

FISH

Eels inhabit lake bottom; live in freshwater and breed in the ocean (catadromous) ; believed to breed in the Sargasso Sea; the juvenile glass eel stage travels across the Atlantic to Europe; transform to elver stage in coastal waters; enter rivers to grow and feed as yellow eel; as maturation begins they descend to the marine environment again. By-laws prohibit commercial fishing and angling for eel, or possessing or selling eel caught in a Fishery District in the State until June 2012 when status will be reviewed. Recruitment of glass eels is 5% of the pre-1980's levels 7; Eel Management Plan prepared by each Member States for implementation by 1 July 2009 (Council Regulation 1100 / 2007). Upon reaching sexual maturity, European eels migrate from freshwater streams back to the Sargasso Sea in order to spawn and die in the late winter months to the early summer months. European eel males release sperm into the water in which female European eels have already laid eggs, thereby fertilizing the eggs (Horie et al., 2004). Very little is known about the actual spawning mechanism, and time to hatching is variable. European eels spawn during the late winter to early spring months. European eels invest a substantial amount of energy in reproduction, and die shortly thereafter (Deelder, 1970). Consequently, the only resource that female eels give to their offspring is enough food source to last the egg until hatching. After hatching, the larvae are completely independent and able to find food.



Sea trout inhabits shallow sea-water adjoining coasts and open ocean as well as freshwater; migratory form of Brown trout¹; juvenile sea trout are indistinguishable from juvenile brown trout, but juvenile sea trout migrate to sea as silvered smolts between April and June after spending two or, less frequently, three winters in freshwater; they do not travel as far into the marine environment as Atlantic Salmon, usually remaining in



coastal waters; they return to freshwater to spawn either the summer after migration (known as finnock, harvesters, whiting or juniors) or one year or more later (known as maidens); adult sea trout return to sea after a winter in freshwater; they may return to freshwater many times to spawn which means that there can be significant variation in the recorded life history of sea trout. Sea trout > 40 cm fork length are classified as salmon in terms of legislation and are covered under salmon regulations; commercial and rod harvest of salmon is permitted where stocks are in surplus (exceeding a system-specific Conservation Limit) and the fisheries are very strictly controlled; approximately one third of Irish salmon and sea trout fisheries are open for harvest, with the remainder being open for catch-and-release angling or closed to angling; fisheries for Sea trout < 40 cm are open in many areas. Like all members of the salmon family, mature males make a "drumming" sound to attract females during the spawning season. Spotted

sea trout have a long spawning season from spring through summer. Larval sea trout reach 5-7 mm in length about two weeks after hatching, and 170-200 mm within about seven months. It takes between one and two years for sea trout to reach 300 mm (about 12 inches) and between two and three years to reach 400 mm in length (about 16 inches). The maximum age of spotted sea trout that have been caught is estimated to be 12 years old, though that is rare, and the oldest fish caught on a regular basis are closer to four or five years old. By the end of the first year, spotted sea trout are about 250 mm long and about half of them are mature enough to reproduce. They reproduce in shallow, grassy areas of estuaries.

Atlantic salmon occurs on the bottom or mid waters of a water body; anadromous¹; spawning occurs in well-oxygenated, fast-flowing rivers and streams; juveniles (fry and par) feed and grow in the freshwater environment for up to three years before migrating to sea; the rich feeding grounds off the coast of Norway and Greenland are the destination of adult Atlantic salmon until they choose to return to freshwater to spawn, between 1 and 4 years later. Salmon, both male and female, cease to feed on entering freshwater in response to gonadal development, directing all their energy instead to reproduction. The migration of adults to suitable habitat may commence up to a year before spawning takes place in winter. Spawning typically occurs in the tributary streams of rivers, though it can happen anywhere in a river if the substrate (gravel) is suitable. At spawning time, the female will excavate a depression in the gravel with her tail and deposit her eggs into this. One or more males discharge sperm over the falling eggs to fertilize. The female covers the eggs with gravel to a depth of several centimetres. The parents then leave the eggs in the nest or "redd" with no further parental care. Buried deep inside the gravel the eggs are safe from shock during critical early days of development such as impact from debris travelling down river during heavy floods and attack from predators such as eels (*Anguilla anguilla*), trout (*Salmo trutta*) and cormorants (*Phalacrocorax carbo*).



Protected in the freshwater environment under Annex II and Annex V of the European Habitats directive.

