

SUPPORT FOR BASKING SHARK TOURISM IN DONEGAL, IRELAND

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DEDICATION

I would like to dedicate this to Lucia, Emily, and my family for being my perpetual cheerleaders. Without their unwavering support and encouragement, I couldn't have done this.

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I want to acknowledge the support of my committee, Dr. Chris Parsons, Dr. Cindy Smith, and Dr. Erin Peters-Burton. Dr. Parsons suggestion that I modify my initial thesis idea led me down an unexpected, but delightful path of research. Dr. Smith's continual commitment to my education and professional development has encouraged me to challenge myself in ways I did not expect. Dr. Peters-Burton's expertise in social research allowed me to tackle those important conservation questions that are difficult to quantify.

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LIST OF ABBREVIATIONS

Inishown Basking Shark Study Group.....	IBSSG
United Kingdom	UK
Oslo and Paris Conventions.....	OSPAR

ABSTRACT

SUPPORT FOR BASKING SHARK TOURISM IN DONEGAL, IRELAND

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Basking sharks visit Ireland during the spring and summer season, but are not currently featured heavily in advertising material, much of which often highlights coastal wildlife. Comparatively, basking shark tourism is well established in Scotland. No studies have been done to determine support or opposition to basking shark conservation or interest in basking shark tourism in Ireland. In order to determine this, 173 residents and visitors to Buncrana, Ireland, were surveyed in the summer of 2018. Respondents were asked knowledge questions about basking sharks, were asked to rank their interest in basking shark tourism and their belief that *others* would pay to view basking sharks, along with support for shark conservation. A Pearson's Chi Square was run on the questions, in order to determine significant correlations between support for conservation, interest in shark tourism, and belief in others' interest in shark tourism. Results indicate that knowledge of basking sharks is low, however, support for basking shark conservation and interest in basking shark tourism is high. Furthermore, individuals who support conservation were

significantly more likely to believe that others would pay to view basking sharks. This study indicates that there may be a strong, if untapped, tourism market for basking shark viewing in Donegal.

INTRODUCTION

Tourism is a booming business in the Republic of Ireland (Eire). While a good portion of tourists visit for history and culture, wildlife tourism and ecotourism have begun to grow in popularity in Ireland (both in the Republic of Ireland and Northern Ireland), as they have done worldwide (McLoughlin & Hanrahan, 2016). Though an island, relatively few resources have been dedicated to the development of marine ecotourism. In recent years, there has been a push to include wildlife and ecotourism in marketing initiatives, in particular along the Wild Atlantic Way, a scenic coastal road that runs along the West Coast of Ireland (Hector, 2001). For instance, County Clare began a marketing campaign to develop marine ecotourism based around their unique population of dolphins. This was highly successful, and the dolphins are frequently featured on marketing materials (Hector, 2001).

Likewise, individuals in Malin Head, located in County Donegal would like to push for a similar tourism industry. Notable for its scenic beauty, Malin Head is visited by basking sharks (*Cetorhinus maximus*) in the summer (Southall, Sims, Witt, & Metcalfe, 2006). These large, plankton-eating sharks frequently swim near the surface of the water (they "bask" in the sun). This makes basking sharks easy to view from boats, kayaks, or by snorkeling. Malin Head has worked to brand itself as a "hot spot" of basking shark activity, and has been featured on Discovery Channel's Shark Week as

such (Clemens, 2015). Because they are plankton-eaters, basking sharks are not generally considered dangerous, but their large size is impressive to viewers.

While basking sharks are a unique attraction, Malin Head is home to many other species of sharks, such as blue sharks (*Prionace glauca*) and porbeagle sharks (*Lamna nasus*), species popular with recreational divers and sports fisherman. The region is also home to many species of seabirds and marine mammals.

To increase wildlife and ecotourism¹ to the area, the Irish Basking Shark Project has proposed the creation of a "shark park", or a Marine Protected Area, off of Malin



Figure 1: Map of Inishowen Peninsula (NASA 2013)

Head (Inishowen Basking Shark Study Group, 2014). The main attraction would be to see sharks, notably the “charismatic” basking shark. The Inishowen Basking Shark Study Group has recommended that these become the "totem" or flagship species for marine conservation in the region (Inishowen Basking Shark Study Group, 2011). This would make Malin Head stand out, in

regards to marine wildlife tourism, as only ~5% of all the world's shark tourism occurs in Europe, with less than 10 shark tourism operators located in UK and Ireland (Gallagher & Hammerschlag, 2011). However, it should be noted that many wildlife tourism operators in the UK and Ireland site multiple species, such as

¹Wildlife tourism is considered watching, studying, or enjoying wildlife, with ecotourism including the additional goal of minimizing human impact on local ecosystems and providing benefits to the human community hosting the wildlife tourism operation (Kiss, 2004).

whales and sharks (including basking sharks), and are often left out of studies accounting for shark tourism specifically.

Increases in ecotourism can serve two beneficial purposes: the preservation of threatened or endangered species and the creation of jobs. Ireland has a large fishing economy, and the West Clare marketing campaign was partially begun to combat a loss of fishery jobs, as new regulations were enacted to combat the collapse of several fisheries (Hoctor, 2001). Marine ecotourism is seen as a sustainable alternative to fishing, and frequently viewed as a way to protect jobs, traditions, and culture in traditional fishing towns (Hoctor, 2001; Parsons, 2012; Woods-Ballard et al., 2003). This is because marine ecotourism still requires boating, and the subsequent related support (i.e. seamanship skills, dock staff). Whale watching in some rural areas of western Scotland has contributed as much as 12% of the income from tourism (Parsons, Warburton, Woods-Ballard, Hughes, & Johnston, 2003).

This drive to increase marine tourism does not seek to substitute for all fisheries, as anglers make up a large portion of tourists in Ireland (Daly et al., 2017). A balance between all stakeholders must be reached in order to achieve a successful tourism market, a fact recognized by the Inishown Basking Shark Study Group (Inishown Basking Shark Study Group, 2014).

Aquatic (Marine & Freshwater) Tourism in Ireland

In 2013, the number of international tourists that visited Ireland was greater than the number of Irish residents (approximately 4.5 million) in the country (McLoughlin &

Hanrahan, 2016). Tourists generally participate in historical and nature (ecotourism and wildlife) tourism. In 2002-2003, 40% of tourists in Ireland participated in water-based leisure activities, spending a total of 434 million Euros (Daly et al., 2017), which accounted for 45% of domestic tourism revenue (Williams & Ryan, 2004). Forty-three percent of tourists visited coastal nature reserves, while 9.6% percent of those tourists participated in whale or dolphin watching and a further 9.1% participated in scuba diving or snorkeling. Angling and sport fishing, in particular for sharks, is also popular in Ireland. It has been found that anglers who target game species prefer ecologically significant (i.e. healthy) regions when selecting a fishing area (Curtis & Stanley, 2016). This fact may mean that anglers may favor marine protected areas, if they are permitted to fish within or near the boundaries of such areas.

Wildlife Tourism versus Ecotourism

Wildlife tourism is characterized by watching, studying, or enjoying wildlife (Bentz et al., 2014) and is often regarded as an opportunity to educate tourists about conservation. Ecotourism is similar to wildlife tourism, with the additional goal of minimizing human impact on local ecosystems and providing benefits to the human community hosting the wildlife tourism operation (Kiss, 2004). Under these definitions, shark diving that involves chumming would be considered wildlife tourism, while viewing sharks or whales from a boat, with little to no interaction between sharks and people, would be considered ecotourism. The basking shark tourism proposed for Malin Head could be deemed to fit the definition of ecotourism, as viewing will be done by boat

or by land, will not involve attracting the sharks via activities such as chumming, and it would provide direct benefits to the local community (Lacher, Oh, & Norman, 2016).

Marine Fauna of Ireland

Ireland is host to several species of charismatic megafauna, attractive to both divers and anglers. Off the west coast of Ireland, basking sharks arrive seasonally, between April and August (Berrow & Heardman, 1994). Several companies provide boating and snorkeling trips to view basking sharks in Scotland and England, such as Basking Shark Scotland (<http://baskingsharkscotland.co.uk>) and NewQuay Sea Safaris, which offers a "Basking Shark Encounter" (<http://www.newquayseasafarisandfishing.co.uk>). In contrast, Ireland currently offers no publicized trips specifically focused on basking sharks. If one was to conduct an internet search for basking sharks in Ireland, out of the first three pages of search results (approximately ten links per page), only seven links actually lead to tour company websites. However, many of the search results include pages that contain information on where to view these sharks in Ireland, as well as links to videos or articles about basking sharks visiting Irish waters. This suggests a desire to watch basking sharks that the current tourism market is not meeting. Furthermore, there are no providers who take individuals whale watching in the region surveyed (Buncrana). However, at the Buncrana Visitor Center, the researcher was told that, informally, fishing charters may take individuals out whale-watching if there are no fishing charters scheduled for the day.

Ireland also has blue sharks, a species popular with recreational divers in the Azores, Portugal (Torres et al., 2017) and with divers and anglers in various states in the

United States (Gallagher & Hammerschlag, 2011), as well as porbeagle sharks, a species popular with anglers, as noted above.

Basking Sharks

Basking sharks are arguably a “charismatic” species of shark. Their “peaceful” nature and massive size make them attractive to many tourists, and the County of Donegal, in particular Malin Head, have become known as a hotspot for viewing this species.

Because of this, there has been a push to revitalize Malin Head as a tourist destination, with the hopeful goal of developing a "Shark Park" (Inishown Basking Shark Study Group, 2014). Currently in stage one of its tourism development plan, the Inishown Basking Shark Study Group (IBSSG)'s Malin Head Ocean Centre and Marine Park Plan is in the process of creating outdoor signage for hikers. Further development of the plan includes the establishment of an "Ocean Wave Centre", which could include interpretive exhibits for visitors, educational resources and research labs. The long-term goal of the IBSSG is to establish a United Nations Educational, Scientific, and Cultural Organization (UNESCO) biosphere fishing reserve, and eventually an international basking shark sanctuary with the cooperation of Northern Ireland (Inishown Basking Shark Study Group, 2014).

