

Protecting Our Ocean's Wealth - a proposal for legal protection of threatened marine species



www.iwt.ie



Introduction

90% of Irish territorial area is sea. Our ocean is the source of significant economic activity. Seafood and fisheries alone were worth over €850 million and supported 11,000 jobs in 2014¹ while the Wild Atlantic Way is now a lynchpin of Ireland's tourism industry. Shipping, energy and research also provide ocean-based opportunities for economic development. All of these industries depend upon a healthy marine environment, however protection for this priceless resource has historically been weak. Wild fish and invertebrate populations continue to be overfished; harmful activities – such as trawling or dredging – damage sea floor habitats, while by-catch of marine life, from whales and dolphins to smaller invertebrates, is an on-going cause for concern.

There are few official data which assess the overall health of our seas, but what we have does not paint a good picture. According to the Environmental Protection Agency 76% of our coastal water bodies are of either 'good' or 'high' status, however for estuaries this figure is only 37%². These figures are based primarily on water quality indicators. According to the Marine Institute, 77 Irish fish stocks were subject to scientific assessment in 2016. Of these the health of 37 are unknown (47%). 25 are in poor health (32%; either being fished beyond 'maximum sustainable yield' or with populations below a recommended size) while only 16 are in good health (21%)³. Bottom trawling and dredging, which is associated with large quantities of unwanted by-catch occur across most of the sea around Ireland, sometimes more than once a year. 21 coastal or marine habitats are designated under Annex I of the EU's Habitats Directive and of these only one (sandbanks) is assessed as 'favourable'. Three fish species, which are at least partly marine in their life cycle, are listed under Annex II of this directive: Sea Lamprey, Twaité Shad and Atlantic Salmon. None is assessed as 'favourable'. Larger marine animals, such as the Leatherback Turtle, Grey and Common Seal, and 18 species of cetacean (whale and dolphin) appear on Annex II, IV or V of the Habitats Directive. Our two seal species, five dolphin types (Common, Bottle-nosed, Atlantic White-sided, White-beaked and Striped), as well as Harbour Porpoise and Long-finned Pilot Whale are listed as 'favourable'. The status of other whale and dolphin species is unknown.

According to the National Biodiversity Data Centre 1,079 species of algae and >8,000 species of non-insect invertebrates have been described from Ireland, many of which are marine, while over 560 marine fish species are recorded from Irish waters.

In 2016 the NPWS published a Red Data list (conservation assessment) for cartilaginous fish (sharks, skates, rays and chimaeras). In total 58 species regularly occurring in Irish waters were assessed under IUCN criteria. Of these six are 'critically endangered', five are 'endangered', six are 'vulnerable'. A further 19 are 'near

threatened' leaving only 22 (38% of all assessed species) as 'least concern'⁴. It is currently the only conservation assessment for exclusively marine fish or invertebrates in Irish waters. There is an assessment for freshwater fish which includes those species found in tidal estuaries, or which spend part of their life cycle in the sea. These include Allis Shad, Twaite Shad, Sea Trout, Smelt, Flounder, Atlantic Salmon, European Eel, River Lamprey and Sea Lamprey. The Twaite Shad, Atlantic Salmon and European Eel are all assessed as at risk of extinction⁵.

The European Red List of Marine Fishes assessed a total of 1,220 fish species from across continental waters. For one fifth of these there was insufficient information to make a conclusion. Just over 10% of the total were assigned 'threatened' or 'near threatened' status⁶. 24 of these threatened species are regularly occurring in Irish waters. In addition, some species are assessed at a global level and these include certain marine invertebrates, such as the Common Spiny Lobster (vulnerable), or estuarine fish which are now extinct from Irish waters, such as the Sturgeon (critically endangered).

BirdWatch Ireland lists 23 regularly occurring species of seabird, all of which nest on dry land but rely entirely on ocean food webs for their survival⁷. All but one of these (Northern Fulmar) is of either 'high' or 'medium' conservation concern⁸.

Of mammals at least 24 types of whale and dolphin are known from our waters and two types of seal are well established⁹.

So, it can be seen that for only a handful of marine species is there research into their life cycles or an assessment of their conservation status. Despite some encouraging progress in recent decades remarkably little is known about life under the waves.

Current Protection for Marine Life

There are a number of existing legal instruments which are used for the protection of sea life in Ireland:

European Nature Directives

The EU Habitats and Birds Directives list habitats or species for strict protection, including the designation of areas as Special Areas of Conservation (SAC) or Special Protection Areas (SPA). These afford protection to the specific conservation interest, or feature of interest in the case of SPAs, which have been set out in the annexes of the directives. Human activities can proceed in these areas so long as 'favourable conservation status' is maintained for these defined species or habitats. Many of our bays and estuaries, as well as some off-shore areas, fall into one of these designations.

Because certain activities may be impacting upon the special features the government agreed with the European Commission that fishing and aquaculture activities would be assessed on a site by site basis, and plans formulated to ensure the protection of the sites. In total 192 SACs or SPAs are listed by the Department of Agriculture, Food and the Marine as 'marine'. At the end of 2016 'fisheries natura plans' had been concluded for only eight of these, plus the mussel fishery in the Irish Sea, which affects a number of SACs/SPAs¹⁰.

Apart from the fact that such little progress has been made in developing plans for marine sites, the legal basis of SACs and SPAs is limited in terms of the protection of whole marine ecosystems. For instance, harmful fishing practices, such as scallop dredging, hydraulic dredging, tangle netting, or pair-trawling are permitted inside these areas. In some cases, critically endangered species (e.g. Angel Shark or White Skate) are being impacted by these fishing methods but because they do not appear on the annexes of the Habitats Directive, they are afforded no protection.

The Common Fisheries Policy

The Common Fisheries Policy (CFP) allows access to fishing vessels of all EU nations to waters beyond 6 nautical miles from the coast. Access to fishing grounds is regulated by a quota system which allows for a 'total allowable catch' (TAC) for fish species of commercial interest. In 2016 TACs were set for 21 species of fish in Irish waters, plus Dublin Bay Prawns. In certain circumstances a lower, or even zero TAC can be applied to protect vulnerable populations. However, in bottom trawl fisheries, where many species are caught at the same time, this is impossible to enforce. A zero TAC for cod in the Irish Sea, for instance, has been advised since 2004 but has never been applied. Under the most recent version of the CFP Member States are obliged to set TACs at 'maximum sustainable yield' (MSY) *and* rebuild fish stocks by 2020 at the latest. The use of MSY is controversial because a stock can be much reduced in size, but still fished at MSY. This is why the commitment to rebuild fish stocks is vitally important. Since the regulation came into force on January 1st 2014 there has been progress in reaching this goal however the rate of improvement is currently not fast enough to meet the deadline. The CFP also allows for the introduction of a 'landing obligation' or ban on discarding. It is important to note however that this only applies to commercially targeted species, i.e. the vast majority of non-TAC species can still be discarded as before. Under Article 13 of the CFP a number of vulnerable species are listed for which it is prohibited "to fish for, to retain on board, to tranship or to land". This includes Basking Shark, Common Skate and Angel Shark.

Many commercially important species, such as Lobster, Brown Crab, Scallops etc, do not fall within the TAC system and for these creatures management is limited or absent. For instance, in pot fisheries, ostensibly a low-impact fishing technique used to trap lobsters, crabs and shrimps, there are no limits to the number of pots which can be set, or the number of individuals which can be removed. The number of pots in certain small shallow bays is not known but is believed to number in the thousands. Because pots need to be baited, pressure is then placed on other marine species – although little is known about these effects.

The Marine Strategy Framework Directive (MSFD)

The EU's Marine Strategy Framework Directive demands that Member States define the parameters for 'good environmental status' in the sea, monitor that status against existing baselines, and ensure that action is taken so that 'good status' is achieved by 2020. A key component of the MSFD is the designation of Marine Protected Areas (MPAs). Under the Convention on Biological Diversity the EU has committed to the conservation of 10% of its seas as MPAs. An MPA differs from an SAC or an SPA in that "its primary and clearly stated objective is nature conservation¹¹". While progress in designating MPAs in some Member States is proceeding, the process has yet to commence in Ireland.

Other quasi-legal instruments

Ireland is a signatory to international conventions such as OSPAR and RAMSAR which aim to protect marine and coastal biodiversity. In 2015 Ireland, represented in New York by Taoiseach Enda Kenny, signed up to the UN's sustainable development goals – or the Global Goals – as they are also known. Goal 14: Life Below Water, aims to 'sustainably manage and protect marine and coastal ecosystems'. However, these are non-binding agreements and so have little legal force.

Is more protection needed?

Yes. Implementation of existing laws is clearly important. Were existing legislation to be fully and enthusiastically implemented we would see an end to overfishing, the rebuilding of fish stocks and the establishment of 'coherent and representative networks' of MPAs¹². This would do much to conserve and restore beleaguered sea life populations and the coastal communities which depend upon them. However, a missing element of this is the lack of legal status for individual marine species. Assigning protection for species of flora and fauna has been a cornerstone of nature conservation law since the 1970s. In Ireland the Wildlife Act of 1976, subsequently amended in 2000, provides for the 'protection of flora, wild birds and wild animals'. In this legislation fauna is defined as:

.. all wild animals (both aquatic & terrestrial) and includes in particular wild birds, wild mammals, reptiles, non-aquatic invertebrate animals and amphibians [...], but in relation to fish or aquatic invertebrate animals [...] only includes fish and such aquatic invertebrate animals which are of a species specified in regulations under Section 23 of this Act. [our emphasis]

In other words, unless otherwise specified, fish and aquatic invertebrates do not count as wild animals. Under Section 23 of the 1976 Act:

*the Minister may, after consultation with the Minister for Agriculture and Fisheries, by regulations provide that -
(a) an animal of a species of fauna specified in the regulations (not being a species specified in the Fifth Schedule to this Act) shall be an animal to which this section applies*

This has never been invoked and as a result no species of marine fish or invertebrate enjoys legally protected status. This is unusual and sets us apart from many nations, including our European neighbours. If we are serious about protecting our seas we need a system in place that monitors the health of key species and can apply legal protection as necessary to conserve these vital ecosystems. This report therefore proposes a list of species which require listing under the Fifth Schedule.

Why would legal protection make a difference?

Healthy oceans are essential not only for the protection of our unique natural heritage but also for safeguarding the livelihoods which depend upon it. This report finds that many species of marine flora and fauna are threatened with extinction. Some are already known to be extinct or may be very close to it. Legal protection is an essential first step in reversing this trend. It would close all harmful commercial or non-commercial activities until such time as that species was no longer threatened. Targeted hunting, either in a commercial fishery or for recreational angling would be regulated, i.e. a licence would be required. The National Parks and Wildlife Service would oversee the licencing and ensure that conditions are attached which ensure the use of appropriate gear, handling, open seasons, etc. – as is done for existing protected species, such as deer. It would help in the designation process for MPAs, ensuring that the network will be ‘coherent’ and ‘representative’ as is required under law. Experience on land shows that legal status works in restoring the health of rare or threatened species, e.g. the pine marten or red deer. It is not the only solution to reversing declining populations but it is an essential component of an overall framework.

