

Science AMA Series: Hi Reddit! I'm NOAA scientist Lee Benaka. I work to reduce bycatch in U.S. ocean fisheries to ensure that our fisheries remain sustainable and that protected species are given their

NOAAgov<sup>1</sup> and r/Science AMAs<sup>1</sup>

<sup>1</sup>Affiliation not available

April 17, 2023

### Abstract

Hello Reddit! I'm Lee Benaka (Fishery Management Specialist, NOAA Fisheries Office of Science and Technology). While U.S. fisheries are among the world's most sustainable, bycatch is a complex, global issue that threatens the sustainability and resiliency of our fishing communities, economies, and ocean ecosystems. NOAA Fisheries works hard to minimize bycatch in U.S. fisheries, ensuring our fisheries remain sustainable and protected species are given their best chance to recover. Bycatch occurs when fishermen catch and discard animals that they do not want, cannot sell, or are not allowed to keep. Discarded catch represents loss of opportunity for fishermen and too frequently, loss of marine life, which can impact vulnerable ecosystems and slow the rebuilding process for overfished stocks or place protected species at further risk. NOAA Fisheries works with fishermen, scientists, and managers to mitigate the negative effects of bycatch by developing innovative fishing gear and tracking bycatch through regular data collection. Bycatch is an issue that impacts the overall health of our oceans and the sustainability of our seafood industry. If you want to learn more about bycatch and how it can be reduced, this is your chance. I'll be back at 10 am EST (7 am PST, 3 pm UTC) to answer your questions, Ask me anything! We are out of time, but I want to thank you for taking the time to join us for this Reddit AMA and asking your questions about bycatch. I was really impressed by the variety of great questions, as well as the respectful and helpful responses from other participants. I certainly learned a lot this morning! If you're interested in learning more about bycatch and the work NOAA Fisheries and others are doing to reduce bycatch, please visit some of the following sites: Bycatch Portal [[http://www.nmfs.noaa.gov/sfa/fisheries\\_eco/bycatch/index.html](http://www.nmfs.noaa.gov/sfa/fisheries_eco/bycatch/index.html)] Draft National Bycatch Strategy [[http://www.nmfs.noaa.gov/sfa/fisheries\\_eco/bycatch/strategy.html](http://www.nmfs.noaa.gov/sfa/fisheries_eco/bycatch/strategy.html)] National Bycatch Report First Edition Update 2 [<http://www.st.nmfs.noaa.gov/observer-home/first-edition-update-2>] 2014 BREP Report to Congress [[http://www.fisheries.noaa.gov/sfa/publications/feature\\_stories/2016/brep-2014-rtc.html](http://www.fisheries.noaa.gov/sfa/publications/feature_stories/2016/brep-2014-rtc.html)] 2016 BREP Funding Opportunity [[http://www.nmfs.noaa.gov/sfa/publications/feature\\_stories/2016/brep-2016-funding-opportunity.html](http://www.nmfs.noaa.gov/sfa/publications/feature_stories/2016/brep-2016-funding-opportunity.html)] Bycatch video [<https://www.youtube.com/watch?v=xz8q6uHSdmg>] Leadership Message [[http://www.fisheries.noaa.gov/about/2016\\_leadership\\_message\\_tackling\\_bycatch.html](http://www.fisheries.noaa.gov/about/2016_leadership_message_tackling_bycatch.html)] Bycatch 101 [[http://www.nmfs.noaa.gov/sfa/fisheries\\_eco/bycatch/bycatch-101.html](http://www.nmfs.noaa.gov/sfa/fisheries_eco/bycatch/bycatch-101.html)] Bycatch Bites [[http://www.fisheries.noaa.gov/stories/2016/02/bycatch\\_bites.html](http://www.fisheries.noaa.gov/stories/2016/02/bycatch_bites.html)] AMA Landing Page [[http://www.nmfs.noaa.gov/stories/2016/02/ama\\_bycatch.html](http://www.nmfs.noaa.gov/stories/2016/02/ama_bycatch.html)] Inspiring Students through Fisheries Bycatch Research [[http://www.fpir.noaa.gov/stories/021182016\\_fisheries\\_bycatch\\_research.html](http://www.fpir.noaa.gov/stories/021182016_fisheries_bycatch_research.html)]

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NOAAGOV [R/SCIENCE](#)

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We are out of time, but I want to thank you for taking the time to join us for this Reddit AMA and asking your questions about bycatch. I was really impressed by the variety of great questions, as well as the respectful and helpful responses from other participants. I certainly learned a lot this morning! If you're interested in learning more about bycatch and the work NOAA Fisheries and others are doing to reduce bycatch, please visit some of the following sites:

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Draft National Bycatch Strategy [[http://www.nmfs.noaa.gov/sfa/fisheries\\_eco/bycatch/strategy.html](http://www.nmfs.noaa.gov/sfa/fisheries_eco/bycatch/strategy.html)]

National Bycatch Report First Edition Update 2 [<http://www.st.nmfs.noaa.gov/observer-home/first-edition-update-2>]

2014 BREP Report to Congress [[http://www.fisheries.noaa.gov/sfa/publications/feature\\_stories/2016/brep-2014-rtc.html](http://www.fisheries.noaa.gov/sfa/publications/feature_stories/2016/brep-2014-rtc.html)]

2016 BREP Funding Opportunity [[http://www.nmfs.noaa.gov/sfa/fisheries\\_eco/bycatch/brep.html](http://www.nmfs.noaa.gov/sfa/fisheries_eco/bycatch/brep.html)]

Bycatch video [<https://www.youtube.com/watch?v=xz8q6uHSdmg>]

