MUSSEL RAFT CULTURE IN GALICIA (MEJILLÓN DE GALICIA DOP)

Public Comment Draft Report

MARCH 2021

Conformity Assessment Body (CAB)	Bureau Veritas Certification Holding SAS
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Fishery client	Consello Regulador Mejillón de Galicia
Assessment Type	Initial Assessment

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2 Glossary

Below are presented the abbreviations and acronyms used in the report. The terms defined here do not contradict terms used in the MSC-MSCI vocabulary.

Concepts, terms, Institutions, Organizations, Bodies, Working Groups, regulations and agreements

ACDR	(MSC) Announcement Comment Draft Report
ADEGA	Galician Ecologic Defence Association
BDRI	Bottlenose Dolphin Research Institute
B_{MSY}	Biomass (population size) that enables a fish stock to deliver the maximum sustainable yield (MSY).
BV	Bureau Veritas
CAB	Conformity Assessment Body (in this case Bureau Veritas)
CAG	Catch and Grow
CEMMA	Coordinator for the Marine Mammals Study
CETMAR	Sea Technological Center
CFP	Common Fisheries Policy of the European Union
CIMA	Marine Research Center
CoC	(MSC) Chain of Custody
CPRDR	(MSC) Client and Peer Review Draft Report
CSIC	Spanish Council for Scientific Research
DGMARE	Directorate-General for Maritime Affairs and Fisheries, European Commission
DOP	(PDO) Protected Designation of Origin
EC	European Commission
ETP	Endangered, threatened and protected species
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FCP	(MSC) Fisheries Certification Process
FCR	(MSC) Fisheries Certification Requirements (superseed by FCP and FS)
FDR	(MSC) Final Draft Report
FS	(MSC) Fisheries Standard
GCR	(MSC) General Certification Requirements
JACUMAR	Junta Nacional Asesora de Cultivos Marinos
HCR	Harvest Control Rules
ICES	International Council for the Exploration of the Sea
INTECMAR	Technologic Institute for the Marine Environment Control of Galicia
MAPAMA	Spanish Ministry of Agriculture, Fisheries and Food (Ministerio de Agricultura, Pesca y Alimentación, Gobierno de España)
MCS	Monitoring, Control and Surveillance system
MITECO	Ministry for Ecological Transition and the Demographic Challenge (Ministerio para la transición Ecológica y el reto Demográfico)
MSC	Marine Stewardship Council
MSY	Maximum Sustainable Yield
NGO	Non-governmental organization
P1, P2, P3	(MSC) Principles 1, 2, 3 respectively
PCR	(MSC) Public Certification Report
PDRA	Defence Platform of the Arousa estuary
PI	(MSC) Performance Indicator
REGA	Registro General de Explotaciones Ganaderas (General Register of Livestock Holdings)
SA	(MSC) Surveillance audit
SEPRONA	Nature Protection Service
SI	(MSC) Scoring Issue
SG	(MSC) Scoring Guidepost
SGP	General Secretariat for Fisheries, Spanish Government (Secretaría General de Pesca, Gobierno de España)
TAC	Total Allowable Catch
UoA	(MSC) Unit of Assessment
UoC	(MSC) Unit of Certification
WWF	World Wide Fund for Nature

3 Executive summary

To be drafted at Announcement Comment Draft Report stage

To be completed at Public Certification Report stage

This Public Comment Draft Report (PCDR) provides details to the client, peer reviewers and stakeholders on the assessment of the Mussel raft culture in Galicia (Mejillón de Galicia DOP) fishery against the MSC-Fisheries Standard v2.01. The assessment team has addressed the peer reviewers comments and modified the CPRDR accordingly in order to elaborate the current Public Comment Draft Report, which will be published at the MSC website for a 30-day public consultation period.

This report was prepared by Bureau Veritas Iberia. The assessment team is comprised of Miguel Gaspar, Bert Keus, Macarena Garcia and Ana Rascado. Miguel and Bert were mainly responsible for assessing P1 and P2-related issues, Ana Rascado together with Bert Keus assessed P3-related issues. Macarena García served as team leader and her main responsibility was to ensure compliance with the MSC fisheries certification process and standard.

The announcement of the fishery entering the MSC assessment process was made available publicly on the MSC website on November 19, 2019. The site visit was undertaken between the 20th and 24th of January 2020. For more details see Section 8.2. After the site visit, the team compiled and analysed the information collected and, when necessary, additional information was requested to the stakeholders. Each expert prepared their respective draft scores and rationales, and then all the team discussed and weighed up the evidences for assigning the final scores. Detailed scoring rationales are provided in **Appendix 1.**

Bureau Veritas decided to undertake an additional remote site visit on Week 22nd June 2020. This was due to additional information that became available since the first site visit, which needed to be assessed by the team. As a result of this new information, the team performed an RBF. Detailed information is provided in Appendix 9.

Furthermore, the gap between the date of the announcement (November 2019) and the site visit (January 2020), together with the time necessary to gathered and analyse exhaustive bibliography motivated a delay in the assessment process. In accordance with the FCP 7.20.1.a, a new 30-day consultation period was opened for the stakeholders on the 25th of August 2020.

A shortlist of potential peer reviewers compiled by the MSC's Peer Reviewers Collegue was published at the MSC website on 25th February 2020.

Main strengths and weaknesses of the client's operation are described below:

Strengths

- The control and monitoring carried out by the Galician Administration and in particular, the management carried out by the Galician Mussel Regulatory Council, is an important factor for compliance with regulations (Principle 3) and ensures traceability.
- Fishery management is carried out within an appropriate regulatory framework.
- There are no interactions with ETP species
- Extensive bibliography on maërl distribution in the areas under assessment and the effects of the mussel culture and other human activities on its structure and function is available.

Weaknesses

- Lack of regular monitoring of natural mussel beds. The most recent information on the status of the natural mussel beds dates from 2014
- The harvest limit established by mussel raft /year is not established based on scientific criteria and it has not been revised.
- Lack of a review and regular improvement of the harvest strategy in order to deal with changes in the status of the natural beds.
- Although the client undertook a spat study to gather data of other species resulting from the use of scrapers from the rocks, the available information is still limited.

- Lack of load capacity models implemented to determine the impact on the Rias ecosystem.
- Studies on inter-tidal and sub-coastal benthic fauna are generally restricted to certain 'rías' and inlets, as well as certain zoological groups (e.g. López-Jamar, 1978). Thus there are still numerous enclaves that lack detailed knowledge of their benthic fauna. This knowledge is of great importance when assessing the potential impact on biota and possible environmental interactions (Jewet et al. 1999).
- There are studies and authors who disagree on the impact that mussel culture can have on maërl.
- The mussel culture developed in Galicia and its productive capacities are determined by the same natural environment that allows it. As a consequence, there is a disparity of opinions about its effects: degradation of riverbeds due to the production of detritus rich in organic matter and the consumption of phytoplankton in detriment to other species. The challenge consists in weighing the effects of mussel production in the Rías to the harmful effects that come from other origins (materials carried by rivers, runoff waters and discharges from towns and industries).
- There is an ongoing controversy between mussel spat collection from the rocky coastal strip and goose barnacles collection.

The MUSSEL RAFT CULTURE IN GALICIA achieved a score of 80 or more for both Principle 2 & 3 of the MSC Principles (P1 was not scored), and did not score under 60 for any of the MSC criteria set under Principle 2 or 3.

Based on the evaluation of the fishery presented in this report the assessment team gives a draft determination on the certification of the MUSSEL RAFT CULTURE IN GALICIA for the client

As the fishery achieved a score of below 80 against 5 scoring indicators, the assessment team has set 5 conditions (**Table 5.2.3**) for the certification that the client is required to address. The conditions are applicable to improve performance to at least the 80 level within the period set by the assessment team.

4 Report details

4.1 Authorship and peer review details

To be drafted at Announcement Comment Draft Report stage

Peer reviewer information to be completed at Public Comment Draft Report stage

The BV assessment team comprised of:

MIGUEL B. GASPAR is a Senior Researcher with Aggregation at the Portuguese Institute for the Sea and Atmosphere (IPMA), and he is heading the IPMA's Research Centre of Olhão since 2013. In 1990, he completed a BSc in Marine Biology and Fisheries at the University of Algarve (Portugal) and undertook his PhD at the same university, where he studied several aspects related to the bivalve dredge fishery that occurs along the south coast of Portugal (biology and ecology of the target species, selectivity, and fishing gears impacts). He is responsible for the management of bivalve fisheries in Portugal and he is the coordinator of the small-scale fisheries (SSF) programme at IPMA. He has been the coordinator of several international and national research projects focusing on the management of SSF, maritime spatial planning, and on the ecological impacts of artisanal fishing, aquaculture and other anthropogenic activities on marine ecosystems. He is the Geographic Expert for Portugal at the European network FARNET and he is a member of diverse strategic committees on fisheries at national level. Author or co-author of more than 170 publications in international journals and book chapters. He is a member of the Editorial Board of the journal "Scientia Marina".

• He meets the competence criteria in to MSC Fisheries Certification Proces v. 2.1, annex PC, concerning substantial and appropriate skills related to Principle 1 and Principle 2 requirements.

• He is trained as a team member according to v 2.0.

• He has passed the Fisheries Certification Process Version 2.1 and enhanced bivalve fisheries training modules for team members

For this assessment his main responsibility will be acting as P1 and P2 assessor. He has no conflicts of interest in relation to this fishery.

BERT KEUS is an independent consultant based in Leiden, the Netherlands. He holds degrees in both marine biology and law, and started his career at the Netherlands Institute for Fisheries Investigation (RIVO-DLO) in 1991. Later he held the position of Head of the Environmental Division of the Dutch Fisheries Board (Productschap Vis). Particular areas of expertise are environmental impact assessments of fisheries in the Natura 2000 framework, fisheries management plans, natural resource policy, and programme and project evaluations.

He has long association with several fisheries in the Netherlands, and he has been involved in efforts to achieve MSC certification of the North Sea brown shrimp fishery – acting as technical advisor to this multi-stakeholder initiative. Through this work and several other MSC certifications he has become particularly familiar with the MSC certification process. Between the years 1998 and 2003 he was a Member of the European Sustainable Use Specialist Group (ESUSG), Fisheries Working Group of IUCN.

He has been the team member of MSC assessment teams for Dutch North Sea gill net fishery for sole, Ekofish twin rigged trawl plaice fishery, Dutch suspended and bottom mussel culture, North Sea sea bass, DFPO North Sea sole and haddock, Shetland suspended mussel culture, Gambia sole fishery and Guyana Seabob Fishery. He has also been Principle 2 and 3 expert in the Estonia and Faroe Islands Barents Sea cold water prawn fishery, team leader and Principle 2 and 3 expert of the Sweden Skagerrak and Norwegian Deep cold water prawn fishery and Principle 3 expert for recertification of Norway, Estonia and Faroe Islands Barents Sea cold water prawn fisheries.

• He meets the competence criteria in to MSC Fisheries Certification Proces v. 2.1, annex PC, concerning substantial and appropriate skills related to Principle 2 and Principle 3 requirements.

• He is trained as a team member and team leader according to v 1.3 and v 2.0

• He has passed the Fisheries Certification Process Version 2.1 training for team leaders

• Furthermore, he has completed the MSC training in the use of the RBF.

For this assessment his main responsibility will be acting as P2 and P3 assessor. He has no conflicts of interest in relation to this fishery.

José Rios participated in the ACDR and first site visit. His main responsibility was acting as P3 assessor and team leader, ensuring compliance with FCP.

The following new members of the team were published in the MSC website on the 21st of May 2020:

MACARENA GARCÍA, her academic background includes a Bachelor of Science Degree in Environmental Science from the Madrid Polytechnic University (Spain) and a Master degree in Sustainable Management of Marine and Coastal Systems from Barcelona University (Spain). She was the manager in Inemar (Association for Innovation in Marine Resources and Sea Studies) developing sustainable projects. She has worked as an assistant in the Spanish Ministry of the Environment and Rural and Marine Affairs, carrying out different projects involving human activities and sea resources.

She has participated in several scientific publications, such as the “Ecological framework for the management of the different habitats in Spain (Council Directive 92/43/CE)”, “Supporting report accompanying the thematic cartography of the MedRAS Project”, and “Draft of the Basis for Marine Planning in Spain”. She was responsible for the scientific and technical coordination of the bilingual publication “The Seas of Spain” from the Spanish Ministry of the Environment and Rural and Marine Affairs, and responsible for the scientific and technical coordination of the bilingual publication “Human Activities in the Seas of Spain”

She is the MSC fisheries manager at Bureau Veritas and specialises in sustainable fisheries. She has particular expertise with the MSC Certification requirements and has completed numerous MSC full assesssments, pre-asessments, surveillance audits. Furthermore, she is in charge of other seafood sustainable projects developing private sustainable labels and seafood companies’ policies. She is lead auditor for Friends of the sea, MSC Chain of custody, and other quality labels (DOP, Mexillon de Galicia, Pesca de Rías).

She meets the qualification and competency requirements for team leader, traceability and the CoC Standard set out in Annex PC of the MSC Fisheries Certification Process v2.1. She also has knowledge of the country, language and local fishery context.

For this assessment her main responsibility will be acting as team leader. She has no conflicts of interest in relation to this fishery.

ANA RASCADO, holds a degree in Biology and a master degree in Aquaculture from the University of La Coruña. She has 5 years of experience working in fisheries in the area of Galicia (Spain). In 2012, she collaborated with the activities of the Marine Research Center (CIMA[1]) of the Galician administration in improving the growing of sea urchin and bivalve molluscs, especially clams, for repopulation activitities on the Galician coast. Since 2015, she is working collaborating with Bureau Veritas as auditor in different Standards, all of them related with aquaculture and fisheries, including ASC and MSC Chain of Custody and DOP Mexillón de Galicia. During this time, she is in contact with local fishery activities, mainly linked with mussel production including producers, harbour activities, mollusc depuration centres, etc. She also has knowledge of the local and country legislation, local language and local fishery context.

For this assessment her main responsibility will be acting as P3 assessor together with Bert Keus and undertaking the traceability section. She has no conflicts of interest in relation to this fishery.

4.2 Version details

Details on the version of the fisheries program documents used for this assessment are presented in **Table 4.2.1**, as required in the 'MSC Surveillance Reporting Template v2.01'.

Table 4.2.1 Details on the versions of the fisheries program documents used for this assessment.

Document	Version number
MSC Fisheries Certification Process	Version 2.1, 31 August 2018 (28 February 2019).
MSC Fisheries Standard	Version 2.01, 1st October 2014 (1st April 2015)
MSC General Certification Requirements	Version 2.4.1, 7 May 2019 (28 September 2019)
MSC Reporting Template	Version 2.01, 28th March 2019 (28th March 2019)

5 Unit(s) of Assessment and Certification and results overview

5.1 Unit(s) of Assessment and Unit(s) of Certification

5.1.1 Fishery within the scope of the MSC fisheries certification

The assessment team confirms that this fishery is within the scope of the MSC fisheries certification sought since:

I. This is an enhanced fishery that conforms to all of the scope criteria as required by FCP 7.4.6 (see **section 5.1.4** for more details).

II. The fishery is not based on any introduced species

III. It does not target species classified as 'out-of-scope' (amphibians, reptiles, birds, mammals)

IV. The fishery does not make use of any kind of poisons or explosives

V. The assessed fishery takes place in the Galician 'rías' and it is regulated by the local authority (Xunta de Galicia) and managed in agreement with the Spanish and European fisheries regulations. The fishery is not conducted under any controversial unilateral exemption to an international agreement and its management regime includes mechanisms for resolving conflits.

[1] Centro de Investigación Mariña

VI. Spain has been a member of the International Labour Organization (ILO) since 1956. The country has ratified 133 conventions, including the 8 fundamental conventions and the 4 governance conventions. The CAB is not aware that any of the fishing operators included in the UoA have been prosecuted for a forced or child labour in the last 2 years

VII. The client has completed and submitted to the CAB the 'Certificate Holder Forced and Child Labour Policies, Practices and Measures Template' to detail the policies, practices and measures in place to ensure the absence of forced and child labour. This template was submitted before announcing the fishery and it will be uploaded to the MSC database for publication on the MSC website at the same time as the PCR, as required in FCP 7.4.4.4.

Besides the assessment team confirms that:

- There are no MSC-certified or under-assessment overlapping enhanced fisheries.
- There are no catches of non-target species that are inseparable or practically inseparable (IPI) from the target stock.
- In 2019 Bureau Veritas Iberia performed a pre-assessment of the fishery. In accordance with FCP 7.12.4 the CAB has uploaded in Ecert a copy of the pre-assessment report. Another pre-assessment was done in 2015 by Bureau Veritas.

The fishery has not previously failed an assessment and has no certificate withdrawn.

5.1.2 Units of Assessment

To be drafted at Announcement Comment Draft Report stage

The Unit of Assessment defines the full scope of what is being assessed, and includes the Unit of Certification and any other eligible fishers.

The Unit of Assessment includes the target stock (s), the fishing method or gear type/s, vessel type/s and/or practices, and the fishing fleets or groups of vessels, or individual fishing operators pursuing that stock, including any other eligible fishers that are outside the Unit of Certification.

According to the UoA definition above mentioned and the information collected during and after the site visit, BV concludes that the UoA presented in **Table 5.1.2** meets the MSC fisheries requirements while it also suits client's needs.

Table 5.1.2 Units of Assessment.

UoA 1	**Description**
Species	Galician mussel, *Mytilus galloprovincialis* (Lamarck 1819)
Stock	*Mytilus galloprovincialis,* which extends from the Mediterranean to the Cantabrian coast of the Iberian Peninsula (Sanjuan et al., 1994).
Geographical area	North East Atlantic in FAO Statistical Area 27 (ICES sub areas VIIIc and IXa). The UoA operate in the area of Galician "rías", northwest of Spain. Production of mussel (Mytilus galloprovincialis) in Galicia is extended from the Rías de Ares-Sada to the Ría de Vigo, including Ría de Muros-Noia, Ría de Arousa and Ría de Pontevedra.
Harvest method / gear	Collection of spat from intertidal rocks (Catch) using hand tools (scrapers) and on-growing on rafts (Grow)
Client group	Mussel rafts registered at the Regulatory Council of the Galician mussel (Consello Regulador Mejillón de Galicia) and certified for the Protected Designation of Origin 'Mexillon de Galicia' (DOP Mexillón de Galicia, Spanish acronym).
Other eligible fishers	All other mussel rafts in Galicia
UoA 2	**Description**
Species	Galician mussel, *Mytilus galloprovincialis* (Lamarck 1819)
Stock	*Mytilus galloprovincialis,* which extends from the Mediterranean to the Cantabrian coast of the Iberian Peninsula (Sanjuan et al., 1994).
Geographical area	North East Atlantic in FAO Statistical Area 27 (ICES sub areas VIIIc and IXa). The UoA operate in the area of Galician "rías", northwest of Spain. Production of mussel (Mytilus

	galloprovincialis) in Galicia is extended from the Rías de Ares-Sada to the Ría de Vigo, including Ría de Muros-Noia, Ría de Arousa and Ría de Pontevedra.
Harvest method / gear	Collection of spat on ropes at the rafts (Catch) and on-growing on rafts (Grow)
Client group	Mussel rafts registered at the Regulatory Council of the Galician mussel (Consello Regulador Mejillón de Galicia) and certified for the Protected Designation of Origin 'Mexillon de Galicia'
Other eligible fishers	All other mussel rafts in Galicia

Other eligible fishers

Other eligible fishers exist in cases where a client enters into assessment with the aim of initially certifying only part of a fishery, but also wishes to have the possibility of expanding the UoC at a later data by the mechanism of certificate sharing (see FCP G7.5.7. According to FCP 7.5.7 the CAB shall identify if there are other eligible fishers or other entities that may share the certificate as new client group members.

The client decided to leave the certificate open to all other mussel rafts in Galicia. Therefore, the UoA includes all mussel rafts in the Galician rías (Ares-Betanzos, Muros-Noia, Arousa, Pontevedra, Vigo-Baiona). A certificate sharing statement was published on the MSC website in the Appendix 2 of the Announcement of the fishery (19th November 2019).

5.1.3 Units of Certification

To be drafted at Client and Peer Review Draft Report stage

To be completed at Public Certification Report stage

The unit of assessment (UoA) defines the full scope of what is being assessed and is therefore equal to or larger than the UoC. If it is larger this means it will include "other eligible fishers". As indicated above, there are other eligible fishers (see Section 5.1.2).

The proposed UoC is the unit entitled to receive an MSC certificate. The target stock(s) combined with the fishing method or gear type(s), vessel type(s) and/or practices, and the fishing fleets or groups of vessels, or individual fishing operators pursuing that stock including entities initially intended to be covered by the certificate. There are 2 UoCs. See **Table 5.1.3**.

Table 5.1.3 Units of Certification.

UoC 1	**Description**
Species	Galician mussel, *Mytilus galloprovincialis* (Lamarck 1819)
Stock	*Mytilus galloprovincialis,* which extends from the Mediterranean to the Cantabrian coast of the Iberian Peninsula (Sanjuan et al., 1994).
Geographical area	North East Atlantic in FAO Statistical Area 27 (ICES sub areas VIIIc and IXa). The UoA operate in the area of Galician "rías", northwest of Spain. Production of mussel (Mytilus galloprovincialis) in Galicia is extended from the Rías de Ares-Sada to the Ría de Vigo, including Ría de Muros-Noia, Ría de Arousa and Ría de Pontevedra.
Harvest method / gear	Collection of spat from intertidal rocks (Catch) using hand tools (scrapers) and on-growing on rafts (Grow)
Client group	Mussel rafts registered at the Regulatory Council of the Galician mussel (Consello Regulador Mejillón de Galicia) and certified for the Protected Designation of Origin 'Mexillon de Galicia' (DOP Mexillón de Galicia, Spanish acronym).
UoC 2	**Description**
Species	Galician mussel, *Mytilus galloprovincialis* (Lamarck 1819)
Stock	*Mytilus galloprovincialis,* which extends from the Mediterranean to the Cantabrian coast of the Iberian Peninsula (Sanjuan et al., 1994).
Geographical area	North East Atlantic in FAO Statistical Area 27 (ICES sub areas VIIIc and IXa). The UoA operate in the area of Galician "rías", northwest of Spain. Production of mussel (Mytilus galloprovincialis) in Galicia is extended from the Rías de Ares-Sada to the Ría de Vigo,

	including Ría de Muros-Noia, Ría de Arousa and Ría de Pontevedra.The UoA operate in the area of Galician "rías", northwest of Spain. Production of mussel (Mytilus galloprovincialis) in Galicia is extended from the Rías de Ares-Sada to the Ría de Vigo, including Ría de Muros-Noia, Ría de Arousa and Ría de Pontevedra
Harvest method / gear	Collection of spat on ropes at the rafts (Catch) and on-growing on rafts (Grow)
Client group	Mussel rafts registered at the Regulatory Council of the Galician mussel (Consello Regulador Mejillón de Galicia) and certified for the Protected Designation of Origin 'Mexillon de Galicia'

5.1.4 Scope of assessment in relation to enhanced fisheries

To be drafted at Announcement Comment Draft Report stage

To be completed at Public Certification Report

This enhanced fishery conforms to all of the scope criteria as required by FCP 7.4.6 (see **table 5.1.4**).

Table 5.1.4 Scope criteria for eligible enhaced fisheries. Source: FCP 2.1.

A.- Linkages to and maintenance of a wild stock	
Criteria	*CAB response*
i- At some point in the production process, the system relies upon the capture of fish from the wild environment. Such fish may be taken at any stage of the life cycle including eggs, larvae, juveniles or adults. The 'wild environment' in this context includes marine, freshwater and any other aquatic ecosystems.	This mussel culture involves: UoA1- the collection of mussel spat from its natural habitat (intertidal rocks). UoA2- the collection of mussel larvae from its natural environment (water column) when they settle on collector ropes.
ii- The species are native to the geographic region of the fishery and the natural production areas from which the fishery's catch originates	This mussel culture is developed along the coast of Galicia where the target species (Mytilus galloprovincialis) is native and abundant.
iii- There are natural reproductive components of the stock from which the fishery's catch originates that maintain themselves without having to be restocked every year.	Only a fraction of the population of *Mytilus galloprovincialis* is exploited (spat smaller than 2 cm). The great abundance of adults together with the production method and the fact that the mussel joins a broad larval phase to favourable circulation patterns in the Rias, produce an abundant and extensive recruitment of the species along the coast. In more than 60 years of cultivation it has not been necessary to carry out restocking actions.
iv- Where fish stocking is used in hatch-and-catch (HAC) systems, such stocking does not form a major part of a current rebuilding plan for depleted stocks. *Note:* *This requirement shall apply to the current status of the fishery. Wild stocks shall be managed by other conventional means. If rebuilding has been done by stocking in the past, it shall not result in an out-of-scope determination as long as other measures are now in place.*	This fishery is based on wild stocks managed by other conventional means (e.g. restricting access, closed season, establishing daily and annual catch of spat per fishing area, maximum catch size). These measures have allowed exploited areas to recover quickly so there has been no need to proceed with restocking actions, or implement additional restrictions on the fishery.
B.- Feeding and husbandry	
Criteria	*CAB response*
i- The production system operates without substantial augmentation of food supply. In HAC systems, any feeding is used only to grow the animals to a small size prior to release (not more than 10% of the average adult maximum weight), such that most of the total growth (not less than 90%) is achieved during the wild phase. In catch-and-grow (CAG) systems, feeding	This is a CAG system. Feeding during the on-growing phase is only by natural means. Mussels are filter feeding animals, so they feed on the suspended organic matter available in the water column.

during the captive phase is only by natural means (e.g. filter feeding in mussels), or at a level and duration that provide only for the maintenance of condition (e.g. crustaceans in holding tanks) rather than to achieve growth	
ii- In CAG systems, production during the captive phase does not routinely require disease prevention involving chemicals or compounds with medicinal prophylactic properties.	No action is taken in relation to disease prevention that involves the use of chemicals or prophylactic drugs.
C.- Habitat and ecosystem impacts	
Criteria	*CAB response*
i- Any modifications to the habitat of the stock are reversible and do not cause serious or irreversible harm to the natural ecosystem's structure and function. *Note:* *Habitat modifications that are not reversible, are already in place and are not created specifically for the fishery shall be in scope. This includes:* • *Large-scale artificial reefs.* • *Structures associated with enhancement activities that do not cause irreversible harm to the natural ecosystem inhabited by the stock, such as salmon fry farms next to river systems.*	The habitat of the stock are rocky intertidal shores. The spat collection causes a reversible modification to this habitat, since the collection is done manually with the help of scrapers.

5.2 Assessment results overview

5.2.1 Determination, formal conclusion and agreement

To be drafted at Final Draft Report

To be completed at Public Certification Report

The report shall include a formal statement as to the certification determination recommendation reached by the assessment team on whether the fishery should be certified.

The report shall include a formal statement as to the certification action taken by the CAB's official decision-makers in response to the Determination recommendation.

Reference(s): FCP v2.1 Section 7.21

5.2.2 Principle level scores

To be drafted at Client and Peer Review Draft Report

Table 5.2.1 Principle level scores.

Principle	UoA 1	UoA 2
Principle 1 – Target species	N/A	N/A
Principle 2 – Ecosystem impacts	81	82.3
Principle 3 – Management system	82.3	82.3

5.2.3 Summary of conditions

To be drafted at Client and Peer Review Draft Report

Table 5.2.3 Summary of conditions.

Condition number	Condition	Performance Indicator (PI)	UoA	Related to previous condition?
1	By the fourth surveillance audit, evidence must be presented that there is a regular review of alternative measures to minimise the UoA-related mortality of unwanted catch of main secondary species and they are implemented as appropriate.	2.2.2	**UoA1**	**No**
2	By the fourth year the client should provide evidence that information is adequate to support a partial strategy to manage main secondary species.	2.2.3	**UoA1**	**No**
3	By the fourth surveillance, some quantitative evidence must be presented that shows that the partial strategy to ensure the growth phase of both UoAs does not pose a risk of serious or irreversible harm to bottom habitats (including VME habitats) is being implemented successfully.	2.4.2	**UoA1 & UoA2**	**No**
4	By the fourth surveillance audit, evidence should be presented that shows that adequate information continues to be collected to detect any increase in risk to the main habitats.	2.4.3	**UoA1 & UoA2**	**No**
5	By year four it should be shown that information on the fishery's performance and management action concerning spat collection is available on request, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity	3.2.2	**UoA1 &UoA2**	**No**

5.2.4 Recommendations

To be drafted at Client and Peer Review Draft Report stage

If the CAB or assessment team wishes to include any recommendations to the client or notes for future assessments, these may be included in this section.

6 Traceability and eligibility

6.1 Eligibility date

The eligibility date is the date from which the products from a certified fishery are eligible to be sold as MSC certified or bear the MSC ecolabel. In this fishery**, the eligibility date is the date of the publication of the Public Common Draft Report (PCDR)**. Any fish harvested after the eligibility date and sold or stored as under-MSC-assessment fish shall be handled in conformity with relevant under-MSC-assessment product requirements in the MSC Chain of Custody standard.

6.2 Traceability within the fishery

To be drafted at Announcement Comment Draft Report stage

To be completed at Public Certification Report stage

A summary of the mussel production cycle explained below will facilitate the understanding of the traceability at every stage making the difference between the two Units of assessment.

1. **Seed collection**. The seeds can be obtained either from rafts using collecting ropes (UoA2), or from intertidal rocks along the coast (UoA1) by using scrapers. In order for the farmed mussel to be under DOP denomination, the seed obtained from UoA1 must come from the areas, subzones and farmlands or from the traditional collection areas on the coast. The details of this information will be explained in the remainder of this report.

   The legislation clearly defines the season where the mussel is allowed to be collected from the natural beds for the UoA1 (Order 26 of October) from the 1st December until the 30th of April. As well as the settlement of spat for the UoA2 (Decree 174/2002), that can be done from the 1st of April with possibilities of prolonging it until June or exceptionally July. See **Table 6.2.1** where it is shown the timelines for both activities.

2. **String binders**. Mussel seeds of a size of 1-2 cm are carried to the raft and then placed on the collecting ropes for the UoA1. These strings have a máximum length of 12cm and they are crossed by “palillos” every 40-50 cm.

   In the case of the colleting ropes used to fix the seed of UoA2, they cannot have more than 5 m length counted from the sea level, and must be differentiated from the rest of the strings (seed ropes and growing ropes) by a strong red coloured rabiza with a maximum lenght of 30 cm. The final size of the mussel from the collector is between 2-4 cm due to the series of settled breeding over already settled breeding while the ropes are in the sea.

   The seeds’ strings in UoA2 are elaborated and hang out from the raft at least 2 months before the seeds in UoA1.

3. Seed wraps over the rope with the help of a thin biodegradable rayon net, giving the mussel enough time to be on the rope embise. (**Figure 6.2.2**).

4. **The Unfolding**: after 4 to 6 months at sea, when the mussel reaches 4.5 or 5.5 cm, it proceeds to the hoisting mussel ropes. Due to the considerable weight gain of mussels, the splitting of the ropes is necessary, that is, the preparation of new ropes of lower density. This operation, which consists of hoisting mussel ropes, separates juveniles to make new ropes of a lower intensity with more homogeneous individuals, in terms of size. At the time of splitting the ropes, the mussel has an average size of 4.5 cm.

   As the mussel belonging to the UoA2 has a larger size, the splitting is performed from the end of May until July, in contrast with the one belonging to the UoA1 whose splitting takes place between August and October.

5. **Harvest, selection and transport to the port:** After about a year, the mussel unfold reaches commercial size. The ropes are removed from the water with the help of the ship crane and hoisted. **Is at this point that the separation between mussels it is not commercially feasible due to the practical operation of the fishery that would require significant modification to the existing harvesting and processing methods.** For instance, the mussel harvested for processing (cooking and canning) is around 20.000kg, the mussel has to be separated from the ropes, cleaned and transport to the port in bulk. In addition, the space onboard is limited and the mussels can drop from the ropes. Finally, the producers do the segregation on-board upon client’s request, and therefore

they could mix between different lots (products from both UoAs) to increase the yield and efficiency of the production.

Table 6.2.1 Timeline of a typical culture cycle differentiating the phases of the two UoA. Source: Consejo Regulador del Mejillón.

Month (year)	**UoA1**	**UoA2**
April.0 to September.0		Settlement of spat for the UoA2 and preparation of (seed ropes and growing ropes
October .0 to November .0		
December .0 to April. 1	Seed collection from the natural beds (UoA1)	
May.1 to July 1.		Splitting of the ropes
August .1 to October 1.	Splitting of the ropes	
November.1 to June 2.		
Jul.2		Harvest
Ago.2	Harvest	

Once on deck, depending on whether the mussels are to be marketed fresh or preserved, the cleaning, selection, unloading and sampling processes are different. See **Figure 6.2.1**.

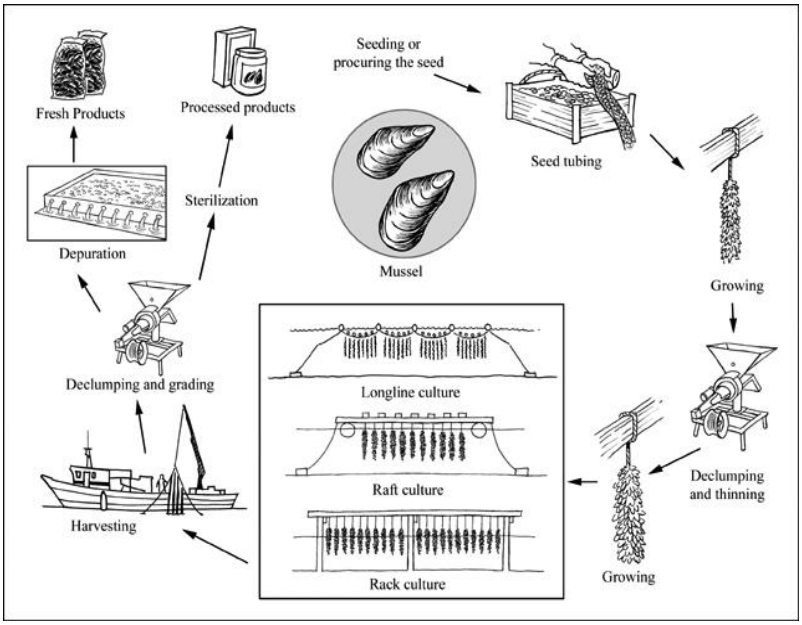

Figure 6.2.1 Mussel raft cycle: seeding, growing and harvest. Source: Client.

Protected Designation of Origin (PDO) controls

In order to comply with Regulation (EC) No. 1050/2007 of the European Commission of September 12, 2007, a Specification was prepared in accordance with the inscription of the *Protected Designation of Origin (PDO) Mexillón de Galicia* and the Regulatory Council. This PDO was the first in Europe for a seafood product.

Next, the control system of the Galician Mussel PDO will be described in the following text. This control system ensures the traceability of the product at all stages and compliance with the above mentioned European Regulation.

The product under assessment can end up in either of two destinations: I) depuration plant and II) processing plant. Depending on the destination, the control performed by the Consello Regulador Mejillón de Galicia inspectors will vary:

- **Depuration plant**: the commercialization of the fresh product is carried out from mid-July to February. Once mussel ropes are on the deck of the ship, the producer separates mussels from the ropes and cleans them with sea water. Next, they are selected by size according to the buyer's requirements and, finally, are introduced into plastic bags to total approximately 11kg of mussels. The bags are not closed completely and the mussels are ready for their transfer to port and the corresponding control from the personnel of the Consello Regulador Mejillón de Galicia.

  As regards port control, the inspector takes 2 kg samples from 3 different bags at random. The inspector first weighs the uncooked sample, then when it is cooked for 5 minutes, he weighs the cooked meat (without shell) to calculate the yield. The requirement to comply with the PDO is that the minimum yield of the cooked meat (without shell) is 16% of the gross weight (uncooked mussel). In addition the PDO requirement sets out that a maximum of 70 pieces of cooked meat (without the shell) makes up 1 kg.

- **Processing plant (cooking and canning)**: takes place all year round. The control process followed when the mussel is destined for processing is as follows: the mussel is separated from the ropes, lightly cleaned and taken to the port in bulk. It is then picked up by the crane at the dock and put into the truck destined for processing plant without further cleaning. The PDO control is done with 1 total sample of 50kg taken from 3 different points of the mussel pile. These sampling points are determined using cards in an envelope that the buyer will choose and show to the crane operator so that he knows the points from where to take the sample. The sample is graded using grids located at the port control point. Grading grids vary depending on what the buyer wants: 16, 17 or 18mm. 2 samples of 2kg each, from the left overs, is first weight by the inspector, then when it is cooked for 5 minutes, he weighs the cooked meat (without shell) to calculate the yield. The requirement to comply with the PDO is that the minimum yield of the cooked meat (without shell) is 12% of the gross weight (uncooked mussel). In addition the PDO requirement sets out that a maximum of 70 pieces of cooked meat (without the shell) makes up 1 kg.

There are 17 authorised ports to unload fresh mussels for marketing and in which verification actitivities are carried out by the inspectors of the Regulatory Council and the External Certification Body (Bureau Veritas). They are the following: Domaio, Moaña, Aldán, Beluso-Bueu, Combarro, Cambados, Meloxo (O Grove), Cabo de Cruz, Illa de Arousa, Vilanova, Vilaxoán, Pobra do Caramiñal, Rianxo, Freixo, San Adrián (Vilaboa), Muros and Lorbé. All these ports have a PDO control point. At each PDO control point there will be either one or two inspectors. **Figure 6.2.2**.

Figure 6.2.1 PDO control point at Porto de Meloxo (O Grove, Galicia). The figure also shows the grading and the weight tools. Source: Bureau Veritas.

Once the mussel is in port, a certification document will be issued for each of the lots, showing all the identification data of origin (raft identification, polygon, district, production area, ...), sample lot characteristics (indicating the number of pieces or viands per kilo and the estimated yield, as well as the total gross weight thereof), producer, recipient (a dispatch/depuration centre or processing centre), assigning then a unique identification code to guarantee traceability. Each one of the cultivated mussel lots that have entered into a dispatch/depuration centre or processing centre must be covered by the corresponding documentation issued in port and its lot identification.

The following traceability documents are generated from the website http://www.pescadegalicia.com/:

1. The producer obtains the document of origin (Extraction Guide/*Guía de extracción*) on the PESCAGALICIA platform. It has a code (Guide Code/*Código de la guía*). The inspector has a list of unloaded mussels and producers and a number is assigned to correspond to that load and producer.

2. In port, 3 documents are produced:

a) The Origin Guide (*Documento de registro*) to enable it to leave the dock;
b) The Purchase Note (including €);
c) The PDO delivery note named *Documento de Certification* (same as the previous one without price but it indicates that it is PDO). Document by which the production is certified as PDO.

All of them are traceable by the Guide Code (*Código de la guía*).

Finally but not less important, since 2015 producers have been forced to be included in the REGA (General Register of Livestock Holdings). This forces them to keep a diary named "*libro de rexistro de explotación de acuicultura en batea*" where they must include everything that goes in and out of their rafts (See **Figure 6.2.3**). This has led to an improvement in the collection of data. As they are part of the REGA, the Royal Decree 1614/2008, of October 3, 2008, on animal health and aquaculture products' requirements applies to them, as well as the prevention and control of certain aquatic animal diseases. Article 8 describes the record keeping and traceability obligations and requires that "all movements of aquaculture animals to or from registered aquaculture farms or mollusc growing areas shall be reported to the competent authority, which shall include them in the corresponding register in such a way that the identification of the place of origin and destination can be guaranteed".

This diary is subjected to inspection by the *Servizo de Inspección e control dos recursos* from the *Subdirección Xeral de Gardacostas de Galicia*.

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ENTRADA DE MOLUSCOS						
DATA	ESPECIE	ZONA AUTORIZADA DE PROCEDENCIA	CÓDIGO DA EXPLOTACIÓN DE ORIXE(REGA)	Nº DE DOCUMENTO DE AUTORIZACIÓN SANITARIA DE COMPAÑAMENTO	CATEGORÍA	CANTIDADE OU PESO DOS ANIMAIS

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SAÍDA DE MOLUSCOS						
DATA	ESPECIE	TITULAR OU ESTABLECEMENTO DE DESTINO	CÓDIGO DA EXPLOTACIÓN DE DESTINO (REGA)	Nº DE DOCUMENTO DE AUTORIZACIÓN SANITARIA DE COMPAÑAMENTO	CATEGORÍA	CANTIDADE OU PESO DOS ANIMAIS

Figure 6.2.3 Record of the raft aquaculture exploitation record book where the producer must write down the origin of the seed (intertidal or collector) and in the lower image the information about the output that has been given to those mollusks.

Finally, but of the utmost importance, in order to be identified as PDO, the final product must be clearly identified with the words "Mexillón de Galicia", in addition to any other symbols or logos that the Council determines. All the packaging of the covered product must carry a control label that identifies and guarantees the traceability of the product.

In relation to the traceability and how the team assessed the factors that may lead to confirm that systems allow the fishery client to trace back to the UoC, BV decided to send a Variation Request to MSC. The proposal, approved by MSC on the 9th February 2021, was to trace back to the combined UoCs rather than

the individual UoCs. The team assessed the factors that may lead to risk of the combining both UoC (**See Table 6.2.2**).

Table 6.2.2 Traceability risk analysis of the combining both UoC.

Factor	Description
Will the fishery use gears that are not part of the Unit of Certification (UoC)? If Yes, please describe: If this may occur on the same trip, on the same vessels, or during the same season;How any risks are mitigated.	The main regulations of the mussel activity: Law 11/2008, Decree 406/1996 (with their modifications) and Order of 26, 2000 sets out the specifications of both spat collection (Catch) and on-growing on rafts (Growth) stages. Further, It is also established in the PDO (Protected Designation of Origen) Product Specification. There are only two authorised ways in Galicia for collecting spat from the environment: using scrappers for the collection of spat from the rocks and/or using collectors placed in the rafts. Both activities are regulated and subjected to regular inspections performed by the *Guardacostas* Service from the *Xunta de Galicia* and also by the *Guardapescas maritimos* hired by the fisher's guilds spread throughout the coast. In terms of traceability records, the Origin Guide and PDO delivery note includes all the relevant information to trace back to the combined UoC such as batch number, mussel production area and the mussel raft, the producer, the quantity to be harvested, the port and the date of unloading. Finally, since 2015 producers have been forced to be included in the REGA (*Registro General de Explotaciones Ganaderas*). This forces them to keep a diary named "*libro de rexistro de explotación de acuicultura en batea*" where they must include everything that goes in and out of their rafts. As a conclusion, there is no risk associated to this factor for the combined UoCs.
Will vessels in the UoC also fish outside the UoC geographic area? If Yes, please describe: If this may occur on the same trip; How any risks are mitigated.	The production areas of these *Rias* will be the maritime space inside the traditional imaginary lines between points, the following production areas being delimited and included in the Order October 26, 2000 (See Section 7.4.1.1). In turn, the following authorized sub-areas or polygons are established in the Orders approved by the *Xunta de Galicia*, with their corresponding identifications and cartographic references. The information is public and can be found on the web: https://servicio.pesca.mapama.es/acuivisor/ An ordering of the cultivation areas was carried out in application of Decree 197/1986, of June 12, establishing 44 production polygons distributed among the five Rias. 3,386 rafts are established within the five Rias. The *Consejo Regulador Mejillón de Galicia* will carry out the necessary periodic checks on board the rafts in order to verify the maintenance of the conditions that gave rise to their registration in the Raft Register and will carry out checks on the cultivation processes that guarantee their subjection to the precepts established in this Specification, taking written record of all this in the corresponding documentation. There is no risk associated to this factor for the combined UoCs.

Do the fishery client members ever handle certified and non-certified products during any of the activities covered by the fishery certificate? This refers to both at-sea activities and on-land activities. - Transport - Storage - Processing - Landing - Auction If Yes, please describe how any risks are mitigated.	The mussel grown in a raft, taken to port, and immediately transported to the depuration / dispatch center or transformation, accompanied by the document that is part of the traceability system and identifies the batch, so that it reaches the fresh consumer market under the protection of the *Mejillón de Galicia* PDO, must be in accordance with the standards established in Regulation 853/2004 cited above. The MSC-fisheries certificate will cover the activities performed at sea (catch and grow, harvesting, storage on board) until landing. Change of ownership takes place when the trucks are loaded for transporting the mussels to the processing plants. MSC-CoC is required after landing and before transportation to the processing plants takes place. All mussels harvested by members of the client group would be MSC certified product, so they do not handle non-certified products. Further, all landings are inspected by the *Consejo Regulador Mejillón de Galicia* to check the quality of the mussels landed and whether they meet the criteria to get the PDO label or not. Producers transport only mussel from one raft of origin in the vessel so this is not mixed in the harbour neither. The depuration / dispatch area is limited to the coastal provinces of A Coruña and Pontevedra in the case of the *Mejillón de Galicia* PDO. There is no risk associated to this factor for the combined UoC.
Does transhipment occur within the fishery? If Yes, please describe: If transhipment takes place at-sea, in port, or both; If the transhipment vessel may handle product from outside the UoC; How any risks are mitigated.	No transhipment occur within the fishery. Mussel is directly transported from the raft to the harbour where is directly unloaded in the truck of the client (in bags in case of depuration centers or in bulk in case of preserves industry. There is no risk associated to this factor for the combined UoC.
Are there any other risks of mixing or substitution between certified and non-certified fish? If Yes, please describe how any risks are mitigated.	No other risks of mixing or substitution between certified and non-certified mussels for the combined UoC were identified by the team.

6.3 Eligibility to enter further chains of custody

To be drafted at Announcement Comment Draft Report stage

To be completed at Public Certification Report stage

All mussels harvested from rafts registered at the Regulatory Council of the Galician mussel (*Consello Regulador Mejillón de Galicia*) and certified for the Protected Designation of Origin '*Mexillon de Galicia*' will be eligible to be sold as MSC certified. Therefore, only mussel producers members of the Regulatory Council of the Galician mussel are eligible to use the fishery certificate.

All landings are inspected by the Consello Regulador Mejillón de Galicia to check the quality of the mussels landed and whether they meet the quality criteria to get the Protected Designation of Origin label or not. However, all mussels harvested by members of the client group would be MSC certified product.

Change of ownership takes place when the trucks are loaded for transporting the mussels to the processing plants. MSC-CoC is required after landing and before transportation to the processing plants takes place.

Mussel producers members of the Consello Regulador Mejillón de Galicia are the only ones eligible to use the MSC fishery certificate and sell fishery products as certificated. The product caught by the UoC and traced and segregated according to the description above is eligible to be sold by the client group as MSC certified and enter further certified CoC without restrictions.

6.4 Eligibility of Inseparable or Practicably Inseparable (IPI) stock(s) to enter further chains of custody

To be drafted at Announcement Comment Draft Report stage

To be completed at Public Certification Report stage

In this fishery, there are no catches of non-target P2 species that are inseparable or practically inseparable (IPI) from the target stock of *Mytilus galloprovincialis*. So there are no IPI stocks.

7 Scoring

7.1 Summary of Performance Indicator level scores

Principle	Component		Performance Indicator (PI)	Likely score	
				UoA1	UoA2
One	Outcome	1.1.1	Stock status	N/A	N/A
		1.1.2	Stock rebuilding	N/A	N/A
		1.1.3	Genetic outcome	N/A	N/A
	Management	1.2.1	Harvest strategy	N/A	N/A
		1.2.2	Harvest control rules & tools	N/A	N/A
		1.2.3	Information & monitoring	N/A	N/A
		1.2.4	Assessment of stock status	N/A	N/A
Two	Primary species	2.1.1	Outcome	100	N/A
		2.1.2	Management strategy	80	N/A
		2.1.3	Information/Monitoring	100	N/A
	Secondary species	2.2.1	Outcome	80	N /A
		2.2.2	Management strategy	75	N/A
		2.2.3	Information	70	N/A
	ETP species	2.3.1	Outcome	80	100
		2.3.2	Management strategy	80	=

		2.3.3	Information	80	=
	Habitats	2.4.1	Outcome	80	=
		2.4.2	Management strategy	75	=
		2.4.3	Information	75	=
	Ecosystem	2.5.1	Outcome	80	=
		2.5.2	Management	80	=
		2.5.3	Information	80	=
Three	Governance and policy	3.1.1	Legal &/or customary framework	85	=
		3.1.2	Consultation, roles & responsibilities	85	=
		3.1.3	Long term objectives	80	=
	Fishery specific management system	3.2.1	Fishery specific objectives	80	=
		3.2.2	Decision making processes	75	=
		3.2.3	Compliance & enforcement	80	=
		3.2.4	Monitoring & management performance evaluation	90	=

7.2 Principle 1 and overview of the fishery

7.2.1 Outline of the target species: Biology, ecology, and life history of mussels

3Alpha Code: MSM
Phylum: Mollusca
Class: Bivalvia
Order: Mytilida
Family: Mytilidae
Genus: Mytilus
Species: *Mytilus galloprovincialis*
Common name: Es.- mejillón; Ga.- mexillón En.- mediterranean mussel

7.2.1.1 Shell description

Shell brittle, oval, subtriangular, or pear-shaped, umbones prominent, pointed, and slightly curved ventrally. Posterior to umbones ventral margin is slightly concave and both shell edges form a flattened area. Sculpture of fine concentric lines, growth stages clear (Hayward and Ryland, 1995). This species is readily confused with *Mytilus edulis*. The most useful distinguishing features of *M. galloprovincialis* are the beaked, downturned umbones, the degree of flattening of the ventral margin and the colour of the mantle edge. However, both species of *Mytilus* display great variation in shell morphology through the interaction of ontogenetic and environmental factors, and old specimens may be almost impossible to identify with certainty.

7.2.1.2 Shell colour

Colour blue to deep purplish black, periostracum light brown to blue-black. Inner surfaces white beneath umbones, becoming bluer and darker posteriorly. Mantle edge of live specimens typically purple (Hayward and Ryland, 1995).

7.2.1.3 Distribution and habitat

Mytilus galloprovincialis lives on hard substrates from the intertidal zone to depths of 40 m. It is found along coasts and rocky shores, and in sheltered harbours and estuaries. The native range is in the Mediterranean (Barsotti and Meluzzi, 1968) and the eastern Atlantic, from Ireland and the United Kingdom (Gosling, 1992) to northern Africa (Comesana et al., 1998). This species is also found on the Pacific coast of North America, in Japan, Hong Kong, South Africa, Chile, and Australia, where it was accidentally introduced. Delineating the exact range of *Mytilus galloprovincialis* is complicated by the lack of reliable morphological differences between *Mytilus* species and by hybridization (Gosling, 1992; Rawson and Hilbish, 1995; Brannock et al., 2009).

7.2.1.4 Reproduction

Mytilus galloprovincialis is gonochoric, with the gonads extend throughout the body, being cream colored in males and orange in females. Sexual maturity is reached within the first year of life (Bayne, 1976). The reproduction usually takes place more than once each year with annual reproductive output (van Erkom Schurink and Griffiths, 1991). In Vigo, Arousa and Muros Rías gametogenesis takes place in autumn and early winter, remaining ripe during winter and mass spawning occurs in spring (Villalba, 1995). A rapid gonad restoration occurs after spawning and there is a new mass spawning later in spring. New sequences of gonad restoration and spawning may occur in some mussels, but most of them reabsorb their gonads concurrently with development of storage tissue. A new gametogenic cycle starts by late summer (Villalba, 1995). In Ares-Betanzos Ría, mussels did not become ripe until spring and only one mass spawning took place, in summer (Villalba, 1995). Millions of gametes are released during spawning events with fertilized eggs developing into free swimming planktotrophic larvae capable of dispersing large distances (Picker and Griffiths, 2011). *M. galloprovincialis* is a broadcast spawner, i.e. eggs and sperm are released into the water and fertilization is external. Millions of gametes are released during spawning events with fertilized eggs developing into free swimming planktotrophic larvae capable of dispersing large distances (Picker and Griffiths, 2011). The planktonic life varies from 2-4 weeks depending on temperature, food supply and availability of suitable settlement substratum (Matson, 2000).

7.2.1.5 Growth

On average, the length of the shell is typically 5-8 cm, but it can grow up to 15 cm. They exhibit a rapid growth and can attain 7 cm at first year at favourable sites (Picker and Griffiths, 2011). Pérez Camacho et al. (1995), reported for mussel cultivated in the Ría Arousa growth rates ranging from 6.3 to 11.1 mm month^{-1}, were slightly higher than those reported by Perez Camacho and Roman (1979) for mussels from the same Ría. The source of seed stock (seed obtained from collector ropes had higher growth rates than seed collected from intertidal areas), and the cultivation site (differences in chlorophyll a content and water current speed, which influence phytoplankton availability), were the major factors underlying variation in mussels growth rate (Pérez Camacho et al., 1995). Steffani and Branch (2003), also found that mussel growth is faster at exposed sites as a result of greater water flow and currents which increases the availability of food per unit of time. Babarro et al. (2003), compared the growth of seed mussel *Mytilus galloprovincialis* from two origins (rocky shore and collector ropes) placed on raft culture was compared, following the commercial culture phases commonly used in Galician Rías: (a) from seeding to thinning-out and (b) from thinning-out to harvest. Significant differences in both length and weight were only found for the first culture phase, being significant higher in mussels obtained from collector ropes than in mussel seed from rocky areas. Azpeitia et al. (2018), reported for mussels from the Bay of Biscay that mean growth rates varies with the season. During the winter growth rates are low, increasing from late spring to mid fall, and being highest during summer, which may be partially explained by the influence of temperature on growth rate.

7.2.2 History of the fishery: The legal and regulatory framework

Between 1946 and 1960, more than 2,000 licenses were granted for rafts, although only about 1,100 were actually installed, which in the first year produced about 300 tonnes, according to the data by Durán et al. (1990). In 1960, production amounted to 61,000 tons (Andreu, 1976), growing close to 8% per year. Between 1960 and the enactment of the law on seafood in 1969, 2,800 rafts were installed that produced some 160,000 tonnes. **Figs. 7.2.1** and **7.2.2** show the growth of production according to the estimates made by Andreu (1976) and Porta and Pardellas (1987). Historically, it was Andreu who estimated the first mussel productions between 1956 and 1975. According to these estimates, the output grew from 22,500 tonnes produced by 410 rafts in 1956 to 61,550 tonnes produced by 1,099 rafts in 1960. In 1966, 2,050 rafts produced 114,000 tonnes. In 1975, there were 3,134 rafts which were producing 175,500 tonnes.

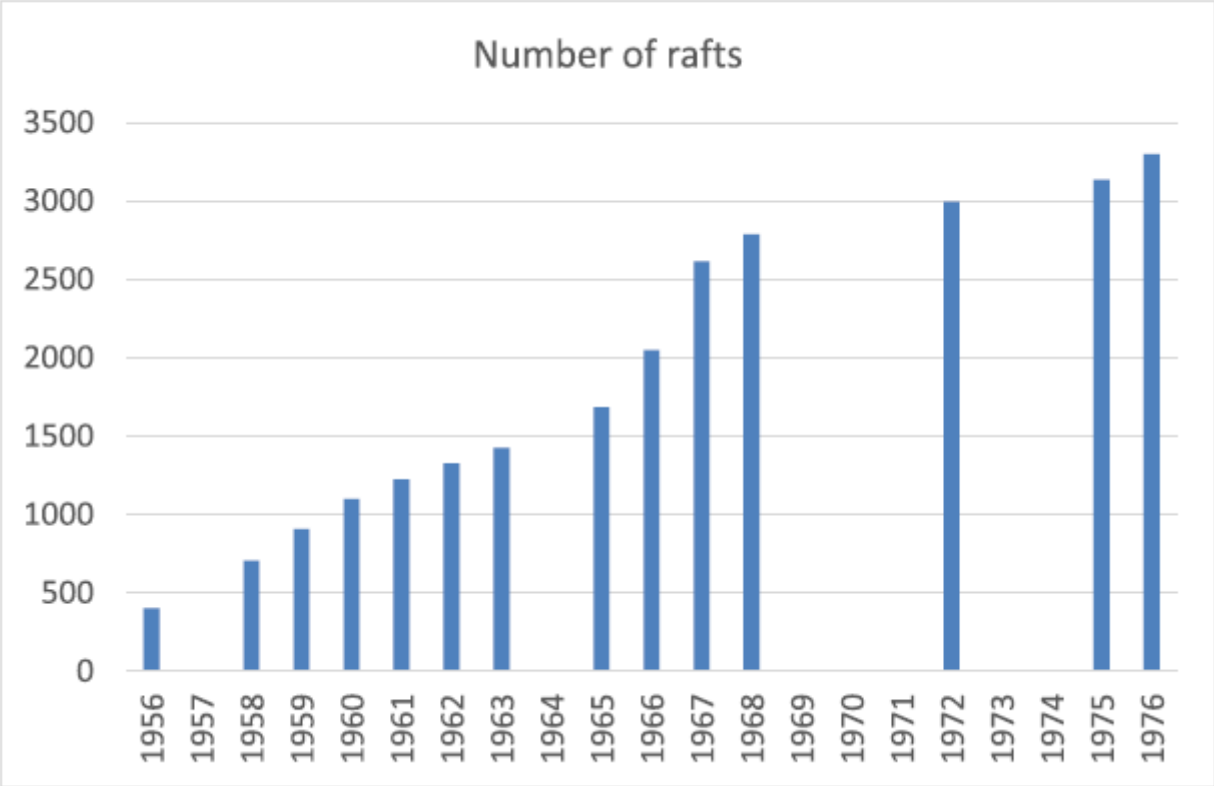


Figure 7.2.1 Mussel rafts between 1956 and 1976. The number of rafts has been stabled since 1976. Source: Labarta et al., 2019.

The year 1976 marks the beginning of the Political Reform in Spain, and the mussel farming industry begins its maturity phase. In this year, the number of installed rafts was equal to the number today, totalling around 3,300. It was also in that year when it was established that during a period of 3 years, extendable, no further applications for licenses to set up floating mussel farms would be accepted or processed. Since then, the limitation of mussel production began in Galicia which continues to this day as the main strategy for its economic management. (Labarta et al., 2019).

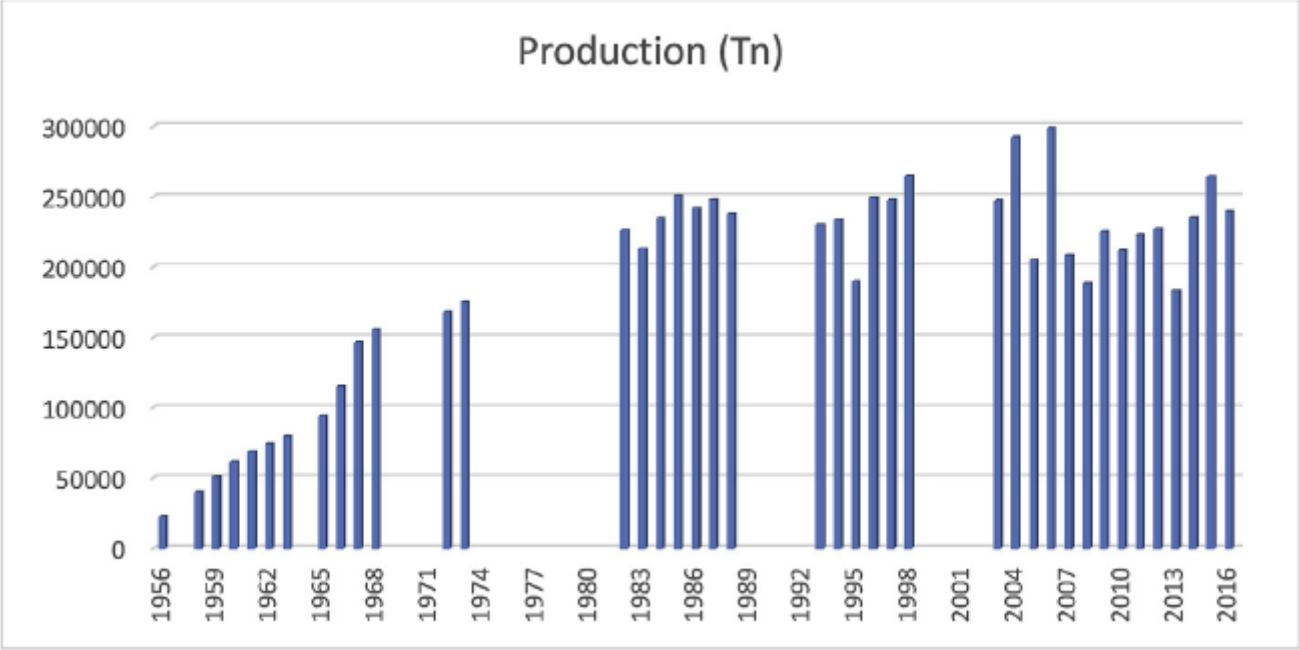


Figure 7.2.2 Growth of production between 1956 and 2016. Source: Labarta et al., 2019.

Nowadays, the average annual production per raft has been estimated at 75 tonnes, ranging between 60 and 84 tonnes depending on the area and type of product. Data from the Consello do Mexillón de Galicia estimate the following yields: 50 tonnes per raft/year in 1995, 67.4 in 1999, and a maximum of 70 tonnes in 1997.

7.2.3 Growth of farming and mussel production

In order to understand the origins of mussel farming, we must first approach the history of oyster farming, which in Galicia dates back far in time, starting to decline in the 18th century (Labarta, U et al, 2019). Oyster farming had long focused on the recovery of its natural oyster beds, in harvesting the seed, and marketing. In parallel, mussel farming activities began in the 1930s at an industrial scale, as recorded by Fernández-González (2005).

In the year 1927, the Ozores-Saavedra family took an interest in shellfish farming. After several failed attempts to grow oysters, the company Viveros del Rial SL, established in 1944, saw the need to engage in mussel farming using the suspension system previously tested in the Mediterranean area. In 1946, the company owned by the Ozores Saavedra (Viveros del Rial SL) installed the first experimental raft and before the end of the year they had already anchored ten such rafts destined for production near the port of Vilagarcía de Arousa. During the first ten years, many canneries were present among the 250 awardees of 1,110 concessions for mussel farming. The cannery industries comprised one-tenth of the applicants and yet they were given a quarter of the concessions. According to this fact, the development of mussel farming is associated to such kind of initiatives in the canning industry, although the canneries that took part in the concession of mussel farms only accounted for 15% of the total existing canneries in Galicia, most of them from the Ría de Arousa (according to Fernández-González, 2005). Very few pioneers had their residence away from the coast or outside of Galicia, and they all had stakes in the Mediterranean mussel markets.

Bivalve molluscs, shellfish products and marine cultures achieved a certain level of economic potential in Galicia in the 1960s during the first stage of Spain's economic development at that time, under the socalled Stabilization Plan and Development Plans of 1959–1974 (Labarta, U et al, 2019).

New standards were developed for shellfish farming related to licenses or concessions and cultivation areas, first by means of the Decree 2559 of November 1961, and later on, by an Order of the Ministry of Commerce

in 1963 providing for the establishment of 4750 points to anchor the rafts. Such an offer caused many individuals to install rafts or to trade with the concessions (Labarta, U et al, 2019).

Another decree was issued in 1962 governing concerning seafood purification plants and the regulation for "Recognition of the Quality and Health of Molluscs". This brought important changes in the mussel farming industry, especially in the marketing of the produce, given that many of those who developed the first mollusc treatment plants were at the same time the concessionaires of shellfish farm or shellfish traders. The importance of the purification requirement for the fresh product changed the stakes for the marketers and reinforced their oligopoly (Labarta, U et al, 2019).

7.2.4 Status and management of natural mussel beds

19th century and early 20th century

The following paragraph from Pazos Pata (2016) explains in a few words the reason for the mussel spat richness in Galicia: "The success of mussel farming in Galicia is due, in large measure, to abundance of mussel spat on its coasts, favoured by: (i) the production method itself, which allows multiple and widespread spawning of mature individuals at the rafts before being harvested and (ii) fast recolonization of the the intertidal rocky areas where the mussel spat is collected."

But this abundance was already noted long before the mussel raft culture began, so it is documented that the abundance of mussel in the Galician rías was already highlighted by Paz Graells in 1870 (quoted in Perez de Rubín, 2010b), together with the incipient practices of mussel aquaculture carried out at the ría de Arousa at that time.

Years later, the mussel suspended culture started to be developed in the Spanish Mediterranean area (early twentieth century), and mussel spat from the Galician coast was systematically exported to be grown in the Mediterranean. In 1906, the collection of mussel spat in the area of Vigo was authorized for shipment to the city of Barcelona (Perez de Rubín 2010, Perez de Rubín 2011). While in 1936, it was estimated that between 80 and 100 tons of mussel spat were exported from Galicia to Catalunya. Besides, given the abundance of this resource, it was a common practice among locals to remove mussels from the intertidal rocky coastal areas to fertilize their fields.

Mid-20th century

Once the mussel culture started in Galicia, several works published since the 1950s highlighted the richness of the Galician coasts in terms of supply of mussel spat (Buenaventura, 1958 an references cited therein). Buenaventura (1957), based on the fact that mussel spat was more and more abundant, discarded comments expressed at the latest National Conference on fisheries about the unsustainability of the mussel culture if licences were lavished. It is during these years that Buenaventura develops the first studies on the use of collectors for larval settlement, seasonality of larval settlement both on the environment and collectors, etc.

The first regulation aimed to manage the activity of removing mussel spat from its natural beds found by the client is the Decree 2559/1961, of November 30, which approves the new Regulation for the exploitation of seafood farmings (BOE nº 304, December 21, 1961). Article 21 states that mussel producers that need to collect spat from the natural beds in volumes greater than 5,000 kg have to formally request it to the competent authority where the natural beds are located (Comandancia provincial de la Marina). If it is less than 5,000 kg then it would be enough to send a request to a lower level administration (Ayundantía de Marina del Distrito).

Buenaventura Andreu was a pioneer, and his studies helped to develop, promote and improve the use of collectors to get larval settlement. Therefore, almost since the beginning of the mussels raft culture in Galicia, the collection of seed has been carried out by means of two techniques:

1) The use of ropes as collectors to ensure larval settlement.

2) Spat collection from natural mussel beds.

Last years of the 20th century

With the arrival of democracy the Government of Galicia assumes the competences on aquaculture and shellfish collection activities, including mussel spat collection from rocky shores. In this context in 1989, the research group of Jose Miguel Fuentes (Mariñas Research Center - CIMA CORON, Xunta de Galicia) begins a line of research on ecology of the early stages of life of Mytilus galloprovincialis, with the aim of ensuring that spat continues to cover the annual demand generated by the mussel culture industry (Fuentes and Molares (1994), Molares and Fuentes (1995)). The group's first project on the subject was entitled Ecological study of mussel spat recruitment and began in 1989. Over the following years they carried out more projects on this subject. The information obtained was used to determine the best mussel seed management (regulations on the time to place the collectors, etc). This studies were focused on the Arousa ría.

The 1994 report of the research project “Gonadal cycle, fixation and recruitment of the mussel Mytilus galloprovincialis on the Arousa ría” of this CIMA group include the following technical recommendation:

<< 7.- In order to increase the yield in mussel spat of the rocky surfaces of the intertidal strip of exposed areas, we recommend that during the work of collecting spat or after it, proceed to the removal, using scrapers , of all the organisms fixed in the intertidal strip mostly occupied by mussels. In this way it would not be necessary to extract mussel seed from very exposed areas, where this activity can interfere with the exploitation of goose barnacle >>.

Also since the early 90's the research group of Antonio Figueras of the IIM-CSIC developed a series of studies on mussel spat based on the Vigo ría (Caceres-Martinez (1994), Caceres-Martinez & Figueras (1997), Caceres-Martinez & Figueras (1998a), Caceres-Martinez & Figueras (1998b), Caceres-Martinez & Figueras (1998c), Caceres-Martinez, Robledo & Figueras (1993a), Caceres-Martinez, Robledo & Figueras (1993b), Caceres-Martinez, Robledo & Figueras (1994)).

As a development of Law 6/1993, of May 11, on fishing in Galicia, the Xunta de Galicia published in 1996 Decree 406/1996, of November 7, approving the regulation of seafood farmings in Galician waters. (DOG No. 228, November 21, 1996). Article 36 regulates the collection of mussel spat by means of ropes (maximum number allowed, seasons...); and in its article 37 the supply of mussel spat from the intertidal strip is regulated (season, to whom requests should be sent ...).

According to the studies carried out at the CIMA and in order to provide greater flexibility to the spat collection and improve its responsiveness to state of the resource, the Xunta published Decree 338/1999 (DOG No. 251, of December 3, 1999), of December 3, amending Decree 406/1996.

The 1994 report of the research project “Gonadal cycle, fixation and recruitment of the mussel Mytilus galloprovincialis on the Arousa ría (1994) pointed to the need of mapping the natural mussel beds in order to regulate the exploitation of this resource. In line with these recommendations, the Department of Fisheries, Seafood and Aquaculture of the Xunta de Galicia promoted the development of a multidisciplinary research project entitled "Integral management of the maritime-land space of Galicia." It was developed between 1996 and 1999 and among the studies undertaken, the first mussel spat mapping on the coast of Galicia carried out by the Eugenio Fernández Pulpeiro group (Department of Animal Biology of the University of Santiago) stands out (Pulpeiro, Aldariz, Lustres Perez, Ojea Bouzo, 1999).

Outcomes of these works are included in the thesis of Aldariz (2000). “Species associated with rocky substrates of the Rías Baixas Gallegas (N.O. of Spain): exploitation and productivity”. In the thesis, a mapping of 28 species associated with rocky substrates on the coast of Galicia was carried out, including mussel spat and goose barnacle. For the different species the author carries out the study of biomass distribution and estimation, and observes the composition of their populations, all of this, fundamentally, in the intertidal zone but also in the infralitoral zone.

On the other hand, in 1999, Intecmar (at that time the CCCMM, Centro del Control del Medio Marino), aiming to provide advice to the mussel culture industry about a strategy to place ropes as collectors, started to issue weekly reports on the presence of larvae of bivalve molluscs (mostly mussels) in the waters of the Galician rías. This was relevant issue since the regulations in force at that time allowed a maximum number of ropes per raft (regardless they were devoted to mussel growing or spat collection).

In parallel the group of J.M. Fuentes developed a project for the optimization of mussel larvae sampling protocols. With this line of work the CIMA group chains several projects in the first decade of the 21st century that culminate in the approval of a patent for an immunological method that allows the rapid and accurate identification of mussel larvae in plankton samples.

First decade of the 21st century

The Xunta regulates in greater detail the collection of mussel spat from the rocky coastal strip through the Order of October 26, 2000 which regulates this activity (DOG No. 228, November 24, 2000). It establishes the procedures, forms, places, season... It also limits the collection to a maximum of 3,500 kg per raft.

At the beginning of the century, the Department of Fisheries commissioned the group of E. Fernández Pulpeiro more detailed and extensive studies of natural mussel seed banks (Pulpeiro et al (2001), Pulpeiro et al (2002), Lustres Perez (2002), Aldariz et al (2002), Brea Bermejo et al (2005), Brea Bermejo (2009), Pazos Pata et al (2010), Pazos Pata et al (2012).

It is noteworthy that modifications to the season of spat collection were supported, at that time, on the technical advice provided by the CIMA and the Pulpeiro research group.

Decree 174/2002 of May 10 (amending Decree 406/1996) was published to encourage the use of ropes in the collection of mussel spat. From that moment the producers can perform a new technique (chicoteo) which provides greater flexibility in the placement of the ropes and more important: from April 1 to September 30, a maximum of 100 ropes for spat collection can be placed per raft (on top of the 500 ropes authorised for mussel growing).

On November 13, 2002, the accident of the Prestige tanker happened, forcing the Department to ban extractive activity throughout the coast from the date of the accident until February 2003, affecting the collection of mussel spat. This situation led to adopt exceptional measures in the Decree 182/2003, of March 13, by which exceptional measures were taken to facilitate the supply of mussel spat, allowing the placement of a maximum 150 collecting ropes with respect to the maximum that corresponds to each raft, from March 1 to September 30, 2003.

At this time, the Galician Fisheries Administration (Consellería de Pesca) hired the CIMA to develop the monitoring of the natural mussel beds. Between 2002 and 2007 the group lead by Fuentes, J.M. (CIMA researcher) conducted monthly sampling in 6 coastal stations along the Galician coast between July and December. Further, this group was providing technical advice to Consellería de Pesca in relation to the mussel spat collection activities.

On the other hand, the group lead by Pulpeiro at the University of Santiago also continued to carry studies on the situation of the natural mussel beds until 2007, but they were force to get funding through different projects. These studies are cited in Pazos Pata (2015). In 2007, a new mapping of the natural mussel seed banks is carried as part of the project “Modeling larvae settlement at the Galician coasts, improvement of its cartography, optimization of its extraction and quality control of the adult mussel (2007-2009), funded by the Xunta de Galicia and carried out by the University of Santiago.

Brea Bermejo (2009) carried out a monitoring of the natural mussel beds from November 2001 to November 2006. This study provided historical series of both recruitment and settlement periods, which in conjunction with the physiochemical parameters allow to assess the status of their populations. This thesis also assessed the effect of the Presidige spill on M.galloprovincialis population.

On the other hand, in 2008 the Xunta transferred the monitoring of larvae in the plankton and natural mussel beds from CIMA to the CETMAR Foundation (Public Foundation of the Xunta).

Finally, indicate that during this decade the Uxio Labarta (IIM-CSIC) group focused its mussel studies on the Ares-Sada estuary, and as a result, the thesis by Laura García Peteiro entitled “Patterns of settlement and recruitment of Mytilus galloprovincialis in the Ría de Ares-Betanzos and implications for its cultivation in rafts” was published.

Second decade of the 21st century

In June 2010, the Galician Fisheries Ministry (Consellería do Mar) meets with representatives of the mussel culture industry and the fisher’s guilds involved in the spat collection from the coastal strip. As result, the development of cartographic maps was announced to determine areas where the extraction of mussel seed does not affect other resources (mainly the goose barnacle).This work was committed to the CETMAR Foundation. In 2011, Cetmar completed the report “Cartography of mussel spat and goose barnacle along the Galician coast between Fisterre and A Guarda”. Unfortunately this piece of work is not available for consultation.

In 2011 the Consellería do Mar created the Mussel Commission as a permanent advisory body for the mussel sector. (Order dated December 28, 2010 establishing the Mussel Commission. DOG nº 2, dated January 4, 2011). This forum will discuss issues of interest along with representatives of the sector, such as the annual spat collection season.

In recent years the Conselleria do Mar stop funding the monitoring of mussel larvae in samples of plankton that had been carried out continuously since 1999. It also waives the ownership of the invention patent developed in the CIMA.

In recent years, the supply of mussel spat has not been an issue of concern and the average volume of mussel spat collected from the rocky coastal strip has been around 2,100kg/raft, far away from the maximum allowed by regulation (3,500 kg).

7.2.5 Economic and market information

The mussels industry with a production that accounts for more than twenty five percent of the fresh product landings from the sea, and the full-time employment of more than 8000 people, is by far the largest productive activity of the Galician sea (Labarta, U et al, 2019).

The reality of European markets (EUMOFA, 2016) establishes that the European mussel market is of around 600,000 tonnes in weightequivalent of live animals, of which 500,000 tonnes are of national origin, and another 100,000 tonnes of international origin (the net balance of imports and exports).

In Europe, Spain produced 46% in volume in the year 2015, although it was France that increased its production by 17,500 tons, a 30% growth in volume. (EUMOFA, 2018). The differences in the average price between the French mussel (1.8 Euros kg) and the Galician mussel (0.51 Euros kg), could be due to the fact that French is directed only to the fresh mussel market, and the Galician mussel serves product markets fresh and processed.

7.2.6 Catch profiles

See **Table 7.2.3.1** for catch profile of the UoA over time.

7.2.7 Total Allowable Catch (TAC) and catch data

Table 7.2.3.1 presents annual production of mussel in Galicia and average production per raft. There is no TAC for this culture. Taking into account that the harvest is common for both UoA, the data on annual production is presented for the combined UoAs.

Table 7.2.3.1 Annual production of mussel in Galicia (tons, green weight) and average production per raft. Source: the client.

Year	N rafts	UoA total annual production (tons, green weight)	Average annual production per raft (t/year*raft)
2005	3,386	205,227	60.61
2006	3,386	298,872	88.27
2007	3,386	208,187	61.48
2008	3,386	188,818	55.76
2009	3,386	225,091	66.48
2010	3,386	212,031	62.62
2011	3,386	222,945	65.84

2012	3,386	227,229	67.11
2013	3,386	183,168	54.10
2014	3,386	235,459	69.54
2015	3,386	264,109	78.00
2016	3,386	239,251	70.66
2017	3,386	266,917	78.83
2018	3,386	278,698	82.31
2019	3,386	255,514	75.46

7.2.8 Application of the MSC scope for the enhanced mussel bivalve fishery

According to the MSC Fisheries Standard (version 2.01) and specifically Annex SB, the team should evaluate whether or not the fishery has a negative impact on the parent stock, and whether it includes translocations. If an enhanced CAG bivalve fishery does not involve translocations, and there is no evidence that it negatively impacts the parent stock, the team may choose not to score Principle 1. The team has evaluated these issues in the sections below.

7.2.8.1 Potential impact of planktonic spat collection

In Galicia some mussel farmers install spat collectors in the water column within the area of their raft, where mussel larvae will naturally attach themselves. This system increases the settlement area for mussel larvae by providing a substrate for them, contributing to the survival of a higher proportion of larvae. This is 'additional' to the target stock. On the other hand, the use of spat collectors in the fishery reduces the fishing effort over the natural mussel beds, since the amount of mussel juveniles needed to be transplanted to mussels on-growing ropes decreases. Therefore, no impact on the parent stock is forseen. The team therefore concluded that spat collection on ropes has no negative impact on the parent stock. In relation to impacts on the target stock therefore, the issue is only around spat collection of wild seed beds on the rocky shores of Galicia.

7.2.8.2 Potential impact of spat collection from rocks

With regards to the question whether the spat collection has a negative impact on the natural reproductive component of the associated wild mussel stock in Galicia the team has assessed in the first place whether the population of *M. galloprovincialis* in Galicia can be considered as a single stock. Sanjuan et al. (1990) performed a genetic analysis using allozymes on five Galician samples found a low genetic distance among populations, thus corresponding to populations of a single species (Ferguson, 1980). Quesada et al. (1995) analysed 14 polymorphic allozymes on 21 samples and also included Galician mussels sampled from Ribadeo (northern Galician coast) to Silleiro (southern Galician coast). Indeed, all eight Galician samples analysed clustered in a single phenetic group with a very low genetic distance between them. The genetic diversity pattern of *M. galloprovincialis* in Galician Rías was studied by Diz & Presa (2009) using six microsatellites on 27 mussel samples from the main five Galician Rías. The results obtained showed that weak genetic divergence occurs and therefore no genetic structuring exists neither within Rías (inner versus outer or northern versus southern beds) nor among the five Rías compared. The highest local differentiation was observed between the sample pools from Rías Altas versus Rías Bajas, which are separated by Cape Finisterre. Smietanka et al. (2014) studied the genetic diversity of three species of *Mytilus* (*M. edulis, M. trossulus* and *M. galloprovincialis*) using a 900-bp long part of the most variable fragment of the control region from one of their two mitochondrial genomes. Population samples were obtained along the European coasts, at 23 sites, located between the Black Sea to the White Sea. Most of the comparisons made in this study showed significant differentiation, which were correlated with the longer geographical distances between compared sampling sites.

Those authors found that the effect of isolation by distance is highly significant and quite strong. Notwithstanding, they also found that in some cases, the distance was not so important, since no genetic

differentiation between Atlantic mussels on the Iberian Peninsula, from Bidasoa (Northern Spain, Basque Country) to Punta Camarinal (Northern Spain, Gulf of Cadiz), separated by >1700 km, was observed.

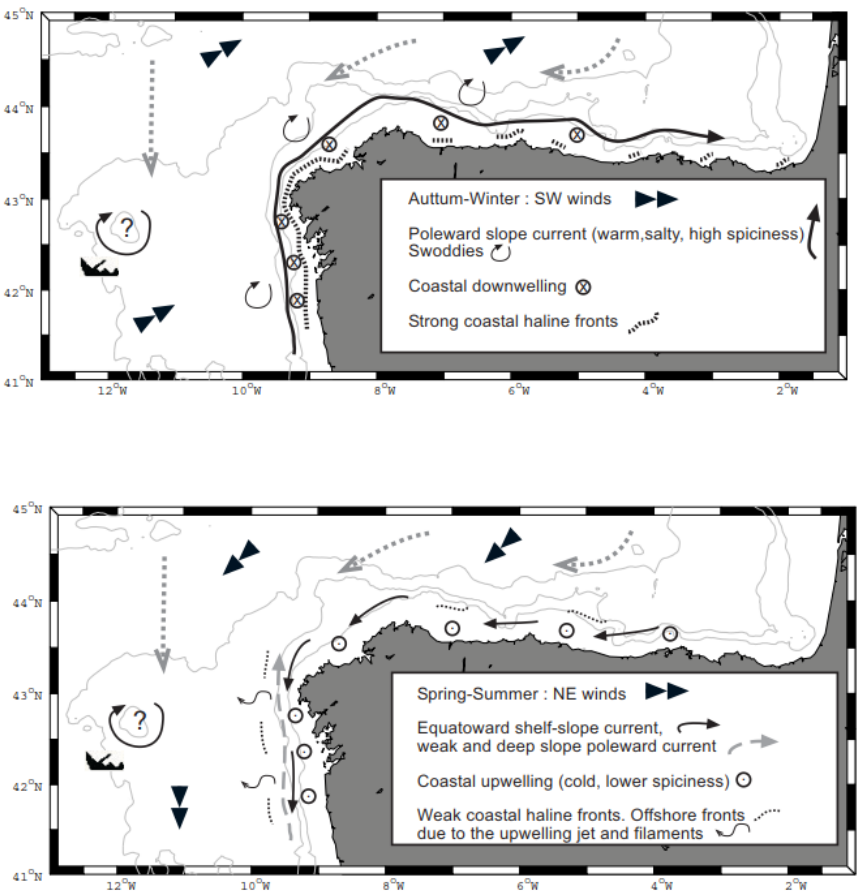


Figure 7.2.1 Schematic circulation during typical upwelling (spring and summer) and downwelling (autumn–winter) seasons. Source: Ruiz-Villareal et al., 2006.

The lack of genetic structuring among *Mytilus* populations of the different Rías may be explained by the panmixia theory. This theory assumes that pelagic shellfish larvae favour large-scale dispersion, which results in a significant gene flow among populations, particularly when they are geographically close (Berger, 1973). Recruitment to an area would depend to a large extent on larval drift from other areas. Therefore, the knowledge of connectivity pathways in the marine environment is crucial for understanding the spatial structure of populations (Gomes et al., 2016). In a study aimed to investigate connectivity patterns within the Berlengas and Arrábida Marine Protected Areas (MPAs) along the central Portuguese west coast, Gomes et al. (2016) based on the microchemistry of bivalve larval shells, which allowed to trace the natal origins of newly settled mussels and generate connectivity matrices among populations. The population connectivity matrix obtained allowed to identify different dispersal pathways for mussel larvae, in particular a predominantly northward dispersion pattern in July 2013, which was related with an extended period of wind reversal and upwelling relaxation. These authors found maximum dispersal ranges of about 120 km.

The current system along the North Iberian West Coast varies between Spring/summer and Autumn/Winter. During spring and summer northerly winds along the coast are dominant, causing coastal upwelling and producing a southward current at the surface and a northward undercurrent at the slope (e.g Haynes & Barton, 1990; Peliz et al., 2005; Mason et al., 2006) (**Figure 7.2.1**). In autumn and winter, the surface circulation is predominantly northwards, partially driven by southward winds and meridianal alongshore density gradients (Peliz et al., 2003a, b). *M. galloprovinciallis* spawns between Spring and late Autumn and therefore based on the current regime, larvae are mainly transported from north to south. However during periods of wind reversal and upwelling relaxation larvae can be transported in the opposite directions.

The studies described above suggest that no genetic structuring exists between mussel populations from Galicia and that there is a strong connectivity among Rías in both directions. The team therefore concluded that the *M. galloprovinciallis* population in Galicia can be considered as a single stock and as one single

reproductive component. In fact the mussel population is also interconnected with the mussel populations on the bordering Spanish coast on the east and the bordering Portuguese coast in the south.

Concerning the potential impact of spat removal on the reproductive component of the associated stock it is important that in Galicia, *M. galloprovincialis* is not harvested for consumption in the wild. Mussel spat is collected from rocky shores and used for ongrowing on the mussel rafts in the rias. When harvesting mussel spat mussel growers have a large preference small mussel spat. Several studies on the abundance and distribution of mussel seed beds on the shores in Galicia have been conducted (e.g. Fernández Pulpeiro et al., 2001, 2002; Lustres Pérez, 2002; Brea Bermejo, 2004, 2009). Apart from these studies the Consellería de Mar (Xunta de Galicia) has carried out an annual monitoring of these natural beds first through CIMA and posteriorly through CETMAR. Seed harvesting effort varies among sites, with higher effort being carried out where seed density is higher. Moreover these studies have shown that the recovery rate among sites differs, which is related to the local environmental conditions and mainly with the success of recruitment. In the case of Galicia the study of Bermejo (2009) has shown that mussel spat densities on beds that have been exploited between October and April recovered to more or less initial densities in the following summer. This recovery being dependent on the amount of spatfall. Indeed, in coastal areas, the annual recruitment of bivalves is characterized by substantial year-to-year variability; failing and successful cohorts often differ by orders of magnitude in several bivalve species (e.g. Beukema, 1982; Möller & Rosenberg 1983; Beukema et al. 2001, Strasser et al., 2001, 2003; Beukema and Dekker, 2005), which affects the recovery rates of the areas exploited. Although recruitment failure may occur in certain years, this is not related to stock-recruitment relationships in shellfish species with short lifespan, being instead related to unfavourable environmental conditions (e.g Coe, 1953; Holm, 1990; Botsford, 2001).

In the case of spat collection from rocks it is therefore important that largely only small mussel that are not yet part of the reproductive component are harvested. The recolonization of the exploited mussel beds depends on adult mussels in the ecosystem. As stated above in shellfish stocks stock-recruitment relationships between the size of the adult stock and the size of new recruitment to the stock have not been found. Mussels produce enormous amounts of larvae and it is merely the amount of larvae that survive and successfully colonise that determines the recruitment success (e.g. Beukema & Dekker, 2007; Strasser et al., 2003). These processes depend on factors like favourable water currents and larval drift into the right direction and predation in the water column of after settlement by for instance crabs and shrimp. It is therefore safe to conclude that a removal of a very limited part of the adult mussels in the system will not affect the reproductive capacity of the mussel stock.

Furthermore, it is also very important that the mussel spat is not removed from the surrounding ecosystem of the mussel population. The mussel spat remains in the system as it is placed on the ropes of the mussel rafts in the rias. On these rafts, growing conditions in terms of food supply and mortality are usually better then in natural beds. The spat remains in the rafts between one to two years until reaching the market size, depending on their original size. As *M. galloprovincialis* attain the sexual maturity during their first year of life (Villalba, 1995), the mussels will spawn several times during the producing cycle, depending on the interaction between different environmental factors (Villalba, 1995; Cáceres-Martínez & Figueras, 1998; Casa & Bacher, 2006). Thus, the individuals that were moved from natural beds to rafts are not removed from the system but provide supplementary spawning biomass. In fact the biomass of mussels on the rafts with an annual production of over 200.000 tons of mussels is probably much higher that the biomass of the adult stock in the wild and the larvae production from mussels on the rafts will therefore also be much higher than the larvae production from the wild. In other words the mussel biomass on the rafts forms an important part of the reproductive capacity of the *M. galloprovinciallis* stock in Galicia. The activity of spat collection and subsequent ongrowing of this spat increases this reproductive component.

