



Gaps in legislation and communication identified as stakeholders reflect on 30×30 policy in Icelandic waters

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ARTICLE INFO

Keywords:

30×30
Fisheries restricted areas
OECMs
Stakeholder involvement
Fisheries legislation
Rightsholders
Biodiversity conservation

ABSTRACT

Other Effective Conservation Measures (OECMs) recognize that various forms of management actions can contribute to biodiversity conservation. OECMs have been criticized for ambiguity, lack of criteria for evaluation and, thereby, inconsistent implementation. Nevertheless, many coastal states aim to evaluate current management actions as candidates for OECMs and count them toward numerical biodiversity conservation goals. Successful implementation requires careful examination of biodiversity benefits and estimation of the social impacts of such actions. There are numerous fisheries restricted areas within the Icelandic Exclusive Economic Zone, some with designated biodiversity conservation goals, whereas the Icelandic Act of Nature Conservation (60/2913) has rarely been used in marine waters. In the current study, complementary methods are used to broadly examine stakeholder views on the efficiency of current legislation, and future policy, to achieve numerical goals on biodiversity conservation. Despite documenting broad willingness of stakeholders to protect ocean space, gaps in legislation and communication are identified both through survey responses and in interviews with key informants. As a first study to document stakeholder perceptions on using fisheries legislation for the purpose of biodiversity conservation, the results have relevance for future policy on reporting fisheries legislation as OECMs, understanding stakeholder perceptions on different actions and, finally, to inform policy on stakeholder involvement, and outreach campaigns, as governments move forward to meet marine conservation goals.

1. Introduction

The current rapid loss of biodiversity threatens human wellbeing, including health [1], food security [2] and other ecosystem services [3]. Other Effective Conservation Measures (OECMs) emerged as a concept within the conservation community and gained prominence in relation to the Aichi Biodiversity Targets, adopted in 2010 [4–6]. The Convention on Biological Diversity (CBD) defines OECMs as “A geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in situ conservation of biodiversity with associated ecosystem functions and services and

where applicable, cultural, spiritual, socio-economic, and other locally relevant values”, and the International Union for Conservation of Nature (IUCN) uses a similar definition [7]. Therefore, OECMs recognize that

various forms of management actions can contribute to the health of ecosystems even if biodiversity conservation is not the primary goal. OECMs have been criticized for ambiguity, lack of criteria for evaluation, inconsistent implementation and monitoring [8,9], and for encouraging tokenism as numerical targets are sought without meaningful efforts to protect biodiversity [10]. Other research suggests that OECMs can foster actions based on equity and inclusion and lessen the need for already scarce resources in governing MPAs [10–13]. Interest in OECMs surged following the 2022 adoption of The Kunming-Montreal Global Biodiversity Framework to minimize the loss of biodiversity and protect 30 % of land and seas by 2030 (known colloquially as 30×30) [14]. However, there are currently no unequivocal guidelines to evaluate or designate existing actions [15–18] and to date there are only a few global examples of marine OECMs [19]. There is an ongoing international debate as coastal states assess how, and if, they should

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<https://doi.org/10.1016/j.marpol.2024.106422>

Received 30 May 2024; Received in revised form 28 September 2024; Accepted 30 September 2024

Available online 2 October 2024

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incorporate marine OECMs to meet CBDs targets.

Fisheries restricted areas (FRAs) are commonly used technical measures in fisheries management [20,21] and have received interest as candidate OECMs [17,21,22]. FRAs represent some of the oldest forms of fisheries management and differ from output controls, such as total allowable catch (TAC) and fishing quotas, in that they restrict the area of use, often given a specific time. They can be gear-specific, such as bans of trawlers in nearshore waters [23], long-term closures for all fishing gear, such as some seasonal spawning closures [24], or be spatially variable and highly temporary, such as real time closures [25]. FRAs are commonly established through fisheries legislation but can represent considerations other than fisheries management, such as, habitat protection or attempts to reconcile stakeholder interests and social equity [20,26–28]. Given this complexity careful review of individual actions is necessary to determine relevance for biodiversity conservation as well as the social impacts of OECM designation [21,29].

Iceland's Exclusive Economic Zone (EEZ) is determined by 200 nautical miles, excepting borders by the principle of equidistance with Greenland and the Faroe Islands [30], and includes sovereign rights to exploit, conserve and manage many fished stocks [31]. Fisheries has been one of the largest economic sectors in Iceland for centuries [32,33]. There are currently extensive area-based fisheries restrictions established as part of fisheries legislation [34] and the effectiveness of some of these actions for fisheries management has been evaluated [35–37]. Many area-based measures were established in close collaboration between industry, scientists and politicians in response to declining demersal stocks in the late 20th century [38,39] but others have a more convoluted background [40,41]. Conversely, the Marine and Coastal Planning Act [42], the only legislation on multipurpose marine zoning and planning in Iceland, excludes fisheries related planning and has only been applied in two coastal regions [43]. Finally, marine areas protected under the Icelandic Nature Conservation Act [44] cover less than 0.3 percentage of the EEZ [45].

