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UK Public Attitudes and Perceptions of Seafood Sustainability: A Case Study of the Marine Conservation Society's Good Fish Guide

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Abstract: Globally, the ocean faces growing pressures from various human activities, not just those related to overfishing and other fisheries related issues. In response to these pressures over the last few decades, seafood guides were developed to influence seafood purchasing behaviour and in turn increase the sustainability of the fisheries sector. However, to date there has been limited evaluation of the use and impact of these guides, and little assessment of public perceptions and attitudes to seafood sustainability. Using a public questionnaire (n = 2409) and the Marine Conservation Society's (MCS's) Good Fish Guide (GFG) as a case study, this study explored UK public attitudes and perceptions toward seafood sustainability and examined the role of the GFG in encouraging sustainable seafood purchasing habits. Motivational drivers and barriers to using the MCS GFG were also investigated. A positive attitude towards the guide and knowledge, including understanding of the importance of sustainability, were found to be important motivators of use. The main barrier was found as lack of awareness of the guide for 69% of participants. This study also revealed that the perception of seafood as healthy, and a more environmentally friendly animal protein than land-based alternatives is an important driver for its consumption. MCS GFG users were found to purchase significantly more (60%) seafood compared to non-users with a slight majority (53%) reporting that guide use influences their purchasing behaviour. These findings have practical implications for using guides to increase seafood consumption in line with UK government dietary guidelines whilst simultaneously meeting global sustainability goals. The study makes a unique contribution to understanding how the use of seafood guides can influence public purchasing behaviour both in the UK and globally and thus their potential for impacting the sustainability of seafood supply chains more generally.

Keywords: coastal; seafood consumption; marine environment; overfishing; seafood purchasing behaviour; sustainable seafood; seafood guides

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1. Introduction

Ocean ecosystems globally are under threat from climate change, biodiversity and habitat loss, pollution, and overfishing [1–3] with society's most direct impact on the ocean considered to be fish consumption [4]. With a growing world population and extensive encouragement to consume more food from the sea for both individual and planetary health reasons [5], the global demand for seafood is increasing [6], with preference for 'sustainable' seafood also rising, particularly in higher income countries [7,8]. While this appears reassuring, the lack of an internationally accepted definition for sustainable

fisheries and understanding of what constitutes sustainable seafood poses a challenge for its interpretation and marketing [9–13].

Despite the absence of an agreed definition, 'sustainable seafood' is popularly regarded as seafood that was produced with minimal impact to the marine ecosystem [14–16]. However, due to the concerns about unsustainable fishing practises, the inclusion of seafood in a sustainable diet that balances healthy eating and environmental priorities is regarded by some as something of a 'dilemma' [17–20]. Compared to other animal proteins, the lower environmental burden associated with fish consumption is widely acknowledged [21,22], alongside the accepted role of fish within a healthy diet [23] and the benefits associated with eating seafood [10,24–28]. With the ever-growing demand, it is vital that seafood is sustainable both for the perpetuity of stocks for nutrition and food security, as well as for coastal communities reliant upon fishing now and in the future.

Despite the UK being an island nation with a long fishing history as one of the main seafood producers in Europe [29], UK seafood consumption is lower than that of many other European countries [30]. At approximately 148 g per person per week [31], it is only half that recommended [32]. UK seafood consumption has changed since World War Two [30], from locally caught species to the market being dominated by largely imported species [33,34]. This trend of 'importing what we eat and exporting what we catch' [35] is exacerbated by UK consumers' preference for a narrow range of species [36]—cod, haddock, salmon, tuna, or prawns, the so-called 'Big 5' [37]. In addition to the social and economic impacts on fishing communities [38], and fish security in the UK and overseas [39–41], the importation of seafood incurs higher environmental impacts associated with air transport [42], while a shift towards pre-packed seafood [43] creates further challenges.

In response to concerns regarding the sustainability of the seafood sector, various initiatives, collectively known as the sustainable seafood movement (SSM), have evolved since the early 1990s. The SSM aims to raise consumer awareness and increase sustainability within the seafood supply chain [44–46]. In common with other social food movements [47], it has largely used market-based approaches to achieve these aims [12,48–51]. By influencing consumers' decisions, seafood guides aspire to change behaviour and consumption in favour of purchasing seafood from sustainable fisheries [13].

Since the production of the first seafood guide in the USA nearly thirty years ago [52], around 200 sustainable seafood guides were produced internationally [12,53]. However, despite their relatively long history, there are few studies, except for some that evaluated the Seafood Watch Programme in the US [54], to suggest seafood guides are effective in influencing sustainable seafood purchasing behaviour. Understanding how consumers use seafood guides is essential to improving the efficacy of guides and their potential role in wider seafood sustainability.

Increasingly, individuals, as 'agents of change' [55,56], are being encouraged to alter their consumptive behaviours and lifestyle choices, to make 'responsible' and 'informed' choices to help address global environmental challenges [57]. Understanding public perceptions, what people value, think about, and 'connect' with, it is clear that the sea [58–62] is key to engaging the public in making pro-environmental choices, including their seafood choices, to reduce human impact on the marine and coastal environment and support wider fishery management efforts. There is therefore an opportunity to explore the role of tools such as seafood guides to enable individuals to 'transform' ocean literacy (i.e., their knowledge and understanding of their impact on the ocean through seafood consumption, in this case) into 'behaviour and actions (sustainable seafood purchasing behaviour) that promote ocean sustainability' [63].

This paper explores UK public attitudes and perceptions towards seafood sustainability and the role of the Marine Conservation Society's (MCS's) Good Fish Guide (GFG) in

encouraging more sustainable seafood purchasing habits as well as identifying potential motivational drivers for its use. In addition to addressing the gap in the current understanding of the effectiveness of seafood guides, recommendations for increasing awareness and use of seafood guides are provided.

2. Materials and Methods

2.1. Questionnaire Design

A self-administered online questionnaire distributed through Google Forms, with a mix of open and closed questions, was used to gather insights into participants' attitudes and perceptions towards seafood consumption and use of the MCS GFG. The questionnaire comprised 11 sections, covering a range of topics including guide use, seafood purchasing behaviours, and sustainable seafood knowledge, as well as information about the participants, including gender, age group, employment, and location (see Supplementary Materials SM S1 for a full version of the questionnaire).

A 5-point Likert scale format, 1 (strongly disagree) to 5 (strongly agree), was used for most closed questions, and where appropriate, used to determine a composite measure [64] for variables. For example, to determine seafood purchasing frequency, participants were asked about their buying habits for the 17 species listed in the 12 months prior to completing the questionnaire and a composite score for fish purchasing frequency calculated [65]. From researchers' knowledge of the UK seafood market, and information presented in the annually published MCS Pocket Good Fish Guide, general or objective seafood knowledge statements, including issues for seafood, were constructed—for example—the net import of fish into the UK [66]; consumer interest in the UK in a narrow range of species (the 'Big 5') [37,67]; and the impacts of climate change on fish stocks, such as the effect of increasing water temperatures on fish distribution [68,69]. To examine the role of ocean connectedness on guide use and perceptions, a scale incorporating Ocean Literacy Principles 5 ('The ocean supports a great diversity of life and ecosystems') and 6 ('The ocean and humans are inextricably interconnected') was produced [70]. Negative statements (Items 4, 9, and 10) were reverse scored (see Supplementary Materials Figure S3). A Seafood Logo scale was also developed to measure eco-label knowledge. See Section 2.2. below for the discussion of the scale used for motivational drivers for using the MCS GFG. The reliability of the scales developed was assessed by conducting Cronbach Alpha tests in IBM SPSS 25. The scores obtained (0.85 to 0.924) indicated that the scales used were highly reliable. Open-ended questions were used to obtain consumers' understandings of 'sustainable seafood' and 'responsibly sourced' (i.e., objective seafood sustainability knowledge), terms widely used on supermarket seafood packaging.

A multi-phased approach to data collection ensured that the data were: nationally representative; not biassed toward individuals with an interest in marine conservation; and included representation from those with potential exposure to the guide. This was especially important given that the study aimed to evaluate the effectiveness of the guide, understand who guide users are, what motivates them to use the guide, and to make comparisons between them and non-users. In the first data collection phase (1 May to 11 July 2020), a link to the questionnaire was distributed through the social media channels of public attractions, e.g., aquaria and wildlife park as well as via appropriate organisations' networks. In total, 411 responses were collected in this phase. To widen the reach of the survey, a second phase of data collection was carried out by Cint (a data collection company). This resulted in a further 1998 responses over the period of 1 May to 7 July 2020, resulting in a final sample of 2409.

2.2. Examining Drivers and Use of MCS GFG

To examine the role of the MCS GFG in influencing seafood purchasing behaviour, an extended model of the Theory of Planned Behaviour (TPB) [71] (Ajzen, 1991) was chosen as the theoretical framework to explore motivation for using the guide (see Section 3.6). The study hypothesised that several cognitive, emotional, and behavioural factors could be used to predict the intention to use the MCS guide, and that the intention to use the guide, would, in turn, predict behaviour, i.e., self-reported GFG use. Further, it was hypothesised that knowledge, Perceived Behavioural Control (PBC), defined as '*the person's belief as to how easy or difficult performance of the behaviour is likely to be*' [72] (p. 457); whether a person feels they can take a certain action, and importantly, the effort they are prepared to expend to help make a difference and individual responsibility (for the sea) would directly predict GFG use. Situational factors included in the model were deemed as those considered to have a moderating effect on behaviour, recognising that the intention to perform a behaviour does not always result in the behaviour being actioned. See Supplementary Materials SM S2 for a summary of scale items, their descriptive statistics, and Cronbach Alpha values for each of the model constructs.

2.3. Data Analysis

Given the varied data collected, a range of analytical techniques were employed. For closed questions, descriptive analysis was used to identify initial trends. Segmentation of participants according to their awareness and use of the guide, and seafood purchasing, allowed relationships such as the level of seafood knowledge of guide users compared to non-users, the seafood choices made by guide users compared to non-users, and their connectivity to the sea, were examined. These were then analysed further using other statistical tests. Mann–Whitney U tests explored differences in responses between groups (for example, the difference in responses between users and non-users of the guide). Chi-square tests for independence examined the association between nominal or categorical variables (for example, MCS GFG use and the responses to each of the items or statements in the question). One sample Wilcoxon tests were used to determine if responses overall to the items presented differed from the mid-point i.e., neither agree nor disagree, as applied by McKinley et al. (2020) [73] (for example, 'I buy less seafood now than before I started using the Guide'). Kruskal–Wallis tests were run to examine the relationship between 'eco-label knowledge' and participant characteristics and purchasing behaviour. Pearson's coefficient correlation and standard multiple regression analysis was carried out to assess the predictors of GFG use, e.g., individual responsibility for the sea [74–77]. Finally, Principal Component Analysis (PCA) explored what variables most strongly characterise an individual using the MCS GFG.

