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Fisheries

# Study finds that acoustics are seldom considered when developing strategies to protect fish populations at risk from extinction

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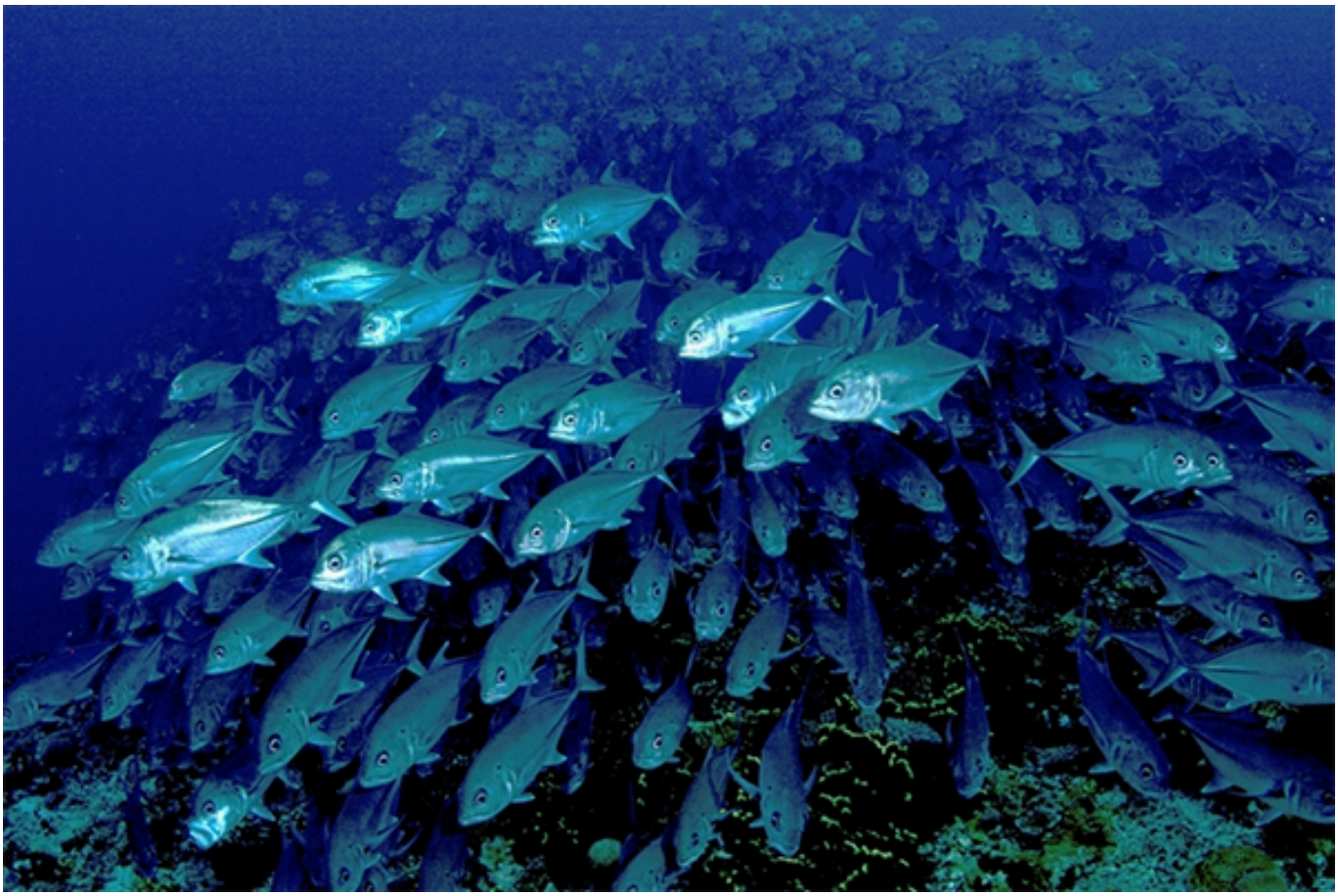
**By Darryl Jory, Ph.D.**

## Results indicate that 29 imperiled fish species in Canada produce sound for communication, and their status and recovery documents omit acoustics or noise impacts

The results of research by scientists affiliated with several universities in Canada and the U.S. show that although over a thousand fish species are known to use sound to communicate, attract mates, avoid predators (using hums, grunts, clicks, and bubbles) and obtain information about their habitats quality – all of which can be negatively impacted by noises caused by humans – fish acoustics are rarely considered when developing strategies to protect fish populations at risk from extinction.

The **study** (https://doi.org/10.1016/j.biocon.2025.111339) – authored by Drs. Kiara R. Kattler (Simon Fraser University, and University of Alberta, Canada); Audrey Looby (University of Victoria, Canada; and University of Florida, USA); Isabelle M. Côté (Simon Fraser University, Canada); and Kieran D. Cox (Simon Fraser University, and University of Victoria, Canada) – discusses research that examined the



Study finds that acoustics are rarely considered when developing strategies to safeguard at-risk fish populations from extinction. The results indicate that 29 imperiled fish species in Canada produce sound for communication and their status and recovery documents omit acoustics or noise impacts. Integrating fish sonifery, soundscapes, and noise pollution considerations into Canadian policies will improve species management, conservation, and recovery efforts. Photo of fish school by Gordon Firestein (CC BY-SA 3.0, http://creativecommons.org/licenses/by-sa/3.0/, via Wikimedia Commons).

extent to which acoustics have been considered in recommendations for listings by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and subsequent action plans following listings under the Species at Risk Act (SARA).