Basking sharks have been historically significant to Ireland and the UK, having been hunted for their livers (a source of oil) well into the twentieth century (McGonigle, 2008). Basking sharks have been listed as “vulnerable” by the IUCN since 1996 (IUCN, 2005), they are protected in UK waters (Southall et al., 2006) and are also protected from

depletion via trade as they are listed on CITES Appendix II. Domestic laws exist against the landing and sale of basking shark parts within United Kingdom waters (Southall et al., 2006) under the Wildlife and Countryside Act (1981) in England, the Countryside Rights of Way Act (2000) in England and Wales, as well as under the Wildlife Order (1985) in Northern Ireland, and the Nature Conservation Act (2004) in Scotland. The UK has also listed basking sharks as Priority Marine Species in the UK Biodiversity Action Plan (2007), which included directives to continue research to determine the rate of by-catch, increase public awareness of legal status of basking sharks, and create measures to avoid harassment and collision

Currently, no fishes, including basking sharks, are listed as protected or restricted under any specific domestic marine or conservation law in the Republic of Ireland. However, in 2007, the European Union designated basking sharks as prohibited species under the Common Fisheries Policy (OSPAR Commission, 2009).

While basking sharks are no longer hunted, collisions, by-catch, and harassment are the top threats to basking sharks in the North Atlantic (OSPAR Commission, 2009). The rate of these is unknown, as many countries, Ireland included, do not require reporting or track such incidences (OSPAR Commission, 2009; Southall et al., 2006). However, one study found that at least 28 basking shark sightings were from sharks entangled in fishing gear (Berrow & Heardman, 1994). A lack of domestic Irish protections makes basking sharks particularly vulnerable to wildlife harassment in Irish waters, as international law does not regulate vessel distance.

Currently, much is still not known about the population size or migratory patterns of basking sharks. Basking sharks have been sighted in South Africa, South America (Lucifora, Barbini, Di Giacomo, Waessle, & Figueroa, 2015), and the Mediterranean (Fossi et al., 2014), though the majority of basking shark population and migration research has been conducted in the North Atlantic (Lucifora et al., 2015). Basking sharks are notably challenging to study, compared to other elasmobranch species, as they are known to migrate large distances between foraging areas, which are often in turbid water, making underwater photography and ID difficult (Gore, Frey, Ormond, Allan, & Gilkes, 2016). Catch data (i.e. counting the number of sharks captured by fisheries) is not an option, due to the fact that basking sharks are often protected and rarely caught on purpose (Gore et al., 2016).

A study of tagged basking sharks found that the tagged sharks spent a large percentage of their time within exclusive economic zones (EEZ) of coastal countries (Southall et al., 2006). Notably, many of the countries that basking sharks passed by were countries where they were *not* under legal protection (Southall et al., 2006). Another small case study in 2017 showed similar results, finding that basking sharks only spent 18% of their time in UK waters, where they are protected (Doherty et al., 2017). This study also found that basking sharks spent the majority of their time in the upper portion of the water column, along the continental shelf. Over the course of 165 days, the tagged sharks generally remained along the continental shelf, within the EEZs of the nearest nation, and tagged sharks migrated as far south as North Africa (Doherty et al., 2017).

This demonstrates the importance of the combination of domestic and international protection.

Gore et al. (2008) demonstrated long-range migration across deeper, mid-ocean basins, with a shark tagged in Scotland migrating to Canada and traveling at depths up to 1,264 meters. Notably, other sharks tagged in the study remained near the surface or along continental shelves. The authors attributed the difference in migration pattern to size (and therefore maturity) of the sharks, as the deep-diving shark was also the largest (Gore et al., 2008). Studies of fin ID photos have demonstrated that some sharks return annually to locations, often within the same narrow time frame (Gore et al., 2016). This demonstrates a lack of consistent migration patterns, making it difficult to track whole or partial populations. Furthermore, genetic studies have also estimated the world-wide population size of basking sharks to be as low as 8,200, with researchers theorizing that the population went through a bottle neck at some point in history (Rus Hoelzel, Shivji, Magnussen, & Francis, 2006).

Basking Shark Sightings

An important aspect of basking shark conservation is sighting reports made by regular citizens. While satellite tag data is imperative to understand off-shore behavior, it is also cost prohibitive. Sightings data is not always reliable, but it is frequently utilized in conjunction with boat surveys and tag data (Southall et al., 2005). Long-term sightings data has been recorded in England since at least the late 1980s (Southall et al., 2005). Likewise, basking shark sightings can be reported in Ireland, through the Irish Basking Shark Project, though it is not known how well the public is aware of this fact. The Irish

Basking Shark Project is currently trying to increase the rate of sighting reports and to gather data regarding what would make individuals more likely to file a sighting report. There has been previous efforts to track basking shark sightings (Berrow & Heardman, 1994), but it is not currently known if the general public is aware of these efforts or how they can contribute.

Blue Sharks

Blue sharks (*Prionace glauca*) are a species of shark popular with wildlife tourists, in particular divers. Commonly found throughout the world's oceans, they are a tourist attraction in South Africa as well as the Azores. Blue sharks can reach approximately 3 meters in length (Joung et al., 2017) and are considered "near threatened" by the IUCN, as blue sharks are the most common elasmobranchs taken as both a targeted species or bycatch in pelagic fisheries (Bentz et al., 2014). Blue sharks are considered a "non-harmful" species, though diving operators frequently take reasonable safety precautions, and divers generally do not interact with blue sharks, but instead observe from a short distance (Bentz et al., 2014).

Surveys of tourists have found that the number of blue sharks seen by tourists are not correlated with the satisfaction of the tour (Torres et al., 2017), thus, even a small population of blue sharks may still be a sustainable source of tourism. However, because blue sharks are a pelagic species, chumming is frequently used to attract them to dive locations (Bentz et al., 2014).

Shark Tourism

Shark ecotourism is popular worldwide, with both "man-eaters", such as great whites, and peaceful sharks, such as whale sharks (filter feeders, similar to basking sharks) attracting international tourists.

Shark tourism is approximately worth USD 314 million worldwide, and estimated to be directly responsible for 10,000 jobs. While still more profitable than shark tourism, shark fisheries are currently on the decline, and it is predicted that shark tourism will exceed shark fisheries in profits in the next twenty years (Cisneros-Montemayor et al., 2013).

Surveys of tourists in the Azores have found that the "danger" or "thrill" factor is not a main reason for why individuals dive with sharks (Torres et al., 2017). This is beneficial for those who wish to create tourism around "gentle giants" like the basking shark. Additionally, previous studies have found that the majority of scuba divers are willing to pay more for the experience of viewing a shark, over all other marine animals (Gallagher & Hammerschlag, 2011).

It should be noted that data on shark tourism is not widespread, and studies frequently focus on a limited location or a particular species (Gallagher & Hammerschlag, 2011). This leaves many gaps in regards to the environmental impact or economic benefits of shark tourism.

The fact that many shark species are long-lived is also a boon to the industry. It has been demonstrated that non-charismatic species of sharks, such as a reef shark, is worth 100 times more alive than dead, due to the "renewable" nature of a live shark, which can be viewed multiple times by the multiple visitors (Gallagher &

Hammerschlag, 2011). Meanwhile, whale sharks, a species similar to basking sharks, in their large size and feeding habits, are attributed to the creation of 300 tourism and tourism-related jobs in the Philippines (Gallagher & Hammerschlag, 2011). In 2006 alone, whale shark tour participants on the Ningaloo Coast of Australia spent \$6 million (Jones, Wood, Catlin, & Norman, 2009).

Individuals who participate in whale shark watching have indicated that it is important or very important that whale shark tourism be environmentally-friendly (Ziegler, Dearden, & Rollins, 2012). In the same studies, tourists expressed significant dissatisfaction with the high volume of boats in the area, a result of rapid growth in the industry. Regulations about the number of boats, number of people, and vessel distance are needed to reduce environmental impact and ensure customer satisfaction.

Angling

Recreational fishing has been a popular pasttime in Ireland since the 1970s (Gallagher et al., 2017), making anglers another potential source of tourism for Malin Head. Shark fishing is particularly attractive due to the "challenge" of reeling in sharks. Fishing for other large species of fish, such as sharks, is also a common attraction in many coastal areas in Ireland (Daly et al., 2017). In recent decades, recreational anglers worldwide have switched from catch and kill, to catch and release when fishing for sharks as a way to minimize environmental impact (Gallagher et al., 2017). While blue sharks have the potential to be profitable as a diving attraction in Ireland, they are already well established as a popular and valuable species for sport angling (Crummey et al., 1991).

Data on the effects of recreational fishing on sharks is sparse, due largely to the diffuse nature of angling. Catch and release is not without risks to the shark. Common sources of injury come from the hook, physiological stress as a result of a long fight against the fisherman, long exposure to air, and improper handling that can damage delicate areas of the shark, such as the gills (Gallagher et al., 2017).

Sports fishing accounts for an estimate 12% of global fish catches and pelagic sharks, which includes blue, tope (*Galeorhinus galeus*), and porbeagle sharks (*Lamna nasus*) (Heard et al., 2016). While catch and release is generally considered less harmful than landing every catch, many sharks are still susceptible to high rates of mortality. A survey of fisheries observer data and satellite tags have determined that the mortality rate for porbeagle and blue sharks caught by commercial logline fishing is largely dependent on whether or not a shark is injured on release. Healthy porbeagle sharks have a 10% mortality rate, while injured ones have a 75% mortality rate. In contrast, the study found that healthy blue sharks have a 0% mortality rate, while injured blue sharks have a 33% mortality rate (Campana et al., 2016). In the case of both species, it could take several days for the individual shark to die.

While species data on recreational angling is still limited, the survival rates of sharks subjected to catch and release depends greatly on the individual species and factors, such as the amount of time spent fighting the fisherman (Gallagher et al., 2014). More research is required to determine the effect of recreational angling on blue and porbeagle sharks, but it is becoming clear that the environmental impact is not negligible (Gallagher et al., 2017).

Tourism in Malin Head

In a survey of websites (conducted in November 2017) of “Airbnb”, hotel, and hostel locations within a 30-minute drive of Malin Head (n = 40), only three websites (5%) mentioned sharks at all. Out of those three sites, one mentioned viewing basking sharks, and two mentioned sharks in the context of fishing (Table 1). However, a total of 40.63% mentioned the "Wild Atlantic Way" or "Wild Atlantic Coast" and 34.38% made reference to "beautiful" or "scenic views" of the ocean or coastline, while 6.25% of the websites surveyed mentioned dolphins, with one website including "swimming with dolphins" as a local attraction (which is arguably illegal under EU law). Notably, 27.5% of the Airbnbs, which are more likely to be run by locals or non-professionals, mentioned that scenes from a recent *Star Wars* movie (*The Last Jedi*) were filmed nearby, implying a desire by residents to highlight notable and unique tourist attractions. *Star Wars* was not mentioned by any of the hotel or hostel websites.

A search of the "*Wild Atlantic Way*" visitors' page (<https://www.wildatlanticway.com/>) reveals that, while mentioned in several articles, basking sharks are never actually listed as an attraction themselves. They are only mentioned in lists of other marine species, while "Whale and Dolphin Watching" (<https://www.wildatlanticway.com/highlights/whale-dolphin-watching>) receives its own article. Furthermore, basking sharks are included in an article on fishing along the *Wild Atlantic Way* (<https://www.wildatlanticway.com/things-to-do/features/fishing/best-fishing-locations>).

