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Local People's Appraisal of the Fishery-Seal Situation in Traditional Fishing Villages on the Baltic Sea Coast in Southeast Sweden

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ABSTRACT

The gray seal (*Halichoerus grypus*) population in the Baltic Sea is flourishing. On the one hand, this can be interpreted as successful conservation management but, on the other, the gray seal has also become a persistent problem for small-scale coastal fisheries. Departing from the appraisal theory of emotion, this case study investigated local people's appraisals of the current situation of small-scale fishery and seals in three fishing villages. Survey results and interviews showed that the fishery-seal situation is perceived as being highly relevant, with negative implications, and local communities and fishers lack the tools to tackle the challenges. Successful management requires not only attention to local context and stakeholder groups, but also to people's individual interpretation or appraisal of the situation. Place-specific coping strategies should be sought, to balance the seal population with the promotion of small-scale fisheries as a sustainable local industry and as a cultural heritage.

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Introduction

All over the world, coastal communities and traditional small-scale fisheries are experiencing an impact on recovering populations of marine mammals. This entails a conflict with prevailing conservation interests that frame population increases as successful management (Davis et al. 2020; De María, Barboza, and Szteren 2014; Mouro, Santos, and Castro 2018). Terrestrial wildlife species threatened by or threatening humans, and their activities, have received considerable attention (Dickman 2010), but the marine context of human-wildlife interaction is a relatively new field of study (Guerra 2019). The gray seal (*Halichoerus grypus*) population in the Baltic Sea is one example. In 2014, the seal population was estimated to have doubled over a 10-year period, from approximately 15,000 to more than 30,000 individuals (HELCOM 2018). The public regard seals as a high-value “flagship” species, the estimated willingness to pay for conservation measures

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is high (Butler et al. 2008), and seal tourism is a growing industry (Bosetti and Pearce 2003). However, the presence of gray seal has developed into a persistent problem for small-scale coastal fisheries in the Baltic Sea (Varjopuro 2011). Seals feed directly from gillnets, damaging the gear and reducing the catch. Despite attempts to develop new fishing tools in collaboration with local fisheries (Königson and Lunneryd 2013; Königson et al. 2015), negative effects of seals on the economic performance of small-scale fisheries have been reported (Svels et al. 2019; Waldo, Paulrud, and Blomquist 2020). Studies on human-wildlife interaction involve various disciplines, using different lenses to focus on the individual, collective and institutional level (Bennett et al. 2017; Sjölander-Lindqvist, Johansson, and Sandström 2015). This study, part of an interdisciplinary project, uses an environmental psychology approach to understand people's feelings and how seal presence is appraised by individuals who live in the local context of fishing villages (Clayton, Litchfield, and Geller 2013). The research contributes to a biological perspective on investigating catch losses in fishery due to seals, and an economic perspective on estimating the total costs for coastal fishery from seal interference (Waldo, Paulrud, and Blomquist 2020; Waldo et al. 2020).

Socio-ecological approaches to understand interaction between coastal communities and marine wildlife has been called for, and so far, research has focused on the collective level of adaptive governance and management (e.g. Butler et al. 2015; De María et al. 2014; Meek et al. 2011). Research has shown the importance of collaboration to identify management measures that are accepted and effective (De María et al. 2014; Königson and Lunneryd 2013; Königson et al. 2015; Sepúlveda et al. 2018). Results at individual level show that local attitudes toward management strategies vary greatly between studies. Scott and Parsons (2005) found a majority to be against seal culling to protect fisheries in Scotland. The level of support or opposition of culling could not be attributed to people's interest in marine or environmental issues. Neither could the level of support or opposition be attributed to people's involvement in the fishing industry. A similar opposition to lethal management of seals has been reported in the US (Jackman et al. 2018). A different scenario was presented for stakeholder attitudes toward the conservation of the Saimaa ringed seal in Finland. Local landowners thought the presence of seals restricted land use, commercial fishers considered conservation unnecessary, and summer cottage owners and biologists called for conservation (Tonder and Jurvelius 2004). However, local views on fishery and protection of marine wildlife are more complex. Although local people along the Russian coast ascribed a commercial value to salmon, they also attributed nonprofit meanings to salmon as an important aspect of the identity of fishing villages (Nakhshina 2012). Mouro, Santos, and Castro (2018) illustrated how ecological governance was consistently thought of as a threat to artisanal fishing due to perceived power asymmetries between fishers and governing institutions. Indeed, the protection of marine mammal species may result in unintended negative consequences for small-scale fisheries (Davis et al. 2020).

Nature conservation requires understanding of local perspectives (IPBES 2019). In a previous multidisciplinary analysis of management actions toward seals along the Baltic Sea coast in southeast Sweden, we identified a strong concern among local people about the increasing presence of seals. They wanted to see immediate action to save livelihoods, local culture and atmosphere (Waldo et al. 2020). Considering that both theory

and empirical results suggest that attitudes toward wildlife and wildlife management involves emotions (Manfredo 2008), the present study strived to go beyond local people's general expressions of concern or attitudes to provide a detailed understanding of feelings of fear and associated appraisals. The study specifically aimed to (i) investigate local people's fear for their future and their appraisals of the current situation of small-scale fisheries and seals, (ii) examine the extent to which the appraisals were associated with fear for their future, and (iii) provide an in-depth understanding of the fishers' concerns in relation to their perceived coping potential.

