Received: 28 December 2023 | Revised: 28 July 2024 | Accepted: 5 August 2024

DOI: 10.1111/fme.12735

Fisheries Management and Ecology WILEY

ARTICLE

# A Delphi-study to identify drivers of future angling participation in five Nordic countries

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**Funding information**
Danish Rod and Net Fish License funds, Grant/Award Number: 39122; Nordisk Ministerråd

## Abstract

The Delphi method was used to gather assessments from 93 experts about drivers of future angling participation by locals and tourist anglers in Denmark, Finland, Iceland, Norway, and Sweden. The main drivers of future angling participation related to habitat and fish populations, and access to and information about fishing. For Norway and Finland, the predicted future decline in local angler numbers was consistent with a life-cycle model of recreational fisheries, while the anticipated increase for the three other countries contradicted the model. For tourist anglers, growth was expected for both domestic and foreign tourists. Long-term and societal drivers, such as urbanization, sociocultural changes, and climate change were not seen as strong drivers, and may be considered out of reach by managers, but should be included with information and conservation drivers in angler recruitment and retention strategies.

**KEYWORDS**
constraints, facilitators, life-cycle of recreational fisheries, outdoor recreation, recruitment, tourist

## 1 | INTRODUCTION

Angling or recreational fishing with a rod, line, and hook, is from a societal perspective generally seen as a beneficial recreational activity that promotes physical and mental health, provides economic and cultural benefits to local communities and society at large, brings food on the plate, and supports funding and advocacy for nature protection, (Arlinghaus et al., 2002; Parkkila et al., 2010; Tufts et al., 2015). Angling importance varies greatly across the globe, with participation rates averaging 10% and up to 30–40% in angling hotspots like the Nordic countries (Arlinghaus et al., 2023). At a macro or country level, a conceptual life-cycle model of recreational fisheries has been presented as a holistic approach to explain changes in angling participation over time (Arlinghaus et al., 2023; Cowx et al., 2010). The model highlights how four societal factors; (i) the cultural importance of fishing, (ii) urbanization and post-industrialization, (iii) time and resources available, and the perceived needs for leisure, and (iv) access to quality fishing waters; work in combination to affect recreational fishing in multiple, often complex relations (Arlinghaus et al., 2023). The model hypothesizes that an initial increase is followed by a later decrease in recreational fisheries participation as societies move from primary industries to industrialization and urban, post-industrial societies (Arlinghaus et al., 2023; Cowx et al., 2010).

At a micro or individual level, anglers face constraints or facilitators to their participation (Aas, 1995; Kuehn et al., 2013; Sutton, 2007): *Intrapersonal* constraints/facilitators are the angler's own perceptions (about e.g., health issues, fishing skills, time and money available) that affect the building of fishing preferences. *Interpersonal* constraints/facilitators involve other people (e.g., have people to fish with, family obligations). *Structural* constraints/facilitators happen after preferences are formed but before behavior takes place, such as rules, costs of fishing, habitat and stock status, access, and alternative activities. Available time, fishing expenses, access, stock status, social obligations, and health status, are some frequently mentioned constraints/facilitators (Kuehn et al., 2013). Constraints and facilitators add complexity about which direction participation evolves in different groups of society and across fisheries, such as tourist anglers away from their ordinary environment and local anglers who fish near home differing in their motivations and behavior, and therefore factors (drivers) influencing their participation (Hunt et al., 2023). Which factors limit angling might also vary based on age-cohorts, ethnic groups, or gender (Hunt et al., 2023; Krogman et al., 2023).

Given the multiple benefits of angling and the many people and agencies involved that depend on angling participation, the future of angling has long been a topic of discussion among managers, practitioners, business representatives, and researchers, especially because angling participation has been predicted to decline in the western, post-industrial world (Adams et al., 1993; Arlinghaus, 2006; Arlinghaus et al., 2023; UK Sports Council & UK National Anglers' Council, 1991). To better adapt to and possibly shape future directions of angling participation, fishery managers, and angling businesses should understand future development in participation rates, effort, and characteristics and what the drivers behind changes are (Arlinghaus, 2006).

One tool suggested for assessing future developments in recreational fishing (Zuboy, 1981) is the Delphi method, a consensus-based method using systematic data gathered from experts, to inform decision-making across many societal sectors (Hanna & Noble, 2015). Use of the Delphi method has been limited in recreational fishing (Liu & Chen, 2021; Qureshi et al., 2018). Our Delphi study aimed to estimate future angling participation in five Nordic countries, Denmark, Finland, Iceland, Norway, and Sweden, that are considered global angling "hotspots" with well-established cultural ties to commercial and recreational fishing and fish consumption (Arlinghaus et al., 2023), 13–41% of populations go angling every year (Table 1) and fishing is often an important part of nature-based tourism (Fredman & Margaryan, 2014; Stensland et al., 2018). Our objective was to determine which drivers will influence angling participation rates by locals and tourists, age groups, genders, and ethnic minorities. We surveyed how 93 experts in the angling sector perceived angling participation by local and tourist anglers in Nordic countries and drivers of participation 10 years in the future (2030).

