Aquaculture Licences Appeals Board

Technical Advisor's Report

Appeal(s) Reference No:

1. AP5/2019
2. AP6/2019
3. AP7/2019
4. AP8/2019
5. AP9/2019

DRAFT Version 3

Contents

Summary Description

Description:	The cultivation of mussels using longlines on a site totalling 2.55ha, on the foreshore in Killary, Co. Galway.
Licence Application	
Department Ref No:	**T09/508**
Applicant:	Patrick Lydon, Lettergesh West, Renvyle, Co. Galway
Minister's Decision:	Refuse application for an Aquaculture Licence and Foreshore Licence
Appeal	
Type of Appeal:	Appeal against the decision of the Minister for Agriculture, Food and Marine to refuse to grant Aquaculture and Foreshore Licence for the cultivation of mussels using longlines on the foreshore in Killary Harbour.
Appellant(s):	**AP5/2019** – Patrick Lydon
Observers:	N/A
Technical Advisor:	Altemar, Marine and Environmental Consultants
Site Inspection:	13th July 2020

Description:	The cultivation of mussels using longlines on a site totalling 0.5 ha, on the foreshore in Killary Harbour, Co. Galway.
Licence Application	
Department Ref No:	**T09/509**
Applicant:	Kevin and Michael Lydon, Cluggam, Maam, Co. Galway
Minister's Decision:	Refuse application for an Aquaculture Licence and Foreshore Licence
Appeal	
Type of Appeal:	Appeal against the decision of the Minister for Agriculture, Food and Marine to refuse to grant Aquaculture and Foreshore Licence for the cultivation of mussels using longlines on the foreshore in Killary Harbour.
Appellant(s):	**AP6/2019** – Kevin and Michael Lydon
Observers:	N/A
Technical Advisor:	Altemar, Marine and Environmental Consultants
Site Inspection:	13th July 2020

Description:	The cultivation of mussels using longlines on a site totalling 1.0 ha, on the foreshore in Killary Harbour, Co. Galway.
Licence Application	
Department Ref No:	**T09/510**
Applicant:	Kevin and Michael Lydon, Cluggam, Maam, Co. Galway
Minister's Decision:	Refuse application for an Aquaculture Licence and Foreshore Licence
Appeal	
Type of Appeal:	Appeal against the decision of the Minister for Agriculture, Food and Marine to refuse to grant Aquaculture and Foreshore Licence for the cultivation of mussels using longlines on the foreshore in Killary Harbour.
Appellant(s):	**AP7/2019** – Michael and Kevin Lydon
Observers:	N/A
Technical Advisor:	Altemar, Marine and Environmental Consultants
Site Inspection:	13th July 2020

Description:	The cultivation of mussels using longlines on a 1ha site on the foreshore in Killary Harbour, Co. Galway.
Licence Application	

Department Ref No:	**T09/511A**
Applicant:	Kevin and Michael Lydon, Cluggam, Maam, Co. Galway
Minister's Decision:	Refuse application for an Aquaculture Licence and Foreshore Licence
Appeal	
Type of Appeal:	Appeal against the decision of the Minister for Agriculture, Food and Marine to refuse to grant Aquaculture and Foreshore Licence for the cultivation of mussels using longlines on the foreshore in Killary Harbour.
Appellant(s):	**AP8/2019** – Michael and Kevin Lydon
Observers:	N/A
Technical Advisor:	Altemar, Marine and Environmental Consultants
Site Inspection:	13th July 2020

Description:	The cultivation of mussels using longlines on a site totalling 15.0422ha, on the foreshore in Killary Harbour, Co. Galway.
Licence Application	
Department Ref No:	**T09/477**
Applicant:	Kevin Lydon, Cluggam, Maam, Co. Galway
Minister's Decision:	Refuse application for an Aquaculture Licence and Foreshore Licence
Appeal	
Type of Appeal:	Appeal against the decision of the Minister for Agriculture, Food and Marine to refuse to grant Aquaculture and Foreshore Licence for the cultivation of mussels using longlines on the foreshore in Killary Harbour.
Appellant(s):	**AP9/2019** – Kevin Lydon
Observers:	N/A
Technical Advisor:	Altemar, Marine and Environmental Consultants
Site Inspection:	13th July 2020

1.0 General Matters / Appeal Details

This report constitutes a complete account of technical advice and information provided to the Aquaculture Licence Appeals Board (ALAB) to support assessment of the appeals submitted in respect to the refusal to grant applications for the cultivation of mussels at five separate sites in Killary Harbour, Co. Galway. Details of each application and their respective appeals will be provided in the following sections.

1.1 Appeal Details & Observer Comments/Submissions

Date Appeal Received:

Appeal Number	Date Received by ALAB
AP 5/2019	24th October 2019
AP 6/2019	24th October 2019
AP 7/2019	24th October 2019
AP 8/2019	24th October 2019
AP 9/2019	24th October 2019

Location of Site Appealed:

Appeal Number	Location of Site Appealed
AP 5/2019	T09/508 – Killary Harbour, Co. Galway.
AP 6/2019	T09/509 – Killary Harbour, Co. Galway.
AP 7/2019	T09/510 – Killary Harbour, Co. Galway.
AP 8/2019	T09/511 – Killary Harbour, Co. Galway.
AP 9/2019	T09/477 – Killary Harbour, Co. Galway.

1.2 Name of Appellant(s):

Appeal Number	Appellant	Address
AP 5/2019	Patrick Lydon	Lettergesh West, Renvyle, Co. Galway.
AP 6/2019	Kevin and Michael Lydon	Cluggam, Maam, Co. Galway.
AP 7/2019	Kevin and Michael Lydon	Cluggam, Maam, Co. Galway.
AP 8/2019	Kevin and Michael Lydon	Cluggam, Maam, Co. Galway.
AP 9/2019	Kevin Lydon	Cluggam, Maam, Co. Galway.

1.3 Name of Observer(s):

No official observations outside of Appellants/Applicants responses were submitted/received.

1.4 Grounds for Appeal

The grounds for appeal for each Appellant are summarised below.

Appellant 1	Patrick Lydon	AP 5/2019

Appeal reference number AP5/2019 relates to application T09/508 which was refused by the Minister. The Appellant is also the Applicant and he is seeking to appeal the decision to refuse the application and has offered the following reasons as part of his appeal.

Issues

1. Application is a renewal of existing site

It is argued that application T09/508A is a ''renewal'' of a previously operational site (T09/318A) and not a new application. As this previous site was factored in to the UISCE Carrying Capacity Study, the proposed site (T09/508A) will not lead to any ''additional'' negative impacts on the carrying capacity of Killary Harbour. It is the Appellant/Applicant's opinion that this was not considered by the Minister in the decision to refuse permission.

2. Conditions deemed acceptable for previous applications still exist

The former site (T09/318A) was subject to a comprehensive survey and assessment, including its longlines and deemed suitable. Proposed site T09/508A will, effectively, replace the former site and therefore, should be subject to the same decision-making which enabled the former site to operate.

3. Equipment improvements/alterations

The Applicant/Appellant has made significant alterations to his operational practices on sites in Killary, including reduced flotation, reduction in number of droppers and moving of anchors, which ensure that current operations adhere to the conditions of the most recent licences and have reduced mussel stocking density in Killary. Therefore, the concerns that existed in relation to the carrying capacity of Killary are no longer valid and this should be factored into a decision on the granting of the proposed application.

4. Ownership arrangements

The Appellant/Applicant has stated that he has a ''verbal agreement'' with former licence holder (T09/318A) to continue operations on this site.

5. Prolonged licensing process

It is argued that due to uncertainties with the renewal and licencing process, the Applicant/ Appellant withheld submission of their own application for several years, in order to await a resolution. This has now proved detrimental to their ambitions as the conditions and requirements of new applicants has changed substantially, in their opinion, and this has resulted in the refusal of their application.

6. Historical Links and Employment

The Applicant/Appellant has a longstanding association with farming in the harbour and has engaged in such practices there for 14 years. This is part of their livelihood and is an employment generator in what is a remote, rural area.

Appellant 2	Kevin & Michael Lydon	AP 6/2019
Appellant 3	Kevin & Michael Lydon	AP 7/2019
Appellant 4	Kevin & Michael Lydon	AP 8/2019

Appeal reference numbers AP6/2019, AP7/2019 and AP8/2019 relate to site reference numbers T09/509, T09/510 and T09/511 respectively, which were refused by the Minister. All appeals were made simultaneously within the one form and the comments by the Appellants, who are also the Applicants, relate to all sites. The Appellants/Applicants are seeking to appeal the decision to refuse permission for aquaculture licences and have offered the following reasons as part of their appeal.

Issues

1. Applications are renewal of existing sites

The Appellants argue that proposed site applications (T9/509, T9/510 & T9/511) are not ''additional production sites'' but instead renewals of existing sites (T09/190C, T09/330 & T09/318B). This fundamentally changes the context of the applications as they are not adding to the total number of active sites in the Harbour.

2. Prior acceptable conditions for previous applications still exist

The Appellant argues that as the former sites (T09/190C, T09/330 & T09/318B) and their longlines were subject to a comprehensive survey and assessment and deemed suitable, the proposed applications should be subject to the same considerations. They claim that as the proposed applications (T9/509, T9/510 & T9/511) are replacing the former sites, there will be no additional impact on the carrying capacity of the harbour.

3. Equipment improvements/alterations

The Appellant has made significant alterations to their rope mussel cultivation system, from ''*the traditional single drop rope system to a continuous longline cultivation system based on the New Zealand structure*''.

4. Suitable environmental conditions

The Appellant claims that the UISCE Carrying Capacity report identifies Inner Killary Harbour as possessing the ''*best growth rate*''. As the proposed sites will be located in this area they will not experience the same constraints to growth cited as a reason in the decision to refuse permission.

5. Importance for Mussel seed collection

It is stated by the Appellant that *''Inner Killary is the primary collection area for mussel seed within Killary Harbour''*. Furthermore, the proposed sites are essential for the new growing system the Applicant/Appellant is implementing as *''continuous mussel collection rope requires more surface water area compared to the traditional mesh and dropper rope system as we can only collect mussel seed in the top 1 metre to 1.5 metre''.*

6. Ownership agreements

The Appellant/Applicant has stated that they *''were in communication with previous licence holders''* and have a ''*verbal agreement to continue to operate on the sites*''.

7. Prolonged licensing process

The Appellant cites a drawn-out licensing process and an understanding that DAFM would only consider new applications or licence renewals for the subject sites once *''all other Killary Licences were renewed*''. They claim that this uncertainty prevented them from applying for the licences at an earlier stage, when the likelihood of successful applications would have been greater.

Appellant 5	Kevin Lydon	AP 9/2019

Appeal reference number AP9/2019 relates to application T9/477 which was refused by the Minister. The Appellant is also the Applicant and they are seeking to appeal the decision to refuse the application for licence and have offered the following reasons as part of their appeal.

Issues

1. Reduction of cumulative effects

The Appellant has proposed a *''reduction of current floatation condition of 18,000 litres per hectare to 9,000 per hectare''* on existing sites in Killary Harbour that they operate. Such a proposal would, it is claimed, reduce overall floatation levels from 279,000 litres to 139,500 litres. They also propose the same condition be attached to application site T9/477 resulting in a situation where floatation of 279,000 litres on 4 sites is reduced to 274,500 litres on 5 sites. If implemented, these changes would see a reduction in stocking levels and *''impact positively on current production yields as there will be an increase in spacing between longlines thereby increasing buffer zones between mussel farms''*.

2. Operational changes

The Appellant cites changes to their methods of cultivation from *''single dropper system using Pergolai plastic mesh to a system based on the New Zealand continuous longline system''* as a more environmentally friendly method which should be factored into licence decision-making.

3. Benefits to unproductive areas

The Appellant believes that adequate consideration was not given to their proposal contained in the original application for the removal of longlines from existing, unproductive sites to the proposed licence site. It is claimed that allowing this would result in the *''opening up of channels and creating buffer zones which would be highly beneficial''*. Furthermore, by moving the longlines from the existing sites, these unproductive areas will have an opportunity to replenish.

4. Oversight in Ministerial decision-making

The Appellant argues that DAFM refused to consider the Appellant's offer to reduce floatation on *''existing sites to enable issuing of new licence''* before arriving at their decision to refuse licence.

5. Impact of other licences

The Appellant claims that they have been forced to apply for a new licence in order to maintain their business. This is due to the decision of the Minister to issue licences to other operators *''on the outside – adjacent to our sites and other sites towards the north and the channel''*, which have *''drastically reduced''* the yield from the Appellant's other existing sites. It is claimed that *''DAFM are producing contradictory evaluations in relation to the issuing of licences in Killary''*.

1.5 Minister's Submission

Section 44 of the Fisheries (Amendment) Act 1997 part 2 states that:

"The Minister and each other party except the Appellant may make submissions or observations in writing to the Board in relation to the appeal within a period of one month beginning on the day on which a copy of the notice of appeal is sent to that party by the Board and any submissions or observations received by the Board after the expiration of that period shall not be considered by it".

No submissions are enclosed from the Minister in the light of appeals.

1.6 Applicant Response

The Applicant may submit a response to appeal submissions under the provision set out in Section 44(2) of the Fisheries Amendment Act 1997 which states:

"*The Minister and each other party except the Appellant may make submissions or observations in writing to the Board in relation to the appeal within a period of one month beginning on the day on which a copy of the notice of appeal is sent to that party by the Board and any submissions or observations received by the Board after the expiration of that period shall not be considered by it*."

In each case the Applicant is also the Appellant to the decisions for each licence application.

1.6.1 Additional Submissions/Responses

There are no recorded additional submissions in each case.

2.0 Consideration of Non-Substantive Issues

Non-substantive issues raised in each appeal case have been compiled and responded to in the following tables.

AP5/2019

#	Issue	Comment
1	Ownership arrangements	The Appellant/Applicant has stated that they have a *''verbal agreement''* with former licence holder (T09/318A) to continue operations on the site for which their application applies. This Technical Advisor Report is reviewing an appeal that relates to an application for an aquaculture site and any agreements between the Appellant and third parties are not deemed relevant to this technical advisor review.
2	Prolonged licensing process	The Appellant/Applicant has stated that they postponed their submission of a licence application for several years due to an understanding that they must first await a decision on other licence renewals by the Minister. It is not within the remit of this Technical Advisor Report to review the system of licencing, nor can such a claim be assessed as part of the review process.
3	Historical links and employment	The Applicant/Appellant has engaged in aquaculture practices in the area for 14 years and they contribute towards local employment in a rural, coastal area. This Technical Advisor Report relates specifically to an application appeal and such a statement has no bearing on the technical review process.
4	Ownership arrangements	The Appellant/Applicant has stated that he has a ''verbal agreement'' with former licence holder (T09/318A) to continue operations on this site.
5	Prolonged licensing process	It is argued that due to uncertainties with the renewal and licencing process, the Applicant/ Appellant withheld submission of their own application for several years, in order to await a resolution. This has now proved detrimental to their ambitions as the conditions and requirements of new applicants has changed substantially, in their opinion, and this has resulted in the refusal of their application.
6	Historical Links and Employment	The Applicant/Appellant has a longstanding association with farming in the harbour and has engaged in such practices there for 14 years. This is part of their livelihood and is an employment generator in what is a remote, rural area.

AP6/2019, AP7/2019 & AP8/2019

#	Issue	Comment
1	Ownership agreements	The Appellant/Applicant has stated that they have a ''*verbal agreement to continue to operate on the sites*'' (T09/190C, T09/318B & T09/330) with the licence holders. This Technical Advisor Report relates specifically to an application appeal and this statement have no bearing on the technical review process.
2	Prolonged licensing process	The Appellant/Applicant has stated that they postponed their submission of a licence application for several years due to an understanding that they must first await a decision on other licence renewals by the Minister. It is not within the remit of this Technical Advisor Report to review the system of licencing, nor can such a claim be assessed as part of the review process.
3	Equipment improvements/ alterations	The Appellant has made significant alterations to their rope mussel cultivation system, from ''the traditional single drop rope system to a continuous longline cultivation system based on the New Zealand structure''.
4	Suitable environmental conditions	The Appellant claims that the UISCE Carrying Capacity report identifies Inner Killary Harbour as possessing the ''best growth rate''. As the proposed sites will be located in this area they will not experience the same constraints to growth cited as a reason in the decision to refuse permission.
5	Importance for Mussel seed collection	It is stated by the Appellant that ''Inner Killary is the primary collection area for mussel seed within Killary Harbour''. Furthermore, the proposed sites are essential for the new growing system the Applicant/Appellant is implementing as ''continuous mussel collection rope requires more surface water area compared to the traditional mesh and dropper rope system as we can only collect mussel seed in the top 1 metre to 1.5 metre''.
6	Ownership agreements	The Appellant/Applicant has stated that they ''were in communication with previous licence holders'' and have a ''verbal agreement to continue to operate on the sites''.
7	Prolonged licensing process	The Appellant cites a drawn-out licensing process and an understanding that DAFM would only consider new applications or licence renewals for the subject sites once ''all other Killary Licences were renewed''.

AP9/2019

#	Issue	Comment
1	Oversight in Ministerial decision-making	The Appellant argues the Minister failed to consider their offer to reduce floatation on *''existing sites to enable issuing of new licence''* before arriving at the decision to refuse licence. It is not within the remit of the Technical Advisor, in their capacity to prepare this report, to undertake a review of Ministerial decision-making or question the legitimacy of such decisions.
2	Impact of other licences	The Appellant claims that *''DAFM are producing contradictory evaluations in relation to the issuing of licences in Killary''* which have had a negative impact on their existing operations. This Technical Advisor Report relates to an appeal against a decision to refuse a licence and cannot assess previous or existing licensed sites.
3	Benefits to unproductive areas	The Appellant believes that adequate consideration was not given to their proposal contained in the original application for the removal of longlines from existing, unproductive sites to the proposed licence site. It is claimed that allowing this would result in the ''opening up of channels and creating buffer zones which would be highly beneficial''. Furthermore, by moving the longlines from the existing sites, these unproductive areas will have an opportunity to replenish.
4	Oversight in Ministerial decision-making	The Appellant argues that DAFM refused to consider the Appellant's offer to reduce floatation on ''existing sites to enable issuing of new licence'' before arriving at their decision to refuse licence.
5	Impact of other licences	The Appellant claims that they have been forced to apply for a new licence in order to maintain their business. This is due to the decision of the Minister to issue licences to other operators *''on the outside – adjacent to our sites and other sites towards the north and the channel''*, which have *''drastically reduced''* the yield from the Appellant's other existing sites. It is claimed that *''DAFM are producing contradictory evaluations in relation to the issuing of licences in Killary''*.

3.0 Oral Hearing Assessment

In line with Section 49 of the Fisheries Amendment Act 1997 an oral hearing may be conducted by the ALAB regarding the license appeals. Requests for oral hearings were submitted by Appellants in four of the five appeals considered in this Technical Advisor Report.

Appeal No.	Site Ref No.	Request for Oral Hearing
AP5/2019	T9/508	No
AP6/2019	T9/509	Yes
AP7/2019	T9/510	Yes
AP8/2019	T9/511	Yes
AP9/2019	T9/477	Yes

Having reviewed the Ministers Files, all additional correspondence and undertaken site visits, it is felt that there is sufficient evidence in this technical report and in the Uisce Report to make a clear decision in relation to the appeals. As a result, it is the opinion of the Technical Advisor that an Oral Hearing is not required in any of the five appeal cases.

4.0 Minister's File

In line with particulars of Section 43 of the Fisheries Amendment Act 1997 the following documented items were sent to the ALAB from the Minister and were reviewed:

AP5/2019 – T09/508

- T09/508 application form;
- Technical and Statutory reports received in relation to the application,
- UISCE report;
- Appropriate Assessment Screening – February 2019;
- Applicant's response to comments received as a result of the statutory consultation;
- Submission to Minister for Aquaculture Licence and Submission to Minister for Foreshore Licence;
- Notification of the Minister's decision to the applicant;
- Publication of the Minister's decision in the Connacht Tribune.

AP6/2019 – T09/509

- T09/509 application form;
- Technical and Statutory reports received in relation to the application,
- UISCE report;
- Appropriate Assessment Screening – February 2019;
- Applicant's response to comments received as a result of the statutory consultation;
- Submission to Minister for Aquaculture Licence and Submission to Minister for Foreshore Licence;
- Notification of the Minister's decision to the applicant;
- Publication of the Minister's decision in the Connacht Tribune.

AP7/2019 – T09/510

- T09/510 application form;
- Technical and Statutory reports received in relation to the application,
- UISCE report;
- Appropriate Assessment Screening – February 2019;
- Applicant's response to comments received as a result of the statutory consultation;
- Submission to Minister for Aquaculture Licence and Submission to Minister for Foreshore Licence;
- Notification of the Minister's decision to the applicant;
- Publication of the Minister's decision in the Connacht Tribune.

AP8/2019 – T09/511

- T09/511 application form;
- Technical and Statutory reports received in relation to the application;
- UISCE report;
- Appropriate Assessment Screening – February 2019;
- Applicant's response to comments received as a result of the statutory consultation;
- Submission to Minister for Aquaculture Licence and Submission to Minister for Foreshore Licence;
- Notification of the Minister's decision to the applicant;
- Publication of the Minister's decision in the Connacht Tribune.

- T09/477 application form;
- Technical and Statutory reports received in relation to the application;
- UISCE report;
- Appropriate Assessment Screening – February 2019;
- Applicant's response to comments received as a result of the statutory consultation;
- Submission to Minister for Aquaculture Licence and Submission to Minister for Foreshore Licence;
- Notification of the Minister's decision to the applicant;
- Publication of the Minister's decision in the Connacht Tribune.

ArcGIS shapefiles were also sent from the Department to Altemar Ltd. for the review.

5.0 Context of Area

This Technical Advisor's Report considers five separate appeals (AP5/2019, AP6/2019, AP7/2019, AP8/2019 & AP9/2019) to the Ministerial decisions to refuse to grant Aquaculture and Foreshore Licenses for five sites respectively (T09/508, T09/509, T09/510 & T09/477). The five sites are located in Killary Harbour in Co. Galway and each site was proposed for the cultivation of mussels on longlines. Due to their similar nature and geographical locations, the following sections will provide an overview of Killary Harbour and the relevant factors to be considered as part of an assessment of each appeal.

5.1 Physical Descriptions

Killary Harbour is a fjord located in the Connemara region of the West of Ireland, with County Mayo lying to the north and County Galway to the south (Fig. 1). It is considered Ireland's only true fjord and extends approximately 16 kilometres from the harbour mouth to its head at Aasleagh. It is roughly 0.75km wide and has an average depth of 15 metres. However, there are depths of up to 40 metres at certain points. Killary Harbour is relatively well sheltered from winds (which are predominantly SW), thus reducing the impacts of storm surges and inclement weather, which makes it an ideal location for aquaculture.

The village of Leenaun is the closest settlement and is situated adjacent to the harbour on its southern shore. In terms of larger settlements, Clifden has a population of 1,597 and lies approximately 30km south-west; Louisburgh has a population of 434 people and lies roughly 20km north; Westport has a population of 6,198 and is approximately 30km north-east; Oughterard, with a population of 1,318 people is roughly 40km south-east; and, Ballinrobe, 50km to the east of Killary Harbour, possesses a population of 2,787 people[1].

However, the surrounding hinterland of Killary Harbour is an extremely rural area with a low population density. For example, the four Electoral Divisions (Owennadornaun/Bundorragha, Erriff, Leitir Breacáin and Cushkillary) that border Killary Harbour have a combined population of 840 people, which offers an indication of the rural nature of this area.

The Claremorris weather station in Mayo is the closest station to Killary Harbour, located approximately 60km north-east. The most recent report on long-term averages (1971 to 2000) for Claremorris show a mean daily maximum temperature of 18.9 degrees in July and a mean daily minimum of 1.7 degrees in January. In terms of wind speeds, the mean monthly speed ranges from 6.8 knots in August to 10.3 knots in February, with average maximum gusts of up to 96 knots recorded for January[2] (Fig. 2). Water temperatures on the west coast average 15 degrees from June to October, and can vary from a low of 11 degrees in June to highs of 19 degrees in July and August.