The emphasis on the natural splendor of the Irish Coast in tourism marketing materials indicates that tourism operators are aware of natural attractions, but the

emphasis on *Star Wars* and other local amenities, such as art shows, indicates that tourism advertisers are aware natural beauty alone isn't sufficient to attract tourists. The town of Malin, located just outside Malin Head, lacks a large number of amenities, with only two pubs and few restaurants. Compared to nearby cities on the Wild Atlantic Way, Malin and Malin Head are relatively isolated. Residents in these areas may be looking for a way to compete with less rural Irish locations, many of which still offer scenic Irish coastlines.

It is widely accepted that large charismatic species, such as big cats, whales, and sharks, attract the most attention from tourists (Bentz et al., 2016; Gallagher & Hammerschlag, 2011). A large percentage of Ireland's tourists come specifically to enjoy the unique natural scenery and landscape, and choose activities that bring them closer to the landscape, such as kayaking, sailing, diving, and angling (Daly et al., 2017). It is not a large leap of logic to assume that people visiting Ireland to enjoy the natural landscape would also desire to view basking sharks.

However, little is known about the perspective of local stakeholders, such as fisherman and business operators. It has been documented that failure to take social impacts into account negatively impacts the success of marine conservation efforts (Lopes et al., 2015; Trave et al., 2017). Furthermore, a lack of ecological awareness can lead visitors to negatively impact the environment they are there to visit. Therefore, it is important that the opinions and knowledge base of both locals and tourist is established, in order to ensure that stakeholder concerns are addressed and that both tourists and

locals are adequately educated about the most sustainable tourist practices (Trave et al., 2017).

Table 1
Summary of hotels, hostels and Airbnbs within a 30 minute drive of Malin Head (Hotels and Hostels, n = 8; Airbnbs, n = 32). Analysis conducted in November 2017.

<u>Key Words on Website</u>	<u>Totals (%)</u>	<u>Hotels/Hostels (%)</u>	<u>Air BnB (%)</u>
Amenities (Pubs, cafes, etc.)	52.5	100	40.63
Wild Atlantic Way	50	87.5	40.63
Beautiful/ Scenic view	32.5	25	34.38
<i>Star wars</i>	27.5	0	34.38
Fishing	17.5	75	3.13
Dolphins	7.5	12.5	6.25
Sharks In context of fishing	5	25	0.00
Basking sharks	2.5	12.5	0.00
Whale watching	2.5	12.5	0.00

In July 2018, a review of the same Airbnb, hotel, and hostel websites was repeated. It was found that 65.6% of Airbnb now mentioned beautiful or scenic views (a 31% increase), while 9% now mentioned dolphins (a 3% increase). No Airbnbs mentioned basking sharks. However, a review of the same hotel and hostel websites

indicated that one (n = 8) website now mentioned that a *Star Wars* movie was filmed there. There was no increase in the number of times basking sharks were mentioned.

Table 2

Analysis of hotels, hostels and Airbnbs within a 1 hour drive of Malin Head. (Hotels and Hostels, n = 13; Airbnbs, n = 111). Analysis conducted in July 2018.

<u>Key Words Mentioned on Website</u>	<u>Totals (%)</u>	<u>Hotels/Hostels (%)</u>	<u>Air BnB (%)</u>
Beautiful or scenic	64.2	91.7	61.3
Wild Atlantic Way	42.3	100.0	36.0
Pubs/other amenities	41.5	50.0	40.5
Golf	41.5	41.7	41.4
Beaches	38.2	58.3	36.0
Malin Head/Most northerly Point	36.6	58.3	34.2
<i>Star Wars</i>	19.5	8.3	20.7
Fishing	7.3	33.3	4.5
Horseback riding	7.3	41.7	3.6
Seabirds	5.7	50.0	0.9
Kayaking	5.7	50.0	0.9
Dolphins	4.9	25.0	2.7
Sharks mentioned in context of fishing	2.4	25.0	0.0
Basking shark	2.4	25.0	0.0

The survey of Airbnb, hotel, and hostel websites was expanded to a one-hour drive from Malin Head, and a more detailed examination of advertising was conducted.

Out of a total of 111 Airbnbs, still not a single one mentioned basking sharks (Table 2). Out of 13 total hotels, a total of 3 mentioned basking sharks. Of the total websites surveyed (N = 123) 36.6% referenced Malin Head as the most Northern point of Ireland, 38% mentioned local beaches as an attraction, 6% mentioned kayaking, 6% mentioned bird watching, and 5% mentioned dolphins. *Star Wars* was mentioned by a total of 19% of all websites surveyed, with the majority of those websites being Airbnb ads (21% of Airbnbs referenced *Star Wars* compared to 8% of hotels and hostels). Two of the most popular references for both Airbnb and hotel websites were both “*The Wild Atlantic Way*” and "beautiful", "scenic", or "stunning" views.

Study Aim

The purpose of this study was to determine the public's perception of sharks and shark tourism in Ireland. As highlighted by Tables 1 and 2, very few locations make mention of sharks in their advertisements for Malin Head, though the beautiful surrounding nature is frequently highlighted in advertising material.

This study will investigate: (a), if people are aware of sharks in Irish waters; (b), whether people have accurate knowledge about basking sharks; (c), if they are interested in shark tourism; and (d), if the public believes shark tourism has the potential to be economically profitable in Ireland. This will be accomplished through surveys of both residents and tourists.

Data collected by this study can be used for several purposes. As demographic information was collected, attitudes of different sectors of the sample population were compared and contrasted. For example, it was determined whether there are significant

differences in attitudes that are affected by gender, age, residency, involvement in the fishing or tourism industries, and membership of environmental groups. By investigating attitudes in this way, potential conflicts regarding tourism may be identified. For example, a particular occupation or gender may be more opposed to shark conservation than another. The Irish Basking Shark Group, other NGOs, or even ecotourism operations can use this information to target marketing campaigns to those who may be predisposed to oppose shark conservation, or to solicit support from those who are more likely to support shark conservation.

It is hypothesized that those who demonstrate an interest in environmental activities will be more likely to support basking shark conservation and to believe that ecotourism can be profitable. It is also hypothesized that visitors will be more likely to say that they will pay to view basking sharks, as they are already paying to stay in Buncrana, or at least paying for gas to day trip there. Moreover, it is hypothesized that the majority of survey takers (residents and visitors) are unaware of basking sharks in Irish waters, but will see an economic benefit to shark conservation.

RESEARCH QUESTIONS

The main research question for this study is:

What is the public's perception of sharks and shark eco-tourism in Ireland?

However, under this broad question are several areas of specific research interest:

Is the public aware of sharks in Irish waters?

Does the public have accurate knowledge about basking sharks?

Does the public believe that sharks can be profitable for tourism?

Does the public support shark conservation?

Does the public see economic benefit to shark conservation?

Moreover, an addition area of interest is:

Are there demographic factors that affect public awareness and attitudes towards sharks in Ireland?

Do people know that they can report sightings of basking sharks and what would make them more likely to do so?

Discovering information on these questions will determine if there are trends of support or opposition to shark conservation within subsets of the population, and demonstrates ways that reports of basking shark sightings can be made more easily.

METHODS

A Quantitative Comparative Design (Creswell, 2005) was conducted in Buncrana, County Donegal Ireland from July 2- July 16, 2018. Buncrana was chosen as it is located on the Wild Atlantic Way, and is the last town individuals driving the Wild Atlantic Way will pass through before reaching Malin head. Located approximately a 40-minute drive from Malin Head, it is reasonable to assume that many tourists and residents will or have made day trips to Malin Head or overnight trips to the small town of Malin. Visitors may also daytrip to Dunree Fort, a 15-minute drive from Buncrana, where basking sharks have also been sighted. The higher population density of Buncrana, when compared to Malin, made it more feasible to interview the required number of random individuals.

Furthermore, a week before surveys were conducted, the Local Link Donegal bus service began a new route that took people from Buncrana to Malin Head (with several stops at tourist attractions between), with a round trip costing approximately ten Euro.

A power analysis was conducted with G*Power Faul (Faul, Erdfelder, Lang, & Buchner, 2007) and a minimum total of 160 surveys were needed from both local residents and tourists. Individuals were approached along the beach and on the Buncrana Heritage Trail. The Heritage Trail is a 2.5 km, paved trail that includes multiple areas for beach access as well as tourist attractions such as O'Doherty's Keep and Friar Hegarty's Rock, and several scenic overlooks. The trail also contains several benches and amenities

such as a gated playground and workout equipment. Because it is paved, it is wheelchair accessible, accessible to those who have strollers, the elderly, and small children, which allowed for a diverse survey group.

Bucrana beach is located within a ten-minute walk of Main Street, and is located near the start of the Buncrana Heritage trail. There is a parking lot located just above the beach, which provides paved access to the Heritage Trail. Due to the heat wave of Summer 2018, when temperatures reached 18 degrees Celsius in Donegal, Buncrana Beach was unusually crowded during the first week of July. Furthermore, the town of Buncrana, and surrounding Donegal, had an unusually high number of visitors, as Ballyliffin, located a 20-minute drive from Buncrana, hosted the Dubai Duty Free Irish Open from 5 July 2018 to 8 July 2018.

During the first two weeks of July, 2018, Ireland was also in a drought (The Irish Meteorological Service, 2018). The unusual heat, combined with the lack of rain, meant that a high number of people were enjoying both the beach and the heritage trail.

Surveys were conducted in the morning, afternoon, and evening, as during the summer the sun does not set until 10:30 pm in Ireland. Individuals or groups were approached, and each adult in the group was counted. For example, if one member of a couple filled out a survey, but their partner declined to fill out the survey, this was counted as one refusal and one completed survey. Households were not counted as it was not always clear if groups were comprised of relatives or friends. Those who were not approached included those engaged in active pursuits, such as runners and bikers, and individuals supervising small children in the water.

Those approached were asked if they were willing to answer a few questions on sharks (Appendix A), if they agreed, they were read an informed consent script and provided a copy (Appendix B). Survey respondents were told to skip any questions they did not know the answer to or did not feel comfortable answering. The informed consent procedure and the questionnaire had been reviewed and approved by George Mason University's Human Subjects Review Board.

