

# MarineSpace

Making Sense of the Marine Environment™



## Technical Appendix 10.1: Fish and Shellfish Baseline Report

Document Ref: J/5/24/20	Originator: Oscar Ward
Date: 28/06/2021	Circulation: Restricted - Commercial-in-confidence

# Technical Appendix 10.1: Fish and Shellfish Baseline Report

Prepared by:

MarineSpace Ltd



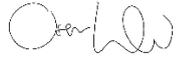
MarineSpace Ltd  
Ocean Village Innovation Centre  
Ocean Way  
Southampton  
SO14 3JZ

Prepared for:



Blue Gem Wind Ltd  
Bridge Innovation Centre,  
Pembrokeshire Science and  
Technology Park,  
Pembroke Dock,  
Wales,  
SA72 6UN

## Technical Appendix 10.1: Fish and Shellfish Baseline Report

Date	Originator	Version	Action	Signature
28/06/2021	O Ward	0.1	Internal Draft	
29/06/2021	J Lewis	0.2	Technical Review	
30/06/2021	I Reach	0.3	Editorial Review	
02/11/2021	O Ward	0.4	Internal Draft	
03/11/2021	J Lewis	1.0	Director Sign-off / External Document	

Any reproduction must include acknowledgement of the source of the material. This report should be cited as:

**MarineSpace Ltd, 2021. *Technical Appendix 10.1: Fish and Shellfish Baseline Report.***

All advice or information presented in this report from MarineSpace Ltd is intended only for use in the UK by those who will evaluate the significance and limitations of its contents and take responsibility for its use and application. No liability (including that for negligence) for any loss resulting from such advice or information is accepted by MarineSpace Ltd, subcontractors, suppliers or advisors.

## Data Licenses

© Crown Copyright 2021. All rights reserved.

Charts NOT TO BE USED FOR NAVIGATION.

## Contents

1.	Purpose of the Document .....	1-1
2.	Elasmobranchs .....	2-1
3.	Demersal Fish .....	3-1
4.	Pelagic Fish .....	4-1
5.	Shellfish .....	5-1
6.	Migratory Fish .....	6-1
7.	References.....	1

## List of Figures

No table of figures entries found.

## List of Tables

Table 2.1: Ecology of key elasmobranch species expected to be present within the study area (From: MarLIN, 2021; The Shark Trust, 2021) .....	2-1
Table 2.2: Nature conservation status of key elasmobranch species expected to be present within the study area .....	2-5
Table 3.1: Ecology of key demersal species expected to be present within the study area (From: FishBase, 2021; IUCN, 2021; MarLIN, 2021; SeaFish, 2020) .....	3-1
Table 3.2: Nature conservation status of key demersal fish species expected to be present within the study area.....	3-6
Table 4.1: Ecology of key pelagic species expected to be present within the study area (From: FishBase, 2021; IUCN, 2021; MarLIN, 2021; SeaFish, 2021) .....	4-1
Table 4.2: Nature conservation status of key pelagic species expected to be present within the study area .....	4-2
Table 5.1: Ecology of key shellfish species expected to be present within the study area (From: Bennet, 1995; FishBase, 2021; IUCN, 2021; MarLIN, 2021; Pierce et al., 2005; Regnault, 1994; SeaFish, 2021; SeaLifeBase, 2021) .....	5-1

**Technical Appendix 10.1: Fish and Shellfish Baseline Report**

---

Table 5.2: Nature conservation status of key shellfish species expected to be present within the study area.....5-5

Table 6.1: Ecology of key migratory species expected to be present within the study area (From: Roule, 1925; Applegate & Brynildson 1952; Hasler and Scholz, 1983; Taverny 1991; Hansen et al., 1993; Hansen and Quinn, 1998; Malcom et al., 2010; Righton et al., 2016)]#.....6-1

Table 6.2: Nature conservation status of key migratory species expected to be present within the study area.....6-5

## 1. Purpose of the Document

This Technical Appendix contains data pertinent to Chapter 10: Fish and Shellfish of the Project Erebus Environmental Statement (ES). These data provide information on both the ecology and nature conservation status of species expected to be present within the study area (ICES Rectangles 31E4 and 32E4). Data is grouped by receptor group, as defined within Chapter 10: Fish and Shellfish:

- Elasmobranchs;
- Demersal Fish;
- Pelagic fish;
- Shellfish;
- Migratory fish.

Data sources used throughout this Appendix include:

- Marine Life Information Network (MarLIN);
- FishBase and SeaLifeBase;
- The Shark Trust;
- National Biodiversity Network (NB) Gateway;
- EMODnet (2019);
- Lle (Marine Planning Portal for Wales);
- IUCN Red List;
- ICES landing data (MMO, 2020).

This Appendix should be read in combination with Chapter 10: Fish and Shellfish.

## 2. Elasmobranchs

Table 2.1: Ecology of key elasmobranch species expected to be present within the study area (From: MarLIN, 2021; The Shark Trust, 2021)

Species	Seasonality	Habitat Association	Migration	Predator-prey relationships
Angelshark <i>Squatina squatina</i>	Likely migrates to UK waters in the summer months.	Inhabits coasts and estuaries, in waters of 5-150 m depth. Buries itself in the substrate during the day, active at night	Migratory in this region, moving north during summer, and south during winter	Diet comprises mostly bony fish, especially flatfish, and also skates, crustaceans, and molluscs
Basking shark <i>Cetorhinus maximus</i>	Present in the summer months, usually between May and September	Occurs mostly offshore but does venture into shallows near shore	Unknown	Passive filter feeder, feeding solely on plankton
Blonde ray <i>Raja brachyura</i>	Spawning occurs between February and August	Varied depth range depending on location, up to 150 m in NE Atlantic, 10-300 m in Mediterranean, and globally up to 900 m. Typically occurs on soft substrate such as sandy and muddy ground	Shallow, coastal waters are used as nursery areas, leading to an increased presence of juveniles	Both adults and juveniles feed on crustaceans, with larger adults also taking cephalopods and small teleosts
Blue shark <i>Prionace glauca</i>	Young are born in spring early summer. Nursery grounds not located in this area.	Oceanic and pelagic, from surface up to 1,160 m. More commonly found over deep waters, occasional over continental shelf	Highly migratory, undertaking annual clockwise transatlantic migrations	Feed on relatively small prey, especially squid and bony fishes, and to a lesser extent other invertebrates, small sharks and mammalian carrion
Common skate <i>Dipturus batis</i> complex	Mating occurs in spring, followed by spawning in summer.	Lives on sandy and muddy bottoms, at depths of 10-600 m.	Juveniles prefer shallow waters.	Actively hunts other elasmobranchs, teleosts, cephalopods and crustaceans

