STANDARDIZED SAMPLING PROCEDURES FOR FISHERIES MANAGEMENT

Revised September 2023

Table of Contents

Seine Sampling
Gear Code: 10

I. Objective: Shoreline seine sampling is used to collect fish samples for information about the following:

- A. Year class strength
- B. Prey species availability
- C. Indication of stocking success
- D. Relative abundance and growth

II. Gear Specification

- A. General Description (12 m and 6 m bags seines)
  1. Poles - 2 @ 1.83 m (6 ft.) long x 51 mm (2 in.) diameter (fiberglass or wood)
  2. Bottom line - 29.5 kg leadcore line
  3. Top line - float core line with 100 mm sponge floats spaced evenly
- B. Specifications for 12 m bag seine
  1. 12.2 m (40 ft.) total length x 1.8 m (6 ft.) total height
  2. Each wing should measure 5.2 m long
  3. Bag dimensions - 1.8 m x 1.8 m x 1.8 x 6.4 mm (6 ft x 6 ft x 0.25 in) Delta mesh
- C. Specifications for 6 m bag seine
  1. 6.1 m (20 ft.) total length x 1.8 m (6 ft.) total height
  2. Bag dimensions - 1.8 m x 1.8 m x 1.8 m x 6.4 mm (6 ft x 6 ft x 0.25 in) Delta mesh

III. Effort

- A. Number of Sites
  1. Fewer than 2,025 hectares (5,000 acres) - 5 permanent stations
  2. 2,025 – 4,047 hectares (5,000-10,000 acres) - 10 permanent stations
  3. Greater than 4,047 hectares (10,000 acres) - 15 permanent stations
     a) A permanent station is a specific location on the lake (i.e., swimming beach, shallow area, public-use area, island, etc.), which can be identified by name and is reproducible as a seining location year after year. Identify station on Data Form 1. Station numbers should remain the same each year to be comparable. More specific location details should be recorded in the Field Notes.
- B. Represent as many habitats as possible and identify on the Data Form. (See Code Instructions)

C. Method - the quadrant method is used for seine sampling. One end of the seine is held stationary at the water's edge while the other end is pulled through the water. The seine is stretched full length perpendicular to the shoreline if possible. Effort is expressed in total area sampled per station (see Code Instructions). Depending on the length of seine used, a minimum amount of area must be sampled at each station:

1. Seine length = 6 meters
   Minimum area = 7 quadrants (1 quadrant = 29 m2)
2. Seine length = 12 meters
   Minimum area = 4 quadrants (1 quadrant = 117 m2)

IV. Frequency of Collection

A. A minimum of one collection trip annually during June-July is required.

B. If additional seining is conducted during any other time than that specified above, it is analyzed separately from the regular data and must be identified as separate data when submitted for computer analysis.

C. Time of day - seining will be conducted during the early morning and/or evening hours. (Evening seining is preferred in clearer, less turbid lakes.) Exact time will be recorded on Data Form 1.

V. Data Collection

A. Sort all fish by species, count up to 100 individuals and subsample to determine numbers too numerous to count. (See Special Instructions for subsample procedure.)

B. Recording - See Code Instructions, use Data Form 1.

VI. Data Analysis

A. Catch per unit effort, stratified by:

1. Lake
2. Species
3. Annual Catch Data
   a) total no. of individuals
   b) total no. of individuals per 100 m2
   c) relative abundance, % by number
   d) mean, minimum and maximum values, and standard deviation of individual lengths.

VII. Reporting

A. All Data should be entered digitally, validated, and uploaded to the OFAT database. Paper copies of the field data sheets should be filed at the region's field office.

Table Of Contents

Gillnet Sampling: Standard Experimental Nets
Gear Code: 23

I. Objective: Gill net sampling is used to collect fish samples for information about the following:

A. Age and growth
B. Length frequency
C. Relative abundance/catch rates

II. Gear Specification

A. General description

1. Monofilament nets having bar mesh ranging 1.9 to 6.4 cm (0.75 to 2.5 in.)
2. Net dimensions: 24 m (80 ft) long X 1.8 m (6 ft) deep
3. Webbing to be free hanging (unhobbled) from top to bottom, ½ basis.
4. Proper weight/float ratio for neutral buoyancy.

B. Materials

1. Top line - floating 9.5 mm (0.4 in.) diameter prolene (polypropylene) rope having foam center. Check float line annually to ensure proper buoyancy.
2. Bottom line - hollow 6 mm (0.25 in.) diameter braided poly rope.
3. Weights - 6 mm (0.25 in.) diameter lead cylinders, inserted in hollow bottom line.
4. Twine size (for hanging and splicing webbing) - size 9 multifilament nylon.
5. Webbing - monofilament panels 1.8 m (6 ft.) deep and 3 m (10 ft.) long; one panel each in the following order:
    a) 3.8 cm (1.5 in.) bar mesh - size 104 twine
    b) 5.7 cm (2.25 in.) bar mesh - size 139 twine
    c) 2.5 cm (1 in.) bar mesh - size 69 twine
    d) 4.5 cm (1.75 in.) bar mesh - size 104 twine
    e) 1.9 cm (0.75 in.) bar mesh - size 69 twine
    f) 6.4 cm (2.5 in.) bar mesh - size 139 twine
    g) 3.2 cm (1.25 in.) bar mesh - size 69 twine
    h) 5.1 cm (2 in.) bar mesh - size 104 twine

III. Effort

A. Number of net sets will be determined by surface area of the impoundment.

1. fewer than 40.5 hectares (100 acres) = not more than 5 stations (discretion of the biologist)
2. 40.5-405 hectares (100 – 1,000 acres) = 5 stations
3. 405-2025 hectares (1,000 – 5,000 acres) = 10 stations
4. > 2025 hectares (5,000 acres) = 15 stations

B. One net should be set at each station (no replication of stations within same year). Station requirements may be met by setting all nets for one night or by setting part of the total number of nets on consecutive nights not to exceed four sampling nights, if possible.

C. Sampling period - One net-night is one net fished overnight, usually 18-24 hours (attempts should be made to approximate the time of net sets from one year to the next).

D. Retrieve nets in same order they are set.

IV. Frequency of Collection

A. Once annually per lake during the months of October-December. Time of year should also approximate previous year's gillnet sampling. The target C.V. of mean (or relative standard error) is 0.20 for the primary target species. If the target C.V. of mean is not obtained using the minimum number of stations additional stations should be sampled not to exceed three times the minimum.

B. Repeated annual sampling with gill nets, especially in smaller lakes, may be harmful to certain fish populations. Each biologist is required to determine if gill-net mortalities could be detrimental to the fishery. If so, alternate sampling methods, such as surface-set gill nets, hoop nets, fyke or trap netting, will be substituted for bottom-set gill nets where annual netting is deemed necessary.

V. Data Collection

A. Sampling sites

1. Sampling sites - Random site selection will be used based on 300m² grids. If a randomly selected site is deemed unfishable by this gear, a coin is flipped to determine the direction (uplake or downlake) to proceed to the next grid square with acceptable features (<4.5 m (15 ft.) depth, no obstructions) to properly fish the net.

B. Net placement

1. Nets should be set in depths <4.5 m (15 ft.), whenever possible. Nets can be placed anywhere within the assigned grid square at the discretion of the field crew to ensure the net fishes properly.

2. Net set configuration - Nets should be set near shoreline (including islands) structure at proper depths (i.e., points, creek channels) to maximize catch rates. Shoreline orientation (parallel vs. perpendicular) is at the discretion of the field crew. Attention should be paid to expected direction of fish movement to maximize encounter rates.

C. Recording - see Code Instructions, use Data Form 1.

1. Data are recorded immediately after nets have been retrieved.
2. Record each net's catch separately.
3. Individually measure total length and weight for all target species. See Special Instructions for the minimum lengths used in Relative Weight calculations.

4. Data collection for shad is optional with standard experimental nets. If subsampling is deemed necessary, separate all shad ≤ 150 mm (6 inches), sort by species, and individually measure and record total lengths of 50 shad of each species. Count the remaining shad of each species and record number of individuals on the data sheets. Total length should be individually measured and recorded for shad >150 mm.

5. Otolith and/or spine samples - see Special Instructions

VI. Refer to individual species stocking requirements when determining the necessity of age sampling for an impoundment.

VII. Data Analysis

A. Catch per unit effort, stratified by:

1. Lake
2. Species
3. Size groups
   a) total number of individuals
   b) percent number of individuals
   c) CPUE with standard error, relative standard error, and 95% confidence intervals
   d) mean relative weights
   e) maximum weight

B. Length-frequency analysis, stratified by:

1. Lake
2. Species
3. Annual Catch Data - tables will be divided into 25 mm (1 – inch) intervals and the number of fish in each inch group, the percentage of total for each inch group, and relative weights by inch group will be given.

C. Age and Growth Analysis (Optional)

VIII. The basic age and growth analysis will include:

1. Total number of fish aged
2. Total number of fish within each age
3. Mean length at age (time of sample)

IX. Reporting

A. All Data should be entered digitally, validated, and uploaded to the OFAT database. Paper copies of the field data sheets should be filed at the region's field office.

Table Of Contents

Gillnet Sampling: Texoma Experimental Nets
Gear Code: 23

I. Objective: Texoma experimental gillnet sampling is designed to target temperate bass species (striped bass and white bass). Gillnet sampling is used to collect fish samples for information about the following:

A. Age and growth
B. Length frequency
C. Relative abundance/catch rates

II. Gear Specification

A. General description
1. Monofilament nets having bar mesh ranging 25 to 76 mm
2. Net dimensions: 38 m long X 2 m deep
3. Webbing to be free hanging (unhobbled) from top to bottom, ½ basis.
4. Proper weight/float ratio for neutral buoyancy.

B. Materials
1. Top line - 9.5 mm diameter prolene (polypropylene) rope having foam center. Check float line annually to ensure proper buoyancy.
2. Bottom line - hollow 6 mm diameter braided poly rope.
3. Weights - 6 mm diameter lead cylinders, inserted in hollow bottom line.
4. Twine size (for hanging and splicing webbing) - size 9 multifilament nylon.
5. Webbing - monofilament panels 2 m (6 ft.) deep and 8 m (26 ft.) long; one (1) panel each in the following order:
a) 25 mm (1 in.) bar mesh - size 69 twine
b) 38 mm (1.5 in.) bar mesh - size 104 twine
c) 51 mm (2 in.) bar mesh - size 104 twine
d) 64 mm (2.5 in.) bar mesh - size 139 twine
e) 76 mm (3 in.) bar mesh - size 139 twine

III. Effort – same as Standard Experimental Nets

IV. Frequency of Collection

A. Once annually per lake during the months of January - February. Time of year should also approximate previous year's gillnet sampling.

V. Data Collection and Analysis– same as Standard Experimental Nets

VI. Reporting

A. All Data should be entered digitally, validated, and uploaded to the OFAT database. Paper copies of the field data sheets should be filed at the region's field office.

Table Of Contents

Gillnet Sampling: Floating Shad Nets
Gear Code: 25

I. Objective: Floating gill net sampling is used to collect pelagic forage fish samples for information about the following:

A. Length frequency
B. Relative abundance/catch rates

II. Gear Specification

A. General description
1. Monofilament nets having bar mesh ranging 10 to 19 mm (0.4 to 0.75 in.)
2. Net dimensions: 12 m (40 ft.) long X 2 m (6 ft.) deep
3. Webbing to be free hanging (unhobbled) from top to bottom, ½ basis.
4. Positively buoyant

B. Materials
1. Top line - floating (foam core) 13 mm braided poly rope with SB-6 floats spaced at 122 cm (48 in.) intervals.
2. Bottom line - 30# leadcore rope
3. Twine size (for hanging and splicing webbing) - size 9 multifilament nylon.
4. Webbing - monofilament panels 1.8 m deep and 3 m long; one panel each in the following order:
a) 13 mm (0.5 in.) bar mesh - size 69 twine
b) 16 mm (0.6 in.) bar mesh - size 69 twine
c) 19 mm (0.75 in.) bar mesh - size 69 twine
d) 10 mm (0.4 in.) bar mesh - size 69 twine
5. Bullet floats can be clipped at each panel change to help with buoyancy and to make the net more visible to boaters who may otherwise damage the net.

III. Effort

A. Minimum number of net sets will be determined by surface area of the impoundment. The target C.V. of the mean (or relative standard error) is 0.20. If the target C.V. of mean is not obtained using the minimum number of stations additional stations should be sampled not to exceed three times the minimum.
1. fewer than 40.5 hectares (100 acres) = not more than 5 stations (discretion of the biologist)
2. 40.5- 405 hectares (100 – 1,000 acres) = 5 stations (up to 15 stations to reach target C.V. of mean)
3. 405- 2,025 hectares (1,000 – 5,000 acres) = 10 stations (up to 30 stations reach target C.V. of mean)
4. > 2,025 hectares (5,000 acres) = 15 stations (up to 45 stations to reach target C.V. of mean)

B. One net should be set at each station (no replication of stations within same year). Station requirements may be met by setting all nets for one night or by setting part of the total number of nets on consecutive nights not to exceed four sampling nights, if possible.

C. Sampling period - One net-night is one net fished overnight, usually 18-24 hours (attempts should be made to approximate the time of net sets from one year to the next).

D. Retrieve nets in same order they are set.

E. Deployment -

1. The entire float line should be visible on the water surface. Both end panels should fish completely open and should not pinch when the anchors are dropped. If needed, bullet floats can be clipped at each panel change to help with buoyancy and to make the net more visible to boaters who may otherwise damage the net.

2. The anchor type and anchor line length will be decided by the biologist. To aid with proper deployment, a ten-foot bridle of #12 9.5 mm polypropylene rope can be attached to the top and bottom lines on both ends of the net. Top and bottom extensions will be tied together to form a loop to facilitate the attachment of an anchor line.

IV. Frequency of Collection

A. Once annually per lake during the months of August-October. Time of year should also approximate previous year's gillnet sampling.

V. Data Collection

A. Sampling sites

1. Sites will be selected in a random or stratified-random design from a 300m^2 grid overlay of each lake (approx. 73 hectares).

a) Lakes <405 hectares (1,000 acres) will have a minimum of 5 sites randomly selected from all available grid numbers.

b) Lakes 405 – 2,025 hectares (1,000 – 5,000 acres) will be stratified by upper and lower sections of the lake. A minimum of 5 sites will be randomly selected from each section.

c) Lakes >2,025 hectares (5,000 acres) will be stratified by upper, middle, and lower sections. A minimum of 5 sites will be randomly selected for each section.

2. Identify Grid Number on Data Form 1. More specific location should be recorded in Field Notes.

B. Net placement

1. Nets can be set anywhere within the selected sampling grid. Nets should be set in depths >2 m (6 ft.). Attempts should be made to avoid high traffic areas in which boat collisions with nets may occur. If a randomly selected sampling grid will not provide suitable depths or present other logistical problems (high traffic area, timber, etc.) then the next randomly selected grid number within the same section should be used as the sampling site.

2. Net set configuration - Shoreline orientation (parallel vs perpendicular) is at the discretion of the field crew. Attention should be paid to expected direction of fish movement to maximize encounter rates.

3. Suitable weights or anchors should be used on each end of the net to ensure proper net stretch and prevent net movement due to currents, wave action, etc.

C. Recording - see Code Instructions, use Data Form 1.

1. Data are recorded immediately after nets have been retrieved.

2. Record each net's catch separately.

3. Sort by species and individually measure (no weights) all shad collected. If subsampling is deemed necessary, separate all shad ≤150 mm (6 inches), sort by species, and individually measure and record total length of 50 shad of each species. Count the remaining shad of each species and record number of individuals on the data sheets. Shad >150 mm, total length should be individually measured and recorded.