[1] Population statistics are retrieved from the CSO's Census 2016 database.

[2] https://www.met.ie/climate-ireland/1971-2000/claremorris.html

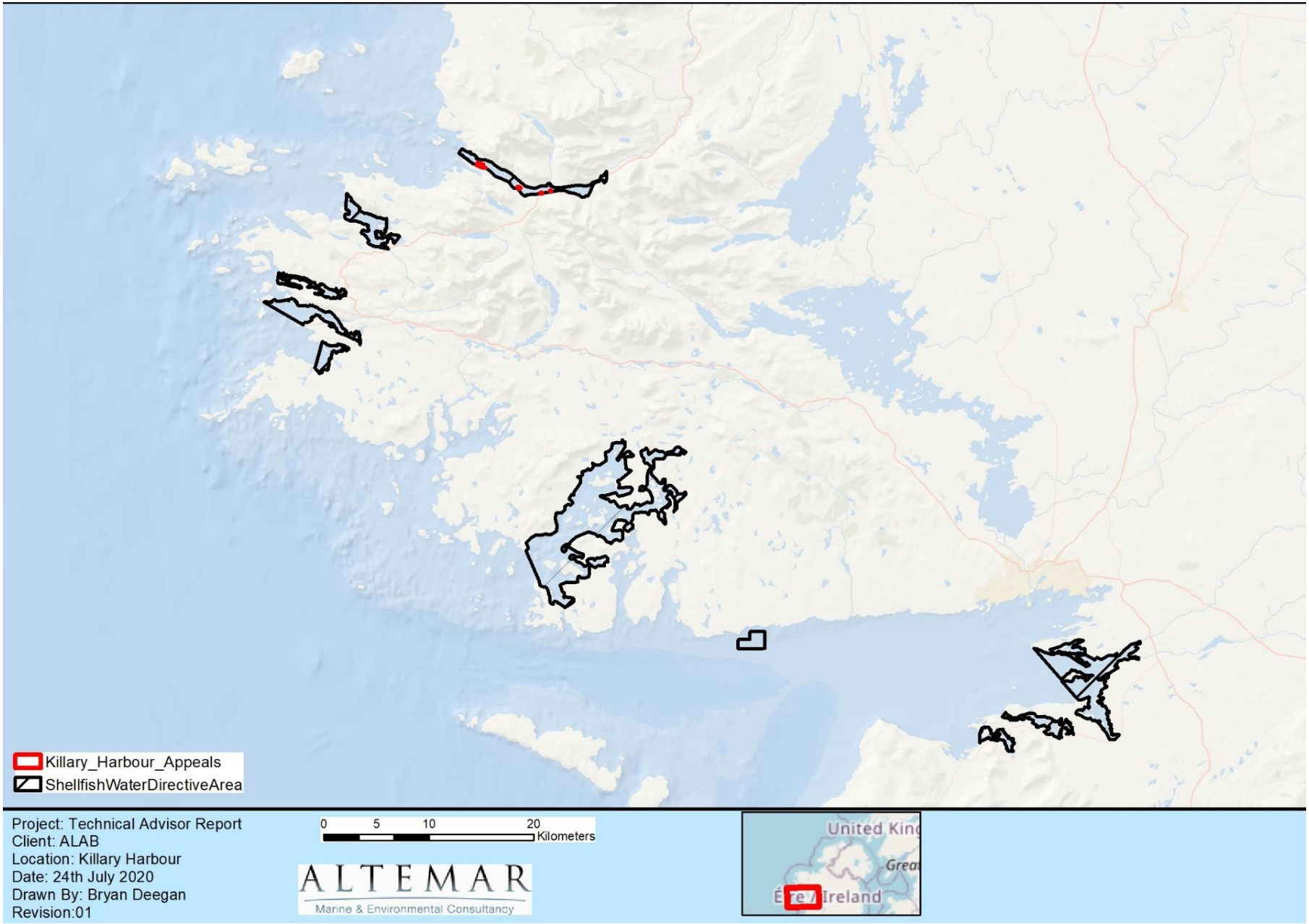

Figure 1. Killary Harbour

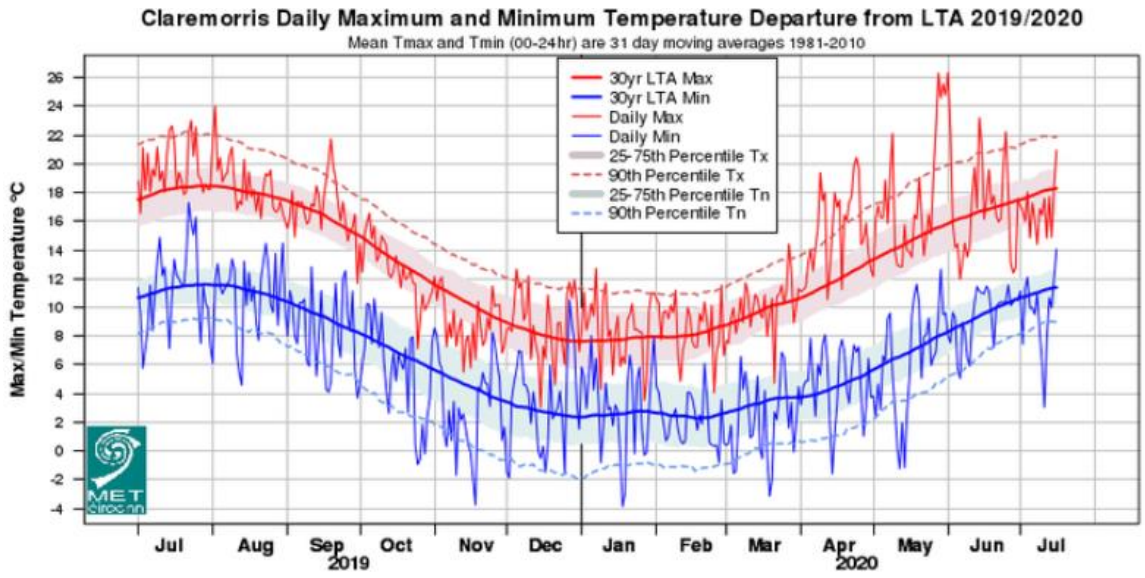

Figure 2. Claremorris temperature trends

Figure 3 shows rainfall trends by month for the Claremorris weather station, as retrieved from the CSO[3]. Although the data only begins in January 2016 and ends in January 2020, there is a clear trend of increasing total rainfall, with January 2020 showing a significant spike by recording 286.7mm of rain. Total number of rain days per month has remained relatively stable, while 'most rainfall in a day' is showing a slight increase. The averages for the 50 months recorded highlight the relatively wet conditions that are common in this region: 108.05mm total rain per month; 19.28mm most rainfall in a day; and, 21.64 rain days per month.

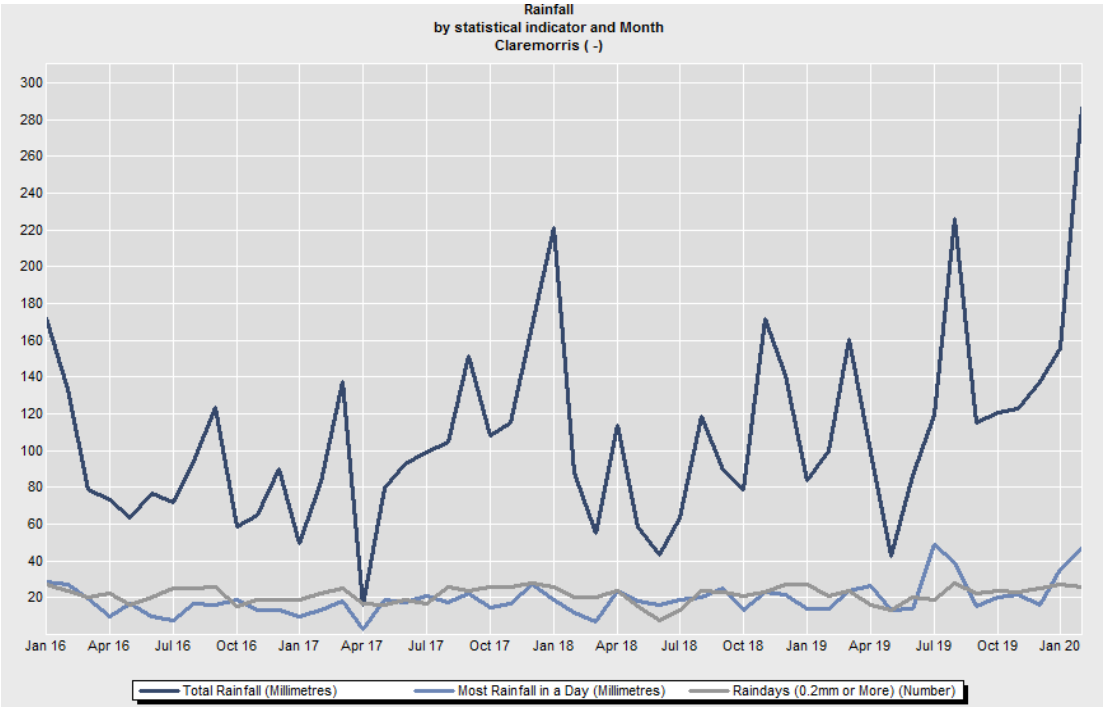

Figure 3. Monthly rainfall trends in Claremorris

[3] https://statbank.cso.ie/px/pxeirestat/Statire/SelectVarVal/Define.asp?Maintable=MTM01&Planguage=0

The contributing catchment of Killary Harbour is approximately 250km2, with the contributing catchment for the shellfish area stated as 297.1 km2. The harbour is surrounded by high, mountainous terrain and this ensures that freshwater runoff is a major feature of the area's hydrography. Three main rivers feed into the harbour, the Erriff and Bundorragha from Mayo, and the Bunowen from Galway, and combined these rivers provide the majority of the freshwater input that occurs in Killary Harbour. Other smaller streams exist that discharge into the harbour and account for the input that does not occur through the three main rivers.

5.2 Resource Users

Aquaculture Activity

Fisheries and aquaculture are a significant sector in Ireland's economy, with the overall value of seafood exports estimated at €564 million in 2015. In their 2016 development strategy, the Fisheries Local Action Group (FLAG) for the West (Galway and Clare) stated that in the previous year the *''largest Irish seafood export by value is pelagic (€204m, 36%), followed by crustaceans (€113m, 20%), freshwater fish (€85m, 15%), molluscs (€82m, 15%), whitefish (€53m, 9%) and fish meat and oil (€26m, 5%). Sectorally, shellfish led the way – rising 12% to €195 million; followed by salmon – where exports increased to €75 million; and whitefish – where exports grew by 7% to €53 million. The only decline in 2015 was seen in the pelagics fishery, where exports fell 7% to €204 million as a result of falling trade and market prices''*[4].

Killary Harbour has been utilised for a range of aquaculture activities for several decades, with a range of licenced facilities in operation and is a Designated Shellfish Production Area. At present, mussels, oysters and salmon are cultured in Killary Harbour on licensed sites (Fig. 4 & 5). Based on 2020 Departmental GIS data, there are a total of 63 recorded aquaculture sites, 58 of which are fully licensed and a further 5 that are listed as 'Under Appeal'. The following table provides a breakdown of the aquaculture sites that are recorded.

Aquaculture	Method	Status	No. Licensed
Finfish	Intensive	Licensed	2
Shellfish	Extensive	Licensed	56
Shellfish	Extensive	Under Appeal	5

Finfish:

There are two licensed Finfish aquaculture sites in Killary Harbour, both of which are Salmon farms. Salmon farming is carried out intensively. As a result marine finfish farms can be associated with increased nutrient levels in waters, arising from fish excretion and excess feed input. The two sites (T09/143 & T09/143A) are both listed as being licensed to a Mr. Padraic Doherty. Proposed aquaculture site **T09/477A** is located south-east of salmon farm site **T09/143**, along the southern shore of Killary Harbour near the mouth.

The Killary Harbour Characterisation Report for the Designated Shellfish area states that there are no *''water quality issues which are likely to be associated with these finfish farms and the WFD status of the marine water body within which they are located is 'high'. Therefore, these finfish farms are unlikely to be affecting shellfish water quality in this shellfish area''* (pg. 54)[5]. However, it should be noted that this report does not account for the second Salmon farm that is licensed.

[4] http://fisherieslocalactiongroups.ie/wp-content/uploads/2019/09/6075-BIM-FLAG-West-1.pdf

[5] https://www.housing.gov.ie/sites/default/files/publications/files/filedownload22069en.pdf

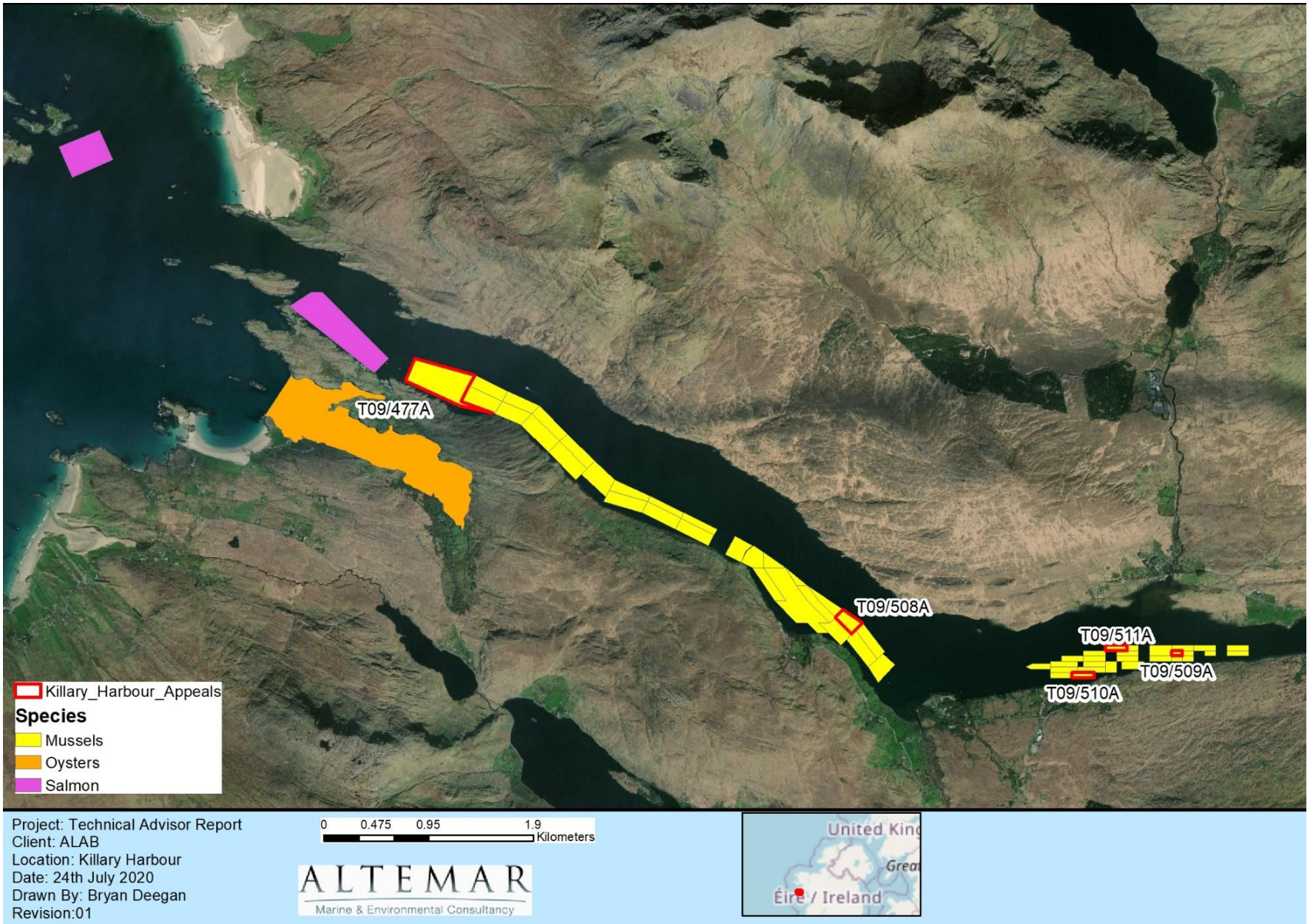

Figure 4. Aquaculture sites (species) in Killary Harbour

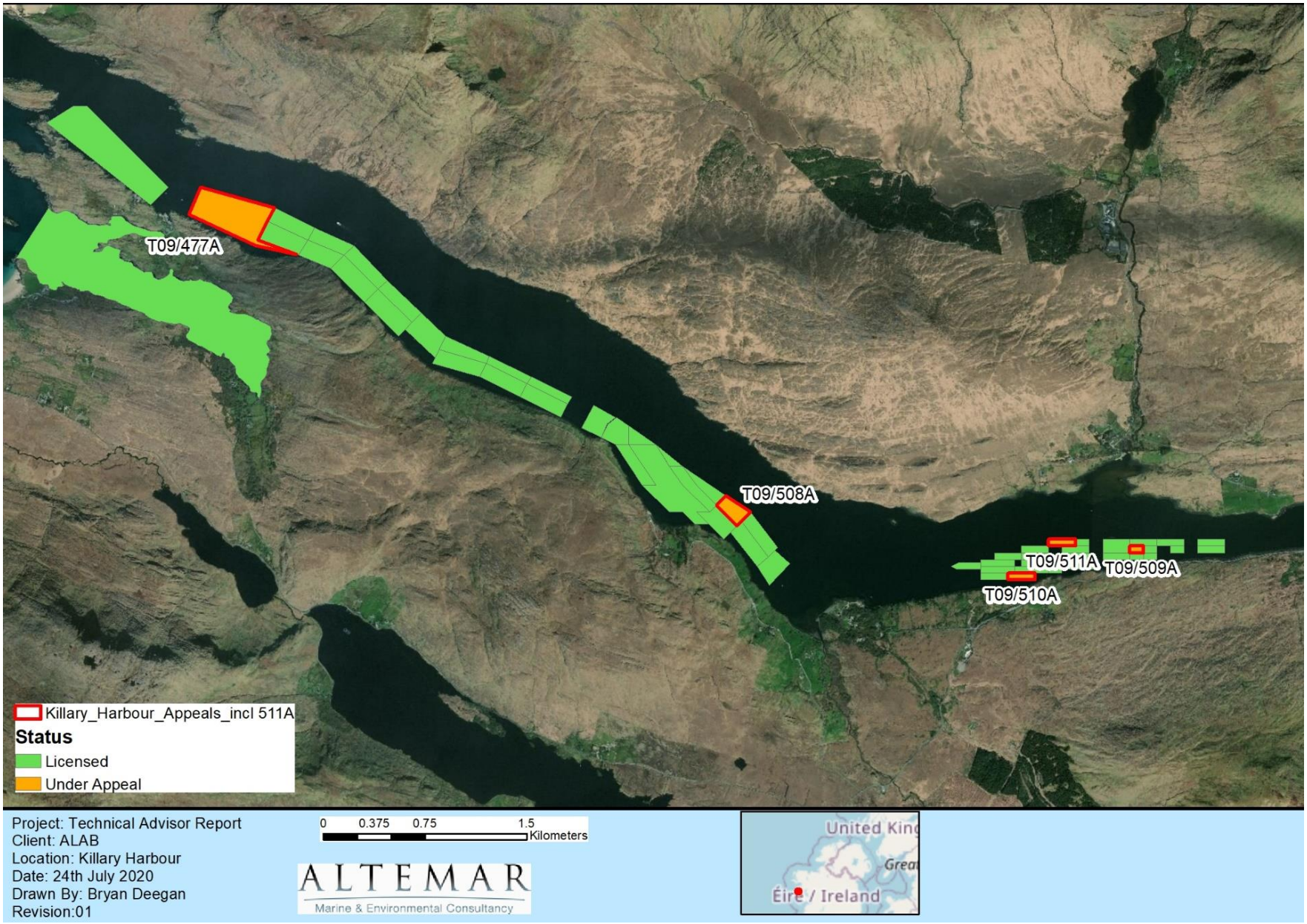

Figure 5. Licenced sites and sites under appeal

Shellfish:

Commercial shellfish cultivation is only allowed to occur in designated Shellfish Areas as per the European Communities (Quality of Shellfish Waters) (Amendment) Regulations, 2009 (S.I. No.55 of 2009), of which there are 63 in Ireland. Killary Harbour is a Designated Shellfish Area.

***"Killary Harbour** is a fjord-like inlet situated on the west coast of Ireland in the Western River Basin District and it straddles the county boundaries of Galway to the south and Mayo to the north. The designated shellfish area within the bay is 9.9 km^2 in area. It runs the entire length of the Harbour, from the high water mark at Aasleagh at the head to Dooneen at the mouth of the harbour, which opens to the Atlantic Ocean."*

As previously stated, Shellfish cultivation is by far the most common form of aquaculture activity being undertaken in Killary Harbour, with 56 of the 58 licensed sites dedicated to shellfish cultivation, while a further 5 shellfish cultivation applications are under appeal. All but one of the 56 licensed sites are used to cultivate mussels, with the remaining one site used for oyster cultivation.

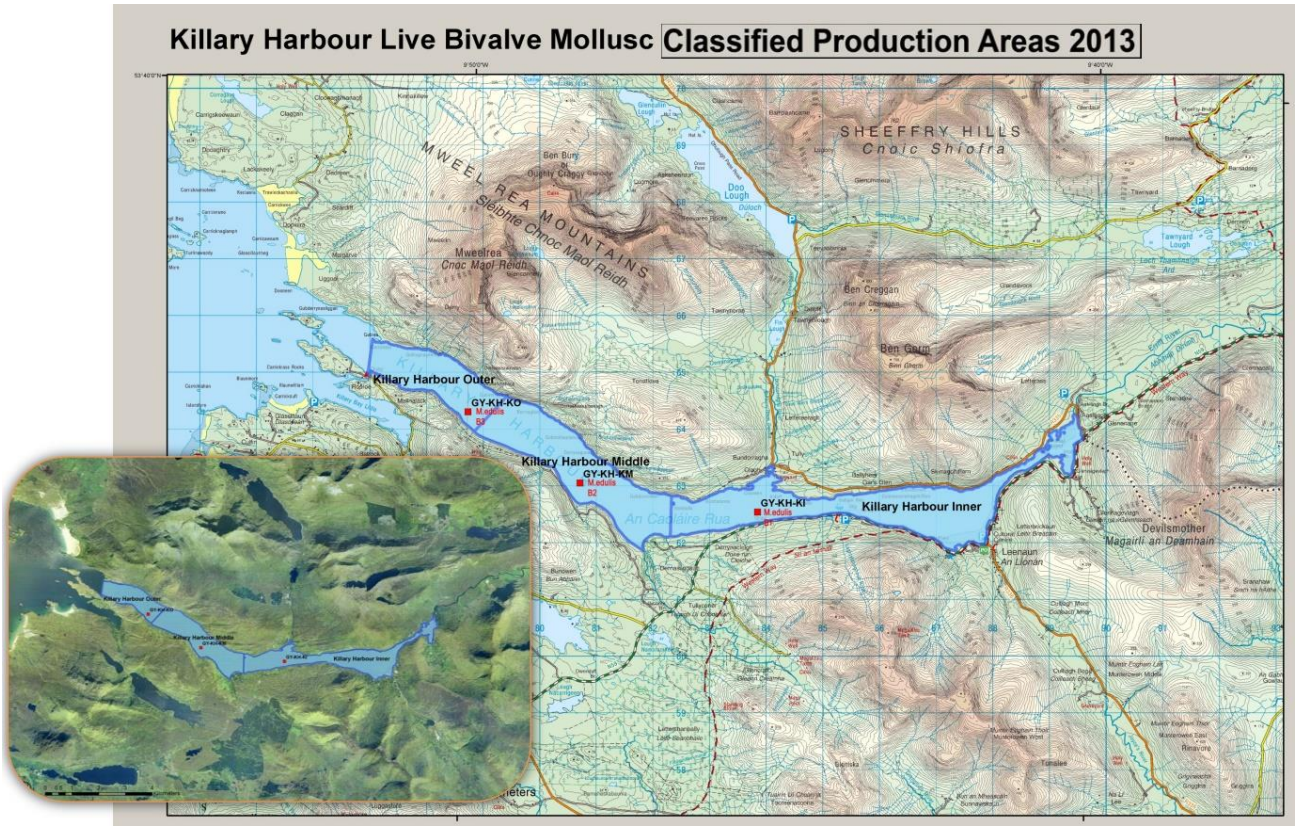

Figure 6. Designated Shellfish Area

Regular biotoxin testing of shellfish cultivated in the various designated areas throughout Ireland occurs, with data available from the Marine Institute. Sampling in Killary Harbour occurs in three separate areas: Killary Outer; Killary Mid; and, Killary Inner. A fourth sampling location is found in the approaches into Killary Harbour (Killary Approaches). Samples are usually taken on a weekly basis and the results of the testing determines whether harvesting of the named species can occur.

