NOAA Fisheries and Newspapers In Education present

SUSTAINABLE U.S. SEAFOOD:

SCIENCE IS THE BASIS OF SUSTAINABLE SEAFOOD


SCIENTIFIC RESEARCH


RESOURCE MANAGEMENT


HARVESTING AND AQUACULTURE


TABLE


DISTRIBUTION


PROCESSING

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION U.S. DEPARTMENT OF COMMERCE

The Seattle Times NEWSPAPERS IN EDUCATION
INSPIRING STUDENTS TO LEARN

Photos courtesy of Alaska Seafood, NOAA Fisheries and NPFMC

SUSTAINABLE U.S. SEAFOOD: SCIENCE IS THE BASIS OF SUSTAINABLE SEAFOOD

SUSTAINABLE SEAFOOD: IT'S ALL ABOUT BALANCE

Conserving our natural resources, whether on land or at sea, is something that should concern all of us. For this reason, the Magnuson-Stevens Fishery Conservation and Management Act was created to govern U.S. marine fisheries in federal waters from three to 200 miles off our country's coasts. Fishery scientists at the National Oceanic and Atmospheric Administration (NOAA) provide fishery managers with information to ensure responsibly harvested seafood through healthy fish populations and ecosystems.

DATA ANALYSIS

Have you ever crunched numbers? Our scientists are experts at analyzing or "crunching" data to better understand the environment we live in. Scientists in fisheries use a variety of mathematical techniques to determine—how many fish there, how old a fish gets, how fast it grows, what it eats and what eats it. They also gather information to better understand the benefits of fishing to Alaskan fishing communities.

Scientific Documents
Scientists present their results to fishery managers as a "stock assessment." A stock assessment explains the biological and ecological processes influencing the health of fish populations. They provide the scientific basis for making responsible management decisions such as how many fish are safe to catch each year without hurting the health of the fish population.

In places like the Bering Sea, survival is about eating or being eaten. This complex relationship between predators and prey is the basis of the Bering Sea ecosystem. To better understand these relationships, scientists at the Alaska Fisheries Science Center annually collect and examine the stomachs of thousands of fish. Each organism is important in understanding what keeps an ecosystem in balance.

Check out the ecosystem report cards for Alaska waters. You can see the large amounts of data necessary to understand an ecosystem. (**http://access.afsc.noaa.gov/reem/ecoweb/Index.php**)

Social and economic information is also important in making management decisions. The economic status report is produced yearly and presents summary statistics on catch, discards, prohibited species catch, ex-vessel and first-wholesale production and value, participation by small entities, and effort in these fisheries. Social scientists have compiled a report of community profiles of north pacific fishing communities. The fisheries considered in these profiles include both state and federal fisheries in the commercial, recreational and subsistence sectors. (**http://www.afsc.noaa.gov/REFM/Socioeconomics/Default.php**)

WHAT'S SCIENCE GOT TO DO WITH SUSTAINABLE SEAFOOD?

The goal of fishery science is to determine the amount of fish to harvest that minimizes harm to the environment and leaves enough fish in the water for the population to renew itself. This is no easy task. It takes many different types of scientists to conduct the research to have the scientific knowledge necessary to responsibly manage a fishery.

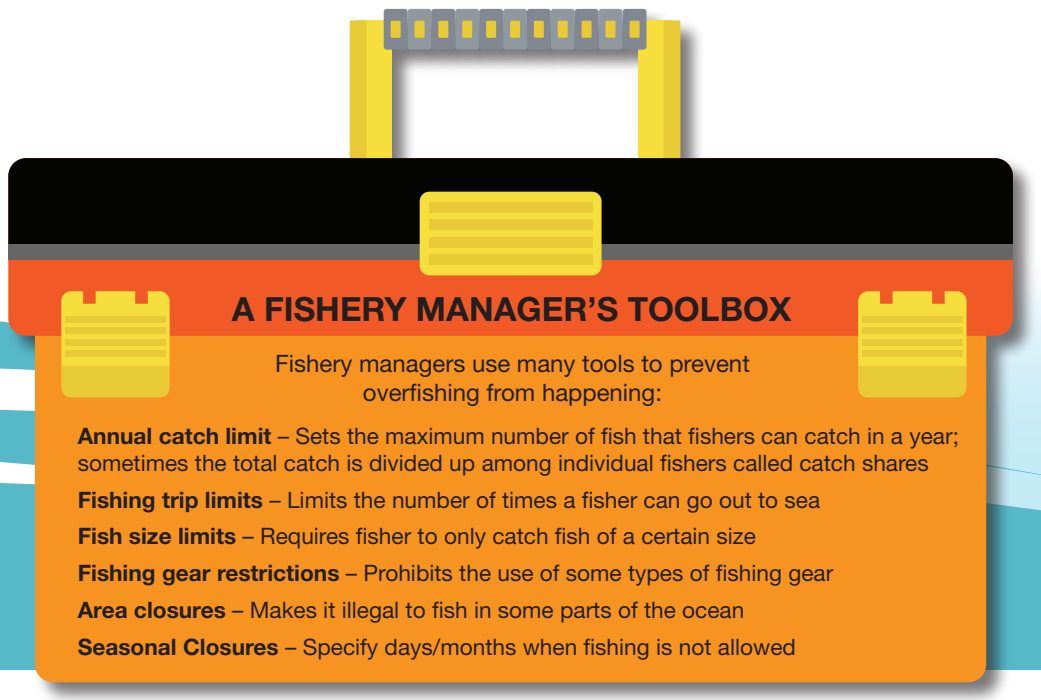
A mathematician works on estimating fish population size; a biologist finds out things like how old a fish gets, or how many eggs survive to adulthood during a fish's life cycle; and a group of scientists including oceanographers, mathematicians and biologists work together to determine what influences an ecosystem.