VI. Data Analysis

A. Catch per unit effort, stratified by:

1. Lake
2. Species
3. Size groups
   a) total number of individuals
   b) percent number of individuals
   c) CPUE with standard error, relative standard error, and 95% confidence intervals

B. Length-frequency analysis, stratified by:

1. Lake
2. Species
3. Annual catch data - tables will be divided into 25 mm intervals and the number of fish in each inch group, and the percentage of total for each inch group will be given.

VII. Reporting

A. All Data should be entered digitally, validated, and uploaded to the OFAT database. Paper copies of the field data sheets should be filed at the region's field office.

Table Of Contents

Fall Trap or Fyke Net Sampling
Gear Code: 31

I. Two standardized methods of trap or fyke net sampling are used to collect crappie samples with choice of method determined by sampling objective:

A. Random Station Sampling

1. Objective: To estimate relative abundance of crappie spp. (or CPUE) for standardized comparison among reservoirs.

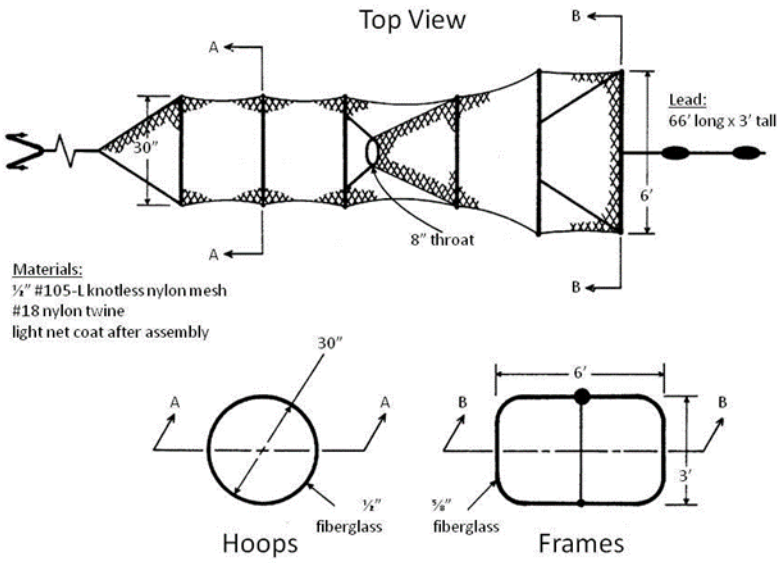
B. Fixed Station Sampling

1. Objective: To evaluate age structure, growth rates, and population structure within a single crappie spp. stock.

II. Gear Specifications

A. Fyke net (net-coat treated after netting tied to frames and hoops)

1. netting material - 13 mm #105-L knotless nylon
2. twine - #18 nylon to sew nets together
3. construction - netting sewn between center braces of first and second frame; netting from second frame will have a 15 cm throat; the cod section will be 91.5 cm in length from last fiberglass hoop to the steel ring; the cod end of the net will have a drawstring closure with 5 ft of #5 braided nylon tailrope with a 51 mm steel ring, 8 mm O.D., attached.
4. Frame (2)
   a) dimension - 1 m (3 ft.) high X 1.8 m (6 ft.) wide
   b) material -16 mm (0.6 in.) diameter fiberglass
5. Hoops (4)
   a) dimension - 76 cm (30 in.) diameter
   b) material - 13 mm x 13 mm (0.5 in. x 0.5 in.) fiberglass
   c) placement - first hoop 81.3 cm (32 in.) from the second frame; remaining hoops 24 inches apart
6. Lead
   a) lead - 20 m (65.5 ft.) long x 0.9 m (3 ft.)
   b) mesh size - 13 cm (0.5 in.) #105-L knotless nylon
   c) float line - 8 mm polypropylene rope with 76 mm (3 in.) floats (#SB-4) every 122 cm (5 in.)
   d) leadline - 8 mm polypropylene rope with #12 lead every 20 cm (8 in.) apart; bridle made of 8 mm polypropylene rope extended 91.5 cm (36 in.) one end with a 5 cm (2 in.) steel ring, 8 mm (0.3 in.) O.D., attached.



Graphic adapted from Schneider, James C. and J. W. Merna. 2000. Fishing gear. Chapter 3 in Schneider, James C. (ed.) 2000. Manual of fisheries survey methods II: with periodic updates. Michigan Department of Natural Resources, Fisheries Special Report 25, Ann Arbor

III. Timing and Frequency of Collection - once annually per reservoir when surface temps are 16-21 ^{0}C (60-70 ^{0}F).

A. Sampling Sites

1. Trap nets are to be deployed perpendicular to the shoreline, with net opening facing the shore, on gradually sloping bottom contours. Nets should be deployed with water depths no greater than 5 m at the net opening and the entire net (including lead) should be completely submerged at all times. Care should be taken that boat traffic is not impeded by net deployment and that nets are suitably marked with buoys. In reservoirs with actively manipulated water levels, care should be taken that nets remain submerged throughout the deployment.

B. Effort

1. Random Station Sampling

a) Number of overnight net deployments will be determined by the surface area of the impoundment.

(1) fewer than 202.5 hectares (500 acres) = 15 net nights

(2) greater than 202.5 hectares (500 acres) = 30 net nights

(3) Net night requirements may be met by setting all nets for one night or by setting part of the total number of nets on consecutive nights.

b) Effort - total number of hours (e.g., 18 hrs.) between net deployment and retrieval, rounding to the nearest whole hour

c) CPUE - (# crappie / effort) x 24 hours and expressed as number of crappie / net night

2. Fixed Station Sampling

a) Number of overnight net deployments will be restricted only to the number of nets required to adequately evaluate age and growth from otoliths samples, and therefore will be at the biologist's discretion (see special instructions).

b) Effort will not be calculated for this gear code

c) CPUE will not be calculated for this gear code

IV. Site Selection

A. Random Station Sampling

1. Using a 300m^2 grid map of the reservoir, identify all shoreline sites (squares touching the reservoir shoreline perimeter or shoreline of interior islands). At biologist's discretion, exclusion of sites based on inappropriate bottom contour, obstructions, user conflict, etc. may occur.

2. For reservoirs >4,050 hectares (10,000 acres), total surface area may be subdivided into logical substrata (e.g., upper, middle, lower)

3. Randomly selected sites which are determined in the field to be inappropriate can be replaced by alternate sites. Alternate sites (within strata, when used) can be chosen a priori through randomization or identified in the field, as long as an unbiased field methodology is employed. For example, upon discovering an inappropriate, randomly selected site, the biologist can flip a coin to determine the direction of travel in search of the next available appropriate site (heads = upstream, tails = downstream). Careful consideration of reservoir contours and unbiased exclusion of sites a priori should minimize the need for identifying alternate sites while in the field.

B. Fixed Station Sampling

1. Site selection for trap netting crappie spp. for age and growth should be highly biased and at the biologist's discretion regarding location of net deployments and the amount of effort. Sites should be chosen that maximize catch of all size classes and minimize effort.

2. Points, creek channels, and brush piles should be targeted as stations for sampling. If stations do not produce good catches, new sampling stations should be selected.

3. For consistency within a reservoir shoreline sampled for various species, using site numbers from an existing grid (developed as above) is preferred, but not required.

V. Data Collection and Recording

A. Identify stations by Grid No. on Data Form 3. Station numbers must remain the same from year to year to be comparable. Record coordinates (Latitude and Longitude in decimal-degree format) for each net location. Additional descriptive details for net locations should be recorded in field notes.

B. Data are recorded immediately after nets are retrieved- see Code Instructions, use Data Form 3

C. Record each net's catch separately

D. Individually measure total length for all crappie and weigh individuals ≥100 mm

E. Crappie otolith samples - see Special Instructions

1. no otoliths will be collected for crappie < 120 mm (5 inches)
2. 20 otoliths will be collected per 25 mm (1-inch) group ≥120 mm
3. 30 otoliths will be collected per 25 mm group ≥120 mm if a stunted population is suspected

VI. Data Analysis

A. Catch per unit effort, stratified by:

1. Lake
2. Species
3. Annual catch data
4. total effort (net-hours)
5. total number of individuals per net
6. mean number of individuals per net for all individuals as well as those individuals <13 cm (5 in.), ≥13 cm (5 in.), ≥20 cm (8 in.) and ≥25 cm (10 in.)
7. mean, minimum, and maximum values, and standard deviations of individual lengths and weights
8. PSD and RSD with 95% confidence limits
9. number of stock-sized, quality-sized, and preferred-sized individuals

B. Length-frequency analysis, stratified by:

1. Lake
2. Species
3. Annual catch data - tables will be divided into 25 mm intervals; CPUE, mean relative weights, and 95% confidence intervals will be calculated by size groups

VII. Reporting

A. All Data should be entered digitally, validated, and uploaded to the OFAT database. Paper copies of the field data sheets should be filed at the region's field office.

Table Of Contents

Tandem Hoop Net Sampling - Small Impoundments
Gear Code: 33

VIII. Objective: hoop net sampling is used to collect Channel Catfish samples for information about the following:

A. Relative abundance/catch rates
B. Length frequency
C. Age and growth
D. Length-weight relationships

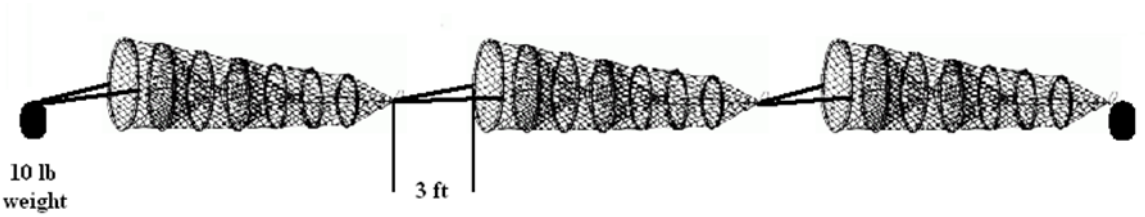
IX. Gear Specification

A. General description

1. A tandem set consists of three hoop nets tied together (bridle to cod end)
2. Nets have twine netting with 25 mm (1 in.) bar mesh
3. Net dimensions: largest hoop is 0.8 m in diameter, net is approximately 3.4 m long
4. Nets are tied together with bridles 1.8 m in length (2.6 ft.) (allows nets to be fished 1 m (3 ft.) apart).
5. Each net is baited with approximately 0.9 kg (2 lbs.) of cheese log (1/3 of a log), 0.9 kg (3 lbs.) of soybean cake, one full size bar of Zoat soap (400 g), or approximately 450 g (1 lbs.) of catfish food pellets. Bait is placed in a porous container preventing immediate or direct consumption.

B. Materials

1. Netting: #15 twine with 1 inch bar mesh, net-coat treated
2. Hoops: seven 13 mm fiberglass hoops, the largest hoop is 0.8 m in diameter with each successive hoop decreasing in diameter.
3. Bait containers: 0.9 kg plastic sample jars with 25 to 30 holes. Each hole is 6 mm in diameter.
4. Bait types
    a) Zoat soap
    b) Cheese log (Boatcycle)
    c) Commercial catfish food pellets
    d) Soybean cake (local feed and seed)



X. Effort

A. Number of net sets will be determined by surface area of the impoundment.

1. fewer than 20 hectares (50 acres) = 3 stations
2. 20-60 hectares (50 – 150 acres) = 5 stations
3. 60-100 hectares (150 – 250 acres) = 8 stations
4. >100 hectares (250 acres) = 10 stations

B. Net night requirements may be met by setting all nets on one day or by setting part of the total number of nets on consecutive days.

C. Effort – 72h set (3 net nights)

D. CPUE - (# channel catfish / effort) and expressed as number / set

XI. Frequency of Collection - once annually per lake from June to August before catfish are stocked that year.

XII. Data Collection

A. Sampling sites - Nets are set parallel to the shoreline in 2.5 to 3.7 m of water. Nets may be set shallower if there is insufficient depth or oxygen (<4mg/ml in 2.5 to 3.7 m of water). Select sites along shorelines with a gentle enough slope to avoid nets from rolling to deeper water. Nets should be set blind to avoid theft (no buoys).

B. Stations - Establish permanent stations on lakes <20 hectares (50 acres). On lakes >20 hectares, stations should be randomly selected with 91.5 m^2 grids.

C. Recording - see Code Instructions, use Hoop Net Data Form 4.

1. Data are recorded immediately after nets are retrieved.
2. Record each net's catch separately.
3. Individually measure total length for all channel catfish.
4. Weighing of channel catfish is optional.
5. Otoliths should be pulled from 20 fish per 25 mm (1-inch) group.

XIII. Data Analysis

A. Catch per unit effort, stratified by:

1. Lake
2. Size groups
   a) total number of individuals
   b) percent number of individuals
   c) CPUE, standard error, relative standard error, and 95% confidence intervals
   d) mean relative weights
   e) maximum weights

B. Length-frequency analysis, stratified by:

1. Lake
2. Annual catch data – tables will be divided into 25mm intervals and the total number of fish in each inch group, the percentage of total for each inch group, and relative weights for each inch group will be given

C. Age and growth
   1. Total number of fish aged
   2. Total number of fish of each age
   3. Mean length at age (time of sample)

XIV. Reporting

A. All Data should be entered digitally, validated, and uploaded to the OFAT database. Paper copies of the field data sheets should be filed at the region's field office.

Table of Contents

Electrofishing Sampling
Gear Codes: 41, 42.2, 44, 44.01, 44.02, 45, 49

XV. Objective: Sampling with electrofishing is used to collect fish samples for information about the following:

A. Age and growth
B. Relative weights
C. Length-frequency
D. Population structure
E. Catch rates by species
F. Year class strength

XVI. Standard Gear Specifications (all species)

A. The header on Data Form 1 should be filled out completely. Any variables that might affect sampling efficiency should be identified in the field notes (extreme weather, water level fluctuation, turbidity, etc.).

B. Standardized electrofishing gear includes an electrofishing unit mounted on an aluminum boat with the hull acting as the cathode. Two booms with stainless steel dropper cables 4.8-6.4 mm in diameter equally spaced around a 40.6-45.7 cm ring will be used. Dropper cables will be long enough to submerge 0.6-0.9 meters below the water surface. The distance between the water line at the bow of the boat and the center of the boom rings is 2.4-2.5 meters, and the distance between the two booms is 1.9-2.0 meters (Chapter 3 in Standard Methods for Sampling North American Freshwater Fishes, Bonar, et al. 2009).

C. Samples should be collected using pulsed DC (60 pulses per second) and, depending on the conditions, optimum amp output used (see Power Output Tables at the end of this section). A single dipper on the bow of the boat should be used to collect samples. The dipper will power the electrical field (foot on the pedal) any time the boat is progressing into new (unsampled) water.

XVII. Site Selection

A. Random Station Sampling (Gear Code: 44.02 for bass)

1. Random Site Selection - Sites will be randomly selected using a 300m^2 grid overlay. Only shoreline sites (grids that touch the shoreline) including island sites, if applicable, will be selected (no open water sites). The ArcGIS software used to generate the grid overlay will produce a centroid point of each grid square. Navigate to the centroid lat/long coordinate, proceed directly to shore, turn to the port side (left) and begin sampling.

B. Fixed Station Sampling (Gear Code: 44.01 for bass)

1. Sampling Stations: Establish permanent stations in upper, middle, and lower lake areas and identify these stations with permanent station numbers. The number of stations in each area (upper, middle, lower) is at the discretion of the Regional Supervisor. If sampling Smallmouth Bass, stations will be confined to the lower 50% of the reservoir.

2. Sampling sites: More specific locations within sample stations where fish are actively collected. Sampling effort (number of units of effort/sites) should be partitioned among the sampling stations at the Regional Supervisor's discretion.

a) Efforts should be concentrated in known habitat areas. Establishing GPS coordinates for each sampling location is recommended.