Respondents were told that the surveys were part of a research project by an American university student, but if they inquired for more detail they were told that the purpose of the research could not be explained until after the survey was completed, to reduce interviewer variance ("Interviewer Variance," 2008) and social-desirability bias in survey results ("Social Desirability," 2008). Respondents were given the same answer if they asked for the "correct" answer for the shark knowledge questions. Survey respondents also frequently asked about the current legal status of basking sharks, and were told that they could not be told the legal status, again to avoid interviewer variance and social desirability bias. Once all surveys in a group were answered, any questions the respondents had were answered.

Survey Design

The survey questions fall into the following categories (Table 3):

Demographic information

Shark Knowledge Questions

Interest in General Shark Tourism

Support for Shark Conservation

Belief in Other People's Interest in Basking Shark Tourism

Personal Interest in Basking Shark Tourism

Effect of Basking Shark Tourism and Protections

General Interests

Membership of different organizations (both conservation and general)

Demographic information was gathered, such as age, gender, profession, and hobbies of the survey takers. This was used to determine if there are any trends within specific demographic groups. Likewise, information on general interests (i.e. golfing, fishing, hiking) and affiliation with conservation and non-conservation organizations was gathered to identify trends in support for shark conservation (Table 3). Respondents were also asked if they wanted tourism to increase in Malin Head, in order to identify potential opposition to tourism in relation to demographic factors.

The questionnaires included Likert-like attitudinal scales of 1-10, to get an accurate view of the range of perception and understanding that individuals have regarding sharks and shark tourism. The span of 1-10 was chosen because it is assumed that most people can judge their agreement/disagreement on a decimal or percentage scale.

Data Analysis

Pearson's Chi-square tests were used to determine if there were significant differences in answers between gender, age, resident or tourist status, membership of environmental groups, and selected hobbies. Pearson's Chi-Square tests were also used to

determine if there were any correlations between answers to survey questions. Pearson's correlations were calculated for each compared variable.

Pearson's Chi-Squares and correlations were calculated in R Studio (Version 1.1456), using the Stats and Tidyverse packages. Questions with nominal answers were converted to binaries. For yes/no questions, yes was assigned a 1, no assigned a 0. For knowledge questions, correct answers were assigned 1 and incorrect answers were assigned 0. For Gender, females were assigned 1 and males assigned 2. Residents were assigned 1, while visitors were assigned 0. Likewise, participation in a hobby was assigned 1, with non-participants receiving a 0.

'Support for shark conservation' was compared to 'awareness of sharks' and the accuracy of basking shark knowledge, as well as 'personal interest in shark tourism'. Previous studies have found that the more knowledge an individual has about sharks, the more likely they are to support their conservation (O'Bryhim & Parsons, 2015), though research is not consistent that in general knowledge correlates with support for conservation. Other research shows that individuals who lack strong knowledge about marine mammals, will still support their conservation (Drymon & Scyphers, 2017), and the same may therefore be true for basking sharks. Previous research has shown that individuals will support conservation for fake cetaceans, as well as list whale sharks as a top cetacean species to preserve (Naylor & Parsons, 2018), indicating that individuals may simply support marine megafauna out of principle, even if they are unfamiliar with specific species.

Previous research has also found that those who enjoy whale watching (which is similar to viewing basking shark) do not necessarily have a high amount of knowledge of whales (García-Cegarra & Pacheco, 2017), meaning that lack of knowledge does not predispose an individual to lack interest in a marine animal. However, research in Scotland has found that whale-watchers tend to higher than average knowledge of local whale species (Parsons, Warburton, Woods-Ballard, et al., 2003).

'Support for conservation' was compared to the perception of how healthy the basking shark population is in Ireland, as previous research has shown an unwillingness to promote shark conservation, at least among anglers, if they perceive that the shark population is healthy (Drymon & Scyphers, 2017). Surveys of shark divers have also shown that divers support paying more in diving fees, if a portion of the fee goes to shark conservation (though surveys were conducted *after* shark diving trips) (Torres et al., 2017).

'Support for conservation' was compared to 'effect of basking shark tourism' as well as the 'belief in other people's interest in basking shark tourism' and the 'effects of basking shark tourism and protections'. Shark tourism is becoming increasingly valuable in the Atlantic region (Torres et al., 2017) and if survey respondents recognize an interest in basking shark tourism, it is expected they will be more likely to support shark conservation. It is also well established that shark tourism brings in more money over time than shark fishing, as shark tourism is a more 'sustainable' source of income (Vianna et al., 2012). 'Personal interest in basking shark tourism' was compared to residents and tourists, to identify if there are significant differences in interest between the two. It was

also be assessed if there was a trend between 'personal interest in basking shark tourism', and 'belief in others interest in basking shark tourism'.

'Support for shark conservation' was compared to 'general interests' and 'memberships in different organizations', to determine demographic trends of support. Respondents were also asked to rank their support of increasing tourism in Malin Head, in order to determine if there was opposition to tourism.

Table 3
Survey Questions Sorted by Category

Demographic Information

Question

Nationality

Age

Gender

Occupation

Are you a resident of the area or a visitor?

If visitor, what is the purpose of your visit? *Work, holiday, or other?*

Would you like tourism to increase in Malin Head?

Shark Knowledge

Question

Are you aware of any sharks that inhabit in the local coastal waters? *If you answered yes, what species occur here?*

Do you know what a basking shark look like?

Do you know what a basking shark feeds on? *[Please circle all that apply]*

Small fish Seawater

Large fish Jellyfish

Other sharks Shrimp

Microscopic plants Microscopic animals

Seaweed Seals

Are you aware that you can report your sightings of basking sharks to the www.IWDG.ie and or at www.baskingshark.ie?

Table 3 (continued).

Have you ever seen a basking shark? *If yes where, when and did you report it?*
How big is a fully-grown adult basking shark (roughly)?
How dangerous are basking sharks?
Did you know that you can find basking sharks in local waters?
Have you ever seen a basking shark?
How healthy do you think basking shark populations are in Ireland?

Interest in General Shark Tourism

Question

If a location offered shark viewing from a boat how likely are you to take a trip to see sharks?
If a location offered chances to swim with sharks, how likely are you to swim with sharks?
If a location offered shark viewing from the land (a headland or watch tower) how likely are you to go there to watch sharks?

Support for Shark Conservation

Question

Do you support legal protections for basking sharks in Ireland?
Do you support legal protections for other shark species?
Do you think the reporting of basking shark sightings can help basking shark conservation?
How likely are you to report a basking shark sighting?

Belief in other peoples' Interest in basking shark tourism

Question

Do you think tourists will pay to go and see basking sharks from a boat?
Do you think tourists will pay to go and see basking sharks from the land (headland or watchtower)?
Do you think Irish citizens will pay to view basking sharks?
How likely do you think it is that someone would choose Ireland as a tourism destination, in order to view basking sharks?

Personal Interest in Basking Shark tourism

Question

How willing are you to pay to view basking sharks from a boat?
How willing are you to pay to view basking sharks from the land?

Table 3 (continued).

Effect of Basking Shark Tourism and Protections

Question

If basking sharks were protected, do you think that would increase tourism?
What impact do you think marine tourism has on the Irish economy?

General Interests

Question

Do you participate in the following activities: *[Please circle all that apply]*

Surfing	Golfing
Scuba diving	Hiking
Fishing	Painting
Sailing	Writing
Visiting aquariums	Pottery-Making
Beach clean ups	Horse back Riding
	Rock Climbing

Membership of Organizations

Question

Are you a part of any of the following: *[Please circle all that apply]*

A fishing organisation	Conservation/ Environmental Group
Golf Club	A business that benefits from tourism
Tourism Operation	

If you are a member of any conservation/environmental organization(s), which one(s)?

RESULTS

Response Rate

A total of 173 questionnaires were filled out, four of which were partially completed (partial completion being defined as six or more questions skipped). The questionnaires had a 75% response rate. Sixty-six percent of the surveys were collected directly on the beach while 33% were collected on the heritage trail. The questions most commonly skipped were knowledge questions, with the basking shark length left unanswered by 24% of respondents, and the question about what basking sharks eat was unanswered by 16% of respondents. Nine percent of respondents declined to answer how healthy they thought the basking shark population in Ireland was. All other questions had an answer rate of 95% or higher (Table 6).

Demographic Information

Sixty-four percent of the surveys were filled out by women, while 35% were completed by men (Table 4). The average age of survey respondents was 41 years, with ages ranging from 18 to 80 years of age (Figure 2). Fifty percent of the survey respondents were visitors to Buncrana, while 50% were residents. However, 82% of survey respondents were Irish citizens, and another 9% were UK citizens (including Northern Irish Citizens). The other 9% were a mix of nationalities, including American, Polish, and Australian. Out of those who identified as "visitors" to Buncrana, 71% of

visitors listed their reason for visiting as "holiday", 29% listed their reason as "other" and 3% listed their reason as work (Table 4).

Table 4
Demographic Information of Survey Respondents (N = 173)

<u>Gender</u>	<u>%</u>
Female	64
Male	35
<u>Nationality</u>	<u>%</u>
Irish	82
UK	9
Other	9
<u>Resident</u>	<u>%</u>
Resident	50
Visitor	50
<u>Reason for Visit</u>	<u>%</u>
Holiday	71
Other	29
Work	3
<u>Selected Hobbies</u>	<u>%</u>
Hiking	34
Visit Aquariums	27
Fishing	19
Beach Clean Ups	17

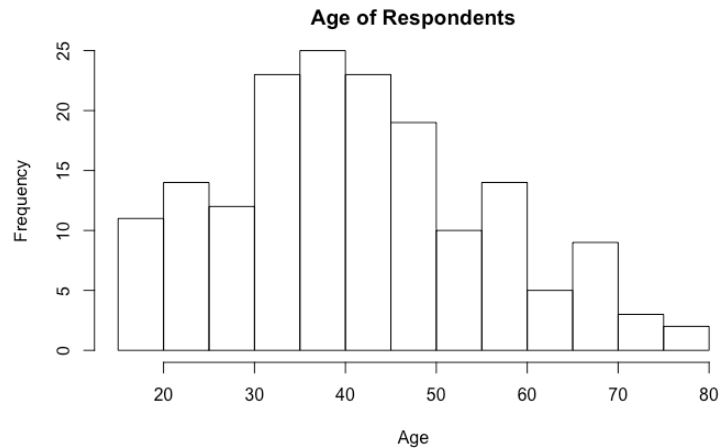


Figure 2: Age of respondents. N = 173

Shark Knowledge

Out of the 173 surveys, 62% of survey respondents were unaware that there were sharks in local waters, with just 35% aware of sharks in local waters. Forty-six percent of survey respondents were aware that basking sharks were found in local waters, while 52% were unaware of this fact.

Out of those that were aware of shark species in local waters, a total of 44 (25%) respondents listed basking sharks as a species found there (33 of those listed *only* basking sharks), while 12 (7%) individuals listed other species, such as blue and tope sharks.