## 2 | METHOD

### 2.1 | Study area

The five Nordic countries are characterized by modern societies with citizens having a high education and income, and with relatively similar history, culture, and governance systems. Public access and ownership models for marine and freshwater fisheries are also relatively similar across the region (Table 1). The countries have well-developed, knowledge-based management and governance systems for fisheries management in general, yet, the way the administration of fisheries is organized varies (Table 1).

The nature geography differs significantly within the region, and the fish fauna is characterized by relatively few species in the north with a growing diversity toward the south and from freshwater via brackish to marine water (Table 1). Angling is possible in most lakes, rivers, along the coast, and in the sea, for citizens and tourists. In Finland, Sweden, and Norway freshwater lakes both small and large are very important settings for angling. In Norway, the coastline is long and equally important, or for the sake of Denmark, more important. Fishing along the coastline and archipelago of the brackish Baltic Sea is popular in Finland and Sweden. River fisheries also occur in all countries, but most so in Iceland and Norway.

Anthropogenic impacts differ within the region and are less in sparsely populated areas and the north. Many watersheds are developed for hydropower, and watersheds near urban areas and intensely farmed areas are often subject to encroachment, eutrophication, and local pollution. Impacts from acid rain have been severe in many regions from the mid-1900s to recent decades. Large-scale

**TABLE 1** Sociodemographic and geographic attributes of recreational fisheries in Denmark, Finland, Iceland, Norway, and Sweden, where experts were surveyed in 2019–2021 about likely drivers of future angling participation in 2030.

| | Denmark | Finland | Iceland | Norway | Sweden |
|---|---|---|---|---|---|
| Area km$^2$[b] | 43,561 | 338,430 | 102,775 | 323,781 | 447,435 |
| Number of inhabitants in millions (2021)[b] | 5.8 | 5.5 | 0.38 | 5.4 | 10.4 |
| Freshwater of total land area | 1.5% | 10.2% | 2.6% | 5.7% | 8.9% |
| Coastline km (without islands)[b] | 7314 | 6308 | 6542 | 28,953 | 11,530 |
| Dominating nature type | Agricultural landscapes | Boreal forests | Mountain | Mountain | Boreal forests |
| Adults' self-reported participation in RF[a] | 13% | 33% | 20–25% | 41% | 19% |
| Female self-reported participation in RF[a] | 3–4% | 23% | N/A | 30% | 10% |
| Most commonly targeted marine species | Brown trout, garfish (*Belone belone*), Atlantic mackerel (*Scomber scombrus*) | Perch (*Perca fluviatilis*) northern pike (*Esox Lucius*) | Atlantic cod (*Gadus morhua*) | Atlantic cod | Atlantic mackerel |
| Most commonly targeted freshwater species | Pike, brown trout, perch, salmon | Pike, perch | Brown trout, salmon | Brown trout | Pike, perch |
| GDP per capita, in EUROs (2021)[b] | 43,200 | 36,700 | 38,500 | 52,800 | 40,100 |
| Fishing right for freshwater with rod/line | Land/property owner | Land/ property owner and public right | Land/ property owner | Land /property owner[c] | Land/ property owner[c] |
| Fishing right marine | Public right | Public right | Public right | Public right | Public right |
| Required state fishing license | Yes[d] (exceptions) | Yes | No | Yes, for anadromous fish in freshwater | No |

[a]Data are most recent available, although from different years (Dalen & Oppøyen, 2023; LUKE, 2023; Sparrevohn & Storr-Paulsen, 2012; Swedish Agency for Marine and Water Management & Statistics Sweden, 2024; University of Iceland, 2018).

[b]Data from Nordic Council (Nordic Cooperation, n.d.).

[c]Some large lakes in Norway and the five largest lakes in Sweden are considered public/free for all to fish with rod and line, within the regulations (i.e., bag limits, minimum length, and closed seasons) set by the authorities.

[d]A national angling license/fee is mandatory in Denmark both in freshwater and saltwater. Exception and not needed if younger than 18 years, or if you have achieved the right to a state pension (age 65 years or older), fishing in put and take waters, or on own freshwater property.

land use such as intensive forestry operations increase acid leaks from soils, altering habitat and waterflow, thereby affecting freshwater biota.

The fishing rights in the Nordic countries are a mix of private property and public fishing rights. In all countries, marine angling is generally part of the "public right of access [to nature]." In fresh water, the general rule is that the landowner or property holds the fishing right (Stensland, 2010), both in privately owned waters and where land and water are owned by public bodies (e.g., state, or municipal land). However, regulated by law children and youth often fish for free. Some large lakes in Norway and Sweden can through practice or law be free to fish for all. The public right to fishing in fresh water is stronger in Finland than in the other Nordic countries. All countries have species and habitats that are subject to stricter regulations than others, a common example being migratory salmonids. Denmark, Finland, and Norway have established systems for a national fishing fee (a tax/license). In Denmark and Finland, such a fee applies to both marine and freshwater fisheries, while in Norway, the fee applies only when fishing in fresh water for anadromous salmonids. Younger and older anglers might be exempt from paying the national fee, see Table 1 for other exceptions.

