in act as species of special concern. Act states that species listed as special concern must have a management plan created to protect the species and species habitat. | | Cannot "kill, harm, harass, capture or take an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species" (SARA, 2002). |
| ***COSEWIC Assessment and Status Report on the Black-footed Albatross* Phoebastria nigripes *in Canada* (2007)** | This status report informs decisions made regarding the conservation of the species. | Fisheries operations and plastic ingestion are the most threatening to the species. | Scientific information that provides insight into how vulnerable the species is to fisheries operations. | | |
| **National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries (2007)** | To reduce incidental seabird bycatch in longline fisheries in Canada. | Canada's acts and policies working collaboratively to reduce seabird bycatch. | Legislative instruments from the *Migratory Bird Convention Act* and *Species at Risk Act* are applied to this action plan. | Comply with laws and policies that pertain to fisheries management. | Comply with laws and policies that pertain to fisheries management. |
| **Sustainable Fisheries Framework** | Make sure that fisheries in Canada are sustainable and support conservation initiatives. | A framework that ensures sustainability and conservation: "precautionary approach to fisheries management" (Fisheries and Oceans Canada, 2020), ecosystems approach, monitoring and assessment tools, and evolving management policies. | Precautionary approach includes bycatch management policies which pertain to seabirds. | "[K]eep our fish stocks healthy[,] protect biodiversity and fisheries habitats [and] make sure our fisheries remain productive" (Fisheries and Oceans Canada, 2020). | Recognize and implement policies and acts listed within the Sustainable Fisheries Framework to ensure that fisheries are sustainable and support conservation. |
| **Policy on Managing Bycatch** | 1.) ensures "sustainable harvesting of aquaculture species" (Fisheries and Oceans Canada, 2019b) while reducing harm to species that are | Fisheries need to be operated sustainably with an ecosystems approach to management while also ensuring | This policy refers to the management plans set forth by the Species at Risk Act (SARA) that are implemented to help reduce bycatch. | Policy is implemented and followed based on an Integrated Management Plan. Each plan is unique to the fishery and geographic | Implementing the objective of the policy through steps provided in document titled *Guidance on the Implementation of the Policy on* |

| | | | | | |
|---|---|---|---|---|---|
| | caught as bycatch and 2.) "account for total catch, including retained and non-retained bycatch" (Fisheries and Oceans Canada, 2019b). | economic growth and success. | | location of fishery. | *Managing Bycatch*. |
| **Canada's Progress Report on the Implementation of Key Actions for Reducing the Incidental Catch of Seabirds in Longline Fisheries (2012)** | To reduce seabird bycatch in longline fisheries. | Past policies and acts have been implemented, but seabird bycatch is still an issue. | Addresses need for ecosystem-based and precautionary approach to reduce seabird bycatch in fisheries. | Comply with management plan set out for individual fishery. | Continue to abide with Fisheries Management Policies, Integrated Fisheries Management Plans and Fisheries Monitoring Programs. |
| **Management Plan for the Black-footed Albatross (*Phoebastria nigripes*) in Canada (2017)** | Proposed in 2015, plan looks at | Impacted by toxic chemicals, heavy metals, plastic, and fisheries operations. Distribution of species is problematic: nesting habitat being impacted. | Objective is to help increase global population and reduce bycatch mortality. | | |
| **National Bycatch Reduction Strategy Implementation Plan (2020-2024)** | Result of the *National bycatch Reduction Strategy* (2016). Aim is to reduce bycatch through monitoring fisheries and gathering bycatch data. | More bycatch data is needed to understand how to reduce bycatch in an individual fishery. | Seabird bycatch data must be reported accurately and regularly to strengthen bycatch mitigation methods in fisheries. | | Seabird bycatch data is reported. Observers are used onboard fishing vessels to keep track of seabird mortalities in fisheries. |

