



EXPEDITIONARY  
LEARNING

# **Grade 6: Module 3B: Unit 3: Lesson 2**

## **Researching Information about Overfishing**



This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.

Exempt third-party content is indicated by the footer: © (name of copyright holder). Used by permission and not subject to Creative Commons license.



**Long-Term Targets Addressed (Based on NYSP12 ELA CCLS)**

I can write informative/explanatory texts that convey ideas and concepts using relevant information that is carefully selected and organized. (W.6.2)

I can conduct short research projects to answer a question. (W.6.7)

I can interpret information presented in different media and formats. (SL.6.2)

**Supporting Learning Target**

- I can research overfishing to find relevant and compelling factual information and quotes.

**Ongoing Assessment**

- Structured notes: First part of Chapter 7 of *World without Fish* (from homework)
- Researching graphic organizer: Lesson 2



Agenda	Teaching Notes
<ol style="list-style-type: none"> <li>1. Opening               <ol style="list-style-type: none"> <li>A. Engaging the Reader: Chapter 7 of <i>World without Fish</i> (5 minutes)</li> <li>B. Unpacking the Learning Target (3 minutes)</li> </ol> </li> <li>2. Work Time               <ol style="list-style-type: none"> <li>A. Modeling how to Fill In the Researching Graphic Organizer for a Video (15 minutes)</li> <li>B. Researching Facts: Part 1 of the Jigsaw (15 minutes)</li> </ol> </li> <li>3. Closing and Assessment               <ol style="list-style-type: none"> <li>A. Triad Share: Part 2 of the Jigsaw (7 minutes)</li> </ol> </li> <li>4. Homework               <ol style="list-style-type: none"> <li>A. Read the rest of Chapter 7 of <i>World without Fish</i>. Remember to record new words on your word-catcher. Use evidence flags to gather evidence as you read to answer the focus question on your structured notes:                   <ul style="list-style-type: none"> <li>• According to Mark Kurlansky, what are some other solutions to the issue of fish depletion? According to Kurlansky, why won't they work?</li> </ul> </li> <li>B. Continue reading your independent reading book.</li> </ol> </li> </ol>	<ul style="list-style-type: none"> <li>• In this lesson, students work in triads to research information about overfishing. This is done in a Jigsaw, so each triad is given a different research resource and they partner up with another triad in the Closing and Assessment to share their findings.</li> <li>• To practice SL.6.2, students are given Researching graphic organizers and also watch an excerpt of a video called “Ending Overfishing” (accessed here: <a href="http://www.ocean2012.eu/pages/94-ending-overfishing-animation">http://www.ocean2012.eu/pages/94-ending-overfishing-animation</a>) as part of their research. How you choose to manage this depends on the technology you have available. You may choose to show it to the whole group, or have it set up on devices for students to access independently. As with other research resources, it needs to be reviewed multiple times to be used effectively. Please note and explain to students that this video was made by and for Europeans, so many of the measurements they use, like meters and kilos, may not be familiar to them. There is a transcription of the video included in the supporting materials that you can read to your class if you do not have access to audiovisual equipment.</li> <li>• As in Unit 1, continue to emphasize to students that the ideas presented are just one point of view and that there are other points of view out there on overfishing and fish depletion.</li> <li>• In advance:               <ul style="list-style-type: none"> <li>– Prepare the research articles for each triad (see supporting materials). Each triad needs to be allocated one research article, and you need enough of each article for one per student. The articles provided range in difficulty—determine how to allocate articles by considering the reading level of students in each triad. Each triad needs to be given a glossary for its vocabulary article, too. An excerpt of <i>World without Fish</i> is also used as a research resource, so consider allocating this to triads with students who require more support with reading, as they should already be familiar with the text.</li> <li>– Review: Concentric Circles protocol (see Appendix).</li> </ul> </li> <li>• Post: Learning target.</li> </ul>