Bass has a fusiform body with silver sides and silvery grey to bluish on the back, small scales (lateral line contains 62 to 74), two distinct dorsal fins (the first with 8-10 spines, the second with a spine and 12 or 13 soft rays), an anal fin equipped with 3 spines and 10 or 12 soft rays, a seal provided on the edge of a diffuse spot and 2 flat spines, caudal fin moderately forked. It can reach 1 m long with a weight of 12 kg, but specimens of 50 cm to 1 kg are more common. The oldest whose age is certain, was a resident of Amsterdam who was 30 years in 1963 aquarium; Sète, the biggest bar examined by a specialist was aged 15-16 years, with a weight of 11 kg and a length of 92.5 cm. Juveniles may have a few spots on the upper body, which can create confusion with *Dicentrarchus punctatus*. It is impossible to distinguish a male from a female without the autopsy



fish. The Common bar generally lives in shoals in waters with rocky bottoms near the coast, it is also found in the fund on gravel or sand banks but still there and the water is choppy and therefore well oxygenated. It is a fresh water fish back when the mouths of rivers, river and canals. It is in winter that the males and females together for breeding at sea in well-defined spawning grounds. The bass reaches sexual maturity at 6-7 years.

The European flounder is a flatfish with an oval-shaped body with a width about half its length. The maximum recorded length is 60 centimetres (24 in) and the maximum recorded weight 14 kilograms (31 lb). However, a more usual mature length is about 50 centimetres (20 in). The fish is flattened laterally and swims and rests on one side. During development, its eyes usually migrate to the right side of the fish and what appears to be its upper surface is in reality its right side. In about thirty percent of individuals, its eyes move to the left and the left side becomes uppermost. The fish has a small mouth at the end of its bluntly pointed snout. The upper surface is fawn, olive green or pale brown with spots and larger patches of darker brown and some irregular reddish spots. The under surface is opaque pearly-white giving the fish its common name of "white fluke". The lateral line is nearly straight and runs along the middle of the upper surface, curving round the short pectoral fins. The dorsal fin runs from the base of the head to beside the caudal peduncle. It has no dorsal spines but has between 53 and 62 soft rays. The anal fin also runs the length of the body and has no spines and 37 to 46 soft rays. The skin is rough, with prickly tubercles at the base of the dorsal and anal fins, and there are large scales beside the lateral line. The caudal peduncle is about half the length of the tail and the caudal fin has a squared-off end. After 3 years flounders are ready to start laying eggs and producing offspring. Unlike other fish the female flounders lay their eggs, all 500,000 of them on the bottom of the river/lake where the males come along not to long after and fertilize them. 15-18 days later little fish are born. Peak spawning activity occurs from early September through early November.

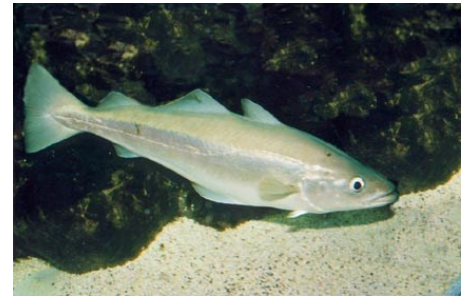




Turbot are large flatfish and are regarded as one of the major prizes of Irish sea angling and they are also highly regarded for the table. The upper side is a mottled brown with numerous bony lumps or tubercles. The body is diamond shaped. Turbot can grow to over 40lbs. Turbot mimics the colour and size of the substrate where it is located. At sexual maturity (during the third year for males and during the 4th or 5th year for females), reproduction takes place between the end of winter and the month of July in each region. Turbot chooses funds gravel or stones between 10 and 80 m. Eggs (0.9 to 1.2 mm) are pelagic larvae (2.7 to 3 mm) which hatched after 5-

10 days of incubation is pelagic; after metamorphosis the young turbot (aged 3 to 6 months) joins a sandy beach will be his nursery (nursery).

Pollock is a very popular sport fish. Can be taken from both boat and shore on the northern coast. Common over areas of rough ground, reefs and sunken wrecks. Easily identified from its near relation, the coalfish, by the protruding lower jaw and by the shape of the lateral line which is bent over the pectoral fin. Tail not forked. Usually brown or bronze on back and flanks. Grows to over 20 lbs. Specimen Weight, 12 lbs. Outside the breeding season, pollock does not form large schools, rarely solitary living in small scattered in open water or near the bottom groups. Young people living on the coast the first two years and then migrate offshore (40-100 meters) to 3 years. A reproduction, pollock gather in dense formation on less than 150 m funds between February and May, spawning takes place when the water reaches 10 ° C. At hatching, the larvae (3-4 mm) are pelagic.