Based on the above, the team concludes that spat collection does not negatively impact the parent stock of *M. galloprovinciallis* in Galicia.

7.2.8.3 Translocation

Mussel spat that is collected on the Galician coast is regularly moved from the Atlantic coast to the rias and from one ria to another. The question to be answered here is whether these spat movements within Galicia constitute translocation as mentioned in Annex SB2.1.3 and SB2.1.4 of the MSC Fisheries Standard V2.01.

Annex SB2.1.3 states that the team shall assume that fisheries that involve translocation may impact the parent stock. As described above the team has concluded that spat harvesting does not impact the parent stock since the mussels remain in the same surrounding ecosystem and remain part of the reproductive component of the same stock. With regards to the size or the genetics of the parent stock the movement of spat does therefore not constitute translocation.

Annex SB2.1.4 states that if the team concludes that there is no impact on the biomass of the target stock and no translocations, then the team may choose not to score Principle 1. In order to answer the question whether the fishery does involves translocation, and thus that the possible impacts of translocation on the surrounding ecosystem should be assessed, the question should be answered whether the movement of spat from the Atlantic coast to the rias and from one ria to another could result into the introduction of diseases, pests, pathogens, or non-native species into the surrounding ecosystem. Central in the answering of this question is thus on the one hand whether the waters along the North Iberian West Coast (NIWC) form a single ecosystem and on the other hand whether spat movements could result in introductions of diseases, pests, pathogens, or non-native species into this ecosystem.

When answering these questions the assessment team had into consideration decisions made on translocations for other MSC certified *Mytilus* fisheries, namely those that involve spat movements between the Wadden Sea and the adjacent Eastern Scheldt (https://fisheries.msc.org/en/fisheries/mussel-translocation-by-members-of-the-vereniging-van-importeurs-van-schelpdieren-into-the-oosterschelde/@@assessments (MEC, 2016); https://fisheries.msc.org/en/fisheries/germany-lower-saxony-mussel-dredge-and-mussel-culture/@@assessments (Control Union Pesca Ltd., 2018)).

Considering the information described above on the current system along the North Iberian West Coast (e.g Haynes & Barton, 1990; Peliz et al., 2005; Mason et al., 2006) and the work by Reis (2015) on the dispersal and larval connectivity along the NW Iberian coast, the team concludes that there is a strong interconnectivity between the rias along this coast. The current system along this part of the coast tends to transport organisms from one Ria to another, hence strong connectivity would be expected between Galicia the Rias as demonstrated by Reis (2015). Additionally, as noted above, movement of mussels spat has been a common practice for many decades. Hence there is strong connectivity whether natural or manmade. It can be added that, despite these regular movements of spat between areas for many years Ría of Noia can be considered free of the parasite *M. refigerans* as well as rafts in the Southern coast of Ría of Pontevedra. This situation has been maintained for many years, indicating that spat movements are irrelevant compared to the characteristics of the different areas. Thus, it is likely that oceanographic and environmental conditions in those areas do not favour the presence of a hypothetical intermediate host (Susana Darriba, personal communication). The team concludes that the North West Iberian Coast should be considered as one ecosystem and that movements of spat within this ecosystem cannot result in the introduction of of diseases, pests, pathogens, or non-native species into this ecosystem that are not already present in this system.

Concerning the second part of the question it is important that it is forbidden to import mussel spat from outside Galicia into Galicia. This means that the movement of spat cannot lead to the introduction of diseases, pests, pathogens, or non-native species into the NWIC ecosystem from outside this ecosystem.

7.2.8.4 Determination regarding not to score Principle 1

The evidence above lead the assessment team to conclude that the fishery does not have an impact on the target stock and does not involve translocation, as any input of mussel seed must come from the North Iberian West Coast (NIWC) and therefore the same ecosystem as this fishery.

The team concluded that any sourcing of mussel seed from within the NIWC ecosystem does not constitute a translocation and therefore it was decided not to score Principle 1.

In accordance with Annex SB2.1.4 the team decided not to score Principle 1. See **section 7.2.1** for more details.

7.3 Principle 2

7.3.1 Principle 2 background

Principle 2 of the Marine Stewardship Council standard states that:

"Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent ecologically related species) on which the fishery depends".

Before developing the P2 section it is helpful to understand what is involved in the fishing operation during both forms of the harvest activity: 1) Catch and 2) Grow. As stated in Section 5.1.3, there are 2 UoAs (Catch forms) with different effects on the environment.

UoA 1.- Collection of spat from intertidal rocks (Catch) and on-growing on rafts (Grow)

The spat collection, regulated by the Orden de 26 de octubre de 2000 de la Consellería de Pesca, Marisqueo e Acuicultura, is done by hand, using scrapers on the rocky coastal strip during the low tide of the spring tides between December and April. The scraper consists of a flat metal sheet of about 10 cm^2 attached to a wooden handle (**Figure 7.3.1**). The collectors select the best seed with the help of the scraper by scrapping the seed from the rocks. The regulations applying to the activity are described in Section 7.4.1.

Figure 7.3.1 Mussel spat harvesting process on the coast of Galicia (UoA1). Source: Xurxo Lobato from the Consello Regulador.

The natural beds of the mussel seed are found on rocky shores fully or moderately exposed to the action of waves, both in the open sea areas and in the middle or outer areas of the rias. These beds occur from the middle intertidal zone up to depths of 15 meters, although its harvesting is restricted to the intertidal zone. (or also called Mesolithic*). The seed extraction can only be performed in the following intertidal rocky natural areas:

a) Natural banks on the coast line of the Provinces of Coruña and Pontevedra.

b) Ons Archipelagos: East of Ons (From Punta Centrolo to Punta Federento) and Onza (from Punta Cociñadoiro to Porto do Sol).

c) Archipelago of Sálvora: East side of Sálvora Island (from Punta Lagos to Punta Besugueiros).

d) Archipelago of Cíes: East side of the northern islands (from Punta Farolillo to Islote Viños) and southern islands (from Punta Pau of Bandeira to Alto de Vicos).

The growth phase is the same one as for the Uo2.

UoA 2.- Collection of spat on ropes at the rafts (Catch) and on-growing on rafts (Grow)

In this UoA a natural settlement of spat occurs directly in collectors placed in the rafts.The placement of the collectors that hang on the mussle rafts takes place between the months of March, April and May. The current regulation (Decree 408/1996 and Decree 174/2002) autorice to place the collecting ropes from the 1st of April to the 30th of September, and are kept submerged during the breeding season of the mussel, allowing the fixation of mussel larvae on them. The most commonly used collectors are remnants of nets or the ropes themselves. They are placed floating spread on the surface, or rolled into a ball, submerged at 1-2 m deep. **Figure 7.3.2**.

Figure 7.3.2 Growing rope (Collector) in a raft. Source: Bureau Veritas.

The growth phase is the same one as for the Uo1.

This section of the report outlines the potential impacts of the Mussel raft culture in Galicia on the wider ecosystem. Five components are considered to cover the range of potential ecosystem elements that may be impacted by the fishery.

7.3.1.1 Description of the intertidal zone communities

The intertidal zone is a very heterogeneous environment inhabited by a wide variety of life forms (Araújo et al., 2005). In addition, these communities have great dynamism that is reflected in important spatio-temporal variations (Menge et al., 1997).

The references included in the ACDR for a first description of species composition that can be found in the intertidal zone were the following:

1. Piñeiro-Corbeira *et al*, 2018. Mussel farming in Northwest Spain involves the collection every year of thousands of tons of young mussels (0.5-2 cm long) from the nearby rocky intertidal zone to supply floating rafts. Piñeriro-Corbeira et al, 2018 includes a list of sessile intertidal organisms as a result of a monthly intertidal monitoring of five protected and six exploited sites. Source number 1 (Table 7.3.1.1.2).

2. Tato *et al*., 2009. Faunal inventory of the rocky intertidal zone of two locations of the western Galician coast (NW Iberian Peninsula) after the *Prestige* oil spill. The evaluation compiled an inventory of the benthic fauna present in the rocky intertidal zones of two locations on the western Galician coast (O Segaño and Cadebarco). Only the data from the intertidal zone has been extracted and included in Table 7.3.1.2 of the intermediate horizon (Medium level (M)), where the highest concentration of abundance and substrate coverage of *M. galloprovincialis* is found. The table 7.3.1.1.2 (Source 2) lists the species found in the two sampling zones (indicate them) and when the presence is common (2-3 samples) and constant (4 samples). Source number 2.

3. Troncoso and Sibaja-Cordero, 2017. Influence of oceanic exposure on the ecology of sessile organisms of the rocky intertidal zone: 1. Spatial patterns defining the limits of vertical zonation. The vertical zonation of sessile organisms (algae, lichen, mussels and barnacles) along the rocky coast of the two main islands of the Cies Islands (Rigo de Vigo) is described. Source Number 3, **Figure 7.3.3**.

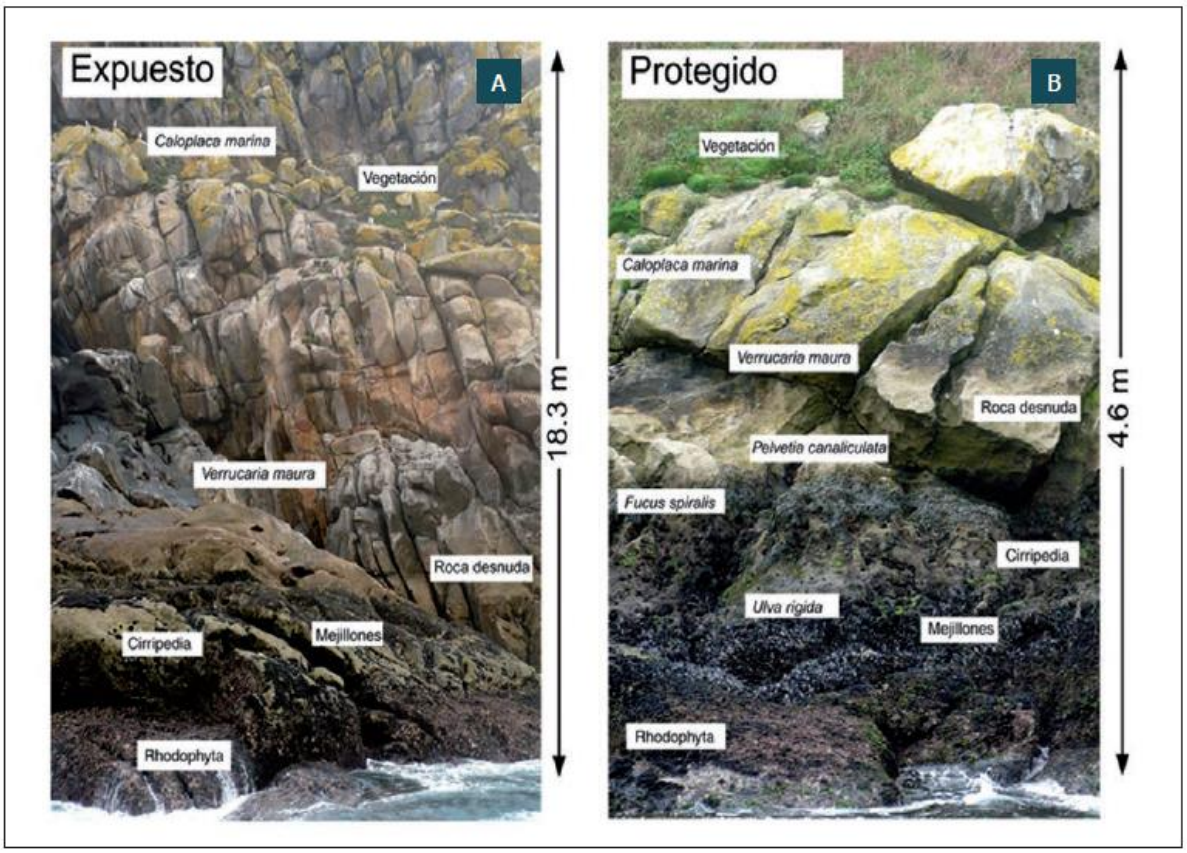
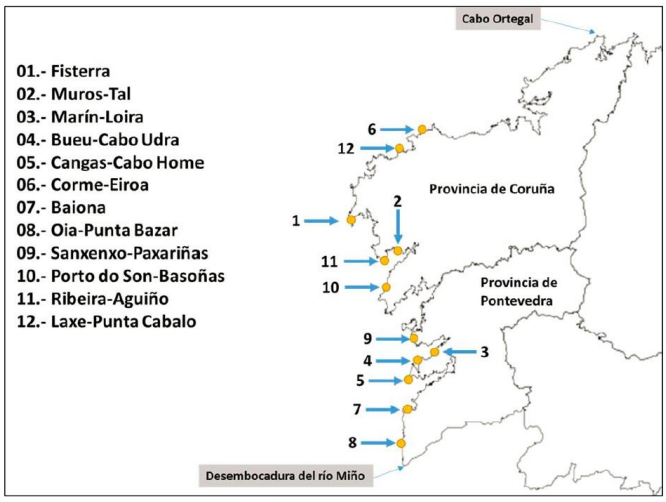


Figure 7.3.3 Vertical zoning of sessile organisms on the rocky coast of the Cies Islands: A) Exposed area. B) Protected area. Source: Troncoso and Sibaja-Cordero, 2017

In addition to the information mentioned above, the client undertook a brief study of the catch composition during the extraction of mussel spat using scrapers along the Galician coast. A short summary of the study follows:

One part of the samples were collected along the coast, taking a sample of between one and two kilograms of seeds from the ones collected by producers registered in the PDO, but due to adverse weather conditions, less time was available than expected for the sampling throughout the coastline. 12 samples were collected during the month of January 2020, coinciding with the best tides of the month. Half of the sampled locations belong to the province of Pontevedra and the other half to that of Coruña (**Figure 7.3.4**).



Mapa de la costa gallega (provincias de Coruña y Pontevedra) donde se localización de los bancos naturales de semilla de mejillón muestreados.

Figure 2.3.4 Map of the Galician coast (provinces of Coruña and Pontevedra) where the sample points were located. Source: Consello Regulador.

The sum of the individual weighing of the mussel seed, the large mussel and the total bycatch is called the clean sample weight. This weight is less than the weight of the sample because it does not include sand, small shell fragments, and part of the water that continues to drain during sample processing. The weight of the clean sample is the one used in the calculation of the relative weights of the different defined fractions (brood, mussel, total bycatch, and main bycatch).

Table 7.3.1.1 shows the location of samples, as well as the variables analyzed (total sample weight, seed weight, weight of the mussel over 4 cm in length, the weight of total by-catch, weight of the main bycatch species, weight of the clean sample.

Table 7.3.1.1 Results of the samples analysed in the different sampling points. Source: Consello Regulador 2020.

	Concello	Zona	Localización	Día muestreo	Peso muestra (g)	Peso cría (g)	Peso mejillón (> 4 cm)	Peso total bycatch (g)	Bycatch principal	Peso bycatch principal (g)	Peso muestra limpia (g)	% peso semilla	% peso mejillón	% peso bycatch total	% peso bycatch principal
1	Fisterra	Mar de Fora	42.910722 -9.276722	13.01.2020	2.165	2.021	0	32	-		2.053	98,4	98,4	1,6	
2	Muros	Punta Coido, Tal	42.782411 -9.014933	13.01.2020	1.831	1.231	249	283	Balanos (*Balanus spp.*)	278	1.763	69,8	83,9	16,1	15,8
3	Marín	Loira	42.368301 -8.743260	27.01.2020	1.562	1.365	66	73	-		1.504	90,8	95,1	4,9	
4	Bueu	Cabo de Udra	42.339098 -8.837759	27.01.2020	1.430	1.001	57	197	Algas (*Corallina*)	152	1.255	79,8	84,3	15,7	12,1
5	Cangas	Cabo Home	42.250650 -8.869961	27.01.2020	1.660	1.576	10	32	-		1.618	97,4	98,0	2,0	
6	Corme	Santa Mariña-A Eiroa	43.292902 -8.923353	27.01.2020	1.525	1.322	101	14	-		1.437	92,0	99,0	1,0	
7	Baiona	Miradoiro antes del restaurante Rocamar	42.118424 -8.865334	28.01.2020	2.005	1.970	0	10	-		1.980	99,5	99,5	0,5	
8	A Guarda	cerca del Miradoiro de Punta Bazar	41.940237 -8.887036	28.01.2020	2.160	1.733	0	13	-		1.746	99,3	99,3	0,7	
9	Sanxenxo	Portonovo, Paxariñas	42.390825 -8.845013	28.01.2020	1.789	1.445	0	252	Balanos (*Balanus spp.*)	248	1.697	85,2	85,2	14,8	14,6
10	Porto do Son	Basoñas	42.620886 -9.055672	28.01.2020	1.617	1.376	0	14	-		1.390	99,0	99,0	1,0	
11	Ribeira	Aguiño, As Centoleiras	42.516415 -9.010713	28.01.2020	1.255	1.097	0	39	-		1.136	96,6	96,6	3,4	
12	Laxe	Punta Cabalo	43.228206 -8.981891	28.01.2020	1.621	1.434	0	10	-		1.444	99,3	99,3	0,7	
				TOTAL MUESTRAS	20.620	17.571	483	969	balanos	526	19.023	92,4	94,9	5,1	2,8

Only in three samples did the total species of bycatch add up to more than 5% of the weight of the clean sample: Bueu-Udra, Muros-Tal and Sanxenxo-Paxariñas.

In two of the seed samples, a significant presence of large size barnacles was recorded: Sanxenxo-Paxariñas and Muros-Tal. This is possibly explained because the weather conditions at the beginning of the seed

extraction campaign were not the best for producers to access to seed banks, so they did not have access to “cleaner” seed patches.

At the beginning of the campaign, in some places, the recorded low tides were not as intense as expected, so only the seed from the top of the bank and the least exposed rocks were accessed, where the quality of the seed patches is worse, i.e. the lower the quality, the greater the presence of bycatch and the greater the size of the seed.

In spite of everything, in most samples, mussel weight represented more than 96% of the total weight of the clean sample. Similarly, in the Bueu-Cabo Udra sample, an alga (Corallina) also added a significant part of the total weight of the clean sample.

In general, the appearance of mussel seed stock in samples was quite homogeneous and clean, with practically mono-specific mussel seed patches with a wide range of sizes (from mms to several cms). In some cases, and in some samples, especially in those with the greatest presence of bycatch, monospecific patches were observed mixed with patches of seed fixed on algae or on barnacles. Except for the barnacles, very few specimens of other animal species were found in the samples.

Table 7.3.1.2 Summary of the species that can be found along with the mussel, based on the references above. “x” indicates the presence of the species in the specific source.

Phylum	Scientific name	SOURCE 1: 2018 Piñeiro - Corbeira	SOURCE 2: 2009 Tato et al	SOURCE 3: 2017 Troncoso & Sibaja-Cordero	SOURCE 4 2020: Client study
Cnidaria	*Actinia equina*	x	x		
	Sagartiogeton undatus		x		
	Aulactinia verrucosa		x		
	Anemonia viridis		x		
	Obelia geniculata		X		
	Sertularella distans		X		
	Sertularella polyzonias		x		
	Sertularella gaudichaudi		x		
	Dynamena pumila		x		
	Amphisbetia operculata		x		
Arthropoda	*Chthamalus* sp.	x			x
	Chthamalus montagui		x	x	
	Chthamalus stellatus		x		
	Balanus sp	x			x
	Perforatus perforatus		x	x	
	Semibalanus balanoides	x			
	Pycnogonum litorale		x		
	Callipallene phantoma		x		
	Anoplodactylus virescens		x		
	Achelia simplex		x		
	Achelia echinata		x		
	Pachygrapsus marmoratus		x		

	Tanais dulongii		x		
	Jaera (Jaera) praehirsuta		x		
	Jaera (Jaera) albifrons		x		
	Idotea pelagica		x		
	Idotea granulosa		x		
	Ischyromene lacazei		x		
	Dynamene magnitorata		x		
	Dynamene bidentata		x		
	Campecopea lusitanica		x		
	Campecopea hirsuta		x		
	Microdeutopus anomalus		x		
	Apherusa jurinei		x		
	Apherusa bispinosa		x		
	Hyale stebbingi		x		
	Apohyale prevostii		x		
	Apohyale perieri		x		
	Stenothoe monoculoides		x		
	Astrominius modestus		x		
	Pollicipes pollicipes		x		
	Amphiglena mediterranea		x		
	Terebella lapidaria		x		
	Arenicolides ecaudata		x		
Annelida	*Cirratulus cirratus*		x		
	Scoletoma funchalensis		x		
	Scoletoma impatiens		x		
	Lepidonotus clava		x		
	Syllis vivipara		x		
	Syllis prolifera		x		
	Syllis pectinans		x		
	Syllis gracilis		x		
	Syllis amica		x		
	Sphaerosyllis hystrix		x		
	Odontosyllis ctenostoma		x		
	Platynereis dumerilii		x		
	Perinereis oliveirae		x		
	Eumida sanguinea		x		
	Eulalia viridis		x		
Mollusca	*Lepidochitona cinerea*		x		
	Acanthochitona crinita		x		

	Patella depressa		x		
	Patella ulyssiponensis		x		
	Patella vulgata		x		
	Tectura virginea		x		
	Steromphala cineraria		x		
	Steromphala umbilicalis		x		
	Steromphala pennanti		x		
	Phorcus lineatus		x		
	Tricolia pullus		x		
	Bittium reticulatum		x		
	Marshallora adversa		x		
	Cerithiopsis tubercularis		x		
	Littorina obtusata		x		
	Littorina saxatilis		x		
	Melarhaphe neritoides		x		
	Skeneopsis planorbis		x		
	Brachystomia scalaris		x		
	Cingula trifasciata		x		
	Crisilla semistriata		x		
	Onoba semicostata		x		
	Rissoa parva		x		
	Barleeia unifasciata		x		
	Nucella lapillus		x		
	Ocinebrina aciculata		x		
	Runcina coronata		x		
	Doris pseudoargus		x		
	Facelina auriculata		x		
	Onchidella celtica		x		
	Musculus costulatus		x		
	Musculus discors		x		
	Anomia ephippium		x		
	Kellia suborbicularis		x		
	Lasaea rubra		x		
	Venerupis corrugata		x		
	Hiatella arctica		x		
Bryozoa	*Aetea anguina*		x		
	Electra pilosa		x		
	Scruparia ambigua		x		
	Scruparia chelata		x		

	Flustrellidra hispida		x		
Echinodermata	*Amphipholis squamata*		x		
Chordata	*Ascidia conchilega*		x		
SEAWEEDS		x			
Rhodophyta	*Lithophyllum hibernicum*	x			
	Mastocarpus stellatus	x			
	Hildenbrandia rubra	x			
	Asparagopsis armata	x		x	
	Laurencia pyramidalis	x			
	Ceramium spp.	x			
	Gelidium pulchellum	x			
	Mastocarpus stellatus	x			
	Corallina ferreyrae	x			
	Caulacanthus ustulatus	x			
	Chondracanthus acicularis	x			
Chlorophyta	*Ulva* sp.	x			
	Bryopsis plumosa	x			
Ochrophyta	*Ralfsia verrucosa*	x			
	Leathesia marina	x			
	Halopteris scoparia	x			

Considering the result of the client report regarding the composition of the catch from the spat mussel harvesting, it can be concluded that in average the bycatch does not surpassed 5%. Therefore, in average, the proportion of any of the accessory species presented in the catch never exceeded 5%, which means that all species should be classified as minor secondary species. Notwithstanding, the team agreed to classify the goose barnacle (*Pollicipes pollicipes*) as a main secondary species since is commercially exploited and because of the conflict that exists between the goose barnacle and the mussel spat harvesters. All the other species were considered minor secondary species. In face of the above, the team decided to use the RBF and PSA outputs only for the goose barnacle. In the case of the barnacle species (Chthmalus spp, Balanus sp. and Semibalus sp.), although it was carried out a RBF, the team decided not to use the PSA output for those species considering that the proportion of them in the catch is, in average, very low as concluded from the client report. According to FCP v2.01 PF 4.1.4 the team may elect to conduct a PSA on “main” species only when evaluating PI 2.1.1 or 2.2.1. If the team decides to consider “main” species only, final PI score shall be adjusted downward in accordance with clause PF 5.3.2 (the final score shall not be greater than 80).

7.3.1.2 Primary and secondary species

All those species that are not protected (ETP) must be classified as primary ('primary') or secondary ('secondary') depending on whether their management implements measures that seek to achieve an objective expressed in Biological Reference Points (eg: BMSY, Blim, FMSY, Flim, SSBMSY, SSBlim) in relation to the status of the stock (see SA3.1.3-3.1.4). For the evaluation process, those species managed based on BRPs will be considered as ‘Primary’, while the remaining P2 species will be considered as ‘Secondary’. In turn, all of them (primary and secondary) will be classified as main (‘Main’) or smaller (‘Minor’) depending on the percentage of the catch they represent (SA3.4.2-3.4.5). In general, those species that represent ≥5% of the total catch weight of the UoA will be main (≥2% in the case of less resilient species, such as sharks), while the remaining species will be classified as minor.

In addition to the above, Principle 2 has a series of exceptions applicable to the condition of Enhanced Fisheries and specifically those that are CAG (Catch and Grow) as the one under evaluation. According to Annex SB, a CAG fishery based exclusively on seed collection should not take into account the effects on primary and secondary species. However, and although the standard in its requirement SB3.3.1 refers only to the use of dredgers, the team considers that for the UoA1 (spat collection from the rocky coastal strip) the impact on primary and secondary species must be taken into account. For UoA2 (use of spat collectors) that exception does not apply and primary and secondary species will not be assessed.

7.3.1.3 ETP species

As for the ETPs and based on SA3.1.5, the team will assign ETP species as follows:

1. Species that are recognized by national legislation as ETP.
2. Species listed in the binding international agreements indicated below:
    - Appendix 1 of the Convention on International Trade in Endangered Species (CITES), unless it can be demonstrated that the particular stock affected by the UoE is not in danger.
    - Binding agreements concluded under the Convention on Migratory Species (CMS).
    - Species classified as "out of scope" (amphibians, reptiles, birds and mammals) that are listed on the IUCN Red List as vulnerable (VU), endangered (EN) or critically endangered (CR).

Species that are appear exclusively on non-binding lists such as ASCOBANS, IUCN Red List, OSPAR, HELCOM or that are only the subject of intergovernmental recognition (such as FAO International Plans of Action) and that are not included under national legislation or binding international agreement are not considered as ETP under MSC protocols.

CITES Appendix 1 lists species that are the most endangered among CITES-listed animals and plants. They are threatened with extinction and CITES prohibits international trade in specimens of these species with some exeptions, for instance for scientific research. Appendix 1 of CITES has been accessed by the team at the CITES website (see reference).

As Spain is a member of the EU the species protected by the EU Habitat Directive (Annex II) and the Birds Directive (Council Directive 2009/147/EC) should also be considered ETP species.

The EU Bird Directive aims to protect all European wild birds and the habitats of listed species, in particular through the designation of Special Protection Areas (SPA). Under this assessment all birds species listed in the EU Bird Directive are considered ETP species.

Under this PI, only those effects of rope grown mussel cultivation that may reasonably be expected to affect ETP species are considered. Mussel culture on ropes and spat collection on rocks are not likely to affect protected or endangered fish species like sharks and rays or fish species protected by the Habitat Directive so these are not considered. The species groups where impacts are considered possible are marine mammals and birds. Possible effects are: entanglement in mussel farm structures and spat catching structures, ingestion of litter from farms, exclusion by farm structures, reduced or increasing prey availability, disturbance (noise or boat activity), creation of resting places on floats within farms (Lloyd, 2003). Spat collection on rocky shores could result in disturbance of birds and could lead to the removal of food for birds. These impacts are assessed in the scoring tables for ETP species.

7.3.1.3.1 Marine mammals

Species listed in CITES Appendix 1 that sometimes occur in the coastal waters and rias of Galicia are fin whales (*Balaenoptera* spp.), sperm whales (*Physeter macrocephalus*) and Bottlenose Dolphin (*Tursiops truncates*).

Marine mammals that are listed in Annex II of the Habitat Directive and occur in the Galician rias are Bottlenose Dolphin (*Tursiops truncates*) and Harbour porpoise (*Phocoena phocoena*).

In New Zealand there have been some occasions of whales being entangled in mussel farm structures. (Loyd, 2003). Larger whales like fin whales and sperm whales are only occasionally seen in the waters off the Algarve coast. The chances that such whales would be entangled in mussel ropes (especially when the lines are covered with a layer of mussels) can be considered minimal.

There have been no reports of dolphin entanglement in lines in New Zealand (Loyd, 2003). Probably because of their echolocation capabilities and small size, there is no risk of dolphins becoming entangled in mussel ropes. Interaction between ETP species and mussel rafts are limited to bottlenose dolphins (*Tursiops truncatus*) that are attracted by rafts due to the large aggregations of fish species around these structures that provide high concentrations of high quality food for the dolphins (Lopez & Methion, 2017). There are no reports of entanglement of this species in the rafts.

Seals are not present in the Galician rias. But occasionally a common seal *(Phoca vitulina*) is spotted along the Galician coast. Although pinnipeds frequently become entangled in fishing nets, none have been reported entangled in ropes and they are unlikely to be entangled in mussel farm structures (Lloyd, 2003). Since the entanglement of marine mammels in mussel ropes has never happened since rope mussel culture started in Galicia it can be considered a higly unlikely event (especially when the lines are covered with a layer of mussels.

Additionally, a recent study in Ria de Arousa found mussel rafts act as fish attractor devices attracting common dolphins (*Tursiops truncatus*). Large aggregations of fish species around mussel rafts provide high densities of high-quality prey for dolphins.

7.3.1.3.2 Birds

A large number of sea birds species are present or regularly seen in the rias of Galicia. Species present (among others) are: Great skua (*Stercorarius skua),* European Storm Petrel (*Hydrobates pelagicus*), Northern Gannets (*Morus bassanus*), Common Scoter (*Melanitta nigra*) and Common merganser (*Mergus merganser*). Direct effect from mussel culture on long lines on birds species are not to be expected in this fishery (Roycroft et al., 2004). In other mussel rope cultures sometimes large numbers of eider ducks are present and these birds are feeding on mussels on the culture ropes and therefore actively and intentionally disturbed and scared away by the mussel farmers. Eider ducks are however very rarely spotted in Galician rias and no such activities take place. The disturbance of birds by the normal activities on the culture site like the harvesting of mussels is not considered to have any significant impact on any bird species in the area.

7.3.1.4 Habitat

7.3.1.4.1 Habitat of the UoAs geographical area

The Autonomous Community of Galicia has approximately 1,200 km of coastline. The estuaries, which are old river valleys through which a river channel flowed and which, due to a series of tectonic processes were invaded by the sea, constitute an ideal ecosystem for mussel farming. The FAO (Food and Agriculture Organization of the United Nations) considers the Galician Rias as one of the most important phytoplankton deposits on the planet. Its special conditions, the temperatures of its waters and the high primary production, make them an unbeatable place for the development of seafood.

Mussel seed for relaying and on-growing is obtained from the rocky shores of Galicia. Mussel seed are gathered from intertidal rocky shores by scraping them from the surface of the rock using rudimentary fishing tools (scraps). Brea Bermejo (2009) estimated in 18,870 Mt the mean annual mussel seed biomass available along the Galician coast, between Ortegal and the mouth of the Miño river (occupying an area of ≈113 ha). According *Xunta de Galicia* in recent years the average mussel seed catch data per raft is 2,100 kg, which corresponds to an average annual catch of 7,110.6 tons (Client report, 2020b). This agrees with the estimates made by Labarta et al. (2005). Considering the mussel seed biomass available (18,870 tons) and the annual average catch (7,110.6 tons) it can be concluded that around 38% of the biomass is annually extracted from natural mussel beds. Cacerés-Martinez & Figueras (2007), reported that to obtain 4,250 tons of mussel seed is necessary to scrap an area of 21.6 ha. Therefore, to obtain 7,110.6 tons of mussel seed an area of 36.1 ha is exploited annually, which corresponds to 31.9% of the total area where mussel seed occurs.

In Galicia, mussels are cultured in rafts placed in the interior of the rias. The Rıas Bajas are located in the western coast of Galicia (NW of the Iberian Penınsula) (**Figure. 7.3.5**). There are four rıas, from north to south: Muros-Noia, Arousa, Pontevedra and Vigo. Their characteristic morphology is that of a funnel in plan view, with its central axis lying in a SW–NE direction, and an approximate width of 8–12 km in their external part, and from 1–3 km in their inner part. Depth varies from approximately 50–60 m in the external part to 5–10 m at the mouth of the main river (Villas et al., 2005). Vilas (2002) divided the rıas into three clearly

differentiated sectors from sea to land: the external, the internal zone, and the estuarine area. The other ría under assessment, Ría Ares-Betanzos (**Figure. 7.3.5**), is located in the NW coast of Spain, and has a V-shaped inlet divided into two parts: an inner shallower part consisting of the estuaries of river Eume and Mandeo, and an outer deeper part that is connected to the shelf (Álvarez-Salgado et al., 2011). Some characteristics of the five rías are presented in Table **7.3.1.3.1.**

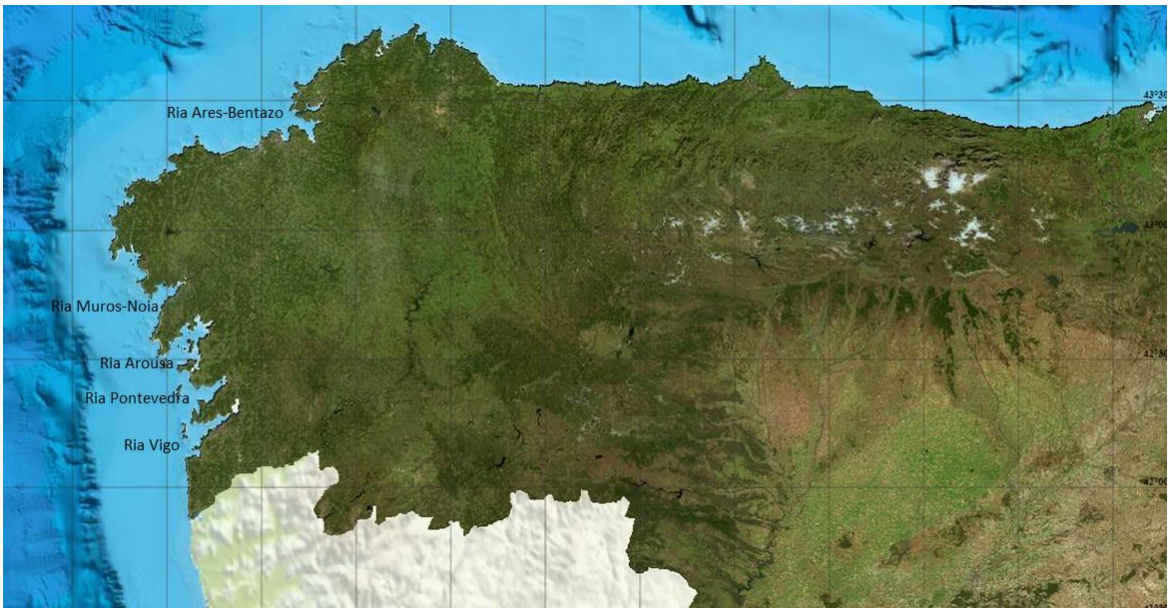


Figure. 7.3.5 Map showing the localization of the five rias under assessment. Source: http://mapas.intecmar.gal/plancamgal

Table 7.3.1.3.1 Characteristics of different rías. Source: www.mexillondegalicia.org

RIA	Vigo	Pontevedra	Arousa	Muros-Noia	Ares-Betanzos
Longitude (Km)	33	23	26	12	19
Surface (Km)	175	145	230	120	72
Volume (m3)	3100	3240	4300	2700	750
Max depth (m)	42	40	65	46	40
Rivers	Oitavén Lagares	Lérez	Ulla, Umia	Tambre	Eume, Mandeo

To understand the impact that fishing may produce on the habitat, is fundamental to know the location of the fishing grounds in order to characterize the habitats where the fishery takes place. At present, there are 3,386 rafts dedicated to the production of mussels (Table 7.3.1.3.2), which are grouped in 44 polygons, distributed among the five rias. In Galicia, rafts are grouped in specific areas, named polygons. Georeferenced information on the position of the polygons (**Figure 7.3.6** Top) and on the characteristics of superficial sediments (**Figure 7.3.6** bottom) within each Ria can be obtained from http://mapas.intecmar.gal/plancamgal/.

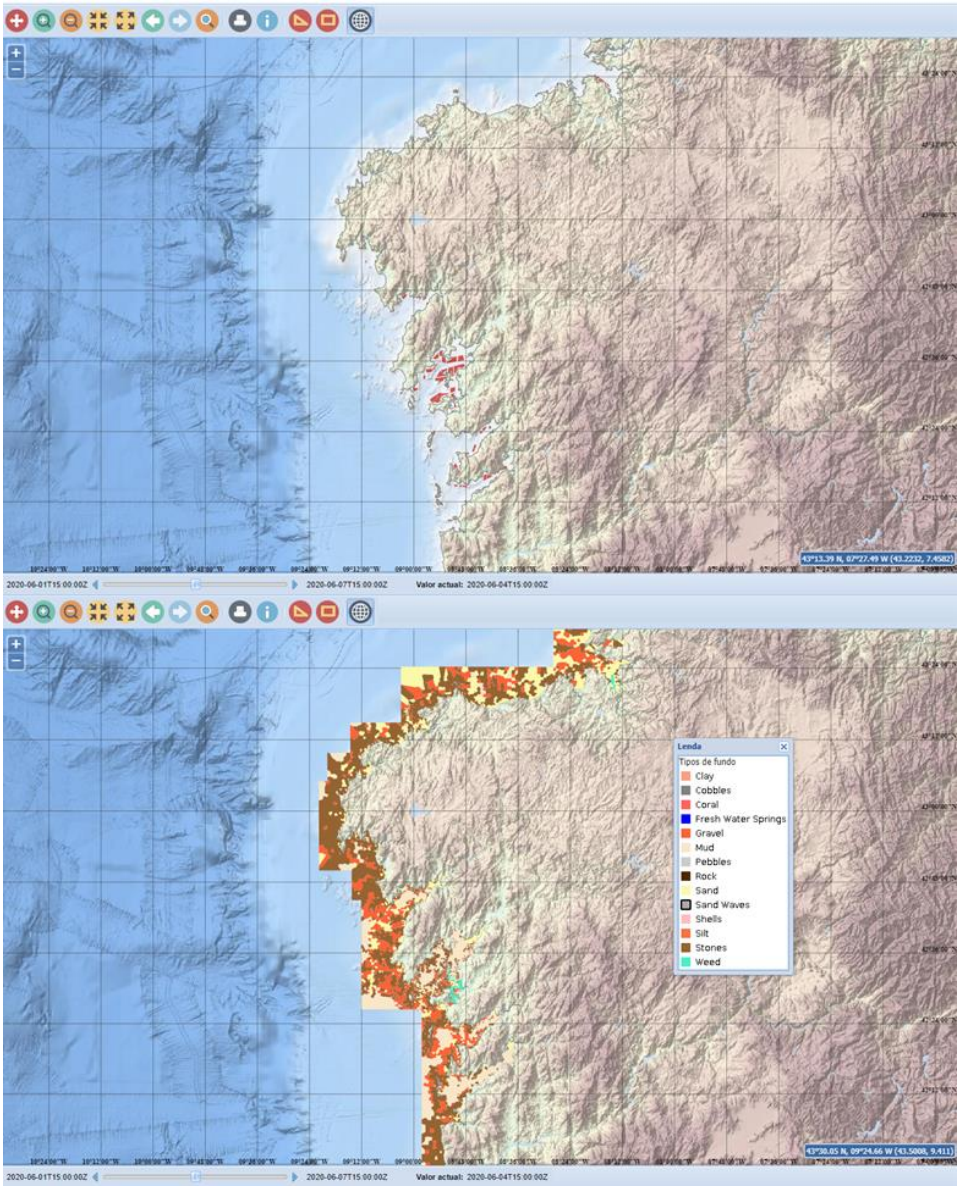


Figure 7.3.6. Georeferenced localization of the polygons (top) and distribution of bottom types (bottom). Source: http://mapas.intecmar.gal/plancamgal/

The number of polygons and mussel raft per Ria, as well as the respective areas are presented in Table 7.3.1.3.2 (Consello Regulador Mejillón de Galicia, 2000). A total of 44 polygons were identified, of which 18, 13, 7, 4 and 2 are localized in the rias of Arousa, Vigo, Pontevedra, Muros-Noia and Ares-bentazos, respectively. The proportion of the total area occupied by the polygons within each Ria ranges between 2.97% (Ria Muros-Noia) and 17.95% (Ria Arousa) (Table 7.3.1.3.3; Consello Regulador Mejillón de Galicia, 2000). Approximately 68% of the mussel rafts are placed within Ria Arousa (**Table 7.3.1.3.2**).

Table 7.3.1.3.2 Number of polygons and rafts per Ria and respective areas. Source: Consello Regulador Mejillón de Galicia, 2000.

RIA	nº polygons with mussel rafts	nº of mussel rafts	Polygon área with mussel rafts (m^2)	Area occupied by mussel rafts (m^2)	Area of polygons occupied by mussel rafts (%)
Ares-Betanzos	2	105	1.876.277,43	57.750	3,08
Muros-Noia	4	122	2.317.350,66	67.100	2,9
Arousa	18	2.318	41.419.787,45	1.274.900	3,08
Pontevedra	7	343	5.176.643,89	188.650	3,64
Vigo	13	498	6.600.480,88	273.900	4,15
TOTAL RIAS	**44**	**3.386**	**57.390.540,31**	**1.862.300**	**3,08**

Table 7.3.1.3.3 Proportion of the area of each Ria occupied by polygons and mussel rafts. Source: Consello Regulador Mejillón de Galicia, 2000.

RIA	Total Area (m^2)	Area occupied by polygons (%)	Area occupied by mussel rafts (%)
Ares-Betanzos	58.456.685,63	3,21	0,1
Muros-Noia	78.154.043,28	2,97	0,09
Arousa	231.995.274,80	17,85	0,55
Pontevedra	83.590.451,80	6,19	0,23
Vigo	120.635.609,45	5,47	0,23
TOTAL RIAS	**572.832.064,96**	**10,02**	**0,33**

Within the areas of the polygons the sediment bottom varies from muddy to pebbles (mixed with soft sediments). In some polygons occurs maerl beds (Peña & Barbara, 2009), considered a vulnerable marine ecosystem (VME). From Table 7.3.1.3.4, it can be concluded that in Ria Ares-Bentazos the rafts are mainly located over sandy bottoms, in Rias Muros-Noia, Arousa and Vigo over muddy bottoms, whereas in Ria Pontevedra they are mainly located over mixed bottom of soft sediment with pebbles. To underline that in Ria Arousa some rafts are located in areas where seaweeds/plants occur.

Table 7.3.1.3.4. Bottom types that may be affected by mussel production in rafts. Maerl beds excluded. Source: Consello Regulador Mejillón de Galicia, 2000.

Rafts	Encounterability (%)				
	Stones	Sand	Gravel	Mud	Seeweed/ Plants
Ares-Betanzos	9,52	90,48	0	0	0
Muros-Noia	5,74	5,74	8,2	80,33	0
Arousa	6,08	7,98	31,1	52,72	2,11
Pontevedra	56,85	2,92	4,37	35,86	0
Vigo	6,22	1,81	10,04	81,93	0
Total	11,34	9,04	23,51	54,67	1,45

Table 7.3.1.3.5 presents data on the area covered by each type of bottom for the entire Galicia, within Rias area, within production areas, and beneath rafts. For the practical purpose of management, Xunta de Galicia has not proposed “thresholds” against which levels of disturbance can be measured. Nevertheless, the team has considered for sedimentary habitats a 15% threshold of overlap between mussel production and a particular habitat (excluding VME), above which mussel production activity is deemed to have a significant impact on that habitat. This threshold was based in other similar fishery already certified by MSC (Ireland rope grown mussel). Based in this threshold (15%) from Table 7.3.1.3.5 considering the entire Galicia it can be concluded for each bottom type that the maximum proportion (considering the entire area of the polygons) that may be affected is always lower than 6%. If only the area of each Ría is taking into consideration, although the proportion of each bottom type that may be impacted increases, never exceeds 14%.

Table 7.3.1.3.5 Area covered for each bottom type that may be affected by mussel production in rafts. Maerl beds excluded. Source: Consello Regulador Mejillón de Galicia, 2000.

	Area (WGS84; $m^{2)}$			
	Galicia	Ría	Polygon	Rafts
Stones	1.852.753.578,01	130.357.371,89	17.570.403,65	437.800
Sand	1.104.595.970,31	107.579.930,51	5.013.696,31	168.300
Gravel	728.344.164,81	84.933.783,98	7.479.556,51	211.200
Mud	496.183.652,27	229.481.826,59	26.282.504,68	1.018.050
Seaweed-Plants	20.479.152,00	20.479.152,00	1.044.379,16	26.950

7.3.1.4.2 Potential habitat impacts of mussel farming

The impact of mussel farming on the environment has been extensively studied. Effects described have been related to sedimentation rate, changes on habitat structure, biodeposition, loading of organic matter, changes on the sediment redox layer, and changes on sediment fluxes. Increase in sedimentation beneath the rafts and longlines are caused by changes on hydrodynamics and reduced flow because of the suspension structure (e.g. Pérez Camacho & Beiras, 1995; Blanco et al., 1996; Herman, 2007; Duarte et al., 2008; Petersen et al., 2008). Several studies have shown that dropper line diameter (Plew et al., 2005) and dropper line as well as farm size and configuration may influence current velocities (Boyd & Heasman 1998; Duarte et al. 2008; Stevens et al. 2008). de Jong (1994) and Lloyd (2003) also reported that shell deposits on the bottom due to fall-off may also slow the flow across the sediments, increasing sedimentation rates. Fall-off of mussels and associated organisms from culture structures can be considerable (Iglesias, 1981; Kaspar et al., 1985; Freire & González-Gurriarán, 1990; Inglis & Gust, 2003) which may also alter the habitat due to the creation of benthic structure, providing a habitat for species normally associated with hard-bottom communities (McKindsey et al., 2011). Biodeposits (faeces and pseudofaeces) have a greater sinking velocity than their constituent particles increasing the flux of organic matter to the bottom beneath mussel farms (Dame, 1996; Newell, 2004). Biodeposition can alter the characteristics of the sediment below culture systems, with sediments tending to be constituted by finer grain sizes and higher silt/clay content, and lower porosity and water content (Giles et al, 2006). Increased organic loading to the sediment from biodeposition by mussels and associated organisms influences the biogeochemical properties of benthic sediments, including modifying benthic respiration and nutrient fluxes at the water-sediment interface (Christensen et al. 2003; Richard et al. 2007a; Richard et al. 2007b; McKindsey et al., 2001) In addition, as organic matter accumulates in the sediment, and the abundance and biomass of the associated organisms increase, leading to substantial oxygen consumption and nutrient fluxes at the interface between culture structures and the water column (e.g. Mazouni, 2004; Nizzoli et al., 2006). Benthic ammonium (Giles et al., 2006; Nizzoli et al. 2006), phosphate (Carlsson et al., 2009) and silicate fluxes are greater within mussel culture sites than in reference sites (Richard et al., 2007a, 2007b; Alonso-Pérez et al., 2010). Increased ammonium and phosphate likely result, in part, from the degradation of mussel biodeposits which are rich in nitrogen and phosphorus (Kautsky & Evans 1987). Some studies reported that Total Organic Matter (TOM) are higher at farm sites than in control areas (Grant et al. 1995 and Hartstein and Rowden 2004). Faecal based sediments are also characterised by increased C:N ratios and increased organic content (Christensen et al, 2003). However, some authors (Grant et al., 1995; Crawford et al., 2003) reported that organic carbon between culture and non-culture sites although variable and often not distinguishable. Other studie, found higher carbon content and nitrogen content under suspended mussel than at reference locations (Chamberlain et al., 2001; Stenton-Dozey et al., 2001). The effect of suspended shellfish aquaculture on sediment redox potential as also been widely studied and most them showed that cultured mussels caused localized decreases in sediment redox potential (Dahlback & Gunnarsson, 1981; Mirto et al., 2000; Chamberlain et al., 2001). The redox discontinuity layer can be identified from a shift in sediment colour from brown through grey to black and is used to identify the depth at which the sediments become anaerobic (McKindsey et al., 2011). Sulfate reduction is an indicator of anaerobic metabolism and have been observed to be higher at raft sites (Dahlback & Gunnarsson, 1981; Grant et al., 1995; Stenton-Dozey, 2001).

Although mussel farming may have several effects on the habitat, they appear to be localized to within the basic footprint of the farm and are generally site specific, being more severe in areas with lower hydrodynamics (see review by Lewis & Nelson, 2008).

7.3.1.4.3 Maërl beds as VME (Vulnerable Marine Ecosystem)

For a habitat to be classified as vulnerable it must have the following characteristics as defined in paragraph 42 of the FAO Guide (for more details see GSA3.12.3.2):

- Uniqueness or rarity
- Functional significance of the habitat
- Fragility
- Life-history traits of components sècoes that make recovery difficult
- Structural complexity.

Maerl beds present all these characteristics and therefore were considered as VME. The conservation importance of maerl led to the inclusion of maerl on the OSPAR list of threatened and/or declining habitats (OSPAR, 2006). The European Union's Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) is the most important legal instrument for the conservation of biodiversity in the European Union (EU). The Article 11 of this Directive requires Member States to monitor the species and types of habitat listed in annexes I, II, IV and V, within their territory, whereas Article 17 requires each Member State to prepare a six-year report on the provisions that they have adopted for compliance. In Spain, this commitment was transposed to the Law 42/2007, of December 13th, on Natural Heritage and Biodiversity. Therefore, Member States must assess the conservation status of species and types of habitats of community interest, which must be carried out for each biogeographic or marine region in which they occur, according to a format and methodology established by the European Commission (EC). Of the habitat types included in Annex I of the Directive, 118 (51%) are officially recognized as present in Spain.

The Habitat Directive gives legislative protection to maerl with *Phymatolithon calcareum* and *Lithothamnion corallioides* included in Annex V of the Directive. In addition, the maerl community is included under specific habitats listed in the Annex I ("sandbank covered by seawater all the time" and "large shallow inlets and bays") as habitat 1170 Reefs. Both species are listed in the Catalogue of Endangered Species of Galicia (Decree 88/2007) as "vulnerable". The spatial distribution of this habitat within Galicia can be viewed and mapped through the EMODnet Seabed Habitats website (https://www.emodnet-seabedhabitats.eu) that provides a permanent single portal for accessing seabed habitat data in Europe (**Figure 7.3.7**).

According to Hall-Spencer (2003) and Grall et al. (2006) maerl beds are comprised by loose-lying non-jointed coralline red algae (Corallinales, Rhodophyta) that can build up over millennia, creating carbonate-rich gravel deposits. Maerl beds are structurally and functionally complex perennial habitats that support a very rich biodiversity and high functional diversity, which is attributed to their complex architecture (Barbera et al., 2013). Maerl beds can also be of importance to fisheries, since they provide nursery areas and brood stock areas for several commercial species for commercial species (e.g Thouzeau, 1991; Sanchez-Mata et al., 1998; Steller et al., 2003).

In the north-west of the Iberian Peninsula, maerl beds are formed of *Lithothamnion corallioides* and *Phymatolithon calcareum* (e.g. Donze, 1968; Adey and McKibbin, 1970; Bárbara et al., 2004; Peña & Bárbara, 2004). In Galicia the main maerl beds are located along the central channel of the rias, in water depths ranging from 5 to 35 m, mainly in gravelly areas mixed with broken shells, pebbles, occasionally occurring on sandy and muddy bottoms (Peña & Bárbara, 2008).

Peña & Barbara (2009), mapped the maerl beds in Galicia. In this study, samples were collected from November 2003 to June 2009 in eight Galician rias, using dredges and SCUBA diving, from lower intertidal to 47 m. Maerl beds were only presented in five of the rías sampled, namely, Ferrol, Muros-Noia, Arousa, Pontevedra and Aldán, and Vigo. A total of 111 maerl beds were recorded in these rías (**Figure 7.3.7**), of which 65% (14.20 km^2) were located in Ria Arousa, occupying a total area of 21.78 km^2. Other important maerl areas were found in the Ría de Vigo (3.31 km^2) and Ría de Pontevedra and Aldán (2.64 km^2). Regarding to the maerl cover classes (%), the cover class 1-25% was the most abundant one (9.09 km^2) followed by the cover class 76-100% (6.80 km^2) (**Table 7.3.1.3.6**).

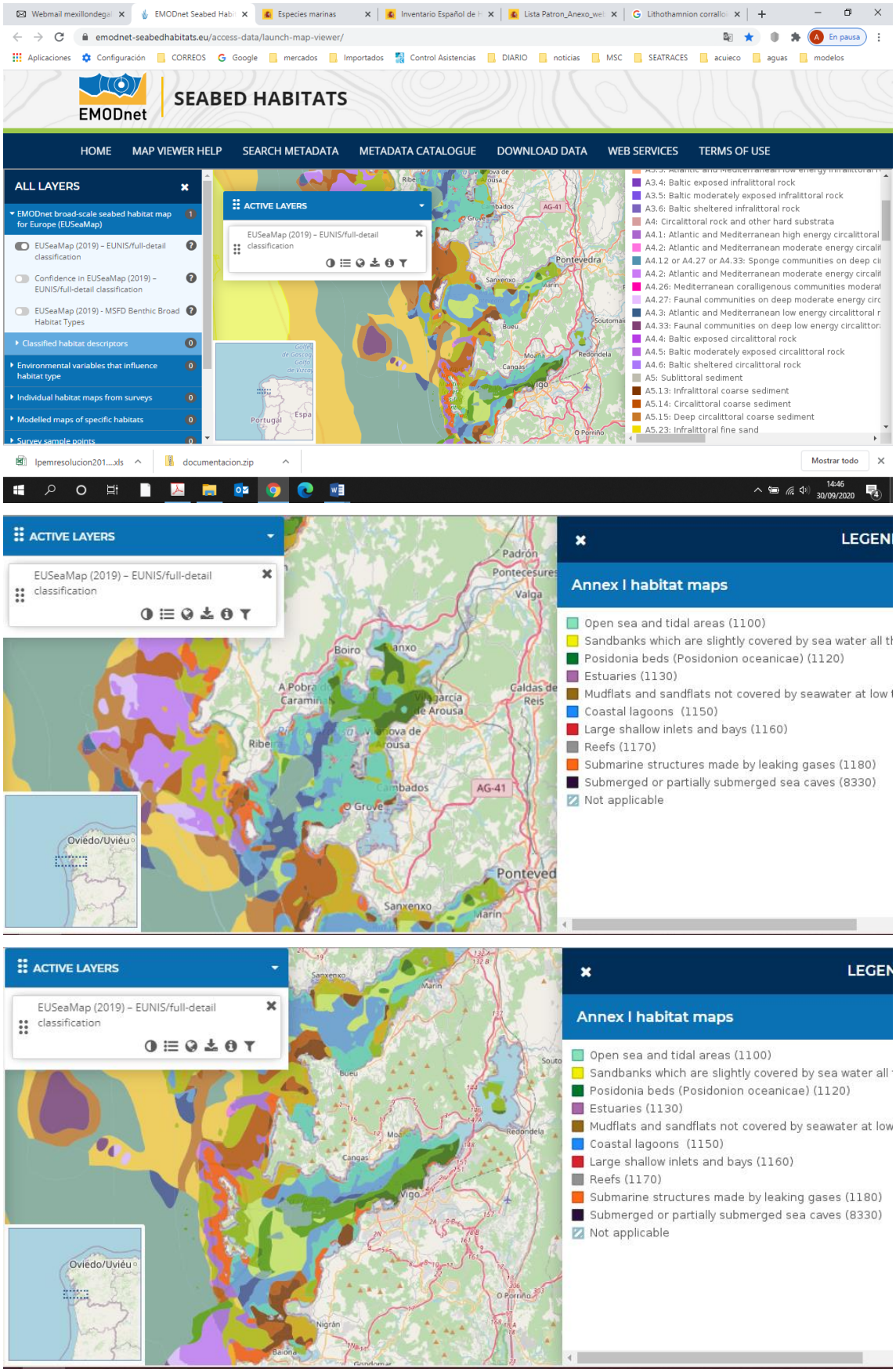


Figure 7.3.7 Annex I habitat maps including the Reefs habitat (1170) where the maerl beds are included in the UoA geographical area. Source: Emodnet

Table 7.3.1.3.6 Maërl beds cover classes by Ría. Source: Peña 2010.

Cover classes (%)	Ría de Ferrol Area (km^2)	Ría de Ferrol Depth (m)	Ría de Muros-Noia Area (km^2)	Ría de Muros-Noia Depth (m)	Ría de Arousa Area (km^2)	Ría de Arousa Depth (m)	Rías de Pontevedra and Aldán Area (km^2)	Rías de Pontevedra and Aldán Depth (m)	Ría de Vigo Area (km^2)	Ría de Vigo Depth (m)	TOTAL Area (km^2)	TOTAL Depth (m)
1-25	0.12	8-21	1.08	5-32	4.90	0-41	2.00	2-32	0.99	1-28	**9.09**	**0-41**
26-50	0.05	11-13	0.13	6-20	1.43	2-38	0.21	5-20	0.71	3-24	**2.53**	**2-38**
51-75	-	-	0.19	13-23	2.49	1-24	0.13	6-21	0.55	5-20	**3.35**	**1-24**
76-100	-	-	0.07	8-17	5.38	2-26	0.29	6-18	1.06	4-16	**6.80**	**2-26**
TOTAL	**0.17**	**8-21**	**1.47**	**5-32**	**14.20**	**0-41**	**2.64**	**2-32**	**3.31**	**1-28**	**21.78**	**0-41**

In 2009, a total of 23 (6 km^2) maerl beds were located within protected marine sites, namely within the Islas Atlánticas National Park (Sálvora Archipelago in the Ría de Arousa, Ons Archipelago in the Ría de Pontevedra and Cíes Archipelago in the Ría de Vigo) and within two Natura 2000 sites ("Costa Ártabra" in the Ría de Ferrol and "Complexo Ons- O Grove" extended along the rías de Arousa and Pontevedra) (**Figure 7.3.8**). Posteriorly, the Natura 2000 sites have been extended in 2014 through the designation of the ZEPA (special protection area for birds) ES0000499 "Marine area of the Rías Baixas de Galicia", which includes the external part of the Arousa, Pontevedra and Vigo Rías, increasing the area of maërl beds located in protected marine sites: 16 km^2.

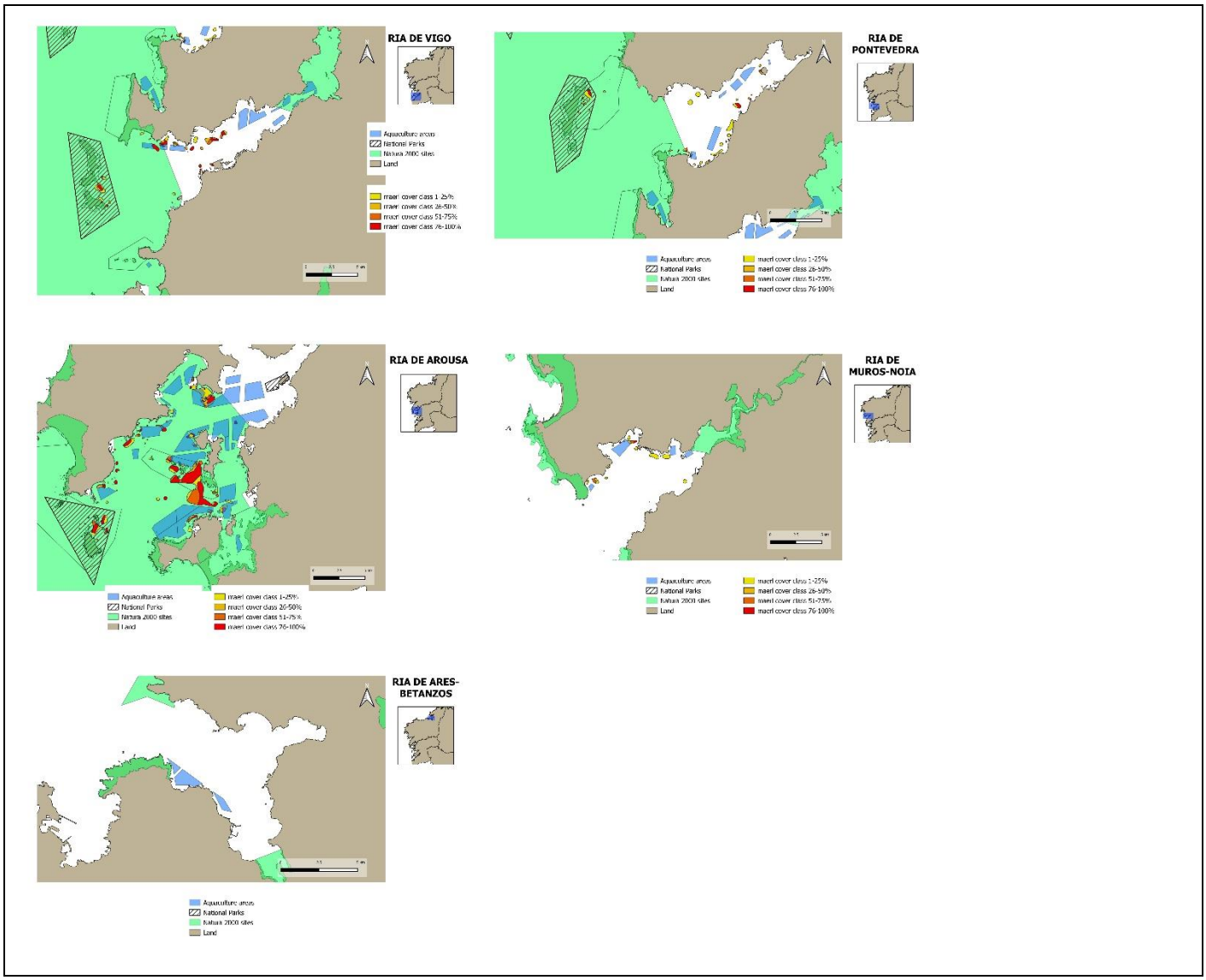


Figure. 7.3.8 Distribution maps of the maerl bottoms (per cover class) in the different Rías. Aquaculture areas and the National Parks and Natura 2000 stripes are also indicated. Source: prepared by the client using the following references: Maërl cover class (Source: Peña & Barbara, 2009); Aquaculture areas (Source: INTECMAR); Natura 2000 sites and National Parks (Source: MITECO).

7.3.1.4.3.1 UoA encounterability with maerl beds

In what concerns mussel raft production in Galician Rías, of the 111 maerl beds mapped, 34 (3.58 km^2) of them were located in the immediate vicinity of aquaculture areas. The area and proportion of maerl that effectively are within the polygons delimited in the rías are resumed in **Table 7.3.1.3.7**. From this table, it can be concluded that the proportion of maerl within the polygons never exceeds 4.5% (Consello Regulador Mejillón de Galicia, 2000).

Table 7.3.1.3.7. Ellipsoidal areas (m^2) of the different maërl coverage classes presented in the mussel polygons and proportion of maërl within the area of polygons for each Ria. Source: Consello Regulador Mejillón de Galicia, 2000.

Maerl coverage / Ria	Area (WGS84; m$^{2)}$					Polygons area (m^2)	% of maerl within polygons
	1-25%	26-50%	51-75%	76-100%	Maërl TOTAL		
Muros-Noia	0	0	2171,357	24309,063	26480,42	2317350,741	1,14
Arousa	188817,861	376161,862	260432,246	904133,361	1729545,33	41460792,95	4,17
Pontevedra	3960,691	8960,405	12781,758	14811,536	40514,39	5176643,9	0,78
Vigo	71285,46	12359,353	46127,824	32071,493	161844,13	6600480,977	2,45
TOTAL 4 RIAS	264064,01	397481,62	321513,185	975325,453	1958384,27	55555268,56	3,53

In order to estimate the area and proportion of maerl that is beneath rafts it was determined the area that may be affected by each raft. Indeed, the anchor system adopted in the fishery allows the movement of the raft and therefore the area that is impacted by each of them is higher than the area of the raft itself. For this reason, for the calculations presented below (**Tables 7.3.1.3.8**. and **7.3.1.3.9**), for each raft it was designed a quadrat corresponding to the maximum area that is directly affected by each of them (**Figure 7.3.9**.).

Table **7.3.1.3.8** Estimations of the mean area (quadrat) that may be affected by each raft and for the rías where maerl beds occur. Source: Consello Regulador Mejillón de Galicia, 2000.

RIA	Area Total Polígonos (m^2)	Nº Cuadrículas	Superficie media de las cuadrículas (m^2)
MUROS	2.317.350,659	185	12.526,22
AROUSA	41.419.787,445	3.227	12.835,39
PONTEVEDRA	5.176.643,894	410	12.625,96
VIGO	6.600.480,878	637	10.361,82

Table **7.3.1.3.9** Overlapping area of maerl presented within polygons, mussel raft quadrats and beneath mussel rafts for each ría where maerl beds occur. Source: Consello Regulador Mejillón de Galicia, 2000.

	Maërl beds total cover in rias with mussel aquaculture and in Galicia (km^2) **	Maërl beds extensión in the vicinity of aquaculture areas (km^2) **	Maërl beds extension located within aquaculture areas (polygons) (km^2)#	Maërl beds extension located under grids with mussel raft (km^2)#	Maërl beds extension located under mussel rafts (km^2)#	No. of rafts located above maërl beds#
Ría Muros-Noia	1,47	0,33	0,03	0	0	0
Ría Arousa	14,20	2,57	1,73	0,65	0,03	51
Ría Pontevedra	2,64	0,09	0,04	0,04	0,002	3
Ría Vigo	3,31	0,78	0,16	0,20	0,01	19
TOTAL GALICIA	21,78	3,58	1,96	0,89	0,04	73

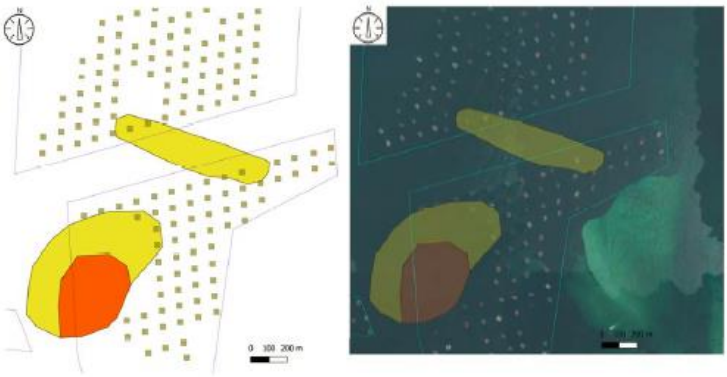


Figure. 7.3.9 Segment of the Ria Arousa showing the overlap of two maerl beds in two aquaculture polygons. Left – Map showing the quadrats within each polygon and the area of maerl that are beneath them. Right – Satellite photograph showing mussel rafts within each polygon and the area of maerl that are beneath them. Source: prepared by the client using the following references: Maërl beds (Source: Peña & Barbara, 2009); Aquaculture areas (Source: INTECMAR); Aeraila photograph (source: Sentinel satellite ortophotograph del Centro Nacional de Información Geográfica).

Based on the information presented in **Table 7.3.1.3.9**, it can be inferred that around 16.4% of maerl beds are within or in the vicinity of the polygons, around 9% of them are totally or partially located within the polygons, and only 4% are beneath the raft quadrats.

In the case of Ría Arousa, although 12.2% (1.72 km^2) of the maerl beds are located within the polygons, only 0.21% (28,050 m^2) are beneath the raft quadrats. The remain area of maerl that are inside the polygons are located in zones without mussel rafts (see **Fig. 7.3.9** as an example).

Table **7.3.1.3.10** Overlapping area of the alive/dead maerl ratio classes presented in Galicia, within polygons, mussel raft quadrats and beneath mussel rafts for each ría where maerl beds occur. Source: Ж - Peña & Bárbara (2009), and # - Consello Regulador Mejillón de Galicia, 2000: Maerl beds (source: Peña & Bárbara, 2009); Production polygons (source: INTECMAR); mussel rafts (bsed on data frm Acuivisor and Sigremar).

	Alive/dead maërl ratio classes	Alive/dead maërl ratio classes extension in rias with mussel aquaculture and in Galicia (km^2) Ж	Alive/dead maërl ratio classes extension located within aquaculture areas (polygons) (km^2)#	Alive/dead maërl ratio classes extension located under grids with mussel raft (km^2)#	Alive/dead maërl ratio classes extension located under mussel rafts (km^2)#	No. of rafts located above Alive/dead maërl ratio classes#
Ría Muros-Noia	0%	0,17	0	0	0	0
	1-25%	0,12	0,03	0	0	0
	26-50%	1,03	0	0	0	0
	51-75%	0	0	0	0	0
	76-100%	0,15	0	0	0	0
Ria de Arousa	0%	0	0	0	0	0
	1-25%	0,46	0,07	0,09	0,004	7
	26-50%	5,17	0,76	0,33	0,015	27
	51-75%	1,73	0,33	0,12	0,003	6
	76-100%	6,84	0,01	0,2	0,006	11
Ría de Pontevedra	0%	0,11	0	0	0	0
	1-25%	0,24	0	0	0	0
	26-50%	1,23	0,01	0,01	0,001	1
	51-75%	0,22	0,02	0,03	0,001	2
	76-100%	0,82	0,01	0	0	0
Ría de Vigo	0%	0,02	0	0	0	0
	1-25%	0,18	0,02	0,03	0,002	3
	26-50%	1,53	0,08	0,09	0,006	10
	51-75%	0,76	0,04	0,04	0,002	4
	76-100%	0,82	0,02	0,02	0,001	2
TOTAL GALICIA	**0%**	**0,31**	**0**	**0**	**0**	**0**
	1-25%	**1,11**	**0,12**	**0,12**	**0,006**	**10**
	26-50%	**8,97**	**0,86**	**0,44**	**0,021**	**38**
	51-75%	**2,71**	**0,39**	**0,18**	**0,007**	**12**
	76-100%	**8,66**	**0,61**	**0,21**	**0,007**	**13**

In Table 7.3.1.3.10 is presented for each ría where maerl beds occur, the overlapping area of the alive/dead maerl ratio classes presented in Galicia, within polygons, mussel raft quadrats and beneath mussel rafts. From the analysis of this Table it can be inferred:

(a) 0% maërl alive/dead: All areas where maerl are totally dead are located outside mussel production polygons.

(b) 1-25% maërl alive/dead: Of the 1.11 km^2 of the 1-25% alive/dead maërl class in Galicia, 118,084 m^2 are found within the mussel polygons (10.81%), the same percentage that is under squares occupied with mussel rafts. Only 0.54% occur beneath mussel rafts.

(c) 26-50% alive/dead: Of the 8.97 km^2 of the 26-50% alive/dead maërl class in Galicia, 855,426 m^2 are found within the mussel polygons (9.59%). Under squares occupied with mussel rafts there is 4.91%, and beneath mussel rafts there is 0.23%.

(d) 51-75% maërl alive/dead: Of the 2.71 km^2 of the 51-75% alive/dead maërl class existing in Galicia, 387,701 m^2 are found within the mussel polygons (14.39%). Under squares occupied with mussel rafts there is 6.64%, and beneath mussel rafts there is 0.26%.

(e) 76-100% alive/dead: Of the 8.66 km^2 of the 76-100% alive/dead maërl class existing in Galicia, 611,201 m^2 are found within the mussel polygons (7.04%). Under squares occupied with mussel rafts there is 2.42%, and beneath mussel rafts there is 0.08%.

Considering a total area of 1.98Km^2 of maerl beds that occur within polygons, 6, 43, 20 and 31%, correspond to an alive/dead maerl ratio classes of 1-25%, 26-50%, 51-75% and 76-10%, respectively (Table 7.3.1.3.10).

7.3.1.4.3.2 Impacts of aquaculture on maerl beds

Maerl beds are threatened by several human activities such as direct exploitation, aquaculture, eutrophication, bottom fisheries, mooring of boats, construction of coastal structures and introduction of non-native species (BIOMAERL Team, 1999, 2003; Hall-Spencer et al., 2006, 2008; Peña & Bárbara 2008b). Several studies have highlighted the negative impacts of aquaculture on maerl communities (e.g Mora, 1980; BIOMAERL team, 1999; De Grave & Whitaker, 1999; Barberá et al., 2003; Grall and Hall-Spencer, 2003; Wilson et al., 2004; Vilas et al., 2005; Hall-Spencer et al., 2006; Peña et al., 2006; Peña & Bárbara, 2008b; Riul et al., 2008). Impacts reported include the burial and decline of maerl abundance, and reduction in water movement and restriction of gaseous exchange around the maerl, both due to the deposition of detritus and fine sediment derived from mussel cultures which settles out on the substratum, which leads to the loss/reduction of the structural heterogeneity and complexity of maërl accompanied with the loss of biodiversity. Nevertheless, contrary to what might be expected, Peña & Barbara (2008a) reported for the maërl bed of Benencia Island (in Arousa) that it has been preserved for the last 40 years and its extension and coverage has not been negatively affected by the surrounding rafts.

The impacts of any damage to maerl beds are long lasting because the key habitat structuring species has a limited regenerative ability (Hall-Spencer & Moore, 2000), since thalli grow very slowly (Littler et al., 1991; Birkett et al., 1998) and therefore maerl deposits may take hundreds of years to develop, especially in high latitudes (BIOMAERL team, 1998).

7.3.1.5 Ecosystem

A large number of studies have been conducted on the ecosystem impacts of mussel rope culture in various parts of the world. These studies show that this activity can have ecological effects on the seabed and on the water column (Varela et al., 1984; Keeley, 2009; Ingles & Gust, 2003; Duarte et al., 2008; Ysebaert et al., 2009; Gallardi, 2014; Figueiras et al., 2002; OESA, 2017; Outeiro et al. 2018). Besides these two generally well-studied impacts there are some wider ecological issues connected to mussel farming. Structures are put in the water and these form mid-water artificial reefs that provide a food source, breeding habitat, and refuge from predators for some species. Potential effects of mussel rope culture on seabirds and marine mammals (seals, dolphins and whales) relate mainly to entanglement (Loyd, 2003).

The effects on the seabed of rope mussel bottom culture through the deposition of pseudo phaeces are discussed under PI 2.4.1 Habitat. The risks of entanglement of marine mammals have been discussed under PI 2.3.1. ETP.

Pelagic ecological impacts of rope culture include the depletion of phytoplankton and the alteration of nitrogen cycles in the water column. The large concentrations of mussels found in mussel farms can extract a significant proportion of phytoplankton. Mussel farms act as biological filters and influence the types and amount of food available in the water column. This in turn has the potential to have top-down effects on the wider ecosystem by influencing the amount of resources available at the base of the food web. Mussel farms also result in a concentration and redistribution of nutrients (Christensen, 2003). Farmed mussels and other associated fauna release dissolved sources of nitrogen (e.g. ammonium) directly into the water column as metabolic waste products. Water column nitrogen concentrations can also be increased due to enhanced benthic re-mineralisation rates beneath the farm (i.e. the microbial breakdown of mussel biodeposits on the sediment surface and flux of ammonium into the water column). Localised nutrient enrichment could effectively stimulate production of algae attached to the mussels and culture lines (Black, 2001).

The ecological effects on the water column of mussel culture in the rias of Galicia are described by Tenore (1985) and Outero et al. (2018) amongst others. Tenore distinguishes (for Ria Arousa) the following ecological effects: the surface area of and detritus provided by mussels support a dense epifaunal community on ropes that supplies food to demersal fish and crabs; changed patterns in plankton composition, epifaunal larvae rather than copepods dominate the zooplankton community; nutrient recycling by mussels dampens phytoplankton oscillations and contributes to high seaweed production on ropes.; heavy sedimentation of mussel deposits changes the sediment regime and lowers infaunal production; outwelling of particulate organics derived from mussel deposits from the Rias enhances benthic biomass and may support coastal fisheries.

Mussels provide surface area for attachment and detrital food, in the form of mussel faeces, that supports a dense epifaunal community of over 100 invertebrates (Tenore and Gonzalez, 1975) Many of these species are detritivores feeding on the biodeposits produced by the mussels. Reworking of the mussel deposits is important in that it reduces the organic load sedimenting to the bottom. Mussels on one raft can produce 35gC·m-2·d-1 and the detrital-feeding epifauna utilize this resource so that only a fraction (0.5 to 2.5gC·m-2·d-1) reaches the sediments (Tenore et al., 1982). Thus, most mussel faeces are converted into animal biomass that in turn serve as a food for benthic megafaunal fishes and crabs. Even though epifauna associated with mussels rework a large portion of the mussel faeces, a significantly high organic load still sediments to the bottom. This results in a high (ca. 14%) organic content of silty bottom muds and results in a low diversity and biomass of a "pollution" infaunal benthos (Tenore et al., 1982). Sediment changes restrict the distribution of some demersal fishes and may adversely affect scallop recruitment.

Several of the issues described by Tenore (1985) are further discussed by Outero at al. (2018) who state that Tenore has identified several win-win trophic and productive situations in Ria de Arousa enabled by aquaculture rafts and mussel production. However besides winners there are also losers. Among the winners are *Trisopterus luscus* and gobies have shifted their diet adapting to the new feeding paradigm in Arousa (Lopez-Jamar et al., 1984). In addition, commercially valuable *Necora puber* (Gonzalez-Gurriaran, 1982) and common prawn *Palaemon serratus* (Figueras, 1984) utilize the mussel rafts ropes. Moreover, vertical resuspension of cultured mussel pseudo-faeces constitutes a major component of the Particulate Organic Carbon (POC) in the water column (Frojan et al., 2016) having a “paradoxal” positive effect on the filter feeding mussels (Navarro et al., 1996). Additionally, a recent study in Ria de Arousa found mussel rafts act as fish attractor devices attracting common dolphins (*Tursiops truncatus*). Large aggregations of fish species around mussel rafts provide high densities of high-quality prey for dolphins, however no conclusive effects of the mussel rafts on attracting dolphins are presented (Lopez & Methion, 2017).

Despite these positive impacts, there are also losers in this situation. Large amounts of standing biomass on ropes produces a vast amount of biodeposits, which can impede infaunal development (Lopez-Jamar et al., 1984). There are also bottom-up trophic cascading effects of zooplankton species shifts from holoplankton-based to meroplankton-based resulting in changes to the diets of small pelagic fish species. In particular, sardine and anchovy use Ria de Arousa as a nursery during the summer season and can conflict with crustacean *Pisidia longicornis* zoea blooms that displace the biomass of copepods (Lopez-Jamar, 1977), which are the preferred zooplankton prey (Corral and Alvarez-Ossorio, 1979). Other potential losers of mussel aquaculture are commercially valuable wild bivalves (*Pecten maximus, Chlamys varia, Aequipecten opercularis* and *Ostrea edulis)* which are resident species and present longer life cycles. Because they reach

maturity later, they compete for resources and species with non-commercial detritivorous species common by mussel rafts and ropes, such as *Ciona intestinalis, Cucumaria elongata* and *Phallusia mamillata*.

Mussel excrete high levels of ammonia and thus increase the rate of geochemical cycling of nitrogen. This is particularly important in that the intrusion of upwelled water and resultant primary production is intermittent in the rias. Episodic upwelling events, occurring roughly every 2 to 3 weeks, result in bursts of primaryproduction superimposed on the typical spring-fall bloom and summer low of temperate coastal phytoplankton (Campos and Marino 1981). Phytoplankton biomass·and production then decline as the nutrients are used up and there is no further replenishment during periods of coastal downwelling. In the Ria de Muros, where there are few mussel rafts, these declines are much more dramatic than in the Ria de Arosa, where regeneration of mussel excretory products supply same nutrients during non-upwelling periods. Furthermore, a large seaweed community, dominated by green and red algae in fall and winter and kelps in summer, also grows on the mussel ropes (Lapointe et al., 1981). Besides providing attachment surface, ammonia excreted by the mussels may well provide a constant nutrient source for seaweeds.

From a biological point of view, the Galician rías are ecosystems with high primary production. Primary production can reach 250 g C/m2/year in the Ría de Arousa (Varela et al., 1984), which is far higher than the average primary production observed in the Atlantic Ocean (100 g C/m2 /year) and is close to the estimated average for land ecosystems (Fraga and Margalef, 1979). The high primary production as a result of the upwelling of nutrient rich water results in a very high productivity of the ecosystem and supports the large production of mussels in the Galician rias. Several studies have focused on the levels of culture that reduce the food in the water to concentrations where they begin to affect the growth of the culture itself. These approaches relate to production carrying capacity (i.e. the stocking density of bivalves at which harvests is maximised (Inglis et al., 2000) or the physical carrying capacity of a given coastal area. Blanton et al. (1987) have demonstrated for the Ria de Arosa, that mussel condition was significantly correlated with the upwelling of ocean water rich in nutrients, hence with food supply. Growth was better in years with more upwelling, hence growth is food limited. Phytoplankton concentration establishes the maximum available food, and water velocity passing through the culture area determines the rate at which the food is supplied. Several studies (Pérez-Camacho at al., 1995; Pérez-Camacho at al., 2014) have been conducted studying the factors determining mussel growth in Galician rias. They show that mussel growth depends on site, water current and chlorophyl a concentration in the water passing the rafts.

As was shown previously, coastal upwelling–downwelling is the oceanographic process that is responsible for both factors (Figueras at al., 2002). Figueras et al. (2002) estimated that mussels incorporate ∼7% of carbon produced in the Rías during the upwelling season, a value that rises to ∼12% when net community production, that is, GPP[2] minus carbon respired in the water column (i.e. including mussels respiration), is considered. Thus mussel culture extracts approximately 10 % of primary productions. Varela et al. (1984) however estimated that mussel farming in the Ría de Arousa required ~60% of the available phytoplankton. Villasante et al. (2010) state that cultivation of mussels is notably contributing to reaching the carrying capacity. They claim that mussel culture reduces the primary production available for other human activities like artisinal fisheries.

Outero et al (2018) conclude that mussle culture has caused an impact in the ways and proportions of primary production is directed towards high trophic levels. They however also claim, based on Ecopath maturity index and omnivory index output values that Ria de Arousa (with the most intensive mussel culture of the Galician rias) can be considered a mature ecosystem relative to other estuarine systems and that this high level of maturity may be interpreted as the resilience of this system to cope with changes brought about over time by the intensification of food production and human activity.

Summarizing the above information the team concludes that the main impacts of mussel culture in Galicia on the ecosystems of the rias are the competion of cultured mussels with herbivore copepods for phytoplankton with resulting impacts on food chains and species and the impact of the activity on sedimenst and bentic life an the sea bottom under the rafts. The activity has no detrimental effects on bycatch species or ETP species. The question to be answered here is whether the ecosystem impacts of the activity disrupt the key elements underlying ecosystem structure and function, to a point where there would be serious or irreversible harm to the environment. The latter being *the reduction of key features most crucial to maintaining the integrity of its structure and functions and ensuring that ecosystem resilience and productivity is not*

[2] Gross primary production.

adversely impacted. This includes, but is not limited to, permanent changes in the biological diversity of the ecological community and the ecosystem's capacity to deliver ecosystem services.

7.3.1.6 Scoring elements to be assessed

Table 7.3.1.4 – Scoring elements

Component	Scoring elements	Designation	Data-deficient
Secondary	Goose barnacle	Main	Yes (RBF used)
Habitat (VME)	Maërl	VME	No

7.3.2 Principle 2 Performance Indicator scores and rationales

PI 2.1.1 – Primary species outcome

PI 2.1.1		The UoA aims to maintain primary species above the point where recruitment would be impaired (PRI) and does not hinder recovery of primary species if they are below the PRI		
Scoring Issue		SG 60	SG 80	SG 100
a	Main primary species stock status			
	Guide post	Main primary species are **likely** to be above the PRI. OR If the species is below the PRI, the UoA has measures in place that are **expected** to ensure that the UoA does not hinder recovery and rebuilding.	Main primary species are **highly likely** to be above the PRI. OR If the species is below the PRI, there is either **evidence of recovery** or a demonstrably effective strategy in place **between all MSC UoAs which categorise this species as main**, to ensure that they collectively do not hinder recovery and rebuilding.	There is a **high degree of certainty** that main primary species are above the PRI **and are** fluctuating around a level consistent with MSY.
	Met?	UoA1: Yes UoA2: NA	UoA1: Yes UoA2: NA	UoA1: Yes UoA2: NA
Rationale				

UoA1: None of the species that coexist with the mussel in the coastal strip (see **Table 7.3.1.2**) is managed based on biological reference points and therefore none of them corresponds to the P2 component designated as 'Primary' according to MSC. Therefore there is no impact on a particular component and it shall receive an outcome score of 100 following SA3.2.1. **UoA2**: Not applicable, in accordance to SB3.1.1.

B	Minor primary species stock status			
	Guide post			Minor primary species are highly likely to be above the PRI. OR If below the PRI, there is evidence that the UoA does not hinder the recovery and rebuilding of minor primary species.
	Met?			UoA1: Yes

				UoA2: NA

Rationale

UoA1: As described above, there are no minor primary species in this fishery and therefore following SA3.2.1 a score of 100 is awarded.

UoA2: Not applicable, in accordance to SB3.1.1.

References

Piñeiro-Corbeira *et al*, 2018

Tato *et al*., 2009

Troncoso and Sibaja-Cordero, 2017

Consello Mexillón. 2020. Extraction of mussel spat using scrapers along the Galician coast.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report

Draft scoring range	UoA1: >80 UoA2: NA
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report

Overall Performance Indicator score	**UoA1: 100** **UoA2: NA**
Condition number (if relevant)	**N/A**

PI 2.1.2 – Primary species management strategy

PI 2.1.2		There is a strategy in place that is designed to maintain or to not hinder rebuilding of primary species, and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are **measures** in place for the UoA, if necessary, that are expected to maintain or to not hinder rebuilding of the main primary species at/to levels which are likely to be above the PRI.	There is a **partial strategy** in place for the UoA, if necessary, that is expected to maintain or to not hinder rebuilding of the main primary species at/to levels which are highly likely to be above the PRI.	There is a **strategy** in place for the UoA for managing main and minor primary species.
	Met?	**UoA1: Yes** **UoA2: NA**	**UoA1: Yes** **UoA2: NA**	**UoA1: No** **UoA2: NA**
Rationale				

UoA1; Since there are no primary species, there is no requirement for primary species management. With reference to the "if necessary'" statement within the SG80 scoring guidepost, **SG60 and SG80 are achieved** for this PI. SG100 is not met because there is not a **strategy** in place for the UoA1 for managing main and minor primary species.

