RISK ASSESSMENT FOR ANNEX IV SPECIES

Extensive Aquaculture

Mullet/Blacksod Bay Complex SAC

(Site Code: 00470)

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Introduction

This Annex IV Risk Assessment has been prepared by the Marine Institute to comply with the provisions of Article 12 and 13 of Council Directive 92/43/EC in relation to the protection afforded to Annex IV species from disturbance or harm. Specifically, this Risk Assessment appraises the current and proposed extensive aquaculture activities in the Mullet/Blacksod Bay Complex SAC (Site Code: 00470).

Legislative Context

The Habitats Directive has identified a number of animal and plant species across Europe, which are rare or are threatened with extinction and which need special measures to be taken to ensure their long-term survival. Under Article 12 and 13 of the Habitats Directive, Member States must establish systems of strict protection for animal and plant species which are listed on Annex IV of the Habitats Directive. Article 12 and 13 of the Habitats Directive are transposed into Irish law by Regulations 51 and 52 of the European Communities (Birds and Natural Habitats) Regulations 2011, as amended[1].

The aim of the strict protection measures (set out in Article 12 (for animals) and 13 (for plants) of the Directive) is that the species in question will reach and remain at favourable conservation status. This means that the population dynamics of the species concerned can maintain itself on a long-term basis as a viable component of its natural habitats. It also means that the natural range of the species is neither being reduced, nor is likely to be reduced for the foreseeable future, and that there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Annex IV species are afforded strict protection throughout their range, both inside and outside of designated protected areas. This protection is afforded to these species at all stages of their life cycle and wherever they occur. This protection includes from deliberate disturbance of these species, particularly during periods of breeding, rearing, hibernation and migration. It is an offence to deliberately capture or kill, keep, transport or sell, injure or disturb a specimen in the wild, or to damage or destroy a breeding site or resting place of an Annex IV animal species. For plants it is an offence to deliberately pick, collect, cut, uproot or destroy any specimen of these species in the wild, or keep, transport, or sell any specimen of these species taken in the wild.

S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011 (inc. Amendment SI 293 of 2021[2])
Protection of fauna referred to in the First Schedule **51.** (1) The Minister shall take the requisite measures to establish a system of strict protection for the fauna consisting of the species referred to in Part 1 of the First Schedule. (2) Notwithstanding any consent, statutory or otherwise, given to a person by a public authority or held by a person, except in accordance with a licence granted by the Minister under Regulation 54 or 54A, a person who in respect of the species referred to in Part 1 of the First Schedule—

[1] https://www.npws.ie/legislation
[2] https://www.npws.ie/legislation

a) deliberately captures or kills any specimen of these species in the wild,
b) deliberately disturbs these species particularly during the period of breeding, rearing, hibernation and migration,
c) deliberately takes or destroys eggs of those species from the wild,
d) damages or destroys a breeding site or resting place of such an animal, or
e) keeps, transports, sells, exchanges, offers for sale or offers for exchange any specimen of these species taken in the wild, other than those taken legally as referred to in Article 12(2) of the Habitats Directive,

shall be guilty of an offence.

(3) The prohibitions referred to in paragraph (2) shall apply to all stages of life of the biological cycle of fauna to which this Regulation applies.

(4) The Minister shall establish a system to monitor the incidental capture and killing of fauna consisting of the animal species referred to in Part 1 of the First Schedule and, having regard to the information gathered, he or she shall conduct further research or take such conservation measures as required to ensure that incidental capture and killing does not have a significant negative impact on the species concerned.

Protection of flora referred to in the First Schedule

52.

(1) The Minister shall take the requisite measures to establish a system of strict protection for the flora consisting of the plant species referred to in Part 1 of the First Schedule.

(2) Notwithstanding any consent, statutory or otherwise, given to a person by a public authority or held by a person, except in accordance with a licence granted by the Minister under Regulation 54 or 54A, a person who in respect of the plant species referred to in Part 1 of the First Schedule—

a) deliberately picks, collects, cuts, uproots or destroys any specimen of these species in the wild, or
b) keeps, transports, sells, exchanges, offers for sale or offers for exchange any specimen of these species taken in the wild, other than those taken legally as referred to in Article 13(1)(b) of the Habitats Directive

shall be guilty of an offence.

(3) The prohibitions referred to in paragraph (2) shall apply to all stages of the biological cycle of the flora to which this Regulation applies.

