

**AN ANGLER'S GUIDE TO INTERPRETING
ALABAMA WILDLIFE AND FRESHWATER FISHERIES
RESERVOIR REPORTS**

This guide is compatible with reports published after 2007
and select reports published prior to 2007

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RESERVOIR SAMPLING METHODS

Standardized sampling – Repetitive surveys conducted at regular intervals, which are designed to establish a long-term data set used to detect changes in a fishery over time.

Effort – This value describes the amount of time required to capture a given number of fish and may be presented in net-nights, CPE, or angler-days, etc., depending on the type of gear used to collect the sample of fish.

Net-night – a unit of measure which represents the amount of effort expended to collect fish using trap-nets or gill-nets. For example, 20 trap-nets fished overnight for two nights each represents 40 net-nights of effort.

CPE – The catch-per-unit-of-effort (also known as the catch-rate or CPUE). For example, the number of fish collected during one hour of electrofishing.

Angler-day – An amount of effort equal to one fisherman fishing for a full day (10 hrs.). This is sometimes expressed as catch-per-angler-day or catch-per-angler-hour and is frequently used when reporting creel survey statistics.

TABLE 1. STATEWIDE AVERAGE CPE FOR SELECTED SPORTFISH SPECIES COLLECTED FROM ALABAMA'S PUBLIC RESERVOIRS. CRAPPIE CPE'S ARE GIVEN IN NET-NIGHTS AND ALL OTHER SPECIES ARE GIVEN IN CATCH PER HOUR OF ELECTROFISHING.

SPECIES	STOCK	QUALITY	PREFERRED	MEMORABLE
Bluegill	73	17	1	-
Crappie (Upland Lakes)	0.8	0.8	0.6	0.2
Crappie (Lowland Lakes)	4.3	2.5	1.8	0.6
Largemouth Bass	19	16	9	2
Spotted Bass	13	7	4	1

Sampling gear – Any device used to collect fish for population analysis. The most effective gears are chosen based upon the target fish species, time of year, environmental factors, and fish behavior. These gears are generally set in standard locations from year to year, which coincide with the standardized sampling plan.

Electrofishing – The use of pulsed electrical current to stun fish in shallow water (< 6 ft.) so that they may be collected for population studies. This gear-type is used primarily in the spring, and sometimes in the fall to sample bass, bream, shad, and sometimes crappie. Occasionally, catfish and other species can be sampled effectively using this method.

Trap-net – A type of passive fish sampling gear used when specifically targeting crappie. This gear-type is generally biased towards collecting smaller fish.

Gill-net – A type of passive fish sampling gear used to target striped bass, hybrid striped bass, and white bass. These nets have a variety of mesh sizes for capturing different sized fish.

Hoop-net – A type of passive gear that is sometimes used with bait to collect catfish.

Seine-net – A length of net which is physically carried into the water and used to herd fish against the shoreline. This gear-type is used when sampling small streams and farm ponds.

Trot-line – A long line with baited hooks placed at intervals along its length. This gear-type is effective when sampling scavengers, such as catfish and sturgeon, but may also be used to collect striped bass brood fish.

RESERVOIR CHARACTERISTICS

Shoreline development index – reflects the degree of shoreline irregularity. This value ranges from 1 to infinity. A perfectly circular lake would have a SDI of 1. The more irregular the shoreline becomes, the higher the SDI becomes. This is important because it indicates the amount of shoreline habitat available to the fish.

Stratification – Heating from the sun during summer decreases the density of the upper water in reservoirs causing it to “float” above the lower, cooler layers of water. However, not all reservoirs stratify, particularly those with low retention times and frequent current from wind or hydropower generation. Stratification begins during summer and continues through early fall.

Epilimnion – This is the upper layer of water which benefits from photosynthesis; thus, it contains all the healthy populations of algae, plankton, aquatic plants, and fish. The depth of this layer ranges from a few feet deep in very green reservoirs to many meters in clear reservoirs.