UoA2: NA

b	Management strategy evaluation			
	Guide post	The measures are considered **likely** to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is some **objective basis for confidence** that the measures/partial strategy will work, based on some information directly about the fishery and/or species involved.	**Testing** supports **high confidence** that the partial strategy/strategy will work, based on information directly about the fishery and/or species involved.
	Met?	**UoA1: Yes** **UoA2: NA**	**UoA1: Yes** **UoA2: NA**	**UoA1: No** **UoA2: NA**
Rationale				

UoA1: Since there are no primary species SG80 is met by default. there is no requirement for management.

UoA2: NA

c	Management strategy implementation			
	Guide post		There is **some evidence** that the measures/partial strategy is being **implemented successfully**.	There is **clear evidence** that the partial strategy/strategy is being **implemented successfully and is**

				achieving its overall objective as set out in scoring issue (a).
	Met?		**Yes**	**No**
Rationale				

UoA1: Since there are no primary species and a partial strategy is not necessary SG80(a) is met by default. Since no strategy is in place for primary species it can not be evaluate and SG(c) is not scored.

UoA2: NA.

d	Shark finning			
	Guide post	It is **likely** that shark finning is not taking place.	It is **highly likely** that shark finning is not taking place.	There is a **high degree of certainty** that shark finning is not taking place.
	Met?	**NA**	**NA**	**NA**
Rationale				

No sharks are caught in this fishery, and therefore there is no need to score this SI.

e	Review of alternative measures			
	Guide post	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main primary species.	There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main primary species and they are implemented as appropriate.	There is a **biennial** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of all primary species, and they are implemented, as appropriate.
	Met?	**NA**	**NA**	**NA**
Rationale				

UoA1: As there are no primary species, it follows that there are no unwanted primary species.

UoA2: NA

References

List any references here, including hyperlinks to publicly-available documents.

Draft scoring range	UoA1: ≥80 UoA2: N/A
Information gap indicator	Information sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	**UoA1: 80**

	UoA2: NA
Condition number (if relevant)	**N/A**

PI 2.1.3 – Primary species information

PI 2.1.3		Information on the nature and extent of primary species is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage primary species		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impact on main primary species			
	Guide post	Qualitative information is **adequate to estimate** the impact of the UoA on the main primary species with respect to status. **OR** **If RBF is used to score PI 2.1.1 for the UoA:** Qualitative information is adequate to estimate productivity and susceptibility attributes for main primary species.	Some quantitative information is available and is **adequate to assess** the impact of the UoA on the main primary species with respect to status. **OR** **If RBF is used to score PI 2.1.1 for the UoA:** Some quantitative information is adequate to assess productivity and susceptibility attributes for main primary species.	Quantitative information is available and is **adequate to assess with a high degree of certainty** the impact of the UoA on main primary species with respect to status.
	Met?	**UoA1: Yes** **UoA2: NA**	**UoA1: Yes** **UoA2: NA**	**UoA1: Yes** **UoA2: NA**
Rationale				

UoA1: Although there is no impact of the UoA on primary species, this PI should be assessed. It should be checked if the information collected is adequate to demonstrate that there is indeed no impact on primary species (according to the interpretation of MSC: Scoring P2 species in absence of impact, originally published on 06/12/2015). Although there are no a regular monitoring of the natural mussel beds, different studies have contributed to gain good knowledge on the species composition of the communities living in the intertidal and subtidal rocky coastal strips (see studies referred in **sections 7.3.1**). Based on this information and the fact that none of the species present is managed with the use of reference points the team concludes with a high degree of certainty that there are no primary main species. This means that that SG60, SG80 and SG100 are met.

UoA2: N/A

b	Information adequacy for assessment of impact on minor primary species			
	Guide post			Some quantitative information is adequate to estimate the impact of the UoA on minor primary species with respect to status.
	Met?			**Yes**
Rationale				

UoA1: The available information shows that there are no species that are managed using reference points (see **Section 7.3.1.2**) and (thus) that are no primary species. This information is adequate to assess with complete certainty that the fishery has no impact on minor primary species. Therefore, **SG100 is met**.

UoA2: NA.

c	Information adequacy for management strategy			
	Guide post	Information is adequate to support **measures** to manage **main** primary species.	Information is adequate to support a **partial strategy** to manage **main** primary species.	Information is adequate to support a **strategy** to manage **all** primary species, and evaluate with a **high degree of certainty** whether the strategy is achieving its objective.
	Met?	**UoA1: Yes** **UoA2: NA**	**UoA1: Yes** **UoA2: NA**	**UoA1: Yes** **UoA2: NA**
Rationale				

UoA1: The information that exist is adequate to assess with complete certainty that the fishery has no impact on all primary main species. **SG100 is met**.

UoA2: NA

References

List any references here, including hyperlinks to publicly-available documents.

Overall Performance Indicator score	**UoA1: 100** **UoA2: NA**
Condition number (if relevant)	**N/A**

PI 2.2.1 – Secondary species outcome

PI 2.2.1		The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biological based limit		
Scoring Issue		SG 60	SG 80	SG 100
a	Main secondary species stock status			
	Guide post	Main secondary species are **likely** to be above biologically based limits. OR If below biologically based limits, there are **measures** in place expected to ensure that the UoA does not hinder recovery and rebuilding.	Main secondary species are **highly likely** to be above biologically based limits. OR If below biologically based limits, there is either **evidence of recovery** or a **demonstrably effective partial strategy** in place such that the UoA does not hinder recovery and rebuilding. AND Where catches of a main secondary species outside of biological limits are **considerable**, there is either **evidence of recovery** or a, **demonstrably effective strategy in place between those MSC UoAs that have considerable catches of the species**, to ensure that they collectively do not hinder recovery and rebuilding.	There is a **high degree of certainty** that main secondary species are above biologically based limits.
	Met?	**RBF**	**RBF**	**RBF**
Rationale				

UoA 1 (spat collection in rocks)

Despite the lack of detailed data on the species composition resulting from the spat collection done by hand using scrapers on the rocky coastal strip, the composition of the communities coexisting with the mussel beds is well known (see **Section 7.3.1.2** and **Table 7.3.1.2**). Existing studies characterising these communities reveal that:

(i) Although the species composition is highly dependent on physical characteristics of the coastal strip (e.g. height, exposure, morphology), mussels form dense, aggregate beds, allowing harvesters to select the most appropriate areas to be exploited and minimizing the catch of non-target species.
(ii) The only species coexisting with the mussels with commercial value is the goose barnacle.

This means that there are no incentives for the mussel producers to target other species which are not mussel spat, with the only exception of the goose barnacle. They are not authorised to target goose barnacle, but the impact of the mussel spat collection from the rocky coastal strip and the goose barnacles has raised controversy between mussel producers and goose barnacles harvesters since when removing mussel spat from the rocks also goose barnacles can be caught.

In order to provide the team with additional information on catch composition the client commissioned a brief study of the catch composition during the extraction of mussel spat using scrapers along the Galician coast. 12 samples were collected during the month of January 2020, coinciding with the best tides of the month. Half of the sampled locations belong to the province of Pontevedra and the other half to that of Coruña.

Table 7.3.1.1 in paragraph 7.3.1 shows the location of samples, as well as the variables analyzed (total sample weight, seed weight, weight of the mussel over 4 cm in length, the weight of total by-catch, weight of the main bycatch species, weight of the clean sample.

Based on the catch composition shown from the samples the team considered that it is highly unlikely that the contribution of goose barnacles or any other species to the total volume removed by the mussel collectors is ≥5%. However, due to the lack of specific monitoring and data on the species composition harvested by the mussel collectors when removing mussel spat from the rocky coastal strip, the limited amount of available data and the controversy raised by this issue, the assessment team decided to take a precautionary approach and decided that goose barnacle shall be assessed as a main secondary species, and RBF was used for its assessment since no biologically based limits are available to assess the status of this species/stock (See **Section 7.3.1**).

UoA 2. N/A

	Minor secondary species stock status			
b	Guide post			Minor secondary species are highly likely to be above biologically based limits. OR If below biologically based limits', there is evidence that the UoA does not hinder the recovery and rebuilding of secondary species
	Met?			**Not assessed, in accordance with PF4.1.4**
Rationale				

In accordance to PF 4.1.4 the team elected to conduct a PSA on 'main' secondary species and not on 'minor secondary species'. Consequently, the score for PI 2.2.1 will be adjusted downward in accordance with clause PF5.3.2.1, meaning that overall score for this PI shall not be greater than 80.

References

Piñeiro-Corbeira, C., Barrientos, S., Olmedo, M., Cremades, J., & Barreiro, R. (2018). By-catch in no-fed aquaculture: exploiting mussel seed persistently and extensively disturbs the accompanying assemblage. ICES Journal of Marine Science, 75(6), 2213-2223.

Consello Regulador Mejillón de Galicia. 2020. Estudio de la composición de capturas en la extracción de semilla de mejillón en el litoral de Galicia. Informe del departamento de I+D del Consello Regulador Mejillón de Galicia.

Overall Performance Indicator score	**80**
Condition number (if relevant)	**N/A**

PI 2.2.2 – Secondary species management strategy

PI 2.2.2		There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are **measures** in place, if necessary, which are expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be above biologically based limits or to ensure that the UoA does not hinder their recovery.	There is a **partial strategy** in place, if necessary, for the UoA that is expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be above biologically based limits or to ensure that the UoA does not hinder their recovery.	There is a **strategy** in place for the UoA for managing main and minor secondary species.
	Met?	**Yes**	**Yes**	**No**
Rationale				

UoA1 (spat collection in rocks)

The collection of mussel spat from the rocky coastal strip is regulated by the *Xunta de Galicia*. Order of October 26, 2000 establishes the authorised areas, season and sets a maximum amount of mussel spat to be removed to supply each raft (3,500 kg/raft). (See section 7.2.1.2 for a complete overview on this issue.) The collection of mussel spat is only allowed in the period 1 December - 30 April. This allows for regenation of mussel spat through new spatfall and growth in the May – November period. It is also prescribed that only mussel spat should be targetted. The harvesting of goose barnacles is reserved to the goose barnacle collectors.

It is important to note that the Order mentioned above contains an additional provision in which it is mentioned that whenever the monitoring and evaluation of resources advise it, the Jefatura Territorial, within the scope of its competence, may modify the areas, quantities, and periods of extraction through the publication of a resolution that must be communicated to the interested parties in due time. This provision was used in April, May and June of 2020, mainly due to the pandemic situation, resulting in two Resolutions published by the respective territorial Delegations of Vigo and Coruña, and which includes the extension of the extraction period, the areas of non-permitted extraction and the limitation in the number of harvesters. These resolutions cite the need to coexist with other activities carried out in the same areas, mainly with the extraction of barnacles. The details of this exceptional circumstances and how the process took place between mussel seed and gooseneck barnacle collectors mediated by the Consellería has been described in PI 3.2.2.

This collection of mussel spat can be done either by mussel producers (this is what happens in most occasions) and, in some cases, by goose barnacle collectors from the authorised fisher's guild in a particular portion of the coastal strip as it is set out in the Decree 153/2019. In both cases they shall follow the regulation of the Xunta de Galicia.

In the case of the goose barnacle collectors, they also have to develop an annual management plan for collecting goose barnacle, in accordance with the Order of December 30, 2015. The annual plans of exploitation of goose barnacle include different components of the management system: number of authorized fishers, areas where fishing is allowed, economic and production objectives, biological monitoring, number of working days, individual quotas per day, sites designated to control catches and to market the catches and a financial programme including expected total yearly incomes and expenses.

The Law 11/2008 of Fishing in Galicia establishes the regulation of measures related to the conservation, management and rational and sustainable exploitation of the marine resources. As part of the measures, management plans are included for the fishing and shellfish activities. Additionally, with the purpose of not harming or affecting the conservation of the goose barnacles, the Decree 153/2019 also appears to try to regulate the conservation and exploitation of the shellfish resources in Galicia. In its Article 13, the management plan of this secondary species can also reserve areas for the mussel seed extraction, as it is shared area for both goose barnacle collectors and mussel producers. In the case that the goose barnacle collectors dedicate time for mussel seed collection, they will be included in the annual allotted working days. For the renewal of their authorization for the shellfishing activity time dedicated to both actitivies (goose barnacle extraction and mussel spat collection) must be included in the annual alloment of days. For this reason, when they collect mussel seed in the area, this needs to be communicated in the fishermen´s guild to include the days as activity done as part of the annual allotment.

Since the establishment of the Decree 153/2019, the shellfish management plans will have a validity of 3 years instead of just 1 year. The *Consellería do Mar* has introduced changes related to this point based on the requests of the fishing sector. They have established objectives based on the stock health and on the assessement of stock volume. The catching quotas will be reviewed every 3 years based on the number of people enroled and with access to the resources over the last three years, taking into account that mussel spat collection is included as part of their extractive activity.

In 2011 the Consellería do Mar created the Mussel Commission as a permanent advisory body for the mussel sector (Order of December 28, 2010, establishing the Mussel Commission). This forum will discuss issues of interest along with representatives of the sector, such as the annual spat collection season. However, the forum where the goose barnacle collectors are represented is the Consejo Gallego de Pesca. See Section 7.4.1.5 for more details.

Based on the information presented above the team concludes that the measures restricting the amount of mussel spat that can be collected and the time restrictions on mussel spat collection also restrict the impact on the main secondary species goose barnacles. Therefore it can also be concluded that measures are in place that are expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be above biologically based limits or to ensure that the UoA does not hinder their recovery. **SG60 is met**.

As stated above, the Order of October 26, 2000, regulates the extraction of mussel seed in natural banks. In May 2020 this regulation has been partially amended after the 2020 conflict between mussel seed and gooseneck barnacle harvesters. After several several meetings between parties mediated by the Consellería do Mar a provisional agreement, only for the 2020 season, was met and Provincial Resolutions were published on this topic on 31 May 2020 (see (in Galician) https://www.asesoriadelmar.com/detallar-noticia.php?id=6794; and (in Spanish) https://www.diariodepontevedra.es/articulo/comarcas/xunta-prorroga-mes-extraccion-mejilla-fija-zonas-exclusivas-percebeiros/20200601191725108904 5.html). On the one hand, several (additional) areas relevant for the gooseneck barnacle harvesters were closed for mussel seed harvesting. On the other hand the 2020 season for seed harvesting on the rocks was extended with one month. Based on recent development the team concludes that further measures have been taken to reduce the impact of the fishery on goose barnacles and that the existing measures together form a patial strategy that is expected to maintain or not hinder rebuilding of this main secondary species. Thus, **SG80 is met**. SG100 is not met since it cannot be concluded that the measures together form a full strategy to manage main secondary species.

UoA2- Not applicable.

	Management strategy evaluation			
b	Guide post	The measures are considered **likely** to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/species).	There is **some objective basis for confidence** that the measures/partial strategy will work, based on some information directly about the UoA and/or species involved.	**Testing** supports **high confidence** that the partial strategy/strategy will work, based on information directly about the UoA and/or species involved.
	Met?	**Yes**	**Yes**	**No**

Rationale

UoA1- Based on the information presented in SI(a) is was concluded that there is a partial strategy in place that a is expected to maintain or not hinder rebuilding of main secondary species. The measures in place that reduce the impact of the fishery on goose barnacles are the closed season and the areas that are closed for mussel spat collection. Further the impact on the goose barnacle stock is limited due to the quantity restriction on mussel spat collection. It is obvious that the area closures and time restrictions effectivily limit the impact on the goose barnacle stock and work in the interest of the goose barnacle collectors. Considering the productivity attributes of goose barnacles (see Table 9.8.2) it can also be concluded that this species has a high productivity with fast growth and high reproductive capacity. This results in fast recovery of areas or spots that have been fished. Based on this information about the UoA and the species involved there is thus some objective basis for confidence that the partial strategy will work. **SG80 is met**.

SG100 is not met since there has been no testing that supports high confidence that the partial strategy will work.

UoA2- N/A

	Management strategy implementation			
c	Guide post		There is **some evidence** that the measures/partial strategy is being **implemented successfully**.	There is **clear evidence** that the partial strategy/strategy is being **implemented successfully and is achieving its objective as set out in scoring issue (a).**
	Met?		**Yes**	**No**
Rationale				

UoA1- The *Xunta de Galicia* is enforcing the existing regulations and the private *Guardapescas Marítimos* hired by the different fishers guilds spread along the Galician coast are also checking the mussel producers act according to the regulations. The mussel producers shall report the volumes of mussel spat collected and the areas where they were removed from. The activity is only allowed from 1 December until 31 April and several areas are closed for mussel spat collection. In 2020 additional areas have been closed for mussel spat collection. These measures are monitored and enforced and also the cofradias and the individual goose barnacle collectors have a large interest in monitoring whether the existing regulations are respected by mussel spat collectors. It is concluded that there is some evidence that the partial strategy is implemented successfully. Thus **SG80 is met**. However, since there is no clear evidence from scientific research that the partial strategy is achieving its objective as set out in scoring issue (a), SG100 is not met.

UoA2- N/A

	Shark finning			
d	Guide post	It is **likely** that shark finning is not taking place.	It is **highly likely** that shark finning is not taking place.	There is a **high degree of certainty** that shark finning is not taking place.
	Met?	**NA**	**NA**	**NA**
Rationale				

No sharks are retained in this fishery, and therefore there is no need to score this SI.

Review of alternative measures to minimise mortality of unwanted catch

e	Guide post	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of **unwanted** catch of main secondary species.	There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of **unwanted** catch of main secondary species and they are implemented as appropriate.	There is a **biennial** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of **unwanted** catch of all secondary species, and they are implemented, as appropriate.
	Met?	**Yes**	**No**	**No**

Rationale

UoA1. In June 2010, the Galician Fisheries Ministry (*Consellería do Mar*) met with representatives of the mussel culture industry and the fisher's guilds involved in the spat collection from the coastal strip. As a result, the development of cartographic maps was announced to determine areas where the extraction of mussel seed does not affect other resources (mainly the goose barnacle). This work was committed to the CETMAR Foundation. In 2011, Cetmar completed the report "Cartography of mussel spat and goose barnacle along the Galician coast between Fisterre and A Guarda". Unfortunately, this piece of work is not available for consultation. However, the team considers that a review of alternative measures was done. **SG60 is met**.

In 2011 the Consellería do Mar created the Mussel Commission as a permanent advisory body for the mussel sector (Order of December 28, 2010, establishing the Mussel Commission). This forum will discuss issues of interest along with representatives of the sector, such as the annual spat collection season. However, there is no evidence that there is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of goose barnacle and they are implemented as appropriate. SG80 is not met and a condition was opened.

UoA2- N/A

References

Decree 153/2019, of November 21, regulating the regime for the conservation and exploitation of shellfish and seaweed resources. DOG Nº 233 of 09/12/2019. Available at (in Spanish): https://www.xunta.gal/dog/Publicados/2019/20191209/AnuncioG0427-281119-0002_es.html

Law 11/2008, of December 3, on fishing in Galicia. Available at (in Spanish): https://www.boe.es/buscar/doc.php?id=BOE-A-2009-805

Order of October 26, 2000, regulating the extraction of mussel seed in natural banks. DOG Nº 228 of 24/11/2000. Available at (in Spanish): https://www.xunta.gal/dog/Publicados/2000/20001124/Anuncio15CB6_es.html.

Order of December 28, 2010, establishing the Mussel Commission. DOG Nº 2 of 04/01/11. Available at (in Spanish): https://www.xunta.gal/dog/Publicados/2011/20110104/AnuncioD4A_es.html

Order of December 30, 2015, regulating the exploitation of specific resources in the scope of the Autonomous Community of Galicia. DOG Nº 13 of 21/01/16. Available at (in Spanish): https://www.xunta.gal/dog/Publicados/2016/20160121/AnuncioG0427-140116-0001_es.html

Draft scoring range	**60-79**
Information gap indicator	**More information sought**

Overall Performance Indicator scores added from Client and Peer Review Draft Report

Overall Performance Indicator score	**75**
Condition number (if relevant)	**1**

PI 2.2.3 – Secondary species information

PI 2.2.3		Information on the nature and amount of secondary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage secondary species		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impacts on main secondary species			
	Guide post	Qualitative information is **adequate to estimate** the impact of the UoA on the main secondary species with respect to status. OR **If RBF is used to score PI 2.2.1 for the UoA:** Qualitative information is adequate to estimate productivity and susceptibility attributes for main secondary species.	Some quantitative information is available and **adequate to assess** the impact of the UoA on main secondary species with respect to status. OR **If RBF is used to score PI 2.2.1 for the UoA:** Some quantitative information is adequate to assess productivity and susceptibility attributes for main secondary species.	Quantitative information is available and **adequate to assess with a high degree of certainty** the impact of the UoA on main secondary species with respect to status.
	Met?	**Yes**	**Yes**	**No**
Rationale				

UoA1- Considering the result of the client report regarding the composition of the catch from the spat mussel harvesting, it can be concluded that in average the bycatch does not surpassed 5%. Therefore, in average, the proportion of any of the accessory species presented in the catch never exceeded 5%, which means that all species should be classified as minor secondary species. Notwithstanding, the team agreed to classify the goose barnacle (*Pollicipes pollicipes*) as a main secondary species since is commercially exploited and because of the conflict that exists between the goose barnacle and the mussel spat harvesters. All the other species were considered minor secondary species. In face of the above, the team decided to use the RBF and PSA outcomes only for the goose barnacle. In the case of the barnacle species (*Chthmalus* spp, *Balanus* sp. and *Semibalus* sp.), although it was carried out a RBF without a conclusive and outstanding results,and thus the team decided not to use the PSA for those species considering that the proportion of them in the catch is, in average, very low. According to FCP v2.01 PF 4.1.4 the team may elect to conduct a PSA on “main” species only when evaluating PI 2.1.1 or 2.2.1. If the team decides to consider “main” species only, final PI score shall be adjusted downward in accordance with clause PF 5.3.2 (the final score shall not be greater than 80).

Also, there is cartography and studies characterising the intertidal communities inhabiting the rocky coastal strips in the Galician rías. **SG60** and **SG80 are met**. However, SG100 is not met since RBF shall be used

UoA2- N/A

Information adequacy for assessment of impacts on minor secondary species

b	Guide post			Some quantitative information is adequate to estimate the impact of the UoA on minor secondary species with respect to status.
	Met?			**No**
Rationale				

SG100 is not met since the information adequacy required for estimation of the impact of the UoA on the minor species is not available.

c	Information adequacy for management strategy			
	Guide post	Information is adequate to support **measures** to manage **main** secondary species.	Information is adequate to support a **partial strategy** to manage **main** secondary species.	Information is adequate to support a **strategy** to manage **all** secondary species, and **evaluate** with a **high degree of certainty** whether the strategy is **achieving its objective**.
	Met?	**Yes**	**No**	**No**
Rationale				

UoA1- The existing studies on the intertidal communities inhabiting on the rocky coastal strip along the Galician rias provide adequate information to support measures to manage main secondary species and particularly the goose barnacle. However, since the level of unwanted catches of goose barnacle associated with the collection of mussel spat is not well documented and there is no monitoring on this issue, the team cannot confirm that the information is adequate to support a partial strategy for main species, SG80 is not met and a condition was open.

UoA2- N/A

References

Piñeiro-Corbeira *et al*, 2018

Tato *et al*., 2009

Troncoso and Sibaja-Cordero, 2017

Consello Regulador Mejillón de Galicia. 2020

Draft scoring range	**60-79**
Information gap indicator	**More information sought**
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	**70**
Condition number (if relevant)	**2**

PI 2.3.1 – ETP species outcome

PI 2.3.1		The UoA meets national and international requirements for the protection of ETP species The UoA does not hinder recovery of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	Effects of the UoA on population/stock within national or international limits, where applicable			
	Guide post	Where national and/or international requirements set limits for ETP species, the **effects of the UoA** on the population/ stock are known and **likely** to be within these limits.	Where national and/or international requirements set limits for ETP species, the **combined effects of the MSC UoAs** on the population /stock are known and **highly likely** to be within these limits.	Where national and/or international requirements set limits for ETP species, there is a **high degree of certainty** that the **combined effects of the MSC UoAs** are within these limits.
	Met?	**NA**	**NA**	**NA**
Rationale				

None of the ETP species present in the area are subject to national and/or international limits. Therefore, this SI is not applicable for this assessment.

b	Direct effects			
	Guide post	Known direct effects of the UoA are likely to not **hinder recovery** of ETP species.	Direct effects of the UoA are **highly likely** to not **hinder recovery** of ETP species.	There is a **high degree of confidence** that there are no **significant detrimental direct effects** of the UoA on ETP species.
	Met?	**Yes (Both)**	**Yes (Both)**	**UoA1 No** **UoA2 Yes**
Rationale				

As for the ETPs and based on SA 3.1.5, the team assigned ETP species as follows:

a) Species that are recognized by national legislation as ETP
b) Species listed in the binding international agreements indicated below:
   - Appendix 1 of the Convention on International Trade in Endangered Species (CITES), unless it can be demonstrated that the particular stock affected by the UoE is not in danger.
   - Binding agreements concluded under the Convention on Migratory Species (CMS).
c) Species classified as "out of scope" (amphibians, reptiles, birds and mammals) that are listed on the IUCN Red List as vulnerable (VU), endangered (EN) or critically endangered (CR).

Species that appear exclusively on non-binding lists such as ASCOBANS, IUCN Red List, OSPAR, HELCOM or that are only the subject of intergovernmental recognition (such as FAO International Plans of Action) and that are not included under national legislation or binding international agreement are not considered as ETP under MSC protocols.

CITES Appendix I lists species that are the most endangered among CITES-listed animals and plants. They are threatened with extinction and CITES prohibits international trade in specimens of these species with

some exeptions, for instance for scientific research. Appendix 1 of CITES has been accessed by the team at the CITES website (see reference).

As Spain is a member of the EU the species protected by the EU Habitat Directive (Annex II) and the Birds Directive (Council Directive 2009/147/EC) should also be considered ETP species.

The EU Bird Directive aims to protect all European wild birds and the habitats of listed species, in particular through the designation of Special Protection Areas (SPA). Under this assessment all birds species listed in the EU Bird Directive are considered ETP species.

Under this PI, only those effects of rope grown mussel cultivation that may reasonably be expected to affect ETP species are considered. Mussel culture on ropes and spat collection on rocks are not likely to affect protected or endangered fish species like sharks and rays or fish species protected by the Habitat Directive so fish species are not considered. The species groups where impacts are considered possible are marine mammals and birds. Possible effects on those groups can take place in various ways. In UoA1, spat collection on rocky shores could result in disturbance of birds and could lead to the removal of their food source. The growth phase of both UoA1 & UoA 2 could lead to their becoming entangled in the mussel farm and spat collecting structures (Lloyd, 2003). Details below.

Spat collection on intertidal rocks (UoA1)

As stated above direct impact from spat collection on rocks would only have possible impacts on <u>bird species</u> as a result of disturbance or competition with their food supply. Research on birds on the shores of Galicia was carried out by Domingue, & Lorenzo (1992). They found A total of 728 waders of 13 species were counted in a sample survey of the open coasts of Galicia. The species counted were: Oystercatcher *(Haematopus ostralequs),* Ringed Plover (*Charadrius hiaticula),* Kentish Plover (*Charadrius alexandrinus),* Curlew (*Numenius arquata),* Redshank (*Trinqa totanus),* Grey plover (*Pluvialis squatarola),* Dunlin (*Calidris alpina),* Purple Sandpiper (*Calidria maritima),* Redshank (*Tringa totanus),* Greenshank (*Tringa nebularia),* Sandpiper (*Actitis hypoleucos),* Golden plover (*Pluvialis apricaria) and* Turnstone *(Arenaria interpres).* The most numerous were Curlew, Turnstone and Oystercatcher. The overal mean population density was 4.1 birds/km; no single species exceeded an overal density of 1 bird/km. It was also noted on which substrate the birds were present (mud, sand, rocks, meadows and uncultivated land) . The species that were seen on rocks were: Oystercatcher, Purple Sandpiper, Common Sandpiper, Curlew and Turnstone. Oystercatcher and Curlew however were more present on sand than on rocks. The researchers also noted the number of people present in the research locations. In total 101 persons were seen. Of these were 27 shellfish fishermen with a total density of 0,17 person/km.

The activity takes place during a limited part of the year (1 December – 30 April) and bird numbers and the number of fishermen per km of coast are of such a low level that the activity will not prevent birds from feeding through disturbance .

Spat collection on ropes and ongrowing on ropes (UoA2)

<u>Marine mammals</u>

Species listed in CITES Appendix 1 that sometimes occur in the coastal waters and rias of Galicia are fin whales (*Balaenoptera* spp.), sperm whales (Physeter macrocephalus) and Bottlenose Dolphin (*Tursiops truncates*).

Marine mammals that are listed in Annex II of the Habitat Directive and occur in the Galician rias are Bottlenose Dolphin (*Tursiops truncates*) and Harbour porpoise (*Phocoena phocoena*).

In New Zealand there have been some occasions of whales being entangled in mussel farm structures (Loyd, 2003). Larger whales like fin whales and sperm whales are only occasionally seen in the waters off the Galicia. Considering the minimal chances that such whales would be entangled in mussel ropes (especially when the lines are covered with a layer of mussels) direct effects of the UoA are highly unlikely.

There have been no reports of dolphin entanglement in lines in New Zealand (Loyd, 2003). Probably because of their echolocation capabilities and small size, there is no risk of dolphins becoming entangled in mussel ropes. Interaction between ETP species and mussel rafts are limited to bottlenose dolphins (*Tursiops truncatus*) that are attracted by rafts due to the large aggregations of fish species around these structures that provide high concentrations of high quality food for the dolphins (Lopez & Methion, 2017). There are no reports of entanglement of this species in the rafts.

Seals are not present in the Galician rias. But occasionally a common seal (*Phoca vitulina*) is spotted along the Galician coast[3]. Although pinnipeds frequently become entangled in fishing nets, none have been reported entangled in ropes and they are unlikely to be entangled in mussel farm structures (Lloyd, 2003). Since the entanglement of marine mammels in mussel ropes has never happened since rope mussel culture started in Galicia it can be considered a higly unlikely event (especially when the lines are covered with a layer of mussels.

Additionally, a recent study in Ria de Arousa found mussel rafts act as fish attractor devices attracting common dolphins (*Tursiops truncatus*). Large aggregations of fish species around mussel rafts provide high densities of high-quality prey for dolphins.

Birds

A large number of sea birds species are present or regularly seen in the rias of Galicia. Species present (among others) are: Great skua (*Stercorarius skua),* European Storm Petrel (*Hydrobates pelagicus*), Northern Gannets (*Morus bassanus*), Common Scoter (*Melanitta nigra*) and Common merganser (*Mergus merganser*). Direct effect from mussel culture on long lines on birds species are not to be expected in this fishery (Roycroft et al., 2004). In other mussel rope cultures sometimes large numbers of eider ducks are present and these birds are feeding on mussels on the culture ropes and therefore actively and intentionally disturbed and scared away by the mussel farmers. Eider ducks are however very rarely spotted in Galician rias and no such activities take place. The disturbance of birds by the normal activities on the culture site like the harvesting of mussels is not considered to have any significant impact on any bird species in the area.

Considering this information the team concludes that there is a high degree of confidence that there are no significant detrimental direct effects of spat collection on ropes or ongrowing on ropes on ETP species.

The team therefore concludes that **UoA1** is not likely to hinder the recovery of ETP species and **SG60 and SG80 are met**. SG100 is not met since there is not a high degree of confidence that there are no significant detrimental direct effects of the spat collection phase of the UoA1 on ETP species.

For UoA2 (both catch and grow activities) SG60, SG80 and SG100 are all met since there is a high degree of confidence that there are no significant detrimental direct effects of UoA2 on ETP species.

	Indirect effects			
c	Guide post		Indirect effects have been considered for the UoA and are thought to be **highly likely** to not create unacceptable impacts.	There is a **high degree of confidence** that there are no **significant detrimental indirect effects** of the UoA on ETP species.
	Met?		**UoA1: Yes** **UoA2: Yes**	**UoA1: No** **UoA2: Yes**
Rationale				

UoA1- The bird species that were present on rocks feed on a mix of organisms like worms, small crabs and molluscs. Especially for oyster catchers it is known that mussels are a important food source. However looking at the relative scarcity of the birds on the Galician coasts compared to for other areas (Domingue, & Lorenzo, 1992) and the resulting low densities and the fact that the activity only removes part of the mussels which are replenished in the following summer means the team concludes that, indirect effects have been considered for the UoA and are thought to be highly likely to not create unacceptable impacts. **SG80 is met**. SG100 is not met since there is not a high degree of confidence that there are no significant detrimental indirect effects of UoA1 on ETP species.

UoA2 The spat collection on ropes has no impact on the food supply for ETP species or other indirect effects. It can be concluded that indirect effects on ETP species. It can be concluded that there is a high degree of

[3] http://www.sealwatch.org/

confidence that there are no significant detrimental indirect effects of UoA2 on ETP species**. SG80 and SG100 are met**.

References

Dominguez,J., Barcena. F., Souza,J.A. and Villarino,A. 1987. Breeding waders in Galicia, north-west Spain. Wader Study Group Bull. 50: 28-29.

DomingueJz., & Lorenzo, M, . 1992.Waders wintering on the open shores of Galicia, NW Spain. Wader Study Group Bulll 66:73-77.

López, B. D., Methion, S. 2017. The impact of shellfish farming on common bottlenose dolphins' use of habitat. Mar. Biol- 164(4), 83.

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Roycroft, D.; Kelly, T. C.; Lewis, L. J. (2004). *Birds, seals and the suspension culture of mussels in Bantry Bay, a non-seaduck area in Southwest Ireland*. Estuarine, Coastal and Shelf Science, Volume 61, Issue 4, p. 703-712; Roycroft et al., (2007) Aquaculture International 15: 25-36

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	**UoA1: 80** **UoA2: 100**
Condition number (if relevant)	**N/A**

PI 2.3.2 – ETP species management strategy

PI 2.3.2		The UoA has in place precautionary management strategies designed to: - meet national and international requirements; - ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place (national and international requirements)			
	Guide post	There are **measures** in place that minimise the UoA-related mortality of ETP species, and are expected to be **highly likely to achieve** national and international requirements for the protection of ETP species.	There is a **strategy** in place for managing the UoA's impact on ETP species, including measures to minimise mortality, which is designed to be **highly likely to achieve** national and international requirements for the protection of ETP species.	There is a **comprehensive strategy** in place for managing the UoA's impact on ETP species, including measures to minimise mortality, which is designed to **achieve above** national and international requirements for the protection of ETP species.
	Met?	**NA**	**NA**	**NA**
Rationale				

This scoring issue need not be scored if there are no requirements for protection or rebuilding provided through national ETP legislation or international agreements.

b	Management strategy in place (alternative)			
	Guide post	There are **measures** in place that are expected to ensure the UoA does not hinder the recovery of ETP species.	There is a **strategy** in place that is expected to ensure the UoA does not hinder the recovery of ETP species.	There is a **comprehensive strategy** in place for managing ETP species, to ensure the UoA does not hinder the recovery of ETP species.
	Met?	**Yes (Both)**	**Yes (Both)**	**No (Both)**
Rationale				

UoA 1 – The spat collection on the rocks is managed and limited through the management system for this activity. Fishermen need an authorisation to collect spat and the maximum amount that can be harvested per raft is limited. The authorization includes a limit of spat quantity allowed and also specifies where the raft is positioned, for the purpose of verifying that the limit is not exceeded. On the other hand, the fact that the mussel ropes for ongrowing are immobile and from stiff rope material means that it is nearly impossible that a seal or a bird will be entangled in the ropes. The use of immobile ropes can be considered as an implicit strategy to manage the fisheries impact on ETP species. There is also a strategic regulation framework to protect ETP species which is integrated in an integral planning of the maritime-terrestrial zone. **SG60 and SG80 are met**. However, SG 100 is not met since it cannot be concluded that there is a comprehensive strategy in place.

UoA 2 - The UoA does not have an impact on ETP species. The fact that the mussel ropes are immobile and from stiff rope material means that it is nearly impossible that a seal or a bird will be entangled in the ropes. The use of immobile ropes can be considered as an implicit strategy to manage the fisheries impact on ETP species. There is also a strategic regulation framework to protect ETP species which is integrated in an integral planning of the maritime-terrestrial zone. **SG60 and SG80 are met**. However, SG 100 is not met since it cannot be concluded that there is .a comprehensive strategy in place.

	Management strategy evaluation			
c	Guide post	The measures are **considered likely** to work, based on **plausible argument** (e.g., general experience, theory or comparison with similar fisheries/species).	There is an **objective basis for confidence** that the measures/strategy will work, based on **information** directly about the fishery and/or the species involved.	The strategy/comprehensive strategy is mainly based on information directly about the fishery and/or species involved, and a **quantitative analysis** supports **high confidence** that the strategy will work.
	Met?	**Yes (Both)**	**Yes (Both)**	**No (Both)**
Rationale				

UoA 1 and UoA2 - Based on rationale presented in SI(b) and the fact that stakeholders have not expressed any concern about impacts on ETP species the team considers that **SG60 and SG80 are met**, SG100 is not met since there is no quantitative analysis that supports high confidence that the strategy will work.

	Management strategy implementation			
d	Guide post		There is some **evidence** that the measures/strategy is being implemented successfully.	There is **clear evidence** that the strategy/comprehensive strategy is being implemented successfully and **is achieving its objective as set out in scoring issue (a) or (b).**
	Met?		**Yes (Both)**	**No (Both)**
Rationale				

UoA 1 and UoA2- As described under SI(b) and SI(c) there are no concerns about impacts of the fishery on ETP species. From scientific information (Lopez & Mathion, 2017; Lloyd, 2003) and anecdotal information it can be derived that negative impacts do not take place. Therefore the team concludes that **SG80 is met**.

SG100 is not met since there is no comprehensive strategy with set objectives concerning ETP species in place.

	Review of alternative measures to minimize mortality of ETP species			
e	Guide post	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species.	There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species and they are implemented as appropriate.	There is a **biennial** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality ETP species, and they are implemented, as appropriate.
	Met?	**N/A**	**N/A**	**N/A**

Rationale

UoA1 and UoA2- There is no UoA-related mortality of ETP species.

References

López, B. D. & Methion, S. 2017. The impact of shellfish farming on common bottlenose dolphins' use of habitat. Mar. Biol- 164(4), 83.

Lloyd, B.D., 2003. Potential effects of mussel farming on New Zealand's marine mammals and seabirds. Discussion Paper, Published by New Zealand Department of Conservation, Wellington, New Zealand.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	**UoA1: 80** **UoA2: 80**
Condition number (if relevant)	**N/A**

PI 2.3.3 – ETP species information

PI 2.3.3		Relevant information is collected to support the management of UoA impacts on ETP species, including: - Information for the development of the management strategy; - Information to assess the effectiveness of the management strategy; and - Information to determine the outcome status of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impacts			
	Guide post	Qualitative information is **adequate to estimate** the UoA related mortality on ETP species. **OR** **If RBF is used to score PI 2.3.1 for the UoA:** Qualitative information is **adequate to estimate productivity and susceptibility** attributes for ETP species.	Some quantitative information is **adequate to assess** the UoA related mortality and impact and to determine whether the UoA may be a threat to protection and recovery of the ETP species. **OR** **If RBF is used to score PI 2.3.1 for the UoA:** Some quantitative information is **adequate to assess productivity and susceptibility attributes** for ETP species.	Quantitative information is available to assess with a high degree of certainty the **magnitude of UoA-related impacts, mortalities and injuries and the consequences for the status** of ETP species.
	Met?	**Yes (Both)**	**Yes (Both)**	**No (Both)**
Rationale				

UoA1 – There is no direct mortality relation to UoA1. Some quantitative information is available (Domingues & Lorenzo, 1992) to determine whether the UoA may be a threat to protection and recovery of the ETP species. **Thus SG60 and SG80 are met**. SG100 is not met since there is no quantitative information available to assess with a high degree of certainty the magnitude of UoA-related impacts, mortalities and injuries and the consequences for the status of ETP species.

UoA2 No direct or indirect detrimental effects of the fishery on ETP species occurs and the information available is considered sufficient to determine if the fishery constitutes a threat to protection and recovery of ETP species. Several information and monitoring programs are in place and are focused in offshore fisheries that are known to impact ETP species such as birds and mammals. **SG60 and SG80 are met**. SG100 is not met since there is no quantitative information available to assess with a high degree of certainty the magnitude of UoA-related impacts, mortalities and injuries and the consequences for the status of ETP species.

	Information adequacy for management strategy			
B	Guide post	Information is adequate to support **measures** to manage the impacts on ETP species.	Information is adequate to measure trends and support a **strategy** to manage impacts on ETP species.	Information is adequate to support a **comprehensive strategy** to manage impacts, minimize mortality and injury of ETP species, and evaluate with a **high degree of certainty** whether a strategy is achieving its objectives.
	Met?	**Yes (Both)**	**Yes (Both)**	**No (Both)**

Rationale

UoA1 and UoA2- The information available is considered sufficient to determine if the fishery constitutes a threat to protection and recovery of ETP species. Several information and monitoring programs are in place and are focused in offshore fisheries that are known to impact ETP species such as birds and mammals. **SG60 and SG80 are met**, but SG100 is not met since there is no comprehensive strategy in place and information is not adequate to support a comprehensive strategy to manage impacts, minimize mortality and injury of ETP species, and evaluate with a high degree of certainty whether a strategy is achieving its objectives

References

Dominguez,J., Barcena. F., Souza,J.A. and Villarino,A. 1987. Breeding waders in Galicia, north-west Spain. Wader Study Group Bull. 50: 28-29.

Dominguez, J. and Lorenzo, M, . 1992.Waders wintering on the open shores of Galicia, NW Spain. Wader Study Group Bulll 66:73-77.

Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	**80**
Condition number (if relevant)	**N/A**

PI 2.4.1 – Habitats outcome

PI 2.4.1		The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(s) responsible for fisheries management in the area(s) where the UoA operates		
Scoring Issue		SG 60	SG 80	SG 100
a	Commonly encountered habitat status			
	Guide post	The UoA is **unlikely** to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.	The UoA is **highly unlikely** to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.	There is **evidence** that the UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.
	Met?	**Yes**	**Yes**	**No**
Rationale				

UoA1 (Catch phase) - Mussel seed for relaying and on-growing is obtained mainly from the **rocky shores** of Galicia. Mussel seed are gathered from intertidal rocky shores by scraping them from the surface of the rock using rudimentary fishing tools. Therefore, this habitat is considered as a commonly encountered habitats for the UoA1. The areas where mussel seed can be obtained are identified. According to Brea Bermejo (2009) the mean annual mussel seed biomass available along the Galician coast (occupying an area of ≈113 ha) is around 18,870 tons. In recent years the average mussel seed catch data per raft is 2,100 kg (Xunta de Galicia, personal communication), which corresponds to an average annual catch of 7,110.6 tons (Client report, 2020b). Considering the mussel seed biomass estimated by Brea Bermejo (2009) (18,870 tons), and the annual average catch estimated (7,110.6 tons), it can be concluded that around 38% of the biomass is annually extracted from natural mussel beds. In a study conducted by Cacerés-Martinez & Figueras (2007), to obtain 4,250 tons of mussel seed is necessary to scrap an area of 21.6 ha. Therefore, to obtain 7,110.6 tons of mussel seed an area of 36.1 ha is exploited annually, corresponding to 31.9% of the total area where mussel seed occurs. Moreover, the target species usually recovers during the closed seasonal whereas the associated benthic communities need more time to recover to pre harvester conditions (Piñeiro-Corbeira et al., 2018). Indeed, Piñeiro-Corbeira et al. (2018), found that mussel seed harvesting was detrimental to the abundance and diversity of the associated sessile assemblage. Moreover, coverage and richness were also significantly lowered by the exploitation of mussel seed, and the community structure of protected and exploited sites was significantly different. These authors reported that the duration of the closed season was not long enough to allow the intertidal community to recover. Similar conclusion was reached by Barrientos et al. (2019), who found that the consistently distinctive species composition of the recolonizing assemblage suggests that time rather than patch size and/or distance is the major obstacle to a more complete recovery of mussel-seed exploited beds. Oliveira et al. (2015) in a similar study carried out on north Portugal rocky shores, found that intertidal assemblages subjected to even extreme combinations of past disturbances can recover in a relatively short time, within 3 to 9 months after the end of the disturbances, depending on the timing of disturbance which is related to the life-history traits of the species, such as peaks in reproduction and recruitment. These authors reported no significant differences between unmanipulated and treated assemblages after 15 months, indicating that intertidal communities recover very fast.

The team therefore concludes that impacts are reversible and do not result in the reduction in habitat structure, biological diversity, abundance and function such that the habitat would be unable to recover to at least 80% of its unimpacted structure, biological diversity and function within 5-20 years, if fishing were to cease entirely.

Thus, is highly unlikely that the UoA reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm and therefore **SG60 and SG80 are met**. SG100 is not met since there is insufficient scientific research done to conclude there is evidence.

UoA 1 and UoA2 (growing phase) – In Galicia there are several natural areas, around the 12% of its surface corresponds to protected zones included in the Natura 2000 network. In the Atlantic coastline there are the five bays (rías) where there are located mussel farms. This coastline hold four protected zones classified as National Park (Cies Islands, Ons Islands, Cortegada Island and Corrubedo dunes) relevant habitats as estuaries (wetland RAMSAR), rocky shores, coastal lakes, dunes and sand flats exposed during low tide classified as SACs, Special Protection Areas (SPAs) and Protection Birds Interest Sites (ZEPAs).

Several studies have been carried out aiming at characterizing the bottoms of the rías (e.g., Abella et al., 1998; García et al, 2000; Troncoso, 1993; Villas et al., 1995, 1996, 1999; Arrieta et al., 2011). All these works allowed to map the habitats that occur within the rías under assessment in detail (see **Section 7.3.1.3**). In Galicia, rafts are grouped in specific areas, named polygons. Georeferenced information on the position of the polygons and on the characteristics of superficial sediments within each Ría can be obtained from http://mapas.intecmar.gal/plancamgal/. Within the areas of the polygons the sediment bottom varies from muddy to mixed sediments. In some polygons occurs maerl beds (Peña & Barbara, 2009), considered a vulnerable marine ecosystem (VME) which will be assess in SIb. In ria Ares-Bentazos the rafts are mainly located over sandy bottoms, in rias Muros-Noia and Vigo over muddy bottoms, in ria de Arousa over muddy and gravel bottoms, whereas in ria Pontevedra they are mainly located over mixed bottom of soft sediment with stones (see Client report, 2020b). These habitats have been designated for this UoAs as the commonly encountered habitats.

There are several research studies in various parts of the world (including Galicia) that identify and describe the main impacts on habitats associated with mussel culture in rafts. The impact of mussel farming on the environment has been extensively studied. Pérez Camacho & Beiras (1995), Blanco et al. (1996) and Petersen et al. (2008) (among other authors) observed an increase in sedimentation beneath the rafts due to changes on hydrodynamics and reduced flow because of the suspension structure. Other studies have shown that dropper line diameter (Plew et al., 2005) and dropper line as well as farm size and configuration may influence current velocities (Boyd & Heasman 1998; Duarte et al. 2008; Stevens et al. 2008), whereas de Jong (1994) and Lloyd (2003) reported that shell deposits on the bottom due to fall-off may also slow the flow across the sediments, increasing sedimentation rates. Moreover, the fall-off of mussels and associated organisms from culture structures can be considerable which may alter the habitat due to the creation of benthic structure (Iglesias, 1981; Kaspar et al., 1985; Freire & González-Gurriarán, 1990; Inglis & Gust, 2003). Biodeposits (faeces and pseudofaeces) have a greater sinking velocity than their constituent particles increasing the flux of organic matter to the bottom below mussel farms altering the characteristics of the sediment, with sediments tending to be constituted by finer grain sizes and higher silt/clay content, and lower porosity and water content (Giles et al, 2006). Increased organic loading to the sediment from biodeposition by mussels and associated organisms influences the biogeochemical properties of benthic sediments, including modifying benthic respiration and nutrient fluxes at the water-sediment interface as observed by Christensen et al. (2003) and Richard et al. (2007a; 2007b). In addition, as organic matter accumulates in the sediment, and the abundance and biomass of the associated organisms increase, there is a substantial oxygen consumption and nutrient fluxes at the interface between culture structures and the water column (e.g. Mazouni, 2004; Nizzoli et al., 2006). Benthic ammonium (Giles et al., 2006; Nizzoli et al. 2006), phosphate (Carlsson et al., 2009) and silicate fluxes are greater within mussel culture sites than in reference sites (Richard et al., 2007a, 2007b; Alonso-Pérez et al., 2010). Increased ammonium and phosphate likely result, in part, from the degradation of mussel biodeposits which are rich in nitrogen and phosphorus (Kautsky & Evans 1987). Some studies reported that Total Organic Matter (TOM) are higher at farm sites than in control areas (Grant et al. 1995 and Hartstein and Rowden 2004). Faecal based sediments are also characterised by increased C:N ratios and increased organic content (Christensen et al, 2003). However, some authors (Grant et al., 1995; Crawford et al., 2003) reported that organic carbon between culture and non-culture sites although variable and often not distinguishable. Other studies found higher carbon content and nitrogen content under suspended mussel than at reference locations (Chamberlain et al., 2001; Stenton-Dozey et al., 2001). The effect of suspended shellfish aquaculture on sediment redox potential as also been widely studied and most them showed that cultured mussels caused localized decreases in sediment redox potential (Dahlback & Gunnarsson, 1981; Mirto et al., 2000; Chamberlain et al., 2001). The redox discontinuity layer can be identified from a shift in sediment colour from brown through grey to black and is used to identify the depth at which the sediments become anaerobic. Sulfate reduction is an indicator of anaerobic metabolism and have been observed to be higher at raft sites (Dahlback & Gunnarsson, 1981;

Grant et al., 1995; Stenton-Dozey, 2001). Probably, the major problem associated with sediment accumulation in aquaculture systems is the formation of anoxic sediments. Notwithstanding, Christensen et al. (2003) and Giles et al. (2006) have shown that the formation of such sediments does not happen within the mussel area production.

Although suspended mussel culture results in the production of biodeposits that may accumulate on the sediment under the ropes which may induce changes in the local habitat structure and function, and in the benthic community, significant harm is not expected since deposition prevails under the rafts. Moreover, effects on the habitat are generally site specific, being more severe in areas with lower hydrodynamics (see review by Lewis & Nelson, 2008).

Although there was not established by Xunta de Galicia a "threshold" against which levels of disturbance can be measured, the team has considered for sedimentary habitats a 15% threshold of overlap between mussel production and a particular habitat (excluding VME), above which mussel production activity is deemed to have a significant impact on that habitat. Based on this, from Table 7.3.1.3.5 and considering solely the area of each Ría, for each bottom type the maximum proportion (considering the entire area of the polygons) that may be affected is always lower than 14%.

Based on the above, is considered **highly likely** that structure and function of the commonly encountered habitats in the rias will be reduced to a point where there would be serious or irreversible harm. **SG60 and SG80 are met. SG100 is not m**et since the available information does not warrant the conclusion that there is evidence that the UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.

	VME habitat status			
b	Guide post	The UoA is **unlikely** to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.	The UoA is **highly unlikely** to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.	There is **evidence** that the UoA is highly unlikely to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.
	Met?	**Yes**	**Yes**	**No**
Rationale				

UoA1 and UoA2 - The team has identified the **maerl** as a VME (Vulnerable marine ecosystem) habitat. See **section 7.3.1.3** for more details on the VME classification.

The depth of the Galician beds ranged from the low intertidal to 41 m depth with the main populations typically located along the central channel of the rías where the currents are strong, in water depths ranging from 5 to 35 m (Peña & Bárbara, 2009). In Galicia, maerl beds are typically composed of both living and dead maerl of varying proportions (Peña & Bárbara, 2009).

Peña & Bárbara (2009), mapped a total of 111 maerl beds in five Galician rías: 3 in Ría de Ferrol, 13 in Ría de Muros-Noia, 43 in Ría de Arousa, 29 in Rías de Pontevedra and Aldán, and 23 in Ría de Vigo). These beds occupied an estimated area of approximately 21.78 km^2, of which 14.20 km^2 was recorded in the Ría de Arousa (65%). Other important maerl areas were found in the Ría de Vigo (3.31 km^2) and Ría de Pontevedra and Aldán (2.64 km^2). Of the mearl beds mapped, 23 were included in protected marine sites (Islas Atlánticas National Park and two Natura 2000 sites), occupying an area of 6 km^2 which corresponds to 28% of the area occupied by maerl beds.

Maërl beds are threatened by human activities such as direct exploitation, aquaculture, eutrophication, bottom fisheries, mooring, construction of coastal structures, and introduction of non-native species (BIOMAERL Team, 1999 & 2003; Hall-Spencer et al., 2006 & 2008; Peña & Bárbara 2008b).

Peña et al. (2006), as a result of several radial transects (SCUBA diving) from the natural maërl population to the bed impacted in the southern estuaries of Galicia that reveal the degradation of the maërl bed at the bat sites: increase in the proportion of dead maërl (up to 85%), decrease in the thickness of the live maërl layer (only 1 cm deep), reduction in the structural heterogeneity and complexity of maërl and reduction of the abundance and diversity of algae associated with the epiflora. Peña & Bárbara (2008b) in a study regarding

the long-term changes in several Galician maërl beds reported the deterioration of several beds (12 out of 111 – 10.8%) placed in the vicinity of mussel aquaculture areas. In the BIOMAERL project, the effects of mussel farming on maërl, in the Vigo estuary, are studied for the first time. They analyzed two stations: one impacted - under a mussel raft - and a control station, to establish the effect of mussel culture on the maërl beds. They conclude that: The feaces and pseudopheaces of trays located on maërl bed fall on their surface, which alters the sediment structure and compromises the maërl's ability to perform photosynthesis and growth. Several other studies (Mora, 1980; BIOMAERL team, 1999; Barberá et al., 2003; Wilson et al., 2004; Vilas et al., 2005; Hall-Spencer et al., 2006; Riul et al., 2008) have highlighted the negative impacts of aquaculture on maerl communities, due to the increased deposition of detritus and fine sediment derived from mussel cultures which settles out on the substratum, resulting in the burial and decline of maerl abundance. Other studies (e.g., De Grave & Whitaker, 1999; Grall and Hall-Spencer, 2003; Wilson et al., 2004) have all linked the deposition of these fine sediments with a reduction in water movement and restriction of gaseous exchange around the maerl. Quotes have also been found such as Peña & Barbara (2008a), in which, contrary to what might be expected, in the case of the maërl bed of Benencia Island (in Arousa) it is concluded that it has been preserved for the last 40 years and its extension and coverage of maërl has not been negatively affected by the surrounding rafts.

According to Hall-Spencer & Moore (2000) the impacts of any damage to maerl beds are long lasting because the key habitat structuring species has a very poor regenerative ability. Indeed, extremely slow growth rates, of the order of tenths of millimetres to one millimetre per year, have been recorded for maerl (Adey & McKibbin, 1970; Potin et al., 1990; Bosence & Wilson, 2003; BIOMAERL Team, 2003; Blake & Maggs, 2003), which lead the OSPAR (IMPACT, 1998) to categorized the “recovery potential” of maerl beds in relation to a single event as ‘poor’, indicating that partial recovery is likely within 10 years and full recovery may take up to 25 years. Notwithstanding, is important to underline that maerl recovery may never occur if a bed is removed by dredging or completely smothered by sediment (Hall-Spencer et al., 2008).

According to SA3.13.4.1, in the case of VMEs, such as is the case of maerl beds, “serious or irreversible harm” should be interpret as reductions in habitat structure and function below 80% of the unimpacted level.

Data available on the area of polygons (http://mapas.intecmar.gal/plancamgal/) was superimposed with the distribution of maerl beds (Peña & Bárbara, 2009; Client report, 2020) to estimate the impact of mussel production on maerl beds. Raft polygons occupy a total area of 55.55 km^2 and the area of maerl inside the polygons is 1.96 km^2, indicating that only 3.53% of polygons is occupied by maerl. According to Peña & Bárbara (2009), maerl beds in Galician Rias occupy a total area of 21.78 km^2, which means that ≈9% of maerl is located inside the polygons. Considering not only the area of maerl inside the polygons but also the maerl beds located in their vicinity, Peña & Bárbara (2009) reported that a total of 34 maerl beds may be impacted by mussel rafts (5 in the Ría de Muros-Noia, 22 in the Ría de Arousa, 3 in the Ría de Pontevedra and Aldán and 4 in the Ría de Vigo), occupying an estimated area of 3.58 km^2. Therefore, mussel rafts in Galicia Rías may impact 16.4% of the total maerl beds recorded.

It is also important to note that all maerl beds totally dead are located outside the polygons area despite the massive mussel production in Galicia. Moreover, 96% of maerl beds within polygons present an alive/dead maerl ratio > 25%, and more than 50% are included in the upper two alive/dead ratio classes (51-75% and 76-100%) (see Table 7.3.1.3.10). Considering all maerl beds for Galicia the contribution of the maerl beds that occur within the polygons for alive/dead maerl ratio classes of <25%, 26-50%, 51-75%, and > 76% is, respectively, 7, 14, 10 and 11% (see Table 7.3.1.3.10). Finally, Peña & Bárbara (2008), reported that the maërl bed of Benencia Island (in Arousa) has been preserved for the last 40 years and its extension and coverage has not been negatively affected by the surrounding rafts.

On the basis of the above information the team concludes that the UoA is **highly unlikely** to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm and **SG80 is met**. SG100 is not met since currently there is insufficient information to conclude that there is evidence that the UoA is highly unlikely to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.

C	Minor habitat status			
	Guide post			There is **evidence** that the UoA is highly unlikely to reduce structure and function of the minor habitats to a point

				where there would be serious or irreversible harm.
	Met?			**No**

Rationale

Minor habitats have not been identified so we cannot conclude that there is evidence that the UoA is highly unlikely to reduce the structure and function of those minor habitats. SG100 is not met.

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Draft scoring range	60-79
Information gap indicator	More information sought

Overall Performance Indicator scores added from Client and Peer Review Draft Report

Overall Performance Indicator score	**80**
Condition number (if relevant)	**N/A**

PI 2.4.2 – Habitats management strategy

PI 2.4.2		There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are **measures** in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.	There is a **partial strategy** in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.	There is a **strategy** in place for managing the impact of all MSC UoAs/non-MSC fisheries on habitats.
	Met?	**Yes**	**Yes**	**No**
Rationale				

The term "if necessary" used in SIa, exclude the assessment of the UoAs that do not encounters VME habitats (e.g maerl). Therefore, **SG60 and SG80 are not scored for UoA 1 (catch phase)**. SG100 is not met as a comprehensive strategy is not in place.

In relation to the **UoA1 & UoA 2 (growing phase)**, there is a good understanding of habitats types in the area where the growing activity takes place. The Autonomous Government of Galicia (*Xunta de Galicia*) being aware of the saturation reached in many areas devoted to mussel farming, as well as the ecological problems raised by this culture, based in several scientific studies (e.g Tenore et al., 1982; Wiegert & Penas-Lado, 1983; Porta-Vila, 1984) has regulated this kind of exploitation. Therefore, the design of the polygons has changed over time (since 1986) through the Decrees 197/1986, 423/1993, and 406/1996, in order to minimize the impacts of the fishery on habitat as much as possible (see section 7.4.1.8 for detailed information). Nowadays, the polygons are designed in areas where the bottom is mainly constituted of soft sediments, gravel and/or mixed sediments with stones. Currently, mussel rafts are located offshore in the bays called rías, at depths higher than 10 m, ordered in 44 polygons, holding in total more than 100 Ha.

The Autonomous Government of Galicia (*Xunta de Galicia*) has restricted the number of the rafts and the size of the platform to 500 square metres, with a maximum length side of 25 metres, the number of ropes per raft at 500 max and the length of ropes no longer than 12 metres (depending on depth some rafts can have ropes 8 metres length). The rafts are located together, but separated from each other by about 80-100 m, which allowed to decrease the density of the rafts within the polygons. That regulation took the form of the Fisheries Act publishing in 1993 (Decreto 423/1993). In 1996 is published the Regulations to apply to marine culture in floating marine shellfish cultures structures (Decreto 406/1996). Moreover, mussel rafts are not allowed to be placed outside the polygons. This means that the threshold of 15% (assumed by the team) for each bottom habitat within each Ría is never exceeded.

Regarding VME habitats, it was designed a plan of action (Bárbara & Peña, 2010) aiming at protecting maerl beds where there were identified for each maerl bed the potential threats (aquaculture, bivalve dredging, artisanal fisheries, harbors, sand dredging, boat anchoring, among others) that may lead to the degradation or, ultimately, the disappearance of the maerl beds, and where it was proposed a set of actions and measures that can be implemented to protect these habitats. This action of plan was sent to *Xunta de Galicia*.

It is concluded that a partial strategy is in place that identifies the areas where mussel rafts can be placed, limits the spatial extent of the mussel rafts, and limits the number and characteristics of mussel rafts, as well, as the amount that can be produced by raft. All these measures are in place and intent to minimize the environmental impacts on the habitat and ecosystem. In addition, large areas are protected as National Parks and Natura 2000 sites (**Fig. 7.3.1.3.3**). There is only a very limited extent of mussel rafts that overlay with areas of maërl, and operators are not allowed to relocate their rafts to such areas. According to the Orden of 18th April 2001, it is also possible to relocate mussels raft to empty areas within the polygons to minimise

habitat impacts. There is also a plan of action to protect maerl beds, where a set of actions and measures were identified, and that can be put in place to protect them.

From the above it can be concluded for both UoA that there is a partial strategy in place that is expected to achieve the Habitat Outcome 80 level of performance or above. **SG60 and SG80 are met**. SG100 is not met since the measures in place are considered to constitute a partial strategy and not a strategy.

	Management strategy evaluation			
b	Guide post	The measures are **considered likely** to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/habitats).	There is some **objective basis for confidence** that the measures/partial strategy will work, based on **information directly about the UoA and/or habitats** involved.	**Testing** supports **high confidence** that the partial strategy/strategy will work, based on **information directly about the UoA and/or habitats** involved.
	Met?	**Yes**	**Yes**	**No**
Rationale				

UoA 1 (catch phase) - Areas where mussel seed can be obtained are identified, delimited and regulated (Order 26 October 2000), the maximum amount that can be harvested per year and raft is defined, harvesting periods are also defined and the fishing gears that can be used are restricted. Harvesters, are obliged to declare the amount of seed harvested per area. It is important to note that the Order mentioned above contains an additional provision in which it is mentioned that whenever the monitoring and evaluation of resources advise it, the Jefatura Territorial, within the scope of its competence, may modify the areas, quantities, and periods of extraction through the publication of a resolution that must be communicated to the interested parties in due time. In the case of the Ons, Sálvora and Cíes National Parks, mussel seed harvesting is only allowed if there is a positive decision from the Consellería de Medio Ambiente (Galician Department of Environment), otherwise harvesting is forbidden. If the decision is positive, a set of conditions, rules, and restrictions are imposed to harvesters. The compliance of these is controlled by the competent authorities, namely the Parque Nacional Marítimo-Terrestre de las Islas Atlánticas de Galicia. All the conditions and rules are included in the permit issued by Junta de Galicia to mussel producers. See Section 7.4.1.4 for more details.

UoA 1 and UoA2 (growing phase) – All the measures described in Si (a) are already implemented and are regularly inspected to ascertain that mussels producers comply with all the rules imposed. Those measures aim to restrict the activity and to minimize the impacts on the habitat and ecosystem. The impact of mussel production in rafts on the habitat are known and the main issues are identified. Although not implemented to date, there are several measures that can be put in place to mitigate the impacts on the habitat. Indeed, the Gestinmer Project (co-financed under LIFE Environment Programme) carried out a number of studies in order to identify the most viable management techniques and systems, from the technical and economic point of view, both for sediments accumulated on the bottom and for mussel byproduct generated on board (Gestinmer report, sd). Regarding sediments accumulated beneath the rafts, four different techniques (manual extraction with divers, dredging with a hydraulic pump, dredging with a pneumatic pump, and mechanical dredging) were tested in order to identify the most appropriate technologies, equipment or systems for extracting this material from the technical, environmental and economic point of view. Of the techniques used, hydraulic and pneumatic pump were unfeasible without coupling a dewatering system, due to the high water content in the material extracted. Integrating this system in dredging operations involves extremely high costs and logistic difficulties, which compromise its viability. Extracting sediments with a bucket using a silt curtain was identified as the most viable technique, from the technical and economic point of view, taking into account the high output rate obtained, the high solid/liquid ratio of the material extracted and the costs per volume of mobilized sediments. Manual extraction with divers have inherent limitations (low output rate, depth considerations and limited operating time), but due to its high selectivity, could be applied prior to using the bucket for extracting solid waste. In what concerns mussel byproducts management, the system tested (based on temporarily storing mussel byproduct waste on built floating platforms) proved to be effective and would cut down significantly the contribution of materials to the bottom. If the proposed solutions (for sediment removal and for mussel byproduct management) are implemented the environmental impacts due to mussel production will be minimized. Other project, carried out by JACUMAR (2008), investigated with success the potential use of three system to collect the biodeposits generated by mussel, as well as, debris.

Regarding the protection of VME habitats, a plan of action (Bárbara & Peña, 2010) aiming at protecting maerl beds was designed, where a set of actions and measures were proposed and that will work if they are put in place.

Based on the above **SG60 and SG80 are met** since there is some objective basis for confidence that the measures/partial strategy will work, based on information directly about the UoA and/or habitats involved. SG100 is not met since the information available does not allow to conclude that testing supports high confidence that the partial strategy/strategy will work, based on information directly about the UoA and/or habitats involved.

	Management strategy implementation			
c	Guide post		There is **some quantitative evidence** that the measures/partial strategy is being implemented successfully.	There is **clear quantitative evidence** that the partial strategy/strategy is being implemented successfully and is achieving its objective, as outlined in scoring issue (a).
	Met?		**No**	**No**
Rationale				

UoA 1 (catch phase) - Areas where mussel seed can be obtained are identified and delimited, the amounts that can be harvested per area are defined, harvesting periods are also defined and the fishing gears that can be used are restricted. Seed harvesters are obliged to declare the seed catches per area. Since the impacts on rocky habitats are not expected apart from the impacts on macrofauna communities that inhabit in those areas the team agreed that the measures in place provide some quantitative evidence that the measures/partial strategy is being implemented successfully. This decision also took into consideration that intertidal communities recover very fast if the fishery ceases. SG80 is met for this UoA. SG100 is not met since there is not clear quantitative evidence that the partial strategy/strategy is being implemented successfully and is achieving its objective, as outlined in scoring issue (a).

UoA 1 and UoA2 - Georeferenced information on the location of mussel rafts is available. Rafts are inspected with some regularity in order to ascertain if the position and area occupied by the rafts, and the number and length of the ropes, complies with the legislation in force. Bottom habitats (including VME habitats) are mapped in detail. Nonetheless, the mussel production in rafts induces impacts on habitats which are known and the main issues related to this fishery are well identified (please see PI 2.4.1). Despite this, there are not in place a monitoring program on the effects of mussel production on the habitats, which is paramount to identify problematic areas where some actions/measures should be undertaken/implemented to mitigate the impacts of the fishery on the habitats. Although several actions/measures have been identified and proposed to reduce the impact of the mussel production on habitats (see Si(a,b)), to the team best knowledge any of them have been put in place so far. Based on this, and following a precautionary approach, the team agreed that **SG80 is not met** since there isn't some quantitative evidence that the measures/partial strategy is being implemented successfully. A condition was opened.

	Compliance with management requirements and other MSC UoAs'/non-MSC fisheries' measures to protect VMEs			
d	Guide post	There is **qualitative evidence** that the UoA complies with its management requirements to protect VMEs.	There is **some quantitative evidence** that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.	There is **clear quantitative evidence** that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.
	Met?	**Yes**	**Yes**	**No**

Rationale

UoA 1 (catch phase) – Not applicable since seed harvesting does not impacts any VME.

UoA 1 and UoA2 - The Galician maerl beds area is well mapped, occupying an estimated area of approximately 21.78 km^2 of which 6 km^2 (27.55%) are located within protected marine sites, namely within the Islas Atlánticas National Park (Sálvora Archipelago in the Ría de Arousa, Ons Archipelago in the Ría de Pontevedra and Cíes Archipelago in the Ría de Vigo) and within two Natura 2000 sites ("Costa Ártabra" in the Ría de Ferrol and "Complexo Ons- O Grove" extended along the rías de Arousa and Pontevedra) (Peña & Barbara, 2009). These areas were designated to protect biodiversity and habitats (including VME habitats) and therefore fishing activities in those areas are forbidden or are extremely restricted. Of the remain maerl area, 3.58 km^2 are located in the immediate vicinity of aquaculture areas (Peña & Barbara, 2009), and 3.53% of the total maerl area are within the aquaculture polygons with the maximum proportion observed for Ría de Arousa with 4.17% (Client report, 2000; Table 7.3.1.3.7). The area of the polygons is defined and the location and position of the rafts are also identified. Moreover, the number of rafts per polygon is defined (no more rafts can be assigned) as well as its characteristics and production model. All the measures currently in place aims to minimize the impacts on the habitats (including maerl habitats). Therefore it can be concluded that **SG60 and SG80 are met** since there is some quantitative evidence that the UoA complies with both its management requirements and with protection measures afforded to VMEs. In relation to other non-MSC fisheries, the measures within the Islas Atlánticas National Park and Natura 2000 is also applicable for other fisheries activities. **SG100 is not met** since there isn't a clear quantitative evidence that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other non-MSC fisheries.

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Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	**≥80**
Information gap indicator	**More information sought**

Overall Performance Indicator scores added from Client and Peer Review Draft Report

Overall Performance Indicator score	**75**
Condition number (if relevant)	**3**

PI 2.4.3 – Habitats information

PI 2.4.3		Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat		
Scoring Issue		SG 60	SG 80	SG 100
a	Information quality			
	Guide post	The types and distribution of the main habitats are **broadly understood**. **OR** **If CSA is used to score PI 2.4.1 for the UoA:** Qualitative information is adequate to estimate the types and distribution of the main habitats.	The nature, distribution and **vulnerability** of the main habitats in the UoA area are known at a level of detail relevant to the scale and intensity of the UoA. **OR** **If CSA is used to score PI 2.4.1 for the UoA:** Some quantitative information is available and is adequate to estimate the types and distribution of the main habitats.	The distribution of all habitats is known over their range, with particular attention to the occurrence of vulnerable habitats.
	Met?	**Yes**	**Yes**	**No**
Rationale				

The main habitats in this case are the commonly encounter and VME habitats.

UoA1 - The areas for harvesting mussel seed are identified and delimited. Mussel seed is obtained from the rocky areas that occur along the NW coast of Galicia on its intertidal zone. After each spat collection campaign, the mussel producers shall communicate to the Galician authorities the total quantities of seed collected and the areas where the collection took place (included in the Order of October 26, 2000).

UoA 1 and UoA2 - Several studies have been carried out aiming at characterizing the bottoms of the rías (e.g. Abella et al., 1998; Arrieta et al., 2011; García et al., 2000; Troncoso et al., 1993; Villas et al., 1995, 1996, 1999). Therefore, the habitats of the rías under assessment are mapped in detail (http://mapas.intecmar.gal/plancamgal/). Maerl beds are also mapped in detail (Peña & Barbara, 2009; Peña, 2010). Rafts position are known and georeferenced.

Sufficient data are available to allow the nature of the impacts of the fishery on habitat types identified and there is reliable information on the spatial extent of interaction, and the timing and location of use of the fishing gear. For all bottom types (excluding VME) the area “fished” is quite small (lower than 15%) compared to the entire area of the Rías, and even smaller (lower than 6%) compared to the large scale of the entire Galicia.

From the above, it can be said that the nature, distribution and vulnerability of the main habitats in the UoA area are known at a level of detail relevant to the scale and intensity of the UoA. **SG60 and SG80** are met. SG100 is not met since it cannot be concluded that the distribution of all habitats is known over their range.

	Information adequacy for assessment of impacts			
b	Guide post	Information is adequate to broadly understand the nature of the main impacts of gear use on the main habitats, including spatial overlap of habitat with fishing gear. OR **If CSA is used to score PI 2.4.1 for the UoA:** Qualitative information is adequate to estimate the consequence and spatial attributes of the main habitats.	Information is adequate to allow for identification of the main impacts of the UoA on the main habitats, and there is reliable information on the spatial extent of interaction and on the timing and location of use of the fishing gear. OR **If CSA is used to score PI 2.4.1 for the UoA:** Some quantitative information is available and is adequate to estimate the consequence and spatial attributes of the main habitats.	The physical impacts of the gear on all habitats have been quantified fully.
	Met?	**Yes**	**Yes**	**No**
Rationale				

UoA1 – Mussel seed is obtained from the rocky areas that occur along the coast of NW Galicia. The areas where mussel seed can be harvested are delimited and identified. A closed season for mussel harvesting is also in place. Harvesters are obliged to declare the catches and the areas where mussel seed was obtained and therefore there is reliable information on the spatial extent of interaction and on the timing and location of use of the fishing gear. The impact of the collection of mussel seed on the physical habitat is considered negligible due to the characteristics of the areas where mussel seed is harvested (intertidal area of rocky habitats).

UoA1 and UoA2- Mussel rafts are located within the rías. The main habitats (including commonly encounter and VME habitats) that occur within the rías are mapped in detail. Since the position of the rafts are georeferenced there is reliable information on the spatial extent of interaction and on the timing and location of use of the fishing gear.

There are several research studies in various parts of the world (including Galicia) that identify and describe the main impacts on habitats associated with mussel culture in rafts. Overall, the information available allows to identify the main impacts of the UoA on the main habitats.

Therefore it can be said that the information is adequate to allow for identification of the main impacts of the UoA on the main habitats, and there is reliable information on the spatial extent of interaction and on the timing and location of use of the fishing gear. **SG60, SG80 are met**. SG100 is not met since the physical impacts of the gear on all habitats have not been quantified fully.

	Monitoring			
c	Guide post		Adequate information continues to be collected to detect any increase in risk to the main habitats.	Changes in all habitat distributions over time are measured.
	Met?		**No**	**No**

Rationale

As discussed in detail in Principle Two Habitat Background (Section 7.3.1), the Habitats Directive require EU Member States to report on the conservation status of habitats. Under Article 11 of the Directive, each member state is obliged to undertake surveillance of the status of listed habitats, and, under Article 17, to report to the European Commission every six years on their status. This report is produced for each biogeographic region according to the methodology established by the European Commission. The types of marine habitats includes mäerl (hábitat 1170) and the most commonly encountered habitat (habitats 1110 and 1160). Each Spanish Autonomous Community (e.g. Galicia) writes its report and forward it to Spain, that compiles all the information, homogenise it, and prepares the reporting and cartography. In May 2019, Spain submitted the second assessment report, covering the period from 2013 to 2018, on the conservation status of the 117 habitats with interest present in Spain. It can be downloaded through the following link:

https://www.miteco.gob.es/es/biodiversidad/temas/espacios-protegidos/red-natura-2000/rn_cons_seguimiento_Art17.aspx.

At European level, EMODnet Seabed Habitats portal provides a single access point to European seabed habitat data and products by assembling individual point datasets, maps and models from various sources and publishing them as interoperable data products for assessing the environmental status of ecosystems and sea basins.

Although changes in habitat distributions over time are somehow measured, the team agreed that there is no regular monitoring of the physico-chemical characteristics of the seabottom beneath the rafts. Furthermore, the impact of the fishery on maerl beds that occur in the vicinity of the rafts is also not monitored with regularity. Therefore, SG80 and SG 100 are not met. A condition was opened.

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Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	**60-79**
Information gap indicator	**More information sought**
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	**75**
Condition number (if relevant)	**4**

PI 2.5.1 – Ecosystem outcome

PI 2.5.1		The UoA does not cause serious or irreversible harm to the key elements of ecosystem structure and function		
Scoring Issue		SG 60	SG 80	SG 100
a	Ecosystem status			
	Guide post	The UoA is **unlikely** to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	The UoA is **highly unlikely** to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	There is **evidence** that the UoA is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.
	Met?	**Yes**	**Yes**	**No**
Rationale				

UoA1 (catch phase) - The natural beds from which the mussel seed is extracted are found on rocky coasts exposed or moderately exposed to the action of the waves, both in the open sea areas, as well as in the outer and middle areas of the estuaries, and can be developed from the average mesolithral zone to depths of 15 meters, although its exploitation is restricted to the intertidal zone (Brea-Bermejo, 2009).

The removal of large patches of mussels from the middle to lower shore will presumably modify local community structure by altering small-scale hydrography, trophic interactions and the exchange of organic matter. Studies have shown that the target species usually recovers during the closed season. The results of scientific research (Piñeiro-Corbeira et al., 2018) also shows that regeneration of all associated flora and fauna may not be complete before the next harvesting season takes place. Complete recovery to the pristine undisturbed situation on rocky shores where mussel spat is harvested annually is thus prevented. However would the impact be ceased it can be expected that recovery will take place within at least 5 years. The team thus concludes that the impact is not to be considered serious or irreversible. The team therefore concludes that impacts are reversible and do not result in the reduction of key features most crucial to maintaining the integrity of the structure and functions of the ecosystem. Also it is not to be expected that ecosystem resilience and productivity are adversely impacted.

The team therefore concludes that UoA is **highly unlikely** to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm and thus **SG80 is met**. SG100 is not met since the amount of research that has been done on the impacts of spat collection on rocks is limited and not all aspects have been investigated yet.

UoA1 and UoA2 (growing phase) - A large number of studies have been conducted on the ecosystem impacts of mussel rope culture in various parts of the world. These studies show that this activity can have ecological effects on the seabed and on the water column (Varela et al., 1984; Keeley, 2009; Ingles & Gust, 2003; Ysebaert et al., 2009; Gallardi, 2014; Figueiras et al., 2002; OESA, 2017; Outeiro et al. 2018). Besides these two generally well-studied impacts there are some wider ecological issues connected to mussel farming. Structures are put in the water and these form mid-water artificial reefs that provide a food source, breeding habitat, and refuge from predators for some species. Potential effects of mussel rope culture on seabirds and marine mammals (seals, dolphins and whales) relate mainly to entanglement (Loyd, 2003).

The effects on the seabed of rope mussel bottom culture through the deposition of pseudo phaeces are discussed under PI 2.4.1 Habitat. The risks of entanglement of marine mammals has been discussed under PI 2.3.1. ETP.

Pelagic ecological impacts of rope culture include the depletion of phytoplankton and the alteration of nitrogen cycles in the water column. The large concentrations of mussels found in mussel farms can extract a significant proportion of phytoplankton. Mussel farms act as biological filters and influence the types

and amount of food available in the water column. This in turn has the potential to have top-down effects on the wider ecosystem by influencing the amount of resources available at the base of the food web. Mussel farms also result in a concentration and redistribution of nutrients (Christensen, 2003). Farmed mussels and other associated fauna release dissolved sources of nitrogen (e.g. ammonium) directly into the water column as metabolic waste products. Water column nitrogen concentrations can also be increased due to enhanced benthic re-mineralisation rates beneath the farm (i.e. the microbial breakdown of mussel biodeposits on the sediment surface and flux of ammonium into the water column). Localised nutrient enrichment could effectively stimulate production of algae attached to the mussels and culture lines (Black 2001).

The ecological effects on the water column of mussel culture in the rias of Galicia are described by Tenore *et al*. (1985) and Outero et al. (2018) amongst others. Tenore distinguishes (for Ria Arousa) the following ecological effects: the surface area of and detritus provided by mussels support a dense epifaunal community on ropes that supplies food to demersal fish and crabs; changed patterns in plankton composition, epifaunal larvae rather than copepods dominate the zooplankton community; nutrient recycling by mussels dampens phytoplankton oscillations and contributes to high seaweed production on ropes.; heavy sedimentation of mussel deposits changes the sediment regime and lowers infaunal production; outwelling of particulate organics derived from mussel deposits from the Rias enhances benthic biomass and may support coastal fisheries.

Mussels provide surface area for attachment and detrital food, in the form of mussel faeces, that supports a dense epifaunal community of over 100 invertebrates (Tenore and Gonzalez, 1985) Many of these species are detritivores feeding on the biodeposits produced by the mussels. Reworking of the mussel deposits is important in that it reduces the organic load sedimenting to the bottom. Mussels on one raft can produce 35gC·m-2·d-1 and the detrital-feeding epifauna utilize this resource so that only a fraction (0.5 to 2.5gC·m-2·d-1) reaches the sediments (Tenore et al., 1982). Thus, most mussel faeces are converted into animal biomass that in turn serve as a food for benthic megafaunal fishes and crabs. Even though epifauna associated with mussels rework a large portion of the mussel faeces, a significantly high organic load still sediments to the bottom. This results in a high (ca. 14%) organic content of silty bottom muds and results in a low diversity and biomass of a "pollution" infaunal benthos (Tenore et al., 1982). Sediment changes restrict the distribution of some demersal fishes and may adversely affect scallop recruitment.

Several of the issues described by Tenore (1985) are further discussed by Outero at al. (2018) who state that Tenore has identified several win-win trophic and productive situations in Ria de Arousa enabled by aquaculture rafts and mussel production. However besides winners there are also losers. Among the winners are *Trisopterus luscus* and gobies have shifted their diet adapting to the new feeding paradigm in Arousa (Lopez-Jamar et al., 1984). In addition, commercially valuable *Necora puber* (Gonzalez et al. 1982) and common prawn *Palaemon serratus* (Figueras, 1984) utilize the mussel rafts ropes. Moreover, vertical resuspension of cultured mussel pseudo-faeces constitutes a major component of the Particulate Organic Carbon (POC) in the water column (Frojan et al., 2016) having a “paradoxal” positive effect on the filter feeding mussels (Navarro et al., 1996). Additionally, a recent study in Ria de Arousa found mussel rafts act as fish attractor devices attracting common dolphins (*Tursiops truncatus*). Large aggregations of fish species around mussel rafts provide high densities of high-quality prey for dolphins, however no conclusive effects of the mussel rafts on attracting dolphins are presented (Lopez & Methion, 2017).

Despite these positive impacts, there are also losers in this situation. Large amounts of standing biomass on ropes produces a vast amount of biodeposits, which can impede infaunal development (Lopez-Jamar et al., 1984). There are also bottom-up trophic cascading effects of zooplankton species shifts from holoplankton-based to meroplankton-based resulting in changes to the diets of small pelagic fish species. In particular, sardine and anchovy use Ria de Arousa as a nursery during the summer season and can conflict with crustacean *Pisidia longicornis* zoea blooms that displace the biomass of copepods (Lopez-Jamar, 1977), which are the preferred zooplankton prey (Corral & Alvarez-Ossorio, 1979). Other potential losers of mussel aquaculture are commercially valuable wild bivalves (*Pecten maximus, Chlamys varia, Aequipecten opercularis* and *Ostrea edulis)* which are resident species and present longer life cycles. Because they reach maturity later, they compete for resources and species with non-commercial detritivorous species common by mussel rafts and ropes, such as *Ciona intestinalis, Cucumaria elongata* and *Phallusia mamillata*.

Mussel excrete high levels of ammonia and thus increase the rate of geochemical cycling of nitrogen. This is particularly important in that the intrusion of upwelled water and resultant primary production is intermittent in the rias. Episodic upwelling events, occurring roughly every 2 to 3 weeks, result in bursts of primaryproduction superimposed on the typical spring-fall bloom and summer low of temperate coastal phytoplankton (Campos and Marino 1981). Phytoplankton biomass·and production then decline as the

nutrients are used up and there is no further replenishment during periods of coastal downwelling. In the Ria de Muros, where there are few mussel rafts, these declines are much more dramatic than in the Ria de Arosa, where regeneration of mussel excretory products supply same nutrients during non-upwelling periods. Furthermore, a large seaweed community, dominated by green and red algae in fall and winter and kelps in summer, also grows on the mussel ropes (Lapointe et al., 1981). Besides providing attachment surface, ammonia excreted by the mussels may well provide a constant nutrient source for seaweeds.

From a biological point of view, the Galician rías are ecosystems with high primary production. Primary production can reach 250 g C/m2/year in the Ría de Arousa (Varela et al., 1984), which is far higher than the average primary production observed in the Atlantic Ocean (100 g C/m2 /year) and is close to the estimated average for land ecosystems (Fraga & Margalef, 1979). The high primary production as a result of the upwelling of nutrient rich water results in a very high productivity of the ecosystem and supports the large production of mussels in the Galician rias. Several studies have focused on the levels of culture that reduce the food in the water to concentrations where they begin to affect the growth of the culture itself. These approaches relate to production carrying capacity (i.e. the stocking density of bivalves at which harvests is maximised (Inglis et al., 2000) or the physical carrying capacity of a given coastal area. Blanton et al. (1987) have demonstrated for the Ria de Arosa, that mussel condition was significantly correlated with the upwelling of ocean water rich in nutrients, hence with food supply. Growth was better in years with more upwelling, hence growth is food limited. Phytoplankton concentration establishes the maximum available food, and water velocity passing through the culture area determines the rate at which the food is supplied. Several studies (Pérez-Camacho at al., 1995; Pérez-Camacho at al., 2014) have been conducted studying the factors determining mussel growth in Galician rias. They show that mussel growth depends on site, water current and chlorophyl a concentration in the water passing the rafts.

As was shown previously, coastal upwelling–downwelling is the oceanographic process that is responsible for both factors (Figueras at al., 2002). Figueras et al. (2002) estimated that mussels incorporate ∼7% of carbon produced in the Rías during the upwelling season, a value that rises to ∼12% when net community production, that is, GPP[4] minus carbon respired in the water column (i.e. including mussels respiration), is considered. Thus mussel culture extracts approximately 10 % of primary productions. Varela et al. (1984) however estimated that mussel farming in the Ría de Arousa required ~60% of the available phytoplankton. Villasante et al. (2010) state that cultivation of mussels is notably contributing to reaching the carrying capacity. They claim that mussel culture reduces the primary production available for other human activities like artisinal fisheries.

Outero et al (2018) conclude that mussle culture has caused an impact in the ways and proportions of primary production is directed towards high trophic levels. They however also claim, based on Ecopath maturity index and omnivory index output values that Ria de Arousa (with the most intensive mussel culture of the Galician rias) can be considered a mature ecosystem relative to other estuarine systems and that this high level of maturity may be interpreted as the resilience of this system to cope with changes brought about over time by the intensification of food production and human activity.

Summarizing the above information the team concludes that the main impacts of mussel culture in Galicia on the ecosystems of the rias are the competition of cultured mussels with herbivore copepods for phytoplankton with resulting impacts on food chains and species and the impact of the activity on sedimenst and bentic life an the sea bottom under the rafts. The activity has no detrimental effects on bycatch species or ETP species. The question to be answered here is whether the ecosystem impacts of the activity disrupt the key elements underlying ecosystem structure and function, to a point where there would be serious or irreversible harm to the environment. The latter being *the reduction of key features most crucial to maintaining the integrity of its structure and functions and ensuring that ecosystem resilience and productivity is not adversely impacted*. This includes, but is not limited to, permanent changes in the biological diversity of the ecological community and the ecosystem's capacity to deliver ecosystem services.

The team notes that the impact on habitats under the mussel rafts is assessed under PI 2.4.1 where it was concluded that although the activity clearly impacts sediments and bottom life under the mussel rafts that the spatial scale of the activity and the overlap with VME habitats is of such a scale that it is highly unlikely to reduce structure and function of the habitats to a point where there would be serious or irreversible harm.

[4] Gross primary production.

Concerning the impact of mussel culture in the water column the team concludes that the activity results in (some) changes in the energy flows through the different trophic levels but has not adversely impacted the productivity of the ecosystem. The fact that the ecosystem has sustained a very high level of mussel production during several decades illustrates that the ecosystem's capacity to deliver ecosystem services has been maintained.