Technical Appendix 10.1: Fish and Shellfish Baseline Report

Species	Seasonality	Habitat Association	Migration	Predator-prey relationships
Common smoothhound <i>Mustelus mustelus</i>	Limited information on the reproductive biology of this species	Most common over sandy and muddy substrates at <50 m over continental shelf, recorded up to 350 m. Mostly demersal in nature, occasionally midwater	Not described as migratory	Primarily feeds on crustaceans, also cephalopods and teleosts
Cuckoo ray <i>Leucoraja naevus</i>	Egg cases produced throughout the year	Demersal from 30-500 m, though most common <200 m. Found on continental shelf and upper slopes over sandy and coarse sediment	Not described as migratory	Feeds on crustaceans, polychaete worms and teleosts
Lesser spotted dogfish <i>Scyliorhinus canicula</i>	Egg-laying occurs during spring and early summer	Found from shallow sublittoral waters up to 400 m, mostly on sand and mud, but also on algae, rocky and gravelly bottoms	Females come inshore during the warmer months to lay eggs	It feeds opportunistically on a range of benthic fauna, mostly crustaceans and molluscs. Feeding intensity is highest during the summer
Nursehound <i>Scyliorhinus stellaris</i>	Spring and summer are when egg-laying occurs	Found at depths of up to 125 m but most common between 20-63 m. Prefers rough, rocky or coralline grounds with algal cover	Shallow waters are used for egg-laying.	Take a variety of prey, mostly crustaceans, but also molluscs, small teleosts and <i>S. canicula</i>
Sandy ray <i>Leucoraja circularis</i>	Females lay their eggs on soft substrates from August to November	Demersal from 70-800 m. Found on sandy and muddy substrates, primarily on upper continental shelf and banks	Not described as migratory	Diet consists of benthic invertebrates and small teleosts

Species	Seasonality	Habitat Association	Migration	Predator-prey relationships
Shagreen ray <i>Leucoraja fullonica</i>	Limited information on the reproductive biology of this species	Demersal from 30-550 m, found primarily on outer continental shelf. No preference for substrate	Not described as migratory	Predominant prey comprise benthic invertebrates and teleosts, though large individuals take teleosts and cartilaginous fish
Small-eyed ray <i>Raja microocellata</i>	Eggcases frequently laid June September	Found at depths of up to 100 m. Favours soft sandy substrates on the continental shelf	Not described as migratory	Adults feed on teleosts, whereas juveniles feed on benthic crustaceans
Spotted ray <i>Raja montagui</i>	Limited information on the reproductive biology of this species	Majority of population found in waters 100-500 m deep. Prefers soft, sandy substrates in coastal seas and on continental shelves	Mostly non-migratory, though females migrate to shallow waters from April-July to spawn	Adults feed on large crustaceans, teleost fish, polychaetes and molluscs, juveniles on small crustaceans
Spurdog <i>Squalus acanthias</i>	Timing of reproduction varies by location, though it broadly occurs between January August	Found in inshore waters to continental shelf, most commonly 10-200 m but recorded up to 900 m. Is epibenthic but also occurs in water column, with no preference for habitat	Highly migratory, dependent on age and sex. Young females migrate to shallow waters to give birth	In this region their diet is mostly teleost fish (herring, whiting, Norway pout, cod, and Atlantic mackerel), with crustaceans often taken by smaller individuals
Starry smoothhound <i>Mustelus asterias</i>	Gives birth to pups in the summer. Adults may migrate inshore in summer	Predominantly found on sandy and gravelly bottoms, at depths of 1-100 m on continental shelves	Young are born inshore, adults may migrate inshore in the summer	Feeds almost exclusively on crustaceans

Technical Appendix 10.1: Fish and Shellfish Baseline Report

Species	Seasonality	Habitat Association	Migration	Predator-prey relationships
Thornback ray <i>Raja clavata</i>	Overwinters in deeper water, migrating into shallower areas in the late spring and summer (February-September) to spawn	Inhabits continental shelf and upper slope waters from 10-300 m, though it is most abundant in waters 10-60 m. Frequents a range of sediments, though not typically coarser sediments	Mostly non-migratory, though fish often moves close inshore during the spring	Adults feed on large crustaceans and small teleost fish such as sandeels, small gadoids and dragonets, whereas juveniles prefer small crustaceans
Tope shark <i>Galeorhinus galeus</i>	Mating and parturition occurs during the spring	Found inshore through to 550 m depth, mostly near the seabed	Highly migratory in this region, moving north in the summer, and south in the winter. Females give birth in shallow waters	Feeds mostly on a wide variety of teleost fish, in addition to some invertebrates
White skate <i>Rostroraja alba</i>	Thought to produce eggcases year round	Found from shallows up to 500 m. Prefers rocky and sandy substrates on continental shelf and upper slope	Not described as migratory	Takes benthic invertebrates, cephalopods and teleosts

Table 2.2: Nature conservation status of key elasmobranch species expected to be present within the study area

Species	IUCN Red List	OSPAR Annex V species	Environment (Wales) Act 2016, Section 7	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
Angelshark <i>Squatina squatina</i>	Critically Endangered (Global and Europe)	Yes	Yes	Yes	Yes	No	No
Basking shark <i>Cetorhinus maximus</i>	Endangered (Global and Europe)	Yes	Yes	Yes	Yes	No	No
Blonde ray <i>Raja brachyura</i>	Near Threatened (Global and Europe)	No	Yes	No	No	No	No
Blue shark <i>Prionace glauca</i>	Near Threatened (Global and Europe)	No	Yes	Yes	No	No	No
Common skate <i>Dipturus batis</i> complex	Critically Endangered (Global and Europe)	Yes	Yes	Yes	No	No	No
Common smoothhound <i>Mustelus mustelus</i>	Vulnerable (Global and Europe)	No	No	No	No	No	No