SCIENCE INFORMS MANAGEMENT

Limiting the amount of fish harvested may sound easy, but it is a challenging—a real balancing act. Factors like the need for jobs and food are considered, as well as ensuring healthy fish populations and ecosystems. Fortunately, under U.S. law, we have a process that brings together scientists, fishers, resource managers, tribes and citizens to form Fishery Management Councils. At Council meetings, scientists give their recommendation for a harvest limit and then others can discuss whether that number should be lowered based on economic, social or environmental factors. If any one of these things is out of balance, then a fishery could be considered unsustainable.

After reviewing the information found in the stock assessments for each species or species group and discussing the available management tools, the Council makes a recommendation on annual catch limits and methods to regulate the fishery to NOAA Fisheries Service.

NOAA Fisheries Service then makes the final regulatory action, which is what tells people how many fish they can catch, as well as where, when and how they can catch them. NOAA Fisheries Service, the U.S. Coast Guard and state agencies make sure these rules are followed. They can give warnings, issue fines, take away fishing permits or even confiscate a fisher's catch.



HOW DO WE KEEP WILD HARVESTED SEAFOOD IN ALASKA SUSTAINABLE?

Good Science + Responsible Management = Sustainable Fisheries and Seafood

A goal of fishery science is to determine the amount of fish to harvest that does little to no harm to the environment and leaves enough fish in the water for the population to renew itself. How do we do this? Data collection and it's as simple as A, B, C.

DATA COLLECTION

Scientists collect a variety of data. These data are the building blocks on which sustainable fisheries' management decisions are made. Three types of data: abundance data, biological data and catch data provide a picture of the dynamics and health of a fish population.

Abundance
Each year NOAA scientists conduct surveys to collect data that are used to estimate abundance of groundfish and crab in Alaska waters. The primary survey uses a bottom-trawl, where a large net is pulled along the seafloor to catch fish. A hydro-acoustic survey uses sound to count pollock in the water column. Sound? That's right. Sound waves bounce off the air-filled swim bladder (an organ that helps with buoyancy) of pollock and is collected by a receiver located on the bottom of the ship which is then transferred to computers and later analyzed by scientists.