Appraisal Theory of Emotion

The study is based on the appraisal theory of emotion (Leventhal and Scherer 1987). This theory has previously been successfully applied to discern people's feelings toward human-wildlife interactions (e.g. Eriksson et al. 2020; Eklund et al. 2020; Johansson et al. 2019a). Appraisal processes are considered to be the main causal determinants of the various components that together develops into emotions (Moors et al. 2013). In other words, emotions are elicited and differentiated by people's subjective interpretation of the personal significance of a certain situation.

In appraisal processes, people are considered to use information from events in their context (a direct experience or an indirect experience through friends, neighbors, or news of seals and fishery) combined with their personal concerns, history, and other sensitivities. The Component Process Model of emotional appraisal (CPM, Scherer 2001) offers a theoretical tool to further nuance the understanding of people's appraisal of an event. The CPM states that an appraisal process can be understood as four interconnected steps. In the first step, the new situation is reflected upon with respect to its relevance in relation to a person's goals (e.g. making a living out of fishery or getting recreation by watching seals). Second, if relevant, the individual considers the implications of the new situation in terms of different potential positive and negative consequences to themselves, their lifestyle, etc. Third, if these implications are perceived as negative, for example an obstruction to reaching the goal, different ways to deal with the situation are considered, conceptualized as the coping potential. This may be ideas about how to counteract the presence of seals, to reach the goals. Finally, the situation and the possible ways of coping with the situation are evaluated for congruence with personal and societal norms.

Scherer (2013) argued that the coping potential has a significant role in the appraisal process if the event is goal obstructive. This was empirically illustrated by Eklund et al. (2020) for the presence of large carnivores and livestock owners' fear of predation. Their trust in management authorities seems to facilitate their coping. Social trust has also been identified as a critical component in people's feelings of fear of the presence of large carnivores (e.g. Johansson et al. 2012; Zajac et al. 2012), suggesting that trust in parallel with coping potential warrants attention in human-wildlife interactions with perceived negative impact. The conceptual framework of the study is outlined in [Figure 1](#).

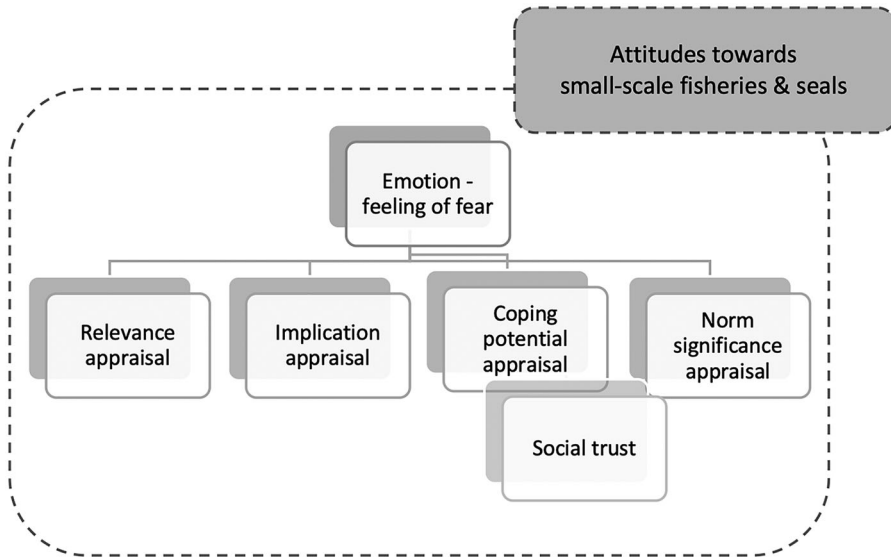


Figure 1. Conceptual model of people's fear for the future illustrating the components of the appraisal process.

Swedish Fisheries and Management

In Sweden, fishery is an industry of major economic, cultural and social importance for rural coastal areas (Swedish Board of Agriculture 2018). In the environmental objective, *A Balanced Marine Environment, Flourishing Coastal Areas and Archipelagos*, biological diversity and recreational, natural and cultural resources are identified as being fundamental to sustainability, and the importance of local industry in conservation of cultural environments is emphasized (Swedish Environmental Protection Agency, EPA 2019). However, the number of licensed fishers in Sweden fell by 17% in the period 2008-2016 (Scientific, Technical and Economic Committee for Fisheries, STECF 2018), which is partly a consequence of the observed negative effects of seals on the economic performance of small-scale fisheries (Svels et al. 2019; Waldo, Paulrud, and Blomquist 2020). Sweden has a management plan for gray seal in the Baltic Sea (SwAM 2019), based on the Habitats Directive (European Union, 1992), stating that the seal population will have “a favourable conservation status, and the impact on human interests will be neutral or positive” (translation by the authors). Today, more than half of the Baltic Sea gray seal population is in Swedish waters (Swedish Agency for Marine and Water Management SwAM 2017).

