Atlantic Sharks: 30 Years of Successes and Lessons

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NOAA Fisheries has successfully managed Atlantic highly migratory sharks for 30 years. Learn about some of the challenges of assessing shark stocks and combatting misinformation about sharks.

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Atlantic Sharks: 30 Years of Successes and Lessons

[music]

0:00:00.0 John Sheehan: Sharks inspire strong, even visceral reactions in people. They're beloved, feared, revered and reviled and hold a distinct place in our imaginations and culture.

0:00:13.4 S2: There is a creature.

0:00:14.4 S3: This shark, swallow you whole.

0:00:16.9 S4: To kill, it's a man-eater.

0:00:17.9 S5: You're gonna need a bigger boat.

0:00:22.5 JS: By the way, I don't invoke jaws lightly here. The '75 Spielberg film actually contributed to conditions that led the federal government to create an Atlantic shark management plan in 1993. And in the intervening decades, sharks have grown no less popular or polarizing, in the words of one of my guests.

0:00:41.5 Karyl Brewster-Geisz: Everybody has a strong opinion about sharks.

0:00:44.2 JS: And as is often the case, when strong emotions are involved, the conversation about how sharks are handled and managed can itself get pretty muddled. This is Dive In With NOAA Fisheries. I'm John Sheehan, and today we're discussing sharks, specifically Atlantic highly migratory sharks managed by NOAA Fisheries, which has been doing so successfully for 30 years. We'll discuss the challenges to assessing shark stocks and combating the constant misinformation about sharks leading to lasting misconceptions and some of those strong public feelings that I mentioned earlier. My guests are Karyl Brewster-Geisz, branch chief for regulations of the Atlantic HMS Management Division.

0:01:26.9 KB: We manage the shark, swordfish, tuna and bill fish fisheries throughout the Atlantic, from the state of Maine through the Gulf of Mexico to the state of Texas. And we also include the Caribbean.

0:01:39.6 JS: And Dr. Enric Cortés, a senior scientist at the Southeast Fisheries Science Center.

0:01:45.1 Dr. Enric Cortés: My role has been essentially to do shark stock assessments. So I work on the population dynamics, life history issues, etcetera.

0:01:53.9 JS: And what kinds of sharks are we talking about?

0:01:55.9 KB: Oh, all sorts of sharks. Some of our more coastal ranging species such as lemon sharks or black tip sharks. And then you have sharks that go all the way across the ocean, like blue sharks or Shortfin mako. We manage about 40 different species of sharks.

0:02:12.4 JS: Now, before we get to recent history, I think it's helpful to start with a brief look at shark fisheries over the last century or so.

0:02:20.6 DC: Sharks have been caught recreationally in the US since at least the 19th century, if not before. Sharks were not commercially caught in any significance until approximately the 1920s, when this company called the Ocean Leather Company, started catching sharks for their skin to make leather and also collecting some fins. From approximately 1935 to 1950 on the Atlantic Coast, on the east coast of Florida, there was a dedicated shark fishery for liver oil, because that's where Vitamin A was extracted from. But in 1950, vitamin A was synthesized and so

there was no longer a need to get it from the liver oil of sharks. So shark fisheries went down considerably. Fast forwarding now to approximately the early 1970s, shark meat consumption in the US started to take off and concomitant with that was the opening of the Asian shark fin market to the US. And then in the mid '70s there was the release of the book and the movie, Jaws, which led to a big increase in recreational fishing.

0:03:39.1 JS: See, Jaws. And this brings us to more recent decades. Here's Karyl Brewster-Geisz.

0:03:45.7 KB: In the late '80s, the five fishery management councils along the Atlantic coast were really concerned about the status of sharks and how much fishing pressure was going on in those species. They figured out they would have a really hard time managing these species because it encompassed the full range of all five councils. So they asked the Secretary of Commerce to manage sharks, and in 1992 the science center produced a stock assessment final report that showed that a number of shark species were over fished. And that triggered a 1993 fishery management plan, which was the first federal fishery management plan for sharks. And that's what we're celebrating.

0:04:35.3 JS: Wow. So because sharks had so much pressure on them, it just needed to have an overarching body specifically devoted to sharks.

