Sustainable Fisheries Guide

A resource describing
fishing methods and effects

Introduction

Sustainable fisheries are directed fisheries, catching target species and little else; waste and bycatch is minimal. They are generally passive fisheries, not active. The catch is always fresh. Sustainable fisheries are such because fish are removed at an age and volume that does not affect the stocks' ability to reproduce at a replicative rate.

Fishing technique is one of the most important factors when judging the sustainability of a fishery. While all fishing methods effect fish habitat, some have far less impact than others. Different fishing methods have greater impact at different times and in different areas for each species. A nondiscriminating longline fishery during the 1970's was responsible for the crash of Atlantic Swordfish populations. Today, halibut longlining in Alaska is a well managed, sustainable fishery that successfully addresses all management issues. Sustainable fishery methods may include encircling seine nets, long lines, hook and lines, jigging, weirs, traps, dipnets, harpooning, gillnetting, diving, and trolling.

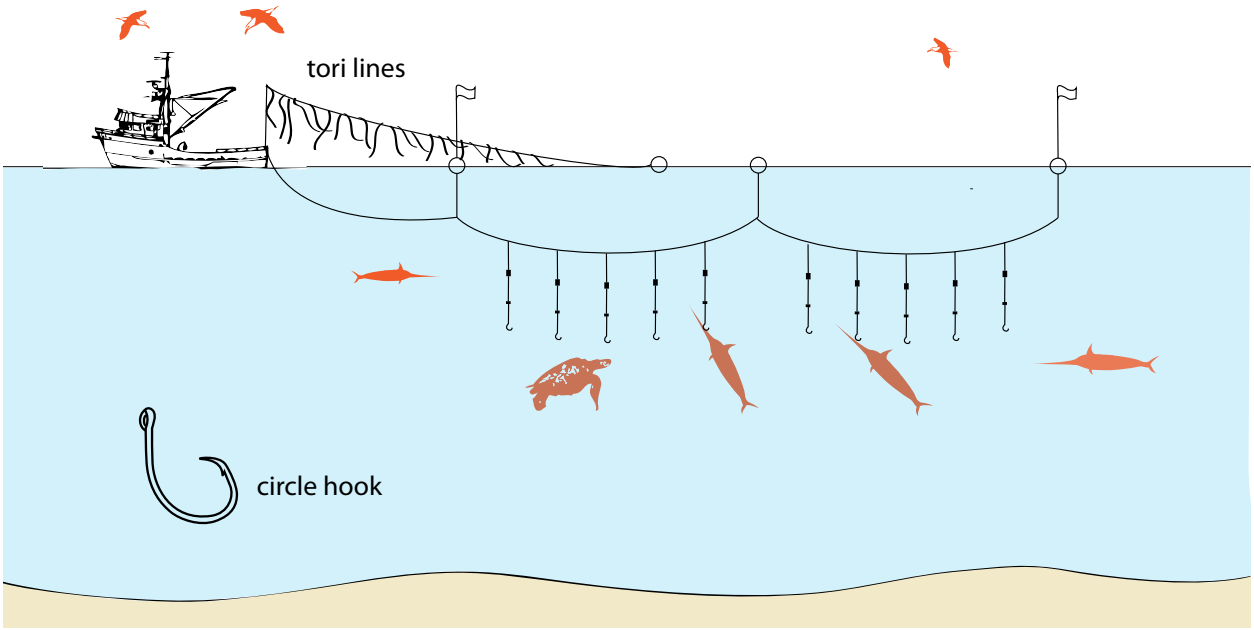
Broad-based consumer boycotts, which advocate the boycott of an entire species, irrespective of fishing method or area of capture, only harm proponents of conservation; namely, the small-scale sustainable fishermen. Species-specific consumer boycotts put the sustainable fishermen, who have an interest in the stewardship of ocean resources, out of business. They do not prevent industrialized fishing vessels from moving on to other species and waters.

Sustainable fisheries management is complicated; myriad factors are in constant flux. When trying to make responsible decisions we must be well informed to judge each fishery on its own merits, and be aware of the effect these decisions have on the lives of the people involved in fisheries.

Fin Fish Harvesting Techniques

Longlining

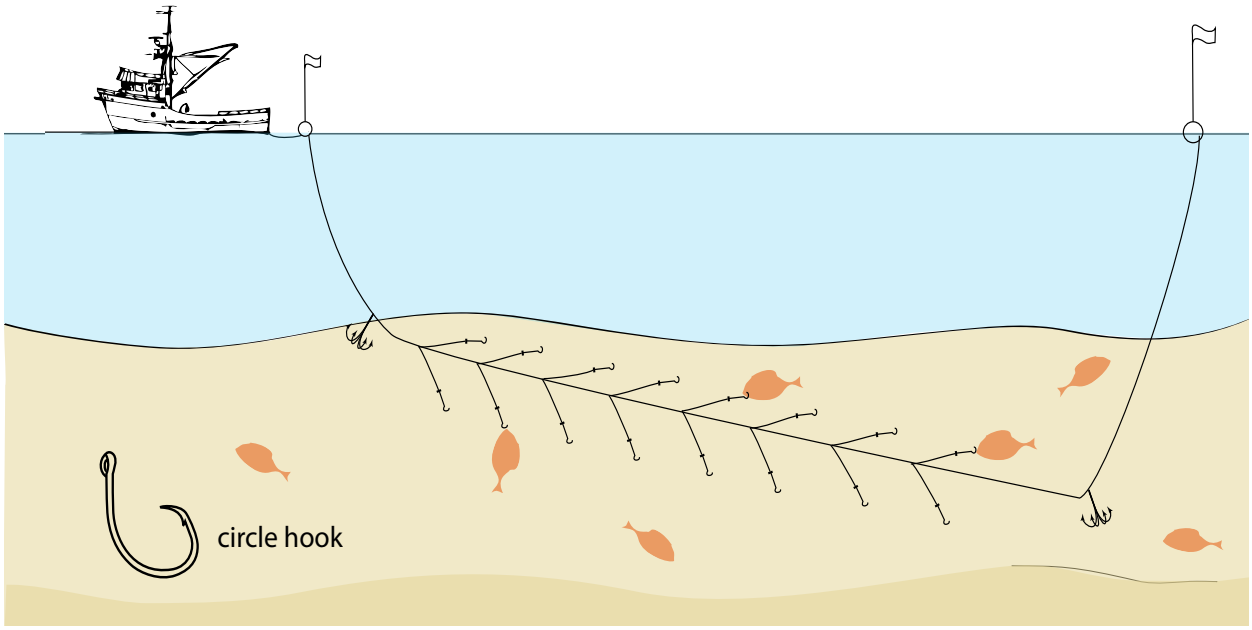
PELAGIC LONGLINING - A PASSIVE METHOD



Longlining uses baited hooks, on offshoots of a single main line, to catch fish at any depth. The line can be anchored in areas too rough for trawling, or set adrift, suspended by floats.

Pelagic, or midwater longline hooks are baited to attract fish such as swordfish, tuna and opah. Unfortunately they also catch sea life such as turtles, sea mammals and birds. Lines can be altered to mitigate bycatch by utilizing: circle hooks that can pass through turtles without damaging their systems, colored bait, weights to sink the bait faster, targeted locationing, and tori lines that scare away sea-birds.