As outlined by Waldo, Paulrud, and Blomquist (2020) Swedish fisheries are regulated within the framework of the EU Common Fisheries Policy (CFP; EU 2013). The CFP has an objective to “*promote coastal fishing activities, taking into account socio-economic aspects*” (EU 2013, Article 2). The promotion of small-scale enterprises is also important in Swedish fisheries management, especially for coastal development and local markets (Swedish Board of Agriculture and SwAM 2016). This implies an inherent tension between objectives in the CFP and seal conservation targets. In Sweden, this is manifested in a division of responsibilities. Whereas SwAM is responsible for gray seal conservation and fisheries regulation, gray seal population control is managed by the

Swedish EPA, and development of fisheries by the Swedish Board of Agriculture. Regionally, each County Administrative Board (CAB) has a Wildlife Management Delegation (WMD) tasked with facilitating local collaboration between stakeholders. The WMDs consist of representatives of various interests, e.g. nature conservation, tourism, forestry, agriculture and fisheries, as well as politicians, but are not specifically dedicated to issues related to fisheries and marine wildlife (SFS 2009:1474). Coastal communities often have fishing-based origins, and the livelihood and well-being of the local population have become closely intertwined with fishery as a local value.

Method

A case study was conducted in three traditional fishing villages situated in Blekinge county, on the Baltic Sea coast in southeast Sweden. A concurrent mixed methodological approach was applied in data collection, combining quantitative survey data and qualitative information obtained by interviews (Creswell 2003). Initial thematic analysis of interviews provided input when formulating survey questions, and the results of the quantitative investigation informed the in-depth analysis of the qualitative component, enabling further elaboration of both qualitative and quantitative results (Onwuegbuzie and Leech 2005). All participation was based on informed consent.

Setting

The study area was chosen on the basis of reports of increasing interference from seals with fisheries, which made it suitable for the interdisciplinary project. The seal population in the Baltic Sea is spreading southwards, and with it the impact from seals on coastal fishery (SwAM 2014), strongly affecting the viability of small-scale fisheries in the area (Waldo, Paulrud, and Blomquist 2020).

The villages were chosen as three examples of traditional fishing villages in the county (villages A, B and C) with seemingly similar conditions—sea fishers active in the harbor and visible signs of fishery as a cultural heritage (e.g. fish restaurant, fishmonger, fishery related architecture). Traditional fishery meant alternating between different species and using different gears based on abundance and fishing season. Current regulations (e.g. restrictions on fishing for eel (*Anguilla anguilla*) and salmon (*Salmo salar*), the need for permits to fish for cod (*Gadus morhua*) or herring (*Clupea harengus*) make this no longer possible.¹ Today, a coastal small-scale fishery is more or less dependent on the abundance of cod to survive. Tourism has been proposed as a way to strengthen depopulated rural communities, by providing alternative local businesses in the area. Guided seal-spotting tours are arranged to a small island along the south coast, but the waters immediately adjacent to the villages lack isles and rocks where seals are easily visible.

Interviews

In total, 27 persons were interviewed. These comprised in-depth individual interviews with five small-scale fishers, three stakeholder representatives (*Rural Sweden*² and

Swedish Society for Nature Conservation, SSNC), four local/regional³ officials, and one local politician, and three focus group interviews with local people in groups of three, five and six. The results presented here focus on the appraisal of the fishers and local people representing all three villages (19 individuals in all). The remaining eight interviews provide a contextual understanding important for the analysis. Contact information was obtained through a combination of channels such as official registers and snowballing. Participants in focus groups were invited with assistance from local cultural association representatives, where the ambition was to target locals with no personal involvement in fishery. All participants were informed about the study aim, and it was explained that participation was voluntary, and that the research team at all instances followed ethical guidelines for psychological research. They were then asked to consent to participation before the interviews started.

The interviews with non-fishers began in the local context, focusing on perceptions of the local community, important local values, and small-scale fishery as a local value. The initial focus in the fishers' interviews was on their occupation as a legacy and on fishery as a personal identity and lifestyle. All interviews then moved onto attitudes and emotions toward seals and perception of the seal-fishery issue. The interviews were recorded and transcribed verbatim. Reflexive thematic analysis (Braun et al. 2019) was used to identify and analyze patterns and variations in the material (see also Waldo, Paulrud, and Blomquist 2020). The analysis focused on themes describing the appraisal of the seal-fishery situation, i.e. perceived *relevance* and *implication*, and perceived *coping capabilities*. This enabled an understanding of the complexity of perceptions, which was then used to explain and further analyze results from the questionnaire.

