

COSEE-West  
Fish Tales: California Fisheries from Science to Management Workshop  
Saturday, May 12, 2012

**Glossary**

**A allowable biological catch (ABC)** – a term that refers to the range of estimated allowable catch for a species of a species group. It is set each year by a scientific group. The ABC estimates are used to set the annual total allowable catch (TAC).

**anadromous** – fish that are born in freshwater rivers and streams but spend most of their adult lives in the marine environment, typically returning to freshwater to spawn, or reproduce.

**angler** – a person catching fish or shellfish with no intent to sell, including people releasing the catch.

**aquaculture** – the general term given to the farming/cultivation of any aquatic (fresh and marine) species (plant or animal).

**artisanal** – term used to describe small-scale, traditional fisheries.

**B backdown maneuver** – a process whereby any dolphins or porpoises that have been caught in a net can be released. Boat operators will run their seiner in reverse so that the floatline of a purse seine can be submerged and pulled from under the mammals. The backdown stage is executed after about 1/3 of the seine has been hauled in.

**beam trawl** – in this type of trawl, the mouth of the net is kept open by a beam which is mounted at each end on guides or skids which travel along the seabed.

**benthic** – living on or in the seabed.

**benthos** – those organisms attached to, living on, or in the seabed.

**berried** – egg-bearing lobster or crab.

**bioaccumulation** – the accumulation of a substance (contaminant) within the tissues of an organism.

**biological pollution** – biological pollutants are animals, plants, or other organisms, the pollution of which refers to the introduction of an exotic species into a specific, non-native habitat.

**biomass** – the total weight of living organisms or total weight of a resource or stock.

**bivalve** – having two shells or valves which open and shut.

**boreal** – living near the north; sub Arctic.

**bottom culture** – the culture of species such as oysters and other mollusks on the seafloor.

**bottom trawl** – a large cone-shaped net which is towed across the seabed. Also called an otter or demersal trawl.

**brailer** – a net used for transferring the catch of a deep sea seine after it has been brought alongside. It is operated either entirely by hand or partly by hand and partly by power.

**broodstock** – a fish which is kept for the purposes of reproduction and supply of juveniles.

**bycatch** – non-target organisms caught in fishing gear.

**bycatch reduction devices (BRD)** – devices inserted in fishing gear, usually in trawls in shrimp fisheries, close to the cod end, that allow the escapement, alive, of unwanted species, individuals or endangered species.

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**C** **catadromous** – fish that are born in the sea then migrate to freshwater to grow and mature.

**catch** – total number or weight of fish and other marine life, including bycatch, taken during a fishing event (as opposed to landings which do not reflect the amount of bycatch discarded).

**catch curve** – a breakdown of different age groups of fish, showing the decrease in numbers of fish caught as the fish become older and less numerous or less available. Catch curves are often used to estimate total mortality.

**caviar** – the salted roe (unfertilized eggs) of a female sturgeon. The roe from other fish species, e.g. salmon, is also considered an edible delicacy but in most countries, including the U.K, only sturgeon eggs can legally be called ‘caviar.’

**cephalopod** – a type of mollusk that has a distinct head and tentacles, e.g. octopus, squid and cuttlefish.

**CITES** – Convention on International Trade in Endangered Species (CITES). An international agreement which aims to ensure that trade in plants and animals does not threaten their survival.

**Coastal Zone Management Act (CZMA)** – the main objective of the CZMA is to encourage and assist states in developing coastal zone management programs, to coordinate state activities, and to safeguard the regional and national interests in the coastal zone. It requires that any Federal activity (including fishery management regulations) directly affecting the coastal zone of a state be consistent with that state's approved coastal zone management program, since activities that take place beyond the territorial sea may affect the coastal zone.

**cod-end** – the rear end of a trawl net where the catch accumulates.

**Contiguous Fishery Zone (CFZ)** – the 9-nautical-mile (n.mi.) seaward zone, from 3 to 12 n.mi. offshore, and adjacent to the 3-n.mi. territorial sea.