Samples from across a five-year period (July 2015 to July 2020) were retrieved and the following information was derived from this database for each of the three sample locations.

In **Killary Outer** there were a total of 256 samples taken and tested of which 26 (10.2%) resulted in closure, a further 11 (4.3%) resulted in closure pending further sampling and a single sample (0.4%) was rejected for non-standard reasons. 85.2% of all samples, which is 218 in total, returned resulted that allowed for the continuation of activity.

Killary Middle had a total of 260 samples from across the time period. Six samples (2.3%) resulted in site closures, 3 (1.2%) required closure pending further sampling, 2 (0.8%) samples were rejected for non-standard reasons and the majority of samples, 249 (95.8%) of the total, enable continued activity in the area.

Killary Inner records a total of 254 samples taken across the time period. Of this total there were 4 (1.6%) that resulted in closures, 2 (0.8%) that required closure pending further sampling and there were no samples rejected. Therefore, the vast majority of samples (248 or 97.6%) were deemed to be suitable to allow for the continuation of activity.

Overall, there were 770 samples taken across the three locations of which 36 (4.7%) returned results that required closure.

Agricultural Activity

Agriculture accounts for a significant proportion of land use in the areas surrounding Killary Harbour and is an important sector of employment. CSO data for the four Electoral Divisions (EDs) that bound Killary Harbour highlight the importance of agriculture in this area. According to the Census of 2016, in the four EDs of Owennadornaun/Bundorragha, Erriff, Leitir Breacáin and Cushkillary, the Agriculture, Forestry and Fishing industries account for a combined 14.7% of total industries of employment. Both the Owennadornaun/Bundorragha and Erriff EDs recorded proportions far greater than 14%, with 20.9% and 29.1% respectively. Such figures are far above the national average for these industries and this gives an indication of the reliance on agriculture and fishing that exists in the area.

The Central Statistics Office (CSO) undertook a 'Census of Agriculture' that covered the period from 1991 to 2010, the aim of which was to compile census data on crops, livestock, farm labour and miscellaneous agricultural items[6]. Information from this exercise is useful to understand the composition of agricultural activities in particular areas and will now be used to provide some insights into activities in the areas adjacent to the subject site(s).

There are three EDs with information that are adjacent to Killary Harbour. However, perhaps the most pertinent would be the Cushkillary ED, which is on the southern shore of the harbour where all of the subject sites are situated and therefore adjacent to this ED. The following information for **Cushkillary ED** was retrieved from the CSO's Census of Agriculture:

- The total number of farms, classified by Agricultural Area Utilised (AAU), has increased from 36 in 1991 to 44 in 2010. It appears that larger farms have shown the greatest level of change with those between 30 to 50 hectares increasing from 1 to 6 and two additional farms of greater than 100 hectares emerging.
- In terms of the usage of the total area farmed, 'rough grazing' accounts for the vast majority of the total (2,131 of 3,000 hectares), although it has decreased slightly from 1991. Pasture was the next most common land-use type, having increased from 121 to 816 hectares.
- Regarding livestock, total cattle numbers have decreased from 314 in 1991 to 98 in 2010. Sheep account for the majority of livestock and total sheep numbers have also decreased from 10,003 to 9,829.
- The total number of persons engaged in farm activity remained relatively static, recording a slight decrease from 70 in 1991 to 69 in 2010, however the total number of 'Annual Work Units' saw a decrease from 47 to 37 over the same time period.

[6] https://www.cso.ie/en/methods/agricultureandfishing/censusofagriculture/

The sites subject to the appeals for which this Technical Advisor's report is being prepared are all proposed mussel cultivation sites (T09/508, T09/509, T09/510, T09/511 & T09/477), each of which are located in the Killary Harbour Designated Shellfish Growing Area. Table 1 provides an estimate of the average number of dairy and drystock livestock units and the average loadings of nitrogen and phosphorus chemical fertiliser per hectare of farmed land within the contributing catchment areas for Killary Harbour. The national averages are also included for comparison purposes. This information was obtained from the Shellfish Waters Characterisation Reports prepared by the Department of the Environment, Community and Local Government[7].

Table 1. Average number of dairy and drystock livestock units and the average loadings of nitrogen and phosphorus chemical fertiliser per hectare

Indicator	Catchment (p/ha of farmed land)	National Average (p/ha of farmed land)
Livestock Units	0.12 LU	1.20 LU
Nitrogen Fertiliser	17.9 kg	92.09 kg
Phosphate Fertiliser	2.9 kg	9.74 kg

Of these recorded figures, the Site Characterisation Report states that: *"Approximately 40% of the area of this catchment is farmed land. Estimates of livestock density and fertiliser usage are much lower than the national averages. However the EPA's diffuse model risk assessment, which investigates the relationship between catchment attributes (percentages of diffuse land cover including agriculture), water chemistry and ecological status, highlights some diffuse risk areas in the catchment. Also, the prevalence of wet soil types in the catchment and the high slopes means that there is a potential risk of agricultural runoff in the catchment. Agriculture is a possible source of the faecal contamination indicated by shellfish monitoring and therefore, agriculture could possibly be affecting shellfish water quality in this shellfish area.''* (pg.64)

Angling and Inshore Fishing Activity

As outlined in the West of Ireland Sea Angling Guide[8] "*Killary is the only fjord in Ireland, a long deep inlet formed by glacial erosion during the last Ice Age. The steep hillsides continue underwater, so deep water is found very close to shore. Killary is known as a tackle graveyard, with jagged rock ledges snagging traces on the retrieve, and deep sucking mud on the bottom that lead weights seem to disappear into without trace.*

Having said that, it can be a very productive area for several species, including dogfish, ray, bull huss, pollack, wrasse, cod, and even deep water species like ling may be taken from the shore. There are unconfirmed reports of common skate being hooked by shore anglers, although none were landed. It would be some feat to land one on a beachcaster given the depth of water and tackle limitations. Bottom fishing here requires heavier tackle, and lead lifts are advisable. Single hook pulley rigs will help avoid rock ledges on the retrieve, and a fast retrieve is vital to get fish up in the water before reaching these ledges. Rotten bottom lead links are also a good idea. Killary is also a good spot for mackerel, with the salmon cages providing a plentiful supply of food to attract them inshore."

Salmon and Trout fishing occurs in the rivers leading to Killary Harbour (Figure 7), with the Bundorragha River renowned for this activity and includes Finlough and Doo Lough, all of which constitute the Delphi Fishery. The Erriff System is comprised of the Erriff River and the two small loughs of Tawnyard and Derrintin. The River Erriff is considered as one of the premier salmon fishing rivers in Ireland. Both the Erriff and the Bundorragha systems prove extremely popular areas for Anglers to fish.

Based on the information in the Inshore Fishing Atlas (Figure 8) Killary Harbour is an area pots, mid water, dredge and line fishing. Based on the distribution of this activity there is an overlap with current aquaculture sites. However, it would be expected that there would be no fishing activity in areas of aquaculture activity.

[7] https://www.housing.gov.ie/water/water-quality/shellfish-waters/shellfish-waters-final-characterisation-reports-and-prps

[8] https://www.fisheriesireland.ie/documents/315-west-of-ireland-sea-angling-guide-clew-bay-north-clare-1/file.html

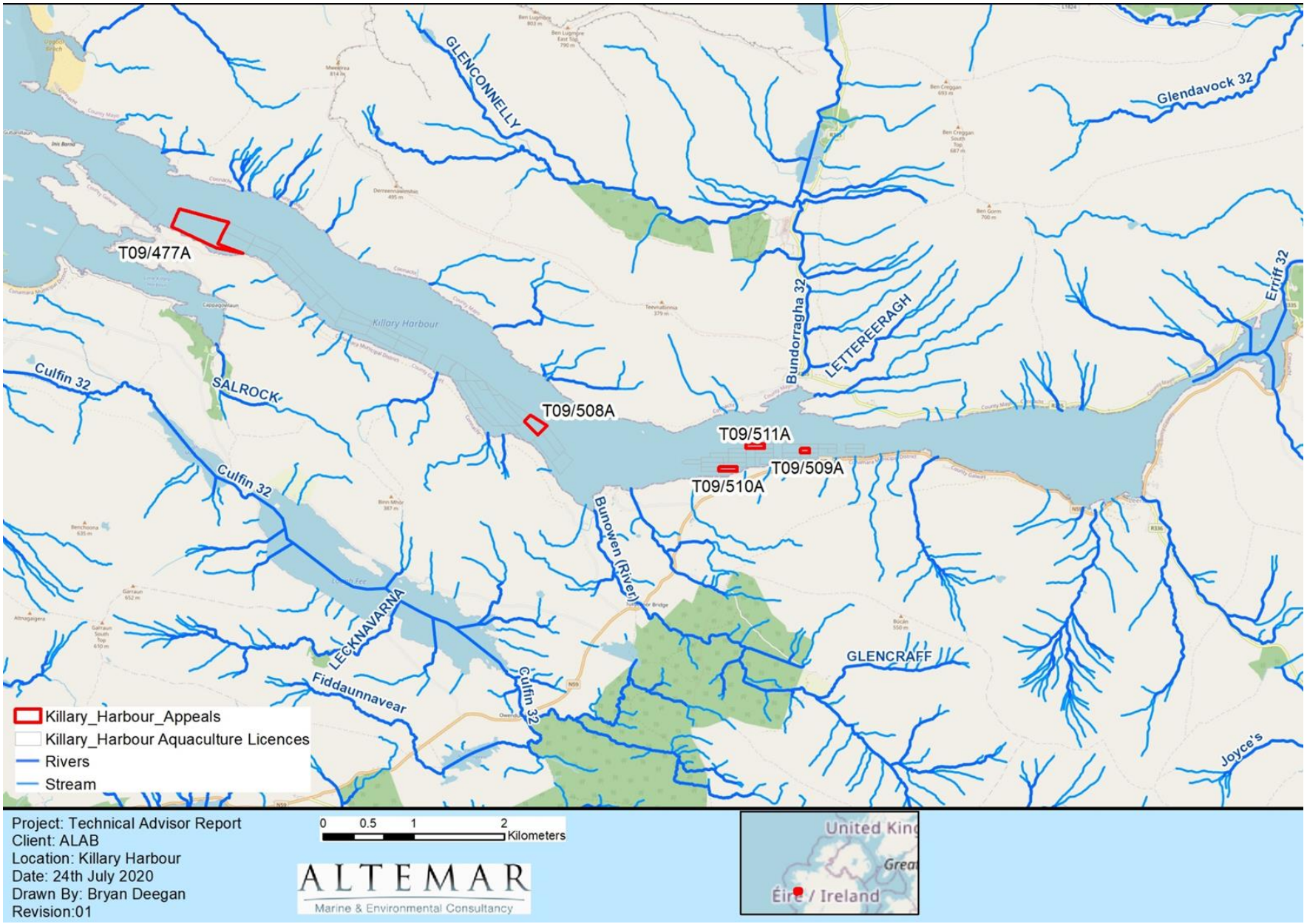

Figure 7. Watercourses leading to Killary Harbour

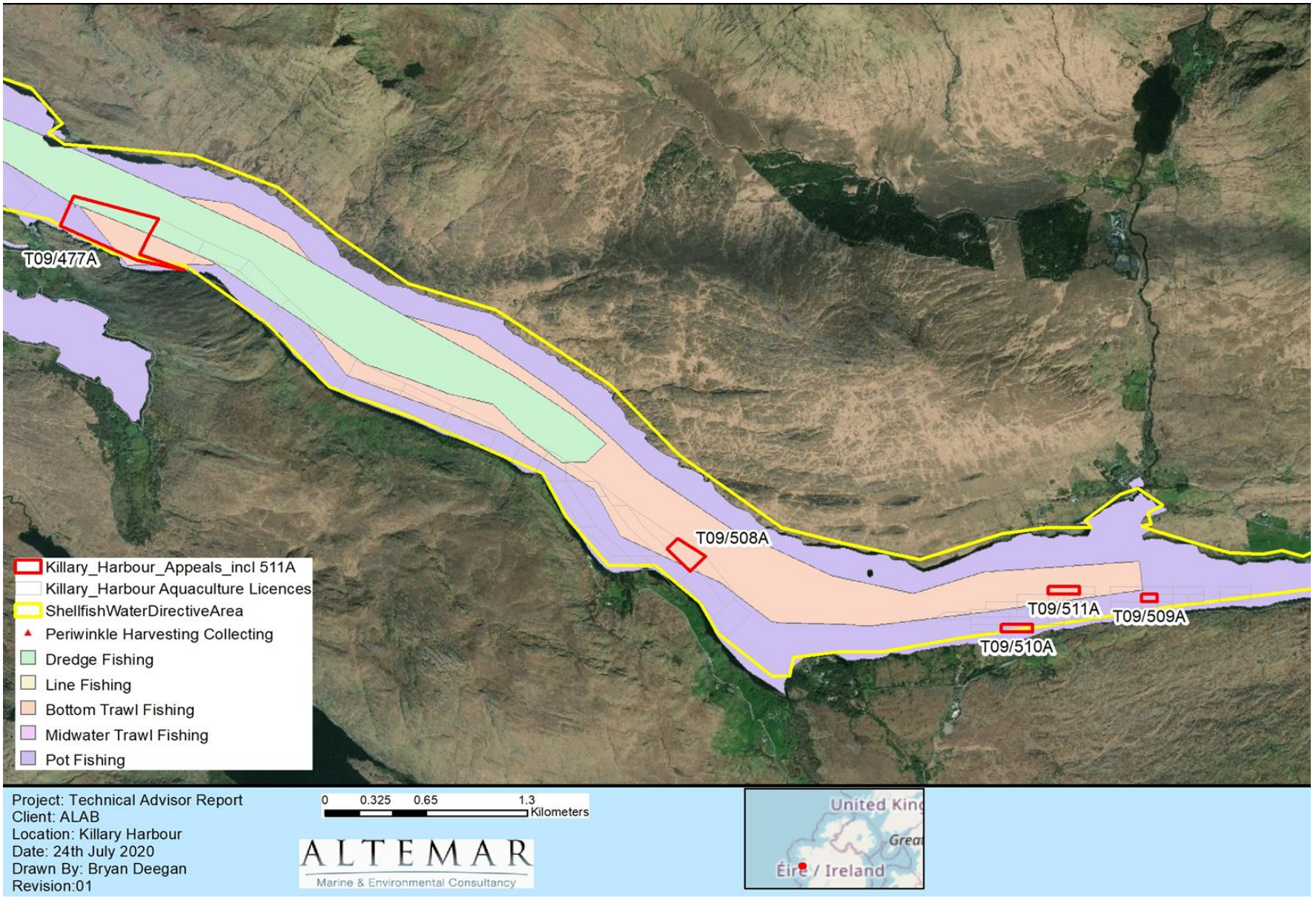

Figure 8. Inshore Fishing Activity

The Marine Institute and Bord Iascaigh Mhara prepared a review of Shellfish Stocks and Fisheries in 2018 which provides an assessment of selected stocks[9]. In this report Killary Harbour was selected as one of the locations to survey razor clams (*Ensis magnus* and *Ensis siliqua*). The approaches to Killary Harbour were surveyed on August 13th 2018, with fifteen stations sampled in shallow water. *Ensis siliqua* and *Ensis magnus* occur in commercial quantities in the sample area with the estimated biomass of 24 tonnes and 71 tonnes respectively. It is stated that all of this biomass was over the minimum landing size.

Tourism and Leisure

Failte Ireland provide statistics on tourism in Ireland, with regional breakdowns for visitor numbers and estimated spend[10]. The 'West' region contains counties Galway and Mayo, where Killary Harbour is located, and this region saw an estimated 1.96 million of overseas visitors who helped to generate approximately €727 million in revenue in 2018. This puts the West as the third most popular destination for overseas visitors, behind Dublin and the South West.

In terms of domestic tourists, the West region again performs well when compared with other regions. In 2018, there were an estimated 1.66 million domestic tourists who helped to generate approximately €337 million in revenue for the region. These figures are almost on a par with those for Dublin, with only Ireland's South-West recording higher totals. Clearly tourism is an integral part of the economy in the West of Ireland, something that has been emphasised by the major success of the Wild Atlantic Way branding exercise.

While tourism information for Killary Harbour itself is not available, it can be assumed that there is significant spillover generated as a result of the West's popularity to visitors. Killary Harbour is considered Ireland's only true fjord and this, along with the region's other attributes, proves popular with tourists and visitors. Indeed, there are several boat tours of Killary Harbour available daily (Killary Cruises), with chartered tours departing from Leenaun, scuba-diving occurs via a number of scuba diving operators from the wider region, while the Killary Adventure Centre offers a range of water-based activities in the harbour. The Delphi adventure resort is north of Killary Harbour.

Additionally, the surrounding countryside is popular for hiking and walking, with a local famine trail promoted by regional tourism operators. The Connemara region has become a major destination in itself, with towns and villages such as Clifden, Delphi and Westport all significant destinations that are located in close proximity to Killary Harbour.

9 https://oar.marine.ie/bitstream/handle/10793/1392/Shellfish%20Stocks%20and%20Fisheries%20Review%202018.pdf?sequence=1&isAllowed=y

10 https://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/Key-Tourism-Facts-2018.pdf?ext=.pdf

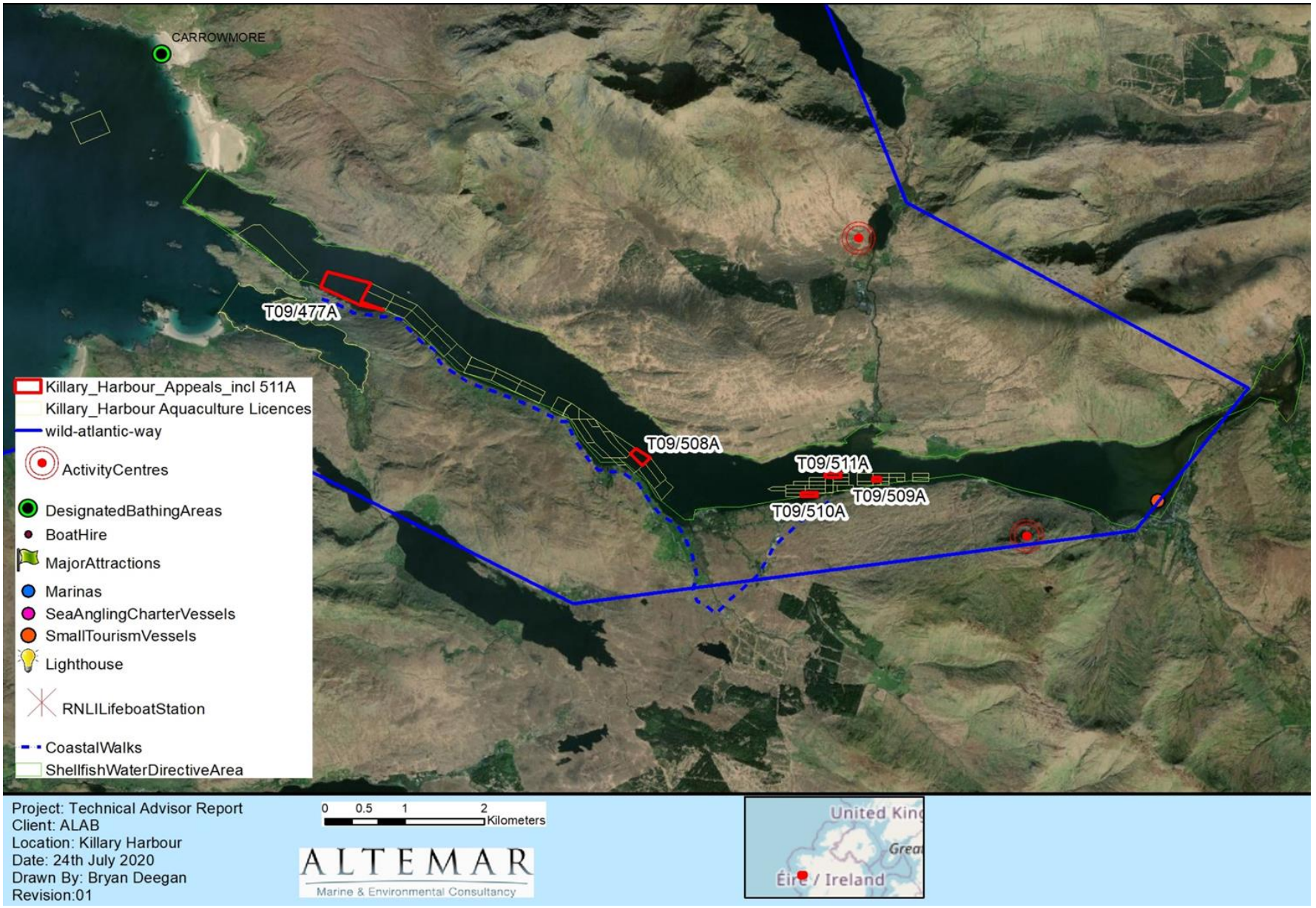

Figure 9. Tourism activities in Killary Harbour

5.3 Environmental Data

Water Quality

Killary Harbour is located within the Erriff-Clew Bay Water Framework Directive Catchment, which covers an area of approximately 1500 km2 and possesses a human population of roughly 23,747 people, according to the EPA's 'Catchement Assessment' for Erriff-Clew Bay[11]. Regarding the catchment's geology and hydrology in the area around Killary Harbour, the assessment states:

''The western and southern slopes of Mayo's highest mountain, Mweelrea, are drained by a series of small rivers flowing into the mouth of Killary Harbour. The Bundorragha River, which is probably the most intact freshwater pearl mussel catchment in the country, flows from Doo Lough and then is joined by the Glenummera River from the east, the Bundorragha flows south past Delphi and into Killary Harbour. The Errif River rises near Croagh Patrick, and flows in a southerly direction being joined by the Darrycraff River from the northeast. The Errif flows over the picturesque Aasleagh Falls, after which it flows into the sea at the head of Killary Harbour. Entering Connemara, the northern end of the Maumturk Mountains is drained by small coastal rivers that flow into Killary including the Letterbrickaun and Bunowen Rivers.'' (pg.1).

In a summary of the catchment, the report states that:

- 16 of the 80 river water bodies are 'At Risk' of not meeting WFD objectives;
- 2 of 80 lake water bodies are 'At Risk';
- There is 1 'At Risk' groundwater body where a waste facility is causing elevated ammonia;
- Eutrophication is the main issue in rivers and lakes, with the ''significant pressures'' resulting from forestry, agriculture and wastewater;
- Hydromorphological conditions and poor habitat quality are issues for some surface water bodies.

The EPA regularly sample and monitor bathing water quality at 147 locations across Ireland, however there are no bathing water sampling locations within Killary Harbour. The nearest sampling points are found at Clifden Beach in Galway and Carrownisky, Louisburgh in Mayo. Carrownisky in Mayo recorded a bathing water quality status of 'good', whereas Clifden Beach recorded a water status of 'poor' in the 2019 bathing season results[12]. In each of the previous three sampling years (2018, 2017 & 2016) Clifden Beach has been designated as having 'poor' bathing water quality status. Clifden's results differ dramatically from Carrownisky, which recorded 'excellent' status in each of the previous four years (2018, 2017, 2016 & 2015).

