These reports summarize fish surveys conducted in western South Dakota (Game, Fish and Parks, Division of Wildlife, Region 1). Region 1 fisheries management covers waters in 12 counties (Bennett, Butte, Custer, Fall River, Haakon, Harding, Jackson, Lawrence, Meade, Pennington, Perkins, and Ziebach). Below are explanations about the methods used to accomplish surveys on lakes and terminology used in these reports. Methods for stream surveys are included with each stream report.

Netting

Net sampling consists of gill net nights and trap net nights. All gill nets are monofilament experimental nets 150 feet long and 6 feet deep. Each experimental net has six different 25 foot long mesh panels with bar mesh sizes measuring ½", ¾", 1", 1¼", 1½" and 2 inches. All trap nets are modified fyke-nets with a 4 foot by 5 foot frame, ¾ inch mesh and a 4 foot by 75½ foot lead.

Night Electrofishing

Night electrofishing is used to sample largemouth and smallmouth bass populations. Electrofishing is conducted using a boat mounted Smith-Root unit with pulsed-DC. Six 10-minute sites, or as many 10-minute sites up to six that can be accomplished in one trip around a lake, are completed during the surveys. Sampling normally occurs when water temperatures are in the 60's F. Due to time constraints, sampling is generally done in Spring on lakes with both largemouth and smallmouth bass and in Fall on largemouth bass lakes.

Day Electrofishing

Day electrofishing is used to sample age-0 gizzard shad in late summer. Electrofishing is done using a boat mounted Smith-Root unit with pulsed-DC and the number of age-0 gizzard shad collected per hour of electrofishing (i.e., CPUE) is reported. A stratified-random approach is employed with a total of 10 sites sampled. To reduce the amount of time spent at the reservoir, if age-0 gizzard shad are collected during the first 300 seconds then sampling at that site is done; however, if no age-0 shad are collected during the first 300 seconds, then shocking at that site continues until 600 seconds is attained.

Fish Age Determination

Up to 100 collected fish are measured for total length (millimeters) and weight (grams). Age and growth analysis is accomplished using otoliths or scales collected from individual fish. Otoliths are generally collected from the first five walleye and first five yellow perch per centimeter group. For younger fish, typically less than age-4, otoliths are submersed in water in a black dish and viewed whole under a dissecting microscope. Preparation of otoliths from older fish involves breaking the otolith through the nucleus and burning the fractured area under a propane torch. The half-otolith is mounted in putty, cleared with mineral oil, illuminated with a single fiber-optic strand and viewed under a dissecting scope. Aging of other game fish is done with scales. Scale samples are obtained from below the lateral line just behind the pectoral fin. Scales are prepared for reading by pressing them between two acetate slides to make an imprint, then the slides are viewed with a microfiche projector (40X) and distances between scale annuli recorded on paper strips.

Data Analysis

Data collected during the survey is entered into the program WinFin 2.95. Fish population parameters, confidence intervals and standard errors are computed using the program WinFin Analysis 4.4. Parameters reported are mean catch-per-unit-effort (CPUE), proportional stock density (PSD), proportional stock density preferred (PSD-P) and relative weight (Wr).

Abundance is expressed as CPUE. Population structural characteristics are expressed as length frequency histograms and with PSD and PSD-P values. Fish condition is expressed as mean Wr values for all fish and for fish over stock lengths (Wr-S).

A brief explanation of catch per unit effort (CPUE), proportional stock densities (PSD, PSD-P) and relative weight (Wr):

Catch Per Unit Effort (CPUE) is the catch of animals in numbers or weight over a defined period of effort. Refers to trap-net nights or gill-net nights of effort, or catch per hour of electrofishing.

Stock density indices (i.e. **PSD, PSD-P**) provide proportional values for size structure of adult fish (Table 1). For example, PSD is the proportion of adult fish (i.e. fish ≥ a given stock length) within the population that are considered to be of quality size to anglers. PSD and PSD-P are unitless and usually calculated to the nearest whole digit. Below are calculations for these indices.

Proportional Stock Density (PSD) is calculated by the following formula:

$$PSD = \frac{\text{Number of fish > quality length}}{\text{Number of fish > stock length}} \times 100$$

Proportional Stock Density of preferred-length fish (PSD-P) is calculated as:

$$PSD\text{-}P = \frac{\text{Number of fish > preferred length}}{\text{Number of fish > stock length}} \times 100$$

Table 1. Size categories for selected species found in western South Dakota lake surveys, in centimeters (inches in parenthesis)

Species	Stock	Quality	Preferred	Memorable	Trophy
Black bullhead	15 (6)	23 (9)	30 (12)	38 (15)	46 (18)
Black crappie	13 (5)	20 (8)	25 (10)	30 (12)	38 (15)
Bluegill	8 (3)	15 (6)	20 (8)	25 (10)	30 (12)
Brown trout (lentic)	20 (8)	30 (12)	40 (16)	50 (20)	60 (24)
Channel catfish	28 (11)	41 (16)	61 (24)	71 (28)	91 (36)
Common carp	28 (11)	41 (16)	53 (21)	66 (26)	84 (33)
Green sunfish	8 (3)	15 (6)	20 (8)	25 (10)	30 (12)
Lake trout	30 (12)	50 (20)	65 (26)	80 (31)	100 (39)
Largemouth bass	20 (8)	30 (12)	38 (15)	51 (20)	63 (25)
Northern pike	35 (14)	53 (21)	71 (28)	86 (34)	112 (44)
Rainbow trout	25 (10)	40 (16)	50 (20)	65 (26)	80 (31)
Smallmouth bass	18 (7)	28 (11)	35 (14)	43 (17)	51 (20)
Walleye	25 (10)	38 (15)	51 (20)	63 (25)	76 (30)
White crappie	13 (5)	20 (8)	25 (10)	30 (12)	38 (15)
Yellow perch	13 (5)	20 (8)	25 (10)	30 (12)	38 (15)

For most fish species, PSD values of 30-60 or 40-70 are typical objective ranges for "balanced" populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is an index that quantifies fish condition (i.e. how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. Mean Wr values below 90 for a species or size group indicates problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish populations may not be making the best use of available prey.