Appendix C. Primary tributaries (drainage areas 2,600 km^2 (1,000 $mile^2$) or more) of the Ohio River. These tributaries account for 89 percent of the entire watershed.

Tributary	Enters Ohio River at river km	Enters Ohio River at river mile	Stream length (km)	Stream length (mile)	Drainage (km^2)	Drainage ($mile^2$)
Allegheny River (PA)	0.0	0.0	520	325	30,420	11,700
Monongahela River (PA)	0.0	0.0	205	128	19,240	7,400
Chartiers Creek (PA)	4.0	2.5			720	277
Beaver River (PA)	40.6	25.4	34	21	8,138	3,130
Raccoon Creek (PA)	47.4	29.6			520	200
Little Beaver River (PA)	63.2	39.5	82	51	1,326	510
Yellow Creek (OH)	80.6	50.4	54	34	624	240
Cross Creek (OH)	114.6	71.6	43	27	333	128
Buffalo Creek (WV)	119.5	74.7			416	160
Short Creek (OH)	130.2	81.4	46	29	382	147
Wheeling Creek (OH)	145.6	91.0	48	30	281	108
Wheeling Creek (WV)	145.6	91.0			780	300
McMahon Creek (OH)	151.5	94.7	45	28	237	91
Grave Creek (WV)	164.0	102.5			195	75
Captina Creek (OH)	175.4	109.6	62	39	471	181
Fish Creek (WV)	182.1	113.8			650	250
Sunfish Creek (OH)	188.8	118.0	50	31	296	114
Fishing Creek (WV)	205.3	128.3			572	220
Middle Island Creek (WV)	246.4	154.0			1,456	560
Little Muskingum River (OH)	269.3	168.3	112	70	819	315
Duck Creek (OH)	273.1	170.7	83	52	593	228
Muskingum River (OH)	275.5	172.2	179	112	20,904	8,040
Little Kanawha River (WV)	295.4	184.6	256	160	6,032	2,320
Little Hocking River (OH)	306.9	191.8	29	18	268	103
Hocking River (OH)	318.9	199.3	160	100	3,094	1,190
Shade River (OH)	337.0	210.6			575	221
Shady Creek (WV)	353.0	220.6			299	115
Mill Creek (WV)	370.4	231.5			598	230
Leading Creek (OH)	406.7	254.2	48	30	393	151
Kanawha River (WV)	425.1	265.7	155	97	31,720	12,200
Raccoon Creek (OH)	441.6	276.0	174	109	1,778	684
Guyandotte River (WV)	488.3	305.2	106	66	4,342	1,670
Symmes Creek (OH)	493.9	308.7	112	70	926	356
Twelvepole Creek (WV)	501.1	313.2			1,144	440
Big Sandy River (WV-KY)	507.4	317.1	43	27	11,128	4,280
Little Sandy River (KY)	538.2	336.4			1,882	724
Pine Creek (OH)	555.0	346.9	77	48	481	185
Little Scioto River (OH)	558.4	349.0	66	41	606	233
Tygarts Creek (KY)	565.3	353.3			874	336
Scioto River (OH)	570.4	356.5	379	237	16,926	6,510
Kinniconnic Creek (KY)	589.0	368.1			658	253

Appendix C. (continued). Primary tributaries (drainage areas 2,600 km^2 (1,000 mile^2) or more) of the Ohio River. These tributaries account for 89 percent of the entire watershed.

Tributary	Enters Ohio River at river km	Enters Ohio River at river mile	Stream length (km)	Stream length (mile)	Drainage (km^2)	Drainage (mile^2)
Ohio Brush Creek (OH)	620.8	388.0	91	57	1,131	435
Eagle Creek (OH)	665.1	415.7	50	31	400	154
Whiteoak Creek (OH)	678.2	423.9	78	49	608	234
Little Miami River (OH)	741.6	463.5	144	90	4,342	1,670
Licking River (KY)	752.3	470.2	512	320	9,542	3,670
Mill Creek (OH)	756.0	472.5	45	28	432	166
Great Miami River (OH)	785.8	491.1	258	161	14,040	5,400
Tanners Creek (IN)	791.7	494.8			354	136
Laughery Creek (IN)	797.9	498.7	62	39	910	350
Kentucky River (KY)	873.3	545.8	408	255	18,122	6,970
Little Kentucky River (KY)	874.4	546.5	56	35	382	147
Indian Kentucky River (IN)	880.8	550.5			390	150
Silver Creek (IN)	970.4	606.5			585	225
Salt River (KY)	1007.8	629.9	200	125	7,514	2,890
Big Indiana Creek (IN)	1051.2	657.0			658	253
Blue River (IN)	1060.8	663.0			1,131	435
Sinking Creek (KY)	1121.4	700.9			400	154
Anderson Creek (IN)	1170.4	731.5			608	234
Blackford Creek (KY)	1187.5	742.2			322	124
Little Pigeon Creek (IN)	1236.8	773.0			1,079	415
Green River (KY)	1254.7	784.2	592	370	23,998	9,230
Pigeon Creek (IN)	1268.6	792.9			975	375
Wabash River (IN-IL)	1356.8	848.0	758	474	86,060	33,100
Saline River (IL)	1387.7	867.3	43	27	3,042	1,170
Tradewater River (KY)	1397.6	873.5	176	110	2,600	1,000
Cumberland River (KY)	1472.6	920.4	1109	693	46,592	17,920
Tennessee River (KY)	1495.2	934.5	1043	652	106,366	40,910
Cache River (IL)	1561.1	975.7			1,872	720

Data provided by www.orsanco.org.