Water Framework Directive

The Site Characterisation Report for Killary Harbour, in relation to the WFD Monitoring Programme, states that the *''status of the coastal water body within which the shellfish area is situated is 'high' and therefore satisfactory; however, this status was extrapolated from similar water body types. The Erriff River and Bunowen River which both discharge into the designated shellfish area are 'good' and 'high' and therefore satisfactory. The Bundorragha which also discharges into the shellfish area is 'moderate' and therefore unsatisfactory, reflecting issues with macro invertebrate.''*. However, as seen

[11] https://catchments.ie/wp-content/files/catchmentassessments/32%20Erriff-Clew%20Bay%20Catchment%20Summary%20WFD%20Cycle%202.pdf

[12] https://www.epa.ie/pubs/reports/water/bathing/Bathing%20Water%20Quality%20Map%20of%20Ireland%202019.pdf

in Figure 10, it appears to have improved by 2018. Although, the Coastal Water Quality was classed as intermediate in 2018.

There are three WFD Sub-Catchments that immediately surround Killary Harbour: Bundorragha; Erriff; and, Owenduff Bridge Stream. Each of these subcatchments has a WFD Cycle 2 assessment report from which the most pertinent points have been identified and reproduced below[13].

Sub-Catchment	Key Points from WFD Cycle 2 Report
Bundorragha SC	There are 11 recorded waterbodies (4 lakes, 4 rivers, 2 coastal and 1 groundwater). Of the 7 areas monitored for water quality status 3 recorded 'high' status, 3 recorded 'good' and 1 recorded 'moderate', 6 of the 11 waterbodies are deemed 'Not At Risk', with 4 requiring further review and 1 waterbody 'At Risk' (Bundorragha_020)
Erriff SC	There are 17 recorded waterbodies (8 rivers, 4 lakes, 3 groundwater, 1 coastal and 1 transitional), 36 locations are monitored for water quality status, with 7 designated as 'high', 26 classified as 'good' and 3 classified as 'moderate', 14 of the 17 recorded waterbodies are classified as 'Not At Risk', with the remaining 3 requiring 'Review'. The Killary Harbour coastal waterbody requires 'review' due to 'anthropogenic pressures'
Owenduff Bridge Stream SC	There are 19 recorded waterbodies in this sub-catchment (6 lakes, 6 rivers, 3 groundwater, 3 coastal and 1 transitional) Of the 21 areas monitored for water quality status 2 recorded 'high' status, 15 are classified as 'good' and 5 are classified as 'moderate' 12 of the 19 waterbodies are deemed to be 'Not At Risk', 6 waterbodies require 'review' and 1 waterbody is deemed to be 'At Risk' (Culfin_010)

[13] https://www.catchments.ie/data/#/catchment/32?_k=eq226a

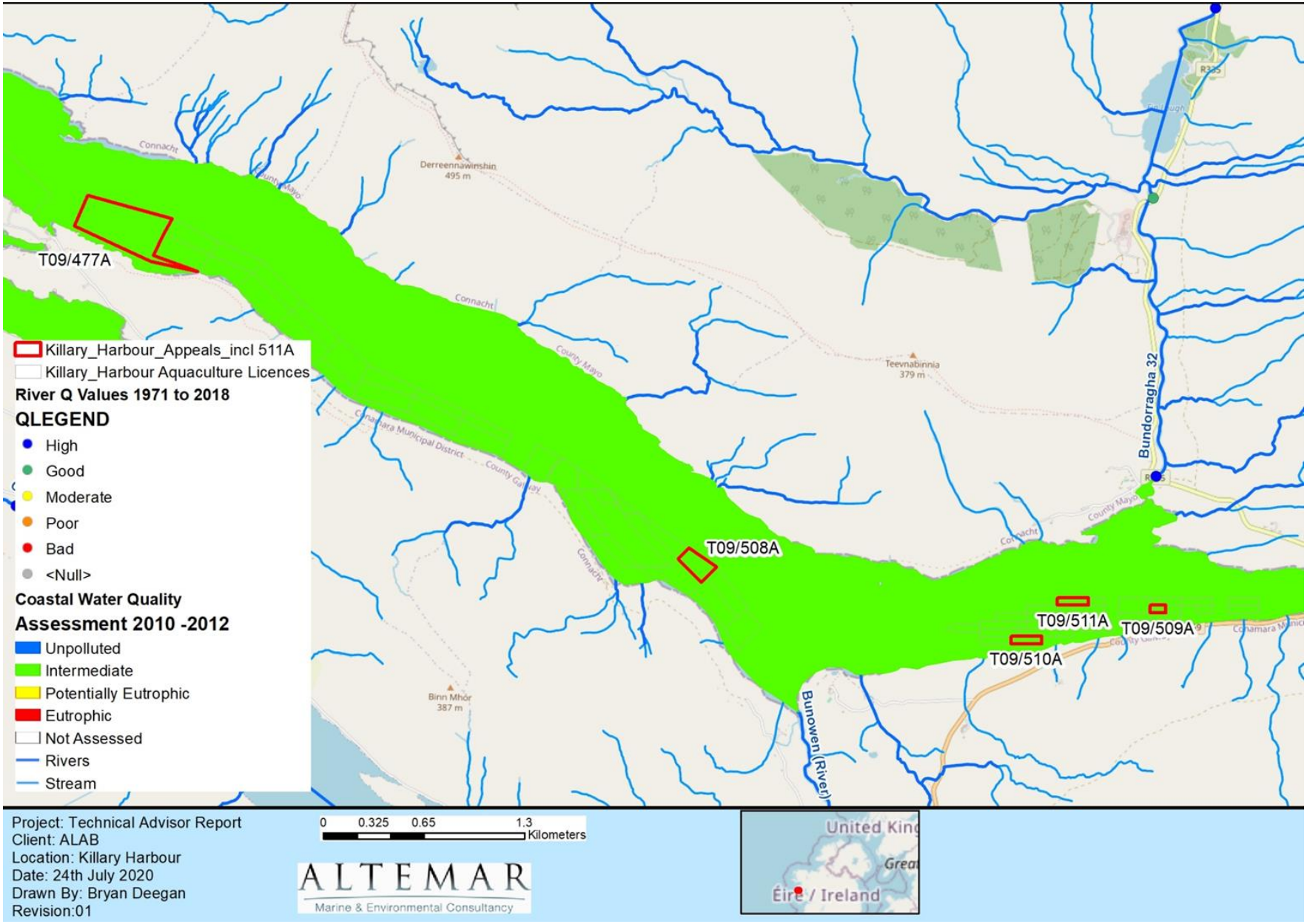

Figure 10. Water Framework Directive Status Killary Harbour (EPA)

Shellfish Monitoring Programme

The Site Characterisation Report for Killary Harbour states that the *''licensed area is classified as Class B meaning that shellfish may be placed on the market for human consumption only after treatment in a purification centre or after relaying so as to meet the health standards for live bivalve molluscs laid down in the EC Regulation on food safety (Regulation (EC) No 853/2004). This indicates faecal contamination in this shellfish area.''*.

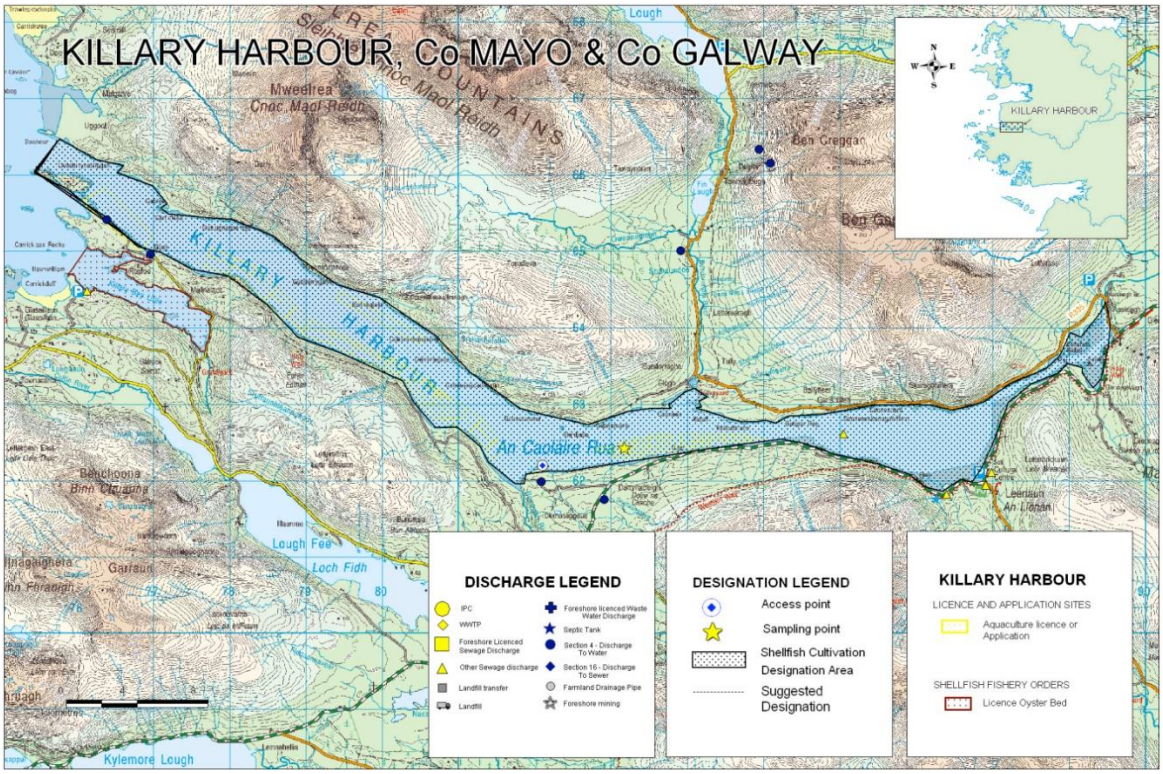

Figure 11. Sampling points and discharges to Killary Harbour

Shellfish flesh classifications are carried out under the European Communities (Live Bivalve Molluscs) (Health Conditions for Production and Placing on the Market) Regulations, 1996 (S.I. No. 147 of 1996)). The Marine Institute carries out shellfish monitoring at designated shellfish areas. This dedicated shellfish monitoring programme involves analysing for general components, metals and organics in both water and biota samples. Shellfish safety data can be obtained from the Marine Institute HABs website and it provides results of sampling of specified shellfish flesh from each of the designated shellfish areas[14].

Combined biotoxin results for shellfish species *Mytilus edulis* in the three sample areas in Killary Harbour (Outer, Middle and Inner) are provided in the table below. The results are taken from regular sampling that occurred in the three locations from July 6th 2015 to July 19th 2020, of which there are a total of 770 sample results.

Area Species Status	# of Occurrences	% of Total
Closed	36	4.7%
Closed Pending	16	2.1%
Open	715	92.9%
Rejected – Nonstandard Reason	3	0.4%

[14] http://webapps.marine.ie/HABs/Locations/Inshore

5.4 Statutory Status

Nature Conservation Designations

The aquaculture sites in Killary Harbour that are under appeal are not located in any Natura 2000 sites, nor are there any other conservation or environmental designations attached (Fig. 12 – 14). However, the harbour is surrounded by areas that have been assigned protected status. The following sites, with are all adjacent to Killary Harbour, are classified as Special Areas of Conservation (SAC):

Mweelrea/Sheeffry/Erriff Complex SAC (001932) – This SAC is located in south Mayo and it borders the northern shore of Killary Harbour and it is bounded to the east by the Aille River. It has received its designation due to the presence of a range of habitats/species listed on Annex I/II of the EU Habitats Directive. Features of interest are:

- Coastal lagoons [1150]
- Annual vegetation of drift lines [1210]
- Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]
- Mediterranean salt meadows (Juncetalia maritimi) [1410]
- Embryonic shifting dunes [2110]
- Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]
- Atlantic decalcified fixed dunes (Calluno-Ulicetea) [2150]
- Dunes with *Salix repens ssp. argentea* (*Salicion arenariae*) [2170]
- Machairs (* in Ireland) [21A0]
- Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110]
- Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or Isoeto-Nanojuncetea [3130]
- Natural dystrophic lakes and ponds [3160]
- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]
- Northern Atlantic wet heaths with *Erica tetralix* [4010]
- European dry heaths [4030]
- Alpine and Boreal heaths [4060]
- *Juniperus communis* formations on heaths or calcareous grasslands [5130]
- Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]
- Blanket bogs (* if active bog) [7130]
- Transition mires and quaking bogs [7140]
- Depressions on peat substrates of the Rhynchosporion [7150]
- Petrifying springs with tufa formation (Cratoneurion) [7220]
- Alkaline fens [7230]
- Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) [8110]
- Calcareous rocky slopes with chasmophytic vegetation [8210]
- Siliceous rocky slopes with chasmophytic vegetation [8220]
- *Vertigo geyeri* (Geyer's Whorl Snail) [1013]
- *Vertigo angustior* (Narrow-mouthed Whorl Snail) [1014]
- *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029]
- *Salmo salar* (Salmon) [1106]
- *Lutra lutra* (Otter) [1355]
- *Petalophyllum ralfsii* (Petalwort) [1395]
- *Najas flexilis* (Slender Naiad) [1833]

- *Maumturk Mountains SAC* (002008) - The Maumturk Mountains are situated in Co. Galway, bounded to the north by Killary Harbour and to the south by the Galway/ Clifden road. It has received its designation due to the presence of a range of habitats/species listed on Annex I/II of the EU Habitats Directive. The features of interest are:
  - Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110]
  - Northern Atlantic wet heaths with *Erica tetralix* [4010]
  - Alpine and Boreal heaths [4060]
  - Blanket bogs (* if active bog) [7130]
  - Depressions on peat substrates of the *Rhynchosporion* [7150]
  - Siliceous rocky slopes with chasmophytic vegetation [8220]
  - *Salmo salar* (Salmon) [1106]
  - *Najas flexilis* (Slender Naiad) [1833]

- The Twelve Bens/Garraun Complex SAC (002031) – A large, mountainous SAC located in north-west Connemara which is adjacent to the southern shore of Killary Harbour. It has received its designation due to the presence of a range of habitats/species listed on Annex I/II of the EU Habitats Directive. Features of interest are:
  - Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110]
  - Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or Isoeto-Nanojuncetea [3130]
  - Alpine and Boreal heaths [4060]
  - Blanket bogs (* if active bog) [7130]
  - Depressions on peat substrates of the Rhynchosporion [7150]
  - Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) [8110]
  - Calcareous rocky slopes with chasmophytic vegetation [8210]
  - Siliceous rocky slopes with chasmophytic vegetation [8220]
  - Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]
  - *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029]
  - *Salmo salar* (Salmon) [1106]
  - *Lutra lutra* (Otter) [1355]
  - *Najas flexilis* (Slender Naiad) [1833]

- West Connacht Coast SAC (002998) – This SAC is predominantly marine waters and lies off the coasts of Galway and Mayo, extending west towards the Atlantic continental shelf, approximately 11 km from the mainland. The southern component of the SAC contains the islands on Inishturk, Inishbofin, Inishshark and Clare Island. This SAC was selected due to the presence of the Bottle-nosed Dolphin (*Tursiops truncates*), which is a species listed on Annex II of the EU Habitats Directive.

As seen from Figure 13 there are no SPA's in the vicinity of Killary Harbour. The nearest SPA's to the aquaculture sites in Killary Harbour are Cross Lough (Killadoon) SPA (for Sandwich Tern (*Sterna sandvicensis*) [A191]) (>10km from the appeal sites) and Illaunnanoon SPA (for Sandwich Tern (*Sterna sandvicensis*) [A191]) (>10.7 km from the appeal sites). All other SPA's are greater than 15km from the appeal sites. As seen in Figure 14 the Mamturk Mountains pNHA, The Twelve Bens/Garraun Complex pNHA, Mweelrea/Sheeffrey/Erriff Complex pNHA, Dernasliggaun Wood pNHA are on the terrestrial areas surrounding Killary Fjord.

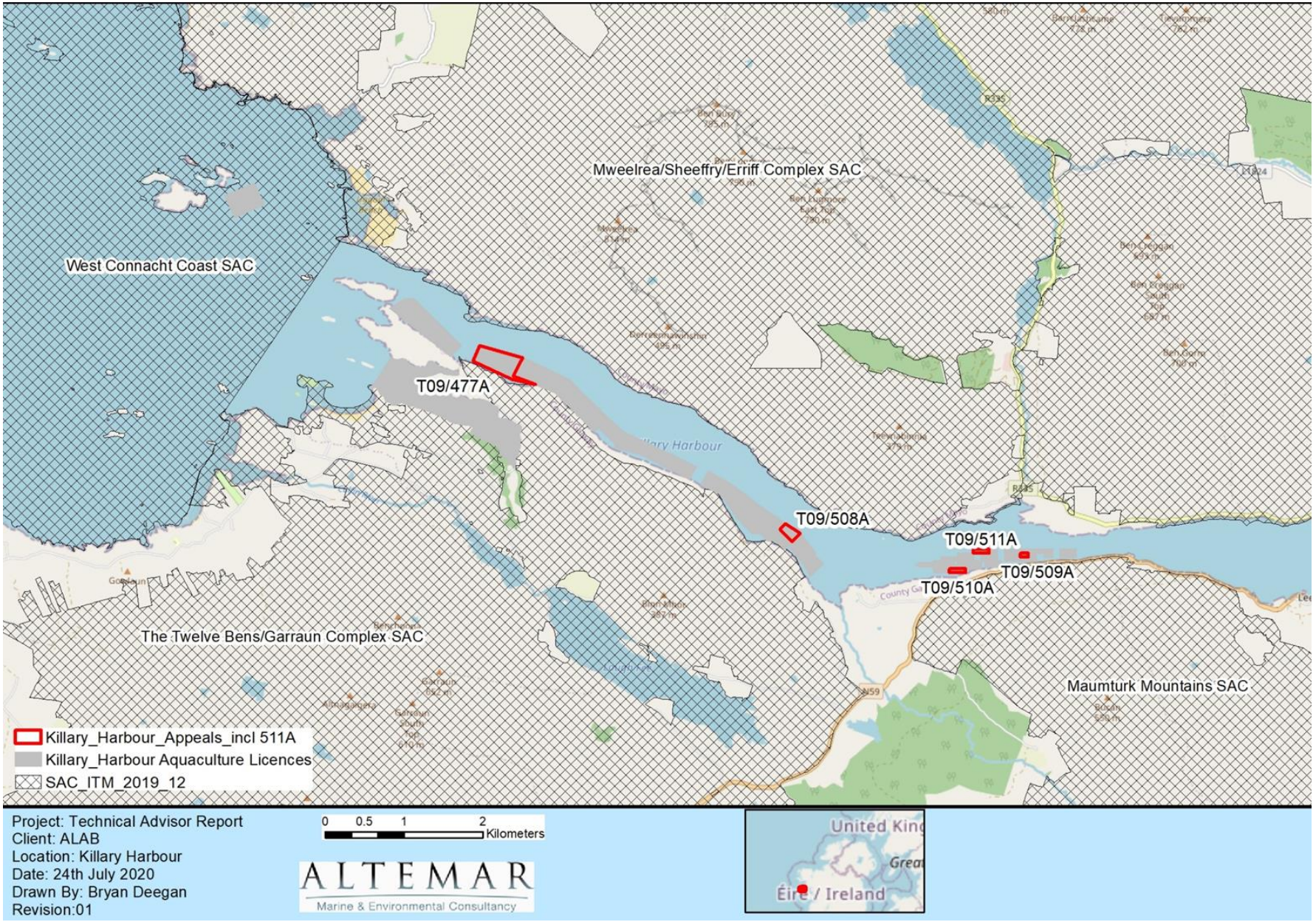

Figure 12. Special Areas of Conservation in proximity to the appeal sites

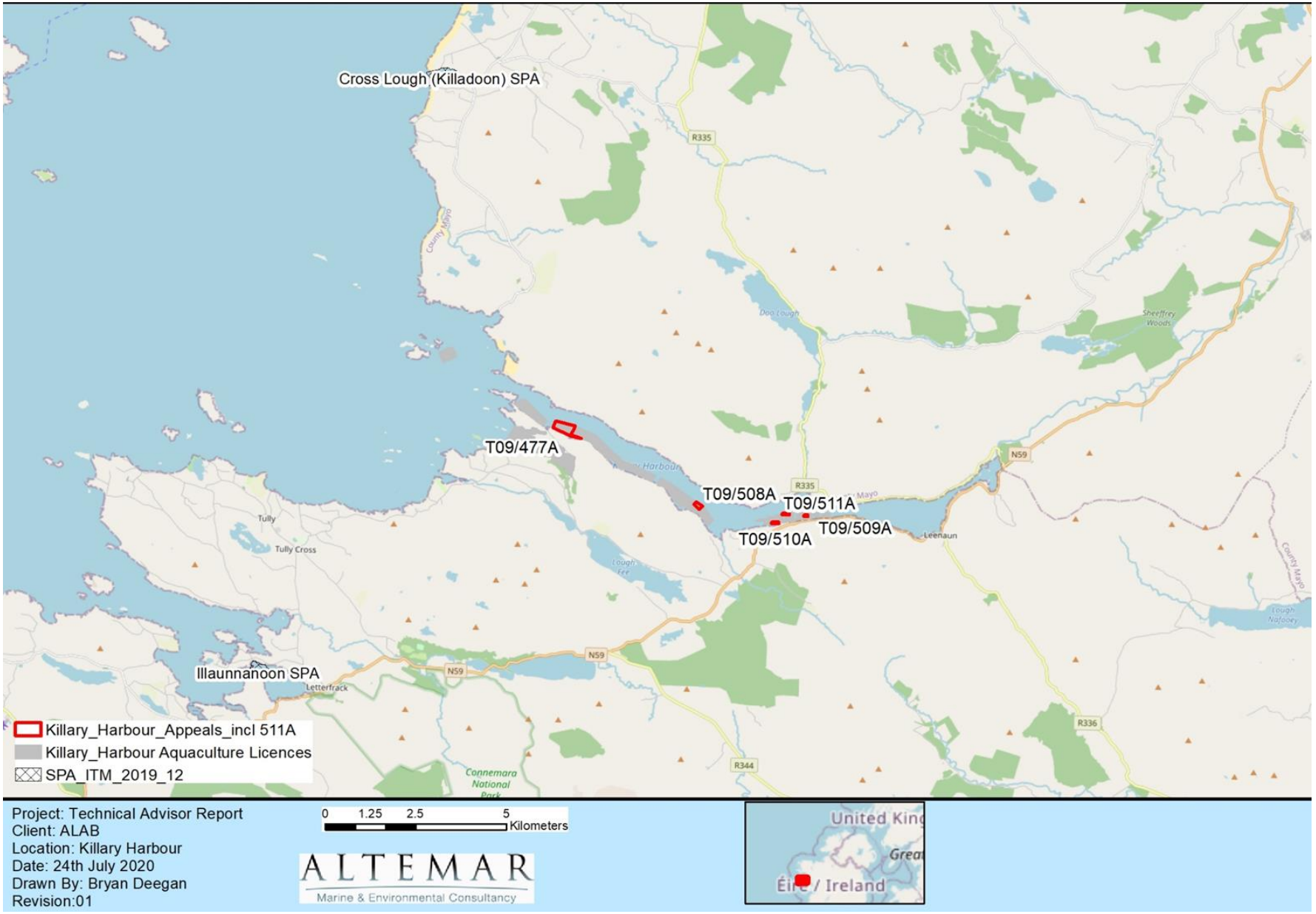

Figure 13. Special Protection Areas in proximity to the appeal sites

Figure 14. Natural Heritage Areas in proximity to the appeal sites

Protected Species

The proposed aquaculture sites that are subject to this Technical Advisor's Report are not themselves located within protected areas. However, as the previous section highlighted, there are several conservation sites in the vicinity. Many of these sites have received their special protection designation due to the presence of protected, or important species of flora and fauna, including:

Bottle-nosed Dolphin (*Tursiops truncates*) is one of the cetacean species listed on Annex II of the EU Habitats Directive and the West Connacht Coast SAC possesses physical and hydrographic features that are considered important for this species. Bottle-nosed Dolphins are found within the SAC area all-year round and local population estimates are said to range from 150 to 200 individuals[15]. Widespread sightings are said to occur in areas that include outer Killary Harbour. The marine mammal sightings of the Irish Whale and Dolphin Group are shown in Figure 15.