Twenty-three percent of respondents were able to correctly select that basking sharks eat "microscopic animals", while 24% selected microscopic plants (phytoplankton). Forty-eight percent of respondents selected that basking sharks eat small fish. Fifteen percent thought they ate large fish and 12% thought they eat seaweed. Fourteen percent thought that basking sharks eat shrimp, while 6% thought they ate seals,

the latter possibly confusing basking sharks with seal-predating great white sharks (*Carcharodon carcharias*). Sixteen percent selected the "don't know" option or did not answer. It should be noted that individuals could select "all that apply" and the majority of survey respondents selected at least two answers.

Only 10 (6%) out of 173 respondents were able to accurately estimate the length of a basking shark (with a margin of error of ± 3 meters). The estimated average length was 15 meters, but lengths ranged from 1 meter to 1,000 meters. However, 24% of respondents declined to answer the question. Fifty-Eight percent of respondents estimated that basking sharks were at least 3 meters or larger, indicating that slightly over half of respondents recognize that basking sharks are on the larger size, but only 31% estimated basking sharks to be 6 meters or larger (Table 6).

The average estimated level of danger of a basking shark was 3.0 out of 10. The average health of the basking shark population in Ireland was estimated to be 5.0, out of 10.0, though 17 (10%) individuals declined to answer the question (Table 6). Sixty-five percent of respondents rated basking sharks as a 4 or below out of 10 on the danger scale.

Basking Shark Sightings

Ninety-one percent of respondents were not aware that they could report sightings to either IWDG.ie or Baskingshark.ie. Only 7% of respondents were aware that basking shark sightings could be reported.

A total of 23 respondents (13%) said that they had seen basking sharks. Out of those 23, eight (23%) reported that they had seen basking sharks on TV or the Internet (i.e. Facebook videos). Kerry had three sightings, while Malin Head, Lough Swilly and

Dunree were each cited twice. Culdaff, Cornwall, Lough Foyle, Burtonport, and Florida (USA) all had one sighting. No one who indicated they had a sighting on the survey had reported it.

The average response to "How likely are you to report a sighting?" was 5.6 out of 10, with a standard deviation of 3.5 and a median of 6. The belief that reporting basking shark sightings is helpful for basking shark conservation had an average of 8.5 out of 10, with a standard deviation of 2.23 and a median of 10 (Table 6).

When asked what would make reporting easier, seven (4%) respondents declined to answer. One hundred and two (59%) selected a Facebook page, 40 (23%) selected email, 37 (21%) selected a mobile app, and 34 (20%) selected a phone number. It should be noted that respondents were told to select "all that apply", and many selected more than one option.

Support for Shark Conservation

The average support of legal protections for basking sharks and other shark species was 7.9 (SD = 3.1) and 7.8 (SD = 3.2), respectively (out of a maximum of 10) (Table 6).

Belief in Others' Interest in Basking Shark Tourism

The average belief that tourists would pay to view basing sharks from a boat was 8.2 out of 10 (SD = 2.2), but the average response to the belief that tourists would pay to view basking sharks from land was 6 out of 10 (SD = 3.2). The average response for the belief that the Irish would pay to view basking sharks was 7.1 (SD = 2.6) (Table 6).

Personal Interest in General Shark & Basking Shark Tourism

General interest in shark tourism had an average of 7.1 out of 10 for viewing sharks from a boat (SD = 3.1), 7.5 for viewing sharks from the land (SD = 3.9), but a 3.8 for swimming with sharks (SD = 2.9). Interest in paying for basking shark tourism had a mean of 6.9 for paying to view basking sharks from a boat (SD = 3.1), and 6.1 for paying to view basking sharks from the land (SD = 3.2) (Table 6).

Effect of Basking Shark Tourism and Protections

The belief that someone would choose Ireland in order to view basking sharks averaged 5.8 out of 10 (SD = 2.8). The belief that protecting basking sharks would increase tourism averaged a 6.7 (SD = 2.7), while the belief that marine tourism has a positive impact on the economy was an average of 6.8 (SD = 2.6). The average response to if respondent's want tourism to increase at Malin Head was 8.7 (SD = 1.9) (Table 6).

General Interests and Membership of Organizations

Eighty-seven percent of individuals were not a part of the listed groups or organizations and 95% did not indicate that they were a member of any environmental groups. The small response rate barred these questions from being used in data analysis. Less than 10% of survey respondents participated in scuba diving, sailing, or writing, and so those hobbies could not be used in statistical analysis. 17% of respondents participated in beach clean ups, 19% participated in fishing, 27% visited aquariums, and 34% participated in hiking.

Likelihood to Report Basking Shark Sightings and Support for Conservation

There was a significant correlation between a respondent's likelihood to report a basking shark sighting, and a belief that legal protections for basking sharks will increase

tourism in Ireland ($X^2 = 166.36$, $p = 3.49 \times 10^{-5}$), as well a support for legal protections for basking sharks ($X^2 = 160.60$, $p = 0.00012$). Likelihood in reporting was also significantly positively correlated with a belief that the Irish will pay to view basking sharks ($X^2 = 140.19$, $p = 0.0050$) as well as the respondent's willingness to pay to view basking sharks from a boat ($X^2 = 145.31$, $p = 0.0021$). Likelihood in reporting was also significantly correlated with the belief that reporting basking shark sightings is important for basking shark conservation ($X^2 = 126.38$, $p = 0.038$) (Table 5).

Relationship Between Knowledge and Support for Conservation

Correct knowledge of what a basking shark eats was significantly positively correlated with support for legal protections for basing shark ($X^2 = 20.4$, $p = 0.026$) (Table 5). Knowledge that basking sharks are found in local waters or knowledge about the correct length of a basking shark were not correlated with support for legal protections. Perception of the danger of basking sharks was not correlated with support for their legal protections. Similarly, knowing the correct "danger" level of a basking shark was not correlated with support for legal protections for basking sharks. Support for legal protections for basking sharks was also not correlated with how "healthy" the respondents thought Irish basking shark populations were (Table 7).

Relationship Between Knowledge and Interest in Shark Tourism

Correct knowledge of what a basking shark eats was significantly positively correlated with support for legal protections for basing shark ($X^2 = 20.4$, $p = 0.026$) (Table 5). Similarly, there was no correlation between knowing what a basking shark

looks like, what it eats, or how long it is, compared to willingness to pay to view basking sharks (Table 7).

Relationship Between Conservation and Interest in Tourism

Support for legal protections for basking sharks was significantly and positively correlated with a belief that tourists will pay to view basking sharks from a boat ($X^2 = 197.1$, $p = 7.13 \times 10^{-12}$) and a belief that marine tourism has a positive impact on the Irish economy ($X^2 = 154.1$, $p = 9.58 \times 10^{-4}$) (Table 5).

Support for legal protections for *other* sharks was significantly correlated with a belief that protections for basking sharks would increase tourism ($X^2 = 154.1$, $p = 4.18 \times 10^{-4}$) (Table 5). Notably, there was not a significant relationship between the belief that protecting basking sharks would increase tourism and support for legal protections for basking sharks (Table 7).

Support for legal protections for basking sharks was significantly positively correlated with a belief that Irish citizens would pay to view basking sharks ($X^2 = 130.7$, $p = 0.021$) (Table 5). Support for legal protections for basking sharks was also significantly positively correlated with the respondents' willingness to pay to view basking sharks from a boat ($X^2 = 137.3$, $p = 5.30 \times 10^{-4}$).

Support for legal protections for other sharks was significantly positively correlated with a respondents' willingness to visit a location to view sharks from the land ($X^2 = 141.4$, $p = 0.0150$) but negatively correlated with a respondents' willingness to swim with sharks ($X^2 = 139.9$, $p = 0.0244$). Support for legal protections for basking sharks was significantly negatively correlated with a respondent's desire to swim with

sharks ($X^2 = 139.9$, $p = 5.23 \times 10^{-3}$). Support for legal protections for basking sharks was significantly positively correlated with a respondents' willingness to visit an area that offered general shark viewing from the land ($X^2 = 141.4$, $p = 4.10 \times 10^{-3}$) and a respondents' willingness to pay to view basking sharks from land ($X^2 = 143.3$, $p = 2.94 \times 10^{-3}$). Support for legal protections for other sharks was positively correlated with willingness to take a boat trip to view sharks ($X^2 = 137.3$, $p = 7.91 \times 10^{-3}$) (Table 5).

Effect of Demographic Factors

There was no significant correlation between support for legal protections and any of the selected hobbies, with Pearson's Chi-square p-values ranging from 0.30 - 0.50 (Table 7).

There was no significant difference in survey answers between gender (Table 7), with the exception that men were significantly more likely to swim with sharks ($X^2 = 24.6$, $p = 0.0061$) (Table 5). Residents were significantly more likely to be aware of both general shark species ($X^2 = 8.5$, $p = 0.0035$) and basking sharks than visitors were ($X^2 = 7.9$, $p = 0.0050$) (Table 5) but not more likely to support legal protections for basking sharks or other sharks (Table 7).

Nineteen percent of survey respondents selected fishing as a hobby, but of those who did the average support for legal protections for basking sharks was 8 out of 10, the same as the general average, and no significant difference was found in chi square analysis.

There was no significant difference in interests in basking shark or general shark tourism between residents and tourists of Buncrana. Similarly, there was no significant

difference between residents or visitors and the belief that either Irish citizens or tourists would be willing to pay to view basking sharks (Table 7).

Table 5
A summary of statistically significant correlations between key variables (N = 173)

*** p<0.01, ** p<0.05, *p<0.1

<u>Question 1</u>	<u>Question 2</u>	<u>Chi-Square</u>	<u>DF</u>	<u>P Value</u>	<u>Pearson's Correlation</u>
Support for legal protections for other sharks	Legal protections for basking sharks increasing tourism	154.11	100	0.00042***	0.35
Support for legal protections for other sharks	View other sharks from boat	137.32	100	0.0079**	0.19
Support for legal protections for other sharks	Swim with sharks	129.73	100	0.024*	-0.03
Support for legal protections for other sharks	View other sharks from land	133.11	100	0.015*	0.20
Resident or Visitor	Aware of basking sharks in local waters	7.92	1	0.0049**	0.23
Resident or Visitor	Aware of other sharks in local waters	8.53	1	0.0035**	0.23
Support for legal protections for basking sharks	Tourists pay view basking sharks from boat	197.05	80	7.31e-12***	0.27

Table 5 (continued).