With regard to biological diversity it is important that the activity results in some changes in species composition but has not resulted in the loss of species. Thus there are no permanent changes to biological diversity. It is also higly likely that oberved changes are reversable and that the structure and function of the ecosystem are maintained. Concerning resilience[5] the team refers to the conclusions of Outero et al. (2018) who note that the ecosystem is mature and has absorbed 60 years of impact of raft culture and due to its features is resilient to these impacts. Considering the above the team concludes that it is **highly unlikely** that the current mussel culture practice in Galicia disrupt the key elements underlying ecosystem structure and function, to a point where there would be serious or irreversible harm to the environment and therefore **SG80 a is met**. Since scientific research is ongoing and it is also argued that the activity is reaching the limits of ecological carying capacity it can not be concluded that there is evidence that the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm. Thus SG100 is not met.

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Draft scoring range	**≥80**
Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report

Overall Performance Indicator score	**80**
Condition number (if relevant)	**N/A**

PI 2.5.2 – Ecosystem management strategy

PI 2.5.2		There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are **measures** in place, if necessary which take into account the **potential impacts** of the UoA on key elements of the ecosystem.	There is a **partial strategy** in place, if necessary, which takes into account **available information and is expected to restrain impacts** of the UoA on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.	There is a **strategy** that consists of a **plan**, in place which contains measures to **address all main impacts of the UoA** on the ecosystem, and at least some of these measures are in place.
	Met?	**Yes**	**Yes**	**No**
Rationale				

UoA1 (catch phase) - Areas where mussel seed can be obtained are identified and delimited, the amounts that can be harvested per raft are defined, harvesting periods are also defined and the fishing gears that can be used are restricted. The closed season spans the time that mussel recruitment peaks so to allow the mussel concentrations on the rocky shores to regenerate. It can thus be concluded that a partial strategy that takes into account information and restrains impacts of the UoA on the ecosystem is in place and **SG80 is met**. The strategy does not consist of a plan and therefore SG100 is not met.

UoA1 and UoA2 (growing phase) - The mussel culture increases the mussel stock and does not compete with other predators by removing wild stock. The practice of mussel culture could therefore be considered as a strategy to reduce ecosystem impact. Nevertheless mussel culture has impacts on the ecosystem. Several strategies can be identified aiming at keeping impacts within acceptable limits. First and for all the site selection for the mussel farms is important. The location of all mussel culture sites is exactly allocated since the coordinates of the sites are described in the license. The location of mussel culture sites is easy to determine using GPS. Therefore it is quite certain that the installations are only present on allocated sites. Inspectors control the site location and the allocated number of lines on a regular basis. The impact on the ecosystem is further controlled by controlling the number and size of mussel farms per polygon, distance between rafts, as well as the number and length of ropes per raft. To this end strategies are in place to ascertain that the industry operates within biological and assimilative carrying capacity of the environment. Mussel farmers apply their own strategy of maximizing their production of high value mussels indicating that they work within the carrying capacity of their site minimizing the impact on the ecosystem. Mussel farms impacts are determined by water speed, water depth, farm size and stocking densities. A good knowledge of these parameters exits which are paramount to identify the potential impacts and to design a strategy to the location of the mussel farms in order to minimize ecosystem impacts.

Recently *Xunta de Galicia* has promoted a project co-funded under the LIFE ENVIRONMENT Programme of the EU which its main objective is to develop a system for the integral management of the wastes produced by mussels cultured in order to reduce the environmental impact and restore the natural heterogeneity of the marine ecosystem. This project tries to establish a system for the extraction of sediments deposited under the mussel rafts as well as a system for selective collection and transport of the waste produced during the different working tasks associated to the mussel cultivation process. This project includes also training activities in order to involve mussel producers in good working practices of waste management and preservation of ecosystems.

Therefore, both UoAs: There is a partial strategy in place which takes into account available information and is expected to restrain impacts of the UoA on the ecosystem so as to achieve the Ecosystem Outcome 80

level of performance. **SG60, SG80 are met**. SG100 is not met since the partial strategy does not consists of a plan.

	Management strategy evaluation			
b	Guide Post	The **measures** are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar UoAs/ ecosystems).	There is **some objective basis for confidence** that the measures/ partial strategy will work, based on some information directly about the UoA and/or the ecosystem involved.	**Testing** supports **high confidence** that the partial strategy/ strategy will work, based on information directly about the UoA and/or ecosystem involved.
	Met?	**Yes**	**Yes**	**No**
Rationale				

UoA1 (catch phase) - The partial strategy consists of measures that control the spat collection season and the maximum amounts that can be collected per mussel raft. Results of scientific monitoring (Brea Bermejo, 2009; Piñeiro-Corbeira et al., 2018) show that regeneration of mussel beds takes place during the closed season. Thus there is some objective basis for confidence that the measures/ partial strategy will work, based on some information directly about the UoA and/or the ecosystem involved. **SG80 is met.** The results of the scientific research (Piñeiro-Corbeira et al., 2018) also shows that regeneration of all associated flora and fauna may not be complete before the next harvesting takes place. Therefore it can not be concluded with high confidence that the partial strategy will work. Thus **SG100 is not met.**

UoA1 and UoA2 (growing phase) - Based on the rationale presented in SI(a) the team considers that the partial strategy is successful in controlling the activity of mussel culture spatially. The activity only takes place in allocated sites (polygons) and the number and length of ropes is controlled. **Therefore SG60 and SG80 are met**. **SG100 is not met** since it can not be concluded that inspection rates are of such a level that it supports high confidence that the number of ropes on all rafts is effectively controlled.

	Management strategy implementation			
c	Guide Post		There is **some evidence** that the measures/partial strategy is being **implemented successfully**.	There is **clear evidence** that the partial strategy/strategy is being **implemented successfully and is achieving its objective as set out in scoring issue (a).**
	Met?		**Yes**	**No**
Rationale				

UoA1 (catch phase) - The amounts of mussel spat that can be harvested are limited at 3,500 kg per raft per year. Harvesting is only allowed with previous authorisation. The season of spat collection is limited to a specific part of the year (1 December – 30 April). There is some evidence through regular inspections that these measures are implemented successfully. **SG 80 is met**. SG100 is not met since there is no clear evidence of full compliance and the achievement of the objectives.

UoA1 and UoA2 (growing phase) - The location and number of mussel rafts is easy to determine. Therefore it is quite certain that the installations are only present on allocated locations. The size of rafts and the number of ropes are limited. There is some evidence through regular inspections that these measures are implemented successfully. **SG 80 is met**. SG100 is not met since there is no clear evidence of full compliance and the achievement of the objectives.

References

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Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	**≥80**
Information gap indicator	**More information sought / Information sufficient to score PI**
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	**80**
Condition number (if relevant)	**N/A**

PI 2.5.3 – Ecosystem information

PI 2.5.3		There is adequate knowledge of the impacts of the UoA on the ecosystem		
Scoring Issue		SG 60	SG 80	SG 100
a	Information quality			
	Guide Post	Information is adequate to **identify** the key elements of the ecosystem.	Information is adequate to **broadly understand** the key elements of the ecosystem.	
	Met?	**Yes**	**Yes**	
Rationale				

Extensive scientific research has been conducted on water circulation patterns, carrying capacity, fyto- and zooplankton production, ecosystem impact on water column and habitats, etc. therefore information is adequate to **broadly understand** the key elements of the ecosystem and **SG60 and SG80 are met**.

b	Investigation of UoA impacts			
	Guide Post	Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, but **have not been investigated** in detail.	Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, and **some have been investigated in detail**.	Main interactions between the UoA and these ecosystem elements can be inferred from existing information, and **have been investigated in detail**.
	Met?	**Yes**	**Yes**	**No**
Rationale				

Scientific research has shown that the UoA can have impacts on the water column (fytoplankton composition) and benthonic life (see SIa). Main impacts of the UoA on key ecosystem elements can be inferred from the existing scientific information (Brea-Bermejo, 2009; Tenore et al. (1985); Outero et al. (2018); Piñeiro-Corbeira et al., 2018). Some impacts on key ecosystem elements such as bottom sediments, phytoplankton and nutrient cycles have been investigated in detail in the rias in Galicia. It can therefore be concluded that **SG60 and SG80 are met**.

Although, some of the results can be extrapolated among rías, some relevant information is lacking for some of the rías. Therefore, at this stage, the team considers that not all main interactions have been studied in detail and **SG100 is not met.**

c	Understanding of component functions			
	Guide Post		The main functions of the components (i.e., P1 target species, primary, secondary and ETP species and Habitats) in the ecosystem are **known**.	The impacts of the UoA on P1 target species, primary, secondary and ETP species and Habitats are identified and the main functions of these components in the ecosystem are **understood**.
	Met?		**Yes**	**No**
Rationale				

There is sufficient scientific literature to conclude that the main functions of the components (i.e., P1 target species, primary, secondary and ETP species and Habitats) in the ecosystem are known. **Therefore, SG80 is met**. **SG100 is not met** since not all impacts on the components are known and not all main functions of these components are understood.

	Information relevance			
d	Guide Post		Adequate information is available on the impacts of the UoA on these components to allow some of the main consequences for the ecosystem to be inferred.	Adequate information is available on the impacts of the UoA on the components **and elements** to allow the main consequences for the ecosystem to be inferred.
	Met?		**Yes**	**No**
Rationale				

Information on the impacts of the UoA on the components of the ecosystem is available. There has been extensive research on associated fauna on mussel ropes, impacts on phytoplankton composition, nutrient cycles, inpacts on bottom sediments and benthonic life, effects of spat collection and this information is considered to be sufficient to allow some of the main consequences for the ecosystem to be inferred and thus **SG80 is met.** SG100 is not met since there is not sufficient information on the impacts of the UoA on all ecosystem elements.

	Monitoring			
e	Guide post		Adequate data continue to be collected to detect any increase in risk level.	Information is adequate to support the development of strategies to manage ecosystem impacts.
	Met?		**Yes**	**No**
Rationale				

Information on annual mussel production, seed collection, locations of mussel rafts continue to be collected and these data allow for the detection of increase in risk level. **Therefore, SG80 is met**. SG100 is not met since information is currently insufficient to support the development of strategies to manage ecosystem impacts.

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Outeiro, L., Byron, C., & Angelini, R. (2018). Ecosystem maturity as a proxy of mussel aquaculture carrying capacity in Ria de Arousa (NW Spain): A food web modeling perspective. Aquaculture, 496, 270-284.

Piñeiro-Corbeira, Cristina & Barrientos, Sara & Olmedo, Mercedes & Cremades, Javier & Barreiro, Rodolfo. (2018). By-catch in no-fed aquaculture: exploiting mussel seed persistently and extensively disturbs the accompanying assemblage. ICES Journal of Marine Science. 10.1093/icesjms/fsy107.

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Draft scoring range and information gap indicator added at Announcement Comment Draft Report

Draft scoring range	>80
Information gap indicator	More information sought
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	**80**
Condition number (if relevant)	**N/A**

7.4 Principle 3

7.4.1 Principle 3 background

7.4.1.1 Area of operation of the fishery

The UoAs operates in Galician inland waters (rías") in the northwest of Spain, Galicia borders the waters of the Northeast Atlantic located in FAO Statistical Area 27 (ICES sub areas VIIIc and IXa). Production of mussel (Mytilus galloprovincialis) in Galicia is extended from the Rías de Ares-Sada to the Ría de Vigo, including Ría de Muros-Noia, Ría de Arousa and Ría de Pontevedra.

The Order of October 26, 2000 identifies the areas where the harvesting of mussel seed is allowed. These are the intertidal rocks on the coast of the provinces of A Coruña and Pontevedra, Archipelago of Ons (east part from Punta Centolo to Punta Federento and Onza, from Punta Cociñadoiro to Porto do Sol), Archipelago of Sálvora (east part of the island, from Punta Lagos to Punta Besugeiros) and Archipelago of Cíes (north area from Punta Farolillo to Viños islet and south area from Punta Pau de Bandeira to Alto de Vicos). See Figure 7.3.5.

An authorization for extraction of mussel spat in the case of the Archipelagos Ons, Cíes and Sálvora will require a previous report from the Environment Counseling conform Decree 177/2018, 27 December, approving the plan for use and management of the Maritime Terrestrial National Park Islas Atlánticas. The activity is carried out in the inland waters of Galicia, an area characterized by its high primary production. This area has an average depth of 18-24m depending on the estuary and reaches a maximum of 40-65m. Figure 7.4.1.

Figure 7.4.1 Two representative pictures of the fishery under assessment. The picture on the left is an aerial picture of rafts in one *Ría* and the one on the right represents the extraction of mussel from the rocks. Source: Consello Regulador.

7.4.1.2 Jurisdiction of the fishery

The competence for the regulation of mussel culture in Galicia lies with the Autonomous Government of Galicia (Spain-EU). Galicia is one of the so called autonomous community of Spain. Spain is not a federation, but a decentralized unitary state. While sovereignty is vested in the nation as a whole, represented in the central institutions of government, the nation has, in variable degrees, devolved power to the communities, which, in turn, exercise their right to self-government within the limits set forth in the constitution and their autonomous statutes. Each community has its own set of devolved powers and as stated Galicia has the right to regulate the mussel culture along its coastline. Spain is a member of the European Union since 1986. Consequently, national and regional fisheries policies are also governed by the broader legal framework of the EU.

Article 148.1.11.a of the Spanish Constitution provides for the exclusive competence of the Autonomous Communities for fisheries in internal waters, shellfish harvesting and aquaculture. In accordance with the Constitution, Article 28.5 of the Statute of Autonomy of Galicia establishes that Galicia has competence for the legislative development and for the enforcement of the State law, in relation with different areas, where the management of the fishing sector is one of them. Through Article 27.15 of the Statute of Autonomy of Galicia, it is conferred to the Galician Autonomous Community the exclusive competence in fishing in estuaries ("rías") and other inland waters, shell-fishing and aquaculture. Royal Decree 3318/82 on the transfer

of functions and services of the State Administration to Galicia lists these powers in terms of fishing and shellfish.

As stated Spain is a Member State of the European Union, and its fisheries are therefore subject to the principles and practices of the Common Fisheries Policy (CFP) of the EU. Although there is considerable local management (see below), the EU rules of the Common Fisheries Policy do none-the-less still apply to Spains shellfish fisheries. The first EU common measures in the fishing sector date from 1970, when it was agreed that, in principle, EU fishermen should have equal access to Member States' waters. A revised CFP came into force in 2014 and the current basic fisheries regulation (No.1380/2013) details the CFP objectives, including: “The CFP shall ensure that fishing and aquaculture activities are environmentally sustainable in the long-term and are managed in a way that is consistent with the objectives of achieving economic, social and employment benefits, and of contributing to the availability of food supplies.”

Outside the CFP framework other EU legislation dealing with habitats and species protection is also relevant to fisheries management and to operators in the fishery.

In 2013 the EU published Strategic Guildelines for the Sustainable Development of Aquaculture, COM (2013) 229. These note the significance of the Water Framework Directive (Directive 2000/60/EC) and the Marine Strategy Framework Directive (Directive 2008/56/EC) in ensuring healthy aquatic systems that are essential for sustainable aquaculture.

Implementation of the CFP at a national level is carried out through the individual Member States. The General Secretariat for Fishing (SGP, Spanish acronym) that is part of the Ministry of Agriculture, Fisheries and Food (MAPA, Spanish acronym) is responsible for fisheries management in Spain on a national basis. At the national level, Law Nº 3/2001 on National Marine Fisheries (*Ley Nº 3/2001 de Pesca Marítima del Estado* Ley[6] 3/2001, of 26 March) establishes the legal framework for fishing management essentially covering the contents of European regulation. Marine aquaculture is regulated at the national and autonomous levels. At the national level, the relevant norms are the Law on Marine Aquaculture (Law 23/84, of 25 June) and the Law of the Coasts (Law 22/88, of 28 June).

The Autonomous Government of Galicia has taken responsibility of the management of aquaculture and fishing in its area. The *Consellería do Mar* (Council of the Sea) with its Secretariat and its different general directorates and services is the organisation in which is responsible for fisheries and aquaculture management in Galicia. The Galician authorities have established the Law 11/2008, 3 December, of Fishing of Galicia (modified by Law 6/2009 of 11 December). This Law includes the regulation of the activity of aquaculture in the maritime zone by describing different functions, instruments and mechanisms for the development of the management system along its 14 headings: I; conservation and management of fisheries and shellfish resources II; sea fishing III; shellfish IV; marine aquaculture V; Galician fishing fleet VI; agents of the fishing sector and advisory bodies on fisheries VII; marketing of fishery products VIII; development of sustainable fishing areas IX; research and technologic development X; training of maritime-fishing XI; inspection, control and avoid of pollution XII; records XIII; sanctions XIV. Additionally, Decree 423/1993, of December 17, contains the current regulations on shellfish, seaweed and marine culture, in its title II, chapter I, specifically regulates the rafts, remains repealed by Decree 406/1996 currently in force. This Decree has been modified with regard to Article 37 through the Decree 338/1999 (in relation with the natural beds of mussel in the coast) and in with regard to the Articles 1, 35, 36, 44 through Decree 174/2002.

7.4.1.3 Objectives for the fishery: Resource, Environmental, Biodiversity and ecological, Technological, Social and Economic

According to Decree 406/1996, the high density of rafts existing in inland waters of Galicia, makes it essential to issue rules to ensure that such marine cultures will not be detrimental to other activities, or especially to themselves. Therefore, the regulation of the dimensions, characteristics and other circumstances of the nurseries is absolutely necessary in order to:

a) Ensure a more equitable distribution of natural resources, avoiding as far as possible that some shellfish cultures[7] harm others, and

[6] Law.

[7] Viveros.

b) Avoid deterioration of the environment.

The Law of Fishing of Galicia 11/2008 establishes that the policy of the Administration of the Autonomous Community of Galicia will have objectives related with the conservation and management of fisheries and shell-fish resources. It includes:

a) The establishment and regulation of measures aimed at the conservation, management and responsible, rational and sustainable exploitation of living marine resources. These measures will be done gradually, trying to minimize the possible socioeconomic imbalances that may arise from their adoption.

b) The adoption of measures aimed at promoting the exercise of a fishing and shellfish activity respectful with the environment, as well as the protection of fishing and shellfish resources from other activities that have an impact on them.

c) The adoption of measures aimed at a better use of under-utilized species, by-products and waste.

d) The promotion of the participation of the fishing and shellfish sector in the adoption of conservation measures.

e) The promotion of improvements in the access and exploitation of living marine resources.

The objective of the marine aquaculture will be achieve optimum use of the productive potential of the marine environment, respecting the environment and increasing and promoting competitiveness, as well as improving the living and working conditions of people who are engaged in this activity and contributing to the socioeconomic development of the coastal communities.

Through the Article 57 of this Law, the *Consellería do Mar* (Council of the Sea) is authorized to grant concessions for aquaculture activities. In the event that the concession has the exclusive purpose of exploiting natural beds that entail the carrying out of extensive or semi-extensive marine farming, it will be required a viability plan that guarantees efficient and rational exploitation and evidence of economic self-sufficiency.

7.4.1.4. Description of the measures agreed upon for the regulation of fishing in order to meet the objectives within a specified period

Article 7 in the Law of Fishing of Galicia 11/2008 establishes that the Galician authorities will regulate the rights and obligations that can affect the management of living marine resources. They will adopt management plans to regulate the technical measures, capacity and schedules for the fishing activity (including closing of the areas when needed). Recovery plans will be established for when species fall outside the biological safety limits. These recovery plans will establish measures, deadlines and objectives to guarantee the recovery of the populations. Exceptional measures for cases of serious threat to resources or the ecosystem, will take effect immediately.

In addition, in Chapter 3, the Law establishes the objective of the concessions in the maritime area for installing different production activities, for example mussel rafts. The producer who owns a concession has different obligations, one of them is to keep the area in good condition and to establish corrective measures which can minimize the impact on the environment and historical heritage of aquaculture activity. These concessions are granted to the producer for 10 years, being extendable for further periods of ten years up to a maximum of fifty years, if conditions are complied with. See Section 7.4.1.8 for more details.

Decree 406/1996, of November 7, which approves the Regulation of marine culture nurseries in the waters of Galicia regulates the rafts with the following requirements:

• **Surface of the rafts** will be a maximum of 550 m^2 and its longest length may not exceed 27 meter.

• **Funding**. Mussel rafts can only be anchored at locations where the minimum depth is greater than 10 meter. One or two anchor chaines can be used. In the first case, the characteristics of the chain will be such that they allow the normal movement of the raft, and in no case can the raft exceed the limits of the assigned grid. As a general rule, all the rafts of a polygon will be anchored in the same way.

Decree 174/2002 has modified some of the articles of Decree 406/1996 as applicable to growing ropes:

• A **maximum length** of 6 000 meters is set for the total length of the growing ropes for mussels on a single raft. The maximum number of growing ropes is set at 500 and the maximum length of the ropes is set at 12 meters.

• The **growing ropes** will attached to the grid of the raft by means of the '*rabiza'*, which is a rope, usually of polyester, thinner than the growing ropes. The *rabiza* will have a maximum length of 5 meters, it cannot have sticks and can be clearly distinguished from the growing line.

Decree 338/1999 has modified the Article 37 of Decree 406/1996 as applicable to mussel seed:

• For the **mussel spat collection** ('*abastecimiento de semilla en banco natural'*), the areas, extraction periods and maximum allowed quantities in each area will be regulated by Orders issued by the regional competent counselling *Consellería de Pesca, Marisqueo y Acuicultura*, which is currently *Consellería do Mar*. This is done because it depends on different factors like the climatology, social issues and the quantity of seed in a determined period of the year.

Order of October 26, 2000 is applicable in relation with **seed collection from the rocks**: catching from natural areas are all of them located in the coast of Pontevedra and Coruña Provinces, including specific areas of the three Archipelagos of Ons, Sálvora and Cíes. The main points are:

- **Period of extraction** in the rocks will be limited between 1st December and 30th April, only from Monday to Friday (excluding public holidays as well).
- The producer needs an **authorization** approved by the competent Council in the regional government (Xunta de Galicia) to be allowed to extract mussel seed from the natural areas. The forms are presented in Annex I and Annex II of the Order of October 26, 2000[8].
- In each period of extraction the **limit of extraction** for each raft is 3.500kg. This quantities should be communicated by each producer to the competent authorities to ensure compliance with the authorization given. This authorization form includes personal data, validity, approved means of transport and details the raft the seed is destined for.

Decree 406/1996 and its related modification Decree 174/2002 regulate the activity of **spat collection on collector ropes** at the rafts:

- The use of collecting ropes is allowed from 1st April to 30th September. Their **number** shall not exceed one hundred, being identified in red color to be easily differentiated. Maximum length allowed for this ropes is 5m under the surface of water. This conditions could be modified by the responsible local authorities because of exceptional environmental phenomena which could alter the normal cycle of reproduction of the mussel; upon request of the majority of representative entities of the sector and report of the corresponding technical administrative unit.

List of authorized vessels and ports of landing for mussel are described in the Order of December 11, 2008, created to regulate landings in ports and to ensure traceability. All mussel discharges must obtain the corresponding registration document for live bivalve molluscs in the port and be carried out between 7:00h and 20:00h. The ports of landing can be found on the Traceability Section.

The mussels must be grown under the conditions of water quality established by Directive 79/923 / EEC, and comply with the production and placing on the market standards established by Regulation 853/2004.

Listed below are the applicable Galician legislation for marine nurseries such as rafts:

Common Dispositions	➢ Law 11/2008, of December 3, on fishing in Galicia. ➢ Law 1/2009, of June 15, amending Law 11/2008, of December 3, on fishing in Galicia. ➢ Law 6/2009, of December 11, amending Law 11/2008, of December 3, on fishing in Galicia. ➢ Law 2/2017, of February 8, on medidas fiscales, administrativas y de ordenación. ➢ DOG Nº 127 of 07/02/86. Decree 197/86, of June 12, regarding the reorganization agreements of regulated marine shellfish cultures. ➢ DOG Nº 228 of 21/11/96. Decree 406/1996, of November 7, 1996, approving the Regulation of marine culture nurseries in Galician waters.

[8] *Orden de 26 de octubre de 2000 por la que se regula la extracción de semilla de mejillón en bancos naturales.*

	➢ DOG Nº 251 of 12/30/99. Decree 338/1999 of December 3, amending the Regulation of nurseries of marine cultures in Galician waters approved by Decree 406/1996 of November 7. ➢ DOG Nº 97 of 22/05/02. Decree 174/2002, of May 10, which amends the Regulation of marine culture nurseries in the waters of Galicia, approved by Decree 406/1996 of November 7. ➢ DOG Nº 121 of 24/06/05. Order of June 22, 2005, adopting temporary and exceptional measures for the transfer of bivalve molluscs.
Concessions	➢ DOG Nº 126 of 02/07/99. Order of June 15, 1999, regulating the procedure for the transfer of ownership of the concessions of marine crop nurseries in the waters of Galicia. ➢ DOG Nº 245 of 22/12/99. Order of November 17, 1999, regulating the procedure for granting extensions of the concessions of marine crop nurseries in the waters of Galicia. ➢ DOG Nº 95 of 18/05/00. Order of May 8, 2000, modifying that of June 15, 1999, which regulates the procedure for the transfer of ownership of concessions of marine crop nurseries in the waters of Galicia. ➢ DOG Nº 83 of 30/04/01. Order of April 18, 2001, regulating the procedure governing the exchange of anchorage points and changes of system, location and cultivation in marine culture nurseries. ➢ DOG Nº 177 of 13/09/2006. Order of September 8, 2006, declaring and classifying the production areas of bivalve molluscs and other marine invertebrates in waters under the jurisdiction of the Autonomous Community of Galicia. ➢ DOG Nº 227 of 28/11/11. Order of November 23, 2011, amending the Order of September 8, 200,6 declaring and classifying the production areas of bivalve molluscs and other marine invertebrates in the waters under the jurisdiction of the Autonomous Community of Galicia. ➢ DOG Nº 227 of 28/11/11. Order of November 23, 2011 declaring and classifying new relaying areas for bivalve molluscs in the waters under the jurisdiction of the Autonomous Community of Galicia.
Experimental authorizations	➢ DOG Nº 188 of 28/09/98 Order of September 17, 1998, regulating the procedure for granting experimental temporary authorizations in marine crop nursery polygons. ➢ DOG No. 207 of 26/10/99 Order of October 7, 1999, regulating the procedure for mortis causa transfer of the ownership of experimental temporary authorizations in nursery polygons. ➢ DOG Nº 13 of 20/01/2000 Order of December 17, 1999 regulating the procedure for granting extensions of experimental temporary authorizations in nursery polygons. ➢ DOG Nº 80 of 27/04/94. Order of March 22, 1994, declaring the exclusive reserve of certain grids of various floating nursery polygons.
Other Dispositions	➢ DOG Nº 61 of 01/04/97. Order dated March 14, 1997, establishing conditions for the transfer of bivalve molluscs between nurseries located in the waters of the Autonomous Community of Galicia. ➢ DOG Nº 30 of 13/02/98. Order of January 28, 1998, determining the characteristics of the identification plates of the marine culture nurseries in the waters of Galicia. ➢ DOG Nº 51 of 16/03/98 Order of March 3, 1998, regulating the procedure for the withdrawal of illegal nurseries. ➢ DOG Nº 228 of 24/11/00 Order of October 26, 2000 regulating the extraction of mussel seed in natural banks. ➢ DOG Nº 83 of 30/04/01. Order of April 18, 2001, regulating the procedure governing the exchange of anchorage points and changes of system, location and cultivation in marine culture nurseries. ➢ DOG Nº 243 of 16/12/08. Order of December 11, 2008, regulating the unloading and control of mussel grown in floating nurseries in Galicia.

	➢ DOG Nº 2 of 04/01/11. Order of December 28, 2010, establishing the Mussel Commission. ➢ DOG Nº 68 of 08/04/19. Order of March 20, 2019 approving the Regulation of the protected designation of origin Mexillón de Galicia - Mejillón de Galicia and its Regulatory Council.

In addition to the previous regulations, in 2000 the regulation of the designation of origin Mexillón de Galicia-Mejillón de Galicia and its regulatory council was approved for the first time. Previously, this denomination was approved by the Order of July 15, 1998, of the Department of Fisheries, Shellfish and Aquaculture (DOG No. 148, of August 3).

In order to adapt the Regulation to the new technical requirements published in the Official Journal of the European Union, the Order of August 29, 2008 was published approving the Regulation of the designation of origin Mexillón de Galicia-Mejillón de Galicia and its Regulatory Council

The denomination is 'Mexillón de Galicia' (Galician language) and the intellectual property right granted by the registration of the Mejillón de Galicia Protected Designation of Origin is owned by the Galician Mejillón Regulatory Council.

7.4.1.5 Particulars of the recognised groups with interests in the UoA

The groups recognised as having direct interests in the fishery fit into the classification of groups belonging to the Regional Government, the National Administration and private groups and natural persons with economic and social interests in the fishery. All of the organisations, institutions and individuals participating in the fishery are easily identifiable and are explicitly defined:

- **National Administration: The Government of Spain**

At the national level, several organisations are in charge of carrying out additional controls to those already covered by the Galician Government. As it was mentioned above, the General Secretariat for Fishing (SGP) belonging to the **Ministry of Agriculture, Fisheries and Food (MAPA)** is responsible for the broader legal framework for managing the fishing activity in Spain, transposing the European regulations. Maritime Rescue from the Ministry of Public Works is responsible for search and rescue services, and the prevention and control of marine pollution. The Maritime Captanies from the General for Merchant Shipping, Ministry of Public Works are in charge of safety at sea, the prevention and control of marine pollution, maritime inspections and the clearance and registration of marine traffic. Another state organisation that contributes to monitoring in terms of food safety, poaching and coastal and marine environmental impacts is the Nature Protection Service (SEPRONA, Spanish acronym), which is part of the Civil Guard (Ministry of the Interior).

- **Regional Government: Autonomous Community of Galicia.**

The ***Consellería do Mar*** is the body of the Galician Administration which is responsible for proposing and executing the Government's general guidelines on inland fisheries management, shellfish, aquaculture, fishermen's guilds / other organizations and associations of professionals in the sector, in accordance with the provisions of the Statute of Autonomy of Galicia and according the Spanish Constitution (Law 1/2016). With the Decree 168/2015, in chapter III is described the structure and functions of the **General Directorate of Fisheries, Aquaculture and Technological Innovation** which is the section in charge of direction and coordination of the competencies and functions related with inland fishing and aquaculture; industries of transformation and commercialization of this products; statistics and records on fisheries, shellfish and aquaculture; promotion of the competitiveness and quality of fishery, shellfish and aquaculture products; conservation, protection and sustainable management of marine resources; aquatic animal health coordination; cooperation inter-institutional and foreign fisheries, according to the Galician fisheries policy and the basic regulations of the European Union and the General State Administration. This includes the **General Subdirection of Fishing and Markets Fishing and the Aquaculture Subdirection.**

- Two institutions of the regional government which are involved in research related with the marine environment including mussel in Galician *rías* are: The **Marine Research Center** (CIMA[9], Spanish acronym)**,** a public institution whose purpose is to achieve the rational and effective management of renewable marine resources, within the geographic scope of competences of the Autonomous Community of Galicia.
- The **Sea Technological Center** (CETMAR[10], Spanish acronym), a public foundation with actions at local, national, European and international levels whose main objective is to promote cooperation between institutions, research centres and fisheries sector, promoting at the same time the involvement of this different sectors in R&D projects. With this actions, it favours the efficiency of the use and exploitation of the sea.

The ***Guardacostas*** (Coastguards) of Galicia is a public service regulated by the Law 2/2004, depending on the *Consellería do Mar*. They act in compliance with the Spanish Constitution, the Statute of Autonomy of Galicia and the rest of the legal system collaborating with the different administrations and authorities with the performance of control activities in establishments and activities related with the exploitation of the marine resources, including the different stages from production to commercialization and transport until its final consumption, to ensure compliance of the related maritime safety laws (Decree 136/2017). In addition, in relation with the mussel activity in Galicia, they are in charge of activities like controlling illegal movements. The Inspection and Control of Resources Service is part of the **General Subdirection of *Guardacostas* of Galicia** as establish in Decree 168/2015. It is the area in charge of (without prejudice to the competencies of other bodies of the Administration) the promotion and protection of public health, security throughout the food chain (including primary production) and, especially, wildlife and the environment itself, productions and aquatic animal genetic resources; aquatic animal health and aquaculture; protection of resources (especially regarding minimum sizes, areas and times of closure or catch limits); control of the food chain, inspection in first sales points of fish markets and control points and establishments authorized to make first sales of seafood.

The General Subdirection of Coastguards of Galicia is organized in 3 units:

1) Resource Protection Service: coordinates, organizes and controls the material and personnel means of the Coastguard Service; it also controls Coastguard documents and actions.

2) Search, Rescue and Pollution Control Service: coordinates the competences in the field of maritime rescue and the fight against marine pollution.

3) Resource Inspection and Control Service (SICOR): it is responsible for carrying out actions to:

- ensure the protection of resources (closed seasons, catch limits, etc.), including animal health issues; and

- ensure the protection of public health (food safety), thus, SICOR inspections and controls cover production areas and natural stocks, extending to the entire commercial chain (rafts, vessels, ports, companies, etc.).

Finally, there is another figure employed by the fisher's guilds named *Guardapescas Maritimos* (Marine Fishery Wildlife rangers), who carry out surveillance and control tasks in the shellfish banks and fishing areas. The marine fishery wildlife rangers are specialized *Guardias Rurales* (Rural guards) and must have the authorization of the Guardia Civil (Law 5/2014). Additionaly, the *Consellería do Mar* has two collegiate bodies of participation where the mussel sector is represented: The Comisión del Mexillón and the Consejo Gallego de Pesca.

Comisión del Mejillón

The Mussel Commission, created by the Order of December 28, 2010, has a permanent and consultative character. It is integrated by representatives of the Consellería do Mar and by representatives of the mussel sector. And its main role is to perform a consultative and advisory function for the Administration in the different administrative issues affecting the mussel producing sector.

From the Autonomous Administration: four members from the Regional Ministry of Rural Affairs: general director of competitiveness and technological innovation; director of INTECMAR; Head of Market Service; Head of the Aquaculture Service or head of the Technological Innovation Service of aquaculture. From the

[9] Centro de Investigación Mariña.

[10] Centro Tecnológico del Mar.

associative entities: variable number of representatives for each associative entity depending on the number of rafts it represents. Each entity will have one representative for every 300 bats.

Consejo Gallego de Pesca

Created in 1993 and later modified by the Decree 123/2011 of 16 June, it is the collegiate body of participation, consultation and advice of the general administration of the Autonomous Community of Galicia for fishing, shellfish and aquaculture matters with an impact on the Galician sector. See Section 7.4.1.6 for more details on functions and decision-making process.

The Galician Fishing Council is structured in two bodies:

a) the plenary session, with 55 members including the president (Conselleira do Mar), vice-president (Secretaria Xeral Técnica da Consellería do Mar), secretary (with the right to speak but not to vote) and spokepersons (sea sectors: fishing, shellfishing, aquaculture, processing companies, unions and recreational fishing),

b) 10 sectorial commissions in relation to the specific topics of each area, with an average of 13 members. All the sectorial commissions are chaired by a director or general director of the Consellería do Mar with competence in the subject.

The mussel producing sector has participation in the plenary session and also in 3 of the sectorial commissions:

1. Sectorial commission on Aquaculture. Comprised of (i) 8 spokepersons representing the mollusk aquaculture sector (seven appointed by the most representative associations in the Mussel Commission + one appointed by the Galician Federation of Guilds), and (ii) 3 spokepersons representing the fish aquaculture sector appointed by the Galician Aquaculture Cluster.
2. Sectoral Commission on Social Policy and Fleet Safety: Comprised of union representatives and 7 spokepersons representing the different sectors (1 from the aquaculture sector).
3. Sectoral Commission on Processing, Marketing, Depuration and Producer Organizations: although currently there is no representation from the mussel production sector, OPMEGA could be included in this commission as it is a Producer Organization, when a new renewal takes place if the POs so decide.

- **INTECMAR**[11], Technologic Institute for the Control of the Marine Environment of Galicia.

It constitutes the official instrument of the regional administration of Galicia, for the control of the quality of the marine environment and the application of the legal dispositions in the matter of technical-sanitary control of the products of the sea. Its activity is focused on monitoring, control and research of the environmental quality of the coastal waters of Galicia, especially regarding to oceanographic conditions, phytoplankton, marine biotoxins, chemical pollution, microbiology and pathology.

- **Consejo Regulador Mejillón de Galicia (Client group)**

The constitution of the Regulatory Council of the Galician mussel (*Consejo Regulador Mejillón de Galicia*) in 1994, has had a significant impact, with the approval of the quality Galician product designation, and since 2000 with the provisional approval of the EU protected designation of origin (PDO): *Mexillón de Galicia*. Its importance lies in the protection and regulation of a cultural added value, as is its origin of the Galician estuaries, for its exclusive use in the mussel of that origin.

The Regulatory Council of the Galician mussel is a corporation under public law that is responsible for the management and control of the PDO Mejillón de Galicia. Its members are either mussel producers, mussel processing companies or mussel depuration companies / dispatching centers.
The Law 2/2005, of February 18th, gives competences to the Regulatory Council about the protected product (Mussel of Galicia) in any of its production phases, conditioning, storage, packaging, circulation and commercialization and about the people registered in its records.

[11] Instituto Tecnolóxico para o Control do Medio Mariño de Galicia

The Law 2/2005 (and the regulation approved by the ORDER of March 20, 2019) includes the functions of the Regulatory Council among which are included activities of dissemination of the PDO, mussel quality control, product certification, anti-fraud surveillance and investigation. It also confers the Regulatory Council the power to formulate proposals for modification, guidelines for intervention in the sector, including regulatory changes or reforms, and proposals for inspection actions to the competent council for marine products. It also gives it the function of ensuring the sustainable development of the production areas of the Galician Mussel.

The highest management body of the Galician Mussel Regulatory Council is the plenary, composed of representatives of mussel producers and marketers, as well as members of the Regional Administration. Control activities of the Protected Designation of Origin (PDO) are channelled through an independent structure, headed by a Certification Committee.

The *Consellería* acts as a promoting body in which the Mussel Commission in charge of its presidency is integrated. Thus, based on the regulation established in Law 30/1992, the has the power to issue specific provisions on the issues related to the operation of the Mexillón Commission, specifically as regards development of the meetings and the approval of the agreements adopted by those.

- **Fisheries sector**

The sectoral part identifies *Cofradías* (fishers´ guilds) and the fishers themselves. The mussel producers can be independent producers and / or be grouped in associations. In this case, the associations manage the entire administrative part of the exploitation of the rafts. Those mussel producers not included in the *Consello Regulador Mejillón de Galicia* are also identified as stakeholders because of their relation with the same activity in same area.

In addition, the presence of other shellfish producers and mussel industry (depuration and canning centres) in the area is important.

The different *Cofradías* (fisher´s guilds), which are defined as public law corporations that act as bodies for consultation and collaboration with the Administration on issues of general interest and relating to the extractive fishing activity and its marketing, especially in the artisanal and coastal sectors. Following fisher´s guilds are included as stakeholders: *Federación Galega de Confrarías, Federación Provincial de Confrarías de Pescadores de Pontevedra, Federación Provincial de Cofradías de Pescadores de la Provincia de A Coruña, Federación Provincial de Confrarías de Pescadores de Pontevedra, Confraría de Pescadores Santa Tecla de A Guarda, Cofradía de Pescadores La Anunciada de Baiona, Cofradía de Pescadores de Vigo, Cofradía de Cangas, Confradía de O Grove, Cofradía de Ferrol, Cofradía de Muros.* Regarding industry sector representation: *Asociación Gallega de Empresas Depuradoras y Distribuidoras de Moluscos, Asociación Gallega de Cocederos* and *Asociación Nacional de Fabricantes de Conservas de Pescados.*

- **Other associations and NGO`s.**

In addition, the following associations that are active in the area are identified as stakeholders: Defence Platform of the Arousa estuary[12] (PDRA, Spanish acronym), Galician Ecologic Defence Association (ADEGA, Spanish acronym), ecologist group with activity in the Autonomous Community of Galicia; *Sociedade Galega de Historia Natural*, defending and spreading the Galician natural heritage; Coordinator for the Marine Mammals Study (CEMMA, Spanish acronym), regional NGO related with the study of marine mammals. Other recognised groups with interests in the UoA are Bottlenose Dolphin Research Institute (BDRI), involved in research and education in marine science; OCEANA, dedicated to protecting and restoring the oceans on a global scale; and WWF-Spain, NGO related with the environment protection.

- **Other institutions and public organisations**

Other institutions exist, especially those connected with research, for example the three Galician Universities (A Coruña, Santiago de Compostela and Vigo), with different marine and aquaculture research centres and teams. Also the Spanish Council for Scientific Research (CSIC, Spanish acronym), the State Agency for

[12] Plataforma en Defensa da Ría de Arousa

scientific research and technological development, whose mission is the promotion, coordination, development and diffusion of scientific and technological research, of a multidisciplinary nature, in order to contribute to the advancement of knowledge and economic, social and cultural development, as well as the training of personnel and advising public and private entities on these matters.

Lastly, JACUMAR (Junta Nacional Asesora de Cultivos Marinos) is an agency of the MAPA Ministry, comprised of the Fisheries General Secretariat and the aquaculture governing bodies of the autonomous communities. It also has the participation of the main representative organizations of the mussel production sector, including the Consejo Regulador de Mejillón de Galicia.

Its main objective is to facilitate the coordination and cooperation in marine aquaculture matters between the State Administration and the Autonomous Communities. Main fields of action, among others: Management of National Plans for Marine Aquaculture, maintenance of an inventory of aquaculture facilities at national level, collection of production data at national level.

7.4.1.6 Consultations, decision-making process or processes and recognised participant

The Order of December 28, 2010 includes in its Article 1 the creation of the *Comision do Mexillón* (Mexillón Commission) as a permanent and advisory collegiate body, under the *Consellería do Mar*. This body will be composed of representatives of the *Consellería do Mar* and representatives of the Galician mussel sector and its scope will be Galicia.

Its main function is to perform the function of consultation and advice for the Administration on the different administrative issues that affect the mussel sector, thus facilitating a communication channel.

In the inland waters of protected natural areas, the limitations or prohibitions of fishing, shellfish and aquaculture activities will be established by the *Consellería do Mar* in accordance with applicable legislation, after consulting the sector and taking into account the economic factors that concur (Law 11/2008).

The fishermen's guilds act as consultation and collaboration bodies for the Administration of the Autonomous Community of Galicia in matters related to extractive activity and management of the fishing sector.

In this Law, Fishing Law of Galicia, in its Article 78 is established that the fishermen's guilds, producer organizations, sea cooperatives, professional associations of the sector, trade union organizations of professionals in the sector, marine and nautical recreational fishing associations and other legally recognized associative entities made up of professionals from the sector will be considered representative entities for the purposes of their collaboration in decision-making that may affect the interests they represent.

Furthermore, in Article 95 of the Galician Fishing Law, it is expressly included the Consejo Gallego de Pesca. Article 1 of Decree 123/2011, dated June 16th, which regulates the Consejo Gallego de Pesca, defines it as a collegiate body for participation, consultation and advice on fishing, shellfishing and aquaculture with an impact on the Galician sector. It is assigned to the Consellería del Mar with the following roles:

a) To collaborate with the Consellería del Mar in the elaboration of the fishing, shellfish and aquaculture planning and in the programming of studies on the different activities that can favor the development of the Galician fishing sector.
b) To study and propose the reforms that it considers precise in the fishing, shellfish and aquaculture regulations with incidence in the Galician fishing sector.
c) To propose reforms, channel recommendations and make suggestions regarding policies that affect the fishing sector as a whole.
d) To consultat other organizations and institutions.
e) To issue reports and decisions in all those cases where the Consejo declares it, as well as when requested by the Consellería del Mar.
f) Issue decisions on the preliminary draft laws on fishing, shellfish and aquaculture, as well as on the draft regulatory provisions that, in relation to such matters, are submitted to it by the Consellería del Mar.

7.4.1.7 Details of other non-MSC fishery users or activities, which could affect the UoA, and arrangements for liaison and co-ordination

There are other non-MSC groups of fishermen/producers whose activity is interacting with the same area than mussel producers. One of them are the percebeiros, goose barnacles producers, whose activity takes place on the intertidal rocks in the same areas where mussel seed is collected. Decree 153/2019 regulates the conservation and exploitation of shellfish and algae resources in Galicia in order to guarantee sustainable management of shellfish resources taking into account environmental, economic, social and employment aspects. In its Article 13 is said that management plans of goose barnacle can reserve areas for the seed mussel harvesting and for this reason, both activities could coincide. The decree describes that days dedicated to the mussel seed extraction will count for the renewal of the exploitation authorization for shellfish producer when coincides with a journey of extractive activity and for this reason, the activity of mussel seed extraction by this producers should be authorized with a certificate from the guild or associative entity stating the days dedicated to this activity. This issue is usually cause for dispute between both groups, as the percebeiros believe that the collection of mussel seed could affect their production Besides that some fisher´s guild prefer to collect the mussel seed in their area and sell it to the producers. At the same time, mussel producers point on the law to defend their right to collect seed by themselves own.

Other groups active in the area are the oyster and scallops producers, whose products can be grown in rafts in the same area. Also the shellfish cultures are regulated by Decree 406/1996 but the requirements that apply are different.

Additionally, there are other mussel producers which are not included in the UoA and produce mussel in the same area and with the same method and legislation. They can be individual producers or associations and the difference with those included in the UoC is that the rafts of these producers are not registered at the Regulatory Council of the Galician mussel or certified for the DOP Mexillón de Galicia.

7.4.1.8 Individuals or groups granted rights of access to the fishery and particulars of the nature of those rights.

Rights of access to the fishery are recorded in the Article 47 of Law 11/2008 (as amended by law 1/2009 and law 6/2009). The Law establishes that any natural or legal person involved in the activity of marine cultures, requires a previous qualifying administrative title granted by the competent Authority in the field of aquaculture (currently, *Consellería do Mar*), without prejudice to the permits, licenses and authorizations that may be granted to other agencies in the exercise of their powers.

In addition, in Chapter 3, the Law establishes the objective of the concessions in the maritime area for installing different production activities, for example mussel rafts. These concessions are granted to the producer for 10 years, being extendable for further periods of ten years up to a maximum of fifty years, if conditions are complied with. See Section 7.4.1.8 for more details

The marine cultives (rafts) covered by a concession may be the subject of inter vivos legal business (sale, exchange, donation), that is, both the ownership of the marine cultives and the concession title can be transferred, however, they require prior authorization from the *Consellería do Mar*. The transfer of the raft to a new producer could be done during the validity of the concession with previous approval of the authorities in aquaculture. The concession may also be the object of transmission mortis causa (inheritance). (art. 63). And finally, it can be transferred by court order.

In any case, when the concession is transferred within it's valid period, the validity remains the same as for the previous owner, the 50 years does not restart. Since the implementation of the Law 1/2009, each concession period began in 2009 (end of all concessions is 2059).

Since 1976 no new concessions have been granted. In the case of cessation of activity on a concession or the ending of the concession period, the Galician authorities of aquaculture will convene a public tender which will be accessible to new producers. The new producer will be subject to some criteria, for example, being previously involved in the activity in order to ensure that the raft will not be left unused.

According to the "Re-registration of fishing vessels of the Autonomous Community of Galicia", in the 4th list, for aquaculture, and in the estuaries dedicated to mussel farming, there are a total of 943 boats of which, according to estimates, 871 are dedicated to the cultivation of mussels and 71 correspond to auxiliary boats, many of which are used in seed collection. See **Section 7.4.1.10** for more details.

7.4.1.9 Particulars of arrangements and responsibilities for monitoring, control and surveillance and enforcement

The Order of October 26, 2000 regulating the extraction of seed from the Department of Fisheries and Seafood and Aquaculture. The purpose of this Order is to regulate the supply of mussel seed nurseries from natural banks, permits, zones and periods of extraction and the maximum amounts to be extracted in each zone.

The entity responsible for monitoring the inland waters of Galicia is the *Guardacostas de Galicia* (Coastguards) Service under the *Consellería do Mar*. The Coast Guard Service of Galicia was created by Law 2/2004 and there roles and responsibilities are clearly defined by Decree 136/2017. Coastguards are responsible for monitoring compliance with current legislation on fisheries, shellfish, aquaculture, control of the marine environment, prevention and control of marine pollution and marine rescue in accordance with the constitutional and statutory competence regime.

In addition to the coastguards, the monitoring activity is also reinforced with the *Guardapescas Maritimos* (Marine Fishery Wildlife rangers) of the fishing guilds, who carry out surveillance and control tasks in the shellfish banks and fishing areas. The marine fishery wildlife rangers are specialized *Guardias Rurales* (Rural guards) and must have the authorization of the Guardia Civil (Law 5/2014).

The INTECMAR activity is related with the Fishing Technologic Platform, being a project of the Galician fisheries administration whose main objective is to facilitate management tools and information collection of the sector. This platform offers a series of services to the productive and marketing sectors, to serve them, to support the management of fishery resources and their traceability, in accordance with existing legal requirements. Source: http://www.pescadegalicia.com/

7.4.1.10 Outline the fleet types or fishing categories participating in the fishery

The vessels used by mussel producers for catching activity, transport and unloading of the mussel are in the 4th list, adapted to the mussel harvest in addition of auxiliary vessels. Based on Law of Fishing of Galicia, Article 16, they need to be registered in the “Re-registration of fishing vessels of the Autonomous Community of Galicia” and additionally notify in this platform any variation in information of the vessel if it happens. To be authorized to be registered in this list, it is needed to own an exploitation permit, be registered in the Census of the Operating Fishing Fleet, not be an irregular vessel and have a base port in the Autonomous Community of Galicia. For access to mussel seed catching activities, a temporary authorization can be issued for aquaculture vessels or aquaculture auxiliaries (Law 11/2008).Current ships have a length that varies between 5.2 and 22 m, a tonnage (TRB) between 1.25 and 59.1 tons and a power between 9 and 450 hp. **Figure 7.4.2.**

The length of these boats and the type of catches to which they are dedicated allow their mooring to docks or alternatively their mooring in dead and unloading in port.

Figure 7.4.2 The photo shows the typical type of boat used in the extraction of the mussel from a raft. Source: Consello Regulador.

7.4.1.11Details of of any planned education and training for interest

Title XI in the Law of Fishing in Galicia 11/2008 establishes that the competent Counseling will carry out the necessary actions to promote training, qualification and retraining of professional people from different

sectors, as well as those who may demand it. It includes: regulated maritime-fishing, shellfish and aquaculture training courses in the Galician Autonomous Community, non-regulated training in maritime-fishing, shellfish, aquaculture and professional diving training in Galicia and promotion of all kinds of training activities through collaboration, cooperation and coordination between organisms and competent entities in the area of fishing, education and safety at work.

7.4.2 Principle 3 Performance Indicator scores and rationales

PI 3.1.1 – Legal and/or customary framework

PI 3.1.1		The management system exists within an appropriate legal and/or customary framework which ensures that it: - Is capable of delivering sustainability in the UoA(s); - Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and - Incorporates an appropriate dispute resolution framework		
Scoring Issue		SG 60	SG 80	SG 100
a	Compatibility of laws or standards with effective management			
	Guide Post	There is an effective national legal system **and a framework for cooperation** with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2	There is an effective national legal system and **organised and effective cooperation** with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2.	There is an effective national legal system and **binding procedures governing cooperation with other parties**, which delivers management outcomes consistent with MSC Principles 1 and 2.
	Met?	**Yes**	**Yes**	**No**
Rationale				

The condition of Spain as a member of the EU implies the adaptation of its Fisheries Policy to the legal framework of the Common Fisheries Policy (CFP) as well as the laws of Fishing of the Autonomous Communities affected, as is the case of Galicia. Additionally, in the EU scenario, Regulation No 2371/2002 succeeded by Regulation 1380/2013 sets the framework that establishes the objective of the sustainable exploitation of fishery resources in a context of sustainable development and that takes into account a balance between the social, environmental and economical.

The management system that guides all fisheries in Galicia, conforms to the legal requirements and long-term objectives set by EU Regulation 850/98 as a base document that has guided the development of the fishing law for both Government of Spain (Law 3/2001) as the fishing law of the Autonomous Government of Galicia of 11/2008, of December 3 (Law 11/2008) and amended by Law 6/2009 of December 11 (law 6 / 2009). A regulation applicable to the regulation of fishing gear; species; minimum sizes; fishing restrictions; etc. based on the precautionary principle and with fisheries sustainability objectives.

Law 6/1993, on fishing in Galicia, established already that for the exercise by any natural or legal person of marine cultivation activities through nurseries, a prior administrative concession was required, granted by the Department of Fisheries, Shellfish and Aquaculture, who could establish a exploitation fee for the activity to be paid by the owner of the raft. In the Galician Fishing Law in force (Law 6/2009), the activity authorization is still maintained as an enabling administrative title for the exercise of the extractive activity. In case of the availability of new locations for aquaculture, these will be offered in public tender by order of the Department of Fisheries, Shellfish and Aquaculture, and this with the criteria set forth in Decree 406/1996.

In summary, the information on the call will be related to: number and location of the free locations offered; types of shellfish installation to be installed; species to be cultivated; maximum authorized production; professional qualification; scale by which the contest will be governed.

Applicants must submit an exploitation plan that will include, at a minimum: methodology of the cultivation process; way of obtaining the seed or fry; extraction plan; technical means to be used; planned production schedule during the period covered by the enabling administrative title; financial plan; commercialization.

Once the contest has been resolved, the granting of the concession will be published in the Official Gazette of Galicia by order of the Department of Fisheries, Shellfish and Aquaculture.

The national and international legal framework that applies to the mussel culture in Galicia is effective and organised and effective cooperation with other parties exists where necessary. The management system is able to deliver management outcomes consistent with MSC Principles 1 and 2. **Therefore, SG60 and SG80 are met.** SG100 is not met since there are no binding procedures governing cooperation with other parties.

	Resolution of disputes			
b	Guide post	The management system incorporates or is subject by law to a **mechanism** for the resolution of legal disputes arising within the system.	The management system incorporates or is subject by law to a **transparent mechanism** for the resolution of legal disputes which is **considered to be effective** in dealing with most issues and that is appropriate to the context of the UoA.	The management system incorporates or is subject by law to a **transparent mechanism** for the resolution of legal disputes that is appropriate to the context of the fishery and has been **tested and proven to be effective**.
	Met?	**Yes**	**Yes**	**No**
Rationale				

Legal disputes are dealt with within the Spanish legal system. When it comes to fishing infractions, the disciplinary procedures will invariably be open as a result of the resolution adopted to that effect by the Delegate of the Regional Government in the Spanish Autonomous Region in question, in this case the Galician Autonomus Comunity. In the case of disputes involving EU regulations, the disputes could be referred to the European Court of Justice.

Hence, transparent dispute resolution mechanisms exist at the national level in Spain and at the EU level and they are appropriate to the context of the fishery and thus **SG80 is met**. It cannot be concluded that the system has been tested and has been proven to be effective and therefore SG100 is not met.

	Respect for rights			
c	Guide post	The management system has a mechanism to **generally respect** the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to **observe** the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to **formally commit** to the legal rights created explicitly or established by custom of people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.
	Met?	**Yes**	**Yes**	**Yes**
Rationale				

Based on the rationale presented in SI(a) the team considers that there is a legal framework in the EU and Spain and that these have mechanisms to observe the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood and **therefore SG60 and SG80 are met**..

Mussel cultivation in Galicia is a traditional activity, practiced since 1945 by family businesses in the area. Its rapid expansion led to the need for regulation, giving rise to Laws and restrictions on the occupation of marine areas and conditions of exploitation. From the end of 1976, and with the subsequent transfer of powers to

the Autonomous Communities, the granting of concessions for the occupation of marine areas for mussel farming was suspended in order to obtain better quality and higher product performance (in relation to with load capacity of the estuaries).

Nowadays, mussel cultivation requires a previous qualifying administrative title, granted by *Consellería do Mar*. Marine cultives (rafts) that occupy maritime public domain for their installation, commissioning, and exploitation, require an activity concession granted by the *Consellería do Mar*, after a mandatory and binding report of the State Administration on the occupation of the public domain. See Section 7.4.1.4 for more details about concesions.

With the intention of honoring the custom of people dependent on fishing for food and livelihood, the current Law of Fishing in Galicia includes points which establish a preference towards them at the time of granting new concessions. For example, their being previously involved in the activity ensures that the raft will be used correctly and effectively.

Based on the above, it is considered that the management system has a mechanism to formally commit to the legal rights of people dependent on fishing for food and livelihood in a manner consistent with MSC Principles 1 and 2. **Therefore, this SI reaches SG100**.

References

Council Regulation (EC) No 850/98 of 30 March 1998 for the conservation of fishery resources through technical measures for the protection of juveniles of marine organisms. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1590311853745&uri=CELEX:31998R0850

Council Regulation (EC) No 2371/2002 of 20 December 2002 on the conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32002R2371

Decree 406/1996, of November 7, 1996, approving the Regulation of marine culture hatcheries in Galician waters. DOG Nº 228 of 21/11/96. Available at (in Spanish): https://www.xunta.gal/dog/Publicados/1996/19961121/AnuncioC082_es.html.

Law 3/2001, of March 26, 2001, on State Maritime Fishing. Available at (in Spanish): https://www.boe.es/buscar/act.php?id=BOE-A-2001-6008

Law 11/2008, of December 3, on fishing in Galicia. Available at (in Spanish): https://www.boe.es/buscar/doc.php?id=BOE-A-2009-805

Law 6/2009, of December 11, amending Law 11/2008, of December 3, on fishing in Galicia. Available at (in Spanish): https://www.boe.es/boe/dias/2010/02/04/pdfs/BOE-A-2010-1706.pdf

Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32013R1380

Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	**85**
Condition number (if relevant)	**N/A**

PI 3.1.2 – Consultation, roles and responsibilities

PI 3.1.2		The management system has effective consultation processes that are open to interested and affected parties The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties		
Scoring Issue		SG 60	SG 80	SG 100
a	Roles and responsibilities			
	Guide post	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are **generally understood**.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are **explicitly defined and well understood for key areas** of responsibility and interaction.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are **explicitly defined and well understood for all areas** of responsibility and interaction.
	Met?	**Yes**	**Yes**	**Yes**
Rationale				

Organisations and individuals involved in the management process have been identified. See section 7.4.1.5 and 7.4.1.6 for Particulars of the recognised groups with interests in the UoA and consultation decision making process.

Main players in the overall fisheries management system are the European Commission (EU), the Spanish Ministry of Agriculture, Fisheries and Food (MAPA), the Galician Autonomous Community and the *Consellería do Mar* (Council of the Sea). The Council of the Sea has two collegiate bodies for social participation and in which mussel producers are represented: the Galician Fishing Council and the Mussel Commission. The first one is broader and brings together high representatives of the Council of the Sea with representatives of the fishing, shellfish, aquaculture and trade union sectors; while the Mussel Commission only brings together representatives of the mussel-producing sector and the administration. The roles, functions and responsibilities of the various actors are clearly defined in longstanding practice and are codified in the EU-regulations, National Laws and Galician laws and Regulations. According to interviews during the site visit, they are well understood by all involved entities in all areas of responsibility and interaction.

Considering this information the team concludes that **SG60, SG80 and SG100 are met**.

b	Consultation processes			
	Guide post	The management system includes consultation processes that **obtain relevant information** from the main affected parties, including local knowledge, to inform the management system.	The management system includes consultation processes that **regularly seek and accept** relevant information, including local knowledge. The management system demonstrates consideration of the information obtained.	The management system includes consultation processes that **regularly seek and accept** relevant information, including local knowledge. The management system demonstrates consideration of the information and **explains how it is used or not used**.
	Met?	**Yes**	**Yes**	**No**

Rationale

The *Consejo Gallego de Pesca*, is the advisory body of the regional administration regarding policies related to the fishing sector as a whole. The Decree 123/2011 includes its composition (Plenary and Sectorial Commissions) and roles (See Sections 7.4.1.5 and 7.4.1.6). The mussel producing sector has participation in the plenary session and also in 3 of the sectorial commissions: the sectorial commission on Aquaculture, the sectorial commission on Social Policy and Fleet Safety, and the sectorial commission on Processing, Marketing, Depuration and Producer Organizations. Article 21 includes the possibility of external participation in the meetings of both the plenary and the sectorial committees, with the right to speak but not to vote, of persons, organizations' representatives, institutions and public or private entities that, due to their activities, knowledge or experience, the President considers appropriate for the matters to be dealt with. Both the plenary and the sectoral commissions meet at least twice a year. The minutes of the *Consello Gallego de Pesca*, in which the University of Santiago participates, are made available to the team.

Agreements are adopted by simple majority of its members. The reports or decisions of the *Consejo Gallego de Pesca* are optional and not binding.

By the Order of December 28, 2010, the creation of the *Comisión del Mejillón* is established as an advisory body composed of representatives of the *Consellería do Mar* and representatives of the Galician mussel sector. Its main function is to act as a consultation body on the different administrative issues that affect the sector.

To regulate the operating regime of the *Comisión del Mejillón*, the basic administrative regulation in this field is Law 30/1992, of November 26, establishing the legal regime of public administrations and the common administrative procedure, in particular regarding the functioning of the collegiate bodies. On the basis of this Law, the *Consellería do Mar* has the power to establish the specific provisions on the issues related to the operation of the *Comisión del Mejillón*, specifically with regard to the development of the meetings and the form of approval of the agreements adopted by the Commission.

The Commission is constituted by a variable number of members: representatives belonging to the Autonomous Administration and the different associative entities that group a certain number of mussel bats (See Sections 7.4.1.5 and 7.4.1.6). The Commission meets on a regular basis at least 4 times a year. External advisors may participate in the meetings with prior approval and the reports issued by these advisors are of an advisory capacity. The studies, proposals and reports that are prepared in the Commission must be submitted to the *Consellería do Mar* for the purposes of its knowledge and approval.

In the Decree 406/1996, the previous consultations to the sector are identified in several sections as for the following cases:

• Maximum length of total mussel broiler rope per bat, the maximum number of growing ropes, their density.

• determine the areas in which repair, system change or scrapping of nurseries is carried out.

All these actions will be subsequently approved by orders by the competent body.

Furthermore, it is important that the *Xunta de Galicia* (the Galician Government) and thus also the *Conselleria do Mar* have in place formal procedures to promote transparency of the decision making processes (Article 9 (Specific Duties of Information of Legal Relevance) of Law 1/2016, 18 January, of transparency and good governance). For many plans and processes it is prescribed by law that formal consultation will take place. However also when there will be no formal consultation all citizens are enabled to present their view through a response (filling a form) on the *Xunta de Galicia* website (https://transparencia.xunta.gal/tema/informacion-de-relevancia-xuridica/consulta-publica-previa/consultas-pechadas?departamento=Mar). Indeed, the minutes of the meetings of the aforementioned collegiate bodies, which must specify the attendees, the agenda of the meeting, the circumstances of the place and time in which they were held, the main points of the discussions and the content of the agreements adopted, must be submitted to this regulatory framework of transparency (Law 19/2013 and Law 1/2016), being the minutes of the meetings the object of this right.

Lastly, but not less important, as for the consultation process on the elaboration of legal provisions such as regulations or decrees, there is Law 16/2010, of December 17th, on the organization and functioning of the general administration and the Galician autonomous public sector. In Chapter II of the elaboration procedure for these provisions, the 3 phases that must take place before the definitive approval by the competent body are developed. In both the initial and intermediate phases, a public consultation is carried out to gather information from citizens and the most representative and possibly affected organizations and associations.

All decisions and decrees of the government are published on this website during their different stages in the decision-making process.

It can thus be concluded that the management system includes consultation processes that regularly seek and accept relevant information, including local knowledge of mussel growers and therefore **SG60 and SG80 are met**. Concerning certain aspects of the management system it is not clear whether the management system demonstrates consideration of the information and explains why decisions are taken. Therefore, SG100 is not met.

	Participation			
C	Guide post		The consultation process **provides opportunity** for all interested and affected parties to be involved.	The consultation process provides **opportunity and encouragement** for all interested and affected parties to be involved, and **facilitates** their effective engagement.
	Met?		**Yes**	**No**
Rationale				

There are consultation processes that allow all interested parties effective involvement based on different mechanisms of representation. The EU Fishery Advisory Councils are one of the main mechanisms, but at a national level, the fishers are also represented by fishers' associations and federations in the different forums and consultation mechanisms, whether they are general in nature or specific to each fishery. The Common Fisheries Policy Reform process allowed all the interested parties, including the civil society, to provide their comments to the Green Paper on Fishing in Europe that formed the basis for the new CFP.

On a national level, the Spanish government regularly meets with the sector to tackle shared interest issues and learn of their opinions on the issues that affect their activity. The Consejo Asesor de Medio Ambiente (CAMA, Environment Advisory Council) of MAPA is a forum where environmental NGOs and the fishing sector have the opportunity to discuss environmental issues, including those related to the health of the seas and the existing issues, and where action measures are proposed to try to improve the identified negative aspects. Fishing activity related aspects are discussed in CAMA.

Based on the rationale presented in SI(a) the team concludes that the consultation process provides opportunity for all interested and affected parties to be involved and therefore **SG80 is met**. SG100 is not met since it can not be concluded that the consultation process provides encouragement to all interested parties and facilitates their effective engagement through the establishment of the *Comisión del Mejillón*.

References

Decree 406/1996, of November 7, 1996, approving the Regulation of marine culture hatcheries in Galician waters. DOG Nº 228 of 21/11/96. Available at (in Spanish): https://www.xunta.gal/dog/Publicados/1996/19961121/AnuncioC082_es.html.

Decree 123/2011, of June 16, which regulates the Galician Fisheries Council. DOG Nº 126 of 01/07/2011. Available at (in Spanish): https://www.xunta.gal/dog/Publicados/2011/20110701/AnuncioCA06-230611-3552_es.html.

Law 30/1992, of November 26, 1992, on the Legal Regime of Public Administrations and Common Administrative Procedure. Available at (in Spanish): https://www.boe.es/buscar/act.php?id=BOE-A-1992-26318

Law 19/2013, of December 9, 2013, on transparency, access to public information and good governance. Available at (in Spanish): https://www.boe.es/buscar/act.php?id=BOE-A-2013-12887

Law 16/2010, of December 17, 2010, on the organization and functioning of the general administration and the autonomous public sector of Galicia. Available at (in Spanish): https://www.boe.es/buscar/act.php?id=BOE-A-2011-2544

Law 1/2016, of January 18, on transparency and good governance. Available at (in Spanish): https://boe.es/buscar/act.php?id=BOE-A-2016-3190

Order of December 28, 2010, establishing the Mussel Commission. DOG Nº 2 of 04/01/11. Available at (in Spanish): https://www.xunta.gal/dog/Publicados/2011/20110104/AnuncioD4A_es.html

Draft scoring range	≥80
Information gap indicator	More information sought / Information sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	**85**
Condition number (if relevant)	**N/A**

PI 3.1.3 – Long term objectives

PI 3.1.3		The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Fisheries Standard, and incorporates the precautionary approach		
Scoring Issue		SG 60	SG 80	SG 100
a	Objectives			
	Guide post	Long-term objectives to guide decision-making, consistent with the MSC Fisheries Standard and the precautionary approach, are **implicit** within management policy.	**Clear** long-term objectives that guide decision-making, consistent with MSC Fisheries Standard and the precautionary approach are **explicit** within management policy.	**Clear** long-term objectives that guide decision-making, consistent with MSC Fisheries Standard and the precautionary approach, are **explicit** within **and required by** management policy.
	Met?	**Yes**	**Yes**	**No**
Rationale				

Management objectives are clearly defined and explicit within the EU Common Fisheries Policy (CFP), the Fisheries Law of Spain 3/2001 of 26 March and the Fisheries Law of Galicia11/2008 of December 3 and are consistent with the MSC Principles and Criteria and precautionary approach.

For the EU clear over-arching long term objectives are set out in the EU CFP (https://ec.europa.eu/fisheries/cfp_en). These long term objectives are clear and explicitly defined and entirely consistent with MSC P&Cs. The EU CFP was reformed in 2002 and 2014. The 2002 reform of the CFP also embraced a more long-term approach to fisheries management, involving the establishment of multi-annual recovery plans for stocks outside safe biological limits and of multi-annual management plans for other stocks. It aimed to progressively implement an eco-system-based approach to fisheries management. More recent a second reform took place. In December 2013, the European Commission's proposed reforms were adopted, with phased implementation taking place from 1 January 2014 through to 2020. The most important changes were the phased introduction of a landing obligation (discard ban), legally binding commitment to fishing at sustainable levels (the Maximum Sustainable Yield (MSY) and more decentralised decision making, allowing Member States to agree the measures appropriate to their fisheries. Article 15 of Council Regulation EC 1198/2006 on the European Fisheries Fund, requires that all member states "Shall adopt, following appropriate consultation... a national strategic plan covering the fisheries sector (which) ...sets out the priorities, objectives, the estimated public financial resources (in accordance with the CFP) ...for:

(a) ... adjustment of fishing effort / capacity with regard to the evolution of fisheries resources, promotion of environmentally-friendly fishing methods and sustainable development of fishing activities;

(e) the sustainable development of fisheries areas,

(g) preserving human resources in the fisheries sector, through upgrading professional skills, securing sustainable employment and enhancing the position and role of women;

(h) protection and enhancement of the aquatic environment related to the fisheries sector".

The CFP was revised in 2013 and Article 2, paragraphs 1-4, of the revised CFP establish a range of objectives for managing fisheries in the EU, including: long-term environmental sustainability; being consistent with achieving economic, social and employment benefits; using a precautionary approach and restoring resources above levels that will produce MSY; implementing an ecosystem approach; and contributing to the collection of scientific data (Regulation (EU) No 1380/2013).

With regards to the Spanish aquaculture the Spanish Aquaculture Multiannual Strategic Plan 2014-2020 was developed (https://ecoaqua.ulpgc.es/ecoaqua_project/sites/default/files/documentos/workshop2015/4-Cris_Ppt%20Plan%20EcoAqua.pdf). Objectives of the plan are (mongst others):

- Promote sustainable development of the Spanish aquaculture.
- Encourage natural resources protection and environmental conservation value.

In Article 3 of the **Spanish Fisheries Law** 2001/3 of 26 March the purposes of this law are stated. Among other objectives this article states:

a) Ensure balanced and responsible exploitation of fishery resources, promoting their sustainable development and taking the necessary measures to protect, conserve and regenerate these resources and their ecosystems.

c) Adapt the effort of the fleet to the situation of the fishing resources.

Nationally, Spain ratified the Convention on Biological Diversity (CBD) in 1993. Its objectives are the conservation of biodiversity, the sustainable use of its components and the fair and equitable sharing of benefits arising from the utilisation of genetic resources.

The **Law of Fishing of Galicia,** 11/2008, establishes that the policy of the Administration of the Autonomous Community of Galicia will have objectives related with the conservation and management of fisheries and shell-fish resources. These include:

a) The establishment and regulation of measures aimed at the conservation, management and responsible, rational and sustainable exploitation of living marine resources. These measures will be done gradually, trying to minimize the possible socioeconomic imbalances that may arise from their adoption.

b) The adoption of measures aimed at promoting the exercise of a fishing and shellfish activity respectful with the environment, as well as the protection of fishing and shellfish resources from other activities that have an impact on them.

c) The adoption of measures aimed at a better use of under-utilized species, by-products and waste.

d) The promotion of the participation of the fishing and shellfish sector in the adoption of conservation measures.

e) The promotion of improvements in the access and exploitation of living marine resources.

The long-term objectives that guide decision-making are explicit in the fisheries management policy of the Galician Fisheries Law and are consistent with the MSC Principles and Criteria.

Decree 406/1996 explicitly reflects the need to ensure coexistence among marine shellfish cultures without harming the deterioration of the environment. Therefore, the regulation of the dimensions, characteristics and other circumstances of the nurseries is absolutely necessary in order to:

a) Ensure a more equitable distribution of natural resources

b) Avoid deterioration of the environment.

The objectives of the general fishing policies of the EU, Spain and the Galician Autonomous Community are clearly focused on sustainable development, rational exploitation of fishing resources and protection of the environment. It can therefore be concluded that clear long-term objectives that guide decision-making, consistent with MSC Fisheries Standard and the precautionary approach, are explicit within the management policy. **Therefore SG60 and SG80 are met**. **SG100 is not met** since the application of the precautionary approach is not specificly required by the Galician management policy.

References

Decree 406/1996, of November 7, 1996, approving the Regulation of marine culture hatcheries in Galician waters. DOG Nº 228 of 21/11/96. Available at (in Spanish): https://www.xunta.gal/dog/Publicados/1996/19961121/AnuncioC082_es.html.

Council Regulation (EC) No 850/98 of 30 March 1998 for the conservation of fishery resources through technical measures for the protection of juveniles of marine organisms. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1590311853745&uri=CELEX:31998R0850

Council Regulation (EC) No 1198/2006 of 27 July 2006 on the European Fisheries Fund. Available at: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex:32006R1198

Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32013R1380

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Law 11/2008, of December 3, on fishing in Galicia. Available at (in Spanish): https://www.boe.es/buscar/doc.php?id=BOE-A-2009-805

Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	**80**
Condition number (if relevant)	**N/A**

PI 3.2.1 – Fishery-specific objectives

PI 3.2.1		The fishery-specific management system has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2		
Scoring Issue		SG 60	SG 80	SG 100
a	Objectives			
	Guide post	**Objectives**, which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are **implicit** within the fishery-specific management system.	**Short and long-term objectives**, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are **explicit** within the fishery-specific management system.	**Well defined and measurable short and long-term objectives**, which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are **explicit** within the fishery-specific management system.
	Met?	**Yes**	**Yes**	**No**
Rationale				

In the Fishing Law of Galicia 11/2008, the general objectives of the Galician fisheries policy are described in Article 6. These are among others: 1) The establishment and regulation of practices to ensure the conservation, management and responsible, rational and sustainable exploitation of marine resources; 2) The adoption of measures to promote fishing and shellfish culture activities that are respectful to the environment as well as protection of the fishery and shellfish resources from other activities that have an impact on them. In addition, Article 28 which specifically describes the objectives for the management of shellfish culture states: To ensure that shellfish culture is sustainable and economically viable.

In the case of the mussel culture in Galicia there are specific regional regulations (Decree 406/1996 among others), in particular regarding the dimensions of the mussel rafts, the characteristics of the facilities and the origin and quantity of the seed. The applicant for a license must also submit an Exploitation Plan.

For the purposes of what is established in this decree, the starting conditions of the cultivation polygons, their geographical location, number and location of the anchoring points, will be that contemplated in the reorganization agreements of regulated marine shellfish cultures by Decree 197/86 of June 12 (DOG nº 127 of July 2, 1986) and by Decree 423/1993, of December 17. Decree 406/1996 explicitly reflects the need to ensure coexistence of shellfish cultures avoiding as far as possible that some shellfish cultures ('viveros') harm others. The Decree also specifically states that it is absolutely necessary to: b) Avoid deterioration of the environment.

It can be concluded that within the fishey specific management system there are explicit objectives that guide the decision processes being consistent with achieving the outcomes expressed by the MSC Principles 1 and 2. **SG60 is met**. The specific objectives to develop a sustainable aquaculture and to avoid negative impacts on the environment in connection with the objective in the Fishing Law of Galicia to establist a responsible, rational and sustauinable exploitation can be considered objectives for both the short and the long term objective that guide the decision making process. Hence it can be concluded that also **SG80 is met. SG100 is not met** since the objectives are not defined in measurable terms and not well defined in the sense that short and long term objectives are clearly distinguished.

References

Decree 423/1993, of December 17, 1993, which consolidates the current regulations on shellfishing, seaweed extraction and marine culture. DOG Nº 13 of 20/01/94.

Decree 406/1996, of November 7, 1996, approving the Regulation of marine culture hatcheries in Galician waters. DOG Nº 228 of 21/11/96. Available at (in Spanish): https://www.xunta.gal/dog/Publicados/1996/19961121/AnuncioC082_es.html.

Law 11/2008, of December 3, on fishing in Galicia. Available at (in Spanish): https://www.boe.es/buscar/doc.php?id=BOE-A-2009-805

Draft scoring range	≥80
Information gap indicator	More information sought / Information sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	**80**
Condition number (if relevant)	**N/A**

PI 3.2.2 – Decision-making processes

PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery		
Scoring Issue		SG 60	SG 80	SG 100
a	Decision-making processes			
	Guide post	There are **some** decision-making processes in place that result in measures and strategies to achieve the fishery-specific objectives.	There are **established** decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.	
	Met?	**Yes**	**Yes**	
Rationale				

Within the Spanish national and the Galician regional management systems decision-making process takes place that have resulted in management measures for this fishery. Most aspects of the Galician mussel culture are managed regionally by the *Xunta of Galicia* (the Galician Government) or the *Consellería do Mar* (Council of the Sea) that has been given the specific task to regulate fisheries and aquaculture in Galicia (See Section 7.4.1.5). As it has been explained in the previous PIs (3.1.X), the Consellería do Mar has two collegiate bodies for social participation and in which mussel producers are represented: the Galician Fishing Council and the Mussel Commission. The first one is broader and brings together high representatives of the Consellería do Mar with representatives of the fishing, shellfish, aquaculture and trade union sectors; while the Mussel Commission only brings together representatives of the mussel-producing sector and the administration. The structure, roles and functions of each of them are detailed in Section 7.4.1.6 and assessed in PI 3.1.2. The Commission meets on a regular basis at least 4 times a year. The deliberations of the Commission are confidential and are the main framework where decisions on the management of the fishery are made.

The decision-making process has resulted in measures and strategies to achieve objectives set for mussel culture like the allocation of culture areas, the maximum size of rafts, the maximum number and length of culture ropes and the regulation of spat collection. An important aspect of the management system for mussel culture is also the sanitary control of mussels.

During the complete mussel cycle, numerous controls are carried out by the Regional Ministry of Rural Affairs that guarantee the transparency of the management system.

For the collection of seed, the producer must complete an authorization form and send it to the *Xunta de Galicia* to be able to extract mussel seed from the natural banks and the authorization form (Annex I and Annex II of the Order of October 26, 2000). They must also cover a seed extraction survey and send it to *Xunta de Galicia* all mussel producers. Regarding the seed of collectors there is a different regulation that regulates the dates and maximum number of collection ropes that are allowed (Decree 174/2002). Being authorized only from April 1 to September 30, the placement of mussel seed collecting ropes.

After each spat collection campaign, mussel producers must communicate the following information to the Galician authorities: total quantities of seed collected, place of origin of the spat (collection rope (raft) or rocky coastline) when this was done and the final destination of the spat (physical position and identification of the raft). This is based on the requirements included in the Order of October 26, 2000 (*Enquisa de extracción de Mexilla en bancos naturais, Annex 1*). See **Figure 3.2.2**

XUNTA DE GALICIA
CONSELLERÍA DO MAR

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ANEXO I

ENQUISA DE EXTRACCIÓN DE MEXILLA EN BANCOS NATURAIS CAMPAÑA 2011 - 2012

Orde do 26 de outubro de 2000 (DOG nº 228, de 24/11/2000)

DESTINO DA MEXILLA				MES	QUILOS (kg)	PROCEDENCIA MEXILLA		
						COLECTORES	MEDIO NATURAL	
NOME BATEA	DISTRITO	POLIGONO	CUADRICULA			Nome batea	Lugar	Provincia

Data de envío: Nome e sinatura: Selo:

Figure 3.2.2 Annual spat declaration. Source: Xunta de Galicia

It can be concluded that there are established decision-making processes that result in measures and strategies to achieve the fishery-specific objectives. **Thus SG60 and SG80 are met**.

	Responsiveness of decision-making processes			
b	Guide post	Decision-making processes respond to **serious issues** identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take some account of the wider implications of decisions.	Decision-making processes respond to **serious and other important issues** identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.	Decision-making processes respond to **all issues** identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.
	Met?	**Yes**	**Yes**	**No**
Rationale				

The Mussel *Commission* has a permanent and consultative character. This Commission meets on a regular basis at least 4 times a year. Additionally, there is another forum for discussion, the Galician Fishing Council, which involves other parties, such as goose barnacle collectors. Decision-making processes for this fishery are guided by scientific advice by CIMA (https://cim.uvigo.gal/en/), CETMAR (https://cetmar.org/) and INTECMAR (http://www.intecmar.gal/), but also by the research institutions based in Galicia, mainly: the three Galician Universities (A Coruña, Santiago de Compostela and Vigo), with different marine and aquaculture research centres and teams, and also the Spanish Council for Scientific Research (CSIC, Spanish acronym). The results of the scientific assessments and research are published on web-sites. Findings and relevant recommendations emerging from research, monitoring, evaluation and consultation activity related to the Galician mussel culture, such as harvest levels, potential impact on the marine environment, the phytosanitary quality of production areas and the quality of mussels are formally reported and available on web-pages. Decision-making processes are in place to immediately respond to changes in the phytosanitary quality of production areas in order to guaranty the quality of mussels and consumers.

The following is a real situation that serves as an example of a current case on decision making. As described previously, in Galicia a long-lasting controversy exists between the mussel sector and Goose barnacle collectors. During spat harvesting the proceeds of the Goose barnacle collectors can be negatively impacted when goose barnacles that grow among the mussel spat are also removed. The harvesting of Goose barnacles is tightly regulated with designated areas and licenses whereas the mussel spat collectors have free acces to large parts of the Galician coast.

This year (2020) the conflict has intensified since the mussel sector has applied for one extra month (May) within the spat harvest campain due to the bad weather during the winter, the COVID 19 health crisis and the relatively low availability of spat.

This request was approved by all the relevant parties apart from *Parques Illas Atlánticas*. As a result, the mussel producers were authorised to extract spat only in the banks of Coruña and Pontevedra during the month of May. Other extraordinary measures due to this situation are already available and are applicable during this year, 2020, to the mussel producers so that they can meet their demand for spat. The measures also include extending the number of collection ropes in rafts (from 100 to 150) and the possibility to, through Galician Port Authorities, extract spat inside port areas. The goose barnacle collectors had not been involved in the consultation.

Due to the ongoing and oftentimes violent conflict along the month of May, the *Consellería del Mar* brought together representatives of the goose barnacle collectors and mussel producers' guilds in order to resolve the issue of spat collection in areas common to both sectors. It aimed to resolve current, and to avoid future conflicts in the different areas of exploitation of mussels and barnacles. Proposals were raised by both parties in order to reach an agreement that would satisfy both. The initial proposal stated that mussel producers would not be able to collect spat from the sensitive barnacle areas, but neither authorised goose barnacle producers to be able to extract spat in those areas. These areas which are considered sensitive to barnacle extraction, amount to a total of only 50 km of the 1,673 km available, in the Autonomous Region.

In exchange, the *Consellería* proposal authorized the mussel producers to obtain spat for an extra month (June). During this extra month, they will have acces to extract spat in the majority of zones in Pontevedra and Coruña other than 16 marked zones, keeping the exclusion to the *Parques Illas Atlánticas*.

Party representatives presented it before their association members who accepted it and thus it is in force as part of the Provincial Resolutions published on the 31 May 2020 (Resolution 28 April 2020, Coruña; Resolution 29 April 2020, Pontevedra; Resolution 31 May 2020, Coruña; Resolution May 2020, Pontevedra).

The *Consellería* recognized that this was only a temporary solution since they acknowledge that the sustainable exploitation of both resources could need further negotiation. The press indicated the possibility of a working group being organized so that the most sensitive coastal areas can be analyzed by representatives of the two sectors for the extraction of both resources, in order to avoid recurring conflict situations.

Therefore, although a long-term solution has not been reached yet, it can be concluded that decision-making processes respond to serious and other important issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions. It can be concluded that **SG60 and SG80 are met**. SG100 is not met since existing decision-making processes have not yet responded to all issues identified. For instance, the goose barnacle producers are requesting a mussel management plan, similar to other plans which are already published for other shellfish, such as goose barnacles. This request is related to the lack of public information in relation with the current mussel populations, specifically in terms of spat quantities and extraction areas. Currently, the Decree 153/2009 is in a contentious appeal done by different groups like mussel and goose barnacle producers.

C	Use of precautionary approach			
	Guide post		Decision-making processes use the precautionary approach and are based on best available information.	
	Met?		**Yes**	

Rationale

As described in the rationale provided in SI(a) decision-making processes are based on the best available information seeking also the input of stakeholders through the *Comisión do Mexillon* and other interested parties including all citizens that can present their view on plans or decisions the Galician government is in the process of making. The decision-making process also uses the precautionary approach for instance in the control system of of the phytosanitary and bacteriological quality of the mussel production areas. Information on the monitoring and status of production areas is updated on a daily basis on the INTECMAR website (http://www.intecmar.gal/pdfs/zonas_1403.pdf; http://www.intecmar.gal/pdfs/zonas_1401.pdf). Monitoring the water quality of the production areas on a regular basis in order to prevent that contaminated mussels will be sold to consumers can be regarded as a precautionary system.

Further the planning process with regards to the location of mussel rafts and measures that control maximum production like size of rafts and number of ropes, to ensure that rafts do not negatively affect the production on other rafts or the environment. As such the measures in place can be regarded as the result of the use of the precautionary approach. Also, the fact that in 2020 measures are implemented to reduce the impact on goose barnacles in a situation where not all impacts are exactly known can be seen as a precautionary measure. Further management measures are based on the best information available for instance through scientific advice or advise of the mussel commission. The team therefore concludes that **SG80 is met**.

	Accountability and transparency of management system and decision-making process			
d	Guide post	Some information on the fishery's performance and management action is generally available on request to stakeholders.	**Information on the fishery's performance and management action is available on request**, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.	Formal reporting to all interested stakeholders **provides comprehensive information on the fishery's performance and management actions** and describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.
	Met?	**Yes**	**No**	**No**
Rationale				

Information on mussel production is available from different public sources:

- MAPA. Mussel national production data collected through annual surveys based on which an estimated of total production is made: https://www.mapa.gob.es/es/estadistica/temas/estadisticas-pesqueras/acuicultura/
- JACUMAR, collects the production data reported by the different autonomous communities, including Galicia: https://www.mapa.gob.es/app/jacumar/datos_produccion/datos_produccion.aspx
- Xunta de Galicia. Galician mussel production data from the oficial first sales notes: https://www.pescadegalicia.gal/gl/publicacions/acuicultura

Other Information on issues and news concerning the mussel production of Galicia is also published on the website of OPMEGA (https://www.opmega.com/en/actualidade/) and the *Consello Regulador da Nominacion de Orixe Protexida Mexillon de Galicia* (https://www.mexillondegalicia.org/).

The latter also publishes regular bulletins with news and facts about the Galician mussel industry. Information on management actions (e.g: rafts, vessels, mussel production) concerning the fishery is available on the website of the *Xunta de Galicia* (*Conselleria do Mar*). **SG60 is met.**

In relation to how the information is available on request, access to public information in the scope of the Galician public administration is regulated by the following laws:

- Law 19/2013, of December 9, on transparency, access to public information and good governance (Boletín Oficial del Estado No. 295, December 10, 2013)

- Law 1/2016, of January 18, on transparency and good government (Diario Oficial de Galicia nº 30 of February 15, 2016).

In accordance with the principles set forth in these regulations, the Galician administration makes various contents available to citizens through the transparency website: https://transparencia.xunta.gal. The website is an instrument of direct and centralized access to information on the organization, resources and management developed by the autonomous administration.