Metalimnion – The middle layer of water which is cooler and contains less oxygen. This layer serves as a transition between the epilimnion and the hypolimnion. This is where the greatest decrease in water temperature and oxygen levels occurs. This layer of water is sufficient to support aquatic life and is often utilized by resting fish which seek out the coolest water they can find that still contains enough oxygen to survive.

Hypolimnion – The cold, very dense layer of water which contains little if any oxygen. Because of its density, this layer of water is restricted to the deepest areas of the reservoir and contains few living organisms.

Thermocline depth – The depth at which the greatest change in temperature and oxygen levels occurs. The thermocline is located within the metalimnion.

Retention time – The time required for a volume of water equal to the volume of the lake to pass through the dam and out of the lake. In other words, the time required to refill an empty lake with its natural inflow. Increasing rainfall amounts causes a decrease in retention time.

Morphoedaphic index – indicates the potential yield of reservoir based on its trophic state. It is calculated based on the ratio of dissolved solids to mean lake depth.

Trophic state – A method of classifying reservoirs based on their nutrient concentrations. A reservoir’s fish production capacity is limited by its nutrient levels. Nutrient levels are generally measured by analyzing chlorophyll-a concentrations in phytoplankton. The soil and mineral-types present in the watershed determine a reservoirs nutrient concentration; thus, little can be done to change the trophic state of a reservoir.

TABLE 2. CHARACTERISTICS OF RESERVOIRS WITH VARIOUS TROPHIC STATES.

Reservoir Trophic State	Chlorophyll-a (ug/L)	Visibility (ft)	Typical Reservoir Characteristics	Typical Fishery Characteristics	Some Alabama Reservoirs
Oligotrophic	< 2.6	> 13	Deep, clear water; nutrient poor; biologically unproductive with few aquatic plants; long retention time.	High recruitment, slow growth, and little fish diversity.	Smith, Martin, Tuscaloosa
Mesotrophic	2.6 – 7.3	7 - 13	Intermediate nutrient availability; moderate biological productivity; moderate retention time.	Moderate recruitment, growth, and fish diversity	Harris, Demopolis, Coffeetown
Eutrophic	7.3 – 20.0	3 – 7	Often shallow; nutrient rich; high biological productivity; green water caused by phytoplankton blooms; aquatic plants often abundant; short retention time.	Low recruitment, fast growth, diverse fish population.	Logan Martin, Lay, Guntersville, Miller’s Ferry
Hypereutrophic	> 20.0	1 – 2	Usually shallow; extremely high nutrient levels; very green water caused by dense phytoplankton blooms; very short retention time.	Poor recruitment, rapid growth, and very diverse fish populations.	Neely Henry, Weiss

AGE, GROWTH, MORTALITY, and RECRUITMENT

Age-class – A particular age-group of fish. For example, all three year old fish collected during a given sample are considered Age-3 fish.

Year-class – A particular cohort of fish. For example, all crappie born during the spring of 2001 are considered to be members of the 2001 year-class.

Young-of-year – Fish that are less than one year old.

Otolith – A small bone which is suspended within a fish’s inner ear. Because fish are cold-blooded animals, their growth slows down considerably during winter and speeds up during spring as the water temperature increases. This reduction in growth can be

detected by a “ring” deposited on the otolith. A fish’s age can be determined by counting the rings on its otolith.

Mortality – The death of fishes, which can be subdivided into natural mortality and fishing mortality.

Natural mortality – deaths resulting from natural causes, such as old age, disease, starvation, etc.

Fishing mortality – Includes any deaths that can be attributed to angling, such as gut-hooking, harvest, or problems resulting from mishandling.

Total mortality – The combined effects of natural and fishing mortality. In most Alabama reservoirs, the total mortality rate is between 30 and 50 %, annually. Separating total mortality into natural mortality and fishing mortality requires very expensive and time consuming fish tagging studies.

Growth – The addition of biomass by individual fish; and generally measured as change in weight or increase in length.

