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Marine Manager Helps Protect Unique Ecosystem in South Atlantic Ocean

How a technology portal synthesizes data to inform management of Ascension Island's vast marine protected area

On an otherwise jubilant day in 2019, Diane Baum had a concerning realization: The marine protected area (MPA) that she and her team had worked so hard to establish around Ascension Island, in the Atlantic Ocean between Angola and Brazil, was about to become a reality. But Baum, who at the time was director of the Ascension Island Government Conservation and Fisheries Directorate (AIGCFD), did not yet know how or where her team would summon the resources to actively manage and monitor such a vast area— 445,000 square kilometers, the entirety of Ascension's territorial waters.

> "I knew this would be possible only if we had partners in the effort and access to the latest technology."
>
> **Diane Baum, former director of conservation and fisheries, Ascension Island Government**

Ascension Island is home to 11 species of seabirds, including the declining masked booby (Sula dactylatra).
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Ascension Island sits approximately 1,600 kilometers off the African coast in a broader ocean region that is incredibly remote but subject to heavy industrial fishing, primarily by various countries' tuna fleets. Historically, this fishing occurred mostly outside of Ascension's exclusive economic zone (EEZ), but officials worried that would change as fishing and vessel technology advanced, allowing boats to travel farther and stay at sea far longer than they had in the past.

And the people of Ascension knew they had reason to protect their waters.

"We've got a huge range of habitats, from shallow areas with abundant fish to hydrothermal vents and seamounts, which are biodiversity hotspots," says Baum. "Large predatory fish such as sharks and grouper swim around our shores in great numbers. We've got at least 67 unique species to Ascension, which includes 11 fish species found nowhere else on Earth. And we haven't overfished our waters."

The island is also home to 11 species of seabirds, including the vulnerable Ascension Frigatebird *(Fregata aquila)*, declining Masked Booby *(Sula dactylatra)* and Sooty Tern *(Onychoprion fuscatus)*. Most of the region's seabirds feed on small bait fish that are chased to the surface by schools of tuna and other predators. But heavy fishing of those large species, tuna in particular, outside of Ascension's waters was disrupting the cycle and further imperiling the seabirds.

In fact, scientists had noticed that seabird populations on Ascension had either begun to decline or had leveled off after years of steady growth, a trend the experts attributed to poor diets. Sooty Tern numbers in particular had dropped alarmingly, according to research published in 2019 in the journal Global Change Biology, which researchers attributed to the birds' eating less bait fish and more squid which are less nutritional. Scientists further noted that many local seabirds travel well beyond the boundaries of the MPA to forage, especially outside of breeding season.

So Ascension's Conservation and Fisheries Directorate—along with its artisanal fishers and most of the 800 people who live on the island year round—had growing reasons to want an MPA. But declaring an area protected and actually protecting it are two very different things, especially given the frequency of illegal, unreported and unregulated (IUU) fishing around the world. Many illegal fishers target tuna because of its high demand and global market value, which meant Ascension had good reason to worry about IUU fishing in the island's waters.

At a 2019 symposium that island officials organized at the University of Exeter in the U.K., Baum met staff from Global Fishing Watch, who offered to develop a novel remote ocean monitoring portal for her. "Once the scope of the portal was explained to me, it was clear how valuable it would be for Ascension and I was keen for us to be one of the initial sites," Baum recalls. The tool was an early version of Global Fishing Watch's marine manager portal, and Ascension signed on as a pilot site, along with neighboring Tristan da Cunha and Guyana, both of which are using the platform to monitor and manage their own protected waters.


