ACOUSTIC DISCRIMINATION

ISSF Research for Sustainable Tuna Fisheries

Technology to Support Selective Fishing

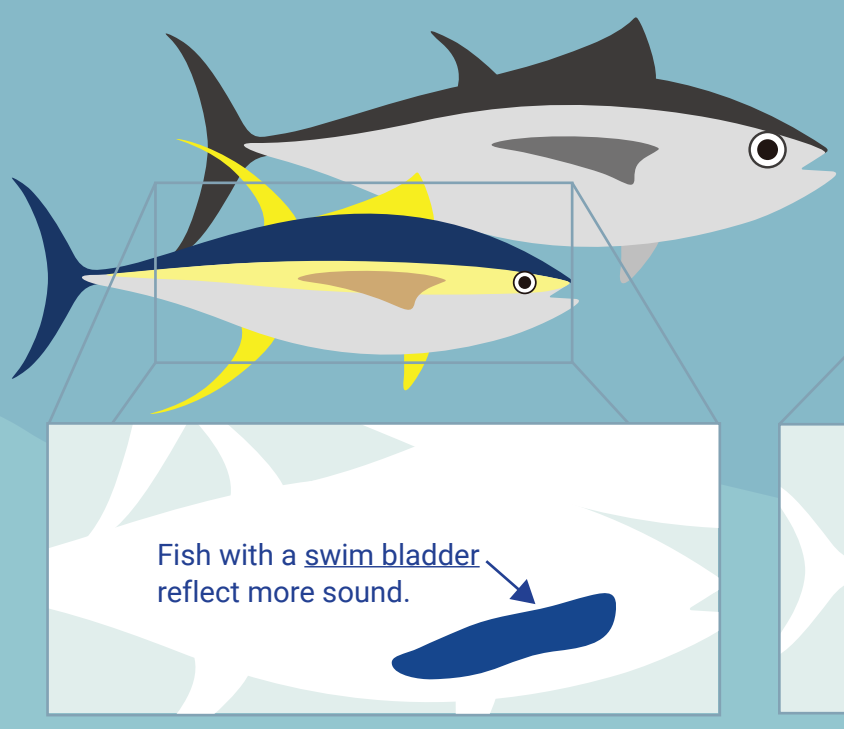
Purse-seine vessels, which catch 66% of the world´s tuna, rely largely on Fish Aggregating Devices (FADs) to capture tropical tuna species. In partnership with purse-seine fleets and AZTI research institute, ISSF researchers are studying how vessels that use FADs may be able to fish more selectively by applying acoustic technology like echosounders in new ways.

Species Reflect Sound Differently

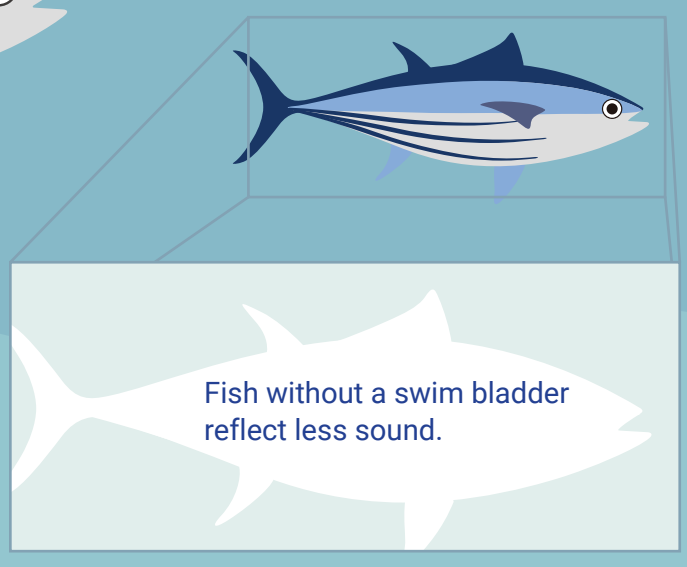
Skipjack, bigeye, and yellowfin are the main tropical tuna species found at FADs. Depending on the ocean region, certain species may be suffering from overfishing. Ideally, before they make a set, FAD fishers could target the tuna species whose stocks are at healthy levels.

