

REVIEW ARTICLE

Basking shark tourism in Donegal, Ireland – a case-study of public interest and support for shark conservation

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Abstract

1. Basking sharks (*Cetorhinus maximus*) visit the coastal waters of Ireland annually, and while protected in Northern Ireland, they are not protected by domestic legislation in Ireland. In Ireland, basking shark conservation relies heavily on publicly reported sightings to assess population size and migration patterns.
2. While basking shark tourism is popular in nearby Scotland, Irish tourism materials rarely feature basking sharks.
3. In order to determine public awareness about basking sharks, public support for basking shark conservation and interest in shark tourism, 173 residents and visitors in Buncrana, Ireland were surveyed in July 2018.
4. The results indicated that public knowledge of basking sharks is low, whilst support for basking shark conservation and interest in tourism are high.
5. Despite the fact that conservation groups rely on publicly reported sightings as a cost-effective research tool that is important for conservation policy, only 7% of survey respondents were aware that they could report a basking shark sighting to local research organizations (Irish Whale and Dolphin Group or Irish Basking Shark Group).
6. Individuals who support conservation were significantly more likely to believe that others would be willing to pay to view basking sharks, indicating a link between tourism potential and support for conservation.
7. This study showed that there may be an untapped tourism market for basking shark viewing in Donegal as well as public support for shark conservation.

KEYWORDS

basking shark, *Cetorhinus maximus*, marine tourism, public attitudes, public knowledge, shark conservation, social science

1 | INTRODUCTION

Wildlife tourism, defined as watching, studying or enjoying wildlife (Kiss, 2004), has the potential to positively impact conservation efforts by shaping public opinion of popular species and/or increasing the economic value of the species that attract tourists. Krüger (2005) found that both terrestrial and aquatic areas with a charismatic 'flagship' species were significantly more likely to have sustainable

ecotourism than areas without such a species. Ecotourism is wildlife tourism that also works to minimize the human impact on the local ecosystems and provides benefits to the human community hosting the tourism operators (Kiss, 2004).

Studies have demonstrated the high economic value of shark tourism specifically, which in some regions may be an untapped source of revenue for conservation efforts (Woods-Ballard et al., 2003; Vianna et al., 2018). Tourism can create incentives to increase protection for

sharks, and increasing shark abundance (because of successful conservation) increases tourism demand (Zimmerhackel et al., 2018). Shark tourism may reduce the rate of illegal or unreported fishing, as tourism operators act as incidental monitors of the region (Gallagher et al., 2015). Marine ecotourism has long been seen as a sustainable alternative to fishing, and frequently viewed as a way to protect jobs, traditions and culture in fishing towns (Hector, 2001; Woods-Ballard et al., 2003; Parsons, 2012). For example, whale shark tourism developed from conversion of fishery-based jobs into more sustainable tourism-based jobs and localized management led to regulations that protect whale sharks and other marine species, as a direct result of their economic value (Lowe, Tejada & Meekan, 2019).

In 2018 alone, tourism was a €9.4 billion industry in Ireland, with wildlife tourism growing in popularity in recent years (McLoughlin & Hanrahan, 2016; Fáilte Ireland Research Unit, 2019). Marine tourism is one of the most valuable marine sectors in Ireland and accounts for almost half of all marine-related jobs (Vega & Hynes, 2017). In 2003, 9.6% of visitors to Ireland participated in whale or dolphin watching, 9.1% participated in scuba diving or snorkelling and coastal reserves were visited by 45% of tourists (Daly et al., 2017). There have been wildlife-focused marketing initiatives in Ireland, most often highlighting dolphins, whales and sea birds, in particular along the 'Wild Atlantic Way', a scenic coastal road that runs along the entire west coast of Ireland (Hector, 2001). One successful Irish marketing initiative rebranded local dolphins as a totem or mascot animal in West Clare, to combat the loss of fishing jobs as a result of fisheries collapse (Hector, 2001). The majority of marine tourism (which includes both wildlife and ecotourism) in Ireland focuses on marine mammals, neglecting one of the most charismatic species in Ireland, the basking shark (*Cetorhinus maximus*). Understanding public knowledge of and interest in sharks, shark tourism and shark conservation is essential to determine the feasibility of a basking shark tourism initiative in Donegal and the potential intersection of tourism and conservation.

1.1 | Basking shark conservation in Ireland and the UK

Basking sharks, which are found worldwide, grow to up to 6 metres in length. Their main food source is zooplankton, which they often consume at the sea surface. Research has demonstrated long migratory routes along Europe and Africa (Doherty et al., 2017), and at least one basking shark has been documented as having travelled between Malin, Ireland, the west coast of Scotland and the east coast of the USA (Johnston et al., 2019).

Basking sharks were hunted well into the 20th century in both Ireland and the UK as a source of oil (McGonigle, 2008) and genetic studies have estimated the worldwide population of basking sharks to be as low as 8,200 (Hoelzel et al., 2006). In 1996, they were listed as 'Vulnerable' by the IUCN but in 2019 were listed as 'Endangered' (IUCN, 2019). International efforts in recent decades have protected basking sharks under international treaties, such as CITES (Appendix

II), the United Nations Convention on the Law of the Sea (UNCLOS), the Common Fisheries Policy (designated as a prohibited species) and the Convention on Migratory Species (OSPAR Commission, 2015).

Despite their IUCN status, basking sharks (or any fishes) are not protected under any domestic legislation in Ireland (basking sharks have been protected in the UK since 1981). National legislation can be particularly valuable to conservation, as tagging data have demonstrated that, at least in Europe, basking sharks spend the majority of their time within exclusive economic zones of coastal countries (Southall et al., 2006), and it has been demonstrated that some basking sharks exhibit interannual, seasonal site fidelity in Ireland and the UK (Gore et al., 2016; Doherty et al., 2017).