Appendix D. Current navigational dams of the Ohio River.

Name	River km	River mile	Normal Pool (m)*	Normal Pool (ft)*	Year place in operation**
Emsworth	9.9	6.2	213	710	1921
Dashields	21.1	13.2	208	692	1929
Montgomery	50.7	31.7	205	682	1936
New Cumberland	87.0	54.4	199	664.5	1959
Pike Island	134.7	84.2	193	644	1963
Hannibal (h)	202.2	126.4	187	623	1972
Willow Island	258.7	161.7	181	602	1972
Belleville	326.2	203.9	175	582	1965
Racine (h)	380.0	237.5	168	560	1967
Robert C. Byrd	446.7	279.2	161	538	1937
Greenup (h)	545.6	341	155	515	1962
Meldahl	697.9	436.2	146	485	1964
Markland (h)	850.4	531.5	137	455	1963
McAlpine (h)	970.9	606.8	126	420	1961
Cannelton	1153.1	720.7	115	383	1972
Newburgh	1241.8	776.1	107	358	1975
Myers (Uniontown)	1353.6	846	103	342	1975
Smithland	1469.6	918.5	97	324	1980
Lock and Dam 52	1502.2	938.9	91	302	1928
Lock and Dam 53	1540.2	962.6	87	290	1929

*Height of water surface above mean sea level (National Geodetic Vertical Data).
**Year place in operation defined as when the pool was raised.
(h) Means that the project has hydropower facilities.

Data provided by www.orsanco.org.

Appendix E. Ohio Revised Code 1533.54, a pre-1953 statute, specified the bounds of inland commercial fishing in Ohio.

1533.54. Three hooks per line allowed; angling is the only device permitted; exception:

No person shall draw, set, place, locate, maintain, or possess a pound net, crib net, trammel net, fyke net, set net, seine, bar net, or fish trap, or any part thereof, or throw or hand line with more than three hooks attached thereto, or any other device for catching fish, except a line with not more than three hooks attached thereto or lure with not more than three sets of three hooks each, in the inland fishing district of the state, except for taking carp, mullet, sheephead and grass pike as provided in section 1533.62 of the Revised Code, and except as provided in section 1533.60 of the Revised Code, or as otherwise provided for by division rule. No person shall catch or kill a fish in that fishing district with what are known as bob lines, trotlines, or float lines, or by grabbing with the hands, or by spearing or shooting, or with any other device other than by angling. In the waters of the inland fishing district, except those lakes, harbors, and reservoirs controlled by the state, a trotline may be used with not more than fifty hooks, and no two hooks less than three feet apart, by the owner or person having the owner's consent in that part of the stream bordering on or running through that owner's lands.

Notwithstanding this section, any resident who is licensed to fish with nets in the Ohio River may possess fish nets for the sole purpose of storage, repair, drying, and tarring in the area between United States route fifty and the Ohio River from the Indiana state line to Cincinnati, Ohio, and in the area between United States route fifty-two and the Ohio River from Cincinnati, Ohio to Chesapeake, Ohio, and in the area between state route seven and the Ohio River from Chesapeake, Ohio to East Liverpool, Ohio.

Any person possessing a net in this reserve district shall have an Ohio permit for each net in his possession. The permit shall be issued annually by the chief of the division of wildlife upon application of the owner of the net and submission of evidence by him of his possession of a valid fishing license permitting him to fish with nets in the Ohio River, and the payment of ten dollars for each net for which an application is made and a permit is issued. The permit shall expire at twelve midnight on the fifteenth day of March of each year.

Appendix F. Kentucky commercial fishing regulations, effective 2001.

Kentucky Administrative Regulations
TITLE 301
TOURISM DEVELOPMENT CABINET DEPARTMENT OF FISH AND WILDLIFE RESOURCES

Chapter 1 Fish

301 KAR 1:060. Sport and rough fish.
RELATES TO: KRS 150.010
STATUTORY AUTHORITY: KRS 13A.350, 150.015
NECESSITY, FUNCTION, AND CONFORMITY: The purpose of this administrative regulation is to limit the taking of certain fishes to angling. It is necessary to protect the fish population. This amendment is necessary to clarify the prohibition against using sport fish as bait.

Section 1. The following fishes are designated sport fishes and may be taken only by angling:

Largemouth Bass	Rockfish (Striped Bass)
Smallmouth Bass	White Bass
Kentucky Bass	Yellow Bass
Coosa Bass	Musky
Rock Bass	Northern Pike
White Crappie	Chain Pickerel
Black Crappie	Trout
Walleye	Hybrids of any of the above
Sauger	

Section 2. All species of fishes, except those listed in Section 1 of this regulation, are hereby designated as rough fish and may be harvested by the methods prescribed by any section of KRS Chapter 150 or by any regulation adopted by the department, including angling.