The list of Annex IV species which occur in Ireland and its waters[3] is set out in Table 1.

Table 1 Annex IV species which occur in Ireland (NPWS).

Animals	Plants
All bat species	Killarney Fern
Otter	Slender Naiad
Natterjack Toad	Marsh Saxifrage
Kerry Slug	
Dolphins, Whales and Porpoises	
Marine Turtles	

As an Annex IV species may be found throughout the country, the protection of these species is not restricted in geographical terms and is not necessarily associated with areas subject to specific designations. Any works or projects must ensure compliance with the requirements of the Regulations, which means avoiding impacts to Annex IV species. To do this a project must determine the probability of the protected species being present in the area affected by the works, using existing

[3] https://www.npws.ie/legislation

information, and applying the precautionary principle. If it is highly unlikely that an Annex IV species could be present or affected by the works, then the works will be compliant with Regs 51 and 52[4].

If information shows that the Annex IV species is present, or may be present, then an investigation to establish presence is required. The Precautionary Principle must be applied in relation to this matter at this stage. If the investigation finds the species to not be present then the project may proceed. If an Annex IV species is found to be present, or there is a breeding or resting place to which the animals are likely to return, then the likely impacts of the project needs to be examined to see if those impacts can be avoided through the design of the works[5].

Outline of the Aquaculture Activities

Currently within the Mullet/Blacksod Bay Complex SAC [000470] there are 11 sites at different stages within the licencing process:

- 3 sites Licensed in 2018:
  - 2 subtidal seaweed sites using longlines at sub-tidal sites (T10-296A and T10-320A)
  - 1 intertidal shellfish site for Pacific and native oysters, mussels and periwinkles (T10-237A)
- 3 sites in Renewal / Review (application) stage:
  - Native Oyster – extensive culture on seabed (T10-028A, T10-028B, T10-028C)
- 5 new Applications:
  - 1 x Pacific oysters – intertidal (T10-347A)
  - 1 x seaweed – longlines to replace existing licence T10/296A subtidally (T10-344A)
  - 1 x seaweed – longlines subtidally (T10-355A)
  - 2 x multispecies – primarily seaweeds, other shellfish species (mussels, oysters and scallops) on longlines (T10-351A and T10-352A)

Table of existing and proposed Licensed Aquaculture Activities (Data from AquaMIS database)

Site No.	Status	Activity/Species	Total Area (ha.)
T10-237	Licensed	Pacific and Native Oyster, Blue Mussel, Periwinkle	3.42
T10-296A	Licensed	Brown Seaweeds, Red Seaweeds	10.09
T10-320	Licensed	Brown Seaweeds	10.00
T10-028A	Application	Native Oyster - *Ostrea edulis*	205.59
T10-028B	Application	Native Oyster - *Ostrea edulis*	571.27 [6]
T10-028C	Application	Native Oyster - *Ostrea edulis*	172.89
T10-344A[7]	Application	Brown, red and green seaweeds	29.98

[4] Guidance on the Strict Protection of Certain Animal and Plant Species under the Habitats Directive in Ireland. 2021. National Parks and Wildlife Service Guidance Series 1. DHLGH Link