Technical Appendix 10.1: Fish and Shellfish Baseline Report

Species	IUCN Red List	OSPAR Annex V species	Environment (Wales) Act 2016, Section 7	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
Cuckoo ray <i>Leucoraja naevus</i>	Least Concern	No	No	No	No	No	No
Lesser spotted dogfish <i>Scyliorhinus canicula</i>	Least Concern	No	No	No	No	No	No
Nursehound <i>Scyliorhinus stellaris</i>	Near Threatened (Global and Europe)	No	No	No	No	No	No
Sandy ray <i>Leucoraja circularis</i>	Endangered (Global and Europe)	No	No	Yes <sup>2</sup>	No	No	No
Shagreen ray <i>Leucoraja fullonica</i>	Vulnerable (Global and Europe)	No	No	No	No	No	No
Small-eyed ray <i>Raja microocellata</i>	Near Threatened (Global and Europe)	No	No	No	No	No	No
Spotted ray <i>Raja montagui</i>	Least Concern	Yes	No	No	No	No	No
Spurdog <i>Squalus acanthias</i>	Vulnerable (Global),	Yes	Yes	Yes	No	No	No

Species	IUCN Red List	OSPAR Annex V species	Environment (Wales) Act 2016, Section 7	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
	Endangered (Europe)						
Starry smoothhound <i>Mustelus asterias</i>	Least Concern (Global), Near Threatened (Europe)	No	No	No	No	No	No
Thornback ray <i>Raja clavata</i>	Near Threatened (Global and Europe)	Yes	Yes	No	No	No	No
Tope shark <i>Galeorhinus galeus</i>	Vulnerable (Global and Europe)	No	Yes	Yes	No	No	No
White skate <i>Rostroraja alba</i>	Endangered (Global), Critically Endangered (Europe)	Yes	Yes	Yes	No	No	No

1. With respect to English waters only.
2. Sandy ray is protected under the UK post-2010 biodiversity framework, though not specifically for Wales as it was at the time not reported for Welsh waters. It has been included here as there have been landings of this species in the study area in 2014 and 2015.

### 3. Demersal Fish

Table 3.1: Ecology of key demersal species expected to be present within the study area (From: FishBase, 2021; IUCN, 2021; MarLIN, 2021; SeaFish, 2020)

Species	Seasonality	Habitat Association	Migration	Predator-prey relationships
Anglerfish <i>Lophius piscatorius</i>	Spawning occurs between January-June	Occur at depths from coast up to 1,000 m, on sandy and muddy bottoms. May also be found on rocky bottoms	Migrate between inshore and offshore spawning grounds	Feeds mostly on fish that it lures
Atlantic cod <i>Gadus morhua</i>	Spawning occurs in winter and beginning of spring	Juveniles prefer shallower waters (10-30 m) with complex habitats than adults (up to 600 m)	Migrate between spawning, feeding and overwintering areas, journeys of <200 km	Omnivorous, feeding on mostly fish and invertebrates
Atlantic halibut <i>Hippoglossus hippoglossus</i>	Spawn December-April	Lives mostly at sea bottom, depth range of 50-200 m. Occurs on sand, gravel or clay bottoms. Spawning over soft sediment	None reported	Mostly feeds on other fish, also other benthos
Ballan wrasse <i>Labrus bergylta</i>	Unknown	Adults found in at depths of 10-30 m over rocks, reef and seaweed. Juveniles are found in the intertidal area	None reported	Feeds primarily on crustaceans and molluscs

Technical Appendix 10.1: Fish and Shellfish Baseline Report

Species	Seasonality	Habitat Association	Migration	Predator-prey relationships
Bass <i>Dicentrarchus labrax</i>	Spawning occurs in spring	Inhabit coastal waters up to 100 m on range of bottom types	Migrate from coastal to offshore waters in winter	Feeds mostly on shrimp and molluscs, as well as fish
Black sea bream <i>Spondyliosoma cantharus</i>	Spawning occurs in April and May	Found over seagrass beds, rocky and sand bottoms, at depths of up to 300 m	None reported	Omnivorous, feeding on seaweeds and small invertebrates, especially crustaceans
Brill <i>Scophthalmus rhombus</i>	Spawning occurs in first half of year, varies by location	Live on sandy or mixed bottoms up to 50 m	Adults found more offshore than juveniles	Feed on benthic fish and crustaceans
Cuckoo wrasse <i>Labrus mixtus</i>	Unknown	Mainly found between 20-80 m, over rocks, hard ground or algae	None reported	Feeds mainly on crustaceans but also on fish, molluscs and worms
Dab <i>Limanda limanda</i>	Spawning occurs in spring and early summer in British waters	Mostly found over sandy ground at depths of 20-40 m, sometimes up to 150 m. Young live inshore	Adults migrate inshore from deeper water in the warmer summer months	Opportunistic feeder, though mainly on crustaceans and small fish
Dover sole <i>Solea solea</i>	Spawning happens mostly during February-May	Most frequently found at depths of 10-60 m, though records up to 150 m. Prefers soft substrate (mud, sand)	Adults retreat into deeper water in winter. Juveniles remain inshore before migrating to deeper waters	Nocturnal feeder, mostly on worms, molluscs and small crustaceans

Species	Seasonality	Habitat Association	Migration	Predator-prey relationships
European hake <i>Merluccius merluccius</i>	Spawning occurs April-December, with a peak in February-March	Found usually between 30-1075 m, normally 70-400 m	Diurnal; off bottom during day, on bottom at night	Feed mainly on fish, with young feeding on small crustaceans
Gilthead seabream <i>Sparus aurata</i>	Spawning occurs October-December	Found on seagrass bed and sandy bottoms, up to 150 m depth though more frequently 1-30 m	None reported	Mainly carnivorous, though occasionally eats seagrass. Feeds on shellfish, including mussels and oysters
Grey gurnard <i>Eutrigla gurnardus</i>	Spawns April to August	Common on sand, rocky and muddy bottoms between coastal and 140 m depth	None reported	Feeds on crustaceans and fish
Grey triggerfish <i>Balistes capriscus</i>	Spawning uncommon in UK waters	Found from intertidal to 100 m. Inhabits rocky areas and wrecks	Poor swimmers, likely in UK waters by travelling along currents	Feeds on benthic invertebrates, such as molluscs and crustaceans
Haddock <i>Melanogrammus aeglefinus</i>	Spawning takes place from March to May	Found over rock, sand gravel or shells, at depths of 40-300 m	None reported for UK waters	Feeds on variety of benthic organisms, including crustaceans, molluscs and teleosts
John Dory <i>Zeus faber</i>	Spawning occurs at the end of winter/early spring	Remains near seabed	None reported	Feeds mostly on teleosts, also cephalopods and crustaceans