Examples of how this would affect real-life situations is given in the case studies below.

Case Study 1: the Angel Shark and the Crawfish in Tralee Bay

The Angel Shark, sometime called a Monkfish (but not to be confused with the Anglerfish which is also called Monkfish), is an unusual looking fish. Although a member of the shark family it does not have the classic shark shape – being flattened with a broad snout of a mouth and overlapping lateral fins. It is a large fish, up to 2.5 metres long for a fully grown female and lives in shallow water, preying on flatfish and crustaceans. They are thought to be migratory and specimens tagged in Ireland have turned up in south-eastern England, France and northern Spain¹³. Until the 1960s they were found all around our coast in shallow water with a sandy bottom. During the 1960s and 70s however they were targeted in sport angling competitions and huge numbers were taken (along with many other species). Unlike today, anglers then did not release their catches, indeed they were required to bring them ashore to verify their size or weight.

Like many shark species, the female Angel Shark gives birth to live young, bearing a relatively small number of pups (7-25). Gestation is long, up to ten months. Because of these characteristics overfishing can take a heavy toll, and species are slow to recover. It is for this reason that so many endangered species of marine life are sharks and rays. In the late 1980s Clew Bay in County Mayo and Tralee Bay in County Kerry were still considered to have ‘really large’ Angel Sharks¹⁴. In 2005 it was clear that the Angel Shark was in big trouble and it was taken off the Irish Specimen Fish List – but this was too late to save it from disappearing from many of its haunts. In recent years the Clew Bay population has been lost. Until recently Tralee Bay was the

last known location, and even here the most recent confirmed sighting was in 2015. Its conservation status is now 'critically endangered'. Is it too late to save the Angel Shark from complete extinction in Ireland?



An angling contest from the 1950s, Fenit, Co. Kerry (from the Kennelly Archive)

Tralee Bay has long been recognised as a centre for sea angling. A Bord Fáilte guide from 1957 described the fish to be caught:

..pollack, mackerel, bass, mullet, codling and plaice.[...] There is excellent pollack fishing around the Seven Hogs or Magharee Islands, and the reefs extending from there towards Kerry Head, and there is a variety of other species including cod, whiting, conger, gurnard, plaice, turbot, rays, skate and sharks. At Ballyheige, a small seaside village on the north-east shore of Tralee Bay, there is some bass fishing, and large fish have occasionally been taken.¹⁵

Today, many of these species have been chronically overfished (Cod, Whiting & Bass) and/or are on the endangered species list (Turbot, White Skate, Common Skate, Porbeagle, Tope, Common Stingray, Shagreen Ray, Undulate Ray, Spurdog, and of course the Angel Shark). Sea angling is still pursued in the area and the Tralee Bay Sea Anglers Club has been active in promoting catch and release, as well as tagging of rare species to promote research. Tralee Bay is the last known location of the Angel Shark and Common Stingray, and one of only a handful of places where White Skate is still recorded. The bay has been a refuge for these species due to its shallow nature as well as the fact that bottom trawling is not known to occur on a regular basis.

A fishery for large crustaceans, particularly Lobster and Crawfish (also known as Common Spiny Lobster) has been active in Tralee Bay for many decades (probably longer) using pots. By the 1960s however catches were declining¹⁶. During the 1990s Common Spiny Lobster was a valuable fishery nationally, with the first sale value of IEP£30 per kilo in 2000. However, the stock was under intense pressure, having collapsed by 70% from 170 tonnes in 1990 to 40 tonnes in 1999. The Marine Institute stated at this time:

The cause of this decline is widely regarded as the use of “cray nets” – tangle netting which causes considerable destruction to crustacean and fish stocks. Many, possibly the vast majority, of fishermen would like to see its use prohibited but it is still legal to use cray nets. And, if one fisherman in a community chooses to do so, his neighbours must follow suit or see him capture a disproportionate share of the stock¹⁷.

Despite identifying the problem no action was taken to restrict the use of tangle nets. A tangle net is a weighted net which, as its name suggests, entangles creatures which wander into it. They are indiscriminate, but efficient. The longer the net is in the water, referred to as the soak time, the more it can catch, while if a net is lost it can continue catching marine life indefinitely (known as ‘ghost fishing’). A study by An Bord Iascaigh Mhara in 2013 found that tangle nets were responsible for incidental by-catch of Harbour Porpoise, sea birds, Ocean Sunfish and high numbers of Common Seal, Grey Seal and the critically endangered Common Skate¹⁸. Angel Shark does not appear on this list as by 2013 it had already disappeared from most of its former range, however it is known to have been caught in tangle nets set in Tralee Bay.

The catch of Crawfish has reduced further in the intervening years and while 40 tonnes was a low in 1999 in 2015 only 25 tonnes were caught. The Crawfish itself is now listed as an endangered species by the IUCN. However, with unit prices still high, and few restrictions on the fishery, the incentive to not only maintain, but increase, fishing effort persists. As the stock declines, soak times increase and the number of nets increases, thereby placing the stock and other marine life under more sustained pressure.

Faced with the total extinction of the Angel Shark the Minister for Agriculture, Food and the Marine, in 2011, introduced a minimum landing size for Crawfish and a prohibition on the use of nets in the fishery in North Kerry, including Tralee Bay. However, the wording of the regulation, that “it is prohibited to fish or attempt to fish for crawfish by means of nets” within the area specified, suggests it remains legal to fish for other species, such as Spider Crab, using existing gear. This has meant that in effect, nothing has changed on the ground. There is no prohibition on the sale of Crawfish so animals caught ‘incidentally’ can legally enter the market.

The lack of management in Tralee Bay has led not only to devastating ecological impacts, but has also drastically reduced the economic opportunities for local fishermen and other users of the sea.

If our proposal were to be accepted then not only the Angel Shark but White Skate, Common Stingray and even the Crawfish itself would become legally protected species. This would imply an obligation on the State to ensure that protected species be restored to healthy numbers. It would force the State and its agencies to devise a management plan for Tralee Bay and the North Kerry area which would detail how this would happen. It would almost certainly mean a total prohibition on the use of

all nets and the closing of the Crawfish fishery. It would promote the designation of the area as an MPA, with the aim of restoring not only the threatened species but the entire ecosystem.

At first this may be seen as a threat to local fishing interests. However, wise long-term management which restores healthy stocks of fish and crustaceans, would mean increasing the value of the fishing opportunities and assuring incomes for future generations. Legal protection would not mean permanently closing the fishery, but that the fishery could only reopen when Crawfish is no longer an endangered species.

Case Study 2 – Sport Angling and Conservation

Sea angling in Ireland is much diminished compared to its heyday the 1960s when Irish waters were considered among the richest in Europe. Nevertheless, a number of sea angling boats continue to operate around the coast. Today's anglers increasingly practice catch and release although this will depend upon the species being targeted. Inland Fisheries Ireland, on its website, says: "No matter what species you fish for Catch and Release plays an important role¹⁹." However, with the exception of Sea Bass, there is no legislation to support conservation measures. The IWT feels that more could be done to promote conservation among the sport angling community by better highlighting the need for catch and release and the conservation status of individual species where this is available. While the vast majority of sea anglers are supportive of, or even actively involved in, conservation measures there nevertheless remains a need for legal protection for certain species. This is highlighted in a number of recent incidents.



'Trophy' Bluntnosed Sixgill Shark landed in 2009

In 2009 a Bluntnosed Sixgill Shark, weighing 480kg, was landed by a tourist in Co. Clare, setting a record for the species²⁰. The massive female shark was killed and landed for no other reason than to record the weight and get a trophy photograph, for which the animal was indignantly hoisted onto a forklift truck. This shark species is listed as 'near threatened' in Irish waters and little is known of its population trends. There was an understandable public outcry but neither the tourist, nor the boat operator had broken any law.

More recently, concerns have arisen regarding the handling of sharks, and the effect this has on their survivability despite being released alive. Although IFI have produced guidelines to ensure fish are correctly treated there seems to be little awareness of these. One of their guidelines is to "keep the fish in the water at all times for an optimal release". The Shark Trust in the UK has more comprehensive guidance including:

- if removing the shark from the water, lift it horizontally while supporting as much of the abdomen as possible.
- As sharks have no ribcage, abdominal support to protect soft organs is vital.
- Never lift a shark, skate or ray only by its tail. Take care not to squeeze the gills as these delicate structures can easily be damaged.²¹



Angler with Porbeagle Shark

The photo above was posted to a Twitter feed in 2016 and shows a critically endangered Porbeagle shark clearly being handled in a way that threatens the shark's ability to survive upon release.

Another issue is the pursuit of sharks from kayaks. This technique relies on 'playing' the shark for a long time before bringing it near the boat. The image below is a still from a video posted on YouTube which shows the shark 'belly up', and clearly exhausted. IFI guidelines clearly state that this should be avoided. Other images from kayak fishing show sharks dangling vertically in the water – another clear indication that they have been exhausted.



Kayak fishing Porbeagle Shark off Donegal

While greater awareness of existing guidelines is essential, these examples clearly show that legal protection for certain species is needed. Under the system that the IWT is proposing, angling boat operators, or individual anglers, would require a licence from the NPWS to target certain species, such as endangered sharks and rays. The NPWS can issue licences with conditions attached, e.g. to comply with IFI guidelines on handling and treatment. Kayak fishing for sharks should be prohibited.

This system would do nothing to diminish the enjoyment of sport angling, would promote conservation of the marine environment, and by doing so, would better advertise Ireland as a destination abroad for responsible tourism. Indeed, the purpose of legal protection would ultimately be to restore diminished populations of threatened species and this surely would benefit the local tourist/sea angling industry.

How did we choose the species to be listed?

Any proposed list must be based on science and must not be so unwieldy that it is unworkable, or designates a too high number of species. It would be impractical to designate all species for protection, as was done for birds, amphibians, reptiles and most of our mammals. There are so many species that this would render the exercise meaningless. We therefore applied the following criteria:

- Listing on the IUCN Red List as threatened or near threatened (global, European or Irish)
- Listing on the EU's Habitats Directive
- Evidence for marked decline in Irish waters
- Very localised in Ireland or unique population (e.g. one or two sites)

Using these criteria would include certain species of commercially important fish such as Blue Fin Tuna (near threatened on the IUCN red list) or Cod (marked decline in all waters since the early 1980s). However, these species are already managed under the TAC system and it was considered that added legal protection would not contribute to their conservation management. These species are consequently excluded from our list.

In one instance, Turbot, TACs are allocated under the CFP but not in Irish waters and therefore we included the species on our list.