Leadership Message [[http://www.fisheries.noaa.gov/aboutus/leadership/feb\\_2016\\_leadership\\_message\\_tackling\\_bycatch.html](http://www.fisheries.noaa.gov/aboutus/leadership/feb_2016_leadership_message_tackling_bycatch.html)]

Bycatch 101 [[http://www.nmfs.noaa.gov/sfa/fisheries\\_eco/bycatch/bycatch-101.html](http://www.nmfs.noaa.gov/sfa/fisheries_eco/bycatch/bycatch-101.html)]

Bycatch Bites [[http://www.fisheries.noaa.gov/stories/2016/02/bycatch\\_bites.html](http://www.fisheries.noaa.gov/stories/2016/02/bycatch_bites.html)]

AMA Landing Page [[http://www.nmfs.noaa.gov/stories/2016/02/reddit\\_ama\\_bycatch.html](http://www.nmfs.noaa.gov/stories/2016/02/reddit_ama_bycatch.html)]

Inspiring Students through Fisheries Bycatch Research

[[http://www.fpir.noaa.gov/stories/021182016\\_fisheries\\_bycatch\\_research.html](http://www.fpir.noaa.gov/stories/021182016_fisheries_bycatch_research.html)]

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So the big question is, what do we (as consumers) do? Is it just avoiding certain species of fish, or is it more complicated than that? Is there a way to know we are buying from fishermen who are doing it the right way?

**CORRESPONDENCE:**

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[lutey](#)

As a consumer you should continue to ask questions and educate yourself about bycatch and U.S. Fisheries. You can help by making smart seafood choices by arming yourself with the facts about what makes U.S. seafood sustainable. Resources like FishWatch.gov provide up-to-date information on the status of some of the nation's most valuable marine and farmed fish, as well as the how those fisheries impact habitat and protected species. The species profiles also contain information about bycatch in fisheries. Check out FishWatch.gov: <http://www.fishwatch.gov/>

You can also contribute by commenting on our draft National Bycatch Reduction Strategy. If you have ideas on how to further reduce bycatch, or other approaches the agency can take, we want to hear them. We're accepting comments on the draft strategy until June 3rd.

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Has by-catch from shrimping improved at all and, if not, why are these hugely wasteful catch methods still allowed?

[por\\_que\\_no](#)

We have several shrimp fisheries in the United States. In the Gulf of Mexico and South Atlantic shrimp fishery, bycatch reduction has improved over the past several years. In 2005, we estimated that for every pound of shrimp landed, there was a little over three pounds of bycatch. By 2010, that estimated amount decreased to less than two pounds of bycatch for every pound of shrimp landed. That rate held steady or improved slightly each year for 2011, 2012, and 2013. With continued improvements to bycatch reduction devices that are required for shrimpers (see <http://www.sefsc.noaa.gov/labs/mississippi/brd/>), we will see continued improve improvement.

In the West Coast shrimp fishery, we have identified novel technologies to reduce bycatch of protected fish. Please check out this story:

[http://www.westcoast.fisheries.noaa.gov/stories/2014/20\\_102014\\_eulachon\\_led\\_lights.html](http://www.westcoast.fisheries.noaa.gov/stories/2014/20_102014_eulachon_led_lights.html)

I'm sorry, but I'm confused by "ensure our fisheries remain sustainable." I was under the impression that they were anything but sustainable, but that's just based on occasional articles and studies I come across - mainly on reddit.

Is what we're doing "okay," or are we rapidly destroying all the fish populations (both intentionally and via bycatch?)

[Terminus](#)

Yeah, that's a common misconception. We're doing okay, especially here in the U.S. Our fisheries are sustainable because our science-based fishery management process prevents overfishing and rebuilds fish stocks, conserves and recovers protected species, helps strengthen the value of fisheries to the economy, our communities, and marine ecosystems, and provides a long-term supply of seafood for the nation.

Some fish stocks are doing better than others for various reasons, including warming waters that may be causing fish populations to move away from traditional fishing grounds, but overall, U.S. fisheries are among the best-managed fisheries in the world. Many previously overfished fish species like Atlantic swordfish have been rebuilt, and many of our fisheries are managed with conservative quotas to avoid overfishing of the stocks.

See our response to zorander22 and check out our Status of Stocks report for the most up to date stock status information. [[http://www.nmfs.noaa.gov/sfa/fisheries\\_eco/status\\_of\\_fisheries/](http://www.nmfs.noaa.gov/sfa/fisheries_eco/status_of_fisheries/)]

The United States is working hard through regional fisheries management organizations and other international forums to promote sustainable fisheries and recovery of protected species.

Hi, and thank you for taking to time to discuss this. I lived in rural Alaska a while back, in a small fishing village where my wife taught and I did many jobs, including commercial fishing. This was when the fight against Pebble Mine was still being actively fought in the local communities, and I had many chances to visit the potentially affected villages in and around Lake Iliamna and Bristol Bay.

I also recently read American Catch by Adam Greenberg and learned about the plights of New York oysters and Gulf shrimp. Additionally, I grew up on Lake Erie, which 100 years ago had a thriving fishery for Blue Fish and Sturgeon, both of which are all but extinct in the area.

Suffice to say that I have an interest in sustainable fisheries, but my first introduction to the topic was through a mathematics course in biological models, learning about the various models used and how a specific model (Beverton-Holt maybe?) was developed by looking at the effect that the cessation of large-scale fishing in the Mediterranean due to WW2 had on population sizes - I have been fascinated ever since.