Technical Appendix 10.1: Fish and Shellfish Baseline Report

Species	Seasonality	Habitat Association	Migration	Predator-prey relationships
Lemon sole <i>Microstomus kitt</i>	The timing of spawning is related to a temperature threshold	Found on stony bottoms at depths 20-200 m	None reported	Feeds on invertebrates, primarily polychaetes
Ling <i>Molva molva</i>	Spawn in spring	Occurs mostly in deep water (100-400 m) over rocky bottoms	Unknown	Feeds on large fish and invertebrates
Long-snouted seahorse <i>Hippocampus guttulatus</i>	Unknown	Prefers shallow waters of 1-20 m amongst algae and seagrass	May move to deeper water during winter. Adults disperse using currents, following which they make limited movements within their home range	Primarily feeds on plankton, small fish and crustaceans
Megrim <i>Lepidorhombus whiffiagonis</i>	Unknown, though spawning occurs in deep waters off west of British Isles	Occurs at depths 100-700 m, over soft bottoms	Not reported	Feeds on small bottom-living fishes, cephalopods and crustaceans
Plaice <i>Pleuronectes platessa</i>	Spawn mostly between January-March in well-defined spawning grounds	Occurs on mud and sandy bottoms, from intertidal to about 100 m depth (increase in water depth with age)	Migrate for spawning activity	Feed mainly on thin-shelled molluscs and polychaetes. Active at night
Pollock <i>Pollachius pollachius</i>	Spawn in the late winter to spring	Found from nearshore to 200 m, over hard bottoms	Larger individuals move to more open sea. May take spawning migrations	Major predator of young cod

Species	Seasonality	Habitat Association	Migration	Predator-prey relationships
Pouting (Bib) <i>Trisopterus luscus</i>	Unknown	Found inshore down to 300 m, over mixed rock and sand, also around wrecks	Moves inshore to waters <50 m for spawning	Feeds mostly on crustaceans, but also on small fish, molluscs and polychaetes
Striped red mullet <i>Mullus surmuletus</i>	Spawning occurs in May-July	Occurs mostly at depths up to 100 m over hard broken grounds	Adults migrate to shallows in spring/summer; juveniles move summer/autumn	Feeds mostly on benthic invertebrates
Saithe <i>Pollachius virens</i>	Unknown	Occurs up to 350 m	Enters coastal waters in spring and returns to deeper waters in winter	Adults feed on other fish, whereas small fish feed primarily on crustaceans
Sand eel Ammodytidae	Spawning recorded in December and January	Occurs up to 150 m over sandy bottoms, both inshore and offshore	Bury in bottom during night and winter, migrate in water column during strong tidal currents	Feed on plankton
Sand sole <i>Pegusa lascaris</i>	Unknown	Occurs at depths usually 20-50 m. Found on gravel, sand or mud	None reported	Feeds on a wide range of crustaceans, mostly bivalves
Turbot <i>Scophthalmus maximus</i>	Spawning season is April-August	Most common on sandy, rocky or mixed bottoms. Depth range 20-70 m	None reported	Feeds mostly on benthic fish and less on crustaceans and bivalves
Whiting <i>Merlangius merlangus</i>	Spawning occurs January-September	Depth range 10-200 m, most commonly 30-100 m, over mud and gravel bottoms mostly, but also on sand and rock	Individuals migrate to open sea after first year	Feed on a range of benthic prey

Technical Appendix 10.1: Fish and Shellfish Baseline Report

Species	Seasonality	Habitat Association	Migration	Predator-prey relationships
Witch flounder <i>Glyptocephalus cynoglossus</i>	In Irish Sea, spawns March-May	Inhabits soft mud bottoms at depths of 45-366 m	None reported	Feeds on crustaceans, polychaetes, brittle stars and fish

Table 3.2: Nature conservation status of key demersal fish species expected to be present within the study area

Species	IUCN Red List	OSPAR Annex V species	Environment (Wales) Act 2016, Section 7	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
Anglerfish <i>Lophius piscatorius</i>	Least Concern	No	Yes	Yes	No	No	Yes
Atlantic cod <i>Gadus morhua</i>	Vulnerable (Global), Least Concern (Europe)	Yes	Yes	Yes	No	No	Yes
Atlantic halibut <i>Hippoglossus hippoglossus</i>	Vulnerable (Europe), Endangered (Global)	No	No	Yes	No	No	Yes
Ballan wrasse <i>Labrus bergylta</i>	Least Concern	No	No	No	No	No	No

Species	IUCN Red List	OSPAR Annex V species	Environment (Wales) Act 2016, Section 7	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
Bass <i>Dicentrarchus labrax</i>	Least Concern	No	No	No	No	No	No
Black sea bream <i>Spondyllosoma cantharus</i>	Least Concern	No	No	No	No	No	No
Brill <i>Scophthalmus rhombus</i>	Least Concern	No	No	No	No	No	No
Cuckoo wrasse <i>Labrus mixtus</i>	Least Concern	No	No	No	No	No	No
Dab <i>Limanda limanda</i>	Least Concern	No	No	No	No	No	No
Dover sole <i>Solea solea</i>	Least Concern	No	Yes	Yes	No	No	Yes
European hake <i>Merluccius merluccius</i>	Least Concern	No	Yes	Yes	No	No	Yes
Gilthead seabream <i>Sparus aurata</i>	Least Concern	No	No	No	No	No	No
Grey gurnard <i>Eutrigla gurnardus</i>	Least Concern	No	No	No	No	No	No
Grey triggerfish <i>Balistes capriscus</i>	Least Concern	No	No	No	No	No	No