0:04:43.0 KB: Specifically devoted to sharks. Yeah. A lot of fishermen back then used different gear types than they use now. And for sharks in particular, they would catch the sharks. And at the time they weren't... Not all the sharks, they knew how to process well enough to eat the meat. So they would keep the fins and dispose of the carcass. And that's where fining comes from. Because the fins were worth a lot of money. It wouldn't disrupt what else was in the hold? Like the swordfish or the tunas that they caught, 'cause they could just dry the fins out on deck.

0:05:18.9 JS: Yeah, and that has been a very controversial practice and has been the subject of a lot of sort of uproar.

0:05:25.9 KB: Yes. Yes, it has. Yeah, we banned finning back in that 1993 fishery management plan. So it has not been a problem in the United States essentially since then. We've done a lot since that time to help close any loopholes. Most importantly, in 2008 we actually implemented what we call, fins naturally attached. So all commercial fishermen and recreational fishermen are required to land the

sharks with the fins naturally attached to the body, so they can't remove the fins and then staple a whole bunch to this body, which has happened elsewhere. They actually have to keep the fin attached with skin to the shark.

0:06:08.7 JS: Since we're talking about sort of some of these milestones over the last 30 years, what have been some others?

0:06:14.0 KB: There have been huge improvements in terms of the data that's available. So that has improved all of our stock assessments. In 1999, we implemented what we call limited access, which means for the commercial fishery, there's only a limited number of permits. So not anyone can go out and fish commercially for sharks. You need to have a special permit and you need to basically buy a permit from somebody who's leaving before you can enter. In 2008, in addition to requiring fins naturally attached, we also started what we call a shark research fishery. And this is a cooperative fishery where we work with specific fishermen to collect data. And it has been instrumental in all the things we've been doing, including the science, the underlying science we use for the management, along with helping us figure out more about what we should be doing for management. We have had a number of species be either rebuilt or well on their way to rebuilding. So an example of that will be the black tip shark, which back in 1998 we thought was on the way to extinction and now it's fully rebuilt and could withstand a lot more fishing pressure than we allow it at the moment.

0:07:28.6 KB: Other species would be like the sandbar shark, which was historically the major shark species is now under a rebuilding plan and is ahead of the rebuilding time period for that. In addition, we've added some species to our fishery management unit that we did not have in 1993. So an example of that is Smooth Dogfish or Gulf smooth-hounds and all of the smooth-hound complex. We added them to our management unit in 2015.

0:08:00.5 JS: Can we talk about some misconceptions? I think, shark finning is an example of something that I think a lot of people knew about, and maybe aren't aware that it's banned and that it's something that doesn't happen in the United States anymore. What other misconceptions kind of exist?

0:08:15.5 KB: Yeah, there are a lot of misconceptions. People go online and they Google sharks and they immediately see all sharks are endangered and that is actually a big problem for us. And the finning issue that you mentioned. So a lot of people tend to group all sharks together as though sharks is just like one big

species when it's not. There are hundreds of species of sharks and they are all so different and so diverse, and we do have some species of sharks that for a shark is relatively slow-growing and takes a while to have pups. So an example of that would be the dusky shark. It has been prohibited for over 20 years now, still over-fished still experiencing overfishing, but then you have other shark species that are relatively fast growing for a shark, like the blacktip and it's fully rebuilt now. The idea about finning, there's a couple of misperceptions there. One is, a lot of people tend to be surprised that we even allow a commercial shark fishery. And then the other one is surprised that commercial shark fishermen are still allowed to land fins. Commercial fishermen actually abhor wasting any fish. They wanna use the whole shark, they don't wanna just land the fins, so they use the meat, they use the skin, they use the teeth. Some parts of the shark are even used medically. So sharks are really good for us overall, not just in the water, but also as a resource to eat.

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0:10:05.8 JS: And just to reiterate here, not only has shark finning been illegal in the United States. In late 2022, president Biden signed the Shark Fin Sales Elimination Act. It's part of the National Defense Authorization Act. Under that act, shark fins, except for those of smooth and spiny dogfish, but all others cannot enter into commerce and fishermen are still required to land the fins naturally attached to the shark. You mentioned sort of public surprise at some aspects of shark, such as that there is a commercial shark fishery. How else have you seen the public swing in their perceptions? Because, sharks are... They're both beloved and feared and in popular culture sharks are... They're iconic and people are very, very interested in them. How have you seen sort of the public's swing of emotions regarding sharks?