So my question: What is the current state of fisheries modelling, and how is it used on a day-to-day basis to try to create sustainable fisheries? Are the models more deterministic or stochastic in nature? How is data collected, is it reported counts, direct observation, hatchery data, etc? An specifically regarding bycatch, how is this incorporated into any decision making?

I guess my primary question is how I would go about working in fisheries management, given that I don't have degrees in the area? (Math/Engineering BS/MS, but no bio sciences) I genuinely feel that I would look forward to going to work everyday if I were a part of helping to create and maintain sustainable fisheries.

[misterthirsty](#)

Thanks for your question. Many of us here at NOAA Fisheries have a diversity of backgrounds from fisheries scientists to public policy to communications to modellers. We need a diversity of experience to tackle the challenges of fisheries management. In fact, we have a Senior Science Advisor for Stock Assessments: [[http://www.nmfs.noaa.gov/stories/2013/09/meet\\_senior\\_scientists.html](http://www.nmfs.noaa.gov/stories/2013/09/meet_senior_scientists.html)]

Below are some helpful links to information about our stock assessment program. If you want to look

for job opportunities in this area please visit [[www.usajobs.gov](http://www.usajobs.gov)].

Check out this video on the ABCs of Stock Assessments:

[[http://www.nmfs.noaa.gov/stories/2013/06/science\\_stock\\_assessments.html](http://www.nmfs.noaa.gov/stories/2013/06/science_stock_assessments.html)]

Learn more about stock assessment models:

[[http://www.nmfs.noaa.gov/stories/2012/10/10\\_10\\_12stock\\_assessment\\_101\\_part2.html](http://www.nmfs.noaa.gov/stories/2012/10/10_10_12stock_assessment_101_part2.html)]

More detailed information about fish stock assessment science is available here:

[<https://www.st.nmfs.noaa.gov/StockAssessment/StockAssessment.html>]

Do the fish/animals that are caught in bycatching get killed? You said it "too frequently results in loss of marine life." Isn't it just as easy to release an unwanted catch as it is to kill it? Or are they harmed by the process? Thanks for doing this!

[plantsforhigher](#)

That's a great question. With bycatch, some of those fish and protected species that are released or discarded die, and some do not. A lot of factors contribute to the survival of released fish, for example: how deep was the fish pulled up from, how long have they been out of the water, and how were they handled? We have funded dozens and dozens of studies to examine these factors and help give fishermen tools to help them increase the chances that a released fish will survive. One example of a tool is descending devices for recreational anglers. Check it out here:

[<https://www.youtube.com/watch?v=lyaxVhRmcDw>]

Read this story on how scientists and fishermen worked together to prevent thresher shark tailspin::

[[http://www.nmfs.noaa.gov/stories/2011/12/6\\_thresher.html](http://www.nmfs.noaa.gov/stories/2011/12/6_thresher.html)]

We've also supported the development of the FishSmart website, which provides a lot of information about best practices to reduce recreational release mortality: [<http://www.fishsmart.org/bestpractices>]

We also just published a science action plan for discard and release mortality, which should help us to answer the great questions you have raised:

[<http://www.st.nmfs.noaa.gov/ecosystems/bycatch/discard-and-release-mortality>]

For protected species, we have safe-handling and release guidelines for sea turtles and marine mammals in longline fisheries. We carry out training with the captains to educate them on these techniques.

[[http://www.nmfs.noaa.gov/sfa/hms/compliance/workshops/protected\\_species\\_workshop/handouts.html](http://www.nmfs.noaa.gov/sfa/hms/compliance/workshops/protected_species_workshop/handouts.html)]

[[http://www.fpir.noaa.gov/SFD/SFD\\_psw\\_1.html](http://www.fpir.noaa.gov/SFD/SFD_psw_1.html)]

What can consumers do to make the seafood industry sustainable?

Also, I've heard life in our oceans are in a great deal of trouble. What is the current state of ocean ecosystems?

[Zorander22](#)

Please see our response to lutey regarding the consumer's role in seafood sustainability.

In response to your second question, the health of the oceans is a very important issue. Not all areas of the oceans are managed the same. In the United States, we have several indicators that help us to assess the state of the oceans. One of them is the Status of Stocks report

[[http://www.fisheries.noaa.gov/sfa/fisheries\\_eco/status\\_of\\_fisheries/index.html](http://www.fisheries.noaa.gov/sfa/fisheries_eco/status_of_fisheries/index.html)]. Others include the NOAA Coral Reef Watch [<http://coralreefwatch.noaa.gov/satellite/index.php>]. The United States works

hard to responsibly manage its waters and to share those values with the international community. As a consumer and citizen, educating yourself about the health of the oceans and fisheries is an important first step in becoming an ocean advocate.

How do you (or NOAA in general) incentivize fishers or fisherie managers to adopt practices that minimize bycatch? Do you provide technical assistance and hope that parties adopt? Use regulatory backing to implore fishers to adopt better practices? How do we avoid a tragedy of the commons with such a international industry that is so ecologically intertwined? Thanks for all you do!

[Robert-Sacamano](#)

This is a very interesting question. No one likes bycatch, least of all fishermen. It's often in their business interest to avoid bycatch. And for our part, we work with the U.S. fishery management councils and Marine Mammal Take Reduction Teams to put in place voluntary and regulatory measures to encourage fishermen to reduce bycatch.