Survey

The survey involved 357 inhabitants aged 18–77 (mean age 59 years, 48% women and 52% men), with 146 respondents living in Village A, 118 in Village B, and 79 in Village C. Fourteen respondents did not report their village. The response rate was 41.8%. The sample was obtained from the official Swedish population register, representing all inhabitants registered within the relevant postal codes for the three villages (Adresskälla SPAR, 171 94 Solna). In households with more than one adult, females/males were alternated on the basis of first name, resulting in a total sample frame of 854 persons. A written invitation to participate in a study on “your view on seals and local coastal fishery”, a questionnaire, and reply-paid envelope were sent by post in November 2017. In the invitation, it was explained that participation was voluntary and that the research team at all instances followed ethical guidelines for psychological research. The study was announced on local radio a few days later and a reminder, including a new questionnaire, was sent two weeks later.

The questionnaire was divided into five sections as follows.

1. *General attitudes* toward local coastal fishery and the presence of seals in the Baltic Sea. “It is important that Blekinge has (a) living coastal fishery, (b) viable seal population.” Two items, 5-point response scale: 1 = completely disagree, 5 = completely agree.

2. *Appraisal of the current situation*: “The current presence of seals along the Blekinge coast is a success for the seal population, but it is said to have resulted in competition for fish between seals and fishery. In the debate the development is described both as something negative and positive. We would like to know what you think.” Ten items, 11-point response scale (Table 1).
3. *Social trust in managing authorities*: “How do you experience that authorities are handling the management of seal and coastal fishery? I trust that the (a) Municipality, (b) County Administrative Board, (c) Swedish Agency for Marine and Water Management, considers the local population in issues regarding seal and fishery.” Three items, five-point response scale: 1 = completely disagree, 5 = completely agree. Items derived from Johansson et al. (2017) and treated as a summarized index.
4. *Personal feelings regarding the future of seal and fishery*. “Do you feel any worry regarding: (a) an increase in the seal population along the coast in Blekinge? (b) the survival of the coastal fishery? (c) your possibilities to have a good life in the area where you live? (d) the development of the area where you live?” Four items, 11-point response scale 0 = not at all, 10 = to a high degree.
5. *Socio-demographics*: gender, age, household member active in fishery.

Statistical analyses were performed in IBM SPSS 24. The ten questionnaire variables assessing locals’ appraisal of the presence of seals along the coast were normally distributed, i.e. the ratio of skewness and kurtosis, and its standard error, did not exceed 5. These items were subjected to an exploratory factor analysis with the objective to identify overarching appraisal dimensions. One item (“To what extent do you consider the development growth of the seal population to be caused by natural processes?”) consistently showed low correlations with the other items (Pearson $r=0.06-0.16$) and was excluded from further analyses. Cronbach’s alpha was calculated to establish the internal reliability of indices based on the factor analysis. Differences between independent samples in the appraisal dimensions and worry were tested with Univariate General Linear

Table 1. Summary of statistics for Analysis of Variance with village and involvement in fishery as grouping variables.

Differences between village A (N = 145), village B (N = 78), and village C (N = 114)							
	Village A M, SD	Village B M, SD	Village C M, SD	ANOVA	p	η_p^2	LSD post hoc
Feelings of fear	5.59, 2.45	6.47, 2.59	6.62, 2.59	$F(2, 337) = 37.64$	.003	0.030	B&C > A
Relevance	4.63, 2.75	5.64, 3.26	5.95, 3.27	$F(2, 337) = 5.95$	.003	0.034	B&C > A
Potential to cope with implications	3.27, 1.77	2.65, 1.98	2.66, 1.95	$F(2, 337) = 4.65$	.01	0.027	B&C < A
Social trust	2.57, 0.97	2.27, 1.05	2.23, 1.05	$F(2, 337) = 4.65$	.02	0.023	B&C < A
Differences between people involved in fishery (N = 224) and not involved in fishery (N = 126)							
	Involved in fishery (D) M, SD	Not involved in fishery (E) M, SD	ANOVA	p	η_p^2	LSD post-hoc	
Feelings of fear	7.50, 2.07	5.40, 2.46	$F(1, 348) = 357.03$	.001	0.16	D > E	
Relevance	7.40, 2.76	4.20, 2.61	$F(1, 348) = 115.77$	.001	0.25	D > E	
Potential to cope with implications	1.87, 1.74	3.45, 1.76	$F(1, 348) = 203.32$	.001	0.16	D < E	
Social trust	1.97, 1.08	2.61, 0.92	$F(1, 348) = 33.14$	.001	0.09	D < E	

A few missing values for the indices of relevance (N = 3) and potential to cope with implications (N = 7) were replaced with sample means of the respective index in the analyses.

Model and LSD post hoc tests. Associations between appraisals and fear for the future were analyzed by hierarchical multiple regression analyses. The Breusch–Pagan test indicated slight heteroscedasticity. The regression analyses were also calculated with robust standard errors as suggested by White (1980) in STATA, yielding almost identical results. We interpreted p values $<.05$ as an indication of differences not occurring by chance, and the partial eta-squared (η_p^2) was used to assess effect size.

Results

Quantitative and qualitative analyses are presented jointly. The questionnaire result constitutes the basis for the presentation, and interview findings nuance and elaborate statistical results.

