



Haringvliet

Towards a dynamic delta

Fish migration

From river to sea and vice versa

In 2018, when the Haringvliet sluices will be slightly opened, the Haringvliet will again become the gateway to the rivers Rhine and Meuse. In the Haringvliet, migratory fish will then be able to acclimatize in brackish water, before continuing their journey to the river or to sea. Based on historical data, we have displayed how 16 fish species made use of the freshwater-saltwater transition zone in the Haringvliet, i.e. during which part of their life cycle and during which period of the year. The fish migration calendar provides insight into developments that can be expected to take place after the Haringvliet sluices are opened in 2018.

Spring: migration from sea to river

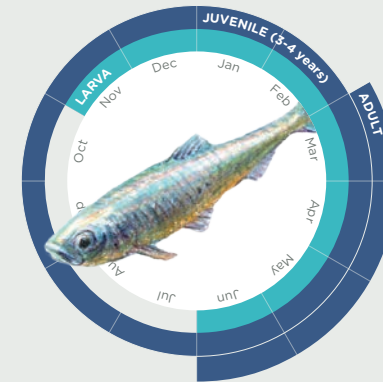
The fish migration calendar on the inside of the leaflet features a complex mixture of migration patterns. Throughout the year fish run upstream towards the river or downstream towards the sea. From February until July, the prevailing migration pattern is upstream from sea towards the river. Species such as stickleback, allis shad, twait shad, sturgeon and smelt run upriver to spawn.

Autumn: migration from river to sea

From July until December the prevailing migration pattern is downstream, from the river to sea. The predominantly juvenile fish, which were born in the river, such as allis shad, twait shad, salmon, sturgeon and sea lamprey, migrate through the Haringvliet to sea to forage, to grow into adults and to spawn. Before any transition from fresh water to salt water and vice versa it is vital that migratory fish can acclimatize in an undisturbed brackish-water zone, which the Haringvliet will provide after 2018.

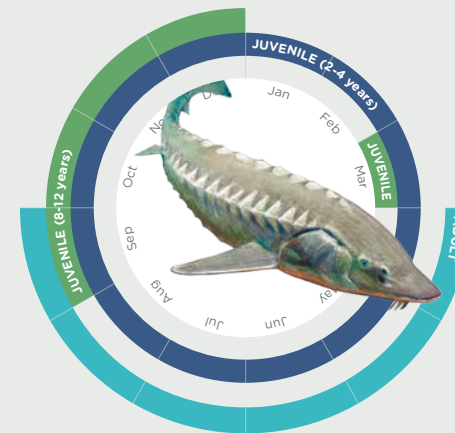
All year round: nursery area for juvenile fish

In addition to being a route of passage for migratory fish such as salmon and sturgeon, the freshwater-saltwater transition zone also plays an important role as refuge and nursery area for juvenile fish. Juvenile European sprat, smelt, river lamprey, European seabass and herring stay sometimes for 1 to 2 years in this brackish-water zone before they continue their journey to sea or to the river. Juvenile fish also serve as food for numerous other fish species and birds, including migratory species.



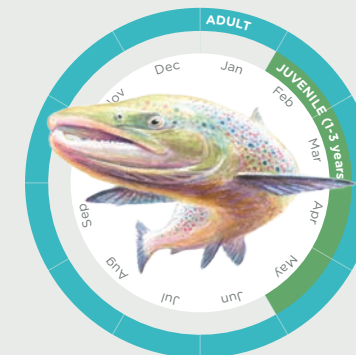
Atlantic herring

The area's name Haringvliet refers to the past, when the Haringvliet teemed with juvenile herring. Herring are born at sea. The juvenile larvae then migrate to coastal waters and to the freshwater-saltwater transition zone where they grow into adults. Subsequently, the adult herring migrate again to sea to spawn.



European sea sturgeon

Much effort is put into securing the return of this prominent and impressive migratory fish to Dutch waters. Sturgeons are born upriver. Juvenile sturgeons run downriver and stay a considerable time in the freshwater-saltwater transition zone and only become adult fish at sea. Mature sturgeons run upriver during the summer to produce offspring.



Atlantic salmon

Salmon stay the greater part of their life cycle at sea, but just like sturgeons they depend on fresh water for their reproduction. Throughout the year adult salmon run upriver to spawn, showing a peak from May to August. Juvenile salmon, also known as smolts, need a gradual freshwater-saltwater transition in order to be able to adapt to saltwater conditions.

