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Diane Baum, former director of conservation and fisheries, Ascension Island Government

Long Beach is one of the varied landscapes found across Ascension—an isolated volcanic island that supports a wide range of biodiversity.
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A tool to revolutionize ocean monitoring

Marine Manager is an innovative online portal that draws on satellite data to help a wide variety of officials, authorities and other interested parties to better monitor the ocean. The portal was specifically designed to help strengthen management of marine protected areas and what are known as "other effective area-based conservation measures," or OECMs. These are areas that might be set aside for a non-conservation purpose—cultural preservation, for example—which in turn safeguards biodiversity, even though that wasn't the main goal of the protection.
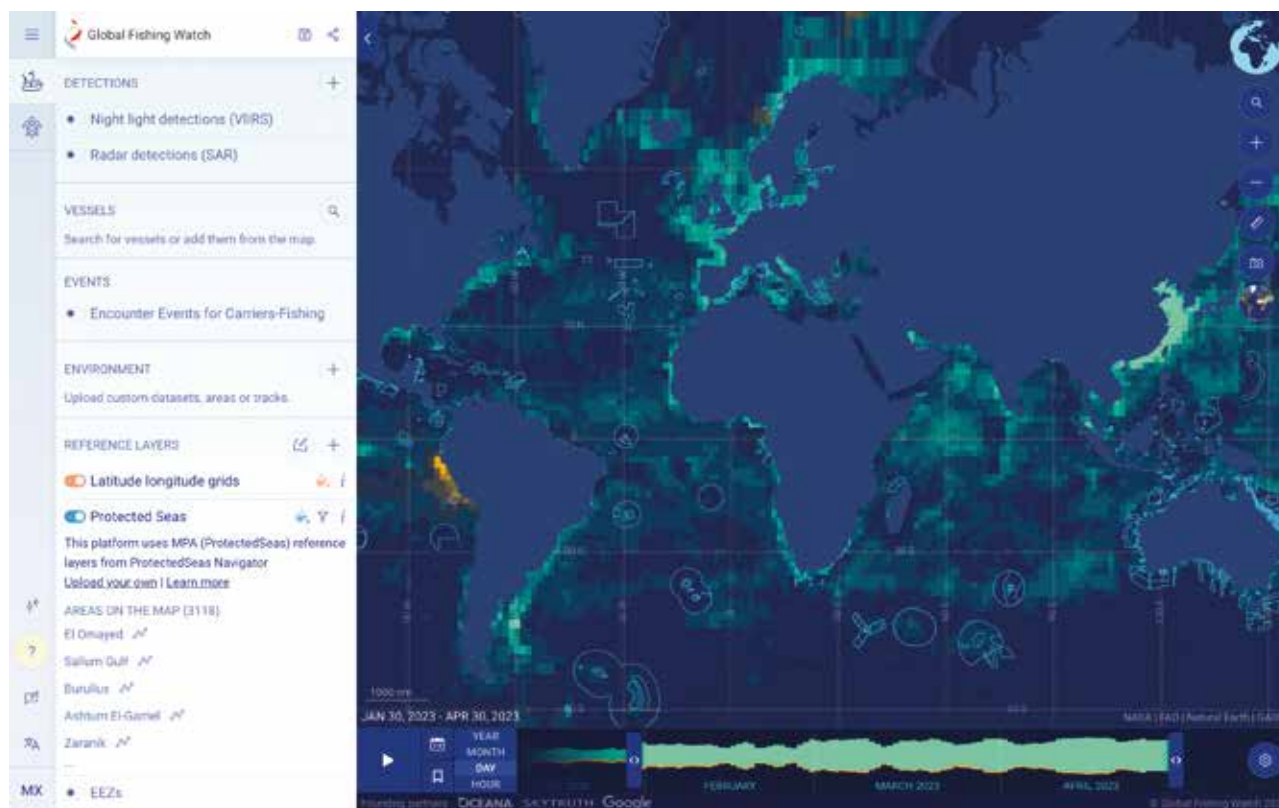
A screenshot of Global Fishing Watch Marine Manager displays a heatmap of apparent fishing effort (green) and marine protected areas (blue). © 2024 Global Fishing Watch

The marine manager portal hosts diverse datasets and analysis tools to support ocean stewardship and marine spatial planning. This gives users the ability to dynamically monitor and conserve marine ecosystems in a single platform, all at no cost to them—and accomplish in minutes or hours what used to take days, weeks or months to do.