Lesson Vocabulary	Materials
factual information, relevant, compelling; see glossaries for vocabulary words pertaining to specific research resources	<ul style="list-style-type: none"><li>• Performance Task Prompt: Informative Consumer Guide (from Lesson 1; one per student)</li><li>• Researching graphic organizer: Lesson 2 (one per student and one for display)</li><li>• “Ending Overfishing” video (up to 2:40)</li><li>• Ending Overfishing” Video Transcript (for teacher reference)<ul style="list-style-type: none"><li>– Research articles and glossaries (one per student in assigned triad; see Teaching Notes):</li><li>– <i>World without Fish</i>: pages 36 and 37 (book; distributed in Unit 1; one per student)</li><li>– “Threat 1: Overfishing”</li><li>– “Destructive Fishing”</li><li>– “Protecting Ocean Habitat from Bottom Trawling”</li></ul></li><li>• Evidence flags (three per student for homework)</li><li>• Structured notes (from Unit 2, Lesson 1; one new blank copy per student)</li></ul>



Opening	Meeting Students' Needs
<p><b>A. Engaging the Reader: Chapter 7 of <i>World without Fish</i> (5 minutes)</b></p> <ul style="list-style-type: none"><li>Remind students of the homework: Read up to page 97 in Chapter 7 of <i>World without Fish</i> and answer the focus question on their structured notes: According to Mark Kurlansky, what are some solutions to the issue of fish depletion? According to Kurlansky, why won't they work?</li><li>Ask students to take out their structured notes and review them.</li><li>Invite students to follow the Concentric Circles protocol to share their structured notes:<ol style="list-style-type: none"><li>Split the group in half. Invite one half to get into a circle with their structured notes and the other half to make a circle around them also with their structured notes.</li><li>Ask the inner circle to face out and the outer circle to face in. Each student should be facing another.</li><li>Invite the inner circle to share their answer(s) to the homework focus question with the person opposite them.</li><li>Invite the outer circle to do the same.</li><li>Invite the inner circle to move two people to the left.</li><li>Repeat three to five times until each student has spoken to three people.</li></ol></li><li>Ask students to return to their seats.</li><li>Invite students to make revisions to their structured notes where necessary based on their discussions during the Concentric Circles protocol.</li><li>Select volunteers to share their answers to the focus question with the whole group. Listen for students to explain that fish farming is one solution, but it won't work because farmed fish are fed wild fish that have been caught at sea. Another solution is limiting the number of fish that fishermen can catch, but this is hard to manage and encourages fishermen, when they have caught more fish than they are allowed, to just throw back the dead fish into the water. The fish have been caught and killed either way.</li></ul>	<ul style="list-style-type: none"><li>Opening the lesson by asking students to share their homework makes them accountable for completing it. It also gives you the opportunity to monitor which students are not doing their homework.</li><li>Consider pairing ELL students who speak the same first language to deepen their discussion and understanding.</li></ul>



Opening (continued)	Meeting Students' Needs
<p><b>B. Unpacking the Learning Target (3 minutes)</b></p> <ul style="list-style-type: none"> <li>• Announce triads. Ask students to quietly move to sit with their triads.</li> <li>• Direct students' attention to the posted learning target and ask for a volunteer to read it aloud:             <ul style="list-style-type: none"> <li>* "I can research overfishing to find relevant and compelling factual information and quotes."</li> </ul> </li> <li>• Ask students to discuss in triads:             <ul style="list-style-type: none"> <li>* "What is <i>factual information</i>? Why are you looking for factual information?"</li> <li>* "What does <i>relevant</i> mean?"</li> <li>* "What does <i>compelling</i> mean?"</li> </ul> </li> <li>• Cold call students to share out their ideas whole group. Listen for students to explain that factual information is information that is undeniably true and that they are researching factual information because this brochure is informative—they are aiming to inform the consumer with factual information rather than to try to persuade them with opinions. Listen for students to explain that relevant means that it is appropriate to the topic, and compelling means it sparks the interest of the reader and makes them want to continue reading to the end. We want readers to read to the end of the consumer guides to be fully informed of the issue.</li> <li>• Ask students to discuss in triads:             <ul style="list-style-type: none"> <li>* "Where have you already read some information about overfishing?"</li> </ul> </li> <li>• Select volunteers to share their ideas. Listen for students to explain that World without Fish contains information about overfishing.</li> <li>• Explain to students that today some of them will be revisiting an excerpt of this text in their research.</li> <li>• Remind students that as in Unit 1 with Mark Kurlansky's <i>World without Fish</i>, there are different points of view about overfishing and fish depletion, so they should not accept everything they read as fact. Make it clear that good readers question everything—they don't believe everything that they read, but instead they consider ideas they read and use them as a jumping point to find out more.</li> </ul>	<ul style="list-style-type: none"> <li>• Learning targets are a research-based strategy that helps all students, especially challenged learners.</li> <li>• Posting learning targets allows students to reference them throughout the lesson to check their understanding. The learning targets also provide a reminder to students and teachers about the intended learning behind a given lesson or activity.</li> </ul>



