

## 2003 COSEE Summer Institute

### A GLOSSARY OF SELECTED TERMS USED IN FISHERY SCIENCE

Modified from *Understanding Fisheries Management* by Richard Wallace and Kristen Fletcher, MASGP-00-005 (2000) and from the NOAA, Northeast Fisheries Science Center's website - [http://www.nefsc.noaa.gov/techniques/tech\\_terms.html](http://www.nefsc.noaa.gov/techniques/tech_terms.html)

**Absolute Recruitment:** The number of fish that grow into the catchable size range in a unit of time (usually a year).

**Abundance Index:** Information obtained from samples or observations and used as a measure of the weight or number of fish that make up a stock.

**Age:** The number of years of life completed, here indicated by an Arabic numeral, followed by a plus sign if there is any possibility of ambiguity (age 5, age 5+).

**Allocation:** The distribution of a resource among user groups.

**Annual (or Seasonal) Total Mortality Rate:** The number of fish that die during a year (or season), divided by the initial number.

**Benthic:** Organisms that live on or near the bottom.

**Biomass:** Measure of the quantity, usually by weight in pounds or metric tons (2,205 pounds = 1 metric ton), of a stock at a given time: total weight or volume of a species in an area.

**By-catch:** The harvest of fish or shellfish other than the species for which the fishing gear was set. Crabs and fish caught while trawling for shrimp are by-catch. Also called incidental catch.

**Catch:** The total number or pounds of fish captured from an area over some period of time. This includes fish that are caught but released or discarded instead of being landed. Catch, harvest, and landings have different definitions.

**Catchability:** The fraction of a fish stock that is caught by a defined unit of the fishing effort.

**Catch Per Unit of Effort (CPUE, C/E):** The catch of fish, in numbers or in weight, taken by a defined unit of fishing effort. Also called: catch per effort, fishing success.

**Cohort:** A group of fish spawned during a specified period, usually within a year.

**Commercial Fishery:** A term that encompasses the whole process of catching, processing, and marketing fish/shellfish. It includes the fisheries resource, fishermen, and related businesses.

**Common Property Resource:** A resource owned by the public and regulated by the government to ensure its future benefits.

**Conditional Fishing Mortality Rate:** The fraction of an initial stock that would be caught during the year (or season) if no other causes of mortality operated. Also called fishing mortality rate.

**Conditional Natural Mortality Rate:** The fraction of an initial stock that would die from causes other than fishing during a year (or season), if there were no fishing mortality. Also called annual natural mortality rate, seasonal natural mortality rate.

**Demersal:** Fish that live near the bottom.

**Essential Fish Habitat:** Those waters and substrate necessary to a species for spawning, breeding, feeding, or growth to maturity.

**Exclusive Economic Zone (EEZ):** All waters from the seaward boundary of coastal states out to 200 nautical miles; formerly called the Fishery Conservation Zone (FCZ).

**Exploitation pattern:** The distribution of fishing mortality over the age composition of the fish population, determined by the type of fishing gear, area and seasonal distribution of fishing, and the growth and migration of the fish. The pattern can be changed by modifications to fishing gear, for example, increasing mesh or hook size, or by changing the ratio of harvest by gears exploiting the fish (e.g., gill net, trawl, hook and line, etc.).

**Exploitation rate:** The proportion of a population at the beginning of a given time period that is caught during that time period (usually expressed on a yearly basis). For example, if 720,000 fish were caught during the year from a population of 1 million fish alive at the beginning of the year, the annual exploitation rate would be 0.72.

**Ex-vessel:** Activities that occur when a commercial fishing boat lands or unloads a catch. The price paid to the fishermen for the catch is the ex-vessel value of the species landed.

**Fishery:** All the activities involved in catching a species of fish or shellfish.

**Fishing Effort:** The total fishing gear in use for a specified period of time. When two

or more kinds of gear are used, they must be adjusted to some standard type.

**Fishing Mortality:** Deaths in a fish stock caused by fishing.

**Fishing Power:** The catch that a particular gear or vessel takes from a given density of fish during a certain time interval. For example, larger vessels (horsepower) have a greater ability to catch more fish, thus the greater their fishing power. Also, improvements in a vessel or gear, such as fish finders, Loran, etc., can increase fishing power.

**Growth Overfishing:** When fishing pressure on smaller fish is too heavy to allow the fishery to produce its maximum poundage.

**Harvest:** The total number or pounds of fish kept from an area over a period of time. Catch, harvest, and landings have different definitions.

**Individual Transferable Quota (ITQ):** A form of limited entry that gives private property rights to fishermen by assigning them a fixed share of the catch.

**Landings:** The number or pounds of a species unloaded at a dock by commercial fishermen. Catch, harvest, and landings have different definitions.

**Length Frequency:** An arrangement of recorded lengths that indicates the number of times each length or length interval occurs.

**Limited Entry:** A program that changes a common property resource like fish into private property for individual fishermen. Limiting the number of fishing licenses sold and the use of ITQ's are two forms of limited entry.

**Long-term Potential Catch:** The largest annual harvest, in weight, that can be removed from a fish stock year after year, under existing environmental conditions.

**Magnuson-Stevens Fishery Conservation and Management Act:** Federal Law that created the regional fishery management councils and is the federal government's basis for fisheries management in the EEZ.