Currently, boat collisions, fishing by-catch and harassment from humans are the top threats to basking sharks in the North Atlantic (OSPAR Commission, 2015). The rate of collisions or bycatch is unknown, as many countries, Ireland included, do not require the reporting or tracking of such incidences (Southall et al., 2006; OSPAR Commission, 2015). Reductions in boat speed at shark hotspots may be one of the most effective ways to reduce collisions and experts have advocated for 'awareness' campaigns centred on reducing boat speeds in areas known for basking sharks as well as training for ecotourism operators (Speedie, Johnson & Witt, 2009; OSPAR Commission, 2015).

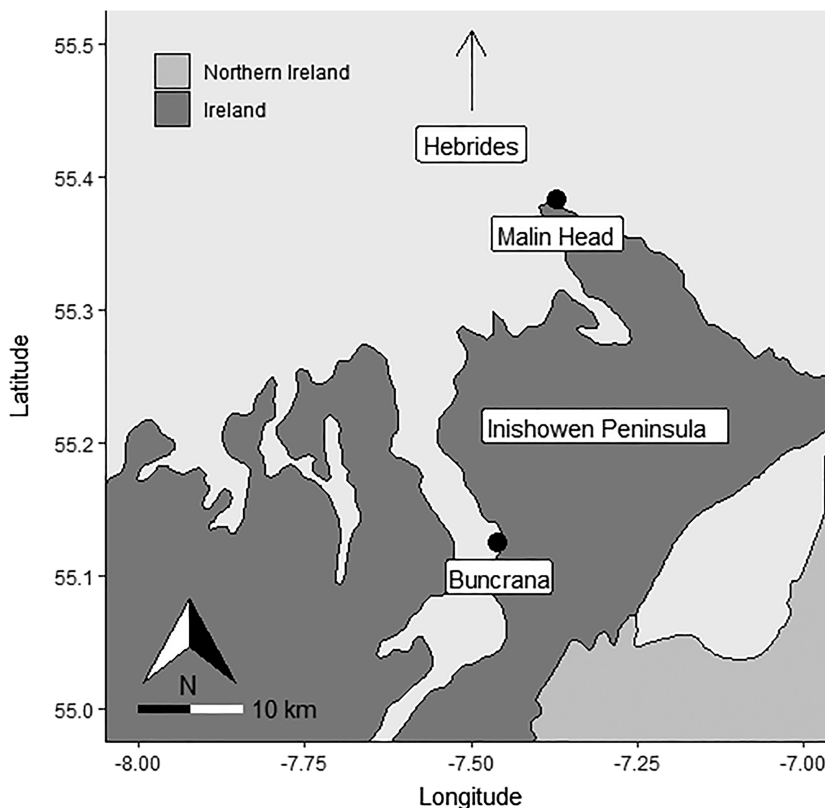
In 2020, Scotland declared the Sea of the Hebrides Marine Protected Area, citing its importance to basking shark feeding and social behaviour (Speedie, Johnson & Witt, 2009; Nature Scot, 2020; Marine Scotland, 2020a). Recent grassroots efforts in Ireland have led to a proposed amendment to the Wildlife Act 1976, which would provide basking sharks with the same protection as marine mammals (Sabin, 2021; Wildlife (Amendment), 2021). The Irish government has also begun plans to increase the coverage of Marine Protected Areas within Irish waters (Marine Protected Area Advisory Group, 2020).

1.2 | Basking shark tourism in Ireland and the UK

Shark watching tours are most successful with species that aggregate close to the surface, such as great white or whale sharks (Cisneros-Montemayor et al., 2013). Basking sharks are known to gather in aggregations that range in size from tens to hundreds (Okey, Wallace & Gallucci, 2010; Crowe et al., 2018; Gore et al., 2018). Their surface-feeding behaviour makes them easy to view from boats and kayaks, or by snorkelling. Their docile nature also makes basking sharks a popular target for swim-with-shark activities. They return annually to Ireland and the UK during the summer months, corresponding with the height of the tourism season (Sims & Reid, 2002; Southall et al., 2006; OSPAR Commission, 2015). One of the most reliable destinations for 'swim with basking shark' marine tourism is the Sea of Hebrides and Malin Sea, which connect Ireland, Northern Ireland and Scotland (Figure 1).

In Scotland, marine tourism is well established and in 2018 it earned £579 million (0.4% of the overall economy and 13% of the

FIGURE 1 Map of the Inishowen Peninsula in Donegal, Ireland. Surveys were conducted in Buncrana, located approximately 40 km from Malin Head, where basking sharks are commonly spotted in summer. The Inishowen Peninsula is located in the Malin Sea, which connects to the Hebrides Sea in Scotland. It also borders Northern Ireland



marine economy; Marine Scotland, 2020b). In 2016, wildlife watching accounted for almost 40% of all marine tourism activities, and in 2015, 90% of surveyed tourists ($N = 2,170$) stated that the possibility of seeing wildlife was 'quite important' or 'very important' to their trip to Scotland (LUC, 2016; Marine Scotland, 2020b). In 2009, 23% of wildlife-watching customers in the Isle of Man reported that they came specifically to view sharks, and 69% reported that the presence of basking sharks influenced their decision to visit (Clarke, 2009). In 2021, at least three agencies advertised 'swim with basking shark' tours and one tourism agency in Scotland charged £720 for a four-day 'basking shark and wildlife tour'.

Basking shark watching tours are also offered in Northern Ireland, which notably, takes shark-watchers to the coast of Malin Head, located in County Donegal, Ireland. Despite this, no tourism agencies based in Donegal offer such a tour. Basking shark viewing tours are only offered in the southern half of Ireland.