Recruitment – Number of fish hatched or born in any year that survive to reproductive size; also, the number of individuals that reach harvestable size, a particular size or age, or a size captured by a particular sampling gear.

Relative Weight (W_r) – An index for determining the condition or plumpness of a fish. A fish in good condition would have a relative weight of 100, while a skinny fish would have a lower relative weight and a fat fish would have a higher relative weight. Relative weights of Alabama’s sport fish typically range from 70 – 110.

Standard Weight (W_s) – An equation that calculates the weight at which a fish of a given length would have a relative weight of 100.

TABLE 3. AVERAGE RELATIVE WEIGHTS OF SELECTED SPORTFISH SPECIES COLLECTED FROM ALABAMA’S PUBLIC RESERVOIRS.

SPECIES	STOCK	QUALITY	PREFERRED	MEMORABLE
Bluegill	85	83	88	-
Black Crappie	74	85	92	98
White Crappie	76	89	94	95
Largemouth Bass	88	90	94	97
Spotted Bass	94	98	100	105

LENGTH GROUPS

Sub-stock-size - Any fish smaller than stock size.

Stock-size – The minimum size for a fish in this category is roughly 20 - 26 % of the length of the world record for that species. This corresponds roughly to the length at which the fish first becomes vulnerable to angling.

Quality-size – The minimum size for a fish in this category is roughly 36 – 41 % of the length of the world record for that species. This corresponds roughly to the length at which most anglers begin to consider the fish to be of desirable size.

Preferred-size – The minimum size for a fish in this category is roughly 45 – 55 % of the length of the world record for that species. This corresponds roughly to the length at which most anglers begin to consider the fish to be of a preferred size.

Memorable-size - The minimum size for a fish in this category is roughly 59 - 64 % of the length of the world record for that species. This corresponds roughly to the length at which most anglers begin to consider the fish to be a memorable size catch.

Trophy-size - The minimum size for a fish in this category is roughly 74 - 80 % of the length of the world record for that species. This corresponds roughly to the length at which most anglers begin to consider the fish to be of trophy size.

TABLE 4. LENGTH GROUP CATEGORIES USED TO CHARACTERIZE THE STOCK DENSITY OF ALABAMA'S SPORT FISH SPECIES. THE LENGTHS LISTED BELOW ARE THE MINIMUM SIZES FOR EACH CATEGORY; THUS, AN INDIVIDUAL FISH MAY BE PART OF ONE OR MORE CATEGORIES. ALABAMA RESERVOIR REPORTS ARE GENERATED USING METRIC UNITS OF MEASURE. THE ENGLISH AND METRIC UNITS LISTED UNDER EACH CATEGORY ARE ROUGHLY EQUAL. REFER TO TABLE 4 TO FIND AN ENGLISH TO METRIC CONVERSION CHART.

SPECIES	STOCK		QUALITY		PREFERRED		MEMORABLE		TROPHY	
	ENGLISH	METRIC	ENGLISH	METRIC	ENGLISH	METRIC	ENGLISH	METRIC	ENGLISH	METRIC
Black Crappie	5 in.	130 mm	8 in.	200 mm	10 in.	250 mm	12 in.	300 mm	15 in.	380 mm
Bluegill	3 in.	80 mm	6 in.	150 mm	8 in.	200 mm	10 in.	250 mm	12 in.	300 mm
Largemouth Bass	8 in.	200 mm	12 in.	300 mm	15 in.	380 mm	20 in.	510 mm	25 in.	630 mm
Smallmouth Bass	7 in.	180 mm	11 in.	280 mm	14 in.	350 mm	17 in.	430 mm	20 in.	510 mm
Spotted Bass	7 in.	180 mm	11 in.	280 mm	14 in.	350 mm	17 in.	430 mm	20 in.	510 mm
Striped Bass	12 in.	300 mm	20 in.	510 mm	30 in.	760 mm	35 in.	890 mm	45 in.	1140 mm
Hybrid Striped Bass	8 in.	200 mm	12 in.	300 mm	15 in.	380 mm	20 in.	510 mm	25 in.	630 mm
White Bass	6 in.	150 mm	9 in.	230 mm	12 in.	300 mm	15 in.	380 mm	18 in.	460 mm
White Crappie	5 in.	130 mm	8 in.	200 mm	10 in.	250 mm	12 in.	300 mm	15 in.	380 mm

STOCK DENSITY

SSR – The sub-stock ratio is the ratio of fish less than stock size to those stock size and larger.