Atlantic Salmon (*Salmo salar*) is a species listed in Annex II of the EU Habitats Directive and are located in the Bundorragha and Erriff rivers, both of which flow into Killary Harbour. There are two popular fisheries (Delphi and Erriff) which utilise these rivers for salmon angling. The Erriff River system is noted as supporting an important population of Salmon (Fig. 16). The Appropriate Assessment Screening for aquaculture activities in Killary Harbour states that *''salmon for Mweelrea/Sheeffry/Erriff Complex SAC use Killary Harbour as a migratory route. The presence of aquaculture structures could potentially form a physical barrier to migration''*.

Otter (*Lutra lutra*) is a species listed on Annex II of the EU Habitats Directive and have been identified in two SACs that surround Killary Harbour (Mweelrea/Sheeffry/Erriff Complex and Twelve Bens/Garraun Complex). Otters have been known to breed in locations throughout the area, particularly lakes within the Mweelrea/Sheeffry/Erriff Complex SAC.

Freshwater Pearl Mussel (*Margaritifera margaritifera*) is an Annex II species in the EU Habitats Directive and have been identified as existing within several rivers in two SACs that are adjacent to Killary Harbour (Mweelrea/Sheeffry/Erriff Complex and Twelve Bens/Garraun Complex). The species is endangered and highly threatened, therefore requires special protection.

[15] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002998.pdf

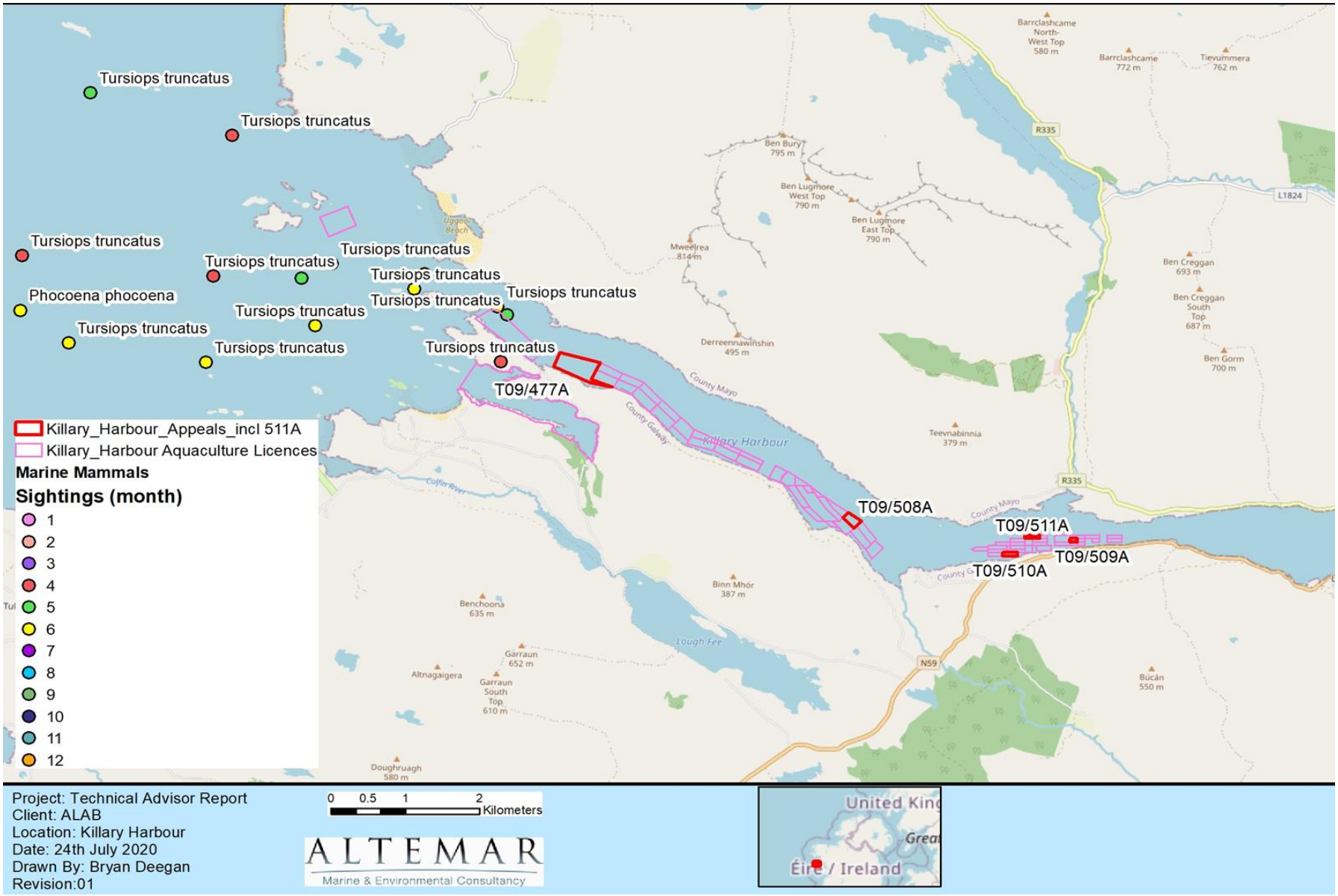

Figure 15. Marine Mammal sightings (IWDG) in the vicinity of Killary Harbour

Figure 16. Atlantic Salmon Rivers in the vicinity of Killary Harbour.

Statutory Plans

Northern and Western Assembly Regional Spatial and Economic Strategy

Killary Harbour is situated on the boundary between counties Galway and Mayo, both of which are part of the Northern and Western Regional Assembly, which is one of three regional-level administrative units in Ireland. One of the core functions of these newly established Assemblies is to prepare a Regional Spatial and Economic Strategy (RSES) for their respective regions which will guide all future economic and spatial development. The RSES is guided by the overarching aims contained in the National Planning Framework (NPF), a high-level strategic document prepared by the Irish Government, and it transposes these aims and objectives to a more regional context. All future Local Authority Development Plans must be cognisant of the objectives set out in their respective RSES, and for this reason alone the RSES is an important document to consider.

The RSES has established a range of key aims and objectives which will be the focus of future policy-making and co-ordinated development for the Assembly area entitled Regional Policy Objectives (RPOs). The following table provides a list of RPOs that are deemed to be the most relevant to the aquaculture sector and context of this Technical Advisor Report.

Table 2. Regional Policy Objectives of NWRA RSES

Regional Policy Objective	Focus
RPO 4.2	To support the maintenance of, and enhanced access to state lands, such as National Parks, Forest Parks, Waterways together with Monuments and Historic Properties, for recreation and tourism purposes.
RPO 4.30	To review, and where necessary amend, the RSES upon adoption of the National Marine Planning Framework (NMPF) to ensure alignment, and consistency between landuse and oceanbased planning, and to ensure co-ordination which supports the protection of the marine environment and growth of our marine economy.
RPO 4.31	To protect, upgrade and expand our key Fisheries Ports of Killybegs, Greencastle and Ross a Mhil, and to ensure adequate continued in investment in facilities to ensure their ongoing success.
RPO 4.32	To enable the expansion of our regional assets in the Blue Economy in the following sectors: - Marine research and innovation - Gas and Oil deposits within Ireland's waters - Seafood innovation through Greencastle, Killybegs, Pairc Na Mara and other BIM fishery centres
RPO 4.33	To facilitate where possible Marine Renewable Technology Projects off the West and North West coasts of Ireland, and subject to environmental and amenity considerations (feasibility studies), and where applicable, enable National Grid connection.
RPO 4.34	To enable the development (and/or expansion) of a number of strategic Marine Resource Innovation Parks, including locations at Greencastle, Killybegs, Co. Donegal and Cill Chiaran, Co. Galway, (Pairc na Mara), to increase aquaculture and seafood sectoral growth in the Marine Economy.
RPO 4.35	To support the ongoing upgrade and improvement of the region's harbours and ports, and ensure the sustainable development of this infrastructure to enable aquaculture and seafood industry expansion responsively.
RPO 5.2	Protect, manage and conserve the quality, character and distinctiveness of our landscapes and seascapes.
RPO 5.5	Ensure efficient and sustainable use of all our natural resources, including inland waterways, peatlands, and forests in a manner which ensures a healthy society a clean environment and there is no net contribution to biodiversity loss arising from development supported in this strategy. Conserve and protect designated areas and natural heritage area. Conserve and protect European sites and their integrity.

<u>Galway County Development Plan 2015-2021</u>

Development Plans are the main strategic documents that direct the future growth and development of local authority areas. The most recent development plan for Galway County is the 2015 Development Plan, which sets out the planning and sustainable development strategy for the County that covers a six-year period from 2015 to 2021.

A range of policies and objectives are set out under broad thematic areas such as the economy, tourism, water, climate change and the environment. Their intention is to manage or steer the direction of growth and development in these areas. The most pertinent objectives, in terms of aquaculture and/or the study area, identified in the Development Plan are outlined below.

Table 3. Key Objectives Galway County Development Plan

Objective	Focus
Objective TI 24 – Sustainable Development of Ports, Harbours, Piers and Slipways	a) Support the development of Ros an Mhíl Harbour as a deep water port and support and facilitate improvements and maintenance to other harbours including Inis Oirr and Inis Meáin, piers and slipways and consider any new marine infrastructure where appropriate; b) Facilitate the safe and convenient access to the water for the purpose of public transport, industry, commerce, sea rescue, tourism, aquaculture and recreation where appropriate and as resources allow.
Objective FL3 – Protection of Waterbodies and Watercourses	Protect waterbodies and watercourses within the County from inappropriate development, including rivers, streams, associated undeveloped riparian strips, wetlands and natural floodplains. This will include protection buffers in riverine, wetland and coastal areas as appropriate.
Objective NHB 2 – Biodiversity and Ecological Networks	Support the protection and enhancement of biodiversity and ecological connectivity within the plan area, including woodlands, trees, hedgerows, semi-natural grasslands, rivers, streams, natural springs, wetlands, stonewalls, geological and geo-morphological systems, other landscape features and associated wildlife where these form part of the ecological network and/or may be considered as ecological corridors or stepping stones in the context of Article 10 of the Habitats Directive.
Objective NHB 3 – Water Resources	Protect the water resources in the plan area, including rivers, streams, lakes, wetlands, springs, turloughs, surface water and groundwater quality, as well as surface waters, aquatic and wetland habitats and freshwater and water dependant species in accordance with the requirements and guidance in the EU *Water Framework Directive 2000 (2000/60/EC)*, the *European Union (Water Policy) Regulations 2003* (as amended), the *Western River Basin District Management Plan 2009 2015, Shannon International River Basin Management Plan 2009-2015* and other relevant EU Directives, including associated national legislation and policy guidance (including any superseding versions of same) and also have regard to the *Freshwater Pearl Mussel Sub-Basin Management Plans.*
Objective NHB 10 – Protection of the Coastal Zone	Protect the amenity, character, visual, recreational, economic potential and environmental values of the coast. Ensure that natural coastal defences including sand dunes, beaches and coastal wetlands are not compromised by inappropriate development. Conserve the character, quality and distinctiveness of seascapes.
Objective AFF 7 – Commercial Sea Fishing	Galway County Council shall encourage and facilitate the sustainable development and expansion of the fishing industry while providing for the management and conservation of coastal habitats and ecosystems.
Objective AFF 8 – Aquaculture	The Council shall support and promote the sustainable development of the aquaculture sector in order to maximize its contribution to employment creation and growth in coastal communities whilst balancing environmental considerations. Special consideration should be made to gradually enforce a policy that would encourage onshore fish farming practices and special consideration would be given when granting planning for on shore farms to areas that are already involved in the fish farming industry.
Objective AFF 9 – Inland Fishery Resources	The Council shall support the County's valuable inland fishery resource and support its sustainable development and expansion through the protection of water and habitat quality and facilitation of ancillary infrastructure and improvements at appropriate locations.
Objective AFF 14 – Provision of Infrastructure	Facilitate the provision of infrastructure, which is necessary for the development of the fishing, seaweed and mari-culture industry. The provision of infrastructure, which is necessary for the development of the

	fishing and mari-culture industry, should be located in proximity to established landing facilities.
Objective AFF 15 – Aquaculture, Marine Enterprise and Biotechnology	The Council shall encourage and support an integrated approach to marine enterprise as set out within the national Integrated Marine Plan titled Harnessing Our Ocean Wealth 2012. The Council shall consider appropriately located marine resourced enterprises within the County subject to proper planning and in compliance with environmental legislation. Ros an Mhíl shall be promoted as a location for a 'maritime/marine cluster'.

Landscape sensitivity is a measure of the ability of the landscape to accommodate change or intervention without suffering unacceptable effects to its character and values. Sensitivity ratings for landscapes throughout the County have been created and are derived from the character and perceived value of the landscapes (Fig. 17). Killary Harbour and its southern banks are classified as a Landscape Character Area which have primarily been designated as 'Class 5 – Unique', with some locations also designated 'Class 4 – Special'. The implication of these designations are that the determination of development uses must consider the landscape sensitivity ratings, with the design and choice of location critical considerations.

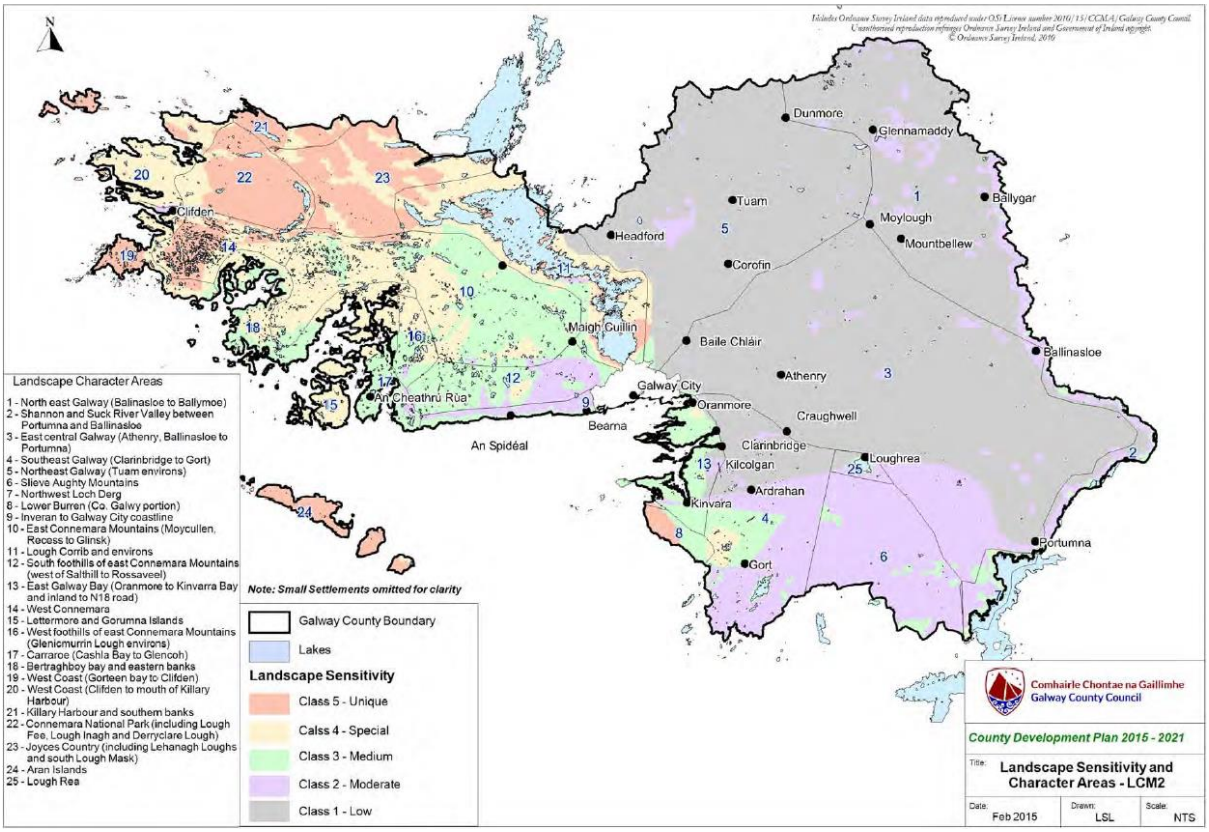

Figure 17. Landscape Sensitivity and Character Areas in Galway

Mayo County Development Plan 2014-2020

The latest iteration of the County Mayo Development Plan is for the 2014 to 2020 period, with a new development plan consultation process set to commence soon. Killary Harbour is situated on the border between County Galway and County Mayo, therefore, there is a need to consider the development plans for both counties. As with the County Galway Development Plan, a range of policies and objectives are set out to guide future growth and development in Mayo. The most pertinent objectives, in terms of aquaculture and/or the study area, identified in the Development Plan are outlined below.

Table 4. Key Objectives Mayo County Development Plan

Objective	Focus

MF – 01	It is an objective of the Council to support the sustainable development of the marine sector and subject to Government policy to prepare a Marine Strategy for Co. Mayo to include the following: Marine Spatial Planning; Leisure; Tourism; Aquaculture; Fishing; Renewable Energy; Other energy resources including Hydrocarbons; Transportation; ICT; Marine Biotechnology; Coastal Protection; Ecosystem Management, having regard to Harvesting Our Ocean Wealth An Integrated Marine Plan for Ireland July 2012.
MF – 02	It is an objective of the Council to support the sustainable development of marine aquaculture and fishing industries having regard to best environmental practices so as to maximize their contribution to jobs and growth in coastal communities where it can be demonstrated that the development will not have significant adverse effects on the environment, including the integrity of the Natura 2000 network, residential amenity or visual amenity.
MF – 03	It is an objective of the Council to protect the County's valuable inland fishery resource and support its sustainable development through the protection of water and habitat quality and facilitation of ancillary infrastructure at appropriate locations.
PH - 01	It is an objective of the Council to develop and improve ports, harbours, piers, slipways and associated shore facilities and access, including those that can be shared by leisure, tourism, fishing, renewable energy and aquaculture, where it can be demonstrated that the development will not have significant adverse effects on the environment including the integrity of the Natura 2000 network.
WQ – 01	It is an objective of the Council to implement the Western River Basin District Management Plan "Water Matters" 2009-2015 to ensure the protection, restoration and sustainable use of all waters in the County, including rivers, lakes, ground water, coastal and transitional waters, and to restrict development likely to lead to deterioration in water quality or quantity.
LP – 01	It is an objective of the Council, through the Landscape Appraisal of County Mayo, to recognise and facilitate appropriate development in a manner that has regard to the character and sensitivity of the landscape and to ensure that development will not have a disproportionate effect on the existing or future character of a landscape in terms of location, design and visual prominence.
NH - 01	It is an objective of the Council to protect, enhance, conserve and, where appropriate restore: c). Features of natural interest and amenity, which provide a unique habitat for wildlife including ecological networks (including ecological corridors and stepping stones), riparian zones, hedgerows, stonewalls and shelterbelts. g). Surface waters, aquatic and wetland habitats and freshwater and water dependent species through the implementation of all appropriate and relevant Directives and transposed legislation.

Landscape Policy Protection Areas have been created for Mayo which enables the determination of the potential impacts of development on the various policy areas. Landscape sensitivity is assessed through this (Fig. 18). The landscape policy protection area that adjoins Killary Harbour to the north is classified as Policy Area 3 – Uplands, Moors, Heath or Bog. Industrial and commercial developments in these areas are deemed to possess ''*medium potential to create adverse impacts on the existing landscape character. Such developments are likely to be clearly discernible and distinctive, however with careful siting and good design, the significance and extent of impacts can be minimised to an acceptable level*''.

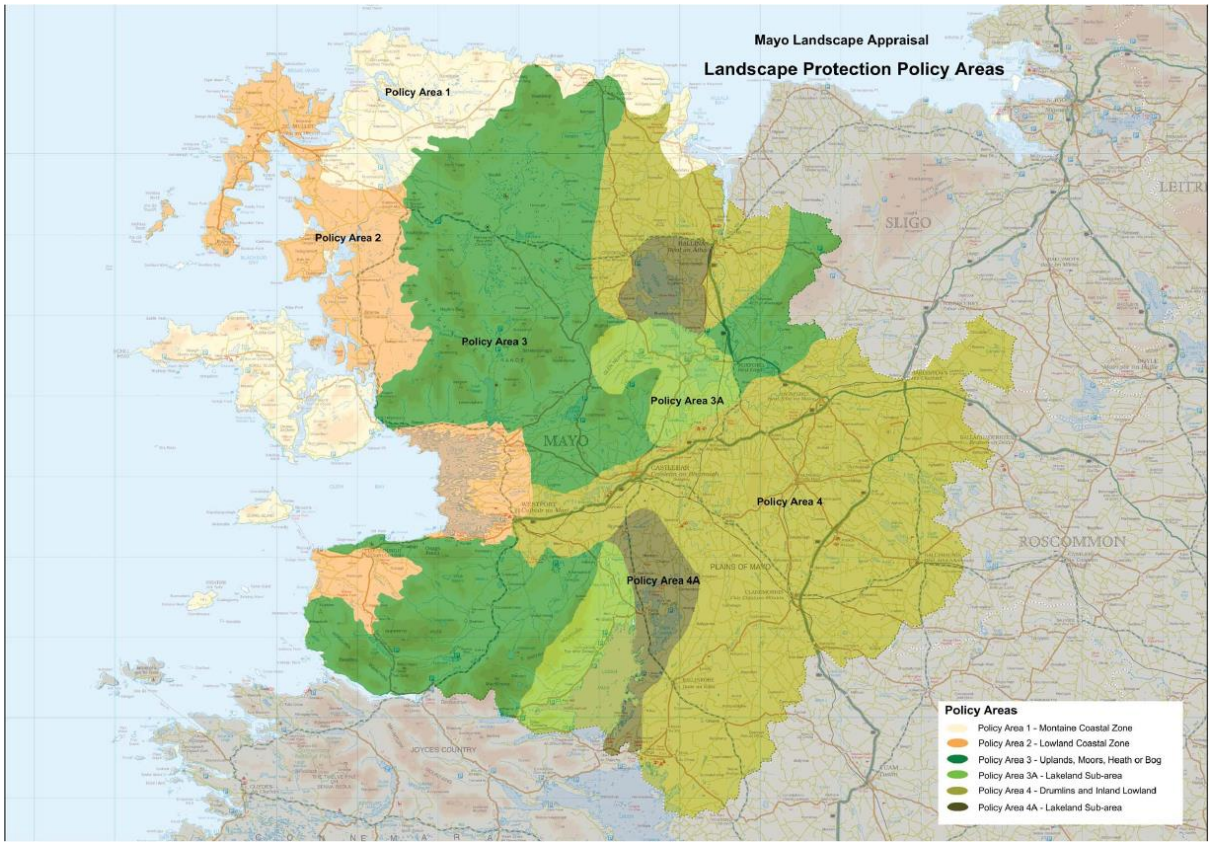

Figure 18. Landscape Policy Protection Areas in Mayo

FLAG West & Northwest Local Development Strategies 2016

The Fisheries Local Action Groups (FLAG) are regional organisations focused on community-led development to enhance the economic opportunities and social sustainability of Fisheries and Aquaculture dependent areas. Each FLAG has, through a process of public consultation developed a Local development Strategy, aimed at supporting job creation, adding value, promoting innovation as well as enhancing environmental assets and promoting each area's maritime cultural heritage.

Due to the location of Killary Harbour on the border of Galway and Mayo, it could be assigned to both the FLAG West and FLAG Northwest groups. Although not statutory documents, the FLAG Development Strategies offer useful insights into the local economies of Irish coastal communities (Fig. 19).