Illustrations: © Jeroen Helmer, ARK Natuurontwikkeling

Fish Migration Calendar

Haringvliet

FROM SEA TO RIVER FROM RIVER TO SEA STAYING IN FRESHWATER-SALTWATER TRANSITION ZONE

SOURCE: The Fish Migration Calendar has been drawn up by Bart Reeze (Buro Stroming), Martin Kroes (Kroes Consultancy), Willie van Emmerik (Sportvisserij Nederland) and Jaap Quak (Sportvisserij Nederland) based on historical and biological data.

LIFE PHASE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	EXPLANATION
 European eel <i>Anguilla anguilla</i> glass eel 1-3yrs yellow eel 2-17yrs adult													Reproduction at sea. Glass eels migrate to coastal waters and various freshwater bodies. Grow also in the estuary and can be found all year round. Mature eels migrate to the sea/the ocean to reproduce.
 European flounder <i>Platichthys flesus</i> juvenile juvenile 2-4yrs adult													Reproduction at sea. Juveniles migrate to shallow coastal waters until reaching freshwater river areas. Juveniles grow up in the estuary. Mature adults migrate to foraging grounds in the coastal zone and to the sea to reproduce.
 Three-spined stickleback <i>Gasterosteus aculeatus</i> juvenile 0.5yrs adult													Reproduction in the downstream part of the river. Juveniles migrate to the estuary and coastal zone. Present throughout the year in estuaries and shallow coastal zones (including the Wadden sea). Migrate from the sea to the river to spawn.
 Thinlip mullet <i>Liza ramada</i> juvenile 9-11yrs adult													Reproduction at sea off the coast. Juveniles live in the estuary's shore area. Present throughout the year in the estuary. Migrate to the estuary and river during spring and in the opposite direction during autumn.
 Allis shad <i>Alosa alosa</i> juvenile 0+yrs juvenile 0-1yrs adult													Reproduction on the river. Juveniles migrate to the estuary. Continuing their journey to the coastal zone and the sea as from October (or a year later). At sea / in coastal waters. Migrate upriver to reproduce.
 Twait shad <i>Alosa fallax</i> juvenile 0+yrs juvenile 0-1yrs adult													Reproduction in the freshwater area of the tidal zone or slightly more upstream. Juveniles migrate to the estuary. Migrate immediately to the coastal zone and the sea (or a year later). At sea/ coastal waters. Migrate downriver to reproduce.
 Atlantic Herring <i>Clupea harengus</i> larva juvenile 3-4yrs adult													Reproduction at sea. Larvae migrate to coastal waters and the estuary. Nursery areas in coastal waters and estuaries. Migrate at a later stage to deeper waters / the sea. At sea. In March-June small numbers stay in the Voordelta/Goereese Gat areas.
 Houting <i>Coregonus oxyrinchus</i> juvenile juvenile 2-4yrs and adult													Spawn in the midstream/downstream part of the river. Juveniles go slowly downriver to the coastal zone and the estuary. Stay all year round in the shallow coastal zone and the brackish-water area of the estuary. Mature adults migrate upriver and downriver to reproduce.
 River lamprey <i>Lampetra fluviatilis</i> larva 3-4.5yrs juvenile 1.5yrs adult													Reproduction on the river and brooks. After 3-4.5 years the larvae float down the river to the estuary. Grow up further in the estuary and later at sea. Live in estuaries, coastal waters and the open sea. Migrate to rivers and brooks to spawn.
 Smelt <i>Osmerus eperlanus</i> larva juvenile 2-3yrs and adult adult													Reproduction on the river, just upstream of the tidal zone. Larvae grow in freshwater areas and the estuary. Grow up and live in the estuary and the coastal zone. Migrate upriver (and downriver) to reproduce.
 European sprat <i>Sprattus sprattus</i> larva juvenile <2yrs adult													Reproduction at sea /in coastal waters, larvae float to coastal waters or estuaries. Nursery areas in coastal waters and estuaries. Migrating later on to deeper waters/ the sea. Adults stay in the estuaries during winter /older adults stay at sea.
 European sea sturgeon <i>Acipenser sturio</i> juvenile juvenile 2-4yrs juvenile 8-12yrs adult													Reproduction on the river. Juveniles migrate to the estuary. Juveniles grow up in the estuary. Older juveniles migrate to the coastal zone and the sea where they continue their development. At sea. Mature adults migrate to the river to spawn.
 Atlantic Salmon <i>Salmo salar</i> juvenile 1-3yrs adult													Reproduction on the river. Juveniles migrate to the sea and have a short stay in the estuary. At sea. Mature adults migrate to the river to spawn, all year round with a peak from May-August.
 European seabass <i>Dicentrarchus labrax</i> juvenile 4-5yrs adult summer													Reproduction at sea. Juveniles migrate to estuaries, harbours and lagoons (warm, shallow waters). Migrate to the estuaries' foraging sites during summer and to the sea during winter.
 Sea trout <i>Salmo trutta trutta</i> juvenile 2-3yrs adult													Reproduction at the upstream part of the rivers. Juveniles migrate (rapidly) through the estuary towards the coast and the sea. In coastal waters, gathering in estuaries before migrating to the river to reproduce.
 Sea lamprey <i>Petromyzon marinus</i> juvenile 2-3yrs adult													Reproduction in the midstream/upstream parts of the river. Juveniles migrate to the sea. At sea. Migrate upriver to spawn.