## Table 2. Wild-caught cod and sablefish longline fisheries that impact Black-footed albatross

| Fish species | Grocery store | Sustainable fishing label | Location of fishery |
|---|---|---|---|
| Sablefish* | Fortinos | | |
| Cod | Fortinos | MSC | |
| Cod | Longos | | Iceland |
| Cod | Metro | | Pacific Ocean |
| Cod | No Frills | | Pacific Ocean |
| Cod | Oceans | | Pacific Ocean |
| Cod | Sobeys | OW | Iceland |
| Cod | Superstore | MSC | |

**Table 2.** List of supermarkets that I collected data from that carry cod and sablefish for purchase in the Great Toronto Area. *wild caught

# Solastalgia

by Paige Thomson

supervised by Gail Fraser

A Portfolio submitted to the Faculty of Environmental and Urban Change
in partial fulfillment of the requirements for the degree of Master in Environmental Studies
York University, Toronto, Ontario, Canada

April 19, 2021

# solastalgia

paige thomson

# solastalgia

/ a form of emotional or existential distress caused by environmental change

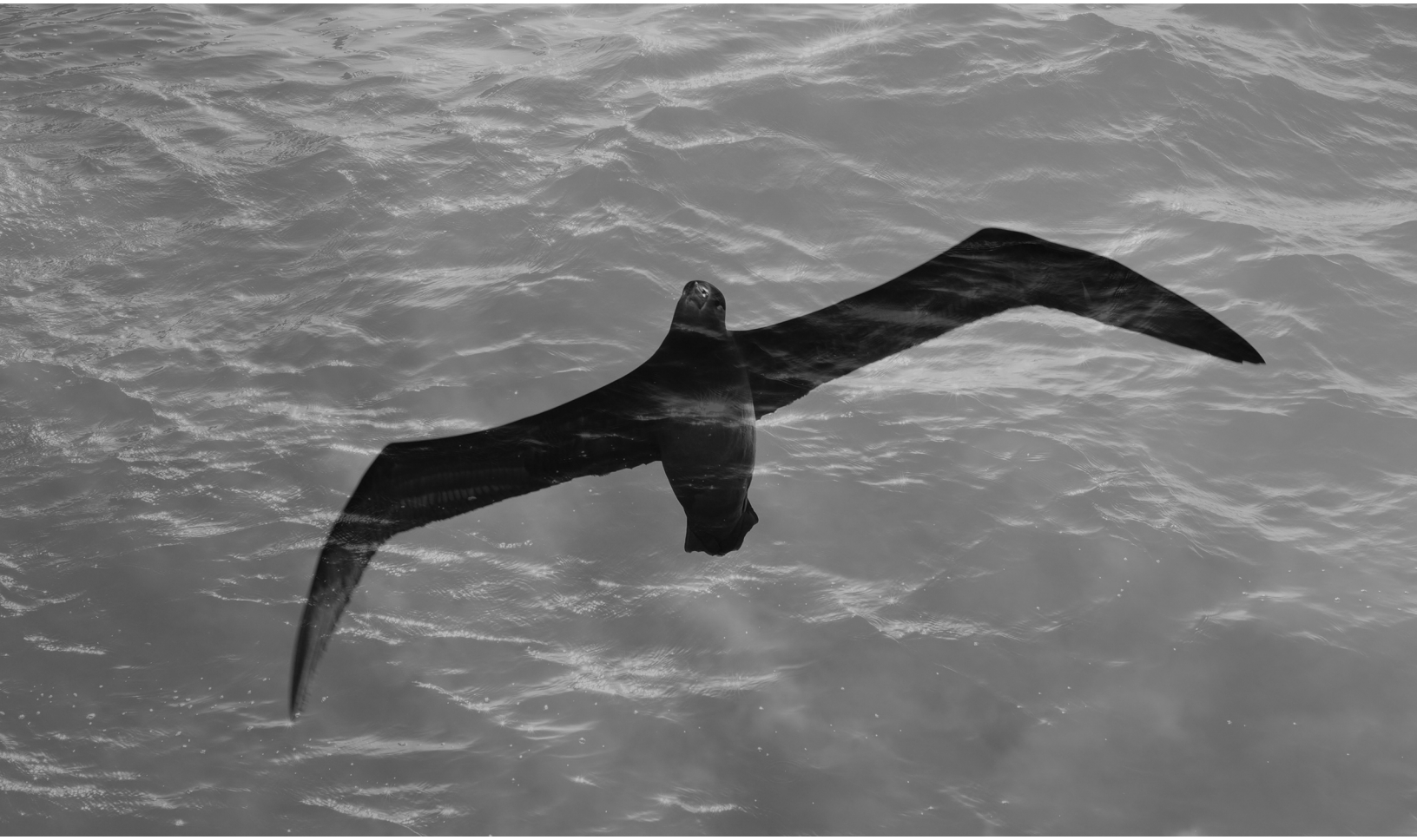
## foreword

This portfolio was created to fulfill the requirements of the degree of Master in Environmental Studies at York University. This portfolio focuses on how Black-footed albatross are impacted by commercial longline fisheries and includes an analysis of seabird bycatch mitigation methods that have successfully reduced seabird bycatch in longline fisheries. I assembled together some poems and photographs that are a symbolic representation of what I perceive to be the experiences of Black-footed albatross when they come into conflict with longline fisheries. Gail Fraser's photographs of seabirds and fisheries also appear throughout this portfolio.

I feel it is important to recognize that representations of wildlife in literature are framed through an anthropomorphic lens, reflective of our own notion of wildlife biology, behaviour and experiences. Despite this, language and art can help to portray a message to viewers about environmental issues. Currently, laws and acts do not exist in Canada to ensure the reduction in seabird bycatch in fisheries, leaving mitigation methods a voluntary measure. This portfolio is a reflection of the environmental degradation that has been caused by the lack of laws that ensure the protection of vulnerable seabirds from becoming bycatch in longline fisheries.