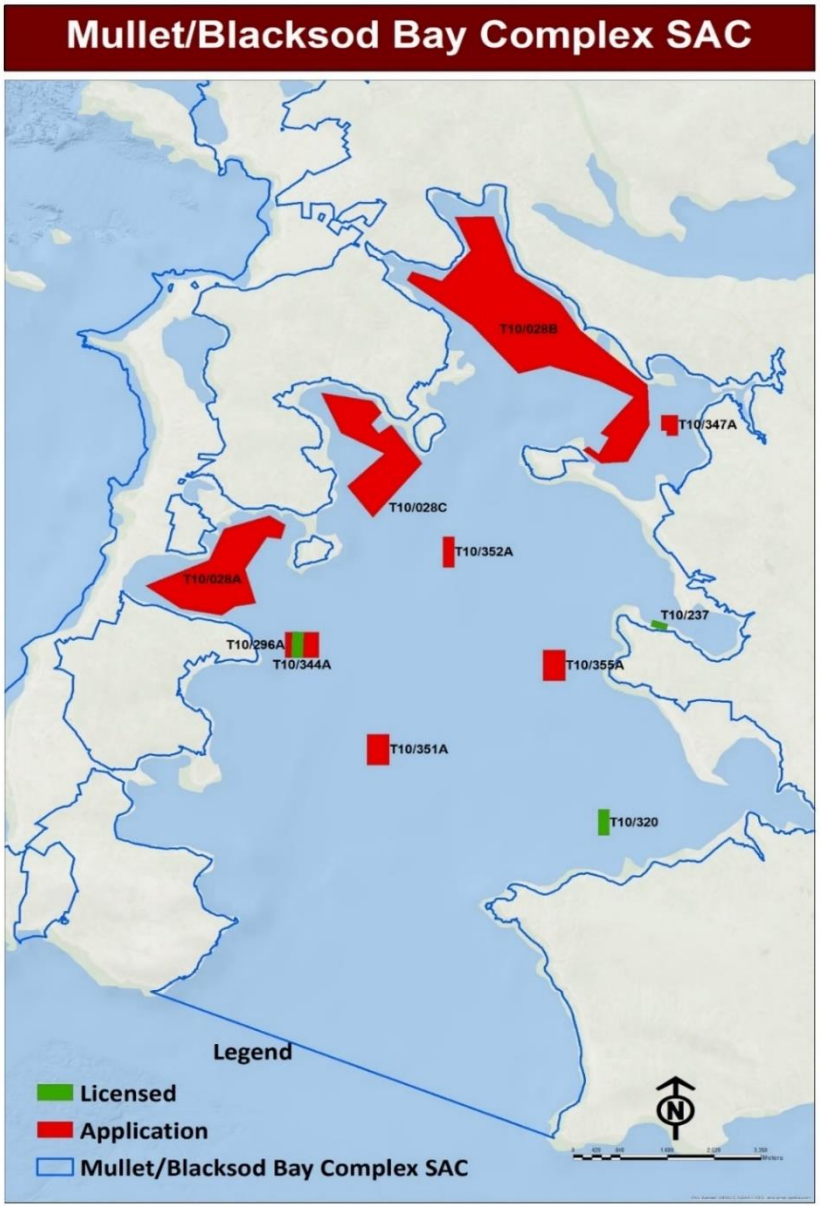
[5] Guidance on the Strict Protection of Certain Animal and Plant Species under the Habitats Directive in Ireland. 2021. National Parks and Wildlife Service Guidance Series 1. DHLGH Link

[6] The area of site applied for has been reduced to 564.56 ha following consultation - this assessment has continued to conservatively use the previous applied for 571.27 ha area.

[7] T10-344A if issued to replace T10/296A

T10-347A	Application	Pacific Oyster – *Magallana gigas*	10.99
T10-351A	Application	Native Oyster - *Ostrea edulis* Pacific Oyster – *Magallana gigas*, Blue Mussel – *Mytilus edulis*, King Scallop – *Pecten maximus*, Queen scallop – *Aequipecten opercularis*, Brown, Red and Green Seaweeds	23.99
T10-352A	Application	Native Oyster - *Ostrea edulis* Pacific Oyster – *Magallana gigas*, Blue Mussel – *Mytilus edulis*, King Scallop – *Pecten maximus*, Queen scallop – *Aequipecten opercularis*, Brown, Red and Green Seaweeds	11.99
T10-355A	Application	Brown, Red and Green Seaweeds	23.99

All Aquaculture Sites in Mullet/Blacksod Bay Complex SAC.



Native Oysters Cultivation

The North Mayo Oyster Development Co-operative manages the naturally occurring beds of native oysters of Inner Blacksod Bay. The original oyster beds were seeded and managed in the 19th century and lay unmanaged and dormant for much of the 20th Century until the late 1970s. The Co-op was formed in 1983 principally to manage the oyster fishery as it was in danger of being over exploited. Membership today is *circa* 148 members. The Co-operative was successful in being granted an aquaculture licence for native oysters for two areas in 1993.