(1) Identify stations on Data Form 1; arbitrary numbers can be assigned. Station numbers must remain the same from year to year to be comparable. More specific location details should be recorded in Field Notes.

(2) Select sites within each station in as many habitat types as possible where fish are expected to be.

XVIII. Effort

A. Random Station Sampling

1. Unit of effort - units of effort are measured in 10-minute units of "actual fishing time," or when electricity is applied to the water. Samples must be collected in discrete 10-minute units of effort. Catch from each 10-minute unit of effort must be recorded separately on an individual data sheet.

2. Catch per unit effort - number of fish collected per hour. This is calculated by averaging the number of fish collected in each 10-minute unit of effort and multiplying by 6.

3. Amount of effort – Minimum number of sites will be determined by surface area of the impoundment. The target C.V. of mean is 0.20. If the target C.V. of mean is not obtained using the minimum number of stations, additional stations should be sampled not to exceed two times the minimum.

a) fewer than 202.5 hectares (500 acres) = 6 stations or complete shoreline (discretion of the biologist if targets are met)

b) 202.5- 405 hectares (500 – 1,000 acres) = 12 stations (up to 24 stations to reach target C.V. of mean)

c) 405-4,050 hectares (1,000 – 10,000 acres) = 18 stations (up to 36 stations reach target C.V. of mean)

d) > 4,050 hectares (10,000 acres) = 24 stations (up to 48 stations to reach target C.V. of mean)

4. Quota - If C.V. target is met and 150 individuals of target species have not been obtained, additional sampling should be conducted in known bass habitat to reach goal for a length frequency. Extent of additional sampling is left to the discretion of the Regional Supervisor.

B. Fixed Station Sampling

1. Quota - sampling will cease when 150 individuals of the target species have been obtained, or 24 units of effort have been completed. If the lake being sampled is too small to conduct 24 units of effort without repeating areas already electrofished, sampling can be discontinued once a complete circuit of the shoreline has been completed.

XIX. Frequency of Collection

A. Frequency of collection (years between samples) is left to the discretion of the Regional Supervisor. Priority should be given to lakes where management methods are being evaluated (such as a change in length limits).

B. Electrofishing samples (spring or fall) must be collected when surface water temperatures range from 15 – 24 ^{0}C (60-75 ^{0}F). Care should be taken to not sample when bass fry (<39 mm or1.5 inches) are present to avoid mortality associated with electrofishing. Sampling during the "pre-spawn" period is preferred.

C. Sample period - sunrise to sunset except in clear water (mean secchi disk reading >3 m) impoundments where electrofishing should be conducted sunset to sunrise. If the target species of the sample is either Smallmouth Bass or young-of-the-year Saugeye, sampling should be conducted after sunset.

XX. Data Collection

A. Recording - see Code Instructions, use Data Form 1.

1. Record each unit of effort separately on Data Form 1.
2. Completely fill in all data at top of Data Form 1.
3. Individually measure total length and weigh all target species.
4. Otolith samples - See Special Instructions.

XXI. Data Analysis

A. Catch per unit effort, stratified by:

1. Lake
2. Species
3. Size groups
   a) total number of individuals
   b) percent number of individuals
   c) CPUE, standard error, relative standard error, and 95% confidence intervals
   d) mean relative weights
   e) maximum weight

B. Length-frequency analysis, stratified by:

1. Lake
2. Species

3. Annual catch data - tables will be divided into 25 mm (1 – inch) intervals and the number of fish in each inch group, the percentage of total for each inch group, and relative weights by inch group will be given.

C. Age and growth analysis (optional)

1. The basic age and growth analysis will include:

a) Total number of fish aged

b) Total number of fish of each age

c) Mean length at age (time of sample)

XXII. Power Output (Smith-Root 5.0, 7.5, and 9.0 electrofishing units ONLY; not ETS or other electrofishing units)

A. Introduction - The following power output tables have been adopted from the Florida Fish and Wildlife Conservation Commission Standardized Sampling Manual (Compiled by Kimberly Bonvecchio, 2005). Electrofishing crews will use these tables to determine the proper amount of power to apply to the fish during standardized sampling. Surface temperature and conductivity must be measured to compute the correct amount of power.

B. Calculating power output – Measure surface temperature (^{0}C) and conductivity (micro-Siemens per centimeter; µS/cm) of the water. Use Table 1 to determine the voltage range required to transfer 3,000 watts of power to the fish. Transfer that voltage range to Table 2 and match the range with your GPP unit. Use the correct voltage range setting on the GPP (for 5.0 GPP 500V = low range and 1000V = high range) to produce the amperage goal from the far-right column of Table 2.

XXIII. Power Output (All other electrofishing unit types, including ETS and Midwest Lakes)

A. Introduction – The following output tables are used to standardize power output by using water temperature and conductivity. Table 3 was provided by Dr. Dan Shoup of Oklahoma State University, 2023, to determine ambient conductivity from a measured specific conductance. Tables 4 and 5 were taken from Chapter 14 of Standard Methods for Sampling North American Freshwater Fishes (Bonar et al., 2009) and are used to determine power (Table 4) and current (Table 5) using ambient conductivity calculated from Table 3 and water temperature (^{0}C).

B. Table 3 is used for calculating ambient conductivity from a measured specific conductivity and water temperature (^{0}C). The ambient conductivity is then used to determine power output. Look up specific conductance measured by a meter along the rows of the first column, then go across the corresponding row until you are in the column for the current water temperature. The value in the cell where those intersect is the appropriate ambient conductivity that the electrofishing unit output power should be standardized to. If you have a meter capable of measuring ambient conductivity, you can use the measured values and do not need to use this table.

C. Table 4 is used to determine power output (Watts). The ambient conductivity chosen from Table 3 is used to determine the proper power range for effective electrofishing. Power can be adjusted by manipulating the voltage on the control unit.

D. Table 5 is used to determine current output (Amps). The ambient conductivity chosen from Table 3 is used to determine the proper current range for effective electrofishing. Current can be adjusted by manipulating the voltage on the control unit.

XXIV. Reporting

A. All Data should be entered digitally, validated, and uploaded to the OFAT database. Paper copies of the field data sheets should be filed at the region's field office.

Table of Contents

Reservoir Smallmouth Bass Electrofishing Guidance
Gear Codes: 44, 44.01

In 2020, the SSP committee was tasked with constructing a standardized sampling procedure for reservoir Smallmouth Bass. We reviewed related literature, state reports, and spoke with managers from other southeastern states with reservoir Smallmouth Bass populations. Results from the review lead to this document. None of the southeastern states that we contacted had standardized sampling procedures for sampling Smallmouth Bass in reservoirs. Most states indicated that it was either impossible, or too time consuming to obtain a large enough sample, and that the samples were too size-biased to infer accurate abundance estimates. However, they continue to sample reservoir Smallmouth Bass to gather genetic samples, and age and growth data. This is not a standardized sampling procedure, but guidance for those interested in sampling Smallmouth Bass in reservoirs.

Sampling Smallmouth Bass in reservoirs is arduous, as they live, feed, and spawn in relatively deep water (Boman 2013; Bush 2020). Although many sampling gears excel in deeper water, boat electrofishing has been found to be the most effective gear for sampling reservoir Smallmouth Bass (Bacula et al. 2011), as results exhibit the least size selectivity and bias when compared to other sampling gears (Beamesderfer & Rieman 1988). A brief window in fall occurs at water temperatures between 60 and 70 ^{0}F, when Smallmouth Bass feed in relatively shallow water at night (Suski & Ridgway 2009). This presents an opportunity for relatively effective sampling with boat electrofishing gear (Sammons & Bettoli 1999). Reservoir Smallmouth Bass inhabit boulder, large cobble, and rip-rap habitats on the main lake, spending very little time in gravel or other fine substrates (Gilliland & Horton 1991; Sammons & Bettoli 1999). Smallmouth Bass are rarely found in cove habitats (Hubert & Lackey 1980).

I. Objective: Sampling with electrofishing is used to collect fish samples for information about the following:
   - A. Age and growth
   - B. Relative weights
   - C. Length-frequency
   - D. Population structure
   - E. Catch rates by species
   - F. Year class strength

II. Standard Gear Specifications (all species)
   - A. The header on Data Form 1 should be filled out completely. Any variables that might affect sampling efficiency should be identified in the field notes (extreme weather, water level fluctuation, turbidity, etc.).

B. Standardized electrofishing gear includes Smith-Root GPP 5.0 or 7.5, or ETS electrofisher mounted on an aluminum boat with the hull acting as the cathode. Two booms with ss dropper cables 4.8-6.4 mm in diameter equally spaced around a 40.6-45.7 cm ring will be used. Dropper cables will be long enough to submerge 0.6-0.9 meters below the water surface. The distance between the water line at the bow of the boat and the center of the boom rings is 2.4-2.5 meters, and the distance between the two booms is 1.9-2.0 meters (Chapter 3 in Standard Methods for Sampling North American Freshwater Fishes, Bonar, et al. 2009).

C. Samples should be collected using pulsed DC (60 pulses per second) and, depending on the conditions, optimum amp output used (Power Output Tables). A single dipper on the bow of the boat should be used to collect samples. The dipper will power the electrical field (foot on the pedal) any time the boat is progressing into new (unsampled) water.

III. Site Selection

A. Sampling Stations: Establish permanent stations in the lower 50% of the reservoir and identify these stations with permanent labels. All permanent stations shall be in main-lake habitats, having boulder, riprap, and/or cobble substrate. No sites should be established in cove habitats, or areas made up of fine substrate.

B. Sampling Sites: Sampling effort (number of units of effort/sites) should be partitioned among the sampling stations at the Regional Supervisor's discretion.

1. Efforts should be concentrated in known habitat areas. Establishing GPS coordinates for each sampling location is recommended.

a) Identify stations on Data Form 1; arbitrary numbers can be assigned. Station numbers must remain the same from year to year to be comparable. More specific locations should be recorded in Field Notes.

IV. Effort

1. Unit of effort - units of effort are measured in 10-minute units of 'actual fishing time.' Samples must be collected in discrete 10-minute units of effort. Catch from each 10-minute unit of effort must be recorded separately on an individual data sheet.

2. Catch per unit effort - number of fish collected per hour. This is calculated by averaging the number of fish collected in each 10-minute unit of effort and multiplying by 6.

3. Amount of effort – Minimum number of sites will be determined by surface area of the impoundment. The target C.V. of mean (or relative standard error) is 0.20. If the target C.V. of mean is not obtained using the minimum number of stations additional stations should be sampled not to exceed two times the minimum.

a) less than 202 hectares (500 acres) = 6 stations or complete shoreline (discretion of the biologist is targets are met)

b) 202 – 404.5 hectares (500-1,000 acres) = 12 stations (up to 24 stations to reach target C.V. of mean)

c) 404.5 – 4050 hectares (1,000-10,000 acres) = 18 stations (up to 36 stations reach target C.V. of mean)

d) > 4050 hectares (10,000 acres) = 24 stations (up to 48 stations to reach target C.V. of mean)

4. Quota – sampling will cease when 150 individuals of the target species have been obtained, or 24 units of effort have been completed. If the lake being sampled is too small to conduct 24 units of effort without repeating areas already electrofished, sampling can be discontinued once a complete circuit of the shoreline has been completed.

V. Frequency of Collection

A. Frequency of collection (years between samples) is left to the discretion of the Regional Supervisor. Priority should be given to lakes where management methods are being evaluated (such as a change in length limits).

B. Electrofishing samples should be collected during the fall, when surface water temperatures range from 15.5-21 ^{0}C (preferably 15.5-18.3 ^{0}C).

C. Sample period - Night, at least 30 minutes after sunset and before sunrise.

VI. Data Collection

A. Recording - see Code Instructions, use Data Form 1.

1. Record each unit of effort separately on Data Form 1.
2. Completely fill in all data at top of Data Form 1.
3. Individually measure total length and weigh all target species.
4. Otolith samples - See Special Instructions.

VII. Data Analysis

A. Catch per unit effort, stratified by:

1. Lake
2. Species
3. Size groups
   a) total number of individuals
   b) percent number of individuals
   c) CPUE with standard error, coefficient of variation of the mean, and 95% confidence intervals
   d) mean relative weights
   e) maximum weight

B. Length-frequency analysis, stratified by:

1. Lake
2. Species

3. Annual Catch Data - tables will be divided into 25 mm (1-inch) intervals and the number of fish in each inch group, the percentage of total for each inch group, and relative weights by inch group will be given.

C. Age and Growth Analysis (Optional)

VIII. The basic age and growth analysis will be programmed to include:

1. Total number of fish aged
2. Total number of fish of each age
3. Mean length at age (time of sample)

IX. Reporting

A. All Data should be entered digitally, validated, and uploaded to the OFAT database. Paper copies of the field data sheets should be filed at the region's field office.

Table of Contents

Flathead And Blue Catfish Electrofishing
Gear Code: 98

I. Objective: Sampling with electrofishing is used to collect catfish samples for information about the following:

A. Length frequency
B. Relative weight
C. CPUE by size class
D. Year-class strength
E. Age and growth

II. Gear Specifications

A. Standardized electrofishing gear includes an electrofishing unit mounted on an aluminum boat with the hull acting as the cathode. Two booms with stainless steel dropper cables 4.8-6.4 mm in diameter equally spaced around a 40.6-45.7 cm ring will be used. Dropper cables will be long enough to submerge 0.6-0.9 meters below the water surface. The distance between the water line at the bow of the boat and the center of the boom rings is 2.4-2.5 meters, and the distance between the two booms is 1.9-2.0 meters (Chapter 3 in Standard Methods for Sampling North American Freshwater Fishes, Bonar, et al. 2009). Use low pulse rates (15 pps) with the appropriate output (Approx. 4 amps).

B. Two additional chase boats are also required to pick up stunned individuals. Additional electrofishing boats with dipper cages attached to the

1. bow can be use as chase boats, but only one boat is used to actively shock
2. fish. Any other style of boat used as a chase boat must be outfitted with a safety cage for the dipper on the bow.
3. One dipper will be used on each of the three boats.

III. Effort

A. Unit of effort - units of effort are measured in 5-minute units of “'actual fishing time,” or when electricity is applied to the water.' Samples must be collected in discrete, 5-minute units of effort. Catch from each 5-minute unit of effort must be recorded separately on an individual data sheet. Catch per unit effort - number of fish collected per hour. This is calculated by averaging the number of fish collected in each 5-minute unit of effort and multiplying by 12.

B. Amount of effort

1. At each site, 5 minutes (one unit of effort) will be required.
2. Amount of sampling required:
   (1) >4,050 hectares (10,000 acres) = 18 sites (90 minutes total) for each lake.
   (2) 405 - 4,050 hectares (1000-10,000 acres) = 9 sites (45 minutes total) for each lake.
   (3) <405 hectares (1,000 acres) = Biologist discretion.

IV. Frequency of Collection

A. Once annually per lake when the surface water temperatures range from 18 to 29ºC.

B. Sample period - sunrise to sunset.

C. Flathead Catfish - sampling during the pre-spawning period for Flathead Catfish is preferred (late-May) but may be extended through July.

D. Blue Catfish – May through October, as long as water temperature requirements are met.

V. Data Collection

A. Blue Catfish

1. Sampling sites

a) Sampling should concentrate in the upstream 50%of the reservoir. Sample depths ranging 3-12m.

b) Sites will be selected in a random or stratified-random design from a grid overlay of each lake. Grids will be comprised of numbered 300-meter squares.

c) Identify Grid Number on Data Form 1. More specific location details should be recorded in Field Notes.