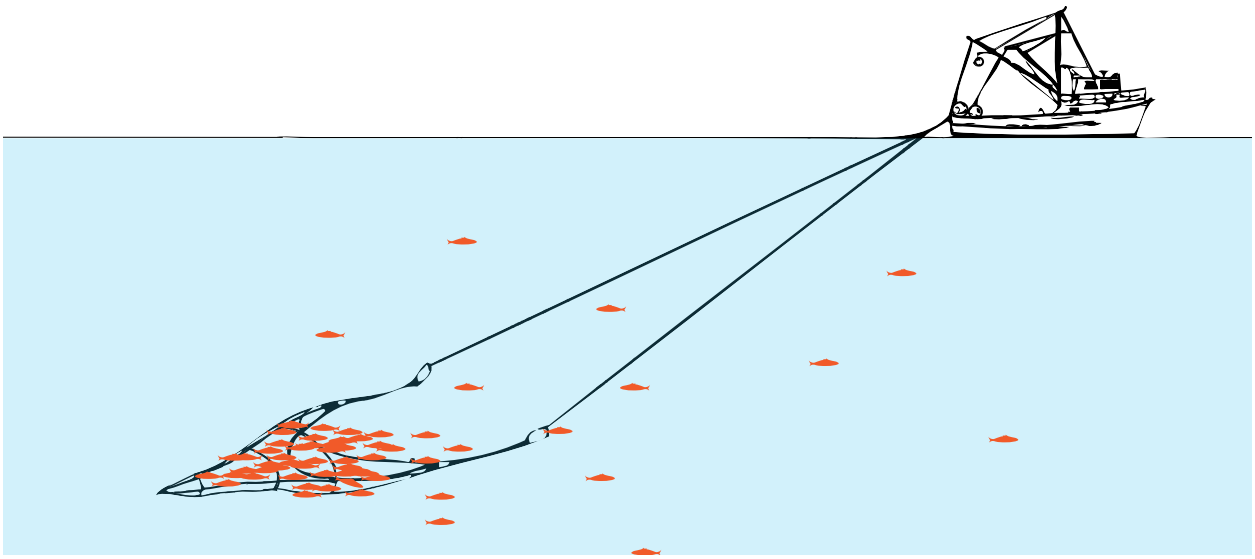
BOTTOM OR DEMERSAL LONGLINING - A PASSIVE METHOD



Demersal, or bottom, longlining is a much more environmentally sound means of catching fish like halibut and true cod, which dwell on the ocean floor, than the very destructive alternatives of bottom trawling or dredging. Circle hooks are employed to ameliorate sea turtle deaths.

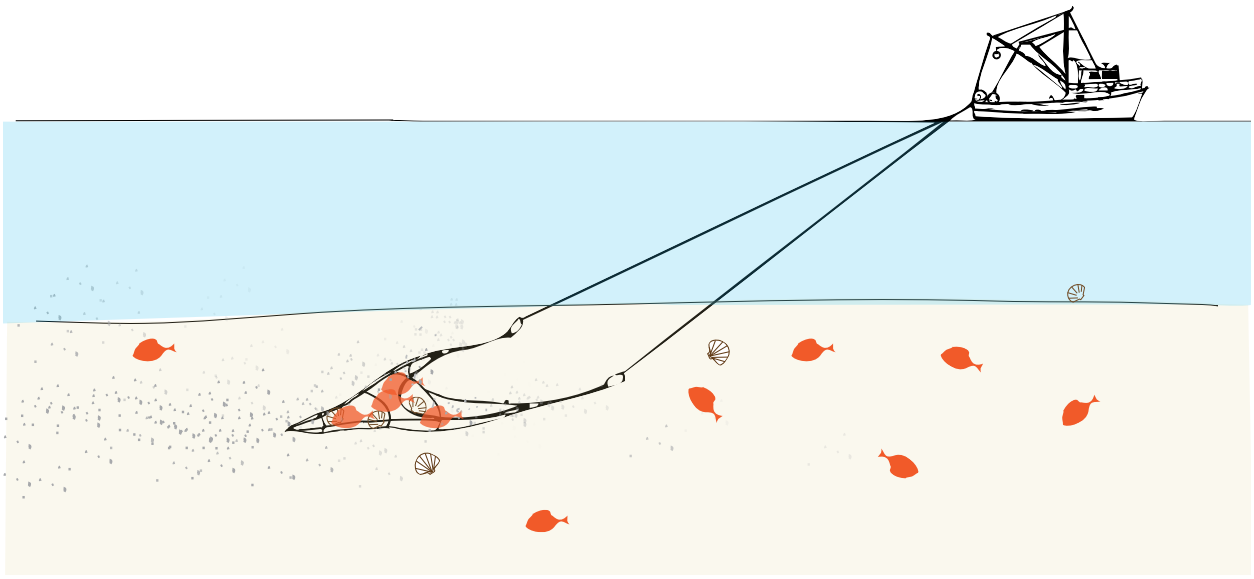
Trawling or Dragging

MID WATER OR PELAGIG TRAWLER - AN ACTIVE METHOD



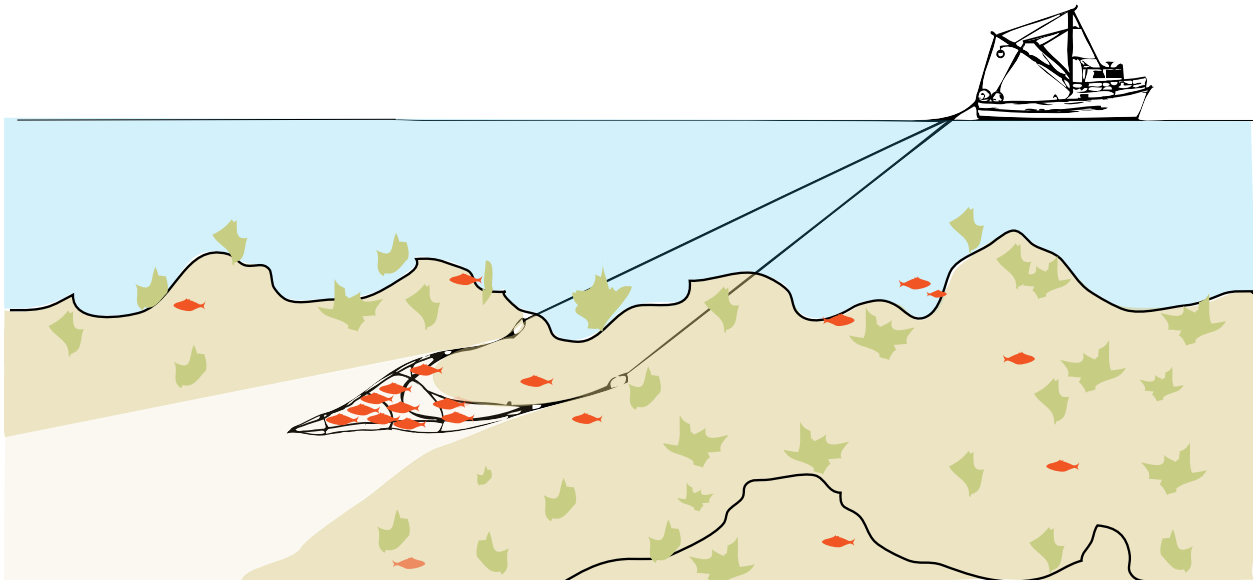
Trawling or Dragging is the method of fishing responsible for the greatest percentage of fishery landings. Trawling is simply described as towing a net through water. Mid-water trawlers tow a funnel-shaped net through the water column between the surface and the bottom, targeting mid-level pelagic fish, such as true cod and pollock, resulting in less impact on fishery habitat and less bycatch.

SANDY AND MUDDY BOTTOM TRAWLER - AN ACTIVE METHOD



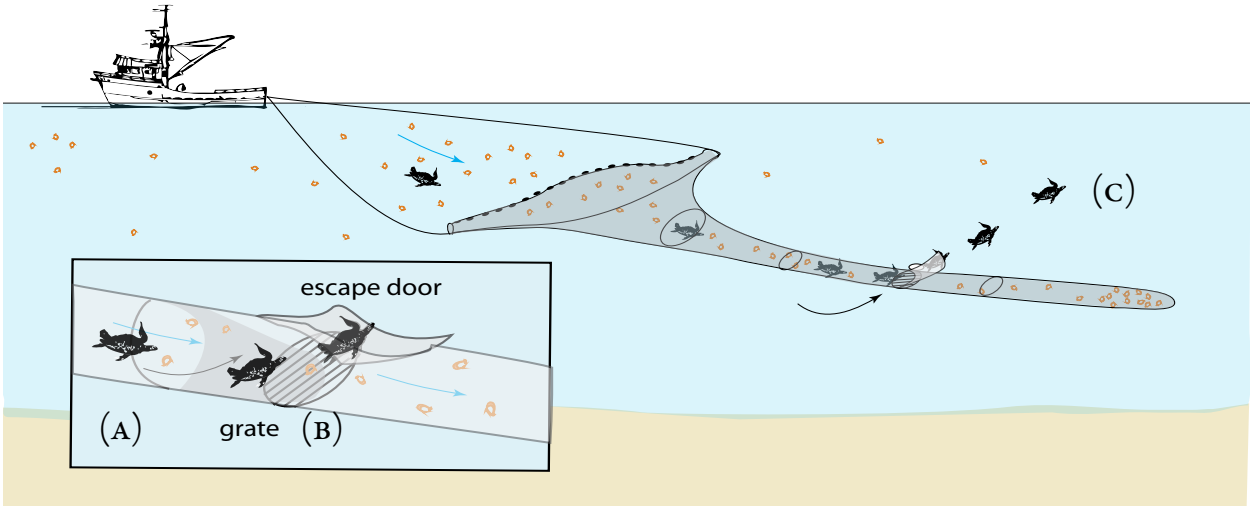
Sandy and Muddy, or Soft Bottom Trawling has less impact on the ocean floor because these environments and the species that live in them, such as petrale sole and sand dabs, are adaptable to periodic shifting caused by storms and currents. Scale, targeting skill, and equipment are factors that determine whether this method of capture is a sustainable one or not.