1.3 | Tourism in Donegal

Donegal is the most rural county in Ireland, offering many of the natural attractions that tourists desire. A 2015 survey of 1,987 overseas holidaymakers found that visitors rated 'beautiful scenery' (92%) and a 'natural unspoilt environment' (86%) as important to their visit, with high satisfaction for both (Fáilte Ireland Research Unit, 2015). In 2017, out of approximately 9 million domestic tourists, 25% participated in hiking or walking, as did 22% of the 10 million overseas tourists (Fáilte Ireland Research Unit, 2018).

The Wild Atlantic Way is a scenic highway that runs along the entire west coast of Ireland and ends at Malin Head (the most Northern Point of Ireland). Located approximately 48 km from the Northern Ireland border, Malin Head is the tip of Inishowen Peninsula (Co. Donegal, Ireland) and is largely known for its scenic hiking. Malin Head is consistently rated by Fáilte Ireland (the National Tourism Development Authority of Ireland) as one of the top free attractions in Ireland, with visitation increasing from 105,000 visitors in 2014 (Fáilte Ireland Research Unit, 2016) to 172,329 individuals in 2017 (Fáilte Ireland Research Unit, 2018).

There has been a recent push to revitalize Malin Head as a tourist destination, with the goal of establishing basking sharks as a 'totem' animal of the region (Inishowen Basking Shark Study Group, 2014), and it has been featured on Discovery Channel's Shark Week as a 'hotspot' of basking shark activity (Clemens, 2015). While basking sharks have been sighted along the entire coast of Ireland, Malin Head is a particularly reliable place to spot them from land, as they are known to gather in large groups and display various social behaviours, such as breaching (Daly et al., 2017; Johnston et al., 2019).

In order to assess what attractions are highlighted in tourism material for Malin Head and to quantify the prevalence of basking sharks as a tourist attraction in the area, the authors conducted a preliminary survey of tourism material online in July 2018. Websites for Airbnb, hotels and hostels located within a one-hour drive of Malin Head were reviewed. The remoteness of Malin Head means that few visitors actually stay in the surrounding villages, as they have little available accommodation, so a one-hour radius was chosen to account for day-trippers. 'Hotels Malin Head' and 'Hostels Malin Head' were

searched via Google. 'Malin Head' was set as the destination on Airbnb, with no preferences set on price or guest limit, and with a year-long date range to account for booked properties.

The majority (64.7%, $N = 124$) of all websites surveyed mentioned 'beautiful' or 'scenic' views. The 'Wild Atlantic Way' was mentioned by 42.3% of all websites surveyed, with a difference between hotels/hostels (100%, $n = 13$) and Airbnbs (61.3%, $n = 111$). Basking sharks were only mentioned by 2.5% of all hotel/hostels and Airbnb websites surveyed (0% of Airbnbs and 25% of hotels/hostels). The mention of other charismatic fauna, including dolphins (4.9%) and sea birds (5.7%), demonstrates either a lack of knowledge of basking sharks in the area or a belief that tourists would not find basking sharks an interesting attraction.

At the time of the study, the Inishowen Tourism Office confirmed that there were no whale- or shark-watching tours in the area. Informally, according to the Office, fishing vessels were willing to take visitors whale-watching if they had not otherwise been chartered for the day.

1.4 | Research overview

While outreach has been done by local groups, such as the Irish Basking Shark Project (since renamed Irish Basking Shark Group), few empirical data have been gathered to assess public knowledge or support of basking sharks and shark conservation in Ireland. This is an especially pertinent point, as basking shark conservation relies heavily on publicly reported shark sightings which require three preconditions to be met in order to be successful: (1) public awareness that the animal is around (for confident identification); (2) public awareness that they can report a sighting; and (3) public awareness of how to report the sighting (Mulder et al., 2010; Hall et al., 2013). Assessing the number of people who are aware that they can report sightings (including demographic trends) will allow research groups to design targeted campaigns for educational outreach.

Understanding the level of support for conservation is also vital as failure to take social impacts into account negatively impacts the success of marine conservation efforts (Lopes et al., 2015; Trave et al., 2017). Therefore, identifying if there is a link between knowledge about sharks, demographics or other factors, and support or opposition to conservation can help identify avenues for conservation outreach, such as educational campaigns.

As tourism increases in Donegal, marine tourism, including basking shark tourism, may organically arise. Assessing the level of interest in such tourism, and the potential intersection with conservation support, may help with the development of sustainable ecotourism. Identifying opposition to such practices is also important, as stakeholder concerns must be recognized when implementing new tourism or conservation policies.

The purpose of this research is to understand local public knowledge of sharks, interest in shark tourism and support for shark conservation, with a focus on the basking shark, as it is a charismatic megafauna popular in nearby countries. As it was not feasible to

sample the entirety of Ireland, Donegal was chosen for a case study. Malin Head was chosen as the focal point, owing to its reputation as a reliable area for basking shark sightings and increasing popularity with tourists. The town of Buncrana, which had a higher population density, when compared to Malin and other nearby villages, was selected as it provided the required number of interviewees (Figure 1).

1.5 | Research questions

This research aimed to understand the public perception of basking sharks, shark conservation, and shark tourism in Donegal through exploring a series of questions:

- Are there demographic factors that affect public awareness and attitudes towards sharks in Donegal?
- Is the public aware of sharks in Donegal waters?
- Do people know that they can report sightings of basking sharks and is there interest in doing so?
- Does the public support shark conservation?
- Does the public have accurate knowledge about basking sharks?
- Is there an interest in basking shark tourism in Donegal?
- Is there a relationship between interest in shark tourism and support for conservation?