2. Electrofishing procedure

(1) During the 5- minute unit of effort, the electrofishing boat will remain stationary until fish begin to surface (60-90 seconds after the shocking pedal is depressed). As the density of surfaced fish changes, the electrofishing boat should move slowly to follow the moving school of Blue Catfish. The chase boats pick up fish out of reach of the shocker boat personnel.

(2) Only Blue Catfish will be picked up during this procedure.

3. Recording

(1) Collection data will be recorded on Data Form 1.

(2) Separate data sheets should be recorded at each site.

(3) Record total length, weight, and, if possible, sex for each individual catfish. If no individuals were collected, a "98" should be recorded for species code, and a “0” for number of individuals.

B. Flathead Catfish

1. Sampling Sites

a) Efforts should be concentrated in areas of known or suspected Flathead concentrations.

b) Flathead Catfish - Site selection for Flathead Catfish should include rocky points, riprap, log piles, undercut banks, and timbered creek channels. Bank inclines should be moderate to steep

2. Electrofishing procedure

a) Sampling all habitat types: The electrofishing boat will remain stationary until fish begin to surface (60-90 seconds after the shocking pedal is depressed). As the density of surfacing fish changes, the shocking boat will be driven slowly along the shoreline during the remainder of the 5-minute effort. The chase boats will pick up fish out of reach of the shocker boat personnel.

b) Only Flathead Catfish will be picked up during this procedure.

3. Recording

a) Biological data will be recorded on regular SSP Data Form 1. Include all information at the top of Data Form including time, surface temperature, secchi disc, conductivity, gear length, and effort.

b) Separate data sheets should be recorded at each site.

c) Record total length, weight, and if possible, sex for each individual catfish. If no individuals were collected, a "98" should be recorded.

VI. Data Analysis

A. Catch per unit effort, stratified by:

1. Lake
2. Species
3. Size groups
   a) total number of individuals
   b) percent number of individuals
   c) CPUE, standard error, relative standard error, and 95% confidence intervals
   d) mean relative weights
   e) maximum weight

B. Length-frequency analysis, stratified by:

1. Lake
2. Species
3. Annual catch data - tables will be divided into 25 mm (1-inch) intervals and the number of fish in each inch group, the percentage of total for each inch group, and relative weights by inch group will be given.

C. Age and growth analysis (optional): The basic age and growth analysis will include:

1. Total number of fish aged
2. Total number of fish of each age
3. Mean length at age (time of sample)

Table Of Contents

Water Quality Sampling

I. Objective: To monitor on a periodic or annual basis, the most critical water quality conditions existing within an impoundment.

II. Gear Specification

A. Secchi disc

B. Temperature, dissolved oxygen, pH, and specific conductivity should be measured with individual digital probes or a digital multi-parameter probe or sonde (e.g., Hydrolab®, YSI®, Eureka®). All probes should be calibrated at an appropriate frequency and with calibration standards matching the bodies of water being monitored.

III. Effort

A. < 40.5 hectares (100 acres) = 1 permanent station, deepest part of the reservoir.

B. > 40.5 hectares (100 acres) = 2 permanent stations; one at lower end near dam and one in upper end, opposite dam.

C. The need for more stations or more samples is left to the discretion of the biologist.

IV. Frequency of Collections

A. Profiles will be recorded in August or September each year, or at the discretion of the biologist.

V. Data Collection

A. Sampling period:

1. Field determinations will be made between 9:00 a.m. and 5:00 p.m., C.S.T. All measurements will be recorded on Data Form 2.

B. Temperature profiles as degrees Celsius (nearest tenth) are recorded at one-meter intervals from surface to bottom. Note: Be sure to include substrate sample as separate reading. (See Data Form 2)

C. Dissolved Oxygen (D.O.)

1. Record as milligrams per liter to the nearest tenth at one-meter intervals from surface to bottom. (Bottom is separate reading.)

D. Conductivity (micromhos/cm at 25°C) record values at surface and one meter from bottom.

E. pH is measured to nearest tenth at surface, mid-depth, and one meter from bottom.

F. Secchi disc reading - record values in inches.

G. Optional - other water quality data may be taken for laboratory analysis at the Oklahoma State Water Quality Laboratory. The Water Quality Lab will analyze samples for alkalinity, pH, chlorides, conductivity, turbidity, nitrogen, phosphorus, and C.O.D. They require that the sample be taken and labeled properly and delivered immediately upon collection (within 8-10 hours). Delivering person should call the lab in advance to make sure the delivery can be accepted.

State Environmental Laboratory Services
Department of Environmental Quality
707 N Robinson
Oklahoma City, OK 73102
Phone: (405) 702-1000
Hours: Monday – Friday, 8:00 a.m. – 4:30 p.m. (closed on state holidays)

VI. Data Analysis – Temperature data will be converted from Celsius to Fahrenheit; D.O. data will be converted from mg/L to ppm; and depth will be converted from meters to feet. Water quality data will be graphically represented in oxygen and temperature profiles.

Table Of Contents

Reservoir Creel Surveys (Revised 7/23/2020)

Objectives:

Creel surveys provide estimates of fishing effort catch and harvest rates, species size-distribution, angler valuations of fisheries and angler preferences. These procedures are designed to provide baseline data for fisheries management decisions and the comparison of data over time and between waterbodies. These procedures address reservoirs. River/stream surveys will be addressed on a case-by-case basis or in future updates to this manual. Creel data should represent all angler types and all fish species caught whether or not they are targeted.

Survey Design:

There are certain requirements for acquisition of valid field data. The primary one is that the creel clerk should work during the entire time period to complete each sample. Also, within any roving survey section, all anglers should be counted and as many interviewed as possible.

Roving surveys: Roving creel surveys involve a creel clerk traveling around a predefined area (usually by boat), counting and interviewing anglers while they are fishing. The primary advantage of roving surveys is they are more manpower-efficient than access point surveys.

Passive-Gear Anglers: Creel surveys for passive-gear anglers (trotlines, limblines, jug lines, jugs that are set to fish and left unattended) will be handled on a special project proposal basis. Pressure, effort, catch and harvest data for passive-gear anglers should not be included with data from this procedures manual.

Time of Year and Effort: Annual surveys are preferred as they represent an entire year's angling effort and catch data. The minimum period for creel surveys is 3 months (one quarter). Annual surveys will be stratified by quarter and are defined as:

- Winter – December 1 through February
- Spring – March 1 through May
- Summer – June 1 through August
- Fall – September 1 through November

The major consideration behind sampling effort is the desired precision of the estimate obtained. For purposes of monitoring trends in catch rates and angler effort, sample sizes that yield CVs of 0.2 or less are often considered sufficient. The minimum sample sizes recommended below are likely to yield CV values near 0.2; however, data should be reviewed at least annually to check for the level of precision and possible ways to improve precision.

For quarter survey periods, the minimum days sampled should be at least 10% of the days in the period (i.e., 9 days/quarter). Sample weekend days and weekdays in a 5/4 ratio (5 weekend days and 4 weekdays in a 90-day period). The afternoon portion of Friday will be included in the weekend category. Certain holidays and other high use days will also be included in the weekend category. These include Memorial Day, Labor Day and July 4th. If July 4th falls on a

Tuesday or Thursday, the preceding or following day, respectively, will be included as a weekend day (i.e., 4-day weekend period including Saturday and Sunday). If July 4th falls on a Wednesday, the Tuesday and Thursday of that week will also be included in the weekend category.

Time Periods: Time periods are the temporal units during which interviews are conducted on any day of field sampling. There will be two (2) time periods for each sampling day. The length of time periods in a given day is dictated by hours of possible fishing time (i.e., dawn to dusk fishing dah). Start and end times will be standardized for each month and reflect the average daylight hours (See Table 1). The date of each sample day and the time period to be sampled will be chosen at random by the creel schedule generator program. Only one time period will be chosen for each possible sampling day.

Table 1. Starting and ending times for creel periods by month.

	Start/End Times		
Month	**AM**	**PM**	**Hrs**
January	800 - 1300	1300 - 1800	10
February	730 - 1300	1300 - 1830	11
March ST	700 - 1300	1300 - 1900	12
March DST	800 - 1400	1400 - 2000	12
April	700 - 1330	1330 - 2000	13
May	630 - 1330	1330 - 2030	14
June	630 - 1400	1400 - 2100	14.5
July	630 - 1400	1400 - 2100	14.5
August	700 - 1400	1400 - 2030	13.5
September	730 - 1400	1400 - 2000	12.5
October	730 - 1330	1330 - 1900	11.5
November DST	800 - 1330	1330 - 1830	10.5
November ST	700 - 1230	1230 - 1730	10.5
December	730 - 1230	1230 - 1730	10
		Total Hrs	**147**

Sections: Lakes may be surveyed as an entire waterbody or broken down into smaller sections based on the following criteria. Instantaneous pressure counts must be completed in 60 minutes or less. If a waterbody is too large to conduct an instantaneous pressure count in less than 60 minutes, it must be divided into sections. Sections should be similar in travel time necessary for these counts. Consider marinas, timbered areas, no-wake zones, etc. when determining time

needed to complete a circuit. An experimental trip to the lake to conduct trial runs is advised before determining the number of sections and section size. Limit the number of segments to the minimum amount required, because larger sections will produce more interviews per creel day.

Within each area to be surveyed (whether entire waterbody or section), four (4) "pressure count starting points" should be established. These points will divide the area into approximately 4 equal lengths of shoreline. These will be selected at the discretion of the biologist and remain permanent throughout all quarters of the creel survey. See Figures 1 and 2 for reference.

Survey Calendar: Once the creel duration (annual or quarterly), effort and number of sections has been determined, sampling periods will be randomly selected. This will be broken down quarterly and will identify the day, time period and section for each random selection. The random start times for the two (2) pressure counts will also be identified. An additional four (4) random samples (2 WD, 2 WE) will also be generated from which biologists can select or use as replacement days, if needed.

Survey Procedures:

For a given sampling day, clerks will sample either the entire waterbody or only one section of a waterbody. Each sampling day will consist of both instantaneous pressure counts and angler interviews. Direction of travel throughout the day (clockwise or counterclockwise) will remain consistent and should be determined randomly before the sample begins (ex: coin flip).

Pressure Counts: Pressure counts are used for effort estimates. The most important parameters calculated from creel surveys are total effort estimates. Total effort or extrapolated angler effort, based on counts of anglers at a waterbody, is the estimate of the angler-hours expended at a waterbody given a specific time interval. Calculation of total effort is important because metrics such as, catch, harvest, release and CPUE are all calculated using the estimated total angler effort.

There will be two (2) instantaneous pressure counts per sampling day. These counts will be predetermined randomly and will be a minimum of 1 hour apart.

Just prior to the beginning of a pressure count, the creel clerk should travel to the nearest "pressure count starting points". The count will begin at the designated time and will continue until the clerk completes an entire circuit of the waterbody or section. Subsequent pressure counts will be initiated at the nearest predetermined starting point at the time a count is to begin.

During pressure counts, move in the randomly selected direction of travel for that day, and count all anglers along the way. This should be accomplished in approximately 60 minutes or less. Angler interviews will not be conducted during pressure counts.

Count anglers as they are encountered. Imagine a line extending from the bow of the creel clerk's boat on the shoreline in one direction, and to the center of the waterbody in the opposite

direction. As the line crosses an angler, they become part of the count. Bank and boat angler subcategories must be enumerated separately (see Angler Types listed below). The sample section should be circumnavigated as rapidly as is safely possible for careful enumeration of all anglers.

Individual anglers, not boats, are to be counted. For example, if there is a boat with four (4) anglers fishing in it, the count would be four (4) anglers, not one (1) boat. Only count anglers that you encounter if they are actively fishing, or if you have observed them fishing within the sampling section and time period for that day (ex: you interviewed them earlier and know they are/have been fishing). Enclosed public fishing docks should be investigated to count and interview anglers. Private dock anglers can be counted and interviewed if visible. Do not trespass or enter private docks to look for anglers or to conduct interviews.

If inclement weather prevents you from making a pressure count, and it can be assumed anglers were not fishing, record zeros on the count form for the appropriate time. If you are unable to complete either of the pressure counts due to illness, boat problems, vehicle problems, etc., that creel day is considered invalid and must be made up with a replacement day of the same type (WE or WD).

Angler Interviews: when pressure counts are not being conducted, it is important to get as many interviews as possible. The direction of travel will remain consistent, but the clerk can proceed as quickly as necessary through the section to obtain interviews.

Interviews should include both shore and boat anglers. Try to avoid bias in choosing people to interview or overlooking difficult to find anglers (back of coves or on docks). The interviews should reflect the type of anglers using a lake on a given day. If you are unable to interview everyone, interview every 2nd or 3rd party. Do not interview an angler more than once on the survey day unless you are updating the angler's catch and are able to positively identify the angler's interview form. Making notes on datasheets will assist with this (i.e. Ranger bass boat, blue shirt).

Multiple anglers fishing together will be interviewed as a party. Record the number of anglers and record combined catch, harvest, and release data for the party. Do not record catch data for anglers fishing for less than 30 minutes. This could lead to over or underestimated catch statistics for the day. Politely terminate the interview and ask permission to interview them later in the day.

Angler Type will be subdivided into the following categories:

- Boat Anglers
    - Subcategories - gas motor, electric motor, manual power (ex: kayak, tube, etc.)
- Bank Anglers
    - Subcategories - bank or dock

Interview Process:

The following is a set of instructions to be used as guidelines in conducting an angler interview. It is important to follow the guidelines as closely as possible to ensure that data is collected in a uniform fashion. When finishing an interview, check to make sure all sections are filled out correctly and completely.

Fill out the top portion of the interview datasheet. Much of the card can be filled out before the angler or party is asked any questions:

- Impoundment (??code)
- Date (e.g., mm/dd/yyyy)
- Interview Time (24-hr format)
- Section (1, 2, 3, etc.)
- Period (AM or PM)
- Angler type (Boat or Bank categories)
- Number of Anglers (e.g., 1, 2, etc.)

Start the interview by stating: "Hello, I am with the Oklahoma Department of Wildlife Conservation and I am conducting an angler survey. Would you mind if I asked you some questions? The interview should take less than 5 minutes." If the angler declines, politely terminate the interview.

QUESTION 1: "How long have you fished today?"

Record the total time the angler has fished (Hrs and min) in the space provided.

If the angler began fishing the previous day, record 00:00 (midnight) as the start time.
If the angler has been fishing for less than 30 minutes, politely terminate the interview. "Since you've only begun fishing, I'll give you some time to get started. Would it be alright if I interviewed you later?"

QUESTION 2: "What types of fish are you fishing for today?"

Record the appropriate species name or species group in the space provided. If the angler(s) answers with more than one species, record the name for the first species that is mentioned. Record "anything" if the angler's response is "anything" or "nothing in particular".

QUESTION 3: "Is today's fishing trip part of a tournament event or practice for a tournament event?"

Circle the appropriate response (Yes, No, Practice).

Follow up question: If yes, ask "For this tournament, will fish be released later, released immediately after catch, or will they be kept?"

Circle the appropriate response (LR, IR, Harvest).

QUESTION 4: "Have you kept any fish today?"

If yes, ask for the total number of fish kept per species and the length group.

Record the angler's response in the Kept (K) column of the Angler Catch table. A list of Species Groups and abbreviations can be found in Table z.

QUESTION 5: "Have you released any fish today?"

If yes, ask for the total number of fish released per species and the length group.

Record the appropriate species category and the number of fish released in the "R" column (for released). Do this for each different fish species group that was caught and released. A list of Species Groups and abbreviations can be found in Table z.

QUESTION 6: What is your home zip code?

END INTERVIEW (unless asking additional human dimension questions listed below): "Thank you very much for your cooperation."