To facilitate qualitative analysis of the open-ended questions, responses for 'sustainable seafood' were categorised according to the methodological approach developed by Lawley et al. (2019) [14]. A definition provided by the Marine Stewardship Council (MSC) for seafood sustainability—'leaving enough fish in the ocean, respecting habitats and ensuring people who depend on fishing can maintain their livelihoods' [78]–was used as a model for analysis. For 'responsibly sourced', responses were similarly coded. A correct response was deemed to be one where reference was made to any action (or behaviour) taken by a business to mitigate the risk of seafood being unsustainable i.e., 'the steps taken by a business during the sourcing of own brand fish and seafood' [79].

3. Results

3.1. Participant Profile

A summary of the participant profile is presented in Table 1 (see Supplementary Materials SM S3 for more). Most participants were female (54.4%), which compares to 51% of the overall population in England and Wales [80] (ONS, 2021), and most (60%) were aged between 18 and 50; 32% were aged between 50 and 70; and 8% were above 70 years old. In comparison, 18.6% (11.1 million) of the population in England and Wales in 2021 were aged 65 years and over [80]. The majority (79%) were white British, reflecting this as the largest ethnic group in the UK [80]. Nearly all reported to be from households with one (21%) or two (51%) adults, with 54% indicating that they have no children and 27% indicating they are single child households.

Table 1. Summary of participant profiles.

Demographics		*n*	%
Gender (n = 2356)	Male	1046	44.4
	Female	1282	54.4
	Other	6	0.3
	Prefer not to say	22	0.9
Ethnicity (n = 2338)	Bangladeshi	22	0.9
	Black British or Afro-Caribbean	46	2
	Chinese	22	0.9
	Indian	47	2
	Multi-racial	31	1.3
	Pakistani	32	1.3
	White British	1907	79.2
	White European	137	5.7
	Other	50	2.1
	Prefer not to say	44	1.8
Age (n = 2346)	18–29	552	23.5
	30–49	856	36.5
	50–69	746	31.8
	70+	192	8.2
Adults in household (n = 2347)	1 adult	487	20.7
	2 adults	1194	50.9
	3 adults	383	16.3
	More than 3 adults	283	12.1
Children in household (n = 2350)	No children	1278	54.4
	1 child	640	27.2
	2 children	308	13.1
	3 children	82	3.5
	More than 3 children	42	1.8

Note: The variation in sample size (n) is due to incomplete responses to questions by participants in some cases.

3.2. MCS GFG Awareness and Use

When asked about their awareness of the Marine Conservation Society (MCS) Good Fish Guide (GFG), most participants (54%) indicated that the survey was the first time they had seen the guide (Figure 1).

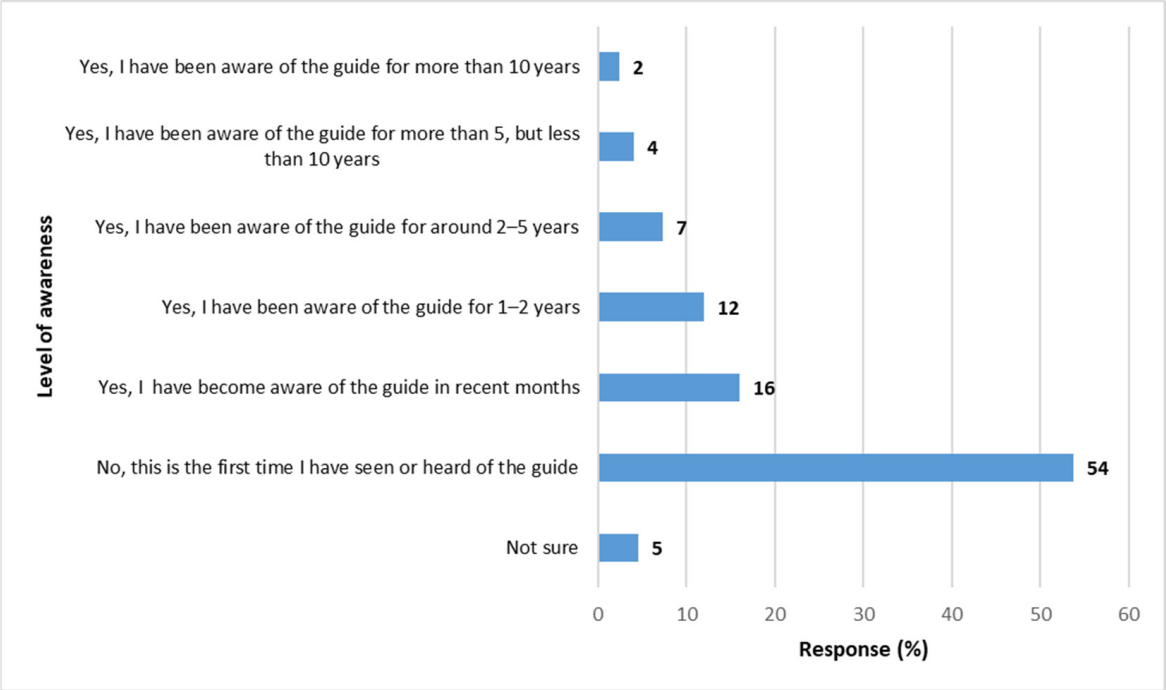

Figure 1. Level of public awareness of Marine Conservation Society's Good Fish Guide (n = 2359).

Examination of variation in guide awareness with participants' locations revealed a statistical difference in guide awareness across the UK (X^2 (11, n = 2209) = 48.99, $p < 0.001$). South West England recorded a significantly higher median score for guide awareness (Md = 2) compared to all other regions except Scotland (Md = 1). South West England (47.5%) and Scotland (38%) were also found to have the highest number of guide users as a proportion of all participants from a given region. Analysis of the responses also indicates that of those participants with awareness of the guide (41%), 62% claim to use it.

Analysis of participants' reasons for not using the guide (n = 1172) found that many (69%) indicated they had not seen or heard of the guide prior to the survey (see Supplementary Materials SM S1 Question 3). Habit, with a tendency to 'stick' to familiar seafood choices, was a barrier for 51%. Finally, analysis revealed the typology for guide users from this study as more likely to be male, in employment, aged 30–49 years, members of a charitable group, with a postgraduate qualification, and people who visit the coast frequently (see Supplementary Materials SM S4).

3.3. General Seafood Purchasing Behaviour

The study compared the influence of various factors on seafood purchasing and the prioritisation of seafood attributes between guide users and non-users. Moreover, 82% of participants purchasing seafood indicated that they have always eaten seafood with many (70%) noting this habit was formed in childhood. In addition, 68% disagreed with the statement 'I don't eat seafood', suggesting that, for the majority, seafood is part of their normal diet. Just over half (55%) agreed they have always tried to only buy sustainably produced seafood (Figure 2).

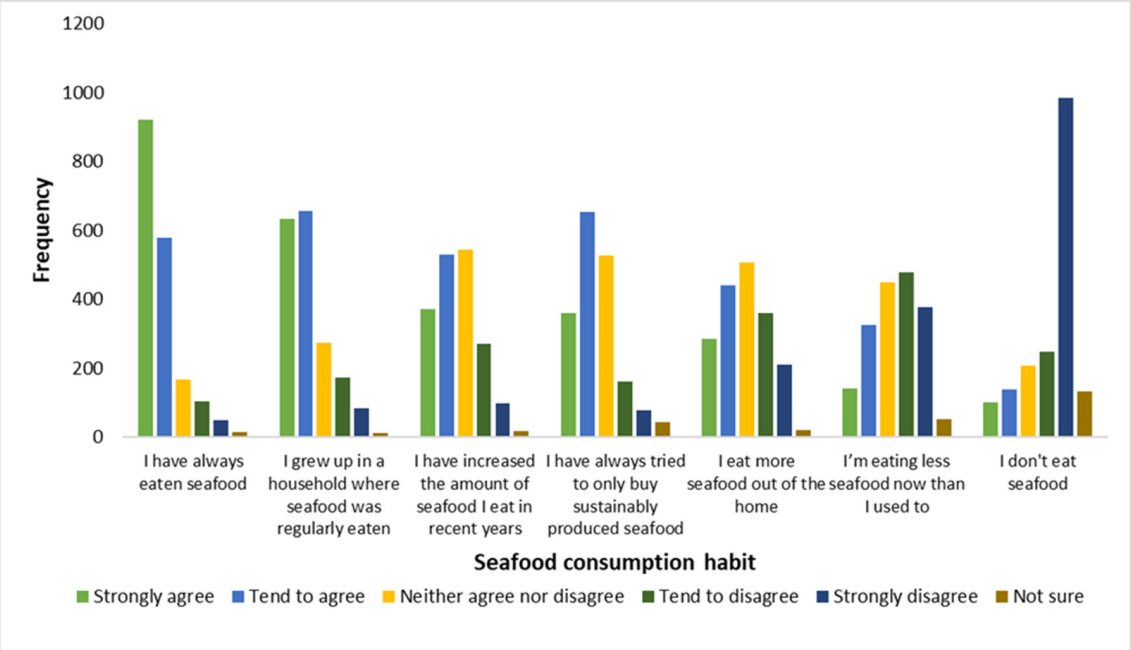

Figure 2. Trends in participants' seafood consumption habits (n = 1834).

An analysis of where seafood is purchased for home consumption indicated supermarket purchases dominate (n = 1587; 45%). The data were further examined to understand whether guide use influences where seafood is bought. As shown in Figure 3, guide users make 18% more purchases from independent sources (e.g., fishmongers, fish vans, etc., and local markets) compared to non-users and make twice the number of purchases online. The proportion of purchases made by users in supermarkets is 21% less than that reported by non-users.

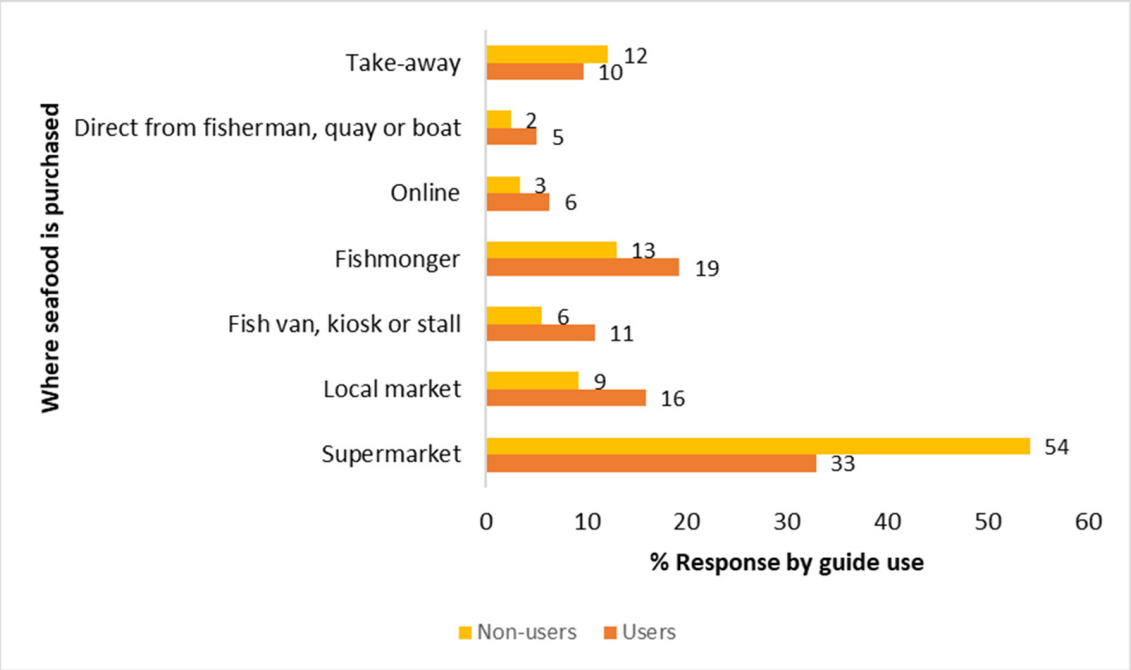

Figure 3. Summary of participant seafood use in both guide users and non-users.

