Article

The 'cod-multiple': modes of existence of fish, science and people

Heike Schwermer[1,2*], Alexandra M. Blöcker[1], Christian Möllmann[1] and Martin Döring[3]

[1] University of Hamburg, Institute of Marine Ecosystem and Fishery Science, Center for Earth System Research and Sustainability (CEN), 22767 Hamburg, heike.schwermer@uni-hamburg.de (H.S.), alexandra.bloecker@uni-hamburg.de (A. B.), christian.moellmann@uni-hamburg.de (C.M)
[2] Christian-Albrechts University Kiel, Center for Ocean and Society, 24118 Kiel, heike.schwermer@ae.uni-kiel.de (H.S.)
[3] University of Hamburg, Institute of Geography, 20146 Hamburg, doering@metaphorik.de

* Correspondence: heike.schwermer@ae.uni-kiel.de

Abstract: Fish represent a politically regulated, scientifically researched, industrially processed, commercially marketed, and socially contested living marine resource species. Related to this, the incorporation of resource users and stakeholders into fisheries management is particularly important. Such involvement has recently improved, but institutional frameworks often result in a lack of recognition and integration of the diverse 'knowledges' of stakeholders involved. Against this background, we aim to uncover the potentials of additional knowledge types for management purposes paving the way towards a more collaborative management. We first conducted qualitative expert interviews with different stakeholder groups (e.g., commercial fisheries, eNGO, administration) to map various 'knowledges' about cod (*Gadus morhua*), a major resource species in the Western Baltic Sea to reveal the various experiences and epistemologies revolving around it. A second analytical step consisted in analyzing how these 'knowledges' structure, inform and often get into conflict with perspectives on and assessments of fisheries management. Potentials were identified that provide food for thought to seek change in sustainable management of fish stocks in the future. Our study is a pointer to the need to transform fisheries management in a more social and participatory way. We argue that sustainable natural resource management cannot be designed solely by integrating more 'knowledges' (knowledge-sharing), but requires the creation of social contexts and institutions with stakeholder empowerment at the local level (power-sharing) to sustainably manage natural resources such as commercially importance fish stocks.

Keywords: Baltic Sea, fisheries management, cod, stakeholder participation, interviews, knowledge types, qualitative content analysis, co-management.

Citation: Schwermer, H..; Blöcker, A.; Möllmann, C.; Döring, M. The 'cod-multiple': modes of existence of fish, science and people. *Sustainability* **2021**, *13*, 12229. https://doi.org/10.3390/10.3390/su132112229

Received: 30 September 2021
Accepted: 2 November 2021
Published: 5 November 2021

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Supplementary Materials: Accompanying our manuscript, we present additional information on the stock assessment of Western Baltic cod and measures taken to manage this stock sustainably. The document also includes the interview guide consisting of questions on ecology, management, economy, communication as well as conclusion and ideas for solutions. Also included are the detailed descriptions of the three categories knowledge, management and science and their empirical subcategories as collectively identified during interview analysis.

Supplementary Material

Western Baltic cod (WBC) stock status and management measures taken

In recent years the development of this stock has been strongly influenced in a negative way, particularly by climatic change effects (Drinkwater 2005, Hüssy et al. 2011, Stiasny et al. 2016, Voss et al. 2019) and continued overfishing (Sellke et al. 2016). According to scientific findings within our period of investigation (2017-2018), the fishing mortality (F) as well as the spawning stock biomass (SSB) were outside safe biological limits within both reference years: F was above FMSY (MSY = maximum sustainable yield; fishing pressure at sustainable level) and SSB was below the reference point called MSY Btrigger (ICES 2017, ICES 2018). It should also be mentioned that SSB has been below the reference level since 2008, as well as F, which was significantly above FMSY (ICES 2017, ICES 2018). Furthermore, the level of recruitment (R, i.e., number of young fishes enter the fishery) has been low since 1999 and, according to scientific estimates, it is assessed to be at lowest level of the time series in 2016 (ICES 2017, ICES 2018). Based on scientific calculations, a strong decrease of the cod catch quota for Western Baltic cod was set at EU level resulting in a reduction of catches by 60% compared to 2015 (EC 2016). As commercial fisheries are directly dependent on the level of the quota, this reduction also led to a considerable loss of fishers' income. Based on an estimated stock development, a roll-over period was negotiated for 2018 meaning a no further decrease or increase of the catch quota of Western Baltic cod (EC 2017).