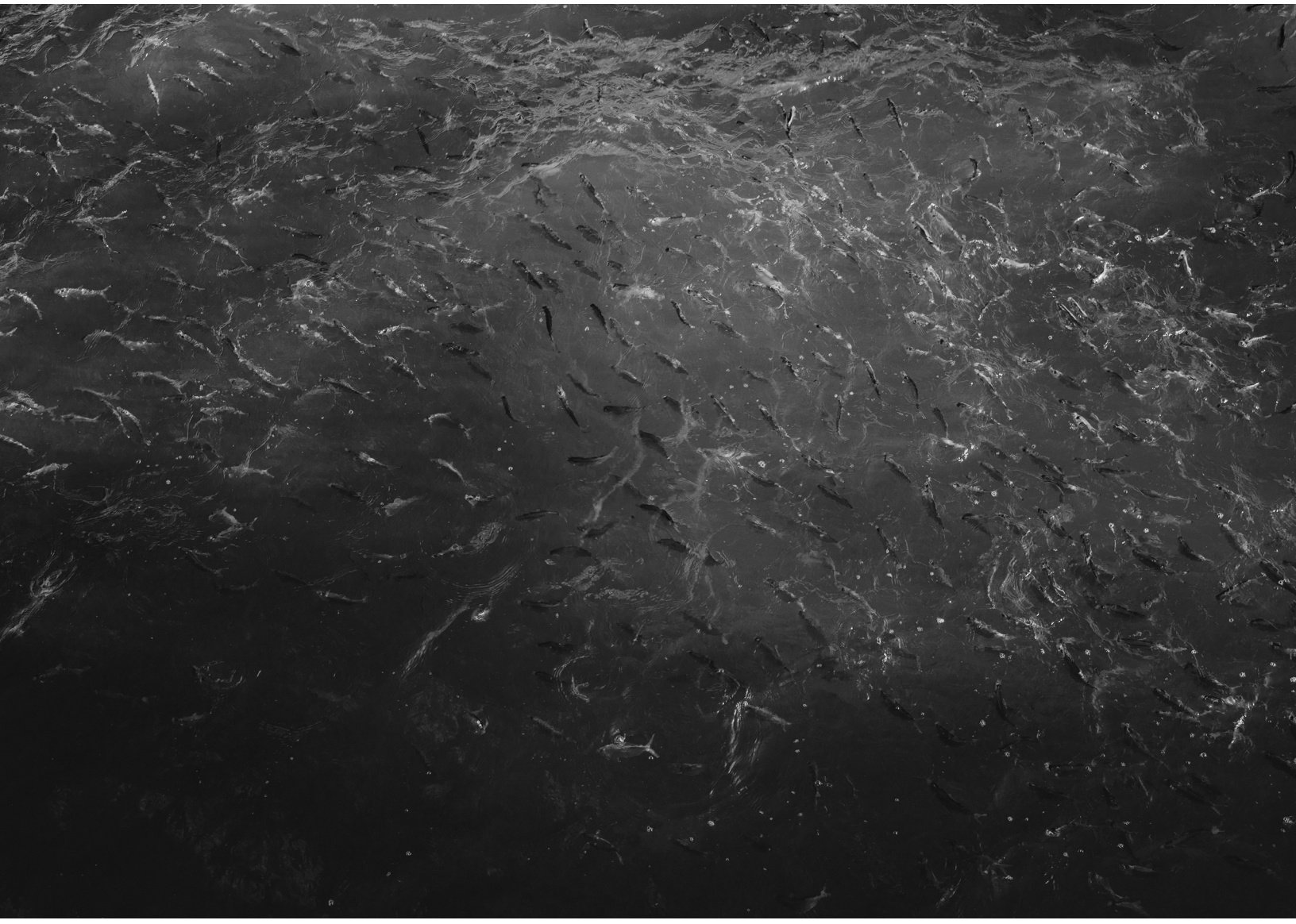
## abstract

This portfolio is a creative reflection of what I have learned and researched as a fulfillment for the degree of Master in Environmental Studies at York University. I wanted to illustrate how I perceive the experiences of Black-footed albatross when they come into conflict with commercial longline fisheries. Looking at this topic through a scientific and political framework, I gathered information on seabird biology, behaviour, habitat, and how seabirds are impacted by anthropogenic activity. I looked at how seabirds and Black-footed albatross in particular are protected through policies and acts in Canada, focusing primarily on seabird bycatch mitigation methods in fisheries. Despite numerous studies that demonstrate the success of bycatch mitigation in fisheries, Canada's laws do not demand that seabird bycatch mitigation methods be implemented in fisheries operating in Canada. While there are policies that help protect Black-footed albatross and other seabirds, the progression toward environmental sustainability in fisheries in Canada has been slow. I hope that as environmental issues continue to be discussed in a political atmosphere, Canada's policies and acts will reflect a movement toward the protection of vulnerable marine wildlife and ecosystems where anthropogenic activity is concerned.



**ebb and flow**

pulled in and under,
panic sets in and i swim,
with futile attempt.



**you're welcome**

we wrote
words on paper,
a facade to save you
in the name of conservation.
*we tried.*

**do they know?**

feathers soft and dark,
like dusty shadows brushed by the sun's last rays.
their wings catch currents of wind
that propel them toward vast spaces.

this could be their last flight.
the last time their feet sweep the water's surface,
before being pulled into depths that suffocate
and fill their lungs with cold, lifeless sleep.


**extinct**

i think i saw you
disappearing from landscape,
but no one noticed.

**policies passed**

there is an ocean
where the dead collect.

their undesired bodies
discarded and forgotten.

rough waves and cold water
grind their bones into sand.

we do not stop to honour them,
we just motion
to do better
next time.

**Phoebastria nigripes**

below, a wide open sea
wings stretched open wide,
wind-searching, soaring and free

**tricked**

tired and hungry,
our bodies rest on a blanket of blue.

an offering presents itself,
dangling from cold hands and thin limbs.

we dive under,
but we cannot reach the surface again.

our flesh and bone peel away
as steel breaks through our delicate frame.

we have been tricked,
a life traded for food we cannot consume.

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