Just over half (56%) of the participants suggested that family was the most important influence on seafood purchasing decisions (see Supplementary Materials Figure S1).

Celebrity chefs (32%), media (27%), and social media (21%) appear to have less influence than anticipated.

Analysis indicated a high level of agreement with the importance of the influences presented. In all cases, except in the case of scientific experts, a statistical difference ($p < 0.05$) between observed medians and the hypothetical median was found. This suggests that scientific experts do not have as much of an influence on the seafood choices people are making compared to family and wildlife experts, for example.

The importance of a range of factors influencing participants' seafood purchasing decisions was also examined. Table 2 summarises responses from both users and non-users of the MCS GFG.

Table 2. Summary of comparison of importance of 14 seafood attributes for seafood purchasing.

Seafood Attribute	Guide Users (n = 662)		Non-Users (n = 1172)	
	Strongly Agree/Tend to Agree (%)	Strongly Disagree/Tend to Disagree (%)	Strongly Agree/Tend to Agree (%)	Strongly Disagree/Tend to Disagree (%)
Price	71	11	81	5
Easy to cook with recipe in mind	70	10	75	5
Provenance (i.e., who caught or farmed the fish and where)	76	7	41	17
How it's caught or farmed	79	4	53	12
That it's good for me	81	7	82	3
Is it wild caught or farmed?	68	5	44	14
Fish welfare	80	4	50	12
That it's sustainable	86	3	59	8
Taste	85	4	90	2
Social justice (i.e., that the product is fairly traded)	74	6	45	14
Locally caught or produced	72	7	48	14
The type of product it is (e.g., fresh or frozen etc.)	73	5	77	4
That it's easily available	72	10	78	4
That it's a more sustainable source of animal protein	75	5	52	11

To further explore drivers for seafood purchasing, the various influences were grouped into four categories (Table 3): situational factors, such as seafood eating habits [81], (convenience [82,83]) and visibility [84]; egoistic factors, such as health consciousness [85]; altruistic factors, such as those associated with ethical or social; and environmental consciousness or values [85,86].

Table 3. Drivers for seafood purchasing grouped into categories.

Factor Category	Factors
Situational (5)	Price; Taste; Availability; Easy to cook; Product type.
Egoistic (1)	That it's good for me.
Environmental (4)	Is it wild or farmed?; How it's caught or farmed?; That it's sustainable; That it's a more sustainable source of animal protein.
Ethical or social (4)	Provenance; Fish welfare; Social Justice; Locally caught or produced.

Figure 4 indicates that, although important for guide users, situational factors such as price and taste appear to be less important when buying fish compared to other factors. Moreover, 74% of participants using the guide agreed that these factors are important compared to 80% of non-users. Health considerations appear to be equally important for both groups (81%/82%), whereas environmental (77%/52%) and ethical or social considerations (76%/46%) appear more important to guide users compared to non-users.

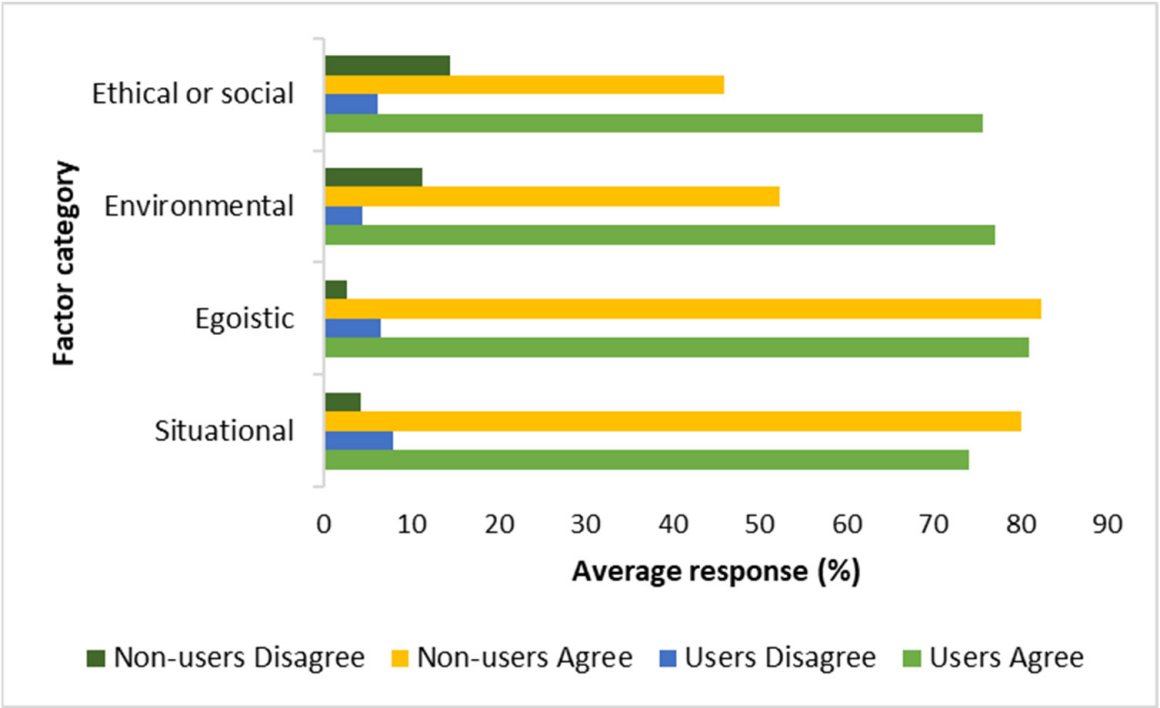

Figure 4. Relative importance of seafood purchasing influences for participants.

To explore the relative importance of purchasing influences for both groups, Chi-square tests for independence examined the relationship between GFG use and the seafood attributes in Table 2. A statistical difference ($p < 0.05$) was found in all cases, except for product type (Table 4), implying that the categorical variables are dependent on guide use and the responses differ for users and non-users of the guide. In the case of product type, findings suggest it is universally important when making purchasing decisions.

Table 4. Summary of results for seafood purchasing attributes.

Category	Attribute or Factor	Pearson Chi-Square Value	Yates Continuity Correction (X^2)	*n*	df	Significance (*p*)	Phi Coefficient
Ethical or social drivers	Provenance	86.891	85.549	1211	1	$p < 0.001$	0.27
	Fish welfare	58.988	57.724	1278	1	$p < 0.001$	0.22
	Social justice	52.169	51.055	1219	1	$p < 0.001$	0.21
	Local	43.843	42.847	1253	1	$p < 0.001$	0.19
Environmental	How it's caught or farmed	51.467	50.266	1309	1	$p < 0.001$	0.20
	Is it wild or farmed?	55.115	53.928	1160	1	$p < 0.001$	0.22
	That it's sustainable	31.346	30.27	1373	1	$p < 0.001$	0.15
	More sustainable protein source	35.826	34.823	1262	1	$p < 0.001$	0.17
Egoistic	It's good for me	16.078	15.097	1565	1	$p < 0.001$	0.10
Situational	Price	22.942	22.042	1548	1	$p < 0.001$	−0.12
	Easy to cook	17.871	17.058	1452	1	$p < 0.001$	−0.11
	Taste	11.474	10.459	1654	1	$p < 0.001$	−0.08
	Product type	1.121	0.885	1452	1	$p = 0.347$	−0.03
	Availability	19.250	18.372	1492	1	$p < 0.001$	−0.11

The analysis also indicates guide users purchased fish more frequently in the previous 12 months (Figure 5).

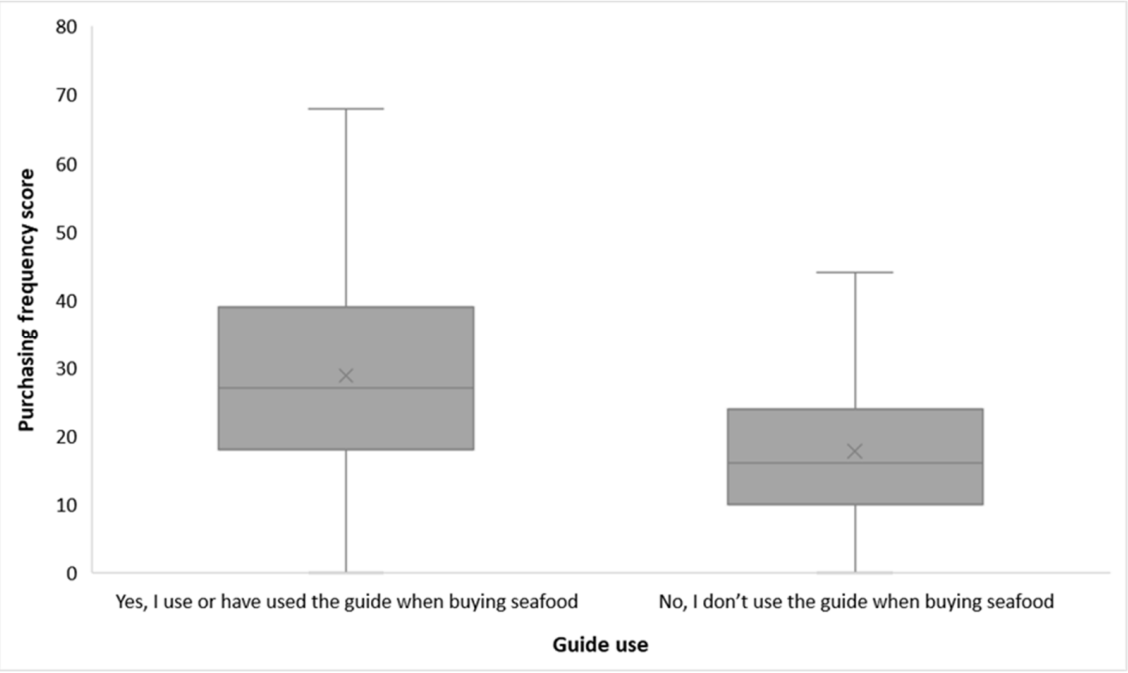

Figure 5. Median fish purchasing frequency score for all 17 species purchased in previous 12 months by guide users and non-users.

