

Journal of Oceanography



Dr. Kenneth A. Rose
Editorial Board member



Professor
Department of Oceanography and Coastal
Sciences
Louisiana State University
USA



Biography

- ✦ Kenneth Rose received a BS degree from the State University of New York at Albany in Biology and Mathematics in 1975, and a MS (1981) and PhD (1985) in Fisheries from the University of Washington.
- ✦ After several years in private consulting, he went to the Oak Ridge National Lab, where he was a Research Staff member in the Environmental Sciences Division for 12 years.
- ✦ In 1998, he joined the Department of Oceanography and Coastal Sciences at Louisiana State University, where he is presently the E.L. Abraham Distinguished Professor in Louisiana Environmental Studies.
- ✦ His area of specialty is in population, foodweb, and ecosystem modeling of aquatic systems, both theoretical developments and applications to management.
- ✦ He has published over 130 papers and served on over 30 national and international advisory committees and editorial boards.



Research Interests

- ◆ Fisheries
- ◆ Population
- ◆ Foodweb
- ◆ Ecosystem
- ◆ Modeling
- ◆ Aquatic ecosystems

Recent Publications

- + Patterns of life-history diversification in North American fishes: implications for population regulation, KO Winemiller, **KA Rose** - Canadian Journal of Fisheries, 1992 - NRC Research Press
- + CMS Physics, R Bard, A Baumbaugh, M Bercher, **K Rose**... - J. Phys. G, 2007 - cds.cern.ch



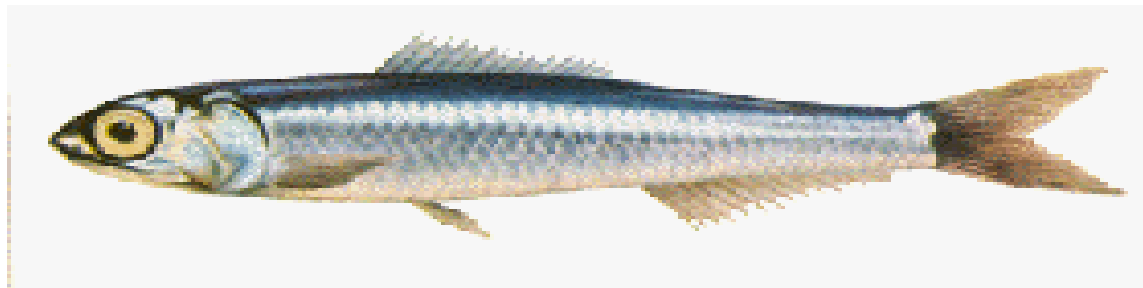
Fisheries

- ✚ Fishing makes its greatest contribution to the economy when it is harvested as a food source.
- ✚ This is the **commercial** fishery
- ✚ Fisheries is today defined as one of the largest threat to global marine ecosystems
- ✚ Aquaculture is the worlds fastest growing food sector - and further growth is expected
- ✚ Important economic sectors in the Nordic countries
- ✚ Sectors with significant impact on the marine environment



Fishery cont.

- It is estimated that over 100 million people in developing countries depend on the fishery for their livelihood
- In recognition of the fact that all fish species are a part of the oceans food chains, sustainable use is beginning to be promoted.



- A balance is needed so that one species does not outstrip the food supply available to the system as a whole.
- When humans harvest fish resources, however, there is a risk of overexploitation and a consequent disruption to the balance of nature.



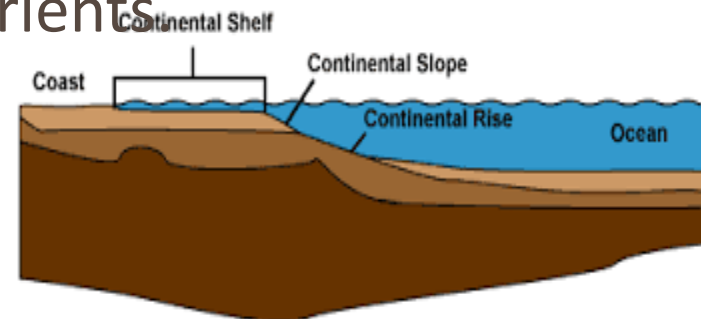
The 4 major fishing regions are:

- North east Atlantic (England/Norway);
- North west Pacific (Japan);
- West central Pacific (China/Indonesia);
- South east Pacific (Western South America)



Continental Shelves

- Most fishing grounds are found on continental shelves for 2 reasons.
- The shallow waters of the shelf make harvesting more cost effective. The fish have to be landed on shore for human use so the regions closer to shore are fished most profitably.
- Most of the fish are on the continental shelves. The shallow waters of the shelf promote plankton production which serve as the base of the marine food web including fish.
- Shallow water ensures enough light for phytoplankton and effective circulation of nutrients.