301 KAR 1:140. Special commercial fishing permit.
RELATES TO: KRS 150.450(2)
STATUTORY AUTHORITY: KRS 150.025(1)
NECESSITY, FUNCTION, AND CONFORMITY: KRS 150.025(1) authorizes the department to regulate the size or type of devices and methods used to take wildlife, including rough fish and the places where they may be taken. This administrative regulation is necessary to specify the waters open to, and other restrictions on the use of, gill and trammel nets.

Section 1. Definitions.
(1) "Bar mesh size" means the distance between two (2) knots on a line of a net.
(2) "Permit" means a special commercial fishing permit.
(3) "Rough fish" is defined by KRS 150.010(32).
(4) "Whip set" means a gill net or a trammel net rigged so it is free-floating.

Section 2. A person who has in his possession a valid special commercial fishing permit and a commercial fishing license may use a gill net or a trammel net to take rough fish:
(1) From November 1 through:
    (a) March 31 in Kentucky Lake; and
    (b) The last day of February in Barkley Lake.
(2) In the portions of Kentucky and Barkley lakes open to commercial fishing as specified in 301 KAR 1:150.

Section 3. A person using a gill net or a trammel net in the waters specified in Section 2 of this administrative regulation shall:
(1) Before fishing, apply for a permit by providing on a form provided by the department his:
    (a) Name;
    (b) Address;
    (c) Telephone number; and
    (d) Fish markets he intends to use;
(2) Have the permit in his possession while:
    (a) Fishing with a gill net or a trammel net;
    (b) Transporting a gill net or a trammel net; or
    (c) Selling fish taken with a gill net or a trammel net;
(3) Tag a gill net or a trammel net as specified in KRS 150.175(1)(d);
(4) Not use a gill net or a trammel net with a bar mesh size smaller than three and one-half (3-1/2) inches or larger than four and one-half (4-1/2) inches, except that a whip set may have a minimum bar mesh size of three (3) inches;
(5) Not fish a stationary set net with the top of the net or float line shallower than three (3) feet below the surface;
(6) Tend each net, except whip sets, at least once every twenty-four (24) hours;
(7) Not leave whip sets unattended;
(8) Affix a decal supplied by the department to each side of the boat or motor he uses for fishing under the special commercial fishing permit so that the decal is clearly visible while the boat is used for fishing with a gill net or a trammel net;
(9) Not release a rough fish; and
(10) Fish a minimum of 800 yards of net for at least one-fourth (1/4) of the season.

Section 4. The permit holder may be accompanied by one (1) unlicensed helper, who shall be:
(1) In the same boat with the permit holder while fishing with a gill net or a trammel net; or
(2) Accompanied by the permit holder while transporting or selling fish taken under the permit.

Section 5. The permit holder shall:
(1) Maintain an accurate record of daily fishing activity and fish sales; and
(2) Submit a weekly report to the department:
    (a) On a form provided by the department, providing information on:
        1. The number of each species of rough fish taken;
        2. How the fish were disposed of; and
        3. The average total length of nets fished each day, with separate entries for:
            a. Gill nets;
            b. Trammel nets; and
            c. Whip sets.
    (b) Duplicate receipts for fish sold.

Section 6. The department shall:
(1) Not renew the permit of a person who does not submit a report as specified in Section 5 of this administrative regulation.
(2) Revoke the permit of a person found guilty of violating a statute or administrative regulation pertaining to commercial fishing for three (3) years.
Section 7. Incorporation by Reference.
(1) The following material is incorporated by reference:
    (a) Application for a Special Commercial Fishing Permit, 1998.
    (b) Permit Fisherman's Daily Catch Report, 1998.
(2) This material may be inspected, copied or obtained at the Department of Fish and Wildlife Resources, #1 Game Farm Road, Frankfort, Kentucky 40601, Monday through Friday, 8 a.m. to 4:30 p.m.

301 KAR 1:146. Commercial fishing gear.

RELATES TO: KRS 150.010, 150.025, 150.120, 150.170, 150.175, 150.445, 150.450, 150.990
STATUTORY AUTHORITY: KRS 13A.350, 150.025
NECESSITY, FUNCTION, AND CONFORMITY: It is necessary to accurately describe the gear allowed in commercial fishing so that the proper size and species of fish can be harvested, the sport fish populations are not adversely affected and perpetuation of the fishery resource is assured. This amendment is necessary to readjust the hoop net mesh size on the Ohio River for a two (2) year transition period.

Section 1. The functions of the various commercial fishing tags authorized under KRS 150.175 are consolidated into one (1) tag called "commercial gear tag" which shall serve as they each were designated in KRS 150.175, subsections (5), (6), (7) and (8).

Section 2. All lines and mesh shall be made of linen, cotton or flexible synthetic fiber only. All mesh shall be measured by bar measure. This measure is the length of one (1) side of the square, or as measured between two (2) knots on the same line.

Section 3. The following gear is the only commercial gear that shall be used in commercial waters designated in 301 KAR 1:150 and under conditions described in 301 KAR 1:155 by appropriately licensed commercial fishermen:

(1) Hoop net, wing net, straight lead net, heart lead net.

(a) Shall have a minimum mesh size of three (3) inches, except in the Ohio River, the Mississippi River, those portions of the Cumberland River below Barkley Dam and the Tennessee River below Kentucky Dam that are open to commercial fishing where the minimum mesh size shall be one (1) inch.

(b) Hoops may be any size or shape or material.

(c) Maximum length of each lead or wing shall be sixty (60) feet.