The research focused both on 'sharks' as well as 'basking sharks' because basking sharks do not fit the stereotypical concept of a shark, which could potentially affect the survey results. Previous research has shown that fear of a particular species, including sharks, can impact support for conservation (Draheim et al., 2013; Pepin-Neff & Wynter, 2018).

2 | METHODS

A quantitative comparative design (Creswell, 2005) survey was conducted in Buncrana, County Donegal, Ireland from 2 to 16 July 2018. A power analysis was conducted with G*Power (Faul et al., 2007) and it was determined that a minimum of 160 surveys were needed to demonstrate power in the statistical inferences. Convenience sampling was used owing to time and monetary constraints.

The Buncrana beach and connected Heritage Trail (4.6 km) were chosen as the sample locations because they are highly accessible to all ages and abilities and are heavily utilized by residents of and visitors to Buncrana. Both can be reached by car or on foot, and the Heritage Trail (a wide, paved pathway) is accessible for wheelchairs and strollers. This location was chosen to increase the chances of achieving a representative population sample. Drought conditions, coinciding with multiple heat waves (defined in Ireland as five or more consecutive days with maximum temperature over 25°C) between 24 June and 4 July 2018, also led to an unusually high number of

individuals lounging or swimming at the beach and walking the Heritage Trail (Climatology and Observations Division of Met Éireann, 2018; Irish Meteorological Service, 2018; Falzoi et al., 2019).

Surveys were conducted in the morning, afternoon and evening. Individuals or groups were approached, and each adult in the group was counted. Those engaged in active pursuits, such as running and biking, and individuals supervising small children in the water, were not approached. Respondents who agreed to participate were read an informed consent script and told that the surveys were part of a research project by an American university student, but if they asked for more details they were told that the purpose of the research could not be explained until after the survey was completed, to reduce interviewer variance and social-desirability bias in survey results (Lavrakas, 2008). 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 was reviewed and approved by George Mason University's Human Subjects Review Board.

2.1 | Survey design

The survey took approximately 10 minutes to fill out and included yes or no and open-ended questions, and Likert attitudinal scales of 1–10.

Questions were divided into four categories: (1) demographics, (2) shark knowledge, (3) shark conservation, and (4) interest in shark tourism (IST) (Table 1). Interest in shark tourism was divided into two subcategories: personal IST (i.e. willingness to swim with sharks) and belief in others' IST (i.e. belief that tourists will pay to view sharks). For the full survey, see Appendix A.

TABLE 1 Average responses to survey questions

Survey category	Survey question	Completed answers (out of 173)	Average	SD
Shark knowledge	How dangerous are basking sharks?	164	3.18	2.80
	How healthy do you think basking shark populations are in Ireland?	156	4.94	2.29
Shark conservation	Do you think the reporting of basking shark sightings can help basking shark conservation?	167	8.50	2.23
	How likely are you to report a basking shark sighting?	167	5.64	3.49
	Do you support legal protections for basking sharks in Ireland?	168	7.99	3.14
	Do you support legal protections for other shark species?	171	7.78	3.21
Interest in shark tourism (IST)	If a location offered shark viewing from a boat how likely are you to take a trip to see sharks?	170	7.17	3.14
	If a location offered chances to swim with sharks, how likely are you to swim with sharks?	170	3.81	3.91
	If a location offered shark viewing from the land (a headland or watch tower) how likely are you go there to watch sharks?	170	7.55	2.86
	Do you think tourists will pay to go and see basking sharks from a boat?	171	8.19	2.21
	Do you think tourists will pay to go and see basking sharks from the land (headland or watchtower)?	172	6.12	3.22
	Do you think Irish citizens will pay to view basking sharks?	171	7.14	2.60
	How willing are you to pay to view basking sharks from a boat?	172	6.99	3.06
	How willing are you to pay to view basking sharks from the land?	171	6.12	3.22
	How likely do you think it is that someone would choose Ireland as a tourism destination, in order to view basking sharks?	168	5.85	2.75
	If basking sharks were protected, do you think that would increase tourism?	170	6.67	2.66
	What impact do you think marine tourism has on the Irish economy?	170	6.87	2.61
Would you like tourism to increase in Malin Head?	166	8.72	1.97	

Note: Average responses from Likert-scale questions (0–10 scale). The total number of completed surveys was 173, but respondents were told to skip questions they did not know the answer to or were uncomfortable answering, so the response rate for individual questions varied.

Demographic questions asked for age, gender and nationality. Respondents were asked if they were residents or visitors, and the reason for the visit (work, holiday or other).

Respondents were asked the following yes or no questions:

Are you aware of any sharks that inhabit the local coastal waters? If they answered yes they were asked to list which species occurred in the area.

Do you know what a basking shark looks like?

Did you know that you can find basking sharks in local waters?

Have you ever seen a basking shark? If they answered yes, they were asked where and when the sighting occurred and if they reported it.

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

Respondents were asked how the reporting of a basking shark sighting could be made easier, with the following options: *Facebook page, email link, phone number, phone app or other*, with a line to write their own suggestion.

Respondents were asked to select what a basking shark feeds on from the following list and instructed to select 'all that apply': *small fish, large fish, other sharks, microscopic plants, seaweed, seawater, jelly fish, shrimp, microscopic animals, plankton or seals*. They were also asked to write a rough estimate of how large a fully grown basking shark is in metres and to rank how dangerous they thought a basking shark was (1 being not at all dangerous; 10 being very dangerous).

Respondents were asked to rank the following from 0 (not at all likely) to 10 (very likely):

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

How likely are you to report a basking shark sighting?

