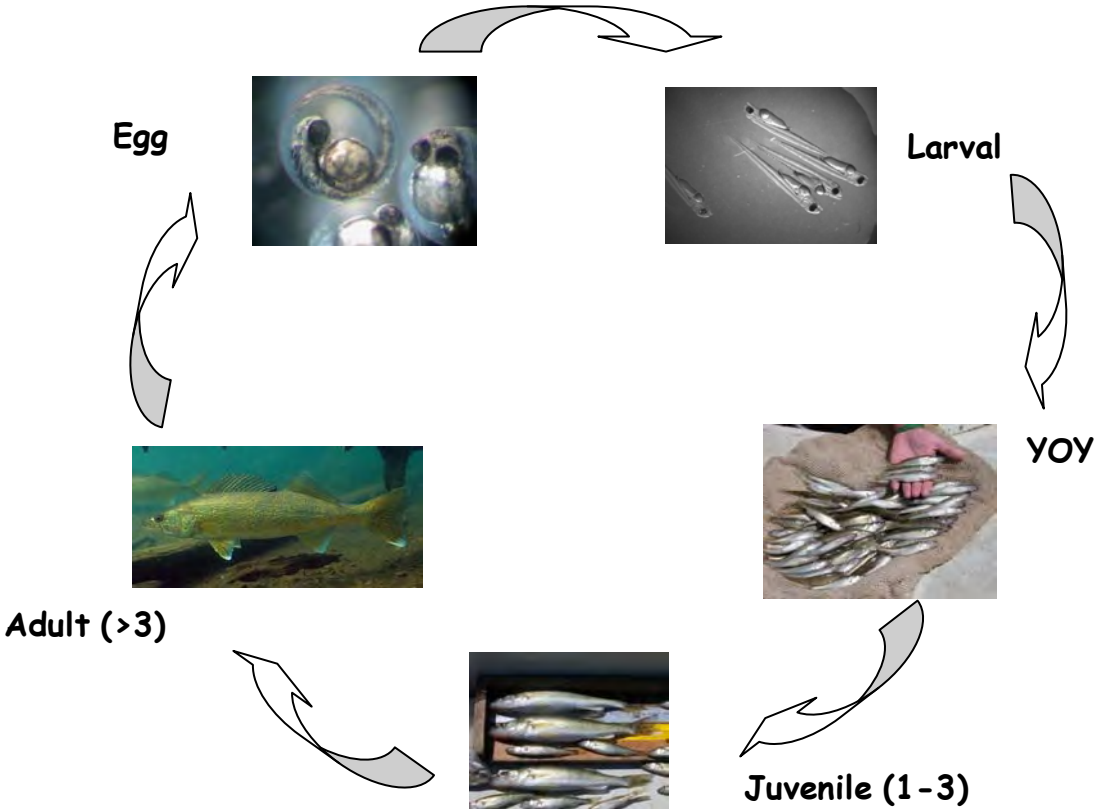


Glossary of Fisheries Terms and DNR Sampling Techniques on Leech Lake
Prepared for Leech Lake Advisory Committee

Minnesota Department of Natural Resources
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Abundance: Biomass (such as total pounds or pounds per acre) or numbers of individuals in a population, a portion of the population (such as year class), or a sample.

Angler catch rate: the rate fish are caught. Includes fish that are kept and released by anglers per hour spent fishing.

Angler harvest rate: the rate fish are harvested (released fish not counted) by anglers per hour spent fishing.

Angler-hour: One hour of fishing by a single angler.

Biomass: The aggregate weight of a given group of organisms. When biomass is expressed as per unit area or volume (e.g., lb/acre) it is often called standing stock.

Catch per Unit Effort (CPE or CPUE; catch rate): the average or number of fish caught per unit of effort spent fishing for them. For anglers, this would be the angler catch rate. For fisheries sampling nets and other gears, this would be the number of fish caught per net (eg. gillnet) or per hour (eg. trawling). By using standardized assessments, changes in catch rates reflect changes in relative abundance in most cases.

Condition factor: A ratio relating fish length to fish weight and measuring the relative plumpness of a fish. Is similar to the Body Mass Index (BMI) for humans.