ROCKY BOTTOM TRAWLER - AN ACTIVE METHOD



Rocky Bottom Trawling or Dragging is the method of fishing responsible for the greatest environmental damage. This trawling drags a net weighted down with extremely heavy cables and rollers over the ocean floor, scraping everything in its path, including all sea creatures and plant life-forms, as well as the habitat necessary for their survival.

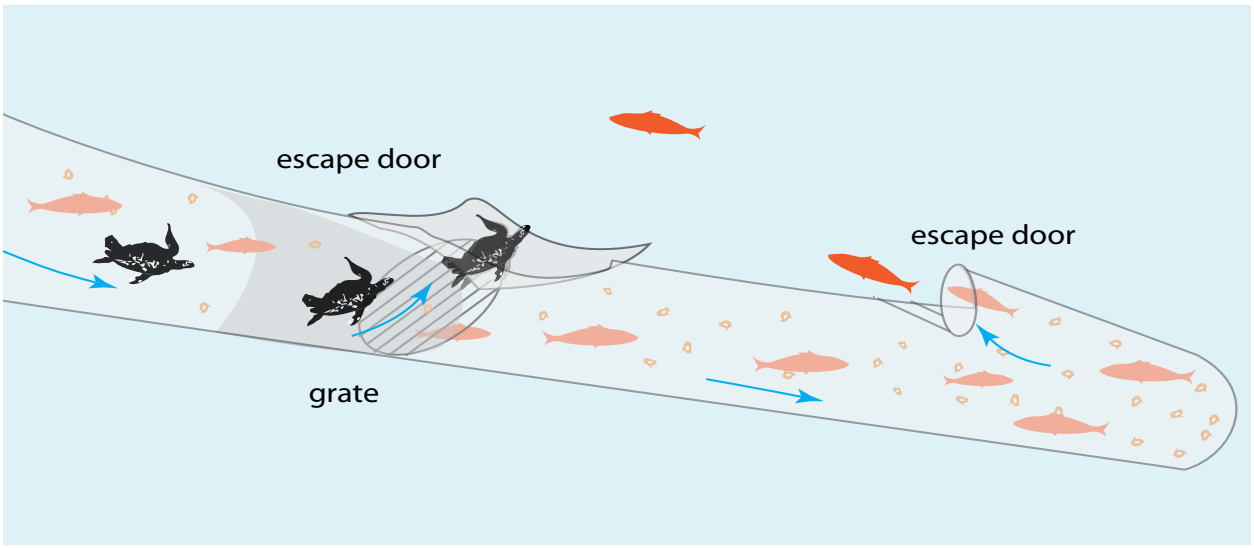
TURTLE EXTRUDER DEVICES - T.E.D.S - FOR SHRIMP TRAWLERS - ACTIVE METHOD



Turtle extruder devices are net modifications consisting of grates that are sewn into nets adjacent to open flaps that function as escape hatches.

A) Sea Turtles and large fish carried by the current into the nets swim or float onto the grate through which they cannot fit.
B) The current gently forces the turtles up the grate and out the escape hatch.
C) Targeted shrimp fit through the grate and remain in the net while the turtles and larger fish swim free.

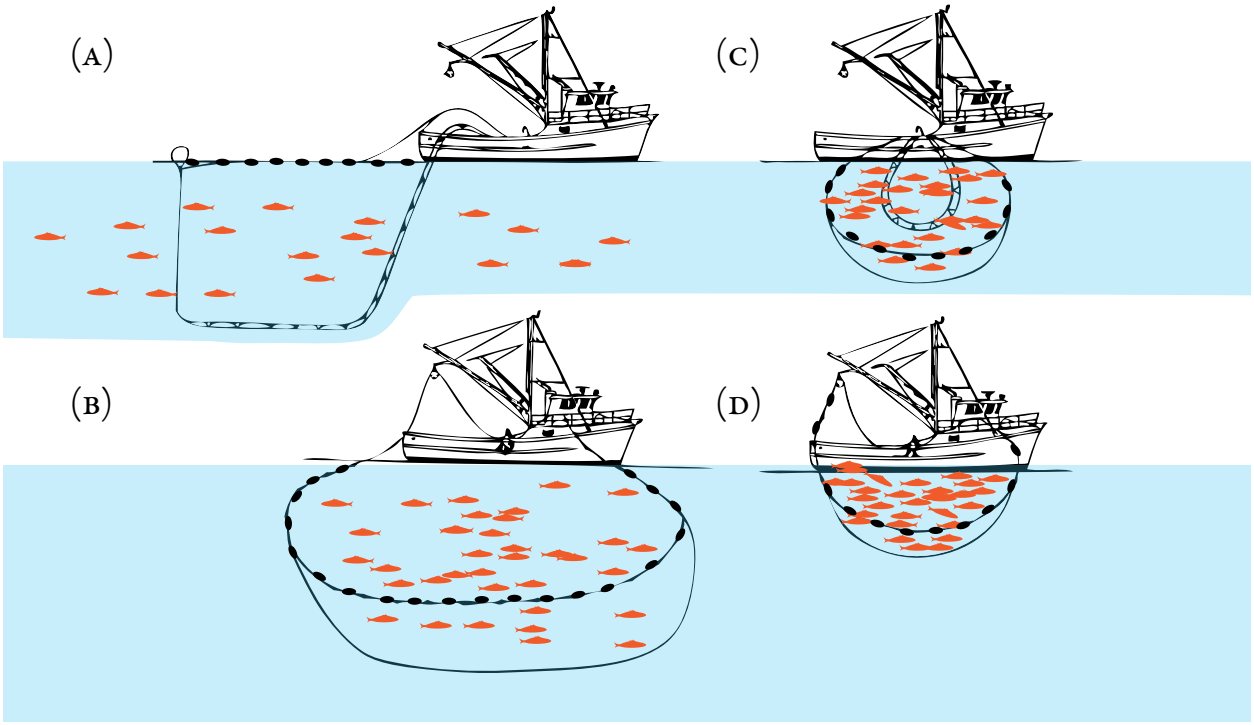
BYCATCH REDUCTION DEVICES - B.R.D.S - FOR SHRIMP TRAWLERS - ACTIVE METHOD



A bycatch reduction device is an opening in a shrimp trawl net that allows finfish or other sea animals to escape, while the target species of shrimp is directed towards the bag end of the net. BRDs are required in shrimp trawl nets in federal waters of the Gulf of Mexico and South Atlantic regions.

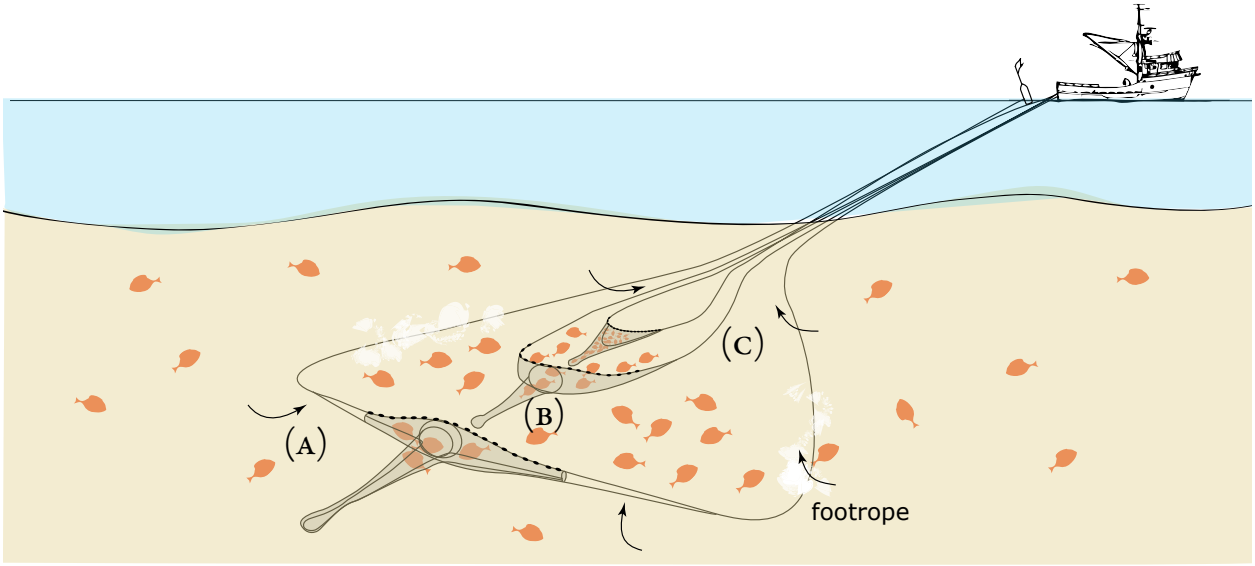
Seining

PURSE SEINING - AN ACTIVE OR PASSIVE METHOD



Purse seines are walls of netting used to encircle entire schools of fish such as sardines, mackerel, squid, and some tuna, at or near the surface. A drawstring cable is threaded through the bottom of the net. When the cable has pulled the netting tight, enclosing the fish in a pouch, the catch is hauled onboard with a dip net in a process called brailing.

