

# Understanding the World's Ocean and Climate

Join NOAA Fisheries for an exploration of the ocean and climate, and how they interact. The series runs Thursdays through June 3.



Baby ringed seal with a satellite transmitter on its back. (Photo: Josh London/NOAA Fisheries)

transmitters. These methods required researchers to not only capture the animals to attach the device, but to recapture them to retrieve the instrument. In addition, they had to be within a few miles of the animal to electronically receive information. Currently, researchers use satellite-linked time-depth recorders to gather information about the location and diving behavior of animals. The information is remotely

transmitted via satellite to the researchers.

### How do you attach an instrument to a seal or a whale?

For seals and sea lions, instruments can be fastened to the animal's fur with glue, which can last up to a

year until the animal molts. Devices attached to a tag can also be fastened to an animal's flipper, much like piercing an ear. Whales, dolphins and porpoises, however, don't have fur to glue

### Why scientists want to know where marine mammals go:

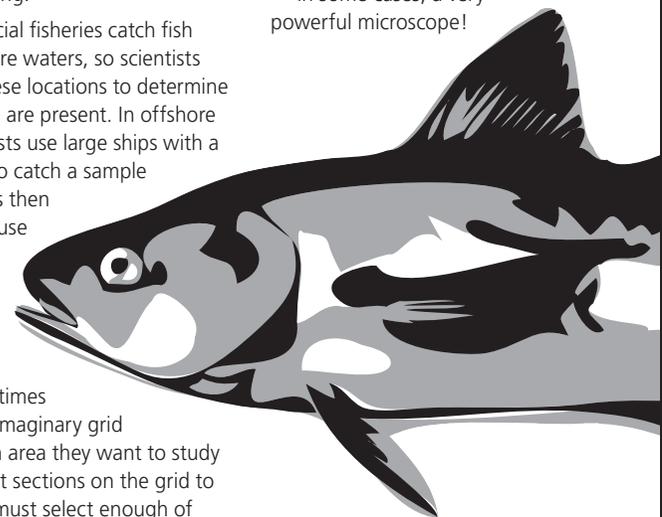
- To understand how human activities (such as shipping traffic, fishing, contaminants, oil spills and noise) affect whales and seals.
- To get a better idea of where marine mammals feed (the depths they dive for food and seasonal locations).

### Have you ever tried counting fish in an aquarium?

You probably could count nearly every fish in the tank, but as you know, fish don't just live in aquariums. In the wild, fish live in a variety of habitats that range from the shallows near shore to the deep depths of the ocean. Scientists at NOAA Fisheries need to know how many fish are in a given area so they can determine the number of fish that can be harvested. This strategy will maintain healthy fish

populations for future generations.

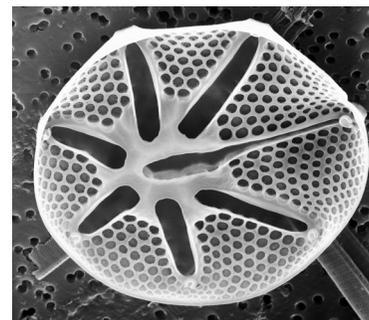
variety of tools to estimate the size of a fish's population. How they make these estimates depends on the fish species they are studying. Most commercial fisheries catch fish in deep offshore waters, so scientists must go to these locations to determine how many fish are present. In offshore waters, scientists use large ships with a big trawl net to catch a sample of fish which is then counted. Because the ocean is so vast, scientists must create a plan to count the fish. Sometimes they place an imaginary grid over the ocean area they want to study and then select sections on the grid to sample. They must select enough of these sections to get a representative sample size. Scientists then add up the weight of all the fish of the same species within the sample and extrapolate that weight to the entire area of the grid to



Some of the most important organisms in the ocean are so small that you can't see them without a microscope — in some cases, a very powerful microscope!

**Phytoplankton** (single-celled marine plants) are organisms at the base of the food chain. They are the food source for many larger animals. Diatoms are one of thousands of phytoplankton species. They have a rigid shell, come in all shapes and patterns and are transported around the ocean by currents. A gallon of seawater may contain as many as 4 million of these one-celled plants.

Join us next week to learn how NOAA Fisheries studies rockfish and Dungeness crabs.



An image of a diatom (a phytoplankton) using a scanning electron microscope. (Photo: Carla Stehr/NOAA Fisheries)

arrive at an estimate of the number of fish. Play the Fish Fetch game to learn more about this process. You'll find it in the Featured Content section of our website, [www.seattletimes.com/nie](http://www.seattletimes.com/nie), under Additional NOAA Resources.

### Microscopic plants and animals in the ocean – plankton

**Did you know?** Plankton are the food source for the largest animal on the planet, the blue whale!

### Additional Resources:

- [www.afsc.noaa.gov/nmml/](http://www.afsc.noaa.gov/nmml/)
- [www.afsc.noaa.gov/species/pollock.php](http://www.afsc.noaa.gov/species/pollock.php)
- [www.nwfsc.noaa.gov/hab/index.html](http://www.nwfsc.noaa.gov/hab/index.html)

### Principles

- Ocean Literacy Principle 5**  
The ocean supports a great diversity of life and ecosystems.
- Climate Literacy Principle 3**  
Life on earth depends on, is shaped by, and affects climate.

## Busy Gray Whales!

Gray whales have one of the longest migration routes for a mammal, 7,500 – 12,500 miles. They spend the summer feeding in Alaskan waters and in the fall, migrate south along the west coast of North America to Baja, Mexico.

populations for future generations.

### How many fish?

Like you, scientists cannot count every fish in the ocean, so they use a

## CHAPTER TWO

### NOAA Fisheries studies a diversity of ocean life, from large whales to microscopic plankton.

Every day, scientists at NOAA Fisheries work to increase our knowledge of ocean life. In this issue, you'll discover how scientists find out where whales go, how to count fish and how microscopic plants and animals are connected to other ocean life. This is a small sample of the great diversity of ocean life and the different tools scientists use to study them.

### Solving the mystery of where seals and whales go.

You may have seen seals in a harbor or a whale while boating or kayaking, but do you know how scientists track marine mammals when they are not so easy to see? In the past, they've used a variety of tools, from plastic tags to radio