Additionally, since 2017, the removal of cod by recreational fisheries has been considered in the fisheries stock assessment for Western Baltic cod. According to scientific calculations, recreational fisheries contribute significantly to the overall fishing mortality and were consequently significant compared to the catches from commercial fisheries (Strehlow et al. 2012, Eero et al. 2014). A so-called bag limit was introduced regulating anglers' removal by a fixed daily catch limit of 5 specimens, or 3 during the eight-week closure period between February to April (EC 2016, EC 2017). The latter was established politically in order i) to protect the Western Baltic cod stock from possible disturbance during spawning aggregations and thus ii) contribute to stock recovery (EC 2016, EC 2017).

Table A1. List of questions asked within each interview. The order of asked questions was dependent on the interviewees' expertise. Hereby, the interview guide consisted of five different thematic blocks: ecology, management, economy, communication as well as conclusion and solution. For the questions Ec1, Ec2 (economics) and C1 (communication) additional scale questions were used, which asked for further knowledge about economics and communication.

Id	Questions
Ecology	
Unlike in most marine areas, the marine fish species in the brackish water sea Baltic Sea are strongly dependent on environmental conditions such as salinity, temperature, oxygen content. In addition to these environmental factors, economic sectors such as fishing or tourism also influence fish stocks like cod.	
E1	What is your current state of the cod stock in the Western Baltic Sea? Would you rate the stock as endangered?
E2	Do you believe that a good environmental status can be achieved by 2020?
E3	How do you evaluate the influence of climate change on marine fish stocks and in particular on the stock situation of Western Baltic cod?
E4	Do you think that seabirds, such as cormorants and marine mammals (e.g. porpoises and seals) may have a negative impact on cod stocks in the Western Baltic Sea?
E5	Do you think that recreational fisheries have a negative impact on the stock size of the Western Baltic cod?
E1	What is your current state of the cod stock in the Western Baltic Sea? Would you rate the stock as endangered?
E2	Do you believe that a good environmental status can be achieved by 2020?
Management	
The stock of cod in the Western Baltic Sea is currently managed accordingly to a multi-annual plan. In addition to the Total Allowable Catches (TACs), this plan provides further restrictions on fishing activities. The aim is to manage the stock according to the maximum sustainable yield (MSY).	
M1	How would you define a good status for a fish stock?
M2	Do you currently consider the Western Baltic cod stock to be sustainably managed?
	a) Do you think the MSY approach is appropriate?
	b) Is it possible to achieve the management target by 2020?
M3	How would you explain to a student the way of allocating catch quotas in a comprehensible way?
M4	How would you evaluate the current fisheries management of the EU?
	a) In your opinion, what are the biggest problems and uncertainties in the management of Western Baltic cod?
	b) Do they consider the EU's sanctioning potential to be too low?

M5	Do you trust the calculation on the basis of which the fishing quotas are allocated & if yes/no why/why not?
M6	What do you think about the fact that the fishing quotas, and therefore the fisheries, are currently much less restricted than suggested by scientists?
M7	Can you comprehend the implementation of "bag limits" and fishing ban zones for angling in the current state of the stock? Do you think that these will lead to a recovery of the stock?
M8	Which stakeholders do you consider to have the greatest influence on the size of fishing quotas and on the management of fish stocks in general?
M9	Who do you think should take on which tasks in fisheries management?
M10	What do you say to the following quotation: "Fish has a lobby, fishers don't!"
M11	Should fisheries representatives be given more decision-making power in fisheries management?
M12	Do you believe that a reduction in fleet capacity will be necessary to protect the stock?
M13	Do you see the scrapping premium as an appropriate measure to protect the cod stock in the Western Baltic Sea?
M14	How do you assess the benefits of alternative fishing methods (e.g. modified nets to avoid by-catch species)?
M14	Do you see the business concept of 'Kutterfisch', i.e. one company controls production, processing and marketing, as a potential business model for the fishing companies managing the western Baltic cod stock?
Economy (Ec)	
Cod and herring are considered to be the "bread fish" for Schleswig-Holstein (cod) and Mecklenburg-Vorpommern (herring). Fishers here are dependent on the income from fisheries on these species.	
Ec1	How do you assess the economic importance of the Western Baltic cod stock both nationally and internationally?
Ec2	Assess the economic damage caused by the management measure now and in the future: a) bag limit b) fishing prohibited zones
Communication	
During the master class, we dealt intensively with a number of different media contributions. Each of these articles provides an exciting insight into the cooperation but also into the dependencies of the stakeholders involved.	
C1	How do you perceive and evaluate the dialogue between stakeholders involved in the fisheries management of Western Baltic cod (e.g. between scientists and representatives of angling and commercial fisheries)?
C2	Please describe possible reasons for a disrupted communication.