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 go there to watch sharks?

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

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

Respondents were asked to rank the following on a scale of 0 (not at all) to 10 (very much).

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

Do you support legal protections for basking sharks in Ireland?

Do you support legal protections for other shark species?

Respondents were asked to rank the following on a scale of 0 (not at all) to 10 (very much yes).

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?

Would you like tourism to increase in Malin Head?

Respondents were asked to rank the following on a scale of 0 (not at all willing) to 10 (very willing).

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?

Respondents were asked what impact they thought marine tourism has on the Irish economy, on a scale of 0 (negative) to 10 (positive).

Respondents were asked to select any of the following hobbies that they participated in: *surfing, scuba diving, fishing, sailing, visiting aquariums, beach clean ups, golfing, hiking, painting, writing, pottery-making, horseback riding and rock climbing*. They were also asked if they were part of any of the following: *an environmental/conservation group, golf club, tourism operation, fishing organization or a business that benefits from tourism*. This was followed up by an open-ended question that asked if they were a member of any conservation/environmental organization(s) and to list them.

2.2 | Data analysis

Pearson's chi-square test of independence was used to determine if there was an association between survey answers. It was chosen because the data were categorical, not continuous and because unequal sample sizes do not impact the ability to calculate a chi-square test. All statistics were calculated in R Studio (version 1.1456), using the Stats and Tidyverse packages. Questions with nominal answers were converted to binaries (0/1) for statistical analysis.

3 | RESULTS

3.1 | Response rate and demographics

Out of a total of 231 individuals approached, 173 (75%) filled out the survey. There was a <10% skip rate on the majority of questions

(Table 1). The question with the highest skip rate (24%) asked individuals to estimate the length of a basking shark. The question with the next highest skip rate (10%) asked respondents to estimate how healthy they thought basking shark populations were in Ireland. All other questions had a skip rate of 5% or below (Table 1).

Sixty-four per cent of the surveys were completed by women while 35% were completed by men (Table 2). The average age of survey respondents was 41 years, ranging from 18 to 80 years. Eighty-two per cent of survey respondents were Irish, 9% were UK citizens and the other 9% were a mix of nationalities, including American, Polish and Australian (Table 2). Fifty per cent of survey respondents were visitors to Buncrana, while 50% were residents. Out of those who identified as visitors to Buncrana, 75% were Irish. Seventy-one per cent of visitors listed their reason for visiting as 'holiday', 26% listed their reason as 'other' and 3% listed their reason as work (Table 2). A chi-square test was conducted and there were no significant differences in responses between visitors and residents, with the exception that residents were more likely than visitors to be aware of sharks (d.f. = 1, $n = 169$, $\chi^2 = 8.53$, $P = 0.0035$) and basking sharks (d.f. = 1, $n = 171$, $\chi^2 = 7.92$, $P = 0.0049$) in local waters (Table 3).

Gender, nationality or age did not have any significant impact on support for conservation or interest in shark tourism, with the exception that male respondents were more willing to swim with sharks than female respondents (Table 3).

TABLE 2 Demographic information and hobbies of survey respondents ($N = 173$)

Age	Years
Average	42
Min	18
Max	80
Gender	%
Female	64
Male	35
Nationality	%
Irish	82
UK	9
Other	9
Resident	%
Resident	50
Visitor	50
Reason for visit	%
Holiday	71
Other	26
Work	3
Selected hobbies	%
Hiking	34
Visit aquariums	27
Fishing	19
Beach clean-ups	17

There was no significant correlation of hobbies with any of the survey responses. The numbers of respondents who stated that they were a member of a tourism business or conservation organization were too low to run reliable inferential statistics.

3.2 | Shark knowledge

While 34% of respondents were aware of sharks in local waters, 46% were aware of basking sharks specifically in local waters (this contradictory result will be addressed in the discussion). Of the respondents who were aware of sharks in local waters and able to list basking sharks as one of the species (25%), the majority (19%) listed *only* basking sharks.

While the majority (77%) of respondents were not aware that basking sharks eat microscopic animals, only 6% of respondents thought that basking sharks ate seals. Forty-eight per cent of respondents selected 'small fish', 24% selected microscopic plants, 23% selected microscopic animals, 14% selected shrimp and 12% selected seaweed (respondents could select more than one option). Sixteen per cent of respondents selected 'I don't know'.

The majority (55%) of respondents estimated the level of danger posed by a basking shark to be minimal (3 or below out of 10). While basking sharks are mostly harmless, they have been known to breach and land on vessels, a rare but dangerous event, which is why survey respondents answering 3 or below were combined in data analysis (OSPAR Commission, 2015; Speedie, 2017). While the majority (58%) of respondents understood that basking sharks were 3 m in length or larger, only 31% of respondents estimated basking sharks to be 6 m or larger (24% of respondents declined to answer the question).

The majority of knowledge questions had no significant relationship with support for basking shark conservation questions, but there was a significant positive correlation between support for legal protections for basking sharks and correct knowledge of a basking shark's diet (d.f. = 10, $n = 168$, $\chi^2 = 20.39$, $P = 0.026$; Table 3). There was no significant correlation between the respondent's estimated danger level posed by a basking shark and support for legal protection for basking sharks.

3.3 | Shark conservation

Support for legal protection for both 'basking sharks' and 'sharks' averaged 7.99 (SD = 3.14) and 7.78 (SD = 3.21) out of 10, respectively. While on average respondents stated that reporting basking shark sightings is helpful for conservation (8.50 out of 10, SD = 2.23), the likelihood of making a report was only 5.64 out of 10 (SD = 3.49; Table 1). Only 7% of respondents were aware that they could report a basking shark sighting. When asked what would make reporting easier, 59% selected a Facebook page, 23% selected email, 21% selected a mobile app and 20% selected a phone number.