0:11:01.3 KB: Yes. Everybody has a strong opinion about sharks and if could ask somebody on the street and they would tell me what they think about sharks and it has swung a lot over the years. So when I first started, primarily people thought of them as as dangerous and they were afraid to go in the water. And this was... It was still about 20 years after Jaws, and yet Jaws really did have an impact on what people thought about sharks. At the same time, there were still a lot of people who saw sharks as a challenging sport fish, something to go after. And you think of shortfin mako or spinner sharks that actually jump out of the water and spin when they're caught. A lot of people really thought of them either as dangerous or as let's go catch them. Now, a lot of people wanna just save sharks.

0:11:55.8 KB: Sharks are important and they wanna save sharks. And that was

virtually unheard of when I started. There seems to be a swing now toward a whole different issue where sharks are becoming, for lack of another word, pests, where recreational and commercial fishermen are constantly fighting against the sharks in order to land other species. So they might be fishing for snapper or grouper or Yellowfin tuna, and before they can get the fish into the boat, the sharks come and eat them. And that's called depredation. Similarly, they might be out there enjoying a nice day recreational fishing, they catch whatever it is they wanna catch, say a snapper or a king mackerel. And then they release that back into the water and a shark eats it. And that's called scavenging. It's similar to the depredation. And so a lot of commercial and recreational fishermen throughout the region, for the entire Atlantic and the Caribbean are really coming to see sharks as pests.

0:13:00.5 JS: What's the management response to that? How do you deal with that?

0:13:03.7 KB: That is what we are still coming to terms with. We are trying to work with a lot of the fishermen. A lot of the scientists have been working with fishermen, trying to get a sense of how you can mitigate that. We're not gonna change the fact that sharks are predators. So we need to really work with the fishermen to come up with a proper response. One of our main concerns is that fishermen will become so upset over this, that they will start intentionally killing the sharks. And that of course, we wanna avoid at all costs. We don't wanna end up back where we were when the fishery management plant started in '93.

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0:13:46.1 JS: A few weeks ago, an example of this issue of shark depredation played out publicly. A fishing crew participating in the Big Rock Blue Marlin Tournament in North Carolina lost out on a three and a half million dollar prize. When it was determined their catch had been mutilated and therefore were disqualified.

0:14:03.8 S8: It would appear that this fish has been bitten by a shark.

0:14:08.7 JS: You can bet that crew has feelings about depredation. Of course, it's also a sign that the management efforts of the last 30 years, efforts to stabilize and protect shark populations are working. Here's Dr. Enric Cortés.

0:14:23.9 DC: It's related to the boom and bust cycle of shark fisheries in my opinion. There is a short period of very intense exploitation, the boom, which is followed by a bust, so a drastic declining catches. We had a really large increase in

catches in the mid '80s to early '90s, and since then we've had increasingly restricting regulations. So to me, that shows the recovery period. That can explain why we are now seeing a lot of the populations that are increasing and it's manifested by the depredation.

0:15:02.4 JS: Yeah. Is over-exploitation still a threat to sharks? And I mean, if not, what are the threats to sharks?

0:15:11.3 DC: Yes. So traditionally and historically fisheries have been the main threat to sharks. One issue with sharks is that even if you control the targeted fisheries, sharks are caught in a large amount of fisheries and gears. So that's what we call bycatch or incidental catch. And that makes managing shark fisheries very difficult. Also assessing them, because we have to account for the sharks that are caught in all these fisheries, which oftentimes we don't have a good handle on because those have to be estimated, they have to be observations, reports, etcetera. Another threat... The main one is fisheries. But then you have habitat loss or habitat degradation. So what happens, for example, with number of species of small and large coastal sharks is that they give birth in very shallow coastal areas. So with human construction and contamination, etcetera, that can pose problems to the survivorship or those early life stages.