Testing revealed a statistical difference in the purchasing frequency for users (Md = 27, *n*= 662) and non-users (Md = 16, *n* = 1172); U = 566017; z = 16.355; $p \leq 0.05$; r = 0.38. An r value of 0.38 indicates guide use has a medium effect on seafood purchasing frequency.

This observation is supported by the finding that 53% of guide users reported that they buy more seafood now than before starting to use the guide.

To understand the potential influence of MCS GFG use on public seafood purchasing, species were allocated to four groups: 'Big 5'; 'Best choice'; 'Fish to avoid'; and 'Others', comprising species not assigned to either of the other three groups. The Big 5 were found to be purchased more frequently by guide users, compared to non-users. For example, twice as many (22%) guide users purchase cod 'At least once a week' compared to only 11% of non-users. Overall however non-users were found to be more reliant on the Big 5 compared to guide users, with these species comprising 55% of all species purchased compared to only 40% for guide users. This suggests that guide users purchase seafood from a wider range of fish species. In the case of lesser-known species, such as hake, herring, and mussel, the results suggest it is less likely for non-users to have consumed these species compared to guide users. Almost twice as many non-users (61%) indicated they had never eaten herring compared to guide users (33%). Surprisingly, species 'red-rated' by the MCS GFG, i.e., eel, shark, and rock salmon, were consumed more frequently by guide users compared to non-users, e.g., 67.5% of guide users (n = 369) indicated they consumed eel in the last 12 months compared to only 32.5% of non-users.

Figure 6 summarises the median purchasing frequency for guide use for all purchasing groups examined.

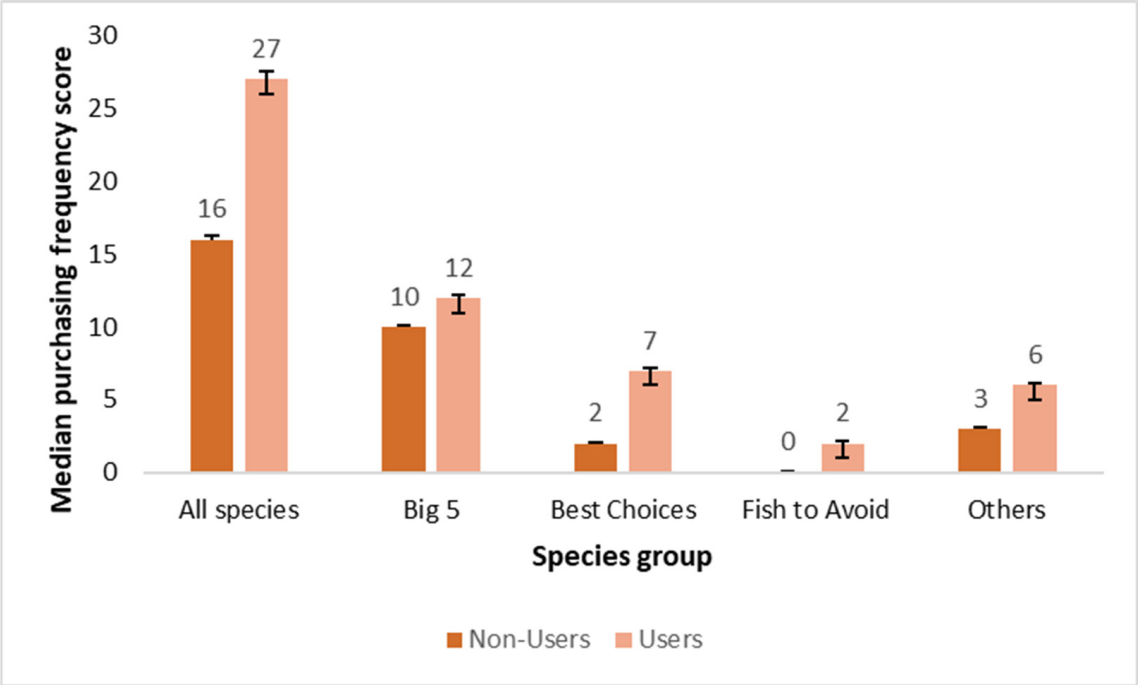

Figure 6. Median purchasing frequency score for users and non-users of guide for each species purchasing groups.

A statistical difference in purchasing frequency was found for all groups. Testing was carried out to understand whether, in addition to guide use, other socio-demographic and purchasing factors were responsible for the difference in the number of purchases made for the groups examined. An analysis for the 'All species' category revealed a statistical difference in total purchasing frequency across all groups with males (Md = 21) reporting more purchases than females (Md = 19); younger age groups (18–29, Md = 23; 30–49, Md = 20) purchasing significantly more than older groups (50–69, Md = 17; 70+, Md = 18); people with a postgraduate qualification purchasing significantly more (Md = 23) compared to those in other education groups; people in the highest household income groups report-

ing significantly more purchases (GBP 50,001–GBP 150,000, Md = 22; over GBP 150,000, Md = 35.5) compared to the lowest income group (GBP 0–GBP 12,500, Md = 15); households with the highest number of both adults (more than 3 adults, Md = 24), and children (more than three children, Md = 35); the regions with significantly higher purchasing frequency were observed to be Northern Ireland (Md = 23), Greater London (Md = 22), and East Midlands (Md = 21); and most fish purchases were made by people who report to most frequently shop for seafood in M&S (Md = 34). Examination of the relationship between seafood sustainability knowledge and purchasing frequency revealed a statistical difference in purchasing frequency across the three different (general) knowledge categories.

In addition to understanding the use of the GFG, the study sought to explore barriers to seafood purchasing and consumption. Moreover, 20% of participants (n = 462) indicated that they do not use the guide because they do not eat fish. Barriers to purchasing (Figure 7) seafood are typically related to the physical and sensory properties associated with fish [87].

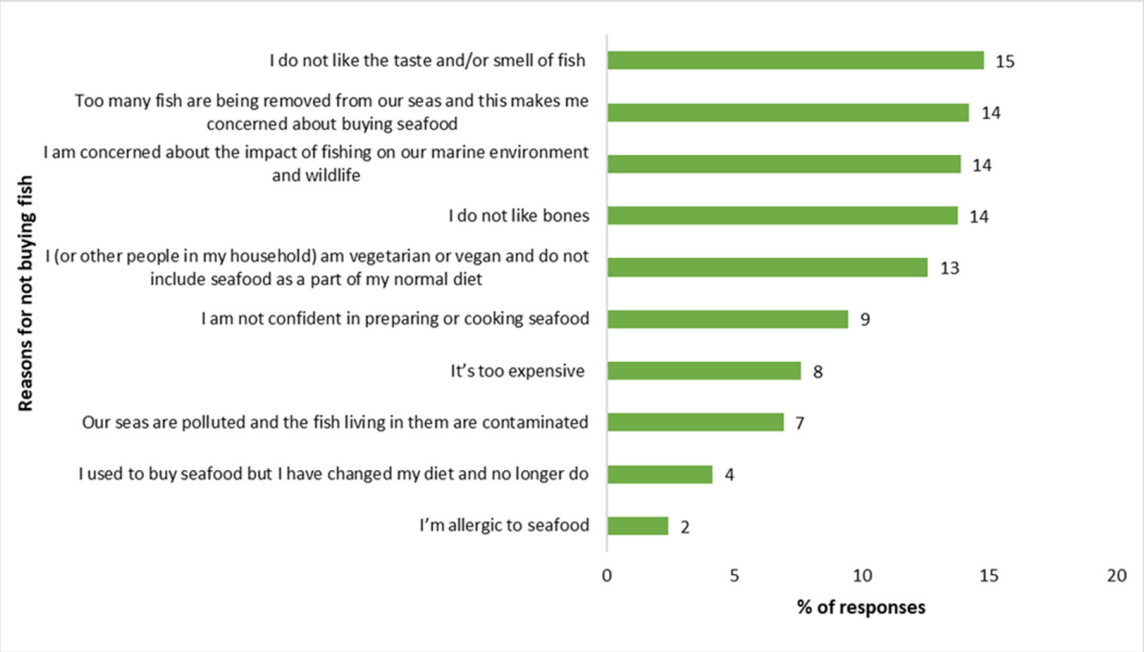

Figure 7. Participants' reasons for not buying seafood (n = 864).

3.4. Understanding Labels and Seafood Information

To explore the understanding of seafood labelling and its potential role in influencing consumer purchasing behaviour, participants' knowledge of mandatory (fish labelling) and voluntary (eco-labelling) labelling was examined (Figure 8).

A statistical difference was found between responses for 'users' and 'non-users' for all four items, indicating that responses are dependent on guide use and that users have a greater understanding of fish labelling and know what information to look for when buying sustainable fish. Figure 9 summarises responses for recognition and understanding of the 10 seafood eco-labels associated with wild caught and/or farmed fish examined in the study by the two groups, users and non-users of the guide.

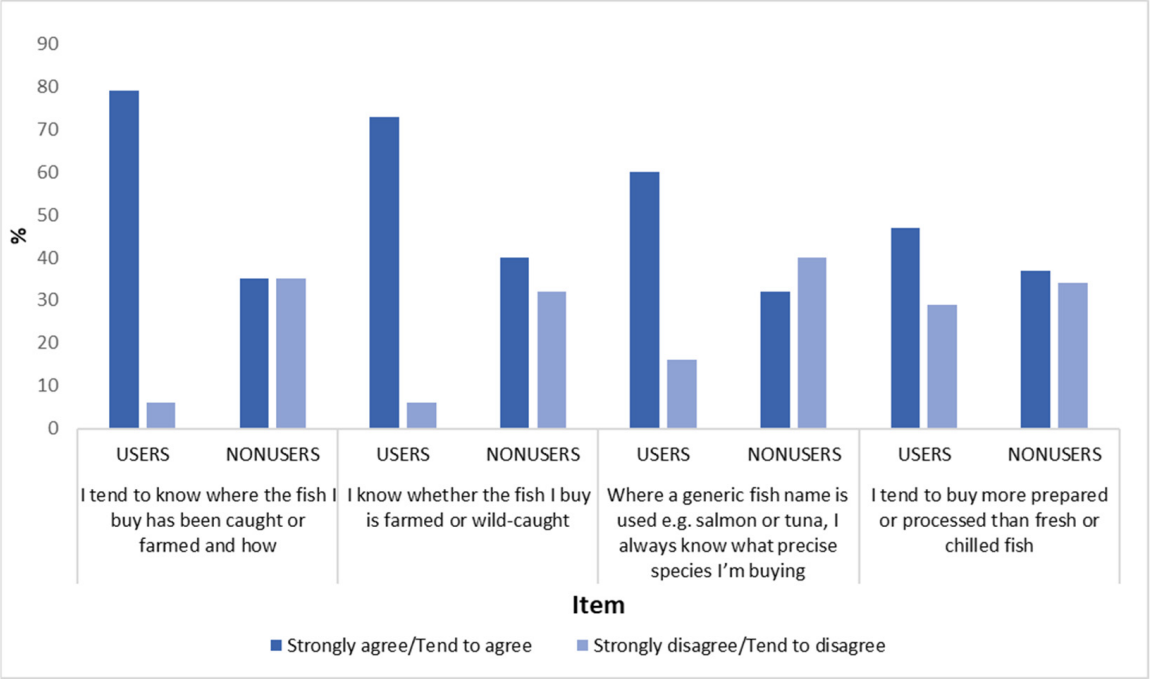

Figure 8. Summary of participant knowledge of mandatory fish labelling knowledge between users and non-users.