Data from Norway, Denmark, and Finland show an overall decline in angling participation rates over the last 10–25 years, and for both genders; however, post-COVID there is a slight incline in all three countries (Dalen & Oppøyen, 2023; Fiskeristyrelsen, n.d.; LUKE, 2023). Swedish official statistics show no significant trend in participation rates for either gender in the last 10 years (Swedish Agency for Marine and Water Management & Statistics Sweden, 2024). No similar longitudinal data exist for Iceland.

## 2.2 | Data collection

We used a structured Delphi survey over three rounds (Hasson et al., 2000) of 20 invited fishing experts involved in recreational fisheries from each of the five Nordic countries (100 total professionals). Experts were first contacted by an invitational email, followed by a phone call to build commitment to the study. If needed, experts were reminded to reply by e-mail or phone. Correspondence with experts used the official language of their country. Experts represented angling media (traditional and social media), fishing tourism companies or agencies, the gear industry, researchers, government authorities (regional-national), landowner organizations, angler NGOs, and a group of other experts (Table 2). We aimed at a balanced representation of different types of experts (Grime & Wright, 2016), with the number of experts in each category differing among countries due to how fishing was governed and angling was organized. Experts who initially declined to take part in the study (1–3 per country) were replaced with another person from the same expert category. Data collection was approved by Sikt – Norwegian Agency for Shared Services in Education and Research (Ref. no. 244631). Informed consent was provided by the research subjects by actively ticking a box in the survey forms.

Three rounds of surveys included initial exploratory and open-ended questions in round 1, as a base for the development of open-ended questions and scales in rounds 2 and 3. Each survey round was divided into one part about local anglers and one part about tourist anglers, with similar questions about each group. The first survey round (December 2019 to February 2020) used qualitative questions to gather general information (Hasson et al., 2000) about likely developments in angler participation for different sociodemographic groups (trends) and drivers behind important trends in their country. An open-ended question was asked for other comments or ideas (survey forms in Data S2). Data were analyzed using a qualitative content analysis approach (Bryman, 2016). Participation trends were coded as "decrease," "stable," or "increase" in participation of different angler groups. Most drivers were then classified into predefined categories (Table S3).

Due to the COVID-pandemic, the second survey round was delayed until February–May 2021. The third round was in June–November 2021. Questions in rounds 2–3 were quantitative, more specific, and derived from answers in previous rounds, except for an added COVID-driver that became a global issue after round 1. Trends in and drivers of angling participation suggested in round 1 were summarized and scored by respondents in round 2 (Data S2). Respondents were first asked to assess if drivers would have a negative or positive effect on angler numbers in 2030 (range from 0 = no positive or negative effect, +6 = strong positive effect, −6 strong negative effect). Options for replying "Don't know" and "Driver not likely to happen" were also allowed. Absolute scores of 0–1.99 were weak, 2–3.99 were medium, and 4–6 were strong. In round 3, the same questions were asked as in round 2, but respondents were also provided with information about how other experts in the same country responded on average. Respondents were allowed to change their response in round 3 based on the information provided, to try to reach a consensus (Hasson et al., 2000). Of the initial 100 experts, 93 responded to all three survey rounds.

## 2.3 | Data analyses and presentation

Means were compared among countries and between local and tourist anglers using ANOVA. Most drivers had the same anticipated effect for both locals and tourists, so were summarized as combined means. Experts identified 19 positive and 20 negative drivers, but only the top 10 are presented for each type of driver (see Data S2 for all drivers).

# 3 | RESULTS

## 3.1 | Participation

For local angling participation, experts expected a weak decrease in the general population in Norway and Finland, and weak to medium growth for all cohorts in Denmark, Iceland, and Sweden (Figure 1 and Table S1). Growth of angling participation was expected to be lower for anglers younger than 30 years, and to decline in Finland and Norway. For all countries, a weak to medium increase in angling participation was expected for women, ethnic minorities, and immigrants. Growth in angling participation

| Category | Norway | Iceland | Sweden | Finland | Denmark | Total |
|---|---|---|---|---|---|---|
| Media | 2 | 2 | 2 | 2 | 3 | 11 |
| Fishing tourism | 4 | 3 | 3 | 3 | 4 | 17 |
| Gear industry | 2 | 2 | 1 | 2 | 2 | 9 |
| Research | 2 | 0 | 2 | 3 | 2 | 9 |
| Government | 3 | 2 | 4 | 2 | 2 | 14 |
| Landowner organization | 3 | 1 | 2 | 3 | 1 | 9 |
| Angler NGO | 3 | 3 | 4 | 2 | 4 | 16 |
| Other | 0 | 6 | 0 | 0 | 2 | 8 |
| Total | 19 | 19 | 18 | 17 | 20 | 93 |

**TABLE 2** Number of experts within eight categories of expertise in Denmark, Finland, Iceland, Norway, and Sweden who were surveyed in 2019–2021 about likely drivers of future angling participation in 2030.