**continental shelf** – sloping undersea shelf of land that extends beyond the shore of the continent.

**cultch** – any substrate laid on the seabed with the purpose of encouraging mollusk larvae (spat) settlement. Examples are shell waste, ropes and tiles.

**cumulative (catch) limit** – the total allowable amount of a species or species group, by weight, that a vessel may take and retain, possess, or land during a period of time. Fishers may take as many landings of a species or species complex as they like as long as they do not exceed the cumulative limit that applies to the vessel or permit during the designated period.

**D** **decommission** – term used to describe the process by which fishing boats are taken out of service or “scrapped.”

**deep-water species** – those species living in water beyond the continental slope in depths of more than 400 meters.

**demersal** – refers to fish, such as cod, haddock and plaice, which live primarily on or near the seabed.

**depleted stock** – a stock driven by fishing to very low level of abundance compared to historical levels, with dramatically reduced spawning biomass and reproductive capacity. It requires particularly energetic rebuilding strategies and its recovery time will depend on the present condition, the level of protection, and the environmental conditions.

**deputation** – the process of removing pathogens from shellfish by keeping them in clean water for a period of time prior to sale.

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**diadromous** – fish that move during their life cycle between fresh and marine waters, e.g. salmon and eels.

**discards** – fish and other organisms caught by fishing gear and then thrown back into the sea for legal, economic or other reasons.

**dredges** – gear which is dragged along the bottom to catch shellfish. They consist of a mouth frame to which a holding bag constructed of metal rings or meshes is attached. There are two main types of dredges; heavy dredges towed by boats (boat dredges), and lighter ones operated by hand in shallow waters (hand dredges).

**dredging** – a fishing method used along the seabed for catching bivalve mollusks such as oysters, clams and scallops.

**drift net** – a gill net suspended vertically in the water that floats unrestrained in the open ocean.

**E echosounder** – an instrument that uses sound to detect and identify fish and for the determination of the depth of the water and/or nature of the seabed.

**economic overfishing** – a level of fish harvesting that is higher than that of economic efficiency; harvesting more fish than necessary to have maximum profits for the fishery.

**ecosystem approach** – the ecosystem approach to fisheries management involves a consideration of all the physical, chemical and biological variables within an ecosystem, taking into account all of their complex interactions.

**ecosystem services** – the benefits people obtain from ecosystems. These include provisioning services, such as food and water; regulating services, such as flood and disease control; cultural services, such as spiritual and cultural benefits; and supporting services, such as nutrient cycling, that maintain the conditions for life on Earth.

**ectoparasite** – a parasite that attaches itself to and lives off the external surface of an animal like a fish.

**effluent** – the material flowing from an aquaculture facility into a treatment system or a nearby water body. The waste stream can include uneaten feed, feces, chemicals, and escaped fish.

**Endangered Species Act (ESA)** – a statute which was enacted in 1973 to conserve species and ecosystems. Under its auspices, species facing possible extinction are listed as threatened or endangered, or as candidate species for such listings. When such a listing is made, recovery and conservation plans are drawn up to ensure the protection of the species and its habitat.

**endemism** – of or relating to a native species or population occurring under highly restricted conditions due to the presence of a unique environmental factor that limits its distribution.

**escapement** – the number or proportion of fish surviving (escaping from) a given fishery at the end of the fishing season and reaching the spawning grounds. The term is generally used for salmon management.

**euryhaline** – organisms able to tolerate a wide range of salinity.

**eutrophication** – the gradual increase in nutrient concentration in a body of water. Eutrophication is a natural process, which happens gradually over time; however, it can be accelerated through the actions of human activity. An increase in nutrients leads to an increase in primary production. When the plants die, the decomposition process depletes the water of oxygen resulting in anoxic conditions, thus rendering the environment unsuitable for most species of aquatic organisms.