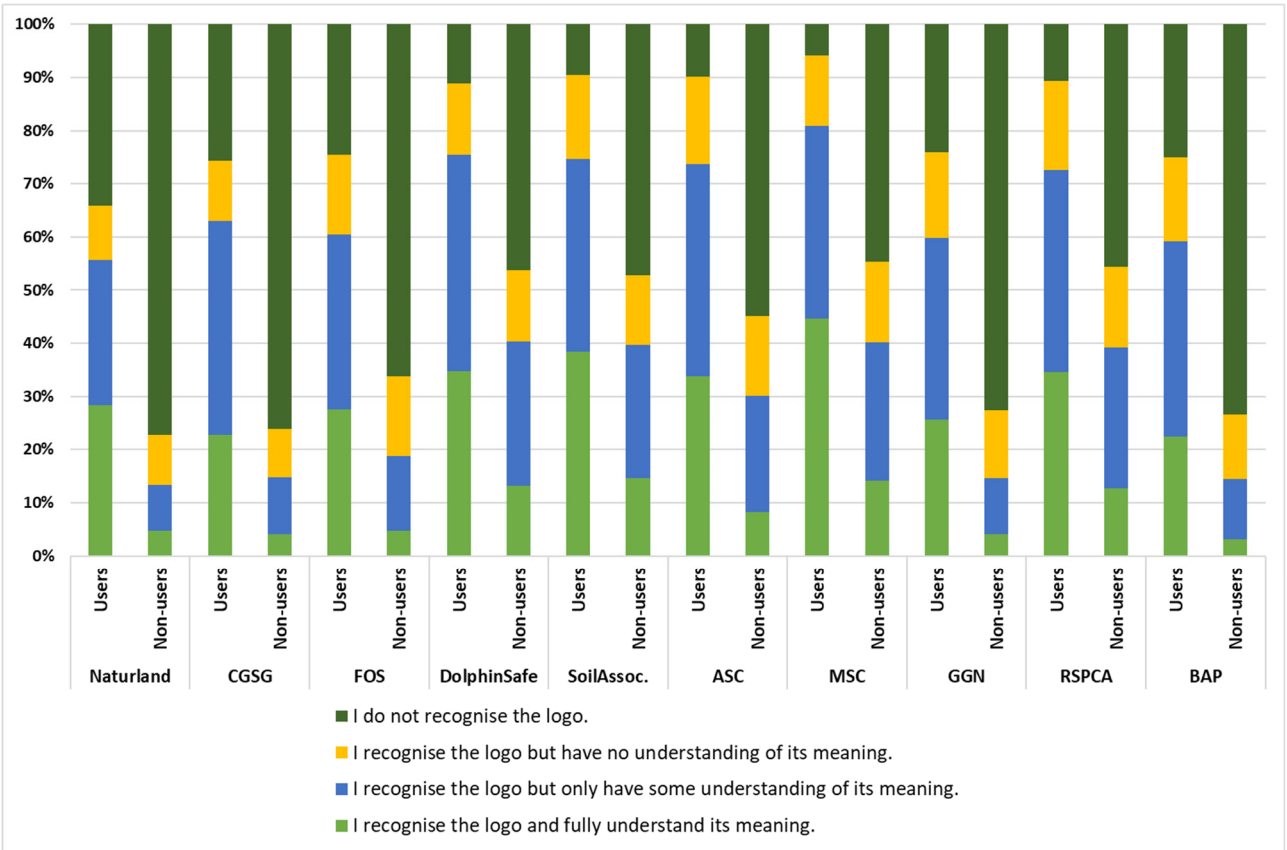

Figure 9. Participants' recognition and understanding of eco-labels between users and non-users.

Using the Seafood Logo scale, designed to measure eco-label knowledge (see Section 2.1), the median eco-label knowledge score and standard error were calculated for users and non-users (Figure 10). A test for equal medians for eco-label knowledge revealed a statistical difference in scores for eco-label knowledge between users (Md = 18; n= 662)

and non-users (Md = 6; n = 1172) of the guide; U= 655128; z= 24.586; $p < 0.001$; r = 0.5741. An r value of 0.57 indicates guide use has a significant effect on eco-label knowledge.

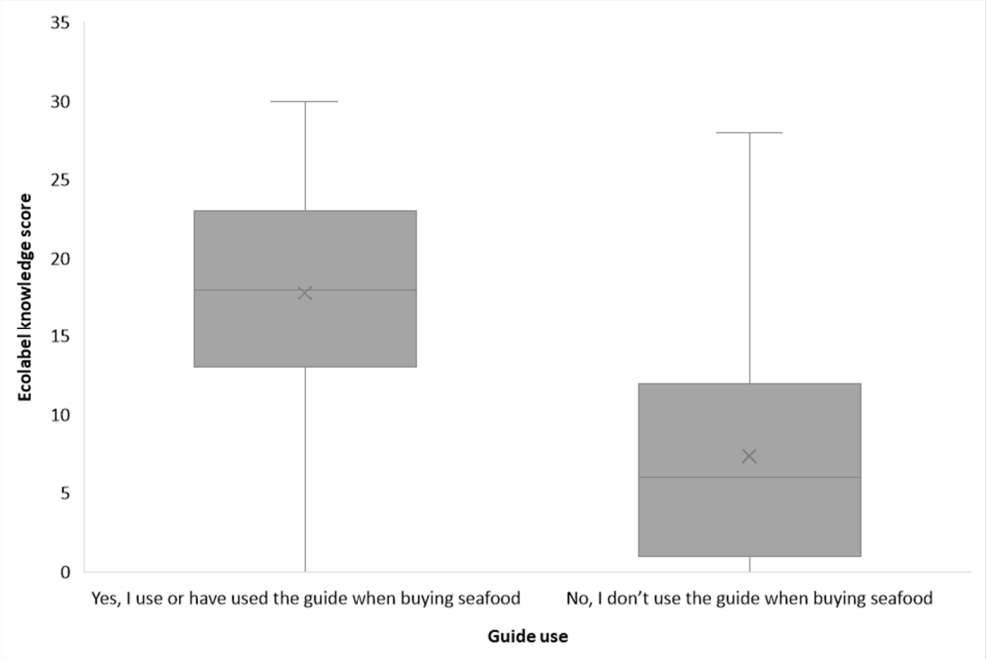

Figure 10. Relationship between participant guide use and eco-label knowledge.

Overall, the proportion of participants that both recognised the seafood eco-labels presented and understood their meaning is significantly higher amongst guide users (31%) compared to non-users (8%). Conversely, the proportion of participants that did not recognise the logos is significantly lower amongst guide users (18%) compared to non-users (60%). The MSC logo was most recognised and understood by 25% of all respondents (45% of guide users compared to 14% of non-users) with the GGN (GlobalGap Number) certified aquaculture label recognised and understood by only 12% of all respondents (26% of guide users compared to 4% of non-users).

3.5. General Seafood Sustainability Knowledge and Ocean Connectedness

The analysis examined the association between MCS GFG use and participants' understanding of 'sustainable seafood' and 'responsibly sourced'. A significant association between guide use and response categories for 'sustainable seafood' was found (X^2 (3, n = 1592) = 97.631; $p < 0.001$; Cramer's V = 0.248). The strength of the relationship between guide use and the response categories was determined as small to medium. Following Cohen (1988) [88], Cramer's V of 0.1 is considered a 'small' effect size; 0.3 is a 'medium' effect size; and 0.5 is a 'large' effect size. In the case of 'responsibly sourced', no significant association between guide use and response categories was found (X^2 (3, n = 1649) = 7.693; p = 0.053; Cramer's V = 0.068). This result indicates that, whilst there is a difference in responses across the knowledge categories for understanding 'sustainable seafood' by users and non-users, there is no statistical difference in responses by users and non-users for 'responsibly sourced'. This suggests a lack of understanding of the term by both groups.

Participants' general or objective seafood sustainability knowledge was also examined. The responses are summarised in Figure 11.

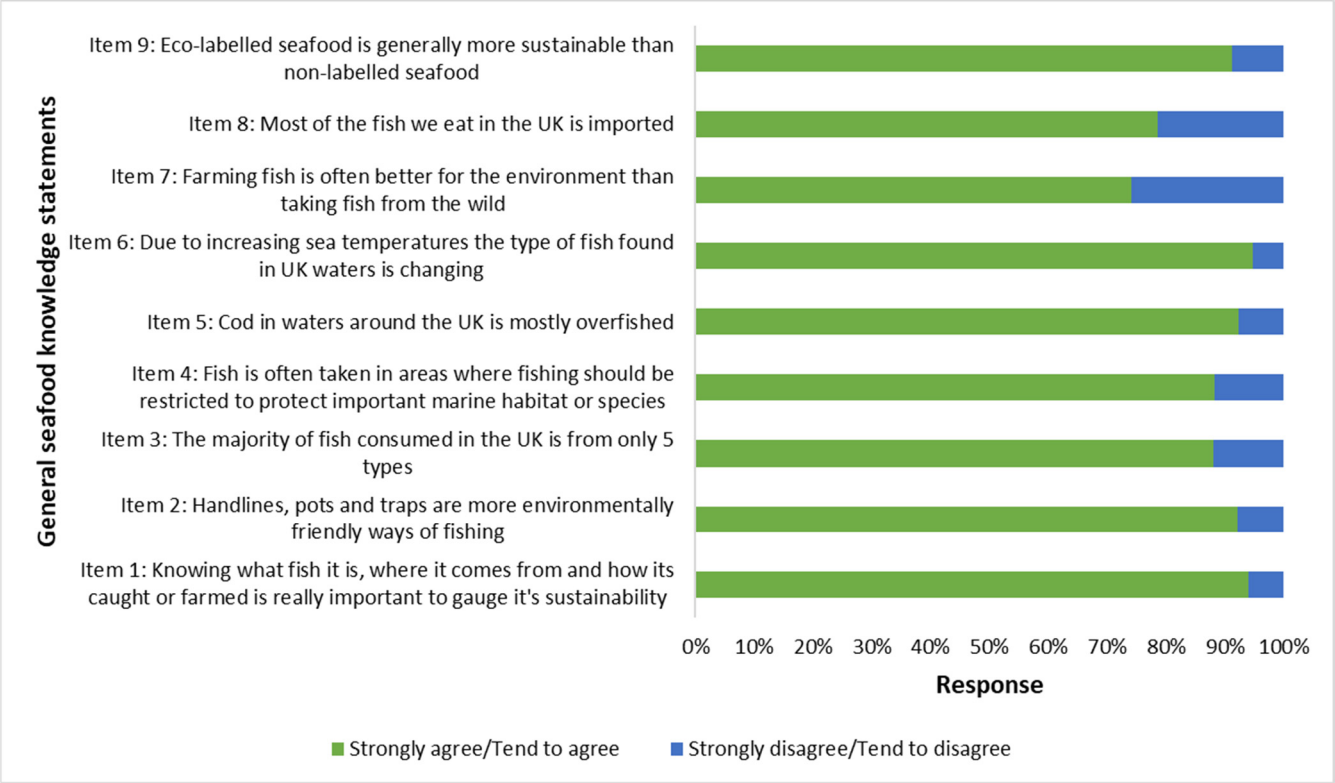

Figure 11. Summary of responses to general seafood knowledge statements.