The coastal zone

- biodiversity & human activities

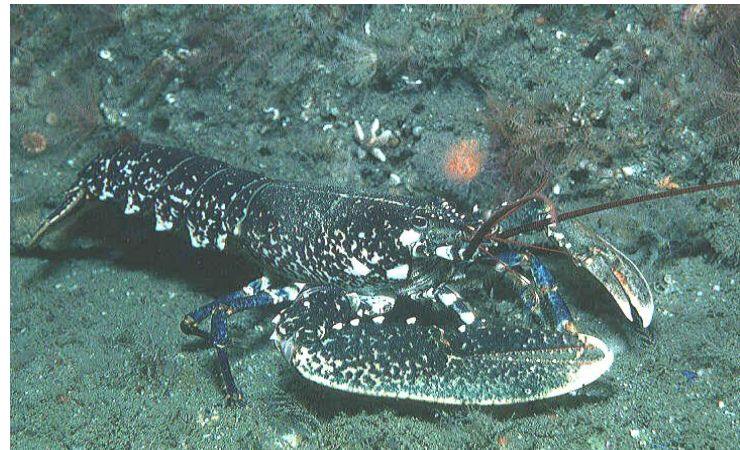
- Fish, plants, kelp, shell, crusteceans, mammals, sand, minerals, birds etc.
- Fishing, fish farming, fish processing, transportation, wood processing, ship building, large industry etc.
- Recreation, protection of habitats and species



Status of some coastal fish

The sad story of cod..

Globally, catches have gone down by 70% the last 30 years. Today, Norway, Russia and Iceland manage the last, large, remaining stocks..



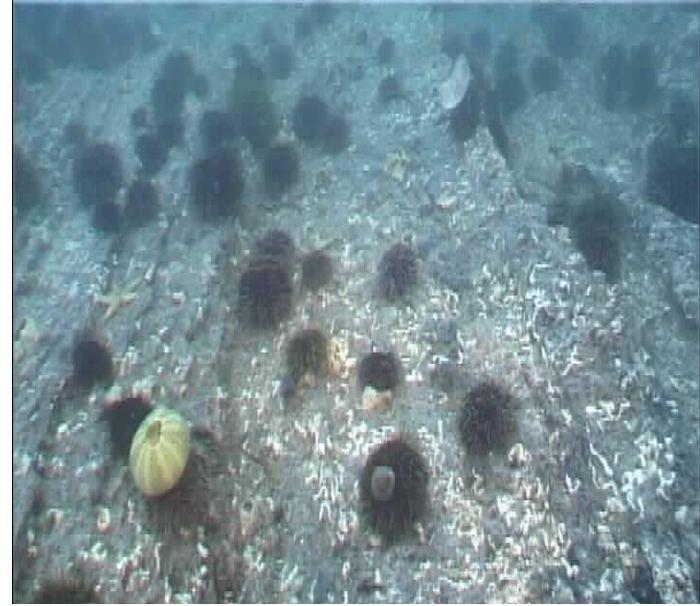
Other fish species that might be relevant?

- Lumpfish
- Anglerfish
- European eel
- Golden redfish
- Ling, Blue ling, Tusk
- - And spawning area for herring and capelin!



Other species present in coastal areas...