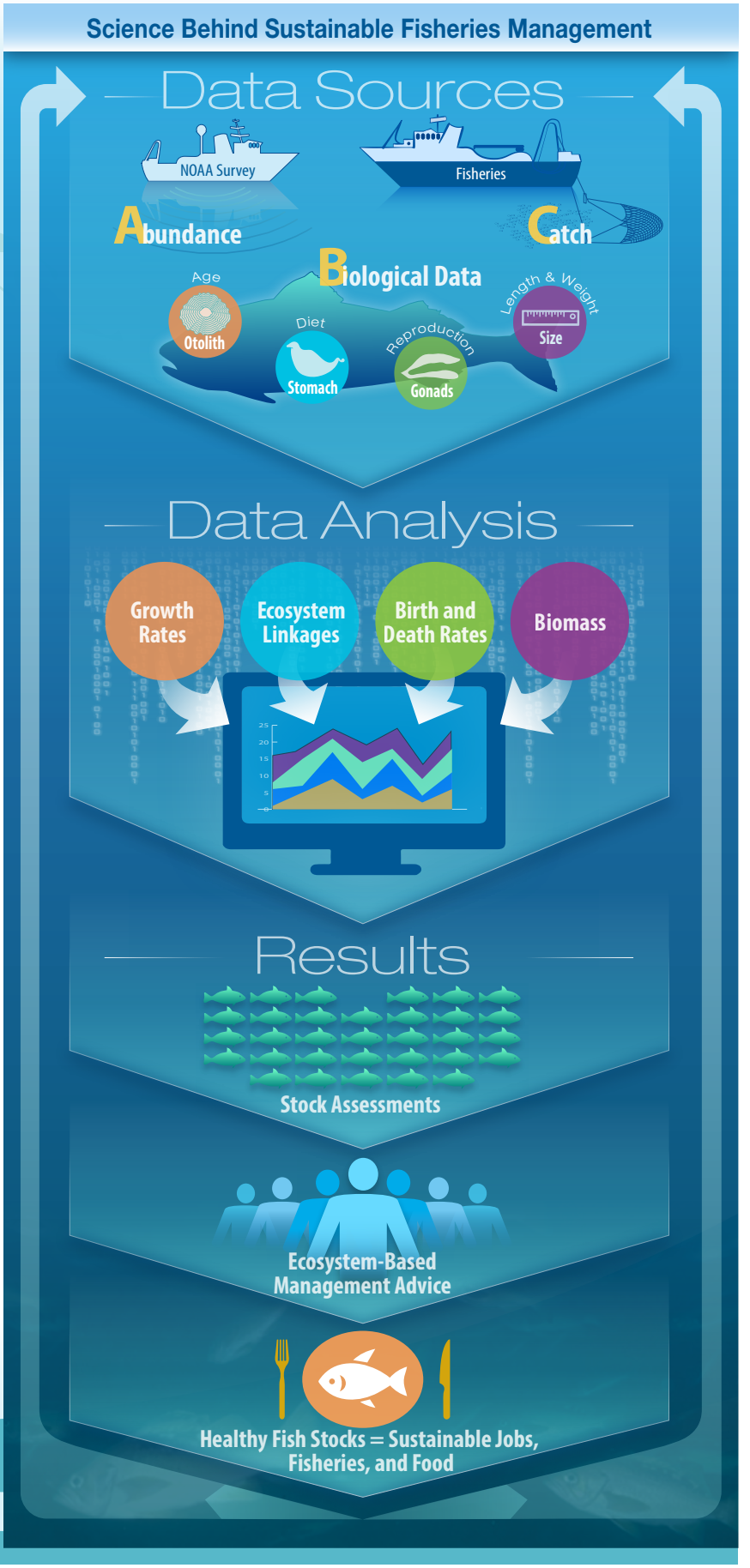
Biological data
Scientists collect otoliths and other biological data from many species and both sexes of fish during research surveys in the cold waters off Alaska. Otoliths are preserved in small jars filled with ethyl alcohol.

The goal is to collect enough data to understand a fish population's age structure. This means knowing how old the fish can get, how many individuals in the population are at each age, and how old a fish is when it first spawns. Some fish grow fast and live less than 10 years, while other fish grow slow and live to be over 100 years old. As a result, some species mature and spawn at a young age, such as less than six years old. Other species may not spawn until they are over 20 years old. Understanding how many fish spawn each year and how many eggs they produce helps scientists get a clearer picture of fish population size.

Scientists tow small meshed nets called bongo nets through the upper layer of the ocean's water column to collect fish eggs and larvae. Can you think of why they are called bongo nets?

Catch – What are fishers catching?
Fishery observers are scientists who work aboard fishing boats or at a dock to collect important data such as how many fish were caught, the sex and age of the fish, and what species were found in the catch (including bycatch). This information is used by managers to decide when to open or close a fishery to maintain the health of the population.

Good Science + Responsible Management = Sustainable Fisheries = Sustainable Seafood!



AQUACULTURE 101

Aquaculture is needed to meet the increasing demand for seafood, to support commercial and recreational fisheries, and to restore species and their habitat. Scientists at NOAA Fisheries Science are studying ways to improve aquaculture practices to better protect the environment, increase the value of farmed seafood, and maximize human health benefits. Scientists are also looking at how increasing ocean temperatures and ocean acidification affect shellfish growth and survival.

Learn more about the science behind sustainable aquaculture at **www.fisheries.noaa.gov**

What is Aquaculture?
Aquaculture is farming of aquatic plants, fish, crustaceans and shellfish. Farming means these organisms depend on help from people for proper feeding and protection from predators.