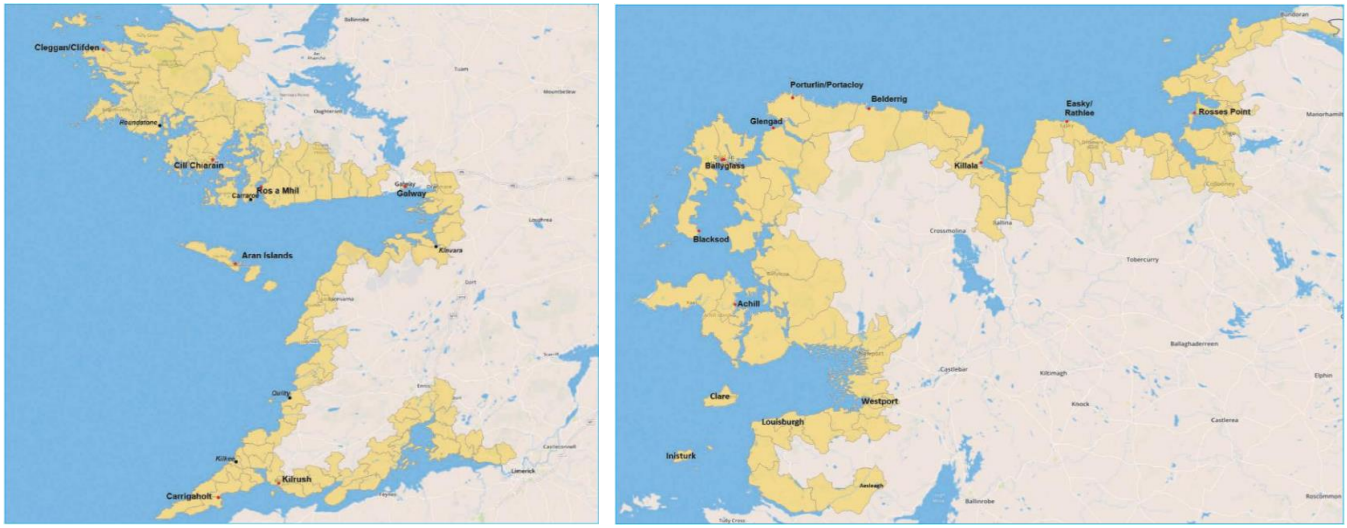

Figure 19. FLAG West and FLAG Northwest areas

The following information is sourced from the development strategies of FLAG West and Northwest:

- The fishing industry in FLAG West is dispersed along the coast of Galway and Clare with a heavy concentration along the Connemara Coast line. Ros A Bhíl is a National Fishery Harbour which represents 2% of all Irish tonnes landed and 6% of the total value.
- Roughly 17% of Irish marine seafood vessels are located in the FLAG West area (368 of 2,196), with approximately 10% (37) of total Irish companies in this sector found here.
- Aquaculture represents the most common business type, with 20 of the 37 engaged in this activity, while processing records 7 and fishing and wholesale record 5 each.
- FLAG West accounts for 3,666 tonnes of the 203,423 tonnes of fish landed nationally, representing 1.8% of the volume across all FLAGs.
- The estimated value of fish landed in FLAG West is €12.2 million, which represents about 5.6% of the value of landings across all FLAGs.
- Total sectoral employment stands at 687 of the 6,424 nationally, which is approximately 11% of total seafood employment across all FLAGs.
- 10% of all FLAG vessels marine sector vessels are located in FLAG Northwest (219 of 2,196), with 7% of total marine seafood companies found in this region (27 in total)
- 13 of the 27 FLAG Northwest companies are engaged in aquaculture, with 12 in processing and the remaining 2 are in fishing
- Total sectoral employment in FLAG Northwest is 450, which represents 7% of seafood employment across all FLAGs
- The total estimated value of aquaculture in the FLAG Northwest region is €20.1 million

Killary Harbour UISCE Report 2010

In order to help inform aquaculture licence renewal processes in Killary Harbour the Department for Agriculture, Fisheries and Food (DAFF) requested Bord Iascaigh Mhara (BIM) to assess various water quality and aquaculture scenarios using the UISCE (Understanding Irish Shellfish Culture Environments) system and make recommendations based on their findings. Various modelling software were utilised as were growth experiments where mussel lines were observed over a number of years and recorded in different parts of the bay. Furthermore, standing stock assessments were carried out in 2007 and 2009/2010 to provide an accurate picture of shellfish quantities. This report is a critical element in relation to the appeals in question. Figure 20 is an image taken from the UISCE report and it represents a tidal ebb modelling output which shows areas of reduced flow adjacent to southern shores in the middle of Killary Harbour.

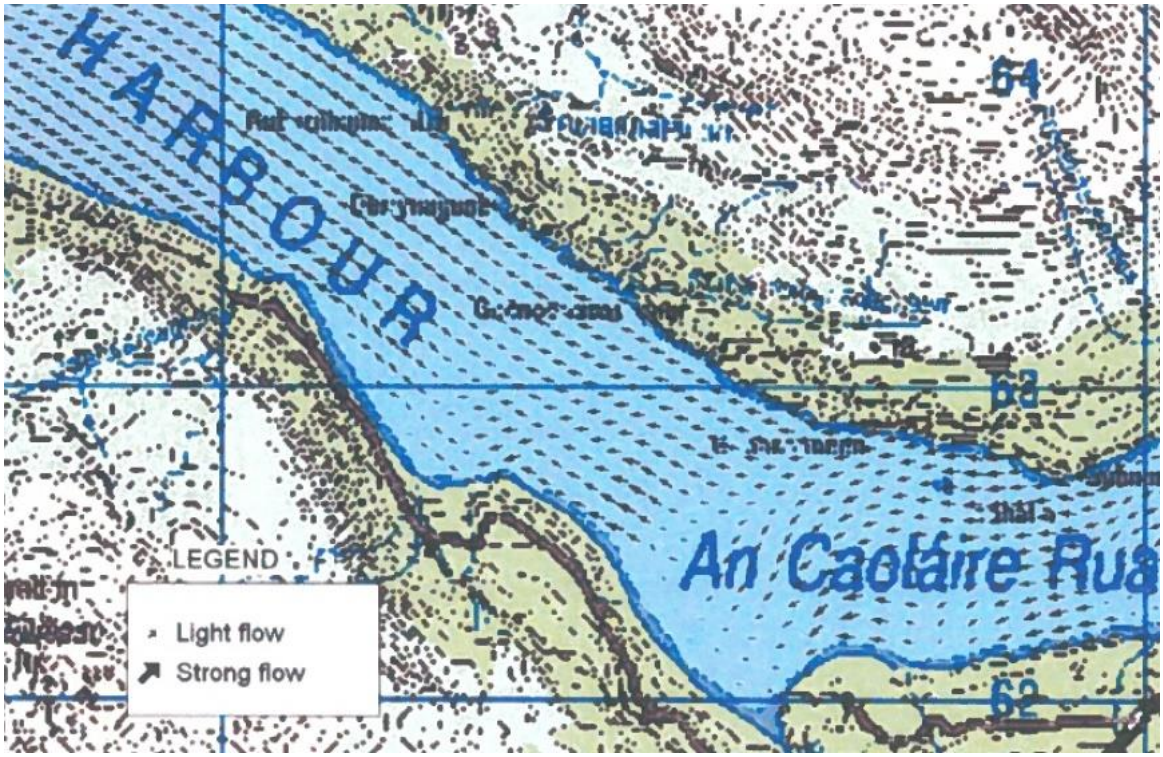

Figure 20. Tidal ebb modelling in Killary Harbour

Figure 21, also taken from the report, shows a modelled chlorophyll distribution map. As chlorophyll is a constituent of the algae/phytoplankton that is a source of food for shellfish, areas with less chlorophyll may prove less productive, according to the report. Locations at and near both the mouth and head of the bay are identified as possessing lower levels of chlorophyll.

The various models utilised by BIM when undertaking the study enabled a prediction of growth potential for shellfish across Killary Harbour. Figure 22 offers a visual representation of this cumulative prediction model and shows the areas of poor and good growth potential. It should be noted that this model assumes no cultivation sites or farms in the bay. The prediction model suggests that a large proportion of the inner bay has poor growth potential. Other areas in both the outer and middle bay showcase a 'medium' growth potential, with the majority of the medium to good areas found in the western parts of the middle bay.

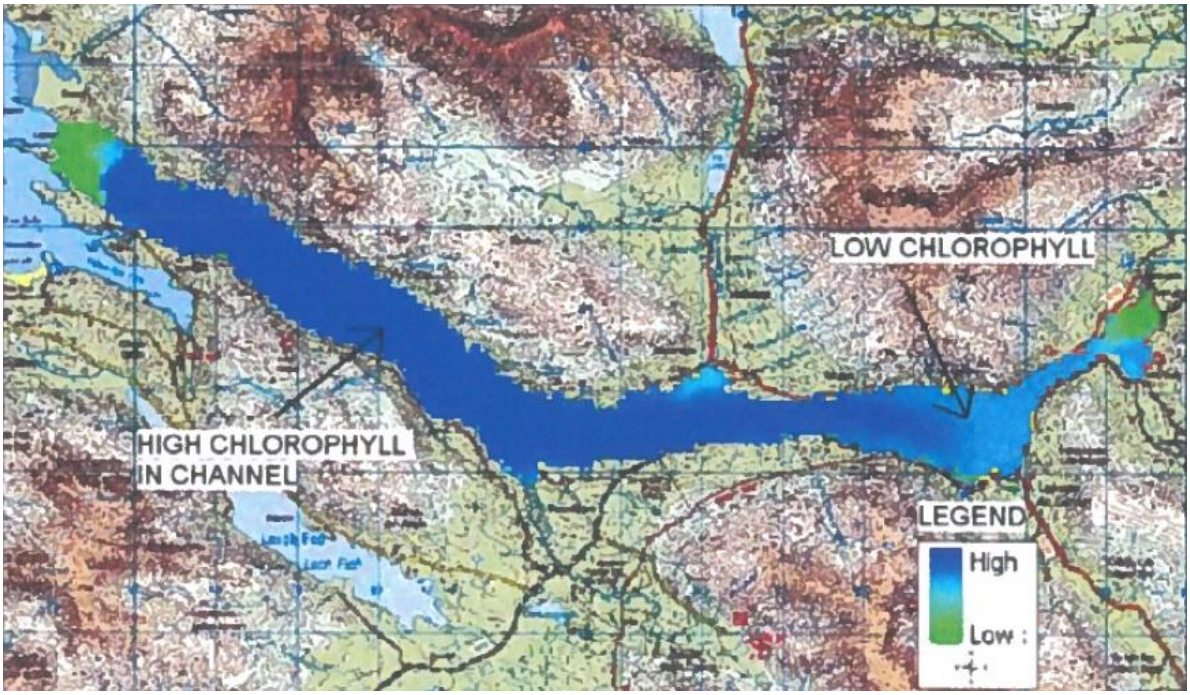

Figure 21. Chlorophyll map for Killary Harbour

As outlined in the Report "*Carrying capacity, biomass and harvestable tonnage are all interrelated with growth rate. Simply, if there are less shellfish in an area they will grow faster as food is not limiting. When you put more shellfish in the system there reaches a point when food does become limiting and the growth rate starts to slow down. If you increase the stock further a plateau is reached where the food has been limited and no further growth is possible unless the number of shellfish is reduced again. In the natural environment this usually leads to starvation and mortalities.*

When the stocking density is too high or the carrying capacity of the bay is being reached, one of the first consequences is slower growth i.e. that it then takes two and a half years to reach market size instead of two years. This means that another year class of stock is added to the system thus increasing the biomass further and exacerbating the problem. This process is quite gradual and cumulative taking several years for the initial increase in seed stock to have its effect on the carrying capacity.

Then with every subsequent year it can take longer and longer for stock to come to market size. If you add to this prolonged closures due to biotoxns you can very easily reach the situation where you are carrying nearly a third more biomass than in a two year cycle and yet the overall annual harvest increase may be as little as 10%."

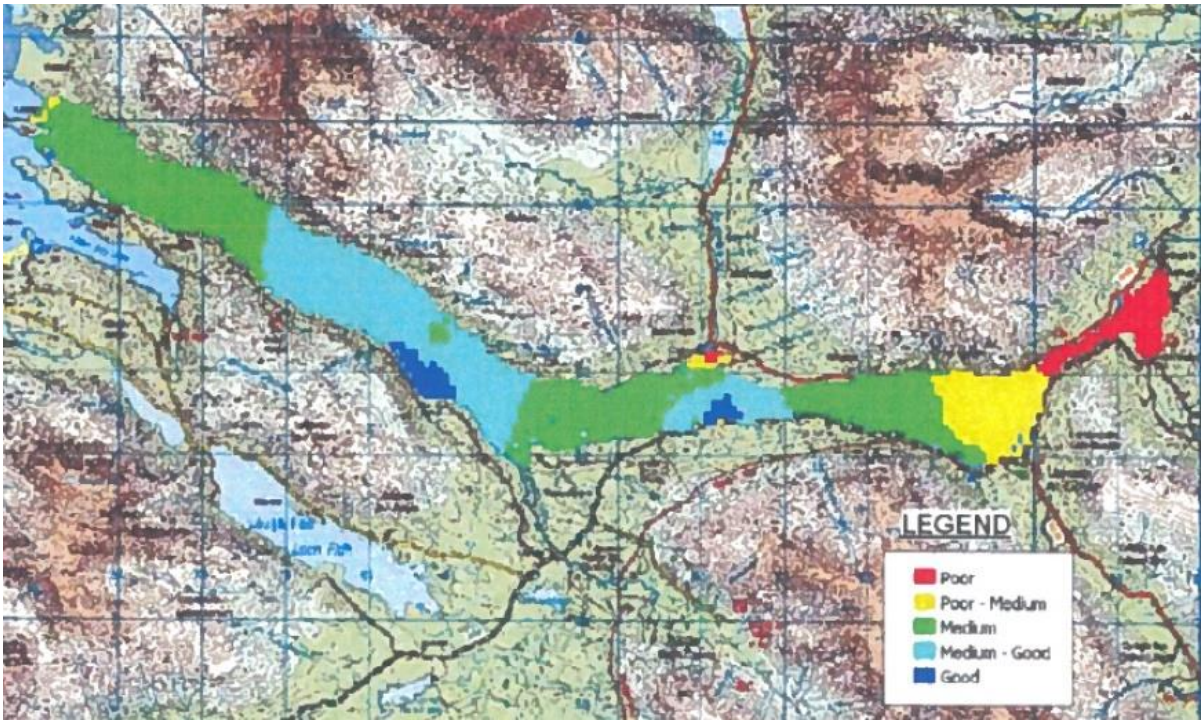

Figure 22. Visual representation of this cumulative prediction model

Further analysis was undertaken that utilised sampling in and near existing mussel farms as this would enable assessments based on working conditions. A reduction in chlorophyll concentrations, to varying degrees, near and within mussel farms was found. By combining baseline data and modelling scenarios an assessment of existing mussel longline farming could be made. The report states that *''the current orientation of the longlines is fairly optimal and there would be no improvement in growth etc., by changing their orientation. What is apparent though is that if the length of longline head rope is increased this would impact on the growth rate in the middle of the lines''*.

An assessment on the distance water must flow from mussel lines before food levels return to that which they were before entering lines was also undertaken. It was found that there is generally a 90% recovery after 50 metres and a 95% recovery after 100 to 150 metres. Therefore, the spacings between blocks of longlines will be important and can help with recovery between lines, particularly *''once the anchors etc. are back within the licensed site''* (pg.13).

Table 5. Summary outputs for varying relative densities on longlines with lines at 0° angle to tidal flow.

Relative Density %	Mean Flow (cm/s)	Mean Food (ug/l)	90% Food Recovery (m)	95% Food Recovery (m)
0	3.95	2.44	50	100
+25	3.73	2.31	125	200
+50	3.53	2.19	150	200
-25	4.16	2.57	20	100
-50	4.42	2.71	20	20

The report provides an assessment of a proposal made by local aquaculture operators who suggested reducing the number of 8m drop ropes to 800 per hectare along with limiting flotation to 18,000 litres per hectare.

Tables 6, 7 & 8 are adapted from the UISCE report and show the comparison between current conditions and the potential estimates when the proposed limits of 18,000 L/Ha and 800 droppers/Ha are used. Table 6 showcases the difference between current usage of droppers and the proposed. Table 7 shows the difference between current floatation and proposed. Table 8 shows a comparison of current tonnage and calculated tonnage using the proposed limits.

Table 6. Comparison of existing No. of Droppers and proposed

	Current No. Droppers	No. Droppers @800/Ha	Difference (No.)	% Difference
Outer	51,013	43,372	7,641	15%
Middle	30,851	38,304	-7,453	-24%
Inner	31,083	20,496	10,587	34%
Totals	112,947	102,172	10,775	9.5%

Table 7. Comparison of existing floatation and proposed

	Current Flotation (Litres)	At 18,000 L/Ha	Difference (Litres)	% Difference
Outer	1,258,080	975,870	282,210	22.4%
Middle	675,170	861,840	-186,670	-27.6%
Inner	684,470	461,160	223,310	32.6%
Totals	2,617,720	2,298,870	318,850	12.2%

Table 8. Comparison of surveyed tonnage, total estimated tonnage and total tonnages of proposed measures

	Outer	Middle	Inner	Totals
Survey Tonnage	871	602	399	1,872
Assumed tonnage of empty lines	430	318	248	996
Total tonnage	1,301	920	647	2,868
Potential tonnage at current flotation	2,717	1,458	1,478	5,653
Tonnage at 18,000L/Ha	2,108	1,862	996	4,966
Tonnage at 800 droppers/Ha	1,735	1,532	820	4,087

Regarding number of drop ropes per hectare, the assessment indicates that farms in the middle harbour had already been operating below the proposed threshold, while farms in the outer and inner harbour would be required to reduce drop ropes by 15% and 34% respectively. In terms of the level of flotation, the middle harbour was already operating under the 18,000 L/Ha, whereas the other areas are over this. Furthermore, the report states that

"*It is clear that including licence conditions that have a maximum floatation of 18,000 LlHa and 800 X 8m droppers will not adversely effect the current overall production in Killary Harbour. Indeed 18,000 LlHa can be considered an overestimate of floatation given that to hold the existing potential total stock of 2,869 tonnes you would conservatively only need 1,328,356 L of floatation which equates to 10,360 L/Ha*."

In effect, the report argues that even if sites are limited to maximum flotation of 18,000L/Ha there will be no impact on production as this limit is still an overestimate of necessary flotation. Furthermore, it is noted that while farming practices had since changed from 2007 to the date of report publication, with a reduction in both flotation and numbers of droppers, there was still no ''*significant change in production and growth rates*''. It is suggested that while some farmers in the Middle Killary zone have altered practices, farms in the Inner and Outer have not made corresponding changes, thereby preventing any potential for overall improvements.

The following bullet points are some of the recommendations that the UISCE report concludes with:

- Reduction of drop rope density (increased space between drop ropes) will improve water flow on the individual site and neighbouring sites which in turn will help improve growth rates. There should be no problem in reducing the number of drop ropes to 800 per Hectare as this will not significantly decrease production in the bay.
- Anchors, longlines and other equipment should be located within the licensed sites in order to permit better water flow which should enable better recovery of food.

- Reduction in flotation is needed as there is twice the necessary number of floats to support the biomass.
- Middle Killary is the worst affected area and a reconfiguration of aquaculture sites across the bay, such as moving some from the south side to the north, should be considered in order to potentially improve these conditions.
- Sites that are currently unused should not be renewed and no new applications for these sites should be considered.

Towards an ecosystem approach to aquaculture: Assessment of sustainable shellfish cultivation at different scales of space, time and complexity

Nunes (*et al.* 2011) produced an academic paper which sought to contribute to improved management of coastal systems where aquaculture occurs by assessing the range of tools used to analyse various aspects of mussel cultivation[16]. The study area was Killary Harbour and the paper is referenced by various statutory and technical consultees as part of the aquaculture licensing process for the subject sites. It provides some insights into conditions in Killary Harbour that explicitly relate to mussel cultivation and carrying capacity.

Some of the most relevant points raised in the paper are as follows:

- Data for 2006 suggests annual production of mussels in Killary Harbour reached 1,632 tonnes (fresh weight), with productivity of 10.4 tonnes p/Ha
- The EcoWin2000 model assessed by the researchers suggested a maximum annual production of 4,200 tonnes and 26.6 tonnes p/Ha
- The FARM model, also assessed as part of the study, suggested a maximum annual production of 8,400 tonnes and 53.5 t/p/Ha
- Researchers considered the EcoWin2000 model to be more realistic and stated that it also compares well with previous predictions made by Rodhouse and Roden (1987) of annual total production of 3,000 tonnes

The following table provides a summary of the total tonnages for Killary Harbour, comparing the surveyed and estimated tonnages from the UISCE report along with the modelled tonnages from the Nunes (et al. 2011) paper. It shows that the maximum potential tonnage from farms in Killary Harbour at the level of flotation in 2010 amounted to 5,653, however the surveyed total was far below this at 2,868 tonnes. If flotation was limited to 18,000 L/Ha and droppers limited to 800/Ha the maximum total is estimated at 4,966 and 4,087 respectively. These totals are similar to the EcoWin2000 model from the Nunes (et al.2011) report, which estimated a maximum tonnage of 4,200 for Killary Harbour. The FARM model, which was discounted in the report itself, suggested a maximum tonnage of 8,400. Each of these aforementioned tonnage estimates are higher than the estimate made by Rodhouse and Roden (1987), who argued that Killary Harbour only has the potential to provide a total tonnage of 3,000.

Table 9. Comparison of tonnages identified in UISCE Report and Nunes (et al.2011) paper

DAFF & BIM UISCE Report			Nunes (et al.2011) Paper		
Max Current Floatation	Floatation of 18,000 L/Ha	Droppers @ 800/Ha	EcoWin2000 Model	FARM Model	Rodhouse & Roden (1987)
5,653	4,966	4,087	4,200	8,400	3,000

[16] https://www.longline.co.uk/site/aboutus/publications/multimodel.pdf

The Discussion of the Uisce report states the following "*Carrying capacity biomass and harvestable tonnage are all interrelated with growth rate. Simply. if there are less shellfish in an area they will grow faster as food is not limiting. When You put more shellfish in the system there reaches a point when food does become limiting and the growth rale starts to slow down. If you increase the stock further a plateau is reached where the food has been limited and no further growth is possible unless the number of shellfish is reduced again. In the natural environment this usually leads to starvation and mortalities.*

When the stocking density is too high or the carrying capacity of the bay is being reached, one of the first consequences is slower growth i.e. that it then takes two and a half years to reach market size instead of two years. This means that another year class of stock is added to the system thus increasing the biomass further and exacerbating the problem. This process is quite gradual and cumulative taking several years for the initial increase in seed stock to have its effect on the carrying capacity.

Then with every subsequent year it can take longer and longer for stock to come to market size. If you add to this prolonged closures due to biotoxins you can very easily reach the situation where you are carrying nearly a third more biomass than in a two year cycle and yet the overall annual harvest increase may be as little as 10%.

Quite often people will say that, at the above stage, the carrying capacity is reached for the bay. This is not quite true. What has happened is the growth rate has slowed but it may still be possible to increase the biomass even further again sacrificing growth rate. What does occur is that it becomes uneconomical to continue to grow mussels at a certain stage. As nearly every site in a bay is different where one farm may be having serious problems, another farm may be performing well due to no fault of either party.

In the situation as it relates to Killary Harbour, unfortunately you can have a farmer that has not changed his practices for years being impacted as a result of another person or an accumulation of several other peoples activities (along with biotoxin closures). At this stage it is very hard to identify one specific reason for the slow growth problem and come up with an easy solution on how to fix it but it is clear that there is overstocking.

One of the issues relating to structures and mussel growth is the flow of water. The food for the mussels (algae/phytoplankton) is carried in the water, hence if the flow is reduced so too is the amount of water and food delivered to the mussels. So the physical mass of mussels on drop ropes and the number of drop ropes does affect the flow of water through the longlines.

Spacings between longlines and leaving channels between blocks of lines is beneficial. Making fanners move their anchors back into their licensed sites will help the flow and recovery of phytoplankton between blocks of lines. However, if there is no associated reduction in the number of droppers etc. then the potential crowding of the lines into smaller blocks will increase the density of mussels at a local level and will most likely impact on mussel growth and harvest tonnage in those and adjacent sites.