One of our most successful programs have been implemented for salmon bycatch in Alaska, where fishermen operate under incentive plan agreements and performance standards:

[\[https://alaskafisheries.noaa.gov/fisheries/chinook-salmon-bycatch-management\]](https://alaskafisheries.noaa.gov/fisheries/chinook-salmon-bycatch-management)

We've also found success with catch share programs such as this:

[\[http://www.nmfs.noaa.gov/stories/2013/03/3\\_04\\_13catching\\_up\\_with\\_catch\\_shares.html\]](http://www.nmfs.noaa.gov/stories/2013/03/3_04_13catching_up_with_catch_shares.html)

In general, we work very closely with the fishing industry to help them implement bycatch reduction techniques. We have a team of gear outreach specialists that conduct workshops and on-the dock trainings.

In addition to these efforts in the United States, we work regularly with international partners to trial and implement bycatch reduction technology, such as circle hooks and turtle excluder devices, around the world. More details can be found at our Report to Congress --

[\[http://www.nmfs.noaa.gov/ia/iuu/msra\\_page/2015noaareptcongress.pdf\]](http://www.nmfs.noaa.gov/ia/iuu/msra_page/2015noaareptcongress.pdf)

As a consumer who tries to be aware of where my food comes from and the environmental impact of what I eat, I appreciate this AMA.

1. Are there particular species of fin fish or shellfish that have lower incidences of bycatch, have less impact on the overall ecosystem, and are sustainable? I know, I'm asking a lot in that question.
2. Does ocean fish farming have any impact as far as bycatch goes?
3. Do you track bycatch related to seaweed farming, or is that negligible?

Thanks

[zombiewoof](#)

Thanks for your question. It is an important one. Each fishery has different risks of bycatch depending on the area they operate in, the time of year, and the type of gear they use. Typically, the more selective the gear and the shorter the time the gear is the water, the less likelihood of bycatch. We have a great resource about fishing gear and the different risk of interactions on our website.

[\[http://www.nmfs.noaa.gov/pr/interactions/gear/\]](http://www.nmfs.noaa.gov/pr/interactions/gear/)

And again, [\[http://www.FishWatch.gov\]](http://www.FishWatch.gov) is a good place to help make yourself smarter about all the seafood choices.

Ocean aquaculture can lead to bycatch depending on the type of equipment used. All aquaculture in Federal waters goes through a rigorous permitting process before it can operate. The risk of bycatch is examined in that process and monitoring and mitigation measures may be required. For instance, if sea turtles or other protected species are known to be entangled in the netting of an aquaculture pen, then mitigation may be required.

I'm a graduate student in Natural Resources Management, and we're learning about sampling methodologies at the moment...Would you mind explaining a bit about how the data is collected? What sampling methods does NOAA employ to collect data about bycatch? Are specific boats tracked, or specific times boats leave harbor? And what countries do the boats sampled belong to? How are these selected and how long is the time frame of tracking? Do the fisherman have a problem with the monitoring? I really respect the work NOAA does, and would love to know more about the methods behind the great data you guys produce as I consider thesis topics.

[tulip92](#)

It's great to hear you are studying about sampling methodologies! The various methods and models used in our different science centers for our different fisheries can be quite complex.

Our National Bycatch Report First Edition is a great resource to learn about these methodologies, especially Section 2 entitled "Bycatch Data Sources."

There's also a nice overview as part of our ABC's of stock assessments.

[\[http://www.nmfs.noaa.gov/stories/2013/03/3\\_04\\_13catching\\_up\\_with\\_catch\\_shares.html\]](http://www.nmfs.noaa.gov/stories/2013/03/3_04_13catching_up_with_catch_shares.html)

In general, human fisheries observers are our best method to monitor bycatch and identify situations where bycatch needs to be reduced.

These are trained scientists who carefully record bycatch levels and take biological samples that assist our agency scientists with their fish stock assessments.

Observers are also highly trained in fishing vessel safety and have been known to make the difference when an emergency happens on a fishing vessel.

The data the observers provide on all species, such as target fish as well as non-target species like sea turtles, sawfish, etc, inform managers efforts to address bycatch. For instance, marine mammal interactions inform marine mammal take reduction team recommendations, and observer data on salmon bycatch are used by the fishing industry for innovative bycatch avoidance programs in Alaska.

Sometimes it's not possible to put an observer on a boat due to space limitations or other factors. In that case, we've got to get creative. Right now, we're focusing a lot on technology. In some fisheries, we're experimenting with using cameras on board, which can help us spot and count bycatch.

This is a really exciting arena for us. Here are a couple of good stories about both the promise and challenge of these technologies:

[\[http://www.st.nmfs.noaa.gov/advanced-technology/electronic-monitoring/index\]](http://www.st.nmfs.noaa.gov/advanced-technology/electronic-monitoring/index)

[\[http://www.nmfs.noaa.gov/stories/2016/02/electronic\\_monitoring.html\]](http://www.nmfs.noaa.gov/stories/2016/02/electronic_monitoring.html)

[\[http://www.fisheries.noaa.gov/sfa/fisheries\\_eco/bycatch/strategy.html\]](http://www.fisheries.noaa.gov/sfa/fisheries_eco/bycatch/strategy.html)

How does the innovative fishing gear work?

My understanding of fishing (which is very little) is that you drag a giant net through the water and pull

up what gets caught, then you sort it in deck. Do you reduce bycatch by fishing in areas where only the fish you want to catch swim? Or maybe do divers sort the fish before pulling them out of the water? I don't know.

OR do you go back to fishing with a rod and line, and catch only a certain type of fish (whilst throwing the rest back without killing them) up to a certain quota maintaining that there are still enough fish in the local ecology to reproduce enough to fish there again?

[onmypenis](#)

This is a great question! There are almost as many ways to catch fish as there are fish in the ocean. There are lots of examples of innovative fishing gear.