The oyster fishery has always depended on the natural settlement for recruitment of young stock. In the 1980s mussel shell 'cultch' was purchased by the Co-op and spread over the oyster beds to assist with recruitment. In addition, bags of mussel shell were suspended from buoys – floats in areas of good oyster spatfall. Once settlement occurred the shell was then spread on the seabed. Other management tools used by the Co-op over the past 22 years include hand harvesting broodstock from very shallow parts of the bay and relaying them in deeper areas. Beds were closed for a number of years to allow stock recovery. The number of days are restricted to a short season normally in February and March (about 8 fishing days per season). Only registered fishing vessels and members of the Co-op are allowed to fish within the Co-ops licensed areas. Each vessel has to obtain a dredging licence from Inland Fisheries Ireland. The recent maximum number of dredge licences issued by the IFI was 18, although in the past few years it has been usually around 12 vessels that fish in the season, if fishing is permitted.

The fishing of the native oyster involves the use of a four-foot dredge, which is fished from the side or back of a boat, as seen in the images below from Blacksod Bay.

It should be noted the boundaries of the native oyster sites are redrawn on foot of the findings of a Natura assessment carried out in 2017. The current licence review areas (T10-28 A, B and C) take into account the findings of this previous assessment and avoid overlap with mapped sensitive habitat areas.

Pacific Oyster Cultivation

There is one new application for the culture of the Pacific oyster (*Magallana gigas*) at Trawmore Bay (T10-347A) and one existing licence at Doolough Point (T10-237A) which is a multi-species licence (for Pacific and native oysters, mussels and winkles).

In the 1990s and early 2000s there was Pacific oyster production in this area for a number of years. These sites lapsed in the 2000s and there are currently some abandoned trestles on one of the old

sites. There is one new application in Trawmore Bay (Blacksod Bay) (T10- 347A) for the cultivation of Pacific oysters in the generally same area as where Pacific oysters were successfully grown in the past. At present there is no Pacific oyster production in the Bay.

Pacific oysters are grown intensively using the traditional bag and trestle method within the intertidal zone. Trestles can be either 5-bag, 6-bag or 7-bag trestles. They are made of steel and measure between 3 and 5 metres in length, are approximately 1 metre in width and stand between 0.5 and 0.7 metres in height. Oyster bags are made of plastic (HDPE) mesh, and vary in mesh size (4 mm, 5 mm, 6 mm, 9 mm and 14 mm) depending on oyster stock grade and size. The bags can be fastened to the trestles with rubber straps and hooks. Trestles can be laid out in rows of four or two as shown in below photograph.

The Pacific oyster is a bivalve mollusc that filter feed plankton and seston from the sea when submerged during high tide periods. The proposed new oyster farm will be positioned between mean Low Water Spring and mean Low Water Neap, allowing on average between 2 and 5 hours exposure depending on location, tidal and weather conditions. Maintenance activities on-site include shaking and turning of bags, and hand removal of fouling and seaweed to ensure maintenance of water flow through the bags when submerged.

The production cycle begins when G4 to G8 (6 – 10 mm) oyster seed is introduced from hatcheries. On rare occasions seed can be brought in at a smaller size of less than 4 mm and are put into 2 and 3 mm plastic mesh pouches within 4mm oyster bags where they remain for few months until they reach 6 mm and are ready to be transferred to the 4 mm oyster bag.

All seed and larger oysters brought into the Bay will be sourced from hatcheries - French, UK or Irish. In the 1990s and early 2000s when there was cultivation in the Bay, seed was diploid which was sourced from hatcheries.

While there is no production in Pacific oysters at present, seed is generally imported between January and June, and between August and November. Sourcing of seed is often dependent on availability. In general, it takes between 2 and 4 years to reach market size 65 gram plus, depending on site location, water quality, and other conditions.

Stocking densities and stock management (thinning, splitting and grading stock) varies with each oyster producer. In general grading and exporting of ½ grown oysters takes place from September to April, and harvesting of stock for mature oysters for market takes place from October to May, but can happen all year round as market dictates sales. Initial stocking densities when deployed into 4mm bags can vary from 800 up to 5000 oyster seed per bag. By the time they reach market size in year 3, the stocking density is reduced to between 100 and 150 per bag. Thinning, grading and harvesting activities entails removing oyster bags from the trestles by hand and transporting them on tractor and trailers from the intertidal zone to the grower's land based facilities.

In general, oyster farms sites are accessed by tractor and trailer using one route from farmer's land base facilities ashore. For farms that have high production of over 100 tonnes, more than one tractor and trailer will be in use. On days when tractors and trailers are not required, producers can access sites by foot. It is envisaged that the oyster sites in Blacksod Bay will be accessed up to between 8 and 16 days each month depending on time of year and work required on farms.

