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Science Highlight: An Investigation into the Hidden Trade of Guitarfishes

Sharks tend to steal the spotlight when it comes to ocean predators—but they're only part of the story. These animals, along with skates and rays, belong to the same fascinating group of fishes: elasmobranchs. While some elasmobranch species are well-known and celebrated, like the formidable white shark or the elegant manta ray, others are understudied and underappreciated—despite facing serious conservation threats. Today, we're turning the spotlight on one such group: **guitarfishes**.



Do you know guitarfishes?

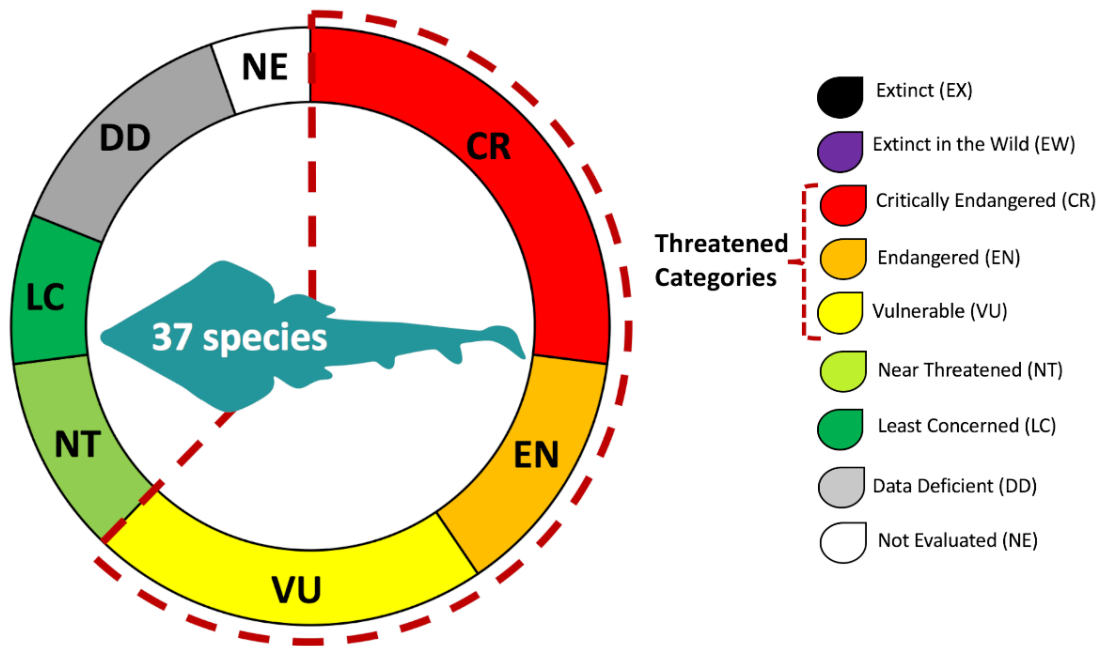
Named for their distinctive body shape, guitarfishes are a group of rays with intriguing adaptations. With their flattened bodies, pointed snouts, dorsal fins, and shark-like tails, they look as if someone took pieces from both sharks and rays and blended them into a single animal. Guitarfishes inhabit warm, shallow, coastal waters around the globe, where they feed on small invertebrates in sandy or muddy habitats.



Guitarfishes are characterized by a flattened, ray-like body and a shark-like tail. Photo courtesy of Bryan Huerta.

Guitarfishes are part of the order Rhinopristiformes, also known as rhino rays—a group considered to be among the most threatened vertebrates on the planet. There are three recognized genera of guitarfishes: *Acroteriobatus* (10 species), *Pseudobatos* (9 species), and *Rhinobatos* (18 species).

Unfortunately, these fishes are particularly vulnerable. Occupying shallow coastal habitats, guitarfishes are caught in small-scale fisheries —either intentionally or as bycatch— and are frequently sold in domestic markets. Despite this, they receive very little regulatory protection in most parts of the world. Nearly two-thirds of the guitarfish species assessed by the [International Union for Conservation of Nature \(IUCN\) Red List](#) are currently classified as threatened. Additionally, harvest and trade of these animals are often undocumented and underreported. That’s where scientists step in to help.



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Meet Bryan: Former Labmate & Guitarfish Detective



Bryan (right) was a part of the Marine Fisheries Ecology Program from 2020 to 2021 before leaving to pursue his master's degree at the University of Southern Mississippi.

[Bryan Huerta Beltrán](#), a former labmate and passionate elasmobranch researcher, has always had a soft spot for the “underdog” species. Originally from Mexico City, he grew up seeing fresh guitarfishes sold in the fish markets as an easily accessible and affordable food source.



Guitarfishes are often traded in artisanal fisheries as an easily accessible and affordable source of protein. Photo courtesy of Bryan Huerta.

Outside of this, dried and modified guitarfishes can also be found in curio shops and medicinal markets. These modified specimens —known as *pez diablo*— are transformed for ornamental or spiritual purposes, with their bodies reshaped or painted to resemble another creature. Sometimes, they're altered so drastically that they no longer resemble a guitarfish.