Chi-square tests revealed a statistical difference between responses in the case of items 1, 2, 8, and 9, implying that the categorical variables are related and understanding is greater amongst guide users. In the case of items 3–7, no statistical difference was found, implying that responses are not related to guide use and that awareness of the issues presented is more widely appreciated and likely acquired from other sources. The response to item 7 ('Farming fish is often better for the environment than taking fish from the wild'), for example, from both groups, suggests that there was agreement amongst users and non-users of the guide relating to the perceived benefits to the environment of farming fish, with around 74% of participants generally in agreement. These results signify that participant knowledge was independent of guide use for over half of the statements.

To further explore participants' knowledge, a general or objective Seafood Knowledge Scale was designed (see Section 2.1). The median score and standard error were calculated for objective knowledge for guide users (n = 662) and non-users (n = 1172) (Figure 12).

Testing revealed a statistical difference in objective knowledge scores for users (Md = 34; n = 662) and non-users (Md = 29; n = 1172); U = 544248.5; z = 14.366; $p < 0.001$; r = 0.335. An r value of 0.34 indicates guide use has a moderate influence on general or objective seafood sustainability knowledge. As shown in the figure (see Supplementary Materials Figure S2), knowledge was higher amongst guide users compared to non-users. A larger proportion of participants (70%) using the guide were found in the high knowledge category (i.e., scoring 31–45 points) compared to non-users (44%). Similarly, the proportion of participants (2.5%) using the guide in the low knowledge category (i.e., scoring 0–15 points) was lower than the proportion of non-users (13%).

Figure 12. Median general (objective) seafood sustainability knowledge score for guide users and non-users.

An ocean connectedness scale (see Section 2.1) was used to determine whether participants using the MCS GFG had greater connectedness to the sea and were driven to use the guide because of this, compared to non-users and those not buying fish. Responses are presented in Figure (see Supplementary Materials Figure S3). The median connectedness score was also calculated for each of the three categories of guide use and is presented in Figure 13.

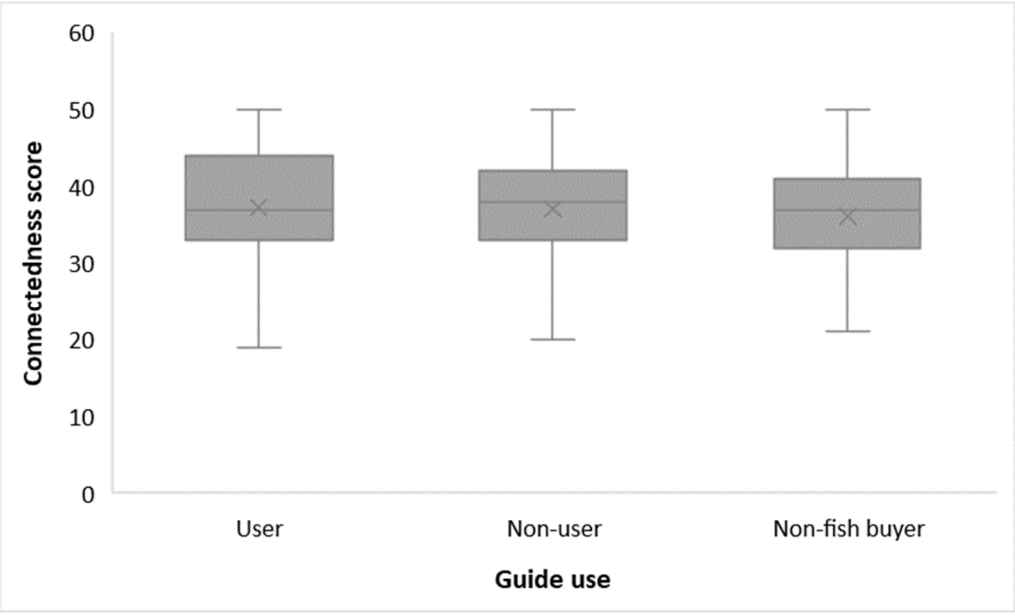

Figure 13. Box plot for mean connectedness scale score for users, non-users, and non-fish buyers.

A Kruskal–Wallis test revealed no statistical difference in scores across the three categories (guide users, Md = 37, n = 662; non-guide users, Md = 38, n = 1172; participants who do not buy seafood, Md =37, n = 462), X^2 (2, n = 2296) = 5.623, p = 0.06). The

median values for the three groups are not significantly different. Further tests were run to investigate the influence of other factors on connectedness to the sea (Table 5).

Table 5. Summary of results for differences in connectedness scale scores across categories listed.

Variable Item	Guide Use Df = 2	Gender Df = 3	Age Df = 3	UK Region Df = 11	Household Income Df = 3	Visits to the Coast Df = 5
Connectedness scale score	N = 2296 H = 5.623 $p = 0.063$	N = 2289 H = 11.302 $p = 0.010$	N = 2279 H = 118.146 $p < 0.001$	N = 2147 H = 91.455 $p < 0.001$	N = 2272 H = 14.082 $p = 0.003$	N = 2273 H = 154.864 $p < 0.001$

A statistical difference in connectedness scale scores was observed across all categories except guide use. This suggests that using the MCS GFG is not important in influencing people's connectedness to the sea. Neither does it appear that people using the guide are more connected to the sea compared to individuals in the other two groups. The analysis indicated more guide users (41%) compared to non-users (23%) agreed that 'the seas around the UK are cold, murky and not very interesting'. More guide users (55%) also agreed that 'the sea is a wild and scary place' compared to non-users (47%). This seems incompatible however with a large majority of guide users (70%) compared to non-users (47%) and non-fish buyers (41%) who agree that 'the sea feels part of my identity', suggesting guide use does not engender a better understanding of and connection with UK seas.

3.6. Understanding the Drivers of MCS GFG Use

As explained in Section 2.2, the role of various influencing factors on the use of the MCS GFG to purchase sustainable seafood was explored using TPB as a model. Figure 14 illustrates the extended model of TPB used and developed through this study. An analysis of predictors of intention to use the MCS GFG revealed that the variables in the model—knowledge; trust; subjective norm; attitude; PBC; and individual responsibility—explained a statistically significant 56% of the variance in the dependent variable 'intention to use guide' ($R^2 = 0.56$; $F = 133.352$; $p < 0.001$). Evaluation of the independent variables found that individual responsibility was the only variable not making a statistically significant and unique contribution to the dependent variable, intention. Attitude ($\beta = 0.503$; $p < 0.05$) to using the guide was found to be making the highest contribution to the prediction of intention. Further analysis revealed that the variables in the model—knowledge; PBC; individual responsibility; and intention—explained a statistically significant 23% of the variance in the dependent variable, behaviour i.e., guide use ($R^2 = 0.232$; $F = 48.913$; $p < 0.001$). Evaluation of the independent variables revealed that only knowledge ($\beta = 0.165$; $p < 0.05$) and intention ($\beta = 0.357$; $p < 0.05$) made statistically significant and unique contributions to the prediction of GFG use.

An analysis of motivational factors for using the MCS GFG is useful for identifying opportunities for broadening MCS GFG use among the UK public and can be used to provide insights into how other seafood guides could be used to influence sustainable seafood purchasing.

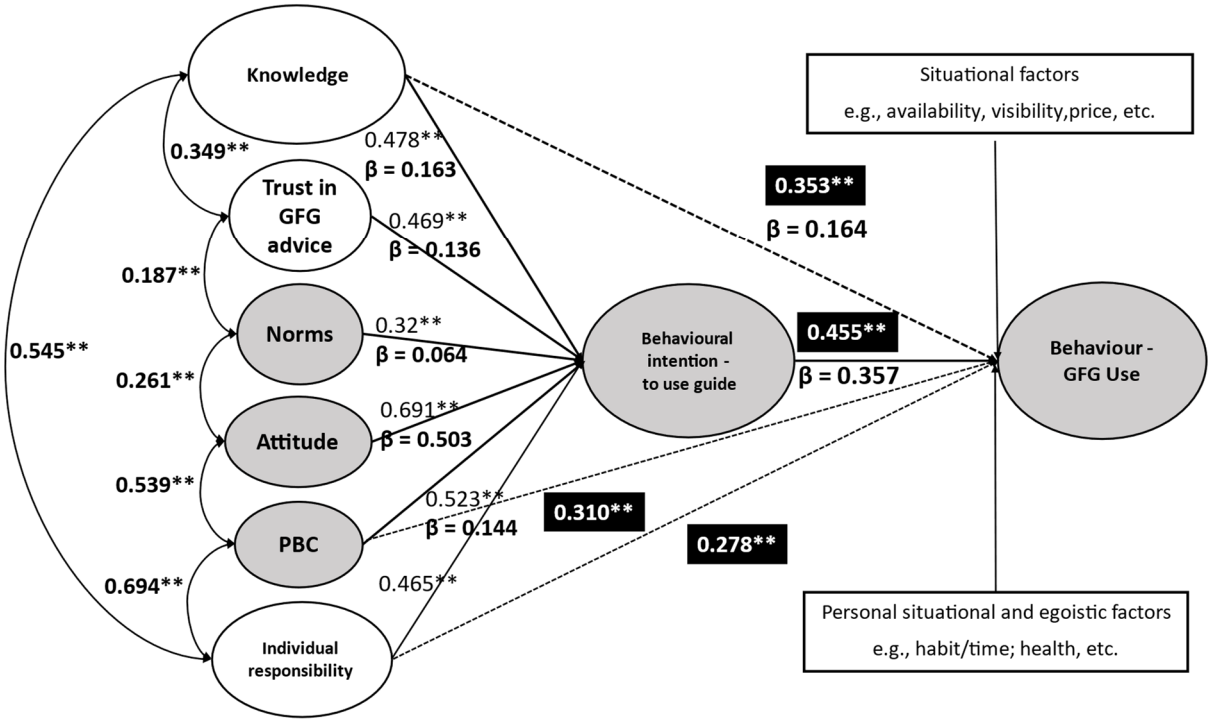

Figure 14. Theoretical framework for understanding motivation and predicting use of MCS GFG (n = 662). Note: ** Correlation is significant at 0.01 level (2-tailed), $p < 0.001$. Beta values (β) for significant predictors ($p < 0.05$).