The portal achieves this by allowing individuals to access and rapidly analyze a wide range of vessel and oceanographic data across huge expanses of the ocean, as well as upload their own data, putting scientific information at the fingertips of managers, researchers and others. These tools include pioneering capabilities such as the ability to overlay vessel activity and position information with environmental datasets—including sea surface temperatures, salinity levels and more—and to monitor vessels involved in commercial fishing and other activities, such as tourism, shipping and oil drilling.

Through the marine manager portal, users have acess to greater global datasets, powered by Google Earth Engine. They also have the ability to track and anlayze groups of vessels as well as greater accessiblity to monitor their area of focus anywhere in the world. Managers focusing on area-based management can access Global Fishing Watch data and insights, promote greater collaboration and sharing among researchers, policymakers, and other stakeholders, to build a broader and more comprehensive understanding of global fishing patterns and trends to implement and improve management.

The many ways Marine Manager can improve ocean governance

The global applications for this monitoring tool are multifold—and growing. They include:

Monitoring existing MPAs to determine how much, if any, legal and illegal fishing or other prohibited activity may be occurring within them.

Scoping sites for potential areas of focus to learn the types and volume of vessel traffic—current and over time.

Mapping changes in environmental and biological conditions to help anticipate shifts in marine life, which could have major implications for national and international fisheries.

Monitoring coastal ecosystems, such as mangroves, seagrass meadows and wetlands for changes that might trigger the need for new policies.

Each of these applications is critical today because our entire global ocean faces mounting threats, from overfishing and illegal fishing to pollution, increased shipping traffic, climate change and coastal development. This is why, in 2010, the United Nations set a target of protecting 10 percent of the ocean by 2020. Sadly, today less than 8 percent of the ocean is safeguarded through MPAs or OECMs, with less than 3 percent covered by fully or highly protected areas.

And while numerous governments and intergovernmental bodies have made sincere efforts to improve this protection, many of the problems persist due to a lack of open, timely and user-friendly data to inform policy and enforcement on the water.

Which is why wide adoption of Marine Manager now can help, by combining and visualizing near real-time, dynamic data on ocean conditions and human activities and their impacts.

During the pilot phase of Marine Manager, Global Fishing Watch partnered with governments to test the portal in seven regional sites, before releasing globally: Tristan da Cunha, Guyana, the Galápagos Islands MPA—one of the most biologically diverse in the world, the Mediterranean Sea, the Black Sea, Ascension Island, and Niue in the South Pacific.

A screenshot of Global Fishing Watch Marine Manager displays vessel presence over time in and around Ascension Island's waters.
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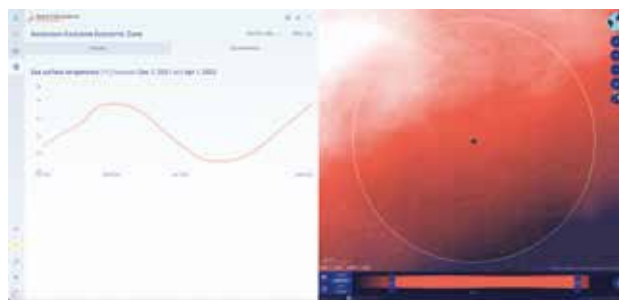
A screenshot of the marine manager portal displays fluctuations in sea surface temperature around Ascension Island through 2022.
© 2024 Global Fishing Watch

Eyes on the Water

Today Ascension's Conservation and Fisheries Directorate regularly uses Marine Manager to assess what's happening on the water.

"Marine Manager is a great tool for us to use in managing the MPA because it is a repository for satellite data from a variety of sources that we wouldn't be able to get on our own," says Tiffany Simpson, marine team leader for the AIGCFD. "It's a great resource where we can put all of our tracking data and ground truthing monitoring data, to bring everything together in a way that we can analyze it, look at historical trends, and also make predictions going forward."

Baum agrees. "The portal is brilliant in allowing us to visualize everything really easily," she says. "It gives you an early indication of trends, or any correlations that need further investigation. And the time series data—the way you can just zoom along and see how sea surface temperatures change over time, looking at changes in fishing fleets, distribution—and then with the click of a button, look for correlations in those as well."