Electrofishing: The use of electricity to capture fish. Sampling with fall electrofishing, targeting young-of-year walleye on Leech Lake began in 2005 but long-term stations were not formally established until 2007. A total of 12 stations were distributed among four areas on Leech Lake. Each station is sampled for 20 minutes during September for a total effort of 240 minutes. Areas targeted are approximately 3-5 feet deep on sand/gravel/cobble shorelines.

Fall electrofishing catch rates are anticipated to complement trawling catch rates when predicting year class strength. However, this relationship cannot be evaluated until several years of data have been collected. Sampling using this gear is highly dependent on water temperature, water clarity, and weather. Consequently, not all stations may be sampled during years of frequently inclement weather.

Exploitation: Removal of fish from a population by humans (usually) or other consumers.

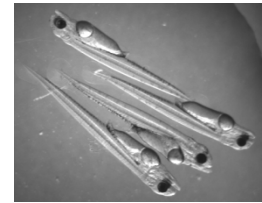
Fingerlings: Young-of-year walleye ranging in size from 5-8 inches long, depending on month sampled and summer growing conditions.

Fishery: The use and exploitation of a fish population by humans, the habitat in which they exist, and other species that live there.

Fishing pressure: total number of angler-hours spent fishing over a specified time period.

Example: a party (or boat) of 2 anglers that fished a 4-hour trip would have expended a total of 8 angler-hours of fishing effort. If this same party caught a total of 8 fish between the two of them during the 4-hour trip, they would have a catch rate of 1.0 fish/hour. If 4 fish were kept and 4 were released, the party would have a harvest rate of 0.5 fish/hour and a release rate of 0.5 fish/hour. If the same party was specifically targeting walleye, then their targeted effort would be 8 angler-hours with a targeted catch rate of 1.0 walleye/hour, harvest rate of 0.5 walleye/hour, and release rate of 0.5 walleye/hour.

Fry (larval stage): what fish are called immediately after hatching; walleye fry are about ¼ inch long. This is the size of walleyes that have been stocked into Leech Lake by the DNR since 2005. In terms of production, walleye fry are considerably cheaper to produce and stock than other age groups of young fish, such as frylings or fingerlings. There is also less risk of reducing genetic fitness, due to selective pressures the fry experience within the lake compared to stocking more advanced life stages (uncontrolled conditions that occur naturally vs. hatchery and rearing facilities where conditions are much more controlled).



Frylings: Young-of-year walleye that are about 2 inches long. The Leech Lake Band of Ojibwe stocked walleye frylings into Leech Lake in 2006, but none of the 206,000 fish stocked were found during the remaining young-of-year evaluation that summer.

Gill net: A net resembling a volleyball net that captures fish by entanglement. Gillnet surveys on Leech Lake have been completed annually during the first two weeks of September. Gillnets are the most effective method for assessing walleye and yellow perch populations; however, information on other species is also collected. Experimental nets (panels, or sections, generally 50ft long of differing mesh sizes) are designed to sample fish of various sizes. Standardized methods include net design, net location, time of year, and net orientation.

Since the Large Lake Program began in 1983, four nets have been fished at fixed locations within each major bay for a total of 36 net sets per year. Data collected with gillnets measure trends in population metrics, such as relative abundance, spawner biomass, age- and size-structure, growth rates, mortality, and year class strength, and are used to establish population management goals that can be effectively evaluated over time.

Similar to long-term trawling data, gillnet catch data were also a substantial component of the EA requesting control of cormorants on Leech Lake. Divergence in catch rates and other population metrics of yellow perch and walleye populations among basins provided further evidence that cormorant populations on Leech Lake were impacting the fishery and that immediate management actions were warranted. Gillnet data, when combined with aerial flights documenting that cormorant feeding activity occurred exclusively within the main basin on Leech Lake, was the foundation of the Environmental Assessment to initiate double-crested cormorant control efforts on Leech Lake.

Growth rate: The per unit time increase in length (inches/year), weight (pounds/year), number of individuals, or biomass.