C3	If you have a suggestion for improving communication between stakeholders - what might it be?
Conclusion & solution (CS)	
CS1	What do you think has gone wrong in the past with the management of EU fish stocks in general and of Western Baltic cod in particular?
CS2	If you had to give an assessment, how do you estimate the involvement of the relevant stakeholders in the current stock situation of Western Baltic cod?
CS3	What would be your personal first/important measure that would contribute to improving the cod stock situation in the Western Baltic?
CS4	What do you think has a higher priority? The state of the stock or the economic security of fisheries?
CS5	How could you foresee a balance between protection and economic consequences?
CS6	Is a sustainable fishery at all possible for you while protecting a stock?

Table A2a. Knowledge describes everything that the interviewees know, and which cannot be predominantly assigned to the EU fisheries management. This comprises a total of 10 different knowledge types, which e.g. are related to a spatial component (i.e., local knowledge), temporal component (i.e., historical knowledge, future knowledge) or knowledge that could be explicitly assigned to a specific stakeholder group (i.e., fishers' knowledge, anglers knowledge).

General categories	Type	Description
Local knowledge	Local ecological knowledge	Biological knowledge with local reference; knowledge of biological processes (i.e., abiotic and biotic factors at local level), e.g., fish species distribution in the Greifswald Bay area or an oxygen depletion event in Kiel Fjord
	Local economic knowledge	Economic knowledge with a local reference, e.g. marketing strategy of fisheries cooperative or side-business of fishers in summer (i.e. tourist trips). The economic term includes commercial fisheries (catch, processing), tourism and recreational fisheries
Tacit knowledge	Tacit knowledge	Knowledge of the experienced in the personal or work context. The own experiences are the main focus here and refer secondarily to other types of knowledge, e.g., interaction with other stakeholders via mail (institutional knowledge) or provided information about fish distribution by fishers (fishers' knowledge)
Ecological knowledge	Baltic Sea ecosystem	Knowledge of the ecosystem which is not clearly assigned to flora & fauna or influencing factors on Baltic Sea ecosystem, e.g., distribution of fish (in general) in response to climate change
	Flora and fauna of Baltic Sea ecosystem	Biological relationships, i.e. descriptions of flora and fauna of the ecosystem, e.g. explicit knowledge on Baltic Sea fish species as well as existence of vegetation in certain areas (e.g., bank area)
	Abiotic factors of Baltic Sea ecosystem	Knowledge about abiotic influences on the ecosystem, including human-induced factors (e.g. commercial fishery, agriculture), e.g., the influence of agriculture or fishery on the ecosystem health
	Cod	Biological knowledge that concerns the species cod including the evaluation of the biological condition of cod based on its recruitment or length distribution
	Influences on cod	Biological knowledge concerning impacts on cod; knowledge about abiotic (e.g., temperature or oxygen conditions), biotic (e.g., predator-prey relationship) and anthropogenic influences (e.g., commercial fisheries, recreational fisheries)
Historical knowledge	Baltic Sea ecosystem	Past biological processes and values related to the Baltic Sea ecosystem, i.e. past inflow events from the North Sea or past abundance of seals within the Baltic Sea
	Cod	Knowledge about cod refers to processes from the past, e.g., stock development or reproductive behavior in the past (i.e., beginning of sexual maturity)
	Economy	Past economic processes including market price of cod or the social status of the fisher in the community

