That sounds FISHY...

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If you heard there was a species of animal in Australia which lets out a call during mating as loud as a rock concert you might picture a blue whale, or another large mammal.... But what if I told you it was the humble Mulloway?

Figure 1 A number of important species for rec fishos including Trevally are known to use sounds to communicate (Source Cheyne Jones)

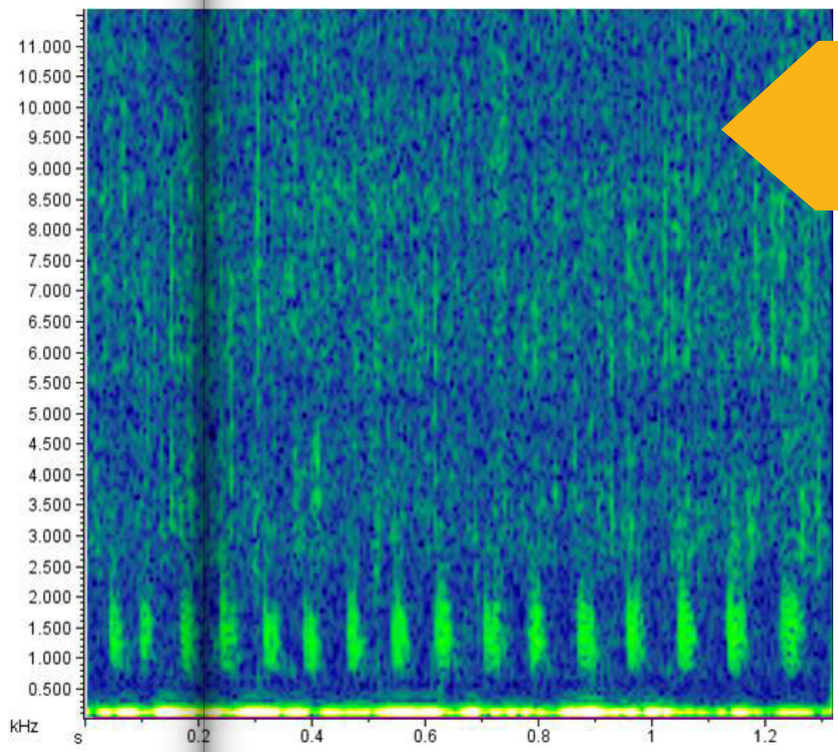

Figure 2 Recording of fish sound choruses from northern Australian waters

(Source: JASCO Applied Sciences Australia).

Research funded by the Fisheries Research and Development Corporation found that Mulloway produce three different call types when spawning, with some calls exceeding 172 decibels in underwater sound units when recorded from 1m away. By comparison, a loud rock concert when roughly compared to underwater levels (imagine the bubbles!) reaches around 177 dB)[1]. Mulloway calls can be detected from over 110-400m away using correct equipment, and can actually cause pain in divers in close proximity.

There are in fact over 700 fish species worldwide which make sounds as part of intricate social and reproductive behaviour[2], including a number of recreationally important species such as Samsonfish, Trevallies, Dhufish, some Tuna species, Spanish mackerel, and species belonging to the family of fish we call cod which includes Queensland Groper and Coral Trout1. The Goliath grouper, for example, advertises it's presence with such power that they can be heard up to 2,000 m away. Interestingly, some other species such as pink snapper don't seem to make a peep.

Fish species have evolved the ability to produce sounds in a variety of ways, including drumming their swim bladder with specialised muscles or bones, as well as hydrodynamic tail slaps, fin flicks, fin spine extensions, and jumps1. You can check out some of the weird and wonderful noises produced by fish species around the world on the website www.fishecology.org An example of a fish chorus from northern Australian waters is also shown below (green pulses depict the repeated, impulsive chorus of a grunter type species)

Rec fishers have known about the noise-making ability of many species they catch for years, with some earning common names like grunters, croakers, blurters and yakkas as a result. Their ability to hear things has also helped to shape our fishing practices; Sir Isaac Walton was possibly the first to discuss the need to outsmart a fish's sense of hearing in order to be a successful angler in his 1653 bookThe Compleat Angler, and we have been tip-toeing along the riverbank ever since.

So what do fish species use the ability to make and hear sounds for?

Well, it seems that finding a mate is the main reason that fish make noise. In some species huge groups of males form and they call together to attract females to their large aggregation.

The fact that many of our fish species can... well... talk underwater provides opportunity for us to take advantage in a number of innovative ways. Overseas researchers have developed interesting techniques to monitor the size of the spawning stock of species such as CoralTrout and Jewfish using passive acoustic recording techniques[3]. Other researchers in Australia have explored 'calling' pest species such asTilapia into traps to control their populations[4].

There is also the potential for sounds to be used advantageously whilst fishing...

In an albacore fishery in the United States the sound of a faulty gearbox was inexplicably associated with increased catch rates (perhaps tempting some to throw a spanner in the gearbox to bring the fish on the chew?)[5]. The appearance of sound producing technology on leading-edge rec fishing boats in recent years playing soundtracks with names such as 'whimpering prawn' and 'balling baitfish banquet' is clear evidence that many rec fishers and tackle producers also see the potential application.