- Iceland Scallop
- European lobster
- Knotted wrack & large kelp
- Crab & Norway lobster
- Shrimp
- Sea urchin
- Red king crab

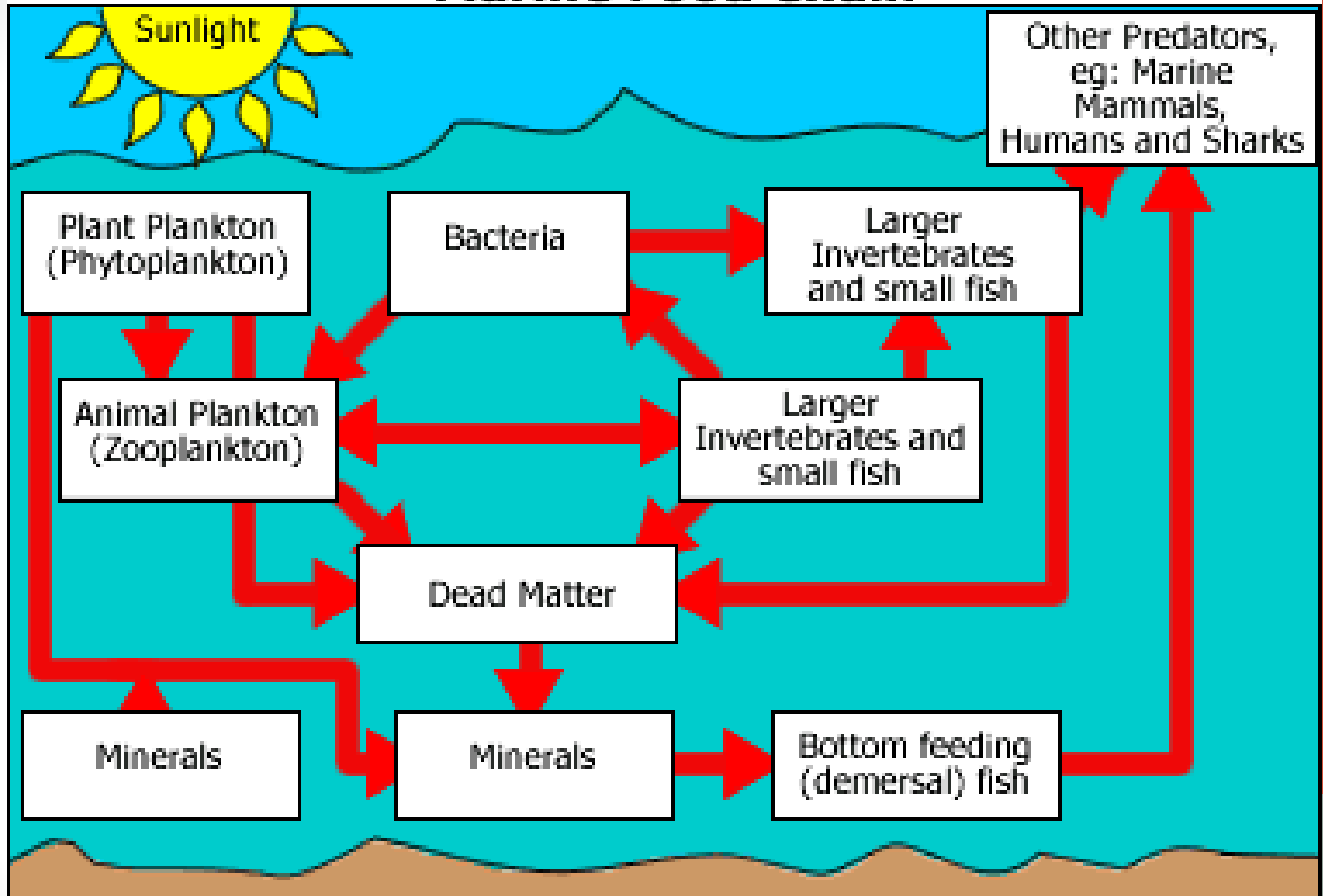


Fish as a source of food

- Fish is a highly recommended food item for any balanced diet because it is protein rich.
- However, the amount of fish consumed depends on where you are in the world



Marine Food Chain



Technology and fishing activity

Inshore

- In Atlantic Canada most boats are under 25m in length and are owner operated.
- They most commonly stay within 20 kms of shore.
- Boats have a limited capacity and little refrigeration.
- Return to port each day to off load catch.