OPTIONAL SUPPLEMENTAL QUESTIONS:
Creel surveys can also include questions that gain insight on human dimensions issues at your fishery. These questions can ask about angler values, motivations, satisfaction, economic spending, support or opposition to a proposal, etc. No more than 2-3 of these supplemental questions should be asked during the creel to avoid survey fatigue. If more information is desired of anglers, consider a follow up survey, working with ODWC Human Dimensions staff. The goal of these questions is to have similar questions that are asked across the state and over the years so that ODWC Fisheries division can compare data. Below is the list of standardized human dimensions questions. Biologists can choose to ask all or some of the questions listed.

#7: How many times have you fished this lake in the last 12 months?

#8: If this lake were unavailable, would you still be fishing today? If so, where?

#9: How satisfied are you with the _____ (number, quality, location) of _____ (boat, dock, shore) fishing access points?

Safety and Weather:

Two creel clerks will be required to conduct creel surveys. When out in the field, you may encounter situations that may be unsafe; these may be equipment, weather or human related. Never put yourself in a situation where you feel that your safety may be an issue. Never engage anglers or any other individuals that are behaving in a manner that makes you feel uncomfortable or unsafe. If you experience or witness an illegal activity, report the activity immediately to your supervisor and the proper authorities.

When inclement weather occurs, use your best judgment and common sense. If conditions (weather, high water, etc.) prohibit the launching and retrieving of a boat from the reservoir safely, and an accurate angler count cannot be made, then a make-up day can also be used. However, if it can be reasonably assumed or verified that no anglers are fishing, then the day should be counted as sampled (i.e., zero effort). If a count cannot be made, but there are anglers to interview, then a make-up day should be used in place of this day. The replacement day will be with a similar day type (weekday or weekend) within the same month, if possible.

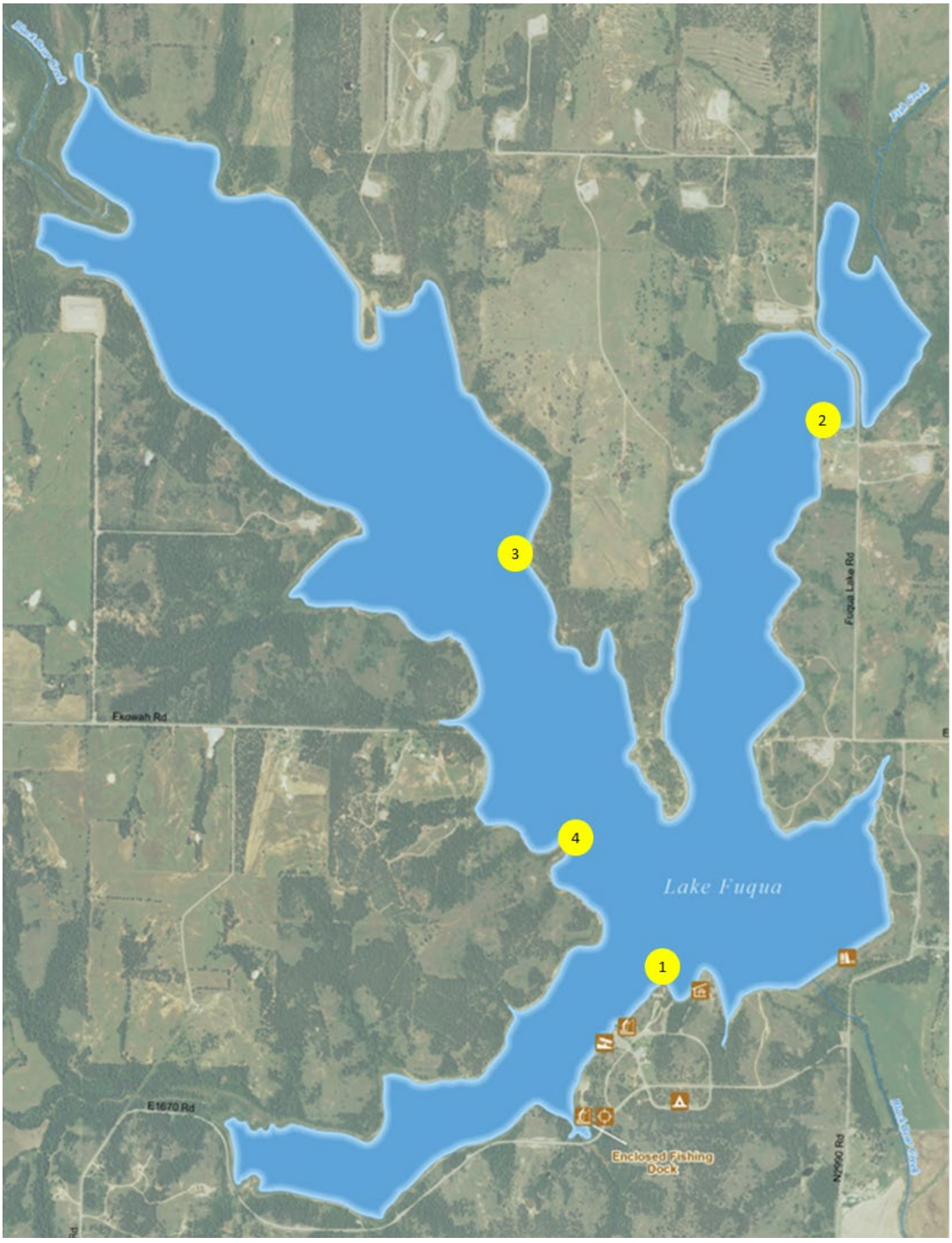


Figure 1: Simple Example - Lake Fuqua, 1,500 acres, 19 miles shoreline, no marinas, no timber. Yellow circles are Pressure Count Starting Points. Pressure counts will start at the point nearest the creel clerk at the randomly chosen time of the pressure count. An entire circuit (clockwise or counterclockwise) of the lake will be made to count anglers (< 60 minutes) before interviews continue.

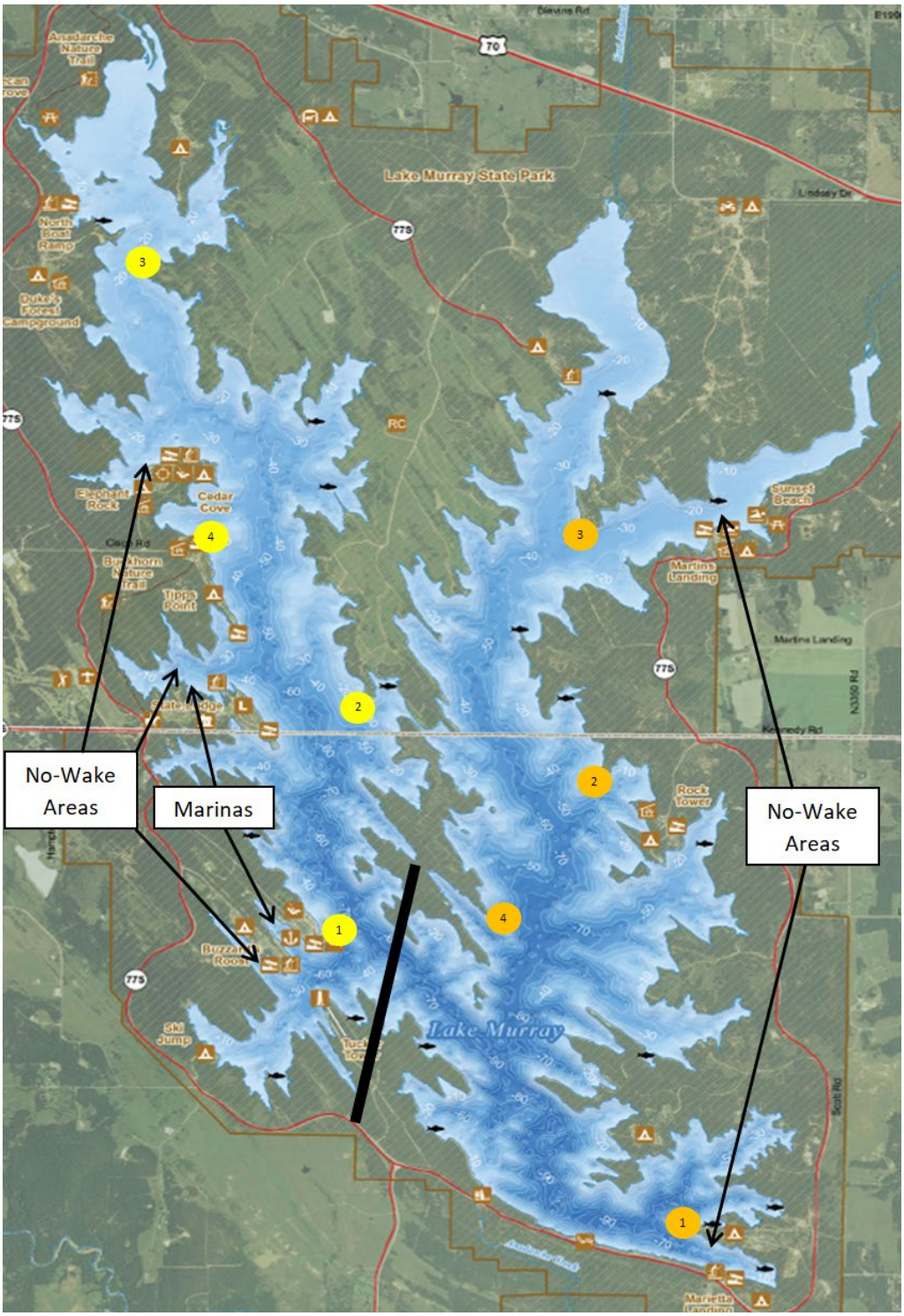


Figure 2: Complex Example - Lake Murray, 5,930 acres, 96 miles shoreline, dendritic shoreline, 2 marinas, and numerous no-wake zones. Solid black line divides lake into 2 Sections. Only 1 Section will be surveyed per day. Each Section has 4 Pressure Count Starting Points (yellow and orange circles). West Section (yellow) is smaller due to the increased time needed for marinas and no-wake areas.

Oklahoma Deparment of Wildlife Conservation

Roving Survey Pressure Count Form

Date:	Waterbody:	Section:
Time Period: AM PM	Clerks:	

First Count

Start time (24 hr): _____ Starting Point: _____

End time (24 hr): _____

Boat Anglers	Bank Anglers
Gas Engine	Shore
Electric Only	Dock
Manual	

Second Count

Start time (24 hr): _____ Starting Point: _____

End time (24 hr): _____

Boat Anglers	Bank Anglers
Gas Engine	Shore
Electric Only	Dock
Manual	

Conditions:		
Water Temp:	Air Temp:	Wind:

Notes:

Waterbody:	Section:	Period: AM PM	Clerk:

Date:	Time (24 hr):	Number of Anglers:

	Angler Type	Boat - Gas Electric Only Manual
		Bank - Shore Dock

Hours Fished (HH:MM) :		Species Sought:

Tournament Participation	Yes	No	Practice
If Answered Yes	Later Release	Immediate Release	Harvest

Estimated Harvested Lengths (in.)					Estimated Released Lengths (in.)			
Species	SPP Code	Number	Length		Species	SPP Code	Number	Length

Zip Code:	Notes:

Table of Contents

Code Instructions

Data Sheets

Paper field data forms must contain adequate information for each sample location so that the data can be properly analyzed and archived in the Oklahoma Fisheries Analysis Tool (OFAT) database. It's strongly encouraged that field crews use the attached sample forms, but if needed, regional crews can create their own forms as long as all the necessary header information (lake code, site number, date, time, water temperature, etc.) is properly recorded for the type of sampling being performed. Once data is entered digitally and submitted to OFAT, all paper data forms should be kept on file at each field office.

The Following Codes are required when entering data on the field data form and when uploading data into the OFAT validation application. Information at the top of the field data form must appear on every sheet that follows. Do not put additional information that is not asked for around the data on the field data sheet. There is a place under "Field Notes" for this kind of information. Under the length or weight categories, do not put "adult" or "YOY" - the computer does not understand these terms.

1. Body Of Water
   Lakes and reservoirs will be recorded as designated in the Reservoir Code. If no code has been assigned, call the Research Laboratory for the proper coding. Reservoir and river codes are listed in the Appendix of this document.
2. Station Code
   Station Code will be designated by Grid No. as taken from the 300m grid overlay of the reservoir. Arbitrary numbers can be assigned if no Grid No. is available. Station numbers should remain the same each year to be comparable. A more precise description of location should be included in the Field Notes section of the Data Form.
3. Date Code
   This is the date (month, day, and year) the data is recorded. Completely fill in all boxes.
4. Time Code
   This is the time the data is recorded based on the 24-hour clock. For example, 10:30 pm would be recorded as 2230. Time is important because the data analysis programs use it to distinguish between day and night electrofishing. The distinction between day and night electrofishing is as follows:

Month	Day	Night
March	0640-1848	1849-0639
April	0559-1902	1903-0558
May	0628-2027	2028-0627
June	0618-2044	2045-0617
July	0629-2041	2042-0628
August	0650-2017	2018-0649
September	0713-1936	1937-0712
October	0738-1855	1856-0737
November	0706-1726	1727-0705

5. Pool Elevation
   This is the elevation of the lake at the time the data are recorded.
   Units = feet above mean sea level. If elevations are not available, then arbitrary values can be assigned or leave the Elevation Code area blank.
6. Surface Temp Code
   This is the temperature at the water surface at the time the data are recorded. Units = Degrees Celsius (Recorded to the nearest whole degree.)
7. Secchi Code
   This is the Secchi Disc reading at the time the data is recorded.
   Units = inches (nearest inch).
8. Conductivity
   This is the conductivity reading at the time the data are recorded.
   Units = microSiemens per centimeter (µS/cm). Values greater than 9,999 µS/cm should be recorded as 9999 µS/cm in the Conductivity Code boxes. Do not add boxes or write outside of boxes. Record actual value in Field Notes.
9. Gear
   The following codes will be used to designate the gear types being utilized (this code must be included on each data sheet submitted):

Gear	Code
Shoreline Seine	10
Gill Net - Experimental	23
Gill Net - 3/8 – 3/4 inch Floating	25
Trap Net - Crappie	31
Hoop Net	33
Electrofishing - All species	41
Electrofishing – Fall, All species	42.2
Electrofishing - bass	44
Electrofishing – bass fixed sites	44.01
Electrofishing – bass random sites	44.02
Electrofishing - bass, sunfish	45
Electrofishing - bass, perch	46
Electrofishing - sunfish	48
Electrofishing - perch	49
Electrofishing - flathead/blue catfish	98

   The above species classifications are defined as follows:
   - Bass - Largemouth Bass (Florida, northern & hybrids), Spotted Bass, and Smallmouth Bass.
   - Sunfish - all sunfish species.
   - Perch - Sauger, Saugeye, and Walleye.
10. Gear Length

Gear Type	Gear Length
Trap Net (Length of lead in meters)	20
Seine (seine length in meters)	12 or 6
Electrofishing (one unit of effort in minutes)	10
Tandem Hoop Nets (length of net set in meters)	10
Gill Nets – Experimental (length in feet)	80
Floating Shad Nets (length in feet)	40
Gill Nets – Texoma Nets (length in feet)	125

11. Habitat

Habitat codes vary with the gear type used. If you are shoreline seining, trap netting, or electrofishing, use the following codes to designate substrate and shoreline cover:

Substrate	Code
Sand	0
Gravel	1
Rock	2
Clay	3
Mud	4
Unknown	5

Shoreline Cover	Code
Vegetated (grass, aquatics)	6
Rock (bedrock, riprap, gravel)	7
Brush (timbers, willows)	8
No Cover	9

Two spaces are provided for habitat designation on the data form. The first space is used to designate substrate (for seining, trap netting, and electrofishing). The second space is used to designate shoreline cover types (for seining, trap netting, and electrofishing).