In the case of sharks, of which the CFP lists six deep-sea species which are present in our waters (Gulper Shark, Leafscale Gulper Shark, Portuguese Dogfish, Kitefin Shark, Velvet Belly and Bluntnosed Sixgill Shark) and Spurdog, a zero TAC has been ascribed for a number of years. However, both Spurdog and Bluntnosed Sixgill Shark are found within the 12-mile limit and are vulnerable to unrecorded catches (e.g. for bait or in recreational fisheries). For this reason, it is appropriate to leave these two species on the list.

A summary of the list of 48 species is presented on the next page and is followed by a more detailed description.

IUCN abbreviations:

CR – Critically Endangered

EN - Endangered

VU – Vulnerable

NT – Near Threatened

LC – Least Concern

DD – Data Deficient

NE – Not Evaluated

Other abbreviations:

CFP – Common Fisheries Policy

TAC – Total Allowable Catch

No	Common names	Scientific name	NBN current name authority	Taxa groups	IUCN status	Other reason for listing
Bony Fish						
1	Common sturgeon	<i>Acipenser sturio</i>	Linnaeus, 1758	bony fish	CE	Habitats Directive
2	Twaite shad	<i>Alosa fallax</i>	Lacepède, 1803	bony fish	VU	Habitats Directive
3	Atlantic Wolf-fish	<i>Anarchichas lupus</i>	Linnaeus, 1758	bony fish	DD	Evidence of steep decline
4	Common eel	<i>Anguilla anguilla</i>	Linnaeus, 1758	bony fish	CE	
		<i>Hippocampus</i>				
5	Short-Snouted Seahorse	<i>hippocampus</i>	Linnaeus, 1758	bony fish	DD	Limited distribution
		<i>Hippoglossus</i>				
6	Atlantic Halibut	<i>hippoglossus</i>	Linnaeus, 1758	bony fish	VU	Possibly extinct
7	Sunfish	<i>Mola mola</i>	Linnaeus, 1758	bony fish	VU	
8	Atlantic salmon	<i>Salmo salar</i>	Linnaeus, 1758	bony fish	VU	
9	Turbot	<i>Scophthalmus maximus</i>	Linnaeus, 1758	bony fish	VU	
Lampreys						
10	Sea Lamprey	<i>Petromyzon marinus</i>	Linnaeus, 1758	fish	NT	Habitats Directive
11	River Lamprey	<i>Lampetra fluviatilis</i>	Linnaeus, 1758	fish	LC	Habitats Directive
Elasmobranchs						
12	Starry ray	<i>Amblyraja radiata</i>	Donovan, 1808	shark/skate/ray	VU	
13	Basking Shark	<i>Cetorhinus maximus</i>	Gunnerus, 1765	shark/skate/ray	EN	
14	Rabbitfish	<i>Chimaera monstrosa</i>	Linnaeus, 1758	chimaera	NT	
15	Common Stingray	<i>Dasyatis pastinaca</i>	Linnaeus, 1758	shark/skate/ray	EN	
16	Common skate complex	<i>Dipturus batis s.l.</i>	Linnaeus, 1758	shark/skate/ray	CR	
17	Norwegian skate	<i>Dipturus nidarosiensis</i>	Storm, 1881	shark/skate/ray	NT	
18	Long-nosed skate	<i>Dipturus oxyrinchus</i>	Linnaeus, 1758	shark/skate/ray	VU	
19	Tope Shark	<i>Galeorhinus galeus</i>	Linnaeus, 1758	shark/skate/ray	VU	

20	Blunt-nose Six-gill Shark	<i>Hexanchus griseus</i>	Bonnaterre, 1788	shark/skate/ray	NT	
21	Shortfin Mako	<i>Isurus oxyrinchus</i>	Rafinesque-Schmaltz, 1810	shark/skate/ray	VU	
22	Porbeagle Shark	<i>Lamna nasus</i>	Bonnaterre, 1788	shark/skate/ray	CR	
23	Sandy Ray	<i>Leucoraja circularis</i>	Couch, 1838	shark/skate/ray	NT	
24	Shagreen ray	<i>Leuraja fullonica</i>	Linnaeus, 1758	shark/skate/ray	VU	
25	Blue shark	<i>Prionace glauca</i>	Linnaeus, 1758	shark/skate/ray	NT	
26	Thornback ray	<i>Raja clavata</i>	Linnaeus, 1758	shark/skate/ray	NT	
27	Undulate ray	<i>Raja undulata</i>	Lacepède, 1802	shark/skate/ray	EN	
28	White or Bottle-nosed Skate	<i>Rostroraja alba</i>	Lacepède, 1803	shark/skate/ray	CR	
29	Spiny Dogfish / Spurdog	<i>Squalus acanthias</i>	Linnaeus, 1758	shark/skate/ray	EN	
30	Angel Shark	<i>Squatina squatina</i>	Linnaeus, 1758	shark/skate/ray	CR	
Crustaceans						
31	Crawfish	<i>Pallinuris elaphas</i>	Fabricius, 1787	crustacean	VU	
32	Goose Barnacle	<i>Pollicipes pollicipes</i>	Gmelin, 1789	crustacean	NE	Only found in West Cork
Echinoerms						
33	Purple sea urchin	<i>Paracentrotus lividus</i>	Lamarck, 1816	echinoderm	NE	Evidence of significant decline
Cnidarians						
34	Sea-fan Anemone	<i>Amphianthus dohrnii</i>	von Koch, 1878	cnidarian	NE	Found in one area off West Cork
35	Pink Sea-fan	<i>Eunicella verrucosa</i>	Pallas, 1766	cnidarian	VU	
36	Kaleidoscope Jellyfish	<i>Haliclystus auricula</i>	Rathke, 1806	cnidarian	NE	Limited distribution

37	Coral Maërl	<i>Lithothamnion corallioides</i>	P.L. Crouan & H.M. Crouan P.L. Crouan & H.M. Crouan Pallas Adey & D.L. McKibbin	alga	NE	Habitats Directive
	Common Maërl	<i>Phymatolithon calcareum</i>	McKibbin	alga	NE	Habitats Directive
38	A Stalked Jellyfish	<i>Lucernariopsis campanulata</i>	Lamouroux, 1815	cnidarian	NE	Limited distribution
39	Fireworks Anemone	<i>Pachycerianthus multiplicatus</i>	Carlgren, 1912	cnidarian	NE	Only found off W Cork and Galway
40	Northern Sea Fan	<i>Swiftia pallida</i>	Madsen, 1970	cnidarian	NE	
Molluscs						
41	Ocean quahog	<i>Arctica islandica</i>	Linnaeus, 1767	mollusc	NE	Very limited distribution
42	Fan Mussel	<i>Atrina fragilis</i>	Pennant, 1777	mollusc	NE	Limited distribution
43	Native Oyster	<i>Ostrea edulis</i>	Linnaeus, 1758	mollusc	NE	Limited distribution; significant decline in Irish waters
Algae						
44	Egg Wrack	<i>Ascophyllum nodosum ecad mackaii</i>	Turner S.M. Baker & M.H. Bohling	Alga	NE	Known only from SE coast, Shannon estuary and W Galway
45	Red Algae	<i>Cruoria cruoriaeformis</i>	P.L. Crouan & H.M. Crouan Denizot	Alga	NE	Known only from maerl beds in W Galway & NI coast
46	Red Algae	<i>Dermocorynus montagnei</i>	P.L. Crouan & H.M. Crouan	Alga	NE	Recorded only from Kilkieran bay
47	Brown Algae	<i>Fucus distichus</i>	Linnaeus	Alga	NE	Known from only 3-4 locations
48	Peacock's tail	<i>Padina pavonica</i>	Linnaeus Thivy	alga	NE	Only found off SW coast

1	Common sturgeon <i>Acipenser sturio</i> Red List status: Critically Endangered²²/ EU Habitats Directive Annex II
---	--

A very large fish found close to shore and entering rivers to spawn. Records of single fish occurred in Irish estuaries up to the 1960s²³ but can now be considered regionally extinct. There is evidence of it having been widespread, but probably never common, in the 17th Century²⁴. It was a 'royal fish', i.e. any fish caught was automatically the property of the Crown. It can live up to 100 years and so is a classic long-lived, slow growing fish, a characteristic that has made it vulnerable to over-exploitation. It could potentially be the subject of a reintroduction programme, although source populations in Europe remain very low.

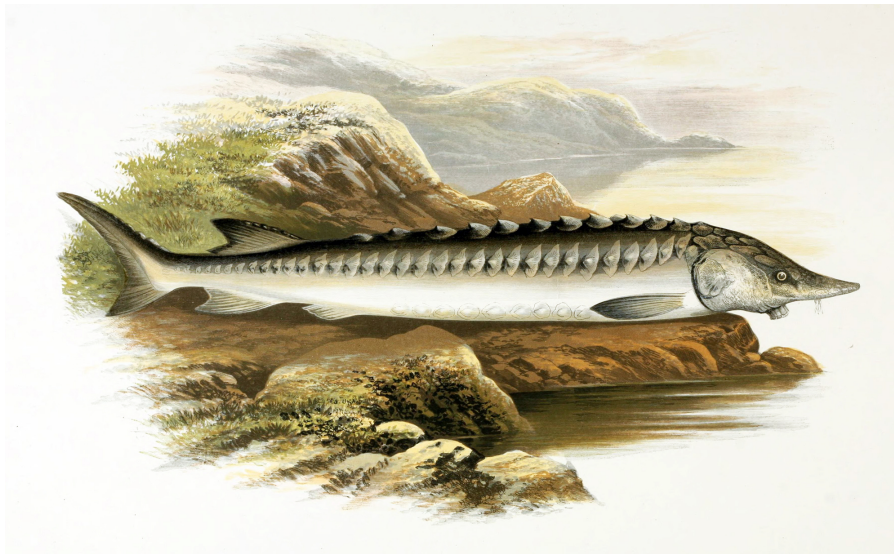


Image by Alexander Francis Lydon - British fresh water fishes, Public Domain,

2	Twaite shad <i>Alosa fallax fallax</i> Red List status: Vulnerable²⁵/ EU Habitats Directive Annex II
---	--



A fish of estuarine waters, recorded only from the mouths of the Rivers Boyne, Slaney, Barrow/Nore/Suir and Munster Blackwater. Its population is thought to have declined dramatically in recent times and it continues to be threatened from by-catch in commercial fisheries and pollution²⁶. All known estuary locations are legally designated for its protection as Special Areas of Conservation.

Image: "Alosa fallax" by © Hans Hillewaert. Licensed under CC BY-SA 4.0 via Wikimedia Commons - http://commons.wikimedia.org/wiki/File:Alosa_fallax.jpg#mediaviewer/File:Alosa_fallax.jpg

3

Atlantic Wolf-fish *Anarchichas lupus*
Red List status: Data deficient²⁷



Image By © Citron /, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=23220856>

It appears that the Atlantic Wolf-fish was never common in Irish waters but numerous records do exist from both the east and west coasts up to 1994²⁸. They are solitary, long-lived and slow to mature. Of concern is that no specimen has been recorded from the Irish Sea or western near shore waters in recent years²⁹.