Index: indicates a value or quantity. Since biologists cannot drain a lake and count all of the fish in it, they use catch rates (eg. gillnet catch rates) to index the relative abundance of the population. That is, a change in the relative abundance of an animal is assumed to be similarly reflected by a change in the catch rate of that animal.

Juvenile (walleye ages 1-3): fish that have survived their first winter but are not sexually mature and not yet able to contribute to reproduction. Generally, recruitment refers to young –of-year fish that survived their first winter and are entering the population as juveniles.

Littoral Area: The area of the lake where water depth is less than 15 feet. This is a surrogate measure of lake productivity; this is where vegetation, insects, and small fish (prey) are most abundant in lakes.

Parameter: A characteristic of a population.

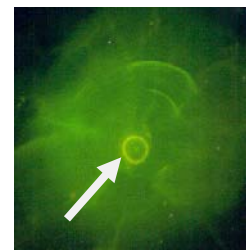
Population: All individuals of the same species within a defined geographic location at a given time.

Population dynamics: The interactions of recruitment, growth, and mortality that determine the abundance, age structure, and sizes of individuals in a population. Because recruitment (number of young fish entering population), growth, and mortality (rate individuals die) are constantly occurring, populations are constantly changing.

Population structure: The proportional distribution of sizes, ages, or genders in a population resulting from the processes of recruitment, growth, and mortality.

Otolith: Bony inner ear structures of fish formed from layers of calcium carbonate that are used for balance and orientation, just like the inner ear of people. These bony structures are used for determining fish age and for determining oxytetracycline mark retention.

OTC (Oxytetracycline): an antibiotic chemical that leaves a fluorescent mark on bones. By stocking marked fry and examining otoliths collected from young-of-year fish, the DNR can determine the ratio of marked (stocked) to wild young-of-year fish and then estimate the number of wild fry produced that year. The picture at right is an OTC-marked otolith from a young-of-year walleye. The center ring is where OTC was absorbed when fry were 1-day old.



Recreational fishery: A fishery in which fish are caught for pleasure, not for sale.

Recruitment: The number of fish surviving to a defined size or age. Commonly defined recruitment size- or age-classes are those first vulnerable to the predominant fishing gear (eg. gillnets when sampling or harvestable sizes when referring to the fishery) and those that are reproductively mature. Recruitment to age-, size- and maturity-classes is extremely dependent on survival.

Seining: Shoreline seining on Leech Lake occurs during July and is used to collect early information on YOY walleye growth and condition (plumpness), relative abundance and sizes of forage species (yellow perch, shiners, etc.) and collection of walleye otoliths for OTC detection during stocking evaluations. Each of five fixed seining sites are sampled with two 150-ft. parallel hauls weekly for four consecutive weeks, yielding a total of 40 hauls completed annually at long-term seining stations. Seine catch rates can be strongly influenced by weather, growth, and fish behavior (eg. sensitivity to light). As a result, seine catch rates can be highly variable and indexing young-of-year walleye abundance using other gears is preferred.

Selectivity: The ability of a gear to catch a certain size or kind of fish relative to its ability to catch other sizes or kinds. For example, a large-meshed trawl will be more selective for larger fish as smaller fish will be able to swim through the mesh, thus avoiding capture.

Size selectivity: Relative over- or underrepresentation of specific sizes (lengths) of fish or other animals in a sample taken with a particular gear.

Spawner Biomass: the aggregate weight of mature female walleyes in the population as determined with gillnet catch rates, usually expressed as lbs/acre.