 **TERAMAR**
Inshore Series



Offshore

- ⊞ More capital intensive and less labour intensive. It accounts for c 40% of the catch but only 20% of the workers.
- ⊞ Vessels are large (35-45m) and are normally owned by large companies.
- ⊞ Vessels have a large refrigeration capacity

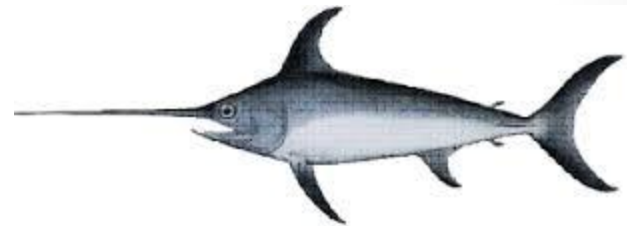


2 categories of fish

1. **Demersal:** live on or near the ocean floor (cod, halibut, flounder, hake, shrimp, and shelfish)
2. **Pelagic:** tend to congregate in schools near the ocean surface (herring, anchovies, salmon, mackerel, and tuna)



Cod - *Gadus morhua* - 70-110 cm



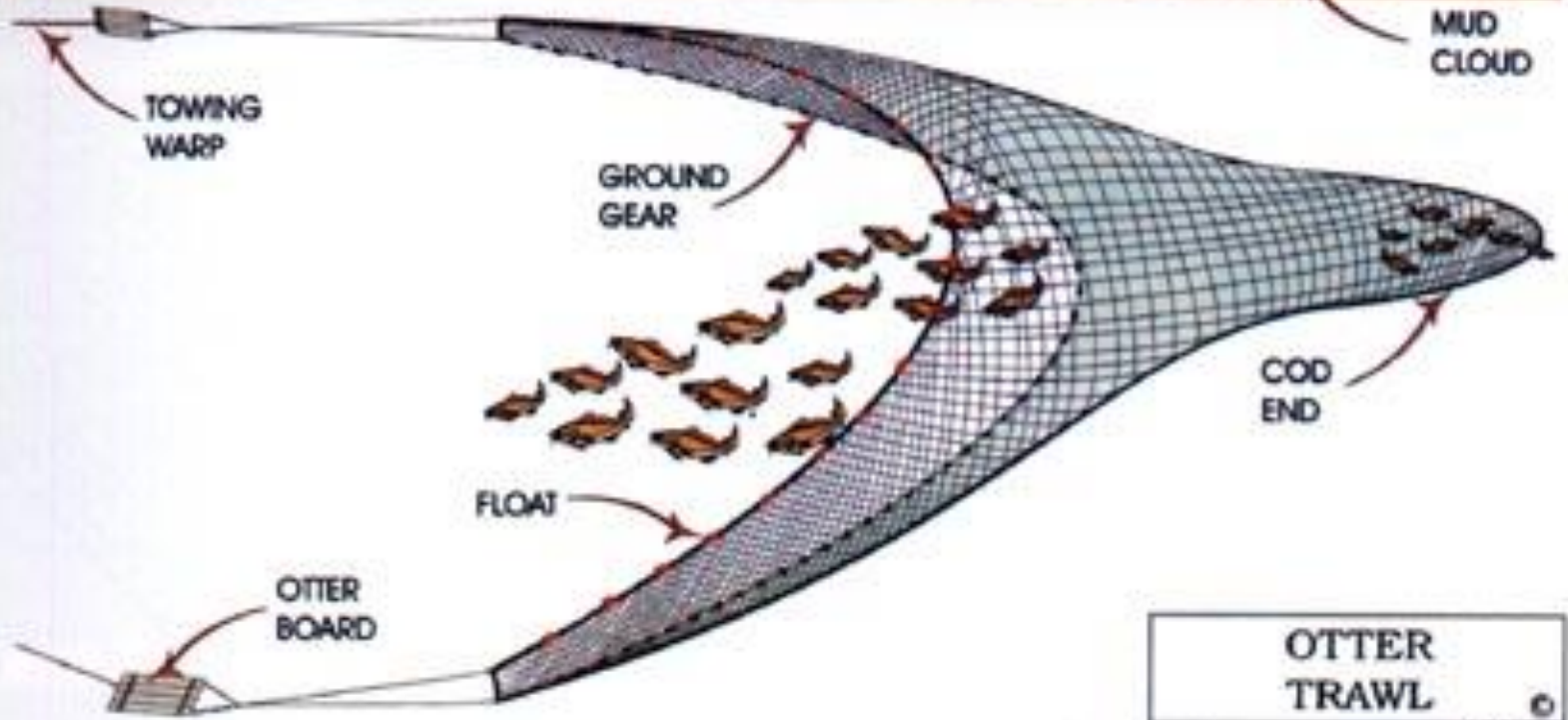
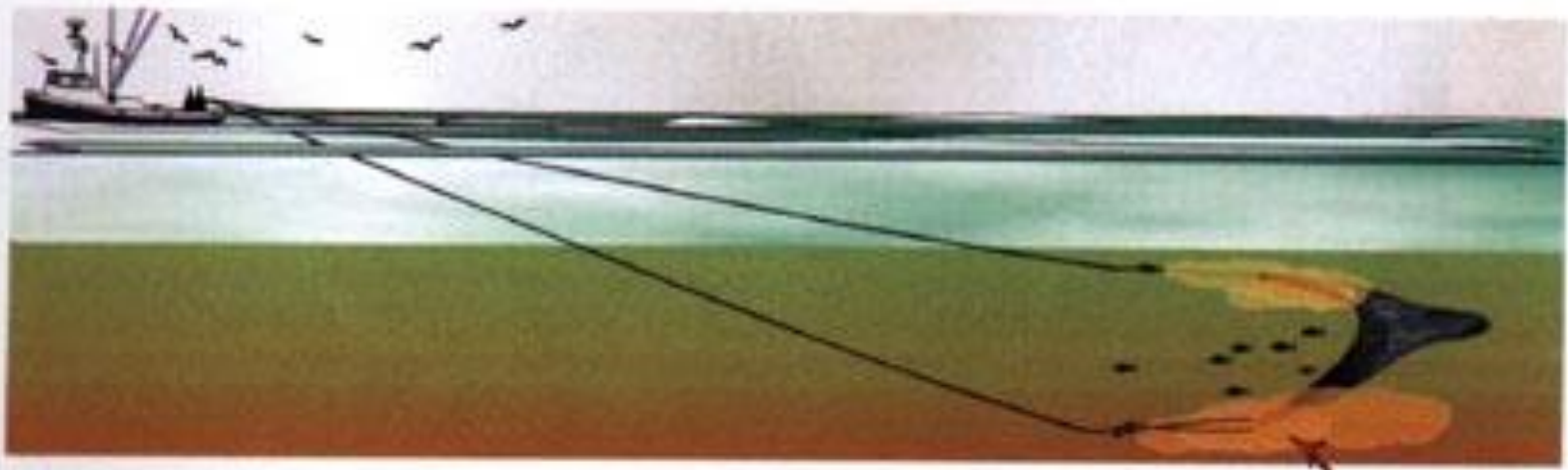
Gear used in Demersal fishery