Considering the extent of FRAs in Icelandic waters and their robust regulation, reviewing these actions through the lens of biodiversity conservation became of interest. In 2017 the Ministry of Fisheries commenced work to evaluate the biodiversity benefit of long-term FRAs. Many of the areas that came under review had the primary management goal of recovering overharvested stocks by protecting undersized fish and had prohibited bottom-contacting fishing gear for 10 years or longer [46]. These areas were evaluated for vulnerable habitats, indicator species for vulnerable habitats, ecological representation, representation of biodiversity indicative of long-term reduced impact, and other scientific value. The evaluation resulted in the identification of areas relevant for protective measures; including protection of lightly-impacted areas, cold-water coral areas (that had previously been protected with fisheries legislation), and areas with unique benthic ecosystems, such as hydrothermal vents, coral and sponge gardens and seamounts [46]. After public consultation (primarily using a governmental online portal: Samráðsgátt), regulation 188/2023 *Regulation on protective measures for vulnerable marine areas and benthic ecosystems* was issued in March 2023. 188/2023 was the first regulation within Icelandic fishery legislation to specifically state biodiversity conservation objectives. It moreover extended restrictive measures on the use of fishing gear in some areas. In August 2024 a governmentally appointed expert group recommended that the management actions stated in the regulation could be designated as OECMs [47]. The objective of 188/2023 is stated in Article 1:

“...to ensure the necessary protective measures for vulnerable marine areas and benthic ecosystems with regard to fisheries, biological diversity, ecosystem conservation and the precautionary approach”.¹

International conservation experts have voiced mixed views on designating FRAs as OECMs [8,10,11,22,48] but less attention has been

given to the views of the fisheries sector on using fisheries legislation as tools for biodiversity conservation. Consultation with stakeholders and rightsholders in an integral part of recognizing OECMs [7] and research has shown that early engagement of the fisheries industry, local communities and other stakeholders in marine planning is critical for follow-through and effectiveness of management actions [44,49,50]. It is likely that stakeholders in fisheries are invested in the use of fisheries legislation as a tool to conserve biodiversity and a focus on rapidly increasing numerical conservation goals may include a decision-making process that may not adequately involve local knowledge holders, local communities, and other stakeholders and rightsholders [51–53], potentially undermining the effectiveness and legitimacy of conservation efforts. Therefore, the social impacts of such conservation actions become highly relevant [54]. Specifically, disagreement is likely to increase the need for regulation and monitoring [55–57], and thereby, the cost of patrolling the waters, enforcing disputed rules, imposing administrative sanctions and prosecution. Such top-down control can thwart management effectiveness even for nations with highly functional regulatory systems.

This research examines Icelandic stakeholder opinions on the use of fisheries management legislation for biodiversity conservation. Specifically, opinions on the effectiveness of current legislation as well as on future policy were explored using complementary methods of semi-structured interviews with key experts within Icelandic fisheries science, policy and industry, a content analysis of publicly available comments on recent legislative changes (regulation 188/2023), and a nation-wide online survey targeting a range of stakeholders in fisheries. The results have relevance for future policy on reporting fisheries legislation as tools for biodiversity conservation, understanding perceptions on different actions to meet holistic and effective 30×30 conservation goals and, finally, can inform policy on stakeholder involvement, and outreach campaigns as governments move forward to meet marine conservation goals.

2. Methodology

2.1. Semi-structured interviews with key informants

First, to gain deeper understanding of Icelandic fisheries legislation in relation to biodiversity conservation, grasp the current trends in policy and management, and examine diversity of opinions between experts in the field, semi-structured interviews were conducted with key informants (n=5). The set of experts on this subject is relatively small in Iceland but purposive sampling ensured that participants were knowledgeable of the subject matter [58]. The interviews thereby ensured the voice of key national experts in the study, something that could not be achieved through online surveys only, but do not ensure saturation of all emergent themes within fisheries relevant stakeholders in Iceland. The interviews followed the informed consent process and ethical standards outlined by the State Universities (Case no. SHV2024–003). All interviews took place via online video meetings between October 2nd and October 16th, 2023, and lasted 30–90 minutes. The interviews were semi-structured with specific predefined questions while allowing open-ended answers, for more in-depth information to be collected [59, 60]. Questions focused on the participant's familiarity with and opinions on key concepts in national and international policy relating to biodiversity conservation, 30×30 goals, and area-based fisheries legislation. Interviews were transcribed and analyzed in Word using thematic analysis with coding specifically following the interview questions [61]. Moreover, exemplary quotes were selected to illustrate the range of perceptions on emergent themes or individual viewpoints that were not represented as themes.