At the Doolough site (T10-237) the species licenced are oysters – native and pacific, mussels and winkles**.** There has been no recent production of oysters on this site. The site has been mainly used to grow mussels (trays and bags) and winkles – (holding and fattening containers).

The mussel seed will be naturally locally sourced seed settlement either on site or from mussel farms in Mayo. The ½-grown mussels will be grown in oyster bags on trestles. The winkles will be sourced from local area as small grade and will be on-grown on site in containers and trays before exported to France and Holland.

Seaweed – Longline Cultivation

There are currently two seaweed aquaculture licenced sites for the cultivation of various species of seaweed using semi-submerged longlines at two sites in Blacksod Bay (T10–296A, T10-320A). One of these producers has applied for a new licence in order to expand an existing site (T10-296A) in the same area of Blacksod Bay. There are an additional 3 new applications for seaweed longline cultivation (T10-351A, 352A, 355A), 2 of which (T10-351A and T10-352A) have also applied to include other shellfish species (mussels, pacific and native oysters, and scallops) using longlines and hanging cultivation systems.

Seaweed string from Irish hatchery being deployed onto longline head-rope

Cultivation technique involves fragments of adult plants, juvenile plants, sporelings or spores being seeded onto either rope or other substrata in hatcheries or nurseries, and the plants are on-grown to maturity at sea. Trials on various native species have taken place in Ireland since the 1990s.

The native seaweeds currently grown in Blacksod Bay are browns, kelps and to a lesser extent red seaweeds – *porphyra* and *palmaria*. All are sourced from an Irish hatchery on seeded rope-twine as shown in above photo. This seeded rope-twine is deployed onto the semi-submerged single longlines during months October to February each year. The seaweeds are fast growing and are harvested within a few months usually during months April to May. Both sites have been in production since 2019 and are serviced by boat from Blacksod Pier.

Seaweed single longline with grey and black buoys in Blacksod Bay.

The single seaweed longlines are suspended at ~1 metre depth using grey and black floats. Currently it takes six days over the months October – November to deploy the seeded string onto the 25 longlines on the existing 2 licensed sites which vary 150 to 220 metres in length. The sites are visited and checked once or twice per month until the following spring when harvesting begins. At the moment it takes a maximum of six days to harvest the seaweed crop over the months April to May, and possibly to the end of June with sugar kelp. It is envisaged that the number of days for harvesting will decrease to three days in the coming year when a new specialised barge will be brought in by one of the producers. Once seaweed is brought ashore it is sent to a specialised drying facility where seaweed is dried and processed for various markets.

Shellfish – Longline Cultivation

Two of the seaweed licence applications includes applications for the cultivation of rope mussels, scallops and oysters using longline rope system for mussels and hanging baskets and lantern for oysters and scallops (T10-351A and T10-352A). All seed will be locally settled seed in the case of mussels and native oysters. Pacific oyster seed will be sourced from hatcheries (French, Irish and UK) and scallops seed from local settlement or from other parts of Ireland e.g. Mulroy Bay or from hatcheries if available. The production of these species will be on a trial basis initially in the first few years and if successful it is intended to cultivate these on a quarter of each site area. It is envisaged that the sites will be visited when seed is deployed/collected on sites, and then when there is a need to grade and thin cultivation systems during growing cycle, and then when harvesting. Most of the work will be carried out in the summer to autumn months. Both sites will be accessed from Blacksod pier.

Relevant Annex IV Species

The Habitats Directive has identified a number of plant and animal species across Europe, which are rare or are threatened with extinction and which need special measures to be taken to ensure their long-term survival. All species listed under Annex IV with the potential to be impacted by the existing and proposed aquaculture activities should be included, even if they have been separately assessed in the AA process.

Of the animal and plant species on Annex IV known to occur in Ireland, the following species were identified as relevant to the existing and proposed aquaculture sites:

Dolphins, Whales and Porpoises

This is the list of marine mammals (dolphins, whales and porpoises) recorded within the Mullet/Blacksod Bay Complex SAC (proximate to the aquaculture activities)[8].