Technical Appendix 10.1: Fish and Shellfish Baseline Report

Species	IUCN Red List	OSPAR Annex V species	Environment (Wales) Act 2016, Section 7	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
Haddock <i>Melanogrammus aeglefinus</i>	Vulnerable (Global), Least Concern (Europe)	No	No	No	No	No	No
John Dory <i>Zeus faber</i>	Data deficient	No	No	No	No	No	No
Lemon sole <i>Microstomus kitt</i>	Least Concern	No	No	No	No	No	No
Ling <i>Molva molva</i>	Least Concern	No	Yes	Yes	No	No	Yes
Long-snouted seahorse <i>Hippocampus guttulatus</i>	Data deficient (Global and Europe)	Yes	Yes	Yes	Yes	No	Yes
Megrim <i>Lepidorhombus whiffiagonis</i>	Least Concern	No	No	No	No	No	No
Plaice <i>Pleuronectes platessa</i>	Least Concern	No	Yes	Yes	No	No	Yes
Pollock <i>Pollachius pollachius</i>	Least Concern	No	No	No	No	No	No
Pouting (Bib) <i>Trisopterus luscus</i>	Least Concern	No	No	No	No	No	No

Species	IUCN Red List	OSPAR Annex V species	Environment (Wales) Act 2016, Section 7	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
Striped red mullet <i>Mullus surmuletus</i>	Least Concern	No	No	No	No	No	No
Saithe <i>Pollachius virens</i>	Least Concern	No	No	No	No	No	No
Sand eel Ammodytidae	n/a	No	Yes <sup>1</sup>	Yes <sup>1</sup>	No	No	Yes <sup>1</sup>
Sand sole <i>Pegusa lascaris</i>	Least Concern	No	No	No	No	No	No
Turbot <i>Scophthalmus maximus</i>	Near Threatened (Global), Vulnerable (Europe)	No	No	No	No	No	No
Whiting <i>Merlangius merlangus</i>	Least Concern	No	Yes	Yes	No	No	Yes
Witch flounder <i>Glyptocephalus cynoglossus</i>	Least Concern	No	No	No	No	No	No

1. Specifically *Ammodytes marinus*.

## 4. Pelagic Fish

Table 4.1: Ecology of key pelagic species expected to be present within the study area (From: FishBase, 2021; IUCN, 2021; MarLIN, 2021; SeaFish, 2021)

Species	Seasonality	Habitat Association	Migration	Predator-prey relationships
Atlantic herring <i>Clupea harengus</i>	Comes to coastal areas to spawn. Both autumn and winter-spawning stock present	Occupy the water column from surface to 200m depth	Comes to coastal areas to spawn	Feed mostly on small shrimps and copepods, with occasional filter-feeding
Atlantic horse mackerel <i>Trachurus trachurus</i>	Spawning occurs in early spring for the “West stock”	Found on continental shelves (frequently over sandy bottoms) up to 500 m depth	Following spawning the stock migrates north to southern Norway/northern North Sea	Feeds on crustaceans, cephalopods and fish
Atlantic mackerel <i>Scomber scombrus</i>	Spawning occurs during summer	Widely distributed on coastal shelves up to 200 m depth	Migrate in winter and early spring to spawning areas (inshore); spawn in summer; migration to post-spawning feeding grounds and overwinter areas	Filter-feeders on zooplankton, such as small fish and prawns
European sprat <i>Sprattus sprattus</i>	Spawn throughout the year, though primarily in spring and summer	Occurs in the water column at depths of 10-150 m	Shows strong migrations between winter feeding and summer spawning grounds. Diurnal migrations through the water column	Feeds on planktonic crustaceans
Atlantic bluefin tuna <i>Thunnus thynnus</i>	Arrive in late spring and may remain until winter	Up to depths of 1000 m	Wide ranging migration moving between UK waters, central and western Atlantic and Mediterranean	Feed on a wide range of fish species

Table 4.2: Nature conservation status of key pelagic species expected to be present within the study area

Species	IUCN Red List	OSPAR Annex V species	Environment (Wales) Act 2016, Section 7	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
Atlantic herring <i>Clupea harengus</i>	Least Concern	No	Yes	Yes	No	No	Yes
Atlantic horse mackerel <i>Trachurus trachurus</i>	Vulnerable (Global), Least Concern (Europe)	No	Yes	Yes	No	No	Yes
Atlantic mackerel <i>Scomber scombrus</i>	Least Concern	No	Yes	Yes	No	No	Yes
European sprat <i>Sprattus sprattus</i>	Least Concern	No	No	No	No	No	No
Atlantic bluefin tuna <i>Thunnus thynnus</i>	Near Threatened	Yes	No	Yes	No	No	Yes

## 5. Shellfish

Table 5.1: Ecology of key shellfish species expected to be present within the study area (From: Bennet, 1995; FishBase, 2021; IUCN, 2021; MarLIN, 2021; Pierce et al., 2005; Regnault, 1994; SeaFish, 2021; SeaLifeBase, 2021)

Species	Seasonality	Habitat Association	Migration	Predator-prey relationships
Blue mussel <i>Mytilus edulis</i>	Peaks in spawning in spring and summer	Occurs from the high intertidal to the shallow subtidal. Uses fibrous byssus threads to attach to suitable substrata	N/A	Filter feeders and collect algae, detritus and organic material
Brown crab <i>Cancer pagurus</i>	Mating takes place in spring and summer. Females are berried for 6-9 months, during which they remain in pits dug into the sediment or under rocks, not feeding. Larvae are released in late spring/early summer juveniles settle in the intertidal zone in late summer/early autumn	Usually at depths between 6 m-40 m, but can be found offshore at depths of up to 100 m. Found on a range of substrates such as sand, gravel and rocky seabed	Juveniles may remain in intertidal areas for approximately 3 years before moving to subtidal areas	Crustaceans including smaller brown crabs as well as bivalve molluscs
Common cockle <i>Cerastoma edule</i>	Main reproductive season is May-June	Burrows in sand, mud, and gravel substrate in intertidal zone	N/A	Filter feeder
Common cuttlefish <i>Sepia officinalis</i>	Spawns in shallow waters in spring and summer	Found on sandy and muddy substrate, up to 200 m though more common up to 100 m	Undergoes seasonal migrations between inshore waters in spring and summer and shelf	Feeds on small molluscs, crustaceans, cephalopods and teleosts