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**Evolutionary Significant Unit (ESU)** – a distinctive group of Pacific salmon, steelhead, or sea-run cutthroat trout that is uniquely adapted to a particular area or environment and cannot be replaced.

**exclusive economic zone (EEZ)** – an area in which a coastal state has sovereign rights over all the economic resources of the sea, seabed and subsoil. Established by international law by the Law of the Sea treaty.

**extirpation** – the loss of a local population (distinct from extinction – the loss of an entire species).

**F factory trawler** – a large stern trawler equipped with plant for gutting, filleting, freezing and storing fish, and for processing fish oil and fishmeal. Such vessels usually have extensive superstructures.

**fecundity** – potential reproductive capacity of an organism or population expressed in number of eggs (fertile or not) produced during each reproductive cycle.

**finning** – the practice of removing fins and discarding the carcass, usually pertaining to sharks.

**fish aggregating device (FAD)** – a permanent, semi-permanent or temporary structure or device made from any material and used to lure fish.

**fishery** – the sum of all fishing activities on a given resource, e.g. shrimp fishery, or activity of catching fish from one or more stocks e.g., North Sea cod fishery, or it may also refer to a single type or style of fishing, e.g., trawl fishery.

**Fishery Conservation and Management Act (FCMA)** – the Fishery Conservation and Management Act of 1976 is the Federal law that created the regional fishery management councils and is the Federal government's basis for fisheries management in the U.S. Exclusive Economic Zone (EEZ). It has been reauthorized a number of times and was renamed the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) in honor of the late Washington Senator, Warren G. Magnuson, in 1980, and in 1996, added Alaska Senator Ted Stevens.

**fishing capacity** – the quantity of fish that can be taken by a fishing unit, i.e. individual, community, vessel or fleet.

**fishing effort** – the amount of fishing gear of a specific type used over a given unit of time, e.g. hours trawled per day; the overall amount of fishing expressed in units of time e.g. number of hauls per boat per day.

**fishing intensity** – 1. In general, and mainly for trawling, the fishing effort exerted per unit of areas (e.g. in hours of trawling per 100 square miles). In stock assessment theory, the effective (or standard) fishing effort per unit area must be proportional to fishing mortality through the relation  $F = q(f/A)$  where  $(f/A)$  is the fishing intensity, and  $q$  is the catchability coefficient; 2. Effective fishing effort; 3. Fishing effort per unit area; 4. Effectiveness of fishing.

**fishmeal** – the primary protein source for farmed carnivorous fish. Small pelagic fish, such as anchovy, pilchard, herring, sardine, sand eel, sprat, and capelin, are caught, processed into fishmeal pellets, and fed to cultured organisms.

**floatline** – the top line on nets like purse seines or gillnets. They usually contain floats so that the nets do not collapse in on themselves.

**flow-through system** – flow-through systems, or raceways, are a type of aquaculture system. Water continuously flows through concrete troughs or tanks - fresh water enters the system and remains in the holding tank area until discharged when the water quality has declined. The constant water flow can occur by natural means through the diversion of rivers or streams, or it can be pumped from wells.

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**footrope** – the rope along the bottom of a trawl net's opening. Small footropes can get caught or tangled in rocky reef areas, so regulations that require small footropes protect these rocky areas by encouraging fishermen to fish elsewhere.

**forage species** – species used as prey by a larger predator for its food. Includes small schooling fishes such as anchovies, sardines, herrings, capelin, smelts, and menhaden, and invertebrates such as squid.

**fry** – juvenile fish.

**G generation time** – a measure of the time required for a female to produce a reproductively-active female offspring for use in setting maximum allowable rebuilding time periods.

**ghost fishing** – the accidental capture of aquatic organisms by fishing gear (usually gillnets, or traps, pots, etc.) that has been lost or discarded into the sea and which continues to entangle or trap aquatic animals.