Work Time	Meeting Students' Needs
<p><b>A. Modeling How to Fill In the Researching Graphic Organizer for a Video (15 minutes)</b></p> <ul style="list-style-type: none"><li>• Display the <b>Performance Task Prompt: Informative Consumer Guide</b> and invite students to refer to their own copies.</li><li>• Focus students on the first bullet: “Include compelling information and quotes about the issue: overfishing and how it causes fish depletion.”</li><li>• Ask students to discuss with their triads:<ul style="list-style-type: none"><li>* “How are you going to find out more about the issue of overfishing and fish depletion? What does the learning target say?”</li><li>* “We read about overfishing and fish depletion in <i>World without Fish</i>, so why are we not just going to the information from that book?”</li></ul></li><li>• Select students to share their responses. Listen for them to explain that they are going to find out more by researching, as the learning target suggests, and they are not just going to use the information in <i>World without Fish</i>. To ensure they are including the most accurate information, they should read other resources to check that the information in <i>World without Fish</i> is accurate.</li><li>• Display and distribute the <b>Researching graphic organizer: Lesson 2</b>. Focus students on the line for a “Refined research question” at the top of the page.</li><li>• Tell students to discuss in triads:<ul style="list-style-type: none"><li>* “You will be researching to find more information about overfishing and fish depletion in this lesson. What do you think a refined research question might be for this lesson? Why?”</li></ul></li><li>• Select volunteers to share their ideas with the class. Listen for students to suggest a question like: “What is overfishing and how does it contribute to the issue of fish depletion?”</li><li>• Invite students to record a refined research question on the lines of their graphic organizer.</li><li>• Invite students to read through the directions and the column headings on the Researching graphic organizer with you.</li><li>• Tell students that they are going to be researching informative facts about the issue of overfishing that they could use in their informative consumer guides.</li></ul>	<ul style="list-style-type: none"><li>• Consider pairing up ELL students who speak the same first language to encourage deeper discussion about the video.</li><li>• Modeling how to fill in the Researching graphic organizer will ensure all students know what is expected of them when they begin working independently; it will also provide them with the confidence necessary to begin working on their own.</li></ul>



Work Time (continued)	Meeting Students' Needs
<ul style="list-style-type: none"> <li>• Explain that they will begin by watching a video about overfishing. Tell students you are going to play the video and you would like them to just watch it through the first time without recording anything on their graphic organizer to see all of the content. You will give them time at the end of the video to make notes on their organizers and you will also replay the video. Emphasize that this video was made by Europeans for Europeans, so many of the measurements they hear, like kilos and meters, may not be familiar to them, but they should still be able to understand the main points the video is making.</li> <li>• Play the “<b>Ending Overfishing</b>” video (<a href="http://www.ocean2012.eu/pages/94-ending-overfishing-animation">http://www.ocean2012.eu/pages/94-ending-overfishing-animation</a>) up to 2:40 for the class without stopping it.</li> <li>• Invite students to talk with an elbow partner about the compelling and relevant factual information and quotes they saw on the video.</li> <li>• Select students to share their ideas with the whole group.</li> <li>• Model filling in the displayed Researching graphic organizer with the title and source (“Ending Overfishing” Ocean 2012) and student ideas.</li> <li>• Tell students that you are going to replay the video, and this time they can make notes on their Researching graphic organizers as they watch.</li> <li>• Replay the video.</li> <li>• Invite students to talk with an elbow partner about the compelling and relevant factual information and quotes they saw on the video and recorded on their graphic organizer.</li> <li>• Select students to share their ideas with the whole group.</li> <li>• Continue to model filling in the displayed Researching graphic organizer with students’ ideas.</li> </ul>	
<p><b>B. Researching Facts: Part 1 of the Jigsaw (15 minutes)</b></p> <ul style="list-style-type: none"> <li>• Tell students they are going to do a Jigsaw so each triad will have a different article to use for research. Then, they will come together at the end to share what they have found; this way, they can share the workload of researching facts.</li> <li>• Distribute the <b>research articles</b> and <b>glossaries</b>.</li> <li>• Choose a team to model following the directions and filling in the displayed Researching graphic organizer with just the first couple of paragraphs of their article.</li> <li>• Remind students to discuss their ideas before writing anything on their individual graphic organizers.</li> </ul>	<ul style="list-style-type: none"> <li>• If students have been grouped homogeneously, focus your attention on those triads that need additional support reading the research materials.</li> </ul>