Local Attitude toward Small-Scale Fishery and Seals

The survey showed that small-scale fishery was very important to all three villages ($M=4.72$, $SD = 0.64$), but the presence of seals along the coast was of lesser importance ($M=2.48$, $SD = 1.31$), scales ranging from 1 = not important at all, 5 = very important. No significant differences could be identified between the villages. The interviews confirmed that fishery was considered important, and even perceived to define the villages and people living in them. The interviewed fishers described an operational, lively harbor as an essential quality and natural venue that was at risk.

People who visit a harbour surely want to see a fishing boat. You see that in the summer when folks come, they practically pilgrimage down there.

In the last ten years it's gone straight downhill. Before, you could come down to the harbour at any time of day, and you'd meet someone. Either coming back from fishing or going out.

The interviews with local people showed clearly that the villages have evolved from fishing. Fisheries were considered fundamental, despite the declining numbers of professional fishers. The cultural heritage was highly valued and the identity as a fishing village was still meaningful. In contrast, the presence of seals off the coast was not considered a local value. The awareness of seal presence in the waters outside the villages comes not from seeing seals in the area but from the consequences of fishery-seal interference being debated locally between neighbors and fishers, and reported in local media.

I think that here, in Blekinge [county], there's not enough archipelago. Here it [seal spotting] is out of the question. You don't see seals at all here.

Fear for the Future of Fishing Villages and Small-Scale Fisheries

The four items addressing concerns about increase in the seal population, survival of coastal fisheries, quality of life expectancy, and community development in the fishing villages were correlated (Pearson $r = 0.44$ – 0.76 , $p < .001$). An index of feelings of fear for the future was computed by averaging responses to the four items addressing fear. The

result showed an intermediate level of fear ($M = 6.15$, $SD = 2.54$, 0 = no feelings of fear at all, 10 = very strong feelings of fear, Cronbach's alpha = 0.84). Analysis of variance (ANOVA) showed that feelings of fear were present in all villages but differed significantly between them, although the effect size was low (Table 1). The *post-hoc* test showed that respondents in Village C and Village B assessed their fear as higher than respondents in Village A.

Identifying Different Appraisals of the Presence of Seals in the Three Villages

The exploratory factor analysis resulted in two factors with eigenvalues above 1, and inspection of the scree plot verified the number of components. Two summarized indices were computed, the *perceived relevance* of the current situation with fishery-seal ($M = 5.33$, $SD = 3.08$, 0 = not at all relevant to 10 = highly relevant, Cronbach's alpha = 0.74), and the *perceived potential to cope with implications* covering the quality of the implications of, and the ability to deal with the situation ($M = 2.89$, $SD = 1.90$, 0 = negative implications difficult to handle to 10 = positive implications possible to handle, Cronbach's alpha = 0.84), Table 2. The mean values for the indices show that, in general, the situation was perceived as relevant, and the implications as primarily negative and difficult to cope with.

Analysis of variance suggested that the relevance appraisal differed between the villages. *Post-hoc* tests showed that the relevance was assessed higher in Villages B and C than in Village A (Table 1). The potential to cope with implications of the fishery-seal situation also differed significantly between villages, lower in Villages B and C than in Village A, but the effect sizes were low. Trust in management authorities as assessed by the index of social trust was rather low across the villages ($M = 2.38$, $SD = 1.02$, scales ranging from 1 = completely disagree on trust, 5 = completely agree on trust, Cronbach's alpha = 0.86). Social trust differed significantly between the villages, with *post-hoc* tests showing that trust was lower in Villages B and C than in Village A.

In the interviews, concerns regarding seal presence and declining local fishery were described differently by the people living in each village, despite a common history and geographical closeness. Tourism was described as a local opportunity to varying degrees. Village B can best be described as a community in change. There were few operative fishers left, and the harbor was no longer a lively meeting place. Tourism was slowly increasing. In this process of change, the local value of being a fishing village seemed to be weakened.

No, I guess it [the village] is not characterised by fisheries anymore, it's more... Now there are restaurants opening and now come the campers and the leisure boats and all this. It's taken over quite a lot here.

Village A was a highly developed tourist destination with a long history of tourism, with many local values contributing to its attractiveness. Unlike Village B, the local fishery was still regarded as an important local value. Even though the professional fishers had almost vanished from the harbor, it was still characterized as a fishing village.

But it still feels as if fishery is present somehow. You're constantly reminded that it is... for example there's this local history society... I often say that I live in a small fishing village, but it actually isn't anymore.



Table 2. Summary of exploratory factor analysis results ($N = 347$) with mean values and standard deviations of the items.