**gillnet** - strings of single, double or triple netting walls, vertical, near the surface, in midwater or on the bottom, in which fish will gill, entangle or enmesh. Gillnets and entangling nets have floats on the upper line (headrope) and, in general, weights on the ground-line (footrope). Gillnets or entangling nets consist of single or, less commonly, double (both are known as "gillnets", strictly speaking) or triple netting (known as "trammel net") mounted together on the same frame ropes. Several types of nets may be combined in one gear (for example, combined gillnets-trammel nets). These nets can be used either alone or, as is more usual, in large numbers placed in line ('fleets' of nets). The gear can set, anchored to the bottom or left drifting, free or connected with the vessel.

**ground fish** – another term for demersal fish.

**H hatchery** – the place where fertilized eggs are grown to become fry before being transferred to freshwater tanks.

**highgrading** – a form of selective sorting of fish in which higher value, more marketable fish are retained and fish that could be legally retained, but are less marketable, are discarded.

**high seas** – all waters beyond the Exclusive Economic Zone (EEZ) (>200 nautical miles) of the United States and beyond any foreign nation's EEZ.

**hook and line** – gear where the fish is attracted by a natural or artificial bait (lures) placed on a hook fixed to the end of a line, on which they get caught. Hooks or metallic points (jigs) are also used to catch fish by ripping them when they pass in its range of movement. Hook and line units may be used singly or in large numbers.

**hydroponics** – a method of raising plants in nutrient-rich water, rather than soil. A polyculture operation can be set up in conjunction with a hydroponic system in which plants feed off of the nutrients contained in fish wastes.

**I ichthyoplankton** – fish eggs and larvae belonging to the planktonic community.

**incidental take** – the "take" of protected species (such as listed salmon, marine mammals, sea turtles, or sea birds) during fishing. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct.

**industrial fisheries** – fisheries which do not target species for direct human consumption, i.e. the capture of fish for reduction into fishmeal and fish oil.

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**International Council for the Exploration of the Sea (ICES)** – an international organization comprised of member countries that border the North Atlantic. Established by international convention in 1902, ICES is the intergovernmental marine science organization developing scientific advice to help manage fisheries.

**International Union for Conservation of Nature (IUCN)** – every four years, IUCN publishes a “Red List” – an inventory of the current global conservation status of plant and animal species – to raise awareness of species threatened with extinction (Critically Endangered, Endangered or Vulnerable) and promote their conservation.

**invasive species** – an introduced species that out-competes native species for space and resources.

**isobath** – a line on a map connecting points of equal bathymetry, i.e. equal depth, in the ocean or another water body.

**J jig** – lures used on a vertical line that is moved up and down (jigged) by hand or mechanically. Often used at night for fishing oceanic squid.

**juvenile** – a young fish or animal that has not reached sexual maturity.

**L landings** – 1. The number or poundage of fish unloaded by commercial fishermen or brought to shore by recreational fishermen for personal use. Landings are reported at the locations at which fish are brought to shore; 2. The part of the catch that is selected and kept during the sorting procedures on board vessels and successively discharged at dockside.

**life history**-the series of living phenomena exhibited by an organism in the course of its development from inception to death.

**long-lining** – uses both vertical and horizontal lines, often a number of miles long, to which short lengths of line (snoods) carrying baited hooks are attached at intervals.

**M Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act)** – federal legislation responsible for establishing the fishery management councils (FMCs) and the mandatory and discretionary guidelines for Federal fishery management plans (FMPs). This legislation was originally enacted in 1976 as the Fishery Management and Conservation Act; its name was changed to the Magnuson Fishery Conservation and Management Act in 1980, and in 1996 it was renamed the Magnuson-Stevens Fishery Conservation and Management Act.

**mariculture** – 1. Marine fish farming (aquaculture). Raising of marine animals and plants in the ocean; 2. The raising of marine finfish or shellfish under some controls. Ponds, pens, tanks, or other containers may be used, and feed is often used. A hatchery is also mariculture but the fish are released before harvest size is reached.

**marine** – waters that receive no freshwater input from the land and are substantially of full oceanic salinity (>30 practical salinity units (PSU) throughout the year).