Over the years, we've worked with fishermen and scientists to come up with creative solutions to avoid or minimize bycatch. A lot of times this involves studying the behavior of animals around fishing gear and then modifying the gear so that the unwanted animals avoid the gear or are not kept if they interact with the gear.

We always manage our fish populations to ensure that there are enough fish in the ecosystem for continued healthy populations.

Some of the solutions I think are the most interesting include: turtle excluder devices:

[\[http://www.nmfs.noaa.gov/pr/species/turtles/teds.html\]](http://www.nmfs.noaa.gov/pr/species/turtles/teds.html)

Streamer lines to scare away seabirds:

[\[http://www.westcoast.fisheries.noaa.gov/stories/2014/10\\_09102014\\_saving\\_seabirds\\_bait.html\]](http://www.westcoast.fisheries.noaa.gov/stories/2014/10_09102014_saving_seabirds_bait.html)

Circle hooks that are less harmful to turtles:

[\[http://www.sefsc.noaa.gov/labs/mississippi/longlinegear.htm\]](http://www.sefsc.noaa.gov/labs/mississippi/longlinegear.htm)

LED lights that can help herd certain kinds of fish out of nets:

[\[http://www.westcoast.fisheries.noaa.gov/stories/2014/20\\_102014\\_eulachon\\_led\\_lights.html\]](http://www.westcoast.fisheries.noaa.gov/stories/2014/20_102014_eulachon_led_lights.html)

But there are literally dozens of other solutions. We have a funding program called the Bycatch Reduction Engineering Program that provides grants to researchers and fishermen to help develop new or modify existing gears or develop new fishing practices:

[\[http://www.nmfs.noaa.gov/sfa/fisheries\\_eco/bycatch/index.html\]](http://www.nmfs.noaa.gov/sfa/fisheries_eco/bycatch/index.html)

Another grant program we administer is the Saltonstall-Kennedy grant program

[\[http://www.nmfs.noaa.gov/mb/financial\\_services/skhome.htm\]](http://www.nmfs.noaa.gov/mb/financial_services/skhome.htm) which funds projects that address the needs of fishing communities, optimize economic benefits by building and maintaining sustainable fisheries, and increase other opportunities to keep working waterfronts viable. One of the program's priorities is development of bycatch reduction techniques.

Bycatch is exactly what always fascinated me about ocean fishing. With lakes you know what's in there, but the possibilities abound in the ocean.

My question: What is the most interesting thing you've seen among bycatch?

[atx\\_operations](#)

The most interesting thing I've seen among bycatch was on a boat out of New Bedford, Massachusetts. I was there to see a new scallop dredge in action that was designed to reduce bycatch. The dredge brought up a torpedo fish, or electric ray, which emitted an electrical charge that made the other fish around it jump off of the deck.

Is it possible to farm cod (similar to the way salmon is farmed)? The demise of cod depresses the hell out of me.

Follow up question: Are there any bright spots in stock restoration? Every news piece I see about commercial fishing sounds like the end of the world.

[metametamind](#)

I'm sorry to say I don't know much about fish farming. However, I do know that there is good news regarding the health and recovery of fish stocks. For example, here's a story about how we are working with fishermen and international partners to conserve sharks, which are the ocean's top predators and also animals that don't reproduce as much as other fish:

[\[http://www.nmfs.noaa.gov/stories/2013/08/08\\_2\\_13shark\\_science\\_research\\_policy.html\]](http://www.nmfs.noaa.gov/stories/2013/08/08_2_13shark_science_research_policy.html)

And here's another story about how scientists are helping endangered Chinook salmon survive during the recent drought on the West Coast:

[\[http://www.nmfs.noaa.gov/stories/2016/02/sound\\_of\\_endangered\\_salmon\\_surviving.html\]](http://www.nmfs.noaa.gov/stories/2016/02/sound_of_endangered_salmon_surviving.html)

We definitely have a lot of challenges, but I wouldn't say it's the end of the world.

Hi, thanks for doing this! Since fish quotas are difficult and costly to enforce, what would you say is currently the most effective method of regulation? I've skimmed some interesting studies suggesting that social enforcement among fishing boats who are allotted their own fishing "zones" has resulted in more sustainable catch rates allowing fish population to increase at a healthy rate. There's a term for this but I can't remember it, sorry about that. I'm curious to hear your thoughts on the subject of social order vs third party regulations.

[dudemanski](#)

You're welcome, and I appreciate your interest! You are raising a specific area that I don't know a whole lot about. Bycatch is a complicated issue and how you resolve it really depends on the fishery, the local culture and the resource. We look at all available tools when determining what is the best approach for that fishery. With respect to the "zones," I think your question is related to the concept of catch shares, or individual fishing quotas, which have been implemented by NOAA and our management partners over the decade. Catch shares allocate rights to harvest part of a quota to a fleet or individual boat, which can allow boats to fish more according to their own schedules and more carefully, which in turn can lead to reduced bycatch. This website has more information about catch share fisheries: [\[http://www.fisheries.noaa.gov/sfa/management/catch\\_shares/index.html\]](http://www.fisheries.noaa.gov/sfa/management/catch_shares/index.html)

Overall, I think that regulations that allow for the development of cooperatives, sectors, and other forms of self-government can lead to positive outcomes, including bycatch reduction.

Check out this story:

[\[http://www.nmfs.noaa.gov/stories/2013/03/3\\_04\\_13catching\\_up\\_with\\_catch\\_shares.html\]](http://www.nmfs.noaa.gov/stories/2013/03/3_04_13catching_up_with_catch_shares.html)

Thanks for your efforts to reduce the bycatch. Can you tell us which fishes have the worst bycatch?