	Others	Includes all contents which could not be assigned to the categories Baltic Sea, cod and economy, e.g. past institutional structures
Future knowledge	Baltic Sea ecosystem	Knowledge about future events and effects on the Baltic Sea ecosystem, which are based on assumptions supported by knowledge from the past and present (e.g., future climate events)
	Cod	Knowledge about future events and effects on cod, which are based on assumptions supported by knowledge from the past and present (e.g., future stock development)
Economic knowledge	Cod	Description of the economic importance of the Western Baltic cod stock, i.e. regional importance (i.e., cultural status) compared to its world market importance (i.e., market price)
	Commercial fisheries	Includes all economic contents in connection with commercial fisheries, including fish processing and certification processes
	Others	Includes all economic contents which cannot be assigned to the categories cod and commercial fisheries, i.e., buyer behaviour or the economic importance of other sectors like tourism and recreational fisheries
Institutional knowledge	Structure	Structural setup of institutions involved, processes and communication channels (e.g., round tables)
	Content	Stakeholder knowledge, statements and opinions on e.g., commercial fisheries, NGO, management, tourism
Fishers knowledge	Fisheries observation knowledge	Fisheries knowledge goes back to fishers as a profession and their practice of fishing (fisheries representatives are excluded); fishers provide information about the fishery (e.g., catches, length frequency)
	Fishers' experimental knowledge	Fishers' knowledge is based on being a fisher as a profession and fishers' practice of fishing (fisheries representatives are excluded); unique knowledge of the fishers that derives from fishing as a social practice
Angler knowledge		Contents which are mentioned related to recreational fisheries (i.e., fishing gear) and management measures (i.e., bag limit)
Non-knowledge	Non-knowledge (reference)	Statement that the interviewee does not know something, but refers directly to persons, institutions or stakeholder groups who possess that knowledge (e.g. I don't know, but XY knows!"); reference to science is excluded
	Non-knowledge (no reference)	Statement that the interviewee does not know something, and makes no reference to persons, institutions or stakeholder groups who might have knowledge about this ("I don't know!")

Table A2b. Knowledge-science describes the acquisition of knowledge by the interviewee, which is scientific consensus. This appropriation can be acquired through listening or reading. Further, knowledge-science is defined by reference to the scientific community. This category often appears in connection with the legitimation of non-knowledge.

General categories	Type	Description
	Non-knowledge	Interviewee does not know something, but refers to science that could give the answer; e.g., no knowledge about explicit numbers on the cod stock but reference to scientists
	Tacit knowledge	Tacit knowledge of the interviewee, which is scientifically grounded, e.g., stock assessment data
	Science reference	Reference to a scientific source (e.g., data of stock assessment) to answer the question

Table A3. Category science contains all quotes that explicitly refer to or mention science in its broadest sense. A total of 9 different sub-categories were found providing a rich conceptual landscape about how the different actors conceive the rationales of science and its perceived role by the interview partners.

General categories	Type	Description
Science	Scientists	Scientists mentioned and referred by interview partners
	Scientific institutions	Scientific Institutions mentioned by interviewees
	Scientific disciplines	Disciplines referred to as important for the cod problem
Scientific epistemology	System understanding of cod	Usefulness of a systems understanding of cod in the positive and negative sense as assessed by the interview partner
	Problem of system dynamics	Aspects of complexities and interactions within systems as described by the interview partner
	Weakness of models and modelling	Limits and limitations of models as seen through the interviewee's eyes
	Methodological gaps	Methodological problems in research as depicted by interview partners
	Empirical principles	Perceived or experienced ways of interpreting results taken from data analysis as witnessed by the interviewee
Science and Society	Trust in science	Ascribed relevance to science and its results for society by the partner
	Scientific uncertainty	Attributed uncertainty of scientific results and procedures as assessed by the interview partner
	Scientific predictability	Perceived accuracy of predictions as perceived by the interview partner
	Data availability and generation	Quest for more data instead of conceptual improvement of models

Table A4a. Management and its list of subcategories primarily concerned with the fisheries management of the European Union. These were further subdivided into a spatial classification (EU, federal and state level), the description of the management (e.g. reference points, conservations measures) and its problems and improvements (EU=European Union, TAC=Total Allowable Catch, MSY=Maximum Sustainable Yield, Blim=biomass limit reference point, BLE=Bundesanstalt für Landwirtschaft und Ernährung (Federal Office for Agriculture and Food), MOFI=Mobile Fisheries Log app, ICES=International Council for the Exploration of the Sea).