The respondent's willingness to report a sighting was significantly positively correlated with the following: the belief that reporting

TABLE 3 Significant χ^2 results between key variables

Question 1	Question 2	χ^2	d.f.	P-Value
Resident or visitor	Are you aware of basking sharks in local waters?	7.92	1	0.0049**
Resident or visitor	Are you aware of sharks in local waters?	8.53	1	0.0035**
Gender (male or female)	If a location offered chances to swim with sharks, how likely are you to swim with sharks?	24.61	10	0.0016**
Do you support legal protections for basking sharks in Ireland?	Do you think tourists will pay to go and see basking sharks from a boat?	197.05	80	7.31×10^{-12} ***
Do you support legal protections for basking sharks in Ireland?	Do you think Irish citizens will pay to view basking sharks?	130.66	100	0.021*
Do you support legal protections for basking sharks in Ireland?	How willing are you to pay to view basking sharks from a boat?	152.86	100	0.00053***
Do you support legal protections for basking sharks in Ireland?	How willing are you to pay to view basking sharks from the land?	143.34	100	0.0030**
Do you support legal protections for basking sharks in Ireland?	If a location offered chances to swim with sharks, how likely are you to swim with sharks?	139.89	100	0.0052**
Do you support legal protections for basking sharks in Ireland?	If a location offered shark viewing from the land (a headland or watch tower) how likely are you go there to watch sharks?	141.37	100	0.0041**
Do you support legal protections for basking sharks in Ireland?	What impact do you think marine tourism has on the Irish economy?	149.68	100	0.00096***
Do you support legal protections for basking sharks in Ireland?	Respondent answered that basking sharks eat microscopic animals (zooplankton)	20.39	10	0.026*
How likely are you to report a basking shark sighting?	Do you think the reporting of basking shark sightings can help basking shark conservation?	126.38	100	0.038*
How likely are you to report a basking shark sighting?	Do you support legal protections for basking sharks in Ireland?	160.60	100	0.00012***
How likely are you to report a basking shark sighting?	Do you think Irish citizens will pay to view basking sharks?	140.19	100	0.0050**
How likely are you to report a basking shark sighting?	How willing are you to pay to view basking sharks from a boat?	145.31	100	0.0021**
How likely are you to report a basking shark sighting?	If basking sharks were protected, do you think that would increase tourism?	166.36	100	3.49×10^{-5} ***
Do you support legal protections for other shark species?	If basking sharks were protected, do you think that would increase tourism?	154.11	100	0.00042***
Do you support legal protections for other shark species?	If a location offered shark viewing from a boat how likely are you to take a trip to see sharks?	137.32	100	0.0079**
Do you support legal protections for other shark species?	If a location offered chances to swim with sharks, how likely are you to swim with sharks?	129.73	100	0.024*
Do you support legal protections for other shark species?	If a location offered shark viewing from the land (a headland or watch tower) how likely are you go there to watch sharks?	133.11	100	0.015*

Note: Significant results of χ^2 analysis. There surveys were a total of 173 surveys, but individual questions had different response rates (see Table 1). The majority of questions were on a 0–10 Likert scale, but gender, resident or visitor, and knowledge questions were converted to binary (0 or 1) for analysis. *** $P < 0.01$. ** $P < 0.05$. * $P < 0.1$.

sightings is important for shark conservation (d.f. = 100, $n = 167$, $\chi^2 = 126.38$, $P = 0.038$); support for legal protection for basking sharks (d.f. = 100, $N = 168$, $\chi^2 = 160.60$, $P = 0.00012$); the respondent's likelihood of paying to view basking sharks from a boat (d.f. = 100, $n = 172$, $\chi^2 = 145.31$, $P = 0.0021$); the belief that Irish citizens would pay to view basking sharks (d.f. = 100, $n = 171$, $\chi^2 = 140.19$, $P = 0.0050$); and the belief that legal protection for basking sharks would increase tourism (d.f. = 100, $n = 170$, $\chi^2 = 166.36$, $P = 3.49 \times 10^{-5}$; Table 3).

3.4 | Shark tourism

Personal IST and belief in others' IST ranged between 7 and 8 out of 10 (SD between 2.21 and 3.22; Table 1). When asked the likelihood that someone would choose Ireland as a tourism destination to view basking sharks, the average response was 5.85 out of 10 (SD = 2.75), while the belief that protecting basking sharks would increase tourism was an average of 6.67 out of 10 (SD = 2.66). Respondents answered that marine tourism had a slightly positive impact on the economy

(6.87 out of 10, SD = 2.61) and the desire to see tourism increase at Malin Head averaged 8.72 out of 10 (SD = 1.97) (Table 1).

Support for legal protection for 'basking sharks' was significantly positively correlated with the following: the belief that both tourists (d.f. = 100, $n = 172$, $\chi^2 = 197.05$, $P = 7.31 \times 10^{-12}$) and Irish citizens (d.f. = 100, $n = 171$, $\chi^2 = 130.66$, $P = 0.021$) would pay to view basking sharks; the belief that marine tourism has a positive impact on the Irish economy (d.f. = 100, $n = 170$, $\chi^2 = 149.68$, $P = 0.00096$); and the respondent's own likelihood of paying to view basking sharks from a boat (d.f. = 100, $n = 171$, $\chi^2 = 152.86$, $P = 0.00053$) or on land (d.f. = 100, $n = 172$, $\chi^2 = 143.34$, $P = 0.0030$; Table 3). Similarly, support for legal protections for 'sharks' was significantly positively correlated with personal IST (Table 3).