Specifically, the Consellería do Mar (https://www.xunta.gal/mar/transparencia) makes available to citizens the contents relating to: Regulations in process (facilitating the submission of suggestions), information of legal relevance, economic, budgetary and statistical information, etc. An example related to this fishery is the current Decree 153/2019, of November 21st, which regulates the regime of conservation and exploitation of shellfish resources and seaweeds, which is appealed by mussel producers. This regulatory project could be consulted by the addressees of the regulation and by the citizens in general since it was published in the transparency website, before and after its elaboration.

Through the following link any citizen can apply for public information:

https://sede.xunta.gal/detalle-procedemento?codtram=PR100A; https://transparencia.xunta.gal/solicitude-de-informacion-publica/acceso-ao-formulario

As is described earlier the mussel spat collection is limited by maximum quantities per mussel raft and quantities harvested have to be reported. The Goose barnacle guilds and WWF have argued during the interviews with the team that the information on quantities harvested per area is not publicly available and the information is not used to take management action.

The team has been able to confirm that within the framework of the transparency law made available by the Galician administration, the minutes of the Commissions and the Galician Fishing Council are included, being a collegiate body of participation and advice to the Consellería regulated by the autonomous Law 16/2010. Therefore, it is important to clarify that the fact that there is no obligation to publish their minutes does not imply that they are not of public access. Citizens are guaranteed access through the request explained in the previous paragraphs and included in Section 2 of the Law 1/2016. However, taking into account that the team has not been able to access historical information on seed quantities by area and as it is also a concern of the stakeholders, the team has pointed out that the SG80 is not fulfilled as it is considered very important information on the performance of the fishery and evidence of the management actions. It is also not clear whether explanations are provided for actions or lack of action concerning the existing controversy and the results of the monitoring of spat collection. **Thus SG80 is not met**, **a condition is opened**.

	Approach to disputes			
e	Guide post	Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability for the fishery.	The management system or fishery is attempting to comply in a timely fashion with judicial decisions arising from any legal challenges.	The management system or fishery acts proactively to avoid legal disputes or rapidly implements judicial decisions arising from legal challenges.
	Met?	**Yes**	**Yes**	**No**
Rationale				

The Galician authorities do not repeatedly violate laws or regulations necessary for the sustainability of the fishery. **Therefore, SG60 is met. SG80 is also met since** in case there are judicial decisions the Galician authorities will comply with them. It can not be concluded that SG100 is met since the ongoing controversy between spat collectors and Goose barnacle collectors shows that the management system did not proactively avoid legal disputes on this matter as is shown by a current court appeal agains recent decisions.

References

Decree 406/1996, of November 7, 1996, approving the Regulation of marine culture hatcheries in Galician waters. DOG Nº 228 of 21/11/96. Available at (in Spanish): https://www.xunta.gal/dog/Publicados/1996/19961121/AnuncioC082_es.html.

Decree 153/2019, of November 21, regulating the regime for the conservation and exploitation of shellfish and seaweed resources. DOG Nº 233 of 09/12/2019. Available at (in Spanish): https://www.xunta.gal/dog/Publicados/2019/20191209/AnuncioG0427-281119-0002_es.html

Law 16/2010, of December 17, 2010, on the organization and functioning of the general administration and the autonomous public sector of Galicia. Available at (in Spanish): https://www.boe.es/buscar/act.php?id=BOE-A-2011-2544

Law 1/2016, of January 18, on transparency and good governance. Available at (in Spanish): https://boe.es/buscar/act.php?id=BOE-A-2016-3190

Order of October 26, 2000, regulating the extraction of mussel seed in natural banks. DOG Nº 228 of 24/11/2000. Available at (in Spanish): https://www.xunta.gal/dog/Publicados/2000/20001124/Anuncio15CB6_es.html.

Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	**75**
Condition number (if relevant)	**5**

PI 3.2.3 – Compliance and enforcement

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with		
Scoring Issue		SG 60	SG 80	SG 100
a	MCS implementation			
	Guide post	Monitoring, control and surveillance **mechanisms** exist, and are implemented in the fishery and there is a reasonable expectation that they are effective.	A monitoring, control and surveillance **system** has been implemented in the fishery and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.	A **comprehensive** monitoring, control and surveillance system has been implemented in the fishery and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.
	Met?	**Yes**	**Yes**	**No**
Rationale				

The *Guardacostas de Galicia* Service is the body in charge of surveillance, inspection and sanction. Law 2/2004 of April 21 (as amended by Law 10/2010) and Decree 136/2017 of November 17 detail the inspection functions developed by this service. In coordintation with the Coastguards, there is another figure named *Guardapescas marítimos* (Marine Fishery Wildlife rangers), who are directly employed by the fishers´ guilds and perform surveillance and control tasks in the shellfish banks and fishing areas. Furthermore, a State organisation that contributes to monitoring in terms of food safety, poaching and coastal and marine environmental impacts, for example the spat collection from rocks, is the SEPRONA (Nature Protection Service) and SEMAR (Maritime Service) dedicated to the surveillance of Spanish territorial waters and therefore in charge of actions at sea,, both are part of the Civil Guard (Ministry of the Interior). There are 2 other state bodies, the Autonomous police and the local police, specialized in the fight against poaching.

The monitoring and inspection system along with the sanctioning regime for aquaculture (Title XIV) are set out in Law 11/2008. The *Subdirección General de Guardacostas de Galicia*, is organised in 3 Units: 1. Servicio de Protección de Recursos (Resource Protection Service); 2. Servicio de Búsqueda, Salvamento y lucha contra la Contaminación (Search, Rescue and Pollution Control Service) and 3. Servicio de Inspección y Control de los Recursos (SICOR) (Resource Inspection and Control Service). See Section 7.4.1.5 for more details.

The units have the following material and human resources to carry out their surveillance tasks:

1) Material means: aerial (two helicopters), maritime (25 vessels) and land (60 vehicles and 3 vans).

2) Human resources: 239 people (including inspectors, subinspectors, skippers and mechanics, as well as watchmen, sailors and personnel from companies that collaborate with the service). According to the information gathered during the visit, about 110 people carry out inspection tasks (including the control of the aquaculture activity) such as personnel of the Coast Guard of Galicia. On the other hand, there are veterinary inspectors at sea (24).

The duties of the staff of the agents of the Coast Guard of Galicia include the monitoring of the ordinary operation of centers and facilities related to aquaculture production and, in general, the conservation of the marine environment. In addition, they make complaints about the offenses established in the legislation for the protection of maritime resources and carry out the inspections entrusted to them.

The inspection function will aim to ensure compliance with the regulations in force in the phases of production, extraction, handling, distribution and marketing of fishery, shellfish and aquaculture products, through the exercise of administrative research functions, carrying out actions of obtaining information, checking the data required to obtain benefits, incentives, grants and subsidies in matters within the competence of

the Department of Fisheries and Maritime Affairs, information to those administered on the occasion of the inspection actions on their rights and obligations, and others that are established in other provisions or entrusted to them by the competent authorities.

For this purpose, they may inspect vessels, vehicles, aquaculture establishments on land or sea, fish markets or auction points, processing industries, transport, commercial and hospitality establishments, port facilities, especially those that operate without the mandatory authorizations, without prejudice to the powers of other ministries.

One type of infraction would be the lack of prior administrative concession determining the illegality of the installation or exploitation. By order of the Department of Fisheries, Shellfish and Aquaculture, the procedure for carrying out its withdrawal will be regulated.

In case of non-compliance with the aforementioned, the Department of Fisheries, Shellfish and Aquaculture may proceed, as appropriate, in accordance with the provisions of Law 11/2008, of May 15, infringements on the protection of maritime resources -fishing.

As it was indicated in the first paragraph, the close collaboration with the *Guardapescas marítimos*, regulated by Law 5/2014, is essential. This is especially relevant for the control of the natural mussel seed banks, mainly in those areas where barnacles are also present. The *Guardapescas marítimos* act under the supervision of the Coast Guard and are obliged to submit monthly to the Coast Guard the report of the activities carried out. In Order 23 of April 2020, the collaboration between the two parties is detailed, including the reports to be sent by the Guardapescas marítimos on their surveillance activities and the obligation to carry a portable geolocation system. Currently, there are 150 Guarpescas marítimos working in the different Cofradias of Galicia.

The mussel culture is also subjected to the compliance of the Regulation (EC) No 852/2004 on the hygiene of foodstuffs. For its compliance, Spain established a National Plan for the Official Control of the food chain. This plan includes a specific program for aquaculture (PNCOHPP). These documents are public and can be consulted at the following link:

https://www.mapa.gob.es/es/pesca/temas/calidad-seguridad-alimentaria/higiene.aspx

The PNCOHPP establishes the hygiene controls to be carried out in the rafts and vessels, with the Autonomous Regions being responsible for organizing, programming and implementing these controls, and also indicates that at least 5% of the farms registered in the REGA must be inspected (see traceability section for more details). These inspections are carried out by the SICOR veterinarians (24 people).

It can be concluded that there is a monitoring, control and surveillance system implemented in the fishery. The inspection services in charge as a whole (*Guardacostas de Galicia*, *Guardapescas Marítimos*, SEPRONA, SEMAR and Police) have the power to inspect and implement sanctions in case of non compliance. Concerning the size and location of mussel rafts, it is clear that the system in place effectively controls the spatial distribution and size of mussel rafts. Non-compliance would be easily detected by inspectors or colleague mussel growers. Stakeholders and inspection services have stated that the inspection system has a demonstrated ability to enforce other relevant management measures, for instance, the number of lines or the collection of mussel spat without previous authorisation. Therefore, it can be concluded that monitoring, control and surveillance systems exist, and are implemented in the fishery and there is a reasonable expectation that they are effective. **Thus, SG60 and SG80 are met**. SG100 is not met since although a system of monitoring, control and enforcement is in place it cannot be considered comprehensive and to have a consistent ability to enforce all relevant management measures. This is because inspections on the number and lengths of ropes or the amount of mussel spat that is collected are not carried out with such a frequency that it can be concluded that noncompliance is prevented.

	Sanctions			
b	Guide post	Sanctions to deal with non-compliance exist and there is some evidence that they are applied.	Sanctions to deal with non-compliance exist, **are consistently applied** and thought to provide effective deterrence.	Sanctions to deal with non-compliance exist, are consistently applied and **demonstrably** provide effective deterrence.
	Met?	**Yes**	**Yes**	**No**

Rationale

Sanctions for non-compliance are defined in the relevant regulations and laws. Since 2015 shellfish poaching is considered a criminal offense with penalties of up to two years in prison, based on article 180 of the Criminal Code of the Organic Law 1/2015, of March 30. This is expected to have a higher deterrent effect as sentences are gradually made public. In addition to the above, offenses related to mussel culture may also have a criminal response, if they fall under any of the offenses against public health related to food.

Title XIV of Law 11/2008, of December 3, 2008, on fishing in Galicia (amended by Law 6/2009), establishes the Penalties Regime, where a comprehensive list of types of infractions and sanctions corresponding to the activity of mussel culture in any of its stages. The administrative procedure, the competent organisms and the responsibles of the infractions are also established.

The administrative infractions are classified into three types: minor, serious and very serious. And the sanctions to be applied are established depending on the type of infraction, the degree criteria, including recidivism and reiteration. The types of sanction can be: warning, fine (for minor infringements between 60-300 €, serious between 301-6,000 € and very serious between 6,001-60,000 €).

In addition, serious and very serious aquaculture penalties may be temporarily sanctioned with:

- Suspension, withdrawal or non-renewal of authorizations.
- Impossibility of being a beneficiary of loans, subsidies or public aids called by the Autonomous Administration for aquaculture for a period not exceeding five years.
- Temporary closure of a marine and auxiliary culture establishment, without prejudice to the declaration of expiration, if applicable, of the corresponding administrative authorization.

The maximum period of application of these sanctions is three years in the case of serious infringements and five years in the case of very serious infringements. Also detailed are the sanctions and amounts of fines for the commercialization of seafood products, cooperation with the authorities, conservation of the marine environment, etc.

Regarding the number of inspections during the spat collection campaing, the information sent by Pedro Gandarillas (Head of Surveillance and Control Unit) summarizes a total of 74 actions from January to May and in the month of December in 2018 and 2019: 20 inspecctions in 2018 (3 at sea, 3 at the port, 14 at the coastline) and 54 inspections (13 at sea, 7 at the port, 33 at the coastline and 1 transport), respectively. From these 74 interventions, 17 resulted in infractions. Fifty percent of these infractions were for seed extraction in unauthorized areas, while the other 50% were mostly for not having an extraction permit, non-compliance with the timetable and unauthorized vessels or other on-board irregularities.

In relation to other types of controls undertaken in the mussel rafts, the information sent by Pedro Gandarillas summarizes a total of 281 actions in 2018 and 192 in 2019. From the total (473), 61 resulted in infractions (i.e., 41 in 2018 and 20 in 2019). From these, most of them (i.e., 27 in 2018 and 9 in 2019) were non-compliances related to the number of ropes and the raft/device dimensions. The rest were other infringements related to, for example, lack of authorization, lack of identification, pollution.

The information sent by Pedro Gandarillas, was extracted from the Guardacostas annual memory. This information is public upon request following the process explained in PI 3.2.2. In case of infringements that are observed by inspection agencies, these sanctions are consistently applied and it is thought that these sanctions provide effective deterrence**. SG60 is met and SG80 is met**. SG100 is not met since sanctions has not been demonstrably provide effective deterrence.

	Compliance			
c	Guide post	Fishers are **generally thought** to comply with the management system for the fishery under assessment, including, when required, providing information of	**Some evidence exists** to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to	There is a **high degree of confidence** that fishers comply with the management system under assessment, including, providing information of importance to

		importance to the effective management of the fishery.	the effective management of the fishery.	the effective management of the fishery.
	Met?	**Yes**	**Yes**	**No**
Rationale				

Concerning the size and location of mussel rafts, it is clear that the system in place effectively controls the spatial distribution and size of mussel rafts. Non-compliance would be easily detected by inspectors or colleague mussel growers. Concerning the mussel spat collection, the activities are controlled by the *Guardacostas* of Galicia and *Guarpescas marítimos*. The team concludes that some evidence exists to demonstrate fishers comply with the management system under assessment, since the fishers are also required to provide their catch data and the area where they have collected their spat, and the system also includes that fishers, when required, provide information of importance for the effective management of the fishery. **Therefore, SG60 and SG80 are met**.

It has, however, also been reported to the team during the site visit that breaches in relation of the number of lines per raft (maximum of 500 growing lines) exist. There have also been some incidents in road transportation associated with the amount of seed that is transported with the goal to use it for ongrowing. This information shows that it cannot be concluded with a high degree of certainty that fisheries fully comply with all management measures in the management system. Therefore, **SG100 is not met.**

d	Systematic non-compliance			
	Guide post		There is no evidence of systematic non-compliance.	
	Met?		**Yes**	
Rationale				

Although during the site visit the team was made aware that cases of non-compliance had been observed by the inspection services, this information does not lead to the conclusion that there is evidence of systematic non-compliance. **Therefore, SG80 is met**.

References

Law 2/2004, of April 21, 2004, creating the Coast Guard Service of Galicia. Available at (in Spanish): https://www.boe.es/buscar/doc.php?id=BOE-A-2010-19214

Law 10/2010, of November 11, 2010, amending Law 2/2004, of April 21, 2004, which created the Coast Guard Service of Galicia. Available at (in Spanish): https://www.boe.es/buscar/doc.php?id=BOE-A-2010-19214

Decree 136/2017, of November 17, on the organization and operation of the Coast Guard Service of Galicia. DOG Nº 113 of 14/06/2018. Available at (in Spanish): https://www.xunta.gal/diario-oficial-galicia/mostrarContenido.do?lang=es&?paginaCompleta=false&idEstado=5&rutaRelativa=true&ruta=/2018/20180614/Secciones1_es.html.

Law 11/2008, of December 3, on fishing in Galicia. Available at (in Spanish): https://www.boe.es/buscar/doc.php?id=BOE-A-2009-805

Law 6/2009, of December 11, amending Law 11/2008, of December 3, on fishing in Galicia. Available at (in Spanish): https://www.boe.es/boe/dias/2010/02/04/pdfs/BOE-A-2010-1706.pdf

Law 5/2014, of April 4, 2014, on Private Security. Available at (in Spanish): https://www.boe.es/boe/dias/2014/04/05/pdfs/BOE-A-2014-3649.pdf

Order of April 23, 2020 establishing the general regulatory bases and calls for 2020, on a competitive basis, grants for collective projects, financed by the European Maritime and Fisheries Fund (EMFF), which contribute to the protection and recovery of marine biodiversity through better management and conservation of marine resources and their ecosystems, as well as the promotion of environmental awareness (procedure

code PE209C). DOG Nº92 of 13/05/20. Available at (in Spanish): https://www.xunta.gal/dog/Publicados/2020/20200513/AnuncioG0427-050520-0003_es.html

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Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	**80**
Condition number (if relevant)	**NA**

PI 3.2.4 – Monitoring and management performance evaluation

PI 3.2.4		There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives There is effective and timely review of the fishery-specific management system		
Scoring Issue		SG 60	SG 80	SG 100
a	Evaluation coverage			
	Guide post	There are mechanisms in place to evaluate **some** parts of the fishery-specific management system.	There are mechanisms in place to evaluate **key** parts of the fishery-specific management system.	There are mechanisms in place to evaluate **all** parts of the fishery-specific management system.
	Met?	**Yes**	**Yes**	**Yes**
Rationale				

Within the Galician fisheries management systems there are mechanisms in place to periodically evaluate parts of the management system. The *Comisión del Mejillón* meets on a regular basis a minimum of 4 times a year. As it can be derived from the large number of Decrees that are published on the regulation of the mussel culture in Galicia (after publishing the Decree 406/1996), it is clear that measures are regularly reviewed and new or amended measures are taken if reviews or developments show that these are necessary (see Section 7.4.1.4 of the Background).

The Order of October 26, 2000, contains an additional provision in which it is stated that, depending on the circumstantial characteristics of each campaign and when the monitoring and evaluation of the resources so advises, the *Jefatura Territorial* (Territorial Headquarters), within the scope of its competence, may modify the areas, quantities and periods of extraction by means of a justified resolution that must be communicated to the interested parties.

The mechanisms in place to evaluate the management system also include the work of the Mussel Commission whose role it is to advise on the management of the Galician mussel culture. In that process, of course, the Commission discusses relevant developments in the industry or evolving issues that affect the industry. As such, the Commission plays an important role in the evaluation the management system and advises the *Xunta de Galicia* on the basis thereof. In this respect also the responsibilities of the OPMEGA should be mentioned since this commission protects the interest of the POD and the mussel producers. The team therefore concludes that there are mechanisms in place to evaluate all parts of the fishery-specific management system and **SG60, SG80 and SG100 are met**.

b	Internal and/or external review			
	Guide post	The fishery-specific management system is subject to **occasional internal** review.	The fishery-specific management system is subject to **regular internal** and **occasional external** review.	The fishery-specific management system is subject to **regular internal and external** review.
	Met?	**Yes**	**Yes**	**No**
Rationale				

The management system of the mussel culture in Galicia is regularly reviewed internally. The Mussel Commission meets on a regular basis a minimum of 4 times a year. See also SIa. External review of the management system is carried out occasionally. For instance the evaluation by the "Observatorio

Español de Acuicultura" (OESA) of the Spanish mussel culture in 2017. Additionally it can be mentioned that there are occasional reviews of the industry or the management system by scientists working at universities or research institutes (Franco Leis, 2006). The team concludes that the fishery-specific management system is subject to regular internal and occasional external review. **SG60 and SG80 are met**. SG100 is not met since it can not be concluded that a regular external review of the management system takes place.

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Draft scoring range	≥80
Information gap indicator	More information sought / Information sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	**90**
Condition number (if relevant)	**NA**

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9 Appendices

9.1 Assessment information

9.1.1 Small-scale fisheries

This is not applicable to this fishery.

9.2 Evaluation processes and techniques

9.2.1 Site visits and stakeholders participation

The 5-day site visit was held in January 2020 and took place in five different places in Galicia. The 3 members of the assessment team took part in all meetings held during the site visit.

BV identified and contacted the stakeholders in order to prepare a comprehensive agenda for the site visit. A specific email was sent to a list of stakeholders, informing them about the announcement of the fishery and encouraging participation. Those different stakeholders included: INTECMAR, CIMA, Consello Regulador Mejillón de Galicia, CSIC (Spanish National Research Council), CETMAR, WWF-España, Consellería do Mar, Universidade de A Coruña, Asociacion BDRI (Bottlenose Dolphin Research Institute), Consello Regulador Mejillón de Galicia, Universidade de Santiago de Compostela, representatives of the client group of mussle rafts,local biologists, Guild´s technical assistance, CIMA, etc. See Section 9.2.2 for more details.

Meetings were scheduled and carried out in Vilagarcía de Arousa, Vigo, Santiago de Compostela, A Coruña and O Grove between the 20th and the 24th of January 2020. Also, in those cases where face to face meetings where not possible, conference calls were organized during the site visit. The resulting agenda, including institutions visited and people met, is presented in **Table 9.2.1.1**.

Apart from meeting with the client, managing authorities, research institutions and NGO's, the team was also present during the landing of mussels at one DOP landing port. This port is used by DOP operators harvesting mussel as included in the UoA.

To conclude the visit, an RBF workshop was held in Vilagarcía de Arousa on January 24, 2020. For more details see **Section 9.2.3.1**. A closing meeting with the client was also held in the same place on the same date.

9.2.2 Stakeholder participation

The announcement of the fishery entering the MSC assessment process published on the MSC website on November 19, 2019. At the same time of the announcement, the Announcement Comment Draft Report (ACDR) was also published and available for stakeholders input for a 60-day period. The announcement detailed the dates of the scheduled site visit to Galicia, and encouraged those stakeholders interested in scheduling a meeting to get in contact with the assessment team. Furthermore, BV also encouraged stakeholders to share any relevant information they might consider relevant for the assessment with the team through the "MSC Template for Stakeholders Input into Fisheries Assessment" provided.

The team contacted them in order to ensure their participation during the site visit and arrange the meetings. As a response, only one email from WWF Spain was received expressing their interest to participate in the assessment before the site visit started. The list of institutions and people finally interviewed during the site visit is detailed in **Table 9.2.2.1**.

Table 9.2.2.1 Details of the meetings maintained during the site visit. BV team members participated in all meetings detailed below.

Date and Place	Venue	Time	Company/Entity/ Asociation	Attendants
Arrival of the team to Santiago de Compostela.				
20/01 Vilagarcía de Arousa	Illa Arousa	7:30-11:00	Representatives of the Client group of mussel rafts, landing operations, controls of the DOP and records generated.	Leticia Dios; Noelia Fuentes; Marta Otero; Mª Teresa Ramiro; Ángeles Longa; Francisco Alcalde García.
	Peirao de Vilaxoán, s/n	11:30-13:30	INTECMAR + CIMA	Jose Molares Vila; Susana Darriba; David Iglesias
	D.O.P headquarters: Avda. da Mariña, 25 - 1º	16:00-18:00	Consello Regulador Mejillón de Galicia	Members of the client group: Alfonso Alcaide; Ángeles Longa; Jesus Cantiñeira.
21/01 Vigo	IIM-CSIC headquarters: Rúa de Eduardo Cabello, 6	10:00-12:00	Instituto Investigacions Mariñas, CSIC	Carmen Gonzalez Castro; Xose A. Alvarez Salgado; José M. Fernández Babarro
		12:30-13:30	CETMAR	Rosa Chapela; Rosa Fernandez Otero; Luis Outeiro (phone call)
	Bureau Veritas headquarters: Vigo	17:00-18:00	WWF-España	Raul García; Beatriz Nieto
22/01 Santiago de Compostela	DX de Pesca Acuicultura e innovación Tecnolóxica, en Rúa Valiño 63, San Lázaro	9:00-11:00	Consellería do Mar: - Subdirección Xeral de Pesca e Mercados da Pesca, Secretaría Xeral do Mar, Consellería do Mar - Servizo de Inspección e Control de Recursos, Consellería do Mar - Subdirección de Acuicultura	Pedro Gandarillas Iglesias; Matilde Alonso.
22/01 A Coruña	CICA	13:00-14:30	Universidade de A Coruña	Javier Cremades; Viviana Peña Freire
23/01 O Grove	BDRI headquarters: Avenida Beiramar 192, O Grove	9:30-10:30	BDRI (Bottlenose Dolphin Research Institute)	Bruno Diaz Lopez Severine Methion

23/01 Vilagarcía de Arousa	Avda. da Mariña, 25 - 1º	12:00-13:00	Producers, processors and distributors not associated with the Consello Regulador	Mª Dolores Fernández; Ramón Javier Figuera; Aurora Alonso;
23/01 Vilagarcía de Arousa	CALL	16:30	Universidade de Santiago de Compostela	Gonzalo Rodriguez Rodriguez
24/01 Vilagarcía de Arousa	Avda. da Mariña, 25 - 1º	10:00-13:00	Mussle producers, members of the Consello Regulador, local biologists, Guild's technical assistance,goose barnacle producers and CIMA	RBF Workshop: See Attendace list in Table 9.2.2.3
24/01 Vilagarcía de Arousa	Avda. da Mariña, 25 - 1º	13:30-14:00	Consello Regulador Mejillón de Galicia	Closing meeting: Ángeles Longa

Table 9.2.2.2 presents the main topics discussed with the different stakeholders during the different meetings.

Table 9.2.2.2 Details of the main topics discussed with the different stakeholders during the site visit.

Stakeholder	Topics discussed
Porto Vilagarcía (DIAZO): Representantes DOP and client	- Raft concessions - Which information is being collected, how it is collected, who is receiving it, transparency… - Catch and grow process from the seed collection to the growing phase. - Details on the Traceability and DOP control. - Harvest and landing operations. - Consello Do Mejillón: history, structure, functions, organization chart - Mussel activity waste. - Eligilible fishers.
INTECMAR	- History of INTECMAR. -.Pathology spot sampling in the estuaries. - Pathologies. - Martelia? - Mussel seed monitoring - Conflict between the mussel industry and the goose barnacle producers. - Goose barnacle zonification, biomass and coexistence with mussel rafts. - Seed mussel reporting. - Impact studies on seabed and shell wastes.Associated wildlife.
IIM/CETMAR	- Effects on climate change and the mussel culture. - Oceanography, organic matter, plankton and circulation?. - Shell waste and seabed impact. - Cartography. - Estuaries ecosystem - GESTIMAR Project -Aquaculture National Plan.Strategical Galician aquaculture Plan. - Other projects such as genetic enhanced. - Carrying capacity models in the Estuaries.
CICA	- Questions and studies related to habitat and ecosystem. - Maërl: mapping of the areas and impact of the mussel activity.

WWF **BDRI**	- Impact of the culture mussels in the Estuaries. - Zonification. - Primary production. - Impacts of the mussel activity related to wastes, noise pollution and the paints used in the mussel rafts. - Conflict between the mussel industry and the goose barnacle producers. - Parque Nacional Illas Atlánticas. -.Selfish harvest Pluriannual Management Plans - Impact with marine mammals and sea birds. - Rafts acting as artificial reefs. - Other impacts not related with the mussel activity such as marine traffic.
Consellería do Mar	- Legal framework and current regulations such as Orden 26 September 2006 - Consultation mechanisms in place for this fishery - Mechanisms for dispute resolution provided within the legal framework - Which information is being collected, how is it collected, who is receiving it, transparency. -Organization chart, roles and functions. - Authorizations and permits (seed extraction). - Technical reports. -Control and monitoring of the *Guardapescas*. - Insight on the MCS system in place in the mussel activity. - Seed monitoring, reporting and mapping. - Mussel activity waste.
USC	-Relevance of the mussel culture from an economic point of view. -Public Administration roles and responsabilities. -Access and rights. -Consultation processes. -Market development.

Information collected was used to elaborate on and confirm the previous information published on the ACDR, and also to re-evaluate and then give the final score for the assessed fishery using the default assessment tree (Annex SA) and when applicable, using the modification to the default tree for enhanced bivalve fisheries (Annex SB) as shown in **Section 7**. All documents used for the assessment are listed in **Section 8** (References).

Seven stakeholder submitted inputs to the ACDR using the MSC template for Stakeholders Input into Fisheries Assessments.These inputs were received after the site visit; therefore, BV was not able to upload them to the MSC website before commencing the site visit as set out in the FCP 7.15.5. It is worth notingthat the team decided to take into account the stakeholders' comments although they were received out of time. The responses to the stakeholders to the ACDR are included in **Section 9.4.**

An additional remote site visit was announced on the MSC website on May 21st, 2020 due to the fact that additional information was not available or had not been assessbled by the client and the stakeholders at the moment of the first site visit (January 2020). Because of that information, the team decided to flag the use of the RBF for other secondary species although there were unlikely to be main. See **Section 9.2.3** for more details.

The remote site visit through teams was performed on the 25th of June 2020. However, the RBF was postpone to Tuesday 30th of June 2020. The attendees are included in **Table 9.2.2.3.**

Apart from the RBF, other topics discussed were related to concesions, conflict between sectors, management, consultation between parties. In relation to the RBF see **Section 9.2.3.1.**

Table 9.2.2.3 Attendes of the second stakeholders.

Day	Time	Company/Entity/ Asociation	Atendees
25/06	10:00	Consello Regulador Mejillón de Galicia	Representantes del grupo cliente: Ángeles Longa y Alfonso Alcaide
	12:00	percebeiros, biologos de zona, asistencia tecnicas en cofradías, WWF	Raquel Outeiral.- Cofradía A Guarda (Pontevedra). Beatriz Nieto, Mariana Herrera, Raúl García.- WWF Txetxu Santiago.- AT Cofradía Bainoa Mº Berta Barreiro .- AT Cofradía Cangas Juan Pedro Monteagudo. Asistencia de WWF Jorge Alfaya .- Cofradía de Vigo
30/06	11:30	Univerdad, Consello, biologos de zona, asistencia tecnicas en cofradías, WWF	Beatriz Nieto, Mariana Herrera, Raúl García.- WWF Txetxu Santiago.- AT Cofradía Bainoa Mº Berta Barreiro .- AT Cofradía Cangas Consello.- Ángeles Longa Jorge Alfaya .- Cofradía de Vigo

9.2.3 Evaluation techniques

The team published an ACDR on 19th November 2019 following the requirements set out in FCR 7.10.2. A draft scoring range together with a draft rationale was assigned to each Performance Indicator (PI). In addition, an indication of the availability of information used to score each PI and the information gaps were included in each PI table.

Scoring was performed according to the procedure established in Certification Requirement 7.17 (MSC FCP v2.1). The assessment team held preliminary scoring meetings during the site visit, where the Performance Indicators of the fishery were evaluated jointly by the team in order to assess whether there was still information needs to be communicated to the client. After the site visit, each expert finished their part of the report before proceeding to a joint evaluation of every PI and the final scoring, through scoring meetings, which took place via conference calls.

9.2.3.1 Rationale for using the RBF

The Risk Based Framework (RBF) was adopted by the MSC to enable scoring of fisheries in data-deficient situations, and it is designed to allow the assessment of specific PIs (1.1.1, 2.1.1, 2.2.1, 2.3.1, 2.4.1 and 2.5.1).

The team determined that the RBF was to be used to assess PI 2.2.1 before the announcement of the fishery. Consequently, the use of the RBF was included in the Fishery announcement template and in the “Use of the RBF form” both of which were published on the MSC website. It was concluded that there were not sufficient data available to estimate the impact of the assessed fishery on the secondary species. A RBF

workshop was triggered for assessing the goose barnacle as the main subcomponent in PI 2.2.1. The criteria and rationale for using the RBF is set out in **Table 9.2.3.1** below.

Table 9.2.3.1 Criteria and rationale for using RBF, based on Table 3 (FCP v2.1).

Performance Indicator	Criteria	Rationale	Consideration	Notes
PI 2.2.1: Secondary species outcome	Stock status reference points are available, derived either from analytical stock assessment or using empirical approaches.	Despite the lack of detailed data on the species composition resulting from the spat collection done by hand, using scrapers, on the rocky coastal strip, the composition of the communities coexisting with the mussel beds is well known. Existing studies characterising these communities reveal that: (i)Although the species composition is highly dependent on physical characteristics of the coastal strip (e.g. height, exposure, morphology), mussels form dense, aggregate beds, allowing harvesters to select the most appropriate areas to be exploited and minimizing the catch of non-target species. (ii)The only species with commercial value coexisting with the mussel is the goose barnacle. The team considers that it is highly unlikely that the contribution of goose barnacles to the total volume removed by the mussel collectors is ≥5%. The assessment team decided to take a precautionary approach and considered the goose banacle as a main secondary species due to 1/ the lack of specific monitoring and data on the species composition harvested by the mussel collectors, and 2/ the controversy raised by this issue. RBF shall be used for the evaluation of the goose barnacle because no biologically based limits are available to assess the status of this species/stock (it is not possible to use default Performance Indicator Scoring Guideposts within default assessment tree for this PI).	No	Use Annex PF (RBF) for this PI.

An additional RBF was announced on the 21st of May 2020. As a result of additional information sent by the client, the team determined that the RBF was to be used to assess other species as part of PI 2.2.1. The criteria and rationale for using the RBF is set out in **Table 9.2.3.1** below.

Performance Indicator	Criteria	Rationale	Consideration	Notes
PI 2.2.1: Secondary species outcome	Stock status reference points are available, derived either from analytical stock assessment or using empirical approaches.	The client decided to perform a sampling study in some areas used for spat collection with the objective to cover the lack of detailed data on the species composition. The new sampling study, which was not available at the site visit, shows that a low percentage of other non-commercial species belonging to **genus Chtamalus and Balanus**, such as Chtlamalus spp (mainly *Chtlamalus stellatus* and *Chtlamalus montagui*) and *Balanus perforatus*, could be found. The species information obtained during this sampling analysis, together with the bibliographic species data already described in the ACDR, provides the team with a better understanding of impact to the communities coexisting with the mussel beds. It is worth nothing to say that there are no incentives for the mussel producers to target those species because they do not have commercial value.	No	Use Annex PF (RBF) for this PI.

The following information was sent to the stakeholders for the workshop: The **Figure 9.2.1** by Junoy (2013), reproduced by E. Vázquez Otero, illustrates in a simple way the zoning of the rocky coastline in Galicia, with the most abundant species present at each level. Focusing on the intertidal, we can distinguish three levels or horizons with their corresponding main species:

Upper mesolittoral zone: from the supralittoral to the maximum level of the high tide in dead tides. This level is characterized by barnacles belonging to genus Chtlamalus spp (mainly Chtlamalus stellatus and in more protected areas Chtlamalus montagui). Other species of barnacles (Semibalanus balanoides, Balanus spp.), several species of limpets (Patella vulgata, Patella depresa) and gastropods of the genus Littorina may appear in smaller numbers.

(2) Mid mesolittoral zone: horizon between the upper mesolittoral and the mid-level of maximum low tide at dead tides. This is where mussels are grouped together in dense aggregates. It is where the mussel spat presents the greatest abundance and coverage of the substrate. In this zone, the larger size Balanus perforatus is the most common. This species likes places less exposed to the action of the waves and settles in more sheltered places such as rock crevices. On the shell of the mussel, acorn barnacles may also attach.

(3) Lower mesolittoral: this area remains dry only during the most intense living tides. For this reason, algae of genera Fucus, Ulva, Chondrus, Gelidium and Corallina appear in this strip. As for the fauna at this level, apart from mussels, anemones, gastropod hedgehogs, crustaceans, etc. are present.

In the lower mesolittoral, patches of goose barnacles (Pollicipes pollicipes) or mixed patches with mussels can appear in the more beaten areas, where one species is easily distinguished from the other since the mussel shell is bluish-black, the goose barnacle nail is grayish-white.

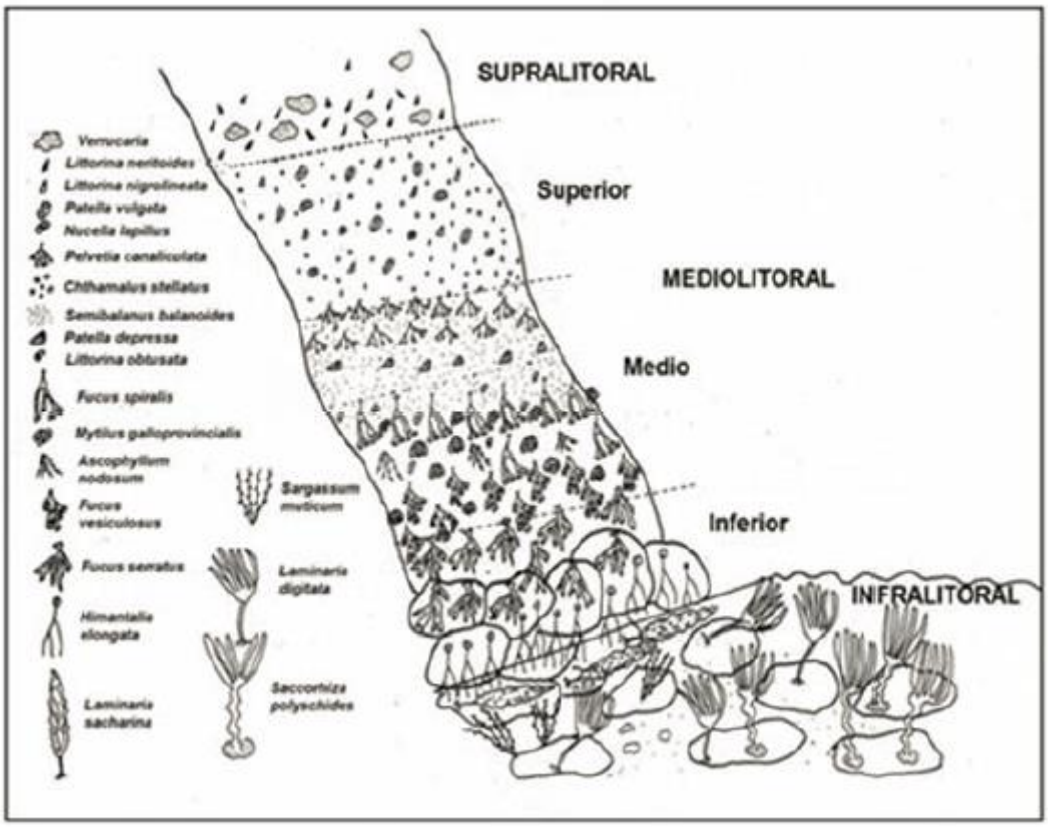


Figure 9.2.1 Zoning of the rocky coastline in Galicia. Source: Junoy (2013), reproduced by E. Vázquez Otero.

The team analysed in detail the study carried out by the client after the RBF workshop, together with other references. Considering the result of the client's report regarding the composition of the catch from the spat mussel harvesting, it can be concluded that on average, the bycatch does not surpassed 5%. Therefore, on average, the proportion of any of the accessory species present in the catch never exceeded 5%, which means that all species should be classified as minor secondary species. Notwithstanding, the team agreed to keep the goose barnacle (*Pollicipes pollicipes*) as a main secondary species. All the other species were considered minor secondary species. Therefore, the team decided not to include the PSA for the rest of the minor species.

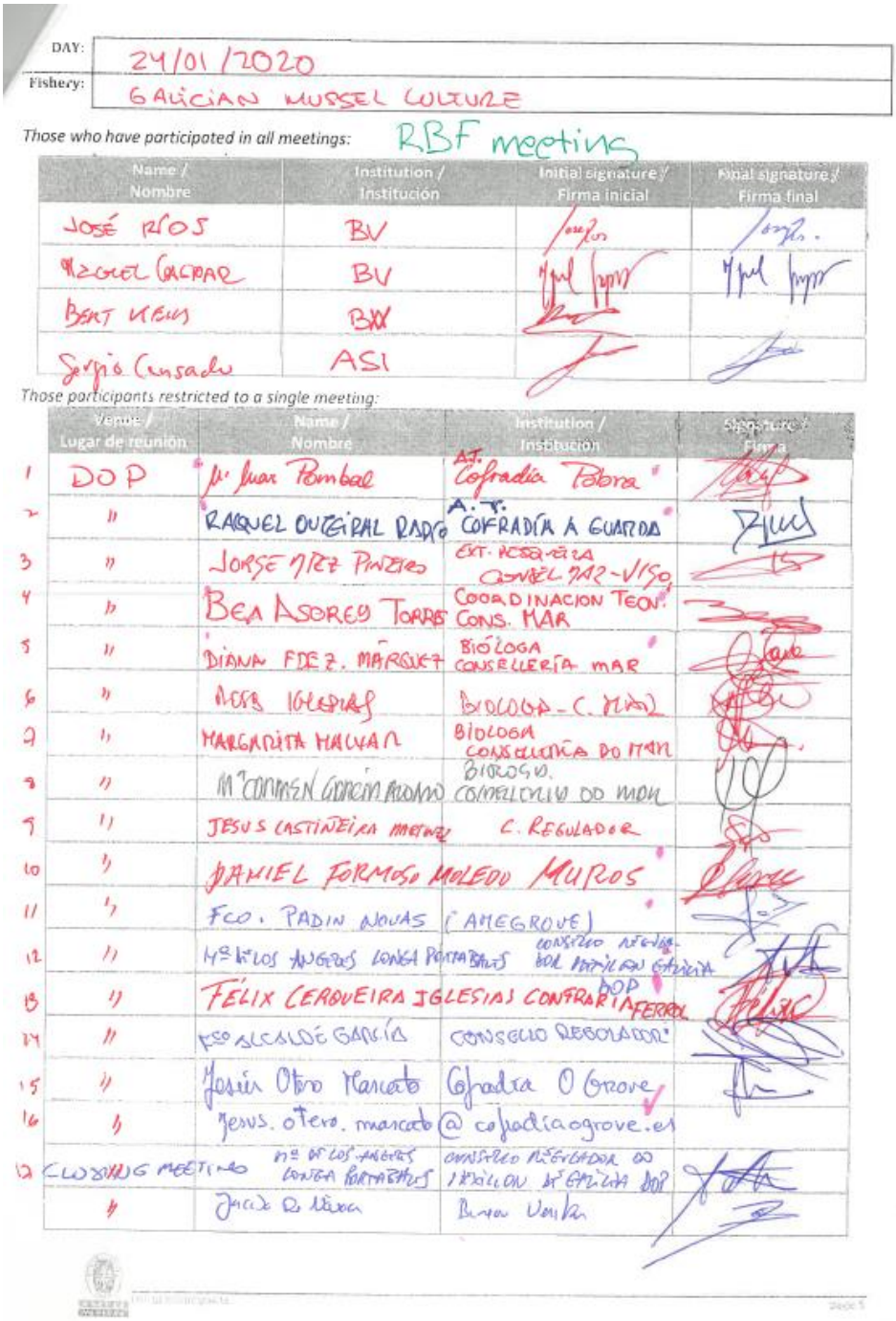
9.2.3.1. RBF stakeholder consultation strategy

Stakeholder engagement is an important aspect of the use of the RBF.

Stakeholders were notified that the RBF was going to be used for assessing the goose barnacle in PI 2.2.1 prior to the site visit, both by notices posted on the MSC website (published on 19th November 2019), and by direct e-mail contact from Bureau Veritas. These notices included the text required by the MSC (Annex PF2.1.2).

No stakeholder comments about the use of the RBF for the assessment of goose barnacle, were received within the 30 days consultation period.

During the site visit, a specific stakeholder-driven, qualitative RBF meeting was carried out. Before the meeting, in order to achieve a sound outcome, a broad range of stakeholders with a balanced knowledge of the fishery were identified and invited to participate. See **Table 9.2.2.3** and **Figure 9.2.1** for more details on the participants in the RBF workshop.



DAY: 24/01/2020

Fishery: GALICIAN MUSSEL CULTURE

Those who have participated in all meetings: RBF meeting

Name / Nombre	Institution / Institución	Initial signature / Firma inicial	Final signature / Firma final
JOSÉ RÍOS	BV		
RAQUEL CACERAR	BV		
BERT KEUS	BV		
Sergio Cansado	ASI		

Those participants restricted to a single meeting:

	Venue / Lugar de reunión	Name / Nombre	Institution / Institución	Signature / Firma
1	DOP	Mª Juan Pombal	A.T. Cofradía Potora	
2	"	RAQUEL OUTEIRAL RADRO	A.T. COFRADÍA A GUARDA	
3	"	JORGE MTEZ PINEIRO	EST. RESERVEIRA CONSEL MAR-VIGO	
4	"	BEA ASOREY TORRES	COORDINACION TECN. CONS. MAR	
5	"	DIANA FDEZ. MÁRQUEZ	BIÓLOGA CONSELLERÍA MAR	
6	"	NESA IGLESIAS	BIOLOGA - C. MAR	
7	"	MARGARITA MALVAR	BIÓLOGA CONSELLERÍA DO MAR	
8	"	Mª CARMEN GARCÍA ALONSO	BIÓLOGO. CONSELLERIA DO MAR	
9	"	JESUS CASTIÑEIRA MARTINEZ	C. REGULADOR	
10	"	DANIEL FORMOSO MOLEDO	MUROS	
11	"	FCO. PADIN NOVAS	(AMEGROVE)	
12	"	Mª Mª LOS ANGELES LONGA PORTABALES	CONSELLO REGULADOR DO MEXILLON GALICIA	
13	"	FÉLIX CERQUEIRA IGLESIAS	CONFRARIA DOP FERROL	
14	"	FCO ALCALDE GARCÍA	CONSELLO REGULADOR	
15	"	Josán Otero Marcato	Cofradía O Grove	
16	"	jesus. otero. marcato	@ cofradiaogrove.es	
17	CLOSING MEETING	Mª Mª LOS ANGELES LONGA PORTABALES	CONSELLO REGULADOR DO MEXILLON DE GALICIA DOP	
	"	Jacob Q Nieva	Bureau Veritas	

Figure 9.2.3.1 RBF Attendance list.

9.2.3.2. *Information and list of components obtained from the meetings*

The consultation with stakeholders to gather data and to seek expert opinions were carried out on the 24th of January. Background information was prepared by the team for the PSA productivity attributes and scores before the workshop based on scientific literature.

The team has used the stakeholders information and other bibliographic data to score the data deficient element. PSA uses a semi-quantitative approach to determine the productivity of a species and the level of fishing impact a species/stock can sustain. This is used to determine the capacity of a species to recover from the fishing impact.

The first step was to complete the productivity table (Table PF4) which provides a three-point risk scale for determining the productivity of different species: Low productivity (3); Medium productivity (2); High productivity (1). In total there are 8 productivity attributes. Different attributes are scored depending on whether a scoring element is an invertebrate or not. This was prepared beforehand by the team in order to

have a base to work on during the RBF meeting.

The second part of undertaking a PSA is to score the susceptibility of the species. Table PF5 includes all four susceptibility attributes and provides a three-point risk scale for determining the level of fishing impact a scoring element can sustain.

In addition to the inputs discussed during the workshop the following stakeholders sent more information to support their scorings. The stakeholder input reported is included in Section 8.4 and incorporated in the rationales directly in the scoring tables (Section 8.8).

1. Raquel Outeiral Radío, Tecnical assistence at Fishermen's Guild of Santa Tecla of A Guarda.
2. José Molares Vila. Deputy Head at the Technological Institute for the monitoring of the marine Environment in Galicia. (INTECMAR).
1. Cofradía de A Guarda. She does not agree with the MSC requirements in relation to Areal overlap. Encounterability with the fishing gear (*rasqueta*) very high, high risk, score (3). Selectivity, a captura de individuos inmaduros (DBC< 13 mm) no percebe é moi frecuente (3)
2. The scoring sent by José Molares was based on his expert opinión.
3. Stakeholders votes at the workshop.

Areal overlap table per stakeholder

A	B	C
Not scored	1	1 = 1 vote 2 = 1 vote 3 = 7 votes. Considering only Galicia 2 = no answer

Encounterability table per stakeholder

A	B	C
3	1	1 = 2 votes 2 = 5 votes 3 = 1 vote

Selectivity table per stakeholder

A	B	C
3	1a) 3b)	1 = 1 vote 2 = 2 votes 3 = 5 votes

Post captura mortaliyy

A	B	C
Not scored	3	No data

See **Appendix 9.8.2** contains the specific Productivity-Susceptibility Analysis (PSA) for the component assessed.

9.3 Peer Review reports

Report from Peer Reviewer A

General comments

Question	Yes/No	Peer Reviewer Justification (as given at initial Peer Review stage). Peer Reviewers should provide brief explanations for their 'Yes' or 'No' answers in this table, summarising the detailed comments made in the PI and RBF tables.	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)
Is the scoring of the fishery consistent with the MSC standard, and clearly based on the evidence presented in the assessment report?	No	In most cases yes, but at a few crucial points it is not (particularly 1.1.3, 2.2.1, 2.4.1. 2.5.1 and 3.2.1)	See the responses on the specific PI comments.
Are the condition(s) raised appropriately written to achieve the SG80 outcome within the specified timeframe? [Reference: FCP v2.2, 7.18.1 and sub-clauses]	Yes		
Is the client action plan clear and sufficient to close the conditions raised? [Reference FCR v2.0, 7.11.2-7.11.3 and sub-clauses]		NA	

Enhanced fisheries only: Does the report clearly evaluate any additional impacts that might arise from enhancement activities?	No	The decision to not define the translocation of spat as translocation reduces the ability to assess this issue.	It is important to highlight that the MSC does not explicitly define when translocation is actually occurring. Indeed, all parties (MSC, ASI and CABs) agree that a thoughtful review of Annex SB is needed. Nonetheless, according to the MSC Fisheries Standard (version 2.01) and specifically Annex SB, the team should evaluate whether or not the fishery has an impact on the target stock biomass, and whether it includes translocations. If the team concludes that there is no impact on the biomass of the target stock and no translocations, then the team may choose not to score Principle 1. The team did a thorough analysis using extensive information on the fishery, area and other similar fisheries for the preparation of the ACDR. The expert knowledge of both Miguel Gaspar and Bert Keus was conclusive to determine that the fishery did not involve translocation.
Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary). Add extra rows if needed below, including the codes in Columns A-C.	NA	It would increase the understanding of the conditions if table 5.2.3 included a column showing which UoAs the conditions applied to (I realise this may be an MSC template issue, rather than something the CAB can change?)	A column showing to which UoC the conditions are applied to is added.

PI comments

PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
1.1.1	NA (PI not scored)					
1.1.2	NA (PI not scored)					
1.1.3	NA (PI not scored)	No (scoring implications unknown)	NA	The report discusses in 7.2.1.2.3, whether the movement of spat along the coast constitutes translocation. I recognise that a) the MSC have not made any clear definition of translocation and, b) there is a precedent (from the Wadden Sea) for not considering movement over even quite long distances translocation. However, it seems to me that this is not the intention of the standard. The guidance on Translocation specifically says: "While there is a low risk for translocations of marine shellfish to affect the genetic integrity of wild populations (depending on the scale of the translocation), it is still necessary for assessment teams to examine each situation and provide rationale and evidence explaining the level of risk if it exists. This will be achieved by scoring the Genetic outcome PI". Notice the last paragraph. To me, this clearly shows that the way to assess whether moving spat constitutes a risk or not, is not for the AT to weight the risks in their own manner, and if they are low, not to score P1 - but on the contrary, USE the P1 requirements, including the genetic PIs, to determine those risks.	It is important to highlight that the MSC does not explicitly define when translocation is actually occurring. Indeed, all parties (MSC, ASI and CABs) agree that a thoughtful review of Annex SB is needed. Nonetheless, according to the MSC Fisheries Standard (version 2.01) and specifically Annex SB, the team should evaluate whether or not the fishery has an impact on the target stock biomass, and whether it includes translocations. If the team concludes that there is no impact on the biomass of the target stock and no translocations, then the team may choose not to score Principle 1. The team did a thorough analysis using extensive information on the fishery, area and other similar fisheries for the preparation of the ACDR. The expert knowledge of both Miguel Gaspar and Bert Keus was conclusive to determine that the fishery did not involve translocation.	
1.2.1	NA (PI not scored)					
1.2.2	NA (PI not scored)					

1.2.3	NA (PI not scored)					
1.2.4	NA (PI not scored)					
1.2.5	NA (PI not scored)					
1.2.6	NA (PI not scored)					
2.1.1	Yes	Yes	NA	Scoring agreed		
2.1.2	Yes	Yes	NA	Scoring agreed		
2.1.3	Yes	Yes	NA	Scoring agreed		
2.2.1	Yes	Yes	NA	Goose barnacle: scoring agreed		

2.2.1	Yes	No (scoring implications unknown)	NA	SI a/b (main/minor designation):The twelve bycatch samples perfomed by the client is a small first indication of which bycatch species may occur in the 'catches'. But it is CERTAINLY not enough to conclude that no bycatch species amount to more than 5% on average. Short of simply asking the client to provide bycatch data with more statistical power before embarking on the full assessment, at the very least it would have been reasonable for the AT to conclude that (lacking better data) the two species that DO occur as a significant bycatch in some samples (ie. the barnacles and the coral algea) should be treated as main bycatch species, at least until better data show otherwise. (In fact, it seems that the AT was moving down this route, having performed an RBF for barnacles - but dropped it because the RBF was inconclusive?)	The rational has been amended in order to make it more clear that limited data on catch composition were available and that the team therefore took a precautionar approach and decided to determine goose barnacles as a main secondary species. Since barnacles and coral algea on avarage constituted clearly less than 5 % of total catch they were determined as minor secondary species and it was decided not to score minor secondary species.	Accepted (no score change, change to rationale)
2.2.2	Yes	Yes	Yes	Goose barnacles: scoring and condition agreed	The rational has been amended to respond PRB.	NA (No response needed)
2.2.2	Yes	No (scoring implications unknown)	NA	Barnacles and coral algea: see above	See response at PI 2.2.1	Accepted (no score change, change to rationale)
2.2.3	Yes	Yes	Yes	Goose barnacles: scoring and condition agreed		NA (No response needed)
2.2.3	Yes	No (scoring implications unknown)	NA	Barnacles and coral algea: see above	See response at PI 2.2.1	Accepted (no score change, change to rationale)
2.3.1	Yes	Yes	NA	Scoring agreed		NA (No response needed)
2.3.2	Yes	Yes	NA	Scoring agreed		NA (No response needed)

2.3.3	Yes	Yes	NA	Scoring agreed		NA (No response needed)
2.4.1	Yes	No (change to rationale expected, not to scoring)	NA	SI a (UoA 1) Scoring agreed, since it is clear that removing even 40% of the mussel bed every year is a "reversible harm". But the rationale also argues that the relevant habitat is 'rocky shores' and that this is much larger in area than the area covered by mussels. This is not in accordance with the MSC requirements for defining the relevant habitat: Substratum, Geomorphology AND Biota. Thus the 'habitat' in question here must be something in the order of "rocky shores with a cover of mussels" (i.e. the 118 ha.)	We agree with the comments of the PR. The rationale of this PI was changed. In the context of this PI, “serious or irreversible harm” for non-VME habitats is to be interpreted as reductions in habitat structure and function such that the habitat would be unable to recover at least 80% of its structure and function within 5 – 20 years if fishing on the habitat were to cease entirely (MSC FCR v2.0; SA3.13.4).	Accepted (no score change, change to rationale)
2.4.1	Yes	No (scoring implications unknown)	NA	SI a (UoA 1+2): The approach taken in designating commonly encountered habitats is "the one with the highest percentage in each ria". This overlooks the fact that gravel is a significant habitat in Arousa (and given the size of this ria, also in the total - in fact a larger area than that covered in pebbles). The guidance says: [any habitat] that make[s] up a reasonable portion of the UoA’s fishing area. Gravel should thus be considered main habitat.	All habitats identified (sand, mud, stones and gravel) were considered main habitats. Nevertheless, as the PR pointed out, by mistake, this was not mentioned in the rationale of this PI. This information was added: "In ria Ares-Bentazos the rafts are mainly located over sandy bottoms, in rias Muros-Noia and Vigo over muddy bottoms, in ria de Arousa over muddy bottoms and gravel bottoms, whereas in ria Pontevedra they are mainly located over mixed bottom of soft sediment with pebbles (see Client report, 2020b). These habitats have been designated for this UoAs as the commonly encountered habitats".	Accepted (no score change, change to rationale)
2.4.1	No (scoring implications unknown)	No (scoring implications unknown)	NA	SI a (UoA 1+2): The justification for this scoring summarises the findings regarding the effect of mussel rafts in general, but does not at all relate these to the specifics of the commonly encountered habitats and the associated biota (in other words, to the "structure and function" of the specific habitats). The fact that "polygons were designed in areas where the bottom is mainly constituted of soft sediments" in order to minimize effects (see PI2.4.2 rationale) suggests that there are significant differences between the susceptibility of the habitats. Furthermore, there is no attempt to quantify or even assess the cumulative effect of 3386 site specific habitat changes on the particular habitats as they occur in the rias. Given that the rafts are positioned at approximately	More information was added to the background regarding habitats. A table was included aiming at showing the proportion of each habitat type (excluding VME which was analysed separetely) that are disturbed by the fishery (please see Table 7.3.1.3.4). Table 7.3.1.3.5 presents data on the area covered by each type of bottom for the entire Galicia, within rias area, within production areas, and beneath rafts. For the practical purpose of management, Xunta de Galicia has not proposed “thresholds” against which levels of disturbance can be measured. Nevertheless, the team has considered for the main habitats a 15% threshold of overlap between mussel production and a particular habitat (excluding VME), above which mussel production activity is deemed to have a significant impact on that habitat. This threshold was based in	Accepted (no score change, additional evidence presented)

				120 m from each other - if the 'site specific effects' of each raft cover a radius of just 60 meters, they overlap with those of the neighboring six to form a habitat impact equal to the entire polygon area. We know that this would amount to 10 % of the entire area of the rias (assuming full polygon occupancy) - but the report lacks a table that shows the proportionate overlap of the polygons with each habitat type (ie. how large a percentage of each habitat is affected by mussel farming).	other similar fishery already certified by MSC (Ireland rope grown mussel). Based in this threshold (15%) from Table 7.3.1.3.5 considering the entire Galicia it can be concluded for each bottom type that the maximum proportion (considering the entire area of the polygons) that may be affected is always lower than 6%. If only the area of each Ría is taking into consideration, although the proportion of each bottom type that may be impacted increases, never exceeds 14%. In this analysis the team adopted a precaucionary approach by assuming that the entire polygon area is affected by mussel production, which is not true. Indeed, Keeley (2009) concluded that impacts are difficult to detect outside of 20 m – 50 m from the site itself, depending on water depth and current velocities, whereas in areas with high hydrodynamic regimes the effect on bethic habitats are minimal due to the high dispersal rates (Chamberlain et al., 2001). The team agreed to analyse the effects of mussel production on habitats in general and not per habitat type (excluding VME, which was analysed separetely). The scale and intensity of benthic impacts are not consistent, varying from severe to low (Hatcher et al., 1994) to no detectable impacts (Crawford et al., 2003), being therefore largely site specific and dependent on a wide variety of factors including depth, hydrographic conditions and stocking density (e.g. Grant et al., 1995; Kaiser et al., 1998; Chamberlain et al., 2001; Keeley, 2009).	
2.4.1	Yes	Yes	NA	SI b (Maerl): Scoring agreed - and I note here that the specific effects of mussel farming in this SI is discussed in relation to the biology of the mearl beds - and that the AT has attempted to quantify these effect on the habitat (in a very precautionary way, by assuming that the effect is not only on the polygon areas, but also on adjacent maerl beds).		NA (No response needed)

2.4.2	Yes	Yes	Yes	Scoring and condition agreed. Note that without a fleshing out of the 'habitat by habitat' and 'structure and function' assessment called for in 2.4.1, the client will have a hard time figuring out what to actually monitor for, in trying to fulfil this condition.		NA (No response needed)
2.4.3	No (scoring implications unknown)	No (scoring implications unknown)	NA	SI a: The vulnerability (as defined in SA3.15.4) of the commonly encountered habitats is not known - or at least not shown in the report (see comments regarding 2.4.1 above)	More information was added in the background concerning habitats, namely the proportion of the habitat that is disturbed by the fishery. The analisys was made by habitat type. The following sentence was added to the rationale of this PI 2.4.3. (Si (a)): Sufficient data are available to allow the nature of the impacts of the fishery on habitat types identified and there is reliable information on the spatial extent of interaction, and the timing and location of use of the fishing gear. For all bottom types (excluding VME) the area “fished” is quite small (lower than 15%) compared to the entire area of the Rías, and even smaller (lower than 6%) compared to the large scale of the entire Galicia.	Accepted (no score change, change to rationale)
2.4.3	Yes	Yes	Yes	SI b+c: scoring and condition agreed		NA (No response needed)
2.5.1	Yes	No (scoring implications unknown)	NA	The justification text does a good job of showing the types of changes caused by the mussel culture - but under-represents the scale of these changes. If one regards the structure and energy flow in the ecosystem maps showing Ria Arousa with and without mussel farming (Figure S5 in Outeiro et al 2018), it is clear that the 'mature' ecosystem structured by 60 years of mussel farming is *fundamentally* different from the one we must assume existed before. With such massive changes (clearly above the LTL threshold of "no more than 40% change in abundance to no more than 15% of the other species/groups" suggested as a guide for serious or irreversible harm in GSA3.16.2), the justification for an 80 score (ie. that serious or irreversible harm is highly unlikely) needs to be a lot stronger (e.g by being crafted in accordance with SA3.16.5).	The question to be answered under this PI is whether the ecosystem impacts of the activity disrupt the key elements underlying ecosystem structure and function, to a point where there would be serious or irreversible harm to the environment. The latter being the reduction of key features most crucial to maintaining the integrity of its structure and functions and ensuring that ecosystem resilience and productivity is not adversely impacted. The team has clearly considered these issues in the rational. The LTL thresholds do not apply here. SA3.16.5 requires that highly unlikely is less than 30 % chance. The way the rational is drafted clearly supports a conclusion that the chance that key elements of structure and function are disrupted is smaller than 30 %.	Not accepted (no change)

2.5.2	Yes	No (scoring implications unknown)	NA	SI a: The current partial strategy (with the exception of Gestinmer - which is still only a pilot project) aims at maintaining the current situation - but if the current situation is not consistent with SG80 for PI 2.5.1, nor is this PI.	The team has indeed considered the currently existing partial strategy.	Not accepted (no change)
2.5.2	Yes	Yes	NA	SI b + c: score agreed		NA (No response needed)
2.5.3	Yes	Yes	NA	Score agreed		NA (No response needed)
2.6.1	NA (PI not scored)					
2.6.2	NA (PI not scored)					
2.6.3	NA (PI not scored)					
3.1.1	Yes	Yes	NA	Scoring agreed		NA (No response needed)
3.1.2	Yes	Yes	NA	Scoring agreed	Additional explanation to the consultation process and entities has been included in the PI.	NA (No response needed)
3.1.3	Yes	Yes	NA	Scoring agreed		NA (No response needed)

3.2.1	Yes	No (material score reduction expected to <80)	NA	To have the word 'sustainable' (which in this context may just mean 'to be able to continue producing') and the words 'avoid deterioration of the environment' in the applicable law/decree is already a very low bar for "long-term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2" (i.e. SG 80) - and certainly nowhere near 'well defined' or demonstrably consistent (SG100). Particularly when the actual decission making based upon these laws/decrees seem to favor stable, economically efficient production, rather than e.g. moving rafts away from maerl beds.	The comment is accepted and the score has been reduced to 80. It is now added to the rational that SG100 is not met since the objectives are not defined in measurable terms and not well defined in the sense that short and long term objectives are clearly distinguished. The rational now also further explains that clear objectives are formulated to establish a responsible, rational and sustainable exploitation. Objectives that guide the decision making process borth in the short and the long term.	Accepted (non-material score reduction)
3.2.2	Yes	Yes	Yes	SI a & e Score agreed		NA (No response needed)
3.2.2	Yes	No (scoring implications unknown)	NA	SI b + c: The fact that there are decision making processes in place that react (with precaution) to changes in fytosanitary quality is hardly relevant evidence of precautionary and responsive decision-making - since this is an issue completely outside the scope of the MSC requirements. The AT itself concluded in scoring 3.1.3 that the Galician legal framework does contain any requirement to use the precautionary approach - nor does the management actions described in the report show any evidence of its use.	Rational has been amended to further support that the precautionary approach is applied and that available information is used in the decision making process.	Accepted (no score change, change to rationale)
3.2.2	Yes	No (score increase expected)	NA	SI d: Not releasing the area specific quantities (which may well be commercially sensitive information?) seems to me to be too small an issue for the fishery to fail SG80. That information might reasonably have been required at SG100 (which explicitly has 'comprehensive' and 'to all stakeholders'.)	The score has been maintained. Some additional rational is added. The information on quantities of spat collection is considered crucial and it is also stated thatSG80 is not met because It is also not clear whether explanations are provided for actions or lack of action concerning the existing controversy and the results of the monitoring of spat collection	Accepted (no score change, additional evidence presented)
3.2.3	Yes	Yes	NA	Scoring agreed		
3.2.4	Yes	Yes	NA	Scoring agreed		

RBF comments

PI	RBF Scoring	RBF Information	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
1.1.1 (RBF)					
2.1.1 (RBF)					
2.2.1 (RBF)	No (change to rationale expected, not to scoring)	Yes	In general, the PSA scores are well explained and sensible. But the justifications given in Table 9.8.2 for the susceptibility scores do not indicate how the given scores relate to the input from the stakeholders at the RBF workshop (as outlined in 9.2.3.1). This makes it difficult a) for the stakeholders to understand how their input was used; b) for the readers to see that the experts and the stakeholders actually disagree over two of the four scores.	We agree with the reviewer and the following text has been added: "During the RBF it was discussed with the stakeholders the Productivity and Susceptibility attributes in order to reach an agreement on the score to assign to each attribute. In the case of Productivity attributes, it was reached a consensus among all stakeholders, whereas in the case of Susceptibility attributes, despite the data presented by the team and the long discussion, no agreement was reached. Therefore it was decided to proceed with the voting in order to understand the position of each stakeholder (only a part of the stakeholders voted). With this purpose, each stakeholder voted in one score and explained the reason underlying his/her decision. It was based both on the explanations given and on the team expertise, that the team decided the final score to be assigned to each Susceptibility attribute. For three out of four Suscepttibility attributes (Encounterability, Selectivity of gear type, and Post capture mortality) the team decided to be precautionary and scored those attributes with 3 (high risk). Regarding the attribute "Areal Overlap", it was clearly a misunderstanding of the definition of this attribute by some stakeholders and therefore, based on the team expertise, the team decided to score this attribute as 2 (medium risk)."	Accepted (no score change, additional evidence presented)
2.3.1 (RBF)					
2.4.1 (RBF)					

2.5.1 (RBF)					

Report from Peer Reviewer B

General comments

Question	Yes/No	Peer Reviewer Justification (as given at initial Peer Review stage). Peer Reviewers should provide brief explanations for their 'Yes' or 'No' answers in this table, summarising the detailed comments made in the PI and RBF tables.	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)
Is the scoring of the fishery consistent with the MSC standard, and clearly based on the evidence presented in the assessment report?	No	My main concern in the fishery is the CAB´s consideration that translocation and negative impact on parent stock are not occurring. **There is a vas amount of literature on oceanography, genetics, biological traits, ecology, biology, ... that clearly supports that both things (translocation and negative impact on parent stock) are actually happening** (see below). Based on FCR SB2.1.3 and SB2.1.4, the decision of scoring P1 or not (based on the involvement of translocation and impact on parent stock), should be taken under a precautionary approach, and even more in this case, taken into account that the mussel aquaculture system in Galicia is considered **the most intensive suspended mussel harvesting in the world** (Alvarez-Salgado et al. 1996). Moreover, M. galloprovincialis in Galicia is as well considered the **most important grazer in the rias**, consuming 12% of the net community production of carbon in this ecosystem (Alvarez-Salgado et al. 1996, Figueiras et al. 2002) and representing **enough biomass to have a clear impact on the whole ecosystem** (Small & Prins 1993). **I do not think the CAB has applied a precautionary approach** in several issues that deserved it. Many evidences of those impacts were not taken into account by the CAB when scoring. Besides this, the fishery needs new conditions on P2 and P3. In resume, I think this **fishery failed in both UoAs (1 & 2) in both P2 and maybe P3 as well.** From my point of view **the fishery has many issues that prevents getting scores ≥80 regarding impacts on all ecosystem elements (excepting Primary and ETP species), and as well regarding the fishery-specific management system.**	It is important to highlight that the MSC does not explicitly define when translocation is actually occurring. Indeed, all parties (MSC, ASI and CABs) agree that a thoughtful review of Annex SB is needed. Nonetheless, according to the MSC Fisheries Standard (version 2.01) and specifically Annex SB, the team should evaluate whether or not the fishery has an impact on the target stock biomass, and whether it includes translocations. If the team concludes that there is no impact on the biomass of the target stock and no translocations, then the team may choose not to score Principle 1. The team did a thorough analysis using extensive information on the fishery, area and other similar fisheries for the preparation of the ACDR. The expert knowledge of both Miguel Gaspar and Bert Keus was conclusive to determine that the fishery did not involve translocation.

Are the condition(s) raised appropriately written to achieve the SG80 outcome within the specified timeframe? [Reference: FCP v2.2, 7.18.1 and sub-clauses]	Yes	Conditions were reasonably well stablished for the <SG80s considered by the CAB. Nevertheless I consider that several new conditions should be placed, or previous ones extended, in P2 and P3. As well, consultation on condition with other stakeholders, mainly the Consellería de Pesca and its several institutions (e.g. INTECMAR, CETMAR, CIMA; ...) should be done in order to assure that milestones can be met.	Nothing to answer at this point.
Enhanced fisheries only: Does the report clearly evaluate any additional impacts that might arise from enhancement activities?	No	Impacts of this fishery is several PIs were not properly set under my opinion. Impacts of the fishery and of seed translocations on the parent stock were not properly established. In general the impacts of the fishery on P2 are way larger than what it was stablished on the CPRDR. Several new conditions were proposed to deal with those impacts. For details see General comments on Translocation and Impact on parent stock and PI comments.	The enhancement in this fishery lies in the ongrowing of mussel spat collected on ropes and in the wild. The impacts of this enhancement activity has been assessed in the appropriate PI's. As a result of the comments of the peer reviewer rational has been amended in quite a number of PI's. Also the scores have been reduced in several oocasions. The comments of the peer reviewer have clearly contributed to the quality of the assessment.

Optional: General Comments_P1 scoring_Translocation_NIWC as a single ecosystem	NA	The CAB has decided not to score P1 claiming that no translocation occurs and that there is no evidence that the fishery negatively impacts the parent stock. But translocation is actually clearly occurring in the fishery, and moreover, there are evidences that this seed translocation is impacting on the parent stock by reducing the genetic heterogeneity of the natural mussel populations in Galicia. The CAB considered that the waters along the North Iberian West Coast (NIWC) form a single ecosystem, when there are vast literature in Galicia on the heterogeneity of habitats, species, and oceanographic conditions between the Galician rias. Moreover, mechanisms of larval retention within rias has also been observed in Galicia in several species, including M. galloprovincialis. **Considering the Galician coastal waters as a single ecosystem, just because there are N-S currents, is a wrongly oversimplification of the reality that goes against the literature published in the region**. Stakeholders have provided a vast amount of references on the heterogeneity along Galician coastal waters (and specifically between rias where mussels rafts are located), on several topics: oceanography, biology, ecology, sedimentology, topography, morphology, parasitology, invasive species, genetics,... Despite all this information, the CAB keeps considering North Iberian West Coast (NIWC) as a single ecosystem. I think this is a mistake. It is known that a marked **environmental heterogeneity** exists between Rías Altas (northern Galician estuaries) and Rías Bajas (southern Galician estuaries) due to various factors such as differential hydrodynamic processes that allow penetration of rich upwelled seawater directly into Rías Bajas (e.g., Prego et al., 1999), topography (Rías Bajas are much larger than Rías Altas) and others (Diz & Presa 2009). Cape Finisterre marks an abrupt change in the coastline orientation of the north-western coast of the Iberian Peninsula (IP) splitting this region in two different domains, the Atlantic coast which lies in the N–S direction and the Cantabrian coast which lies in the W–E direction (Alvarez et al 2011). This change in the orientation creates a well described oceanographic boundary in Galicia due to the Finisterre front, between the northern and southern oceanic and coastal waters (e.g. Fraga et al. 1982. Alvarez-Salgado et al. 2003). This oceanographic front is a permanent subsurface front that is present off Cape Finisterre with convergent fronts close to the coast (Bode	The team believes that the approach followed in the rationale is correct and the literature consulted and cited clearly shows that the North Iberian West Coast can be considered a single ecosystem. Moreover, considering the information described in the rationale on the current system along the North Iberian West Coast (please see works by Haynes & Barton, 1990; Peliz et al., 2005; Mason et al., 2006) and the work by Reis (2015) on the dispersal and larval connectivity along the NW Iberian coast, the team concludes that there is a strong interconnectivity between the rias along this coast. The current system along this part of the coast tends to transport organisms from one Ria to another, hence strong connectivity would be expected between Galicia the Rias as demonstrated by Reis (2015). The major concerns with movements of shellfish are disease and transfer of pest species. However introduction of pest species can be a problem for both shellfish growers and the environment. The intensity of the infestations can vary according to the conditions of the habitat (Buck et al., 2005; Brenner et al., 2009). Some parasite species are extensively found within the distributional range whereas others are restricted to relatively small areas. Thus, a movement of infested mussels amongst different areas and habitats to uninfected areas may support the transfer of parasites and pests between tidal levels or from areas with high parasite diversity to areas showing a limited spectrum of species. The survival of bacteria in seawater and their presence in bivalves varies with exposure to environmental factors such as temperature, salinity, organic loading and is influenced on seasonal and spatial scales (Hernroth, 2003). The bivalves' response towards ingested microbes is to eliminate them. Thus, a movement of infested mussels amongst different areas and habitats to uninfected areas may lead to the transfer of parasites and pests. Since the introduction of mussel raft culture in Galician Rias, in the late 1940s, mortality rates have not been significant, despite the high density of mussels that could facilitate the spread of epizootic diseases (Villalba et al., 1997). Nevertheless, the movement of mussel spat is widespread throughout the Rias of Galicia, and this could influence the distribution of mussel parasites. Villalba et al. (1997) studied the symbionts and diseases of farmed mussels M. galloprovincialis throughout the culture process in the Rias of Galicia. These authors found that average prevalence higher

		et al., 1996). Some recent works carried out around the Galician coast (Torres et al., 2003; Gomez-Gesteira et al., 2006; Alvarez et al., 2008a) have shown that the upwelling frequency and intensity are influenced by the coastal orientation which modulates wind direction and intensity changing the upwelling favourable conditions prevalence at each coastal region. Along the western coast of Galicia these upwelling events are more probable than along the northern one (Gomez-Gesteira et al., 2006; Alvarez et al., 2008a, 2008b). The water exchange between the Rías Baixas and the open waters is drastically affected by the coastal wind pattern as part of the upwelling system of the Canary Current Upwelling System (Wooster et al. 1976, Fraga 1981, Arístegui et al. 2004). This differences in the upwelling has its effect in the primary production between both regions, and therefore, the phytoplankton productive events are less important in North Galicia than those observed south of Cape Finisterre (Varela et al., 2005). Moreover, mechanisms of **larval retention** within rias has also been observed in Galicia in several species, including M. galloprovincialis (e.g. Cáceres-Martínez and Figueras 1998 in Diz & Presa 2009). This mechanism of larval retention of M. galloprovincialis in Galicia has been explained by the upwelling-favourable season and larger residence times of the water mass inside the rias, inducing the larval settlement (Fuentes-Santos & Labarta 2015, Piedracoba et al 2014). The larval retention of mussel larvae within the rias is actually recognized by the Galician Mussel Regulatory Council; "In Galicia, the system of currents ensures that the [mussel] larvae are retained within the rias, and its settlement mainly takes place in the outer part of the rocky coastline" (Consello Regulador Mexillón de Galicia, Boletin 30, June 2020). Residence times within the Galician rias has increased as a consequence of the weakening of the upwelling (Roson et al 2009_CLIGAL), and are also expected to increase more due to the future weakening of the NW Iberian Peninsula coastal upwelling due to ocean warming (Sousa et al 2020). Larval retention is a common phenomenon observed in many estuaries in the world, that actually causes species local adaptations and self-recruitment (e.g. see reviews by Morgan 1995; Sponaugle et al. 2002). Local retention mechanisms are actually far more widespread than it was initially thought, even of species with long-lasting larval stages (Cowen et al. 2000, Warner and Cowen 2002). These mechanisms are behind the spatial structure of metapopulations, well described	than 10 % was recorded at every study site only for macro parasite Mytilicola intestinalis, gill ciliates, and digestive gland ciliates, which could be considered the component species of the symbiont community associated with farmed mussels in Galicia. The role and effects of macro parasites, such as M. intestinalis, on the health status of their hosts can vary enormously, ranging from being a pest causing high mortalities (Odlaug, 1946; Meyer & Mann, 1950; Dethlefsen, 1975), to only being a commensal organism (Calvo Ugarteburu & McQuaid, 1998), as it is the case of Galicia where no mass mortalities has been observed. In contrast to macro parasites, micro parasites species (e.g. Marteilia, Bonamia, Microcytos and Perkinsus) severely affect the health of host shellfish, reason why they are listed under the mandate of the World Organisation Animal Health (OIE 2010) and current shellfish health legislation (EC/2006/88). Of the micro parasites listed only M. refrigerans affects M. galloprovincialis. Villalba et al. (1997) found that the average prevalence of M. refrigerans in mussels was higher than 10%. Nevertheless, these authors also reported that this parasite was only present in some of the Rías. INTECMAR has in place a monitoring programme for this species. Darriba & Villaverde (2017) analysed 15 years of data collected in all Galician Rías and found that M. refringens is endemic in nearly all production areas of Galicia, without causing negative effects (mass mortalities) in the production (Figueras et al., 1991; Robledo et al., 1992). Nevertheless, Ría of Noia can be considered free of the parasite as well as rafts in the Southern coast of Ría of Pontevedra. This situation has been maintained for many years despite regular movements of spat between areas, indicating that spat movements are irrelevant compared to the characteristics of the different areas. Thus, it is likely that oceanographic and environmental conditions in those areas do not favour the presence of a hypothetical intermediate host (Susana Darriba, personal communication). Further, current regulation on animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals (Council Directive 2006/88/EC of 24 October 2006) will be superseded by Regulation (EU) 2016/429 of 9 March 2016 which shall apply as from April 2021. This new regulation has recently been followed by the EU Regulation 2018/1882 of 3 December 2018 on the application of certain disease prevention and control rules to

		in shellfish species and particularly in mussels (Defeo & Cansado 2015). The level of interpopulation differentiation between mussel samples from Galicia compared to Atlantic Iberian samples is expected under a metapopulation scenario for M. galloprovincialis (Diz & presa 2009). In a review of possible mechanisms causing larval retention, Sponaugle et al. (2002) cite, in addition to larval behaviour, the topography and various physical processes (upwelling-downwelling, fronts, convergence zones, internal waves, ocean swirls and counter-currents). On the Galician coast, several works have been carried out on the physical and physic-chemical processes, which have demonstrated the presence of the physical processes mentioned before that are involved in local larval retention (Fraga et al. 1988, Lavin et al. 1992, Figueiras et al. 1994, Fraga 1996, Álvarez-Salgado et al. 1998, 2000, Nogueira et al. 2000, López et al. 2001, Souto et al. 2003, Alvarez et al 2016). It seems that spatial differences in larval supply and settlement magnitude within the rias will be more affected by the local circulation patterns than by the adult population structure (Ladah et al., 2005; Peteiro et al., 2011). Another reason not to consider the Galician coast as a single ecosystem comes from **parasite studies**. The INTECMAR publishes every year an epidemiological report on Galician bivalves (http://www.intecmar.gal/Informacion/Patoloxia/Default.aspx?sm=e), where it can be observed how prevalence of parasites (several protozoans and metazoans are analysed) in M. galloprovincialis consistently varies in a great magnitude between the rias: for example in 2014, mussels of ony three sites presented high prevalence of Marteilia, while it was not found in other 7 sites, and finally 5 sites presenting low prevalence. Another good example in Galicia is the case of the parasite Marteilia cochillia which practically decimated the population of cockles in the Ría de Arousa, but did not affect other Galician rias (Villalba et al 2014, Darriba et al 2020). After the massive mortality of cockles observed in the Ría de Arousa in 2012, Marteilia did the same with the cockle populations of the Rías de Pontevedra and Vigo in the next years, but, it never reached the greatest cockle beds of Galicia in the Ría de Muros-Noia and the Rías Altas. This is a clear example that the Galician rias can not be considered as just one homogenous ecosystem. Based on FCR SB2.1.3 and SB2.1.4, the decision of scoring P1 or	categories of listed diseases, and established a list of species and groups of species posing a considerable risk for the spread of those listed diseases, meaning that disease prevention and control rules for M. refringens shall not apply to M. galloprovincialis or any other species of mussel. Thus, the new European regulation on animal health is not considering anymore that M. refringens constitutes a problem for mussels. Therefore, taking all the above into consideration the team considers that spat movement throughout the Rías of Galicia does not pose any risk to animal health.

		not (based on the involvement of translocation and impact on parent stock), should be taken under a precautionary approach, and even more in this case, taken into account that the mussel aquaculture system in Galicia is considered the most intensive hanging mussel harvesting in the world (Alvarez-Salgado et al. 1996). Based on the above, I think that translocation in clearly happening in this fishery, therefore, following FCR SB3.1.4, when an enhanced CAG bivalve fishery in assessment involves the translocation of seed or adult shellfish, the assessment team shall score the fishery against the Translocation PISGs 2.6.1, 2.6.2, and 2.6.3. Moreover, since translocation and impact on parent stock is occurring in the fishery, following FCR SB2.1.4 and SB2.1.5, P1 should be scored.	

Optional: General Comments_P1 scoring_Translocation_M galloprovincialis populations heterogeneity	NA	The CAB has decided not to score P1 claiming that no translocation occurs. But translocation is actually clearly occurring in the fishery since mussel seeds are being moved in the fishery between areas where mussels populations have shown genetic and biological traits heterogeneity, possible due to adaptation processes to the distinct local environmental conditions. The CAB has not considered this information when assessing translocation. **Mytilus galloprovincialis genetic heterogeneity in Galicia** Sanjuan et al (1990) already found by analysing 5 mussel populations in Galicia (from Rías Baixas, Costa da Morte and Rías Altas) that "a slight but significant genetic differentiation of Galician populations is detected". Authors pointed out two possible explanations for explaining the deficits of heterozygotes at the Odh locus : 1) Existence of a Wahlund effect (reduction of heterozygosity in a population caused by subpopulation structure that can be caused by geographic barriers to gene flow followed by genetic drift in the subpopulations) and 2) Natural selection. Moreover, the most recent and detailed phylogeographic study carried out along the whole Galician coast (27 locations within 6 Galician rias: Vigo, Pontevedra, Arousa, Muros-Noia, Ares-Betanzos and Ribadeo) described a "genetic diversity and structure of Galician mussel populations", and a "Northern–Southern genetic pattern between Rías Altas (Ares-Betanzos & Ribadeo) and Rías Baixas (Vigo, Pontevedra, Arousa and Muros-Noia)" has been found (Diz & Presa 2009). Although these authors found a weak genetic divergence suggesting that no genetic structuring exists among all the rias compared, a local differentiation was observed between the sample pools from Rías Altas versus Rías Bajas. Regarding the intrapopulation diversity, authors found a "shift in size and frequency of modal alleles in four out of six loci between Rías Altas and Rías Bajas, and although this observation could be due to a random fluctuation of allelic distributions, it might indicate some restriction to gene flow between regions". This work refutes the Quesada et al (1995) paper who suggested that no genetic structuring exists between mussel populations from Galicia. Diz & Presa (2009) also highlighted that "despite the narrower geographical range comprised in this study [only samples from Galicia were compared], allelic richness and heterozygosity were 5% and 2.7% larger, respectively, in Galician Rías than in other samples from the Atlantic Iberian coast". Authors indicates that "the	The team performed a bibilographic survey in order to understand whether the population of M. galloprovincialis in Galicia can be considered as a single stock. With this purpose, several studies that involved the use of mussel samples obtained within, and within and outside Galicia (Sanjuan et al., 1990; Ferguson, 1980; Quesada et al., 1995; Diz & Presa, 2009; Smietanka et al., 2014) were taken into consideration. The analyses of these works allowed the team to conclude that no genetic structuring exists between mussel populations from Galicia.

		significantly higher allelic richness (5%) in Galician mussels than in the whole Atlantic Iberian (Diz and Presa, 2008) is probably related with large effective sizes of local populations, and suggests that these populations deserve special attention based on a putative correlation of allelic richness at neutral markers with diversity levels at other adaptive loci (e.g., Schoen and Brown, 1993)". **Mytilus galloprovincialis biological traits heterogeneity in Galicia** Moreover, other studies have reported significant differences in mortality and growth rates between seed stocks from four different M galloprovincialis populations from the Rías Altas to the Rías Bajas (Fuentes et al., 1992). The authors considered that "Differences among stocks could be both environmentally and genetically induced. The different environmental conditions experienced by the mussel populations before the transplantation to growing areas would produce distinct physiological adaptations of different survival value in the new environments. Alternatively, mussel populations coming from different environments could differ genetically for physiological processes controlling mortality. This different genetic constitution of the populations would endow them with different degrees of survival or general vigour. In fact, the existence of genetic differentiation among mussel populations is well documented on macrogeographic and microgeographic scales both in M. edulis and M. galloprovinciali(Koehn and Mitton, 1972; Koehn et al., 1976; Levinton and Stichanek, 1978; Theisen, 1978; Gartner-Kepkay et al., 1980; Skibinski et al., 1983; Koehn et al., 1984; Gosling and McGrath, 1990) and in our case a slight genetic differentiation among mussel populations of the N.W. of the Iberian Peninsula has recently been reported for the Est-D and Odh allozyme loci (Sanjuan et al., 1990)". On a following study, same authors found in a transplantation experiment that "the factors investigated (stock origin, raft site and situation within the raft) present significant effects on the production parameters analysed (growth rate, mortality and final biomass)", and that "stocks coming from the northern coast of Galicia present higher mean values of mortality than stocks coming from the southern coast. These differences in the percentage of mortality between the stocks coming from these two areas could suggest some kind of local adaptation" (Fuentes et al., 1994). These studies confirm different biological traits between the mussels populations in Galicia, possibly due to adaptation processes to the distinct local	

		environmental conditions. In addition, other authors have shown that post-larval dispersion is mainly restricted to within-Rías level (e.g., Cáceres-Martínez and Figueras, 1998a), what could add to the maintenance of limited gene flow among Rías (Diz & Presa 2009). The geographical pattern of genetic variation in Galician mussels might be primarily determined by retention gyres associated with embayment (e.g., Prego et al., 1999; Piedracoba et al., 2005; Varela et al., 2005), and promoting the retention of larvae in the area of major spawning (e.g., Cáceres-Martínez and Figueras,1998a), but also due to the major oceanographic boundary described in Cape Finisterre (e.g., Fraga,1981, López-Jamar et al., 1992) that might act as a barrier to larval flow between Rías Altas and Rías Bajas (Diz & Presa 2009). It is clear to me that it exists both, genetic and biological traits heterogeneity between Mytilus galloprovincialis populations in Galicia. Moving seeds between all this subpopulations should be considered translocation. Based on the above, I think that translocation in clearly happening in this fishery, therefore, following FCR SB3.1.4, when an enhanced CAG bivalve fishery in assessment involves the translocation of seed or adult shellfish, the assessment team shall score the fishery against the Translocation PISGs 2.6.1, 2.6.2, and 2.6.3. Moreover, since translocation and impact on parent stock is occurring in the fishery, following FCR SB2.1.4 and SB2.1.5, P1 should be scored.	