2.2. Text analysis on public comments on proposed legislative change

Proposed changes to fisheries legislation, as described in the

¹ author translation

introduction, were placed under public review on 16th of November 2022 through the governmental consultation portal Samráðsgátt (<https://samradsgatt.island.is>), case no. 221/2022. The consultation included a draft of the proposed regulation 188/2023, as well as maps of the areas under review and a summary report. Since the regulation is the first within Iceland to specifically frame fisheries legislation with a biodiversity conservation objective it was of interest for the current analysis to examine the opinions stated in those comments. The 29 comments were manually scored, sentence by sentence, for sentiment (positive, neutral or negative). They were also analyzed using text analysis methods to document, visualize and contrast opinions of different stakeholders in a standardized manner as described below. By using both manual and automated approaches to estimate sentiment the methodological issues inherent to each method are minimized [62].

Specifically, automated content analysis on Icelandic text has significant complications, as automation tools have not been trained on Icelandic and reference texts are rare [63]. Moreover, automated sentiment analysis may be confounded in languages where compound words, qualifiers and intensifiers are common, such as in Icelandic. Therefore, following manual sentiment assignment, ChatGPT-4 was used to translate the comments from Icelandic to English prompting a translation line by line to keep the structure of the text (this resulted in a translation truer to the word count of the original). ChatGPT-4 had been specifically trained to represent Icelandic grammar, including the common use of compound words and inflections to express emotion and meaning [64]. Nevertheless, the translated text was manually reviewed and compared to the original. The authors concluded that, as ChatGPT-4 does not retain grammatical, spelling or typographical errors, the translated comments had a more formal tone than the originals, but the meaning and expression were well maintained. On the translated text each sentence was assessed using the *sentiment* function in the *sentimentr* package [65] in the R environment [66] with the default settings. The choice of lexicon can affect sentiment analysis and may be sensitive to the structure of different languages [67]. As opposed to many other similar methods, the *sentimentr* package considers whole sentences with valence shifters i.e., negators, amplifiers, de-amplifiers and adversative conjunctions, all common in the corpus, and provided sentiment more in line with manual evaluation of the comments than other methods (results for other methods not shown). The significance of differences between stakeholder groups was examined with a Kruskal-Wallis test both for manual and automated assignment of sentiment.

2.3. Survey design and administration

An anonymous online survey was used to document and contrast fundamental opinions of stakeholders on the functionality of current legislation, on using varied fisheries legislation as tools for biodiversity conservation, and finally on agreement with specific actions to meet 30×30 goals. The survey was administered in Icelandic and is presented here translated by the authors. It contained the following quantitative Likert-style questions: Q1 “How much do you agree with the following statements to meet the 30×30 conservation goals”, Q2 “What effect do you think the following actions within the fisheries legislation system have on fish stocks?”, and Q3 “What effect do you think the following actions within the fisheries legislative system have on biological diversity?”. The legislative actions included both restrictions with biodiversity conservation goals and fisheries management goals (Table 1). Q4 asked how familiar, on a scale of 1–10, the respondents were with the legislation presented in Q2 and Q3. Finally, the survey also included the qualitative open question: Q5 “Does the current legislative framework, including fisheries legislation, provide sufficient protection for marine life?”. Demographics such as age, sex, postcode, self-identification of relationship to the fisheries sector, relevant sectors within fisheries, and vessel sizes were also included in the survey.

The survey, along with a short news release, was published on the website of the University of Iceland on October 12th, 2023, and

Table 1

The online survey evaluated stakeholder perceptions on the effectiveness of these fisheries restricted areas as tools for fisheries management and biodiversity conservation. The table refers to corresponding actions in Fig. 2.