Technical Appendix 10.1: Fish and Shellfish Baseline Report

Species	Seasonality	Habitat Association	Migration	Predator-prey relationships
			grounds in autumn and winter	
Common octopus <i>vulgaris</i>	Spawning peaks in spring and early summer	Prefers rocky, sandy muddy bottom, in water depths from the intertidal to 150 m	Undertakes limited seasonal migrations	Feeds mostly on fish, crustaceans and molluscs
Common prawn <i>Palaemon serratus</i>	Mating directly after first moult; females carry eggs for 9-11 months	Rocky and muddy bottoms in the shallows (up to 40 m)	Occur in shallows (feeding and nursery habitat) during summer months and in deeper water during winter. Also tidal and diurnal migrations	Omnivorous, feeding on seaweed and small crustaceans
Common whelk <i>Buccinum undatum</i>	Whelk have a low fecundity and entirely benthic reproductive strategy. Whelk spawn between November and January, laying distinctive egg masses which are then attached to suitable substrate	Muddy sand, gravel and rock	Common whelk has low growth rates and restricted adult movements	Carnivorous predator and active scavenger
European lobster <i>Homarus gammarus</i>	Mating takes place in the summer and is annual or bi-annual. Eggs carried for 10-11 months	Rocky and stony substrata, usually not deeper than 50 m	Do not undertake migrations; will only move a few miles along the shore	Preys on crabs, molluscs, sea urchins, polychaete worms and starfish
European spider crab <i>Maja squinado</i>	This species is thought to move offshore during the autumn and inshore during the spring	Adults occur in sublittoral to depths of 90 m, on rocky bottoms with algae. Juveniles prefer shallows	Only use slow, small-scale, non-directional movements	Feed upon algae and molluscs during the winter and echinoderms during

Species	Seasonality	Habitat Association	Migration	Predator-prey relationships
		on mixed soft/hard bottoms		the summer; general omnivorous diet
European spiny lobster <i>Palinurus elephas</i>	Spawning occurs between June-October	Lives subtidally on rocky substrates, over depths of 5-200 m	None reported	Omnivorous, feeds on hard-shelled organisms such as molluscs, echinoderms and crustaceans
European squid <i>Loligo vulgaris</i>	Spawning occurs intermittently over several months (season varies; in English Channel peak is late autumn/early winter)	Usually in the water column over sandy and hard bottoms. Occurs down to 200 m	Abundance varies	Squid feed upon fish, as well as crustaceans, polychaetes and other cephalopods
Fan mussel <i>Atrina fragilis</i>	Limited information on the biology of the species	Sublittoral fringe to 400 m, over mud, sands and gravels	N/A	Filter feeder
Green crab <i>Carcinus maenas</i>	Berried females found January-May. Eggs hatch in spring/summer	From high water to 60m depth, though most common in shallows. Found on all types of shore	Generally no migration, though females in estuary move to mouth of estuary to lay eggs	Omnivore, both animal and plant matter from a variety of species
Icelandic cyprine <i>Arctica islandica</i>	Reproduction occurs throughout the year	Found at depths of 10-280 m	N/A	Filter feeder
King scallop <i>Pecten maximus</i>	Scallops spawn in spring or summer and probably require dense concentrations	Coarse gravel with some erect epifauna and shell is known to be suitable for successful settlement and	N/A	Filter feeder

Technical Appendix 10.1: Fish and Shellfish Baseline Report

Species	Seasonality	Habitat Association	Migration	Predator-prey relationships
	to achieve the successful production of larvae	recruitment of larvae to the stock		
Native oyster <i>Ostrea edulis</i>	Spawning is frequent, most often between June-September	Estuarine and shallow coastal water habitats on mud, rocks, muddy sand, muddy gravel with shells, and hard silt	N/A. Dispersal of young estimated to be more than 10 km	Filter feeders of phytoplankton
Norway lobster <i>Nephrops norvegicus</i>	Spawn in summer and autumn	Inhabits muddy bottoms, in waters 20-800 m deep, though usually 200-600 m	None reported	Nocturnally feeds on detritus, crustaceans and worms
Pacific oyster <i>Crassostrea gigas</i>	Spawn when waters are warm (20°C)	Found on littoral and circalittoral hard substrate	N/A	Filter feeder
Periwinkle <i>Littorina littorea</i>	Spawns in February-June	Found at depths of 0-60 m, on both hard and soft bottoms	None reported	Grazes on marine plants such as seaweed and seagrass
Queen scallop <i>Aequipecten opercularis</i>	Scallops spawn in spring or summer and probably require dense concentrations to achieve the successful production of larvae	Coarse gravel with some erect epifauna and shell is known to be suitable for successful settlement and recruitment of larvae to the stock	N/A	Filter feeder

Species	Seasonality	Habitat Association	Migration	Predator-prey relationships
Velvet swimming crab <i>Necora puber</i>	Mating occurs after the moult. Females bear eggs mostly in spring, eggs hatch in late spring	Shallow and intertidal to 80 m	Females migrate to soft substrates for egg laying	Opportunistic feeder, mostly on molluscs and crustaceans but also detritus and algae

Table 5.2: Nature conservation status of key shellfish species expected to be present within the study area

Species	IUCN Red List	OSPAR Annex V species	Environment (Wales) Act 2016, Section 7	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
Blue mussel <i>Mytilus edulis</i>	Not assessed	No	No	No	No	No	No
Brown crab <i>Cancer pagurus</i>	Not assessed	No	No	No	No	No	No
Common cockle <i>Cerastoma edule</i>	Not assessed	No	No	No	No	No	No
Common cuttlefish <i>Sepia officinalis</i>	Least Concern	No	No	No	No	No	No
Common octopus <i>Octopus vulgaris</i>	Least Concern	No	No	No	No	No	No

Technical Appendix 10.1: Fish and Shellfish Baseline Report

Species	IUCN Red List	OSPAR Annex V species	Environment (Wales) Act 2016, Section 7	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
Common prawn <i>Palaemon serratus</i>	Not assessed	No	No	No	No	No	No
Common whelk <i>Buccinum undatum</i>	Not assessed	No	No	No	No	No	No
European lobster <i>Homarus gammarus</i>	Least Concern	No	No	No	No	No	No
European spider crab <i>Maja squinado</i>	Not assessed	No	No	No	No	No	No
European spiny lobster <i>Palinurus elephas</i>	Vulnerable	No	Yes	Yes	No	No	Yes
European squid <i>Loligo vulgaris</i>	Data deficient	No	No	No	No	No	No
Fan mussel <i>Atrina fragilis</i>	Not assessed	No	Yes	Yes	No	No	Yes
Green crab <i>Carcinus maenas</i>	Not assessed	No	No	No	No	No	No
Icelandic cyprine <i>Arctica islandica</i>	Not assessed	No	Yes	No	No	No	Yes