Example: A shoreline seining station had habitat with sand substrate and no cover. The data would be recorded "0" and "9" in the habitat boxes.

12. Effort

This is the unit of effort expended with a given gear type expressed in the following form:

- Seine Sampling - effort is expressed in total area sampled per station. Each station is recorded separately. In quadrant seine sampling, the total area sampled depends on the length of seine and the number of quadrants covered (1 quadrant is ¼ of a circle).

  Example: If seine length = 6 m then the number of quadrants covered multiplied by 29 m2 = total area sampled.

  Example: If seine length = 12 m then the number of quadrants covered multiplied by 117 m2 = total area sampled.

- Gill and Trap Nets - This is expressed in total number of net hours fished per net. Example: A net fished from 1700 hours to 1500 hours is recorded as 22 net hours of effort.
- Electrofishing - units of effort are measured in 10-minute units of "actual fishing time," or when electricity is applied to the water. Samples must be collected in discrete 10-minute units of effort. Catch from each 10-minute unit of effort must be recorded separately on an individual data sheet. If effort is left blank the data analysis program will calculate effort based on the amount of time spent electrofishing.

13. Species
    Species will be recorded as designated in the Species Code. If no Species Code is available for a particular species, call the Oklahoma Fishery Research Laboratory for proper coding. Lines can be drawn through boxes to indicate "ditto" in lieu of repeating the same code numbers over and over. Species codes are listed in the Appendix attached.
14. No. Individuals
    Designated numerically.
15. Total Length
    All data are recorded to the nearest millimeter or 0.1 inch. If English units are recorded in the field, then they must be converted to metric before analysis and uploading to the OFAT database.
16. Weight
    All data will be recorded in grams or nearest 0.1 pounds. If English units are recorded in the field, then they must be converted to metric before analysis and uploading to the OFAT database.
17. Sex (Optional)
    Code: Male = 1 Female = 2 Unknown = 3
18. Gonad Condition (Optional)

Code	Condition
1	Immature - young individuals which have not yet engaged in reproduction; gonads of very small size.
2	Resting Stage - sexual products have not yet begun to develop; gonads of very small size; eggs not distinguishable to the naked eye.
3	Mature - eggs distinguishable to the naked eye; gonads are increasing in weight rapidly, but the sexual products are still not extruded when light pressure is applied.
4	Ripe - sexual products are extruded in response to very light pressure on the belly.
5	Recovery Stage - sexual products have been discharged; gonads of very small size; eggs not distinguishable to the naked eye.
6	Unknown

Table Of Contents

Special Instructions

ODWC protocol for collecting largemouth bass DNA tissue samples (Revised March 2020)

- FLMB stocking evaluations - collect minimum 20 bass per inch group greater than 12 inches. Collect tissue sample, otoliths, and record the sex of the fish.
- Tissue samples will be placed in prefilled, 15-mL vials provided by Auburn University. Confirm lids are secured to prevent leaks and that tissue is suspended in alcohol solution to ensure proper preservation.
- Vials will be labels with a unique fish ID number corresponding to data sheets and otolith envelopes. These can be preprinted labels (laser printer only) or handwritten with a Metallic Silver Sharpie.
- Collect tissue from the soft portion of the fin(s) and avoid spines, if possible. Take a small sample slightly less than the size of a dime (approx. ½" x ½") of fish tissue. Place the sample in the vial.
- Between each fish, dip your instruments in a 10% chlorine bleach solution and thoroughly rinse in tap water followed by a quick wipe with a clean paper towel. Change out the rinse water after every 50 fish sampled. To prevent cross contamination between individual fish, it is important to clean instruments between each fish.
- Once the clips are in the alcohol, store them upright in the vial storage racks (included). Again, make sure the tissue is suspended in alcohol and lids are securely fastened. Samples should be stored in an ice chest with ice pack immediately after collection. Avoid exposure to sunlight and/or heat. Vials can be stored at room temperature and out of sunlight at the office.
- Complete chain of custody paperwork (attached) and email a copy to Cliff Sager cliff.sager@odwc.ok.gov. Place a copy of this paperwork inside each box that is used to ship or deliver DNA samples. Maintain a copy for your records.
- Once data has been analyzed and fish have been aged, a determination will be made regarding the samples to submit for DNA analysis. Once these samples have been identified, they should be shipped or delivered to the Southcentral Region/Durant Hatchery Office.

Questions or comments regarding this protocol? Contact Cliff Sager at the contact info below.

Cliff Sager
Fisheries Biologist, Southcentral Region
Oklahoma Department of Wildlife Conservation
2021 Caddo Highway
Caddo, OK 74729
(580) 924-4087
Email: cliff.sager@odwc.ok.gov

ODWC Bass DNA Collection and Chain of Custody Form

Collection Information

Collector's Name _____
(Please Print)

Location _____ Date _____ Time _____

Number of Samples _____

Other data collected with this sample (circle all that apply)

SSP data Age data Sex Other (Explain in notes) DNA only

Notes:

Chain of Custody Record

Received From _____ Rec. By _____
(Please Print) (Please Print)

Date _____ Time _____

Received From _____ Rec. By _____
(Please Print) (Please Print)

Date _____ Time _____

Received From _____ Rec. By _____
(Please Print) (Please Print)

Date _____ Time _____

Received From _____ Rec. By _____
(Please Print) (Please Print)

Date _____ Time _____

Scale, Otolith and Fin Ray/Spine Samples

Scale, otolith, and/or spine samples will be collected from those species which were individually weighed and measured in gill netting, trap netting, and electrofishing efforts. Sufficient samples will be collected to perform age and growth analysis. If only a few samples of a given species can be collected, then the reliability of the data is questionable and analysis may not be practical.

Procedure:

1. Number of samples to collect - For sunfish species (including bluegill, green sunfish, redear, longear, warmouth, and orangespotted sunfish), collect a minimum of 10 otoliths per 25mm length group per impoundment. Collect a minimum of five otoliths per 25mm length group on other species. Otoliths should be collected from 20 crappie spp. per 25mm\ length group taken from trap-net samples. For populations determined to be stunted, the number of otoliths per 25mm length group should be increased to 30.
2. Frequency of collection - samples are collected for all species of interest throughout the standardized sampling period with the exception that during Spring electrofishing only bass and forage (bluegill and/or shad) scales are collected.
3. Collection methods - Ctenoid scale samples are taken from the lateral surface near the tip of the pectoral fin, when compressed against the body. Cycloid scale samples are taken from an area between the dorsal fin and lateral line. Always remove as much mucus, dirt, and epidermis as possible prior to scale removal. Otoliths lie along the spine near the junction of the dorsal attachment of the gill arches. To remove, place the fish ventral side up and cut the ventral attachment of the gill arches with a scissors at the isthmus. Score the sacculus with a scissors and break open. Remove the otoliths with tweezers and place in a scale envelope. Fin rays/spines?
4. Scale envelopes - samples are retained in a standard 3×5 coin envelope. Fill in all blanks legibly. If sex cannot be determined, write unknown (unk.).

Relative Weight Calculations

Listed below in parentheses are the minimum lengths used in the standard relative weight equations. Do not weigh individuals less than this length.

Largemouth Bass (150 mm)	Walleye (150 mm)
Spotted Bass (150 mm)	Sauger (70 mm)
Smallmouth Bass (150)	Saugeye (170 mm)
White Crappie (100 mm)	Channel Catfish (70 mm)
Black Crappie (100 mm)	Blue Catfish (160 mm)
White Bass (115 mm)	Flathead Catfish (130 mm)
Striped Bass (115 mm)	Bluegill Sunfish (80 mm)
Hybrid Striped Bass (115 mm)	Redear Sunfish (70 mm)

Diet Analysis (revised December 2004)

In the course of routine sampling, biologists may decide that diet analysis is prudent to evaluate management strategies, i.e., stocking forage species. Target species and sample sizes

will be left to the discretion of the biologist. Diet samples can be collected using any gear type, but biologists should be aware of the possibility of regurgitating stomach contents in the case of gill net caught fish and the likelihood of predators consuming prey species captured in trap nets. For these reasons, electrofishing is the preferred methods of gathering diet information.

Other Significant Species

Although not always possible, each biologist should decide prior to annual sampling which "other significant species" are considered important. This is to ensure that sufficient data are collected throughout the year for length frequency, length-weight, and age-growth analysis.

Subsample Procedures

When fish collected are too numerous to individually count and measure, a standardized subsample procedure should be followed. There are three subsample procedures provided.

- Subsample Procedure No. 1 is used for subsampling shad in gill-net samples.
- Subsample Procedure No. 2 is used if the data are desired for length-frequency analysis.
- Subsample Procedure No. 3 is used if there is no desire to include the data in length-frequency analysis.

- Subsample Procedure No. 1
  Sort by species and individually measure (no weights) all shad collected. If subsampling is deemed necessary, separate all shad ≤150 mm (6 in.), sort by species, and individually measure and record total length of 50 shad of each species. Count the remaining shad of each species and record number of individuals on the data sheets. Shad >150 mm (6 in.) total length should be individually measured and recorded.
- Subsample Procedure No. 2 - (Data used in length-frequency analysis)
  Count and record in the Field Notes the total number of fish in a 454 gm (1 lb.) subsample. Sort the subsample into categories of 25 mm length groups, i.e., 0-25 mm, 26-50 mm, 51-75 mm; etc. Count the number of individuals in each length group and divide by the total number of fish in the subsample. Multiply by 100 to determine the percentage of fish represented in each length group. Weigh the remaining fish and calculate the total number of fish in the sample. Multiply the length group percentages as determined from the subsample by the estimated total number of fish. On Data Form 1, record the number of fish representing each length group. Designate the length group in the TOTAL LGTH column with any length which occurs within that length group.
  Example: Your seine sample contains gizzard shad too numerous to individually count and measure. You wish to include shad length-frequencies in your data analysis. Use Subsample Procedure No. 1.

  Field Notes Calculations -

454 gm subsample =	53 fish
0-25 mm length group =	22 fish (41%)
26-50 mm length group =	10 fish (19%)
51-75 mm length group =	21 fish (40%)
Total weight of all fish in sample =	5200 gm

Total number of fish in sample = (5200 / 454) x 53 = 607
Total number per length group = 41% of 607 fish = 249 are 0-25 mm
19% of 607 fish = 115 are 26-50 mm
40% of 607 fish = 243 are 51-75 mm

Note: rounding off causes errors in total numbers.
Recording in Data Form 1

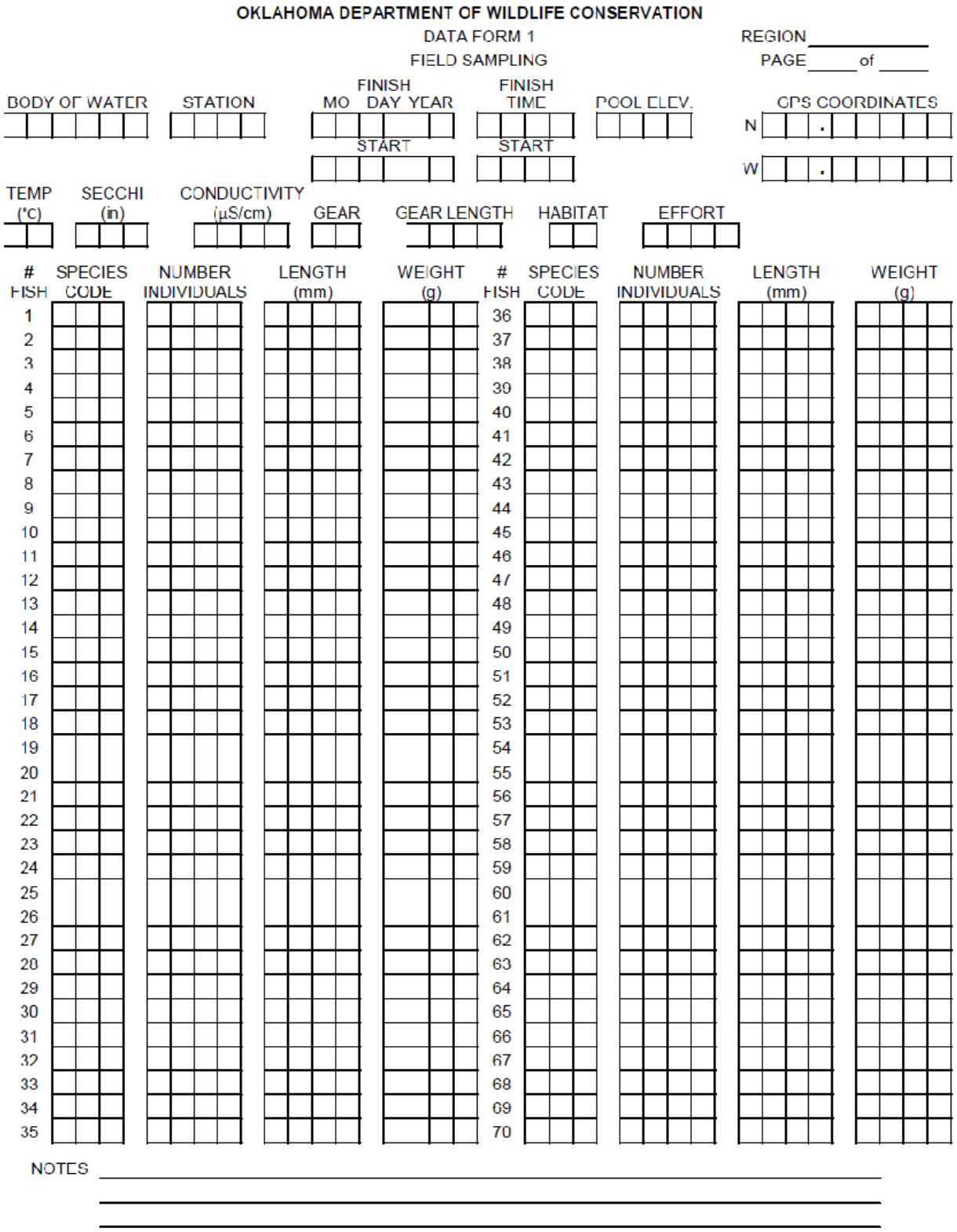
SP CODE	NO. INDIV.	TOTAL LGTH
501	255	25
501	115	50
501	243	75

- Subsample Procedure No. 3 - (Data not used in length-frequency analysis)
  Count and record the total number of fish in a 454 gm subsample. Weigh the remainder and record. Calculate and record the total number in the sample. No length frequency analysis can be made from this procedure.

Table of Contents

APPENDIX

Field Data Form 1



OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION

DATA FORM 1

FIELD SAMPLING

REGION _____

PAGE _____ of _____

BODY OF WATER | STATION | FINISH MO DAY YEAR | FINISH TIME | POOL ELEV. | GPS COORDINATES

N .

W .