Work Time (continued)	Meeting Students' Needs
<ul style="list-style-type: none"><li>• Invite triads to begin.</li><li>• Circulate to support students in reading the texts and underlining factual information. Ask probing questions as necessary:<ul style="list-style-type: none"><li>* "Does this information answer your refined focus question?"</li><li>* "Is this relevant factual information? Is it something that is undeniably true?"</li><li>* "What makes this information/quote compelling?"</li></ul></li></ul>	
Closing and Assessment	Meeting Students' Needs
<p><b>A. Triad Share: Part 2 of the Jigsaw (7 minutes)</b></p> <ul style="list-style-type: none"><li>• Invite triads to pair up with another triad to share the factual information they collected on the issue of overfishing.</li><li>• Invite triads to add any new pieces of factual information to their graphic organizer.</li><li>• Preview homework and distribute <b>structured notes</b> and <b>evidence flags</b>.</li></ul>	<ul style="list-style-type: none"><li>• Inviting triads to share their work can function as a self-check and enables triads to push each other's thinking further.</li></ul>
Homework	Meeting Students' Needs
<ul style="list-style-type: none"><li>• Read the rest of Chapter 7 of <i>World without Fish</i>. Remember to record new words on your word-catcher. Use evidence flags to gather evidence as you read to answer the focus question on your structured notes:<ul style="list-style-type: none"><li>– According to Mark Kurlansky, what are some other solutions to the issue of fish depletion? According to Kurlansky, why won't they work?</li></ul></li><li>• Continue reading your independent reading book.</li></ul>	



EXPEDITIONARY  
LEARNING

# Grade 6: Module 3B: Unit 3: Lesson 2

## Supporting Materials



This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.

Exempt third-party content is indicated by the footer: © (name of copyright holder). Used by permission and not subject to Creative Commons license.



Researching Graphic Organizer: Lesson 2

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Refined research question: \_\_\_\_\_

Directions:

1. Read through the text carefully. Use the glossary to help you with words that are unfamiliar.
2. Reread the text and discuss in your triads the relevant factual information that will help you describe the issue to consumers.
3. If you are reading a paper text, underline any relevant factual information that will help you describe the issue to consumers.
4. Reread the text and discuss in your triads any relevant and compelling quotes that will help you describe the problem to consumers.
5. In a different color, underline any relevant and compelling quotes that will help you describe the issue in a compelling way to consumers.
6. Record the source in the first column (title and author).
7. Record the information in the second column. Record quotes in quotation marks.
8. In the third column, describe how this information/quote answers your refined question.

Source (title and author)	Information/Quotes (copy quotes word for word in quotation marks)	How does it answer the question?



Researching Graphic Organizer: Lesson 2

Source (title and author)	Information/Quotes (copy quotes word for word in quotation marks)	How does it answer the question?



**“Ending Overfishing” Video Transcript**  
(For Teacher Reference)

The earth. There are currently 7 billion people living on 30 percent of its surface and all of them are dependent on the remaining 70 percent: the ocean. The ocean is the largest source of food in the world. Fish is the main daily source of protein for 1.2 billion people. But fishers are more and more frequently returning home with empty nets.

Let’s turn the clock back a little. Some scientists say that in the last 60 years, stocks of large fish have fallen by 90 percent. They are warning that we are facing the collapse of all types of fish species in less than 50 years. The reason for this: overfishing.

Long-line fishing vessels deploy 1.4 billion hooks a year. 1.4 billion hooks, each with a slice of fish hanging from them as bait. There are trawling vessels that cast nets with an opening of up to 23,000 meters squared. The size of four football (soccer) pitches and big enough to hold 13 jumbo jets, or more commonly, 500 tons of fish. Amongst these 500 tons of fish there is a lot of by-catch. By-catch is marine creatures incidentally caught, often at large quantity. Typically shrimp trawlers throw 80-90 percent of the marine creatures caught back overboard. This means that for 1 kilo of shrimp, up to 9 kilos of other marine wildlife is caught and wasted.