The process of using echosounders to identify and differentiate species is called “acoustic discrimination.” Tuna species produce different acoustic signatures based on the presence/size or absence of a swim bladder.

Swim bladder: an air-filled sac that functions as a ballast organ, enabling the fish to maintain its swim depth without floating upward or sinking.



Bigeye & Yellowfin Tuna



Skipjack Tuna

Acoustic Data Can Help Fishers Identify Species at FADs

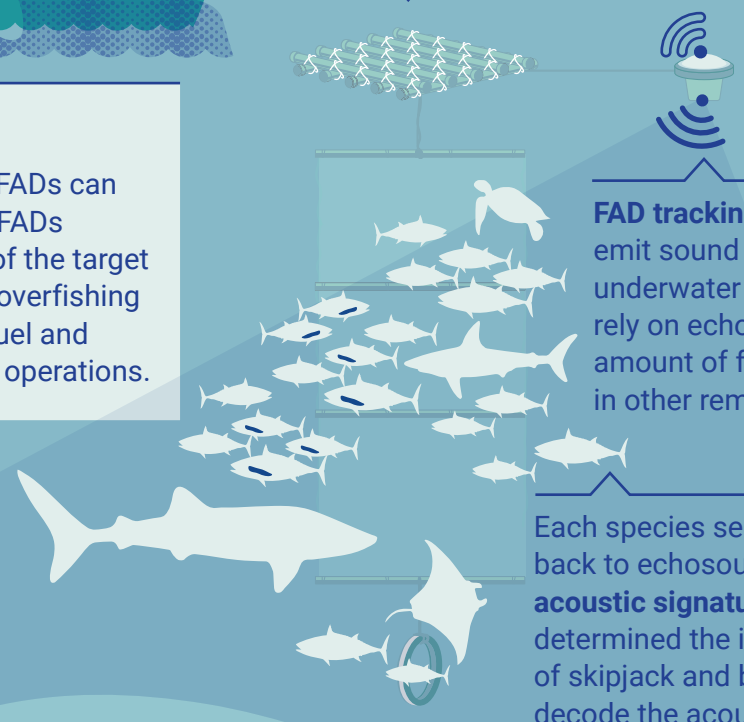
Tuna fishers use buoys equipped with echosounders to remotely track their FADs. They plan fishing trips based on the buoy's acoustic estimate of the amount of fish aggregated at FADs.

Current technology, however, does not allow for discriminating species or sizes, which means fishers may travel to areas where FADs are full of non-target species/sizes.

Target Outcome

Knowing which species are at FADs can help **vessel crew** focus on the FADs attracting a higher proportion of the target tuna species. This can reduce overfishing and bycatch — and also save fuel and reduce emissions from fishing operations.

One challenge to fishing selectively now is that **FADs** can attract a mix of tuna and other marine species — including at-risk rays and sharks — as well as fish of different sizes, making it difficult to catch only the **target tuna species**.



FAD tracking buoys with echosounders emit sound pulses that reflect off underwater targets like fish. Fishers rely on echosounder data to know the amount of fish aggregating at FADs, or in other remote ocean locations.

Each species sends a different sound response back to echosounders — and has a distinctive **acoustic signature**. Marine scientists have determined the individual acoustic signatures of skipjack and bigeye but are still working to decode the acoustic signature of yellowfin.

Learn More

PLOS ONE Journal Article: *Towards acoustic discrimination of tropical tuna associated with Fish Aggregating Devices*

ISSF. "Toward acoustic discrimination of tuna species at FADs."

Moreno, Gala & Guillermo Boyra. "Decoding the acoustic signatures of bigeye and skipjack tuna could help fishers estimate the number of fish by species and size and reduce bycatch."

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