Fishery restricted area (FRA)	Management goal	Timeframe	Defined area
Regulation 188/2023 article 7	Protection of lightly impacted habitats	Permanent	Yes
Regulation 188/2023 article 8	Protection of cold-water corals	Permanent	Yes
Regulation 188/2023 article 9	Protection of unique benthic habitats	Permanent	Yes
Regulation 958/2019 article 8 / Atlantic wolffish spawning closure	Fisheries management	Months	Yes
Regulation 958/2019 article 2 / Atlantic cod spawning closure	Fisheries management	Weeks	Yes
Act 79/1997 article 10 / undersize fish closure	Fisheries management	Weeks	No
Act 79/1997 article 5 / 12-mile gear restrictions	Fisheries management	Varies	Yes
Act 79/1997 article 5 / 12-mile size restrictions	Fisheries management	Varies	Yes

subsequently advertised to stakeholders through various media outlets and directly through several major associations within the fisheries sector, including Fisheries Iceland, The National Association of Small Boat Owners, and The Icelandic Captain’s Association. The survey was also distributed directly by email to the staff of the Pelagic division and the Demersal division of the Marine and Freshwater Research Institute (MFRI), units identified by the authors as employing most scientists involved in fisheries research within Iceland. The survey was open to answers from October 12th, 2023, to January 5th, 2024.

2.4. Analysis of survey results

Survey results were analyzed in R [66] to provide overall survey response trends, and to test differences between stakeholder groups. To visualize participant diversity the distribution of responses to age, sex, sector within fisheries and vessels size were plotted (see further depiction of responses in Supplement 1). The responses to the Likert scale questions were graphed as heat plots using the *likert* package [68]. For each Likert item the polarization score was calculated using the *agrrmt* package [69]. To test if opinions differed between stakeholder groups, a Mann-Whitney U test was used.

For Q5 “Does the current legislative framework, including fisheries legislation, provide sufficient protection for marine life?” replies were extracted and grouped based on their core message (yes, no, maybe etc., as seen in Fig. 1). However, several participants provided a more detailed response (n=47). These responses were translated from Icelandic to English using chatGPT-4. Translations were manually checked by the authors before analysis to ensure that meaning was retained and adjusted as needed (mostly on technical details). Then the term frequency-inverse document frequency (tf-idf) was calculated, following the removal of stop words, using the R package *tidytext* [70]. Tf-idf is a measure of the importance of a word to an individual document (here each comment) in a corpus (here the total comments), weighted by word frequency in the corpus. Tf-idf was used rather than simply the most frequent words to lessen the impact of common words and words that appeared often due to the specific context of the comments. The word stem was used to minimize bias caused by frequent use of words with the same stem, such as, trawler, trawling, trawl etc. The full comments can be viewed in Supplement 1.

3. Results and discussion

A total of 129 surveys were received. Submissions where participants

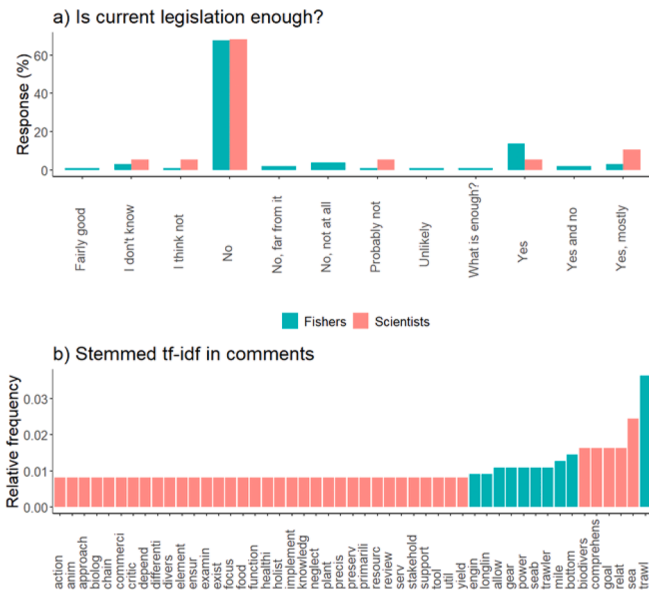


Fig. 1. Results from survey question Q5 *Does the current legislative framework, including fisheries legislation, provide sufficient protection for marine life?* Panel a) summarizes the short responses to this question. Panel b) lists the most frequent words (tf-idf) in the extended comments. The words were stemmed to avoid repeating different forms of the same common words.

had no discernable links to fisheries, fisheries science or management were excluded (n=3). The respondents were from across Iceland, most often male, in the age bracket 56–65 and had worked within fisheries for over 25 years. Most respondents were fishers and indicated their involvement in more than one sector within the fisheries (n=71), which is in line with the results of Chambers & Carothers [71]. There was representation of different fishing gear and vessels, validating the results as representative of a broad group of stakeholders. The survey questions required intricate knowledge of fisheries regulations, and the survey respondents reflect this, providing the perceptions of a relatively small but specialized group of knowledge holders often with at-sea experience. This was also reflected in the self-evaluation of respondent familiarity with the legislation (mean = 6.64 of 10, SD =1.9). In the initial data exploration, there were not robust trends in responses linked to traits, such as gear or vessel size. Response data were thus divided into two groups based on stakeholder category: the fisheries sector (n=107), and participants that listed research, fisheries management and/or administration as their employment (n=19). Although 19 is a relatively low response number it adequately reflects this group nationally; for example, the MFRI, which is by far the largest national employer for

fisheries scientists, employs fewer than 50 individuals within this field. The groups represent broader demographics but were, for simplicity's sake, referred to as fishers and scientists in the following discussion.