(d) Wings and leads must be constructed of multifilament natural or synthetic material only.

(e) Netting used for wings and leads shall be constructed of twine no smaller than number six (#6) nylon or equivalent, having a breaking strength of fifty-five (55) pounds or greater.

(f) Wings and leads may be of knotted or knotless construction and shall have a mesh size no larger than one (1) inch.

(g) Hoop nets, wing nets, straight lead nets or heart lead nets shall be fished as individual nets. Wings or leads shall not be tied together so as to become continuous multiple net units.

(h) Wings and leads shall be used only to lead fish into the hoop net.

(i) One (1) commercial gear tag shall be attached to the first hoop of each net.

(2) Gill net or trammel net.

(a) May be used only in Ohio and Mississippi Rivers and overflow lakes directly connected with each river or as specified in 301 KAR 1:140. Minimum mesh size is three (3) inches in the Mississippi and its overflow lakes and four (4) inches in the Ohio River and its overflow lakes.

(b) May be fished weighted or as a flag net.

(c) Shall have one (1) commercial gear tag attached to each 100 feet or part thereof.

(3) Commercial trotline.

(a) Shall have more than fifty (50) hooks placed no closer than eighteen (18) inches apart.

(b) Shall have one (1) commercial gear tag attached.

(c) Shall be no longer than 3,000 feet, including staging, and shall be fished separately, not tied together in a continuous line.

(4) Seine.

(a) Shall have a maximum mesh size of one (1) inch and may be of knotted or knotless construction. Knotted netting shall be constructed of twine no smaller than number 6 (#6) nylon or equivalent having a breaking strength of fifty-five (55) pounds or greater, and knotless netting shall be constructed of twine no smaller than #147 nylon or equivalent having a breaking strength of fifty (50) pounds or greater.

(b) Shall be constructed of multifilament natural or synthetic material only.

(c) Shall have both float and lead lines.

(d) Shall have wood, fiberglass, or metal poles or brails attached at each end.

(e) Shall be attended by persons pulling the siene by hand through the water for the entrapment of fish.

(f) Shall have one (1) commercial gear tag attached to each 100 feet or part thereof.

(5) Slat trap basket.

(a) Shall have no wire or other mesh added to any part of trap.

(b) Shall have at least two (2) openings left between slats no smaller than one and one-fourth (1 1/4) inches wide in the catch portion of the trap. These openings shall not be restricted by cross-bracings to a length shorter than eight (8) inches.

(c) Shall be no larger than two (2) feet in diameter or square-end measure.

(d) Shall have one (1) commercial gear tag attached to opening ring or square.

301 KAR 1:150. Waters open to commercial fishing.

RELATES TO: KRS 150.010, 150.025, 150.120, 150.170, 150.175, 150.445, 150.450, 150.990

STATUTORY AUTHORITY: KRS 13A.350, 150.025

NECESSITY, FUNCTION, AND CONFORMITY: It is necessary to regulate the places where commercial fishing is permitted to insure that the size of the water and fish population is large enough for this type of activity to better utilize and conserve those populations concerned. This amendment is necessary to close commercial fishing in Mud River and the tailwater areas below the highlift dams on the Ohio River.

Section 1. Appropriately licensed commercial fishermen may fish with commercial fishing gear in the following designated waters subject to requirements as set forth in administrative regulations designating commercial gear and manner of taking. Commercial gear shall be used in no other waters of the commonwealth except under specific permit.

Section 2. Commercial Fishing Waters.

(1) Streams and rivers.

(a) Barren River from its junction with Green River upstream to Greencastle, Kentucky;

(b) Big Sandy River from its junction with Ohio River upstream to junction of Levisa and Tug Forks;

(c) Levisa Fork from its junction with Big Sandy River upstream to 200 yards below mouth of Paint Creek in Johnson County;

(d) Cumberland River from its junction with Ohio River upstream to Highway 62 bridge;

(e) Eagle Creek from its junction with Kentucky River upstream to Highway 22 bridge in Grant County;

(f) Green River from its junction with Ohio River upstream to 200 yards below Lock and Dam 6;

(g) Highland Creek from its junction with Ohio River upstream to Rock Ford Bridge in Union County;

(h) Kentucky River from its junction with Ohio River upstream to junction of North and Middle Forks of Kentucky River;

(i) North Fork of Kentucky River from its junction with Kentucky River upstream to mouth of Walker's Creek;

(j) South Fork of Kentucky River from its junction with Kentucky River upstream to mouth of Cow Creek;

(k) Licking River from its junction with Ohio River upstream to a point directly adjacent to Highway 111 on the Bath and Fleming Counties line;

(l) Mississippi River from the mouth of Ohio River downstream to the Tennessee line;

(m) Ohio River from its junction with Mississippi River upstream to West Virginia state line except those segments of the river that extend below the following locks and dams wherein slat baskets are the only piece of commercial gear allowed:

1. Smithland Dam downstream to the end of the outer lock wall.

2. Uniontown Dam downstream to the end of the outer lock wall and that portion of the split channel around the southern part of Wabash Island from the fixed weir dam to the first dike.

3. Newburgh Dam downstream to the end of the outer lock wall.

4. Cannelton Dam downstream to the end of the outer lock wall.
5. McAlpine Dam downstream to the K&I railroad bridge.
6. Markland Dam downstream to the end of the outer lock wall.
7. Meldahl Dam downstream to the end of the outer lock wall.
8. Greenup Dam downstream to the end of the outer lock wall.