A) A net with weights and buoys is laid out, forming a screen of net around the catch.
B) The drawstring cable at the weighted bottom of the net is cinched, or drawn in, closing the bottom.
C) The catch and the gear is drawn toward the boat.
D) Once the fish is concentrated in the purse, smaller meshed nets called brailers or fish pumps transport the fish from the seine to the boat.



Danish and Scottish seines are nets and lines used to catch species of groundfish, like sand dabs, sole, flouder and cod. Unlike trawling, which uses heavy cables, doors and trawls, Danish and Scottish seining use nets and lines spread out in a diamond shape along the sandy bottom of the ocean floor. The fish are herded into the path of the net by the lines, which gently stir up a mud cloud. Danish Seining keeps the boat in a fixed position and the gear is hauled along the bottom to get it back to the boat. Scottish Seining tows the net and ropes along the ocean floor slowly, just enough to close the nets and bring the gear up to the boat, a method called "fly-dragging".

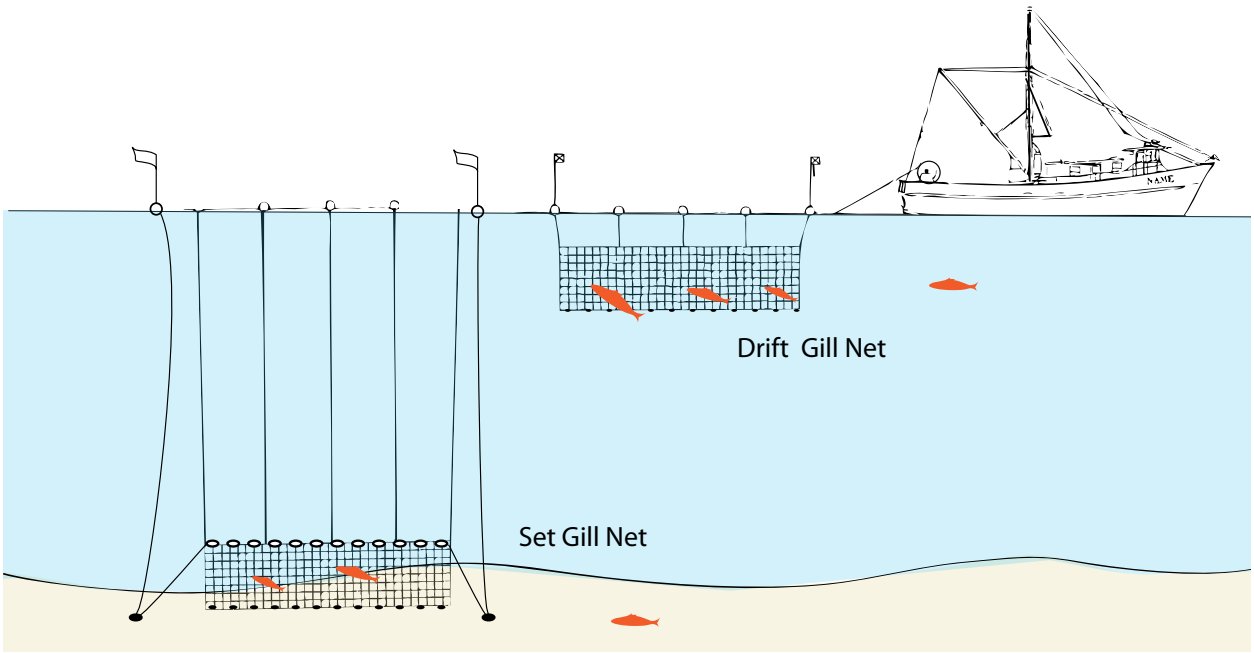
A) With a buoy on one end, nearly a mile of line and a light net are laid out from a boat that circles back to the buoy. The gear is lightweight, and used on smooth, sandy bottoms.

B) The circle of line and net is completed and the lines and nets fall to the bottom and gently settle. The boat slowly proceeds ahead, towing and pulling in the gear and catch, as the fish are herded into the net.

C) This slow, gentle method of pulling the gear and catch back to the vessel leaves dramatically less bottom degradation than trawling. It results in very low levels of bycatch, and nets are configured to result in less drag and more efficient fuel use.

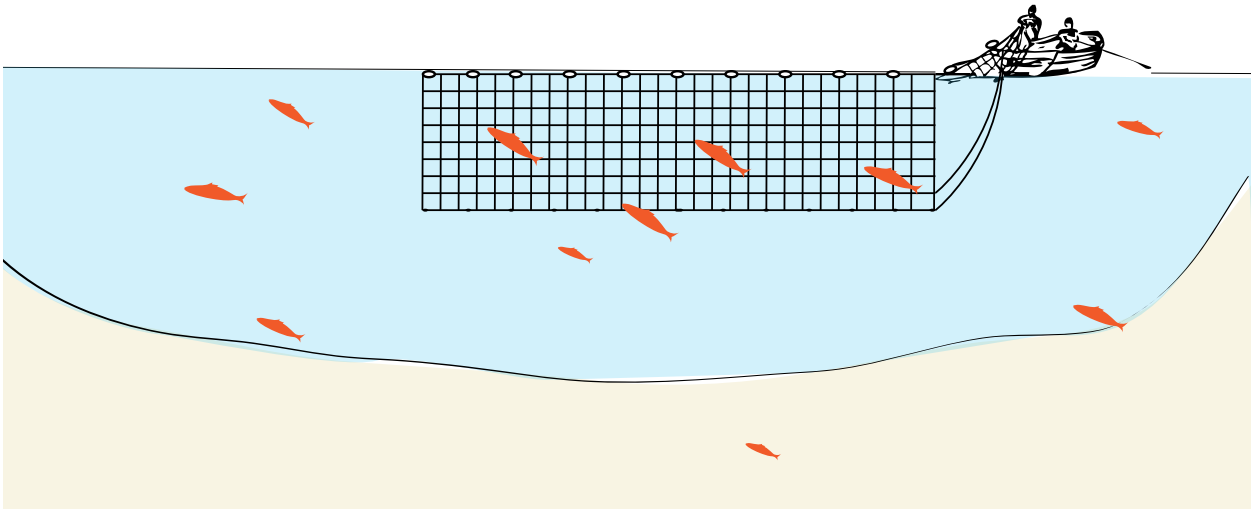
Gillnetting

OPEN OCEAN GILLNETTING - A PASSIVE METHOD



Gillnetting and driftnetting, passive methods, can be used to harvest bottom or pelagic fish. A gillnet is a wall of netting set in a straight line, equipped with weights at the bottom and floats at the top, and is usually anchored at each end. Fish such as swordfish, thresher shark, and rockfish try to swim through the net and are caught when their gill covers are snagged, hence the name gillnetting. If allowed to drift freely, the method is referred to as driftnetting, and the method is more active.