To relieve the strain on wild fish, 47 percent of our seafood demand is farmed fish. But marine aquaculture is more of a nail in a coffin than a lifeline. Many of the farmed fish are carnivorous; that is, they eat other smaller fish. Five kilos of captured wild fish are needed to produce one kilo of farm-reared salmon. Aquaculture just converts low-value small fish into higher-value bigger ones. It does not create more fish.



Research Articles and Glossaries:  
“Threat 1: Overfishing”

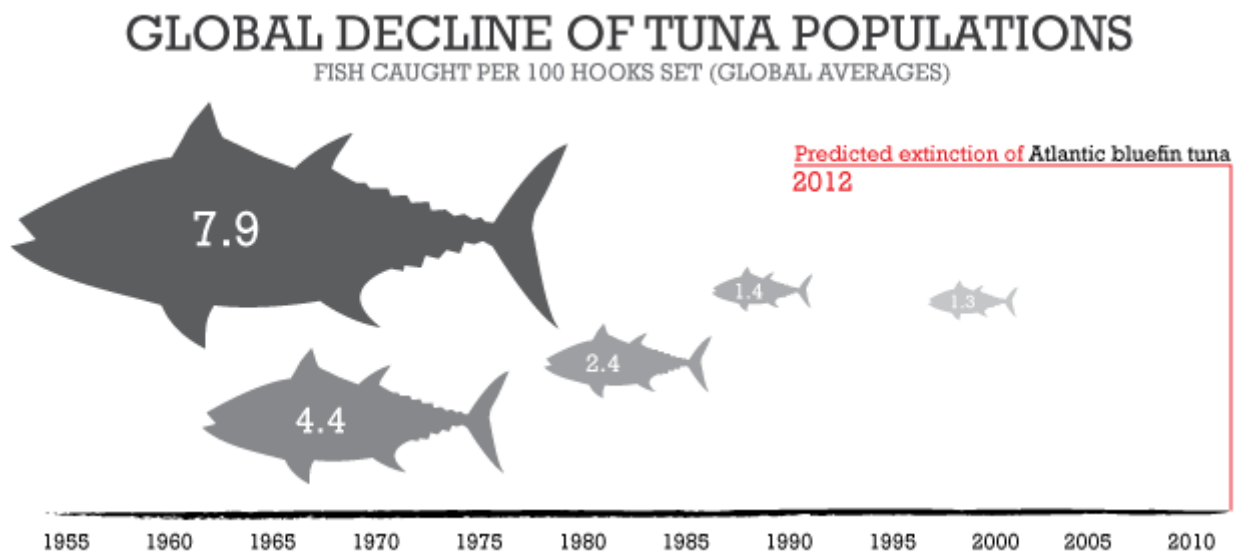
### Overview

Overfishing occurs when fish and other marine species are caught faster than they can reproduce. It is the result of growing demand for seafood around the world, combined with poor management of fisheries and the development of new, more effective fishing techniques. If left unchecked, it will destroy the marine ecosystem and jeopardise the food security of more than a billion people for whom fish are a primary source of protein.

### Sustainable fishing

The statistics are grim: 3/4 of the world's fish stocks are being harvested faster than they can reproduce. Eighty percent are already fully exploited or in decline. Ninety percent of all large predatory fish – including tuna, sharks, swordfish, cod and halibut – are gone. Scientists predict that if current trends continue, world food fisheries could collapse entirely by 2050.<sup>1</sup>

The most prized species are already disappearing. The 1990s saw the widely-publicised collapse of several major cod fisheries, which have failed to recover even after fishing was stopped. WWF predicts that the breeding population of Atlantic bluefin tuna – one of the ocean's largest and fastest predators, and sought-after as a delicacy used for sushi – will disappear within three years unless catches are drastically reduced.





Research Articles and Glossaries:  
“Threat 1: Overfishing”

As fish populations closer to shore dwindle, commercial fishing operations have shifted their focus to largely unregulated deep-sea fisheries – as much as 40 percent of the world's trawling grounds are now in waters deeper than 200 meters. In doing so, they target species which are particularly vulnerable to overexploitation, like the orange roughy. Like many other deep-sea fish, this species matures late and lives very long — over 150 years. Its low fecundity means populations become depleted more quickly than inshore species when they are overfished, and take much longer to recover. Indeed, many orange roughy stocks have already collapsed, and recently discovered substitute stocks are also rapidly dwindling.