There are a number dolphin, whale and porpoise species recorded:

- Atlantic White-sided Dolphin (*Lagenorhynchus acutus*)
- Bottle-nosed Dolphin (*Tursiops truncatus*)
- Common Dolphin (*Delphinus delphis*)
- Risso's Dolphin (*Grampus griseus*)
- Striped Dolphin (*Stenella coeruleoalba*)
- White-beaked Dolphin (*Lagenorhynchus albirostris*)
- Common Porpoise (*Phocoena phocoena*)
- Cuvier's Beaked Whale (*Ziphius cavirostris*)
- Fin Whale (*Balaenoptera physalus*)
- Humpback Whale (*Megaptera novaeangliae*)
- Killer Whale (*Orcinus orca*)
- Long-finned Pilot Whale (*Globicephala melas*)
- Minke Whale (*Balaenoptera acutorostrata*)
- Northern Bottlenose Whale (*Hyperoodon ampullatus*)
- Northern Right Whale (*Eubalaena glacialis*)
- Sperm Whale (*Physeter macrocephalus*)

It is likely that there could be Annex IV species from dolphins, whales and porpoises present in the area of the project, so they are considered in more detail in this risk assessment.

Otter

Ireland remains a European stronghold for the otter and the species is widespread here in our rivers and streams and along our coastline and lakeshores. Otters have two basic habitat requirements: adequate prey; and safe refuges where they can rest and breed. Otters maintain territories along river banks, lake shores and coasts. Coastal territories require a freshwater source for the otter to wash, so will always include a stream or spring. In productive areas, such as coastlines, territories are in the range of 5-6 km. On the coast, otters forage within 80-100m of the coastline, typically in depths of

[8] National Biodiversity Data Centre Link

<3m, but up to 10-12m. For foraging they prefer shallow, rocky environments with seaweed cover. Otters maintains numerous resting places, known as couches (above-ground, hidden in foliage) and holts (underground, among roots, rocks, or tunnels) within its territory. They breed all year, nesting in a well-hidden natal holt.

Otter are a Qualifying Interest in this SAC and have been reported within the SAC[9] so are considered in more detail in this risk assessment.

All bat species

These are marine sites at a distance from bat habitats. These aquaculture activities do not impact on trees, hedges, buildings, bridges, caves, souterrains or changes in lighting, so bats are not likely to be present or affected by the works. As bats are not likely to be present, the lack of spatial overlap or likely interactions between the Annex IV species and the aquaculture activities means there is no significant risk to the number of individuals to breed successfully, nor to the survival of the population, and the species natural range is secure and will not be reduced.

Natterjack Toad

The natural ranges for the Natterjack Toad are freshwater and terrestrial. Populations are restricted to sites in County Kerry. Natterjacks are nocturnal and during the day they hide under logs and stones. Over winter, natterjacks hibernate in burrows that they dig themselves in sandy soils, or in piles of rocks or dry-stone walls. The toad breeds in shallow ponds and forages in the areas around those ponds at these locations. These extensive aquaculture sites are not a suitable habitat for Natterjack toads. Any overlap between these marine sites and this species is highly unlikely, so there is no risk to the number of individuals to breed successfully, nor to the survival of the population, and the species natural range is secure and will not be reduced.

The Kerry Slug

The Kerry Slug are terrestrial and nocturnal (generally), with their natural ranges restricted to sites in County Kerry and west Cork (and more recently found in Galway, Limerick and Tipperary). Its habitats are woodland, and lichen covered rock outcrops and boulders. These aquaculture sites are not a suitable habitat for the Kerry slug. Any overlap between these marine sites and this species is highly unlikely, so there is no risk to the number of individuals to breed successfully, nor to the survival of the population, and the species natural range is secure and will not be reduced.

Plants

The natural ranges for the Annex IV plants species (Killarney Fern, Slender Naiad, and Marsh Saxifrage) are terrestrial and they are highly unlikely to be impacted by these aquaculture activities, so there is no risk to these Annex IV species.

Marine Turtles

Loggerhead Turtle (*Caretta caretta*) have been recorded in the vicinity of the SAC in 1935, 1938, and 2023. A Leatherback Sea Turtle (*Dermochelys coriacea*) was sighted in 1994. Various turtle species are occasional visitors to Irish waters. Considering the rarity in Irish waters of these widely roaming marine species, that may utilise entire oceans, and the intertidal or near-shore location of these aquaculture

[9] National Biodiversity Data Centre Link

activities, it is highly unlikely that there will be any significant interactions with these Annex IV species, and there is no risk to the number of individuals to breed successfully, nor to the survival of the population, and the species natural range is secure and will not be reduced.