4

Common eel *Anguilla anguilla*
Red List status: Critically Endangered³⁰



Image c. Ron Offermans

Once a common and abundant species this well known fish undertakes an epic migration from the Sargasso Sea to the rivers and lakes of Europe. While it has been subject to conservation measures in recent years (specifically a National Management Plan³¹), including the closing of commercial fisheries in Lough Neagh, its decline has been precipitous. It is likely to be suffering from the cumulative pressures from pollution, climate change, river dredging, and barriers to movement in fresh water (weirs, dams etc.).

5

Short-snouted Seahorse *Hippocampus hippocampus*
Red List status: Data deficient³²

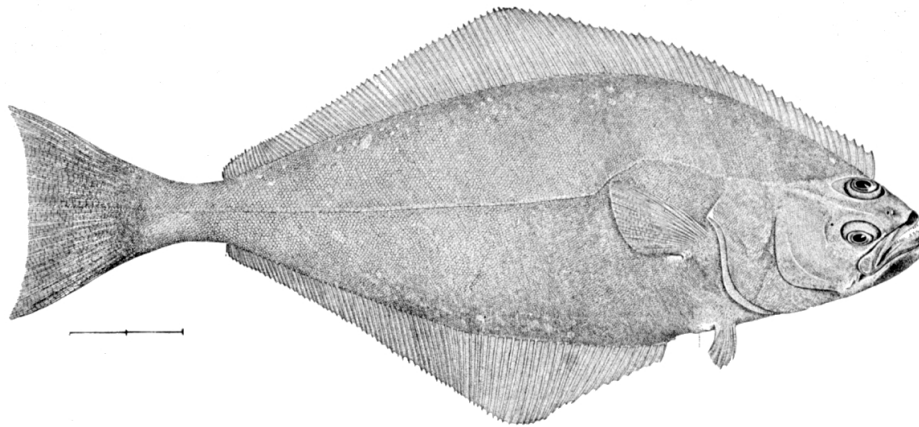


There are records of the short-snouted seahorse only from the coasts of Dublin, Clare, the coast of East Cork and Belfast Lough³³. Seahorses are charismatic marine animals, recognisable and well known for the fact that females lay eggs into a pouch on the male's abdomen. The male then carries them and 'gives birth' to live young.

Image by © Hans Hillewaert

6

Atlantic Halibut *Hippoglossus hippoglossus*
IUCN Status: Vulnerable³⁴



Public Domain, <https://commons.wikimedia.org/w/index.php?curid=677773>

The Atlantic Halibut is a large fish which is sometimes found on restaurant menus. This may be wild caught (from either the Atlantic or Pacific) or farmed³⁵. It is the largest of the flat fish and can reach up to 3-4m in length and weigh around 300kg. While probably never very numerous in Irish waters they were found along the Atlantic coast in particular, in shallow inlets such as Clew Bay and Galway Bay. It may now be extinct entirely from Irish waters as there are no records from recent trawl surveys³⁶.

7

Sunfish *Mola mola*
Red list status: Vulnerable, decreasing³⁷



The sunfish is the largest (by weight) bony fish in the world and wanders the oceans far and wide. While not common it frequently turns up in Irish waters. Although assessed as 'vulnerable' globally in European waters is it 'data deficient'. It may be vulnerable to long-line and other open water fisheries. It has been recorded as incidental by-catch in set nets also.

Image: Per-Ola Norman , Public Domain

8

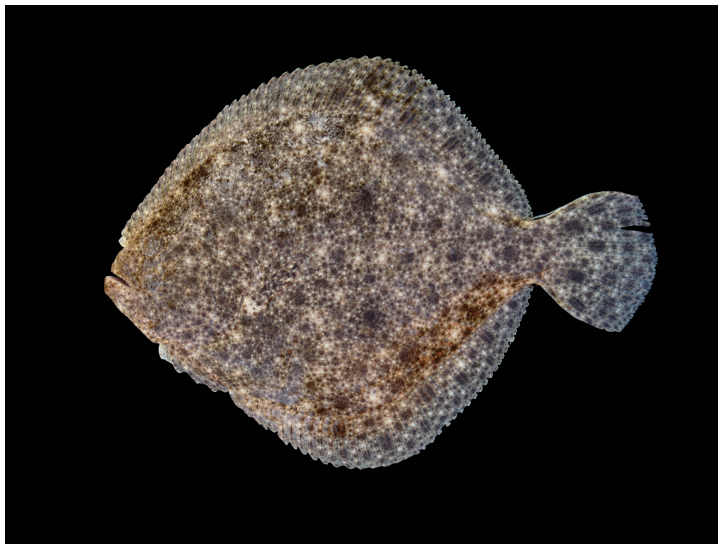
Atlantic Salmon *Salmo salar***Red list status: Vulnerable³⁸; Habitats Directive Annex II & V**

Tim Knepp

Image by Timothy Knepp, U.S. Fish and Wildlife Service

The king of fish, the salmon needs little introduction. The numbers returning to Irish rivers has declined sharply since the 1970s. Commercial drift net fishing for salmon was banned in 2007 and has failed to show any sign of recovery since, perhaps due to climate change. While the fish enjoys strong protection during its freshwater life stages, this does not extend to the marine environment.

9

Turbot *Scophthalmus maximus***Red List status: Vulnerable³⁹**

Turbot is a large flat fish which is very popular among diners. It was once commonly found in shallow inshore waters but recent trawl surveys record it at low densities only, albeit still widely distributed⁴⁰. It is not managed by total allowable catch (TAC) in Irish waters.

Image by © Hans Hillewaert /, CC BY-SA 3.0

10	River Lamprey <i>Lampetra fluviatilis</i> Red List status: Least Concern⁴¹/ Habitats Directive Annex II, V
----	--



River Lamprey spawn in freshwater and spend the early part of their lives as filter- feeders in mud in slow moving rivers. After metamorphosis they migrate to coastal seas where they are parasitic on larger fish. They are protected under Annex II of the Habitats Directive and 10 SACs are designated for them in freshwater. However

this protection does not extend to salt water where they spend much of their adult life.

Image by M.Buschmann - Germany, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=269108>

11	Sea Lamprey <i>Petromyzon marinus</i> IUCN Status: Near Threatened⁴²/ Habitats Directive Annex I
----	--



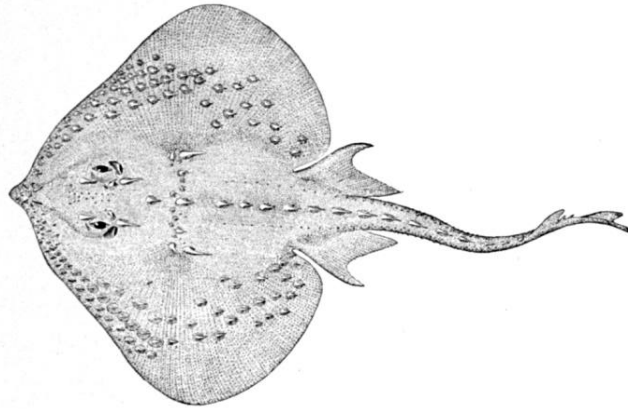
By Ellen Edmonson and Hugh Chriss - <http://pond.dnr.cornell.edu/nyfish/fish.html>, Public Domain,
<https://commons.wikimedia.org/w/index.php?curid=4964659>

Sea Lampreys are anadromous fish, living much of their lives as sea but migrating to freshwater to spawn. These are a primitive type of fish, which lack jaws and are parasitic on larger animals, such as whales or Basking Shark. They are protected in freshwater under Annex I of the Habitats Directive and 12 SACs have been designated for them. This protection does not stretch to salt water however and little is known of their movements or biology during this phase of their lives.

12

Starry ray *Amblyraja radiata*
Red List status: Vulnerable⁴³

Occurring around Irish waters and throughout much of the North Atlantic this ray, once discarded by fishermen due to its size and spines, is now targeted commercially⁴⁴. It is assessed as 'least concern' in the European red list of marine fishes. Despite this there is little information on its current status in Irish waters and available records suggest numbers are low⁴⁵. The Irish Red list does not assess it, saying that there are "few records/probably vagrant"⁴⁶.



"Amblyraja radiata". Licensed under Public Domain via Wikimedia Commons - http://commons.wikimedia.org/wiki/File:Amblyraja_radiata.jpg#mediaviewer/File:Amblyraja_radiata.jpg

13

Basking Shark *Cetorhinus maximus*
Red List Status: Endangered⁴⁷



The Basking Shark is the second largest fish in the world and can be found throughout Irish waters, albeit on a seasonal basis. Once hunted from open boats with harpoons for its oil it is illegal to fish for, retain on board, to tranship or to land Basking Sharks in all EU waters. However Ireland is the only country where Basking Sharks are not a legally protected species. Much knowledge has been gained on the biology and ecology of these species thanks to the work of the Basking Shark Study Group and their programme of radio tracking and DNA sampling. There is currently an initiative underway to create Ireland's first shark reserve off Malin Head in Co. Donegal.

Ireland undoubtedly has seen a reduction in the population up to the point where commercial fishing came to a halt in the 1980s. How great this reduction has been, and to what degree numbers are rebounding, remains a matter of speculation. Although all trade in Basking Sharks is now prohibited they are still vulnerable from commercial pelagic trawling and gill netting, where they can be caught as bycatch. There is currently no obligation on fishing vessels to report such incidents.

Image: "Basking Shark". Licensed under Public Domain via Wikimedia Commons - http://commons.wikimedia.org/wiki/File:Basking_Shark.jpg#mediaviewer/File:Basking_Shark.jpg

14

Rabbitfish *Chimaera monstrosa*
Red List status: Near Threatened⁴⁸



Sogning - Own work, Public Domain, <https://commons.wikimedia.org/w/index.php?curid=1579476>

A demersal fish of deeper waters (200-500m) its range extends from the Arctic around the Atlantic coast of Europe and into the Mediterranean. Of little commercial significance but may be vulnerable to by-catch in shrimp fisheries. There are records from Irish coastal waters off Donegal, Galway and Kerry. A 1999 report states: "The species is regarded as common in deep offshore waters but rare within the 183m line in Irish waters. However, Wheeler (1969) remarked that the species undertakes an inshore migration in summer and this bring them into shallower water, often 100m or less. He also suggested that this inshore migration is probably connected with the breeding biology of the species and observed that most of those taken in shoal water were large females.⁴⁹". The Irish Red List observes that "on the basis of a future suspected decline of >20% in three generations [...] it may soon qualify for Vulnerable".