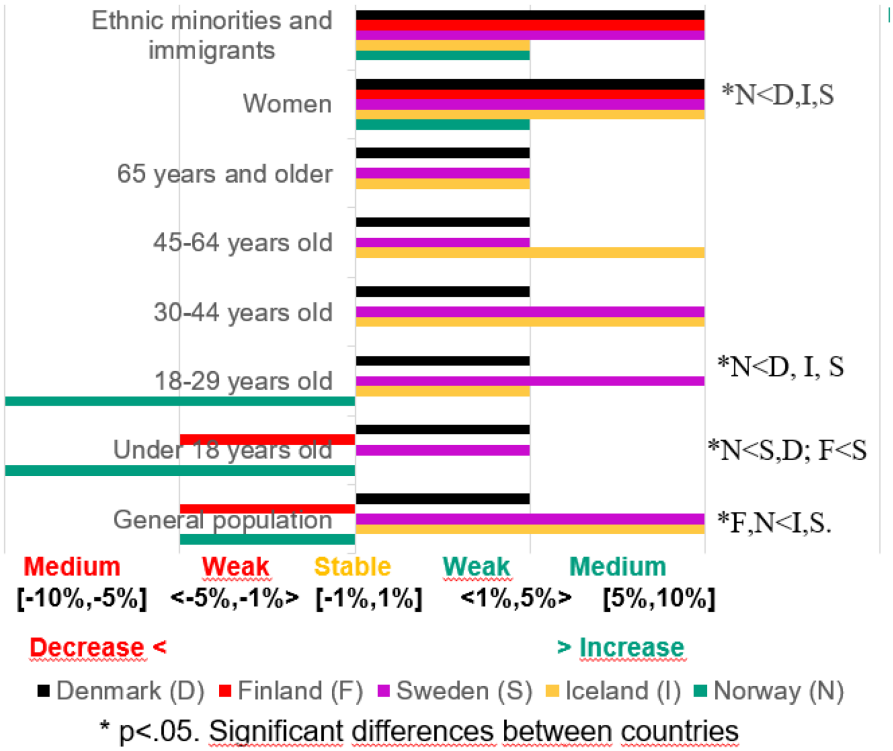


**FIGURE 1** Changes in local angling participation by different ethnic, gender, and age groups by 2030 in Denmark, Finland, Iceland, Norway, and Sweden expected by experts who were surveyed in 2019–2021.

by women was expected to be lower in Norway than in Iceland, Denmark, and Sweden.

Overall, weak (<1%, 5%>) to medium growth (5–10%) in tourist angling was expected by 2030, for both foreign and domestic tourists (no significant differences among countries; Table S2). In Denmark, Norway, and Sweden, most tourists were expected to come from neighboring Nordic countries and Germany. In Iceland, most tourists were expected to come from the UK, USA, EU, and Nordic countries. In Finland, most tourists were expected to come from Russia, Germany, Estonia, and Sweden.

## 3.2 | Positive drivers

Three drivers scored over four on a 0–6 scale, and were expected to exert strong effects (Figure 2 and Tables S3 and S5). Two drivers related only to tourist anglers, including *More direct marketing by local/regional/national tourism authorities* (e.g., *toward special angler segment*), and *Better facilities/products for fishing tourists*. A third strong driver related to both local and tourist anglers: *Increased sharing/discussing/promotion of angling on social media, internet* (e.g., *by anglers, organizations, businesses*). Remaining drivers were all expected to have medium effects (scoring 3–4), including environmental drivers, *Stronger fish stocks/more large fish* and *Increased habitat restoration*; economic drivers, *Increased general wealth among people*, and *More leisure time or/and flexible working hours/tasks*; a managerial driver, *Improved accessibility to fishing waters* (e.g., *easy access, available information on fishing waters*); a socio-cultural driver *Increased environmental awareness among anglers*; and a geopolitical driver, the *COVID-19 pandemic*. Some drivers differed between local and tourist anglers, and among countries (Figure 2), including the *COVID-19 pandemic* and *Increased environmental awareness among anglers* scored higher for locals than tourists; *Increased general wealth among people* scored higher for tourists than locals; *Better facilities/products for fishing tourist* scored higher in Sweden than Iceland and Norway; and for local anglers, Iceland scored lower on increased habitat restoration than Denmark and Sweden.