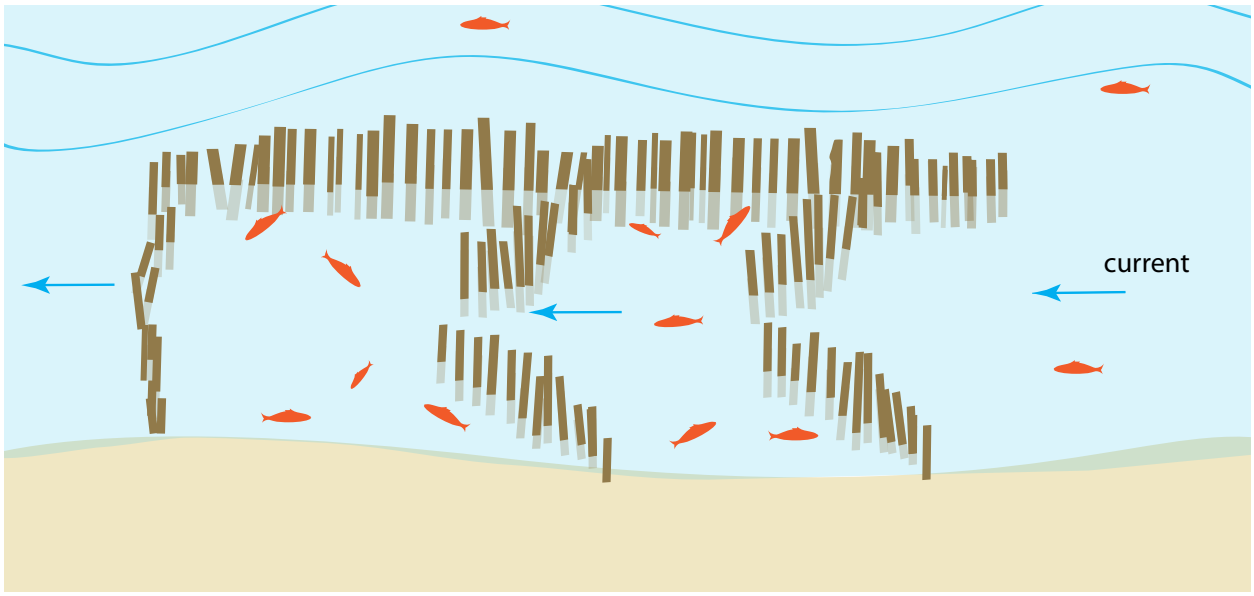
RIVER GILLNETTING - A PASSIVE METHOD



Gillnetting is used in rivers to target specific species such as spawning salmon, and sturgeon.

Wiers

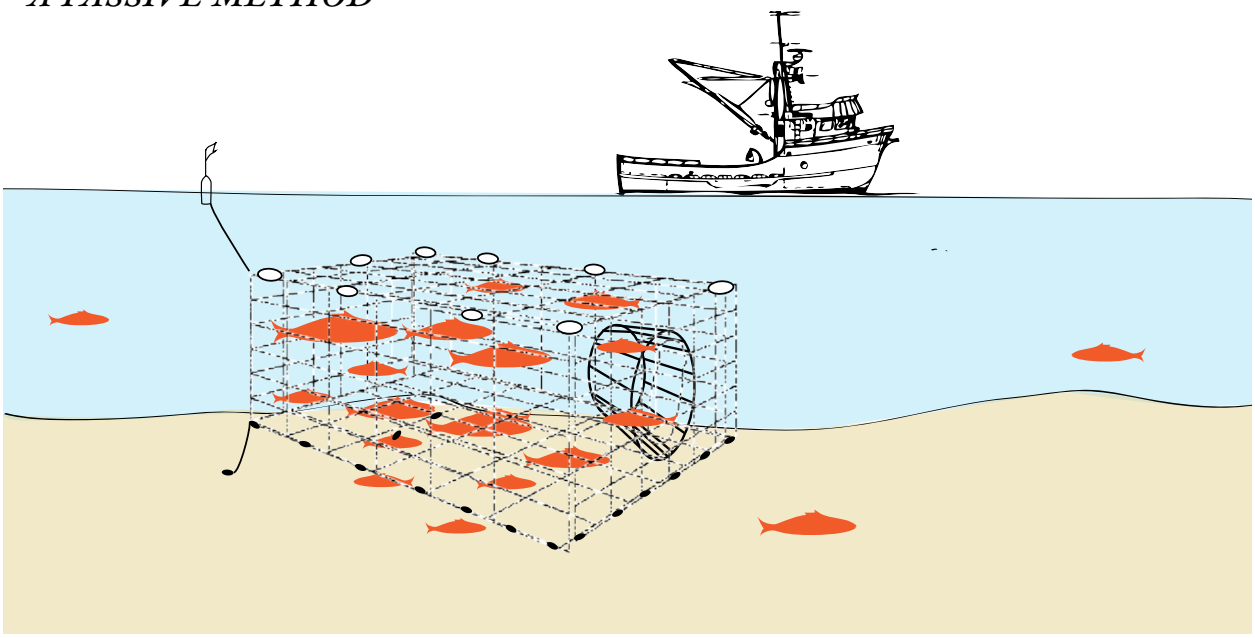
- A PASSIVE METHOD



Weirs are constructions designed from branches or stones that impede free movement of fish such as mackerel and herring by obstructing running waters, and then guiding fish into cordoned areas as they migrate.

Fish Traps

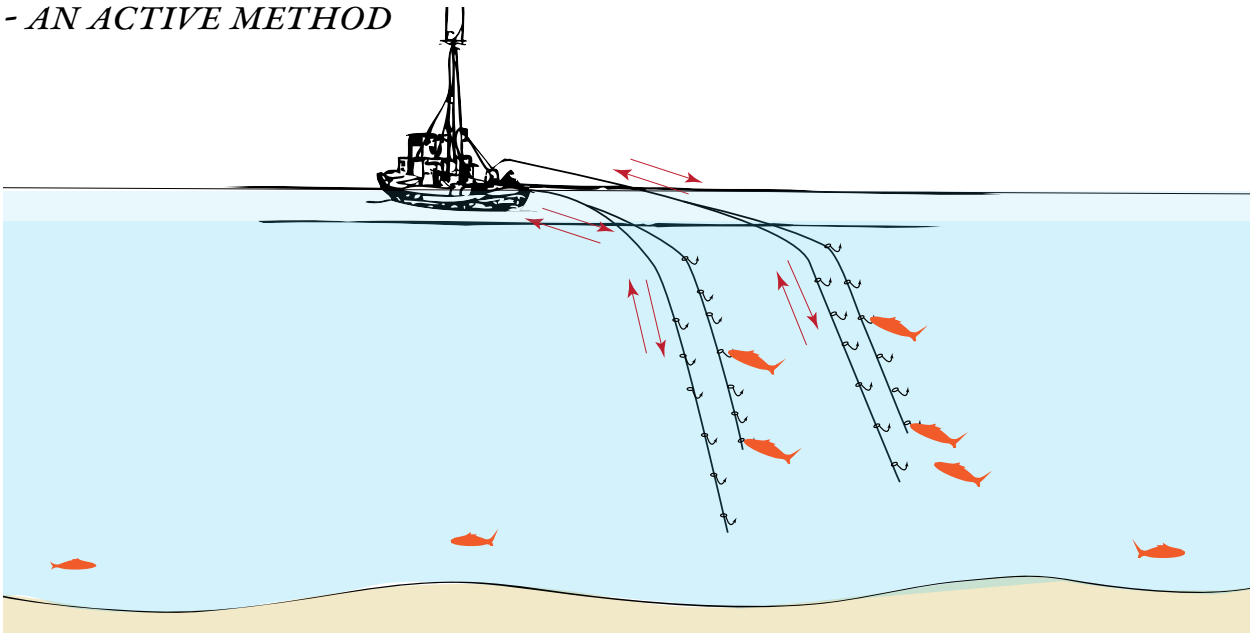
- A PASSIVE METHOD



Fish traps are large net or link traps suspended in the water or on the bottom, marked by buoys, weighted, and anchored. Fish are able to swim in, small size fish can escape and non-targeted fish can be released alive when the fishermen return to harvest the targeted fish.