1. Otter Trawl - also known as dragging.

A large net is dragged along the bottom. Over the past several years there has been a growing concern about the impact that intensive trawling and/or dredging activities have on the habitat on the sea bottom.

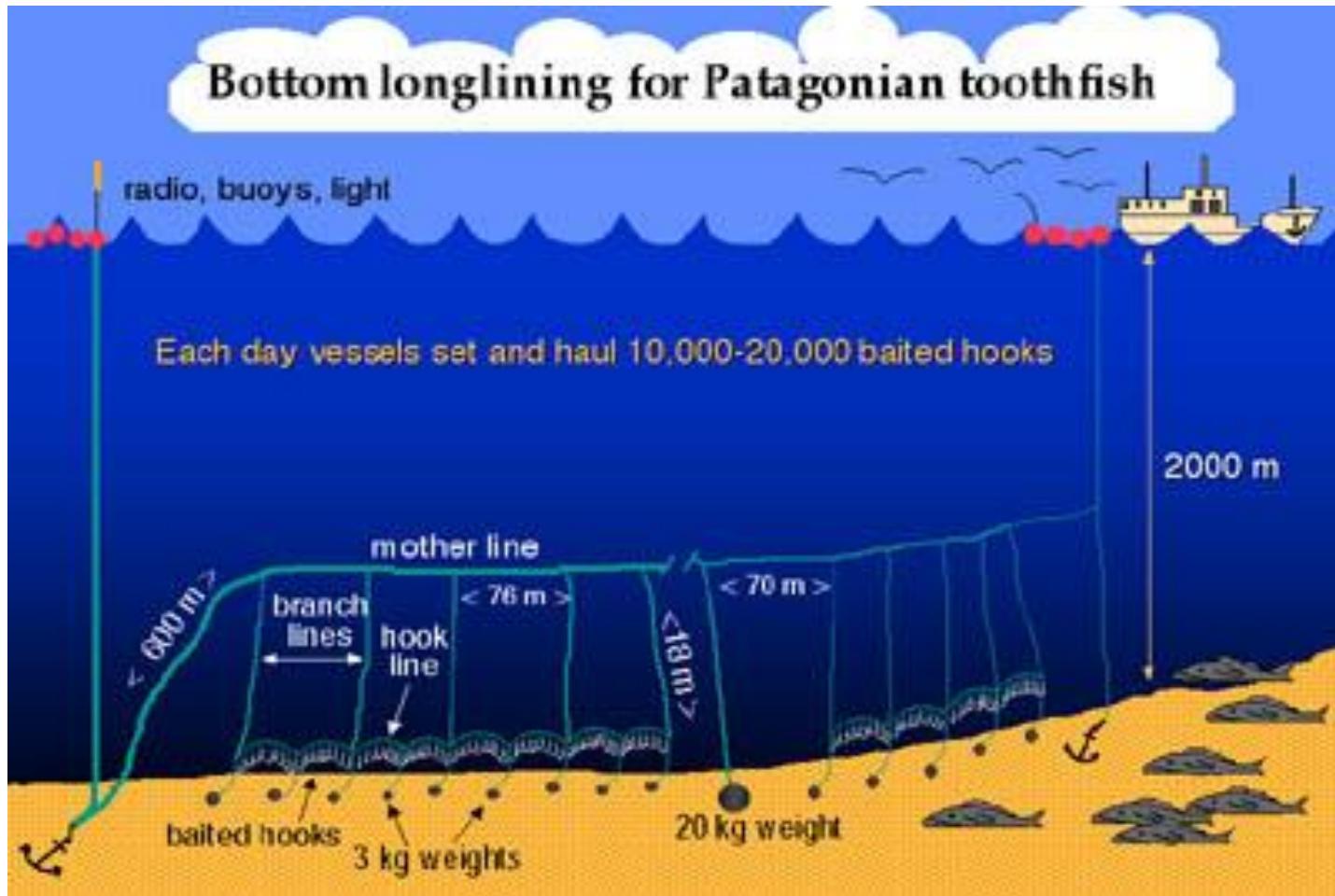


SMOLOWITZ
FIGURE 3
(page 49)
A bottom
trawl.
Drawing
by Robin
Amaral.