START | START

TEMP (°C) | SECCHI (in) | CONDUCTIVITY (µS/cm) | GEAR | GEAR LENGTH | HABITAT | EFFORT

# FISH	SPECIES CODE	NUMBER INDIVIDUALS	LENGTH (mm)	WEIGHT (g)	# FISH	SPECIES CODE	NUMBER INDIVIDUALS	LENGTH (mm)	WEIGHT (g)
1					36				
2					37				
3					38				
4					39				
5					40				
6					41				
7					42				
8					43				
9					44				
10					45				
11					46				
12					47				
13					48				
14					49				
15					50				
16					51				
17					52				
18					53				
19					54				
20					55				
21					56				
22					57				
23					58				
24					59				
25					60				
26					61				
27					62				
28					63				
29					64				
30					65				
31					66				
32					67				
33					68				
34					69				
35					70				

NOTES _____

Field Data Form 2

OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION

DATA FORM 2

WATER QUALITY SAMPLING PAGE_____ of_____

BODY OF WATER (CC 1-6) | STATION (CC 8-9) | MO DAY YR (CC 11-16) | TIME (CC 18-21) | POOL EL. (CC 23-26) | SECCHI (in.) (CC 28-30)

METERS	TEMP °C (CC 35-38)	D.O. (mg/l) (CC 39-42)	pH (CC 43-46)	CONDUCTIVITY (umho/cm) (CC 47-51)	METERS	TEMP °C	D.O. (mg/l)	pH	CONDUCTIVITY (umho/cm)
S					19				
1					20				
2					21				
3					22				
4					23				
5					24				
6					25				
7					26				
8					27				
9					28				
10					29				
11					30				
12					31				
13					32				
14					33				
15									
16									
17									
18					B				

CC 32-33

FIELD NOTES:

AIR TEMP _____ °C

DO. METHOD _____

ph METHOD _____

Field Data Form 3

OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION

DATA FORM 3

TRAPNETTING
CRAPPIE AGE

REGION _____

PAGE _____ OF _____

PAGE _____
(do not write in shaded area)

BODY OF WATER | MO. DAY YEAR | GEAR | GEAR LGTH

SPECIES	SP. CODE	NO. INDIV.	TOTAL LGTH	WEIGHT (g)	WEIGHT (oz)	AGE	LINE
							A
							B
							C
							D
							E
							F
							G
							H
							I
							J
							K
							L
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							Y
							Z

FIELD NOTES:

Field Data Form 4

OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION Page ___ of ___

DATA FORM 4

CHANNEL CATFISH HOOP NETTING

BODY OF WATER	STATION	DEPTH	GEAR	SET MO DAY YEAR	PULLED MO DAY YEAR	GPS COORDINATES
						N ___.____
						W ___.____

TEMP	SECCHI	HABITAT	EFFORT	TIME	TIME

	FIRST NET			SECOND NET			THIRD NET		
# FISH	LENGTH	LENGTH	LENGTH	LENGTH	LENGTH	LENGTH	LENGTH	LENGTH	LENGTH
1									
2									
3									
4									
5									
6									
7									
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NOTES _____

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Table 1. Smith-Root EF Table. Applied voltage levels required to transfer 3000 watts of power to the fish given the conductivity (standardized to 25□C) and temperature of the water.

Conductivity (µS/cm)	Temperature (°C)						
	5	10	15	20	25	30	35
50	5,000-6,000 V	4,000-5,000 V	4,000-5,000 V	4,000-5,000 V	4,000-5,000 V	3,000-4,000 V	3,000-4,000 V
100	3,000-4,000 V	3,000-4,000 V	3,000-4,000 V	3,000-4,000 V	3,000-4,000 V	3,000-4,000 V	3,000-4,000 V
200	3,000-4,000 V	3,000-4,000 V	3,000-4,000 V	3,000-4,000 V	3,000-4,000 V	3,000-4,000 V	3,000-4,000 V
300	3,000-4,000 V	3,000-4,000 V	3,000-4,000 V	3,000-4,000 V	3,000-4,000 V	3,000-4,000 V	3,000-4,000 V
400	3,000-4,000 V	3,000-4,000 V	3,000-4,000 V	3,000-4,000 V	3,000-4,000 V	3,000-4,000 V	4,000-5,000 V
500	3,000-4,000 V	3,000-4,000 V	3,000-4,000 V	4,000-5,000 V	4,000-5,000 V	4,000-5,000 V	4,000-5,000 V
600	3,000-4,000 V	3,000-4,000 V	4,000-5,000 V	4,000-5,000 V	4,000-5,000 V	4,000-5,000 V	5,000-6,000 V
700	3,000-4,000 V	4,000-5,000 V	4,000-5,000 V	4,000-5,000 V	5,000-6,000 V	5,000-6,000 V	5,000-6,000 V
800	4,000-5,000 V	4,000-5,000 V	4,000-5,000 V	5,000-6,000 V	5,000-6,000 V	6,000-7,000 V	6,000-7,000 V
900	4,000-5,000 V	4,000-5,000 V	5,000-6,000 V	5,000-6,000 V	6,000-7,000 V	6,000-7,000 V	6,000-7,000 V
1000	4,000-5,000 V	5,000-6,000 V	5,000-6,000 V	6,000-7,000 V	6,000-7,000 V	7,000-8,000 V	7,000-8,000 V
1100	5,000-6,000 V	5,000-6,000 V	6,000-7,000 V	6,000-7,000 V	7,000-8,000 V	7,000-8,000 V	8,000-9,000 V
1200	5,000-6,000 V	5,000-6,000 V	6,000-7,000 V	7,000-8,000 V	7,000-8,000 V	8,000-9,000 V	8,000-9,000 V
1300	5,000-6,000 V	6,000-7,000 V	6,000-7,000 V	7,000-8,000 V	8,000-9,000 V	8,000-9,000 V	
1400	5,000-6,000 V	6,000-7,000 V	7,000-8,000 V	7,000-8,000 V	8,000-9,000 V		
1500	6,000-7,000 V	6,000-7,000 V	7,000-8,000 V	8,000-9,000 V			
1600	6,000-7,000 V	7,000-8,000 V	8,000-9,000 V	8,000-9,000 V			
1700	6,000-7,000 V	7,000-8,000 V	8,000-9,000 V				
1800	7,000-8,000 V	8,000-9,000 V	8,000-9,000 V				
1900	7,000-8,000 V	8,000-9,000 V					
2000	7,000-8,000 V	8,000-9,000 V					

Table 2. Smith-Root EF Table. Amperage goal for a given electrofisher, voltage range set at 50% of range, and voltage level from Table 1. If a particular grouping is not listed for a particular electrofisher, then that electrofisher should not be used given the conductivity and temperature of the water.

Electrofisher	Voltage Range Setting	Voltage Level from Table 1	Amperage Goal
5.0 GPP	500 V	3,000-4,000	6-8
		4,000-5,000	8-10
	1000V	3,000-4,000	3-4
		4,000-5,000	5-6
7.5 GPP	340V	3,000-4,000	9-11
		4,000-5,000	11+
		5,000-8,000	>12
	500V	3,000-4,000	6-8
		4,000-5,000	8-10
		5,000-6,000	8-10
		6,000-7,000	11+
		7,000-8,000	>12
	1000V	3,000-4,000	3-4
		4,000-5,000	4-5
		5,000-6,000	5-6
		6,000-7,000	6-7
		7,000-8,000	7-8
9.0 GPP	340 V	3,000-4,000	9-11
		4,000-5,000	11+
		5,000-9,000	>12
	680 V	3,000-4,000	4-6
		4,000-5,000	6-7
		5,000-6,000	7-9
		6,000-7,000	8-10
		7,000-8,000	10-12
		8,000-9,000	12+

Table of Contents

Table 3. Ambient conductivity conversion based on measured specific conductivity and water temperature. Use this table to determine proper ambient conductivity to use in Tables 4 and 5 to determine power and current levels needed for effective electrofishing.

Specific Conductance	Ambient conductivity at given temperature (ºC)													
	6	8	10	12	14	16	18	20	22	24	26	28	30	32
50	34.3	35.7	37.2	38.7	40.2	41.8	43.5	45.3	47.1	49.0	51.0	53.1	55.2	57.4
75	51.5	53.6	55.7	58.0	60.3	62.8	65.3	67.9	70.7	73.5	76.5	79.6	82.8	86.2
100	68.6	71.4	74.3	77.3	80.4	83.7	87.1	90.6	94.2	98.0	102.0	106.1	110.4	114.9
125	85.8	89.3	92.9	96.6	100.5	104.6	108.8	113.2	117.8	122.5	127.5	132.7	138.0	143.6
150	103.0	107.1	111.5	116.0	120.6	125.5	130.6	135.9	141.3	147.1	153.0	159.2	165.6	172.3
175	120.1	125.0	130.0	135.3	140.7	146.4	152.3	158.5	164.9	171.6	178.5	185.7	193.2	201.0
200	137.3	142.8	148.6	154.6	160.9	167.4	174.1	181.1	188.5	196.1	204.0	212.2	220.8	229.7
225	154.4	160.7	167.2	173.9	181.0	188.3	195.9	203.8	212.0	220.6	229.5	238.8	248.4	258.5
250	171.6	178.5	185.8	193.3	201.1	209.2	217.6	226.4	235.6	245.1	255.0	265.3	276.0	287.2
275	188.8	196.4	204.3	212.6	221.2	230.1	239.4	249.1	259.1	269.6	280.5	291.8	303.6	315.9
300	205.9	214.2	222.9	231.9	241.3	251.0	261.2	271.7	282.7	294.1	306.0	318.4	331.2	344.6
325	223.1	232.1	241.5	251.2	261.4	271.9	282.9	294.4	306.3	318.6	331.5	344.9	358.8	373.3
350	240.3	250.0	260.1	270.6	281.5	292.9	304.7	317.0	329.8	343.1	357.0	371.4	386.4	402.0
375	257.4	267.8	278.6	289.9	301.6	313.8	326.5	339.6	353.4	367.6	382.5	398.0	414.0	430.8
400	274.6	285.7	297.2	309.2	321.7	334.7	348.2	362.3	376.9	392.2	408.0	424.5	441.6	459.5
425	291.7	303.5	315.8	328.5	341.8	355.6	370.0	384.9	400.5	416.7	433.5	451.0	469.2	488.2
450	308.9	321.4	334.4	347.9	361.9	376.5	391.8	407.6	424.0	441.2	459.0	477.5	496.8	516.9
475	326.1	339.2	352.9	367.2	382.0	397.5	413.5	430.2	447.6	465.7	484.5	504.1	524.4	545.6
500	343.2	357.1	371.5	386.5	402.1	418.4	435.3	452.9	471.2	490.2	510.0	530.6	552.0	574.3
525	360.4	374.9	390.1	405.8	422.2	439.3	457.0	475.5	494.7	514.7	535.5	557.1	579.6	603.1
550	377.5	392.8	408.7	425.2	442.3	460.2	478.8	498.2	518.3	539.2	561.0	583.7	607.2	631.8
575	394.7	410.6	427.2	444.5	462.5	481.1	500.6	520.8	541.8	563.7	586.5	610.2	634.8	660.5
600	411.9	428.5	445.8	463.8	482.6	502.1	522.3	543.4	565.4	588.2	612.0	636.7	662.4	689.2
625	429.0	446.4	464.4	483.1	502.7	523.0	544.1	566.1	589.0	612.7	637.5	663.3	690.1	717.9
650	446.2	464.2	483.0	502.5	522.8	543.9	565.9	588.7	612.5	637.3	663.0	689.8	717.7	746.6
675	463.3	482.1	501.5	521.8	542.9	564.8	587.6	611.4	636.1	661.8	688.5	716.3	745.3	775.4
700	480.5	499.9	520.1	541.1	563.0	585.7	609.4	634.0	659.6	686.3	714.0	742.8	772.9	804.1
725	497.7	517.8	538.7	560.4	583.1	606.6	631.2	656.7	683.2	710.8	739.5	769.4	800.5	832.8
750	514.8	535.6	557.3	579.8	603.2	627.6	652.9	679.3	706.7	735.3	765.0	795.9	828.1	861.5
775	532.0	553.5	575.8	599.1	623.3	648.5	674.7	701.9	730.3	759.8	790.5	822.4	855.7	890.2
800	549.1	571.3	594.4	618.4	643.4	669.4	696.4	724.6	753.9	784.3	816.0	849.0	883.3	918.9
825	566.3	589.2	613.0	637.8	663.5	690.3	718.2	747.2	777.4	808.8	841.5	875.5	910.9	947.7
850	583.5	607.0	631.6	657.1	683.6	711.2	740.0	769.9	801.0	833.3	867.0	902.0	938.5	976.4
875	600.6	624.9	650.1	676.4	703.7	732.2	761.7	792.5	824.5	857.8	892.5	928.6	966.1	1005.1
900	617.8	642.7	668.7	695.7	723.8	753.1	783.5	815.2	848.1	882.4	918.0	955.1	993.7	1033.8
925	634.9	660.6	687.3	715.1	743.9	774.0	805.3	837.8	871.6	906.9	943.5	981.6	1021.3	1062.5
950	652.1	678.5	705.9	734.4	764.0	794.9	827.0	860.4	895.2	931.4	969.0	1008.1	1048.9	1091.3
975	669.3	696.3	724.4	753.7	784.2	815.8	848.8	883.1	918.8	955.9	994.5	1034.7	1076.5	1120.0

Table 4. Target power for standardized electrofishing in predominantly warmwater or coolwater fish communities with 60 Hz at various ambient water conductivities. The target output ranges are designed to maintain a consistent active field capable of transferring a constant power to fish regardless of ambient water conductivity. The target range can be achieved by manipulating voltage with the control unit. (Standard Methods for Sampling North American Freshwater Fishes, Bonar et al., 2009)

Ambient conductivity	target power low	target power high	Ambient conductivity	target power low	target power high
25	4687	5539	**1050**	7727	9132
50	3255	3847	**1100**	8023	9482
75	2878	3401	**1150**	8319	9831
100	2763	3266	**1200**	8615	10181
125	2755	3256	**1250**	8911	10531
150	2799	3308	**1300**	9208	10882
175	2873	3395	**1350**	9504	11232
200	2966	3505	**1400**	9801	11583
225	3071	3630	**1450**	10098	11934
250	3186	3765	**1500**	10395	12285
275	3307	3908	**1550**	10692	12636
300	3432	4056	**1600**	10990	12988
325	3561	4209	**1650**	11287	13339
350	3693	4365	**1700**	11585	13691
375	3828	4524	**1750**	11882	14043
400	3964	4685	**1800**	12180	14394
425	4102	4848	**1850**	12478	14746
450	4241	5012	**1900**	12775	15098
475	4381	5178	**1950**	13073	15450
500	4522	5344	**2000**	13371	15802
525	4664	5512	**2050**	13669	16154
550	4807	5681	**2100**	13967	16506
575	4950	5850	**2150**	14265	16859
600	5094	6020	**2200**	14563	17211
625	5238	6190	**2250**	14861	17563
650	5383	6361	**2300**	15159	17916
675	5527	6532	**2350**	15458	18268
700	5673	6704	**2400**	15756	18620
725	5818	6876	**2450**	16054	18973
750	5964	7048	**2500**	16352	19325
775	6110	7221	**2550**	16651	19678
800	6256	7394	**2600**	16949	20031
825	6403	7567	**2650**	17247	20383
850	6550	7740	**2700**	17546	20736
875	6696	7914	**2750**	17844	21088
900	6843	8088	**2800**	18142	21441
925	6990	8261	**2850**	18441	21794
950	7138	8435	**2900**	18739	22146
975	7285	8609	**2950**	19038	22499
1000	7432	8784	**3000**	19336	22852

Table 5. Target current for standardized electrofishing in predominantly warmwater or coolwater fish communities with 60 Hz at various ambient water conductivities. The target output ranges are designed to maintain a consistent active field capable of transferring a constant power to fish regardless of ambient water conductivity. The target range can be achieved by manipulating voltage with the control unit. (Standard Methods for Sampling North American Freshwater Fishes, Bonar et al., 2009).