Optional: General Comments_P1 scoring_Impact on parent stock of Translocations	NA	The CAB has decided not to score P1 claiming that there is no evidence that the fishery involve translocation and negatively impacts the parent stock. But the CAB has not shown key information that actually suggest that seed harvesting/transfer for the mussel rafts in Galicia has probably reduced the natural genetic divergence of M. galloprovincialis that naturally exists between the Galician rias (Diz & Presa 2009). Following FCR SB2.1.2 CABs "shall make an initial evaluation of whether there is evidence that an enhanced catch-and-grow (CAG) bivalve fishery negatively impacts the parent stock". FCR GSB 2.1.2 states that "translocations of native species among different geographic areas may also pose risks to the genetic diversity of wild populations". Therefore CABs should check that no evidences of fishery impacts on the genetic diversity is occurring. Diz & Presa (2009) concluded in their work that the "current knowledge on seed management suggests that seed transfer between Rías has probably reduced the natural divergence that naturally exists between pools" in Galicia. Authors also found that "the weakest differentiation observed between the neighbouring Ría de Arosa and Ría de Pontevedra could be either due to natural larval exchange and/or human-mediated seed exchange because the larger seed management has taken place for decades in Ría de Arosa" Finally the authors recommend that "a genetic management plan for this species in Galicia is required to maintain a long-term exploitation dynamics without eroding the genetic diversity". Based on the above, this PR considers that translocations in this mussel fishery are not ensuring that the fishery is maintaining the diversity, structure and function of the ecosystem on which they depend, while minimising any adverse effects that are caused. Inadequately managed translocations of mussels seeds between different areas have had genetic impacts that need to be assessed. This study is a clear evidence that the fishery is negatively impacting the parent stock by reducing the genetic natural diversity by translocating seeds between rias. Based on this and following FCR SB2.1.5, P1 should be scored. Based on FCR SB2.1.3 and SB2.1.4, the decision of scoring P1 or	The team performed a bibilographic survey in order to understand whether the population of M. galloprovincialis in Galicia can be considered as a single stock. With this purpose, several studies that involved the use of mussel samples obtained within, and within and outside Galicia (Sanjuan et al., 1990; Ferguson, 1980; Quesada et al., 1995; Diz & Presa, 2009; Smietanka et al., 2014) were taken into consideration. The analyses of these works allowed the team to conclude that no genetic structuring exists between mussel populations from Galicia.

		not (based on the involvement of translocation and impact on parent stock), should be taken under a precautionary approach, and even more in this case, taken into account that the mussel aquaculture system in Galicia is considered the most intensive hanging mussel harvesting in the world (Alvarez-Salgado et al. 1996). Moreover, M. galloprovincialis in Galicia is as well considered the most important grazer in the rias, consuming 12% of the net community production of carbon in this ecosystem (Alvarez-Salgado et al. 1996, Figueiras et al. 2002) and representing enough biomass to have a clear impact on the whole ecosystem (Smaal & Prins 1993).	
Optional: General Comments_P1 scoring_Impact on parent stock of Spat collection ropes	NA	The CAB has decided not to score P1 claiming that there is no evidence that the fishery negatively impacts the parent stock. But the CAB failed to support this conclusion with scientific information. **- 7.2.1.2.1 Potential impact of planktonic spat collection** The CAB has not shown any information supporting its conclusion that the larvae collected on the spat collection ropes has no impact on the wild parent stock. No information has been shown on, for example, the amount of ropes for spat collection, period of collection, distribution of the collection ropes, spats collected per rope, historic of the spats collected, ... No comparison of this data has been done with the size of the wild population and the amount of larvae and settlers in the rocks. Therefore without doing this assessment, CAB conclusion lacks of any scientific evidence-support. Moreover, the CAB wrongly concluded that "the mussels taken from spat collectors at the mussel rafts would not otherwise settle within the ecosystem". This is completely false. Around the aquaculture rafts there are suitable natural habitats for mussels larvae to settle, so, if the larvae is not collected by the ropes, most probably is that ended up settling on the surrounding rocks. Therefore, ropes collection and diminishing the larval supply to settle on the rocks. In what amount? this is so far unknown until the CAB does an assessment of this. There is literature published on the impact of aquaculture industry in the parent stock due to actually massive collection of larvae, reducing considerably the larvae that can reach its natural habitat for replenishing the parent stock (e.g. Chile: Molinet et al. 2015, 2016, 2017).	We agree with the PR and the rationale was changed. Indeed the sentence as it is written gave a misunderstanding of what the team meant: In Galicia some mussel farmers install spat collectors in the water column within the area of their raft, where mussel larvae will naturally attach themselves. This system increases the settlement area for mussel larvae by providing a substrate for them, contributing to the survival of a higher proportion of larvae. This is ‘additional’ to the target stock. On the other hand, the use of spat collectors in the fishery reduces the fishing effort over the natural mussel beds, since the amount of mussel juveniles needed to be transplanted to mussels on-growing ropes decreases. Therefore, no impact on the parent stock is forseen. The team therefore concluded that spat collection on ropes has no negative impact on the parent stock. In relation to impacts on the target stock therefore, the issue is only around spat collection of wild seed beds on the rocky shores of Galicia. The text has been included in section 7.2.7.1

		Although, to this PR knowledge, it seems that the amount of larvae collected by the collection ropes is not going to be very relevant compared to the size of the natural population, the CAB should do an assessment of this topic before reaching any conclusion.	
Optional: General Comments_P1 scoring_Impact on parent stock of Spat collection on rocks	NA	The CAB has decided not to score P1 claiming that there is no evidence that the fishery negatively impacts the parent stock. But the CAB failed to support this conclusion with data on the status of the parent stock (i.e. wild population abundance, biomass, population size-frequency,...). Therefore, some key CABs statements are flawed and too general. **- 7.2.1.2.2 Potential impact of spat collection from rocks** The CAB claims that "The activity of spat collection and subsequent on growing of this spat increases this reproductive component", nevertheless no information on the abundance or biomass of both components (population size in the aquaculture rafts vs wild population) are compared in order to support this statement. The CAB claim that "the biomass of mussels on the rafts with an annual production of over 200.000 tons of mussels is probably much higher that the biomass of the adult stock in the wild". But this is difficult to know without giving any reference, or at least estimate, on the size of the wild population. The CAB also claims that "the Consellería de Mar (Xunta de Galicia) has carried out an annual monitoring of these natural beds first through CIMA and posteriorly through CETMAR". Nevertheless, none of this information is shown in the report!!! And no other information on the status of the natural mussel beds has been shown. With the partial information given, from my point of view, CAB conclusion of no impact on parent stock is not supported. Based on FCR SB2.1.3 and SB2.1.4, the decision of scoring P1 or not (based on the involvement of translocation and impact on parent stock), should be taken under a precautionary approach, and even more in this case, taken into account that the mussel aquaculture system in Galicia is considered the most intensive hanging mussel harvesting in the world (Alvarez-Salgado et al. 1996). Moreover, M. galloprovincialis in Galicia is as well considered the most important grazer in the rias, consuming 12% of the net community production of carbon in this ecosystem (Alvarez-Salgado et al. 1996, Figueiras et al. 2002) and representing enough	The question that must be answered is the following: Does spat collection have a negative impact on the natural reproductive component of the associated wild mussel stock? The team believes that the rationale provided in page 29 clearly shows that spat collection does not negatively impact the parent stock of M. galloprovinciallis in Galicia. Moreover, it was added the information regarding the amounts harvested along the years. INDICAR LAS PÁGINAS O SECCIONES (RESCATARLO DEL ACDR: Status and management of natural mussel beds

		biomass to have a clear impact on the whole ecosystem (Smaal & Prins 1993).	
Optional: General Comments_Normative-Legislation in Reference list	NA	Following the FCR requirements and the Reporting Template, the fisheries normative-legislative documents (laws, decrees, orders …) should be listed in both, the general reference section (8 References) and in each of the scoring tables: - 7.14.10.1 The CAB shall use the “MSC Full Assessment Reporting Template” to create the report. Reference section "shall include a reference list detailing all information sources used in assessing the fishery and preparing the report." - 7.15.2 Any references used to support statements in the evaluation tables of the reports shall be included in the 'References' section of the table and an in-text reference (e.g. number or author, date) made to the relevant source. The CAB placed a very useful and comprehensive list of legislative documents organized by topics under the section "7.4.1 P3 background", which should probably better go to section "8 References" (first place any reader would go to look for references). At least a note on this section could be placed. Some scoring tables do not have either the normative-legislative documents in the reference section of the table. P3 scoring tables do not have a reference list for the in-text references, only some hyperlinks are give, without linking those hyperlinks to the in-text reference, this way is impossible to track citations of information used for scoring the table. In order to avoid this issues, a technical checking of the reports should be done by the MSC before passing them to the PRs and stakeholders for reviewing.	Thank you for the comment. The references have been amended accordingly.

Optional: General Comments_IPI stocks.	NA	The report lacks of a good IPI assessment following the Requirements for inseparable or practicably inseparable (IPI) stocks (Annex PA). The CAB has not mentioned any confounding species in this section, when the presence of Mytilus edulis in Spain, including Galicia, and hybrids between M. edulis and M. galloprovincialis, are well documented in the literature (e.g. Ferrarello et al 2000, Hilbish etal_2002, Beaumont etal_2004, Kjelland et al 2017, Castro et al 2020). As the CPRDR itself indicates, "this species [M. galloprovincialis] is readily confused with Mytilus edulis" "Delineating the exact range of Mytilus galloprovincialis is complicated by the lack of reliable morphological differences between Mytilus species and by hybridization (Gosling, 1992; Rawson and Hilbish, 1995; Brannock et al., 2009)". I am not aware of how common is M. edulis in Galicia, and it seems to me that it is not going to represent a relevant issue in the fishery, but information on the presence of M. edulis in Galicia and in the fishery is needed in order to do a good assessment on this topic.	According to Mallet (2005), hybridization is a prevalent feature in the organization of biological diversity with as much as 18% of species hybridizing in nature. Despite several million years of divergence, since the genetic similarity among Mytilus species is high (Larraín, et al., 2019), mussels interbreed, and therefore can hybridize, where their populations merge and coexist (Roux et al., 2014). M. edulis and M. galloprovincialis are closely related (Rawson & Hilbish, 1995), hybridize readily and form hybrid swarms in several locations in the northeast Atlantic, despite strong selection acting on these individuals (Brannock et al., 2009). Hybridization zones have been described in the Danish Straits at the entrance to the Baltic Sea (Väinölä & Hvilsom, 1991; Zbawicka et al., 2003, 2014; Wennerström et al., 2013), on the Atlantic coasts of France (Bierne et al., 2013) and Great Britain (Gilg & Hilbish, 2013; Dias et al., 2008) and sympatry results in zones with parental types, F1 hybrids, and multi-generation hybrids and backcrosses present to varying extents (Kenchington et al., 2020). So far no hybrid zones were described for Galicia which is probably related to the geographical distribution of the species, with M. edulis populations being more significant in the North of Europe, whereas M. galloprovinciallis has a large natural distribution, from the Black Sea to the North of the British Isles. Notwithstanding, hybridization may only be an issue in areas where a species is introduced, whether deliberately or accidentally, and becomes invasive. The outcomes of hybridisations could be similarly diverse (see works of Ellstrand & Schierenbeck, 2000; Rhymer & Simberloff, 1996; Suarez & Tsutsui, 2008; Schierenbeck & Ellstrand 2009). In those areas, the evolutionary consequences of hybridisation (i.e., gene flow, local introgression, reinforcement, or rescue) depends on intrinsic and extrinsic factors, such as the accumulation of reproductive incompatibilities or local selection processes (Abbott et al., 2013). From the above, the team concluded that hybridization is not an issue in the fishery under assessment, since M. galloprovincialis is an endemic species in Galicia, hybridisation occurs in the nature where Mytilus species occur and coexist, and that mussel spat is collected from rocky shores of Galicia or using collector ropes and used for ongrowing on the mussel rafts in the rias.

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PI comments

PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
1.1.1	NA (PI not scored)	NA (PI not scored)	NA			
1.1.2	NA (PI not scored)	NA (PI not scored)	NA			
1.2.1	NA (PI not scored)	NA (PI not scored)	NA			
1.2.2	NA (PI not scored)	NA (PI not scored)	NA			
1.2.3	NA (PI not scored)	NA (PI not scored)	NA			
1.2.4	NA (PI not scored)	NA (PI not scored)	NA			
2.1.1	Yes	Yes	NA	I agree with the score given.		
2.1.2	Yes	Yes	NA	I agree with the score given.		
2.1.3	Yes	Yes	NA	I agree with the score given.		

2.2.1	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	**SIa Main secondary species stock status** I agree with the score given, nevertheless, I think the rationale would be improved by clarifying: 1- The methodology and scope of the studies used by the CAB to determine the P2 species. 2- There are other secondary species besides gooseneck barnacles (Pollicipes pollicipes); there are other species coexisting with the mussels seeds with commercial value for the small-scale fisheries sector in Galicia, that should have been classified as secondary species. **1- The methodology and scope of the studies used by the CAB to determine the P2 species.** The CAB considered that "some studies [that]reports on species composition associated to mussels spat collection exist (See Table 7.3.1.2)". In this table, actually there is only one study directly done on the bycatch composition of mussel seed harvesting, and it has been done by the client (Consello Regulador Mejillón de Galicia). The rest of the studies have been done in rocky intertidal where mussels seed occurs (Tato et al 2009, Troncoso JS & Sibaja-Cordero 2011) or after mussel seeds have been collected (Piñeiro - Corbeira et al 2018). Therefore, the only study on the mussel seed harvesting on the rocky intertidal analyzing the bychat of this fishery has been done by the client. I am not aware of any other study done in Galicia on mussel seed bycatch. The CAB should highlight that, as long as they are aware, there is not any independent study on the bycatch composition of the mussel seed harvesting activity. Nevertheless, and despite the coexistence of mussels, gooseneck barnacle (Pollicipes pollicipies), and other invertebrate commercial species, in agreement with the client´s study, I do not think the gooseneck barnacle % (or any other commercial species classified as secondary) would ever be higher than 5%, unless intentional cases of poaching would happen. Therefore, I agree with the CAB´s decision that it is highly unlikely that the contribution of goose barnacles, or other	The rational has been amended in order to make it more clear that limited data on catch composition were available and the client commisioned a study to collect further information. The team acknowledges that there are other species present on the rocks but as peer reviewer states these are minor secondary species.	Accepted (no score change, change to rationale)

				secondary species, to the total volume removed by the mussel collectors would be ≥5%. **2- There are other secondary species besides gooseneck barnacle, not identified by the CAB.** Other commercial species, besides gooseneck barnacles, of interest for the small-scale fisheries sector in Galicia that co-occur with mussel seed in the rocky intertidal are: anemones, limpets, gastropods and seaweeds (based on Table 7.3.1.2 from the CPRDR and www.pescadegalicia.com). Those species are allowed to be harvested under the current fishery management system, and are actually most probably harvested, even without intention, when collecting mussel seeds. Nevertheless, most probably is that those species were ended up being considered Secondary Minor. In accordance to PF 4.1.4 the CAB elected to conduct a PSA on 'main' secondary species and not on 'minor secondary species'. Consequently the score for PI 2.2.1 has been adjusted downward in accordance with clause PF5.3.2.1, meaning that overall score for this PI shall not be greater than 80. Regarding the RBF, I have no comments to make.		

2.2.2	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	**Sla Management strategy in place** I agree with the score given. Nevertheless, I think the rationale would be improved by adding some information: On one hand, the provisional agreement achieved in May 2020 between mussel seed and gooseneck barnacle harvesters mediated by the Consellería do Mar. The Order of October 26, 2000, regulates another key aspect of the fishery, the extraction of mussel seed in natural banks. This regulation has been partially amended after the 2020 conflict between mussel seed and gooseneck barnacle harvesters; after several several meetings between parties mediated by the Consellería do Mar, a provisional agreement, only for the 2020 season, was met and Provincial Resolutions were published on this topics on the 31 May 2020; on one hand, several areas relevant for the gooseneck barnacle harvested were not allowed for mussel seed harvesting, and on the other hand the season for seed harvesting on the rocks was extended one month. This information can be considered as part of the partial strategy. On the other hand, the only two general objectives of the fishery regarding P2 species are: - Decree 406/1996 establishes a general objective for the fishery to **avoid deterioration of the environment**. - Order of 26 October 2000 indicates that "the concurrence of other activities [referring mainly to shellfish harvesting] in the [seed] extraction areas and, fundamentally the need to ensure a regular and stable supply [of seeds] for the mussel raft culture, **without altering the fragile ecological equilibrium of the coastal area**, makes necessary to regulate the conditions for the extraction of seed from coastal rocks". Only those general statement were done, and no development of these objectives to clarify them were done afterwards in the fishery. It would be good to leave clear that there is not any specific objective or	The rational has been amended in order to improve clarity and it is now further elaborated that with the further amendments to the Order of October 26. 2000 in 2020 the measures together form a partial strategy.	Accepted (no score change, change to rationale)

				management measure regarding the amount of bycatch species (in %, abundance or biomass, not even regarding ETP species). So, in theory, bycatch of other commercial species (of interest for the small-scale fisheries sector in Galicia) that co-occur with mussel seed in the rocks as gooseneck barnacles, anemones, limpets, gastropods and seaweeds (based on Table 7.3.1.2 from the CPRDR) are allowed to be harvested under the current fishery management system, since no limits have been set on this regard. Apparently, so far, appears that the only problem regarding this is with the bycatch of gooseneck barnacles that has ended up in an historic conflict between mussel seed and gooseneck barnacle harvesters. It is highly unlikely that the contribution of goose barnacles to the total volume removed by the mussel collectors is ≥5%. Therefore, I agree with the CAB that the current management measures can be considered a partial strategy for the UoA that is expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be above biologically based limits or to ensure that the UoA does not hinder their recovery.		

2.2.2	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	NA	**SIb Management strategy evaluation** I agree with the score given. Nevertheless, I think the rationale should be changed. The CABs says that "Considering the productivity attributes of the main species [gooseneck barnacle] involved it can be concluded that these species have a high productivity with fast growth and high reproductive capacity. This results in fast recovery of areas or spots that have been fished". Nevertheless, there is no information on the recovery capacity of gooseneck barnacle after harvesting mussels seeds. Assuming that it is going to have a fast recovery just based on its high reproductive output is very speculative and probably wrong. Despite the high reproductive output of gooseneck barnacle, it is unknown if a stock-recruitment relationship exist, and moreover, the processes that regulates its recruitment success are as well unknown. Moreover, after mussel seed harvesting, patches are entirely cleared leaving practically just the rock, a surface not attractive for gooseneck barnacles cyprids to settle, which need conspecific adults for doing so (Cruz et al. 2010, Fernandes & Cruz et al. 2019). In the only study made in Galicia on the recovery of sessile intertidal assemblages after mussel seed harvesting (Piñeiro-Corbeira et al 2018), gooseneck barnacles were not studied. Therefore, I do not think that a fast recovery of gooseneck barnacles is supported by data. Moreover, the CAB should actually refer in this SI to the work done by Piñeiro-Corbeira et al (2018). This work found that "harvesting young mussels for aquaculture was detrimental to the abundance and diversity of the associated sessile assemblage not directly targeted by this activity. Coverage and richness were also significantly lowered by the exploitation of mussel seed, and the community structure of protected and exploited sites was significantly different. These differences continued until the next open season, suggesting that the closed season was too short for the recovery of the associated non-target sessile assemblage. Given the	Considering the comments of the peer reviewer the rational has been amended. Although the team believes that recovery will be fast due to the productivity attributes of the species there is insufficient scientific literature to support this conclusion. However what is clear is that area closures and time restrictions are effective measures to reduce impact of spat collection on the goose barnacle stock and this is now underlined in the rational. Together with the high productivity the team believes that there is at least some objective basis for confidence that the partial strategy will work.	Accepted (no score change, additional evidence presented)

				size of the local mussel industry, the incomplete recovery along the closed season implies that mussel aquaculture must be putting a sustained pressure on a sizeable portion of the rocky intertidal of Northwest Spain". Several of the species found in this work, like anemones and some seaweeds (Ceramium, Gelidium, Mastocarpus, ...) should actually be considered as Secondary minor species under this assessment, since they are exploited by the small-scale fisheries sector in Galicia and are by-catch on this fishery (see Table 7.3.1.2 of the CPRDR). Piñeiro-Corbeira et al (2018) also found that "seaweeds systematically had greater mean abundances in protected sites [compared to mussel seed harvested ones]".		
2.2.2	Yes	No (non-material score reduction expected)	NA	**SI c Management strategy implementation** The reasons given by the CAB to support this scoring are all controversial. **1- Is the Xunta de Galicia enforcing the regulations regarding mussel seed harvesting?** As it has been highlighted in PI 3.2.3 the CAB has not presented any data on the number of inspections, infractions and sanctions in this fishery. Moreover, the gooseneck barnacle harvesting sector, has repeatedly claimed in the press that mussel seed harvesters from the mussel raft system, do not comply with the management measures regarding the maximum amount of seeds allowed to be harvested and that gooseneck barnacles are being constantly removed when harvesting for mussel seeds. The open conflict between both sectors is an indication that compliance might not be happening in the fishery. WWF highlighted in this CPRDR that the study carried out by Piñeiro-Corbeira et al. (2018) indicated that most of the landward side of the Illas Atlánticas National Park is persistently disturbed by the exploitation of mussel seed, despite its status of marine protected area, which shows the lack of regular surveillance and monitoring in the area. WWF also added that "Supporting these data, even the associations of fishermen indicate that there is	The rational has been amended. The comment of the peer reviewer mainly concern the compliance and enforcement of existing regulations and this issue is considered under PI 3.2.3 and a Condition is formulated there. This was triggered by the rational referring to monitoring and control. Under this PI however it should we considered whether the partial strategy is implemented succesfully. In the rational it is now further stated that the closed season and areas for spat collection are easily to monitor and tat there is some evidence that these measures are implemented succesfully and thus that SG80 is met.	Accepted (no score change, change to rationale)

				no regular surveillance (personal communication)". **2- Do private coast guards hired by fishers guilds check that mussel producers act according to the regulations?** Several fishers´ guilds, the institution responsible for hiring the private coast guards, stated in section "9.4 Stakeholder input" that there is an absence of effective control in the extraction of seed from natural banks made by the private guards. (To check stakeholders input go to PI 1.2.2 - Harvest control rules and tools). **3- The mussel producers shall report the volumes of mussel spat collected and the areas where they were removed from** The Order of 26 October 2000 regulates the mussels seed harvesting on natural beds, and states that "the mussel rafts licence holder must send a list of the quantities [of mussel seeds] to the local authority which authorised harvest, within two weeks of the end of each extraction period [30 April] indicating in detail the place and date of collection" between other information required. Nevertheless, the CAB has not shown in this CPRDR any data on the amount of seed harvested by the mussel raft system along the years. So, this can not be used as an evidence that the measures/partial strategy is being implemented successfully. And moreover, as the CAB stated, "there is no data on the species composition of the activity". The evidences are very controversial and/or inexistent. Based on the above, from my point of view, **SG80 is not met.**		

2.2.3	Yes	Yes	No	I agree with the score given. But I think the Condition should be improved in order to specify an independent authority in charge of the monitoring to record the interaction with secondary species that coexist with the mussel spat on the rocky strip. The CAB considered that consultation on condition is not required for this condition as no external parties are involved. A monitoring of this relevance should not be done directly by the client in order to have reliable information than could be trusted by other affected stakeholders (i.e. the gooseneck barnacle harvesters). The Consellería do Mar had already done a similar monitoring thought its institutions CETMAR and CIMA, started in 2011. This information should be used to develop a strategy to manage main secondary species, and fishery bycatch in general. For me it is clear that the CAB should consult this condition with the Consellería do Mar.	Since a condition was opened the Client must prepare and propose an action plan that will be analysed by the team. We are pretty sure that the Cliente is aware of the amount and type of work that has to be done, as well as the data analyses that have to be carried out. Therefore the team believes that all of these will be reflected in the Action Plan that the Client is going to propose.	Not accepted (no change)
2.3.1	Yes	Yes	NA	I agree with the score given.		
2.3.2	Yes	Yes	NA	I agree with the score given.		
2.3.3	Yes	Yes	NA	I agree with the score given.		

2.4.1	No (material score reduction expected to <80)	No (material score reduction expected to <80)	NA	**SIa Commonly encountered habitat status UoA1 (Spat collection on the rock with scrapers)** A relevant piece of information has not been used to score this SI. Piñeiro-Corbeira et al (2018) is the ony work done in Galicia on the monitoring recovery of patches harvested for collecting mussel seeds for the aquaculture industry. Authors, by doing a nearly monthly monitoring, compared exploited sites (subject to mussel seeds harvesting) with protected sites (no mussel seeds harvesting). Authors literally found that: - Harvesting young mussels for aquaculture was detrimental to the abundance and diversity of the associated sessile assemblage not directly targeted by this activity. - Coverage and richness were also significantly lowered by the exploitation of mussel seed, and the community structure of protected and exploited sites was significantly different. - These differences continued until the next open season, suggesting that the closed season was too short for the recovery of the associated non-target sessile assemblage. - Mussel seed exploitation was likewise detrimental for the abundance of the associated non-target sessile organisms. Exploited sites had significantly smaller average accumulated covers of associated non-target sessile species than protected ones. - Richness (as number of species per sampling quadrat) and diversity of the associated non-target sessile assemblage were also, on average, significantly larger at protected sites. The lower richness and diversity of exploited sites continued until the end of the closed season. On average, protected sites had 3.51 ± 2.94 species per quadrat more than exploited ones and Shannon diversity was 0.46 ± 0.39 units higher. - All the seaweeds identified by SIMPER were, on average, more abundant in protected than in exploited sites. - Richness and abundance diminish because both mussels (the target species) and non-target species are directly removed by fishermen. Mussel aquaculture can	Although not cited in the report, this study was considered to score this PI (SIa). Nevertheless, the rationale was improved and more information was added including references. We agree with the referee that mussel seed harvesting affects not only the target species but also the acessory species. The main issue is related to the time that is needed for the intertidal communites to recover. According to Piñeiro-Corbeira et al. (2018) and Barrientos et al. (2019), the closed season period allows the recovery of mussel population but is not long enough for the intertidal communities to recover. Nevertheless, in a study conducted on the North Coast of Portugal where Oliveira et al. (2015) compared undisturbed (control) and disturbed sites (impact), it was found that the recovery of intertidal communities is extremelly fast communities. Indeed, these authors found that intertidal assemblages subjected to even extreme combinations of past disturbances can recover in a relatively short time, within 3 to 9 months after the end of the disturbances, depending on the timing of disturbance which is related to the life-history traits of the species, such as peaks in reproduction and recruitment. These authors reported no significant differences between unmanipulated and treated assemblages after 15 months, indicating that intertidal communities recover very fast. The key consideration of the impact is upon the structure and functionality of the habitat in question and whether or not the impact can be described as '**serious or irreversible harm**'. For commonly encountered and minor habitats, **this is defined by the MSC as reductions in habitat structure, biological diversity, abundance and function such that the habitat would be unable to recover to at least 80% of its unimpacted structure, biological diversity and function within 5-20 years, if**	Accepted (no score change, change to rationale)

				lead to poorer and sparser intertidal communities in zones away from the culturing areas when it heavily relies on the exploitation of wild mussel seed banks. - Sessile assemblage is, on average, 60% richer, 50% more diverse, and twice more dense in protected than in exploited sites. - From a management perspective, the length of the closed season seemingly meets the goal of allowing the recovery of the mussel seed bank. Unfortunately, this does not extend to the associated non-target assemblage. Paradoxically, the impact on the by-catch (the associated non-target assemblage) takes longer to recover than the impact on the mussels targeted by the fishery. Closed season just 8 months long may be too short for the recovery of the associated non-target assemblage. - The final conclusion of the work was; Given the size of the local mussel industry, the incomplete recovery along the closed season implies that mussel aquaculture must be putting a sustained pressure on a sizeable portion of the rocky intertidal of Northwest Spain. Unfortunately, no more works have been done on the recovery of mussels seed harvested areas, but, from my point of view, this study clearly shows that the UoA is reducing the structure and function of the commonly encountered habitats, rocky shores, to a point where there would be serious (at least) or even irreversible harm. Even more taking into account, as the CAB calculated, that around 38% of the seed biomass is annually extracted from natural mussel beds, and that 31.9% of the total area where mussel seed occurs is exploited annually in Galicia. Based on the above, from my point of view, **SG80 is not met**, and a condition should be placed.	**fishing were to cease entirely**, which is clearly not the case for the fishery under analysis (UoA1 - catch phase). T**herefore, the team decided not to change the score previously attributed to Sla**	

2.4.1	No (material score reduction expected to <80)	No (material score reduction expected to <80)	NA	**SIb VME habitat status** The CAB is right in saying that best information available shows that it was estimated that 3.58 km2 of the Galician maerl beds (16% of the total Galician maerl) were located near the mussel rafts and, therefore, susceptible to be disturbed, following (Peña & Bárbara, 2009). But the CAB did not look at another study done by same authors. In order to assess the long-term changes in Galician maerl beds and their conservation status, Peña & Bárbara (2008) **resampled 60 maerl beds** which have been previously studied by various different workers, mainly in the 1960s-70s (coinciding with the initial stages of the mussel raft system in Galicia), to compare their current distribution, area and cover with historical data from the literature. Main result found by these authors was that "**A reduction in the study area of maerl beds and their cover was detected. Most of the maerl areas were within or in the vicinity of myticulture areas where burial of maerl by fine sediment has a deleterious effec**t". More detailed results shows that "a reduction in both the maerl cover and the extent of beds is seen. In the Ría de Arousa, six [13%] from a total of 46 maerl beds recorded in the literature are totally degraded and four [8.7%] maerl beds have decreased in extent and maerl cover. In the Ría de Pontevedra, one [16.7%] maerl bed has deteriorated from a total of six and the maerl cover and extent of three [50%] maerl beds has been reduced. In the Ría de Vigo, three [37.5%] of eight maerl beds have disappeared and the maerl cover of two beds [25%] has decreased. In total, ten [16.7%] Galician maerl beds have deteriorated and another nine [15%] beds are decreased in extent and maerl cover. **In total, 19 [31.7%] maerl beds have been partially or totally degraded and 12 [20%] of these are located within or in the vicinity of the myticulture areas**". Therefore, 20% of the maerl beds in Galicia have been partially or totally degraded, but more importantly, **12 [63%] of those 19 maerl beds degraded were located within or in the vicinity of the myticulture**	Peña (2010) (see pages 40-41) underlined that the results obtained, on the number and extension of maerl beds differ from those published in Peña & Bárbara (2006a, 2008a) since only the data obtained up to 2006 was used in those works. As a consequence, some maërl beds were not sufficiently delimited, which has led to misinterpretations, that is, the same maërl bed was interpreted as several smaller ones. On the other hand, the application of more robust geographic information systems to estimate the area occupied by maërl beds has substantially modified some of the results presented in the initial publications. Moreover, as pointed out by Peña (2010), given the extension of the farming areas, the research carried out so far in Galicia about the negative impacts on the maërl beds was focused exclusively on the consequences derived from mussel aquaculture, but other anthropogenic activities may have a similar or higher impact on maerl beds than mussel production, such as sediment dredging to deepen the navigation channels, bivalve dredging, wastewaters and industrial outfalls, among others. The team added information to the background regarding maerl beds, by adding Table 7.3.1.3.10 in which is presented for each ría where maerl beds occur, the overlapping area of the alive/dead maerl ratio classes presented in Galicia, within polygons, mussel raft quadrats and beneath mussel rafts. To score all SI related to VME the team used the most updated information available and was extremely precautionary in the analysis performed. Indeed, the team considered that all maerl beds within and in the vicinity of aquaculture polygons are highly impacted by mussel production in rafts. This is not always true as pointed out by Peña & Bárbara (2008), who reported that the maërl bed of Benencia Island (in Arousa) has been preserved for the last 40 years and its extension	Accepted (no score change, additional evidence presented)

				areas. From my point of view, this constitutes a serious or irreversible harm. **I do not think SG80 is met, and therefore, a condition should be placed**.	and coverage has not been negatively affected by the surrounding rafts. According to SA3.13.4.1, in the case of VMEs, such as is the case of maerl beds, “serious or irreversible harm” should be interpret as reductions in habitat structure and function below 80% of the unimpacted level which is not the case for the UoA under assessment. **Therefore, the team decided not to change the score previously attributed to SIb**	

2.4.2	No (material score reduction expected to <80)	No (material score reduction expected to <80)	No	**SIa Management strategy in place** **UoA 1 (catch phase on the rocks)** From my point of view the measures in place indicated by the CAB do not constitute a partial strategy. The issues highlighted in 2.4.1 Justification based on the work of Piñeiro-Corbeira et al (2018) (e.g. Harvesting young mussels for aquaculture was detrimental to the abundance and diversity of the associated sessile assemblage not directly targeted by this activity) are clear examples that the measures in place are not achieving, and are not expected to achieve, the Habitat Outcome 80 level of performance or above. SG80 is not met and a condition should be placed. Based on the above, from my point of view, **SG80 is not met**, and a **condition** should be opened.	The team has realised that the term "if necessary" used in SIa, exclude the assessment of the UoAs that do not encounters VME habitats (e.g maerl). This is the case for UoA1 (catch phase). Therefore, SG60 and SG80 are not scored for UoA 1 (catch phase). SG100 is not met as a comprehensive strategy is not in place. The rationale of this scoring issue was modified in accordance.	Not accepted (no change)

2.4.2	No (material score reduction expected to <80)	No (material score reduction expected to <80)	No	**SIa Management strategy in place** **UoA 1 and UoA2 (growing phase)** I think that there are three key issues that have not been considered when scoring this SI: **1- The VME maerl beds status and strategy**: since the boom of the Galician mussel raft fishery, the maerl beds has experienced a clear deterioration; 12 [63%] of the 19 maerl beds degraded were located within or in the vicinity of the myticulture areas (Peña & Bárbara, 2009). Despite this, since 2009 it seems that no new assessment has been done and no specific objectives has been set in the fishery management plan for recovering, or at least stop the deterioration of this important VME. **2- The monitoring of the physico-chemical characteristics of the sea bottom beneath and in the vicinity of the rafts polygons**: Large amounts of standing biomass on mussel ropes produces a vast amount of biodeposits (Zúñiga et al., 2014). Despite of that maybe the major problem associated with sediment accumulation in aquaculture systems is the formation of anoxic sediments (due to the fall of mussels clumps and mussel phaeces), as the CAB stated, there is no monitoring regarding the physico-chemical characteristics of the sea bottom beneath and in the vicinity of the rafts polygons, and no management measures to reduce anoxia issues. The accumulation of these deposits has been linked to the modification of the characteristics of the seabed, which increase in thickness and become anoxic, as well as changes in the trophic chain inside the rias and the composition of the benthic communities (GESTINMER LIFE project, 2007). In other mussel suspended fisheries this issue is a priority (e.g. Chile), but in the Galician fishery, no monitoring and/or management measures has been stablished to avoid anoxia issues in the sea bottom, despite of the analysis and recommendations made from GESTINMER LIFE project, developed in Galicia and leaded by the main institution dealing with the Galician mussel raft fishery: Consellería do Mar,	In the context of this performance indicator (Source: MSC FCR v2.0; Table SA8): "**Measures**" are actions or tools in place that either explicitly manage impacts on the component or indirectly contribute to management of the component under assessment having been designed to manage impacts elsewhere. - A "**partial strategy**" represents a cohesive arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome and an awareness of the need to change the measures should they cease to be effective. It may not have been designed to manage the impact on that component specifically. - A "**strategy**" represents a cohesive and strategic arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome, and which should be designed to manage impact on that component specifically. A strategy needs to be appropriate to the scale, intensity and cultural context of the fishery and should contain mechanisms for the modification fishing practices in the light of the identification of unacceptable impacts. The habitat management strategy in operation in this fishery is comprised of 1) the designation of protected areas, and 2) to impose restrictions to the activity. The strategy aims to minimise the impact on bethic habitats (including VME habitats). Although there was not established by Xunta de Galicia a "threshold" against which levels of disturbance can be measured, the team has considered for the main habitats habitats a 15% threshold of overlap between mussel production and a particular habitat (excluding VME), above which mussel production activity is deemed to have a significant impact on a particular habitat habitat.	Not accepted (no change)

				CETMAR, Consello Regulador Mexillón de Galicia, OPMEGA, INTECMAR, IEO, CIMA and the University of Santiago. Outeiro et al. (2018) considers that the consequence of this lack of action is that "after 60 years of dense mussel rafts in the Ria de Arousa, the ecosystem has evolved towards a new state with a dominance of detritus feeding species due to the new food web paradigm created by the enormous biomass of mussels". **3- Marine debris related to aquaculture activity**: Outeiro et al (2020) found in a metier of the small-scale beam trawling fleet of the Ria de Arousa that the largest catch group is marine debris, with **hotspots located within mussel rafts areas**. This **strong influence of aquaculture activities on marine debris** can sometimes, due to rough sea conditions or operational accidents, ends up being part of the seabed (e.g., ropes, plastic and other materials) (Mouat et al., 2010; Veiga et al., 2016 in Outeiro et al 2020). Based on the above, from my point of view **none of the UoAs reach SG80**, and a **condition** should be opened.	Based on this, from Table 7.3.1.3.5 and considering solely the area of each Ría, for each bottom type the maximum proportion (considering the entire area of the polygons) that may be affected is always lower than 14% (this approach was added to the background and to the rationale of this PI). Since, mussel rafts are not allowed to be placed outside the polygons areas, this threshold is never exceeded. Although some maerl beds are affected by the fishery, only a small proportion occur within the polygons and only a small proportion of these are beneath mussel rafts. The measures in place allowed the relocation of mussel rafts within the polygons to areas where maerl is not presented. There is also a plan of action to protect maerl beds, where a set of actions and measures were identified, and that can be put in place to protect them. Therefore, there is a partial strategy in place that is expected to ensure that the UoA is highly unlikely to reduce structure and function of the commonly encountered “main” or VME habitats to a point where there would be serious or irreversible harm; SG60 and SG80 are met, but there is no strategy in place for managing the impact of all MSC UoAs/non-MSC fisheries on habitats; SG100 is not met. **Therefore the score of this SI was not changed.**	
2.4.2	No (material score reduction expected to <80)	No (material score reduction expected to <80)	No	**SIb Management strategy evaluation** **UoA 1 (catch phase on the rocks)** From my point of view the measures in place indicated by the CAB do not constitute a partial strategy. The issues highlighted in 2.4.1 Justification based on the work of Piñeiro-Corbeira et al (2018) (e.g. Harvesting young mussels for aquaculture was detrimental to the abundance and diversity of the associated sessile assemblage not directly targeted by this activity) are clear examples that the measures in place are not achieving, and are not expected to achieve, the Habitat	P1 background section now includes historical information about the management of the natural beds that might facilitate the understanding on how the measures/partial strategy will work based on the information directly about the UoA and or habitats involved. In addition, some more information was added to improve the rationale of this PI. Areas where mussel seed can be obtained are identified, delimited and regulated (Order 26 October 2000), the maximum amount that can be harvested per year and raft is defined,	

				Outcome 80 level of performance or above. There has been no evaluation of the measures regarding the activity of mussel seed harvesting in the rocky intertidal. Results from the CIMA-CETMAR (Connsellería do Mar) monitoring on this has never been published, and it is not even clear today, how much mussel seed are harvested every year from the natural populations and what is the impact of this in different areas/years on the rocky habitat. Based on the above, from my point of view, **SG80 is not met**, and a **condition** should be opened.	harvesting periods are also defined and the fishing gears that can be used are restricted. Harvesters, are obliged to declare the amount of seed harvested per area. It is important to note that the Order mentioned above contains an additional provision in which it is mentioned that whenever the monitoring and evaluation of resources advise it, the Jefatura Territorial, within the scope of its competence, may modify the areas, quantities, and periods of extraction through the publication of a resolution that must be communicated to the interested parties in due time. In the case of the Ons, Sálvora and Cíes National Parks, mussel seed harvesting is only allowed if there is a positive decision from the Consellería de Medio Ambiente (Galician Department of Environment), otherwise harvesting is forbidden. If the decision is positive, a set of conditions, rules, and restrictions are imposed to harvesters. The compliance of these is controlled by the competent authorities, namely the Parque Nacional Marítimo-Terrestre de las Islas Atlánticas de Galicia. All the conditions and rules are included in the permit issued by Junta de Galicia to mussel producers. The team considered that these measures together comprise a 'partial strategy' to minimize habitat impacts, with a reasonable basis for confidence that it would work, given that the habitat itself is not damaged and that intertidal communities recover extremelly fast if the fishery ceases completely. Therefore the score of this SI was not changed.	
2.4.2	No (material score reduction expected to <80)	No (material score reduction expected to <80)	No	**SIb Management strategy evaluation** **UoA 1 and UoA2 (growing phase)** In 2007 GESTINMER project directly commissioned by the Consellería do Mar (with almost all key stakeholders) identified the impact of mussel production in rafts on the habitat and its main issues. Nevertheless, project recommendations, as the CAB acknowledge,	In the context of this performance indicator (Source: MSC FCR v2.0; Table SA8): "**Measures**" are actions or tools in place that either explicitly manage impacts on the component or indirectly contribute to management of the component under assessment having been designed to manage impacts elsewhere.	Not accepted (no change)

				has not been implemented to date, more than 10 years later. No monitoring regarding the physico-chemical characteristics of the sea bottom beneath and in the vicinity of the rafts polygons is in place, and anoxic sediments seem to be still a very relevant issue in the fishery. Current status on the maerl VME habitats is unknown since no new studies has been done since 2009, and no specific objectives has been set in the fishery management plan for recovering, or at least stop the deterioration of this important VME. Based on the above, from my point of view **none of the UoAs reach SG80**, and a **condition** should be opened.	- A "**partial strategy**" represents a cohesive arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome and an awareness of the need to change the measures should they cease to be effective. It may not have been designed to manage the impact on that component specifically. - A "**strategy**" represents a cohesive and strategic arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome, and which should be designed to manage impact on that component specifically. A strategy needs to be appropriate to the scale, intensity and cultural context of the fishery and should contain mechanisms for the modification fishing practices in the light of the identification of unacceptable impacts. Based on the rationale provided the team agreed that there is some objective basis for confidence that the measures/partial strategy will work, based on information directly about the UoA and/or habitats involved. Indeed, there is a good understanding of habitats types in the area as well as their distribution and all the measures described in Si (a) are already implemented and are regularly inspected to ascertain that mussels producers comply with all the rules imposed. Those measures aim to restrict the activity and to minimize the impacts on the habitat and ecosystem.There are also identifies additional measures <u>that can be put in place</u> to minimize the impacts on habitats (GESTIMER and JACUMAR projects, as well as the plan for protecting maerl beds). **Therefore the score of this SI was not changed.**	

2.4.3	Yes	Yes	Yes	I agree with the score given. Although, regarding the condition, I think it is clear that the CAB should consult this condition with the Consellería do Mar, between other key stakeholders, since implementing a monitoring for detecting any increase in risk to the main habitats (including monitoring of the physico-chemical characteristics of the sea bottom beneath the rafts and of the status of the maerl beds that occur in the vicinity of the rafts) it is not a trivial task, and the Consellería do Mar already has the skills and technical staff in its institutions (e.g. INTECMAR, CIMA and CETMAR) for doing so.	Since a condition was opened the Client must prepare and propose an action plan that will be analysed by the team. We are pretty sure that the Cliente is aware of the amount and type of work that has to be done, as well as the data analyses that have to be carried out. Therefore the team believes that all of these will be reflected in the Action Plan that the Client is going to propose.	NA (No response needed)
2.5.1	No (material score reduction expected to <80)	No (material score reduction expected to <80)	NA	**SIa Ecosystem status** **UoA 1 (catch phase on the rocks)** A relevant piece of information has not been used properly to score this SI. Piñeiro-Corbeira et al (2018) is the ony work done in Galicia on the monitoring recovery of patches harvested for collecting mussel seeds for the aquaculture industry. Authors, by doing a nearly monthly monitoring, compared exploited sites (subject to mussel seeds harvesting) with protected sites (no mussel seeds harvesting). Authors found relevant impacts on the ecosystem structure, and biodiversity in the rocky intertidal: - Coverage and richness were significantly lowered by the exploitation of mussel seed, and the community structure of protected and exploited sites was significantly different. - These differences continued until the next open season, suggesting that the closed season was too short for the recovery of the associated non-target sessile assemblage. - Richness (as number of species per sampling quadrat) and diversity of the associated non-target sessile assemblage were also, on average, significantly larger at protected sites. The lower richness and diversity of exploited sites continued until the end of the closed season. On average, protected sites had 3.51 ± 2.94 species per quadrat more than exploited ones and Shannon diversity was 0.46 ± 0.39 units higher.	The comment is correct and a reference to Piñeiro-Corbeira et al (2018) is added. However it is further considered that although full recovery does not always take place within 1 year the impact on th eecosystem should not be considered serious or irreversible.	Not accepted (no change)

				- Richness and abundance diminish because both mussels (the target species) and non-target species are directly removed by fishermen. Mussel aquaculture can lead to poorer and sparser intertidal communities in zones away from the culturing areas when it heavily relies on the exploitation of wild mussel seed banks. - Sessile assemblage is, on average, 60% richer, 50% more diverse, and twice more dense in protected than in exploited sites. - The final conclusion of the work was; Given the size of the local mussel industry, the incomplete recovery along the closed season implies that mussel aquaculture must be putting a sustained pressure on a sizeable portion of the rocky intertidal of Northwest Spain. Based on the above, from my point of view, **SG80 is not met, and a condition should be placed**.		

2.5.1	No (material score reduction expected to <80)	No (material score reduction expected to <80)	NA	**SIa Ecosystem status** **UoA 1 and UoA2 (growing phase)** FCR GSB3.1.3.1 states that for suspended cultures, the scoring of Principle 2 ecosystem PIs should clearly focus on issues relating to carrying capacity and the trophic effects of bivalve filtration/feeding. I do not think that the following key information regarding these topics have been used for scoring this issue. The mussel aquaculture system in Galicia is considered **the most intensive hanging mussel harvesting in the world** (Alvarez-Salgado et al. 1996). Moreover, M. galloprovincialis in Galicia is as well considered the **most important grazer in the rias, consuming 12% of the net community production** of carbon in this ecosystem (Alvarez-Salgado et al. 1996, Figueiras et al. 2002) and representing enough biomass to have a **clear impact on the whole ecosystem** (Smaal & Prins 1993). Using ecological modelling with Ecopath software, Outeiro et al (2018) found that current mussel aquaculture biomass (1718 t km−2) have exceeded ecological carrying capacity (773 t km−2) but it is still below production carrying capacity (2164 t km−2). Contrary to CABs statement when scoring this PI ("the activity is reaching the limits of ecological carrying capacity i"), "the fishery has already surpassed this threshold, and actually to reach back the ecosystem Ecological Carrying Capacity, Cultured Mussel biomass should be at least halved in order to meet its ecological optimum". Authors also consider that "Outcomes from the Ecopath model serve as ecological indicators that Arousa is clearly a **resilient and mature ecosystem**. Also, the Arousa ecosystem presents a **detritus based trophic structure**. The Ecological Carrying Capacity of Cultured Mussels has been exceeded, and the system has been coping with this stress for decades sustaining fishing and aquaculture production, but proportions of production between [small-scale] fishing and aquaculture have been inverted. The extraordinary reduction of biomass of competing species such as sardines, anchovies, oysters and scallops, which it can	In the rational the team has assessed the impacts on productivity and biological diversity. Although it is clear that the fishery has resulted in certain changes in the ecosystem it is concluded that it is higly likely that there is no serious or irreversible harm.	Not accepted (no change)

				not be attributed totally to Cultured Mussels but which have exerted a significant role (Andreu, 1968; Perez-Camacho et al., 1991)". Finally in a comparison of the Galician case across other 16 worldwide estuarine systems, the Ria de Arousa presents the largest Ecological Carrying Capacity, but it is also the one that presents the largest abundance of filter feeders, which can be attributed to intense mussel raft aquaculture. More worrying is that it is the only fishery where the current filter feeder biomass is actually over the level of the Ecological Carrying Capacity (Outeiro et al 2018). Based on the above, from my point of view, **SG80 is not met, and a condition should be placed**.		
2.5.2	No (material score reduction expected to <80)	No (material score reduction expected to <80)	NA	**SI a Management strategy in place** From my point of view I do not think that measures in place could be considered a partial strategy to restrain impacts of the UoA on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance. Mainly the impact highlighted above in the justification for the PI 2.5.1 SIa: **- UoA 1 (catch phase on the rocks):** impact on the structure and biodiversity of the intertidal rocky shores harvested for mussel seeds, by both, the great removal of mussel seeds from the rocks, and also due to slow recovery of mainly seaweeds that causes changes in the ecosystem richness and diversity. Based on the above **I do not think SG80 is achieved**.	Even though the measures that form the partial strategy are not all specifically developed to restrain impacts on the ecosystem they do restrain the size and duration of of spat collection and thus the impact on the ecosystem.	Not accepted (no change)

2.5.2	No (material score reduction expected to <80)	No (material score reduction expected to <80)	NA	**SI a Management strategy in place** From my point of view I do not think that measures in place could be considered a partial strategy to restrain impacts of the UoA on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance. Mainly the impact highlighted above in the justification for the PI 2.5.1 SIa: **- UoA 1 and UoA2 (growing phase):** impact on the ecosystem structure and function of the large biomass of mussels on the ropes mainly focused on the Ecological carrying capacity of the system and on the food web functioning. Based on the above **I do not think SG80 is achieved**.	Even though the measures that form the partial strategy are not all specifically developed to restrain impacts on the ecosystem they do restrain the number of rafts and the number of ropes and thus the impact on the ecosystem.	Not accepted (no change)
2.5.2	No (material score reduction expected to <80)	No (material score reduction expected to <80)	NA	**SI b Management strategy evaluation** As far as I understand, there are no measures implemented in the fishery focused on reducing the impact of the UoA on the issues below: **- UoA 1 (catch phase on the rocks):** impact on the structure and biodiversity of the intertidal rocky shores harvested for mussel seeds, by both, the great removal of mussel seeds from the rocks, and also due to slow recovery of mainly seaweeds that causes changes in the ecosystem richness and diversity. No new measures has been implemented to reduce the amount of mussel seeds harvested in the rocky intertidal and the associated sessile fauna and flora. Order of 26 October 2000, still allows to harvest 3500 kg of mussel seeds per raft per season, and only areas with higher abundance of gooseneck barnacles have been provisionally banned in 2020 for mussel seed harvesting (mainly to clam down the conflict between mussels seed and gooseneck barnacles harvesters). No evaluation of the management strategy has been done regarding these issues. Based on the above **I do not think SG80 is achieved**.	Even though the measures that form the partial strategy are not all specifically developed to restrain impacts on the ecosystem they do restrain the the size and duration of of spat collection and thus the impact on the ecosystem.	Not accepted (no change)

2.5.2	No (material score reduction expected to <80)	No (material score reduction expected to <80)	NA	**SI b Management strategy evaluation** As far as I understand, there are no measures implemented in the fishery focused on reducing the impact of the UoA on the issues below: **- UoA 1 and UoA2 (growing phase):** impact on the ecosystem structure and function of the large biomass of mussels on the ropes mainly focused on the Ecological carrying capacity of the system and on the food web functioning. The Decree 406/1996 is still in place, and no modifications to the amount of rafts, ropes per raft, and length of those ropes have been introduced since 1996. So the biomass of mussels growing in the aquaculture system is not expected to be reduced in the near future. Not even despite all the works published warning of a future decline in mussels growth due to climate change (e.g. Pérez Muñuzuri et al. 2009, Des et al 2019). No evaluation of the management strategy has been done regarding these issues. Based on the above **I do not think SG80 is achieved**.	Even though the measures that form the partial strategy are not all specifically developed to restrain impacts on the ecosystem they do restrain the number of rafts and the number of ropes and thus the impact on the ecosystem.	Not accepted (no change)
2.5.2	No (material score reduction expected to <80)	No (material score reduction expected to <80)	NA	**SI c Management strategy implementation** As far as I understand, there are no measures implemented in the fishery focused on reducing the impact of the UoA on the issues highlighted above in SI a and b. No evaluation of the management strategy has been done regarding these issues. The impact of the fishery on the ecosystem comes in a great extend from 1- the large amount of mussel seeds removed from the rocky intertidal (plus the associated sessile fauna and flora) (UoA1), and from 2- the huge biomass of mussels in the on growing system. Since 2000 and 1996 respectively, no measures have been implemented for reducing the mussel seed removals in the rocky intertidal and for reducing the mussel biomass on the on growing system. Based on the above **I do not think SG80 is achieved**.	Even though the measures that form the partial strategy are not all specifically developed to restrain impacts on the ecosystem they are implemented and do restrain the the size and duration of of spat collection and thus the impact on the ecosystem.	Not accepted (no change)

2.5.3	No (non-material score reduction expected)	No (non-material score reduction expected)	NA	**SIe Monitoring** In the assessment of the ecosystem status and outcome, consideration of the removal of the target stock (mussel seeds and larvae in this fishery) which is not considered elsewhere in P2, should be done. In order to do this, I do not think there are monitoring in place to determine the amount of mussels seed harvested in the rocky intertidal and the amount of mussel larvae collected by the collection ropes in the mussels rafts. Both pieces of information, especially the mussels seeds removed from the rocks (since is the main source of seeds in this fishery) are very relevant to determine if those removals can increase the risk level in the ecosystem. Based on the above **I do not think SG80 is achieved**.	Al spat collected from the rocks has to be reported to the authorities. Concerning the information on spat collection a Condition has been formulated under PI2.2.3.	Not accepted (no change)
3.1.1	Yes	Yes	NA	I agree with the score given.		
3.1.2	Yes	Yes	NA	I agree with the score given.		

3.1.3	No (non-material score reduction expected)	No (non-material score reduction expected)	NA	Competence for mussel rafts aquaculture system in Galician waters lies with the Regional Galician Government (Xunta de Galicia), since Article 148.1.11.a of the Spanish Constitution provides for the exclusive competence of the Autonomous Communities for fisheries in internal waters, shellfish harvesting and, as well, aquaculture. The Statute of Autonomy of Galicia (Organic Law 1/1981) in its Article 27, materialized this faculty the Spanish Constitution provides for exclusive competence over "fishing inside the rias and other inland waters, shellfish and aquaculture". The mussel rafts system in Galicia is considered "aquaculture" under the Galician and Spanish laws, and takes place exclusively inside the rias, therefore, the jurisdiction and competences in this fishery falls exclusively under the Galician Government. Based on the above, and despite PIs 3.1.X component is Governance and Policy, from my point of view the CAB should pay more attention to long term objectives in Galicia, but not at the fishery-specific management system, but at the broader context that represents mainly the Law of Fishing of Galicia 11/2008. The CAB scored 90 this PI based on a partial achievement of SG100 and stating that "SG100 is partly met since the precautionary approach is required by the EU management policy but not explicitly required by the Galician management". The fishery-specific management policy (in this case mainly Decree 406-1996 and Order 26 October 2000) has been developed in the context of the high level, long term objectives, represented by the Law of Fishing of Galicia 11/2008 (Law 6/1993 of Fishing in Galicia was still in place when the main mussel rafts normative was delivered). Taking into account that the jurisdiction fall exclusively in the Galician Government, from my point of view **SG100 is not achieved, even partially**, due to the lack of a precautionary approach, that is explicit within and required by the Galician management policy.	The comment is accepted and the score has been reduced. Since indeed the Galician management system does not specifically requires the precautionary approach SG100 is not met.	Accepted (non-material score reduction)

3.2.1	No (material score reduction expected to <80)	No (material score reduction expected to <80)	NA	**Decree 406/1996** established **the only two objectives** in this fishery, which literally are: a) To ensure a more equitable distribution of natural resources, avoiding as far as possible a situation in which some raft cultures ('viveros') harm others. b) To avoid deterioration of the environment. This general objectives are set in the preamble/introduction of the decree, and are not developed afterwards, in any way, in the articles of the decree. After 1996, two amendments to this decree were done, Decree 338/1999 and Decree 174/2002; none of this decrees declared any other new objective or developed the objectives set in Decree 406/1996. Another relevant legislative document in this fishery is the **Order of 26 October 2000**, that regulates the harvesting of mussel seeds in natural beds (UoA1) for the grow-out phase on the raft system. Despite the great potential impact of harvesting seeds on the parent stock and on other intertidal species co-occurring with mussels (like the commercially exploited gooseneck barnacles), the **only reference to the environment (P2)** is on the preamble-introduction or the order; "the concurrence of other activities [referring mainly to shellfish harvesting] in the [seed] extraction areas and, fundamentally the need to ensure a regular and stable supply [of seeds] for the mussel raft culture, without altering the fragile ecological equilibrium of the coastal area, makes necessary to regulate the conditions for the extraction of seed from coastal rocks". This general aim is afterwards not developed in the articles of the order in any way. Regarding the seed collection ropes (**UoA2**), **there are no specific P1 and P2 objectives** related to this way of harvesting seeds, and the potential impact of these collection ropes on the remaining larval abundance available for being settled in the natural environment. The rest of the normative/legislation related to the fishery-specific management system does not state any	The comment is accepted and the score has been reduced. It is now added to the rational that SG100 is not met since the objectives are not defined in measurable terms and not well defined in the sense that short and long term objectives are clearly distinguished.	Accepted (non-material score reduction)

				other objective related to P1 or P2. So, only general statement are done related the status of the environment (P2), and nothing is said related the status of the wild parent stock of mussels (P1). **No timeframe is specified anywhere** related the achieved of the objectives. Checking the legislation, it is clear that it is mainly focus on the aquaculture activity itself, as it is stated in the preamble of the Decree 406/1996, the main normative document regulating this fishery; "**the high density of suspended raft cultures in Galicia, makes essential to dictate rules to ensure that these cultures do not harm other activities, and especially not themselves**". These general aims related to P2, always in the preamble/introduction of the normative, can, as much, be considered implicit long-term objectives within the fishery-specific management system, but **not short-term, and not explicit**. Moreover, the fishery has **no explicit objectives related to P1** in any way, only one may consider that mussels are implicitly included in the objective "avoid deterioration of the environment". These objectives are just broadly consistent with achieving the outcomes expressed by MSC's Principles 2, and, being generous, as well by Principle 1. Based on the above, from my point of view, **SG80 is not met**. Therefore, a **condition** should be opened on this PI.		

3.2.2	No (material score reduction expected to <80)	No (material score reduction expected to <80)	No	**SIb Responsiveness of decision-making processes** Decision making processes for this fishery is guided by scientific advice by CIMA, CETMAR and INTECMAR, as the CAB said, but also by the research institutions based in Galicia, mainly: the three Galician Universities (A Coruña, Santiago de Compostela and Vigo), with different marine and aquaculture research centres and teams, and also the Spanish Council for Scientific Research (CSIC, Spanish acronym). The decision making process uses the precautionary approach with regards of the excellent control system of of the fytosanitary and bacteriological quality of the mussel production areas made by the INTECMAR, which is readily available on its website (www.intecmar.gal). Publications made by CIMA researchers are also available in scientific journals. But, another key part of this advice is related with the **monitoring of the distribution, abundance, biomass and status of the mussel seeds and adult populations.** As the CAB said in an answer to one stakeholder, "The Consellería de Mar (Xunta de Galicia) carried out an annual monitoring of these natural beds first through CIMA and posteriorly through CETMAR. Notwithstanding, in the last years there wasn't put in place a regular monitoring of the seed beds", although It not stated when this monitoring was ended. In 2011 the CETMAR, commissioned by the Consellería de Mar (Xunta de Galicia), developed the project "Cartography of the mussel seeds and gooseneck barnacles in the stretch of coast between Fisterra and A Guarda" with the intention of generating information for mediating between the historic conflict between the mussel rafts sector and the fishers' guilds granted for harvesting gooseneck barnacles. But this monitoring of the mussel natural beds **has never been published and/or shared with the fishing sector in Galicia**, apparently, not even with the mussel raft sector by its main representative bodies (i.e. the client, Consello Regulador Mejillón de Galicia and OPMEGA: Organización de Productores de Mexillón de Galicia).	The Peer Reviewer assumes that the studies indicated are not used in the decision making process. For explample: The project "Cartography of the mussel seeds and gooseneck barnacles in the stretch of coast between Fisterra and A Guarda" 2011, CETMAR is not publish but it does not mean that has not been used by the corresponding authorities (Xunta de Galicia) for their decision. In addition, we have confirmed that the Decree 153/2019 was available for consultation to all parties in the transparency platform. The Consejo Gallego de Pesca includes representatives of the mussel and goose barnacle sector. The rational has been amended. It is explaind how recently further measures have been taken to ressolve the conflict between the spat collectors and goose barnacle collectors.	Accepted (no score change, change to rationale)

				As the CAB said "unfortunately this piece of work is not available for consultation", despite it has been announced in the press several times from 2011 (Galicia already has cartographic maps with the gooseneck barnacle and mussel seeds population of the coast: https://www.farodevigo.es/economia/2011/10/18/galicia-mapas-cartograficos-poblacion-percebe-17716015.html) to even 2019 (A CETMAR mapping study identifies the main mussel seed and gooseneck barnacle producing areas: https://www.farodevigo.es/arousa/2019/03/27/estudio-cartografico-cetmar-identifica-principales-15734506.html), when the conflict between the mussel rafts sector and gooseneck barnacles harvesters reached great intensity. Another relevant research results, mainly from CSIC and Galician Universities, are related with the **impact of climate change and ocean warming in the fishery**. Plenty of studies have shown the great importance of the upwelling in determining the growth and high yield of mussel cultures in the Galician rias (e.g. Blanton et al. 1987, Figueiras et al. 2002, Alvarez-Salgado et al 2016). It is also clear from the literature that if the upwelling weakens under climate change conditions, mussel production would be reduced (e.g. Pérez Muñuzuri et al. 2009). Des et al (2019) found that due to future climate change impacting Galicia, "The general rise in water temperature will increase the time during which mussels will be subjected to thermal stress conditions. The projected increase in stratification, especially at the outer stations (the most productive ones according to Navarro et al. 1991, Pérez Camacho et al. 1995 and Figueras and Caceres-Martinez 2007) will constitute a clear drawback for mussel exploitation. It will limit the vertical exchange of nutrients and oxygen and will give rise to the probable intensification of harmful algae blooms, increasing the number of days that mussel raft polygons are inactive. Hereby **changes in water temperature and stratification at the end of the century will not be**		

				favourable for mussel growth". A future weakening of the NW Iberian Peninsula coastal upwelling due to ocean warming has been predicted due to the future sea surface warming that will increase the stratification of the upper layers hindering the upward displacement of the underlying water, reducing the surface input of nutrients. (Sousa et al 2020). Changing the location of the mussel rafts polygons to outer areas of the rias may help to mitigate the effect of climate change in mussel productivity (Des et al 2019). Another relevant research developed in Galicia, shows using Ecopath software, that the mussel aquaculture biomass (1718 t km−2) in the **Ría de Arousa have exceeded the ecological carrying capacity** (773 t km−2) of the system, but it is still below production carrying capacity (2164 t km−2), so to reach ecosystem Ecological Carrying Capacity, Cultured Mussel biomass should be at least be halved in order to meet its ecological optimum (Outeiro et al 2018). Same authors considers that outcomes from the Ecopath model serve as ecological indicators that Arousa is clearly a resilient and mature ecosystem, but also that the Arousa ecosystem presents a detritus based trophic structure, and finally that the Ecological Carrying Capacity of Cultured Mussels has been exceeded, and the system has been coping with this stress for decades sustaining fishing and aquaculture production, but proportions of production between fishing and aquaculture have been inverted. As a conclusion, authors highlight that after sixty years of dense mussel rafts in the Ria de Arousa, the **ecosystem has evolved towards a new state with a dominance of detritus feeding species due to the new food web paradigm created by the enormous biomass of mussels** (Outeiro et al., 2018). Finally, as the CAB highlighted, the decision-making process has not responded either to the **historic and well known conflict** between **mussel spat collectors and the goose barnacle harvesters,** which resulted in one of its worst last episodes in 2019 and 2020. For instance, the Decree 153/2019 (In its Article 13 is said		

				that management plans of goose barnacle can reserve areas for the seed mussel harvesting and for this reason) is under examination in the High Court of Justice of Galicia, due to a contentious appeal done by different groups like mussel and goose barnacle producers. The CAB has not shown how the decision-making processes has responded to this four examples of key issues around this fishery (1-seeds and adults mussels monitoring on natural beds, 2-Climate change impact on mussel culture and 3-Mussel industry impact on the ecosystem, 4-mussel seed vs gooseneck barnacle collectors). Therefore, from my point of view **SG80 is not met**. Condition should be therefore amended accordingly.		

3.2.2	No (material score reduction expected to <80)	No (material score reduction expected to <80)	No	**SIc Use of precautionary approach** The decision making process uses the precautionary approach with regards of the excellent control system of of the fytosanitary and bacteriological quality of the mussel production areas made by the INTECMAR, which is readily available on its website (www.intecmar.gal). Nevertheless, from my opinion, the decision-making process is **not using the best information available under a precautionary approach**, in at least, the four examples of key issues around this fishery stated above (1-seeds and adults mussels monitoring on natural beds, 2-Climate change impact on mussel culture and 3-Mussel industry impact on the ecosystem, 4-mussel seed vs gooseneck barnacle collectors) (see SIb justification). The best example is probably the **non public and unused information from the annual monitoring of the mussel natural beds** initiated by the CIMA and posteriorly through CETMAR (both institutions from the Galician fisheries administration of the Consellería de Pesca, Xunta de Galicia). Therefore, from my point of view **SG80 is not met**. Condition should be therefore amended accordingly.	The comment is accepted and the rational has been amended to further support that the precautionary approach is applied and that available information is used in the decision making process.	Accepted (no score change, change to rationale)

3.2.2	No (change to rationale expected, not to scoring)	No (change to rationale expected, not to scoring)	No	**SId Accountability and transparency of management system and decision-making process** I agree with the score given. But i think that the transparency and accountability of the decision making process should not only be restricted to the amount and spatio-temporal distribution of the seed harvesting in the natural beds. **The decision-making process is, in general, not transparent**, and is apparently only based in meeting between the administration (Consellería do Mar) and the mussel sector (Consello Regulador Mexillón Galicia, OPMEGA, and other producers associations) withough producing and reporting the meeting notes or the main issues-decisions taken in those meeting. The only chance for stakeholders (e.g. the small scale fishing sector, NGOs, ...) to be informed of decisions is when new normative is published in the DOG, the Official Gazette of the Xunta de Galicia. After this, the only option for stakeholders is to open a tedious and long administrative and/or judicial appeal. On the other side, the mussel raft sector is not consulted either when Management Plans for the gooseneck barnacle fisheries are developed. The consequence is for example, that the the Decree 153/2019 (In its Article 13 is said that management plans of goose barnacle can reserve areas for the seed mussel harvesting and for this reason) is still in a contentious appeal done by different groups like mussel and goose barnacle producers. I would recommend the CAB to include this issue in the Condition opened in this PI.	Taking into account that the PR has emphasized on numerous occasions the lack of transparency of the decision-making process, BV has reviewed in detailed Law 1/2016 confirming the following: both the aforementioned law and the system of petitioning through the transparency portal do provide the possibility of requesting non-public documents such as the reference cited numerous times by the reviewer (i.e., CETMAR, 2001) and the minutes of the meetings of the collegiate bodies (Consejo de Pesca and Consello del Mejillón Firstly, regarding the minutes of both Commissions the framework of this transparency law are included, being a collegiate body of participation and advice to the Consellería regulated by the autonomous law 16/2010. Therefore, it is important to clarify that the fact that there is no obligation to publish their minutes does not imply that they are not of public access on request. On the other hand, the client decided to make a request for the document "Cartografiado del recubrimiento de semilla y percebe en el tramo entre Finisterra y A Garda, CETMAR 2001" to the Technical General Secretariat of the Conselleria do Mar through the transparency portal; in 2 days the Conselleria notified the client that their request had been deemed inadmissible. In response, and under Article 28 of Law 1/2016, the client filed a complaint with the Valedor do Pobo as Commissioner of Transparency. Finally, on November 26, 2020, the Valedora do Pobo resolved in favor of the Consello Regulador and urged the Consellería do Mar to respond to the information petition requested by the Consello, giving them 10 working days to do so. Regarding the reference made by the reviewer on Decree 153/2019, we have been able to confirm that this Decree went through the 3	Not accepted (no change)

					phases established in Law 16/2010 before its approval. In fact, a report from the General Technical Secretariat on the draft Decree signed and dated October 4, 2019 can be downloaded. This report (pages 8 to 10) develops in detail the procedures carried out and their dates and consultations made, as well as its publication for one month on the website of the transparency portal. It even indicates the organizations that presented pleas and suggestions. In conclusion, the team has decided to improve and detail the information on the consultation process in both the Principle 3 background and PIs 3.1.2 and PIs 3.2.2, and has clarified the conclusions as to why PI3.2.2(d) does not meet SG80, but we do not consider the other evidences referred to by the reviewer to be accurate, as explained above. In view of the results of the request made by the client, we also do not consider the process to be tedious and a long administrative and/or judicial appeal.	

3.2.3	No (material score reduction expected to <80)	No (material score reduction expected to <80)	NA	**SIa MCS implementation** The CAB considered that "SG100 is not met since although a system of monitoring, control and enforcement is in place it cannot be considered comprehensive and have a consistent ability to enforce all relevant management measures. This because inspections on the number and lengths of ropes or the amount of mussel spat that is collected are not carried out with such a frequency that it can be concluded that non compliance is prevented". The fishing effort in this fishery is mainly determined by the amount of seeds harvested from the rocks (UoA1) and the amount of collection ropes (and the subsequent spats collected) (UoA2). The impact on the ecosystem (species, habitats and the ecosystem as a whole) of the mussels raft fishery during the grow-out phase, is mainly determined by the amount and length of the growing ropes. As the CAB says, none of these seems to be properly enforced, so from my point of view, the MCS system implemented in the fishery has not demonstrated the ability to enforce the most relevant management measures, strategies and/or rules. At least the CAB has not shown any information on the amount of seed harvested on the rocks and/or collected on the collection ropes, despite the monitoring that the fisheries administration seems to have. The CAB has shown the legislation regarding the MCS system, but it has **not shown any information that demonstrates the ability of this system to actually enforce the management measures**, for example: records of infringements and sanctions, court cases, contentious-administrative appeals regarding enforcement-compliance, the MCS plans and strategy, MCS reports (including reviews/evaluations of MCS efficacy), and any agency reports, such as fishery meetings, annual reports and stakeholder committee minutes which may detail compliance information and details of fishery offences and prosecutions. The "Working towards MSC Certification: a practical	We agree with the concern of the reviewer. The team has done a deep analysis on the comments raised on PI 3.2.3 and went again through the notes of the team leader/P3 expert during the interviews carried out with the Consellería do Mar during the site visit. Due to the change of the team leader after the visit the information about inspections, sanctions and other details highligthed by the reviewer, was not included in the CPRDR. The rationale of each SI was redrafted and relevant information on compliance, including number of inspections and sanctions, was added. Furthermore, the background section was extended by adding the Guardapescas Maritimos figure and roles not referred previously and with and important role for this fishery. We would like to apologize for not having considered this information which has resulted in this confusion. With the new additions the team believes that there is no need to open a condition.	Accepted (no score change, change to rationale)

				guide for fisheries improving towards sustainability", although it is a guiding supporting document and not a requirement, on PI 3.2.3 SIa says that "the performance level described in SG80 requires a ‘demonstrated’ efficacy, rather than simply an expectation of efficacy". From my point of view the expectation of efficacy can come from the legislation and the description of the MCS system, but to demonstrate its ability to enforce the management measures and rules, information on the efficacy of the system should be presented. Finally, FCR SA4.9.2 states that "The team’s judgement on this PI shall be informed, to the extent possible, by independent and credible information from relevant compliance and enforcement agencies or individuals and/or stakeholders". Based on the above, from my point of view, **SG80 is not met** and a condition should be opened.		

3.2.3	No (material score reduction expected to <80)	No (material score reduction expected to <80)	NA	**SIb Sanctions** The CAB considered that in case of infringements observed by inspection agencies, sanctions are consistently applied and it is thought that these sanctions provide effective deterrence. Nevertheless, as in the SIa, this is in theory and based on the law, but **no information has been shown on number of the infractions and subsequent sanction** in this fishery. **Not even on the number of inspection** done under the MCS system every year. FCR GSA4.9 states that "At SG80 and SG100 for scoring issue (b), in some fisheries management systems, or for particular types of fisheries, it may be difficult to demonstrate an ability to enforce relevant management measures, strategies and/or rules if violations are rare. However, an absence of violations (or absence of a record of sanctions and penalties for violations) does not necessarily indicate that compliance and enforcement are effective; **it could mean that MCS is in fact ineffective and what is happening is an absence of detection**" Moreover, the CAB says in SIc that "It has however also been reported to the team during the site visit that breaches in relation of the number of lines per raft (maximum of 500 growing lines) exist", although no sanctions have been presented. Information on the **number of infringements observed by inspection agencies and sanctions applied should be presented** in order to support that sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence. Finally, FCR SA4.9.2 states that "The team's judgement on this PI shall be informed, to the extent possible, by independent and credible information from relevant compliance and enforcement agencies or individuals and/or stakeholders". Based on the above, from my point of view, **SG80 is not met and a condition should be opened**.	We agree with the concern of the reviewer. The team has done a deep analysis on the comments raised on PI 3.2.3 and went again through the notes of the team leader/P3 expert during the interviews carried out with the Consellería do Mar during the site visit. Due to the change of the team leader after the visit the information about inspections, sanctions and other details highligthed by the reviewer, was not included in the CPRDR. The rationale of each SI was redrafted and relevant information on compliance, including number of inspections and sanctions, was added. Furthermore, the background section was extended by adding the Guardapescas Maritimos figure and roles not referred previously and with and important role for this fishery. We would like to apologize for not having considered this information which has resulted in this confusion. With the new additions the team believes that there is no need to open a condition.	Accepted (no score change, change to rationale)

3.2.3	No (material score reduction expected to <80)	No (material score reduction expected to <80)	NA	**SIc Compliance** The CAB says that "stakeholders and inspection services have stated that the inspection system have a demonstrated ability to enforce relevant management measures". Based on this the team concluded that "some evidence exists to demonstrate fishers generally comply with the management system under assessment", despite not showing any data supporting this. On the other hand, the gooseneck barnacle harvesting sector, has repeatedly claimed in the press that mussel seed harvesters from the mussel raft system, do not comply with the management measures regarding this, mainly with the **maximum amount of seeds allowed to be harvested,** and the open conflict between both sectors is an indication that compliance might not be happening in the fishery. WWF highlighted in this CPRDR that the study carried out by Piñeiro-Corbeira et al. (2018) indicated that most of the landward side of the Illas Atlánticas National Park is persistently disturbed by the exploitation of mussel seed, despite its status of marine protected area, which shows the lack of regular surveillance and monitoring in the area. WWF also added that "Supporting these data, even the associations of fishermen indicate that there is no regular surveillance (personal communication)". Taken into account the conflict highlighted by stakeholders that it has been on the press repeatedly along the last years, and without any information on the number of inspections, infractions and sanctions, is it very difficult for this PR to consider that the fishers comply with the management system has been demonstrated in this fishery. Based on the above, from my point of view, **SG80 is not met** and a condition should be opened.	We agree with the concern of the reviewer. The team has done a deep analysis on the comments raised on PI 3.2.3 and went again through the notes of the team leader/P3 expert during the interviews carried out with the Consellería do Mar during the site visit. Due to the change of the team leader after the visit the information about inspections, sanctions and other details highligthed by the reviewer, was not included in the CPRDR. The rationale of each SI was redrafted and relevant information on compliance and enforcement was added. Furthermore, the background section was extended by adding the Guardapescas Maritimos figure and roles not referred previously and with and important role for this fishery. We would like to apologize for not having considered this information which has resulted in this confusion. With the new additions the team believes that there is no need to open a condition.	Accepted (no score change, change to rationale)

3.2.4	No (material score reduction expected to <80)	No (material score reduction expected to <80)	NA	**SIa Evaluation coverage** This PI intends to evaluate if the management system itself is reviewed (FCR GSA4.10), by doing a Monitoring and management performance evaluation by mainly checking if: - There is a system for monitoring and evaluating the performance of the fishery-specific management system against its objectives, and - There is effective and timely review of the fishery-specific management system The CAB considers that the fishery management system and measures are regularly reviewed and amended. Nevertheless, from my point of view, the main fishery-specific management fishery **regulations are all quite old and has not been reviewed in the last years**: - **Decree 406/1996** sets the general regulations of this fishery (dimensions and spatial distribution of the mussel rafts, characteristics of the facilities, origin and quantity of the seeds, seed collection ropes,...) and most importantly, established the only two general objectives in this fishery (1-to ensure a more equitable distribution of natural resources, avoiding as far as possible a situation in which some raft cultures ('viveros') harm others, and 2- to avoid deterioration of the environment), which has not been changed since that. After 1996, two amendments to this decree were done, Decree 338/1999 and **Decree 174/2002**; **none of this decrees declared any other new objective or developed the objectives** set in Decree 406/1996. - But the **Decree 174/2002** does allow some **increment in the number of on growing and collection ropes** due to exceptional environmental and weather conditions (storms, harmful algal blooms, and changes in the mussel settlement season). Under the circumstance of changes in the mussel settlement season, more spat collection ropes could be allowed (from 50, up to 100 per raft) and a longer collection period could be approved by the Consellería do Mar. As well under persistent storms and harmful algal blooms	The fishery has mechanisms in place to evaluate key parts of the fishery-specific management system through the *Comisión del Mejillón* and *Consejo Gallego de Pesca*. The team recognised that the justification included in Sia was not enough to understand the mechanisms and key part that are evaluated. Sections 7.4.1.5 and 7.4.1.6 have been improved and related PIs (3.1.2; 3.2.2) gives now more details on the key information. In addition, we have included a disposition within the Order 26.10.2000 where it is set out that areas, quantities and extraction periods can be modified if needed (new text added) .	Accepted (no score change, change to rationale)

				episodes, the number of on growing ropes could be incremented. - The **Order of October 26, 2000**, regulates another key aspect of the fishery, the extraction of mussel seed in natural banks. This regulation has only been partially amended after the 2020 conflict between mussel seed and gooseneck barnacle harvesters; after several several meetings between parties mediated by the Consellería do Mar, a **provisional agreement**, only for the 2020 season, was met and Provincial Resolutions were published on this topics on the 31 May 2020; on one hand, several areas relevant for the gooseneck barnacle harvested were not allowed for mussel seed harvesting, and on the other hand the season for seed harvesting on the rocks was extended one month. The **level of effort allowed (maximum biomass of seeds harvestable from rocks per mussel raft) was maintained**. My concern on this SI regarding the review of the management system, is that all regulations are quite old, and when amended, it is usually done for allowing more opportunities for the mussel raft system either to facilitate seed harvesting on the rocks or to increase the number of on growing ropes. Besides the exception of the 2020 agreement between mussel seed and gooseneck barnacle harvesters. Nevertheless, key issues around the fishery like the ones I have explained in my 3.2.2 SI b & c justification (1- seeds and adults mussels monitoring on natural beds, 2-Climate change impact on mussel culture and 3-Mussel industry impact on the ecosystem), has not been assessed within the management system, and no new regulations/measures have come up. Another key information as it is the **amount of seed harvested** per year **has never been assessed**, or at least, this data has never been published. Based on the above, I do not think the fishery has mechanisms in place to evaluate key parts of the		

				fishery-specific management system, and the main management measures has not changed since Decree 406/1996, Order of October 26, 2000 and Decree 174/2002. Therefore, from my point of view, **SG80 is not met,** and a condition should be set.		

RBF comments

PI	RBF Scoring	RBF Information	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
1.1.1 (RBF)	NA (PI not scored using the RBF)	NA (PI not scored using the RBF)			
2.1.1 (RBF)	NA (PI not scored using the RBF)	NA (PI not scored using the RBF)			
2.2.1 (RBF)	Yes	Yes	I agree with the scores given.		NA (No response needed)
2.3.1 (RBF)	NA (PI not scored using the RBF)	NA (PI not scored using the RBF)			
2.4.1 (RBF)	NA (PI not scored using the RBF)	NA (PI not scored using the RBF)			
2.5.1 (RBF)	NA (PI not scored using the RBF)	NA (PI not scored using the RBF)			

9.4 Stakeholder input

To be drafted at Client and Peer Review Draft Report

To be completed at Public Certification Report

The following stakeholder inputs were received after the site visit, thus, after the 60-day period allowed by the MSC FCP v2.1 requirement # 7.15.1.1 for stakeholder input to the ACDR. However, and even though the inputs were received late, the team decided to answer the written inputs received on the Announcement Comment Draft Report (ACDR). It is important to highlight that the column "CAB response Code" was answered based on the draft scoring ranges (<60, 60-79, ≥80) published in the ACDR.

WWF Spain

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Fishery name*	MUSSEL RAFT CULTURE IN GALICIA (MEXILLÓN DE GALICIA DOP)
Certification body (CAB)*	Bureau Veritas (BV)
Assessment Stage*	Stakeholder input on the Public Comment Draft Report
Register*	I wish to register as a stakeholder - please keep me informed about each stage of the assessment process

General comments

General comments	Evidence or references	CAB response to stakeholder input	CAB Response Code
The mussel culture *Mytilus galloprovincialis* is the one with the highest production in the Aquaculture of Spain and the most important in Europe, reaching 250,000 tons annually. Such a volume of production at the expense of the Galician rias environment causes WWF to have concerns about the pressure exerted on the ecosystems that sustain this activity. The characteristics of the culture make its effects on the Galician rias double. On the one hand, the contribution of juveniles to the culture, which depends on almost 70% of the extraction of seed from the rocky intertidal, and on the other, the effects caused by more than 3000 rafts located in the Galician rias. Numerous negative impacts on the ecosystem have been described and confirmed by several authors, which, coupled with an outdated resource management, leads us thinking that much of the available information (or lack thereof) has not been considered when drafting the ACDR	References on the PI comments tab.	On the basis of comments of stakeholders and additional information provided by stakeholders large parts of the report have been rewritten. Concerning ecosystem and habitat impacts the complete rationals for PI 2.4.1 and PI 2.5.1 have been replaced by new texts also based on the input of stakeholders. In addtion major parts of the rational for 2.2.2 and all rationals for PIs under Principle 3 have been rewritten and extended.	Accepted (no score change)

The mussel culture in Galicia is based exclusively on the seed collected from the natural environment, both in rocks (more than 70%) and in ropes placed in the rafts for the capture of post larvae. Although there is only a single scientific study on the state of the natural seed, so far it has been assumed that the seed biomass in the intertidal is sufficient to meet the demands of mussel culture but there are indications to think that the situation is changing, and that there is a downward trend in seed production and recovery, therefore, we strongly disagree with the CAB's decision to not evaluate P1. There are risks associated with such assumption, and an example of this is the uncertainty about the effects that climate change will have on this fishing activity. Predictions carried out for Galicia about the impact that climate change may have on mussels' production in the Rías Baixas, stated that mussel culture in certain areas of the Ría de Vigo (with 14% of rafts) and Ría de Arousa (with ~70% of rafts) might be threatened by rising temperatures and decrease of salinity, suggesting that some areas should be considered very sensible for future mussel culture. Even more, early life stages are more vulnerable to warming, therefore it is likely that recruitment and seed production represent bottlenecks for mussel culture under the current warming scenario, given the high dependence on seed supply from the intertidal. Nonetheless, this dependece on intertidal seed exerts a continuous pressure on rocky shore communities, whose recovery rates are below the disturbance periodicity, including species that conflict with the fishery over the use of space, as the goose barnacle. In addition, there is evidence that contradicts the CAB's statements regarding the safety of translocations on the introduction of diseases or pest species, since such translocations in Galician rias have been associated with the dissemination of aloctone species in the past. MSC standard generally recognizes that management should be consistent with the "scale and intensity" of the fishery, but also requires that, when "limited data" approaches are used, higher levels of precaution are applied to compensate for the lower availability of information. The decision not to evaluate P1, assuming that natural seed stock is sufficient to meet the needs of the activity, without resource monitoring, does not conform to the MSC standard. On the other hand, there are scientific evidences pointing out that raft culture has numerous impacts on the habitat and ecosystems of the Galician rias. Mussel raft culture has detrimental effects on the benthic habitat due to the large amount of biodeposits, in the form of feces and pseudofeces, which can be translated into eutrophication of the bottoms that negatively impacts composition and abundance of species. Biodeposits alter granulometry and biogeochemical cycles of the bottoms, which become rich in mud content. These changes are reflected in diversity and community structure, which shifts from sandy species composition to small opportunistic species, tipically present in eutrophied sediments. Some studies have shown that mussel biodeposition under rafts is 6–7 fold the rates at reference sites with no raft effect. Even more, the mobilization of these sediments due to waves and currents has been observed, which contradicts the idea of localized sediments only under raft structures. Besides of biodeposits effects, there is a continuous contribution of by-products and culture waste, contributing to changes of bottom dynamics. In the same way, reduction in extension and complete degradation of the vulnerable meärl beds has been linked to biodepositions from raft culture. Suspended mussel culture infrastructures may also alter hydrodynamics and reduce flow rates, creating areas that are much better flushed than others.		Most of the comments presented here are also provided concerning the different performance indicators and the team has responded to them there and the team has rewritten large parts of the scoring rationals. Concerning climate change it is important that new information concerning this issue will be taken into account during future surveillance audits. If changes occur that affect the current scoring they will be taken into account and a rescoring on relevant performance issues will take place. At this moment the team has based its scores on the currently available information.	Accepted (no score change)

Mussel raft culture takes advantage of the high productivity in the Galician rias, however, this fishing activity is carried out without considering the carrying capacity of the ecosystem. The ACDR states that depletion of primary production is around 10%. Nonetheless, it has been estimated that mussel culture extracts up to 60% of the available primary production, and some authors point out that the extremely high consumption of total primary production by mussel culture is notably contributing to reaching the carrying capacity of the area. Even more, this depletion of primary production may also change phytoplankton structure, with certain fractions of plankton being less available for the rest of the species. Raft mussels depletion on food can also reduce the number of individuals able to recruit into the natural environment, influencing benthic communities by reduced recruitment. Therefore, the scientific evidences suggest that minimising environmental impacts is an unsolved task for this fishery. Regarding management of the Galician mussel culture, there are major structural flaws that significantly affect decision-making, management strategy and articulation of mechanisms facing the future challenges of the sector. Moreover, the obsolete legislation regulating the fishing activity has a clear sectoral character, and the regulations established therein are intended for the protection of the sector itself. An example of these aspects is the scarce rules of management and control around the extraction of seed, which has not only caused a possible overexploitation of the resource, but has also resulted in numerous and continuous conflicts between the mussel sector and goose barnacle collectors. Therefore, it seems clear that intervention by the administration is necessary to make decisions and regulate the fishing activities based on scientific knowledge in order to provide definitive solutions to the conflicts and guarantee, in practice, the sustainability of the exploited resources involved. The current obsolete legislation and the lack of a strategic plan is reflected in legal insecurity, predominantly sectoral planning without coordination according to the fishery dimensions, and atomization of the sector and its organizational structures. There is also a poor coordination of policies and lines of work in specific R & D, which translates into a poor transfer of research results to the productive sector. In spite of the existence of numerous studies of natural populations as well as of their ecological physiology, and even having been used to know the explicit mechanisms of their growth in cultivation conditions, these studies have not been used to operate and plan on the places and cultivation methods. Based on these ideas and the presented information on PI comments, WWF considers that a more critical and exhaustive review on the effects of the fishing activity and its management should be carried out in order to really assess the adequacy to the MSC standards of good practices.			