Item	Distribution		Rotated factor loadings (varimax)		Relevance
	<i>M</i>	<i>SD</i>	Coping with implications		
How do you experience that the development of the seal population influences the attractiveness of your village? (negatively–positively)	3.41	2.47	0.70		–0.34
How do you experience that the current presence of seal influences the local coastal fishery? (negatively–positively)	2.35	2.21	0.68		–0.47
How distant or close does the public discussion about the coastal fishery and the seal population feel to you? (distant–close)	5.59	3.17	–0.06		0.85
Do you feel personally affected by the current situation with the coastal fishery and the seal population? (not at all—to a high degree)	4.98	3.59	–0.22		0.81
To what extent do you consider political decisions to be the cause of the growth in the seal population? (not at all—to a high degree)	6.55	3.00	–0.21		0.65
To what extent do you perceive that you can handle the effects of the current presence of seals in the Baltic Sea? (not at all—to a high degree)	3.30	3.04	0.65		–0.14
To what extent do you perceive that you can influence the effects of the current presence of seals in the Baltic Sea? (not at all—to a high degree)	2.04	2.27	0.66		0.22
Is the current presence of seals in line with your view on how the Baltic Sea should be managed? (not at all—to a high degree)	3.16	2.71	0.76		–0.36
Is the current presence of seal in line with your view on how your village should develop? (not at all—to a high degree)	3.16	2.72	0.80		–0.29
Eigenvalues			4.18		1.35
% of variance			46.43		14.93

Sampling adequacy was good (Hutcheson and Sofroniou 1999), with $KMO = 0.80$. Correlations between items were sufficiently high, as indicated by Bartlett's test of sphericity ($\chi^2(36)=1481.87$, $p<.001$). Two components explaining 61.37% of the variance were retained, namely coping with implications and relevance. Items with high factor loadings for each component are indicated in bold.

Village C can be described as losing its most essential local value. Village C was characterized by industrial fisheries and processing, so the harbor remained a lively meeting-point but, as in the other villages, the number of operating fishers was decreasing rapidly. The quality of being a fishing village was a major local value, and with the local fisheries disappearing, the participants in the focus group discussions could not see how this value could be replaced by something else:

Person 1: Without fishery there's nothing.

Person 2: Then you have no tourism.

Person 1: Then we are no community. This entire community is based on fishery and the fishing industry.

Local people in Village C expressed strong fear for the future of the village, expecting major implications for local livelihoods. In contrast, locals in Village A, although concerned about the local fishery, expressed no fear for the future of the village or livelihoods. This was explained by the well-established tourist industry, but also that the identity of being a fishing village was maintained as an integral part of community development despite the declining fishing industry. Local people in Village B expressed less fear for the future of the village than those in Village C, but more than those in Village A. Interviews revealed that people were aware that the identity of the village was changing, but there was uncertainty about whether tourism would be enough to replace fishery and thereby improve livelihood possibilities.

The interviews with stakeholder representatives, officials and politicians provided a broader perspective and supplemented the local people's descriptions. The representative from *Rural Sweden* and the official from the CAB confirmed that seals were a significant threat to small-scale fisheries from a regional perspective.

The development of fisheries is not sustainable... And the damage caused by seals to the fishers here is a quite substantial part of it all.

In contrast, the representative from SSNC and the local politician were seemingly unaware of the severity of the seal-fisheries interaction as experienced by fishers and local people, describing the seal impact as minor. The local officials admitted a lack of knowledge, making it difficult to comprehend the situation.

Well, if it's such a major issue that it threatens the entire industry, then of course we must write motions or debate articles or influence the County Administrative Board. (—) But as I understand it, we're not quite there yet.

I have no opinion about that [seals being a problem]. I don't know to what extent... There's been an inventory, but it didn't say how many seals we have here. (—) I can't say if it is a problem.

The representative from the municipal tourism department confirmed that the specific area was not suitable for seal-watching tourism, but described local fishery as only one of many local qualities among beaches, festivals, and recreational fishing that were important for tourism.

Appraisals of Those Involved in Fishery

The quantitative data showed that feelings of fear differed significantly between respondents involved in fishery, i.e. working as, or living in a household with someone working as a fisher or in the fishing industry, and those who were not involved in fishery (statistics in Table 1). Clear distinctions in appraisals could be seen between respondents who were involved in fishery compared to those who were not. Respondents involved in fishery assessed the relevance of the situation as significantly higher than respondents not involved. The perceived potential to cope with implications was considered significantly more negative among respondents involved in fishery compared to those not involved in fishery. Social trust in management authorities was significantly lower among those involved in fishery than those not involved (Table 1).

The interviews with local fishers provided some context to the quantitative results, as this group described the seal-fishery situation as alarming. The fishers clarified that the presence of seals was no novelty, and instead they described a long history of competing with and co-existing with seals. However, in recent years, the growing number of seals had turned small-scale fishery into a nonprofitable business on the verge of extinction.

Fishing's not profitable today. Not using passive fishing gear. No chance. If you put the long lines in early and pull them up after two hours, the seals have been there during that time, eating...

The interviewed fishers perceived the implications as devastating, with virtually no potential to cope with the challenges the situation brought. They described a struggle to survive by trying to adapt to the new conditions, but were hindered by a constantly growing and spreading seal population, together with stringent regulations that limited their capacity for action, i.e. only being allowed to fish for cod using passive gear.

I've tried and struggled... Shifted between different fishing locations. But it's reached the point that there are seals everywhere.

SwAM – Swedish Agency for Marine and Water Management – is the biggest threat to Baltic Sea fishery, that is, to the small-scale coastal fishery. It's a disaster what they've done to the fishery. We had a fishery based on cod, herring and salmon, but they've divided it into different segments. (—) If one fishery went wrong, you could switch to another and save the fishing on a yearly basis, so that you still got an income.