Conclusion

The relevant Annex IV species which are likely to be present in the area or potentially affected by these projects, and considered for further investigation, are:

- Dolphins, Whales and Porpoises.
- Otter.

Risk Assessment

Dolphins, Whales and Porpoises

It is likely that there could be dolphins, whales and porpoises that intersect with the Mullet/Blacksod Bay Complex SAC (data from the National Biodiversity Data Centre Ireland) and therefore, in some way, with the aquaculture sites.

These are large mammals, that utilise a wide range of marine habitat environments. Whales tend to be migratory, following food, and are found in open ocean. Dolphins are found from shallow coastal waters to the deeper open ocean. They feed on a variety of fish and invertebrates, such as squid. Porpoises are also found from shallow coastal waters to the deeper open ocean, and are generally shy and elusive and prefer to avoid contact with boats and humans.

Summary of Potential Impacts and Risk Assessment

The main impacts associated with the proposed project on dolphins, whales and porpoises are related to:

- Noise disturbance - the increase in marine vessels resulting from the proposed project is considered minimal and would not be a significant increase, when compared to the existing movements in the area from fishing boats and recreational vessels. Noise associated with marine vessels is considered low. Noise from the site during operation is considered to be not significant as the sound pressure would be minimal, low and would rapidly attenuate.
- Collisions or entanglement - the small number of vessels that will be required will not significantly increase vessel traffic in the area. These vessels will be travelling at slow speeds, in a predefined trajectory, allowing for animals to avoid vessels.
  Given the sheltered and shallow locations for the inter-tidal activities, it is not an optimal habitat for dolphins, whales and porpoises in general, and it is highly unlikely they will interact with these inter-tidal structures and activities.
  There is greater potential for interaction within the existing and proposed suspended culture aquaculture sites and activities. This interaction is likely if they forage inshore, close to the structures. Given the relatively small footprint of the suspended aquaculture locations the likelihood of interactions is very small. In addition, the locations of the structures are inshore, and as such they do not present a significant barrier to movement of this species in the area. Furthermore, the structures are such that echo-locating species can easily detect and avoid,

if necessary, the structures/sites and therefore, avoid any risk of collision or entanglement[10,11,12].

- Obstruction and displacement – the potential for the infrastructure to cause obstruction to dolphins, whales and porpoises is considered low. These mobile species can avoid and go around any obstructions without any significant disturbance. The size of the project is relatively limited and not significant when considered against the overall area and is not likely to cause loss of habitat to these wide-ranging species.
- Attraction – some dolphins, whales or porpoises may be attracted to structures similar to those used in culture operations[13] as the infrastructure can act as artificial reefs and encourage fish aggregation[14]. This would be limited to the direct vicinity of the site and would be considered very small scale. The small footprint of the suspended aquaculture locations and the temporary nature (8 month growing cycle) would mean that these would not be significant attractions. There are no significant energy sources (e.g., light, noise etc.) likely to result from activities at the sites that pose a risk.
- Water quality – studies report water quality improvements in association with seaweed farming[15] and veterinary products are not required, so water quality will not be impacted in any way that would effect dolphins, whales and porpoises.
- Commissioning and decommissioning – The infrastructure involved is relatively small and easily installed and removed, so commissioning and decommissioning will not be tasks that are likely to have significant impacts on dolphins, whales or porpoises.

The potential for impact from the listed hazards is generally unlikely or of low intensity. While there may be some changes present in the environment, they are not likely to be significant. While there may be isolated sightings in the vicinity, the lack of spatial overlap or likely interactions between the Annex IV species and the aquaculture activities means that there is no significant risk to the number of individuals to breed successfully, nor to the survival of the population, and the species natural range is secure and will not be reduced by the existing and proposed shellfish aquaculture operations

Otter

Otter are reported within the area of the SAC. Otter are an opportunist hunter, mainly eating fish, but also eats frogs, small birds, eggs, mussels, crabs and other invertebrates. The nature of this extensive aquaculture means it is not likely to have an effect on the number or availability of prey for the otter. While the general habitat in the area is likely to support otters, the intertidal areas of extensive aquaculture are not considered ideal foraging areas for otter, which prefer shallow, rocky

[10] Watson-Capps JJ, Mann J (2005) The effects of aquaculture on bottlenose dolphin (Tursiops sp.) ranging in Shark Bay, Western Australia. Biological Conservation 124: 519–526.