15

Common Stingray *Dasyatis pastinaca*
Red List status: Engangered⁵⁰



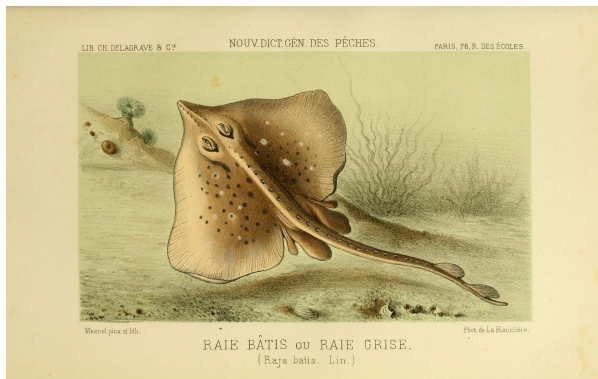
The stingray was reported to have been "occasionally taken off the south-west coasts" in the early 1970s⁵¹. In recent times it is only recorded from Tralee Bay in County Kerry where it is threatened with a tangle net fishery for Crawfish. The Irish Red List states "The seasonally shallow depth distribution makes the common stingray more vulnerable to

small-scale inshore fisheries than to offshore trawling."

By Liné1 - Picture taken with my IXUS 800 IS, CC BY 2.5, <https://commons.wikimedia.org/w/index.php?curid=1748735>

16

Common Skate complex *Dipturus batis s.l.*
Red List status: Critically Endangered⁵²



This very large skate was once common all around the Irish coast but is now scarce. Was considered extinct in the Irish Sea although unconfirmed reports suggest this may not be the case. Particularly targeted by sports anglers through the 1950s and 60s it is now subject to a tagging programme by Inland Fisheries Ireland and catch and release is recommended. Under EU Regulation it is prohibited to fish for, to

retain on board, to tranship or to land Common Skate in Irish waters (ICES areas VI & VII).

Image by Duméril, Auguste Henri André; La Blanchère, Henri de; Mesnel, A.

17

Norwegian Skate *Dipturus nidarosiensis*
Red List status: Near Threatened⁵³

Similar in appearance to other *Dipturus spp.* it is a northerly species. However recent surveys have shown it to be present along the continental shelf to the south-west of Ireland as well as the Celtic Sea⁵⁴.

18

Long-nosed Skate *Dipturus oxyrinchus*
Red List status: Vulnerable⁵⁵



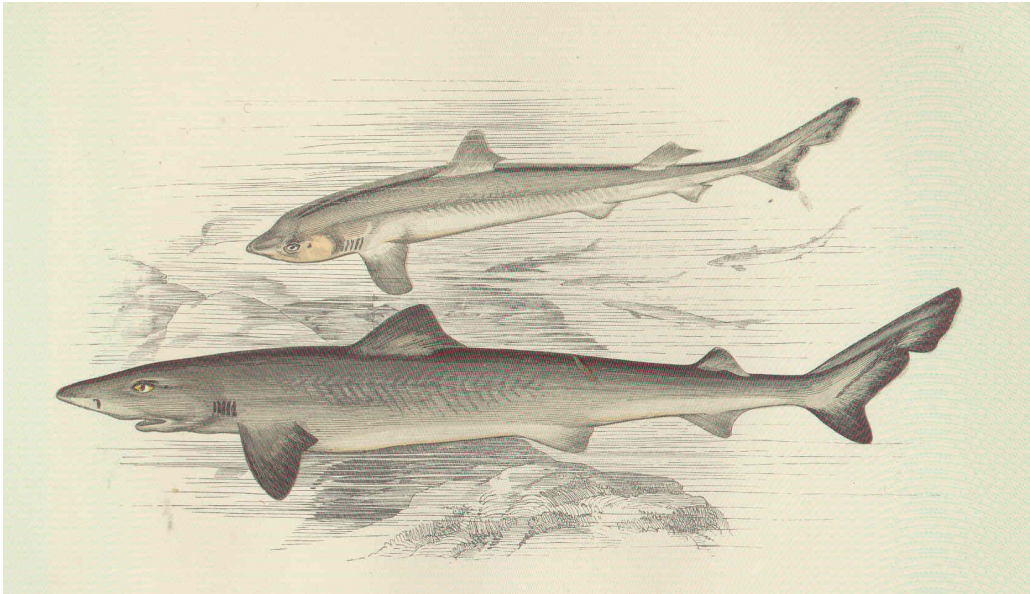
Image by Gervais et Boulart -
 Les poissons Gervais, H.,
 Public Domain,

<https://commons.wikimedia.org/w/index.php?curid=19132248>

Similar in appearance to the Common Skate, the Long-nosed Skate inhabits deeper waters. Its range includes the Atlantic coast but is not recorded from the Irish Sea. Never considered abundant but regarded as reasonably common, yet few data are available on its distribution or abundance in Irish waters. Trawl surveys in Irish waters suggest it is not common⁵⁶. The Irish Red List states: "Because of its wide depth range it is vulnerable as a by-catch in almost all mixed demersal fisheries, including deepwater fisheries on the slopes of the continental shelf and the Rockall Bank."

19

Tope *Galeorhinus galeus*
Red List status: Vulnerable⁵⁷



By Jonathan Couch - Couch, Jonathan (1877) History of the Fishes of the British Islands, London: George Bell & Sons, Public Domain, <https://commons.wikimedia.org/w/index.php?curid=42484155>

This small shark is found all around the Irish coast and is a popular sport fish. Like many shark species they give birth to live young. They are caught as by-catch in long-line fisheries but may also be of commercial value. Under EU Regulation it is prohibited to fish for, to retain on board, to tranship or to land Tope in Irish waters (ICES areas VI & VII) however this only applies to the use of long-lines.

20

Blunt-nosed Sixgill Shark *Hexanchus griseus*
IUCN Status: Near Threatened⁵⁸

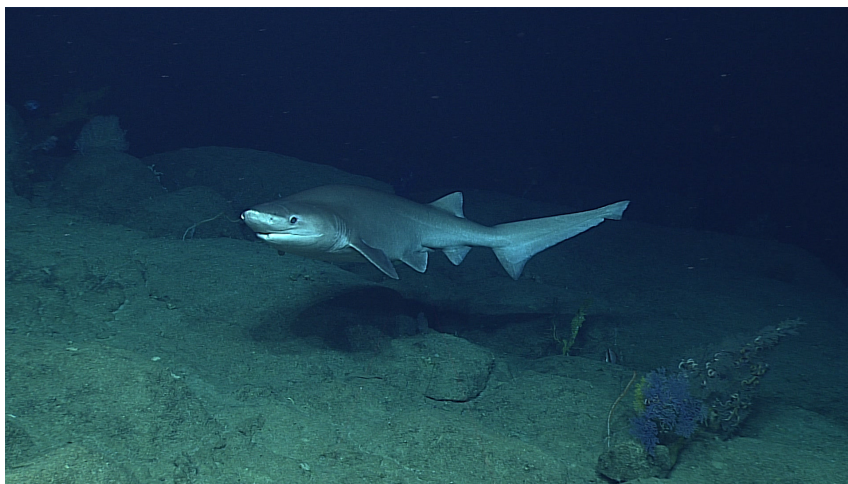


Image by NOAA Ocean Explorer from USA - Sixgill Shark, CC BY-SA 2.0

Although the European Red List of marine fishes lists the Blunt-nosed Sixgill Shark as 'least concern' the Irish list assessed it as 'near threatened'. This late maturing, slow growing shark can grow to over 5m in length and is believed to be long-lived. It is occasionally targeted by anglers in Irish waters and can be caught as by-catch in a variety of commercial fisheries⁵⁹.

21

Short-finned Mako *Isurus oxyrinchus*
Red list status: Vulnerable⁶⁰



Image by NOAA <http://na.nefsc.noaa.gov/sharks/species/mako.html>, Public Domain

The short-finned Mako shark is similar in appearance to the Porbeagle shark and many historic Irish records are more likely to be the latter. Considered to be “possibly the fastest, most muscular and active shark in the world”. Although they are globally listed by the IUCN as vulnerable at a European level they are ‘data deficient’. The Irish Red list did not evaluate it saying it was “vagrant, rarely recorded”.

22

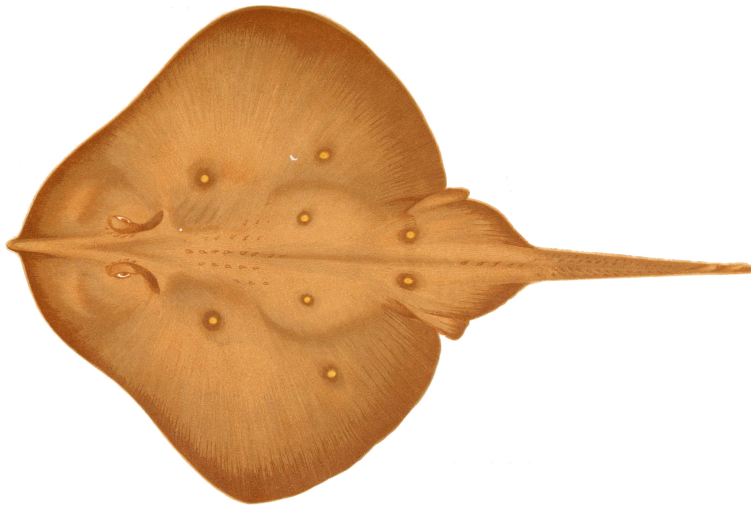
Porbeagle *Lamna nasus*
Red list status: Critically endangered⁶¹



By NMFS, E. Hoffmayer, S. Iglésias and R. McAuley [Public domain], via Wikimedia Commons

Once a common shark around Irish waters they were heavily fished by recreational anglers during the 1960s. The Irish Red List states: “Porbeagles have undergone significant declines in abundance due to commercial exploitation: over 90% decline from baseline in the Northeast Atlantic and over 80% decline from baseline in the northwest Atlantic”. Inland Fisheries Ireland today recommends catch and release and many anglers participate in conservation programmes. Porbeagle are still caught in recreational fisheries off the west coast, but this is unregulated and fish may be harmed by inappropriate fishing methods or handling when caught, which may reduce their survivability upon release. Under EU Regulation it is prohibited to fish for, to retain on board, to tranship or to land Porbeagle in all EU waters.

23	Sandy Ray <i>Leucoraja circularis</i> Red List status: Near Threatened⁶²
----	--



This is a ray of deeper waters, inhabiting the outer continental shelf to 275m and deeper. It is not targeted in industrial fisheries but is caught as by-catch in bottom trawls and long-lines⁶³.