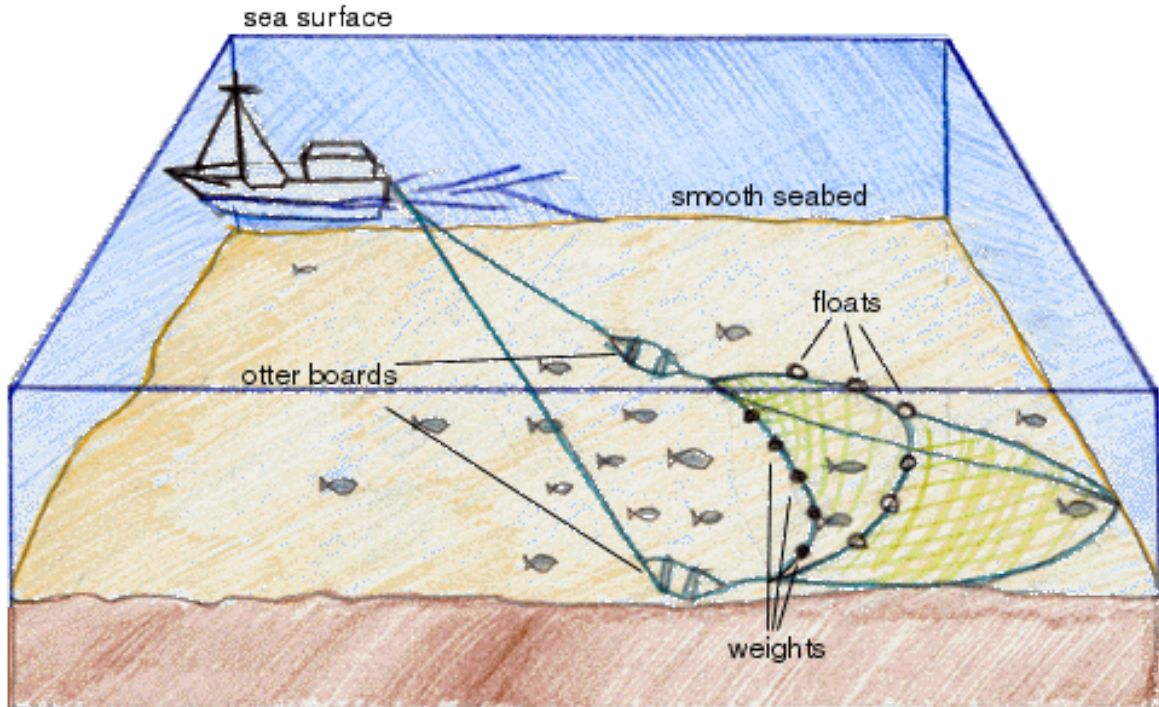
Standardized sampling: Sampling conducted in a prescribed manner that defines conditions such as specific gear, methods of operation, timing, and location. Standardized sampling reduces the amount of variability (noise) in data that could be attributed to infrequent changes in sampling methods.

Example: if you usually gillnetted at an off-shore location (such as 20-ft deep) during September and instead chose to gillnet near-shore (such as 8-ft deep) during July, would the differences between the two catch rates be: because of differences in abundance (higher catch rates tend to reflect more fish swimming around), because you selected a better or worse location to sample, because of the time of year you chose to sample, or some combination of these factors? By standardizing sampling techniques (net design, time of year sampled, and sampling location), you can remove much of the “noise” inherent with constantly changing methods.

Trawl: A pocket-shaped net that is towed through the water by a boat, designed to sample young-of-year and juvenile fish. While older, larger fish are occasionally caught, most are able to outswim the trawl and avoid capture, and this is why it is used primarily to sample small fish.

Trawling is conducted during August. This has been the most effective method for sampling YOY walleyes and yellow perch in Leech Lake. Trawl catch rates also provide an early estimate of walleye recruitment based on a relationship between catch rates at standard sampling stations and eventual year class strength. While trawl catch rates provide some insight into how many YOY walleyes may enter the fishery in the future, recruitment of these

fish is strongly linked to size at the end of the first growing season, which strongly influences survival during the first winter.



The benefits of standardized annual sampling on Leech Lake were witnessed when the Environmental Assessment (EA) requesting control of double-crested cormorant population on Leech Lake was approved in 2005. Among the DNR fisheries data used, the then-recent declines in the relative abundance of age-1 walleye and consistently high abundance of age-0 yellow perch in trawl hauls at the three long-term stations provided convincing evidence in support of immediate cormorant control measures (Figure 1). Had this data not been collected in a standardized manner, approval of the EA would have been much more difficult to obtain.

Young-of-Year (YOY, age-0): fish hatched that spring. For example, YOY fish caught during August, 2009 hatched earlier the same spring or summer. Fry, fryling, and fingerling all refer to general size groupings of YOY fish.