## 3.3 | Negative drivers

Environmental drivers were expected to have the highest negative effect on angling participation (medium scores), including *habitat destruction/degrading, overfishing, weak fish stocks/lack of large fish, pollution*, while *Increased predation on fish stocks from mink, cormorants, otters, seals, whales fishing waters* (Figure 3 and Tables S4 and S6) was in top 10. Three tourist-specific drivers of political or managerial type included: *lack of facilitated/high-quality sites, lack of marketing*, and *lack of political support for the development of fishing tourism*. Another political/managerial driver was *Reduced accessibility to fishing waters* (e.g., *reduced access/privatization of shoreline,*

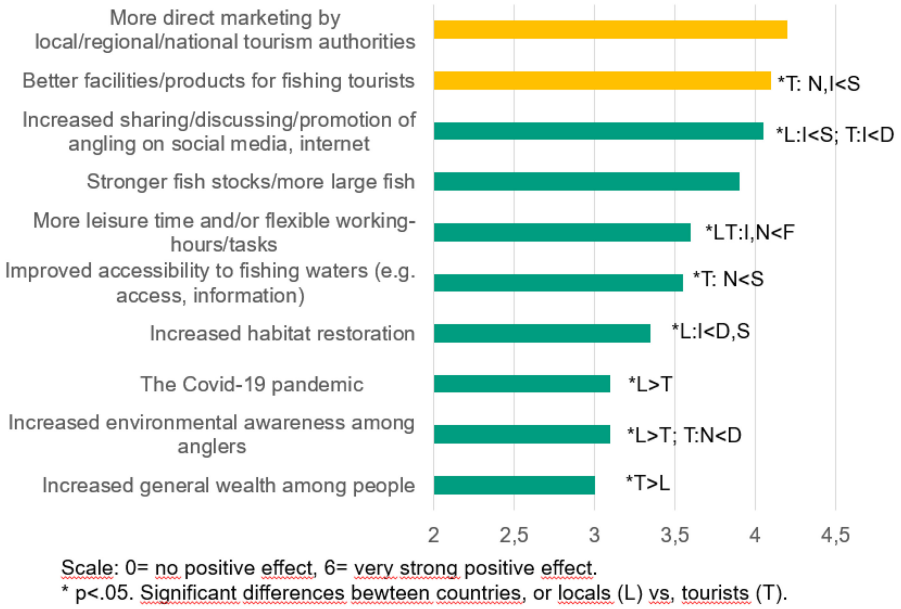


**FIGURE 2** Drivers of expected increases in angling participation by 2030 in Denmark (D), Finland (F), Iceland (I), Norway (N), and Sweden (S) expected by experts who were surveyed in 2019–2021. Orange bars or statements for tourist anglers only.

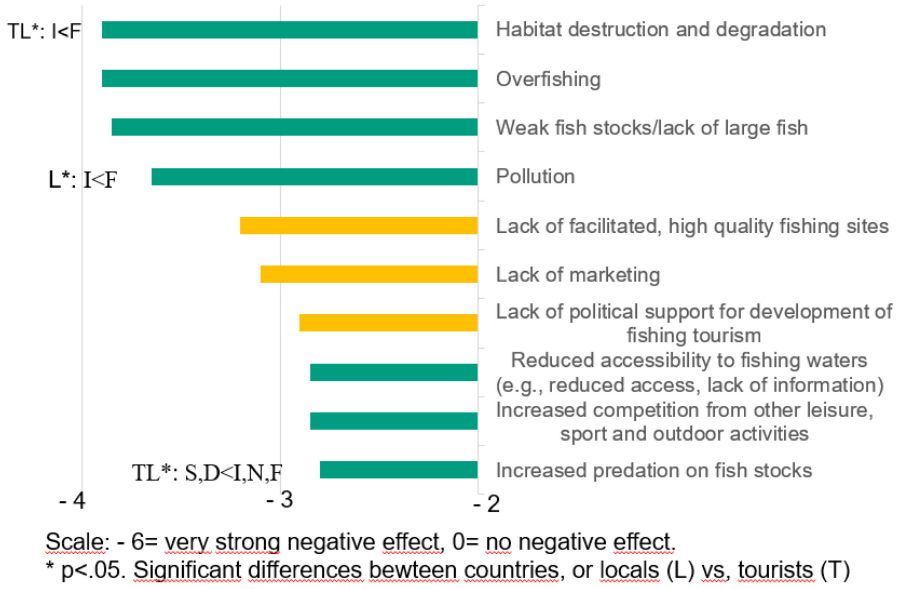


**FIGURE 3** Drivers of expected declines in angling participation in Denmark (D), Finland (F), Iceland (I), Norway (N), and Sweden (S) expected by experts who were surveyed in 2019–2021. Orange bars or statements for tourist anglers only.

*lack of information about*). A sociocultural driver was *increased competition from other leisure, sports and outdoor activities*. *Increased urbanization* was a sociocultural driver and *Increased competition from social media, gaming, TV*, etc. was a technological driver of importance (Tables S4 and S6). *Increased predation on fish stocks* was more of a concern in Denmark and Sweden, and *Habitat destruction and degradation* and *Pollution* were of greater concern in Iceland than in Finland.