General categories	Type	Description
Levels	EU level	Management in relation to the European Union; policies on EU level (e.g., Common Fisheries Policy) and EU competence (e.g., consultancy and determination of quota by the European Council and Commission, respectively)
	Federal level	Management in connection with Germany; contents on federal level and responsibility of the German government (e.g. enforcement of regulations)
	State level	Management on the level of federal states; contents on state level and responsibility of the federal states (i.e., Schleswig-Holstein, Mecklenburg-Vorpommern)
Description of the EU fisheries management	Management system - general	Includes everything mentioned in the context of the current EU fisheries management, i.e. measures, multi-annual plans, quota
	Management system - TAC	Knowledge of the management system; this can range from very simple to very complex structures. The statements here refer mainly to system behind the allocation of the quota like the scientific advice from ICES given to the European Commission
	Reference points	Contains everything mentioned about reference points (MSY, Blim, etc.), as well as the definition of the good environmental status
	Stakeholder opinion	Returns whether the interviewees classify the current management as sufficient for the stock to recover
	Fishers direct implementation	Management content that directly affects the commercial fishers, e.g., catch reports, BLE app (MOFI app)
	Controls	Presence and implementation of controls within the commercial fishery, i.e., implementation of the control regulation
	Conservation measures	Conservation measures that have been implemented to protect the cod stock like set-aside premiums, landing obligation
	Alternative fishing gears	Statements on alternative catch techniques (i.e., selective gear), as well as on possible technical developments
	Bag limit	Contents and judgement on the subject of the bag limit, i.e. effectiveness of this management measure in order to ensure cod stock recovery
	Reduction of fleet capacity	Statements and judgements on the management measure fleet reduction
	Subsidies	Includes statements and judgement on subsidies, e.g. scrappage bonus, set-aside premium
Participation	Stakeholders - general	Contains everything mentioned concerning the participation of the stakeholders involved in the EU fisheries management (e.g., the inclusion on several policy levels)

	Stakeholder responsibilities	Assignment of tasks and position of stakeholders, e.g. task of the fisheries committee to find compromises between economic and fishers' livelihood trade-off
	Regional Advisory councils	Management in the context of regional areas; responsibilities and stakeholder participation of EU countries in the EU fisheries management; here, Baltic Sea Advisory Council
	Commercial fisheries	Contents, which were mentioned in the context of fishers' participation in the EU fisheries management, e.g., how and who to include
	Recreational fisheries	Participation of recreational fisheries in the EU fisheries management, e.g. inclusion in the discussion about measures to conserve spawning cod
	Science	Participation of science in the fisheries management, e.g. in which way to include science
	Communication	General statements regarding communication between stakeholders in the context of the EU fisheries management like an extended exchange between stakeholders on EU and national level
Impacts	Impact on cod	Impacts on the cod stock through the fisheries management, e.g., the amount of allowed and used catch within the different fisheries
	Recreational fisheries	Specific impacts of recreational fisheries on the cod stock (i.e., the amount of cod fished
	Impact on management	Any impact on the management, including the influence by various stakeholders like the commercial fisheries lobby
Problems	Management system	General problems (e.g., actions like the decrease of fishing pressure were taken too late) regarding the EU fisheries management system
	TAC	Problems (e.g., distribution among recreational and commercial fisheries) related to TAC, including the distribution of the quota
	Controls	Problems occurring in the context of the measure control like the complete enforcement
	Multi annual plan	Includes the issues of multi-year plans, e.g. their inflexibility
	Ecological aspects	Includes problems raised by the lack of ecological aspects (e.g. stock in general, age structure) in the management; e.g., consider the genetic diversity of the stock for management measures
	Fishers	Problems (e.g., moratorium) that directly affect the fishers
	Scrapping bonus	Any problems related to the management measure scrappage bonus (e.g., does not have a positive effect on the cod stock)
	Reduction of fleet capacity	Problems related to the fleet capacity and its reduction like the already small size of the fleet
	Bag limit	Possible problems (i.e., measure the effect of the bag limit) that were mentioned in the context of the bag limit
	Improvements in general	Suggested improvements for and by the management including a higher flexibility for quick reactions to unplanned occurrences

Improvements		
	Long-term management	Proposal for a long-term planning (e.g. for increasing robustness), rather than annual management implementations
	TAC distribution	Improvements concerning the TAC distribution, e.g., changes in the TAC levels between commercial and recreational fisheries or taking the TAC across several years (no loss of quota for fishers)
	Trade-off between sectors	Statements regarding the balance between commercial fisheries, conservation or tourism in order to enhance the stability of a socio-ecological as well as socio-economic system
	Scientific advice	Improvements mentioned in relation to the scientific advice, e.g., EU should hold on to advised quotas
	Improvements of communication	Recommendations to improve communication between stakeholders involved in EU fisheries management like a change of existing staff or the inclusion of all stakeholders at round tables

Table A4b. Management-knowledge describes all content of the interviews that explicitly refer to category management and are primarily aimed at the interviewees' knowledge of EU fisheries management, i.e. management in general (e.g. participation by stakeholder groups), explicit management measures (e.g. catch quota, scrapping premium) or knowledge types with focus on EU fisheries management (e.g. historical knowledge) are addressed (EU=European Union, MSY=Maximum Sustainable Yield, TAC=Total Allowable Catch). It should be highlighted that only this subcategory was subject to a different coding procedure. Based on author knowledge, all relevant management measures according to Western Baltic cod were noted and finer categorized if necessary. Furthermore, central knowledge types from the categorization of knowledge were used and applied including historical knowledge, tacit knowledge, local knowledge, non-knowledge and fishers' knowledge.