In the Pacific Northwest, aquaculture is used to:

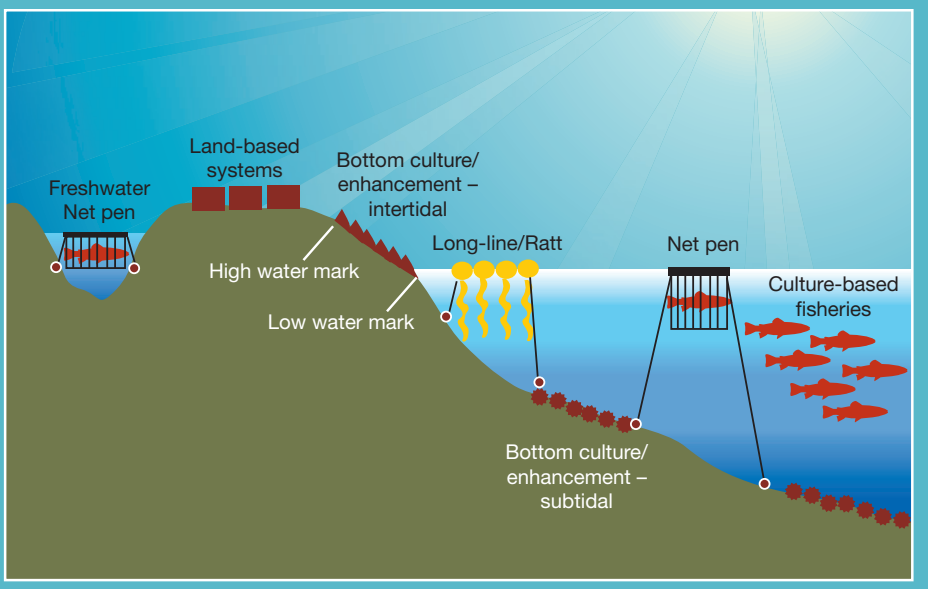
- **Enhance wild fish populations** – Raise fish to rebuild wild populations and stock lakes and streams for recreational fishing.
- **Restore wild shellfish and their habitat** – Rebuild native Olympia oyster populations in Puget Sound and pinto abalone on the West Coast.
- **Grow seafood to eat** – Growing shellfish or finfish to market size is an important part of increasing our supply of seafood.

TYPES OF AQUACULTURE SYSTEMS

Open
Natural systems without the diverting or pumping of water. For example: Shellfish farming techniques such as grow-out in bags placed in the tidelands, suspended culture and "rack and bag" grow-out.

Closed
Tanks where water is recirculated using sophisticated filtration and treatment systems. An example is aquaponics, the cultivation of fish and plants together in a closed system utilizing natural bacterial cycles to convert fish wastes to plant nutrients.

Semi-Closed
Manmade impoundments where water may be pumped or diverted from natural flows. An example is net pen finfish aquaculture, which is a historic, water-dependent use of Washington's shorelines. (**www.ecy.wa.gov/programs/sea/aquaculture**)



Different types of aquaculture systems. Can you tell which ones are open, closed, or semi-closed?

FISHWATCH 101: LEARN MORE ABOUT U.S. SEAFOOD

Fishwatch.gov was developed by NOAA Fisheries to provide simple science-based facts to help seafood lovers like you learn more about why and how the U.S. leads the world in sustainable seafood. What will you find?

- Current information about popular wild-caught and farmed U.S. seafood
- Species scientific and common name
- Status of population; fishing rate; habitat impacts; bycatch
- Scientific research
- Management strategies
- Recipes
- Definitions of terms used in fishery management

Find out more at **Fishwatch.gov**

CHOOSE WISELY: TIPS ON BUYING AND HANDLING SEAFOOD

Many state and federal government agencies work together to ensure our seafood, whether domestic or imported, wild or farmed, is safe to eat.

Tips for buying seafood

Smell: Fish should smell fresh and not have a sour, ammonia-like smell.

Look: If you are lucky enough to see the whole fish, look at its eyes; they should be clear and not cloudy (a little bulge is OK). If it is a fillet or steak, make sure the edges are not dry.

Feel: The flesh should be firm and spring back when pressed.

Tips on handling food

Clean: Wash hands and surfaces often.

Separate: Separate fish from other foods; don't cross-contaminate.

Cook: Cook meat to the right temperature.

Chill: Refrigerate promptly.

For more safe seafood-handling tips from the U.S. Food and Drug Administration, visit **www.fda.gov/food/resourcesforyou/consumers/ucm077331.htm**

The Seattle Times NEWSPAPERS IN EDUCATION
INSPIRING STUDENTS TO LEARN
To learn more about our Newspapers In Education program, email nie@seattletimes.com or visit seattletimes.com/nie