## 4 | DISCUSSION

### 4.1 | Angling participation

Expert expectations of future angling participation in Nordic countries both supported and contradicted the life-cycle model of recreational fisheries that predicts decreasing angling participation in post-industrial and urbanized societies (Arlinghaus

et al., 2023; Cowx et al., 2010). Predicting the future is difficult, such as a predicted decline in German angler participation that was expected due to an aging population, more unemployed people, reduced income, increased urbanization, and people moving from rural Easter Germany to a more urbanized Western Germany (Arlinghaus, 2006). In contrast to a predicted decline, participation rates in Germany have been stable since 2002 and increasing in recent years, and some predicted demographic changes never happened (Hunt et al., 2023). Similarly, in the U.S. angler numbers increased recently, after an earlier decline (U.S. Fish & Wildlife Service, 2023). In the UK, angling participation increased (Aprahamian et al., 2010), but declined after a peak in 2010 (Environment Agency, 2023). However, many factors affect angling participation, so the life-cycle model might be too simplistic in some cases (Arlinghaus et al., 2023). Although some of our findings were inconsistent with the life-cycle model, such differences do not justify abandoning the model, which is a simplification of the real world, and though limited, is still useful at a global scale. At a country or regional scale, the model might put too much emphasis on effects of urbanization and post-industrialization, rather than path dependencies (culture of fishing, resource availability etc.), as seen in Nordic countries (angling hotspots), where country-specific patterns deviate from expected effects of urbanization and development (Arlinghaus et al., 2023).

In Norway and Finland, angling participation is very high and both countries are less urbanized than other countries, but maintaining high angling participation may be difficult in the face of ongoing aging of the population and urbanization in all Nordic countries (Norlén et al., 2024). Young adults, in particular, are moving to urban areas (Norlén et al., 2024), which is consistent with the expected participation decline of youth in Norway and Finland. Population growth is currently the lowest in decades, and likely to last (Norlén et al., 2024). Nearly, all population growth in Nordic countries (except Iceland) is now projected in the future to result from immigration (Norlén et al., 2024). Expert opinions about Norway and Finland are consistent with an overall decline in participation over the last 25 years (Dalen & Oppøyen, 2023; LUKE, 2023). The expected increase in Denmark and Sweden contradicts the trend in the last 10 years (Fiskeristyrelsen, n.d.; Swedish Agency for Marine and Water Management & Statistics Sweden, 2024). The recent increase in angling participation post-COVID (and post-data collection) in Finland, Norway, and Denmark (Dalen & Oppøyen, 2023; Fiskeristyrelsen, n.d.; LUKE, 2023) does however indicate that growth might be possible but uncertain.

Nordic countries are known for a high level of gender equality, and although female participation in angling is much lower than for males (Dalen & Oppøyen, 2023; LUKE, 2023), female anglers in our survey were expected to increase the most, albeit from lower participation rates (3–30% in the five countries). The ratio of female anglers can be even lower in fisheries with a large proportion of expert or specialized anglers (Bryan, 1977), as for salmon fishing in Norway, with 5% female anglers (Stensland, Aas & Mehmetoglu, 2017), and saltwater sea trout (*Salmo trutta*) fishing in Denmark, with less than 1% (Skov et al., 2019). Over the last 10–25 years data show an overall decline, or are stable, but post-COVID a recent increase in female angling participation has been documented for Finland and Norway (Dalen & Oppøyen, 2023; LUKE, 2023). It is therefore uncertain which direction female participation is developing.

What we however know is that female participation faces unique obstacles that urgently deserve attention. Social constraints in a male-dominated activity are likely important reasons for low female angling participation, because women put less emphasis on catch, trophies, and domination than males, and instead, mainly seek other fishing experiences, such as self-empowerment, socialization, being in nature, adventure, and independence (Bull, 2009; Burkett & Carter, 2022; Fennell & Birbeck, 2019).

Immigration has been strong and is predicted to increase in Nordic countries, particularly in Sweden and Iceland, where immigrants are now ~20% of the population (Norlén et al., 2024). Anglers with ethnic backgrounds from outside Nordic countries are already an important local angler segment (Joosse et al., 2021) and are expected to grow in all countries. Although the effects of these groups on future fisheries are not known, their fishing behavior, harvest orientation, and cultural fit might differ and thereby conflict with angling traditions and norms of Western countries (Cooke et al., 2018; Quimby et al., 2020; Roop et al., 2021). For example, immigrants coming from countries with less participation and culture for angling than Nordic countries may participate less in recreational fisheries according to the life-cycle model (Arlinghaus et al., 2023). In addition, immigrants may violate fishing regulations and hold other social norms that lead to overharvest and conflicts among angler groups, thereby challenging fishery management (Waitt et al., 2021). In Nordic countries, Asians and immigrant workers from Eastern Europe create new angling niches by commonly fishing in urban areas to catch and harvest species not traditionally targeted, such as cyprinids (Joosse et al., 2021).