Ambient conductivity	low amps	high amps	Ambient conductivity	low amps	high amps
25	4.0	4.5	**1050**	33.6	37.8
50	4.8	5.4	**1100**	35.1	39.5
75	5.5	6.2	**1150**	36.5	41.1
100	6.2	7.0	**1200**	38.0	42.7
125	6.9	7.8	**1250**	39.4	44.3
150	7.7	8.6	**1300**	40.9	46.0
175	8.4	9.4	**1350**	42.3	47.6
200	9.1	10.2	**1400**	43.8	49.2
225	9.8	11.0	**1450**	45.2	50.8
250	10.5	11.9	**1500**	46.6	52.5
275	11.3	12.7	**1550**	48.1	54.1
300	12.0	13.5	**1600**	49.5	55.7
325	12.7	14.3	**1650**	51.0	57.3
350	13.4	15.1	**1700**	52.4	58.9
375	14.2	15.9	**1750**	53.9	60.6
400	14.9	16.7	**1800**	55.3	62.2
425	15.6	17.5	**1850**	56.7	63.8
450	16.3	18.4	**1900**	58.2	65.4
475	17.0	19.2	**1950**	59.6	67.1
500	17.8	20.0	**2000**	61.1	68.7
525	18.5	20.8	**2050**	62.5	70.3
550	19.2	21.6	**2100**	64.0	71.9
575	19.9	22.4	**2150**	65.4	73.6
600	20.6	23.2	**2200**	66.9	75.2
625	21.4	24.0	**2250**	68.3	76.8
650	22.1	24.8	**2300**	69.7	78.4
675	22.8	25.7	**2350**	71.2	80.1
700	23.5	26.5	**2400**	72.6	81.7
725	24.3	27.3	**2450**	74.1	83.3
750	25.0	28.1	**2500**	75.5	84.9
775	25.7	28.9	**2550**	77.0	86.6
800	26.4	29.7	**2600**	78.4	88.2
825	27.1	30.5	**2650**	79.8	89.8
850	27.9	31.3	**2700**	81.3	91.4
875	28.6	32.2	**2750**	82.7	93.1
900	29.3	33.0	**2800**	84.2	94.7
925	30.0	33.8	**2850**	85.6	96.3
950	30.8	34.6	**2900**	87.1	97.9
975	31.5	35.4	**2950**	88.5	99.5
1000	32.2	36.2	**3000**	90.0	101.2

Table of Contents

Waterbody/Reservoir Codes

Adair Recreational Area	ADAIR
Altus City	ALTCIT
Altus-Lugert	LUGERT
American Horse	AMHORS
Arbuckle	ARBUCK
Arcadia	ARCADI
Ardmore City	ARDCIT
Atoka Lake	ATOKA
Atoka Bluestem	ATOBLU
Bartlesville	BARTLE
Beaver	BEAVER
Beggs	BEGGS
Bell Cow	BELLCO
Birch	BIRCH
Bixhoma	BIXHOM
Bluestem	BLUEST
Boomer	BOOMER
Boren	BOREN
Boswell	BOSWEL
Boyer	BOYER
Bristow	BRISTO
Broken Bow	BRBOW
Burtschi	BURTSC
Cache Creek	CACHEC
Caddo 18	CADD18
Canton	CANTON
Carl Blackwell	BLACK
Carl Albert	CARLAL
Carlton	CARLTO
Carter	CARTER
Cedar	CEDAR
Chambers	CHAMBE
Chandler	CHANDL
Chelsea City	CHELSE
Chickasha	CHICKA
Chimney Rock	CHROCK
Chleshoma	CHELSH
Chouteau L&D 17	CHOUTE
Church	CHURCH
Claremore City	CLAREM
Clayton	CLAYTO
Clear Creek	CLEARA
Clearview	CLEARV
Cleveland	CLEVEL
Clinton	CLINTO
Coalgate	COALGA
Comanche	COMANC
Coon Creek	COONCK
Copan	COPAN
Crowder	CROWDE
Cushing	CUSHIN
Dahlgren	DALGRN
Dead Indian	DEADIN
Dripping Springs	DRSPGS
Doc Hollis	
Duncan	DUNCAN
Dustin	DUSTIN
El Reno	ELRENO
Elk City	ELKCIT
Ellsworth	ELLSWO
Elmer	ELMER
Elmer Thomas	ELMERT
Etling	ETLING
Eucha	EUCHA
Eufaula	EUFAUL
Central Arm	CENTRL
Deep Fork Arm	DEEPFK
Gaines Creek Arm	GAINES
North Canadian Arm	NORCAN
South Canadian Arm	SOUCAN
Evans	EVANS
Fairfax	FAIRFA
Fort Supply	FTSUPP
Fort Cobb	FTCOBB
Fort Gibson	FTGIB
Flatrock Creek Arm	FLATCR
Jackson Bay Arm	JACKBA
Taylor Ferry	TAYFER
Foss	FOSS
Frances	FRANCE
Frederick	FREDER
Fugate	FUGATE
Fuqua	FUQUA
George Horany	HORANY
Gramma	GRAMMA
Grand Lake	GRAND
Drowning Creek Arm	DROWNC
Elk River Arm	ELKRIV
Honey Creek Arm	HONEYC
Horse Creek Arm	HORSEC
Great Salt Plaint	GRSALT

Greenleaf	GREENL
Guthrie	GUTHRI
Hall	HALL
Harthorne	HARTSH
Haskell	HASKEL
Healdton	HEALDT
Hefner	HEFNER
Helen	HELEN
Henryetta	HENRY
Heyburn	HEYBUR
Holdenville	HOLDEN
Hominy	HOMINY
Hudson	HUDSON
Hugo	HUGO
Hulah	HULAH
Humphreys	HUMPHR
Jap Beaver	JAPBEA
Jean Neustadt	JNEUST
Jed Johnson	JEDJOH
Kaw	KAW
Keystone	KEYSTO
Konawa	KONAWA
Langston	LANGST
Lawtonka	LAWTON
Liberty	LIBERT
Lone Chimney	LONECH
McMurtry	MCMURT
Longmire	LONGMI
Mannford	MANNFO
McGee	MCGEE
Meeker	MEEKER
Miami Sec. of the Neosho	MIAMI
Mountain Fork River	MTFORK
Mountain Lake	MTLAKE
Muldrow City	MULDRO
Murray	MURRAY
Nanih Waiya	NWAIYA
Neosho River	NEOSHO
Newt Graham L&D 18	GRAHAM
Nichols Park	NICHOL
Okemah	OKEMAH
Okmulgee	OKMULG
Onapa	ONAPA
Oologah	OOLOGA
Optima	OPTIMA
Overholser	OVERHO
Ozzie Cobb	OZCOBB
Pauls Valley	PVALLY
Pawhuska	PAWHUS
Pawnee	PAWNEE
Perry C.C.C.	PERRYC
Perry	PERRY
Pine Creek	PCREEK
Ponca City	PONCA
Porum City	PORUM
Prague	PRAGUE
Pretty Water	PRETTY
Purcell	PURCEL
Quanah Parker	QUANAH
Raymond Gary	RAYGAR
Robber's Cave State Park	ROBBER
Robert S. Kerr	KERR
Rocky	ROCKY
Roland City	ROLAND
Rush	RUSH
Sahoma	SAHOMA
Sallisaw	SALLIS
Sally Jones	SJONES
Sardis	SARDIS
Schooler	SCHOOL
Shawnee Twin #1	SHAWN1
Shawnee Twin #2	SHAWN2
Shell Creek	SHELLC
Shidler	SHIDLE
Skiatook	SKIATO
Skipout	SKIPOU
Sooner	SOONER
Spavinaw	SPAVIN
Spiro	SPIRO
Sportsman	SPORTS
Spring Creek	SPRING
Stanley Draper	DRAPER
Stigler	STIGLR
Stilwell City Lake	STILWE
Stroud	STROUD
Sunset	SUNSET
Sutton	SUTTON
Taft	TAFT
Taylor	TAYLOR
Temple City	TEMPLE
Tenkiller	TENKIL
Texoma	TEXOMA

Thunderbird	THBIRD	Wayne Wallace	WAYWAL
Tom Steed	STEED	Webbers Falls	WFALLS
Vanderwork	VANDER	Weleetka	WELEET
Veterans (Sulphur)	SULVET	Wetumka	WETUMK
Vian	VIAN	Wewoka	WEWOKA
Vincent	VINCEN	Wichita Mountains	
W.D. Mayo	WDMAYO	Wiley Post	WIPOST
Ward	WARD	Wintersmith	WINTER
Watonga	WATONG	Wister	WISTER
Waurika	WAURIK	Yahola	YAHOLA
Waxhoma	WAXHOM		

Table of Contents

Species Codes

098 = NO FISH IN SAMPLE
100 = BLACK BASS SPP.
101 = LARGEMOUTH BASS
102 = FLORIDA LARGEMOUTH BASS
103 = FLORIDA X LARGEMOUTH BASS HYBRID
104 = SPOTTED BASS
105 = SMALLMOUTH BASS
106 = WHITE CRAPPIE
107 = BLACK CRAPPIE
108 = CRAPPIE SPP.
109 = WHITE BASS (SAND BASS)
110 = STRIPED BASS (STRIPERS)
111 = STRIPED BASS X WHITE BASS HYBRIDS
112 = WALLEYE
113 = SAUGER
114 = CHANNEL CATFISH
115 = BLUE CATFISH
116 = NORTHERN PIKE
117 = GRASS PICKEREL
118 = CHAIN PICKEREL
119 = MUSKELLUNGE
120 = RAINBOW TROUT
121 = NORTHERN LARGEMOUTH BASS
122 = ALBINO CATFISH
123 = CATFISH SPP.
124 = YELLOW BASS
125 = PREDATORY GAME FISH
126 = SAUGEYE
127 = BROWN TROUT
128 = WHITE PERCH
201 = BLUEGILL SUNFISH
202 = LONGEAR SUNFISH
203 = ORANGESPOTTED SUNFISH
204 = REDEAR
205 = GREEN SUNFISH
206 = ROCK BASS
207 = WARMOUTH
208 = REDBREAST SUNFISH
209 = HYBRID SUNFISH
210 = SUNFISH SPP. (PERCH)
211 = SHADOW BASS
212 = DOLLAR SUNFISH
213 = SPOTTED SUNFISH
214 = BANTAM SUNFISH
215 = NON-PREDATORY GAME FISH
216 = FLIER
300 = NON-PREDATORY FOOD FISH
301 = CARP
302 = FRESHWATER DRUM
303 = SMALLMOUTH BUFFALO
304 = BIGMOUTH BUFFALO
305 = BLACK BUFFALO
306 = RIVER CARPSUCKER
307 = HIGHFIN CARPSUCKER
308 = YELLOW BULLHEAD
309 = BROWN BULLHEAD
310 = BLACK BULLHEAD
311 = WHITE SUCKER
312 = BLUE SUCKER
313 = CREEK CHUBSUCKER
314 = NORTHERN HOG SUCKER
315 = SPOTTED SUCKER
316 = RIVER REDHORSE
317 = BLACK REDHORSE
318 = GOLDEN REDHORSE
319 = SHORTHEAD REDHORSE
320 = PADDLEFISH
321 = SHOVELNOSE STURGEON
322 = TILAPIA SPP.
323 = WHITE AMUR (GRASS CARP)
324 = CARP X GOLDFISH HYBRID
325 = QUILLBACK CARPSUCKER
326 = REDHORSE SPP.
327 = GRASS X BIGHEAD CARP
328 = LAKE CHUBSUCKER
330 = BUFFALO SPP.
331 = STRIPED MULLET
401 = FLATHEAD CATFISH
402 = LONGNOSE GAR
403 = SHORTNOSE GAR
404 = SPOTTED GAR
405 = ALLIGATOR GAR

406 = BOWFIN
407 = GAR SPP.
408 = YELLOW PERCH
410 = PREDATORY FOOD FISH
499 = FLATHEAD CATFISH OBS.
501 = GIZZARD SHAD
502 = THREADFIN SHAD
503 = GOLDEYE
504 = MOONEYE
505 = INLAND SILVERSIDE
506 = BROOK SILVERSIDE
507 = GOLDEN SHINER
508 = BLUNTNOSE MINNOW
509 = FATHEAD MINNOW
510 = BULLHEAD MINNOW
511 = PLAINS KILLIFISH
512 = BLACKSTRIPE TOPMINNOW
513 = BLACKSPOTTED TOPMINNOW
514 = PLAINS TOPMINNOW
515 = MOSQUITO FISH (GAMBUSIA)
516 = BANDED SCULPIN
517 = LOGPERCH
518 = SCALY SAND DARTER
519 = CRYSTAL DARTER
520 = GREENSIDE DARTER
521 = BLUNTNOSE DARTER
522 = ARKANSAS DARTER
523 = FANTAIL DARTER
524 = SLOUGH DARTER
525 = LEAST DARTER
526 = JOHNNY DARTER
527 = CYPRESS DARTER
528 = STIPPLED DARTER
529 = ORGANEBELLY DARTER
530 = ORANGETHROAT DARTER
531 = SPECKLED DARTER
532 = REDFIN DARTER
533 = BANDED DARTER
534 = CHANNEL DARTER
535 = BLACKSIDE DARTER
536 = LONGNOSE DARTER
537 = LEOPARD DARTER
538 = SLENDERHEAD DARTER
539 = DUSKY DARTER
540 = RIVER DARTER
541 = STONEROLLER SPP.
542 = OZARK MINNOW
543 = SILVER MINNOW
544 = PLAINS MINNOW
545 = SPECKLED CHUB
546 = BIGEYE CHUB
547 = FLATHEAD CHUB
548 = SILVER CHUB
549 = REDSPOT CHUB
550 = CREEK CHUB
551 = PALLID SHINER
552 = EMERALD SHINER
553 = BLACKSPOT SHINER
554 = RED RIVER SHINER
555 = RIVER SHINER
556 = BIGEYE SHINER
557 = GHOST SHINER
558 = BLUNT FACE SHINER
559 = COMMON SHINER
560 = PUGNOSE MINNOW
561 = LYTHRURUS SPP.
562 = ARKANSAS RIVER SHINER
563 = WEDGESPOT SHINER
564 = RED SHINER
565 = KIAMICHI SHINER
566 = DUSKYSTRIPE SHINER
567 = CHUB SHINER
568 = ROSYFACE SHINER
569 = SPOTFIN SHINER
570 = SAND SHINER
571 = REDFIN SHINER
572 = BLACKTAIL SHINER
573 = MIMIC SHINER
574 = STEELCOLOR SHINER
575 = SUCKERMOUTH SHINER
576 = HYBOGNATHUS SPP.
577 = HYBOGSIS SPP.
578 = NOTROPIS SPP.
579 = PIMEPHALES SPP.
580 = ETHEOSTOMA SPP.
581 = SHAD SPP.

582 = MINNOW SPP.
583 = SKIPJACK HERRING
584 = SLIM MINNOW
585 = SILVERSIDES SPP.
586 = ALL SHAD COMBINED
587 = RUDD
588 = GRAVEL CHUB
589 = PERCINA SPP.
590 = PREY FISH AND MINNOWS
591 = LUXILUS SPP.
592 = FUNDULUS SPP.
593 = WESTERN SAND DARTER
594 = CHUB SPP.
595 = LAMPREY SPP.
596 = AMERICAN EEL
597 = MADTOM SPP.
598 = CAVEFISH SPP.

Table of Contents

Oklahoma Fisheries Analysis Tool (OFAT)

The OFAT database is a digital archive and analysis program that will house all fisheries SSP data for the ODWC. Data from each waterbody sampled must be entered into the OFAT database. Each region is responsible for entering their data into the proper csv file spreadsheet and then running the data through the Data Validation Application (https://odwcfishdata.shinyapps.io/data_validation/). After all corrections are made and the data has been validated, the validated csv file must be downloaded, saved, and then uploaded to the proper online SharePoint folder for each region. From there the data will be uploaded to the OFAT database (https://odwcfishdata.shinyapps.io/ssp_app/). Data files submitted to the shared drive must have the following file name format:

SSP sample data: LakeCode_Year_Gear_Sample_validated.csv
Example: KEYSTO_2022_44.01_Sampl_validated.csv

SSP age data: LakeCode_Year_Gear_Age_SpeicesCode_validated.csv
Example: SAHOMA_2020_31_Age_106_validated.csv

Table of Contents