Examples of guitarfishes cut and dried to take on a devil-like appearance, lending to the name ‘pez-diablo’ — meaning “devil fish”. These pez diablo are traded as curios or used for spiritual or medicinal purposes. Photo courtesy of Bryan Huerta.

This practice can create problems when it comes to species protection and enforcement. *Pez diablo* can be difficult, or even impossible, to identify to the species level. Many guitarfish species look very similar, and when their features are physically changed or erased, visual identification becomes unreliable. This creates a challenge for enforcement agencies, especially those tasked with regulating wildlife trade under international agreements like [CITES \(the Convention on International Trade in Endangered Species\)](#).

Bryan’s research aims to identify which guitarfish species are being traded in the form of *pez diablo* by exploring genetic techniques that could help distinguish them. By using trace DNA from a small tissue sample, researchers can identify the species—even when the specimen has been dried, painted, or physically altered. This method has already proven successful in other wildlife trade studies, including the [identification of shark fins](#) and dried medicinal rays.

“In this study, we’re exploring a unique trade involving guitarfishes. In summary, in some countries, people are taking these fishes and

transforming them to look like mythical creatures (mainly to look like aliens or devils), which are then sold as curiosities or even for use in alternative medicine. This particular trade has been largely ignored, even though there is evidence of guitarfishes being shaped to resemble mythical creatures as early as 1933. For my master's thesis, I'm also investigating which species of guitarfishes are being used and sold as these "mythical creatures." To do this, I'm using genetic techniques to reveal the species identity, as there are at least 37 recognized species of guitarfishes. One big challenge I've encountered is the need to create my own genetic database to accurately identify these species. To achieve this, I'm teaming up with researchers from various countries, which has been a great opportunity, but it also took some time to find the right partners." - Bryan Huerta

Genetic tools offer a relatively low-cost, minimally invasive, and reliable way to support conservation enforcement, and Bryan's work is bringing this approach to an often-overlooked area of elasmobranch research.



Bryan has been hard at work, collecting pez diablo to extract DNA and identify which species of guitarfish are most affected by this trade. Photo courtesy of Bryan Huerta.

We asked Bryan to share a little more about his work and what drives him. Here are a few highlights:

Q: How did your passion for elasmobranchs begin?

A: *"My passion for animals has been with me since I was a child! I was lucky enough to have several pets growing up, and my parents always encouraged my passion, which really helped. One of my favorite activities was visiting fish markets to see what species I could find. I think it is interesting how sharks and rays come in so many different forms and sizes and how diverse they are."*

Q: Why study lesser-known species instead of charismatic megafauna?

A: *"I find it very exciting to learn new things about animals that we don't know much about. There's a good chance we can discover something new when we focus on these lesser-known species, especially compared to charismatic megafauna that everyone knows or is interested in. Often, these lesser-known species get ignored, and we don't fully understand how important they are to the ecosystems or the pressures they face due to human activities. Some lesser-known species might even be at risk of extinction but don't get the same attention as charismatic ones. I think it is also important to look at the forgotten species."*

Q: What's been your favorite part of this project?

A: *"I've really enjoyed working on this project for several reasons. Usually, when you're in graduate school working towards a Master's degree, your professor gives you a project to do. But in my case, I was lucky enough to come up with my own project. I shared the idea with my advisor, and she agreed to let me go for it. This has been my favorite part of the experience—chasing after my own project!"*

Q: What impact do you hope your research will have?

A: *"The modified guitarfish trade has been largely ignored, and much of the information out there is just based on anecdotal evidence. I hope this study serves as a starting point and helps bring attention to the issue of this wildlife trade that affects guitarfishes. My aim is to encourage other researchers to dive deeper into this subject and discover more about these fascinating creatures"*

and better understand the modified guitarfish trade. It's important to know which types of guitarfishes are being sold in the modified guitarfish trade, as some are more at risk of extinction than others.

The good news is that the overall increasing interest in guitarfishes is a positive sign, as it motivates us to learn more about them and advocate for their protection and/or their sustainable fisheries and use."

Looking Ahead

We miss having Bryan around the lab, but we're thrilled to collaborate with him on this important work. His research sheds light on overlooked species, and we're excited to share that a scientific paper based on this work is [hot off the press!](#)



Bryan presenting updates on his work at the annual meeting of the American Elasmobranch Society in 2024.

When we asked Bryan about what is in store for him next, he said, *"I want to keep studying sharks and rays for as long as possible because I'm excited to learn something new about them! I'm committed to my elasmobranch journey for the long haul!"*

There's still so much to learn about guitarfishes and their relatives, and we're excited to be part of that journey—because even the lesser-known species have stories worth telling.

If you're interested in learning more about this work, check out Bryan's profile at the [Save Our Seas foundation](#), and follow us for updates!



I'm Marcus Drymon, an Associate Extension Professor at Mississippi State University and a Marine Fisheries Specialist at Mississippi-Alabama Sea Grant. Amanda Jargowsky, Abby McGregor, Alena Anderson, Danielle McAree, Lindsay Mullins, and I are the Marine Fisheries Ecology Lab. We'd love to hear from you! Please reach out to us at marinefisheriesecology@gmail.com



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