4. Discussion

Public awareness and prioritisation of sustainability over other attributes are basic requirements for the success of market-based instruments such as seafood guides [89–91]. This paper presents the first assessment of UK public perceptions of the MCS GFG and its effectiveness in helping to reduce overfishing by increasing seafood sustainability knowledge and influencing consumer's seafood purchases. Importantly, it also investigates the significance of sustainability to the public and its prioritisation when purchasing seafood.

4.1. Public Awareness and Use of MCS GFG

Seafood guides have long been highlighted as a mechanism for engaging consumers with issues relating to seafood sustainability [12,13,51]. However, in the case of this study, analysis found that, despite the MCS GFG being the most prominent guide in the UK [92,93], public awareness of the guide was relatively low with most participants (54%), indicating this study was the first time they had seen or heard of it. Furthermore, despite the existence of the guide since 2002, only a very small proportion of respondents indicated they had awareness of it for more than 10 years. When compared to other studies however the level of awareness and self-reported use of the MCS GFG evaluated in this study is much higher than the use of similar guides in Norway [9] and Germany [94]. This may be attributed to the growing level of public interest in seafood sustainability in the UK. In a recent survey carried out by the Department for Environment, Food and Rural Affairs (Defra) on ocean literacy in England in 2022 [95], 82% of participants reported that they had some understanding of the term sustainable fishing. Moreover, 71% of participants that purchased seafood in the study also indicated that information about whether the fish is endangered or overfished influenced their purchase decision. In this study, the lack of seafood sustainability knowledge was mentioned as a barrier to MCS GFG use by 43% of participants. Similarly, limited seafood guide use by consumers in Norway was attributed

to the lack of seafood guide knowledge, low interest in seafood sustainability, and a high level of seafood consumption and trust in Norwegian seafood products [9].

As noted above, the highest level of awareness and use of the guide was found in South West England and in Scotland. In addition to the long tradition of fishing and marine related industries and activities [96,97] in these regions, the strength of long-term volunteer programmes (such as Sea Champions organised by MCS), and the routine distribution (before the COVID-19 pandemic in 2020) of a hard-copy guide from various outdoor education and visitor centres in these areas, may have contributed to these high levels of awareness.

As noted, the primary reason for not using the MCS GFG was a lack of awareness for many participants. This is commonly reported as a barrier to engagement by other conservation initiatives [98]. Habit or a tendency to buy familiar products described in other studies [81,87,99,100] is also indicated as a barrier for half of the participants in this study. These results show that efforts need to be made to increase awareness of the guide and for retailers and restauranteurs, for example, to work with the guide as a tool to help familiarise their customers with a more diverse range of seafood products.

4.2. Current Views and Knowledge of Seafood Sustainability

The sustainability (and other attributes) of food including fish is typically communicated through product labelling [101–103]. Eco-labels provide consumers with information that allows them to discriminate between products and to make more informed choices thereby increasing the demand for sustainably produced seafood [104]. Studies have demonstrated that consumers prefer eco-labelled wild seafood over un-labelled seafood [105]. As a result, eco-labels were used by the SSM to help reduce over-fishing and promote better fishing practises by reshaping consumer consumption habits [45,106]. By raising awareness amongst consumers of the importance of choosing responsibly produced seafood, purchasing campaigns have helped increase the demand for certified, principally MSC certified, seafood [107]. Despite the importance of labelling for accessing sustainable seafood, participants (41%) in this study indicated that they did not know how to interpret labelling information to allow them to choose the most sustainable seafood. Furthermore, many (60%) agreed that clear information on packaging and menus about seafood is lacking. In common with other studies, the inadequate labelling of products can be a barrier to sustainability when shopping for seafood and other food categories [108,109]. This suggests there is perhaps over reliance of the public on eco-labels as a 'cue' [102] or 'proxy' for more informative labels when purchasing seafood [110].

One of the main findings of this study is that guide users have more labelling and general seafood sustainability knowledge than non-users. Results also indicate that for more than half of the knowledge statements, responses were not dependent on guide use, suggesting that individuals using the guide have some seafood sustainability knowledge prior to using it. Although knowledge was not found to be necessarily attributable to guide use, a large majority of users (84%) credited their increased seafood sustainability knowledge to using it, which suggests the MCS GFG is perceived as an effective tool for increasing knowledge.

Other studies have similarly shown that knowledge influences consumer behaviour and can also help drive engagement in seafood sustainability and other pro-environmental food choices [14,111–115]. This study found a significantly larger proportion of guide users (88%) than non-users (61%) agreed that sustainability is very important to them when buying and/or eating seafood. This suggests that using the guide increases both the knowledge and prioritisation of sustainability over other factors when purchasing seafood.

This study found MCS GFG users to be most commonly white British and male. This finding echoes Smith et al. (2015) [116], who determined that consumers of 'ecofish' were more likely to be males; in the age group 30–49; with a post-graduate qualification; and in employment. This research also found that individuals with postgraduate qualifications and those in the highest income groups were found to have made significantly more seafood purchases compared to those in the other groups examined. As might be expected, findings suggest guide users have a tendency towards consuming fish. Typical of people in higher socio-economic groups [117], guide users were found to make 60% more seafood purchases than non-users, with more male users than female agreeing they buy more seafood now than before they started using the guide. Other studies show individuals with higher levels of seafood knowledge eat fish more frequently [118]. As is consistent with other studies examining the influence of knowledge on consumption [112,114], results indicated purchasing frequency increases with knowledge where objective knowledge was determined using closed questions.

4.3. Motivational Drivers for Using MCS GFG to Purchase Sustainable Seafood

Theoretical models were used to understand determinants of behaviours related to seafood consumption, including the identification of possible interventions to motivate consumer's sustainable seafood purchases such as seafood guide and eco-label use [15]. TPB assumes that an individual's intention to carry out a behaviour is influenced by three motivational factors: attitude, social norms, and PBC [77]. Underlying each of these factors are beliefs related to the behaviour [87]. The basis for the focus of TPB on behavioural intention rather than on actual behaviour is that, despite intentions to carry out a behaviour, an individual may be prevented from doing so due to circumstances beyond their control [77]. These could include availability or price in the case of intentions towards purchasing sustainable seafood. In general, the study found widespread public agreement regarding individual responsibility for making the right seafood choices. Responses suggested people do consider the impact of their seafood choices but are not convinced by the efficacy of individual choice to reduce the impact of overfishing generally. Although slightly more guide users (85%) than non-users (77%) agreed they have a responsibility to make the right decisions when buying seafood, an analysis of the variables revealed individual responsibility is the only one not making a statistically significant and unique contribution to either of the dependent variables, intention to use the guide or MCS GFG use (Figure 14). This suggests guide use is not necessarily being driven by moral beliefs and that, although the public may care about the marine environment, they also believe making the right decision when buying seafood is not all down to them. However, results indicate that people, guide users in particular, believe they can help solve the problem of overfishing by making more responsible seafood choices. This further emphasises the importance of making this type of information widely available to the public through seafood guides and similar resources.

Motivational factors for predicting MCS GFG use (Section 3.6) were identified by this research as a positive attitude to using the guide; trust (in the guide); and seafood sustainability knowledge. The attitude construct encapsulates an individual's appraisal of performing a behaviour [119] and is regarded as the best predictor of behavioural intention [77] and a significant determinant of behaviour [120]. This study found attitude to using the MCS GFG to be the strongest determinant of behavioural intention, with users agreeing the guide is easy to use and follow. Similarly, in a study by Birch (2015) [121], a positive attitude to sustainable seafood was found to be one of the key drivers for its consumption. Most participants (78%) also indicated that the guide has motivated them to buy sustainable seafood and increased their confidence in using it to make sustainable

seafood choices. These findings underline the importance of engaging more widely with all sectors of society to help foster a positive attitude towards interventions such as the GFG, to increase their use, improve knowledge, and thus awareness of the need for individuals to 'responsibilise' their seafood choices.

A majority (86%) of participants reported that they trust the MCS GFG advice as accurate and credible. Trust in sustainability information is important to consumers concerned about the impact of their fish consumption on global fish stocks [31,122]. Findings support the value of trust in an information source such as the MCS GFG identified in this and other studies [108,123,124]. Knowledge about 'how to act' is identified by Richter and Klockner (2017) [15] as important for the consumption of sustainable seafood. In this study, the importance attached to seafood sustainability and knowing where fish is from and how it is produced is used to determine the level of an individual's 'background' knowledge. This is the knowledge required to motivate responsible seafood consumption [15]. 'Procedural knowledge', i.e., the 'know-how', to increase the sustainability of an individuals' seafood purchases [15] is encapsulated in the importance attached to 'always checking' where the fish purchased was caught or farmed and how (see Supplementary Materials SM S2). As observed, for many participants (83%), the most important change made when buying seafood because of using the guide was reported as always 'checking' where seafood comes from and how it is caught or farmed. This finding emphasises the importance of the presence of clear and comprehensive consumer facing labelling to allow consumers to identify and choose the most sustainable seafood available.

4.4. Drivers for Sustainable Seafood Consumption

One of the aims of this study was to understand whether the seafood purchasing behaviour of guide users is different to non-users. Understanding what drives an individual's decision making when purchasing seafood and how people assign relative importance to various purchasing factors [125] is key to understanding the effectiveness of the guide and encouraging more sustainable seafood purchasing behaviour. Family was found to be one of the main influences on participants' seafood choices. This finding is consistent with other studies [126–128]. A statistical difference in importance for users and non-users of the attributes examined influencing seafood purchasing was found in all cases except product type, which was important to both groups. As is consistent with the findings of other studies, product type (including whether it is fresh, whole, or processed with 'value-added') is an important consideration in terms of price, health benefits, and lifestyle choices when purchasing and consuming fish [129]. Fish is generally perceived as an 'inconvenient' food [82] except for frozen fish, which is regarded as more convenient than fresh [82,130], albeit fresh is viewed as a healthier option [129]. Other attributes in the situational category, such as taste and convenience explored in other studies [82,131,132], were all significantly more important to non-users than guide users. In accordance with studies that identified egoistical factors such as health perceptions of fish as a driver for its consumption [133–135], a large majority in this study agreed health was important to them when buying seafood.

Environmental factors were however found to be significantly more important to more guide users compared to non-users. For example, most participants using the guide agreed production method, i.e., whether the fish is wild caught or farmed, is important, compared to less than half of non-users. In the context of seafood production, studies have highlighted public concerns for the sustainability of aquaculture production [105], 'naturalness' [136], and the perception of wild fish as tasting better, healthier, and slightly more nutritious than farmed fish [137] as evidence of consumer partiality for wild caught fish.