General categories	Type	Description
Management	Structure	Management on structural basis including different guidelines or reference values (e.g., MSY). Statements are excluded if they can be clearly assigned to a management measure (e.g. catch quota, scrapping bonus)
	Participation	Participation on international, national and regional level by stakeholder groups in the EU fisheries management of Western Baltic cod
	Ecology	Knowledge about management in connection with ecological concerns, e.g., knowledge about the fish species cod or the ecosystem
TAC	Structure	Structural characteristics, i.e. legal requirements for the implementation of this measure, including the distribution of the quota, the amount of the set quota
	Ecological impact	Ecological impacts related to the TAC, e.g., impact on the stock in terms of a decreased catch quota (stock recovery)

	Economic impact	Economic effects due to the fishing quota as a management measure; effects refer to the fishing sector in general (e.g., less income due to a decrease in TAC) and in particular to certification processes (e.g., loss of certification license)
Bag limit	Structure	Structural characteristics of the bag limit, including legal requirements for the implementation, e.g., to what amount the removal is limited or the origin of the defined reference value
	Ecological impact	Ecological impact of the bag limit, e.g. the effect on the stock in terms of a reduction of the bag limit resulting in a stock recovery
	Economic impact	Economic effects through the bag limit; effects refer mainly to the fishing and tourism sectors, e.g. the reduction of anglers through fewer fishing opportunities and the resulting decline in the tourism sector (including bed occupancy, restaurant visits)
Reduction of fleet capacity	Structure	Description of the legal requirements defining this measure, including a description of the ships affected by fleet capacity reduction
	Economic impact	Description of economic impacts, i.e. impacts relating exclusively to the fisheries sector (e.g., loss of fishing boats)
Scrapping bonus	Structure	Description of the legal requirements defining this measure, including a description of the ships affected by the scrapping bonus
	Economic impact	Description of economic impacts, i.e. impacts relating exclusively to the fisheries sector (e.g., loss of fishing boats)
Alternative fishing opportunities	Structure	Description of the legal requirements by which the management measure is defined and determined, e.g. description of different alternative fishing gear (e.g., cock pots, fish traps)
	Ecological impact	Ecological effects caused by the use of alternative fishing gear; these effects must be considered for the entire ecosystem or individual ecosystem components, e.g. reduction of bycatch (e.g., harbor porpoise, seal)
	Economic impact	Economic impacts due to the use of alternative fishing gear. These effects are mainly to be considered for the commercial fisheries sector (e.g., investment by commercial fisheries related to higher costs)
Seasonal closing	Structure	Description of the legal requirements by which the management measure is defined and determined, e.g. description of time limits as well as fishing activities that are excluded from the closed season
	Ecological impact	Ecological effects through the establishment of closed seasons, e.g. stock recovery due to the reduction of fishing pressure within a defined period of time (i.e. during the spawning season)
	Economic impact	Economic effects caused by the implementation of closed seasons, e.g. reduction of fishing effort and resulting loss of income

Historical knowledge	TAC	Past catch quota concerns; including content on the distribution mechanism of the catch quota (relative stability by a 15% barrier) or catch quotas allocated in the past
	Reduction of fleet capacity	Historical knowledge related to reduction of fleet capacity; this includes e.g. past performance of the commercial fisheries fleet
	Alternative fishing gears	Knowledge of past alternative fishing gears, e.g. size selection of fish
Tacit knowledge	TAC, bag limit	Experience (personal, working context) in connection with the EU fisheries management of the Western Baltic Sea cod; here in particular related to TAC and bag limit
Local knowledge		Management contents with local reference, e.g. size of the local commercial fishery fleet or effects by the bag limit particularly in Heiligenhafen
Non-knowledge	Non-knowledge - reference	Non-knowledge in the context of EU fisheries management; contents which clearly show that there is no knowledge and no reference to corresponding responsibilities (e.g., stakeholder groups). Usually this classification is accompanied by "I do not know"!
	Non-knowledge - no reference	Non-knowledge in the context of EU fisheries management, i.e., "I do not know, but XY knows." No knowledge but reference to corresponding responsibilities (e.g., stakeholder groups)
Fishers' knowledge		Fishers' knowledge with management reference; here fisheries management of Western Baltic cod, i.e. fishers' information concerning data related to stock assessment

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