[le\\_stephanois\\_55](#)

We don't really think of our fisheries in terms of being "worst" or "best" in levels of bycatch. No fisherman wants to encounter bycatch because they don't want the wrong fish to eat their bait, and because it takes a lot of time for fishermen to sort through the bycatch on deck. In addition, fishermen don't want to catch protected species, like marine mammals, sea turtles and seabirds. In general, some types of gear are more selective than others. For example, pots and traps generally are more selective than longlines, which generally are more selective than trawls. Fishermen and scientists have

been working for decades to make trawls more selective through turtle excluder devices and fish bycatch reduction devices in Gulf of Mexico and South Atlantic shrimp trawl fisheries (see <http://www.sefsc.noaa.gov/labs/mississippi/brd/>) and salmon excluder devices for West Coast and Alaska trawl fisheries [<https://www.youtube.com/watch?v=rqfCzfC2joM>]. And even the more selective longline gear can become a serious concern if it interacts with an endangered species like the short-tailed albatross or an endangered leatherback sea turtle.

A good overview of bycatch can be found at [http://www.nmfs.noaa.gov/sfa/fisheries\\_eco/bycatch/index.html](http://www.nmfs.noaa.gov/sfa/fisheries_eco/bycatch/index.html). Please check out a short video about bycatch at [<https://www.youtube.com/watch?v=xz8q6uHSdmg&feature=youtu.be>]

Hello! Thank you for doing this AMA.

I have a Bachelors in Marine, Freshwater and Environmental Biology, but have had a hard time getting into the field. What do you suggest for aspiring Marine Biologist trying to do research and promote conservation?

What kind of career path lead you to your current position?

How do those in the seafood industry react to you efforts? Are they as cognizant or concerned with the issues plaguing fisheries today?

[MTGothmog](#)

Congratulations on your Bachelor's degree! If you are having a hard time finding a job, and are up for it, you should consider trying to get a master's degree and then apply for a Knauss Fellowship: <http://seagrant.noaa.gov/fundingfellowships/knaussfellowship.aspx>

Many of my coworkers are Knauss Fellows. It's a great program! For me personally, I majored in religion as an undergraduate (you know, loaves and fishes...) and then went to graduate school to get a degree in marine affairs, which led to a fellowship, which led to a contract position, which led to an awesome job here at NOAA Fisheries.

I think the seafood industry is generally very supportive of our bycatch reduction efforts. In many cases they are the first people to identify problems because they are on the water every day. Of course, some people don't want to change their practices, but overall I have seen a lot of encouraging behavior from the industry.

Hi Lee,

There seems to be several bycatch reducing technologies that pay for themselves (quick positive ROI) but fisheries/fisherman can't get the financing for the new gear, what are interested parties doing to help bridge this problem ?

[skibbi9](#)

Gear modifications definitely cost money, and we try to promote cost-effective gear modifications like streamer lines for seabird avoidance, which are basically strips of plastic. We have provided assistance to fishermen to modify their gear in certain instances, for example, providing free streamer lines, but this is not a wide-spread practice and depends on the situation. In some instances, fishermen have adopted new gear on their own when they see how it reduces bycatch and increases their profits by allowing them to catch more of the fish they want to catch.

What is being done on international levels to educate consumers to support sustainable fishing practices?

Is there any consensus on which global nations and consumers are aware of this ocean seafood resource challenge?

[CyberTourist](#)

Thanks for your question. There are a number of initiatives domestically and internationally to educate consumers about sustainable fishing practices.

Here in the U.S., we've developed a consumer-focused website called Fishwatch.gov. It provides information on the stock status and impact to habitat and protected species.

In addition, we play a very active role internationally to support sustainable fishing practices, which includes reducing bycatch of non-target and protected species. By participating in Regional Fisheries Management Organizations [\[http://www.nmfs.noaa.gov/ia/agreements/regional\\_agreements/intlagree.html\]](http://www.nmfs.noaa.gov/ia/agreements/regional_agreements/intlagree.html), we have been able to secure international management measures to reduce bycatch for numerous species.

Here are some species-specific examples:

international shark conservation -- [\[http://www.nmfs.noaa.gov/ia/species/sharks/shark.html\]](http://www.nmfs.noaa.gov/ia/species/sharks/shark.html)

international marine mammal conservation --  
[\[http://www.nmfs.noaa.gov/ia/species/marine\\_mammals/marine\\_mammals\\_home.html\]](http://www.nmfs.noaa.gov/ia/species/marine_mammals/marine_mammals_home.html)

international sea turtle conservation -- [\[http://www.nmfs.noaa.gov/pr/species/turtles/\]](http://www.nmfs.noaa.gov/pr/species/turtles/)

Enforcement seems to be one of the biggest issues facing the bodies responsible for regulating the fishing industry, particularly with issues such as bycatch, illegal fishing practices, etc. How are IFOs currently tackling this issue? Have there been any discussions about an overarching international body to add cohesiveness and collaboration between the disjointed, existing IFOs? Thank you so much for doing this AMA, I greatly admire the work that you all do at NOAA and hope to work there someday on this very issue.

[khaleesi152](#)

Thanks for your questions. Perhaps we'll be colleagues someday! Enforceable management measures are critical to successfully reducing bycatch in U.S. fisheries. We enforce fishery management measures and work with state, federal, and international partners to ensure compliance with all applicable laws. We recognize that not all countries are able to carry out fisheries enforcement. We work with other countries to help strengthen their ability to enforce fisheries management measures. We also participate in the International Monitoring Control and Surveillance Network. [\[http://www.imcsnet.org\]](http://www.imcsnet.org)

More work remains to be done, but we are working hard with our international partners to ensure effective enforcement.