(n) Pond River from its junction with Green River upstream to Highway 62 bridge;

(o) Panther Creek from its junction with Green River upstream to head of creek;

(p) Rough River from its junction with Green River upstream to Highway 69 bridge at Dundee, Kentucky;

(q) Tennessee River from its junction with Ohio River upstream to River Mile 17.8;

(r) Tradewater River from its junction with Ohio River upstream to bridge; and

(s) Salt River from its junction with the Ohio River upstream to the northwestern boundary of Ft. Knox.

(2) Lakes. The following lakes are open to commercial fishing, but not above the first shoal or riffle upstream from the impounded or standing pool of the lake in any main or tributary stream except as noted below:

(a) Barkley;

(b) Cumberland Lake is closed above the confluence of Koger Creek on the Big South Fork Tributary;

(c) Herrington;

(d) Kentucky;

(e) Nolin;

(f) Rough River;

(g) Overflow lakes directly connected to the Mississippi and Ohio Rivers;

(h) Dewey Lake is open uplake to Buffalo Bridge; and

(i) Barren Lake

301 KAR 1:155. Commercial fishing requirements.

RELATES TO: KRS 150.010, 150.120, 150.170, 150.175, 150.445, 150.450(2), (3), 150.990

STATUTORY AUTHORITY: KRS 150.025(1)

NECESSITY, FUNCTION, AND CONFORMITY: KRS 150.025(1) authorizes the department to prescribe by administrative regulation the methods and devices used to take wildlife, as well as the buying and selling of wildlife. The function of this administrative regulation is to regulate taking fish for commercial use, to avoid conflicts with other interests, and to utilize and conserve the populations of these fishes.

Section 1. Definitions.

(1) "Commercial fisherman" means a person holding a valid resident or nonresident commercial fishing license.

(2) "Commercial fishing gear" means the equipment described in 301 KAR 1:146.

(3) "Overflow lake" means a permanent or temporary body of water that receives overflow flood waters from an adjacent stream.

(4) "Sport fish" means those species so designated by 301 KAR 1:060.

(5) "Unlicensed helper" means a person without a commercial fishing license who is assisting a commercial fisherman.

Section 2. Unlicensed Helpers.

(1) A commercial fisherman shall not utilize more than one (1) unlicensed helper.

(2) An unlicensed helper shall not use commercial fishing gear or sell fish unless he is accompanied by a licensed commercial fisherman.

Section 3. Tagging And Using Commercial Gear. A person shall:

(1) Tag commercial gear so that a law enforcement officer can find and read the tag without undue difficulty.

(2) Not use commercial gear:

(a) Within fifty (50) yards of the outlet or inlet of an overflow lake.
(b) Within fifty (50) yards of the mouth of a stream except the mouth of the Ohio River.
(3) Not use commercial nets from April 1 through October 31:
(a) In bays and inlets of Kentucky or Barkley Lakes; and
(b) For a distance of 200 yards from the mouth of bays or inlets in Kentucky or Barkley Lakes.

Section 4. Sport Fish and Endangered Species. A person taking a sport fish or an endangered species by commercial gear shall immediately return the fish, without undue injury, to the waters from which it was taken.

Section 5. Tending Gear and Removing Fish. A person shall:
(1) Tend and remove the fish from:
(a) Baited hoop nets or slat traps at least every seventy-two (72) hours.
(b) Other commercial fishing gear at least every twenty-four (24) hours.
(2) Remove commercial fishing gear from the water when he has finished fishing.

Section 6. Reporting. Beginning March 1, 1999:
(1) A commercial fisherman shall report his catch monthly to the department:
(a) By the tenth day of each month;
(b) On forms provided by the department.
(2) The department shall not renew the license of a commercial fisherman who does not submit:
(a) A report for each month of the license year, including a month during which he did not fish; or
(b) The information required on the report form.
(3) The report form shall include the following information, if applicable:
(a) Days of month fished;
(b) Water body fished;
(c) Kind of gear used, including:
1. Gill net;
2. Trammel net;
3. Hoop net;
4. Fishing pole;
5. Trot line;
6. Slat trap;
7. Seine; and
8. Dip net; and
(d) Weight of the catch by species.
Section 7. Incorporation by Reference.
(1) The Monthly Report of Commercial Fish Harvest in Kentucky, 1998 edition, is incorporated by reference.
(2) It may be obtained or copied at the Department of Fish and Wildlife Resources, #1 Game Farm Road, Frankfort, Kentucky 40601, between 8 a.m. and 4:30 p.m. on normal business days.

Appendix G. Indiana fishery regulations pertaining paddlefish, effective May 1, 2001.

Statewide Paddlefish Regulations

Paddlefish may only be taken from the Ohio River. Any paddlefish caught from public lakes or streams or other rivers in Indiana must be returned.

Ohio River Sport Snagging Regulations

You may not sort or release any lawfully snagged paddlefish. After two paddlefish are taken no more snagging is allowed. Snagging is prohibited within 200 yards of a dam on the Ohio River.
Snagging on the Ohio River for non-sport fish (which includes paddlefish) is allowed from February 1 through May 10 using one single or treble hook. Snagging is not allowed from a boat or platform or along a bay or tributary to the Ohio River.