PSD – The proportional stock density is commonly used to describe the size structure of a fish population and may range from 0 to 100. Proportional stock density and RSD-Q are the same. See RSD-Q listed below for a description.

RSD – The relative stock density is the percentage of fish of any designated length-group in a sample of fish.

RSD_{S-Q} – Given a sample of fish stock size and larger, RSD_{S-Q} is the percentage of those fish that are between the minimum stock size and the minimum quality size (stock size).

RSD_{Q-P} – Given a sample of fish stock size and larger, RSD_{Q-P} is the percentage of those fish that are between the minimum quality size and the minimum preferred size (quality size).

RSD_{P-M} – Given a sample of fish stock size and larger, RSD_{P-M} is the percentage of those fish that are between the minimum preferred size and the minimum memorable size (preferred size).

RSD_{M-T} – Given a sample of fish stock size and larger, RSD_{M-T} is the percentage of those fish that are between the minimum memorable size and the minimum trophy size (memorable size).

RSD-Q – Given a sample of fish stock size and larger, RSD-Q is the percentage of those fish that are of quality size and larger.

RSD-P – Given a sample of fish stock size and larger, RSD-P is the percentage of those fish that are of preferred size and larger.

RSD-M – Given a sample of fish stock size and larger, RSD-M is the percentage of those fish that are of memorable size and larger.

RSD-T – Given a sample of fish stock size and larger, RSD-T is the percentage of those fish that are of trophy size.

TABLE 5. AVERAGE VALUES FOR RELATIVE STOCK DENSITY CATEGORIES OF SELECTED SPORTFISH SPECIES COLLECTED FROM ALABAMA RESERVOIRS THROUGH 1996. VALUES GIVEN ARE THE STATEWIDE AVERAGES.

SPECIES	STOCK	QUALITY		PREFERRED		MEMORABLE		TROPHY
	RSD _{S-Q}	RSD-Q	RSD _{Q-P}	RSD-P	RSD _{P-M}	RSD-M	RSD _{M-T}	RSD-T
Bluegill	78	22	21	1	1	<1	<1	<1
Crappie (Upland Reservoirs)	29	71	36	35	27	8	8	<1
Crappie (Lowland Reservoirs)	46	54	28	25	19	6	6	<1
Largemouth Bass	43	57	33	24	20	4	4	<1
Spotted Bass	49	51	30	21	16	5	5	<1

UNITS OF MEASURE

To avoid problems associated with using fractions, the Alabama Wildlife and Freshwater Fisheries Division collects and reports all fishery data in metric units of measure. This is a standard practice among state wildlife and fisheries agencies and can easily be converted back to the more commonly recognized English units of measure to interpret Alabama's reservoir reports. To convert between the two, refer to the table below.

TABLE 6. CONVERSION TABLE FOR SWITCHING BETWEEN ENGLISH AND METRIC UNITS OF MEASURE. TO CONVERT COLUMN 1 TO COLUMN 2, MULTIPLY BY THE NUMBER BETWEEN THEM.

COLUMN 1	multiply by	COLUMN 2
Inches	25.4	Millimeters
Millimeters	0.0394	Inches
Pounds	453.6	Grams
Grams	0.0022	Pounds
Acres	0.4047	Hectares
Hectares	2.471	Acres
Ounces	0.0625	Pounds
Pounds	16.0	Ounces
Feet	0.3048	Meters
Meters	3.2808	Feet