Species	IUCN Red List	OSPAR Annex V species	Environment (Wales) Act 2016, Section 7	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
King scallop <i>Pecten maximus</i>	Not assessed	No	No	No	No	No	No
Native oyster <i>Ostrea edulis</i>	Not assessed	No	Yes	Yes	No	No	Yes
Norway lobster <i>Nephrops norvegicus</i>	Least Concern	No	No	No	No	No	No
Pacific oyster <i>Crassostrea gigas</i>	Not assessed	No	No	No	No	No	No
Periwinkle <i>Littorina littorea</i>	Not assessed	No	No	No	No	No	No
Queen scallop <i>Aequipecten opercularis</i>	Not assessed	No	No	No	No	No	No
Velvet swimming crab <i>Necora puber</i>	Not assessed	No	No	No	No	No	No

## 6. Migratory Fish

Table 6.1: Ecology of key migratory species expected to be present within the study area (From: Roule, 1925; Applegate & Brynildson 1952; Hasler and Scholz, 1983; Taverny 1991; Hansen et al., 1993; Hansen and Quinn, 1998; Malcom et al., 2010; Righton et al., 2016)]#

Species	Seasonality	Habitat Association	Migration	Predator-prey relationships
Atlantic salmon <i>Salmo salar</i>	After spending 1-3 years in freshwater, smolts travel downstream in April-May	Little is known about the migration pathways of post-smolt Atlantic salmon. Some research has shown that post-smolts move in schools when heading to deep-sea feeding areas. Tagged UK (Scottish) Atlantic salmon have been observed at locations extending from Labrador in the west to Faroe in the east. Studies in Norway and Canada indicate that post-smolts were always observed to migrate rapidly and actively towards open marine areas after leaving their source rivers. They did not appear to closely follow nearby shores, although this may occur in areas of substantial coastal currents. For the few studies where swimming depth was reported, it appears that post-smolts generally utilise shallow depths (typically 1-3 m, but up to 6 m). This latter observation is	Adults return to the freshwater environment after 1, 2 or 3 years in the marine environment. The timing of this is year-round, with a peak in late summer-early autumn.	It is thought that there are distinct components to the homeward migration of adult fish. The first oceanic phase is rapid and highly directed, probably involving navigation or orientation using position of sun and reference to the Earth's magnetic field. The final phases of up-river migration are thought to use the sense of smell to detect olfactory cues that are remembered from the outward migration.  Very little is understood of the phase of migration between location by salmon of the home land-mass and identification of the home river. The limited available information on adult swimming depths suggest that they spend most of their time in shallow water (generally 0-40m), although they can dive to

Technical Appendix 10.1: Fish and Shellfish Baseline Report

Species	Seasonality	Habitat Association	Migration	Predator-prey relationships
		<p>consistent with the effectiveness of sea surface trawls in catching post-smolts.</p>		<p>substantial depths up to 280m. It has been hypothesised that these dives are related to feeding or predator avoidance. Based on work done by Marine Scotland Science, gut content analysis suggest that adult fish are often still feeding, particularly early in the year.</p>
<p>European eel</p>	<p>European eels spend most of their life cycle in the freshwater environment. The duration varies by gender; males spend 7-20 years here, whereas females spend 9-50 years here. The peak timing of downstream migration is from August to December (as silver eels)</p>	<p>Once the eels are ready to spawn, they are known as 'silver eels' and make their way downstream, in order to make the long journey to the Sargasso Sea where they spawn and perish. The downstream migration occurs primarily from August to December.</p> <p>Silver eel are thought to transit quickly through the coastal zone. Transit speed during migration varies from 3-47 km/day.</p> <p>Both juvenile and adult eels are found throughout the water column. Depth selected can vary with time of day; tagged adult eels swim in shallow warm waters at night and then make a deep dive to 1,000 m where they</p>	<p>Adults do not return to fresh water.</p> <p>The upstream migration of juvenile (glass) eels occurs between January-June.</p>	<p>The migration of juvenile eel has a protracted seasonal component. It is thought that juvenile glass eels destined for UK rivers must remain in coastal regions until April or May before river temperatures rise sufficiently for them to enter fresh water.</p> <p>Glass eels travelling in near-shore areas may be facilitated by moving to the seabed in ebb tides and up into the water column in flood tides.</p> <p>Both juvenile and adult eels are found throughout the water column. Depth selected can vary with time of day and state of tide. Negative phototaxis is</p>

Species	Seasonality	Habitat Association	Migration	Predator-prey relationships
		<p>remain for the day before ascending again. The purpose of the dive is not for feeding, as adults do not feed on migration, but may be for predator avoidance.</p>		<p>pronounced in eels of all stages and they are unlikely to be found within a few meters of the surface during daylight, or even bright moonlight, if deeper water is available.</p>
<p>River lamprey</p>	<p>River lamprey remain in freshwater for 5 years or more, where they remain in burrows in river silt beds until adults. They transit to feed in estuaries and coastal waters in July-September.</p>	<p>After metamorphosis (July–September) at three to five years of age, the young adults migrate downstream during darkness to estuaries and coastal waters.</p>	<p>River lamprey spend up to 2 years in the marine environment whilst they reach maturity. In the autumn they stop feeding in preparation for their migration into freshwater, which occurs between October and December. Their upstream migration to spawning grounds occurs in winter and spring, when temperature is low (&lt;10°C). They undertake these movements at night.</p>	<p>Whilst in the marine environment river lamprey occur most frequently in estuaries, though may also frequent coastal waters. The distribution of river lamprey whilst in the marine environment is dependent on the distribution of the prey species to which they are attached.</p>
<p>Sea lamprey</p>	<p>Sea lamprey spend 3-4 years in freshwater environment. Following this, they transit to the open sea, primarily in July-September.</p>	<p>Metamorphosis to the adult form takes place between July and September. The time of the main migration downstream seems to vary from river to river.</p>	<p>Sea lamprey spend 18-24 months in marine waters. Following this, they migrate into freshwater in April-May (Hardisty, 1969), spawning in May-June.</p>	<p>Relatively little is known about sea lamprey once they reach the sea, where they have been found in both shallow coastal and deep offshore waters.</p> <p>After metamorphosis and the downstream migration to the sea, the adults feed on fish there. They seem to feed on a wide</p>