Ohio River Commercial Fishing Regulations

312 IAC 9-8-6 Commercial fishing on the Ohio River
Authority: IC 14-22-2-6; IC 14-22-13
Affected: IC 14-22
Sec. 6
(a) This section applies to commercial fishing on the Ohio River.
(b) No person shall take or sell fish except in accordance with this section and 312 IAC 9-10. A person may take fish with the aid of illumination of a spotlight, searchlight, or artificial light where lawfully engaged in commercial fishing.
(c) A license holder under this section may take and sell all species of fish from the Ohio River except the following: largemouth bass, smallmouth bass, spotted bass, rock bass, white crappie, black crappie, walleye, sauger, saugeye, striped bas, white bass, hybrid striped bass yellow bass, muskellunge, northern pike, tiger muskellunge, chain pickerel, lake sturgeon, trout, salmon.
(d) A license holder under this section must tag each item of gear so that a conservation officer may determine if the gear is properly licensed and the license holder is complying with the law.
(e) No person shall possess a seine, net, or commercial trotline except as authorized for a commercial fishing license for the Ohio River. This subsection does not apply to a manufacturer, retailer, or wholesale dealer who possesses gear exclusively for sale.
(f) Commercial fishing nets authorized under this section cannot be used on a bay or inlet of the Ohio River. A line drawn from point to point of a bay or inlet denotes the limits of the fishing zone. Commercial gear cannot be used with fifty yards of the mouth of a stream. Commercial gear, except slat traps, cannot be used in the following locations:

(1) Uniontown (Myers) Dam downstream of the outer lock wall and the portion of the split channel around the southern part of Wabash Island from the fixed weir dam to the first dike.
(2) Newburgh Dam downstream to the end of the outer lock wall.
(3) Cannelton Dam downstream to the end of the outer lock wall.
(4) McAlpine Dam downstream to the K and I railroad bridge.
(5) Markland Dam downstream to the end of the outer lock wall.

(g) Each item of fishing gear in use must be tended no less frequently than once every twenty-four hours and all fish taken by the gear removed, except that baited hoop nets or slat traps may be left unattended for not more than seventy-two hours. Each item of gear must be removed from the waters in which the item was fished immediately upon usage.
(h) Gear is authorized only as set forth as follows:

(1) Lines and mesh must be made of linen, cotton, or a flexible synthetic fiber.
(2) The following restrictions apply to a hoop net, wing net, straight lead net, or heart lead net:
(A) Each net described in this subdivision must have a minimum bar mesh size of one inch.
(B) Hoops may be any size, shape, or material.

(C) The maximum length of the lead or wing is sixty feet.
(D) One tag must be attached to the front hoop of each net.

(3) The following restrictions apply to a gill or trammel net:
(A) The minimum bar mesh size is four inches.
(B) The nets reference in this subdivision may be fished weighed or as a flag net.
(C) A tag must be attached to the net at intervals not less than one hundred feet apart.

(4) The following restrictions apply to a commercial trotline:
(A) Each line must have more than fifty hooks placed no closer than eighteen inches apart.
(B) One tag must be attached.
(C) The trotline must be not longer than three thousand feet, including staging, and mst be fished separately rather than tied in a continuous line.

(5) The following restrictions apply to a seine:
(A) A seine must have a minimum bar mesh size of one inch.
(B) A seine must have both bloat and lead lines.
(C) A seine must have wood, fiberglass, metal poles, or brails attached to each end.
(D) A seine in the water must be attended by persons pulling the seine through the water for the entrapment of fish.
(E) A seine must have a tag attached at intervals not less than one hundred feet apart.

(6) The following restrictions apply to a slat trap basket:
(A) No wire or other mesh may be added to the trap.
(B) At least two openings no less than one and one-fourth inches wide must be located between the slats. These openings shall not be restricted by cross-bracings shorter than eight inches long.
(C) The trap shall be no larger than two feet in diameter or square end measure.
(D) A tag must be attached to the open ring or square.

(i) A license holder must keep accurate daily catch records on a departmental form of the following:
(1) The pounds and species of fish caught by gear type.
(2) The number of paddlefish and shovelnose sturgeon caught by gear type.
(3) The pounds of paddlefish, shovelnose sturgeon, sucker, and eggs sold.
(4) The location fished by pool, river mile, and county.

(j) The license holder must submit to the department the completed form required under subsection (i) by the fifteenth day of each month for the preceding month whether the license holder fished or not.

(k) The license holder must allow on-board and dockside inspection of the gear and catch at any time by the director or the director's representative. *(Natural Resources Commission, 312 IAC 9-8-6; filed May 12, 1997, 10:00 a.m. 20 IR 2725; filed May 28, 1998, 5:14 p.m.: 21 IR 3727)*

Appendix H. Illinois commercial fishing regulations and information, effective May 1, 2001.

This information is taken from the Fish and Aquatic Life Code and Administrative Rules. It does not supersede or modify the Fish and Aquatic Life Code or Administrative Rules and is presented only as a guide, which is subject to change.

Definitions

Resident Commercial Fishermen: An individual who has actually resided in Illinois for one year immediately preceding his application for a Commercial Fishing License and who does not claim residency for a commercial fishing license in another state or country.