**marine protected area (MPA)** – geographic area with discrete boundaries that has been designated to enhance the conservation of marine resources. This includes MPA-wide restrictions on some activities such as oil and gas mining and the use of zones such as fishery and ecological reserves to provide higher levels of protection.

**marine reserve** – a geographically defined space in the marine environment where special restrictions are applied to protect some aspect of the marine ecosystem including plants, animals, and natural habitats.

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**maximum sustainable yield (MSY)** – maximum amount of a species that can be taken by a fishery without diminishing the future take.

**metapopulation** – a population that consists of a series of physically separate subpopulations linked by dispersal. Metapopulations persist as a result of a balance between extinctions of subpopulations and recolonization of habitat patches (and hence reestablishment of subpopulations).

**moratorium** – a mandatory cessation of fishing activities on a species (e.g. the blue whale), in an area (e.g. a sanctuary), with a particular gear (e.g. large scale driftnets), and for a specified period of time (temporary, definitive, seasonal, or related to reopening criteria).

**multispecies fishery** – a fishery in which more than one species is caught at the same time. Because of the imperfect selectivity of most fishing gears, most fisheries are "multispecies". The term is often used to refer to fisheries where more than one species is intentionally sought and retained.

**N National Marine Fisheries Service (NMFS)** – federal agency within the National Oceanic and Atmospheric Administration (NOAA) and responsible for overseeing fisheries science and regulation of the fisheries.

**National Oceanic and Atmospheric Administration (NOAA)** – a bureau within the Department of Commerce responsible for atmospheric, ocean, and coastal sciences and Federal management.

**native species** – a local species that has not been introduced.

**netpen system** – an aquaculture system that consists of mesh enclosures (or sometimes cages), typically placed in coastal areas. The outside structures may be rigid or semi-rigid. The system design relies upon dilution as the solution to pollution. There is no effective barrier between the netpen interior and the ocean. Wastes are emitted directly into the surrounding waters. The system design also creates the potential for farmed individuals to escape into the wild.

**nominal catch** – the sum of the catches that are landed (expressed as live weight or equivalents). Nominal catches do not include unreported discards.

**non-point sources** – sources of sediment, nutrients, or contaminants that originate from many locations.

**O ocean ranching** – release of farm-raised juveniles into the wild to supplement wild fisheries. The release of the captive-reared individuals is common in areas where stocks of fish are depleted due to overfishing, habitat destruction or pollution. The term ranching is also used to refer to the aquaculture practice of capturing juvenile fish from the wild and rearing them in cages. The fish are kept in cages and are fattened up until harvested at their optimal size and weight. This practice is common in Australia and the Mediterranean with bluefin tuna.

**olympic fishing** – a popular term to denote the "race-to-fish" phenomenon which is characterized by an increasing number of highly efficient vessels fishing at an increasing pace, with season length becoming shorter and shorter.

**organic aquaculture** – an aquaculture system in which food production is managed as an integrated, whole system where all individual parts are meshed together. All parts of the operation are connected to each other: the nutrient inputs, the animals, the environment, and the wastes. The use of antibiotics, genetically engineered organisms, or animal products in the feed is prohibited under most organic culture system standards.

**otolith**-the ear bone of a fish. Otoliths have rings on them like the rings on a tree stump, and are used to find the age of the fish and its growth rate.

**otter trawl** – a large cone-shaped net, which is towed across the seabed. Also called a bottom trawl.

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**overcapacity** – a level of fishing pressure that threatens to reduce a stock or complex below the abundance necessary to support maximum sustainable yield (MSY) and allow an economically sustainable fishing industry.

**overfishing** – 1. According to the National Standard Guidelines, "overfishing occurs whenever a stock or stock complex is subjected to a rate or level of fishing mortality that jeopardizes the capacity of a stock or stock complex to produce maximum sustainable yield (MSY) on a continuing basis". Overfishing is occurring if the maximum fishing mortality threshold (MFMT) is exceeded for 1 year or more; 2. In general, the action of exerting fishing pressure (fishing intensity) beyond the agreed optimum level. A reduction of fishing pressure would, in the medium term, lead to an increase in the total catch.