Performance Indicator (PI)	Input summary	Input detail	Evidence or references	Suggested score change	CAB response to stakeholder input	CAB response code
Principle 1 - Sustainable fish stocks	There is evidence to consider that P1 should be evaluated.	The assumptions made to not score Principle 1 on the natural seed beds were based on non-updated information and even more, the precautionary approach does not seem to be fulfilled. Based on the information presented in the ACDR the team concluded that the Galician mussel raft culture: a) does not involve translocations b) there is no evidence that this activity negatively impacts the parent stock. **However, we strongly disagree, based on the following information, which confirms the need to evaluate P1.** **Regarding assumption a):** As indicated in the ACDR, the results of the study carried out by Villalba et al. (1997) indicate that parasite species like *Mytilicola intestinalis* or *Martelia refringens* have an average prevalence rate around 10% in the Galician rias. However, the authors also point out to differences in prevalence of parasite species within the rias (inner vs outer areas) and among the different rias; therefore, translocations from a given ria, or an area within a ria, where prevalence is high, to another area where prevalence is low, might be contributing to spread of diseases or pest species along the entire Galician region. An example of this is mentioned by these same authors, who stated that the occurence of *Urastoma cyprinae* in Galician mussels was not reported prior to 1988, but at the time of the study its prevalence was close to 100% in adult mussels from every culture site in Galicia, which is most likely explained by the translocation activities. Even more, the authors state that "transplantation of mussel seed for culture could contribute to the spread of some symbionts throughout the Rías". Also, the consistent trade of spats in the Galician rías has been linked to the spread of the invasive mussel *Xenostrobus securis* (Pascual et al. 2010). Furthermore, the habitat created by suspended culture is relatively free from benthic predators and may act to perpetuate infestations once they are established, as stated by McKindsey et al. (2007). **Regarding assumption b):** The only comprehensive study to date about the status of mussel seed beds, carried out by Brea Bermejo in 2009, suggests that seed recovery in the intertidal after harvesting takes places in most of the analyzed sites. However, the author also indicates that there are significant differences in recovery rates among locations and also regarding the number of settling individuals, which is crucial for the	Villalba, A., Mourelle, S. G., Carballal, M. J., & Lopez, C. (1997). Symbionts and diseases of farmed mussels Mytilus galloprovincialis throughout the culture process in the Rias of Galicia (NW Spain). Diseases of Aquatic Organisms, 31(2), 127-139. Pascual, S., Villalba, A., Abollo, E., Garci, M., González, A. F., Nombela, M., ... & Guerra, A. (2010). The mussel Xenostrobus securis: a well-established alien invader in the Ria de Vigo (Spain, NE Atlantic). Biological Invasions, 12(7), 2091-2103. McKindsey, C.W., Landry, T., O'Beirn, F.X., and Davies, I.M. 2007. Bivalve aquaculture and exotic species: a review of ecological considerations and management issues. J. Shellfish Res. 26(2): 281–294. doi:10.2983/0730-8000(2007)26[281:BAAESA]2.0.CO;2. Brea Bermejo, E. (2009). Cartografiado y dinámica de las poblaciones de los bancos naturales de semilla de mejillón en las costas atlánticas gallegas. PhD thesis. Universidad de Santiago de Compostela, Santiago de Compostela. http://www.anfaco.es/blog_ct/index.php/2019/12/23/nuevas-estrategias-para-mejorar-la-viabilidad-de-la-produccion-de-semilla-de-mejillon/ https://www.lavozdegalicia.es/noticia/opinion/2019/03/21/mejilla-mejillon/0003_201903G21P16992.htm Silva AF, Sousa MC, Bernardes C, &		We would like to thank WWF for the comments made which greatly contributed to improving some parts of the assessment report that is being written. According to the MSC Certification Requirements and Guidance Fisheries Standard (version 2.01) and specifically Annex SB, for a catch and grow enhanced bivalve fishery such the one that is under assessment, the team should evaluate whether or not the fishery has an impact on the parent stock, and whether it includes translocations. If the team concludes that the fishery does not involve translocation, and there is no evidence that it negatively impact on the parent stock, then the team may choose not to score Principle 1. The stakeholder comments concerning this issue has induced the team to completely rewrite the rational for deciding not to score P1. In fact stakeholders are right in the sense that in the MSC system it is not in line with the certification requirements to assess the risks of spat movements and then conclude that there is no translocation. The team therefore has now written a rational in which it is evaluated whether the spat movements between rias constitute 'translocations' as defined by the MSC standard and whether the harvesting of mussel spat has an impact on the parent mussel stock. When doing so the assessment team took into consideration decisions made on translocations for other MSC certified Mytilus fisheries, namely those that involve spat movements between the Wadden Sea and Eeastern Scheldt and spat fishery in the Wadden Sea. . (https://fisheries.msc.org/en/fisheries/mussel-translocation-by-members-of-the-vereniging-van-importeurs-van-schelpdieren-into-the-oosterschelde/@@assessments (MEC, 2016); https://fisheries.msc.org/en/fisheries/germany-lower-saxony-mussel-dredge-and-mussel-culture/@@assessments (Control	Not accepted (no score change)

		recruitment of the species in order to sustain the populations. It is also stated that the extractive pressure differs among locations, which causes recolonization to be slower in some of them. More importantly, there are recent evidences that point out to a decrease in the abundance of intertidal seed. Uxío Labarta (an expert on the Galician mussel culture research) states in a press article that "**downward fluctuations in abundance of mussel seed have been detected in Galicia since 2017**". The initiative to develop the MUSSELECT project is an indication of that. The overall objective of the project will be the development of low-cost and scalable methods for the production of mussel seed with improved performance and survival characteristics. As stated by ANFACO-CECOPESCA: "***In recent years, many producers claim to have observed a reduction in the productivity and quality of mussels, in the form of slower growth and weakening of the filaments of the byssal, which causes individuals to detach themselves from the ropes in greater quantity than in earlier times, possibly caused by the gradual increase in water temperature***. *In this sense, MUSSELECT will provide traceability to the cultivation of seed in hatcheries and the possibility of making a genetic selection of families with high growth characteristics or resistance to certain environmental conditions, which is expected to have strong benefits in mussel production in Galicia*". In a changing world, where climate change is already affecting ecosystems on so many levels, it is very risky to assume that over a decade there have been no detrimental changes in a population that is subjected to the pressure of a high volume industry (7,000 tons of seed to obtain an annual harvest of 250,000 tons of mussels) such as the mussel farming in Galicia. Predictions carried out by Silva et al. (2017) about the impact that climate change may have on mussels' production in the Rias Baixas, stated that mussel culture in certain areas (close to river mouths) of the Ría de Vigo (with 14% of rafts) and Ría de Arousa (with ~70% of rafts) might be threatened by rising temperatures and decrease of salinity. The authors suggest that some areas should be considered very sensible for future mussel culture since sea surface temperature is expected to increase about 3ºC in the Rías Baixas and salinity is forecasted to decrease 1 unit. Silva et al. (2017) results were supported by the Gazeau et al. (2014) study, where it was demonstrated that mussels are highly sensitive to a 3ºC warming, which might lead to suboptimal and even lethal temperature responses. Gazeau et al. (2014) studied the impact of ocean acidification and warming in *M. galloprovincialis*, and observed growth limitation under high temperature conditions. They also observed lower calcification rates with periostracum alteration and weaker byssal threads in mussels maintained under low pH treatments, which could reduce the resistance of shell to mechanical damage, and affect the ability of mussels to	Dias JM. (2017). Will Climate Change Endangers the Current Mussel Production in the Rias Baixas (Galicia, Spain)?. Journal of Aquaculture & Fisheries. 1:1. Gazeau F, Alliouane S, Bock C, Bramanti L, Correa ML, et al. (2014) Impact of ocean acidification and warming on the Mediterranean mussel (Mytilus galloprovincialis). Frontiers in Marine Science.		Union Pesca Ltd., 2018)). In line with te decisions made in these assessments the team has concluded that any sourcing of mussel seed from within the NIWC ecosystem does not constitute a translocation. Concerning the impact of spat collection on the parent stock the team considered that only small mussel that are not yet part of the reproductive component are harvested and that a removal of a very limited part of the adult mussels in the system will not affect the reproductive capacity of the mussel stock. Furthermore it was considered that the mussel spat is not removed from the surrounding ecosystem of the mussel population. The mussel spat remains in the system as it is placed on the ropes of the mussel rafts in the rias. On these rafts, growing conditions in terms of food supply and mortality are usually better then in natural beds. The mussels on the ropes will spawn several times during the producing cycle before they are harvested. Thus the harvesting of mussel spat and the ongrowing on ropes rather results in an increase of the parent stock and does therefore not result in a negative impact of the parent stock. The team therefore upheld its initial conclusion that there is no negative impact on the parent stock and that the fishery does not includes translocations and thus that Principle 1 should not be scored.movements of spat between areas, indicating that spat movements are irrelevant compared to the characteristics of the different areas. Thus, it is likely that oceanographic conditions in the area do not favour the presence of a hypothetical intermediate host in those areas (Susana Darriba, personal communication). Further, current regulation on animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals (Council Directive 2006/88/EC of 24 October 2006) will be supersede by Regulation (EU) 2016/429 of 9 March 2016 which shall apply as from April 2021. This new regulation has recently been followed by the EU Regulation 2018/1882 of 3 December 2018 on the application of certain disease prevention and control rules to categories of listed diseases, and	

		attach to substrate, respectively. This last effect could be related to what producers observe and claim regarding a "*weakening of the filaments of the byssal, which causes individuals to detach themselves from the ropes in greater quantity than in earlier times*". Early life stages are more vulnerable to warming, therefore it is likely that recruitment and seed production represent bottlenecks for mussel culture under the current warming scenario, given the high dependence on seed supply from the intertidal (~70% origin from natural seed). Although the CAB does not evaluate the P1, we consider it necessary to highlight the following aspects related to the Performance Indicators.			established a list of species and groups of species posing a considerable risk for the spread of those listed diseases. This new Regulation makes clear that disease prevention and control rules for M. refringens shall not apply to M. galloprovincialis or any other species of mussel. This means that the new European regulation on animal health is not considering anymore that M. refringens constitutes a problem for mussels. The parasitic turbellarian Urastoma cyprinae in M. galloprovincialis was first reported for Galicia by Robledo et al. (1994). How this species was introduced in Galicia remains unknown. Notwithstanding, those authors stated that in 1993, U. cyprinae were present in the 3 main production rias in the Galician region, affecting both natural beds and rafted mussels. According to these authors, in the existing literature, no mention is made on mortalities resulting from infestation by U. cyprinae. Indeed, although causing pathological reactions in its host resulting in disorganization of the gill filaments, no mass mortalities of mussels has been observed in Galicia mussel rafts. Villalba et al. (1997), studied the symbionts and diseases of farmed mussels Mytilus galloprovincialis throughout the culture process in the Rias of Galicia and found a prevalence of U. cyprinae in nearly 100% of adult mussels from every culture site in Galicia. The life cycle proposed for U. cyprinae involves a parasitic period during which sexual maturation is reached, and a free-living period during which reproduction, involving cocoon secretion, egg laying, and hatching, occurs in the external environment (Crespo Gonzalez et al., 2005). Therefore, during the free-living stage larvae can be transported by currents infesting, posteriorly, mussel beds occurring in Galicia. Nevertheless, and despite the discussion about the spread of the infestation by U. cyprinae, this species in not considered in the list of species that causes diseases in molluscs nor fishes (OIE-Listed diseases, infections and infestations in force in 2020; https://www.oie.int/en/animal-health-in-the-world/oie-listed-diseases-2020/).	

					Xenostrobus securis is an exotic species that was introduced into Galicia probably through vessel biofouling or ballast water. In the Iberian Peninsula, this species was first reported in the Ría de Vigo (Garci et al., 2007) and later in the Ría de Pontevedra. Although this species presents a long period of recruitment indicating the high invasiveness potential of this species, its occurrence in the Rías in almost circumscribed to the river mouths or close to it (Montes et al., 2016). Indeed, according to Gestoso et al. (2012), density of X. securis decrease from areas close to the mouth of the rivers to the middle part of rias. Moreover, Montes (2016) stated that the limited distribution range of this species within the Rias is its middle part, where its abundance is extremely low, which indicates that this species does not occur in the areas where mussel spat is collected. Physical factors such as salinity together with predation can be key factors controlling its spread along the estuarine area (Montes, 2016). Pascual et al. (2010) discussed how X. securis was introduced into the Adriatic Sea and Galicia. They stated “On the other hand, although our 18S network and COI tree (clade 2) show the Australian origin of this invasion, they do not allow us to indicate whether or not the European introduction went through the Adriatic or Galicia, via or not from the French lagoons. An aquaculture connection from other areas to Galicia is more likely the potential vector since there is a consistent trade of spat, which may result in multiple invasions.” From this paragraph it can be concluded that these authors didn’t refer that the dispersion of X. secures in Galicia is related to the movement of mussel spat among Rías. Several studies on the abundance and distribution of mussel seed beds were performed in Galicia (e.g. Fernández Pulpeiro et al., 2001, 2002; Lustres Pérez, 2002; Brea Bermejo, 2004, 2009). Apart from these studies the Consellería de Mar (Xunta de Galicia) carried out an annual	

					monitoring of these natural beds first through CIMA and posteriorly through CETMAR. Notwithstanding, in the last years there wasn't put in place a regular monitoring of the seed beds. We agree that seed harvesting effort varies among sites, with high effort being carried out where seed density is higher. Moreover, we also agree that the recovery rate among sites differs, which is related to the local environmental conditions and mainly with the success of recruitment. Indeed, in coastal areas, the annual recruitment of bivalves is characterized by substantial year-to-year variability; failing and successful cohorts often differ by orders of magnitude in several bivalve species (e.g. Beukema, 1982; Möller & Rosenberg 1983; Beukema et al. 2001, Strasser et al., 2001, 2003; Beukema and Dekker, 2005), which affects the recovery rates of the areas exploited. Although recruitment failure may occur in certain years, this is not related to seed movement, being instead related to unfavourable environmental conditions. In Galicia, M. galloprovincialis is not harvested. Indeed, only spat movement occurs and therefore only a small fraction of the population is exploited. Nevertheless, is worth noting that seed is not removed from the system, since it is relayed in culture plots. In these plots, growing conditions in terms of food supply and mortality are usually better then in natural beds. The spat translocated remains in the rafts between one to two years until reaching the market size, depending on their original size. As M. galloprovincialis attain the sexual maturity during their first year of life (Villalba, 1995), they will spawn several times during the producing cycle, depending on the interaction between different environmental factors (Villalba, 1995; Cáceres-Martínez & Figueras, 1998; Casa & Bacher, 2006). Thus, the individuals that were moved from natural beds to rafts provides supplementary spawning biomass. In addition to the challenges posed by land-use change, environmental pollution, and water diversion, aquatic systems are experiencing the added stress of global	

					climate change. For instance, increases in water temperatures as a result of climate change will alter fundamental ecological processes and the geographic distribution of aquatic species. Moreover, changes in seasonal patterns of precipitation and runoff will alter hydrologic characteristics of aquatic systems, affecting species composition and ecosystem productivity. How ecosystems and particularly species will be affected by climate changes and how they will adapt to new climate patterns is still unknown. Although we can hypothesise that mussel production in Galicia will be affected by climate change, this issue is not considered in the evaluation of P1 (please see MSC Certification Requirements and Guidance (version 2.1)). **Final decision:** According to the MSC Certification Requirements and GuidanceFisheries Standard (version 2.01) and specifically Annex SB, for a catch and grow enhanced bivalve fishery such the one that is under assessment, the team should evaluate whether or not the fishery has an impact on the target stock biomass, and whether it includes translocations. If the team concludes that the fishery does not involve translocation, and there is no evidence that it negatively impact on the parent stock, biomass of the target stock and no translocations, then the team may choose not to score Principle 1. Spat movement could result in negative impacts on the environment and on the target stock though the introduction of shellfish associated organisms which can include non-indigenous species, fouling organisms, potentially toxic algae, viruses, bacteria, disease agents or parasites and may also affect the species genetic makeup. The movement of mussel spat occurs throughout the Rias of Galicia. However, none of the above mentioned negative impacts have been identified in Galicia by the team, as detailed in the pre-assessment report and in the improved rationale in the assessment report. This evidence lead the assessment team to conclude that the fishery does not have an	

					impact on the target stock and does not involve translocation, as any input of mussel seed must come from the North Iberian West Coast (NIWC) and therefore the same ecosystem as this fishery. The assessment team also took into consideration decisions made on translocations for other MSC certified Mytilus fisheries, namely those that involve spat movements in the Wadden Sea (https://fisheries.msc.org/en/fisheries/mussel-translocation-by-members-of-the-vereniging-van-importeurs-van-schelpdieren-into-the-oosterschelde/@@assessments (MEC, 2016); https://fisheries.msc.org/en/fisheries/germany-lower-saxony-mussel-dredge-and-mussel-culture/@@assessments (Control Union Pesca Ltd., 2018)). The team concluded that any sourcing of mussel seed from within the NIWC ecosystem does not constitute a translocation and therefore it was decided not to score Principle 1.	

1.1.1 - Stock status	Evidences of decline on natural seed beds	The only comprehensive study to date (Brea Bermejo 2009) about the stock status of natural seed beds points out to different rates of recovery among locations after harvesting, and different rates of recruitment. It is also indicated that the extractive pressure differs among locations, which causes recolonization to be slower in some of them. More importantly, there are recent evidences that point out to a decrease in the abundance of intertidal seed. Uxío Labarta (an expert on the Galician mussel culture research) states in a press article that "downward fluctuations in abundance of mussel seed have been detected in Galicia since 2017". And ANFACO-CECOPESCA justifies the initiative of his new project for the mussel sector as follows: "*In recent years, many producers claim to have observed a reduction in the productivity and quality of mussels, in the form of slower growth and weakening of the filaments of the byssal, which causes individuals to detach themselves from the ropes in greater quantity than in earlier times*". Based on these arguments, there are compelling reasons to consider that the optimal state of the population should not be taken for granted.	Brea Bermejo, E. (2009). Cartografiado y dinámica de las poblaciones de los bancos naturales de semilla de mejillón en las costas atlánticas gallegas. PhD thesis. Universidad de Santiago de Compostela, Santiago de Compostela. http://www.anfaco.es/blog_ct/index.php/2019/12/23/nuevas-estrategias-para-mejorar-la-viabilidad-de-la-produccion-de-semilla-de-mejillon/ https://www.lavozdegalicia.es/noticia/opinion/2019/03/21/mejilla-mejillon/0003_201903G21P16992.htm		This fishery is an Enhanced Bivalve Fishery therefore, some modifications to the default tree structure has to be used. In particular, the team has applied Annex SB as a supplement to Annex A (Default Assessment tree). The team has performed a thorough analysis to justify that this Catch and Grow (CAG) fishery does not involve translotation and there is no evidence that it negatively impacts the parent stock. As a result, Principle one does not have to be scored. The detailed rationale is described on Section 7.2.1.	Not accepted (no score change)
1.1.2 - Stock rebuilding						
1.2.1 - Harvest strategy	Lack of detailed and effective strategy	There is no harvest strategy for natural seed beds. While it is true that there is a regulation for this (Decree 406/1996), such regulation has proven to be obsolete and does not cover essential aspects for optimal resource management, nor even it follows a precautionary approach. There is no regular monitoring on natural seed beds, there is no spatial management of the resource, and there are no mortality estimates, except for the limitation in the amount allowed per raft. In a population where the total biomass was estimated as 18,000 tons (Brea Bermejo 2009), that about 7,500 tons are required to meet the demand of the mussel raft culture (Pérez-Camacho et al. 1995), points out to high depletion rates of the natural population. Furthermore, signifficant variability in abundance has been observed among locations (Brea Bermejo 2009), which should have leaded to a spatial management of the resource and a continuous monitoring, but no measure has been implemented in this regard.	Brea Bermejo, E. (2009). Cartografiado y dinámica de las poblaciones de los bancos naturales de semilla de mejillón en las costas atlánticas gallegas. PhD thesis. Universidad de Santiago de Compostela, Santiago de Compostela. Pérez-Camacho, A., Labarta, U., Bairas, R., 1995. Growth of mussels (Mytilus edulis galloprovincialis) in cultivation raft, Influence of seed source, cultivation site and food availability, Aquac. 138:349-362.		Same answer as above.	Not accepted (no score change)

1.2.2 - Harvest control rules and tools	Lack of HCR for unfavorable scenarios	There are no harvest control rules on natural seed beds, most likely because of the lack of a proper harvest strategy, which leads to infer that the fishery does not have the necessary mechanisms to face fluctuation scenarios in the population as a result of threats such as climate change, for instance. Furthermore, the ACDR states that there is control and surveillance on seed harvesting but the goose barnacle sector claims exactly the opposite (personal communication).			Same answer as above.	Not accepted (no score change)
1.2.3 - Information and monitoring	Lack of recent information and monitoring	There is very little information related to the stock status of natural seed beds and there is no monitoring on it. As mentioned before, the only comprehensive study to date regarding the subject is the one carried out by Brea Bermejo in 2009. There are others made by Fernández Pulpeiro and his group for the Xunta de Galicia, but none of them is available for consultation. It is known that an evaluation was commissioned to the CETMAR on the state of the natural seed beds, but it has not been published and there is no knowledge of its use. This reinforces the need for a harvest strategy that allows knowing the temporal and spatial variability of the resource.	Brea Bermejo, E. (2009). Cartografiado y dinámica de las poblaciones de los bancos naturales de semilla de mejillón en las costas atlánticas gallegas. PhD thesis. Universidad de Santiago de Compostela, Santiago de Compostela.		Same answer as above.	Not accepted (no score change)
1.2.4 - Assessment of stock status						
Principle 2 - Minimising environmental impacts	Multiple environmental impacts	Although a great effort has been put into knowing many aspects regarding the biology and reproduction of the Galician mussel, these efforts have been directed to the economic profitability of the resource and not to the sustainable use of it. This has been translated into numerous impacts on the habitat and ecosystems of the Galician rias, such as the modification of the planktonic and benthic community structure, the exploitation of the resource approaching or exceeding the limits supported by the ecosystem, the disturbance of the benthic systems through biodepositions and litter, and the involvement of other species of commercial interest such as the goose barnacle. Therefore, the evidences suggest that minimising environmental impacts is an unsolved task for this fishery.			The stakeholder is giving their opinion but does not give objective evidence. The team has analysed the habitat and ecosystem components in each particular Performance Indicator. We suggest to review the corresponding sections and PIs.	Not accepted (no score change)
2.1.1 - Primary species outcome						

2.1.2 - Primary species management						
2.1.3 - Primary species information						

2.2.1 - Secondary species outcome	Effects on goose barnacle fishery Some species indicated as minor are of commercial interest Effects on the associated sessile aasemblage	Goose barnacle collectors have been claiming for years that their activity is impaired by the mussel seed collection since the goose barnacle can not settle on the bare rock after the seed is harvested, therefore, their populations suffer less recruitment and lower yield. Goose barnacles are gregarious animals with selective settlement that require the presence of conspecifics in order to successfully settle and recruit into the population (Cruz et al. 2010, Franco et al. 2016). The regular perturbance on natural rocks to obtain the mussel seed exerts pressure on barnacle populations as it limits their recruitment by eliminating all present organisms in the rock, including barnacle conspecifics, regardless of their size. The results of the study carried out by Pita et al. (2019) support the barnacle collectors arguments, since they observed a significant decrease in catches and sales value for the Atlantic goose barnacle and highlighted the need for further research into possible negative interactions with activities posing high potential ecological risk, such as seed harvesting for mussel culture. In addition to the goose barnacle (*Pollicipes pollicipes*), some of the minor species occupying the intertidal with mussel seed have economic interest and therefore are considered for exploitation plans (Pita et al. 2019). Despite this, these species are not considered in the ACDR. These are: *Scoletoma impatiens* (Annelida), *Anemonia sulcata* (Cnidaria), *Littorina littorea* (Mollusca), *Patella spp.* (Mollusca), and some unspecified red seaweeds. Landing of new species like these, and licenses for their exploitation are increasing, given the development of new fisheries for human consumption of algae and anemones, and of polychaetes to meet the demand of baits by fishers. The studies carried out by Piñeiro-Corbeira et al. (2018) and Barrientos et al. (2019) have shown that harvesting young mussels for aquaculture in Galicia has a detrimental effect to the abundance and diversity of the associated sessile assemblage not directly targeted by this activity. Coverage and richness has been also significantly lowered by the exploitation of mussel seed, and the community structure of non-exploited and exploited sites is significantly different. These differences remain until the next open season, suggesting that the established closed season is too short for the recovery of the associated non-target sessile assemblage. Given the size of the local mussel industry, the incomplete recovery along the closed season implies that mussel culture must be putting a sustained pressure on a sizeable portion of the rocky intertidal in Galicia.	https://www.lavozdegalicia.es/noticia/ferrol/ferrol/2019/01/12/guerra-percebeiros-bateeiros-raiz-extraccion-mejilla/0003_201901F12C5991.htm https://www.farodevigo.es/portada-o-morrazo/2019/05/25/percebeiros-cangas-califican-menosprecio-mar/2111689.html Cruz, T., Castro, J. J., & Hawkins, S. J. (2010). Recruitment, growth and population size structure of Pollicipes pollicipes in SW Portugal. Journal of Experimental Marine Biology and Ecology, 392(1-2), 200-209. Franco, S. C., Aldred, N., Cruz, T., & Clare, A. S. (2016). Modulation of gregarious settlement of the stalked barnacle, Pollicipes pollicipes: a laboratory study. Scientia Marina, 80(2), 217-228. Pita, P., Fernández-Márquez, D., Antelo, M., Macho, G., & Villasante, S. (2019). Socioecological changes in data-poor S-fisheries: A hidden shellfisheries crisis in Galicia (NW Spain). Marine Policy, 101, 208-224. Piñeiro-Corbeira, C., Barrientos, S., Olmedo, M., Cremades, J., & Barreiro, R. (2018). By-catch in no-fed aquaculture: exploiting mussel seed persistently and extensively disturbs the accompanying assemblage. ICES Journal of Marine Science, 75(6), 2213-2223. Barrientos, S., Barreiro, R., Olmedo, M., & Piñeiro-Corbeira, C. (2019). Can patch size and patch distance improve the recolonization of mussel-seed beds exploited for aquaculture?. Aquatic Conservation: Marine and Freshwater Ecosystems, 29(11), 1897-1908.		The harvesting of mussel spat has an impact on associated species living on the rocky shores of Galicia. Since there is limited information to assess the consequences of this impact on the outcome status of (main) secondary species the team has conducted an RBF. (Minor secondary species were not included in this RBF and therefore the maximum score that can be attained is 80.) In an RBF both the productivity and susceptibility attributes result in a MSC score.	Not accepted (no score change)

2.2.2 - Secondary species management	Lack of secondary species management	There is no management regarding secondary species, as well as no monitoring of their status. As mentioned in the ACDR, the regulation states that producers must cover a seed extraction form and send it to the Xunta de Galicia, however, no detailed information is provided about the extraction activity, and there is no information about the non-target species. There is much inaction by the administration when it comes to effectively managing these resources. The conflict between mussel producers and goose barnacle collectors is a clear example of that. Although the conflict has been going on for many years, there is no monitoring plan in this regard and decisions are not based on scientific information since, if so, the information provided by Brea Bermejo in 2009 would have been taken into account to develop a spatial management model of these two exploitations in order to mitigate the conflict. The available scientific information suggests that the industrial-scale exploitation of mussel seed from the rocky intertidal in Galicia is being detrimental for many organisms that live on or among the competitively dominant mussel *Mytilus galloprovincialis,* and that the close season is not enough for recovery of the non-target species (Piñeiro-Corbeira et al. 2018). In a study carried out by Barrientos et al. (2019), searching for practices that might ameliorate the damage caused by mussel-seed harvesting, the influence of two properties of the exploitation on the recolonization of the intertidal were assessed: patch size and patch distance. However, their results indicated that rather than patch size and/or distance, the duration of the closed season is the limiting factor for the recovery of mussel-seed exploited beds. The authors suggested a set-aside system, where exploitable regions would be divided into sectors that would be exploited on a rotational basis. However, again, no effective measure is being taken on this regard.	Piñeiro-Corbeira, C., Barrientos, S., Olmedo, M., Cremades, J., & Barreiro, R. (2018). By-catch in no-fed aquaculture: exploiting mussel seed persistently and extensively disturbs the accompanying assemblage. ICES Journal of Marine Science, 75(6), 2213-2223. Barrientos, S., Barreiro, R., Olmedo, M., & Piñeiro-Corbeira, C. (2019). Can patch size and patch distance improve the recolonization of mussel-seed beds exploited for aquaculture?. Aquatic Conservation: Marine and Freshwater Ecosystems, 29(11), 1897-1908.		The comments of stakeholder mainly concern the resource conflict between spat collection and goose barnacle collection. However this performance indicator deals with the measures and strategies developed to manage the impact of spat collection on bycatch species if necessary. The fact that spat collectors possibly remove goose barnacles that as a consequence can not be removed by goose barnacle collectors is a social or economic aspect that is not considered under this performace indicator. The team has considered that measures are in place to regulate spat collection and that these measures together form a partial strategy to expect to maintain that is expected not to hinder rebuilding of main secondary species at/to levels which are highly likely to be above biologically based limits. Nevertheless, the team agreed with some of the points highlighted by the stakeholder. The team has considered that there is no evidence that there is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of goose barnacle and if they are implemented as appropriateand scored this PI in accordance. A condition was opened. We state “no score change” because the scoring range given in the ACDR was 60-79.	Accepted (no score change)
2.2.3 - Secondary species information	Lack of information	There is no information on the species composition and abundance affected by mussel seed harvesting on the intertidal, and specifically, there is a lack of information about the real extent of seed extraction impacts on the goose barnacle populations and the interaction of both species in the intertidal, which would be crucial to establishing management strategies.			We agree with some of the points highlighted by the stakeholder. The team has considered this lack of detailed information on secondary species and scored this PI in accordance. A condition was opened. We state “no score change” because the scoring range given in the ACDR was 60-79.	Accepted (no score change)

2.3.1 - ETP species outcome						
2.3.2 - ETP species management						
2.3.3 - ETP species information						
2.4.1 - Habitats outcome	Changes in the bottom of the rías and alteration of hydrodynamics Disturbance on maërl beds.	Raft mussel culture in Galicia represents a great supply of biodeposits to the benthic habitat, which can result as eutrophication of the bottoms that negatively impacts composition and abundance of species (Bald et al. 2009). Ysebaert et al. (2009) found a significant effect of mussels presence on grain size distribution and mud content in the Ría de Vigo; higher mud content and lower median grain size was found along the transects in the mussel site; diversity and evenness were significantly higher in the reference site; the impact of mussels on the benthic community due to biodeposition was clearly seen in the community structure, since species composition shifted from sandy environment species to more small opportunistic species, tipically present in eutrophied sediments; the elevated POC, PON, phosphorus, and phaeo concentrations in the surficial sediments in the raft area were consistent with measurements of enhanced organic input. Tenore et al. (1982) reported that sulfate reduction was 63% greater in mussel culture locations than in reference locations. Guerra et al. (2009) also indicated that mussel farming has not only altered the composition of zooplankton, thereby modifying the natural flow of energy between the lower and upper levels of the ecosystem, but it also has created a special microenvironment that causes changes in the abundance and composition of the benthic communities. Zuñiga et al. (2014) reported that mussel biodeposition was 6–7 fold the rates at the reference site, corroborating that mussel feeding activity throughout the production of feces increased natural sedimentation rates in the Ría de Ares–Betanzos. Méndez Martínez et al. (2011) estimated the mud produced by mussel rafts as 6.3 x 10^6 m^3, and observed that the distribution of the sector where the mud fraction is over 90% is not coincident with the raft polygons that cause them, showing their mobilization due to waves and currents, which contradicts the idea of localized sediments.	Bald J, Borja A & Solaun O. 2009. Los impactos de la acuicultura: minimización y certificación. AZTI communications. Petersen, J.K., Nielsen, T.G., van Duren, L., and Maar, M. 2008. Depletion of plankton in a raft culture of Mytilus galloprovincialis in Ría de Vigo, NW Spain. I. Phytoplankton. Aquat. Biol. 4: 113–125. doi:10.3354/ab00124. de Paz, L., Neto, J.M., Marques, J.C., and Laborda, A.J. 2008. Response of intertidal macrobenthic communities to long term human induced changes in the Eo estuary (Asturias, Spain): implications for environmental management. Mar. Environ. Res. 66(2): 288–299. doi:10.1016/j.marenvres.2008.04.004 . PMID: 18555522. Gibbs, M.T. 2004. Interactions between bivalve shellfish farms and fishery resources. Aquaculture, 240(1–4): 267–296. doi:10.1016/j.aquaculture.2004.06.038. McKindsey, C. W., Archambault, P., Callier, M. D., & Olivier, F. (2011).		As stakeholders put forward correctly biodeposits from mussel production on mussel rafts can have a negative impact on maerl beds below these rafts or in the near vicinity. The team has assessed these impacts using the available information from scientific literature and information from the database on spatial distribution of mussel culture polygones, mussel rafts and bottom habitats. This information shows that there is a imited overlap of VME habitats (mearl beds) and mussel rafts and that mussel rafts in Galicia Rías may impact 16.4% of the total maerl beds recorded. The consequence being that over 80 % of mearl beds are not impacted and thus that the VME habitat would be able to recover to at least 80% of its unimpacted structure, biological diversity and function within 5-20 years, if fishing were to cease entirely. The comments provided by stakeholders have resulted in the complete redrafting of the rationale of PI 2.4.1. Some of the information provided was used and the issues raised are now discussed in the new rational.	Accepted (no score change)

		The organisms associated with mussel culture (epifauna) also contribute to the deposition of organic matter to the sea bottom (McKindsey et al. 2011). The prospections conducted within the framework of the Gestinmer project, showed that there is a layer of 2-3 m of fine sediment on the base substrate, with high content of $CaCO^3$ and organic matter; as well as a regular distribution of clusters of gravel, from 0.5 to 1 m, which coincides with the location of surface rafts. The lack of information regarding the volume of deposits generated by mussel culture is recognized in the Gestinmer report, although it is estimated that only in 2004 there were 23,600 tons of by-product waste generated during the operations. de Paz et al. (2008) have indicated that marine benthic systems must be studied over long periods to understand the natural temporal and spatial variations that may otherwise obscure the system responses to anthropogenic disturbances. Changes in the upwelling system in Galicia have been proven to increase the residence time of water inside the rías (Álvarez-Salgado et al. 2008), which raises the concern of a worsening situation. Also, suspended mussel culture infrastructures may alter hydrodynamics and reduce flow rates, as has been observed by several authors (Pérez-Camacho et al. 1995; Duarte et al. 2008; Petersen et al. 2008), creating areas that are much better flushed than others. These described effects, especially biodepositions, have a demonstrated negative impact on the vulnerable habitat of meärl beds. The doctoral thesis carried out by Peña Bárbara (2010) observed a reduction in extension and cover of nine mäerl beds, and the complete degradation of ten banks. Of the total 19 banks, 12 were encompassed in polygons with mussel culture or in its vicinity. 34 mäerl beds were identified in the vicinity of areas for mussel culture, accounting for 16% of the total extension of maërl beds in Galicia. Within this affected areas, 2.08 km^2 corresponded to the highest alive/dead maërl proportion, distributed among several rías. In general, the appearance of most impacted samples located just below the rafts were characterized by containing a considerable amount of debris and remains of mussel shells, and there was a decrease in the fraction of medium-coarse sand (0.02-2 mm) and an increase in the finest fraction corresponding to mud (<0.050 mm). Higher values of organic matter and a lower carbonate composition were recorded in the affected areas. The author also found a decline in the associated floristic wealth, as well as a disappearance of encrusting species characteristic of maërl beds, and a marked trend towards an associated fauna composed of typical detritivorous species of mussel raft bottoms. All of these negative impacts were attributed to the effects of mussel culture and the author clearly points out to the threat posed by mussel farming for this vulnerable, non-renewable, habitat. It is also worth mentioning that maërl beds are used as regular habitat by another species of commercial interest, such as the scallop (*Pecten maximus*).	Influence of suspended and off-bottom mussel culture on the sea bottom and benthic habitats: a review. Canadian Journal of Zoology, 89(7), 622-646. Tenore, K.R., and González, N. 1976. Food chain patterns in the Ria de Arosa, Spain: an area of intense mussel aquaculture. In Proceedings of the 10th European Symposium on Marine Biology, Ostend, Belgium, 17–23 September 1975. Vol 2: Population dynamics of marine organisms in relation with nutrient cycling in shallow waters. Edited by G. Persoone and E. Jaspers. Universa Press, Wetteren, Belgium. pp. 601–619. Ysebaert, T., Hart, M., and Herman, P.M.J. 2009. Impacts of bottom and suspended cultures of mussels Mytilus spp. on the surrounding sedimentary environment and macrobenthic biodiversity. Helgol. Mar. Res. 63(1): 59–74. doi:10.1007/s10152-008-0136-5. Guerra, A., Lens, S., Rocha, F., Impacto del hombre sobre el ecosistema de la Ría de Vigo: hacia una gestión integrada. In González-Garcés Santiso, A., Vilas Martín, F., Álvarez Salgado, X.A., 2009. La Ría de Vigo. Una aproximación integral al ecosistema de la Ría de Vigo. Instituto de Estudios Vigueses, Vigo, p. 327-369. Zúñiga, D., Castro, C. G., Aguiar, E., Labarta, U., Figueiras, F. G., & Fernández-Reiriz, M. J. (2014). Biodeposit contribution to natural sedimentation in a suspended Mytilus galloprovincialis Lmk mussel farm in a Galician Ría (NW Iberian Peninsula). Aquaculture, 432, 311-320. Martínez, G. M., Campos, A. O., Vilar, E. G., Mier, R. L., & Pérez-Arlucea, M. (2011). Changes induced			

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2.4.2 - Habitats management strategy	Lack of management strategy for deposits on the bottom	There is no evidence that measures are being implemented to mitigate the harmful effects of biodeposites on seabed, although a couple of pilot projects related to the subject have been carried out a decade ago, which demonstrates the knowledge of the problem by the sector and the administration. Between 2006 and 2008, the pilot project "Mitigation of the environmental impact generated by marine cultures" was carried out by the National Advisory Board on Marine Cultures with the objective of developing a system for collecting biodeposits and characterizing them. The conclusions of the project showed that the installation of collector systems under	https://www.mapa.gob.es/app/jacumar/planes_nacionales/Documentos/91_IE_MITIGACION.pdf http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=home.showFile&rep=file&fil=LIFE04_ENV_ES_000239_LAYMAN.pdf http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=home.showFile&rep=file&fil=wastema		The team agreed with some of the comments made by the stakeholders and therefore the rationale was redrafted in order to acommodate them. A condition was opened.	Accepted (material score reduction to <80)

		the mussel culture rafts allowed the collection of a significant part of the biodeposits before they reached the bottom. However, it was noted that, despite its effectiveness, there were high manufacturing and installation costs. The Gestinmer project, was another example that highlighted the need for proper management of waste generated by mussel culture in Galicia. Gestinmer (System for the integral management of the waste produced by the mussel cultured in rafts and longlines) was a project promoted by the Consellería de Pesca y Asuntos Marítimos, managed by CETMAR and co-financed by the LIFE Program - Environment. The Consello Regulador do Mexillón de Galicia and the association of producers OPMEGA participated as project partners, and the University of Santiago collaborated through the Laboratory of Environmental Technology. Such project, developed more than 10 years ago, intended to evaluate the feasibility of removing the deposits (feaces and pseudofeaces from mussels and epifauna, detached mussels from ropes and mussel by-product waste) produced by mussel culture from the bottom, and the development of a system that led to an appropriate management of the mussel byproducts produced on board, since (as stated in their project report) "*the accumulation of these deposits has been linked to the modification of the characteristics of the seabed, which increase in thickness and become anoxic, as well as changes in the trophic chain inside the rias and the composition of the benthic communities*". Within this project, a guide for good practices was developed, tests were carried out to assess the viability of different methods for waste collection from the seabed, and measures were proposed, such as the creation of floating platforms for waste storage. **<u>However, to date there is no evidence that such measures are being implemented</u>**. It is worth mentioning that changes in the upwelling system in Galicia have been proven to increase the residence time of water inside of the rías (Álvarez-Salgado et al. 2008), which raises the concern of a worsening situation with even less flushing of the affected areas.	nagementofmussels-Guiabuenaspracticas.pdf Álvarez-Salgado, X. A., Labarta, U., Fernández-Reiriz, M. J., Figueiras, F. G., Rosón, G., Piedracoba, S., ... & Cabanas, J. M. (2008). Renewal time and the impact of harmful algal blooms on the extensive mussel raft culture of the Iberian coastal upwelling system (SW Europe). Harmful Algae, 7(6), 849-855.			
2.4.3 - Habitats information	Abundant information regarding impacts on the bottoms	There is extensive information regarding the negative impact of mussel culture biodepositions on the bottoms, however, this information has not been used in order to implement an efficient management strategy that mitigates the impact, even when the mussel culture sector and the administration have been aware of the problem.			The team conluded that there is enough information on the nature, distribution and vulnerability of the main habitats in the UoA area at a level of detail relevant to the scale and intensity of the UoA which allows to infer about the impacts that mussel raft production may cause on habitats. The evaluation of the impacts on habitats was based on the extensive bibliography that exists about this subject. Notwithsatnding, there is no regular monitoring of the physico-chemical characteristics of the seabottom beneath the rafts and on maerl	Accepted (no score change)

					beds which implies the raise of a condition on this PI. We state “no score change” because the scoring range given in the ACDR was 60-79.	
2.5.1 - Ecosystem outcome	Changes in community structure of intertidal rocky shore. Depletion of primary production and changes in plankton composition. Carrying capacity exceeded. Litter from culture activity.	Depletion of mussel seed in the intertidal leads to changes in community structure of the intertidal rocky shore. Rocky shore mussels are considered ecosystem engineering species because they aggregate into beds, thus modify the nature and complexity of the substrate, contributing to species richness in rocky littoral communities (Borthagaray & Carranza 2007). Therefore, their complete removal (and the associated species) by mussel seed harvesting represents a continued perturbance in the ecosystem (Piñeiro-Corbeira et al. 2018, Barrientos et al. 2019). Contrary to the estimations made by Figueiras et al. (2002), where it was estimated that mussel culture extracts ~10% of primary production, Varela et al. (1984) estimated that mussel farming in the Ría de Arousa required ~60% of the available phytoplankton. Several authors (Pérez-Camacho et al. 1995, Penas 2000, Álvarez-Salgado et al. 2008 and Rodríguez Rodríguez 2009) predicted that mussel farming production requires high appropriation of primary production to sustain its activity. The results of Villasante et al. (2010) confirmed the ones obtained by Varela et al. (1984) and point out that the extremely high consumption of total primary production by mussel culture is notably contributing to reaching the carrying capacity of the area. Duarte et al. (2008), also indicated that mussel culture practices in Galicia were close to carrying capacity at the raft scale and suggested changing raft dimensions and the total number of rafts as alternatives to obtain better yields per unit area. Outeiro et al. (2018) calculated the carrying capacity in the Ría de Arousa and found that current mussel aquaculture biomass (1718 t km^{-2}) have exceeded ecological carrying capacity (773 t km^{-2}) but it is still below production carrying capacity (2164 t km^{-2}). This is in agreement with Pérez-Camacho et al. (1991) results, who suggested that the Ría de Arousa might be approaching its production limit in relation to the amount of surface exploited, because yield per raft and number of ropes had remained the same from 1977 to 1984, even when raft size and rope length had increase. Álvarez-Salgado et al. (2017) also observed an overall decrease of the flesh yield of mussels cultured in the Ría de Ares-Betanzos from 2001 to 2012, and related such variations with a decrease in the upwelling regime that has been registered over the last 50 years (Barton et al. 2013). The negative upwelling trend has also been linked to the increase in the number of days that mussel culture areas remain closed due to diarrheic and	Borthagaray, A. I., & Carranza, A. (2007). Mussels as ecosystem engineers: their contribution to species richness in a rocky littoral community. acta oecologica, 31(3), 243-250. Piñeiro-Corbeira, C., Barrientos, S., Olmedo, M., Cremades, J., & Barreiro, R. (2018). By-catch in no-fed aquaculture: exploiting mussel seed persistently and extensively disturbs the accompanying assemblage. ICES Journal of Marine Science, 75(6), 2213-2223. Barrientos, S., Barreiro, R., Olmedo, M., & Piñeiro-Corbeira, C. (2019). Can patch size and patch distance improve the recolonization of mussel-seed beds exploited for aquaculture?. Aquatic Conservation: Marine and Freshwater Ecosystems, 29(11), 1897-1908. Figueiras, F. G., Labarta, U., & Reiriz, M. F. (2002). Coastal upwelling, primary production and mussel growth in the Rías Baixas of Galicia. In Sustainable Increase of Marine Harvesting: Fundamental Mechanisms and New Concepts (pp. 121-131). Springer, Dordrecht. Varela, M., Fuentes, J.M., Penas, E., Cabanas, J.M., 1984. Producción primaria de las Rías Baixas de Galicia. Cuadernos da Área de Ciencias Mariñas, Seminario de Estudos Galegos. Edicións do Castro 1:173-182. Penas, E., 2000. Elementos para una ordenación integral de los usos del medio litoral de Galicia. Consellería		The comments provided by stakeholders have resulted in the complete redrafting of the rationale of PI 2.5.1. The information provided has been used and the issues raised are now discussed in the new rational.	Accepted (no score change)

		paralytic shellfish poisoning toxicity in mussel flesh in the Ría de Vigo, Pontevedra, Arousa and Muros (Álvarez-Salgado et al. 2008, Pérez et al. 2010). The close relationship between coastal upwelling, food availability and mussel growth has been verified empirically (Blanton et al. 1987, Pérez-Camacho et al. 1995, 2014). Therefore, it is crucial to have a comprehensive knowledge on the relationship among these variables in order to forecast population performance under future scenarios. Depletion of primary production may also change phytoplankton structure, as has been observed by Cranford et al. (2014), who indicated that the level of phytoplankton and total suspended particulate matter depletion in the Ría de Betanzos averaged up to 40%, concentrating depletion of larger sizes. The effect of mussel culture on plankton communities has also been described by several authors. Changes in plankton composition, with depletion of specific sizes and therefore, certain fractions of plankton less available for the rest of the species, have been described by Froján et al. (2014, 2016). Maar et al. 2008 observed a significant average depletion of 57% for chl-*a* and of 26 to 77% for different zooplankton groups, as well as changes in the composition of the zooplankton community, suggestings that zooplankton may be important in mussel diet. The authors also suggested that the observed depletion of plankton around the rafts could not be renewed by local production in the farm area. As stated, reduction in zooplankton abundance may reduce fish larvae, since they often are food limited and totally dependent on the abundance of copepod nauplii (depleted by mussels) during their early life (Petersen et al. 2008). Mussel culture can also reduce the number of individuals able to recruit into the natural environment (Gibbs 2004), influencing benthic communities by reduced recruitment. Aquaculture sector in Galicia (mostly mussel raft culture) has been suggested as an important source of marine litter, specially plastics, accounting for 14 to 38% of the items recorded in the region (Gago et al. 2014, Veiga et al. 2016). A study carried out by Álvarez et al. (2018) found microplasctic fibers in 63% of pellets regurgitated by European shags (*Phalacrocorax aristotelis*), suggesting that this type of plastic pollution is prevalent in Galicia; the nylon fibers were the most abundant, followed by polyester; they also found higher presence of microplastics in pellets containing remains of benthic fishes, and suggested that plastics used in mussel culture may be an important source of microplastic release in the area, which is ingested by the benthic fish species the shags feed on. Another source of pollution is that produced by remains of the materials of the rafts and their abandonment, in addition to the antifouling products, which can be toxic to the environment (OESA 2017). However, there are no	de Pesca e Asuntos Marítimos, Xunta de Galicia, 368 p. Pérez-Camacho, A., Labarta, U., Bairas, R., 1995. Growth of mussels (Mytilus edulis galloprovincialis) in cultivation raft, Influence of seed source, cultivation site and food availability, Aquac. 138:349-362. Álvarez-Salgado, X. A., Labarta, U., Fernández-Reiriz, M. J., Figueiras, F. G., Rosón, G., Piedracoba, S., ... & Cabanas, J. M. (2008). Renewal time and the impact of harmful algal blooms on the extensive mussel raft culture of the Iberian coastal upwelling system (SW Europe). Harmful Algae, 7(6), 849-855. Rodríguez Rodríguez, G., 2009. Economía de los cultivos de mejillón en Galicia, Netbiblio, A Coruña. Villasante S, Sumaila R, Garcia-Negro MC and Rodríguez Rodriguez G. 2010. Reconstruction of catches, fisheries, and carrying capacity of Galician (NW Spain) small-scale fisheries. Beijer Discussion Paper Series No. 223. Outeiro, L., Byron, C., & Angelini, R. (2018). Ecosystem maturity as a proxy of mussel aquaculture carrying capacity in Ria de Arousa (NW Spain): A food web modeling perspective. Aquaculture, 496, 270-284. Pérez Camacho, A., R. Gonzalez y J. Fuentes, (1991). Mussel culture in Galicia (N.W. Spain). Aquaculture, 94 (2-3):263-278. Cranford, P. J., Duarte, P., Robinson, S. M., Fernández-Reiriz, M. J., & Labarta, U. (2014). Suspended particulate matter depletion and flow modification inside mussel (Mytilus galloprovincialis) culture rafts in the			

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			Veiga, J.M., Fleet, D., Kinsey, S., Nilsson, P., Vlachogianni, T., Werner, S., Galgani, F., Thompson, R.C., Dagevos, J., Gago, J., Sobral, P. and Cronin, R.; 2016; Identifying Sources of Marine Litter. MSFD GES TG Marine Litter Thematic Report; JRC Technical Report; EUR 28309; doi:10.2788/018068 Álvarez, G., Barros, Á., & Velando, A. (2018). The use of European shag pellets as indicators of microplastic fibers in the marine environment. Marine pollution bulletin, 137, 444-448. OESA - Fundación Biodiversidad (2017). Cultivo del mejillón (Mytilus galloprovincialis). Fundación Biodiversidad, Madrid, España. 104 páginas			
2.5.2 - Ecosystem management strategy	Lack of ecosystem management strategy.	There is no ecosystem management strategy, based on the scientific knowledge to date, for any of the topics considered in the previous PI. As mentioned before, there are several studies that point out to an exceeded carrying capacity and even though, no measures have been taken towards a sustainable yield, nor even considering the proximate expected changes due to climate change.			The rationale for this PI has been redrafted. The team has considered that there are several management measures in place that together form a partial strategy to restrain ecosystem impacts. The resctrictions on the number of rafts and ropes, the length of ropes and the maximum quantities of spat that can be collected are among the most important of these measures. The team further concluded that there is some evidence that these measures are implemented effectively and that these measures will work. The comments of stakeholder argue that more should be done. This issue is further discussed in the response to the comments on PI 3.2.2.	Not accepted (no score change)
2.5.3 - Ecosystem information	Lack of key information for the ecosystem	There are several studies available to assess the effects of mussel raft culture in Galicia on some aspects related with the ecosystem like primary production and carrying capacity, nonetheless, it has not been used with the intention of creating a sustainable management strategy, but has been used to make the culture more profitable, regardless of the signs of non-sustainability. However, there is a lack of information on the real contribution of waste to the Galician rías, as well as in the real stock status of natural mussels, as explained in previous sections.			This PI is concerned with the question if information is available. The team has concluded that there is sufficient information is available to understand the key element of the ecosystem and to infer the main consequences for the ecosystem. The coment argues that the information is not taken into account. This issue is furter discussed under PI 3.2.2.	Not accepted (no score change)

Principle 3 - Effective management	Lack of effective management	The legislation regulating the activity is obsolete regarding the present and future challenges. An example of that are the historical conflicts between the different partners of the mussel sector, and the conflicts between them and barnacle collectors, indicating that fishery management presents major structural flaws that significantly affect decision-making, management strategy and articulation of mechanisms facing the future challenges of the sector. Likewise, it is clear that intervention by the administration is necessary to make decisions and regulate the fishing activities based on scientific knowledge in order to provide definitive solutions to the conflicts and guarantee, in practice, the sustainability of the exploited resources involved.			This comment is a general comment on the management system. The issues raised here by the stakeholder have been considered under PI 3.2.2. and PI3.2.3.	
3.1.1 - Legal and/or customary framework	Obsolete specific legislation Lack of specific mussel culture strategic plan	Although there is a general European framework, specific governance is not sufficient to carry out the fishing activity ensuring the sustainable exploitation of resources. As mentioned in the ACDR, the legal power in shellfish and aquaculture has been transferred to the Xunta de Galicia, and the law that regulates the mussel culture (Decree 406/1996) has been proven to be obsolete, insufficient and poorly detailed, which needs to be reviewed in order to adapt to current needs and future challenges the mussel sector is about to face. Moreover, this legislation has a clear sectoral character, and the regulations established therein are intended for the protection of the sector itself. An example of these aspects is the scarce rules of management and control around the extraction of seed, which has not only caused a possible overexploitation of the resource, but has also resulted in numerous and continuous conflicts between the mussel sector and goose barnacle collectors. The Spanish Aquaculture Strategic Plan (for the 2014-2020 period) establishes that among the weaknesses of mollusc farming (eminently dominated by the Galician mussel culture) is legal insecurity, predominantly sectoral planning without coordination according to its dimensions, and the atomization of the sector and its organizational structures. It is also established that there is a poor coordination of policies and lines of work in specific R & D, which translates into a poor transfer of research results to the productive sector. Similar weaknesses were identified in the Galician Aquaculture Strategic Plan (from 2012), which also highlighted the development of a Strategic Mussel Plan in the first quarter of 2013. However, despite seven years have elapsed, it has not materialized yet. Likewise, the stoppage of the aquaculture law due to lack of consensus, denotes stagnation of the administration in developing plans and legal frameworks that allow an orderly and responsible exploitation of resources.	https://www.mapa.gob.es/es/pesca/temas/acuicultura/plan_estrategico_6_julio_tcm30-77594.pdf https://www.planesga.es/docs/SXMar/ESGA_Noviembre2012_cast.pdf		In this PI it is assessed whether the general fisheries management system exists within an appropriate customary or legal system. The fisheries specific system is assesed under PI 3.2.1. Additional rational is provided. The Spanish fisheries management system operates within the EU Commom Fisheries Policy and within the Spanish legal system. It is concluded that these legal systemas are effective and that there is effective cooperation with other parties (within the EU). The management system also includes a mechanism for the resolution of legal disputes. Further response to the stakeholder comments is given under PI 3.2.1.	Not accepted (no score change)

3.1.2 - Consultation, roles and responsibilities	Lack of effective consultation process	There is no consultation mechanism in place incorporating other parties since the only specific consultation body (Mussel Comission, created on the December 28, 2010 Order) only includes the mussel sector and the administration. There should be two main productive sectors involved in the evaluation of this indicator, due to the overlap in the use of space: the mussel culture sector and goose barnacle collectors. Seed extraction is the biggest obstacle to resolve for the coexistence of both sectors, however, such an important issue is not taken into account when evaluating this indicator. Therefore, roles and responsibilities are not properly addressed, otherwise, the barnacle sector would actively participate in consultation processes. Besides the conflicts with goose barnacle collectors, there have been strong conflicts among mussel producers (Labarta et al. 2019), which reflects that not all the involved parts in the decision-making process agree about the management strategy. It is also worth mentioning that the opinion from NGO's is not considered most of the time and also that it seems clear that not all the relevant and independent scientific information is taken into account.	https://www.lavozdegalicia.es/noticia/ferrol/ferrol/2019/01/12/guerra-percebeiros-bateeiros-raiz-extraccion-mejilla/0003_201901F12C5991.htm https://www.farodevigo.es/portada-o-morrazo/2019/05/25/percebeiros-cangas-califican-menosprecio-mar/2111689.html https://mar.xunta.gal/es/anuncios/decreto-1532019-do-21-de-novembro-polo-que-se-regula-o-rexime-de-conservacion-e-0 Labarta, U., & Fernández-Reiriz, M. J. (2019). The Galician mussel industry: Innovation and changes in the last forty years. Ocean & coastal management, 167, 208-218. https://www.lavozdegalicia.es/noticia/opinion/2019/03/21/mejilla-mejillon/0003_201903G21P16992.htm		It is argued here that the views of NGO's are not sufficiently taken into account and that the goose barnacle sector is not included in the decision making process. The stakeholder comment is merely focusing on the decison making process as they claim that their opinion is not considered by the authorities. Therefor these issues are further discussed under PI 3.2.2. The team has reconsider the rational for this performace indicator and has added rational describing the consultation processes in place. It was concluded that in the general fisheries management system clearly includes consultation processess and that roles and responsibilities are clearly defined and that this system regularly seeks and accepts information through consultation.	Not accepted (no score change)

3.1.3 - Long term objectives	Lack of effective strategies to accomplish the sustainability objectives	The strategic objectives are focused on productivity, with a great gap in planning objectives which lead to a sustainable exploitation of resources. As mentioned before, there is no Strategic Mussel Plan, despite having been identified as a necessity a long time ago. On the same line, the lack of consensus has made it impossible to materialize an aquaculture law. Both the Spanish and Galician Aquaculture Strategic Plans have established that among the weaknesses of mollusc farming (eminently dominated by the Galician mussel culture) is legal insecurity, predominantly sectoral planning without coordination according to its dimensions, and the atomization of the sector and its organizational structures. It is also identified that there is a poor coordination of policies and lines of work in specific R & D, which translates into a poor transfer of research results to the productive sector. Indeed, the regulation in Decree 406/1996 establishes that "equitable distribution of natural resources must be guaranteed, and that the deterioration of the environment must be avoided", but this regulation has proven to be obsolete and does not meet the needs of resource management, based on the submitted bibliography. Even though the legislation regulating the fishing activity has been in force since 1996, it has not been possible to prevent the deterioration of the environment, as mentioned in other sections, so, in practice, the precautionary approach does not appear to be fulfilled. A clear example example of this is the lack of effective strategy and regulation for seed harvesting, where it has been taken for granted that natural seed would always show enough biomass to meet the needs of the crop, without having quantified or monitored it. Labarta and Fernández-Reiriz (2019) study supports the increasing need for mussel seed to be optimized, both in the collection along the coast as well as on ropes, since in recent years many producers claim to have observed a reduction in the productivity and quality of mussel seed (ANFACO-CECOPESCA). The mussel culture industry should take into account the changes that are already occurring, and management strategies should be oriented to more precautionary scenarios.	https://www.mapa.gob.es/es/pesca/temas/acuicultura/plan_estrategico_6_julio_tcm30-77594.pdf https://www.planesga.es/docs/SXMar/ESGA_Noviembre2012_cast.pdf Labarta, U., & Fernández-Reiriz, M. J. (2019). The Galician mussel industry: Innovation and changes in the last forty years. Ocean & coastal management, 167, 208-218. http://www.anfaco.es/blog_ct/index.php/2019/12/23/nuevas-estrategias-para-mejorar-la-viabilidad-de-la-produccion-de-semilla-de-mejillon/		Additional rational is provided in the scoring table. Under this Performance Indicator it is evaluated whether long term objectives that guide decision making are explicit in the management system. The team has concluded that these objectives have been formulated in EU regulations and the Spanish and Galician fisheries laws. The comments of the stakeholder do not deny that objectives are formulated in the management system but argue that things are not working as they shoud do. These comments mainly concern the decision making process and are further discussed under PI 3.2.2.	Not accepted (no score change)

3.2.1 - Fishery-specific objectives	Lack of specific objectives and strategic plans	The short and long-term objectives are static and the administration seems to have a business-as-usual policy, which is reflected in the outcomes exposed on P1 and P2, and is not consistent with achieving the MSC Principles. This can be seen on the lack of a Strategic Mussel Plan, on the lack of an aquaculture law and on the lack of an adecuate revision of the main law regulating the activity, although there is evidence of their need many years ago. Both the Spanish and Galician Aquaculture Strategic Plans have established that among the weaknesses of mollusc farming (eminently dominated by the Galician mussel culture) is legal insecurity, predominantly sectoral planning without coordination according to its dimensions, and the atomization of the sector and its organizational structures. It is also identified that there is a poor coordination of policies and lines of work in specific R & D, which translates into a poor transfer of research results to the productive sector. Therefore, there is no evidence of adaptability to the MSC standard. The lack of strategic plans is then translated into lack of capacity to comply with Principles 1 and 2, and develop future strategies that adapt to the expected challenges. The most recent review on Galician mussel industry, by authors so familiar with the subject, such as Uxío Labarta and Mª José Fernández-Reiriz (2019) (with an extensive background and scientific publications on the subject), supports the increasing need for mussel culture industry to adapt to new scenarios and specifically highlights the need to optimize the seed harvesting processes, both in the collection along the coast as well as on ropes. The recent iniciative to develop the MUSSELECT project is an indication of that, as stated by ANFACO-CECOPESCA, in recent years many producers claim to have observed a reduction in the productivity and quality of mussel seed. The study of Larbarta and Fernández-Reiriz (2019) also covers the strong dependence of mussel culture on the upwelling regime in Galicia: "*when upwelling is weak, the high mussel population density results in low biomass of individual mussels and, thus, poor marketability*". The duration and intensity of the upwelling season have decreased by 30 and 45% respectively in the last 40 years (Álvarez-Salgado et al. 2008). Such decrease has been linked to a reduction in biomass of individual mussels and increase of red tides, therefore, the mussel culture industry should take into account the changes that are already occurring as a result of climate change, and management strategies should be oriented to more precautionary scenarios.	https://www.mapa.gob.es/es/pesca/temas/acuicultura/plan_estrategico_6_julio_tcm30-77594.pdf https://www.planesga.es/docs/SXMar/ESGA_Noviembre2012_cast.pdf Labarta, U., & Fernández-Reiriz, M. J. (2019). The Galician mussel industry: Innovation and changes in the last forty years. Ocean & coastal management, 167, 208-218. http://www.anfaco.es/blog_ct/index.php/2019/12/23/nuevas-estrategias-para-mejorar-la-viabilidad-de-la-produccion-de-semilla-de-mejillon/ Álvarez-Salgado, X. A., Labarta, U., Fernández-Reiriz, M. J., Figueiras, F. G., Rosón, G., Piedracoba, S., ... & Cabanas, J. M. (2008). Renewal time and the impact of harmful algal blooms on the extensive mussel raft culture of the Iberian coastal upwelling system (SW Europe). Harmful Algae, 7(6), 849-855.		The team has rewritten the rational on this performace indicator. It was considered that short and long term objectives are formulated and that they are consistent with achieving the outcomes expressed by the MSC Priciples 1 & 2. The stakeholder comments argue however that there is a lack of strategic planning that adapts to new challenges. This comment is merely concerned with the decisions taken and whether the decisions made achieve fishery specific objectives.	Not accepted (no score change)

3.2.2 - Decision-making processes	Lack of historical consensus among producers and lack of transparency	We strongly disagree with the statement that throughout the mussel cycle numerous controls are performed and transparency in the management of the system is guaranteed. The seed extraction procedure is not rigorously controlled following the precautionary approach or any spatial management strategy (as addressed in P1), nor is there transparency in the decision-making process. There is no report that supports what is done with the information or how it is taken into account when making decisions. For example, an evaluation was commissioned to the CETMAR on the state of the natural seed beds, but it has not been published and there is no knowledge of its use. For many years there has been a conflict between goose barnacle collectors and mussel producers over seed collection, and although measures have been proposed attempting to mediate, such as allowing goose barnacle fishermen to collect the seed, a definitive solution has not been reached. The study carried out by Brea Bermejo a decade ago highlighted the differentiation of harvesting areas for both fishing activities, evaluating the suitability of each zone for both activities, with exclusive recommended areas for barnacle extraction, other exclusive areas for mussel seed, and shared exploitation areas. But this recommendations were never taken into account for the administration in order to stablish an orderly management based on scientific facts. A more equitable negotiating relationship between local barnacle fishers and harvesters of mussel seed is required (Molares & Freire 2003). The recent measure by the Consellería do Mar (Decree 153/2019, Article 13), about allowing barnacle collectors to reserve the exploitation of certain areas, seems to be heading towards it. However, nothing has materialized yet and no action has been defined. It seems clear that effective and definitive regulation is necessary to end the conflict. Likewise, there have been conflicts in the past between mussel organizations in favor and against a common distribution and management. An example of that was the very serious event between 2008 and 2010, which led to major fluctuations in the marketed production. This lack of consensus can counteract efforts directed towards sustainable management.	https://www.lavozdegalicia.es/noticia/ferrol/ferrol/2019/01/12/guerra-percebeiros-bateeiros-raiz-extraccion-mejilla/0003_201901F12C5991.htm https://www.farodevigo.es/portada-o-morrazo/2019/05/25/percebeiros-cangas-califican-menosprecio-mar/2111689.html https://www.lavozdegalicia.es/noticia/carballo/2019/12/11/mar-sofoca-conflicto-mejilla-cambios-plan-percebe/0003_201912C11C3994.htm Brea Bermejo, E. (2009). Cartografiado y dinámica de las poblaciones de los bancos naturales de semilla de mejillón en las costas atlánticas gallegas. PhD thesis. Universidad de Santiago de Compostela, Santiago de Compostela. Molares, J., & Freire, J. (2003). Development and perspectives for community-based management of the goose barnacle (Pollicipes pollicipes) fisheries in Galicia (NW Spain). Fisheries Research, 65(1-3), 485-492. https://mar.xunta.gal/es/anuncios/decreto-1532019-do-21-de-novembro-polo-que-se-regula-o-rexime-de-conservacion-e-0 Labarta, U., & Fernández-Reiriz, M. J. (2019). The Galician mussel industry: Innovation and changes in the last forty years. Ocean & coastal management, 167, 208-218. https://www.farodevigo.es/galicia/2008/09/14/maneras-entender-conflicto/258365.html https://www.farodevigo.es/portada-arousa/2019/03/27/estudio-cartografico-cetmar-identifica-principales/2076182.html		The team has reconsidered the scoring for this performance indicator. Recent developments concerning the extension of the mussel spat collection season have also been taken into account. The team concluded that concerning spat collection the information on the performance of this activity is currently only available for the authorities and other parties are not able to see how and whether this information is used or not used. It is also not clear whether explanations are provided for actions or lack of action concerning the monitoring of spat collection. As a consequence the team concluded that the SG80 scoring issue for PI 3.2.2d is not met. A condition has been formulated.	Accepted (material score reduction to <80)

3.2.3 - Compliance and enforcement	Lack of compliance along the productive process	There is no evidence that a monitoring, control or surveillance system has been implemented in the fishery and no ability to enforce relevant management measures has been demonstrated regarding the seed extraction process. While regarding raft culture management, Article 32 of Decree 406/1996 states that "*waste from by-product, handling and evisceration of the species under cultivation cannot be thrown into the sea*". Nonetheless, even the Gestinmer project report admited an estimation of 23,600 tons of by-product went over sea bottoms only during 2004.			The team has reconsidered the scoring for this performance indicator. Recent developments concerning the extension of the mussel spat collection season have also been taken into account. The team concuded that concerning spat collection the information on the performance of this activity is currently only available for the authorities and other parties are not able to see how and whether this information is used or not used. It is also not clear whether explanations are provided for actions or lack of action concerning the monitoring of spat collection. As a consequence the team concluded that the SG80 scoring issue for PI 3.2.2d is not met. A condition has been formulated.	Accepted (no score change)
3.2.4 - Monitoring and management performance evaluation	Lack of effective management on **key** parts: seed collection	There are no mechanisms in place to evaluate key parts of the mussel raft culture in Galicia, therefore, the fishery-specific management system is not subjected to regular internal or occasional external review. As mentioned before, a strategic mussel plan was identified as a necessity a long time ago but it has not been developed yet. In the absence of a specific plan there are no mechanisms in place to evaluate such a key (PI 3.2.4 - SG80) part of the fishery-specific management system as the seed provisioning. An example of this is the lack of information about the proportion of non-target species when extracting seed, despite the fact that producers must inform the administration about seed extraction. In addition there is no monitoring of the effects on the sea bottoms, nor an adaptation of the crop to the ecosystem carrying capacity, as mentioned in P2. In addition, the internal reviews carried out appear to be biased in favor of the sector itself. An example of this is the report published by the Galician mussel Regulatory Council, entitled "*Galician Mitiliculture as an example of sustainability*", where a series of references are made to the sustainability of mussel farming in Galicia, based on studies of other cultures from different ecosystems and countries, whose results should not be extrapolated to the Galician estuaries. The results of the study carried out by Piñeiro-Corbeira et al. (2018) indicated that most of the landward side of the Illas Atlánticas National Park is persistently disturbed by the exploitation of mussel seed, despite its status of marine protected area, which shows the lack of regular surveillance and monitoring in the area. Supporting these data, even the associations of fishermen indicate that there is no regular surveillance (personal communication). Pita et al. (2019) suggests that the socioecological sustainability of the shellfisheries in Galicia requires administration policies regarding the support of research and surveillance, increase control over pollution and poaching and the strengthening of co-management frameworks.	https://www.mexillondegalicia.org/wp-content/uploads/2015/04/Informe_sostenibilidade_Angeles_Longa.pdf Piñeiro-Corbeira, C., Barrientos, S., Olmedo, M., Cremades, J., & Barreiro, R. (2018). By-catch in no-fed aquaculture: exploiting mussel seed persistently and extensively disturbs the accompanying assemblage. ICES Journal of Marine Science, 75(6), 2213-2223. Pita, P., Fernández-Márquez, D., Antelo, M., Macho, G., & Villasante, S. (2019). Socioecological changes in data-poor S-fisheries: A hidden shellfisheries crisis in Galicia (NW Spain). Marine Policy, 101, 208-224. https://www.lavozdegalicia.es/noticia/opinion/2019/03/21/mejilla-mejillon/0003_201903G21P16992.htm		In the comment it is argued that there is no review in the fishery specific management system. However the team has considered that internal review and discussions regularly take place within the fora that regulate the fishery like the Xunta de Galicia and the Comisión do Mexillon. Besides that there are numorous scientific articles evaluating different parts of the management system and its performance as is shown by the references provided by stakeholder. Stakeholder comments are arguing that review and discussions do not result in sufficient actions. These kind of issues are evaluated under the outcome and management PI's under Principle 2 and under PI3.2.2. Concerning external review the team has considered that external review occasionally takes place since several reports and articles on the management system and its performance have been written by independent authors.	Not accepted (no score change)

Other stakeholders

The following stakeholders (6) sent the same comments to the ACDR. BV decided to put them together and gave a common answer. However, the contact details are indicated separately:

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Register*	I wish to register as a stakeholder - please keep me informed about each stage of the assessment process

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Register*	I wish to register as a stakeholder - please keep me informed about each stage of the assessment process

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Assessment Stage*	Stakeholder input on the Public Comment Draft Report
Register*	I wish to register as a stakeholder - please keep me informed about each stage of the assessment process

General comments

General comments from the following stakeholders: • Cofradia de pescadores San Xose de Cangas • Cofradía de Pescadores de Vigo • Cofradía de Pescadores "La Anunciada" de Baiona • Federación Galega de Confrarías • Federación Provincial de Confradías de Pescadores de Pontevedra • Cofradía de Pescadores de Sant Tecla de Aguarda	**Evidence or references**	**CAB response to stakeholder input**	**CAB Response Code**
En el ACDR se detecta de forma general una ausencia de iniciativas enfocadas a aportar soluciones al conflicto existente entre los planes de gestión de percebe y la extracción de semilla de mejillón. Esta certificación y el nuevo marco regulatorio son una oportunidad para establecer medidas de gestión espacial concretas que eviten la recogida de mejilla en zonas especialmente sensibles propuestas por las cofradías.		Firstly, the team recognizes that the ACDR was not as comprehensive as it could be. The rationale of some PIs were very general. In relation to the stakeholder's comment, the intention of the assessment team is not to propose alternatives or solutions to the current conflict but to assess whether the fishery is sustainable or not, against the MSC Standard. However, the team has considered the issue raised by the stakeholder's comments in several PIs.	Not accepted (no score change)
En desacuerdo en cómo se aborda, desde el punto de vista espacial, el análisis de RBF para evaluación del impacto de la extracción de semilla sobre el percebe, tanto en productividad como en susceptibilidad.Creemos que no se valora con suficiente concreción las especiales características de la gestión de percebe en la costa de Galicia: • En Galicia viven de la extracción del percebe cerca de 1500 personas, que participan en alguno de los 37 planes de gestión aprobados por la Consellería do Mar. En la provincia de Pontevedra cerca de 400 personas trabajan en los 10 planes de gestión presentados por las cofradías. • Cada cofradía realiza una gestión de las poblaciones de percebe y otros recursos marisqueros mediante el otorgamiento por parte de la administración pesquera de unos derechos territoriales de uso en un tramo concreto del litoral de Galicia. • Para realizar una explotación comercial sostenible de las poblaciones de percebe las cofradías deben implantar en sus planes distintas estrategias de gestión (vedas/rotación de zonas, etc), en ámbitos territoriales de poca extensión, en comparación con el área total de distribución de la especie. • Esta micro gestión en un determinado tramo del litoral debe ser tenida en cuenta a la hora de valorar los efectos negativos de una extracción masiva de semilla de mejillón de las rocas, en particular en zonas especialmente sensibles, con alta calidad de percebe y por lo tanto de una gran importancia desde el punto de vista socioeconómico para el colectivo de percebeiros de cada cofradía. • El percebe es un organismo sésil que vive adherido a las rocas. Mantener una cobertura suficiente del recurso es fundamental para garantizar tanto la salud de las poblaciones (reclutamiento, …), como los ingresos de los profesionales que viven de su comercialización.	Development and perspectives for community-based management of the goose barnacle (Pollicipes pollicipes) fisheries in Galicia (NW Spain) J. Molares, J. Freire / Fisheries Research 65 (2003) 485–492 Pescadegalicia (Planes de gestión de Recursos Específicos) Pita, P., Fernández-Márquez, D., Antelo, M., Macho, G., & Villasante, S. (2019). Socioecological changes in data-poor S-fisheries: A hidden shellfisheries crisis in Galicia (NW Spain). Marine Policy, 101, 208-224	This comment focuses on the importance of Goose barnacle collection in Galicia. Additionally it is stated that in the RBF this economic and social impact should be given more weight. The team wishes to express that they understand this view. However the MSC assessment is concerned with the sustainability of the activity and not with social or economic impacts. If Goose barnacles are harvested by both Goose barnacle collectors and this is impacted by mussel spat collectors the removal of Goose barnacles from the rocks is still a fact even without spat collection. The team has to assess the impact of spat collection (and the wider mussel culture) on species, habitats and ecosystem according the the MSC certification requirements. Under P3 the team has to assess the management syste and the decision making process. The team has considered under Pi 3.2.2 that the decision making process is currently does not meet the SG80 guidepost. This because information on spat collection is not publicly availabe and it is also not clear whether explanations are provided for actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity. Therefore the team has drafted a Condition with this respect. In relation to the RBF tool, it was developed by MSC to cover fisheries that have limited data.	Not accepted (no score change)

		The RBF enables the assessment team to conduct a structured risk assessment to determine whether a data-limited fishery is operating sustainably or not. It also ensures that the MSC program is accessible to all fisheries. Indeed, it's a precautionary tool that will likely result in lower scores. The Productivity Susceptibility Analysis (PSA) assesses how likely a stock is to recover when depleted, as well as how likely other species are to interact with fishing gear. The PSA was used to assess the Goose banacle (Pollicipes pollicipes) in PI 2.2.1. The information of the stakeholder is more focused on the management and monitoring of the species which is covered in other PIs (PI 2.2.2; 2.2.3).	
En el análisis de RBF también consideramos que existen otras carencias, puesto que no se abordan cuestiones relativas a la propia biología de la especie secundaria (percebe) que son vitales para mantener la salud de la población. Se deberían plantear atributos como las coberturas mínimas del cirrípedo en la piedra, porque con la extracción intensiva de mejilla también se arrancan los individuos adultos de percebe que se asientan entre el bivalvo, además de percebes de escaso tamaño pertenecientes a cohortes de individuos de percebe recien fijados, que deben renovar la población a corto plazo. El arte de pesca empleado, su baja selectividad, la metodología de extracción (arrancado de toda la biocenosis sobre la roca) conlleva numerosos daños en la especie e incluso en el propio hábitat que no son considerados con la suficiente gravedad.	Piñeiro-Corbeira, C., Barrientos, S., Olmedo, M., Cremades, J., & Barreiro, R. (2018). By-catch in no-fed aquaculture: exploiting mussel seed persistently and extensively disturbs the accompanying assemblage. ICES Journal of Marine Science, 75(6), 2213-2223.	We don't agree with the stakeholder, the PSA is divided into 2 steps: step 1, score the productivity attributes and step 2 score the susceptibility attributes. The productivity determines how rapidly a species can recover from depletion or impact due to fishing. The productivity of a species is determined by species attributes such as longevity, growth rate, fecundity, recruitment and natural mortality. Information about productivity attributes can be found in scientific literature and websites. We consider that the PSA is appropriate to assess the outcome of this PI and covers the main points highlighted by the stakeholders.	Not accepted (no score change)
MSC no facilita la participación en este proceso de certificación aportando la información disponible al público en ingles (informe preliminar ACDR y este formulario). No se entiende el uso de este idioma cuado se está certificando a una entidad gallega, que desarrolla su actividad en Galicia y que tiene efectos económicos y sociales en la sociedad gallega. Las personas a las que le puede interesar participar y conocer el resultado del estudio son gallegas. El empleo del inglés que no es lengua oficial en la zona de estudio, ni lengua de uso habitual dificulta y limita enormemente el acceso a la información y la participación.		English is the official language of the MSC Standard. However, we agree that the language can be a barrier to fully understand the details of the Performance Indicators. However, we want to mention that 3 out of 4 people of the team speaks Spanish and all the announcements were translated to Spanish and interviews were carried out in Spanish ensuring that information could be clearly exchanged between the team, client and stakeholders and understood by most parties.	Accepted (no score change)

PI comments

Performance Indicator (PI)	Input summary	Input detail	Evidence or references	Suggested score change	CAB response to stakeholder input	CAB response code
Principle 1 - Sustainable fish stocks	Hay evidencias para considerar que P1 debe ser evaluado	Los supuestos para no calificar el Principio 1 en los lechos de semillas naturales se basaron en información no actualizada y, aún más, el enfoque de precaución no parece cumplirse. En base a la información presentada en el ACDR, el equipo concluyó que la cultura de la balsa de mejillón gallega: a) no implica translocaciones b) no hay evidencia de que esta actividad afecte negativamente al stock parental. Sin embargo, estamos totalmente en desacuerdo, en base a la siguiente información, que confirma la necesidad de evaluar P1. **Con respecto al supuesto a)**: Como se indica en el ACDR, los resultados del estudio realizado por Villalba et al. (1997) indican que especies de parásitos como Mytilicola intestinalis o Martelia refringens tienen una tasa de prevalencia promedio de alrededor del 10% en las rias gallegas. Sin embargo, los autores también señalan diferencias en la prevalencia de especies de parásitos dentro de las rias (áreas internas frente a las externas) y entre las diferentes rias; por lo tanto, las translocaciones de una ria dada, o un área dentro de una ria, donde la prevalencia es alta, a otra área donde la prevalencia es baja podría estar contribuyendo a la propagación de enfermedades o especies de plagas a lo largo de toda la región gallega. Un ejemplo de esto es mencionado por estos mismos autores, quienes declararon que la aparición de Urastoma cyprinae en mejillones gallegos no se informó antes de 1988, pero en el momento del estudio su prevalencia era cercana al 100% en mejillones adultos de cada sitio de cultivo en Galicia, lo que probablemente se explica por las actividades de translocación. Más aún, los autores dicen que "el trasplante de semilla de mejillón para cultivo podría contribuir a la propagación de algunos simbiontes en las Rías". Además, el comercio constante de mejilla en las rías gallegas se ha relacionado con la propagación del mejillón invasivo Xenostrobus securis (Pascual et al. 2010). El hábitat creado por el cultivo suspendido está relativamente libre de depredadores bentónicos y puede actuar para perpetuar las infestaciones una vez que se establecen, como lo afirman McKindsey et al. (2007) **Con respecto al supuesto b):** El único estudio exhaustivo hasta la fecha sobre el estado de los lechos de mejilla, realizado por Brea Bermejo en 2009, sugiere que la recuperación de semillas en el	Villalba, A., Mourelle, S. G., Carballal, M. J., & Lopez, C. (1997). Symbionts and diseases of farmed mussels Mytilus galloprovincialis throughout the culture process in the Rias of Galicia (NW Spain). Diseases of Aquatic Organisms, 31(2), 127-139. Pascual, S., Villalba, A., Abollo, E., Garci, M., González, A. F., Nombela, M., ... & Guerra, A. (2010). The mussel Xenostrobus securis: a well-established alien invader in the Ria de Vigo (Spain, NE Atlantic). Biological Invasions, 12(7), 2091-2103. McKindsey, C.W., Landry, T., O'Beirn, F.X., and Davies, I.M. 2007. Bivalve aquaculture and exotic species: a review of ecological considerations and management issues. J. Shellfish Res. 26(2): 281–294. doi:10.2983/0730-8000(2007)26[281:BAAESA]2.0.CO;2. Brea Bermejo, E. (2009). Cartografiado y dinámica de las poblaciones de los bancos naturales de semilla de mejillón en las costas atlánticas gallegas. PhD thesis. Universidad de Santiago de Compostela, Santiago de Compostela. http://www.anfaco.es/blog_ct/index.php/2019/12/23/nuevas-estrategias-para-mejorar-la-viabilidad-de-la-produccion-de-semilla-de-mejillon/ https://www.lavozdegalicia.es/noticia/opinion/2019/03/21/mejilla-mejillon/0003_201903G21P1699		This stakeholder comment focuses on the impact of mussel spat collection on the natural mussel bed on the rocks along the Galician coast. The team however evaluated a wider issiue, namely the impact of the fishery (including ongrowing) on the parent mussle stock. Concerning the impact of spat collection on the parent stock the team considered that only small mussel that are not yet part of the reproductive component are harvested and that a removal of a very limited part of the adult mussels in the system will not affect the reproductive capacity of the mussel stock. Furthermore it was considered that the mussel spat is not removed from the surrounding ecosystem of the mussel population. The mussel spat remains in the same ecosystem as it is placed on the ropes of the mussel rafts in the rias. On these rafts, growing conditions in terms of food supply and mortality are usually better then in natural beds. The mussels on the ropes will spawn several times during the producing cycle before they are harvested. Thus the harvesting of mussel spat and the ongrowing on ropes rather results in an increase of the parent stock and does therefore not result in a negative impact of the parent stock. The team therefore upheld its initial conclusion that there is no negative impact on the parent stock and thus that Principle 1 should not be scored.	

		intermareal después de la cosecha se lleva a cabo en la mayoría de los sitios analizados. Sin embargo, el autor también indica que existen diferencias significativas en las tasas de recuperación entre las ubicaciones y también con respecto al número de individuos asentados, lo cual es crucial para el reclutamiento de la especie con el fin de mantener a las poblaciones. También afirma que la presión de extracción difiere entre las ubicaciones, lo que hace que la recolonización sea más lenta en algunas de ellas. Más importante aún, hay evidencias recientes que apuntan a una disminución en la abundancia de semillas intermareales. Uxío Labarta (experto en la investigación del cultivo del mejillón gallego) afirma en un artículo de prensa que "desde 2017 se han detectado fluctuaciones descendentes en la abundancia de semillas de mejillón en Galicia". La iniciativa para desarrollar el proyecto MUSSELECT es una indicación de ello. El objetivo general del proyecto será el desarrollo de métodos escalables y de bajo costo para la producción de semillas de mejillón con un rendimiento mejorado y características de supervivencia. Según lo declarado por ANFACO-SECOPESCA: "En los últimos años, muchos productores afirman haber observado una reducción en la productividad y la calidad de los mejillones, en forma de un crecimiento más lento y un debilitamiento de los filamentos del bisal, lo que hace que los individuos se separen de las cuerdas en mayor cantidad que en épocas anteriores, posiblemente causado por el aumento gradual de la temperatura del agua. En este sentido, MUSSELECT proporcionará trazabilidad al cultivo de semillas en criaderos y la posibilidad de hacer una selección genética de familias con características de alto crecimiento o resistencia a ciertas condiciones ambientales, que se espera que tengan fuertes beneficios en la producción de mejillón en Galicia ". En un mundo cambiante, donde el cambio climático ya está afectando a los ecosistemas en tantos niveles, es muy arriesgado suponer que durante una década no ha habido cambios perjudiciales en una población que está sujeta a la presión de una industria de gran volumen (7,000 toneladas de semilla para obtener una cosecha anual de 250,000 toneladas de mejillones), como el cultivo de mejillones en Galicia. Predicciones realizadas por Silva et al. (2017) sobre el impacto que el cambio climático puede tener en la producción de mejillones en las Rías Baixas, afirmó que el cultivo de mejillones en ciertas áreas (cerca de las desembocaduras de los ríos) de la Ría de Vigo (con el 14% de las balsas) y la Ría de Arousa (con ~ 70% de las balsas) podría verse amenazado por el aumento de las temperaturas y la disminución de la salinidad. Los autores sugieren que algunas áreas deberían considerarse muy sensibles para el futuro cultivo de mejillones ya que se espera que la temperatura de la superficie del mar aumente aproximadamente 3ºC en las Rías Baixas y se	2.htm Silva AF, Sousa MC, Bernardes C, & Dias JM. (2017). Will Climate Change Endangers the Current Mussel Production in the Rias Baixas (Galicia, Spain)?. Journal of Aquaculture & Fisheries. 1:1. Gazeau F, Alliouane S, Bock C, Bramanti L, Correa ML, et al. (2014) Impact of ocean acidification and warming on the Mediterranean mussel (Mytilus galloprovincialis). Frontiers in Marine Science			

		pronostica que la salinidad disminuirá 1 unidad. Silva y col. (2017) los resultados fueron respaldados por Gazeau et al. (2014), donde se demostró que los mejillones son muy sensibles a un calentamiento de 3ºC, lo que podría conducir a un nivel subóptimo e incluso respuestas letales de temperatura. Gazeau y col. (2014) estudiaron el impacto de la acidificación y el calentamiento de los océanos en M. galloprovincialis, y observaron limitaciones de crecimiento en condiciones de alta temperatura. También observaron tasas de calcificación más bajas con alteración del periostraco y hilos balsámicos más débiles en mejillones mantenidos bajo tratamientos de pH bajo, lo que podría reducir la resistencia de la cáscara al daño mecánico y afectar la capacidad de los mejillones para adherirse al sustrato, respectivamente. Este último efecto podría estar relacionado con lo que los productores observan y afirman con respecto a un "debilitamiento de los filamentos del bisal, que hace que los individuos se desprendan de las cuerdas en mayor cantidad que en épocas anteriores". Las primeras etapas de la vida son más vulnerables al calentamiento, por lo tanto, es probable que el reclutamiento y la producción de semillas representen cuellos de botella para el cultivo de mejillones en el escenario de calentamiento actual, dada la alta dependencia del suministro de semillas desde la intermareal (~ 70% de origen de la semilla natural). Aunque el CAB no evalúa el P1, consideramos necesario resaltar los siguientes aspectos relacionados con los Indicadores de desempeño.				