The situation could be understood as failed coping, caused by limited capacity to alter their fishery. The consequences were expressed as both individual and societal. Being a fisher is often a legacy, with the interviewees describing themselves as the last of several generations of fishers. They saw fishing as a lifestyle and their skills as experience based, knowledge they feared would vanish as fishery became more small-scale.

I was next to my father and he saw what I was doing wrong. "You don't do it like that, you should do it like this." So, you learn in a natural way. You can't educate yourself to the skills we have, in this craft.

The heavy regulation and monitoring of small-scale fisheries had implications for local people's social trust in authorities. The fishers saw SwAM as more or less responsible for the fishery-seal issue. It was described as failed management, but the distrust was also expressed as a perception that Swedish authorities were working against fishery.

If you compare and see what Denmark does, they work **for** professional fisheries. Swedish authorities only work to stop it... And then they talk about a flourishing archipelago, it doesn't add up. They want to regulate heavily and at the same time have prosperous coastal communities.

Local people made recurrent comments about the costly and, in their view, unnecessary surveillance by the coastguard and SwAM. In the focus group in Village C, support for the local fishers was strong, as expressed in the following quotes.

Person 1: We were talking this afternoon, me and two fellows, when we saw the blue bus. I mean it's our tax money. Imagine if we had that money to develop our village instead, to develop the local fishery.

Interviewer: Blue bus?

Person 2: It's SwAM, the authorities.

Person 1: They drive from Simrishamn in a blue bus. To observe. If some poor fisher comes along, they approach him instantly, asking for his log, and his catch...

Person 3: And "when did you say you were supposed to be in?" And if you're early, say there's a storm outside and you get back an hour earlier, then there's a heavy fine. Does that make sense?

The Importance of Individual's Appraisals to Feelings of Fear

A hierarchical multiple regression analysis was carried out with fear as outcome variable to examine the association between the individual's appraisal of the situation and their feelings of fear. In this analysis, *village* was first introduced as a dummy variable, comparing Village A with the other two villages (Village B and Village C). This model explained 4% of the variance. In model 2, *personal involvement in fishery* was entered, increasing the explained variance to 18%. In model 3 the appraisal variables *relevance* and *perceived potential to cope with implications*, and finally *social trust* were added. This significantly increased the explained variance to 49%. In this model, *village*, and *involvement in fishery* were no longer significant predictor variables. Appraising the relevance of the situation as high, and potential to cope with negative implications and social trust as low, were significantly associated with stronger feelings of fear. [Table 3](#) shows the statistics for the three regression models.

Discussion

This study provided an environmental psychology perspective on local concerns about the presence of seals along the Baltic Sea south coast, drawing on established theory on human emotional responses. The study contributes to the literature on human interaction with marine wildlife. Local people in the traditional fishing villages expressed fears about an increased seal population, survival of coastal fishery, their quality of life, and the development of their community. In particular, seals were perceived to threaten the fisher's personal lifestyle and livelihood, but also small-scale fishery as a cultural

**Table 3.** Hierarchical multiple regression analysis based on robust standard errors with feeling of fear as outcome variable.

	Model 1 Village (N = 330)		Model 2 Involvement in fishery (N = 330)		Model 3 Appraisals (N = 330)	
	B	SE B	B	SE B	B	SE B
Feeling of fear		β				β
Constant	4.53	0.45	2.36	0.51	6.51	0.65
Village	1.02	0.28	0.60	0.26	0.18	0.22
Village A = 1						
Village B + Village C = 2						
Involvement in fishery		0.20***		0.11*		0.03
Not involved = 1						
Involved = 2			2.10	0.26	0.34	0.25
Relevance (low – high)					0.23	0.05
Potential to cope with implications (low–high)					-0.56	0.07
Social trust (low–high)					-0.29	0.13
					$F(5, 324)=62.18, p<.001,$	$R^2=0.49$
					$F(1, 328)=13.27, p<.001,$	
					$R^2=0.04$	
					$F(2, 327)=40.26, p<.001,$	
					$R^2=0.18$	

In model 1, village is entered as predictor variable. In model 2, involvement in fishery is added, and in the final model 3 the individual appraisals are also entered. * $p<.05$, ** $p<.01$, *** $p<.001$.

heritage and craftsmanship. These feelings are probably expressions of a strong identity with a traditional fishing community (Nakhshina 2012). In addition to expert assessments of the impact of seals on fishery (Waldo, Paulrud, and Blomquist 2020), an understanding of how the local population perceive the situation is just as important in preventing conflict and identifying ecologically, economically and socially sustainable solutions (De María, Barboza, and Szteren 2014; Guerra 2019; Redpath et al. 2013). Results emphasize the importance of a local perspective, including not only general concerns or attitudes but also individual emotion and appraisals, when aiming to reach ecological conservation objectives whilst also preserving local livelihoods and cultural resources.