The good news is that areas with competent fisheries management and coast guard policing, mainly in the developed world, have experienced some dramatic recoveries of fish populations. The bad news is that most overfishing takes place in the waters of poor countries where there is no adequate regulation or policing; areas where rogue fleets — some of which hail from developed countries — equipped with high-tech ships can poach without consequences. Using methods like bottom trawling and long-lining, these fleets are capable of wiping out entire fisheries in a single season. And they don't just catch the fish they target.

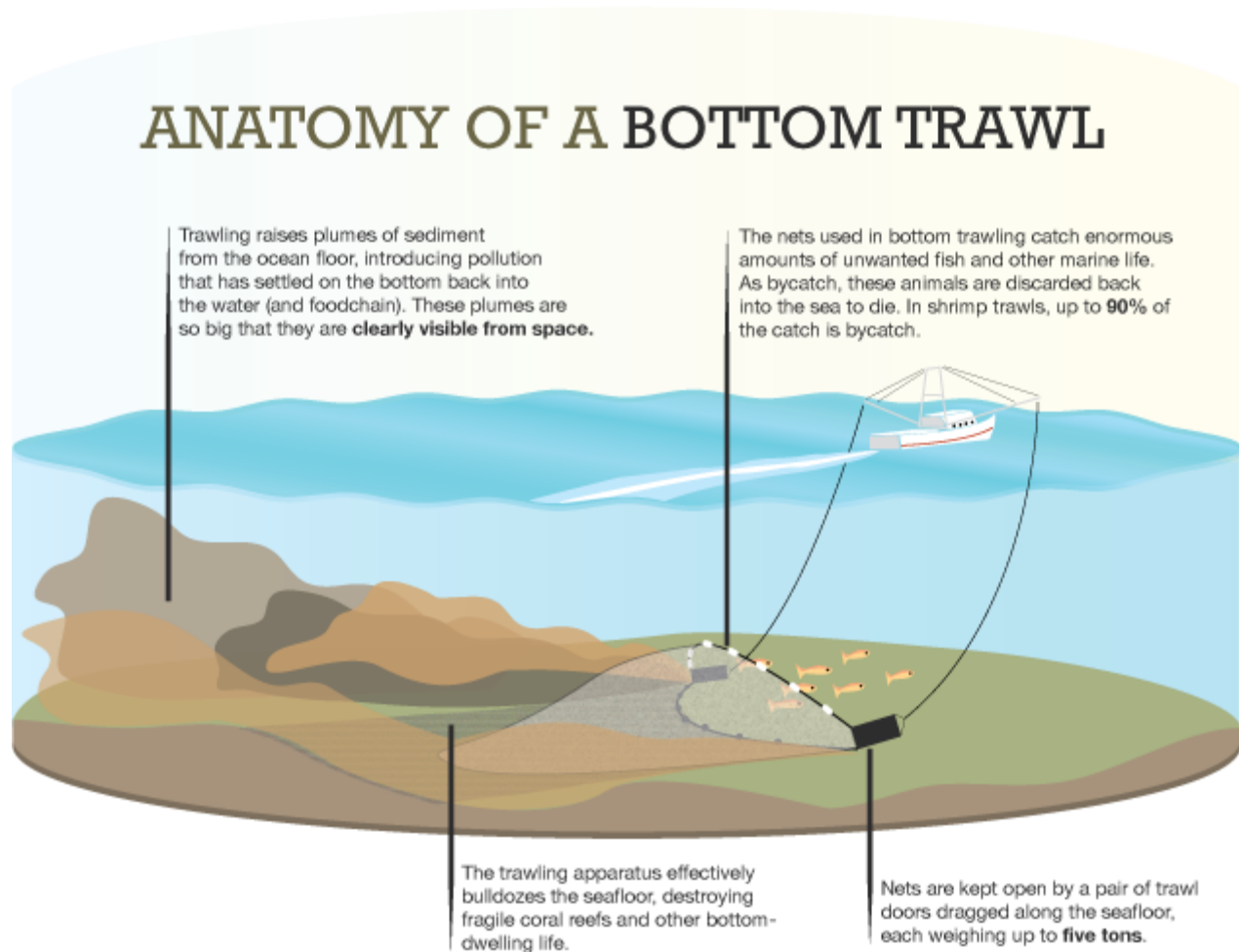
### **Bycatch**

Modern fishing vessels catch staggering amounts of unwanted fish and other marine life. It's estimated that anywhere from 8 to 25 percent of the total global catch is discarded, cast overboard either dead or dying.<sup>2</sup> That's up to 27 million tonnes of fish thrown out each year -- the equivalent of 600 fully-laden Titanics. And the victims aren't just fish. Every year, an estimated 300,000 whales, dolphins and porpoises die entangled in fishing nets, along with thousands of critically-endangered sea turtles. Long-line fisheries also kill huge numbers of seabirds. Over 100,000 Albatrosses die this way every year, and many species are endangered as a result of bycatch.



Research Articles and Glossaries:  
“Threat 1: Overfishing”

All modern forms of commercial fishing produce bycatch, but shrimp trawling is by far the most destructive: it is responsible for a third of the world's bycatch, while producing only 2% of all seafood.





Research Articles and Glossaries:  
“Threat 1: Overfishing”

Shrimp (and many deep-sea fish) are caught using a fishing method called bottom trawling, which usually involves dragging a net between two trawl doors weighing several tons each across the ocean bed. This has a destructive impact on seabed communities, particularly on fragile deep water coral – a vital part of the marine ecosystem that scientists are just beginning to understand.<sup>3</sup> The effect of bottom trawling on the seafloor has been compared to forest clear-cutting, and the damage it causes can be seen from space. The UN Secretary General reported in 2006 that 95 percent of damage to seamount ecosystems worldwide is caused by deep sea bottom trawling.

### Remedies

What can be done? The next few years will be pivotal for the oceans. If strong measures are implemented now, much of the damage can still be reversed. In terms of what needs to happen, preventing overfishing is fairly straightforward: first and foremost, scientifically-determined limits on the number of fish caught must be established for individual fisheries, and these limits must be enforced. Second, fishing methods responsible for most bycatch must either be modified to make them less harmful, or made illegal. And third, key parts of the ecosystem, such as vulnerable spawning grounds and coral reefs, must be fully protected.