Public Domain,

<https://commons.wikimedia.org/w/index.php?curid=18075841>

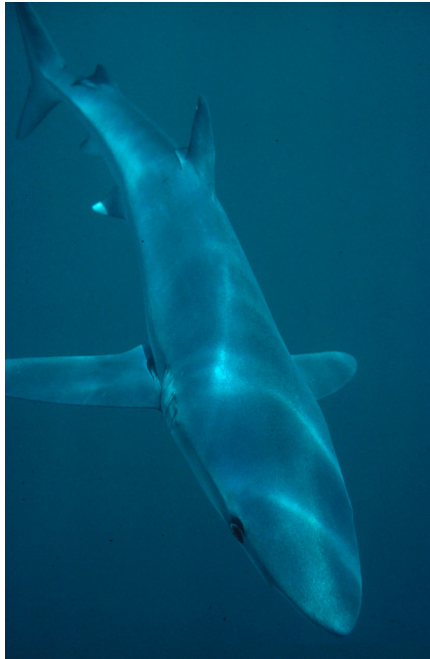
24	Shagreen Ray <i>Leucoraja fullonica</i> Red List status: Vulnerable⁶⁴
----	---



By Couch, Jonathan; Lydon, A. F. - <http://www.flickr.com/photos/biodivlibrary/7556007504>, Public Domain

This is one of a number of species of ray which is rarely the subject of targeted fisheries but can be caught and sold as by-catch. It may be that rays and sharks can survive discarding however hard evidence is lacking. The Shagreen Ray is found around the Irish coast although most recent records suggest it is no longer common in the Irish Sea⁶⁵ The Irish Red Data List states: "Catch rates from the French trawl survey in the Celtic Sea show a decline of about 65% since the late 1990s".

25	Blue Shark <i>Prionace glauca</i> Red List status: Near Threatened⁶⁶
----	--



This is the most heavily fished shark in the world and a common ingredient in Asian shark-fin soup. According to ICES in the waters around Ireland “they are subject to a variety of fisheries, both recreational and directed (long-lines and gillnet) as well as by-catch in offshore tuna fisheries”⁶⁷. While more recent advice suggests it is not being overfished there are few data on its population⁶⁸. It is not subject to any landing obligation and no catch limits are set although removing the fins and discarding the body has been prohibited in EU waters since 2012. It is also important commercially for sport angling.

Image: Public Domain,
<https://commons.wikimedia.org/w/index.php?curid=32043>

26	Thornback Ray <i>Raja clavata</i> Red List status: Near Threatened⁶⁹ (Ireland: Least Concern⁷⁰)
----	--



Many species of rays have been harvested for human consumption but catches are not recorded on a species by species basis. Thornback Rays are believed to have diminished due to fishing pressure and are discarded in unknown quantities when trawling for other species. Total Allowable Catches (TAC) are set on an annual basis for skates and rays as a whole. It is unknown whether catches are sustainable in some areas while by-catch will be allowed to continue under

the EU’s ‘landing obligation’. It may be that rays and sharks can survive discarding however hard evidence is lacking. The Irish Red Data Book suggests it is increasing in number and does not warrant the ‘threatened’ or ‘near threatened’ status in these waters.

Image By © Hans Hillewaert, CC BY-SA 4.0, <https://commons.wikimedia.org/w/index.php?curid=4987107>

27

Undulate Ray *Raja undulata*
Red List status: Endangered⁷¹



Image By Raja_undulata.jpg: jmereloderivative work: Haplochromis (talk) - Raja_undulata.jpg, CC BY-SA 2.0

Along the Irish coast the Undulate Ray was known to be common in Tralee Bay, as well as Brandon Bay and Dingle Bay although there are records from other parts of the coast⁷². The Irish Red Data lists suggests that there has been a 60-80% decline since 1981. Under EU Regulation it is prohibited to fish for, to retain on board, to tranship or to land Undulate Ray however this only extends to ICES area VI (waters west of Scotland).

28

White or Bottle-nosed skate *Rostroraja alba*
Red List status: Critically Endangered⁷³



Image by Theo Modder - <http://www.fishbase.org/photos/thumbnaillsummary.php?ID=7613#>, CC BY 3.0

The distribution of the White Skate extends along the south coast of Ireland into the Bay of Biscay. This large skate has probably been confused with Common Skate so may be historically under-recorded. Over-exploitation has resulted in extreme scarcity in the North Atlantic⁷⁴. Many records from the west of Ireland date from the 1990s or earlier although it is still believed to be present in Tralee Bay, County Kerry. Because of its slow reproductive rate it is considered to have 'very high vulnerability' to overfishing. The Irish Red Data Lists states: "This species is especially vulnerable to coastal fisheries using static nets. In Tralee Bay, one of its known refuges, it is particularly vulnerable to static net fisheries targeting crustaceans." Under EU Regulation it is prohibited to fish for, to retain on board, to tranship or to land White Skate in Irish waters (ICES areas VI & VII).

29

Spiny Dogfish/Spurdog *Squalus acanthias*
Red List status: Endangered⁷⁵

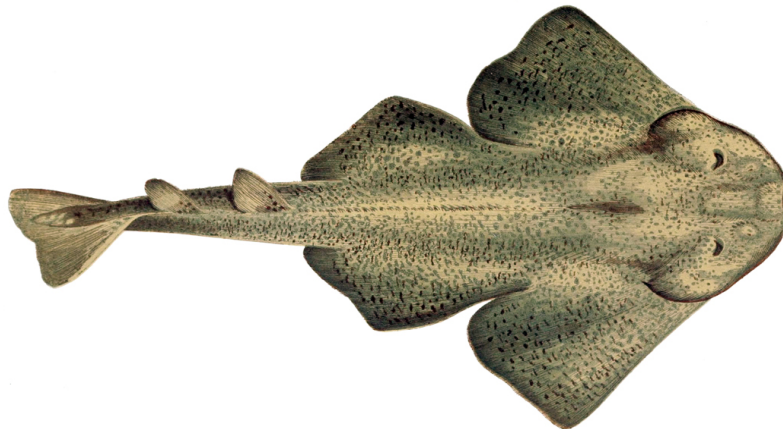


By Doug Costa, NOAA/SBNMS - https://marinelife.noaa.gov/media_lib/preview.aspx?ID=7299&p=img, Public Domain

The Spurdog was once a common predator in Irish coastal waters, shoaling in large 'packs'. It is a small shark but has the longest 'gestation period' in the animal world – females release live young after about two years. This slow rate of reproduction has left it very vulnerable to overfishing and its population in Irish waters is now considered seriously depleted. An ICES assessment puts the decline in the North East Atlantic at 81%⁷⁶. A Marine Institute assessment in 2012 stated that "the stock suffered a high fishing mortality for more than four decades, and was not managed during this time"⁷⁷.

30

Angel Shark *Squatina squatina*
Red List status: Critically Endangered⁷⁸

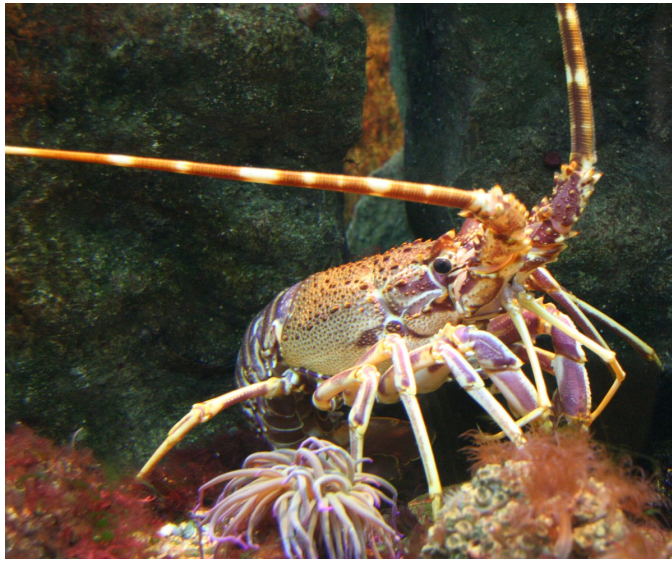


By Gervais et Boulart - Les poissons Gervais, H., Public Domain

This unusual shark, also referred to as a Monkfish, is a bottom-dwelling fish measuring up to 2m in length. Once found all around the coast, in shallow water inlets, estuaries and bays, in recent years they have been recorded only from Tralee Bay in County Kerry. Even here the last confirmed record of a live specimen is from 2015, when one was caught (and released) on a rod and line. Tralee Bay has been the location of a tangle net fishery for Crawfish (vulnerable), which has been implicated in recent declines. The Irish Red Data list suggests its decline has been up to 95%. Under EU Regulation it is prohibited to fish for, to retain on board, to tranship or to land Angel Shark in EU waters.

31

Crawfish/Common Spiny Lobster *Palinurus elaphas*
Red List status: Vulnerable⁷⁹



The common spiny lobster is found throughout the Atlantic coast from Antrim to Waterford. A 'priority species' in Northern Ireland where it is illegal to land specimens which are mutilated or are 'V-notched', it is the subject of no such restrictions in the Republic. Catches peaked in 1971 at 300 tonnes, but had declined to 34 tonnes in 2006⁸⁰. Catches declined even further subsequently (16t in 2007) before recovering slightly since (25t in 2015)⁸¹. As catches dwindle, more effort is needed to maintain

returns. Since Crawfish has been targeted with tangle nets, the fishery is also associated with declines in other endangered species, particularly angel shark and white skate. Since 2011 it has been prohibited to target Crawfish with nets in Tralee Bay.

Image by Michael Wolf - Own work, CC BY 2.5, <https://commons.wikimedia.org/w/index.php?curid=1387521>

32

Goose Barnacle *Pollicipes pollicipes*
Red List status: Not Evaluated



Image by User Gauthier on fr.wikipedia, CC BY-SA 3.0

Most goose barnacles live in the open seas, attaching to flotsam for the adult stage of their lives. *P. pollicipes* however can be found attached to rocks in shallow water. A delicacy on the Iberian peninsula in Ireland it is only recorded from one location in West Cork⁸².

33	Purple Sea Urchin <i>Paracentrotus lividus</i> Red List status: Not Evaluated
----	--



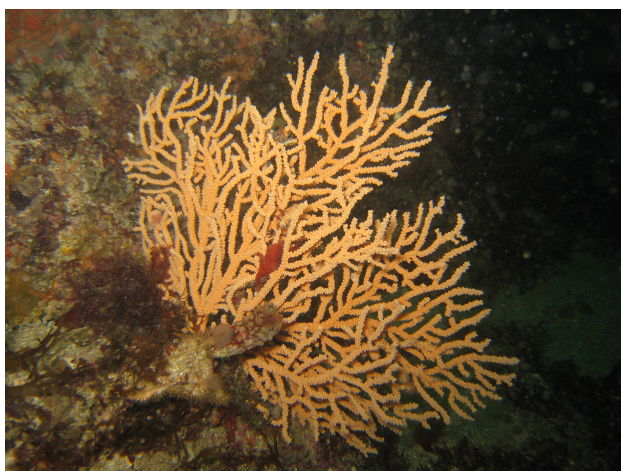
The purple sea urchin was once widespread and abundant along the Irish Atlantic coastline. The opening of a market in France in the 1970s spelt disaster as they were harvested without restriction⁸³. As significant ecosystem engineers their removal is likely to have had profound consequences. They are now hard to find, available records from the National Biodiversity Data Centre date from the mid-1990s.