Support for legal protections for basking sharks	Impact of tourism on the economy	149.68	100	0.00096***	0.23
Support for legal protections for basking sharks	Pay to view basking sharks from boat	152.86	100	0.00053***	0.20
Support for legal protections for basking sharks	Swim with sharks	139.89	100	0.0052**	-0.03
Support for legal protections for basking sharks	View other sharks from land	141.37	100	0.0041**	0.14
Support for legal protections for basking sharks	Pay to view basking sharks from land	143.34	100	0.0030**	0.14
Support for legal protections for basking sharks	Know basking sharks eat zooplankton	20.39	10	0.026*	0.01
Support for legal protections for basking sharks	Irish pay view basking sharks	130.66	100	0.021*	0.23
Likelihood to Report sightings	Legal protections for basking sharks increasing tourism	166.36	100	3.49e-05***	0.37
Likelihood to Report sightings	Support for legal protections for basking sharks	160.60	100	0.00012***	0.31
Likelihood to Report sightings	Irish pay view basking sharks	140.19	100	0.0050**	0.10
Likelihood to Report sightings	Pay to view basking sharks from boat	145.31	100	0.0021**	0.17

Table 5 (continued).

Likelihood to Report sightings	Belief that reporting BS sightings is good for conservation	126.38	100	0.038*	0.41
Gender	Swim with sharks	24.61	10	0.0016**	0.3

DISCUSSION

Shark Knowledge

The hypothesis that the general public is unaware of sharks in local waters was generally supported, though residents were significantly more likely to be aware of sharks than visitors. Of those surveyed who were aware of sharks in Irish waters, the majority were able to list basking sharks (often only basking sharks), matching previous research in Plymouth, UK, which also found basking sharks as one of the most commonly known or encountered species of sharks by aquarium visitors (Friedrich et al., 2014). This reflects the survey data, as the majority of survey respondents were from Ireland and the UK, and basking sharks are one of the largest marine megafauna found locally.

Over half of respondents ranked basking sharks as 4 or below on the danger scale, indicating that the majority of respondents correctly rated basking sharks as not particularly dangerous, albeit not completely harmless. Basking sharks are known to breach and, while they rarely land on vessels, have been attributed to the capsizing of small vessels and were blamed for the subsequent drowning of least three people in 1937 in Carradale, Scotland (Speedie, 2017). Similarly, while the majority of respondents did not know what basking sharks eat, less than 5% of respondents thought that basking sharks were predatory (i.e. ate other sharks or seals). The majority of respondents selected incorrect answers such as "small fish" or "shrimp", which don't follow the stereotype of sharks as aggressive predators.

Shark Knowledge and Support for Shark Conservation

Support for legal protections for both general shark species and basking sharks was high and the data indicate that no group (residents or visitors; men or women) is more likely to *oppose* legal protections than another. Considering the high level of conservation support for both basking sharks and general sharks, tourists may be predisposed to receiving conservation messaging in tourism materials. Previous research has found that those who participate in whale watching (an activity similar to basking shark watching) want more educational information about the dolphins and whales (Lück, 2015). Notably, the surveyed tourists wanted more information about the species they were paying to view, rather than the general marine environment (Lück, 2015).

The question of awareness of sharks may not be wholly accurate. Thirty-five percent of survey respondents said they were unaware of any shark species in local waters, even though 52% of respondents stated that they were aware of basking sharks in local waters. This seemingly contradictory result may be explained by the perception of the general public of sharks as dangerous. Verbal comments by survey respondents indicate that the perception of what a shark is may not be consistent. When surveys were finished, some respondents stated that non-dangerous, but common sharks, such as dogfish, were not "real" sharks. Similar comments were made towards basking sharks for their perceived lack of danger to humans. Furthermore, in 2018, an online survey found that whale sharks were listed as one of the most important "*whale*" species to conserve (Naylor & Parsons, 2018). While basking sharks have a less misleading name, their size, diet, and/or peaceful nature may confuse those who are not generally familiar with marine fauna. Questions that differentiate between dangerous or non-dangerous sharks may shed light on this bias. The

nature of the survey may have influenced the answer as well. Respondents who read ahead may have deduced that if someone was asking about basking sharks, basking sharks may be found nearby. Conducting the survey with a questionnaire platform that prevents reading ahead (e.g. a questionnaire on an iPad or similar tablet) might remove this source of bias. The high level of conservation support, compared with the low level of knowledge and awareness, indicates that individuals may support conservation measures without needing informational awareness campaigns to make people aware of their presence of sharks. The high support for legal protections for basking sharks should bode well for conservation. Conservation groups may not need to educate the public beyond concerns about the health of the basking shark population in order to garner public support for conservation measures.

Lack of awareness of charismatic megafauna may not prevent individuals from participating in or enjoying ecotourism focused on said megafauna. One study in Peru found that 67% of tourists and residents (randomly selected for a whale-watching trip) were unaware of whales in Peruvian waters, but after the trip both groups showed significant increases in knowledge and had high satisfaction rates and high support for investing money into whale conservation (García-Cegarra & Pacheco, 2017). Other research has found that providing educational content on whale-watching trips can significantly increase conservation intent among viewers (Jacobs & Harms, 2014), indicating the importance of conservation messaging in ecotourism.

Support for legal protections for basking sharks was also significantly positively correlated with correct knowledge of what a basking shark eats. This is probably not due

to a perception of basking sharks being less dangerous, because when a respondent's perception of the danger level of a basking shark was compared to support for legal protections, there was no significant correlation. However, having more knowledge of sharks may predispose some to support that organism's conservation (O'Bryhim & Parsons, 2015). This is consistent with previous research on knowledge and conservation regarding knowledge and support for conservation for a wide range of animals (Penn et al., 2018). Lack of overall knowledge about basking sharks did not preclude the public to be against legal protections for basking sharks, which is also consistent with previous research that has found that the general public may have poor knowledge of an organism or its conservation status, and still support funding for its conservation (O'Bryhim & Parsons, 2015; Tisdell & Wilson, 2004). As previously noted, research has shown that individuals will demonstrate high conservation support for *fake* cetacean species, indicating an overall support in general for marine megafauna conservation (Naylor & Parsons, 2018).

The significant correlation between support for legal protections for other sharks and belief that protecting basking sharks would increase tourism may be explained by an overall support for marine conservation and that believe that protecting all marine life will help support tourism. The causation of this significant link is not clear.

The low interest in viewing basking sharks from the land may be explained by the lack of knowledge the general public has about the massive size of basking sharks. While 58% of respondents know that basking sharks were at least three meters long, only 31% were aware that basking sharks were six meters or larger (basking sharks can reach a

length of eight meters, with six meters being the minimum adult size). Combined with the lack of knowledge about what a basking shark eats, individuals may not be aware that basking sharks spend a considerable time at the surface or that they are large enough to view from a great distance. Signage at areas where basking sharks are usually found may increase public knowledge of this fact, increasing interest in viewing basking sharks from areas like Dunree or Malin Head.

It was found that correct knowledge of basking shark facts was not correlated with an interest in paying to view them, nor a belief that others would pay to do so. This reflects previous research that has found low knowledge of whales, a comparable megafauna, does not effect a respondents interest in viewing them (García-Cegarra & Pacheco, 2017). However, the amount of survey respondents who got knowledge questions correct was minimal and knowledge questions were the ones most likely to be unanswered, which could have affected the accuracy of statistical tests. Further research on a wider sample set is needed to determine whether or not this is true.

Belief in Others' Interest in Basking Shark Tourism

It was hypothesized that survey respondents would believe that others would be willing to pay to view basking sharks, and this was supported. The belief that tourists would pay to view basking sharks is significantly correlated with support for legal protections for basking sharks. It is not clear if people support legal protections because they think basking sharks will be profitable, or if those who think people will pay to view them are just more likely to support legal protections. Further research could expand on the reasons for supporting legal protections for basking sharks and the motivations of

those who would pay to view them or believe that others will. There was, however, a lower average belief that tourists would pay to view sharks from land than from a boat. Likely this is because respondents believed that individuals would be much more likely to pay for a more comprehensive experience (i.e. boating). It could also be explained by the fact that most survey respondents underestimated the size of basking sharks. Not realizing that sharks can be easily seen from land in Donegal may have impacted the answer.

The data supports the hypothesis that a belief that marine tourism is good for the Irish economy is correlated with support for legal protections for basking sharks. The relationship between the belief that basking sharks can be profitable and support for legal protections for basking sharks mirrors previous research that has found that support for legal protections for fish species tends to be focused more on utilitarian or monetary gains than emotional ones (Batt, 2009). The high willingness of survey respondents to pay to view basking sharks and high belief that others will pay to view basking sharks is reflected in previous research, which has found a high willingness of individuals to pay for threatened, endangered, or rare marine megafauna (Lew, 2015), of which basking sharks qualify, as they are considered "vulnerable" by the IUCN (IUCN, 2005). The amount individuals are willing to pay can vary depending on the species, however, and future research should delve into the price point that individuals are willing to pay to view basking sharks in Ireland.

Those who believe that legal protections for basking sharks will increase tourism to Ireland were significantly more likely to report any potential basking shark sightings, demonstrating a link between support for shark conservation and the belief that shark

conservation is profitable. Willingness to report basking shark sightings was also significantly correlated with the belief that Irish will pay to view basking sharks as well as the respondents interest in viewing basking sharks from a boat, supporting the hypothesis that those who support shark conservation are more likely to have an interest in shark tourism. However, it should be noted that most respondents did not know they can report basking shark sightings.

General Interests, Support for Shark Conservation and Shark Tourism

The data indicate that overall, people are interested in both general shark tourism and paying for basking shark tourism. There is one discrepancy, in that respondents were less likely to want to swim with sharks, and those who were less likely to want to swim with sharks were also less likely to support legal protections for both basking sharks and other sharks.

It was expected that those who are interested in environmental activities were more likely to support basking shark conservation. There was not enough data to determine whether there was a correlation between those who participate in environmental activities and support for legal protections for basking sharks. However, previous research has found that those who participate in whale-watching are more likely to also participate in pro-environmental behaviors, such as recycling (Parsons, 2004), and that participating in whale watching that contains an educational component will also increase support of conservation in visitors (Jacobs & Harms, 2014). A larger survey may shed more light on this.

There was no indication that there was a conflict between those who fish and those who support legal protections for basking sharks. Nineteen percent of survey respondents selected fishing as a hobby, but of those who did the average support for legal protections for basking sharks was 8 out of 10, i.e., no different from the scores from the non-fishing respondents, and no significant difference was found in the chi square analysis. This matches previous research, which found that recreational anglers have a high support for conservation measures (i.e. catch and release requirements, closed season) (Oh & Ditton, 2008). Previous research has also found support within American fishing communities for policies that directly affect them, such as slot times, hook mandates, and recreational bag limits (Murphy, Scyphers, & Grabowski, 2015). However, this kind of support for shark conservation among fishing communities is not consistent, as other research has found that artisanal fishermen are less likely to support shark conservation if it negatively impacts their ability to fish, even if general support for shark consecration is high (O'Bryhim, Parsons, Gilmore, & Lance, 2016). More research is needed to determine the specific views of the Irish fishing community.