In practical terms, this means:

- Putting pressure on governments to limit fishing subsidies, estimated at tens of billions of dollars per year. Eliminating subsidies of this scale lowers the financial incentives to continuously expand fishing fleets far beyond sustainability.
- Establishing and expanding Marine Protected Areas (MPAs), areas of the ocean where natural resources are protected and fishing is either restricted or banned altogether (no-take areas). Presently, 1% of the oceans are MPAs. This number needs to be bigger if they are to help reverse the damage done by overfishing. The Save Our Seas Foundation has been actively involved in supporting MPAs through our projects in the Cocos (Keeling) Islands and the Maldives.
- Better monitoring and policing of the fish trade. Pirate fishing continues to grow in scope, and though illegal, fish caught in such operations often end up on our plates.
- Consumers choosing to buy sustainably-sourced seafood and avoiding threatened species. Overfishing is driven by global demand — lowering the demand will lower the damage.

“Threat 1: Overfishing.” Overfishing. Save Our Seas, Web. 19 Feb. 2014. <http://saveourseas.com/threats/overfishing>



Research Articles and Glossaries:  
“Threat 1: Overfishing”

“Threat 1: Overfishing” Glossary

Threat 1: Overfishing	
reproduce	have babies
ecosystem	the relationships between living things in an area
jeopardize	put at risk of losing
exploited	made full use of
dwindle	shrink down
fecundity	ability to reproduce
competent	having the skills to do something successfully
discarded	thrown away



Research Articles and Glossaries:  
“Destructive Fishing”

*Expeditionary Learning is seeking permission to reproduce this material. When permission is granted, an updated version of this lesson will be posted at [www.engageny.org](http://www.engageny.org) and [commoncoresuccess.elschools.org](http://commoncoresuccess.elschools.org).*

Source (for teacher reference only): <http://www.marine-conservation.org/what-we-do/program-areas/how-we-fish/destructive-fishing/>



Research Articles and Glossaries:  
“Destructive Fishing”

“Destructive Fishing” Glossary

Destructive Fishing	
notorious	Famous
ecosystems	the relationships among living things in an area
incidentally	by chance
benthic	at the bottom of a body of water
indiscriminately	not selective; at random
collateral	additional; secondary



Research Articles and Glossaries:  
“Protecting Ocean Habitat from Bottom Trawling”

If bottom trawling happened on land instead of at sea, someplace where we could see it and where cameras could film it, perhaps it would provoke the same sort of public outcry that strip-mining does. But unlike the raw, torn earth laid bare by strip-mining, the similar devastation of the ocean floor caused by bottom trawling is hidden beneath thousands of feet of water. In some cases, the damage could be irreparable.