The villages were located in the same region and were only 20–30 km apart, but the interviews showed that village history and tradition colored what was considered an acceptable way to address the situation. While tourism was a solid base for the local economy in Village A, and remaining fisheries could be seen as an additional value strengthening the quality of being a fishing village, Village C was described as being on the verge of losing much of its local economy—fishing and processing. Transitions from emphasis on food production to other forms of natural resource utilization are characteristic for coastal areas where commercial fisheries have to adapt to new circumstances (Salmi 2015). The coping potential, or resilience, depends on local adaptability and transformability (Salmi 2015), and depends on both the collective and the individuals within the collective (Johansson et al. 2019b).

The appraisal theory of emotion and the component process model (CPM, Scherer 2001) enabled a systematic analysis that helped discern appraisals behind the feelings of fear. In line with the CPM, appraisal of relevance to individuals, significant others and the local community constituted one important dimension identified in the factor analysis. The second dimension merged the three stimulus evaluation checks of perceived implications, coping potential, and norm congruence (Scherer 2001). The outcome of the hierarchical regression analysis indicates the importance of, in addition to local community and stakeholder interests, also considering individuals' appraisals of interactions between humans and marine wildlife.

The individuals' appraisals, relevance, potential to cope with implications, and social trust, all contributed to explain the variation in the respondents' feelings of fear. Appraisals were more potent variables than village and involvement in fishery, meaning that the individual person's interpretation of the situation was more important than group affiliation in the feeling experienced. This study emphasizes that analysis of human responses to interaction with marine wildlife benefits from examining individual level (psychological) variables as drivers. The importance of individual-level variables was also illustrated by Pont et al. (2016), who found more negative attitudes toward sea lions in southern Brazil among older, less educated fishers with no alternative source of income.

It is hardly surprising that the impact was more relevant to fishers and others involved in fishery. This is congruent with appraisals of relevance and implication identified among other local and traditional livelihoods vulnerable to wildlife, such as reindeer herding (Eklund et al. 2020). Those involved in fishery saw the limited potential to cope with perceived negative impact, putting them in a vulnerable situation—a

recurrent theme for traditional livelihoods and conservation interests (Davis et al. 2020). Coping potential, or rather the perceived lack of it, as reported in interviews may be an especially important contributor to strong feelings of fear (Scherer 2013; Eklund et al. 2020).

Unfortunately, coping potential did not seem to be supported by management authorities, as social trust was relatively low, lower than previously reported in relation to conflicts around terrestrial wildlife (Johansson et al. 2012, 2019a). Low social trust might be an expression of power asymmetries between fishers and governing institutions (Mouro, Santos, and Castro 2018). Conservation and management of marine wildlife must allow for solutions that could be adapted to place-specific solutions requiring local involvement, experience, and knowledge (IPBES 2019). This implies that suitable coping strategies may differ between apparently similar, fisheries-dependent communities (Brookfield, Gray, and Hatchard 2005). In this case, where responsibilities of conservation and fisheries are split between the national authorities, the existing regional Wildlife Management Delegations may not be a sufficient arena to establish collaboration. Additional collaborative approaches to governance and management may be required to obtain legitimacy for mitigation strategies (Meek et al. 2011; Butler et al. 2015).

The mixed-method approach provided rigor to the results by allowing parallel analyses of statistical patterns and nuances of identified differences and associations. The response rate, 41%, might imply that those most concerned were overrepresented in the questionnaire sample. The qualitative analysis largely focused on the perspective of fishers and local people. Interviews with stakeholder representatives, officials, and politicians, gave complementary insights. The “local” appraisal of the fishery-seal situation was both confirmed (by interviewees with a regional perspective) and contradicted (by local authorities and representatives). Stakeholder interests such as representatives from tourist organizations and residents in other parts of the municipality might have provided additional perspectives. Research to increase understanding of the meaning of an active coastal fishery as a local value, where tourism could offer an opportunity to maintain fishing activities, is of particular interest (Ropars-Collet, Leplat, and Goffe, 2017). It would also be valuable to follow if and how local people’s appraisal of the situation change over time and across generations.

Conclusions

Locals across villages and stakeholder group have called for action in the fishery-seal situation along the Baltic Sea south coast (Waldo et al. 2020). The present study shows that the situation is appraised as highly relevant, with negative implications and where the local communities and fishers lack the tools to handle the situation. These appraisals are associated with feelings of fear for the future of local small-scale fishery and traditional fishing villages. The results suggest that successful management of human interaction with marine wildlife requires not only attention to local context and stakeholder groups, but also to people’s individual interpretation of the situation. Here, perceived potential of coping with the negative implications stands out as a critical aspect to address negative feelings and overcome challenges at the individual level. Strengthening social trust and increasing collaboration seems necessary, to establish a linkage between

individual and collective levels to find place-specific coping strategies balancing the development of small-scale fisheries as a sustainable local livelihood and iconic cultural heritage.

Notes

1. Swedish fishery is managed within the EU Common Fishery Policy (European Union, 2013).
2. In Swedish, *Hela Sverige ska leva*, is a national civil society organisation of NGOs for rural development.
3. The County Administrative Board (CAB).

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