4 | DISCUSSION

This research sought to understand the public perception of basking sharks, shark conservation and shark tourism in Donegal, and to identify demographic factors that affect public awareness and attitudes towards sharks in Donegal.

4.1 | Demographics

While residents were significantly more likely to be aware of both 'sharks' and 'basking sharks' in local waters, demographic factors did not have an impact on support for legal protection or IST. However, the relatively small sample size, lack of international tourists (who were not adequately represented in the sampled population) and the lack of membership of tourism agencies or popular hobbies (i.e. fishing) make this result inconclusive. A larger, more representative sample is needed to accurately assess demographic impacts on support for conservation or IST.

4.2 | Shark knowledge and conservation

Sixty-two per cent of respondents were unaware that sharks were found locally, but only 54% of respondents were unaware of *basking sharks*. It is not clear why this discrepancy exists; however, several respondents verbally commented to the researcher that basking sharks were not 'real sharks' as they did not 'eat people', a common but problematic stereotype (Neff & Hueter, 2013). Previous research has found that the public will mistakenly identify whale sharks, a similar plankton-eating species, as a *whale* (Naylor & Parsons, 2018) and the docile nature and feeding habits of basking sharks are very similar to the locally found northern minke whale (*Balaenoptera acutorostrata*), perhaps causing some confusion. Respondents may have also read ahead of the survey, noticed that basking sharks featured heavily and simply guessed that they were found nearby. A solution to this would be to conduct the survey on a device such as a tablet that prevents reading ahead in the survey instrument.

Previous research has indicated that perceived fear can have a negative impact on support for conservation of local species (Draheim et al., 2013). The support for shark conservation in this research does not appear to follow this trend, as those surveyed support shark conservation. There was virtually no difference between support for legal protection for 'sharks' when compared with 'basking sharks', or interest in 'shark' tourism compared with 'basking shark' tourism (Table 1), even though the majority (55%) of survey respondents were aware that basking sharks are not dangerous or predatory. The results indicate that neither awareness nor 'fear factor' have a significant impact on support for shark conservation in Donegal. There is plentiful literature focused on how changing public attitudes towards sharks can aid conservation, but in areas where conservation support is already high, outreach can focus instead on specific ways that individuals can help shark conservation (Friedrich, Jefferson & Glegg, 2014).

This research found that the public did not have in-depth knowledge about basking sharks, but did understand basic facts (i.e. that they are large, that they are not predatory). The research on the impact of knowledge on conservation support is unclear. Some research has found that having more knowledge of a species may predispose individuals to support that organism's conservation (O'Bryhim & Parsons, 2015; O'Bryhim et al., 2016; Penn, Penn & Hu, 2018), while other research has found that the general public may have poor knowledge of an organism or its conservation status, and still support funding for its conservation (Parsons et al., 2003; Karaffa, Draheim & Parsons, 2012; Friedrich, Jefferson & Glegg, 2014; O'Bryhim et al., 2016). In this study, a lack of accurate knowledge about basking sharks did not preclude those surveyed being against legal protection for basking sharks. Therefore, educational efforts may be best focused on generating awareness about the *presence* of basking sharks, providing guidance for how to report sightings, providing best practices for boaters and swimmers, and informing the public of important conservation efforts.

A willingness to report sightings was significantly correlated with support for conservation, despite the fact that the vast majority of respondents were unaware that they could do so. Lack of widespread knowledge about the size and feeding behaviour of basking sharks may mean that respondents are unaware that they spend a considerable amount of time at the sea surface or that they are large enough to view from a great distance. This may prevent people from recognizing – and therefore reporting – a sighting when it occurs. Information about how to recognize a basking shark and report a sighting could be provided by signage in areas where basking sharks are seen, such as the Buncrana Heritage trail or Malin Head. Signs containing historical information already exist at both locations, and, in 2018, 62% ($N = 602$) of observed visitors at Malin Head used interpretative materials (CAAS, 2018). Encouraging awareness about sightings may also be important for conservation, as positive interactions with sharks (including sightings from boat or land), have been positively correlated with support for shark conservation (Friedrich, Jefferson & Glegg, 2014). Public support can also be beneficial when advancing new legislation. For example, a 2021

petition, asking the Irish Government to list basking sharks under the Wildlife Act 1976, received over 10,000 signatures in just 2 months (Sabin, 2021; Wildlife (Amendment), 2021) and was handed over to the Minister of State with media attention (Mannion, 2021).

4.3 | Shark tourism and conservation

This research shows that there is interest in basking shark tourism in Donegal and that there is a positive link between IST and support for conservation. Considering that there is no significant difference in interest in basking shark tourism between residents and visitors, and that 75% of visitors surveyed were Irish, there may be an untapped domestic market for basking shark tourism in Donegal.

Few studies detail the impacts of tourism on basking sharks specifically, despite concerns about the impact of a largely unregulated industry (OSPAR Commission, 2015). A comparable activity to basking shark tourism would be whale watching, which is well established in Scotland (worth US\$18 million in 2000, with operators charging as much as £1,145 for 12 days; Parsons et al., 2003; Rawles & Parsons, 2005; Parsons, 2012; Parsons, 2014; Ryan et al., 2018). Whale watching from a boat may interrupt natural behaviour, such as feeding, because of proximity to vessels, although normal boat traffic may have the same impact (Catlin & Jones, 2010; Bentz et al., 2016b; Araujo et al., 2017; Clemente et al., 2018). However, whale-watching operators also contribute significantly to whale sighting reports in western Scotland (Ryan et al., 2018) and shark tourism operators keep detailed, often daily, logs of shark behaviour and movement (Gallagher et al., 2015). Shark tourism also offers the opportunity to increase citizen science, especially with the increased availability of technology, such as GoPros (Mieras et al., 2017). Consistent shark watching, especially low-impact sightings from land, have the potential to contribute greatly to basking shark conservation in Ireland. The Irish government has also argued that well-managed tourism can result in better management for sensitive ecosystems (CAAS, 2015).