Technical Appendix 10.1: Fish and Shellfish Baseline Report

Species	Seasonality	Habitat Association	Migration	Predator-prey relationships
				variety of marine and anadromous fishes, including herring, salmon, cod and haddock.
Brown/sea trout	Trout spend 1-3 years in the freshwater environment. They migrate downstream in spring/early summer (both as post-smolts and as adults).	Brown trout that migrate to and are present in the marine environment can be either post-smolts, when they are in the marine environment for the first time, or post-spawned returning adults.	Trout usually spend 1 or 2 years at sea, in coastal areas. They migrate to freshwater environments in April-June.	Brown trout in the marine environment are known as sea trout.  Some post-smolts return to fresh water relatively quickly after migration to sea. There is considerable uncertainty as to the movement of sea trout after the initial few months in the marine environment.  Whilst in the marine environment sea trout spend most of their time in the upper 5 m, though dives of up to 30 m are also recorded.
Shad species (allis and twaite)	Shad remain in the freshwater environment for a short period, usually a few months. Juveniles migrate downstream in April-May.	A suitable estuarine habitat is likely to be very important for shad, both for passage of adults and as a nursery ground for juveniles.	Shad spend 3-4 years in marine environments, specifically in estuarine areas. They return to freshwater in April-May to spawn.	The requirements of shads at sea are very poorly understood, but they appear to be mainly coastal and pelagic in habit. Allis shad have been reported from depths of 10–150 m, and twaite from depths of 10–300 m, with a preference for water 10–20 m deep.

Table 6.2: Nature conservation status of key migratory species expected to be present within the study area

Species	IUCN Red List	OSPAR Annex V species	Environment (Wales) Act 2016, Section 7	UK Post-2010 Biodiversity Framework	UK Wildlife and Countryside Act 1981, Schedule 5	Habitats Directive, Annex II	Species of Conservation Interest (under Marine Conservation Zone process)
Allis shad <i>Alosa alosa</i>	Least Concern	Yes	No	No	Yes	Yes	Yes
Atlantic salmon <i>Salmo salar</i>	Least Concern	Yes	No	No	No	Yes	Yes
Brown/sea trout <i>Salmo trutta</i>	Least Concern	No	No	No	No	No	No
European eel <i>Anguilla anguilla</i>	Critically Endangered (Global and Europe)	No	No	No	No	No	Yes
River lamprey <i>Lampetra fluviatilis</i>	Least Concern	No	No	No	No	Yes	No
Sea lamprey <i>Petromyzon marinus</i>	Least Concern	Yes	No	No	No	Yes	No
Twaiite shad <i>Alosa fallax</i>	Least Concern	No	No	No	Yes	Yes	No

## 7. References

- Applegate, V.C. and Brynildson, C.L. (1952). *Downstream movement of recently transformed sea lampreys, Petromyzon marinus, in the Carp Lake River, Michigan*. Transactions of the American Fisheries Society.
- Bennett, D.B. (1995). *Factors in the life history of the edible crab (Cancer pagurus L.) that influence modelling and management*. ICES Marine Science Symposia.
- Froese, R., and Pauly, D. (2021). *FishBase*. Accessed June 2021. Available at: <https://www.fishbase.se/>.
- Hasler, A.D. and Scholz, A.T. (1983). *Olfactory imprinting and homing in salmon: Investigations into the mechanism of the imprinting process (Vol. 14)*. Springer Science & Business Media.
- Hansen, M.J., Boisclair, D., Brandt, S.B., Hewett, S.W., Kitchell, J.F., Lucas, M.C. and Ney, J.J. (1993). *Applications of bioenergetics models to fish ecology and management: where do we go from here?* Transactions of the American Fisheries Society.
- Hansen, L.P. and Quinn, T.P. (1998). *The marine phase of the Atlantic salmon (Salmo salar) life cycle, with comparisons to Pacific salmon*. Canadian Journal of Fisheries and Aquatic Sciences.
- IUCN (2021). *The IUCN Red List of Threatened Species. Version 2021-1*. Accessed June 2021. Available at: <https://www.iucnredlist.org>.
- Malcolm, I.A., Godfrey, J. and Youngson, A.F. (2010). *Review of migratory routes and behaviour of Atlantic salmon, sea trout and European eel in Scotland's coastal environment: implications for the development of marine renewables*. Marine Scotland Science.
- MarLIN (2021). *The Marine Line Information Network*. Accessed June 2021. Available at: <https://www.marlin.ac.uk/>.
- Pierce, G. (2005). *An overview of Cephalopods relevant to the SEA6 Area*. A report prepared for the Department of Trade and Industry.
- Regnault M. (1994). *Effect of air exposure on ammonia excretion and ammonia content of branchial water of the crab Cancer pagurus*. Journal of Experimental Zoology.
- Righton, D., Westerberg, H., Feunteun, E., Økland, F., Gargan, P., Amilhat, E., Metcalfe, J., Lobon-Cervia, J., Sjöberg, N., Simon, J. and Acou, A. (2016). *Empirical observations of the spawning migration of European eels: the long and dangerous road to the Sargasso Sea*. Science Advances.
- Roule, L. (1925). *Les poissons des eaux douces de la France*. Les Presses universitaires de France.
- SeaFish (2020). *SeaFish*. Accessed November 2020. Available at: <https://www.seafish.org/>.
- SeaLifeBase (2020). *SeaLifeBase*. Accessed November 2020. Available at: <https://www.sealifebase.ca/>.

## Technical Appendix 10.1: Fish and Shellfish Baseline Report

---

Taverny, C. (1991). *Contribution à la connaissance de la dynamique des populations d'aloses: Alosa Alosa et Alosa Fallax dans le système fluvio-estuarien de la Gironde: pêche, biologie et écologie: étude particulière de la devalaison et de l'impact des activités humaines* (Doctoral dissertation, Bordeaux 1).

End page left blank