

What do we use as an Indicator?

Fish

Why do we use Fishes?

Estuarine fish communities are good indicators of a range of man-made disturbances. They are mobile, relatively long lived, found near to the top of the food chain (so are affected by other parts of the chain and prone to bioaccumulation effects) and are easy to identify and return to the water: all of these characteristics make them ideal for the monitoring of estuaries. This method is based on the principle that the abundance of fish and the number of individual species found can change depending on the pressures on the estuary.

Sampling

A combination of sampling methods can be used which include, seine netting, fyke netting, fish traps, and various forms of trawling. All fish caught are identified, counted, and measured.



What do we measure?

We measure 10 things:

Species composition

This is a measure of the amount of similarity between the fish assemblage within an estuary and a reference assemblage under 'natural' conditions.

Presence of indicator species

Indicator taxa are very sensitive to disturbance or anthropogenic stress and their presence within a sample is noted. For example lampreys are listed as an indicator species as they are sensitive to water quality and spawning habitat quality.

Species relative abundance

This is a quantitative measure of the similarity between the relative (%) abundance of the fishes captured in an estuary and the relative abundance expected under natural or reference conditions.

Number of taxa that make up 90% of the abundance

This is a simple measure of dominance; unimpacted systems will be dominated by many species while only a few taxa will dominate an impacted system.

Number of estuarine resident taxa

The number of taxa that spend most of their life in the estuary.

Number of estuarine-dependent marine taxa

This is the number of taxa that can be found in the estuary for part of their life using it for nursery habitats, reproduction grounds, and migratory routes.

Functional Guild composition

Fish species with similar life histories or biological characteristics are grouped together in functional guilds. A healthy estuary should contain species of fish that represent all functional guilds. One functional guild is the diadromous taxa and are fish that are able to travel between salt and fresh water; a species in this guild would be Atlantic Salmon, *Salmo salar*.

Feeding Guild composition

Fish species with similar ways of feeding are grouped together into feeding guilds. For example zooplankton feeders, fish feeders and plants or detritus feeders. A healthy estuary should contain fish from each of the feeding guilds. Of these guilds the following two are particularly important and merit their own measures.

Number of benthic invertebrate feeding taxa

This provides an indirect measure of the benthic invertebrates as a food source for fishes.

Number of piscivorous taxa

This represents top predators within an estuary and are a group of fishes most sensitive to ecological change.

How do we decide the Biological Status?

For the above 10 measures, figures were calculated to determine what these would be for undisturbed waters. The observed results are then compared with these results to calculate the Ecological Quality Ratio (EQR). EQR values close to one indicate fish communities are close to their natural state; those near to zero indicate a high level of pollution or disturbance. To decide the Biological Status the ten measures are combined and the range from one to zero divided into the five bands required by the Water Framework Directive see the table below:

Biological Status Boundary Values

Status	EQR Values
High	0.81
Good	0.58
Moderate	0.40
Poor	0.20
Bad	0

For more details see the [UKTAG Practitioners Guide to the Transitional Fish Classification Index](#).