**OTTER
TRAWL**
drawn by: Robin Amaral

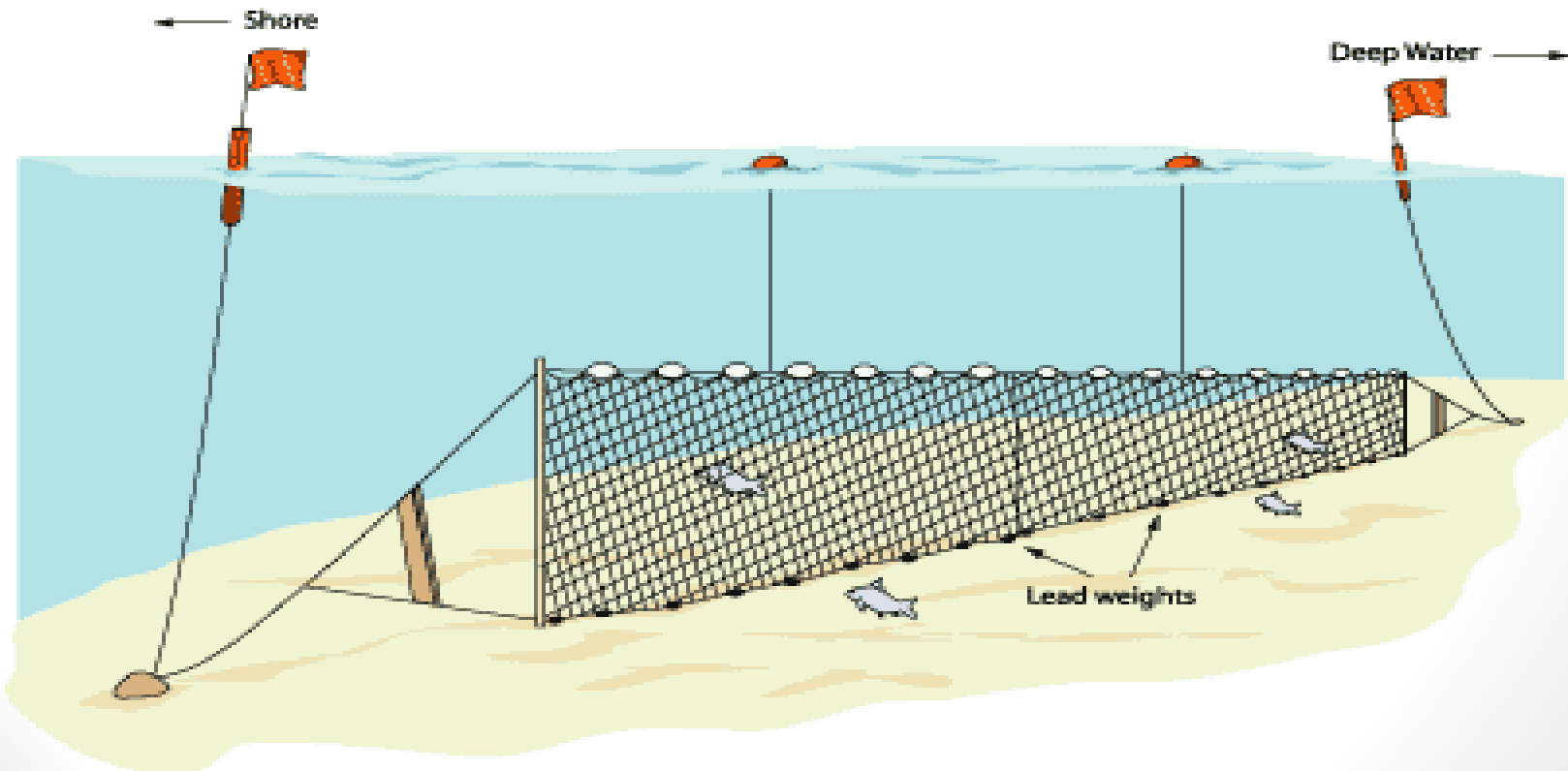
2. **Long line or baited hook** - a commercial fishing technique that uses hundreds or even thousands of baited hooks hanging from a single line.



http://www.birdsaustralia.com.au/albatross/images2/bottom_big.jpg



3. Gill nets – Fish try to swim through deliberately sized mesh openings in a hanging net but are unable to squeeze through. They are prevented from backing out due to the tendency for their gills to become caught. This effectively traps them.



4. Other devices include fish traps for species such as a crab and lobster.



http://www.brassbinnacle.com/Merchant2/images-sep2003/102_0211-lg.jpg



Escaped fish

- Ⓢ Escaped farmed fish can give long term negative effects as offspring have shown lower survival rate
- Ⓢ Escaped fish can be a carrier of sea lice and can spread lice to wild fish and reinfect farms
- Ⓢ Escaped fish can compete with wild fish for food and habitat
- Ⓢ Escape numbers is NOT a good indicator of environmental impact as it says nothing about survival rate or where the escaped fish go. In addition there are indications of significant underreporting of escapes.
- Ⓢ Amounts of escaped fish in fjords, coastal areas and in rivers are better indicators of environmental performance and should be monitored in fjords and rivers with important salmon runs or sea trout stocks.



New marine species

- New environmental challenges

“To open a cod is like entering a microscopic zoo”

- No generation separation
- Escape attitude
- Local cod stocks are already in strong decline
- No knowledge of possible genetic interactions
- Regulations are not sufficient (fallowing, exclusion zones)



According to Kenneth's research ,

- Interspecific patterns of fish life histories were evaluated in relation to several theoretical models of life-history evolution.
- Data were gathered for 216 North American fish species (57 families) to explore relationships among variables and to ordinate species.
- Multivariate tests, performed on freshwater, marine, and combined data matrices, repeatedly identified a gradient associating later-maturing fishes with higher fecundity, small eggs, and few bouts of reproduction during a short spawning season and the opposite suite of traits with small small fishes.



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