Jigging

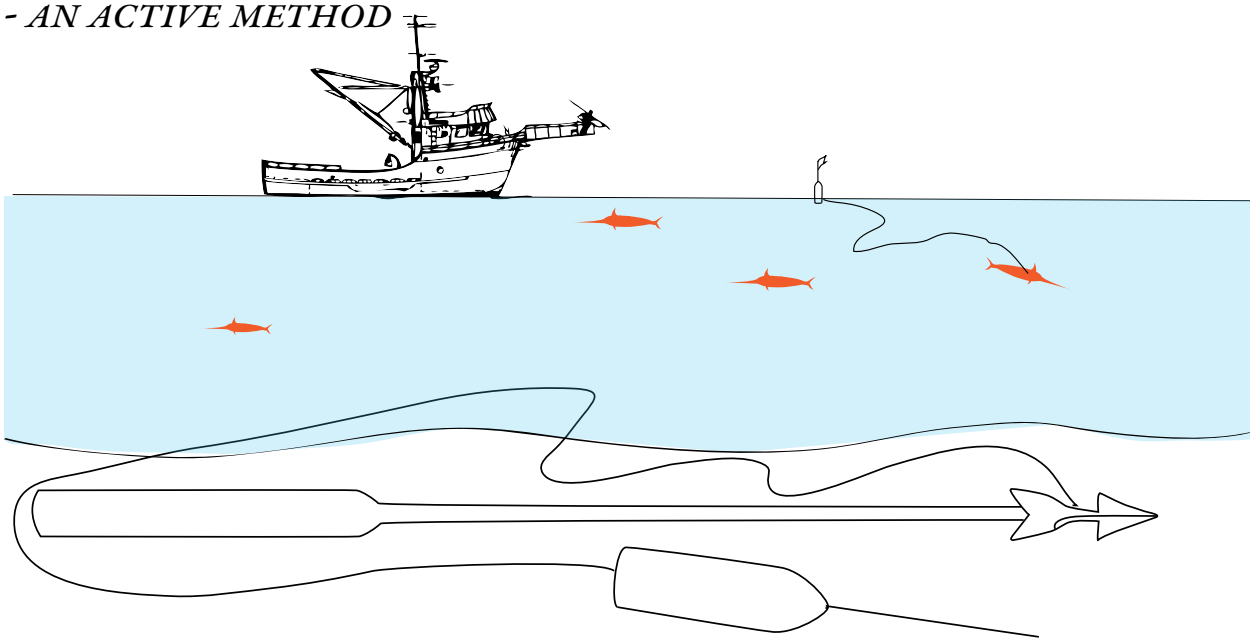
- AN ACTIVE METHOD



Jigging is the setting of a line, with baited hooks or lures, that is continually jerked. The motion, achieved by hand or with a jigging machine, induces fish, such as cod and squid, to take the hook.

Harpooning

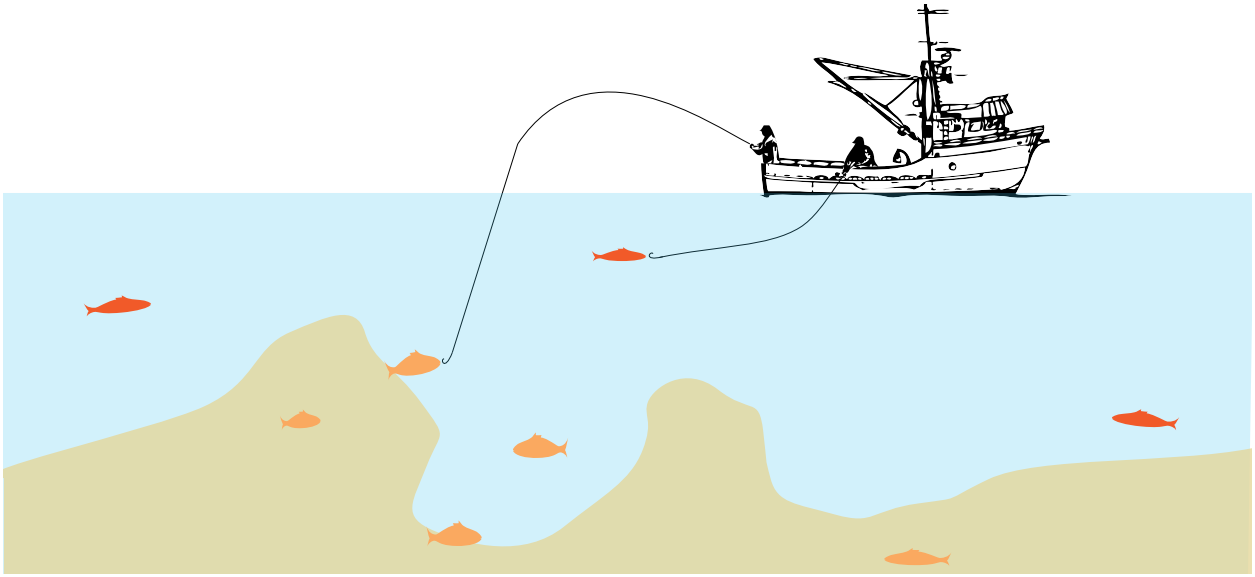
- AN ACTIVE METHOD



Harpooning is used to catch large, near surface swimming fish, and is a very targeted method, without bycatch. Harpoon fishermen spear large pelagic fish, such as swordfish, with wooden or aluminum shafted javelin-like hooks attached to buoyed lines. The fish is caught and hauled onto the boat.

Rod & Reel, and Handline

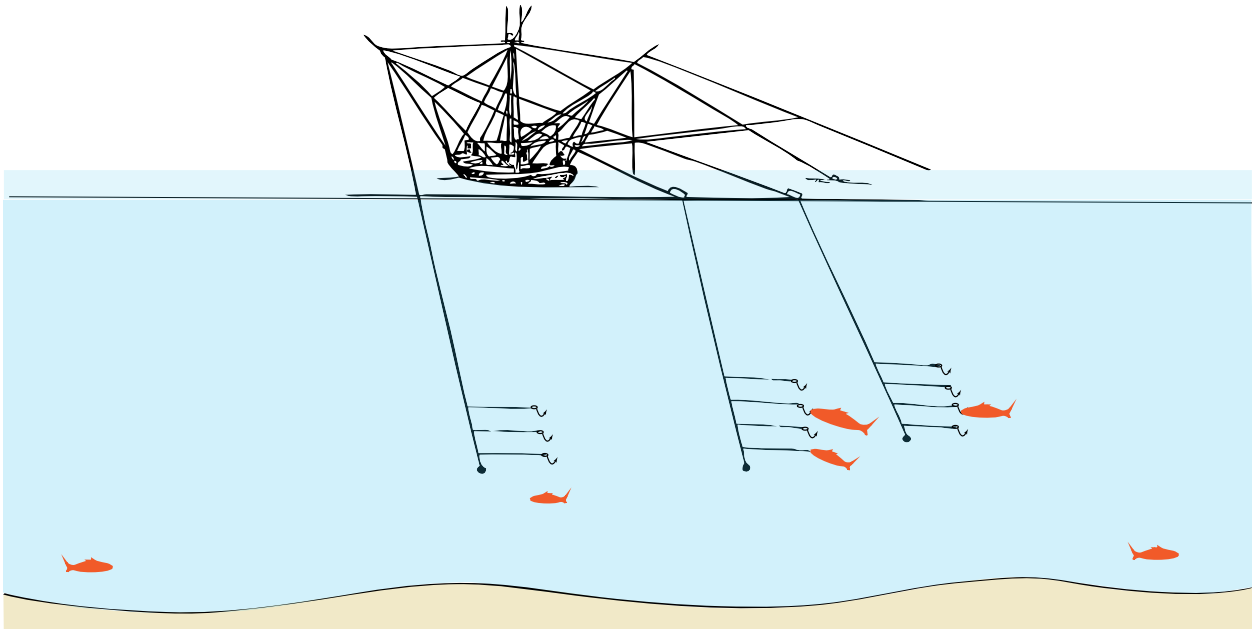
- A PASSIVE METHOD



These methods involve a hand line or rod-and-reel, sometimes with more than one hook, that is literally pulled in by hand. There are no engine devices aiding in these techniques of fish retrieval. Rockfish, cod and ling cod are often caught using this method.