While personal interest in shark and basking shark tourism was high (between 7-9 out of 10) (Table 6), some survey respondents expressed concern about ecological impacts of tourism. One respondent wrote on the survey that they did not support swimming with sharks out of "environmental concerns". Some respondents commented verbally that they weren't sure if they supported shark tourism in general or basking shark tourism in Ireland due to environmental concerns regarding the impact of tourism on sharks. Future surveys can specify environmental impact or ethical guidelines in order to get more clarity in why

individual may oppose shark tourism or are less willing to pay for or participate in shark tourism.

This may indicate that environmental regulations will not negatively impact profit. This is supported by previous research that found that individuals are willing to pay for ecotourism experiences if their money is going towards conservation (Bhandari & Heshmati, 2010; Casey, Brown, & Schuhmann, 2010). Other studies have also found that approximately 80% of participants in whale shark watching rate a desire to expand knowledge or explore a new environment in their top three reasons to go (Ziegler et al., 2012). Furthermore, almost half of Peruvian whale watchers wanted boats to remain at safe distance away from the whales (García-Cegarra & Pacheco, 2017), rather than get closer. Other research has found that tourists on whale watching vessels have expressed concern about the number of vessels and the potential negative impact on cetaceans (Bentz, Lopes, Calado, & Dearden, 2016a). Several studies have found that have found that people would prefer environmentally-friendly wildlife tourism (i.e., ecotourism) (Lacher et al., 2016). Tourists in the Dominican Republic expressed strong support for seeing dolphins in the wild over captive dolphins (Draheim, Bonnelly, Bloom, Rose, & Parsons, 2010). Research in Tanzania demonstrated that individuals were more willing to pay for sustainable certifications (Lacher, 2012). Considering that a large percentage of Scottish whale-watchers demonstrate pro-environmental behaviors (Parsons, 2004), further research should be conducted to determine conclusively if Irish tourists share a similar preference for sustainable wildlife tourism.

There have been studies that demonstrate short-term negative impacts to whale sharks, due to vessel proximity or harassment by tourists (Araujo, Vivier, Labaja, Hartley, & Ponzio, 2017). However, long-term studies are still needed to determine the long-term impact on whale sharks (Araujo et al., 2017) and further research is needed to determine potential impacts on basking sharks. Preemptive regulations may be implemented in order to reduce negative impacts to basking sharks. This preliminary research indicates that regulations that reduce the impact of tourism may be supported by those who are willing to pay for shark tourism, due to the relationship between support for shark conservation and interest in tourism.

Interest in basking shark tourism was not correlated with the respondent's perception of danger. This corresponds to previous research that has found that interest in shark tourism is not necessarily correlated with a danger or “thrill” factor (Torres et al., 2017).

Support for Legal Protections for Basking Sharks

The question of supporting legal protections for basking sharks did cause some confusion. Not all survey respondents were aware of whether or not basking sharks were currently under legal protection in Ireland. In order to ensure consistency, the researcher could not provide that information to respondents. Future surveys may clarify the legal status of basking sharks, or provide a script for researchers to include that information. It is not known if this affected the results.

Due to the strong, positive correlation between a belief that others will pay to view basking sharks and support for legal protections for basking sharks, as well as respondents

interest in viewing basking sharks and support for legal protections for basking sharks, more research is needed to determine whether the support for legal protections for basking sharks is related to the "charisma" of the species, or a belief that it is economically valuable. Similarly, the belief that others will pay to view sharks may or may not be related to the "likeability" of the species. Research has found that "cute" species tend to get more conservation support, though large charismatic "flagship" species may also garner support (Qirko, 2017). Further research has found that the name of a species strongly influences the likelihood that individuals will support its conservation, with positive-sounding names garnering more support than negative-sounding names (Karaffa, Draheim, & Parsons, 2012). Furthermore, research has indicated that perceived fear has a negative impact on support for conservation of local species (Draheim, Patterson, Rockwood, Guagnano, & Parsons, 2013). This research supports this, as the average danger rating for basking sharks was approximately three out of ten. Further research could compare support for basking sharks versus sharks perceived as "dangerous".

It is notable that support for legal protections was not correlated with how healthy individuals thought that the basking shark population was in Ireland. Considering that the mean was 5, indicating that individuals neither thought they were very unhealthy or very healthy, support for legal protections may come from a place of pro-active conservation or general support of the environment. Other research can indicate what the reasoning is, if it is economic or other, or may look into overall environmental concerns of survey respondents.

Is There a Market in Donegal for Basking Shark Tourism?

Considering that there is no significant difference in interest in basking shark tourism between residents and visitors, and, considering that the majority of visitors were still Irish, there seems to be an untapped national market for basking shark tourism. This can provide an opportunity to establish small-scale basking shark tourism, without having to market to foreign tourists, allowing for slower growth of the industry. Slow, controlled growth may help prevent environmental impacts and help ensure that proper ethical guidelines are established and followed (Conaghan et al., 2015; Ziegler et al., 2012). While the majority of survey respondents did not indicate high knowledge or specific interest in basking sharks, this does not mean a tourism industry cannot develop. For comparison, whale shark tourism in Australia evolved from a highly specialized tourism industry to a more generalist tourist attraction (Catlin & Jones, 2010).

It should be noted that while Lough Swilly is not known for basking shark-viewing (though one survey respondent did say that they saw a basking shark in the Lough), people could visit multiple locations to view basking sharks within an hour, such as Dunree, a historic fort and scenic lookout, and Malin Head, another popular tourist destination.

Scottish whale-watching was calculated to be worth \$18 million in 2000, even though whale-watching was not generally the primary reason for visiting western Scotland (Parsons, Warburton, Woods-Ballard, et al., 2003). A survey of whale-watchers and general tourists asked for the reason individuals chose western Scotland as a place to vacation. The top reasons that both groups chose western Scotland include landscape, seascape, and wildlife, however a small, but notable percentage (10%) of whale-watchers chose the region for its remoteness (Parsons, Warburton, Woods-Ballard, et al., 2003).

Similar to western Scotland, Donegal is a region known for its striking land and seascapes, and wildlife is often mentioned in advertising material (Tables 1 and 2). Donegal may consider modeling after West Scotland, as it may attract the same types of tourists from both Ireland and the UK, the second most common visitor surveyed in Buncrana.

Limitations and Sources of Error

Some limitations of this study are that it is a very small case study. However, it should be noted that the trail is used by a very diverse set of people, and is accessible to the elderly, parents with strollers, and able-bodied individuals. It is the only scenic trail in the town of Buncrana. The type of people who would be on the beach or the trail, versus a pub, are those who are more likely to participate in activities that allow them to view basking sharks. However, the survey cannot necessarily be said to apply to all of Donegal or all of Ireland. Gender was not a significant factor in any answers, however, the surveys skewed female. This is due in part to the fact that when families were approached, the women were more likely to answer the survey than the men.

Some potential sources of error include that, based on verbal statements from survey respondents that some respondents took "resident" to mean a resident of Buncrana, while others took it to mean a resident of "Donegal" (which could include Northern Irish towns and cities). However, the confusion is likely minimal as there was no significant difference between residents or visitors. Some Northern Irish individuals may have listed their nationality as simply Irish. Future surveys may ask the county or village of residence if further clarity is needed. Another source of error was that of those who selected "yes" in

response to if they had ever seen a basking shark, several listed the "internet" as the source. Future surveys can specify whether they have seen them *in person* versus online.

While this survey was focused on basking sharks and general sharks, it may be interesting to determine if people have knowledge of other fauna as well, such as minke whales (*Balaenoptera acutorostrata*), seals, or sea birds, all of which can also be found in the same region. Expanding the attention of tourism material to multiple forms of wildlife may attract a wider range of tourists as well as ensuring happy customers, as it increases the chance that someone will see some form of charismatic megafauna.

There are further concerns regarding Brexit. It is currently unclear what, if any, impact Brexit may have on tourism. Malin Head, Buncrana, and Dunree are in close proximity to the Northern Irish Border. With the potential escalation of regional tensions, and the uncertainty regarding how the border will be maintained, it is currently impossible to predict what affect Brexit can or will have on the region.

Conclusion

The data indicates that there seems to be a moderately sized, if untapped, market interest in basking shark watching in Donegal, Ireland. There is also strong support among both residents and visitors for both general shark and basking shark tourism, even though knowledge remains low. Strong support for basking shark conservation is promising, and may indicate that basking shark ecotourism in Ireland can be developed in a sustainable way without risking profit.

Further research should include a wider study area, such as case studies of other towns, located within Donegal, or other parts of Ireland, in order to gauge national

interest. Future studies can and should delve into more detail regarding wider environmental concerns, to ascertain whether support for legal protections for basking and other sharks is related to their charismatic nature or includes a wider range of pro-environmental opinions. A greater understanding of what conservation ideas the Irish support, and the motivation behind these ideas, will give a better understanding of the challenges and potential for support of conservation measures.

APPENDIX

A: Recruitment Script

"Hi, I'm a university student from the United States, Can I ask you some questions about sharks? It should only take about three minutes of your time.

[if no]

Thank you, have a great day!

[if yes]

I am going to read you this informed consent script. You may interrupt me at any time to ask questions, and may ask any questions before or afterwards. If you want, you may also keep a copy of the informed consent form.

B: Informed Consent

RESEARCH PROCEDURES

This research is being conducted to determine public opinions about shark tourism and shark conservation. If you agree to participate, you will be asked to answer opinion questions and provide some information, such as age. The survey will take about 5 minutes, and will be anonymous.

RISKS

There are no foreseeable risks for participating in this research.

BENEFITS

There are no direct benefits for participating in this research. We hope to quantify public opinion on shark conservation and shark tourism through this research.

CONFIDENTIALITY

The data in this study will be confidential. I will not collect identifying information such as name or contact information.

PARTICIPATION

You must be 18 years or older to participate. Your participation is voluntary, and you may withdraw from the study at any time and for any reason. If you decide not to participate or if you withdraw from the study, there is no penalty or loss of benefits to which you are

otherwise entitled. You may also skip any question you do not wish to answer. There are no costs to you or any other party.

CONTACT

This research is being conducted by Chelsea Gray and Chris Parsons, of the Environmental Science and Policy Department, at George Mason University. Dr. Parsons may be reached at +1 (703)- 591-2095 and Ms. Gray may be reached at + 1 (703)-594-1581 for questions or to report a research-related problem. You may contact the George Mason University Institutional Review Board office at 703-993-4121 if you have questions or comments regarding your rights as a participant in the research.