Migratory fish in and around the Haringvliet

Visit haringvliet.nu

In 2018, the Haringvliet sluices will be slightly opened so that fish will be able to migrate again between the river and the sea. To fully benefit from this opportunity, ARK Natuurontwikkeling, Natuurmonumenten, Dutch Angler Association and World Wildlife Fund have joined forces to achieve the recovery of healthy migratory fish stocks in and around the Haringvliet. To achieve this it is necessary to balance fishery as an economic activity with the ecosystem's carrying capacity.

Before the Haringvliet dam's completion in 1971, the Haringvliet not only served as an important passage way for migratory fish, but also as a refuge and nursery area for juvenile fish. We have identified 16 fish species that are expected to make use of the freshwater-saltwater transition zone to be created in the Haringvliet. With regard to these 16 fish species we make an inventory of the measures necessary to improve their current and future protection. We also test and assess various potential solutions, including methods to reduce bycatch in commercial fisheries. Based on gathered knowledge and experience we seek co-operation with the authorities and the fisheries sector.



The Haringvliet's Dream Fund Project

The Haringvliet is formed by the estuary of the rivers Rhine and Meuse, and is situated in the province of South-Holland between the areas of Voorne-Putten and the Hoekse Waard in the North and Goeree-Overflakkee in the South. In 1971, upon completion of the Haringvliet dam, the Haringvliet was closed off from the sea and, as a result, the conservation of this delta area's unique ecosystem was thwarted. In 2018, when the Haringvliet sluices are set ajar, fish will be able to migrate again from sea to river and vice versa.

ARK Natuurontwikkeling, Natuurmonumenten, Dutch Angler Association, Staatsbosbeheer, Netherlands Society for the Protection of Birds (VBN) and World Wildlife Fund have joined forces to create a more natural Haringvliet as a preparatory action before the Haringvliet sluices are opened in 2018. The financial contribution from the Dream Fund (Droomfonds) of the Dutch National Postcode Lottery is an indispensable impetus. Our ambition is to make way for natural dynamics in this delta area, for migratory fish and birds, which will be enjoyed by the public!

Towards a dynamic delta

In addition to recovering healthy migratory fish stocks, the Dutch Dream Fund Project plans to carry out five subprojects: nature development, recreation, reintroducing sturgeons, recovery of shellfish banks and monitoring. Alongside the Haringvliet's banks we prepare a natural fringe area. Water will again flow into nature areas and stream out of them. Currently this is still fresh water, but when the Haringvliet sluices are set ajar, brackish water will flow in as well. The resulting natural tidal zone will provide food, resting places and breeding grounds for birds, including migratory birds. In addition, it will provide refuge sites for fish to acclimatize during their journey between the sea and the river.

Cycle tracks, footpaths and observation posts will enable the public to enjoy this unique nature area. We will also reintroduce the sturgeon, a prominent inhabitant of old times, which disappeared from the rivers due to overfishing and pollution. We also focus on the recovery of shellfish banks. In front of the Haringvliet's mouth we set up test sites at sea, monitoring meticulously how these shellfish develop. Through monitoring we also take an inventory of fish and bird stocks, including historical data and also in terms of what can be expected in the future.

... balancing
economy
and ecology

Supported by



Partners involved in the fishery subproject

