

Tale of a Tuna

A Classroom Activity for Ocean Gazing Episode #43: *Thunnus thynnus*

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Grade Level: 9-12

Lesson Time: 1-1.5 hrs

Materials Required

[ICCAT's Atlantic Bluefin Tuna Species Summary Report](#) (pdf)

Summary

Using data from the International Commission for the Conservation of Atlantic Tunas (ICCAT), examine bluefin tuna fishing levels.

Objectives

- ✓ Describe the basic life history of the bluefin tuna.
- ✓ Evaluate ICCAT international bluefin tuna fishery data to assess catch patterns in the eastern and western Atlantic.
- ✓ Recognize the importance of stock origin and management implications

Vocabulary

Fusiform, Lunate

Introduction

The [bluefin tuna](#) (*Thunnus thynnus*) is one of the most impressive fish in the oceans. Not only is it one of the largest fishes — the

largest recorded bluefin tuna caught weighed in just under 1,500 lbs — and fastest fishes — it's capable of bursts of speed as high as 54 miles/hour — but it can also fetch one of the highest market prices — one bluefin tuna sold for \$174,000 in Japan. Its enormous economic value combined with its life history characteristics make it yet another fish vulnerable to overfishing.

The bluefin is built for speed. Its [fusiform or torpedo-shaped body and lunate or crescent-shaped tail](#) make it a fast swimmer. Drag is further reduced by fins that can be retracted into grooves, finlets at the base of its tail, eyes flush with its body and flat gill covers. A unique internal heat exchange system enables bluefin tuna to thrive in a wide range of temperatures. Warm arterial blood passes by and heats the cooler blood in the veins enabling the tuna to maintain a body temperature up to 18°F warmer than the surrounding water — something most fishes cannot do.

With a body ideal for swimming and tolerant of many climates, it's not surprising that the bluefin tuna is a highly migratory species. Bluefin tuna are found in the Pacific Ocean and throughout the northern Atlantic. They range from Canada



to Brazil in the western Atlantic and from Norway to northern Africa in the eastern Atlantic. Bluefin tuna are believed to migrate as far as any other fish, with some traveling 5,000 miles. The largest individuals makes the longest migrations. They migrate throughout their lives to find prey such as squid, menhaden etc. At around five to eight years of age, they begin migrations to spawning grounds in the Gulf of Mexico and the Mediterranean Sea. After spawning, the tuna then head north to feeding grounds.

Bluefin tuna have been fished for centuries, but in only the past thirty years stocks have been depleted by more than 70 percent. Because they travel far, crossing international borders, bluefin tuna are a challenge to manage. International management of Atlantic bluefin tuna began in the mid-1970s through the [International Commission for the Conservation of Atlantic Tunas \(ICCAT\)](#). Currently, ICCAT has 34 member countries. Its regulations are binding, but it is up to the member

countries to enforce compliance. If a member does not comply, ICCAT may enact quota reductions for overages, or as a last resort authorize trade restrictive measures. The first regulations were issued in 1975 when ICCAT set a minimum size requirement of 6.4 kg and called for fishing levels to remain at the level of 1974 and not increase (~6,000 metric tons for western Atlantic and ~19,000 metric tons for eastern Atlantic). More regulations, including catch quotas, have followed over the years with separate regulations for the western and eastern Atlantic stocks.

The reduced fishing limits seem to be helping the western Atlantic stock, but not the eastern Atlantic. In recent years, the United States and other western Atlantic fishing countries have argued that the [eastern Atlantic regulations](#) are not only causing the depletion of the eastern Atlantic stock, but they are also negatively impacting conservation efforts to rebuild the western stock.

Summary of Major ICCAT Fishing Limits		
Year	Western Atlantic	Eastern Atlantic
1975	Not to exceed 1974 levels (~6,000 metric tons/year)	Not to exceed 1974 levels (~19,000 metric tons/year)
1982	1,160 metric tons/year	No new limits
1983	2,660 metric tons/year	No new limits
1994	2,261 metric tons/year	No new limits
1995	2,200 metric tons/year	Not to exceed 1994 levels (~ 46,500 metric tons/year)
1996	No new limits	75% of 1994 levels (~ 34,800 metric tons/year)
1999	2,500 metric tons/year	32,000 metric tons/year
2000	No new limits	29,500 metric tons/year

Data Activity

Students will use ICCAT international bluefin tuna fishery data to answer questions about bluefin tuna management issues and stock depletion.

Access the [ICCAT's Atlantic Bluefin Tuna Species Summary Report BFT Table 1 \(pdf\)](#) to answer the following questions. (Note: AT.E+Med = Eastern Atlantic and Mediterranean; AT.W = Western Atlantic).

1. Beginning in 1975, ICCAT limited fishing levels to those of 1974. Did the western Atlantic tuna fishery comply (1974 = ~6,000 metric tons)? Did the eastern Atlantic fishery comply (1974 = ~19,000 metric tons)?
2. Beginning in 1982, ICCAT significantly decreased the western Atlantic limit. Since then, what has been the result of catch levels for the western Atlantic? What has happened to catch levels for the eastern Atlantic?
3. What could have caused the dramatic increase in the eastern Atlantic bluefin tuna catch? How might the western Atlantic regulations be impacting the eastern Atlantic stock?

Until relatively recently, scientists believed that Atlantic bluefin tuna were two completely separate stocks, one on the east and one on the west, and therefore the two stocks have been managed separately. However, through tagging research projects such as [Tag-A-Giant](#), a collaboration among Stanford University, Monterey Bay Aquarium and the National Marine Fisheries Service, scientists are finding that there is definitely some mixing occurring between the two stocks. Scientists estimate that there may be [as much as 30% stock mixing](#) at the breeding grounds in the Gulf of Mexico and the Mediterranean Sea. This means that as the western stock is beginning to rebuild more and more “western stock” tunas may be going to spawning grounds in the eastern Atlantic. Once there, they are not only adding to the eastern Atlantic population through reproduction, but they are also susceptible to fishing by the eastern Atlantic fishery that has yearly quotas more than 10 times greater than those of the western Atlantic. In addition, western Atlantic fishing countries are concerned with the level of illegal, unreported, and under-reported

fishing (IUU) in the eastern Atlantic which could exacerbate the situation.

Special thanks to [Dr. John Graves](#) at the Virginia Institute of Marine Science for his assistance with the scientific information in this Data Tip.

References

“King of All Tunas & His Regal Court.” International Foundation for the Conservation of Natural Resources. <http://fisheries.ifcnr.com/article.cfm?NewsID=231>

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“U.S. Opposes Atlantic Bluefin Tuna Overfishing Annual ICCAT Meeting Ends without Approval of Key Measures.” NOAA Public Affairs. <http://www.publicaffairs.noaa.gov/releases2001/nov01/noaa01r152.html>

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Dr. John Graves. VIMS. http://www.vims.edu/people/graves_je/index.php

Sources

The related podcast episode for this activity can be found by going to the podcast section of www.oceangazing.org