Data modelling is key to managing fisheries sustainably

November 17 2017

Rock flathead is one of Australia's favourite fish. Credit: Alpha/Flickr

Have you ever questioned the environmental or economic sustainability

of the flathead you order from your local fish and chips shop? Do you know where it's from?

Not all [fish](#) are caught in an ecologically sustainable way, but scientists are working with fisheries managers to address this.

"To sustainably manage a fishery we need to know its births, deaths, immigration, migration and growth rates", says Dr John Morrongiello, a fish ecologist at the University of Melbourne's School of BioSciences.

"We also need to know where a fish lives, what it eats and how all these factors are affected by changes in the environment."

Dr Morrongiello's team uses complex data modelling to understand the factors impacting fish stocks.

"This helps us understand how the process of fishing itself affects the fish through changing traits like growth rates."

Dr Morrongiello and his colleagues Dr John Ford, Dr Rob Day and PhD student Joshua Barrow have been working in Corner Inlet in southern Victoria to understand how environmental conditions have affected the growth of the commercially valuable Rock Flathead.

Their research was published in the journal *Marine Ecology Progress Series*.

What rock flathead growth reveals about sustainably managing fisheries

The team measured the changes in growth patterns of 526 Rock Flathead fish collected over 32 years, and analysed these against environmental

factors like temperature and river flow. They ran the data through several climate change scenarios to see likely growth rates in 2030 and 2070.

After accounting for factors like age (old fish grow slower than young fish) and sex (females grow faster than males), the researchers showed Rock Flathead grow faster when there are higher river flows and at higher water temperatures.

Growth was measured using bones in the fish's head called otoliths that play a role in hearing and balance. Lead author Mr Barrow says these otoliths have the fish equivalent of tree rings, and can indicate the age of the Rock Flathead.

"If you take a section of the otolith, it has rings like a tree trunk and so you can see how fast the fish grows, how old it is and which particular years line up with those environmental conditions."

Mr Barrow says the high river flows correlate with more seagrass growth, an important habitat for flathead, which are an ambush predator.

Higher temperatures mean more seagrass meadows, and directly help the cold-blooded flathead fish by allowing them to be more active and hunt for food.

The climate change models showed that the fish are likely to grow faster as the climate warms.

"River flows are predicted to decrease, but these will likely be offset by rapid increases in temperature," says Mr Barrow.

This study compliments a larger body of research led by Dr Ford, which examines the changing coastal habitats of Corner Inlet, in Victoria's

Gippsland, in relation to variations in the density of seagrass cover over the last 50 years. The researchers have found that decades of intensified weather events, algal blooms and chemical pollutants have contributed to a decline of seagrass in the area.

"By combining this finding with John's larger project investigating what's driving seagrass decline and recovery, we can provide a clear link between the Rock Flathead's habitat and how this actually affects the commercial fishery," says Mr Barrow.

How can data modeling help manage fish stocks?

Australian fisheries are using this kind of data to help ensure the ongoing viability of their industry.

"It's giving us a very clear indication of whether we might be driving those stocks into the negative or whether we are getting the maximum, or the optimum, productivity out of them," says Dr Ford, an independent sustainability accreditor and honorary researcher at the University of Melbourne.

"What sustainability is all about is balancing this desire to continue to feed a growing population in a world which supports the actual ecosystem."

Dr Morrongiello says that to manage both the environmental and economic impacts of fisheries we need a collaborative effort between consumers, scientists and industry.

"We are generating the scientific knowledge and have a supportive industry and government so there is no excuse why we can't get good outcomes," says Dr Morrongiello.

"It's about managing the fine balance between having a sustainable and viable fishery supported by a healthy ecosystem, and over-harvesting a resource or degrading the environment and causing fisheries to collapse.

"Thankfully, we get the balance right more often than not in Australia."

Look out for the Marine Stewardship Council blue tick label on sustainably fish products. Credit: Marine Stewardship Council

How can we, the consumers, help?

So what can we as consumers do to make educated choices and help promote sustainable fisheries? There are three easy ways to achieve this.

Buy Australian fish that is locally sourced

Australian fisheries operate within strict codes and practises that ensure their sustainability. They rely on research to maintain a healthy ecosystem, as well as a sustainable population.

Diversify your choice

Don't just choose tuna or salmon, as demand for certain types of fish can lead to overfishing and population depletion. Choose from a variety of locally sourced and regionally specific fish to support the local industry and maintain diversity within our oceans. Sustainable and under-appreciated species include sardines, leatherjacket, mackerel, squid/calamari and mullet.

Look for eco-labelled products

The Marine Stewardship Council gives sustainable fish products a blue tick to help consumers make ecologically sound choices.

More information: J Barrow et al. Environmental drivers of growth and predicted effects of climate change on a commercially important fish, Platycephalus laevigatus, *Marine Ecology Progress Series* (2017). DOI: 10.3354/meps12234

Provided by University of Melbourne

Citation: Data modelling is key to managing fisheries sustainably (2017, November 17) retrieved 10 April 2024 from https://phys.org/news/2017-11-key-fisheries-sustainably.html