“Our study highlights a major gap in how we protect at-risk fish species by overlooking the role of sound. Many fish rely on acoustic communication to survive and reproduce, yet noise pollution and soundscapes are rarely considered in conservation planning in Canada. Integrating acoustics into recovery strategies is a necessary step to better protect these vulnerable populations,” corresponding author Dr. Kattler told the *Advocate*.

Authors examined the extent to which strategies for conserving fishes at risk in Canada have considered acoustics. They reviewed **COSEWIC** (https://cosewic.ca/index.php/en/) assessments as well as **SARA Recovery Strategies and Action Plans** (https://www.canada.ca/en/environment-climate-change/services/environmental-enforcement/acts-regulations/about-species-at-risk-act.html) of all

assessed freshwater and marine fishes and established which fish species are actively soniferous using a **global database** (https://fishsounds.net/). Authors then examined whether assessments of these actively soniferous fishes considered the species' sound production, the soundscape of their habitats, or noise pollution as a threat to population recovery. And they provided evidence that this information exists for actively soniferous at-risk fishes, suggesting that integrating it into conservation planning would help to provide better protection to these populations.



Sound is an integral constituent of underwater environments, with **wide-ranging implications** (https://doi.org/10.1126/science.aba4658) for species and their habitats. Our understanding of **how species use acoustics** (https://doi.org/10.1038/s41597-023-02745-4) to discover and broadcast information has expanded in recent decades, with sound-producing (soniferous) mammals, invertebrates, and fishes known to use sound to communicate with conspecifics (other individuals of the same species. The sounds that species produce actively are different from those produced passively from activities like feeding; although both are ecologically pertinent, species **generate active sounds** (https://doi.org/10.1007/s11160-022-09702-1) to exchange information between con- and heterospecifics (individuals of a different species).

More than 1,000 fish species globally have been classified as actively or passively soniferous, despite **less than 4 percent of species** (https://doi.org/10.1007/s11160-022-09702-1) having been examined for sound production, and evolving estimates show that a substantial number of fish species are likely soniferous but these have not been examined yet. The ecological implications of noise – sounds of man-made origin – are well established.

In some instances, concern over noise impacts has resulted in policies that consider underwater noise a threat. However, these strategies are commonly used as guiding documents but do not have enforceable regulations. Consequently, the most viable course of action to mitigate the impacts of noise pollution is to include considerations of noise and the use of sound by species in conservation strategies.

**Ecoacoustics** (https://doi.org/10.1007/s12304-015-9248-x) is an emerging field of research, and global databases on fish sound production have emerged only recently. However, research recentness or confidence cannot fully explain the lack of consideration given to ecoacoustics in recent policy documents. Integrating acoustics into conservation assessments would also incorporate aspects of fish ecology that are currently lacking. The interaction between a species' sound production, its habitat's natural soundscape, and **noise pollution** (https://doi.org/10.1002/fee.2824) can influence individuals and populations.

Authors determined soundscapes, sound production, and noise pollution have seldom been considered in documents assessing stressors to at-risk actively soniferous fishes in Canada. After examining all COSEWIC assessments as well as SARA Recovery Strategies and Action Plans for fishes in Canada, they found only two assessments of actively soniferous species that considered soundscapes, sound

production, or noise pollution, neither of which considered all three aspects simultaneously. Moreover, noise pollution was listed as a potential threat in the assessments of 9 percent of other fish species, of which 69 are likely soniferous.

## Effects of anthropogenic noise on prey quality of the forage fish Pacific sand lance

It's critical to understand how noise affects individual fish species and how it can alter ecosystems, much like climate change or pollution.

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"We find that acoustics are rarely considered when developing strategies to safeguard at-risk fish populations from extinction. Integrating fish sonifery, soundscapes, and noise pollution considerations into Canadian policies will improve species management, conservation, and recovery efforts," stated the authors.

All the documents considered various non-acoustic man-made threats to the recovery of species, with other pollutants and perturbations like waves created by boats, commonly considered. Over the past two decades, Canadian policy has not adequately protected soundscapes from noise pollution where actively soniferous fishes at risk live. The limited consideration of **soundscapes** (http://bastion.wum.edu.pl/wp-content/uploads/2013/09/Europe-2020-Flagship-Initiative-Innovation-Union.pdf), fish sounds and noise pollution in fish species management is reflected by other governing bodies globally.

The challenges associated with implementing management plans that mitigate the ecological effects of noise pollution will vary depending on which environment the at-risk fish species occupies. Noise pollution in marine ecosystems commonly results from industrial activities, commercial shipping, military activity, and resource extraction, requiring coordination between several government agencies

to mitigate impacts. Noise pollution in brackish and freshwater ecosystems, in contrast, is mainly due to local industries, urban infrastructure, and recreational activities, requiring considerations of municipal, provincial, and federal regulations. However, in all cases, species-specific consideration would help navigate the challenges associated with these different environments.

“The protection of the soundscape and communication spaces for charismatic marine mammals is well established; indeed, it has been transformative for the conservation of the Southern Resident Killer Whale and other cetaceans. There is ample evidence to show that sound and noise are as crucial for fishes as they are for charismatic marine megafauna. As such, the importance of acoustics transcends taxonomic boundaries as sound serves similar functions across taxa, its effectiveness in communication can be influenced by disruptions to the soundscape, and all soniferous species should be afforded equal protection. Now is the time to integrate this understanding into the protection of fish species at risk,” concluded the authors.

**Read the full study**. (https://doi.org/10.1016/j.biocon.2025.111339)

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