3.1. Current legislation is perceived efficient for fisheries management but insufficient for broader conservation goals

Survey results in an open-ended question showed that most stakeholders perceived the current legislative framework as insufficient to protect marine life, although a notable minority of both fishers and scientists found it adequate (Fig. 1). Key informants specifically noted that there is no protocol for jointly considering fisheries legislation and nature conservation legislation, or a mandate for collaboration between the ministries and governmental entities that implement these (Table 2). Although common definitions of MPAs are not limited by the type of legislation issuing protection [72] and some fisheries management actions may *de facto* confer a high level of biodiversity protection, fisheries legislation inevitably centers around issues related to fishing and may not offer adequate protection from other anthropogenic stressors or secure the permanency required for biodiversity conservation.

In the survey comments, fisher concerns regarding current legislation were most often related to recent legislative change, such as the perceived lack of consensus for regulation 188/2023 and changes to access controls within the 12-mile jurisdiction (Fig. 1, Supplement 1). Access controls specific to the jurisdiction [73] have developed over decades and reflect efforts to minimize conflicts between stakeholders in addition to arguments relevant to management of fish stocks or habitat protection. In May 2023 access controls within the 12-mile jurisdiction were changed in the fisheries act [73,74] eliminating the use of a proxy for vessel power (engine power by propeller size) as a prerequisite of access. The main argument for this change was energy efficiency and therefore climate mitigating actions [75]. The argument for energy efficiency was controversial across a broad group of stakeholders [76] and seen to risk current protection to near-shore habitats and biodiversity. This legislative change had recently been implemented when the online survey was administered, and these views were prevalent in the survey comments. In a larger context this debate mirrors emerging conflicts about climate driven actions resulting in negative outcomes for other goals such as biodiversity conservation [77,78].

These concerns around changes to input controls within the 12-mile jurisdiction are reflected in other survey results that showed that most fishers perceived the 12-mile restrictions on vessel size and fishing gear as beneficial tools for both fisheries management and biodiversity protection. However, scientists were more likely to perceive the 12-mile restrictions negatively, although the majority considered them at least partly effective (Fig. 2). The concept of a “patchwork system” was identified as a theme in the key informant interviews, specifically, in that the social and scientific rational for input controls within the 12-

Table 2

The following themes emerged in the key informant interviews. The number of interviews reflecting each theme are shown in parentheses. Three themes were identified relating to the efficiency of current legislation, four themes related to the role of fisheries legislation in biodiversity conservation and four themes related to implementation of 30×30 policy in Iceland.

<u>The effectiveness of current legislation</u>
There is a [good, adequate] system in place for the management of fished stocks (4)
There is a gap between fisheries legislation and legislation on nature conservation (2)
Input controls are a patchwork system as new rules and regulations are added onto an older framework (2)
<u>The relevance of fisheries legislation for biodiversity conservation</u>
Biodiversity conservation is now specifically defined in regulation 188/2023 (3)
Restrictions on benthic impacting fishing gear must have some positive effects on biodiversity (3)
The fisheries management is effective, and its effectiveness can be monitored through the status of the fished stocks (3)
There is a narrow focus on the impacts of towed fishing gear, more diverse impacts should be considered (2)
<u>The implementation of 30×30 policy in Iceland</u>
Political shifts in policy [will, can] hinder implementation (4)
Irrespective of national politics, international policy will impact Iceland (2)
Irrespective of stated goals, the industry will oppose limitations (2)
Iceland has previously resisted implementing international policy in marine conservation (2)

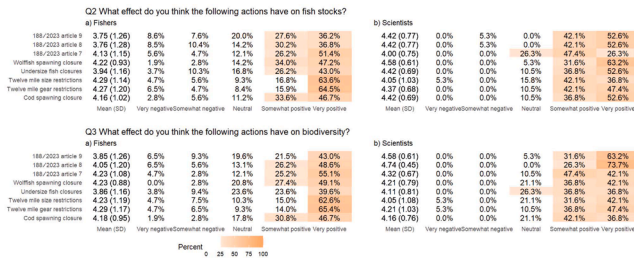


Fig. 2. Perceptions of stakeholders on the efficiency of selected current actions within Icelandic fisheries legislations as tools for Q2) fisheries management and Q3) biodiversity conservation. More specific information on these legislative acts can be found in Table 1.