1.1.1 - Stock status	Ausencia de una evaluación de abundancia/ stock de semilla de mejillón en bancos naturales. No se tienen en cuenta factores que pueden afectar a los lechos de mejilla.	Estamos en desacuerdo con que no se considere necesaria de evaluación que permita determinar el tamaño del stock de mejillón en los tramos rocosos del litoral, para adecuar su extracción a las cantidades presentes, evitando la sobreexplotación del recurso y el perjuicio causado sobre el conjunto del ecosistema (especies depredadoras/especies conspicuais que comparten su hábitat,etc.). El único estudio exhaustivo hasta la fecha sobre el estado de los lechos de mejilla, realizado por Brea Bermejo en 2009, sugiere que la recuperación de semillas en el intermareal después de la cosecha se lleva a cabo en la mayoría de los sitios analizados. Sin embargo, el autor también indica que existen diferencias significativas en las tasas de recuperación entre las ubicaciones y también con respecto al número de individuos asentados, lo cual es crucial para el reclutamiento de la especie con el fin de mantener a las poblaciones. También afirma que la presión de extracción difiere entre las ubicaciones, lo que hace que la recolonización sea más lenta en algunas de ellas. En definitiva, no se proponen medidas de seguimiento y gestión que impidan la sobreexplotación de bancos naturales. De hecho, hay evidencias recientes que apuntan a una disminución en la abundancia de semillas intermareales. Uxío Labarta (experto en la investigación del cultivo del mejillón gallego) afirma en un artículo de prensa que "desde 2017 se han detectado fluctuaciones descendentes en la abundancia de semillas de mejillón en Galicia".	Brea Bermejo, E. (2009). Cartografiado y dinámica de las poblaciones de los bancos naturales de semilla de mejillón en las costas atlánticas gallegas. PhD thesis. Universidad de Santiago de Compostela, Santiago de Compostela. Labarta, U., & Fernández-Reiriz, M. J. (2019). The Galician mussel industry: Innovation and changes in the last forty years. Ocean & coastal management, 167, 208-218. https://www.lavozdegalicia.es/noticia/opinion/2019/03/21/mejilla-mejillon/0003_201903G21P16992.htm		This fishery is an Enhanced Bivalve Fishery therefore, some modifications to the default tree structure has to be used. In particular, the team has applied Annex SB as a supplement to Annex A (Default Assessment tree). The team has performed a thorough analysis to justify that this Catch and Grow (CAG) fishery does not involve translotation and there is no evidence that it negatively impacts the parent stock. As a result, Principle one does not have to be scored. The detailed rationale is described on Section 7.2.1. We also recommend to the stakeholders to review the answer above.	Not accepted (no score change)
1.1.2 - Stock rebuilding	Evaluación de la recuperación	No se propone realizar seguimiento de las zonas explotadas, más cuando existen evidencias que apuntan a una disminución en la abundancia de semillas intermareales.			The information mentioned by the stakeholder is not cover by this PI. This PI looks at the rebuilding and recovery of a stock that is depleted below the levels required to achieve an 80 score on PI 1.1.1. Therefore, is not applicable.	Not accepted (no score change)
1.2.1 - Harvest strategy	Ausencia de una estrategia real para la recogida de mejilla en bancos naturales	No existe una estrategia de captura y seguimiento para los bancos naturales de semilla de mejillón, que además comparten hábitat con otras especies de interés comercial . Si bien es cierto que existe una regulación para esto (Decreto 406/1996), dicha regulación ha demostrado ser obsoleta y no cubre aspectos esenciales para la gestión óptima de los recursos, ni siquiera sigue un enfoque precautorio. No hay un monitoreo regular de los lechos de semillas naturales, no hay un manejo espacial del recurso y no hay estimaciones de mortalidad, excepto por la limitación en la cantidad permitida por batea. En una población donde la biomasa total se estimó en 18,000 Tn (Brea Bermejo 2009), y se requieren alrededor de 7,500 toneladas para satisfacer la demanda del cultivo en batea de mejilllón (Pérez-Camacho et al. 1995), se puede llegar a una altas tasa de agotamiento de la población natural. Además, se ha observado una variabilidad significativa en la abundancia entre las ubicaciones (Brea Bermejo 2009), lo que debería haber conducido a una gestión espacial del	Brea Bermejo, E. (2009). Cartografiado y dinámica de las poblaciones de los bancos naturales de semilla de mejillón en las costas atlánticas gallegas. PhD thesis. Universidad de Santiago de Compostela,Santiago de Compostela. Pérez-Camacho, A., Labarta, U., Bairas, R., 1995. Growth of mussels (Mytilus edulisgalloprovincialis) in cultivation raft, Influence of seed source, cultivation site and food availability, Aquac. 138:349-362.		This fishery is an Enhanced Bivalve Fishery therefore, some modifications to the default tree structure has to be used. In particular, the team has applied Annex SB as a supplement to Annex A (Default Assessment tree). The team has performed a thorough analysis to justify that this Catch and Grow (CAG) fishery does not involve translotation and there is no evidence that it negatively impacts the parent stock. As a result, Principle one does not have to be scored. The detailed rationale is described on Section 7.2.4.	Not accepted (no score change)

		recurso y a un monitoreo continuo, pero no se ha implementado ninguna medida al respecto.				
1.2.2 - Harvest control rules and tools	Ausencia de un control efectivo en la extracción de semilla de bancos naturales.	Existe una ausencia de control efectivo de la actividad que impide conocer las zonas de procedencia de la mejilla y las cantidades reales extraídas. Con la actual normativa se otorgan permisos de recogida muy genéricos, y no se evalúa si la información detallada por los extractores es real. Se deberían proponer medidas para solventar esta carencia.			This fishery is an Enhanced Bivalve Fishery therefore, some modifications to the default tree structure has to be used. In particular, the team has applied Annex SB as a supplement to Annex A (Default Assessment tree). The team has performed a thorough analysis to justify that this Catch and Grow (CAG) fishery does not involve translotation and there is no evidence that it negatively impacts the parent stock. As a result, Principle one does not have to be scored. The detailed rationale is described on Section 7.2.4.	Not accepted (no score change)
	Ausencia de un control efectivo en la extracción de semilla de bancos naturales. Vigilantes de las cofradías	En el documento ACDR se insinúa que existe un control efectivo de la extracción de mejilla por parte de autoridades, o incluso de los vigilantes contratados por las cofradías. Creemos que esta afirmación se aleja bastante de la realidad. Las resoluciones para la extracción de mejilla son muy genéricas, facultan a los interesados a extraer prácticamente sin restricción espacial. Los vigilantes de las cofradías no realizan un control sobre la actividad puesto que no están facultados para ello. Simplemente comprueban periódicamente la vigencia del permiso de extraccion y las condiciones establecidas en el mismo (personas, vehículos,...). No tienen, por ejemplo, derecho a indicarles que abandonen bancos de percebe en veda o zonas especialmente sensibles y claves para la gestión de este cirrípedo en los ámbitos territoriales de las cofradías.				
1.2.3 - Information and monitoring						
1.2.4 - Assessment of stock status						
Principle 2 - Minimising environmental impacts	No se proponen soluciones al impacto ambiental generado en las distintas fases del cultivo de mejullón	Aunque se ha hecho un gran esfuerzo por conocer muchos aspectos relacionados con la biología y la reproducción del mejillón gallego, estos esfuerzos se han dirigido a la rentabilidad económica del recurso y no al uso sostenible del mismo. Esto se ha traducido en numerosos impactos en el hábitat y los ecosistemas de los estuarios gallegos, como la modificación de la estructura planctónica, la explotación del recurso que se acerca o supera los límites soportados por el ecosistema, la perturbación de los sistemas bentónicos a través de biodeposiciones y basura, y la afección a otras especies de interés comercial como el percebe. Por lo tanto, las evidencias sugieren que minimizar los impactos ambientales es una tarea no resuelta para esta pesquería.	Juan Bald, Oihana Solaun y Angel Borja (AZTI-2009).- Los impactos de la acuicultura: minimización y certificación.		The input of the stakeholder is the same as WWF input. The only diference is the language. In order to avoid misunderstanding due to a un-official translation from the expert and considering that the official language is English, we invite the stakeholder to read the answer to WWF.	Not accepted (no score change)
2.1.1 - Primary species outcome						

2.1.2 - Primary species management						
2.1.3 - Primary species information						
2.2.1 - Secondary species outcome	Otras especies secundarias afectadas por la extracción de semilla de mejillón en el medio natural.	Con la extracción masiva de mejilla que se realiza en el intermareal rocoso, además del percebe, también se eliminan otras especies comerciales como las lapas. En Galicia hay varios planes de gestión de este gasterópodo.	Pescadegalicia_planes de gestión		The classification of secondary species was done on the basis that: they are not covered by Principle 1, they are not classified as primary species because though there may be some management tools and measures in place, these are not explicitly linked to stock management objectives reflected in either limit or target reference points and they are not ETP species or outside of scope (i.e. could include birds, reptiles, amphibians, mammals). The economic interest is not one of the criteria used for triggering species. In addition, The threshold for them to be recognised as a main secondary species is that they most be more than 5% of the total fishery catches. Even though there is no evidence that goose barnacle reaches that 5% mark, the team decided to take a precautionary approach and assess it as secondary 'main' species.	Not accepted (no score change)

	Efectos sobre la pesquería del percebe	Los participantes en los planes de gestión percebe de Galicia han afirmado durante años que su actividad se ve afectada por la recolección de semillas de mejillón en los bancos en los que se solapan ambas especies, ya que el percebe no puede asentarse en la roca desnuda tras la cosecha de mejilla y, por lo tanto, sus poblaciones sufren menos reclutamiento y menor rendimiento. Los percebes son animales gregarios con asentamiento selectivo que requieren la presencia de conespecíficos para establecerse y reclutar con éxito en la población (Cruz et al. 2010, Franco et al. 2016). La perturbación regular en las rocas para obtener la semilla de mejillón ejerce presión sobre las poblaciones de percebes, ya que limita su reclutamiento al eliminar todos los organismos presentes en la roca, incluidos los propios percebes, independientemente de su tamaño. Los resultados del estudio realizado por Pita et al. (2019) respaldan los argumentos de los recolectores de percebes, ya que observaron una disminución significativa en las capturas y el valor de venta del percebe del Atlántico y destacaron la necesidad de una mayor investigación sobre posibles interacciones negativas con actividades que presentan un alto riesgo ecológico potencial, como la cosecha de semillas para mejillón de cultivo. Los estudios realizados por Piñeiro-Corbeira et al. (2018) y Barrientos et al. (2019) han demostrado que la cosecha de mejillones jóvenes para la acuicultura en Galicia tiene un efecto perjudicial para la abundancia y diversidad de todo el conjunto sésil asociado al hábitat donse se realiza esta actividad. La cobertura y la riqueza también se han reducido significativamente por la explotación de la semilla de mejillón, y la estructura comunitaria de los sitios no explotados y explotados es significativamente diferente. Estas diferencias permanecen hasta la próxima temporada abierta, lo que sugiere que la temporada cerrada establecida es demasiado corta para la recuperación del conjunto sésil no objetivo asociado. Dado el tamaño de la industria local del mejillón, la recuperación incompleta a lo largo de la temporada cerrada implica que el cultivo de mejillón debe estar ejerciendo una presión sostenida sobre una porción considerable de la zona intermareal rocosa en Galicia.	https://www.lavozdegalicia.es/noticia/ferrol/ferrol/2019/01/12/guerra-percebeiros-bateeiros-raiz-extraccion-mejilla/0003_201901F12C5991.htm https://www.farodevigo.es/portada-o-morrazo/2019/05/25/percebeiros-cangas-califican-menosprecio-mar/2111689.html Cruz, T., Castro, J. J., & Hawkins, S. J. (2010). Recruitment, growth and population size structure of Pollicipes pollicipes in SW Portugal. Journal of Experimental Marine Biology and Ecology, 392(1-2), 200-209. Franco, S. C., Aldred, N., Cruz, T., & Clare, A. S. (2016). Modulation of gregarious settlement of the stalked barnacle, Pollicipes pollicipes: a laboratory study. Scientia Marina, 80(2), 217-228. Pita, P., Fernández-Márquez, D., Antelo, M., Macho, G., & Villasante, S. (2019). Socioecological changes in data-poor S-fisheries: A hidden shellfisheries crisis in Galicia (NW Spain). Marine Policy, 101, 208-224. Piñeiro-Corbeira, C., Barrientos, S., Olmedo, M., Cremades, J., & Barreiro, R. (2018). By-catch in no-fed aquaculture: exploiting mussel seed persistently and extensively disturbs the accompanying assemblage. ICES Journal of Marine Science, 75(6), 2213-2223. Barrientos, S., Barreiro, R., Olmedo, M., & Piñeiro-Corbeira, C. (2019). Can patch size and patch distance improve the recolonization of mussel-seed beds exploited for aquaculture?. Aquatic Conservation: Marine and Freshwater Ecosystems, 29(11), 1897-1908. https://www.elidealgallego.com/articulo/coruna/percebeiros-			

			denuncian-bateeiros-esquilman-marisco-rocas/20160201223921272166.html https://www.diariodearousa.com/articulo/vilagarcia/tension-estalla-percebeiros-y-bateeiros-varios-puntos-costa/20150301233859104183.html https://www.atlantico.net/articulo/area-metropolitana/conflicto-baiona-llegada-nuevos-bateeiros/2014032011131740906 7.html https://www.lavozdegalicia.es/noticia/galicia/2004/12/29/recogida-mejilla-subleva-percebeiros-corme/0003_3330279.htm			

2.2.2 - Secondary species management	Extracción de semilla de mejillón en la franja ocupada por percebe.	En la página 17 del ACDR de la certificación se indica lo siguiente: The 1994 report of the research project "Gonadal cycle, fixation and recruitment of the mussel Mytilus galloprovincialis on the Arousa ría" of this CIMA group include the following technical recommendation: << 7.- In order to increase the yield in mussel spat of the rocky surfaces of the intertidal strip of exposed areas, we recommend that during the work of collecting spat or after it, proceed to the removal, using scrapers, of all the organisms fixed in the intertidal strip mostly occupied by mussels. In this way it would not be necessary to extract mussel seed from very exposed areas, where this activity can interfere with the exploitation of goose barnacle >> Pese a que existe una recomendación de evitar la extracción en zonas con poblaciones de percebe explotadas mediante planes de gestión de cofradías, a lo largo de los años se ha podido comprobar lo contrario: En muchas ocasiones los trabajadores contratados por las empresas bateeiras realizan la extracción de mejilla en puntales y rocas con población del cirrípedo, en zonas vedadas en los propios planes de percebe, y con gran importancia desde el punto de vista económico y de gestión del recurso en el ámbito territorial del plan de cada entidad. Además, se asume que con la mejilla se retira menos de un 5% de percebe del volumen total, pero no se contemplan los individuos de percebe, juveniles o de reciente fijación, que también se arrancan de la roca, que deberían garantizar la recuperación en la zona de las poblaciones del crustáceo. Con ello, además del daño a corto plazo (percebe adulto de alta calidad comercial y en edad reproductiva que se arranca y no es comercializado por los percebeiros), hay que sumar el generado a medio y largo plazo (retraso en la recuperación de cobertura de individuos explotables).	Matsumura, K., Hills, J.M., Thomason, P.O., Thomason, J.C., Clare, A.S., 2000. Discrimination at settlement in barnacles: Laboratory and field experiments on settlement behaviour in response to settlement-inducing protein complexes. Biofouling 16,181–190. https://doi.org/10.1080/08927010009378443		The comments of stakeholder mainly concern the resource conflict between spat collection and goose barnacle collection. However this performance indicator deals with the measures and strategies developed to manage the impact of spat collection on bycatch species if necessary. The fact that spat collectors possibly remove goose barnacles that as a consequence can not be removed by goose barnacle collectors is a social or economic aspect that is not considered under this performace indicator. The team has considered that measures are in place to regulate spat collection and that these measures together form a partial strategy to expected not to hinder rebuilding of main secondary species at/to levels which are highly likely to be above biologically based limits. Nevertheless, the team agree with some of the points highlighted by the stakeholder. The team has considered that there is no evidence that there is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of goose barnacle and if they are implemented as appropriateand scored this PI in accordance. A condition was opened. We state "no score change" because the scoring range given in the ACDR was 60-79.	Accepted (no score change)

	Forma de extracción de semilla de mejillón en la franja ocupada por percebe.	En la página 17 del ACDR de la certificación se indica lo siguiente: The 1994 report of the research project “Gonadal cycle, fixation and recruitment of the mussel Mytilus galloprovincialis on the Arousa ría” of this CIMA group include the following technical recommendation: << 7.- In order to increase the yield in mussel spat of the rocky surfaces of the intertidal strip of exposed areas, we recommend that during the work of collecting spat or after it, proceed to the removal, using scrapers, of all the organisms fixed in the intertidal strip mostly occupied by mussels. In this way it would not be necessary to extract mussel seed from very exposed areas, where this activity can interfere with the exploitation of goose barnacle >> Además, el Decreto 406/1996, recoge en su artículo 37.4: << Unha vez recollida a semente, os recolledores eliminarán, mediante rasquetas, tódolos organismos fixados na zona traballada co fin de aumenta-lo rendemento delas>> La metodología de extracción de las manchas de semilla de mejillón en las rocas fomenta la limpieza de la práctica totalidad de las mismas durante la cosecha, para así garantizar una alta calidad de mejilla en sucesivas extracciones, aumentando su rendimiento. La extracción se hace manualmente, con rasquetas que dejan la roca completamente al aire. En el proceso, por lo tanto, además del mejillón se extrae toda la comunidad de organismos (cirrípedos, algas calcáreas, etc.) que viven adheridos a la roca, que es donde preferentemente se asientan los percebes y sus larvas, tanto por encontrar un sustrato favorable al asentamiento como por la detección por parte de las larvas cypris de cirrípedos de sustancias químicas que las atraen (Matsumura). El tipo de arte de pesca utilizado para la extracción de semilla es muy poco selectivo, produciéndose una mortalidad total de los organismos sésiles arrancados (entre ellos el percebe). No se proponen medidas para evitar la damnificación innecesaria de especies colonizadoras de la costa rocosa y además la normativa que regula la extracción de semilla de mejillón no establece limitaciones espaciales más allá de determinados tramos concretos de costa (PN Illas Atlánticas), y no contempla una prohibición de trabajar en zonas con percebe. Con ello entendemos que el perjuicio causado sobre el percebe como especie secundaria es mucho más amplio que la propia extracción de individuos adultos, porque se ralentiza la sucesión ecológica en las piedras, y por lo tanto la reaparición de individuos. El daño es incluso mayor si se tiene en cuenta la preferencia de las larvas de cirrípedos de fijar sobre congéneres adultos o en zonas donde detectan sustancias quimicas asociadas a éstos.	Piñeiro-Corbeira, C., Barrientos, S., Olmedo, M., Cremades, J., & Barreiro, R. (2018). By-catch in no-fed aquaculture: exploiting mussel seed persistently and extensively disturbs the accompanying assemblage. ICES Journal of Marine Science, 75(6), 2213-2223. Barrientos, S., Barreiro, R., Olmedo, M., & Piñeiro-Corbeira, C. (2019). Can patch size and patch distance improve the recolonization of mussel-seed beds exploited for aquaculture?. Aquatic Conservation: Marine and Freshwater Ecosystems, 29(11), 1897-1908. Christian Buschbaum.-Selective settlement of the barnacle Semibalanus balanoides (L.) facilitates its growth and reproduction on mussel beds in the Wadden Sea. (Helgol Mar Res (2001) 55:128–134 DOI 10.1007/s101520100070) Macho, G., 2006. Ecología reproductiva y larvaria del percebe y otros cirrípedos en Galicia. Universidade de Vigo, Departamento de Ecoloxia e Bioloxia Animal, Facultade de Ciencias.		The comments of stakeholder mainly concern the resource conflict between spat collection and goose barnacle collection. However this performance indicator deals with the measures and strategies developed to manage the impact of spat collection on bycatch species if necessary. The fact that spat collectors possibly remove goose barnacles that as a consequence can not be removed by goose barnacle collectors is a social or economic aspect that is not considered under this performace indicator. The team has considered that measures are in place to regulate spat collection and that these measures together form a partial strategy to expected not to hinder rebuilding of main secondary species at/to levels which are highly likely to be above biologically based limits.	

	Falta de información de las especies secundarias aportada por extractores de mejilla en bancos naturales.	No se exige un manejo con respecto a las especies secundarias,ni una propuesta de monitoreo de su estado. Como se menciona en el ACDR, el reglamento establece que los productores deben cubrir un formulario de extracción de semillas y enviarlo a la Xunta de Galicia, sin embargo, no se proporciona información detallada sobre la actividad de extracción y no hay información sobre las especies no objetivo. Hay mucha inacción por parte de la administración cuando se trata de administrar eficazmente estos recursos. El conflicto entre los productores de mejillones y los recolectores de percebes es un claro ejemplo de ello. Aunque el conflicto ha estado sucediendo durante muchos años, no existe un plan de monitoreo a este respecto y las decisiones no se basan en información científica, ya que, de ser así, la información proporcionada por Brea Bermejo en 2009 se habría tenido en cuenta para desarrollar un modelo de gestión de estas dos explotaciones para mitigar el conflicto. La información científica disponible sugiere que la explotación a escala industrial de la semilla de mejillón del intermareal rocoso en Galicia está siendo perjudicial para muchos organismos que viven entre el mejillón, y que la temporada de cierre no es suficiente para la recuperación de especies no objetivo (Piñeiro-Corbeira et al.2018). En un estudio realizado por Barrientos et al. (2019), al buscar prácticas que pudieran mejorar el daño causado por la cosecha de semillas de mejillón, se evaluó la influencia de dos propiedades de la explotación en la recolonización de la intermareal: el tamaño del parche y la distancia del parche. Sin embargo, sus resultados indicaron que, en lugar del tamaño del parche y / o la distancia, la duración de la temporada cerrada es el factor limitante para la recuperación de los lechos explotados con semillas de mejillón. Los autores sugirieron un sistema de reserva, donde las regiones explotables se dividirían en sectores que serían explotados de forma rotativa. Sin embargo, una vez más, no se están tomando medidas al respecto.	Brea Bermejo, E. (2009). Cartografiado y dinámica de las poblaciones de los bancos naturales de semilla de mejillón en las costas atlánticas gallegas. PhD thesis. Universidad de Santiago de Compostela,Santiago de Compostela. Piñeiro-Corbeira, C., Barrientos, S., Olmedo, M., Cremades, J., & Barreiro, R. (2018). By-catch in no-fed aquaculture: exploiting mussel seed persistently and extensively disturbs the accompanying assemblage. ICES Journal of Marine Science, 75(6), 2213-2223. Barrientos, S., Barreiro, R., Olmedo, M., & Piñeiro-Corbeira, C. (2019). Can patch size and patch distance improve the recolonization of mussel-seed beds exploited for aquaculture?. Aquatic Conservation: Marine and Freshwater Ecosystems, 29(11), 1897-1908.			
2.2.3 - Secondary species information	Falta de información sobre el grado de afección a especies que acompañan a la mejilla en bancos naturales	No hay información sobre la composición y abundancia de especies afectadas por la cosecha de semillas de mejillón en la zona intermareal, y específicamente, hay una falta de información sobre el alcance real de los impactos de la extracción de semillas en las poblaciones de percebes y la interacción de ambas especies en la zona intermareal , lo que sería crucial para establecer estrategias de gestión.			We agree with some of the points highlighted by the stakeholder. A scoring range between 60-79 was proposed for this PI in the ACDR. As a result of the inputs received during the site visit and the review of other references, the team confirmed that this PI should score less than 80. The team has considered the lack of information on secondary species and scored this PI in accordance. A condition was opened against the lack of adequate information in support of a partial strategy to manage main secondary species. We state “no score change” because the scoring range given in the ACDR was 60-79.	Accepted (no score change)

	Percebe de alta calidad en zonas expuestas con alta cobertura de mejilla.	Cuando se analiza espacialmente la distribución de la calidad comercial de percebe en las franjas del intermareal rocoso se constata una correspondencia entre zonas de calidad muy alta o alta de percebe con una menor cobertura del cirrípedo y, en numerosas ocasiones, alta cobertura de semilla del mejillón. En determinadas circunstancias, el percebe de gran calidad (tamaño/morfología) se asienta entre las mantas de semilla de mejillón situadas en "laxes" o puntales de zonas expuestas. Cuando las personas contratadas por los bateeiros llegan a estas áreas no advierten el perjuicio que están causando sobre la población del percebe, puesto que entre la mejilla afloran individuos de gran calidad que se arrancan en el momento de raspar la piedra. Puede parecer que el percebe eliminado de forma accesoria es poco (>5% volumen capturas), sin embargo el impacto generado en la gestión efectiva del recurso es muy elevado, tanto por el percebe adulto de gran tamaño (>número de puestas) que se elimina como por su potencial captura y comercialización a corto plazo, o por individuos juveniles y pequeños reclutas no visibles que tambien se arrancan, que son los que deberían garantizar la renovación del stock comercial y la salud de la población.	"Literatura gris".- Datos propios de la evaluación anual del stock de percebe en la cofradías de Baiona y A Guarda. Muestreo estratificado de bancos en función de la calidad de percebe extraído para obtener entre otros, la cobertura de percebe en porcentaje. Resultados: porcentaje de cobertura percebe de calidad alta y muy alta en Baiona y A Guarda (últimos 5 años): 5,29% y 6,10 %, respectivamente.		As stated above the team has taken a precautionary approach and has considered the Goose barnacle as a main secondary species.	
	Uso del análisis de riesgos para evaluar el impacto de la extracción de mejilla sobre el percebe.	El informe preliminar (ACDR) del equipo auditor decide utilizar el análisis de riesgos para evaluar el impacto de la extracción de mejilla en el percebe porque NO se dispone de puntos de referencia del estado del stock de percebe. Se entiende por puntos de referencia que la pesquería esté gestionada a través de TACs, cuotas, etc. A pesar de ello, creemos que se ha subestimado el nivel de gestión del recurso que se realiza través de los planes de explotación de percebe, donde se establecen topes de captura netos y brutos, días máximos de extracción, censo máximo mariscadores, rotaciones etc. Además en las evaluaciones de bancos naturales se estiman coberturas, índices de reclutamiento y estado reproductor y en el seguimiento de capturas se calculan % ilegales, tallas medias de captura y estructuras de tallas de la población. En la última década a través de los planes de gestión marisquera se obtiene información ambiental y ecosistémica relacionada con descriptores recogidos en la Directiva marco sobre la estrategia marina (DMEM) poniendo de manifiesto la contribución del marisqueo a la conservación y recuperación de los hábitats y de la biodiversidad. Por último, desde la publicación del Decreto 153/2019 los planes de gestión incluirán objeivos biológicos, ecológicos, económicos y sociales a tres años, **niveles de referencia** e indicadores para su seguimiento.	Orde do 20 de decembro de 2018 pola que se aproban os plans de xestión para recursos especificos en Galicia para o ano 2019. DOG nº 246. Decreto 153/2019, do 21 de novembro, polo que se regula o réxime de conservación e explotación dos recursos marisqueiros e das algas.		The comment is concerned with the impact on Goose barnacles. This impact is considered under PI 2.2.1.	

	Análisis de riesgos para evaluar la "susceptibilidad" entendida como el nivel de impacto pesquero que una especie puede soportar.	Pensamos que el siguiente atributo no está bien definido: Superposición geográfica: grado de solapamiento entre la distribución de la pesquería y la distribución de la población. Para ello se considera como distribución de la población, el stock de percebe que se extiende desde el Algarve hasta la Bretaña Francesa. Así, el grado de solapamiento entre el stock de percebe y la pesquería de mexilla que se limita a la costa gallega es muy bajo. Esto se traduce en una baja suspeptibilidad del percebe ante el impacto de la extracción de mexilla por lo que se considera una especie de bajo riesgo. Pensamos que para valorar este atributo solo debe considerarse la población que se distribuye en las zonas autorizadas para la extracción de percebe por las cofradías de pescadores, de forma que el grado de solapamiento con la extracción de mexilla es muy elevado siendo el percebe de alto riesgo ante el impacto.			The team followed the RBF methodology and applied the definitions, such as areal overlap as set out in Annex PF.The team generated the areal overlap (availability) scores after consideration of the overlap of the fishing effort with the distribution of the stock. Therefore, the stock cannot be reduced to the authorised areas in Galicia as it is suggested by the stakeholder. However, a medium risk score of 2 was allocated.	
	Análisis de riesgos para evaluar la "susceptibilidad" entendida como el nivel de impacto pesquero que una especie puede soportar,	Por otra parte en el RBF se echan en falta atributos que tengan en cuenta aspectos fundamentales de la biología y ecología del percebe. La **competencia por el substrato** es muy intensa tras la extracción de mexilla. Las rocas son rápidamente colonizadas por algas, mejillones y balánidos. En esta sucesión el percebe es de los más desaventajados y nunca se fija al sustrato antes de que otros organismos lo hayan colonizado. Si el sustrato se recurbre totalmente con mejillón, el percebe no es capaz de fijarse sobre él y tendrá que esperar a que se formen huecos entre los individuos para poder inciciar lentamente la colonización del substrato. Naturalmente, si la semilla de mejillón se extrae peródicamente para su cultivo en batea, la probabilidad de que la superficie rocosa sea ocupada por percebe es remota. El **reclutamiento** depende de la presencia de una mínima cobertura de adultos en el sustrato ya que las larvas cipris se fijan principalmente en el pedúnculo de percebes adultos. La **reproducción** tiene lugar mediante la cópula por lo que los individuos aislados no podrán reproducirse.	Literatura gris: Informe sobre el estado del stock de percebe en Galicia. Mayo de 2006. Consellería de Pesca y Asuntos Marítimos.		The team followed the RBF methodology and applied the MSC definitions. The productivity attributes (Step 1) of the PSA takes into account biological aspects such as longevity, growth rate, fecundity, recruitment and natural mortality. Indeed, there are specific attributes (i.e Density dependence) for invertebrate fisheries to take into account their particularities.	
2.3.1 - ETP species outcome						
2.3.2 - ETP species management						
2.3.3 - ETP species information						

2.4.1 - Habitats outcome	Efectos de la extracción de mejilla sobre la biota del sustrato duro rocoso, y retraso, como consecuencia, de la recuperación de poblaciones de percebe.	La metodología de extracción de las manchas de semilla de mejillón en las rocas fomenta limpiar la práctica totalidad de las mismas durante la cosecha, para así garantizar una alta calidad de mejilla en sucesivas extracciones, aumentando su rendimiento. La extracción se hace manualmente, con rasquetas que dejan la roca completamente al aire. En el proceso, por lo tanto, además del mejillón se extrae toda la comunidad de organismos (cirrípedos, algas calcáreas, etc.) que viven adheridos a la roca, que es donde preferentemente se asientan los percebes y sus larvas, tanto por encontrar un sustrato favorable para el reclutamiento como por la detección por parte de las larvas cypris de cirrípedos de sustancias químicas que las atraen (S.Dedos-Kotsiri; Matsumura et al.). No se proponen medidas para evitar la damnificación innecesaria de especies colonizadoras de la costa rocosa y además la normativa que regula la extracción de semilla de mejillón no establece limitaciones espaciales más allá de determinados tramos concretos de costa (PN Illas Atlánticas). Las zonas con presencia de mejillón sirven además como estructuras de fijación de cirrípedos (Buschbaum), por lo que se deberían implantar vedas espaciales a la extracción de mejilla para mantener la biodiversidad en el litoral rocoso.	Pineiro-Corbeira, C., Barrientos, S., Olmedo, M., Cremades, J., and Barreiro, R. By-catch in no-fed aquaculture: exploiting mussel seed ~persistently and extensively disturbs the accompanying assemblage. – ICES Journal of Marine Science, doi:10.1093/icesjms/fsy107.Received 21 May 2018; revised 17 July 2018; accepted 23 July 2018 Christian Buschbaum Selective settlement of the barnacle Semibalanus balanoides (L.) facilitates its growth and reproduction on mussel beds in the Wadden Sea. (Helgol Mar Res (2001) 55:128–134 DOI 10.1007/s101520100070)		Mussel seed are gathered from intertidal rocky shores by scraping them from the surface of the rock using rudimentary fishing tools. Mussel seed extraction impact not only the target species but also the associated fauna. Nevertheless, the target species usually recovers during the closed seasonal whereas the associated benthic communities may recover within one year. The team therefore concludes that impacts are reversible and do not result in the reduction in habitat structure, biological diversity, and abundance and function such that the habitat would be unable to recover to at least 80% of its unimpacted structure, biological diversity and function within 5-20 years, if fishing were to cease entirely.	Accepted (no score change)
	Cambios en el fondo de las rías y alteración de la hidrodinámica	El cultivo de mejillones en Galicia representa una gran oferta de biodepósitos para el hábitat bentónico, lo que puede resultar en una eutrofización de los fondos que afecta negativamente la composición y la abundancia de especies. Ysebaert y col. 2009 encontró un efecto significativo de la presencia de los mejillones en la distribución del tamaño de grano y el contenido de lodo en la Ría de Vigo; se encontró mayor contenido de lodo y menor tamaño de grano mediano a lo largo de los transectos en el sitio del mejillón; la diversidad y la uniformidad fueron significativamente mayores en el sitio de referencia; El impacto de los mejillones en la comunidad bentónica debido a la bio deposición se vio claramente en la estructura de la comunidad, ya que la composición de las especies pasó de las especies de ambientes arenosos a las especies más pequeñas y oportunistas, típicamente presentes en los sedimentos eutrofizados; Las concentraciones elevadas de POC, PON, fósforo y phaeo en los sedimentos superficiales en el área de la balsa fueron consistentes con las mediciones de un aporte orgánico mejorado. Tenore y col. (1982) informaron que la reducción de sulfato fue 63% mayor en las ubicaciones de cultivo de mejillones que en las ubicaciones de referencia. Guerra y col. (2009) también indicaron que el cultivo de mejillones no solo ha alterado la composición del zooplancton de la bahía, modificando así el flujo natural de energía entre los niveles inferior y superior del ecosistema, sino que también ha creado un microambiente especial que causa cambios en la abundancia y composición de las	Petersen, J.K., Nielsen, T.G., van Duren, L., and Maar, M. 2008. Depletion of plankton in a raft culture of Mytilus galloprovincialis in Ría de Vigo, NW Spain. I. Phytoplankton. Aquat. Biol. 4: 113–125. doi:10.3354/ab00124. de Paz, L., Neto, J.M., Marques, J.C., and Laborda, A.J. 2008. Response of intertidal macrobenthic communities to long term human induced changes in the Eo estuary (Asturias, Spain): implications for environmental management. Mar. Environ. Res. 66(2): 288–299. doi:10.1016/j.marenvres.2008.04.004. PMID:18555522. Gibbs, M.T. 2004. Interactions between bivalve shellfish farms and fishery resources. Aquaculture, 240(1–4): 267–296. doi:10.1016/j.aquaculture.2004.06.038. McKindsey, C. W., Archambault, P., Callier, M. D., & Olivier, F. (2011). Influence of suspended and off-bottom mussel culture on the sea bottom and benthic		As stakeholders put forward correctly biodeposits from mussel production on mussel rafts can have a negative impact on maerl beds below these rafts or in the near vicinity. The team has assessed these impacts using the available information from scientific literature and information from the database on spatial distribution of mussel culture polygones, mussel rafts and bottom habitats. This information shows that there is a limited overlap of VME habitats (mearl beds) and mussel rafts and that mussel rafts in Galicia Rías may impact 16.4% of the total maerl beds recorded. The consequence being thta over 80 % of mearl beds are not impacted and thus that the VME habitat would be able to recover to at least 80% of its unimpacted structure, biological diversity and function within 5-20 years, if fishing were to cease entirely. The comments provided by stakeholders have resulted in the complete redrafting of the rationale of PI 2.4.1. Some of the information provided was used and the issues raised are now discussed in the new rational.	Accepted (no score change)

		comunidades bentónicas. Zuñiga y col. (2014) informaron que la biodeposición de mejillones fue 6–7 veces mayor que las tasas en el sitio de referencia, corroborando que la actividad de alimentación de mejillones durante la producción de heces aumentó las tasas de sedimentación natural en la Ría de Ares – Betanzos. Méndez Martínez y cols. (2011) estimaron el lodo producido por las balsas de mejillón como 6.3 x 106 m3, y observaron que la distribución del sector donde la fracción de lodo es superior al 90% no coincide con los polígonos de la balsa que los causan, mostrando su movilización debido a las olas y corrientes, lo que contradice la idea de sedimentos localizados. Los organismos asociados con el cultivo de mejillones (epifauna) también contribuyen al depósito de materia orgánica en el fondo del mar (McKindsey et al. 2011). Las prospecciones realizadas en el marco del proyecto Gestinmer mostraron que hay una capa de 2-3 m de sedimento fino en el sustrato base, con alto contenido de CaCO3 y materia orgánica; así como una distribución regular de racimos de grava, de 0.5 a 1 m, que coincide con la ubicación de las balsas de superficie. La falta de información sobre el volumen de depósitos generados por el cultivo de mejillones se reconoce en el informe, aunque se estima que solo en 2004 se generaron 23,600 toneladas de residuos de subproductos durante las operaciones. de Paz y col. (2008) han indicado que los sistemas bentónicos marinos deben estudiarse durante largos períodos para comprender las variaciones temporales y espaciales naturales que de otro modo podrían oscurecer las respuestas del sistema a las perturbaciones antropogénicas. Se ha comprobado que los cambios en el sistema de afluencia en Galicia aumentan el tiempo de residencia del agua dentro de las rías (Álvarez-Salgado et al. 2008), lo que plantea la preocupación de una situación que empeora. Las bateas pueden alterar la hidrodinámica y reducir las tasas de flujo, como lo han observado varios autores (Pérez-Camacho y Beiras 1995; Duarte et al. 2008; Petersen et al. 2008), creando áreas que están mucho mejor enjuagadas que otras. Estos efectos descritos, especialmente las biodeposiciones, tienen un impacto negativo demostrado en el hábitat vulnerable de los lechos de meärl. La tesis doctoral realizada por Peña Bárbara (2010) verificó una reducción en la extensión y cobertura de 9 camas mäerl, y la degradación completa de 10 bancos. Del total de 19 bancos, 12 estaban englobados en polígonos con cultivo de mejillón o en sus alrededores. Se identificaron 34 camas de mäerl en las proximidades de las zonas de cultivo de mejillones, lo que representa el 16% de la extensión total de las camas de maërl en Galicia. Dentro de estas áreas afectadas, 2.08 km2 correspondieron a la mayor proporción de hombres vivos / muertos, distribuidos entre varias rías. En general, la aparición de las muestras	habitats: a review. Canadian Journal of Zoology, 89(7), 622-646. Tenore, K.R., and González, N. 1976. Food chain patterns in the Ria de Arosa, Spain: an area of intense mussel aquaculture. In Proceedings of the 10th European Symposium on Marine Biology, Ostend, Belgium, 17–23 September 1975. Vol 2: Population dynamics of marine organisms in relation with nutrient cycling in shallow waters. Edited by G. Persoone and E. Jaspers. Universa Press, Wetteren, Belgium. pp. 601–619. Ysebaert, T., Hart, M., and Herman, P.M.J. 2009. Impacts of bottom and suspended cultures of mussels Mytilus spp. on the surrounding sedimentary environment and macrobenthic biodiversity. Helgol.Mar. Res. 63(1): 59–74. doi:10.1007/s10152-008-0136-5. Guerra, A., Lens, S., Rocha, F., Impacto del hombre sobre el ecosistema de la Ría de Vigo: hacia una gestión integrada. In González-Garcés Santiso, A., Vilas Martín, F., Álvarez Salgado, X.A., 2009. La Ría de Vigo. Una aproximación integral al ecosistema de la Ría de Vigo. Instituto de Estudios Vigueses, Vigo, p. 327-369. Zúñiga, D., Castro, C. G., Aguiar, E., Labarta, U., Figueiras, F. G., & Fernández-Reiriz, M. J. (2014). Biodeposit contribution to natural sedimentation in a suspended Mytilus galloprovincialis Lmk mussel farm in a Galician Ría (NW Iberian Peninsula). Aquaculture, 432, 311-320. Martínez, G. M., Campos, A. O., Vilar, E. G., Mier, R. L., & Pérez-Arlucea, M. (2011). Changes induced by mussel raft aquaculture in benthic environment of the Rías Baixas (Galicia, Spain). Journal of			

		más impactadas ubicadas justo debajo de las balsas se caracterizaron por contener una cantidad considerable de escombros y restos de conchas de mejillón, y hubo una disminución en la fracción de arena medianamente gruesa (0.02-2 mm) y un aumento en la fracción más fina correspondiente al lodo (<0.050 mm). Se registraron valores más altos de materia orgánica y una composición de carbonato más baja en las áreas afectadas. El autor también encontró una disminución en la riqueza florística asociada, así como una desaparición de especies incrustantes características de los lechos de maërl, y una marcada tendencia hacia una fauna asociada compuesta de especies detritívoras típicas de fondos de balsa de mejillón. Todos estos impactos negativos se atribuyeron a los efectos del cultivo de mejillones y el autor señala claramente la amenaza que representa la cría de mejillones para este hábitat vulnerable, no renovable. También vale la pena mencionar que las camas principales se utilizan como hábitat regular de otra especie de interés comercial, como la vieira (Pecten maximus).	Coastal Research, 786-789. Pérez-Camacho, A., Labarta, U., Bairas, R., 1995. Growth of mussels (Mytilus edulis galloprovincialis) in cultivation raft, Influence of seed source, cultivation site and food availability, Aquac. 138:349-362. Álvarez-Salgado, X. A., Labarta, U., Fernández-Reiriz, M. J., Figueiras, F. G., Rosón, G., Piedracoba, S., ... & Cabanas, J. M. (2008). Renewal time and the impact of harmful algal blooms on the extensive mussel raft culture of the Iberian coastal upwelling system (SW Europe). Harmful Algae, 7(6), 849-855. Duarte, P., Labarta, U., and Fernández-Reiriz, M.J. 2008. Modelling local food depletion effects in mussel rafts of Galician rias. Aquaculture, 274(2–4): 300–312. doi:10.1016/j.aquaculture.2007.11.025. http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=home.showFile&rep=file&fil=LIFE04_ENV_ES_000239_LAYMAN.pdf Peña V. 2010. Estudio ficológico de los fondos de mäerl y cascajo en el noroeste de la Península Ibérica. PhD Thesis. Universidade da Coruña. A Coruña.			
2.4.2 - Habitats management strategy						

2.4.3 - Habitats information	No se propone la recogida de información ambiental estandariza da sobre los hábitats donde se realiza la extracción de mejilla.	De acuerdo a los Descriptores utilizados por la Directiva marco sobre la estrategia marina, como criterios para definir el buen estado ambiental, a nivel de Hábitat han de utilizarse indicadores medioambientales como el tipo de sustrato, la orientación magnética, pendiente, calidad comercial, descrición del hábitat, afecciones antropogénicas, etc.	Directiva 2008/56/CE del Parlamento Europeo y del Consejo de 17 de junio de 2008 por la que se establece un marco de acción comunitaria para la política del medio marino,establece que los Estados miembros deben adoptar las medidas necesarias para lograr o mantener un buen estado ambiental del medio marino en el año 2020.		This comment is not concerned with habitat information.	
2.5.1 - Ecosystem outcome	Cambios en la estructura comunitaria de la costa rocosa intermareal	El agotamiento de la semilla de mejillón en la zona intermareal conduce a cambios en la estructura comunitaria de la costa rocosa intermareal. Los mejillones de la costa rocosa se consideran especies de ingeniería del ecosistema porque se agregan en lechos, modificando así la naturaleza y la complejidad del sustrato, contribuyendo a la riqueza de especies en las comunidades litorales rocosas (Borthagaray y Carranza 2007). Por lo tanto, su eliminación completa (y las especies asociadas) mediante la cosecha de semillas de mejillón representa una perturbación continua en el ecosistema (Piñeiro-Corbeira et al.2018, Barrientos et al.2019). Esta agresión continua y el subsiguiente cambio en la naturaleza del sustrato rocoso provoca un perjuicio en el asentamiento de otras especies, en particular del percebe, que precisa de congéneres y determinadas características en el mismo para que sus larvas recluten exitosamente.	Borthagaray, A. I., & Carranza, A. (2007). Mussels as ecosystem engineers: their contribution to species richness in a rocky littoral community. acta oecologica, 31(3), 243-250. Piñeiro-Corbeira, C., Barrientos, S., Olmedo, M., Cremades, J., & Barreiro, R. (2018). By-catch in no-fed aquaculture: exploiting mussel seed persistently and extensively disturbs the accompanying assemblage. ICES Journal of Marine Science, 75(6), 2213-2223. Barrientos, S., Barreiro, R., Olmedo, M., & Piñeiro-Corbeira, C. (2019). Can patch size and patch distance improve the recolonization of mussel-seed beds exploited for aquaculture?. Aquatic Conservation: Marine and Freshwater Ecosystems, 29(11), 1897-1908.		The comment is mainly concerned with the impact on Goose barnacles. It is argued that the removal of mussels reduces the ability of Goose barnacles to collonize rocks with a negative effect on the production and therefore teh yield of Goose barnacles. The question the team should answer under this PI is whether the activity disrupts the key elements underlying ecosystem structure and function to a point that there would be serious or irrversible harm. The team has concluded that the activity may impact species composition on the rocks on a temperory basis. However considering the ability of all species to recolonize the rocks the team conludes that changes are not irreversible. The abilities to reproduce and colonize again are large in a dynamic ecosystem like these exposed rocky shores. Therefore the team concluded there is no indications for an impact that disrups the key element underlying ecosystem structure and function.	Not accepted (no score change)
2.5.2 - Ecosystem management strategy	Falta de estrategia de gestión del ecosistema.	No existe una estrategia de gestión del ecosistema para algunos de los temas más preocupantes derivados del cultivo de mejillón como el posible exceso de carga en el medio o los cambios producidos en la comunidad del intermareal rocoso con la extracción de semilla. No se han tomado medidas en este sentido para alcanzar un redimiento sostenible, ni siquiera teniendo en cuenta los cambios esperados próximos debido al cambio climático	Juan Bald, Oihana Solaun y Angel Borja (AZTI-2009).- Los impactos de la acuicultura: minimización y certificación.		The rational for this PI has been redrafted. The team has considered that there are several management measures in place that together form a partial strategy to restrain ecosystem impacts. The resctrictions on the number of rafts and ropes, the length of ropes and the maximum quantities of spat that can be collected are among the most important of these measures. The team further concluded that there is some evidence that these measures are implemented effectively and that these measures will work. The comments of stakeholder argue that more should be done. This issue is further discussed in the response to the comments on PI 3.2.2.	Accepted (no score change)

2.5.3 - Ecosystem information	No se propone la recogida de información ambiental estandarizada sobre el estado del ecosistema donde se realiza la extracción de mejilla.	De acuerdo a los Descriptores utilizados por la Directiva marco sobre la estrategia marina, como criterios para definir el buen estado ambiental, a nivel de Ecosistema han de utilizarse indicadores medioambientales como especies descritoras de la comunidad, especies depredadoras e competidoras, categorías de protección, etc.	Directiva 2008/56/CE del Parlamento Europeo y del Consejo de 17 de junio de 2008 por la que se establece un marco de acción comunitaria para la política del medio marino,establece que los Estados miembros deben adoptar las medidas necesarias para lograr o mantener un buen estado ambiental del medio marino en el año 2020.		This comment is not concerned with ecosystem information.	Not accepted (no score change)
Principle 3 - Effective management	Falta de gestión efectiva	Los conflictos históricos entre el sector del mejillón y los recolectores de percebes indican que el manejo de la pesquería presenta carencias estructurales importantes que afectan significativamente a la toma de decisiones, la estrategia de manejo y la articulación de los mecanismos que enfrentan los desafíos futuros del sector. Asimismo, está claro que la intervención de la administración es necesaria para tomar decisiones y regular las actividades pesqueras basadas en el conocimiento científico a fin de proporcionar soluciones definitivas a los conflictos y garantizar, en la práctica, la sostenibilidad de los recursos explotados involucrados. Para que los procesos realizados en el marco de la acuicultura sean sostenible en el tiempo, deben proponerse acciones que eviten una colisión de la actividad con otras que se realizan en el medio marino. Además de reducir el impacto ambiental generado sobre el hábitat en el que se asientan las estructuras de cultivo, se debería reconocer la problemática real existente con el sector del percebe, y el evidente impacto que se genera de forma general en la comunidad del intermareal rocoso. Para responder a los principios de MSC se deberían incluír protocolos para identificar áreas sensibles a la extracción continuada de semilla. En definitiva la acuicultura de mejillón sólo podrá ser realmente sostenible si existe una buena planificación y se gestiona adecuadamente en todas sus fases.	https://www.lavozdegalicia.es/noticia/maritima/2018/03/09/extraccion-mejilla-provoca-choque-percebeiros-bateeiros/0003_201803G9P31991.htm https://www.elidealgallego.com/articulo/coruna/percebeiros-denuncian-bateeiros-esquilman-marisco-rocas/20160201223921272166.html https://www.diariodearousa.com/articulo/vilagarcia/tension-estalla-percebeiros-y-bateeiros-varios-puntos-costa/20150301233859104183.html https://www.atlantico.net/articulo/area-metropolitana/conflicto-baiona-llegada-nuevos-bateeiros/20140320111317409067.html http://www.mispeces.com/nav/actualidad/noticias/noticia-detalle/La-competencia-por-la-roca-del-litoral-vuelve-a-enfrentar-a-bateeiros-y-percebeiros/#.Xkzn7WhKjiw https://www.laopinioncoruna.es/mar/2010/09/30/mar-emplaza-bateeiros-cofradias-pactar-extraccion-mejilla-litoral/424646.html https://www.lavozdegalicia.es/noticia/galicia/2004/12/29/recogida-mejilla-subleva-percebeiros-corme/0003_3330279.htm Juan Bald, Oihana Solaun y Angel Borja (AZTI-2009).- Los		This comment is a general comment on the management system. The issues raised here by the stakeholder have been considered under PI 3.2.2. and PI3.2.3.	

			impactos de la acuicultura: minimización y certificación.			
3.1.1 - Legal and/or customary framework	Legislación específica obsoleta	Aunque existe un marco europeo general, la gobernanza específica no es suficiente para llevar a cabo una actividad con garantías de sostenibilidad en el uso de los recursos del medio. Como se menciona en el ACDR, el poder legal en mariscos y acuicultura se ha transferido a la Xunta de Galicia, y la ley que regula el cultivo de mejillones (Decreto 406/1996) ha demostrado ser obsoleta, insuficiente y poco detallada, y necesita una revisión en temas concretos a fin de adaptarse a las necesidades y conflictos actuales y los desafíos futuros que el sector del mejillón está a punto de enfrentar. Además, esta legislación tiene un claro carácter sectorial, y los reglamentos establecidos en ella están destinados a la protección del propio sector. Un ejemplo de estos aspectos son las escasas reglas de gestión y control en torno a la extracción de semillas en el intermareal rocoso, lo que no solo ha causado una posible sobreexplotación del recurso, sino que también ha provocado numerosos y continuos conflictos entre el sector del mejillón y los recolectores de percebes	https://www.mapa.gob.es/es/pesca/temas/acuicultura/plan_estrategico_6_julio_tcm30-77594.pdf https://www.planesga.es/docs/SXMar/ESGA_Noviembre2012_cast.pdf		In this Performance Indicator it is assessed whether the the general fisheries management system exists within an appropriate customary or legal system. The fisheries specific system is assesed under PI 3.2.1. Additional rational is provided. The Spanish fisheries management system operates within the EU Commom Fisheries Policy and within the Spanish legal system. It is concluded that these legal systemas are effective and that there is effective cooperation with other parties (within the EU). The management system also includes a mechanism for the resolution of legal disputes. Further response to the stakeholder comments is given under PI 3.2.1.	
	En Galicia existe un conflicto entre los sectores bateeiro y percebeiro en aquellas zonas donde sus especies objetivo comparten sustrato y son extraídas simultanea mente. El sector percebeiro refiere importantes daños en las poblaciones de percebe debido a la extracción de mejilla.	En el año 2011 la Consellería del Mar vio la necesidad de realizar un estudio del recubrimiento de estas dos especies en el litoral de Galicia, focalizado en aquellas localidades donde la coexistencia de ambos recursos pudiera das lugar a conflcitos. Se debería solicitar y atender a las conclusiones derivadas de dicho estudio y a la cartografía generada para proponer una gestión espacial de la extracción de mejilla.	Cartografía del recubrimiento de mejilla y percebe en el tramo de costa entre Fisterra y A Guarda (2011; Centro Tecnológico del Mar - Fundación Cetmar)		This comment is concerned with the co-existence of mussel spat collection and Goose barnacle collection. This is not so much related to the legal and customary framework of the gereral management system. It merely concerns the fishery specific management system and the controversy between the two sectors is further discussed under PI 3.2.2.	

	En Galicia existe un conflicto entre los sectores bateeiro y percebeiro en aquellas zonas donde sus especies objetivo comparten sustrato y son extraídas simultaneamente. El sector percebeiro refiere importantes daños en las poblaciones de percebe debido a la extracción de mejilla.	El conflicto entre sector del mejillón y las cofradías con planes de gestión de percebe es evidente, y desde las cofradías se tiene la impresión de que en la evaluación no se le da suficiente peso a un hecho que realmente causa perjuicios económicos por el daño que se causa en la gestión de las zonas de pesca. La certificación atendiendo a los estándares MSC es una oportunidad para establecer un nuevo marco que impulse futuras modificaciones en la normativa que regula la explotación de mejillón.	https://www.farodevigo.es/portada-o-morrazo/2019/05/25/percebeiros-cangas-califican-menosprecio-mar/2111689.html https://www.farodevigo.es/portada-arousa/2019/05/12/enfrentamientos-recrudecen-bateeiros-percebeiros/2103585.html https://www.quepasanacosta.gal/articulo/costa-da-morte/conselleria-sector-bateeiro-dispostos-negociar-maior-control-da-extraccion-da-mexilla/20190410113554108542.html https://www.farodevigo.es/portada-arousa/2019/03/27/percebeiros-reiteran-mar-necesidad-regular/2076425.html https://www.psdeg-psoe.com/a-xunta-debe-mediar-para-resolver-o-conflito-entre-a-extraccion-de-mexilla-e-os-percebeiros/ https://www.lavozdegalicia.es/noticia/maritima/2019/03/23/cofradias-suman-adeptos-exigir-gestion-extraccion-mejilla/0003_201903G23P31995.htm https://www.lavozdegalicia.es/noticia/ferrol/ferrol/2019/01/12/guerra-percebeiros-bateeiros-raiz-extraccion-mejilla/0003_201901F12C5991.htm https://www.diariodeferrol.com/articulo/ferrol/enfrentamiento-percebeiros-bateeiros-extraccion-mejilla-llega-posito-local/20190112230319245140.html https://www.lavozdegalicia.es/noticia/maritima/2018/03/09/extraccion-mejilla-provoca-choque-percebeiros-bateeiros/0003_201803G9P31991.htm https://www.elidealgallego.com/articulo/coruna/percebeiros-denuncian-bateeiros-esquilman-marisco-			

			rocas/20160201223921272166.html https://www.diariodearousa.com/articulo/vilagarcia/tension-estalla-percebeiros-y-bateeiros-varios-puntos-costa/20150301233859104183.html https://www.atlantico.net/articulo/area-metropolitana/conflicto-baiona-llegada-nuevos-bateeiros/20140320111317409067.html http://www.mispeces.com/nav/actualidad/noticias/noticia-detalle/La-competencia-por-la-roca-del-litoral-vuelve-a-enfrentar-a-bateeiros-y-percebeiros/#.Xkzn7WhKjiw https://www.laopinioncoruna.es/mar/2010/09/30/mar-emplaza-bateeiros-cofradias-pactar-extraccion-mejilla-litoral/424646.html https://www.lavozdegalicia.es/noticia/galicia/2004/12/29/recogida-mejilla-subleva-percebeiros-corme/0003_3330279.htm			
	Regulación de la extracción de mejilla. Compatibilidad con leyes o normativas con una gestíon eficaz, resolución conflictos, respeto por los derechos.	La Orden del 26 de octubre del 2000, por la que se regula la extracción de semilla de mejillón permite firmar convenios entre bateeiros y cofradías de pescadores para la extracción de semilla en el ámbito territorial donde se localizan los planes de explotación de las segundas. Esto acuerdos son resueltos por la Consellería do Mar contemplando, cuando así se solicita en el convenio firmado entre las dos partes, restricciones de acceso a zonas habitadas por poblaciones de percebe. Existe un precedente, por lo tanto, de una gestión espacial del recurso, con la que se demuestra una iniciativa del sector percebeiro para troteger sus áreas más sensibles. Teniendo en cuenta los objetivos de la certificación MSC, se deben contemplar medidas de este tipo (limitaciones espaciales de acceso para la extracción de semilla de mejillón), para minimizar los efectos negativos de esta extracción sobre el percebe, proponiendo mecanismos que permitan participar a las cofradías que gestionan el intermareal rocoso en la gestión espacial de la captura de mejilla. Con la nueva normativa publicada en el año 2019 (Decreto 153/2019) se da la posibilidad de establecer zonas reservadas para la extracción de semilla de mejillón en el ámbito territorial de los planes de percebe. Sin embargo, aún existe una evidente falta de concrección del	Orden del 26 de octubre del 2000. Decreto 153/2019, del 21 de noviembre, por el que se regula el régimen de conservación de los recursos marisqueros y de las algas.		This comment is concerned with the co-existence of mussel spat collection and Goose barnacle collection. This is not so much related to the legal and customary framework of the gereral management system. It merely concerns the fishery specific management system and the controversy between the two sectors is further discussed under PI 3.2.2.	

		alcance de la medida y un compromiso real de ejecutarla por parte de la administración.				
3.1.2 - Consultation, roles and responsibilities	Falta de un proceso de consulta efectivo y basado en el conocimiento	Durante muchos años ha habido un conflicto entre los recolectores de percebes y los productores de mejillones por la recolección de semilla en zonas con poblaciones del cirrípedo, y aunque se han propuesto medidas para intentar mediar, como permitir que los pescadores de percebes recojan la semilla, no se ha encontrado una solución definitiva. El estudio realizado por Brea Bermejo hace una década destacó la diferenciación de las áreas de cosecha para ambas actividades de pesca, evaluando la idoneidad de cada zona para ambas actividades, con áreas exclusivas recomendadas para la extracción de percebes, otras áreas exclusivas para semillas de mejillón y áreas de explotación compartidas. Pero estas recomendaciones nunca fueron tomadas en cuenta para la administración a fin de establecer una gestión ordenada basada en hechos científicos. La medida reciente de la Consellería do Mar, sobre permitir que los recolectores de percebes reserven la explotación de ciertas áreas, parece dirigirse hacia ella. Sin embargo, todavía no se ha materializado nada y no se ha definido ninguna acción, y existe una indefinición y una evidente falta de criterio por parte de la administración para llevar a cabo una regulación espacial que realmente cuente con la opinión de las cofradías en este sentido. Parece claro que es necesaria una regulación efectiva y definitiva para poner fin al conflicto. Además de los conflictos con los recolectores de percebes, ha habido fuertes conflictos entre los productores de mejillones (Labarta et al.2019), lo que refleja que no todas las partes involucradas en el proceso de toma de decisiones están de acuerdo con la estrategia de gestión.	https://www.lavozdegalicia.es/noticia/ferrol/ferrol/2019/01/12/guerra-percebeiros-bateeiros-raiz-extraccion-mejilla/0003_201901F12C5991.htm https://www.farodevigo.es/portada-o-morrazo/2019/05/25/percebeiros-cangas-califican-menosprecio-mar/2111689.html https://www.lavozdegalicia.es/noticia/carballo/2019/12/11/mar-sofoca-conflicto-mejilla-cambios-plan-percebe/0003_201912C11C3994.htm Brea Bermejo, E. (2009). Cartografiado y dinámica de las poblaciones de los bancos naturales de semilla de mejillón en las costas atlánticas gallegas. PhD thesis. Universidad de Santiago de Compostela, Santiago de Compostela. Labarta, U., & Fernández-Reiriz, M. J. (2019). The Galician mussel industry: Innovation and changes in the last forty years. Ocean & coastal management, 167, 208-218. Decreto 153/2019, do 21 de novembro, polo que se regula o réxime de conservación e explotación dos recursos marisqueiros e das algas.		The comment is mainly concerned with the fact that the existing contradictiosn between mussle spat collection and Goose barnacle collection has not been solved despite long time discussions and recommendations to solve this conflict. It is argued that certain views and recommendations are not taken over by the authorities. It is not argued that consultation processes do not take place or that roles and responsiblilities are not defined.	

	Falta de un foro representativo de consulta	No existe un mecanismo de consulta que incorpore a otras partes, ya que el único órgano de consulta específico (Comisión de Mejillones, creada por orden del 28 de diciembre de 2010) solo incluye el sector del mejillón y la administración. Debe haber dos sectores productivos principales involucrados en la evaluación de este indicador, debido a la superposición en el uso del espacio: el sector de cultivo de mejillones y los recolectores de percebes. La extracción de semillas es el mayor obstáculo a resolver para la coexistencia de ambos sectores, sin embargo, una cuestión tan importante no se tiene en cuenta al evaluar este indicador. Por lo tanto, las funciones y responsabilidades no se abordan adecuadamente, de lo contrario, el sector de percebes participaría activamente en los procesos de consulta. Además, con la nueva normativa aprobada en 2019 (Decreto 153/2019), se abre la puerta a coordinar una gestión espacial eficaz del área de solapamiento de las dos especies, por lo que se deben promover foros conde se evalúen posibles acuerdos y estrategias futuras. También vale la pena mencionar que la opinión de las ONG no se considera la mayor parte del tiempo y que parece claro que no se tiene en cuenta toda la información científica relevante e independiente.	Decreto 153/2019, do 21 de novembro, polo que se regula o réxime de conservación e explotación dos recursos marisqueiros e das algas.		See response above.	
3.1.3 - Long term objectives						
3.2.1 - Fishery-specific objectives						
3.2.2 - Decision-making processes						
3.2.3 - Compliance and enforcement						
3.2.4 - Monitoring and management performance evaluation						

Stakeholders input after the RBF

- Cofradía de Pescadores Santa Tecla de A Guarda

Taller para a avaliación do impacto da extracción de mexilla no percebe:

Tabla de atributos de susceptibilidade

Participa: Raquel Outeiral Radío

Asistencia técnica da Confraría de pescadores Santa Tecla de A Guarda

Superposición xeográfica: definida como a superposición entre a actividade extractiva da mexilla nunha zona determinada (litoral galego das provincias da Coruña e Pontevedra) sobre toda a área de distribución do stock de percebe dende o Algarve ata a Bretaña francesa.

Non vou puntuar este atributo porque penso que o criterio estándar non é adecuado para valorar o impacto da actividade extractiva da mexilla nos bancos naturais de percebe. O verdadeiro impacto non se produce a nivel do stock de percebe, senón de xeito inmediato e, a corto e longo prazo nos bancos de percebe onde simultáneamente se extrae a mexilla. Para este atributo sería interesante poder adaptar o análise de riscos a unha actividade marisqueira de organismos sésiles.

Capacidade de encuentro: a posición da especie na columna de auga con respecto ao arte de pesca.
A extracción de percebe realízase durante a baixamar cando a franxa intermareal onde aséntase o percebe queda total ou parcialmente ao descuberto. Solapamento có arte de pesca (rasqueta) moi elevado, risco alto, puntuación= 3.
Selectividade do tipo de arte de pesca: a captura de individuos inmaduros (DBC< 13 mm) no percebe é moi frecuente. O tipo de vida gregario desta especie que habita en zonas rochosas moi expostas dificulta enormemente a selección de individuos comerciais no momento da captura. Por eso a maioría dos plans de xestión de percebe establecen topes brutos de captura que teñen en conta os descartes (percebe inmaduro e non comercial, restos de pedra e restos de outros organismos). Puntuación= 3.

En A Guarda, 20 de febreiro de 2020.

9.5 Conditions

To be drafted from Client and Peer Review Draft Report

9.5.1 Condition 1 – PI 2.2.2 SI(e)

Table 9.5.1 – Condition 1

Performance Indicator	2.2.2 Secondary species management strategy e. Review of alternative measures to minimise mortality of unwanted catch.
Score	*75*
Justification	In June 2010, the Galician Fisheries Ministry (Consellería do Mar) meets with representatives of the mussel culture industry and the fisher's guilds involved in the spat collection from the coastal strip. As result, the development of cartographic maps was announced to determine areas where the extraction of mussel seed does not affect other resources (mainly the goose barnacle).This work was committed to the CETMAR Foundation. In 2011, Cetmar completed the report "Cartography of mussel spat and goose barnacle along the Galician coast between Fisterre and A Guarda". Unfortunately this piece of work is not available for consultation. SG60 is met. In 2011 the Consellería do Mar created the Mussel Commission as a permanent advisory body for the mussel sector. (Order dated December 28, 2010 establishing the Mussel Commission. DOG nº 2, dated January 4, 2011). This forum discusses issues of interest along with representatives of the sector, such as the annual spat collection season. However, there is no evidence that there is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of goose barnacle and they are implemented as appropriate. **SG80 is not met**.
Condition	By the Forth surveillance audit, evidence must be presented that there is a regular review of alternative measures to minimise the UoA-related mortality of unwanted catch of main secondary species and they are implemented as appropriate.
Milestones	**Year 1**: the client shall demonstrate that a plan for a regular review of alternative measures to minimise UoA-related mortality of unwanted catch of goose barnacle has been developed. **Year 2**: the client shall demonstrate that alternative measures to minimise UoA-related mortality of unwanted catch of goose barnacle have been reviewed and discussed. **Year 3**: the client shall demonstrate that alternative measures have been reviewed and plans to implement them have been developed as appropriate. **Year 4**: demonstrate that alternative measures are subject to regular review and are implemented as appropriate.
Consultation on condition	The client has contacted the ecology and biology research team from the Universidad de Vigo in order to collaborate in the definition, development, implementation and assessment of the information collected of main secondary species on the intertidial communities on the rocky coastal strip.

9.5.2 Condition 2 – PI 2.2.3 SI(c)

Table 9.5.2 – Condition 2

Performance Indicator	2.2.3 Secondary species information c. Information adequacy for management strategy
Score	70
Justification	UoA1- The existing studies on the intertidal communities inhabiting on the rocky coastal strip along the Galician rias provide adequate information to support measures to manage main secondary species and particularly the goose barnacle. However, since the level of unwanted catches of goose barnacle associated with the collection of mussel spat is not well documented and there is no monitoring on this issue, SG80 is not met.
Condition	By the fourth year the client should provide evidence that information is adequate to support a partial strategy to manage main secondary species.
Milestones	**Year 1**: The client shall demonstrate that a monitoring and catch recording plan for data collection (quantifiable) is being developed to record the interaction with secondary species that coexist with the mussel spat on the rocky strip. Ideally, monitoring should be carried out or supervised by an independent authority. **Year 2**: The client shall demonstrate that the monitoring and catch recording plan is in place and that data collections has started. **Year 3**: The client shall demonstrate that summarised data from first year of recording of secondary species are available. **Year 4**: The client shall demonstrate that the information gathered is adequate to support a partial strategy to manage main secondary species.
Consultation on condition	The client has contacted the ecology and biology research team from the Universidad de Vigo in order to collaborate in the definition, development, implementation and assessment of the information collected of main secondary species on the intertidial communities on the rocky coastal strip.

9.5.3 Condition 3 – PI 2.4.2 SI(c)

Table 9.5.3 – Condition 3

Performance Indicator	2.4.2 Habitat management strategy c. Management strategy implementation
Score	*75*
Justification	Georeferenced information on the location of mussel rafts is available. Rafts are inspected with some regularity in order to ascertain if the position and area occupied by the rafts, and the number and length of the ropes, complies with the legislation in force. Bottom habitats (including VME habitats) are mapped in detail. Nonetheless, the mussel production in rafts induces impacts on the habitat which are knonw and the main issues related to this fishery are well identified (please see PI 2.4.1). Despite this, there are not in place a monitoring program on the effects of mussel production on the habitats, which is paramount to identify problematic areas where some actions/measures should be undertaken/implemented to mitigate the impacts of the fishery on the habitats. Although several actions/measures have been identified and proposed to reduce the impact of the mussel production on the environment (see Si(b)), to the team best knowledge any of them have been put in place so far. Based on this, and following a precautionary approach, the team agreed that SG80 is not met since there isn't some quantitative evidence that the measures/partial strategy is being implemented successfully. A condition was opened.
Condition	By the fourth surveillance, some quantitative evidence must be presented that shows that the partial strategy to ensure the growth phase of both UoAs does not pose a risk of serious or irreversible harm to bottom habitats (including VME habitats) is being implemented successfully.
Milestones	Year 1: Provide evidence of discussion with a scientific entity to define what information is needed to evaluate whether the partial strategy is being implemented successfully. Year 2: Provide evidence of the collection of information needed for the evaluation of the partial strategy. Year 3: Provide further evidence of the collection of information needed for the evaluation of the partial strategy and the actions that were put in place to mitigate the impacts of the fishery on habitats, if necessary. Year 4: Provide quantitative evidence that the measures/partial strategy is implemented successfully. Score = 80.
Consultation on condition	The client has contacted with the BIOCOST Team from the Universidad de Coruña in order to establish a collaboration for the development of a monitoring system. The collaboration will consist on the definition, development, implementation and assessment of the information collected.

9.5.4 Condition 4 – PI 2.4.3 SI(c)

Table 9.5.4 – Condition 4

Performance Indicator	2.4.3 Habitat's information/monitoring c. Monitoring
Score	*75*
Justification	There is no regular monitoring of the physico-chemical characteristics of the seabottom beneath the rafts. The impact of the fishery on maerl beds that occur in the vicinity of the rafts is also not monitored with regularity. Therefore, SG80 and SG 100 are not met. A condition was opened.
Condition	By the fourth surveillance audit, evidence should be presented that shows that adequate information continues to be collected to detect any increase in risk to the main habitats.
Milestones	**Year 1**: Provide evidence of discussion with a scientific entity in order to develop a monitoring system that is able to detect any increase in risk level for main habitats. **Year 2**: Provide evidence of the development of a monitoring system that can detect increases in risk level for main habitats. **Year 3**: Provide evidence of implementation of a monitoring system that can detect increases in risk level for main habitats. **Year 4**: Provide evidence that adequate information continues to be collected to detect any increase in risk to the main habitats. Score=80.
Consultation on condition	The client has contacted with the BIOCOST Team from the Universidad de Coruña in order to establish a collaboration for the development of a monitoring system. The collaboration will consist on the definition, development, implementation and assessment of the information collected.

9.5.5 Condition 5 – PI 3.2.2 SI(d)

Table 9.5.5 – Condition 5

Performance Indicator	3.2.2 Decision-making process d. Accountability and transparency of management system and decision making process
Score	75
Justification	Information on quantities and spat collection areas are provided by fishermen to the Consellaria do Mar. However, this information is not public available and it is not clear whether or how this information is used in managing the fishery or dealing with concerns of stakeholders like the fishermens guilts. It is also not clear whether explanations are provided for actions or lack of action associated with findings emerging from the monitoring of spat collection or recommendations emerging from science, evaluation or review activity.
Condition	By year four it should be shown that information on the fishery's performance and management action concerning spat collection is available on request, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.
Milestones	**Year 1***:* Provide evidence of discussion with Consellaria do Mar concerning the sharing of information on quantities and spatial distribution of spat collection. **Year 2**: Provide evidence that information on quantities and spatial distribution of spat collection is publicly available (on request). **Year 3**: Provide evidence that information on quantities and spatial distribution of spat collection is evaluated and that explanations are provided for any actions or lack of action associated with findings emerging from this information. **Year 4**: Provide evidence that explanations are provided for actions or lack of action associated with relevant recommendations emerging from science, evaluation or review activity concerning spat collection. Score = 80
Consultation on condition	The client sent evidence that after several phone calls they contacted Ms. Rodríguez Moreda (the General director of fisheries, aquaculture and technological innovation of the Conselleria do Mar) by email (on 25th February 2021) to consult them about their commitment to assist the fishery in undertaking the actions specified in the Client Action Plan. The following (translated from the Spanish e-mail) was asked by the Client to the Conselleria do Mar: *To confirm by e-mail their willingness to collaborate with the Consello Regulador do Mexillón de Galicia during the next few years, in order to:* • *Continue improving the collection and processing of statistical information on the extraction of mussel seed in natural banks regulated by the Order of October 26, 2000.*

	• *Ensure public access to statistical information on the quantities extracted and the areas of extraction of mussel seed from natural banks.* • *Collaborate to generate, through its own research services and collaboration with other entities of the public R+D+I service, the scientific-technical information necessary to evaluate the management of mussel culture in rafts and, if necessary, define measures, recommendations and improvement actions for its sustainable development.* • *Provide evidence of the use of the mechanisms and procedures enabled in accordance with the current rules of transparency and good governance, and organization and operation of the General Administration and the autonomous public sector of Galicia, in decision-making related to the management of mussel culture*. As for the Conselleria do Mar, Ms. Rodríguez Moreda replied by email on 2nd March 2021, stating the following (translated from the Spanish e-mail): *From the Consellería do Mar we are very interested in making further progress on the issues you indicate, to the extent that they are fundamental for the sustainability of the mussel growing sector. In the same way, you know well and first-hand our interest in complying with the rules of transparency and good governance of all our actions.* *Do not doubt, therefore, that we will continue to work to improve the management of the mussel and, above all, to guarantee the sustainability of the sector.*

9.6 Client Action Plan

To be added from Public Comment Draft Report

The report shall include the Client Action Plan from the fishery client to address conditions.Reference(s): FCP v2.1 Section 7.19

9.6.1 Client Action Plan - Condition 1

Condition 1 – PI 2.2.2 SI(e)	By the Forth surveillance audit, evidence must be presented that there is a regular review of alternative measures to minimise the UoA-related mortality of unwanted catch of main secondary species and they are implemented as appropriate.

During the first year of certification, a plan will be designed to periodically review the incidence of unwanted catches of secondary species to define and evaluate possible measures to minimize their mortality.

As part of the plan, an independent scientific team will be contracted in the first year to study the possible effects of mussel seed collection on the natural rocky intertidal banks and a monitoring program will be carried out to determine the main secondary species associated with mussel seed collection and the levels of unwanted catches of these species.

At the first audit visit, the designed plan will be presented to the team.

The following years the plan will be implemented and developed.

Based on the results of the studies, management measures and practices for minimizing the mortality of unwanted secondary species will be defined in the third year.

Annually, the results of the plan and the proposed measures will be presented, discussed and evaluated with mussel producers for adoption, if necessary. In addition, the results of the plan will be reported to interested parties upon request.

During the second audit visit, the team will be presented with the results of the studies developed with quantitative estimates of the levels of unwanted bycatch.

During the third and fourth year of the audit, the monitoring and identification of unwanted bycatch will continue, as well as the management measures defined to minimize the mortality of secondary species. These will be presented to the auditors.

9.6.2 Client Action Plan - Condition 2

Condition – PI 2.2.3 SI(c)	By the fourth year the client should provide evidence that information is adequate to support a partial strategy to manage main secondary species.

In the first year, an independent scientific team will be contracted to study the possible effects of mussel seed collection on the natural rocky intertidal banks. In parallel, a program will be defined to monitor and record unwanted catches of secondary species associated with mussel seed collection in natural banks.

During the first audit visit, the program and the study will be presented to the team.

During the second year, the study will be launched and the monitoring and recording program for unwanted catches (species and catch volumes) will be implemented. Both will have continuity in the following years.

For the second audit we will have the first annual report containing the first results of the program and the study.

In the third year the program will be reviewed and changes and improvements will be assessed and implemented. In addition, the first results of the study and the program will be analyzed together with the contracted technical team.

The second and third annual reports will contain, if necessary, a proposal for measures to minimize unwanted catches and a system for their evaluation.

All annual reports will be presented to the mussel producers and will be available to the team during audit visits.

9.6.3 Client Action Plan - Condition 3

Condition – **PI 2.4.2 SI(c)**	By the fourth surveillance, some quantitative evidence must be presented that shows that the partial strategy to ensure the growth phase of both UoAs does not pose a risk of serious or irreversible harm to bottom habitats (including VME habitats) is being implemented successfully.

During the first year, a dialogue will be established with an independent scientific team to determine how to evaluate whether the partial strategy developed for mussel culture in mussel rafts is being successfully implemented to ensure that it does not present a risk of serious or irreversible damage to benthic habitats. In addition, a monitoring plan will be defined and designed to detect possible increases in the risk of serious or irreversible damage that mussel culture may cause to benthic habitats (including VME habitats).

As a result of the above, the independent scientific team needed to develop the plan will be contracted.

The designed plan will be presented to the team at the first audit visit.

In the following years, in addition to collecting the necessary information for the evaluation of the partial strategy, the monitoring plan will be implemented and developed. Based on the information collected and the results of the plan, the validity of the measures and actions implemented, if necessary, to minimize the impacts of cultivation on the habitats will be evaluated in the third and fourth years.

Annually, the results of the plan and proposed measures will be presented, discussed and evaluated with mussel farmers for adoption, if necessary.

The results of the plan, including the evaluation of possible measures taken, will be presented to the team during the audit visits.

9.6.4 Client Action Plan - Condition 4

Condition – **PI 2.4.3 SI(c)**	By the fourth surveillance audit, evidence should be presented that shows that adequate information continues to be collected to detect any increase in risk to the main habitats.

In the first year, an independent scientific team will be contracted to define and design a monitoring plan to detect possible increases in the risks that mussel culture may cause to the main habitats.

In addition, scientific information on the main habitats and their status will be collected.

The monitoring plan will be presented to the team at the first audit visit.

The second year, together with the contracted scientific team, the monitoring plan will be implemented and will have continuity in the following years.

Evidence that the plan is being implemented will be provided for the second audit.

During the third and fourth years, together with the contracted technical team, the plan will be reviewed and analyzed and possible changes and improvements to the plan will be assessed and implemented to ensure that the system can detect increases in the level of risk to key habitats. If indicated by the risk assessment in the third year, a risk management strategy will be developed to prevent mussel culture from causing serious or irreversible damage to benthic habitats.

In the third and fourth years, annual reports will be issued with the results of the plan. These reports will be presented and analyzed together with the mussel producers and will be available to the team during audit visits.

9.6.5 Client Action Plan - Condition 5

Condition – **PI 3.2.2 SI(d)**	By year four it should be shown that information on the fishery's performance and management action concerning spat collection is available on request, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.

Action Plan - Condition 5

In the first year we will work together with the Consellería do Mar to evaluate possible improvements in the system for collecting and processing statistical information on the extraction of mussel seed from natural banks regulated by the Order of October 26, 2000.

In the second year, in collaboration with the Consellería, a statistical report will be prepared on the quantities extracted and the areas of extraction of mussel seed from natural beds. This report will be publicly accessible and will be available to the team during the second audit visit.

This report will be analyzed and evaluated by the administration and sectoral entities in the consultation bodies established in accordance with current regulations and, if necessary, measures will be assessed to improve the management of mussel seed collection. Evidence will be provided to the team in the third audit visit that the information on quantities and spatial distribution of natural bank mussel seed collection has been evaluated with the sectorial entities, as well as the need, or not, to promote actions associated with the results of this evaluation.

For the fourth year of the audit, in collaboration with the Consellería do Mar, evidence will be provided that in the decision-making processes used in the management of mussel culture in rafts, relevant scientific information is regularly analyzed, both with regard to the seed collection phase and other issues of interest for mussel culture in rafts.

9.7 Surveillance

To be drafted from Client and Peer Review Draft Report

Table 9.7.1– Fishery surveillance program				
Surveillance level	Year 1	Year 2	Year 3	Year 4
Level 5	On-site surveillance audit	On-site surveillance audit	Off-site surveillance audit	On-site surveillance audit & re-certification site visit

Table 9.7.2 – Timing of surveillance audit			
Year	Anniversary date of certificate	Proposed date of surveillance audit	Rationale
1-4	Anniversary date	30 days prior to the anniversary date	Not needed.

Table 9.7.3 – Surveillance level rationale			
Year	Surveillance activity	Number of auditors	Rationale
Years: 1, 2, 4	On-site audit	At least 2 auditors	Considering the conditions raised and the progress needed in the first 2 years, it can be deduced that an evaluation on-site to verify the progress towards conditions 1.2.2; 1.2.3; 2.4.2, 2.4.3 and 3.2.2 will be desired.

9.8 Risk-Based Framework outputs

To be drafted at Client and Peer Review Draft Report stage

9.8.1 Consequence Analysis (CA)

N/A

9.8.2 Productivity Susceptibility Analysis (PSA)

The team has scored the productivity and susceptibility of each data-deficient scoring element using PF4: PSA productivity attributes and scores and PF5: PSA susceptibility attributes and scores. As a result **Table 9.8.2** was generated. The information gathered by the stakeholders was considered but the final scoring included in Table 9.8.2 is based on expert opinion.

Table 9.8.2 – PSA productivity attributes and scores		
Performance Indicator	2.2.1	
Productivity		
Scoring element (species)	Goose banacle (*Pollicipes pollicipes*)	
Attribute	Rationale	Score
Average age at maturity	The mean length at sexual maturity was calculated in terms of the diameter of the base of the capitulum - DBC (13.35 mm) for specimens collected on the Galician coast (NW Spain) (Parada et al., 2013; Xunta de Galicia, 2002). Minimum size for maturity of the female gonad was 12.5 mm (RC) whilst sperm production is achieved at a smaller size (10 mm) (Cruz and Hawkins, 1998). Thus, the minimum age at maturity for females is around 9.6 months, while for males is around 7.7 months.	**1**
Average maximum age	Pollicipes pollicipes grow very fast during the first two years of life with newly recruits presenting an individual annual growth rate of 15.7 mm RC – Rostro-Carinal (individuals ≤ 1 year old) which corresponds to a monthly increment of 1.3 mm RC in their first year of life (Cruz et al., 2010). Although, there is no study describing the growth curve for the goose barnacle, considering the annual growth rate estimated for the first year of life and that this species spans within the first year of life it could be expected that maximum age attained is lower than 10 years.	**1**
Fecundity	Estimates of the annual number of broods varied between 1 (crowded animals), 1 or 2 (small, uncrowded animals), and 4 (large, uncrowded animals). Small animals (mean RC = 15.4 mm; 16,229 eggs) produced about half the number of eggs of large animals (mean RC = 19.6 mm; 34,172 eggs). Fecundity was considered to be a function of size (RC) (after logarithmic transformation; r2 = 0.62). A variable number of eggs was produced by animals of the same size; animals with an RC from 23-25 mm ranging from 30,000-130,000 eggs per brood (Cruz and Araújo, 1999). The pattern of functioning of the female gonad should allow production of several broods during the season Cruz et al. (1998)	**1**

Average maximum size	Not scored for invertebrates	**N/A**
Average size at maturity	Not scored for invertebrates	**N/A**
Reproductive strategy	They are broadcast spawners (Cruz and Araújo, 1999; https://www.sealifebase.ca/summary/Pollicipes-pollicipes.html)	**1**
Trophic level	The trophic level of the goose barnacle is 3 (http://www.seaaroundus.org/)	**2**
Density dependence (Invertebrates only)	Crowded *Pollicipes pollicipes* brooded less than animals not as crowded. Only one site was sampled that had animals in crowded conditions. Therefore, results may simply be due to spatial differences. Further studies are needed to confirm this pattern (Cruz and Araújo, 1999). In *Balanus glandula*, a higher transference of energy to egg production has been found in animals at low densities compared to high densities (e.g., Wu et al., 1977). Following the Guidance to Table PF4 Productivity attributes and scores – density dependence de FCP v2.1' and in the absence of more information, the highest risk score (3) is used.	**3**
Susceptibility		
Fishery Only where the scoring element is scored cumulatively	Spat extraction with scrapers (UoA1).	
Attribute	Rationale	Score
Areal Overlap	Considering the distribution of the goose barnacle stock and the areas where harvesters are allowed to collect mussel spat it can be concluded that areal overlap is medium.	**2**
Encounterability	Both species (mussel spat and goose barnacles) coexist in the same areas along the rocky shores of Galicia and therefore encounteraility is high.	**3**
Selectivity of gear type	Harvesters use scrappers to remove mussel spat from the rocks. This type of fishing gear is not selective and therefore all individuals that are associated to mussel spat are caught and retained despite their size.	**3**
Post capture mortality	All goose barnacles that are accidentally caught during the mussel spat collection will die even if returned to the sea alive since they are unable to attach to the rock again.	**3**

Catch (weight) Only where the scoring element is scored cumulatively	As set out in Annex PF 4.4.3.d, If the UoA does not have main species with catches at 10% or more of the total catch by weight of the UoA, the team may elect to conduct the PSA on the UoA only.	

During the RBF it was discussed with the stakeholders the Productivity and Susceptibility attributes in order to reach an agreement on the score to assign to each attribute. In the case of Productivity attributes, it was reached a consensus among all stakeholders, whereas in the case of Susceptibility attributes, despite the data presented by the team and the long discussion, no agreement was reached. Therefore it was decided to proceed with the voting in order to understand the position of each stakeholder (only a part of the stakeholders voted). With this purpose, each stakeholder voted in one score and explained the reason underlying his/her decision. It was based both on the explanations given and on the team expertise,that the team decided the final score to be assigned to each Susceptibility attribute. For three out of four Suscepttibility attributes (Encounterability, Selectivity of gear type, and Post capture mortality) the team decided to be precautionary and scored those attributes with 3 (high risk). Regarding the attribute "Areal Overlap", it was clearly a misunderstanding of the definition of this attribute by some stakeholders and therefore, based on the team expertise, the team decided to score this attribute as 2 (medium risk).

Scoring element	First of each scoring element	Scientific name	Common name	Species type	Fishery descriptor	Average age at maturity	Average max age	Fecundity	Average max size	Average size at Maturity	Reproductive strategy	Trophic level	Density Dependance	Total Productivity (average)	Availability	Encounterability	Selectivity	Post-capture mortality	Total (multiplicative)	PSA Score	Catch (tons)	Weighting	Weighted Total	Weighted PSA Score	**MSC PSA-derived score**	Risk Category Name	MSC scoring guidepost
1	First	Pollicipes pollicipes)	Goose banacle	Invertebrate	spat collection	1	1	1			1	2	3	1,50	2	3	3	3	2,33	2,77					80	Low	≥80

9.9 Objection Procedure – delete if not applicable

To be added at Public Certification Report stage

The report shall include all written decisions arising from a 'Notice of Objection', if received and accepted by the Independent Adjudicator.

Reference(s): FCP v2.1 Annex PD