Malin Head in particular is primed to offer both a low-impact and a high-quality tourist experience, as basking sharks are readily viewed from the high cliffs there. The Manx Wildlife Trust promotes the viewing of basking sharks from shore (Manx Wildlife Trust, n.d.), and whale watchers in western Scotland report that they chose the region because of the landscape, seascape and wildlife (Parsons et al., 2003). Both locations have similar coastlines to Donegal. Shore-based viewing in Malin Head can provide an opportunity to establish small-scale, low-impact basking shark tourism, allowing for slower growth of the industry and time for the regulatory process, whether it be laws or voluntary codes of conduct, to be established (Techera & Klein, 2013). Rapid growth in marine tourism is associated with boat crowding and other negative human impacts (Catlin & Jones, 2010; Ziegler, Dearden & Rollins, 2012; Conaghan, Hanrahan & McLoughlin, 2015). This is a concern for Ireland, as recent research in County Clare has found that hotel and tourism operators value sustainability, but lack clear codes of conduct and formalized policies (Conaghan, Hanrahan &

McLoughlin, 2015; McLoughlin & Hanrahan, 2016). Therefore, if tourism in Ireland is to be expanded to include 'swim with' or boat-based basking shark tourism, it is vital that appropriate voluntary or legal policies are implemented.

Research has found that *tourists*, as opposed to government agencies, are the best enforcers of environmental policies (Mallard, 2019), meaning that areas with high support for conservation may result in self-enforced, low-impact wildlife tourism. Community-based codes of conduct (CoC) are an effective way to ensure that marine tourism does not negatively impact the target species and can help communities develop sustainable ecotourism (Woods-Ballard et al., 2003). Voluntary CoCs may be more trusted in Ireland, as recent surveys indicate that the public do not trust the government to adequately protect marine environments (Hynes et al., 2014). A CoC can also be successfully implemented without impacting profit, as demonstrated by research on whale watchers, who often express a desire not to negatively impact the whales (Rawles & Parsons, 2005; Draheim et al., 2010; Bentz et al., 2016a; Sitar et al., 2017). Notably, basking shark tourism occurs without food provisioning, a controversial and potentially harmful tactic (Gallagher et al., 2015).

Despite a lack of awareness of basking sharks in local waters, survey respondents demonstrated a clear interest in paying for basking shark tourism and the belief that others would pay to view basking sharks. Respondents also expressed the belief that marine tourism is good for the Irish economy. The widespread support for legal protection for sharks, along with high likelihood of paying to view sharks, indicates that residents and domestic tourists in Ireland may be receptive to low-impact ecotourism over potentially high-impact 'swim with shark' tourism. Tourists are often willing to pay if their money is going towards conservation (Bhandari & Heshmati, 2010; Casey, Brown & Schuhmann, 2010) and previous research has found a high willingness for individuals to pay when threatened, endangered and rare marine megafauna are involved (Lew, 2015), a fact that could be used to increase tourism and support for conservation efforts for basking sharks in the region.

Increasing awareness of basking sharks and their subsequent tourism potential may also impact support for conservation in the region. It is not clear if support for legal protection for basking sharks is related to the 'charisma' or 'likeability' of the species or a belief that it is economically valuable. Research has found that 'cute' and charismatic 'flagship' species tend to get more conservation support (Karaffa, Draheim & Parsons, 2012; Qirko, 2017). However, the lack of a significant difference between support for legal protections for 'basking sharks' or just 'sharks' may imply that survey respondents were overall receptive to conservation, regardless of the charisma of the species. There has been much discussion around 'flagship' species and their positive impact on conservation, but the effort to brand basking sharks as a 'flagship' species may not be necessary to achieve public support for tangible policy measures that benefit basking sharks and other species.

Previous research has found that those who support legal protection for fish species tend to be focused on utilitarian or monetary gains (Batt, 2009). Respondents demonstrated a significant

link between support for conservation and belief in others' IST, as well as personal IST. This may mean that support for conservation is related more closely to the economic value of shark tourism, rather than concern about the species itself. When sharks are found to be profitable to tourism, legal protection often follows (Topelko & Dearden, 2005). However, this research did not address the potential non-market value (Boyd, 2007) of sharks and further research is needed to assess whether conservation support is economical or based in other values.

4.4 | Limitations and sources of error

The small sample size, short sampling period and use of convenience sampling limit the generalizability of this study. Even randomized convenience samples are not guaranteed to be representative of the wider population (Andrade, 2021). It is not clear if support for shark conservation or interest in shark tourism is specific to Donegal or if it is a national trend, but replication of this study in other areas in Ireland would identify area-based trends. This study surveyed a majority of *domestic* tourists, despite the fact that a large percentage of tourists in Ireland are international. Therefore, this research cannot speak to international interest in shark tourism in Ireland.

5 | CONCLUSION

This research sought to understand the public perception of basking sharks, shark conservation and shark tourism in Donegal. The results indicate that there is support for shark conservation and it is significantly linked with interest in shark tourism and the belief that shark tourism is profitable. Therefore, sustainable tourism should be combined with educational outreach and conservation efforts.

Conservation outreach efforts should utilize the existing conservation support to press for both formalized protection for basking sharks and voluntary, behavioural changes (such as codes of conduct and speed reductions). Educational campaigns should focus on increasing public knowledge of how to report sightings, on best practices for human–shark interactions, and tangible policy changes.

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CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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