Can we just ban all net fishing? Seems easier than reducing by catch.

[shadowmonk10](#)

Thanks for your question. We are working hard to make net fishing more selective to reduce bycatch of protected species like sea turtles, marine mammals, and protected fish. Net fishing provides a great

deal of food for an ever-expanding world population, and banning all net fishing would not be easy or practical. We prefer to work with fishermen to come up with creative ideas, based in many cases on scientific studies of animal behavior, to modify nets so that they encounter and retain less bycatch. For instance, some of our research has found success in reducing sea turtle bycatch in gillnets by using LEDs. [<https://pifscblog.wordpress.com/2014/03/28/ultraviolet-lights-may-keep-sea-turtles-from-becoming-bycatch/>]

The bycatch problem is the reason I gave up eating fish that is not farmed. I understand fish farming is also bad for the environment, and I was wondering if part of your effort to reduce bycatch includes better farming methods?

[ranaparvus](#)

Great question! Although, I'm sorry you stopped eating fish that is not farmed, because there are many U.S. fisheries with very low levels of bycatch. Check out [[www.FishWatch.gov](http://www.FishWatch.gov)] to see your best (most delicious) options.

Personally, my work does not involve trying to improve aquaculture methods, although NOAA Fisheries has an aquaculture program that focuses on a variety of issues, including best practices. To learn more visit: [<http://www.nmfs.noaa.gov/aquaculture>]

Thanks so much for doing this AMA, and for your hard work. I am an avid recreational fisherman in the Northeast. My question is what kind of impact does recreational fishing have on specie sustainability? I know firsthand that catch-limit enforcement for shore fisherman is near nonexistent in NY, do you know what kind of long term impact this will have on the fishery?

[bagNtagEm](#)

There are about 11 million saltwater anglers in the U.S. And collectively those fishermen catch a lot of fish. They also release many of them back into the water. We're working with anglers, managers, and researchers to make sure these released fish survive. Here's a cool example here:

[[http://www.nmfs.noaa.gov/stories/2013/03/3\\_04\\_13catching\\_up\\_with\\_catch\\_shares.html](http://www.nmfs.noaa.gov/stories/2013/03/3_04_13catching_up_with_catch_shares.html)]

Others have made some note of it, but to expand on what they're already said, what are your methods for reducing bycatch? Do you find these methods have improved over time?

Additionally, what can be done in local communities? Some appreciated tips would include:

- Education on companies that are better about bycatch than others
- How to reduce bycatch locally (if it is a local issue)

Lastly, (sorry for all the questions), are there types of fish that promote bycatch more than others, (i.e. do salmon tend to be bycaught more than cod?), if so, why?

[TheMonitor58](#)

NOAA Fisheries has been working on reducing bycatch for more than 40 years, and we've found success in a variety of approaches. Bycatch continues to be a challenge but we're finding some real success at addressing bycatch.

Check out our new 'Bycatch Breakthroughs- a Brief History' to learn more about some of the progress we've made. [<http://noaa.maps.arcgis.com/apps/MapSeries/?appid=e5d4037090054fa2843a6ab522c9b73b>] And watch this video to learn more about tackling

bycatch in U.S. fisheries [<https://www.youtube.com/watch?v=xz8q6uHSdmg>]

We work with fishermen, researchers, environmental groups, and managers and have for many years to reduce bycatch of fish and protected species.

For example, acoustic pingers are used to reduce harbor porpoise bycatch in gillnet fisheries, and sinking groundlines and weak links are used in some trap/pot and gillnet fisheries to reduce the risk of large whale entanglements.

Here's more:

[[http://www.nmfs.noaa.gov/pr/interactions/trt/marine\\_mammal\\_take\\_reduction\\_program.html](http://www.nmfs.noaa.gov/pr/interactions/trt/marine_mammal_take_reduction_program.html)]

We have also developed several bycatch reduction technologies for sea turtles, seabirds and some protected species. We have some good stories here:

[[http://www.nmfs.noaa.gov/sfa/fisheries\\_eco/bycatch/index.html](http://www.nmfs.noaa.gov/sfa/fisheries_eco/bycatch/index.html)]

Do you have internships?

[pnine](#)

NOAA has a variety of internships, scholarships, fellowships, and post doc opportunities, which can be found on our website:

[[http://www.education.noaa.gov/Special\\_Topics/Student\\_Opportunities.php#page=page-1](http://www.education.noaa.gov/Special_Topics/Student_Opportunities.php#page=page-1)]

Can you share one piece of advice for being successful in the marine science world?

[makeAmove56](#)

That's a great question! The path to success can be long and winding. I think you should try to find a mentor and also try to get your foot in the door with an organization you like, even if it isn't your dream job. Once you get into an organization and make contacts, and do good work, you should be able to get better jobs and become successful.

Right now, Pollack is the largest fishery every year. what is being done to insure that they aren't overfished like Cod was during the 20th century? It seems to me that there is little opportunity to minimize bycatch with the methods I see the Factory ships using. What is typical bycatch in the pollack fishery? It seems like there would be a lot of large fish feeding in the schools I know the big ships are targeting. Full Disclosure - Wholesale Seafood Distributor 20+ yrs in S FL

[Cyberman80](#)

Good morning! I assume you are talking about Alaska pollock, and I am happy to say that Alaska pollock is being very sustainably managed by the North Pacific Fishery Management Council. The population is above target population levels and is not subject to overfishing, and bycatch in the fishery is very low. You can read a lot more about Alaska pollock science and management on our FishWatch website: [<http://www.fishwatch.gov/profiles/alaska-pollock>]

Uninformed individual here. Most sources report that humans have only been able to explore a very small percentage of the world's oceans. How can we be sure that fishing communities are truly in danger...or are we simply referring to fish populations that we have real knowledge of?