Image by FredD - Own work, CC BY-SA 3.0

34	Sea-fan Anemone <i>Amphianthus dohrnii</i> Red List status: Not Evaluated
----	--

Restricted distribution in Irish waters being confined to the south-west coast⁸⁴. A small species of anemone that is found in deep water and attached to other organisms, typically sea-fans. Status in Irish locations is unknown but may be vulnerable to effects from commercial trawling.

35	Pink Sea-fan <i>Eunicella verrucosa</i> Red List status: Vulnerable⁸⁵
----	---

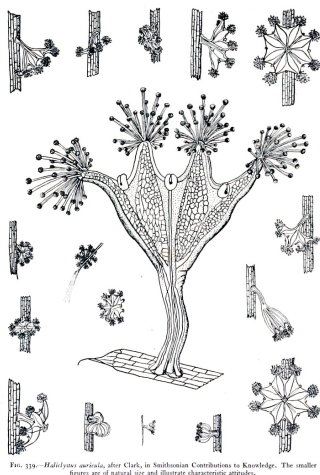


A striking sea fan, growing up to 40cm across and 30cm tall. Present on the south and west coasts of Ireland but common only in Galway and Donegal Bays⁸⁶. Very slow growing and so vulnerable to physical impacts from commercial or recreational fishing gear.

Image by Matthieu Sontag (User:Mirgolth)
Wikimedia Commons

36

Kaleidoscope jellyfish *Haliclystus auricula*
Red List status: Not Evaluated



The Kaleidoscope jellyfish lives much of its life fixed to a hard surface, unlike most jellyfish where are entirely free roaming. Typical substrates include seaweeds or sea grass. Its distribution in Ireland is Atlantic but localised⁸⁷.

37

Coral Maërl *Lithothamnion corallioides* and *Phymatolithon calcareum*
Red List status: Not Evaluated
Habitats Directive Annex V



Not a coral in the strict sense of the word but actually a species of calcified seaweed. It forms 'coral reefs' in a number of locations across the Atlantic seaboard from Donegal to Roaring Water Bay in Cork. It is listed under Annex V of the Habitats Directive, which controls its exploitation (it has been excavated for use as lime), and the OSPAR Convention. Maerl reefs support extraordinary biodiversity and are extremely

vulnerable to fishing activities, with limited powers of regeneration⁸⁸.

Image by Emkaer - Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=6436250>

38

A stalked jellyfish *Lucernariopsis campanulata*
Red List status: Not Evaluated

This species is known from a single location in the Republic of Ireland, east of Dungarvan, County Waterford, where it was last recorded in 1996. It may be more widespread than this, and additional records are from the Northern Ireland coast⁸⁹.

39	Fireworks Anemone <i>Pachycerianthus multiplicatus</i> Red List status: Not Evaluated
----	--



This burrowing anemone is recorded from only two areas on the west coast: Connemara and West Cork⁹⁰. Organisms such as these, which are fixed in position on the sea floor, are vulnerable to towed fished gear, such as trawling or dredging.

Image by Albin Olsson - Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=19912686>

40	Northern Sea Fan <i>Swiftia pallida</i> Red List status: Not Evaluated
----	---

A small sea fan measuring no more than 20cm in height. The Kenmare River in County Cork/Kerry is possibly its only Irish location⁹¹.

41	Ocean Quahog <i>Arctica islandica</i> Red List status: Not Evaluated
----	---



A protected species in Northern Ireland this bivalve is recorded in the Republic only in Galway Bay, the south-west of County Cork and the Irish Sea off Dublin⁹²⁻⁹³. Specimens from Belfast Lough have been estimated to be up to 220 years old⁹⁴ although there are also reports of it living as long as 550 years⁹⁵. It has been commercially exploited, at least in some of its range, however the status of the species in Irish waters is unknown. It is not known whether the limited records are a reflection of poor recording or a decline in a once-wider distribution. Given its long life span, and that it only reaches sexual maturity at on average between 12-13 years, it can be considered highly vulnerable to over-exploitation⁹⁶. Ocean quahogs live within the soft sediment on the sea floor and are known to be collected in beam trawlers in Irish waters⁹⁷.

"Arctica islandica 2008-09-20-13" by G.-U. Tolkiehn - Own work. Licensed under CC BY-SA 3.0 via Wikimedia Commons - http://commons.wikimedia.org/wiki/File:Arctica_islandica_2008-09-20-13.jpg#mediaviewer/File:Arctica_islandica_2008-09-20-13.jpg

42

Fan Mussel *Atrina fragilis*
Red List status: Not Evaluated



Fan Mussel c. Raymond Huet

Limited distribution in Irish waters. A large (up to 48cm) and beautiful mussel, it is recorded only from a handful of locations along the west coast of Ireland. It is found in mud, sand and gravel where it buries itself⁹⁸.

43

Native Oyster *Ostrea edulis*
Red List status: Not Evaluated



Carpets of Native Oysters (also referred to as the European Flat Oyster) once spread out from coastal estuaries and shallow waters near the shore around Ireland. Today they are cultivated in a small number of locations: Lough Swilly, Tralee Bay & inner Galway Bay. According to the Marine Institute “various threats to native oyster stocks exist including naturalisation of Pacific oyster *Crassostrea gigas*, Bonamia infection, poor habitat conditions for settlement and low spawning stocks.⁹⁹” Oyster reefs are

known for their rich biodiversity and can filter massive volumes of seawater – a function that is now lost.

Image: By Gilbert LE MOIGNE - Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=4308216>

44

Egg or Knotted Wrack *Ascophyllum nodosum* ecad. *mackaii*
Red List status: Not Evaluated



Egg Wrack is a widespread brown seaweed found around the Irish coast and one which is commercially harvested. It has been used for fertiliser and human consumption for many centuries. Typically attaching itself to rocky shores it has been harvested using hand tools¹⁰⁰. The free-living form of *A. nodosum*, with the taxonomic suffix *ecad. mackaii*, is known from a small number of sheltered inlets on the west coast (Shannon estuary and the Galway/Mayo coast)¹⁰¹. It forms a unique and rare habitat at a European level¹⁰². While vulnerable to over-harvesting it is not known if Irish habitats are currently under threat.

"Ascophyllum nodosum" by Dozens at en.wikipedia. Licensed under CC BY 2.5 via Wikimedia Commons - http://commons.wikimedia.org/wiki/File:Ascophyllum_nodosum.jpg#mediaviewer/File:Ascophyllum_nodosum.jpg

45

A red algae *Cruoria cruoriaeformis*
Red List status: Not Evaluated

A non-coralline crustose red alga. Sparsely distributed around Britain and Ireland, only one known location in the Republic of Ireland, off Connemara. Known from a number of sites off Northern Ireland¹⁰³.

46

A red alga *Dermocorynus montagnei*
Red List status: Not Evaluated

A seaweed. Very limited distribution between the Burren in County Clare and the west coast of County Galway¹⁰⁴.

47

Brown Alga *Fucus distichus*
Red List status: Not Evaluated



CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=801537>

A brown seaweed of intertidal zones. Recorded only from Clare (1863), Donegal (2003)¹⁰⁵ and Kerry¹⁰⁶.

48

Peacock's Tail *Padina pavonica*
Red List status: Not Evaluated



By Tigerente - Own work, CC BY-SA 3.0

Peacock's tail is a species of alga (seaweed) which only grows to about 100mm in height. Its habitat is rock pools and rocky areas of the lower shore. Records from Ireland indicate a limited distribution along the southern coast¹⁰⁷.

References

- ¹ *Annual Report*. 2014. Bord Iasciagh Mhara.
- ² *Ireland's Environment 2016 – An Assessment*. 2016. Environmental Protection Agency, Dublin.
- ³ *The Stock Book*. 2016. Marine Institute, Dublin.
- ⁴ Clarke, M., Farrell, E.D., Roche, W., Murray, T.E., Foster, S. and Marnell, F. 2016. *Ireland Red List No. 11: Cartilaginous fish [sharks, skates, rays and chimaeras]*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. Dublin, Ireland
- ⁵ King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. (2011) *Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- ⁶ Nieto et al. 2015. *European Red List of Marine Fishes*. IUCN.
- ⁷ *Life on the Edge: Seabirds and fisheries in Irish waters*. 2016. BirdWatch Ireland.
- ⁸ Colhoun K. Cummins S. 2016. *Birds of Conservation Concern in Ireland 2014-2019*. Irish Birds. Vol 9 No. 4. pg523-544
- ⁹ *Ireland's Biodiversity in 2010: State of Knowledge*. 2010. National Biodiversity Data Centre.
- ¹⁰ www.fishingnet.ie
- ¹¹ Report from the Commission to the European Parliament and the Council on the progress in establishing marine protected areas (as required by Article 21 of the Marine Strategy Framework Directive 2008/56/EC)
- ¹² Article 13, Marine Strategy Framework Directive.
- ¹³ Ebert D. A., Fowler S. & Compagno L. 2013. *Sharks of the World*. Wild Nature Press.
- ¹⁴ Whelan K. 1989. *The Angler in Ireland*. Country House.
- ¹⁵ *Angler's Guide. Ireland*. 1957. Fifth Edition. Bord Fáilte Éireann.
- ¹⁶ Molloy J. P. 1970. *Fishery Leaflet No. 18. Crawfish Investigations 1966-1968*.
- ¹⁷ *The Stock Book*. 2000. Marine Institute.
- ¹⁸ Cosgrove R., Cronin M, Reid D, Gosch M, Sheridan M, Chopin N. & Jessopp M. 2013. *Seal depredation and bycatch in set net fisheries in Irish waters*. Bord Iasciagh Mhara.
- ¹⁹ <http://fishinginireland.info/catchandrelease.htm>
- ²⁰ *Angler Sets New Record For Landing Half Ton Shark in Ireland* by Alastair Jamieson. The Telegraph. 25th June 2009.
- ²¹ http://www.sharktrust.org/en/shark_handling_guide
- ²² The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. Downloaded on 23 January 2015.
- ²³ A Second Sturgeon *Acipenser sturio* Landed at Ardglass, 1966 Author(s): J. W. GreavesSource: The Irish Naturalists' Journal, Vol. 16, No. 2 (Apr., 1968), p. 54
- ²⁴ The Status of the Sturgeon, *Acipenser sturio* L., in Irish Waters Now and in Former DaysAuthor(s): Arthur E. J. WentSource: The Irish Naturalists' Journal, Vol. 9, No. 7 (Jul., 1948), pp. 172-174
- ²⁵ King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. (2011) *Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland
- ²⁶ King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. (2011) *Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- ²⁷ The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. Downloaded on 23 January 2015.
- ²⁸ Quigley D.T.G & Flannery K. 1995. *Wolf-Fish Anarhichas lupus L. in Irish Waters: Further Records and a Review of the Irish Records*. Irish Naturalists Journal. Vol25 No3 pp106-110.
- ²⁹ Heessen H.J.L., Daan N. & Ellis (ed.s). 2015. *Fish Atlas of the Celtic Sea, North Sea and Baltic Sea*. Wageningen Academic Publishers.
- ³⁰ King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. (2011) *Ireland Red List No. 5:*