0:16:19.6 DC: Another re-merging problem is climate change. So climate change, I just wanna make clear that we don't really know yet what the effects of climate change are or will be, because in many cases we don't have baseline data. So we cannot tell how things have changed when we don't know the status quo. What we can say though is the risks that are out there. So warming water temperatures that may change their distribution, things like ocean acidification, increased uptake of CO_2 can also affect their prey. I mean, there is a cascading effect, and so it's a lot of potential risk of climate change, but we don't know yet what those are.

0:17:01.9 JS: So what is it about sharks that makes them vulnerable, either to exploitation or these changing conditions?

0:17:09.1 DC: So in general sharks, and not only sharks, but what we call elasmobranchs, which are shark, skates and rays, they grow slowly. They attain sexual maturity at a late age. And so they reproduce, their first reproduction is very delayed. They live many years. They have low fecundity. So only a certain number of pups that are born fully developed. In general, there are different types of reproduction, but in general, they're born fully developed mini replicas of the

adults. So they are ready to go, so to speak. They also have long gestation periods and their breathing frequencies, so how often they made is very long. So many species reproduce every year, but other species reproduce every two or three years, maybe even more. So those are things that we are... We have made a lot of progress on, but we still have a lot of unknowns on. So that's a problem with sharks. So they have developed this life history strategy over the course of approximately 400 million years of evolution. So just having a few pups, a few offspring, makes it okay for them to maintain their population levels because they have few predators, probably larger sharks are their main predators. So that's a problem with sharks. Their low reproductive potential is essentially their Achilles heel.

0:18:42.0 JS: Yeah, and that's all incredibly complicated. And it sounds like contributing factors to what makes them so hard to predict and to model. Could you tell us what it means to model shark populations? And also what are the data that you need?

0:19:00.2 DC: Yeah, good question. So the type of model that we use depends on the data that we have. So there are four main types of data that we need to assess the status of populations. So we have Catches. Catches give us a sense of the scale of the population, how large the population is based on how many are removed. We have indices of relative abundance, what we call CPUE or catch per unit effort. That informs us about the trend of the population, is it going down, is it going up? Then we have the biology, or biology life history, same thing. That tells us about the intrinsic vulnerability of that population. How much can they take? How much exploitation can they take? And then we also have, in some cases, length and/or age samples that inform us about the segment of the population that's being exploited, what age groups or length groups. However, that's in an ideal scenario. For sharks, we often are in situations that we call data poor or data limited. We seldom have all these pieces of information. We have catches, yes, but there is uncertainty in the catches because a lot of them are estimated. There is uncertainty in some biological parameters as well.

0:20:24.9 DC: Sometimes we don't know how many years they live. We don't know how often they reproduce. We are often in data poor or data limited situations. Assessing shark populations is not easy because of the oftentimes sketchy data, but also managing them is very difficult because of bycatch in many different fisheries and trying to quantify all those sources of mortality. It's not an easy task.

0:20:56.8 JS: Sure, and you've got the added pressure of public scrutiny because sharks are, as you say, these charismatic species and there's a lot of interest.

0:21:06.3 DC: That's a good point. This has increased a lot. Through my career, I've seen the change in the level of scrutiny of, for example, the assessments we do. And of course, the managers are very much subjected to that scrutiny as well. So, in one way, things have become better. Data have become better in general, but we're still a long way from having really good data. There's been a lot of advances in the modeling, but at the end of the day, we need the data to model these populations.

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0:21:43.4 JS: Dr. Enric Cortés is a senior scientist at the Southeast Fisheries Science Center, though he has just begun a process of phased retirement.

0:21:52.0 DC: I may continue trying to do some research just for fun, to have some fun at the end of my career and see sharks in real life again, not just through the computer end.

0:22:04.8 JS: Today, we've barely scratched the surface discussing many of the issues surrounding sharks, but as Karyl Brewster-Geisz reminds us, there are many ways to learn more and to make your voice heard if these issues are important to you.

0:22:17.2 KB: The general public can comment on any of our proposed rules or ongoing regulations. We have a lot of information available on our webpage, and anyone can also go to regulations.gov to submit written public comments. We do read every single comment we receive, and we make a lot of changes as a result of those public comments.

0:22:41.5 JS: Karyl Brewster-Geisz is Branch Chief for Regulations of the Atlantic, HMS Management Division. You can always find lots more information at fisheries.noaa.gov. I'm John Sheehan, and this has been Dive In with NOAA Fisheries.

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