**P** **paralytic shellfish poisoning (PSP)** – condition in humans caused by the ingestion of bivalve mollusks that have accumulated dangerous levels of neurotoxins from plankton.

**pinger** – acoustic device designed to deter marine mammals from entanglement in fishing nets.

**poaching** – catching fish for which no quota is held. Illegally harvesting fish.

**point source** – a source of sediment, nutrients, or contaminants into a water body that comes from one discharge location.

**polyculture** – the raising of two or more species in the same aquaculture system. It may involve animals, plants, or plants and animals together. One example would be that of rearing of fish within rice paddies, a common type of polyculture practiced in China. The fish keep mollusks and insects in check - these organisms can cause damage to the rice. The fish can also stir up soil nutrients and make them available to the plants.

**pond system** – one of the earliest types of aquaculture to be practiced. Ponds can either be natural or artificially constructed. They are usually shallow, with sides that are not too steep in order to prevent erosion. Tilapia, catfish, and carp are most commonly cultured in ponds.

**pot** – a trap used to capture fish, especially crustaceans.

**purse seine** – nets characterized by the use of a purse line at the bottom of the net. The purse line enables the net to be closed like a purse and thus retain all the fish caught. The purse seines, which may be very large, are operated by one or two boats. The most usual case is a purse seine operated by a single boat, with or without an auxiliary skiff.

**Q** **quota** – a specified numerical harvest objective, the attainment (or expected attainment) of which causes closure of the fishery for that species or species group.

**R** **recirculating system** – recirculating systems are closed, or semi-closed, systems in which most, or all, of the water is recirculated throughout the system and very little is discharged. Water that would otherwise be discharged as wastes is treated and recirculated for re-use within the system.

**recreational fishery** – harvesting fish for personal use, sport, and challenge (e.g. as opposed to profit or research). Recreational fishing does not include sale, barter, or trade of all or part of the catch.

**recruit** – 1. A young fish entering the exploitable stage of its life cycle; 2. A member of "the youngest age group which is considered to belong to the exploitable stock."

**red tide** – proliferation of marine plankton that is toxic and often fatal to fish. This natural phenomenon is stimulated by phosphorus and other nutrients that are discharged into waterways by human beings. The color of the tide can be red, yellow, green, or brown.

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**retention** – in stock assessment, the probability of a fish encountering fishing gear (hook, webbing, mesh, trap) and being retained by it after coming in contact with it. Often expressed as a function of size or age.

**run** – seasonal migration undertaken by fish, usually as part of their life history; for example, spawning run of salmon, upstream migration of shad. Fishers may refer to increased catches as a "run" of fish, a usage often independent of their migratory behavior.

**S** **seasonal closure** – close season. The banning of fishing activity (in an area or of an entire fishery) for a few weeks or months, to protect juveniles or spawners.

**seine net** – a very long net, with or without a bag in the center, which is set either from shore or from a boat for surrounding a certain area and is operated with two (long) ropes fixed to its ends (for hauling and herding the fish).

**shellfish** – as opposed to finfish. A collective term used to describe mollusks and crustacea.

**smolt** – an adolescent salmon which has metamorphosed and which is found on its way downstream toward the sea.

**spat** – the stage in a mollusk's lifecycle in which it goes from being free swimming to attaching itself to a substrate.

**spawn** – release of eggs into the water; either fertilized or to be fertilized.

**spill-over effects** – sometimes referred to as externalities, an unintended effect (positive or negative, benefit or cost) imposed on others and not borne by the party responsible for the effect.

**stock** – term given to a group of individuals or populations in a species occupying a well-defined spatial range independent of other stocks of the same species. Fisheries are often managed by 'stocks.'