Trolling

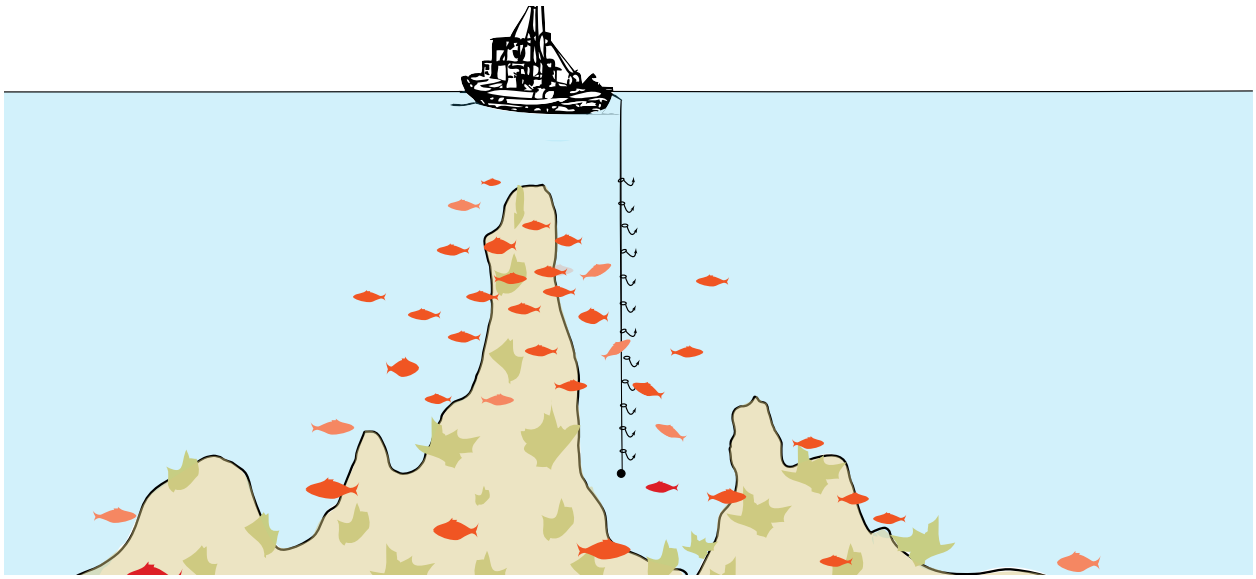
- AN ACTIVE METHOD



Trolling is simply a moving hook and line towed as single fishing lines behind a moving boat. Salmon, ono and mahi mahi are often caught using this method.

Vertical Hook & Line

- A PASSIVE METHOD



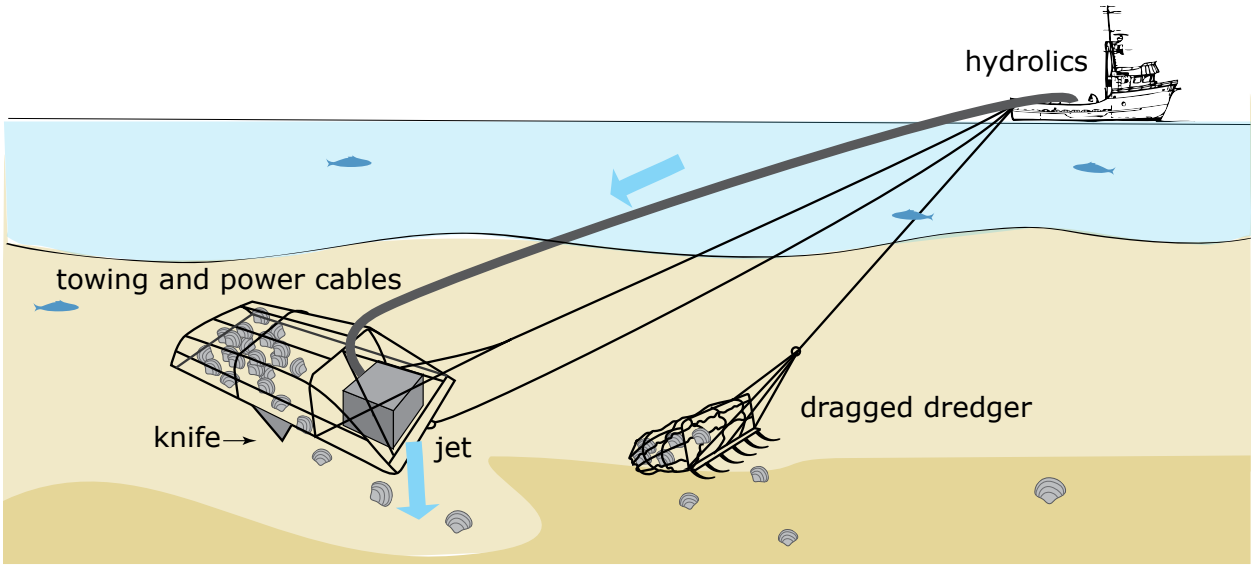
A multi-hooked line weighted at the bottom is dropped into the waters adjacent to vertical outcroppings where fish congregate. The fisherman gently drifts into position and holds that position while slowly retracting the line, encouraging fish, then, in succession, other fish, to bite onto it.

This method of capture is used by small boat artisanal fishermen and demands a high level of skill and knowledge. Accepted by experts as one of the cleanest and most target-specific fishing methods, with no environmental damage, hook and line fishing is fast becoming a lost art. Newly legislated governmental permit and quota restrictions that allow commercial trawlers rights to waters, prohibit hook & line fishermen access to the areas that they've been stewarding and sustainably harvesting from for years.

Shell Fish Harvesting Techniques

Dredging

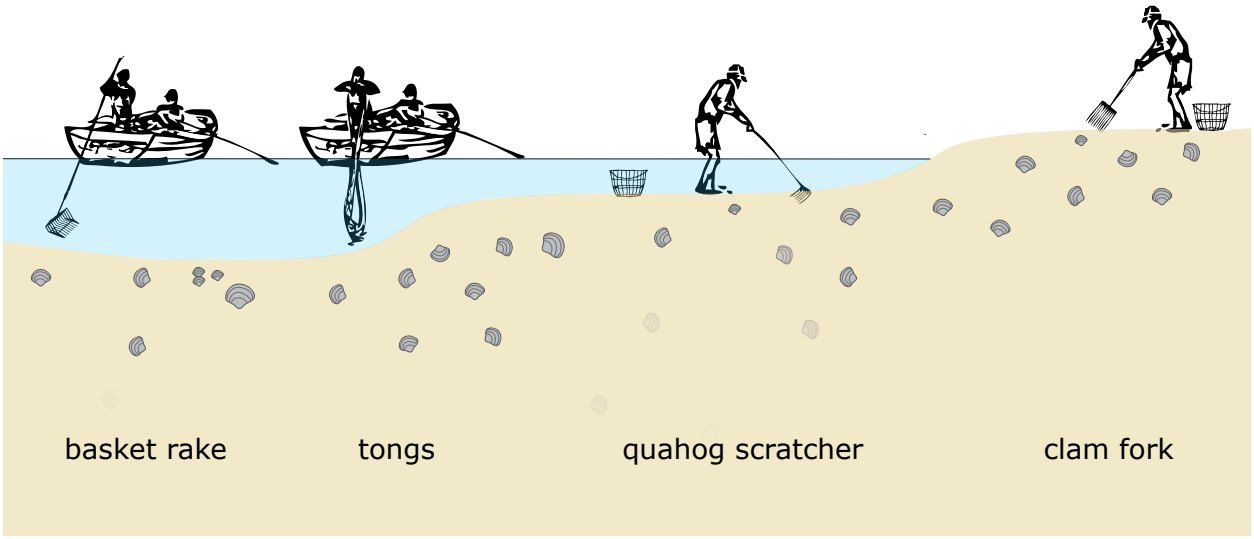
- AN ACTIVE METHOD



Commonly used for the commercial harvesting of scallops, clams, oysters and mussels, a dredge consists of a metal rectangular frame to which a bag-shaped net of metal rings has been attached. The frame's lower end is called the raking bar and is often equipped with metal teeth used to dig up the bottom. The frame is connected to a towing cable and dragged along the sandy floor, much like a trawl net. Variations include hydraulic or jet dredges, which use pressurized water pumped from the vessel to stir up deep-burrowing clams, and suction dredges, which use pump-driven suction to suck the shellfish up a pipe to the boat.