Bottom trawlers drag giant weighted nets along the ocean floor, ripping up or scooping out whatever they encounter, including ancient coral forests, gardens of anemones, and entire fields of sea sponges. Unwanted and undersized fish hauled up by bottom trawlers are thrown back dead or dying—in some areas, as many as four pounds of fish are discarded for every one pound brought to market.

Today’s technology is bringing bottom trawlers into areas ships couldn’t reach before. Trawling nets, huge weighted bags, can be 200 feet wide and 40 feet high, weigh as much as 1,000 pounds, and can be sunk to depths of 5,000 feet or more beneath the water’s surface. Heavier, stronger gear allows trawl nets to plow over rocky bottoms, destroying the underwater corals, sponges, and rock structures that provide important habitat for fish. Advanced navigation technology brings trawl nets deeper and farther from shore, into areas populated with slow-growing deep-sea fish and corals, which are especially slow to recover from repeated trawling.

### **Bottom Trawling in International Waters**

On the high seas, unregulated bottom trawlers operating in waters well off the coast are laying waste to huge swaths of the ocean floor. Seamounts—volcanic mountains and hills that rise from the ocean floor but do not break the surface—are being damaged by these industrial fishing practices, and the wealth of flora and fauna clustered around sea mounts is being wiped out in the process. Many rare, ancient, and even unknown species—some of which hold promise for biomedical research or are critical to undersea biodiversity—are at risk, including:

- Cold-water corals, which are as exotic and colorful as their warm-water counterparts. Red tree corals form ancient forests, stretching up to 7 feet tall and 25 feet wide, providing shelter for fish, shellfish, and sea stars. Corals on seamounts can live up to 8,000 years and tend to take branching, tree-like forms, making them particularly susceptible to trawl damage.
- Sponges, which form giant fields in the deep, creating stretches of habitat up to a mile long and 50 feet high.
- Fish, including orange roughy, which take decades to mature and can live for 125 years.



**Research Articles and Glossaries:**  
“Protecting Ocean Habitat from Bottom Trawling”

- New species of flora and fauna tucked away on seamounts and other deep-sea habitats. Just like the creatures of the Galapagos Islands, many seamount species have evolved in isolation, resulting in unique species. Scientists studying a cluster of seamounts near New Caledonia have determined that nearly one-third of the species there have never been seen anywhere else.
- Novel chemical compounds that hold promise for the treatment of cancer and other diseases after their discovery by scientists investigating the biomedical properties of deep-sea organisms.

**Bottom Trawling in U.S. Waters**

Closer to U.S. shores, bottom trawling can be just as destructive. Bottom trawlers have taken a huge toll on sport and commercial fish such as Pacific rockfish, a family of more than 60 species of colorful fish uniquely adapted to the rocky reefs, rugged canyons, pinnacles, and kelp forests of the Pacific coast. Marketed as Pacific red snapper or as rock cod, they are popular with fishermen and diners. Once greatly abundant, several populations are now so depleted that scientists consider them at risk of extinction.

Rockfish have several characteristics that make them susceptible to overfishing, and particularly to bottom trawling. Some rockfish species live as long as 100 years, are slow to mature and may reproduce successfully only once a decade. Because different species school together, powerful trawl gear catches the vulnerable types along with the more productive, and these deep-dwelling fish cannot survive the trauma of being brought to the surface and then tossed overboard.

Natural Resources Defense Council. “Protecting Ocean Habitat from Bottom Trawling.” Available at: <http://www.nrdc.org/water/oceans/ftrawling.asp>. Accessed on October 23, 2013.



**Research Articles and Glossaries:**  
“Protecting Ocean Habitat from Bottom Trawling”

**“Protecting Ocean Habitat from Bottom Trawling” Glossary**

Protecting Ocean Habitat from Bottom Trawling	
irreparable	can't be repaired
unregulated	not controlled by regulations or laws
swaths	Areas