Findings also indicate guide users may be driven by factors relating to their perception of seafood as a more sustainable source of animal protein with 60% of participants, three quarters of users compared to just over half of non-users, agreeing with the statement. This is unsurprising given increasing pressure on society and individuals to increase the sustainability and health of our diet, and mitigate against climate change, by reducing the intake of red meat and dairy products or by switching to a predominantly plant-based diet [138–141]. Eating seafood as an alternative to land-based animal protein is also acknowledged as beneficial for both human and planetary health [142,143], as well as being vital for meeting the increasing human demand for healthy and nutritious food globally [144,145].

An examination of the relative importance of ethical or social drivers when buying seafood revealed they were significantly more important to users than non-users. For example, a larger proportion of guide users compared to non-users agreed provenance (i.e., who caught or farmed the fish and where) is important when purchasing seafood. Given the complexity of seafood markets, and their vulnerability to the lack of traceability and fraud [146,147], provenance is deemed essential for consumers to make informed seafood choices and help alleviate these challenges [148].

In the context of fisheries and seafood markets, local seafood is often promoted as an eco-friendly and socially conscious alternative to globally sourced seafood [149]. In spite of the belief that the consumption of locally produced food may provide 'individual and societal benefits', limited studies have focused on what underlying motives drive the purchase of these products [85]. According to Tetley (2016) [37], UK consumers could make a positive contribution to the UK economy (and environment) if they chose to buy locally caught species over farmed and exotic species. However, within the UK and EU seafood markets, there is reliance on imports, which have a large carbon footprint and, depending on the product or species, can be associated with social justice issues such as forced labour [149–151]. The volume of seafood imported into the UK is however recently experiencing a decline [152]. The value of social drivers to certain sectors of society and the perception of seafood as a more sustainable source of animal protein indicates the value in highlighting provenance and locally produced seafood to increase the appeal of the guide, and to marketing seafood more generally [85,153].

4.5. Barriers to Seafood Consumption and Action

Notwithstanding the perception of seafood by most participants as a more sustainable source of animal protein, this study found concern for the impact of human consumption on the marine environment is as important as more 'traditional' reasons, such as disliking its sensory and physical properties, for not buying seafood (Section 4.3, Figure 7). This suggests barriers to eating fish are evolving and now more specifically reflect growing awareness and concern for the impacts of seafood production on the marine environment and that where these feelings are strong, people are choosing alternative diets [154,155].

Although barriers for the public purchasing sustainable seafood were identified as a lack of seafood sustainability knowledge and an absence of information, most participants in this study were found to have some understanding of the concept of seafood sustainability, which is key to motivating behaviour change [156]. A lack of understanding of what sustainable seafood is was however identified by other studies as a barrier more generally [9,12,157]. Regardless, the examination of the knowledge of seafood terms in this study suggests some confusion exists.

As found in other studies, there is a perception of sustainable seafood as more expensive than 'conventional' seafood [44,158,159]. Two fifths agreed that the cost and affordability of seafood is more important to them than sustainability. This suggests some people

want to prioritise sustainability over other considerations and that there is a willingness to pay for its health and other attributes [89,135,160,161].

Guide users were found to be less reliant on the Big 5, purchasing seafood from a wider range of species compared to non-users. This suggests guide use is helping reduce reliance on a narrow range of popular species and is positively influencing individuals' seafood choices. However, a study carried out by Almeida et al. (2015) [65] on Portuguese fish consumers found that although people with more seafood knowledge consumed a more diverse range of species, they were not necessarily the most sustainable choices. This seems to be the case for many participants (70%) using the MCSC GFG and claiming to avoid red rated seafood. Surprisingly, MCS GFG users were found to purchase significantly more 'Fish to Avoid' species—eel, shark, and rock salmon—than non-users, with species in this group comprising 11% of all purchases for users, compared to 5% of all purchases for non-users. This suggests the availability of these species in the UK is likely having a much stronger influence on social norms for people purchasing and consuming them than the advice in the MCS GFG to avoid certain species for conservation reasons. In the case of eel, for example, social forces, including social habits such as tradition, identified by Almeida et al. (2015) [162] as one of the main drivers of seafood consumption in Portugal, may offer some explanation for the persistence of eel consumption in the UK, including among guide users.

Given recent emphasis on the importance of ocean connectedness as a component of ocean literacy [63,163], it is perhaps reasonable to expect a relationship between ocean connectedness and guide use. While other factors were found to influence guide use (e.g., age, gender, location, frequency of coastal visits), ocean connectedness was not. This suggests more work is required to understand how ocean connectedness could be harnessed to help individuals make the connection between their seafood choices and the impact of them on the health of the sea.

5. Conclusions

Focusing on the MCS GFG, this paper examined UK public consumers' attitudes and perceptions towards seafood sustainability. A key aim was to understand what effect the guide is having on the public's purchasing behaviour and identify motivational drivers for using it. Despite widespread UK public interest in seafood sustainability, awareness of the guide is low and its is used by a small and privileged sector of society. Although results provide important insights into opportunities for engaging with a wider audience to increase diversity amongst guide users, further studies to understand awareness and use of the guide across society to overcome barriers for using seafood guides is required. A more detailed, longitudinal study is recommended that would benefit the development of seafood guides and their effectiveness in driving change in seafood markets by increasing the understanding of how and where they are being used and thus their utility for wider coastal resource management and relevance to consumers outside the UK.

Results also indicate that there is a geographical component to its use, and that the highest level of awareness and use of the guide is found in typical coastal areas across the UK. Given that MCS GFG users were found to purchase significantly more seafood compared to non-users and appear motivated generally by a 'love of seafood', are less reliant on the Big 5, and supermarkets for purchasing seafood, suggests that with more access to the sea and proximity to local suppliers, there is a greater variety of seafood available and, with that, may suggest more need for consumers to consult information on the sustainability of a wider range of fish. It is unclear however how the assumption of a greater range of seafood available in coastal areas and proximity to the sea is driving use of the guide, which would benefit from further investigation.

Further analysis of GFG users found they visited the coast more frequently. Although travel to the coast appeared to influence people's connection to the sea, guide users were not found to have a stronger connection to the sea compared to non-users or non-fish buyers. From this, it may be concluded that effort is required to better connect people with the sea and fishing communities through the fish they are consuming. Moreover, individual responsibility (for the sea) was also not observed in this study as a statistically significant predictor of either intention to use the guide or its use. From this, it may be presumed that it is unlikely guide use is motivated by a moral obligation towards protecting the sea. It is therefore recommended that effort is made to overcome behavioural barriers to encourage more responsible public choices. A positive attitude towards the guide is however found as a strong determinant of intentions towards its use.

Although a tendency to buy familiar seafood products is a barrier to using the guide, it is concluded that the MCS GFG is a helpful intervention for encouraging diversity in seafood taste, including in lesser-known and under-utilised species. Under-utilised species are ones fishers do not catch their full quota of, or they catch them but then discard them, because they have little or no value or no market for the fish. This is much needed, given that seafood consumption in several high-income countries, including the UK, relies on a narrow range of species [15,41], which are typically imported [17,92]. As highlighted by Zhou et al. (2015) [164] (p. 716), 'shifting fishing effort away from highly targeted stocks towards currently underutilised species' can help reduce the impacts of overfishing on the marine environment and increase fisheries production. Seafood guides and similar consumer-facing materials have a role in delivering this shift.

Health benefits associated with consuming seafood were confirmed as an important incentive for its purchase. Seafood is also regarded by most participants as a more sustainable source of animal protein than alternatives. This suggests that labelling for these attributes and consideration of them within seafood guides would help to better engage interest in seafood sustainability as well as increase diversity in taste including lesser-known and utilised species as well as those affected by changing sea temperatures [165]. Furthermore, the perception of seafood, especially sustainable seafood, as more expensive [44,158,159] could be addressed by promoting typically more eco-friendly species such as herring and sardine, as more affordable options, helping to increase sustainable fish consumption, diversify taste, and importantly alleviate the societal burden of non-communicable human disease [24]. Enhanced labelling of seafood [166] for locally caught or produced, fair-trade, provenance, and fish welfare, for example, would enable consumers to make more educated choices about the social, ethical, and environmental impacts of the seafood they are purchasing, further engaging with a wider audience to reduce human impact on the marine and coastal environment [167].

Findings also indicate guide users have more eco-labelling and seafood knowledge than non-users. Most agree that using the guide has increased their seafood sustainability knowledge and motivated them to buy sustainable seafood, prioritising sustainability over other factors. Labelling and seafood sustainability knowledge enhance an individual's seafood and ocean literacy, which is crucial for accomplishing behaviour change to improve ocean sustainability [163]. The provision of detailed labelling can also serve to 'empower' seafood consumers, helping them to make more informed and sustainable choices [110]. By increasing ocean literacy and contributing to behaviour change in this way, seafood guide use can help society meet marine social and environmental sustainability development goals. However, an absence of clear information about where and how seafood is produced and a lack of knowledge, including understanding 'eco-labels' and key seafood terms, are identified as main barriers to intentions towards purchasing sustainable seafood. From this, it can be concluded that the quality of seafood labelling, including linking information

and advice within seafood guides to the products on shelves, and public understanding of eco-labels and labelling more generally must be improved to increase social norms for purchasing sustainable seafood.

Given the risks attached by supermarkets to supplying unsustainable seafood [168], it may be inferred that in seeking more variety in seafood and wanting to support more local and independent suppliers, the public are potentially more exposed to purchasing species identified by the MCS GFG as species to avoid. This suggests that seafood guides generally need to invest in better educating the supply chain and individuals about seafood sustainability and that agreement is reached on how it is recognised. Compatible with this is the need for recognition of a universally acceptable definition for sustainable seafood, which, given the importance of ethical and social drivers to certain sectors of society, acknowledges all aspects of sustainability, including social and community perspectives, which is currently lacking [11,14,53]. This is essential for increasing public and stakeholder support for sustainable seafood initiatives in coastal communities and for the sustainable management of marine resources.

Overall, the study found widespread agreement with regard to public responsibility for making the right seafood choices, and the importance of caring enough to want to make a difference. Seafood guides are an ideal tool to encourage small everyday actions that can be taken, enhancing ocean literacy and leading to individual expressions of marine citizenship, while empowering the whole of society to take steps to address challenges associated with unsustainable management and consumption of seafood.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/su17020587/s1. SM S1: Full version of questionnaire; SM S2: Scale items, descriptive statistics, and Cronbach Alpha values for model constructs (n = 662); SM S3: More detailed summary of respondent profile; SM S4: Summary of demographics for Guide users; Figure S1: Who most influences respondents' seafood purchasing decisions; Figure S2: Proportion of guide and non-users in each of the general objective knowledge categories; Figure S3: Responses by all respondents to items used to determine respondents' connectedness to the sea.

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