Cod is found on most coasts and unlikely to be mistaken for any other species, even though the colour of adults varies. Caught over a wide range of seabed from reefs and wrecks to areas of shingle and sand and in many of the larger estuaries. Cod are available throughout the year, but generally "peak" fishing times are May and June (boat angling) and December and January (shore fishing). Grows to over 50 lbs. Specimen Weight, 20 lbs. Living near the bottom in search of food, cod form large schools the day disintegrate night (the highest concentration between 150 and 200 m).

Nordic stocks migrate over long distances (800-1000 km). At sexual maturity (2-3 years for males, 3-4 years for females), males produce sounds (February-April) that stimulate females. Couples form and reproduction occurs between 50 and 200 m depth (water 4 to 6 ° C). A female emits between 2.5 and 7.5 million eggs.

Ling is a member of the cod family which has a large barbel under the chin and a mouth of sharp teeth. Olive or red-brown in colour, sometimes mottled. A very popular sport fish, particularly with wreck and reef anglers. Almost exclusively a boat caught fish. Grows to about 50 lbs. Specimen Weight; 11.34 kgs (25 lbs) Burbot reach sexual maturity between four and seven years of age. Spawning season typically occurs between December and March, often under ice at extremely low temperatures ranging between 1 and 4°C. Though a relatively short season lasting from two to three weeks, burbot will spawn multiple times, but not every year. As broadcast spawners, burbot do not have an explicit nesting site, but rather release eggs and sperm into the water column to drift and settle. When spawning, many male burbot will gather around one or two females, forming a spawning ball. Writhing in the open water, males and females will simultaneous release sperm and eggs. Depending on water temperatures, the incubation period of the eggs lasts from 30 to 128 days. Fertilized eggs will then drift until they settle into cracks and voids in the substrate. Depending on body size, female burbot fecundity ranges from 63,000 to 3,478,000 eggs for each batch. Rate of growth, longevity, and age of sexual maturity of burbot are strongly correlated of with water temperature: large, older individuals produce more eggs than small, younger individuals. Eggs are round with a large oil globule, approximately 1 mm (0.039 in) in diameter and have an optimal incubation range between 1 and 7°C (34 and 45°F).

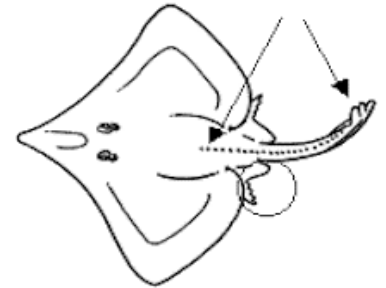


Skate and ray

Skates and rays can be difficult to differentiate. Both are flat and (with a few notable exceptions, such as the eagle and manta rays) bottom-dwelling elasmobranchs sharing a similar diamond or rhomboid shape. Some of the most familiar forms occur together in coastal habitats. Adding to the confusion, the term 'ray' is also used in reference to the electric and torpedo rays (order Torpediniformes); fortunately, torpedinoids are unlikely to be confused with either skates or rays (especially if one handles a live specimen!), being easily identified by the following characteristics: a rounded pectoral disc; soft, flabby body; dorsal fins nearer the pelvic fins than the tail tip; and kidney-shaped electrogenic organs at the base of the pectoral fins. Distinguishing skates from rays is rather subtle, but once one has learned their respective field marks, it is relatively easy to tell them apart.

Skate

- each pelvic fin divided into two lobes
- tail relatively stocky, without a stinging spine
- tail usually with two small dorsal fins near its tip and a tiny caudal fin (some forms lack dorsal and caudal fins)
- many have enlarged, thorn-like scales ('bucklers') along the midline of tail and tail; enlarged scales also occur along the side of the body (near pectoral fin base) in some species
- males have rows of enlarged scales near the eyes and wingtips (termed 'malar' and 'alar' spines, respectively)



Three species of skate have been recorded by anglers in Irish waters. They are: White Skate (*Raja alba*) (specimen weight 120 lbs); Long Nose Skate (*Raja oxyrinchus*) (80 lbs); and Common Skate (*Raja batis*) (specimen weight suspended). In the interests of conservation, the Irish Specimen Fish Committee removed the Common Skate from its list of acceptable species in 1976. Since then, all Common Skate taken by anglers have been returned alive to the water. In recent years, fish to almost 200 lbs have again re-appeared in the northern region.