Since Ascension started using Marine Manager, Baum and her team have used the tool to help island residents see what is—and what is not—happening in their vast exclusive economic zone.

"One thing we struggle with is connecting people on the island to the outer reaches of the marine protected area. We fly over it as we leave the island but that's the only physical connection most islanders probably have with it. So to get people to understand what's going on using an interactive portal that's so graphic people really do respond well to seeing the patterns in the data."

Laura Shearer, costal reserves manager and seabird scientist, Ascension Island Government

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Marine protection and beyond

The team has also used Marine Manager to work with the neighboring islands of St. Helena and Tristan da Cunha to share data and look for patterns, for example in how fish populations are distributed and how climate change is affecting the ecosystem.

That shows how the portal's utility extends beyond MPA enforcement to ocean science and general fisheries management. Marine Manager "brings together environmental data, fishing data, and much more," says Simpson. "So we can look at fishing fleets around the MPA and make sure our MPA is protected from those fleets. We can see where they are, we can also predict where they're going in terms of the environmental data being overlaid on top of that. Then we can predict where the fish may be and look at migratory patterns of fish and birds and other predators."

The team also uses the tool to retrospectively analyze environmental factors from past years and decades to help formulate models of how climate change will impact the ocean going forward.

The crucial piece of the puzzle, of course, is the fishing data. Marine Manager captures automatic identification system (AIS) data so users can see all fishing vessels that are transmitting their locations. "Ascension is in the middle of a very heavily fished area for the tuna fishing fleet—the central Atlantic," says Baum. "We want to make sure they stay outside of our MPA and there's no incursions. On top of that we have access to satellite radar, which means we can detect any vessels that aren't transmitting on AIS and they're the ones that are usually suspicious, potentially engaging in illegal activity."

The AIS data, she adds, "is really helpful for us in identifying patterns where the tuna fleet is operating. It tells us where the tuna are, which also tells us where the illegal fishers might be." The Ascension Government is working with the University of Exeter and Global Fishing Watch to better parse all the data and leverage the full power of Marine Manager.

As Baum explains, "We've got a Ph.D. student analyzing patterns to see if we can link where the fishing vessels are to oceanographic variables such as sea surface temperature, and productivity measures that would allow us to be one step ahead of the illegal fishers to start predicting where they might be."

Researchers also hope to use the portal to better understand seabird feeding, migration and behavior. Shearer notes that "seabirds don't respect this boundary of an MPA, so it's very important that we understand where Ascension seabirds are spending their time when they're not actually on island."

Shearer and others have begun tagging birds for this purpose through a U.K. Government Darwin Plus grant scheme in collaboration with Birdlife International and other partners.

"The ambition is to use this tracking data, alongside data from Global Fishing Watch, and overlap all of this information to find out where the birds are going and why they're going there," she says. "This is a huge blue ocean. It's very difficult for us to look at it and think, 'Why is this place more important than this other place?' Our seabirds rely on tuna to drive the bait fish to the surface. We want to look at where these interactions are, and where we can identify hotspots for marine biodiversity. And then perhaps we can lobby for more protection within the high seas."

In the meantime, Ascension will continue using Marine Manager to ensure its MPA is, indeed, protected. "There are very few places now in the world that haven't been really impacted by human activity," says Baum. "And Ascension is one of those spots. It's how nature was in the raw sense. These little places like Ascension that have escaped some of those big human impacts are so important for us globally, to understand the level of marine biodiversity that we should all be aspiring to."

Contact

Global Fishing Watch Marine Manager is a freely available, innovative technology portal, founded by Dona Bertarelli. It provides near real-time, dynamic, and interactive data on ocean conditions, biology, and human-use activity to support marine spatial planning, marine protected area design and management and scientific research. Global Fishing Watch is an international nonprofit organization dedicated to advancing the sustainability of our ocean through increased transparency of human activity at sea. By creating and publicly sharing map visualizations, data and analysis tools, Global Fishing Watch enables scientific research and drives a transformation in how we manage our ocean.

Global Fishing Watch
MARINE MANAGER

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