The expected growth in tourist anglers in our survey corresponded with general tourism development where the number of overnight stays in hotels in Nordic countries, domestic (90%) and international (68%) tourism markets strongly and continuously grew from 2000 to 2023, except for COVID-years (Nordic Statistics, n.d.). This trend is likely to continue, although major global events can cause temporary or permanent disruptions in fishing tourism markets. For example, the value of the Icelandic krona fell by half against the US dollar and Euro during the financial crisis of 2008, thereby making salmon (*Salmo salar*) angling in Iceland expensive for locals and cheaper for foreigners (Jónsson & Sigurgeirsson, 2016). The COVID-pandemic of 2020–2021 also hindered travel by foreign anglers to fish in Norway (Aas et al., 2021) and Denmark (Pita et al., 2021), especially in 2020. Likewise, the war in Ukraine and increased energy and food prices across Europe will likely limit travel growth in the future (Elmahdy

et al., 2017). The war and consequent reaction of the Western world are also likely to reduce or eliminate the major Russian market for Finnish destinations in the foreseeable future (Elmahdy et al., 2017).

## 4.2 | Drivers of angling participation

Drivers of future angling participation in Nordic countries identified by our survey varied in scale from macro or societal drivers (Arlinghaus et al., 2023) to global. *Sociocultural and global drivers, such as* climate change, increased urbanization, and a shift in wildlife values *are important for long-term population-level changes in angling participation* (Arlinghaus et al., 2023; Manfredo et al., 2021). *However, such drivers might be hard to grasp or change, and therefore may have been downplayed by experts in our survey in the short run in favor of more tangible managerial actions, such as habitat protection or restoration, pollution, and overfishing.*

Environmental drivers that were scored high by experts in our survey directly affect abundance and size of fish and can change fishery quality, angler satisfaction, and ultimately angler participation, (Gundelund et al., 2022). On a global scale, angling participation has clearly been negatively affected by marine overfishing, freshwater biodiversity decline, and loss of species and habitat (Albert et al., 2021; IPBES, 2019). In Nordic countries, for example, marine waters of the Baltic Sea (HELCOM, 2023), coastal marine waters of Denmark (Hansen & Rytter, 2023), and the Oslo fjord of Norway (Klima-og miljødepartementet, 2021) are overfished or in an ecological crisis. Internationally renowned Atlantic salmon fisheries of Norway and Iceland are facing dire threats from salmon farming (parasites, genetic pollution, and diseases), habitat loss and degradation, invasive species like the Pacific pink salmon, and climate change (Thorstad et al., 2021). In contrast, fish and angling in some areas are coming back from reduced acid rain and liming of waters (Rosseland, 2021), controls on invasive species like the salmon parasite Gyrodactylus (Norwegian Veterinary Institute, 2023), and restoration programs in several rivers and streams (Hjalager, 2010). Increased angler environmental awareness and actions mentioned by experts in our survey could play an important role in practical habitat work and conservation advocacy (Shephard et al., 2022). Whether these positive measures can counteract negative effects of environmental drivers is uncertain.

Particularly in Sweden and Denmark, experts were concerned that predation by growing populations of predatory mammals and birds could negatively impact fish stocks and eventually reduce angling participation. Such intercountry variation may reflect differences in predator abundance and harvest or the extent to predation, especially from seals and cormorants, is of concern to anglers, researchers, and managers (Källo et al., 2023; Scharff-Olsen et al., 2018; Sportsfiskarna, 2023).

Accessibility to information about waters and physical access to waters can be a positive or negative driver of future angling participation (Stensland, Aas & Mehmetoglu, 2017; Stensland, Agnarsson et al., 2017), also as indicated by our experts. Anglers in Nordic countries generally have good physical access to waters through a long coastline, many lakes and streams, and public right of access that ensures access to private uncultivated land (Sandell & Fredman, 2010). Increasing development and privatization of waterfronts can pose a problem for access, especially around larger cities (Skar & Vistad, 2013). Freshwater fishing rights in Nordic countries are owned and managed by landowners who single-handedly or in cooperation with other landowners, sell permits to fish an area (Björkvik et al., 2023; Stensland, 2010; Stensland, Agnarsson et al., 2017). Information about fishing and where to get permits varies greatly among areas (Stensland, Aas & Mehmetoglu, 2017; Stensland, Agnarsson et al., 2017) and might be why experts believed this was an important driver as both a constraint and a facilitator. Less-experienced or tourist anglers might have difficulty finding information that would constrain their participation (Stensland, Aas & Mehmetoglu, 2017; Stensland, Agnarsson et al., 2017).