Dressed: Means having the head of aquatic life removed.

WATERS OPEN TO COMMERCIAL FISHING (open year round except as noted)

1. Lake Michigan (limited entry). For further information on Lake Michigan, contact the Division of Fisheries, Lake Michigan Program, 9511 Harrison Street, Des Plaines, IL 60016.
2. Mississippi River and backwaters, except Quincy Bay, including Quincy Bay Waterfowl Management Area, and U.S. Fish and Wildlife Service National Wildlife Refuge waters, but includes that portion of the Kaskaskia River below the navigation lock and dam.
3. Illinois River and backwaters from Route 89 highway bridge downstream, except for:
   a) U.S. Fish and Wildlife Service National Wildlife Refuge waters;
   b) Donnelly/DePue Fish and Wildlife Area;
   c) Rice Lake Complex, including all of Big Lake; and
   d) Meredosia Lake in Cass and Morgan Counties during duck season.
4. Wabash River.
5. Little Wabash River.
6. Skillet Fork (Wayne, Hamilton and White Counties).
7. Embarras River, except from Route 130 in Coles County upstream to Route 16 including Lake Charleston.
8. Sangamon River from Belt Route 48 southwest of Decatur downstream to its mouth in Cass County.
9. Kaskaskia River south of Route U.S. 50 bridge to mouth in Randolph County.
10. Big Muddy River south of State Route 14 Highway bridge in Franklin County to mouth in Jackson County.
11. Cache River from Route 51 downstream to the Mississippi River via Cache Diversion Channel but not including that portion of the Cache River between the Cache Diversion Channel Levee and the Ohio River.
12. Saline River in Gallatin and Saline Counties.
13. Ohio River.

Commercial fishing will not be permitted in any stream, ditch or tributary connected to the backwaters of the aforementioned waters. Other waters (lakes and streams) may be open to commercial fishing by special season or contract with the Illinois Department of Natural Resources.

SIZE LIMITS ON FISH THAT MAY BE TAKEN COMMERCIALLY

No channel, flathead, blue, and white catfishes under 15 inches in length undressed, or under 12 inches dressed, or under 10.7 inches dressed with the first vertebrae (T bone) removed may be taken (except in the Ohio River where there is no minimum size). There is no size limit on carp, buffalo, drum, bullhead, shovelnose sturgeon, paddlefish, sucker, gar (except that alligator gar may not be taken), bowfin, eel, mooneye, goldeye, carpsuckers, white amur (grass carp), gizzard shad, redhorses, bighead and silver carp, goldfish and minnows. Any person operating commercial fishing devices shall have no other species of Aquatic Life in his possession.

PADDLEFISH may not be commercially harvested except in the Ohio River, the Illinois River below Route 89, and the Mississippi River below Lock and Dam 19.

GEAR AND USE LIMITATIONS

Hoop nets, basket traps, trot lines and dip nets may be used in all of the aforementioned waters.

Basket Traps: Must be constructed of wood or plastic slats and must have an unobstructed opening or openings in the rear of not less than 1-1/2 inches square. Wire traps are illegal.
Trot lines: Must have hooks spread at intervals of not less than 24 inches. Trot, set, or throw lines may not be drawn through the water to snare or snag fish.
Hoop Nets: Must have a mesh not less than one inch bar measurement and attached wings and leads must not be smaller than number 9 twine.
Dip Nets: Must have a mesh size not less than 1-1/2 inches bar measurement and must not be more than 15 feet square or in diameter.
Trammel and Gill Nets: Trammel nets must have mesh of not less than 2 inches bar measurement (except in the Ohio River where trammel nets must have a mesh of not less than 4 inches bar measurement), gill nets not less than 4 inches. Neither shall be less than 100 feet in length. It is unlawful to use trammel or gill nets except in the Ohio River, Mississippi River and the Illinois River from its mouth up to Illinois highway Route 89, including adjacent backwaters, but not above the mouth of any stream, ditch, or tributary connected to such backwaters. All trammel and gill nets set shall be under immediate supervision of the operator or his employee except from May 1 to September 30, or except when nets are set under ice, or from sunset to sunrise.

Trammel nets and gill nets may be used in additional waters where authorized by contract from the Illinois Department of Natural Resources.

Seines may be used only in the Ohio River, Illinois River, Mississippi River (except seining will not be permitted in Boston Bay and its connected backwaters above the mouth of Boston Bay in Mercer County) and Wabash River, except where authorized by contract from the Illinois Department of Natural resources. Except for seines, no other devices may be pulled, dragged, hauled or drawn to or near shore or to or against any backstop.

Seines: Seines up to 100 yards in length may have a minimum mesh size of 1-1/2 inches bar measurement; in seines over 100 yards in length, the mesh size shall not be less than 2 inches bar measurement, except that all seines over 100 yards in length may have a section not exceeding 300 feet of 1-1/2 inch bar measurement. No seine shall be more than 1500 yards long. If seines are more than 200 yards long, they must be operated with a backstop of vertical slats not less than 1-1/4 inches apart or with 3 inch bar measurement netting or of chicken wire or metallic cloths with mesh of not less than 1-1/2 inches square and shall be operated in not less than two feet of water.

Commercial devices may not be used within 300 yards above or below any spillway, fishway, lock or dam, or in such a manner as to block more than one-half of the width of any stream or watercourse.