[11] Heinrich, S. (2006) Ecology of Chilean dolphins and Peale's dolphins at Isla Chiloe, southern Chile (PhD dissertation). University of St Andrews, 239 p

[12] Ribeiro S, Viddi FA, Cordeiro JL, Freitas TRO (2007) Fine-scale habitat selection of Chilean dolphins (Cephalorhynchus eutropia): interactions with aquaculture activities in southern Chiloe Island, Chile. Journal of the Marine Biological Association of the United Kingdom 87: 119–128

[13] Díaz López, B. & Methion, S. (2017) The impact of shellfish farming on common bottlenose dolphins' use of habitat. Marine Biology 164: 83. doi:10.1007/s00227-017-3125-x

[14] Callier M, Byron C, Bengtson D, Cranford P, Cross S, Focken U, Jansen H, Kamermans P, Kiessling A, Landry T., O'Beirn F., Petersson E., Rheault, RB., Strand, O., Sundell, K., Svasand, T., Wikfors, GH., McKindsey, CW. (2017) Attraction and repulsion of mobile wild organisms to finfish and shellfish aquaculture: a review. Rev Aquac 0:1–26

[15] Spillias S, Kelly R, Cottrell RS, O'Brien KR, Im R-Y, Kim JY, et al. (2023) The empirical evidence for the social-ecological impacts of seaweed farming. PLOS Sustain Transform 2(2): e0000042. https://doi.org/10.1371/journal.pstr.0000042

environments with seaweed cover for foraging. The extensive aquaculture, being in the intertidal area, and the access routes, being in well-travelled routes, are highly unlikely to interfere with the couches and holts within its territory, nor to disturb the breeding locations. The longline cultivation activities are in a location that is not ideal for otter considering the depth of the site, and the distance from the coastline, along with the absence of freshwater.

The main impacts associated with the proposed projects on otter are related to:

- Obstruction (intertidal)- The structures (generally trestles) and activities associated with this form of oyster culture structures are positioned on, and rising to approximately 1m above, the intertidal seabed. They are oriented in rows with gaps between structures, thus allowing free movement through and within the sites. The structures are placed on the lower-shore, in the intertidal area, which is covered by water for most of the tide. They will not interfere with the natural behaviour of the otter.
- Obstruction (open water)- The longlines and activities associated with this form of seaweed (and mussel, oysters, and scallops) farming involve either ropes, or basket structures, suspended from a float rope, hanging in the water column. Otters generally forage within 80-100m of the coastline, and in shallower waters. The longline structures will be further from the shoreline and are not likely to interfere with the natural behaviour of the otter.
- Entanglement - Shellfish and seaweed production activities are highly unlikely to pose any risk to otter populations through entrapment or direct physical injury.
- Displacement - The number of couching sites and holts or, therefore, the distribution of the otter, will not be directly affected by aquaculture activities.
- Disturbance – Dredging will have a disturbing effect on the dredged area, and will likely result in a sediment plume. This will be localised to the area of activity, and the dredging is restricted to registered, licenced vessels, and to a short period (~ 8 days per year) of time. The proposed operations are generally carried out in daylight hours. The interaction with the otter will be minimal, given that otter foraging is primarily crepuscular. Disturbance associated with vessel traffic could potentially affect otter at these sites. However, the level of disturbance is likely to be very low given the likely encounter rates will be low dictated primarily by tidal state and in daylight hours.

The potential for impact from the listed hazards are generally highly unlikely or of low intensity. The lack of significant spatial overlap or likely interactions between the Annex IV species and the aquaculture activities means there is no significant risk to the number of individuals to breed successfully, nor to the survival of the population, and the species natural range is secure and will not be reduced.

Mitigation Measures

Otters and cetaceans are highly unlikely to interact with these extensive aquaculture sites. Based on the information above, no mitigation measures for encounters are considered necessary for these projects.

Conclusions

Following a risk assessment of the existing and proposed aquaculture sites in the Mullet/Blacksod Bay Complex SAC (Site Code: 00470), the activities pose no risk to the number of individuals to breed successfully, nor to the survival of the population, and the species natural range is secure and will not be reduced, for the Annex IV species which occur in Ireland and its waters.