The level of marketing of fishing tourism, facilities, and products was seen by experts as both facilitators and constraints to tourism angler participation. Fishing tourism suppliers in Nordic countries are generally small, often not well organized, and have limited resources (Fredman & Margaryan, 2014; Stensland, 2012; Stensland et al., 2018), so they need external support for marketing and business development as identified by experts in our survey. Promotion and visibility of angling in social media and the internet were identified as important by experts in our survey, and the growth of platforms selling angling permits and packages (e.g., inatur.no, inatur.se, fishingindenmark.info, eraluvat.fi) confirms why technology is increasingly important in the angling sector. Technology is however a dual-edged sword that competes with angling time. In an increasingly modern and urbanized society, more time is devoted to screens and activities (e.g., sports, events) that might be seen as substitutes for fishing that yield equivalent benefits (Arlinghaus et al., 2023). Increased wealth mentioned by experts in our survey was expected to impact tourist anglers positively because they travel and pay more for fishing than locals, although increased wealth can also work in the opposite direction by motivating people to choose other, more expensive activities or destinations (Arlinghaus et al., 2023).

The COVID-19 pandemic was a global driver that restricted border crossings for foreign fishing tourists in 2020 and 2021 (see e.g., Aas et al., 2021, Pita et al., 2021 Sbragaglia et al., 2023) and probably made tourists in general rethink future travel (Elmahdy et al., 2017). Being restricted from travel and having more leisure time off work, people in general, sought stress-reducing, COVID-friendly activities and experiences in nature close to where they lived, such as angling (Howarth et al., 2021; Karpiński & Skrzypczak, 2022). In many countries, angling grew in the first year of the pandemic, 2020 (e.g., Denmark, Gundelund & Skov, 2021), although marine angling declined in many countries due to it being much based on tourists and boats going out to sea, thereby not being COVID-friendly (Pita et al., 2021). Although we can only speculate, experts in our survey could have noticed the increase in 2020 when considering

COVID to have a country-wide medium to strong positive influence on local angling participation in 2030 and a weak to medium influence on tourist anglers. They probably did not expect COVID-19 to last until 2030, but rather having anglers recruited during COVID continue fishing in the years to come. Whether this would happen is somewhat early to say, but as mentioned, recent figures show post-COVID increases in Denmark, Finland, and Norway (Dalen & Oppøyen, 2023; Fiskeristyrelsen, n.d.; LUKE, 2023).

### 4.3 | The Delphi method

General agreement among experts on most issues supported the validity of the Delphi method in our study, although experts potentially think "inside the box" and are not necessarily open to new perspectives that challenge their worldview (Fredman et al., 2023). Further, experts with personal or institutional interest in specific trends (e.g., wanting female angling participation to grow) may bias results (Hussler et al., 2011). Expert bias is inherent in Delphi studies, so the Delphi method tries to circumvent such bias by using a diverse group of experts in a systematic survey conducted over three rounds, using feedback from others to calibrate results in the final round (Hanna & Noble, 2015). Experts in our survey disagreed about some drivers and were less certain about their effects on participation than other drivers. For example, experts agreed on the effect of climate change (indicated by a low standard deviation), but 10% answered the question with "don't know," thereby underlining the complex and uncertain effects of climate change on future angling. Climate change could benefit angling through prolonged seasons and new species, but could also negatively impact some fisheries (Hunt et al., 2016; Townhill et al., 2019).

### 4.4 | Management implications

Incorporating drivers of angler participation we identified into recruitment and retention strategies would likely halt the decline or lead to increased angling participation in Nordic countries and elsewhere in the world (Neal et al., 2023). To get more people fishing, a potential angler must be convinced that fishing is a better option than other leisure activities, and that constraints to fishing can be overcome (Krogman & Stubbs, 2023). Stopping or reversing the decline in angler participation by recruiting, retaining, and reactivating anglers in a structured mix of traditional and social media (Gallardo et al., 2023), with data analytics (Taylor et al., 2023), and angler education programs (Darr et al., 2023). Agencies and stakeholders need to be flexible and open-minded to educational programs (Neal et al., 2023). Angling organizations are already addressing angling participation, but probably not enough to stop the decline, because different groups (women, ethnic groups, and youth) have different motivations and face different constraints to participation (Fennell & Birbeck, 2019; Krogman et al., 2023). Marketing must be tailor-made to specific segments (Krogman & Stubbs, 2023). Increasing globalization and migration of people with different fishing cultures could increase conflicts among angler groups, so NGOs and authorities could play significant roles supported by interdisciplinary research to mitigate solutions.

## ACKNOWLEDGEMENTS

Funding for this study came from the Nordic Council [grant: AG-Fisk (202)-2019-Human dimension of recreational fisheries], and from the Danish Rod and Net Fish License funds, project 39122.

## CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interest to declare.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

## ETHICS STATEMENT

Data collection was approved by Sikt – Norwegian Agency for Shared Services in Education and Research (Ref. no. 244631). Informed consent was provided by the research subjects by actively ticking a box in the survey forms.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

**How to cite this article:** Stensland, S., Skov, C., Agnarsson, S., Rönnbäck, P., Vehanen, T., Blicharska, M. et al. (2024) A Delphi-study to identify drivers of future angling participation in five Nordic countries. *Fisheries Management and Ecology*, 00, e12735. Available from: https://doi.org/10.1111/fme.12735