This research has been reviewed according to George Mason University procedures governing your participation in this research.

C: Survey

General Information:

- Nationality: _____
- Age: _____
- Gender: **Male** () **Female** () **Prefer not to answer** ()
- Occupation: _____
- Are you a resident of the area or a visitor? **Resident** () **Visitor** ()
 - If visitor, what is the purpose of your visit?
Work () **Holiday** () **Other** ()
- Are you aware of any sharks that inhabit in the local coastal waters? **Yes** ()
No ()

If you answered yes, what species occur here? *[Please write your answer(s) in the space provided below]*

Questionnaire: *Please circle your answers*

1. Do you know what a basking shark look like? **Yes** () **No** ()

2. Do you know what a basking shark feeds on? *[Please circle all that apply]*

Small fish

Large fish

Other sharks

Microscopic plants

Seaweed

Seawater

Jellyfish

Shrimp

Microscopic animals

Seals

3. How big is a fully-grown adult basking shark (roughly)? _____ **meters**

4. How dangerous are basking sharks?

(Not dangerous) **0 1 2 3 4 5 6 7 8 9 10** *(Very dangerous)*

5. Did you know that you can find basking sharks in local waters? **Yes () No ()**

6. Have you ever seen a basking shark? **Yes () No ()**

6 a. If yes where, when and did you report it? *[Please write your answer(s) in the space provided below]*

7. Are you aware that you can report your sightings of basking sharks to the www.IWDG.ie and or at www.baskingshark.ie? **Yes () No ()**

8. Do you think the reporting of basking shark sightings can help basking shark conservation?

(Not helpful) **0 1 2 3 4 5 6 7 8 9 10** *(Very helpful)*

9. How likely are you to report a basking shark sighting?

(Not at all likely) 0 1 2 3 4 5 6 7 8 9 10 (Very likely)

10. How could the reporting of a basking shark sighting be made easier for you? [Please circle all that apply]

Facebook Page

Email

Phone number

Smart phone app

Other: _____

11. If a location offered shark viewing from a boat how likely are you to take a trip to see sharks?

(Not at all likely) 0 1 2 3 4 5 6 7 8 9 10 (Very likely)

12. If a location offered chances to swim with sharks, how likely are you to swim with sharks?

(Not at all likely) 0 1 2 3 4 5 6 7 8 9 10 (Very likely)

13. If a location offered shark viewing from the land (a headland or watch tower) how likely are you go there to watch sharks?

(Not at all likely) 0 1 2 3 4 5 6 7 8 9 10 (Very likely)

14. How healthy do you think basking shark populations are in Ireland?

(Not healthy) 0 1 2 3 4 5 6 7 8 9 10 (Very healthy)

15. Do you support legal protections for basking sharks in Ireland?

(Not at all) 0 1 2 3 4 5 6 7 8 9 10 (Very much)

16. Do you support legal protections for other shark species?

(Not at all) 0 1 2 3 4 5 6 7 8 9 10 (Very much)

17. Do you think tourists will pay to go and see basking sharks from a boat?

(Not at all likely) 0 1 2 3 4 5 6 7 8 9 10 (Very likely)

18. Do you think tourists will pay to go and see basking sharks from the land (headland or watchtower)?

(Not at all likely) 0 1 2 3 4 5 6 7 8 9 10 *(Very likely)*

19. Do you think Irish citizens will pay to view basking sharks?

(Not at all likely) 0 1 2 3 4 5 6 7 8 9 10 *(Very likely)*

20. How willing are you to pay to view basking sharks from a boat?

(Not at all willing) 0 1 2 3 4 5 6 7 8 9 10 *(Very willing)*

21. How willing are you to pay to view basking sharks from the land?

(Not at all willing) 0 1 2 3 4 5 6 7 8 9 10 *(Very willing)*

22. How likely do you think it is that someone would choose Ireland as a tourism destination, in order to view basking sharks?

(Not at all likely) 0 1 2 3 4 5 6 7 8 9 10 *(Very likely)*

23. If basking sharks were protected, do you think that would increase tourism?

(Not at all likely) 0 1 2 3 4 5 6 7 8 9 10 *(Very likely)*

24. What impact do you think marine tourism has on the Irish economy?

(Negative) 0 1 2 3 4 5 6 7 8 9 10 *(Positive)*

25. Would you like tourism to increase in Malin Head?

(Not at all) 0 1 2 3 4 5 6 7 8 9 10 *(Very much)*

26. Do you participate in the following activities: *[Please circle all that apply]*

Surfing

Scuba diving

Fishing

Sailing

Visiting

aquariums

Beach clean ups

Golfing

Hiking

Painting

Writing

Pottery-Making

Horse back

Riding

Rock Climbing

27. Are you a part of any of the following: *[Please Circle all that apply]*

**Conservation/Environmental
Group
Golf Club
Tourism Operation**

**A fishing organisation
A business that benefits from
tourism**

27 a. If you are a member of any conservation/environmental organization(s), which one(s)? *[Please write your answer(s) in the space provided]*

D: Results

Table 6

Average Responses to Survey Questions (N = 173).

<u>Survey Question</u>	<u>Mean</u>	<u>SD</u>	<u>Did Not Answer (%)</u>
Age (years)	41.99	14.53	8.45
How big is a fully-grown adult basking shark in meters?	15.17	87.08	50.63
How dangerous are basking sharks?	3.18	2.80	1.63
Do you think the reporting of basking shark sightings can help basking shark conservation?	8.50	2.23	1.30
How likely are you to report a basking shark sighting?	5.64	3.49	2.03
If a location offered shark viewing from a boat how likely are you to take a trip to see sharks?	7.17	3.14	1.83

Table 6 (continued).

If a location offered chances to swim with sharks, how likely are you to swim with sharks?	3.81	3.91	2.27
If a location offered shark viewing from the land (a headland or watch tower) how likely are you go there to watch sharks?	7.55	2.86	1.66
How healthy do you think basking shark populations are in Ireland?	4.94	2.29	1.33
Do you support legal protections for basking sharks in Ireland?	7.99	3.14	1.82
Do you support legal protections for other shark species?	7.78	3.21	1.87
Do you think tourists will pay to go and see basking sharks from a boat?	8.19	2.21	1.28
Do you think tourists will pay to go and see basking sharks from the land (headland or watchtower)?	6.12	3.22	1.87
Do you think Irish citizens will pay to view basking sharks?	7.14	2.60	1.51
How willing are you to pay to view basking sharks from a boat?	6.99	3.06	1.78
How willing are you to pay to view basking sharks from the land?	6.12	3.22	1.87
How likely do you think it is that someone would choose Ireland as a tourism destination, in order to view basking sharks?	5.85	2.75	1.60

Table 6 (continued).

If basking sharks were protected, do you think that would increase tourism?	6.67	2.66	1.54
What impact do you think marine tourism has on the Irish economy?	6.87	2.61	1.52
Would you like tourism to increase in Malin Head?	8.72	1.97	1.15

Table 7

A summary of statistically non-significant correlations between key variables (N = 173)

<u>Question 1</u>	<u>Question 2</u>	<u>Chi-square</u>	<u>Df</u>	<u>P value</u>
Correct danger	Respondent pay to view basking sharks from boat	15.24	10	0.12
Correct danger	Respondent pay to view basking sharks from land	8.85	10	0.55
Correct danger	Tourists pay to view basking sharks from boat	3.86	8	0.87
Correct danger	Tourists pay to view basking sharks from land	9.65	9	0.38
Correct danger	Irish pay to view basking sharks	14.17	10	0.17
Correct food	Pay to view basking sharks from boat	7.26	10	0.70
Correct food	Pay to view basking sharks from land	10.95	10	0.36
Correct food	Tourists pay to view basking sharks from boat	10.39	8	0.24

Table 7 (continued).

Correct food	Tourists pay to view basking sharks from boat	10.67	9	0.30
Correct food	Irish pay to view basking sharks	16.09	10	0.10
Correct length	Respondent pay to view basking sharks from boat	9.32	10	0.50
Correct length	Respondent pay to view basking sharks from land	14.89	10	0.14
Correct length	Tourists pay to view basking sharks from boat	3.32	8	0.91
Correct length	Tourists pay to view basking sharks from land	8.54	9	0.48
Correct length	Irish pay to view basking sharks	10.93	10	0.36
Knowledge of what basking sharks look like	Pay to view basking sharks from boat	13.70	20	0.85
Knowledge of what basking sharks look like	Pay to view basking sharks from land	16.74	20	0.67
Perception of danger	Respondent pay to view basking sharks from boat	99.52	100	0.49
Perception of danger	Respondent pay to view basking sharks from land	104.60	100	0.36
Perception of danger	Tourists pay to view basking sharks from boat	97.91	80	0.08
Perception of danger	Tourists pay to view basking sharks from land	110.29	90	0.07
Perception of danger	Irish pay to view basking sharks	88.66	100	0.78

Table 7 (continued).

Support for legal protections for basking sharks	Awareness of basking sharks in Irish waters	14.63	10	0.15
Support for legal protections for basking sharks	Tourists pay view basking sharks from land	102.55	90	0.17
Support for legal protections for basking sharks	Protections for basking sharks increasing tourism	114.77	100	0.15
Support for legal protections for basking sharks	Choose Ireland to view basking sharks	120.70	100	0.08
Support for legal protections for basking sharks	View sharks from a boat	123.47	100	0.06
Support for legal protections for basking sharks	How healthy the basking sharks pop is in Ireland	107.47	100	0.29
Support for legal protections for other sharks	Awareness of other sharks in Irish waters	10.29	10	0.42
Support for legal protections for other sharks	Impact of tourism on the economy	119.34	100	0.09
Gender	Support for legal protections for basking sharks	11.17	10	0.34
Gender	Support for legal protections for other sharks	9.08	10	0.52
Gender	View sharks from a boat	15.13	10	0.13
Gender	View sharks from land	10.60	10	0.39
Gender	Respondent pay to view basking sharks from boat	12.22	10	0.27

Table 7 (continued).

Gender	Respondent pay to view basking sharks from land	15.39	10	0.12
Gender	Tourists pay to view basking sharks from boat	16.96	8	0.03
Gender	Tourists pay to view basking sharks from land	15.30	9	0.08
Gender	Irish pay to view basking sharks	10.99	10	0.36
Gender	Impact of tourism on the economy	11.45	10	0.32
Gender	Want tourism to increase in Malin head	10.33	7	0.17
Gender	Choose Ireland to view basking sharks	5.79	10	0.83
Gender	Protections for basking sharks increasing tourism	12.27	10	0.27

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