26. EMAX Glossary
Carolyn A. Griswold

Assimilation Efficiency (AE) - In an animal, the percentage of energy content of ingested food absorbed across the gut wall. In primary producers, the percentage of solar visible light fixed by photosynthesis.

Biomass (B) - Living weight, including stored food; the amount of living matter as in a unit area or volume of habitat. Measure of the quantity of a stock at a given time, usually by weight in pounds or metric tons (2,205 pounds = 1 metric ton).

Bycatch - Many fishers are catching more unwanted species, juveniles, and other marine wildlife than they intend. These non-target species are known as bycatch. Annually, 30 million metric tons - more than 25 per cent of all fish caught - is being thrown over the side of fishing boats, dead or dying.

Catch - Fishery removal which is considered fishing mortality. The catch can consist of targeted species and bycatch or discards.

Chlorophyll - Using satellite sensors, we can measure chlorophyll concentrations in oceans, lakes and seas to indicate the distribution and abundance of phytoplankton. Phytoplankton are the base of the marine food chain and, therefore, are a good indicator of the abundance of life in a body of water.

Consumption (C) - The process of taking food into an organism (eating, ingestion, intake, uptake, etc.). Reported as a rate.

Consumption:Biomass (C:B) - A ratio.

Consumption:Production (C:P) - A ratio.

Consumptive flows - The amount of biomass flowing into a network node from other sources (typically predation).

Consumptive removals - The sum of removals via predation from all sources.

Diet composition - Any matter or combination of matter ingested by an indiviual or defined group of organisms for any given time period. Usually expressed as a percentage.

Discards - The portion of a catch not used and thrown away at sea.

Dry weight (dw) – Mass of tissue minus the weight of free water**.**

Ecological efficiency - A mathematical statement of the ratio between the energy available to an organism or group or group processes, and the energy actually expended. A 10 % gain is average, 20 % is very good, and 5 % is typical of the top of the food chain.

Ecotrophic Efficiency (EE) - The fraction of production (P= B*[P:B]) consumed or caught within the system (including net migration and biomass accumulation). EE can be for one species or a species guild.

Egestion - Expulsion of non-assimilated matter (excess and/or unused food) from the body.

Excretion - Discharge or elimination of an absorbed or endogenous substance or of a waste product, and/or their metabolites, through some tissue of the body and its appearance in urine, feces, or other products normally leaving the body. Also the act or process of discharging waste or other matter from the blood, tissues, or organs.

Fishery removal - The sum of fishing mortality. Added together with natural mortality, they equal total mortality.

Gross Growth Efficiency (GGE) - Secondary Production (P)/Consumption (C), where P is composed of growth + reproduction, while C is the food ingested. Consumption = Secondary Production (P) + Respiration (R) + Egestion (E). The EcoNetwrk program uses P = Production + Egestion (E), where E represents unassimilated consumption, which is an important parameter in Ecopath with Ecosim (EwE). P:C is sometimes referred to as k1.

Gross primary production/productivity - The total amount of organic matter produced by autotrophs.

Gross production - The total rate of photosynthesis including the organic matter used up in respiration during the measurement period. This is also known as total photosynthesis or total assimilation and can be expressed as g C m^{-2} day^{-1}.

Growth - A change in size over time (a rate). A value is obtained by dividing the change by the period of time elapsed during the change.

Input – In the model, parameters (C:B, P:B, R:B, diet composition matrix, etc.) or external forcing used to initialize the model.

Interaction matrix - A table in which the cell elements are rankings. In the context of a fisheries ecosystem, the table would indicate who ate whom.

Landings - The amount of fish or shellfish by weight (expressed as live weight or equivalents) that is brought ashore (or to a factory ship), usually for sale. Nominal catches do not include unreported discards.

Mass balance - These equations are based on an assumption of steady state equilibrium of biomass, and formulate that for any given group its production can be described as:

Production = Catches + Predation + Biomass Accumulation
+ Net Migration + Other Mortality

And further, that

Consumption = Production + Unassimilated Food + Respiration

At steady state (EMAX), the consumptive flows = productive flows. Ecopath can be operated in a non-steady state mode which allows biomass to accumulate in a compartment. Since Ecopath is not a dynamic simulation model, it provides a static picture of the biomass and flows within the ecosystem at one point in time (usually yearly average).

Net Growth Efficiency (NGE) - Secondary Production (P)/Assimilation (A), where A = C - E or C x Assimilation Efficiency (AE) = A. Assimilated energy is composed of P + R (Respiration). P:A is sometimes referred to as k2.

Net production - The amount of organic matter produced by plants and remaining after subtracting the matter consumed by respiration.

Other removals - The amount of biomass removed from other sources. In EMAX this refers to ship strikes of large marine mammals.

Output - Generated by the model and can be either biotic or abiotic. This information is used to evaluate model performance, network balance, and scenario outcome.

Primary production/productivity - The photosynthesis and production of organic matter by plants from inorganic material and sunlight energy.

Net primary production/productivity - The energy remaining after respiratory needs have been met, i.e., Net Primary Production = Gross Primary Production – Respiration, expressed as grams of carbon fixed per squre meter of sea surface per unit of time.

Production:biomass (P:B) - A ratio.

Production:respiration (P:R) - A ratio.

Productive flows - The allocation of biological production from one compartment to a set of recipient compartments.

Reproduction - The process by which a new organism is produced.

Respiration (R) - The bodily processes involved in exchange of oxygen and carbon dioxide between an organism and the environment.

Respiration:biomass (R:B) - A ratio.

Respiration:consumption (R:C) - A ratio.

Sloppy feeding - Loss of material due to inefficient feeding. For example, when prey is large relative to a copepod (e.g., during a bloom of large cells), copepods are not an efficient link to higher trophic levels. They lose significant amounts of what they clear to the surroundings as dissolved material (DOC).

Total production (P) - The total amount of biomass produced, including any respiratory losses.

Transfer efficiency - The fraction of energy that is usefully transferred, usually expressed as a percentage.

Wet weight (ww) – Mass of tissue including water content.