- Amphibians, Reptiles & Freshwater Fish*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- ³¹ <http://www.fisheriesireland.ie/Fisheries-Management/eel-management-plan.html>
- ³² European Red List of Marine Fishes. 2015.
- ³³ <http://www.marlin.ac.uk/species/detail/1788>
- ³⁴ European Red List of Marine Fishes. 2015.
- ³⁵ <http://www.goodfishguide.org/fishfinder?fish=halibut#results>
- ³⁶ Heessen H.J.L., Daan N. & Ellis (ed.s). 2015. *Fish Atlas of the Celtic Sea, North Sea and Baltic Sea*. Wageningen Academic Publishers
- ³⁷ Liu, J., Zapfe, G., Shao, K.-T., Leis, J.L., Matsuura, K., Hardy, G., Liu, M., Robertson, R. & Tyler, J. 2016. *Mola mola*. The IUCN Red List of Threatened Species 2016: e. T190422A97667070. Downloaded on **15 October 2016**.
- ³⁸ King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. 2011. *Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- ³⁹ European Red List of Marine Fishes. 2015
- ⁴⁰ Heessen H.J.L., Daan N. & Ellis (ed.s). 2015. *Fish Atlas of the Celtic Sea, North Sea and Baltic Sea*. Wageningen Academic Publishers
- ⁴¹ King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. 2011. *Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- ⁴² King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. 2011. *Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- ⁴³ The IUCN Red List of Threatened Species. Version 2016-2. <www.iucnredlist.org>. Downloaded on 03 December 2016.
- ⁴⁴ D.A. Ebert and M.F.W. Stehmann. 2013. *Sharks, batoids, and chimaeras of the North Atlantic* FAO Species Catalogue for Fishery Purposes. No. 7. Rome, FAO. 523 pp.
- ⁴⁵ Heessen H.J.L., Daan N. & Ellis (ed.s). 2015. *Fish Atlas of the Celtic Sea, North Sea and Baltic Sea*. Wageningen Academic Publishers.
- ⁴⁶ Clarke, M., Farrell, E.D., Roche, W., Murray, T.E., Foster, S. and Marnell, F. (2016) *Ireland Red List No. 11: Cartilaginous fish [sharks, skates, rays and chimaeras]*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. Dublin, Ireland.
- ⁴⁷ Irish Red List of Sharks, Rays and Chimaeras. 2016
- ⁴⁸ Irish Red List of Sharks, Rays and Chimaeras. 2016
- ⁴⁹ The Irish Naturalists' Journal, Vol. 24, No. 10 (Apr., 1994), p. 411
- ⁵⁰ Irish Red List of Sharks, Rays and Chimaeras. 2016.
- ⁵¹ Went A. E. J. 1975. *Interesting fishes taken in Irish waters 1975*. Irish Naturalists Journal. Vol 18. No. 7. 205-208
- ⁵² Irish Red List of Sharks, Rays and Chimaeras. 2016
- ⁵³ Irish Red List of Sharks, Rays and Chimaeras. 2016.
- ⁵⁴ Heessen H.J.L., Daan N. & Ellis (ed.s). 2015. *Fish Atlas of the Celtic Sea, North Sea and Baltic Sea*. Wageningen Academic Publishers.
- ⁵⁵ Irish Red List of Sharks, Rays and Chimaeras. 2016.
- ⁵⁶ Heessen H.J.L., Daan N. & Ellis (ed.s). 2015. *Fish Atlas of the Celtic Sea, North Sea and Baltic Sea*. Wageningen Academic Publishers.
- ⁵⁷ Irish Red List of Sharks, Rays and Chimaeras. 2016.
- ⁵⁸ Irish Red List of Sharks, Rays and Chimaeras. 2016
- ⁵⁹ Heessen H.J.L., Daan N. & Ellis (ed.s). 2015. *Fish Atlas of the Celtic Sea, North Sea and Baltic Sea*. Wageningen Academic Publishers.
- ⁶⁰ The IUCN Red List of Threatened Species. Version 2016-2. <www.iucnredlist.org>. Downloaded on **07 October 2016**.
- ⁶¹ Irish Red List of Sharks, Rays and Chimaeras. 2016
- ⁶² Irish Red List of Sharks, Rays and Chimaeras. 2016
- ⁶³ D.A. Ebert and M.F.W. Stehmann. 2013. *Sharks, batoids, and chimaeras of the North Atlantic* FAO Species Catalogue for Fishery Purposes. No. 7. Rome, FAO. 523 pp.

-
- ⁶⁴ Irish Red List of Sharks, Rays and Chimaeras. 2016
- ⁶⁵ Heessen H.J.L., Daan N. & Ellis (ed.s). 2015. *Fish Atlas of the Celtic Sea, North Sea and Baltic Sea*. Wageningen Academic Publishers
- ⁶⁶ Irish Red List of Sharks, Rays and Chimaeras. 2016
- ⁶⁷ ICES Advice Book 2008
- ⁶⁸ Stock Book. 2015. Marine Institute.
- ⁶⁹ European Red List of Marine Fishes. 2015
- ⁷⁰ Irish Red List of Sharks, Rays and Chimaeras. 2016
- ⁷¹ Irish Red List of Sharks, Rays and Chimaeras. 2016
- ⁷² Heessen H.J.L., Daan N. & Ellis (ed.s). 2015. *Fish Atlas of the Celtic Sea, North Sea and Baltic Sea*. Wageningen Academic Publishers
- ⁷³ Irish Red List of Sharks, Rays and Chimaeras. 2016
- ⁷⁴ Heessen H.J.L., Daan N. & Ellis (ed.s). 2015. *Fish Atlas of the Celtic Sea, North Sea and Baltic Sea*. Wageningen Academic Publishers
- ⁷⁵ Irish Red List of Sharks, Rays and Chimaeras. 2016
- ⁷⁶ ICES. 2014a. Advice on stocks in the Celtic Seas Ecoregion. In Report of the ICES Advisory Committee, 2014. ICES Advice 2014, Book 1, Section 5.
- ⁷⁷ Marine Institute. 2012. *the Stock Book*.
- ⁷⁸ Irish Red List of Sharks, Rays and Chimaeras. 2016
- ⁷⁹ Goñi, R. 2014. *Palinurus elephas*. The IUCN Red List of Threatened Species 2014: e.T169975A1281221. <http://dx.doi.org/10.2305/IUCN.UK.2014-1.RLTS.T169975A1281221.en>. Downloaded on **03 December 2016**.
- ⁸⁰ Fahy E. & Carroll J. 2008. *Vulnerability of male spider crab Maja brachydactyla (Brachyura: Majidae) to a pot fishery in south-west Ireland*. Journal of the Marine Biological Association of the United Kingdom, page 1 of 14
- ⁸¹ Marine Institute and Bord Iasciagh Mhara. 2015. *Shellfish Stocks and Fisheries Review 2015 An assessment of selected stocks*
- ⁸² <http://www.marlin.ac.uk/species/detail/43>
- ⁸³ Wilkins N.P. 2004. *Alive Alive O*. Tír Eolas.
- ⁸⁴ <http://www.marlin.ac.uk/speciesinformation.php?speciesID=2490>
- ⁸⁵ The IUCN Red List of Threatened Species. Version 2016-2. <www.iucnredlist.org>. Downloaded on **23 September 2016**.
- ⁸⁶ <http://www.marlin.ac.uk/species/detail/1121>
- ⁸⁷ <http://www.marlin.ac.uk/species/detail/2051>
- ⁸⁸ NPWS. 2013. *The Status of EU Protected Habitats and Species in Ireland*. Department of Arts, Heritage & the Gaeltacht.
- ⁸⁹ <http://www.marlin.ac.uk/species/detail/2101>
- ⁹⁰ <http://www.marlin.ac.uk/species/detail/1272>
- ⁹¹ Minchin D. 1987. *Swiftia pallida* Madsen (Coelenterata: Gorgonacea) in Irish Waters, with a Note on *Pseudanthessius thorelli* (Brady) (Crustacea: Copepoda) New to Ireland The Irish Naturalists' Journal Vol. 22, No. 5 (Jan., 1987), pp. 183-185
- ⁹² <http://www.marlin.ac.uk/speciesinformation.php?speciesID=2588>
- ⁹³ https://data.nbn.org.uk/Taxa/NBNSYS0000173928/Grid_Map
- ⁹⁴ I.D. Ridgway, C.A. Richardson, J.D. Scourse, P.G. Butler & D.J. Reynolds. *The population structure and biology of the ocean quahog, Arctica islandica, in Belfast Lough, Northern Ireland*. Journal of the Marine Biological Association of the United Kingdom. Volume 92; Issue No.3; May 2012. pg539-546.
- ⁹⁵ http://en.wikipedia.org/wiki/Arctica_islandica
- ⁹⁶ Cargnelli L.M., Griesbach S.J., Packer D.B. & Weissberger E. *Ocean Quahog, Arctica islandica, Life History and Habitat Characteristics*. NOAA Technical Memorandum NMFS-NE-148. 1999.
- ⁹⁷ Linnane A., Ball B., Munday B., van Marlen B., Bergman M. & Fonteyne R. *A review of potential techniques to reduce the environmental impact of demersal trawls*. Irish Fisheries Investigations (New Series) No. 7 – 2000. The Marine Institute. Dublin.
- ⁹⁸ Dr Harvey Tyler-Walters and Catherine Wilding 2009. *Atrina fragilis*. Fan mussel. Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [cited 23/01/2015]. Available from: <<http://www.marlin.ac.uk/speciesinformation.php?speciesID=2680>>
- ⁹⁹ *Shellfish Stocks and Fisheries*. 2015. Marine Institute.

¹⁰⁰ Kelly L., Collier L., Costello M.J., Diver M. Impact Assessment of Hand and Mechanical Harvesting of *Ascophyllum nodosum* on Regeneration and Biodiversity. Marine Resource Series No. 19. 2001. Marine Institute, Dublin.

Seamus McGarvey³ Stefan Kraan¹, Jim Morrissey¹ and Michael D. Guiry⁴

¹⁰¹ Hill, J.M. 2001. *Ascophyllum nodosum* ecad *mackaii* beds on extremely sheltered mid eulittoral mixed substrata. Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [cited 23/01/2015]. Available from:

<<http://www.marlin.ac.uk/habitatsbasicinfo.php?habitatid=138&code=1997>>

¹⁰² <http://eunis.eea.europa.eu/habitats/1920>

¹⁰³ <http://www.marlin.ac.uk/species/detail/41>

¹⁰⁴ http://www.algaebase.org/search/species/detail/?species_id=y21f8deda09aa8650&-session=abv4:AC1F07411d5fc2CB48LxDCE3824A

¹⁰⁵ http://www.algaebase.org/search/species/detail/?species_id=352

¹⁰⁶ <http://www.marlin.ac.uk/species/detail/1350>

¹⁰⁷ <http://www.marlin.ac.uk/species/detail/1423>