The practice of thinning drop ropes (stripping off mussels and repacking) has the effect of reducing mortalities significantly, As seen above with a relatively low settlement in Killary with no thinning the mortality is at least 80% and up to 95% if there is a heavy settlement, whereas with thinning the mortality only ranges from 25% to 40%. Why this is important is that all the mussels that eventually die or drop off the lines have been feeding and taking up space and thereby increasing the competition for food etc. with the mussels that will be eventually harvested.

One of the main reasons given for not thinning mussels is the increased cost of stripping and repacking. Realistically though. if this is analyzed from an economic point of view you will find this labour and equipment cost is offset by not having to have at least a third more longlines for an extra year class when you do not thin, along with having a shorter growth cycle which decreases the risk of fouling and secondary settlements etc. This ultimately results in harvesting more tonnage per hectare on an annual basis. The main problem though is for thinning to be most beneficial nearly everyone in the bay would have to adopt the practice in order to help reduce the biomass and density of mussels in the bay. Another way of addressing this issue of high mortalities is to try and collect the correct amount of seed per metre on the collectors originally. This has been quite successfully

done in Ardgroom where, though the yield per Hectare is lower than in areas that thin, the growth rate is comparable and the crop is harvested within a two year cycle."

The recommendations of the Uisce Report were as follows "*The requirement to move all longlines and anchors to within the relevant licensed site will increase channels between the lines which will improve water flow between the sites.*

Reduction of drop rope density (increased space between drop ropes) will improve water now on the individual site and neighbouring sites which in turn will help improve growth rates. There should be no problem in reducing the number of drop ropes to 800 per Hectare as this will not significantly decrease production in the bay.

Reduction of floatation is needed as there is currently nearly twice the necessary number of floats present to support the biomass. This is leading la increased shake off of mussels in rough weather. As a maximum the total floatation should be limited to 18,000 Litres per hectare.

A reduction in floatation and drop rope numbers will he required when longlines are moved within sites, otherwise the relative densities within the site will increase which could lead to further problems with growth rates and production.

Thinning and repacking should be encouraged to help reduce overall biomass and improve productivity per licensed Hectare. If this option is not considered then reduction of the density of collection per metre of dropper is required. By doing either of these things the growth rate will improve and it is possible to even increase harvest production for the bay.

At present the worst affected area are the sites in Middle Killary. The above recommendations will help improve the situation. However the movement of some sites from the South side of the bay to the North side without increasing production capacity would potentially improve growth rates etc. Obviously there are legal considerations here that were beyond the scope of the UISCE project. Bearing this in mind, a reconfiguration of sites within Killary should have the effect of allowing better ' buffering' between sites and a consequent increased possibility of food and flow ' recovery' and ultimately better mussel growth. The result of this should be faster and more even growth across aquaculture growing zones.

Certain of the sites in Inner Killary (ones that are 1 square Hectare) cannot fit a standard longline in them with its anchors (most of these sites originally held mussel rafts). Consideration should be given 10 changing the dimensions of these sites to 200m long by 50m wide to permit the operators to place two longlines in them.

Sites that are currently unused should not be renewed (e.g. T9_398A) and no new applications for these sites should be considered.

Any equipment not associated with current licences or renewals should be removed.

A monitoring programme in respect of growth rates and production should be established to measure the outcomes of any changes made.

Growers should provide a work programme, giving time scales. for the movement of specific lines and a detailed plan as to how their sites will be laid out in accordance with the licence renewal. If there are problems with other growers lines that are preventing them from moving their own lines then this should be detailed and agreement reached with the other growers on when they are moving the lines. These individual plans should then be incorporated into an overall work programme for the bay with specific deadlines that can be monitored and reported on."

Further information since 2010 UISCE Report

A Section 47 request was submitted to An Bord Iascaigh Mhara on 10th November 2020 (Appendix I) and a response received on the 8th December 2020.

a) Production tonnages from Killary Harbour 2000-2019

Based on the data provided by BIM Section 47 response in Appendix II a comparison of the tonnages of mussel landed since 2000 and the modelled potential tonnages from the various models is presented in Figure 23. The annual tonnages for Killary Harbour are collected by BIM as part of the annual Aquaculture Production and Employment Census. As can be seen from Figure 23 the peak production of 1,631 tonnes was seen 2006. However, since this peak the maximum tonnage was 1,251 in 2011, with no figure of over 1,000 tones since 2011. These figures indicate that the actual production from Killary Harbour (based on the census data) is at most approximately half of the Roden model which is the most conservative of the capacity models. However, it should be noted that as outlined above that in 2010 the amount surveyed 2,868 tonnes (Nunes 2011) is higher than the census data for this year of 1003 tonnes. However, in the peak year (2006) production figures from Nunes (2011) are directly in line with the BIM Section 47 figures. The discrepancy in the 2010 data could indicate an over estimation of the amount surveyed on ropes in 2010, an under reporting in census data in relation to tonnages or a significant loss in mussel tonnages from the time that the estimates were made to when the mussels were harvested. Not withstanding this all tonnages based on the BIM annual Aquaculture Production and Employment Census were significantly below all predicted models and since 2010 were less than 33% of the most conservative model.

b) Details of the tonnages of mussels harvested from individual sites.

Details of tonnages from individual sites was provided to Alab. It has been deemed that these data would be commercially sensitive to produce in raw data format. However, it should be noted that these data are presented by BIM based on individual licence holder submissions who in many cases provided pooled data for several licenced sites rather than individual site data. Therefore, the data seen in Figure 24 in not based on individual sites but on licence holders. What this shows is that there are between 10 and 18 licence holders actively producing and there are only two years (2011 & 2018) where all licence holders responded to the census. Since 2011 there have been a number of cessations and transfers and an increase in licence holders listed as producing but not listing/stating tonnages (if any). The status of tonnages within the sites not responding to the questionnaire is unknown.

Only one appeal site was noted within the tonnage figures provided by BIM i.e. T9/477. This was part of a pooled figure for sites T9/477, T9/184A&B, 308A&B, 341A&B by Killary Harvest Ltd. (Lydon Kevin & Lydon Michael). This includes site T9/477A which is an Appeal site. A review of satellite imagery from May 2004, April 2009, April 2011, July 2015, April 2017, April 2019 and April 2021 did not appear to show mussel barrels within site T9/477A.

c) Additional information on the food resource, carrying capacity and any modelling carried out by or on behalf of, or available to, BIM subsequent to the Uisce Report for the Department of Agriculture, Fisheries and Food on Killary Harbour 2010.

As outlines in Appendix II "*Following an examination of our records and internal consultation, BIM can locate no additional information on the food resource, carrying capacity and any modelling carried out by or on behalf of, or available to, BIM subsequent to the Uisce Report for the Department of Agriculture, Fisheries and Food on Killary Harbour 2010."* In addition, the technical advisor contacted the Marine Institute who also stated that they did not hold any additional relevant information including modelling that could assist.

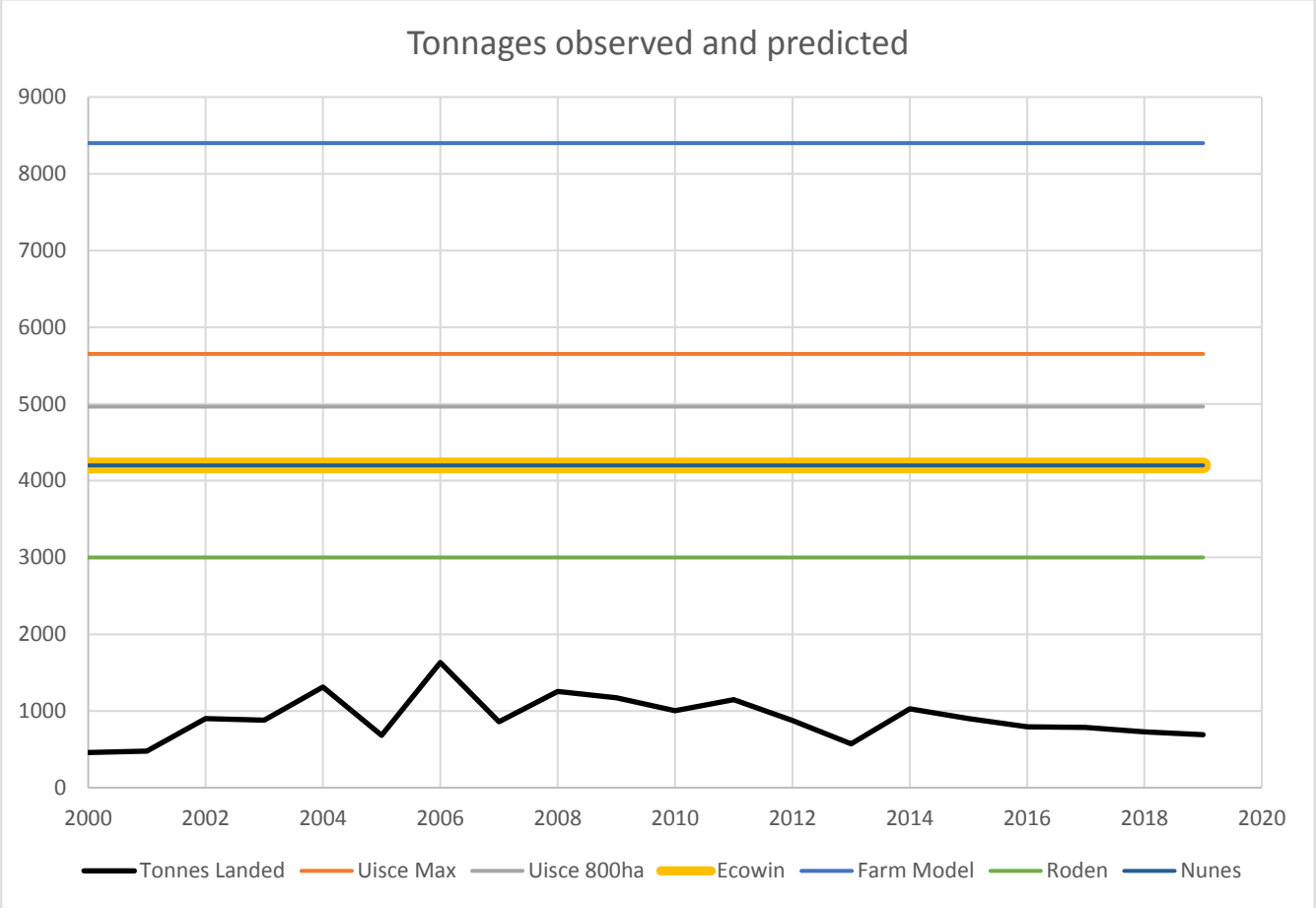

Figure 23. Annual tonnages for Killary Harbour collected by BIM as part of the annual Aquaculture Production and Employment Census and predicted tonnages by various models.

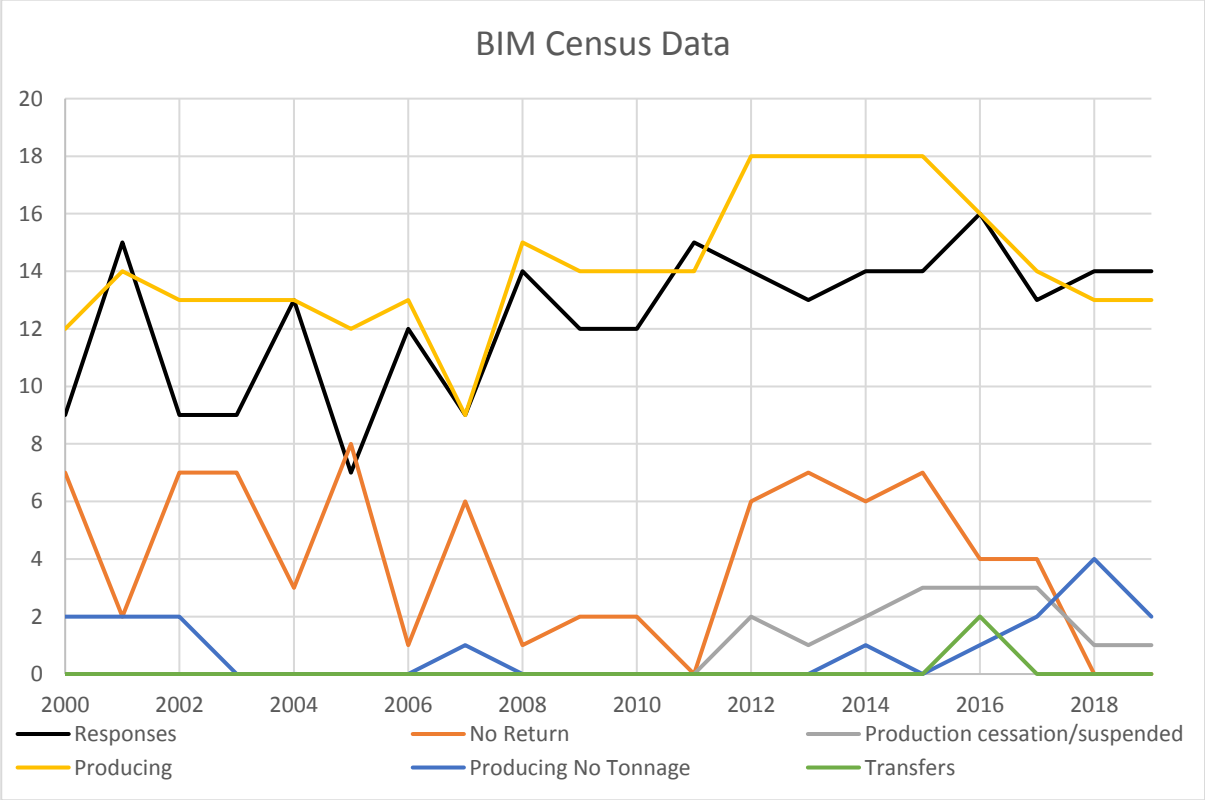

Figure 24. BIM Census data (2000-2019)

d) Conclusion of further information

The BIM data appears to show significantly lower tonnages of mussel than predicted from Killary Harbour. Even when the years where all licence holders responded to the census (2011 & 2018) no significant increases in tonnages were noted which would bring the yields in line with even the most conservative estimates. Also, what appears to be happening in recent years is an increase in production cessation/transfers and responses with no tonnages. However, the latter may be a lack in declaration of tonnage figures. Since 2016, the annual production figures from Killary Harbour have not been greater than 800 tonnes, which tends to indicate that current production levels are low, less than 33% of the most conservative production estimate. At no stage between 2000 and 2019 did the data indicate that tonnages within Killary Harbour were even close to be in line with the most conservative estimates and given the number of licence holders within Killary this would tend to indicate that the capacity within the Harbour is limited to even below the most conservative estimates.

It should be noted that no additional objections were noted on the Ministerial File in relation to the proposed licences. The official status of all sites listed above is that they are "under appeal". No data provided by BIM indicates transfers of these sites in recent years. In relation to data provided as a result of the Section 47 request to BIM (Appendix I and Appendix II) the data is pooled based on the owner and it is not possible to identify the production of each individual site.

5.5 Man-made Heritage

The proposed aquaculture sites that are subject to the appeals being considered as part of this Technical Advisor Report are located in the waters of Killary Harbour and as a result do not impinge or interfere with any man-made heritage sites or protected structures (Fig. 23).

Nonetheless, a study of the National Monuments Service database was undertaken and recorded built heritage sites in close proximity to the proposed aquaculture site have been identified. Sites that are contained within a 2km buffer from the aquaculture site have been recorded and details of them are set out below, with information retrieved from the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs' 'Historic Environment Viewer'[17].

- MA115-001 is a settlement cluster in the townland of Derry on the northern fringe of Killary Harbour.
- MA115-002 is a settlement cluster in the townland of Derreennawinshin on the northern fringe of Killary Harbour.
- MA115-004 is a settlement cluster in the townland of Derreennanalbangh on the northern fringe of Killary Harbour.
- MA115-006 / 006001 is a Burial ground and Hut site in the townland of Lettereeragh on the northern fringe of Killary Harbour.
- GA011-008 is a Wayside Cairn in the townland of Rosroe. Close to the summit of Salrock Pass, on the side of the narrow trackway which crosses the mountain from Killary Harbour to Killary Bay Little.
- GA011-010 is a Ritual site – holy well located in the townland of Foher. On South side of track leading East from Salrock Pass.
- Reg. No. 30401102 Single-arch limestone block road bridge, built c.1820, over Owenwee River.
- Reg. No. 30401103 Single-arch limestone road bridge, built c.1820, spanning Bunowen River.

[17] https://webgis.archaeology.ie/historicenvironment/

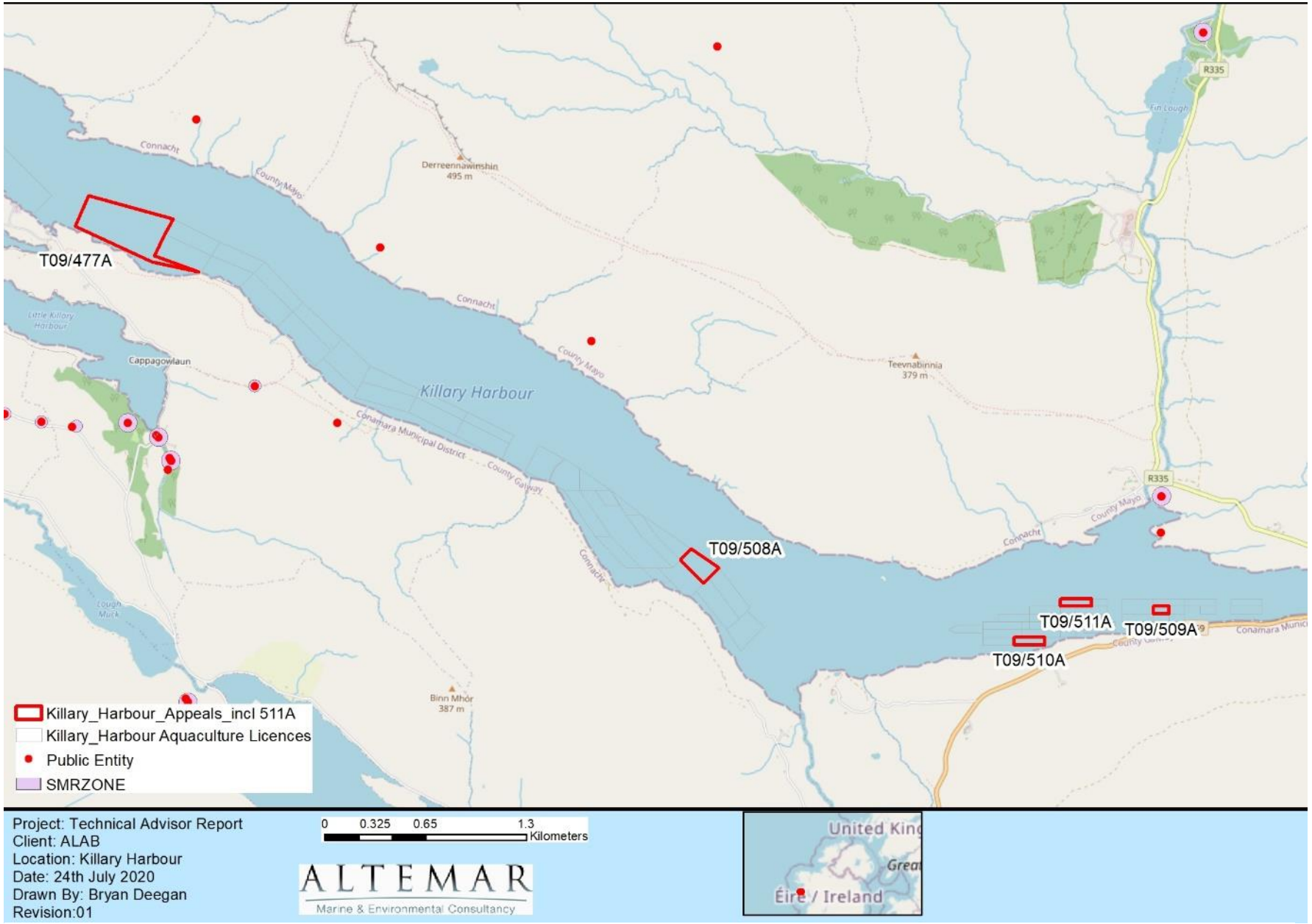

Figure 23. National Monuments and shipwrecks (Informar)

6.0 Section 61 Assessment

This act states that "The licensing authority, in considering an application for an aquaculture licence or an appeal against a decision on an application for a licence or 11 revocation or amendment of a licence, shall take account, as may be appropriate in the circumstances of the particular case, of-

(a) the suitability of the place or waters at or in which the aquaculture is or is proposed to be carried on for the activity in question,

(b) other beneficial uses, existing or potential, of the place or waters concerned,

(c) *the particular statutory status, if any, (including the pro-visions of any development plan, within the meaning of the Local Government (Planning and Development) Act, 1963 as amended) of the place or waters,*

(d) *the likely effects of the proposed aquaculture, revocation or amendment on the economy of the area in which the aquaculture is or is proposed to be carried on,*

(e) *the likely ecological effects of the aquaculture or proposed aquaculture on wild fisheries, natural habitats and flora and fauna, and*

(f) *the effect or likely effect on the environment generally in the vicinity of the place or water on or in which that aqua-culture is or is proposed to be carried on-*

(i) *on the foreshore, or*

(ii) *at any other place, if there is or would be no discharge of trade or sewage effluent within the meaning of, and requiring a licence under section 4 of the Local Government (Water Pollution) Act, 1977, and*

(g) *the effect or likely effect on the man-made environment of heritage value in the vicinity of the place or waters."*

6.1 Site Suitability

Based on the contents of, the Ministerial File and data from the NPWS it is likely that the proposed licences areas (AP5/2019 – T09/508, AP6/2019 – T09/509, AP7/2019 – T09/510, AP8/2019 – T09/511 and AP9/2019 – T09/477) (as refused by the Minister) will not significantly impact on NATURA 2000 sites, man made heritage, , statutory status or the economy.

6.2 Other Uses

Tourism/Recreation/Leisure

The aquaculture sites are not located an area of high Tourism/Recreation/Leisure activity. The area is a long established area for mussel farming. The proposed aquaculture activity, would not be expected to significantly impact on the scenic landscape.

Fishing/ Harvesting/Aquaculture

The proposed aquaculture sites are within a designated shellfish waters with limited inshore fishing and harvesting. Angling is present throughout the Bay. The aquaculture sites would not impact significantly on fishery users.

As outlined in the Uisce Report "*At this stage it is very hard to identify one specific reason for the slow growth problem and come up with an easy solution on how to fix it but it is clear that there is over stocking*." "The physical mass of mussels on drop ropes and the number of drop ropes does affect the flow through the water". "Reduction of floatation is needed as there is currently nearly

twice the necessary number of floats present to support the biomass. This is leading la increased shake off of mussels in rough weather. As a maximum the total floatation should be limited to 18,000 Litres per hectare."

However, the development of the proposed licence areas could have a significant effect on other users (i.e. other aquaculture sites) and on the economy locally. This conclusion is primarily based on the conclusions of the UISCE Report growth where it states that "*At this stage it is very hard to identify one specific reason for the slow growth problem and come up with an easy solution on how to fix it but it is clear that there is overstocking*."

In addition the Uisce report states that a"*Reduction of drop rope density (increased space between drop ropes) will improve water flow on the individual site and neighbouring sites which in turn will help improve growth rates. There should be no problem in reducing the number of drop ropes to 800 per Hectare as this will not significantly decrease production in the bay.*

Reduction of floatation is needed as there is currently nearly twice the necessary number of floats present to support the biomass. This is leading to increased shake of mussels in rough weather. As a maximum the total floatation should be limited to 18,000 Litres per Hectare."

Importantly the Uisce Report States that "***Sites that are currently unused should not be renewed (e.g. T9_398A) and no new applications for these sites should be considered***."