Hand Rakes & Tongs

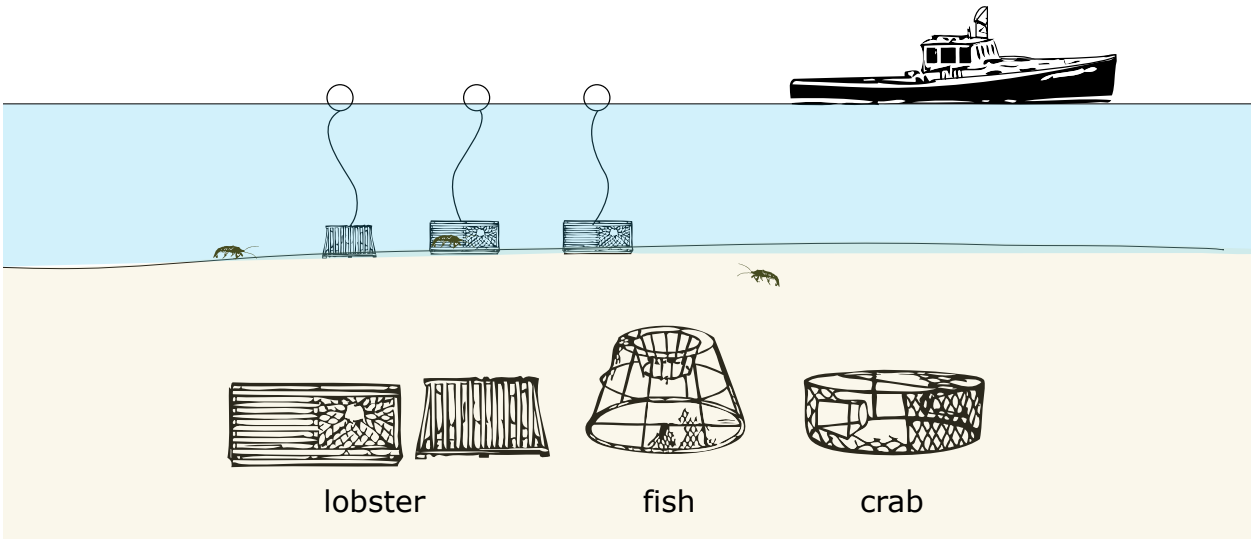
- AN ACTIVE METHOD



Various types of rakes are used to harvest clams and oysters. Basket rakes are equipped with wire mesh baskets to hold the catch, and bull rakes and tongs have very long handles for operation from a skiff.

Traps & Pots

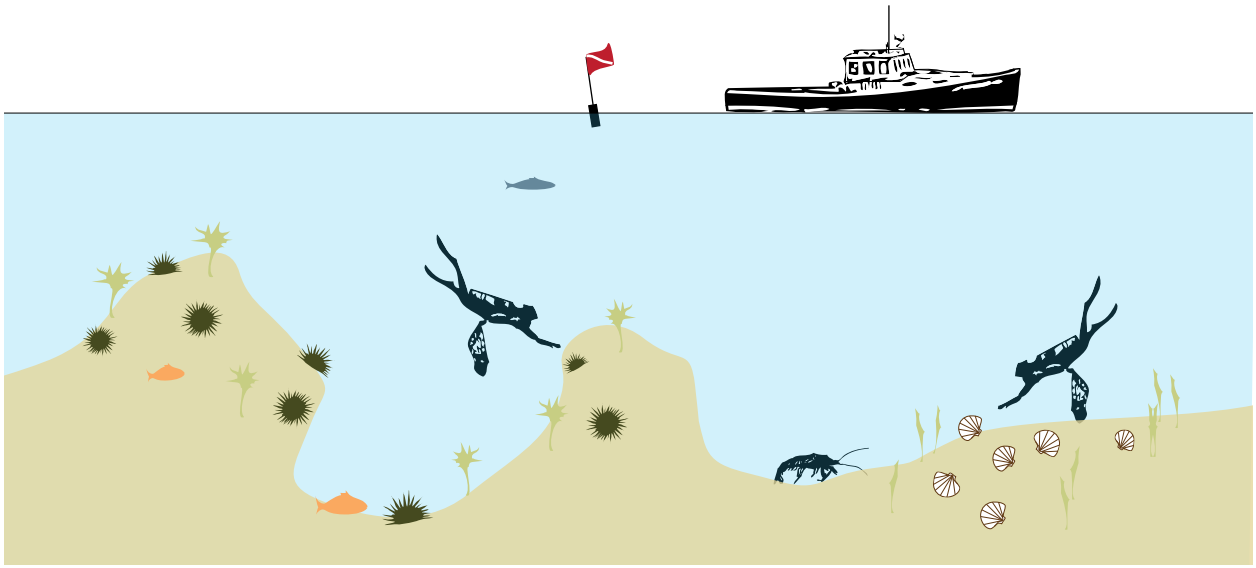
- A PASSIVE METHOD



Pots or traps are often designed specifically for one type of fish or shellfish. Traps and pots are generally baited and equipped with one or more funnel openings, and they are weighted to rest on the bottom. Pots or traps can be fished singularly or in small groups, and each has a buoy at the surface to mark location.

Diving

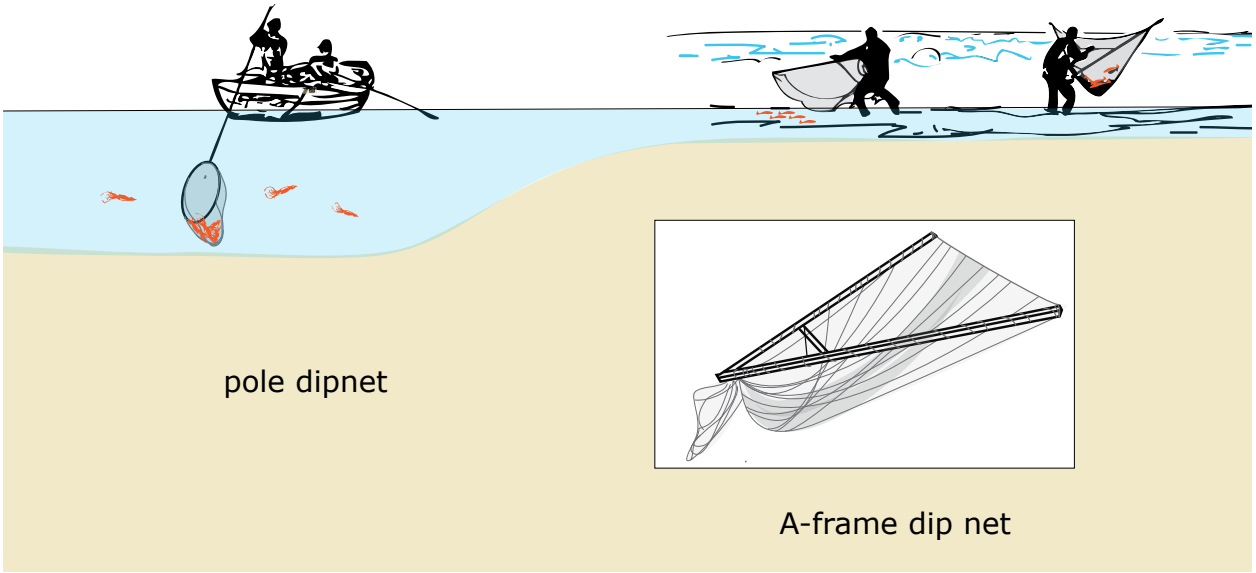
- AN ACTIVE METHOD



Sea urchin (uni), scallops and spiny lobster are selectively harvested from the ocean floor by hand.

Dip Netting for Fin Fish and Shell Fish

- AN ACTIVE METHOD



Squid, scallops, smelt, and other fish are selectively harvested from the surf, the ocean, lakes and rivers. This primitive method allows the fisher to target species and safely release any bycatch.

Fishing Technique	Direct bycatch effect	Indirect effects	Effects Upon Habitat
Trawling and Dredging non-selective method	Bottom trawl is responsitble for high mortality of many immature fish and bycatch species. Midwater trawls can be more selective.	Discarded trawl bycatch-changes the food web, increases populations of scavengers e.g. seabirds, sharks, crabs. Changes to benthic invertebrate communities. Discarded net fragments entangle marine animals and birds.	Reduction of hard substrate, structural damage to reefs and loss of vegetated habitats.
Longlining not highly selective; some interaction between pelagic fisheries	Mortality of bycatch and immature fish. Ancillary factors include when and where set and how often tended. Halibut longlining is ok, while swordfish can be questionable.	Lost and broken lines can entangle fish, marine mammals, birds and vessels.	Low habitat impact
Seining moderately selective	Some bycatch of other species associated with schooling fish.		Low habitat impact
Beach Seining low selectivity, determined by mesh size	Some bycatch concerns about catch of juveniles of non-target species.		Potential sea-grass destruction
Gillnetting selectivity determined by mesh size and location	Some bycatch. Ancillary factors include when and where set and how often tended.	Lost and damaged net can continue to fish and entangle wildlife. Laws require use of cotton ties in corners which ameliorates some long term effect.	Low habitat impact
Trolling, Jigging, Hand-Lining, and Hook-and-Line moderately selective	Little bycatch if hook size is appropriate to target species.		Low habitat impact
Trapping and Potting selective	Selective, with some bycatch. Bait needs to be considered.	Lost post can ghost fish for years.	Potential habitat damage from trapping in fragile areas
Diving highly selective	No bycatch when done properly.	non-selective method	Possible habitat damage from divers and trampling