The fact that many of our fish species both make and listen to sounds also raises a few questions that need further investigation as well. International research has suggested that sounds of large ferries, and even outboard motors, may impact on fish, increasing their heart rate or even disrupting cohesion of schooling[6,7]. Consequently, there is a need to better understand potential impacts to fish stocks resulting in areas of intense shipping activity, or perhaps seismic exploration/drilling activity.

Research has also shown us that larvae of corals, crabs and fish (at least) are attracted to the sounds made by reef complexes, and may use these sounds to navigate towards their eventual home[8]. There is the potential that increases in background noise levels may make it harder for them use their "sonic compass". Researchers have also highlighted concerns that increasing noise levels may mask communication of adults (basically drowning out the conversation), perhaps making it more difficult for them to find a mate[1].

Rec fishers intuitively recognise the need for a stealthy approach to maximise catch rates, and the rapid adoption of the use of electric motors, drift fishing in open waters, use of poling platforms on the flats, and proliferation of kayaks in recent years demonstrate various approaches adopted in the search of increased strike rates. While reduced sound during fishing activities may reduce impacts on fish behaviour and help maintain catch rates, it may be valuable for us to gain a better understanding of the impact of noise pollution on key recreationally-important fish species. Some Australian states currently have no regulations relating to underwater noise in fishery management plans and do not recognise noise as pollution. Establishment of long term baseline monitoring programs would also help to enable us to track how things are changing over time as development continues to increase.

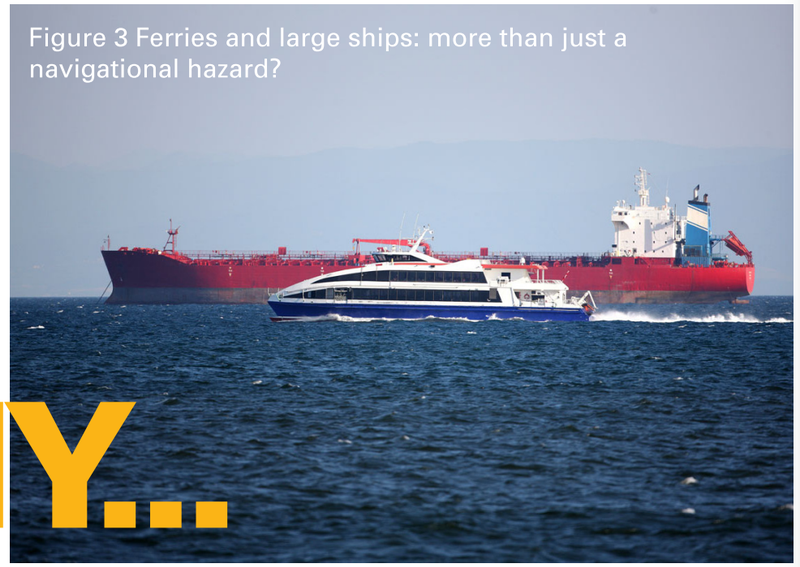

Figure 3 Ferries and large ships: more than just a navigational hazard?

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Studies show that some Tuna species make sounds as part of a schooling behaviour via a cough-like, open jaw action, which probably comes in pretty handy after dark when spawning occurs. Pic courtesy of Matt Daniel

Further Reading...

1Parsons, MJG, Mackie M, Siwabessy PJ, and Duncan AJ (2012). In situ source levels of mulloway (Argyrosomus japonicus) calls. J. Acoust. Soc. Am. 132 (5).

2 Stuart I., Smith M. and Baumgartner L. (2008). Counting Murray-Darling fishes by validating sounds associated with spawning. A final report to the Murray-Darling Basin Commission. MDBC Project MD1022.

3Lowerre-Barbieri S.K., Barbieri L.R. and Flanders J.R. (2008). Use of Passive Acoustics to Determine Red Drum Spawning in Georgia Waters. Transactions of the American Fisheries Society. 137: 562 – 575.

4 McPherson G (2012). Acoustic modification of Tilapia behaviour. Proceedings of Acoustics 2012 – Fremantle. Australian Acoustical Society.

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6 Sara G., Dean J.M., D'Amato D., Buscaino G., Oliveri A., Genovese S., Ferro S., Buffa G., Lo Martire M., Mazzola S. (2007). Effect of boat noise on the behaviour of bluefin tuna Thunnus thynnus in the Mediterranean Sea. Marine Ecology Progress Series. Vol 331: 243-253.

7 Graham A.L. and Cooke S.J. (2008) The effects of noise disturbance from various recreational boating activities common to inland waters on the cardiac physiology of a freshwater fish, the largemouth bass (Micropterus salmoides). Aquatic Conserv: Mar. Freshw. Ecosyst. 18: 1315–1324

8Radford C.A., Stanley J.A., Simpson S.D, Jeffs A.G. (2011). Juvenile coral reef fish use sound to locate habitats. Coral Reefs 30:295–305

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