Assessment of the Census production figures from BIM 2000 to 2019 indicate that the mussel production is far below the most conservative estimates in modelling and the 2016-2019 figures indicate that production is less than 33% of even the most conservative production figures with several licence holders ceasing production. These data tend to support the limited carrying capacity of the Harbour is having an impact on production figures and that further licencing of sites within the Harbour could only exacerbate the situation.

6.3 Statutory Status

The Galway County Development Plan 2015-2021 classify Killary Harbour and its southern banks as a Landscape Character Area which have primarily been designated as 'Class 5 – Unique', with some locations also designated 'Class 4 – Special'. Such classifications mean that when determining whether developments can occur in the area, the Council must be cognisant of the landscape sensitivity ratings, with the development design and choice of location critical considerations.

The Mayo County Development Plan 2014-2020 classifies the areas bordering the north of Killary Harbour as a Landscape 'Policy Area 3 – Uplands, Moors, Heath or Bog'. Industrial and commercial developments in these areas are deemed to possess ''*medium potential to create adverse impacts on the existing landscape character. Such developments are likely to be clearly discernible and distinctive, however with careful siting and good design, the significance and extent of impacts can be minimised to an acceptable level*''.

Both the Galway and Mayo County Development Plans have objectives that support the development of the aquaculture sector in their respective counties, provided development adheres to environmental regulations and sustainable practices. Furthermore, as aquaculture activities have been undertaken in Killary Harbour for several decades, the inclusion of additional sites would not significantly impact landscape sensitivities.

6.4 Economic Effects

The scale of the proposed aquaculture site is moderate and would only be expected to benefit the applicants and their employees. The proposed site is likely to have a non-significant positive effect for the farmers in question. However, it would be expected that based on the findings of the Uisce Report and production data from the Harbour, that the granting of these licences would have a negative impact on other users of the Harbour.

6.5 Ecological Effects

The proposed aquaculture site will not have a significant impact on the designated sites or significant ecological effects. However, the carrying capacity of the bay for shellfish and other organisms dependent on phytoplankton could potentially be impacted.

6.6 General Environmental Effects

Having assessed the potential environmental impacts outlined above, the proposed sites will not have a significant impact on the environment in general.

6.7 Effects on Man-Made Heritage

See section 5.5 for additional details. No National Monuments are in the vicinity of the proposed aquaculture development. The proposed aquaculture site will not significantly impact on man-made heritage of the area

6.8 Section 61 Assessment Conclusions

It is concluded that the licences refused by the Minister, are not likely to significantly impact on the environment, navigation or man-made heritage and visual landscape.

The proposed licences pose no significant impact on:

1) the particular statutory status of the place or waters,

2) the environment generally in the vicinity of the place or water on or in

3) the foreshore,

4) on the man-made environment or heritage value in the vicinity

5) visual landscape.

However, based on the assessment outlined in the Uisce Report and the poor production data (2000-2019) provided by BIM indicating that in recent years production is less than 33% of the most conservative estimates, there is potential for impact on other users of the area (Shellfish Aquaculture) and the economy of the area due to the potential impact on the carrying capacity of the bay.

6.9 Confirmation re: Section 50 Notices

There are no matters which arise in the section 61 assessment which the Board should take into account which have not been raised in the appeal documents. It is not necessary to give notice in writing to any parties in accordance with section 50 (2) of the 1997 Act.

7.0 Screening for Environmental Impact Assessment

As outlined in S.I. No. 240/2018 - Aquaculture (Licence Application) (Amendment) Regulations 2018 in relation to "*Requirement for certain applications to be accompanied by an Environmental Impact Assessment Report*"

"5. (1) Subject to paragraph (3), an application under section 10 of the Act for an aquaculture licence in respect of—

(a) a marine based intensive fish farm (other than for trial or research purposes where the output would not exceed 50 tonnes);

(b) all fish breeding installations consisting of cage rearing in lakes;

(c) all fish breeding installations upstream of drinking water intakes;

(d) other fresh-water fish breeding installations which would exceed 1 million smolts and with less than 1 cubic metre per second per 1 million smolts low flow diluting water;

(e) where the Minister, as part of his or her consideration of an application for intensive fish farming, makes a determination under Regulation 4A that such action is necessary

shall require an environmental impact assessment and be accompanied by an Environmental Impact Assessment Report.

(2) In the case of an application other than one referred to in paragraph (1), the Minister may require the applicant to submit an environmental impact statement if the Minister considers that the proposed aquaculture is likely to have significant effects on the environment.

(3) An environmental impact assessment shall not be required in respect of an application which is solely for movement of navigation buoys, internal reconfiguration of the site, upgrading equipment used on the site, technology changes or improvements, or to comply with public safety requirements or a combination of these, and is unlikely to have significant effects on the environment. In such a case the Minister shall consider if another form of assessment would be appropriate and take such steps as are considered appropriate to bring the information obtained under the other form of assessment to the attention of the public.

(4) For the purpose of this regulation "marine based" means an installation that is located below the line of the high water of ordinary or medium tides."

As a result of the above legislation the proposed shellfish aquaculture sites would not require an Environmental Impact Assessment Report.

8.0 Screening for Appropriate Assessment

An appropriate Assessment Screening for Aquaculture activities in Killary Harbour, Co. Galway was carried out. In relation to the shellfish production sites it concluded that "The shellfish culture activities will not result in habitat loss, there will not be significant disturbance to key species and there will be no habitat or species fragmentation. There will be no direct discharge of pollutants into the environment and water quality will not be affected. Consequently, it is concluded that the culture of shellfish, as it is currently constituted and proposed, in Killary Harbour does not pose significant risk to the conservation features of the adjacent Natura 2000 sites and as such does not require a full appropriate assessment.

On the basis of the above it is considered that there will be no significant effects on the qualifying feature / interests' of the adjacent Natura 2000 sites."

9.0 Evaluation of the Substantive Issues in Respect of Appeal and Submissions/Observations Received

The grounds for appeal for each Appellant are summarised below.

Appellant 1	Patrick Lydon	AP 5/2019

Issues

1. Application is a renewal of existing site

It is argued that application T09/508A is a ''renewal'' of a previously operational site (T09/318A) and not a new application. As this previous site was factored in to the UISCE Carrying Capacity Study, the proposed site (T09/508A) will not lead to any ''additional'' negative impacts on the carrying capacity of Killary Harbour. It is the Appellant/Applicant's opinion that this was not considered by the Minister in the decision to refuse permission.

Technical Advisor Response: The carrying capacity of Killary Harbour was outlined in the UISCE Report. As recommended in the UISCE Report "*At present the worst affected area are the sites in Middle Killary" "Sites that are currently unused should not be renewed (e.g. T9_398A) and no new applications for these sites should be considered*." However, it is recommended as outlined in the Uisce Report that "*the movement of some sites from the South side of the bay to the North side without increasing production capacity would potentially improve growth rates etc. Obviously there are legal considerations here that were beyond the scope of the UISCE project. Bearing this in mind, a reconfiguration of sites within Killary should have the effect of allowing better ' buffering' between sites and a consequent increased possibility of food and flow ' recovery' and ultimately better mussel growth. The result of this should be faster and more even growth across aquaculture growing zones*."

"A monitoring programme in respect of growth rates and production should be established to measure the outcomes of any changes made."

The licencing of additional aquaculture licences or, the renewal of current licences, can only have a negative effect of impacting on the Carrying Capacity of the Killary Harbour. The Harbour is suffering from growth rate and production issues and it is clear that a more sustainable farming approach is implemented within the Harbour by all parties. Until this is implemented or until the a sustainable equilibrium is reached in relation to carrying capacity, the licencing of additional aquaculture licences or, the renewal of current licences would not be advised due to the potential impacts on carrying capacity. As there will be a long term reduction in aquaculture development within the Harbour as a result of this policy, it is recommended that the production figures/yields across the Harbour are carefully monitored.

2. Conditions deemed acceptable for previous applications still exist

The former site (T09/318A) was subject to a comprehensive survey and assessment, including its longlines and deemed suitable. Proposed site T09/508A will, effectively, replace the former site and therefore, should be subject to the same decision-making which enabled the former site to operate.

Technical Advisor Response: As outlined in 1 above.

3. Equipment improvements/alterations

The Applicant/Appellant has made significant alterations to his operational practices on sites in Killary, including reduced flotation, reduction in number of droppers and moving of anchors, which ensure that current operations adhere to the conditions of the most recent licences and have reduced mussel stocking density in Killary. Therefore, the concerns that existed in relation to the carrying capacity of Killary are no longer valid and this should be factored into a decision on the granting of the proposed application.

Technical Advisor Response: As outlined in 1 above.

4. Ownership arrangements

The Appellant/Applicant has stated that he has a ''verbal agreement'' with former licence holder (T09/318A) to continue operations on this site.

Technical Advisor Response: It is not possible for the Technical Advisor to assess this issue.

5. Prolonged licensing process

It is argued that due to uncertainties with the renewal and licencing process, the Applicant/ Appellant withheld submission of their own application for several years, in order to await a resolution. This has now proved detrimental to their ambitions as the conditions and requirements of new applicants has changed substantially, in their opinion, and this has resulted in the refusal of their application.

Technical Advisor Response: It is not possible for the Technical Advisor to assess this issue.

6. Historical Links and Employment

The Applicant/Appellant has a longstanding association with farming in the harbour and has engaged in such practices there for 14 years. This is part of their livelihood and is an employment generator in what is a remote, rural area.

Technical Advisor Response: It is not possible for the Technical Advisor to assess this issue.

Appellant 2	**Kevin & Michael Lydon**	**AP 6/2019**
Appellant 3	**Kevin & Michael Lydon**	**AP 7/2019**
Appellant 4	**Kevin & Michael Lydon**	**AP 8/2019**

Substantive Issues

1. Applications are renewal of existing sites

The Appellants argue that proposed site applications (T9/509, T9/510 & T9/511) are not ''additional production sites'' but instead renewals of existing sites (T09/190C, T09/330 & T09/318B). This fundamentally changes the context of the applications as they are not adding to the total number of active sites in the Harbour.

Technical Advisor Response: The carrying capacity of Killary Harbour was outlined in the UISCE Report. As recommended in the UISCE Report "*At present the worst affected area are the sites in Middle Killary" "Sites that are currently unused should not be renewed (e.g. T9_398A) and no new applications for these sites should be considered*." However, it is recommended as outlined in the Uisce Report that "*the movement of some sites from the South side of the bay to the North side without increasing production capacity would potentially improve growth rates etc. Obviously there are legal considerations here that were beyond the scope of the UISCE project. Bearing this in mind, a reconfiguration of sites within Killary should have the effect of allowing better ' buffering' between sites and a consequent increased possibility of food and flow ' recovery' and ultimately better mussel growth. The result of this should be faster and more even growth across aquaculture growing zones*."

"A monitoring programme in respect of growth rates and production should be established to measure the outcomes of any changes made."

The licencing of additional aquaculture licences or, the renewal of current licences, can only have a negative effect of impacting on the Carrying Capacity of the Killary Harbour. The Harbour is suffering from growth rate and production issues and it is clear that a more sustainable farming approach is implemented within the Harbour by all parties. Until this is implemented or until the a sustainable equilibrium is reached in relation to carrying capacity, the licencing of additional aquaculture licences or, the renewal of current licences would not be advised due to the potential impacts on carrying capacity. As there will be a long term reduction in aquaculture development within the Harbour as a result of this policy, it is recommended that the production figures/yields across the Harbour are carefully monitored.

2. Prior acceptable conditions for previous applications still exist

The Appellant argues that as the former sites (T09/190C, T09/330 & T09/318B) and their longlines were subject to a comprehensive survey and assessment and deemed suitable, the proposed applications should be subject to the same considerations. They claim that as the proposed applications (T9/509, T9/510 & T9/511) are replacing the former sites, there will be no additional impact on the carrying capacity of the harbour.

Technical Advisor Response: As outlined in 1 above.

3. Equipment improvements/alterations

The Appellant has made significant alterations to their rope mussel cultivation system, from ''*the traditional single drop rope system to a continuous longline cultivation system based on the New Zealand structure*''.

Technical Advisor Response: As outlined in 1 above.

4. Suitable environmental conditions

The Appellant claims that the UISCE Carrying Capacity report identifies Inner Killary Harbour as possessing the *''best growth rate''*. As the proposed sites will be located in this area they will not experience the same constraints to growth cited as a reason in the decision to refuse permission.

Technical Advisor Response: As outlined in 1 above.

5. Importance for Mussel seed collection

It is stated by the Appellant that *''Inner Killary is the primary collection area for mussel seed within Killary Harbour''*. Furthermore, the proposed sites are essential for the new growing system the Applicant/Appellant is implementing as *''continuous mussel collection rope requires more surface water area compared to the traditional mesh and dropper rope system as we can only collect mussel seed in the top 1 metre to 1.5 metre''.*

Technical Advisor Response: As outlined in 1 above.

6. Ownership agreements

The Appellant/Applicant has stated that they *''were in communication with previous licence holders''* and have a *''verbal agreement to continue to operate on the sites''*.

7. Prolonged licensing process

The Appellant cites a drawn-out licensing process and an understanding that DAFM would only consider new applications or licence renewals for the subject sites once *''all other Killary Licences were renewed''*. They claim that this uncertainty prevented them from applying for the licences at an earlier stage, when the likelihood of successful applications would have been greater.

Appellant 5	Kevin Lydon	AP 9/2019

Substantive Issues

1. Reduction of cumulative effects

The Appellant has proposed a *''reduction of current floatation condition of 18,000 litres per hectare to 9,000 per hectare''* on existing sites in Killary Harbour that they operate. Such a proposal would, it is claimed, reduce overall floatation levels from 279,000 litres to 139,500 litres. They also propose the same condition be attached to application site T9/477 resulting in a situation where floatation of 279,000 litres on 4 sites is reduced to 274,500 litres on 5 sites. If implemented, these changes would see a reduction in stocking levels and *''impact positively on current production yields as there will be an increase in spacing between longlines thereby increasing buffer zones between mussel farms''*.

Technical Advisor Response: The carrying capacity of Killary Harbour was outlined in the UISCE Report. As recommended in the UISCE Report "*At present the worst affected area are the sites in Middle Killary" "Sites that are currently unused should not be renewed (e.g. T9_398A) and no new applications for these sites should be considered*." However, it is recommended as outlined in the Uisce Report that "*the movement of some sites from the South side of the bay to the North side without increasing production capacity would potentially improve growth rates etc. Obviously there are legal considerations here that were beyond the scope of the UISCE project. Bearing this in mind, a reconfiguration of sites within Killary should have the effect of allowing better ' buffering' between sites and a consequent increased possibility of food and flow ' recovery' and ultimately better mussel growth. The result of this should be faster and more even growth across aquaculture growing zones*."

"A monitoring programme in respect of growth rates and production should be established to measure the outcomes of any changes made."

The licencing of additional aquaculture licences or, the renewal of current licences, can only have a negative effect of impacting on the Carrying Capacity of the Killary Harbour. The Harbour is suffering from growth rate and production issues and it is clear that a more sustainable farming approach is implemented within the Harbour by all parties. Until this is implemented or until the a sustainable equilibrium is reached in relation to carrying capacity, the licencing of additional aquaculture licences or, the renewal of current licences would not be advised due to the potential impacts on carrying capacity. As there will be a long term reduction in aquaculture development within the Harbour as a result of this policy, it is recommended that the production figures/yields across the Harbour are carefully monitored.

2. Operational changes

The Appellant cites changes to their methods of cultivation from ''*single dropper system using Pergolai plastic mesh to a system based on the New Zealand continuous longline system*'' as a more environmentally friendly method which should be factored into licence decision-making.

Technical Advisor Response: As outlined in 1 above.

3. Benefits to unproductive areas

The Appellant believes that adequate consideration was not given to their proposal contained in the original application for the removal of longlines from existing, unproductive sites to the proposed licence site. It is claimed that allowing this would result in the *''opening up of channels and creating buffer zones which would be highly beneficial''*. Furthermore, by moving the longlines from the existing sites, these unproductive areas will have an opportunity to replenish.

Technical Advisor Response: As outlined in 1 above.

4. Oversight in Ministerial decision-making

The Appellant argues that DAFM refused to consider the Appellant's offer to reduce floatation on *''existing sites to enable issuing of new licence''* before arriving at their decision to refuse licence.

Technical Advisor Response: As outlined in 1 above.

5. Impact of other licences

The Appellant claims that they have been forced to apply for a new licence in order to maintain their business. This is due to the decision of the Minister to issue licences to other operators *''on the outside – adjacent to our sites and other sites towards the north and the channel''*, which have ''*drastically reduced''* the yield from the Appellant's other existing sites. It is claimed that *''DAFM are producing contradictory evaluations in relation to the issuing of licences in Killary''*.

Technical Advisor Response: As outlined in 1 above.

10.0 Recommendations of Technical Advisor with Reasons and Considerations

The UISCE Report outlines many recommendations that should be implemented to alleviate the pressure on the carrying capacity of Killary Harbour. However, it is important to note that the carrying capacity is an issue right across the shellfish growing area, with those farms renewing their licences suffering most. It is clear that some licences are being refused on the grounds of carrying capacity while others are continuing to farm within the site. This is clearly not ideal economically and socially.

The BIM data also appears to show significantly lower tonnages of mussel than predicted from Killary Harbour. Since 2016, the annual production figures from Killary Harbour have not been greater than 800 tonnes, which tends to indicate that current production levels are low, less than 33% of the most conservative production estimate. At no stage between 2000 and 2019 did the data indicate that tonnages within Killary Harbour were even close to be in line with the most conservative estimates and given the number of licence holders within Killary this would tend to indicate that the capacity within the Harbour is limited to even below the most conservative estimates. However, as these figures depend on what appear to be questionnaire responses, it is unclear if all production data has been quantified. As a result, the overall production from the questionnaires could be an underestimation of the actual production figures within the Harbour.

A more holistic approach in line with a co-operative methods should be introduced based on updated hydrodynamic and phytoplankton modelling that takes into account optimal growing parameters across the site. This should dictate the spacings, densities that should be implemented across all farms, based on independent scientific assessment, which is regularly monitored. Ultimately, if recommendations are not implemented, it will end up in a situation where it will be even more difficult to renew licences in the long run and it will be difficult to sustain an industry in the area. An evidence-based model is essential to show the optimal growing regime within Killary Harbour. Monitoring will allow for local alterations to be made to optimise growth. However, of greater importance would be local support for the optimisation of the entire designated area, where each licence holder follows the guidance from an updated independent assessment. As outlined in the UISCE Report “Obviously there are legal considerations here that were beyond the scope of the UISCE project.” This is acknowledged and the carrying capacity issues in Killary Harbour will be difficult to resolve, in a fair and consistent manner.

11.0 Draft Determination

Having carried out an inspection of the proposed site and in accordance with Sections 59 & 61 of the Fisheries (Amendment) Act 1997, it is recommended to confirm the Ministers decision and refuse the licences for the sites below:

Appeal No.	Site Ref No.
AP5/2019	T9/508
AP6/2019	T9/509
AP7/2019	T9/510
AP8/2019	T9/511
AP9/2019	T9/477

Technical Advisor: Bryan Deegan

Date: 10/12/2021

References

Nunes, J.P. et al (2011). Towards an ecosystem approach to aquaculture: Assessment of sustainable shellfish cultivation at different scales of space, time and complexity. Aquaclture, Vol. 315, pp. 369-383, 2011.

Appendix I. Section 47 request to Bord Iascaigh Mhara

An Bord Achomharc Um Cheadúnais Dobharshaothraithe
Aquaculture Licences Appeals Board

Bord Iascaigh Mhara
Crofton Road
Dun Laoghaire
Co Dublin

For the attention of Mr Joe O'Toole CEO

10 November 2020

Our Refs: AP5/2019, AP6/2019, AP7/2019, AP8/2019 and AP9/2019
Site Refs: T9/508, T9/509, T9/510, T9/511, T9/477

Re: Appeals against the decisions of the Minister for Agriculture, Food and the Marine to refuse to grant Aquaculture and Foreshore Licences for the cultivation of mussels using longlines on the foreshore on Site refs T9/508, T9/509, T9/510, T9/511, T9/477 Killary Harbour Co Galway

Dear Mr O'Toole

I refer to Appeals received by Aquaculture Licences Appeals Board (**Board**) against the decisions of the Minister for Agriculture, Food and the Marine (**the Minister**) being Appeal References AP5/2019, AP6/2019, AP7/2019, AP8/2019 and AP9/2019 (**Appeals**) accessible via the following link:

http://alab.ie/boarddeterminations/2019/

Pursuant to Section 47(1)(a) of the Fisheries (Amendment) Act, 1997, as amended, ("the Act"), where the Board is of the opinion that any document, particulars or other information is or are necessary for the purposes of enabling the Board determine the Appeal, it may serve a notice on a party requiring that party to submit to the Board such documents, particulars or other information as are specified in the Notice.

Having considered the appeals and the information provided to it, the Board has determined that further documents are necessary for the purposes of enabling the Board determine the Appeals.

All of the Appeals are from decisions of the Minister to refuse to grant Aquaculture Licences for the cultivation of mussels using longlines on the foreshore in Killary Harbour.

As part of its consideration of the Appeals the Board is seeking the most up to date information available in relation to the carrying capacity of Killary Harbour for the cultivation of mussels on longlines, particularly in relation to the food resource available. To assist the Board in this regard the Board seeks following:

1) Details of the overall production volumes of mussels from Killary Harbour for the past 20 years;
2) Details of the tonnages of mussels harvested by from individual sites (and not just the sites under appeal) within Killary Harbour for the past 20 years;

Cúirt Choill Mhinsí, Bóthar Bhaile Átha Cliath, Port Laoise, Contae Laoise, R32 DTW5
Kilminchy Court, Dublin Road, Portlaoise, County Laois, R32 DTW5

Guthán/Telephone: 057 8631912 R-phost/Email: info@alab.ie Láithreán Gréasáin/Website: www.alab.ie

3) Any additional information on the food resource, carrying capacity and any modelling carried out by or on behalf of, or available to, BIM subsequent to the Uisce Report for Department of Agriculture, Fisheries and Food on Killary Harbour 2010.

In accordance with section 47 (1) (a) of the Act, the Board requires this information within **30 days** of receipt of this letter. Please note that if the documents, particulars or other information specified above are not received before the expiration of the period specified above, or such later period as may be agreed by the Board, the Board will, without further reference to you, determine the appeal.

Please also note that a person who refuses or fails to comply with a requirement under section 47 (1)(a) shall be guilty of an offence.

Yours sincerely

Mary O'Hara
Secretary to the Board

Appendix II- Bord Iascaigh Mhara response to Section 47 Request

Bord Iascaigh Mhara
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Aquaculture Licences Appeals Board
Kilminchy Court
Dublin Road
Portlaoise
Co Laois
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08/12/20

Re: Data request in relation to appeals against the decision of the Minister of Agriculture Food and the Marine to refuse to grant Aquaculture and Foreshore Licences for the cultivation of mussels using longlines on the foreshore on Site refs T9/508, T9/509, T9/510, T9/511, T9/477 Killary Harbour Co Galway

Dear Ms O Hara,

In response to your requests of the 10th Nov 2020, BIM has the following response.

1. **Details of the overall production volumes of mussels from Killary Harbour for the past 20 years**
   Page one of the attached document provides the annual tonnages for Killary Harbour collected by BIM as part of the annual Aquaculture Production and Employment Census.

2. **Details of the tonnages of mussels harvested from individual sites (Not limited to sites under appeal) within Killary Harbour for the past 20 years.**
   Pages 2-6 of the attached document provides a detailed report of annual returns for Killary Harbour collected by BIM as part of the annual Aquaculture Production and Employment Census.

3. **Any additional information on the food resource, carrying capacity and any modelling carried out by or on behalf of, or available to, BIM subsequent to the Uisce Report for the Department of Agriculture, Fisheries and Food on Killary Harbour 2010.**
   Following an examination of our records and internal consultation, BIM can locate no additional information on the food resource, carrying capacity and any modelling carried out by or on behalf of, or available to, BIM subsequent to the Uisce Report for the Department of Agriculture, Fisheries and Food on Killary Harbour 2010.

Yours sincerely

Jim O'Toole
Chief Executive