Ray

- each pelvic fin with one lobe
- tail relatively slender to whip-like, usually with a saw-edged stinging spine midway along its length
- tail usually without a dorsal fin (in some forms, a single dorsal fin occurs near the tail base). caudal fin reduced and continuous or absent
- no bucklers along the midline of back or tail (although *Hypolophus* sometimes called the 'Pearl Ray', has three rounded scales in the midline back) or along the side of the body
- males lack malar or alar spines



In addition, skates are typically drab, brownish or greyish deep-water inhabitants while many rays are boldly or colourfully patterned, shallow-water inhabitants. These are generalizations only. Some skates are attractively blotched or spotted, others occur in shallow and even estuarine water, while some rays are plain above, lighter below, and some live at great depths. Normally a summer species available from May to October. Four species of ray are of interest to anglers in the region. They are Thornback Ray (*Raja clavata*) (specimen weight 20 lbs); Blonde Ray (*Raja brachyura*) (25 lbs); Cuckoo Ray (*Raja naevus*) (4.5 lbs); Homelyn Ray (*Raja montagui*) (5 lbs). If some lines are ovoviviparous as manta rays, those of the French coasts are often oviparous. Each egg is contained within a very resistant capsule (egg case). Months after spawning, a miniature line goes out. Empty capsule will be found on the shore in the form of black bag 4 horns. Rays, to long life and slow reproduction, are very sensitive to human pressure. The latest IUCN reports are alarming: 26% of these species should be nearly in extinction in the North Atlantic, against 42% in the Mediterranean, considered the most dangerous seas in the world for this fauna, including giant manta and stripe Malta. In the dock: overfishing, whether accidental or targeted. Internationally, legislation limiting the capture of these fish is almost non-existent. The ray wings are consumed by humans. Trawling, overfishing, marine pollution, electric fishing (banned in Europe for having shown negative effects on rays) threaten.

Twait Shad is a typical herring-type fish and much resembles the allis shad. It has no lateral line and the belly is more rounded than that of the sprat and Baltic herring. The gill cover is ridged and the caudal peduncle has large, plate-like scales. This fish is more colourful than the Baltic herring. The back is a bluish green colour and the head brownish with a golden tinge on the operculum. The flanks



are silvery, sometimes with a bronzy tinge, and there are a distinctive row of six to ten large dark spot just behind the gill cover though these may fade when the fish is dead. The adult length is typically 25 to 40 cm. They primarily live at sea on feeding grounds and will migrate to their spawning grounds between April and June once they are sexually mature. Populations have been reduced primarily through overfishing, pollution, and habitat destruction. Hybridization between species is more likely with species affected by human disturbances. It is estimated that the estuarine phase, or the time that they are in the estuaries migrating from spawning grounds to sea, has a duration in twait shad of up to a year and a half. The estimate however does not take into account individual variation and/or survival of juveniles in the estuarine phase.



Cuttlefish, although colour-blind, are able to rapidly change the colour of their skin to match their surroundings and create chromatically complex patterns, apparently without the ability to perceive colour, through some other mechanism which is not yet understood. They have been seen to have the ability to assess their surroundings and match the colour, contrast and texture of the substrate even in total darkness. The colour variations in the mimicked substrate and animal skin are very similar. Cuttlefish, like other cephalopods, have sophisticated eyes. The organogenesis and final structure of the cephalopod eye differs fundamentally from that of vertebrates such as humans. Superficial

similarities between cephalopod and vertebrate eyes are thought to be examples of convergent evolution. The cuttlefish pupil is a smoothly curving W-shape. Although cuttlefish cannot see colour Family Sepiidae, which contains all cuttlefishes, inhabit tropical/temperate ocean waters. They are mostly shallow-water animals, although they are known to go to depths of about 600 m. Male cuttlefish challenge one another for dominance and the best den during mating season. During this challenge, no direct contact is usually made. The animals threaten each other until one of them backs down and swims away. Eventually, the larger male cuttlefish mate with the females by grabbing them with their tentacles, turning the female so that the two animals are face-to-face, then using a specialized tentacle to insert sperm sacs into an opening near the female's mouth. The male then guards the female until she lays the eggs a few hours later. On occasion, a large competitor arrives to threaten the male cuttlefish. In these instances, the male will first attempt to intimidate the other fish. If the competitor does not flee, the male will eventually attack it to force it away, and the confrontation turns physical. The cuttlefish that can paralyze the other first by forcing it near its mouth would win the fight, and the female. Since there are roughly four or five (sometimes as high as ten) males for every female, this kind of behavior is inevitable. Since cuttlefish are indeterminate growers, small cuttlefish always have a chance at finding a mate the next year, when they are bigger. Additionally, cuttlefish unable to win in a direct confrontation with a guard male have been observed employing several other tactics to acquire a mate. The most successful of these methods is also one of the most remarkable; smaller cuttlefish will use their camouflage abilities to disguise themselves as a female cuttlefish. Changing their coloration, hiding their extra arms (males have four pairs, females only have three), and even pretending to be holding an egg sack, disguised males are able to swim past the larger guard male and mate with the female. Female cuttlefish will mate with several males, storing the sperm and later deciding which one to fertilize the eggs with; studies show that females will more often choose the males that employed this mating trick. This may be an adaptation in order to select for greater intelligence.