[RBelly](#)

Good point! It is definitely true that we have a lot to learn about the oceans. In terms of bycatch, I think the words "communities" and "populations" often refer to fish, rather than humans. But it is important to remember the human factor when reducing bycatch. Bycatch reduction measures work best when fishermen buy-in to the solution and recognize the problem. NOAA Fisheries employs sociologists and economists who study human fishing communities to learn about the effects of our regulations on them. You can learn more about this research here:

[\[http://www.st.nmfs.noaa.gov/humandimensions/index\]](http://www.st.nmfs.noaa.gov/humandimensions/index)

I have relatives that are in fishing. Never knew there was bycatch. Is there resources in this that you are doing? Where is your study being done?

[reloadfreak](#)

Unfortunately, bycatch exists, but NOAA Fisheries and its partners are doing a lot to monitor, minimize, and manage bycatch. We have grant program that awards about \$2.5 million each year for innovative gear-based solutions to bycatch [\[http://www.nmfs.noaa.gov/sfa/fisheries\\_eco/bycatch/brep.html\]](http://www.nmfs.noaa.gov/sfa/fisheries_eco/bycatch/brep.html). In addition, NOAA Fisheries and some fishing fleets spent \$69 million in 2012 for fishery observer coverage and program infrastructure. We study bycatch in every coastal region of the United States, and in other countries. Personally, my job is to compile bycatch estimates for U.S. fisheries and publish them in a national report on a regular basis.

What potential effects could bycatch have on kelp forests and reefs? Has something like this been studied?

Thanks for the AMA! I'm an undergraduate studying marine biology, so I find your work super interesting!

[Magicturtle2018](#)

I'm sorry to say I am unaware of the effects of bycatch on kelp forests. However, our observer programs are increasingly collecting information about bycatch from deep-sea coral reefs [\[http://www.habitat.noaa.gov/protection/corals/deepseacorals.html\]](http://www.habitat.noaa.gov/protection/corals/deepseacorals.html). This information can help our management partners identify areas that might need to be closed to certain types of fishing like bottom trawling.

Hey Lee Benaka, thanks a lot for doing this AMA. I was wondering about the use of acoustic pingers on gill nets (and possibly on other gears as well) to deter echolocating species such as dolphins, porpoises and seals from approaching the nets. How efficient is this for the various groups of species I mentioned, and to what extent is this method in use today? How much maintenance is required for using these pingers? I mean, would fishers consider it a lot of extra trouble to have pingers on their nets?

[larus\\_sapiens](#)

I'm not an expert on this topic, but I know that research on the use of pingers to deter marine mammals from approaching nets and other fishing gear has been mixed. Some pingers are designed to alert animals to the presence of fishing gear, while other pingers are designed to deter animals from the gear (e.g., acoustic harassment devices). Some pingers have been shown to be very effective in keeping some species such as harbor porpoise out of gillnets, and have been required as part of bycatch reduction regulations (such as the Harbor Porpoise Take Reduction Plan,

[\[http://www.greateratlantic.fisheries.noaa.gov/protected/poprtrp/\]](http://www.greateratlantic.fisheries.noaa.gov/protected/poprtrp/), and the Pacific Offshore Cetacean Take Reduction Plan, [\[http://www.nmfs.noaa.gov/pr/interactions/trt/poctrp.html\]](http://www.nmfs.noaa.gov/pr/interactions/trt/poctrp.html)). For other species, such as some dolphins and seals, pingers have been found in some cases to act as a “dinner bell,” drawing animals to the gear.

There are a wide variety of pingers on the market, with different acoustic properties. The amount of maintenance, such as replacing batteries, may vary depending on how often the pingers are pinging, how long they're in the water, how many are used per fishing trip, etc. In cases where we require pingers to be used, we work with fishermen to consider operational issues.

In one of my ecology classes, we were taught that larger commercial fish species(tuna, Marlin) and even medium sized fish are becoming more scarce, so a lot of commercial fishing has shifted to smaller fish. Is there any way to apply a harvesting 'season' for these fish to ensure rebound, and would it be possible to create a fishery system for these smaller fish, since they *typically* have much faster spawning and growth rates?

#### [PseudotritonRuber](#)

This is a great question. Our fisheries are managed in coordination with regional fishery management councils that are made up of various stakeholders, and they all manage fisheries in a variety of ways. One very successful management method that I think relates to your question is the management for Atlantic sea scallops. The New England Fishery Management Council established a “rotation program” that closes areas with large concentrations of fast-growing, small scallops before the scallops are exposed to fishing. Scallops grow fastest when they are very small, and protection of these small scallops through area closures is critical in the rotational management of the scallop resource. After a period of closure, the areas re-open for scallop fishing, when the scallops are larger and more suitable for harvest.

How can we stop or reduce bycatch? Can we do this without sacrificing anything?

#### [Segull](#)

The ultimate objective of bycatch reduction is to reduce it to a very small level or eliminate it altogether. By monitoring the fishery, we better understand why and how bycatch is occurring. Our scientists then work with the fishing industry and academics to try to alter the gear so that it is more selective. If we can not improve the selectivity of the gear sufficiently, we may look at closed areas. We try to balance the economic and ecological objectives of the fishery, so that we can develop win-win solutions.