**surimi** – protein paste derived from processing raw fish, primarily Alaska (walleye) pollock and Pacific whiting (hake). Surimi can be combined with flavoring agents and other substances and extruded to create marketable foodstuffs (e.g. imitation crab meat).

**surrounding net** – large netting walls set for surrounding aggregated fish both from the sides and from underneath, thus preventing them from escaping by diving downwards. Apart from a few exceptions, these are surface nets.

**sustainability** – 1. Ability to persist in the long-term. Often used as "short hand" for sustainable development; 2. Characteristic of resources that are managed so that the natural capital stock is non-declining through time, while production opportunities are maintained for the future.

**T** **target fishing** – fishing for the primary purpose of catching a particular species or species group.

**total allowable catch (TAC)** – the annual recommended or specified regulated catch for a species or species group. The regional fishery management council sets the TAC from the range of acceptable biological catch (ABC).

**total catch** – total catch (optimum yield, OY). The landed catch plus discard mortality.

**Tragedy of the Commons** – the overuse of a resource resulting from a lack of assigned and enforceable property rights.

**traps** – either large stationary nets or barrages or pots, are gear in which the fish are retained or enter voluntarily and are hampered from escaping. They are designed in such a manner that the entrance itself becomes a non-return device, allowing the fish to enter the trap but making it impossible to leave the catching chamber. Traps are baited or not. Other types of traps are provided with large guiding panels made from netting to lead the fish into the catching chamber. Different materials are used for building a trap; wood, split bamboo, netting wire are some examples.

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**trawling** – fishing technique in which a net is dragged behind the vessel and retrieved when full of fish. This technique is used extensively in the harvest of pollock, cod, and other flatfish in North Pacific and New England fisheries. It includes bottom- and midwater fishing activities.

**trawl net** – cone-shaped nets which are towed, by one or two boats, on the bottom or in midwater. The cone-shaped body ends in a bag or cod end. The horizontal opening of the gear while it is towed is maintained by beams, otter boards or by the distance between the two towing vessels (pair trawling). Floats and weights and/or hydrodynamic devices provide for the vertical opening. Two parallel trawls might be rigged between two otter boards (twin trawls). The mesh size in the cod end or specially designed devices is used to regulate the size and species to be captured.

**trolling** – a surface and subsurface fishing method in which lines with baits or lures are dragged by a vessel at a speed of 2-10 knots. Trolling is used to catch tuna and tuna-like fish.

**turtle excluding device (TED)** – turtles can be excluded from trawl nets by fitting solid grids of various kinds into the net. These ‘trap doors’ are designed to reduce turtle bycatch, particularly in tropical prawn fisheries.

**U underfished** – characteristic of a stock that may sustain catches higher than current ones.

**underutilized species** – a species of fish that has potential for large additional harvest.

**usable stock** – the number or weight of all fish in a stock that lie within the range of sizes customarily considered usable (or designated so by law). Also called: standing crop.

**V vertical integration** – a fishery (or industry) is vertically integrated when firms in the fishery engage in multiple levels of the supply chain. For example, a firm that operates and manages fishing vessels, processing plants, and a wholesale distribution operation is considered vertically integrated.

**Y year class** – fish in a stock born in the same year. For example, the 1987 year class of cod includes all cod born in 1987. This year class would be age 1 in 1988, age 2 in 1989, and so on. Occasionally, a stock produces a very small or very large year class that can be pivotal in determining stock abundance in later years.

**yield** – 1. The yield curve is the relationship between the expected yield and the level of fishing mortality or (sometimes) fishing effort; 2. Catch in weight. Catch and yield are often used interchangeably. Amount of production per unit area over a given time. A measure of agricultural production.

**Z zoning** – a process in which a protected area is divided into discrete zones and particular human uses of each zone is permitted, often with conditions such as gear limitations in fishing and waste discharge prohibitions in tourism.

**zooplankton** – non-photosynthetic, heterotrophic planktonic organisms, including protists, small animals, and larvae, which exist within the water column.