Mackerel might seem that the prominent stripes on the back of mackerels are there to provide camouflage against broken backgrounds. That is not the case, because mackerel live in midwater pelagic environments which have no background. However, fish have an optokinetic reflex in their visual systems which can be sensitive to moving stripes. In order for fish to school efficiently, they need feedback mechanisms that help them align themselves with adjacent fish, and match their speed. The stripes on neighbouring fish provide "schooling marks" which signal changes in relative position. Fast (10 km / h) and gregarious fish, it forms large compact benches. Mature at 3

years (30 cm), spawning occurs from March to June in the Celtic Sea between 80 and 120 m deep in water at 12-13 ° C. A female lays between 400 and 500,000 eggs after 5 days of incubation, into larvae gradually go to the coast.

Conger eel has a long snake-like muscular body. Scaleless skin which is grey, bluish or green in colour. Dorsal fin ranges all the way around the body and merges with anal fin. Upper jaw extends beyond lower jaw. Relatively large eyes and prominent lips with mouth full of small, sharp teeth. Due to spawning in the Atlantic conger eels are mostly found around the western coast of the British Isles but can be elsewhere in Britain, including along the eastern coast, but in much smaller numbers. The specialists know little about reproduction, they assume that mature Congress undertake a migration to reach their spawning grounds located between the Azores and Gibraltar. There, in 3000 or 4000 m depth, adults gather and lay their eggs. Like other species congridés, they breed only once in their life and die after spawning. When the individual reaches sexual maturity at 5-15 years, his bowels degenerate and stop feeding. The female can lay between 3 and 8 million eggs. It is a predator which will hunt down and fish species it can find, but will also happily feed by scavenging for dead or rotting fish.



Dog fish has a long, slim body which is tan or light brown and covered in small dark spots and skin is very rough to the touch. Underside is light grey to white in colour. Mouth is set quite far back on underside of body and nasal grooves reach the mouth. Two dorsal fins are set far back on the body and pectoral fins are large and triangular. As this is a shark species there are no rays, spines or segments in the fins, and five gill slits are present on each side of the body. He feeds extremely unfussy scavenger that will eat pretty much anything it can find. Worms, fish, prawns, shellfish and crustaceans will all be taken, as will small fish it can hunt down.



Adults move into shallow water in the spring or early summer, and mate only at night. The eggs are deposited in the shallows from March to October. Although a single female produces 77-109 oocytes per year, not all of these are ovulated and estimates of the actual number of eggs laid range from 9 to 41. The eggs mature and are released two at a time, one from each oviduct. Each egg is enclosed in a thick, dark brown case measuring 10-13 cm (3.9-5.1 in) long and 3.5 cm (1.4 in) wide.

There are tendrils at the four corners, that allow the female to secure the egg cases to bunches of seaweed. Eggs in the North Sea and the Atlantic take 10-12 months to hatch, while those from the southern Mediterranean take 7 months to hatch. The length at hatching is 16 cm (6.3 in) off Britain, and 10-12 cm (3.9-4.7 in) off France. Newly hatched sharks grow at a rate of 0.45-0.56 mm (0.018-0.022 in) per day, and have prominent saddle markings. Sexual maturity is attained at a length of 77-79 cm (30-31 in), which corresponds to an age of four years if hatchling growth rates remain constant. This species has a lifespan of at least 19 years.

There are tendrils at the four corners, that allow the female to secure the egg cases to bunches of seaweed. Eggs in the North Sea and the Atlantic take 10-12 months to hatch, while those from the southern Mediterranean take 7 months to hatch. The length at hatching is 16 cm (6.3 in) off Britain, and 10-12 cm (3.9-4.7 in) off France. Newly hatched sharks grow at a rate of 0.45-0.56 mm (0.018-0.022 in) per day, and have prominent saddle markings. Sexual maturity is attained at a length of 77-79 cm (30-31 in), which corresponds to an age of four years if hatchling growth rates remain constant. This species has a lifespan of at least 19 years.