**Marine Protected Area:** Any area of the marine environment reserved by Federal, State, territorial, tribal, or local laws or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein.

**Marine Reserve:** 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.

**Mark-recapture:** The tagging and release of a species to be caught or recaptured at a later time. Used to study fish movement, migration, mortality, growth, and population size.

**Maximum Sustainable Yield (MSY):** The largest average catch or yield that can continuously be taken from a stock under existing environmental conditions. (For species with fluctuating recruitment, the maximum might be obtained by taking fewer fish in some years than in others.) Also called: maximum equilibrium catch; maximum sustained yield; sustainable catch.

**Mortality rates:** Mortality rates are critical for determining the abundance of fish populations and the effects of harvesting strategies on yield and spawning potential from a stock. Fish abundance is a balance between the factors that act to increase the stock (births) and factors that decrease population numbers (deaths). When births exceed deaths, the stock increases, and vice-versa. The stock is brought into stability when the number of recruits entering the fishery balances the number of deaths. Fishery managers can control deaths caused by fishing by manipulating the sizes of fish vulnerable to the gear. Fishing mortality can be changed through indirect methods, such as regulating mesh size to make fish of certain ages less vulnerable to the gear. Direct control measures, such as catch quotas or effort limits, determine the rate of fishing mortality on the vulnerable sizes. The total number of births is determined by the abundance of breeders in the population for many species. The spawning stock can also be manipulated by managers.

Mortality occurs at all life stages of the population. Depending on the species, mortalities suffered from the egg to larval stages are usually very high, less so from the larval to juvenile stage. In young fish, death can occur from several causes: starvation, predation, or disease. If fish survive their first year, these natural causes of death usually decline dramatically, and in many cases, fishing becomes the dominant source of mortality. Pollution may also add to the death rate of the population. Generally, young fish are more vulnerable to pollution mortalities than are older fish. Knowing the sources and levels of mortalities affecting fish populations is a critical ingredient of forecasting both landings and spawning stock sizes, and in evaluating the changes in populations that may be induced by regulations such as minimum mesh sizes, minimum fish lengths, quotas, effort limits, and area closures. The rate at which the stock is harvested is usually estimated by calculating the abundance of a cohort or year class over successive years to determine how rapidly it is declining. The total mortality of the population is the sum of deaths due to both natural and fishing-related causes.

**Natural Mortality:** Deaths in a fish stock caused by predation, pollution, senility, etc., but not fishing.

**Optimum Yield:** The yield from a fishery which provides the greatest overall benefit to the nation with particular reference to food production and recreational opportunities;

it is based on MSY as modified by economic, social or ecological factors.

**Overfishing:** Harvesting at a rate equal to or greater than that which will meet the management goal, usually the MSY.

**Parameter:** A "constant" or numerical description of some property of a population (which may be real or imaginary).

**Pelagic:** Fish that spend most of their life swimming in the water column as opposed to resting on the bottom are known as pelagic species.

**Population:** A group of individuals of the same species living in a certain area.

**Population Dynamics:** The study of fish populations and how fishing mortality, growth, recruitment, and natural mortality affect them.

**Production:** The total elaboration of new body substance in a stock in a unit of time, irrespective of whether or not it survives to the end of that time.

**Quota:** A portion of a total allowable catch (TAC) allocated to an operating unit, such as a vessel class or size or a country.

**Recruitment:** The amount of fish added to the exploitable stock each year due to growth and/or migration into the fishing area. For example, the number of fish that grow to become vulnerable to the fishing gear in one year would be the recruitment to the fishable population that year. This term is also used in referring to the number of fish from a year class reaching a certain age. For example, all fish reaching their second year would be age 2 recruits.

**Recruitment Overfishing:** The rate of fishing above which the recruitment to the exploitable stock becomes significantly reduced. This is characterized by a greatly reduced spawning stock, a decreasing proportion of older fish in the catch, and generally very low recruitment year after year.

**Relative Abundance:** An index of fish population abundance used to compare fish populations from year to year. This does not measure the actual numbers of fish, but shows changes in the population over time.

**Shellfish:** A general term for crustaceans and molluscs.

**Spawning Stock Biomass:** The total weight of all sexually mature fish in the population. This quantity depends on year class abundance, the exploitation pattern, the rate of growth, fishing and natural mortality rates, the onset of sexual maturity and environmental conditions.

**Stock:** A part of a fish population usually with a particular migration pattern, specific spawning grounds, and subject to a distinct fishery. A fish stock may be treated as a total or a spawning stock. Total stock refers to both juveniles and adults, either in numbers or by weight, while spawning stock refers to the numbers or weight of individuals that are old enough to reproduce.

**Sustainable Yield:** The number or weight of fish in a stock that can be taken by fishing without reducing the stock biomass from year to year, assuming that environmental conditions remain the same.

**Total Allowable Catch (TAC):** The total regulated catch from a stock in a given time period, usually a year.

**Year Class (or Cohort):** Fish in a stock born in the same year. For example, the 1987 year class of croaker includes all croaker born in 1987, which would be age 1 in 1988. Occasionally, a stock produces a very small or very large year class that can be pivotal in determining stock abundance in later years.

**Yield:** The production from a fishery in terms of numbers or weight.