mile jurisdiction was confounded, making it difficult to evaluate the effectiveness of these actions. Moreover, one interviewee stated that “the debate on the Individual Transferable Quota (ITQ) system has diverted and overwhelmed all discussion [of fisheries management in Iceland]”, indicating the lack of discussion on area-based restrictions and concomitant lack of societal awareness of these actions. Taken together the current results suggest that more research is needed on how input controls are meeting management goals as well as their biodiversity and social impacts.

3.2. Perceptions of specific actions are often but not always grounded in science

Despite concerns over complexity and changeability, the fisheries legislation was viewed positively by most survey respondents, both as tools for fisheries management and biodiversity conservation (Fig. 2). Opinions on specific actions could sometimes be related to published scientific arguments. Real-time closures are, for example, disputed as effective tools in fisheries management [25] and less likely to support biodiversity because of their transient nature. The most supported action was an Atlantic wolffish (*Anarhichas lupus*) spawning closure that has been found to significantly improve the stock status of Atlantic wolffish in Iceland and confer benefits to benthic habitats [79]. Fishers and scientists expressed similar views on many actions suggesting general awareness of those arguments, or alternatively, a similar but independent evaluation of effectiveness. Previous research has shown that fishers can provide important “on the ground” knowledge, for example, by their evaluation of MPA effectiveness and subsequent identification of “paper parks” [80].

Statistically significant differences in the perceptions of fishers and scientists were only found for regulation 188/2023, article 9 (protection of unique benthic habitats) and regulation 188/2023, article 8 (protection of cold-water corals) (Fig. 2). This divergence of views is also reflected in the polarization scores that are higher for fishers (all >0.2) but low for scientists (all <0.2) for these specific actions. These actions were the most negatively perceived by fishers, both as tools for fisheries management and biodiversity conservation, despite being the only actions with specific biodiversity conservation goals and considerable scientific backing as tools for biodiversity protection [81]. These views may reflect the perceived lack of consensus and communication when regulation 188/2023 was issued, as is also indicated by the negative sentiment in comments by the fishers on regulation 188/2023 in the consultation portal (Fig. 3). This suggests that a perceived lack of consensus can negatively affect stakeholder trust and agreement with actions, as has been documented in previous studies [82,83]. Since regulation 188/2023 was implemented shortly before this survey was administered it is not possible to conclude that the negative perceptions will persist or have consequences for compliance. Negative views on the effectiveness of management actions were rarely stated by scientist respondents (Fig. 2).

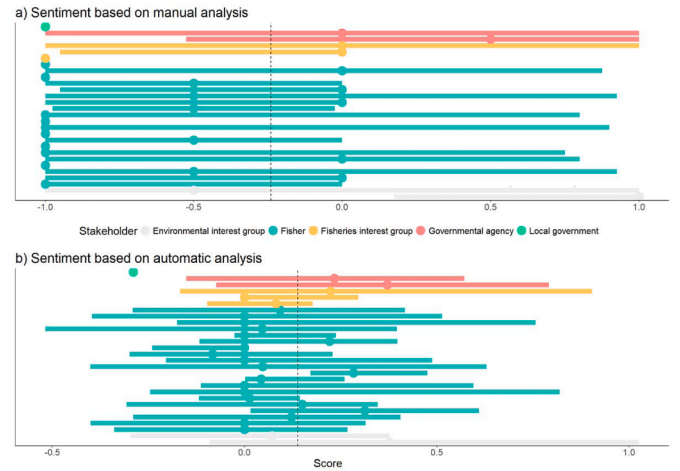


Fig. 3. Analysis of public comments on proposed legislative change (regulation 188/2023), the first Icelandic fisheries regulation with stated biodiversity conservation goals. Both panels show the median and interval of estimated sentiment per comment. Panel a) shows the sentence-by-sentence manual estimation of sentiment and panel b) shows automated sentiment estimates. The results are similar, but the more negative mean sentiment (dotted lines) estimated manually may reflect the more formal tone of comments after automatic translation. Sentiment differed significantly between stakeholder groups by both methods (p < 0.001).

3.3. Fisheries and biodiversity goals are synonymous for many stakeholders

Despite sharing a general willingness to protect and similar perceptions on the legislation, the survey comments differed considerably between fishers and scientists (Fig. 1, Supplement 1). Scientists commonly used words referring to ecosystems, biodiversity etc., in line with their expressed concerns that the current system is specific to fisheries and does not adequately consider other biodiversity or ecosystem effects (Supplement 1). The concerns of fishers centered around topics more specific to fisheries management, for example, towed bottom-contacting gear and large pelagic trawls. Such differences in narrative do not necessarily reflect divergent views but different language, cultural and educational backgrounds, and ways of knowing nature [84–86]. The current results show that fishers are highly focused on fish stocks and fish habitats when asked to consider biodiversity and marine protection. Acknowledging these differences in perception and language when communicating policy could improve consensus and compliance outcomes. Specifically, standardizing the terminology surrounding marine conservation [87] may improve communication and minimize ambiguous messaging to stakeholders.

3.4. Broad willingness to protect but hesitancy toward 30×30 policy

The survey results show broad stakeholder willingness to protect the marine environment but also highlight specific concerns around no-take zones (here defined as areas banning all fishing gear) and closures of current fishing grounds. The only statistically significant differences between fishers and scientists were in the protection of deep-sea habitats; fishers were less interested in conserving deep-sea habitats as part of 30×30 policy, and in the establishment of no-take zones (Fig. 4). Fishers were most interested in actions that may directly benefit fished stocks, such as the protection of spawning grounds, nursery grounds and nearshore habitats, that are likely seen as important habitats for juvenile fish of important stocks, such as Atlantic cod (*Gadus morhua*) [88]. Two proposed actions did not have majority agreement: restricting access to all fishing gear (no-take zones) and closing current fishing grounds (Fig. 4). It is worth noting that polarization scores were also high for

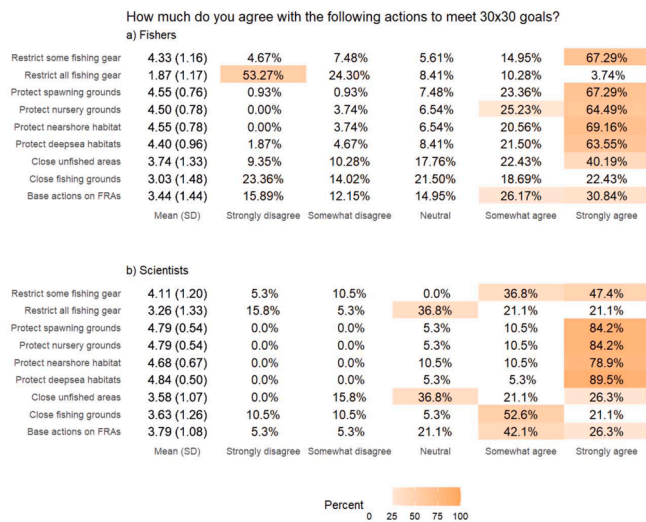


Fig. 4. Agreement of survey respondents to the survey question Q1 “how much do you agree with the following statements to meet the 30×30 conservation goals”. Responses from fishers are shown in panel a) and scientists in panel b).

these actions (0.22–0.52), showing that opinions differ even as a convincing majority of fishers (78 %) opposed no-take zones. Previous research has similarly reported stakeholder opposition to no-take zones [50,89]. Although, a recent survey of recreational fishers in Australia found that fisher agreement increased for longstanding actions [90], an important consideration for establishing highly restrictive areas. No-take zones were also less positively seen by scientists as 21 % disagreed with their use in 30×30 policy. Although more context could not be provided in the survey, these views may reflect familiar themes on the disputed benefits of no-take zones for fish stock management [91–95].

Concerns have been raised that a focus on rapidly reaching numerical conservation goals may result in designation of areas that are politically uncontested but without strong evidence for biodiversity conservation benefits [9,10,21]. These could be areas that are currently regulated, but fishing has not been established and limited biological data is available. For example, the Northeast Atlantic Fisheries Commission (NEAFC) recently asked ICES for advice on their closed areas and fishery restricted areas for designation as OECMs [96]. It was of specific interest for the current study to examine stakeholder opinions on these kinds of actions. Perhaps not surprisingly, opinions on using fisheries legislation and currently unfished areas to meet conservation targets were among the most polarized for both fishers and scientists (0.32 for both groups). For both groups, the majority supports the policy of using area-based restrictions within fisheries legislation (FRAs) to meet numerical conservation goals, and although more fishers disagreed (28 % vs 11 %) this was not statistically significant. Similarly, although fishers were slightly more likely to support designating currently unfished areas for conservation (63 % vs. 47 %), this was not significantly different.

The hesitancy of some stakeholders in fisheries to use fisheries legislation to meet 30×30 goals may signal mistrust or skepticism but it can also indicate a general lack of awareness of the 30×30 policy. This was suggested by the analysis of survey comments as 30×30 was rarely mentioned by fishers. Conversely, some key informant interviews explicitly indicated hesitation toward numerical conservation goals. Most interview participants expressed the view that political policy change could halt Iceland’s progress to meet the 30×30 goals (Table 2), one suggested that “no-one will take a numerical goal seriously”, others pointed out Iceland’s previous unwillingness to follow international policy for marine conservation and, finally, two participants stated that the fisheries sector would “despite talking the talk”, “turn the precautionary principle upside down where we must prove no adverse effects

to the industry”. Surveys of intention can have little predictive value for behavior or follow-through of respondents [97]. The current results show that when asked in an anonymous survey Icelandic fishers align themselves with conservation action. However, comparing survey results to interview emergent themes and representative quotes suggests that nuanced themes may still be uncovered by basing further studies on in-depth interviews with a broader group of stakeholders. Finally, stakeholders in fisheries may associate 30×30 policy with the most restrictive and negatively perceived actions, such as no-take zones, and their strong association of fisheries specific and biodiversity goals, as well as perceived lack of consultation, could all impact policy implementation.

4. Conclusions and policy recommendations

Stakeholders noted a lack of synergy between fisheries and nature conservation efforts, highlighting the need to ensure legislation for marine planning that provides a mandate for collaboration across institutes and ministries. Area-based fisheries legislation was perceived as highly functional for the purpose of fisheries management but it cannot replace a conservation framework. Currently, the Act on Nature Protection (60/2013) has rarely been applied in the marine environment and only at sites that are more easily monitored and regulated. This can be an opportunity to review the efficiency of regulation while identifying areas of specific biodiversity benefits that are not being considered in fisheries management legislation, thereby, working toward the end goal of systematic, rather than opportunistic and poorly regulated networks of MPAs.

The stakeholders unambiguously aligned themselves with marine protection, although there is also willingness to use actions with disputed biodiversity benefits as tools for conservation, and least support for the most restrictive actions. This willingness to protect can be encouraged by involving stakeholders, local knowledge holders and communities at an early point in marine conservation planning, and by encouraging the initiative of stakeholders, civic society and NGOs in reporting candidate areas for protection. Thereby, taking advantage of the potential benefits of small state “face-to-face” governance [98] by providing a clear venue for such communication and flexible processes for evaluating suggestions and their progress.

Across both survey responses and public commentary, it was clear that biodiversity conservation goals and fisheries management goals were synonymous in the perception of many fishers. These views may contribute to the apparent skepticism of using fisheries legislation as a tool for broader biodiversity conservation. For the goal of marine conservation, communication incentives should acknowledge these different ways of knowing the marine environment and the need for consistent use of terms. This can be done, for example, by acknowledging the varied ecosystem services of fished stocks and the efficiency of fisheries management in protecting them, while educating on other biodiversity drivers that are as important for maintaining ecosystem health.

Finally, area-based restrictions were broadly seen as a patchwork of often changeable secondary legislation. This was noted negatively by both fishers and in key informant interviews. Future planning for marine conservation should aim to recognize stakeholder needs for predictability and secure planning and clear consultation on foreseeable legislative change. Robust scientific rationale for conservation actions, predictability, stakeholder buy-in, and long-term goals will also best meet the needs of biodiversity conservation.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CRediT authorship contribution statement

Theresa Henke: Writing – review & editing, Methodology, Formal analysis, Data curation. **Guðbjörg Ásta Ólafsdóttir:** Writing – original draft, Project administration, Methodology, Investigation, Formal analysis, Conceptualization. **Steinunn Hilma Ólafsdóttir:** Writing – review & editing, Validation, Conceptualization. **Catherine P. Chambers:** Writing – review & editing, Supervision, Methodology, Investigation, Conceptualization.

Declaration of Competing Interest

The authors declare no competing interests.

Data Availability

Part of the data is confidential. Part of the data is shared on request

Acknowledgements

The authors wish to thank all participants in the online survey and the many individuals, media and associations that helped raise awareness of the survey. Moreover, we thank the anonymous interview participants for their role in this study by providing the necessary depth, context and background. We also wish to thank the members of the Steering Committee on Marine Protected Areas, within the Ministry of Food, for many useful discussions on marine protection and the legal framework for marine protection in Iceland. Finally, we thank two anonymous reviewers for their useful comments on the manuscript.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.marpol.2024.106422](https://doi.org/10.1016/j.marpol.2024.106422).

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