Live boxes and nets: Must be plainly labeled with the owner's name and address.

OPERATION AND DISTURBANCE OF GEAR
It is illegal to loan licenses for operation of commercial fishing gear. One may not disturb the licensed equipment of another person without that person's consent.

DISPLAY OF TAGS: All gear must be tagged with a 2001 Gear tag and the owner's name and address as follows:
Seines: Tag or tags shall be attached to the brail or to the leader line adjoining the brail on either end of the seine.
All nets: Tag shall be attached to the rear hoop, tail line or on the tail pole.
Other devices: Tag shall be in such a position as to be exposed to public view.

CHECKING GEAR
Commercial fishing devices must be checked and emptied of catch at the following time intervals:
1. Hoop nets and basket traps must be attended at least once every 48 hours during open water conditions. During ice cover conditions, hoop nets and traps must be attended at least once every 20 days.

2. Trammel and gill nets must be attended constantly from October 1 to April 30 during open water conditions and daylight hours and at least every 24 hours during May 1 to September 30. Under ice they must be attended at least every 96 hours.
3. Trotlines and other hook and line devices must be checked at least every 24 hours
4. Seines and trammel or gill nets fished by driving or drifting must be constantly attended.
5. Commercial gear containing dead or moribund fish as a result of failure to check gear and empty catch shall be considered an illegal device.

NETTING UNDER THE ICE

Holes shall be marked so as to be clearly visible. Trammel nets shall be set not less than 100 yards from any natural opening in the ice.

IMPORTED FISH

Fishes imported into Illinois must be in containers labeled as to the state and county of origin and must bear the name and address of the transporter.

RECORDS MAINTAINED BY COMMERCIAL FISHERMEN

Commercial Fisherman shall keep an accurate record throughout the year of their catch and commercial fishing activities showing the species and number of pounds taken, type of gear used and location taken. Additional information required includes disposition of fish and eggs harvested and price received for fish and eggs sold. This information shall be open for inspection by the Department of Natural Resources at all times and shall be submitted to DNR on official forms as requested by the Department. Failure to submit such required reports is a violation of Illinois Law and shall be grounds for the Department to refuse to issue a license for the following year.

PROTECTED SPECIES

All aquatic life on the State and Federal Endangered and Threatened Species List cannot be taken or in possession. The list is available from the Division of Natural Heritage, 524 South Second street, Lincoln Tower Plaza, Springfield, Il 62706. The State endangered river otter is occasionally taken in nets of commercial fishermen. Reporting of accidental captures should be made to the Department of Natural Resources County Conservation Police Officer or Endangered Species Program Manager (217/785-8290).

CONSENT OF LANDOWNERS

Commercial fishermen are responsible for obtaining permission to fish from the landowner(s) of the aforementioned waters.

SALE OF AQUATIC LIFE

Licensed commercial fishermen may sell commercial species of fish legally taken by themselves in commercial fishing devices to a **resident** licensed wholesale fish dealer without additional license.

Resident Retail Fish Dealer's License

Illinois resident commercial fishermen operating a retail fish market in Illinois or offering for retail sale their commercial catch, must also possess a Resident Retail Fish Dealers License. A separate license is required for each location and for each vehicle from which aquatic life is sold.

Resident Wholesale Fish Dealer's License

Illinois resident commercial fishermen who operate a wholesale fish market in Illinois or who sell or ship aquatic life to any other wholesaler, retailer, or commercial institution (other than a licensed resident wholesale fish dealer) must possess a Resident Wholesale Fish Dealer's License. A separate license is required for each location and for each vehicle from which aquatic life is sold.

Non-resident Fish Dealer's License

Any non-resident commercial fisherman who sells or ships aquatic life to other wholesalers, retailers, or consumers must possess a non-resident fish dealer's license. A separate license is required for each location and for each vehicle from which aquatic life is sold.

REQUIRED RECORDS FOR FISH DEALERS

Resident and Non-resident Fish Dealers shall maintain records of all aquatic life bought, sold, and shipped. The records shall include the name of the seller, the species, and the poundage. The records shall be made immediately available to authorized employees of the Department of Natural Resources upon request.

REQUIRED RECEIPTS FOR FISH DEALERS

Fish Dealers shall issue a numbered receipt to the person the aquatic life is purchased or received from listing the number of pounds and kinds of aquatic life, the date of purchase, the price paid per pound for each species, the name and address of the person the aquatic life was received from, the appropriate license number of the seller, and the origin of the aquatic life. A duplicate copy of the receipt shall be given to the person the aquatic life was received from. The original copy of the receipt shall be maintained by the fish dealer for a minimum of two years from the date of the transaction. All receipts, reports, and records shall be open for inspection by any law enforcement officer upon request.

SHIPMENT OF AQUATIC LIFE: LABELS AND TAGS

Any person shipping or transporting aquatic life shall attach to every container a tag showing the different varieties of aquatic life contained within, the pounds of each variety, the name and place of business of the consignor and of the consignee, and the number and type of license.

CURRENT LICENSE FEES

All commercial fishermen shall have a Commercial Fishing License. Persons assisting a commercial fisherman must also have a commercial fishing license unless those persons are under direct supervision of and aboard the same water craft as the licensed commercial fisherman.

Initial commercial licenses and device tags are available from:

Commercial Permits
524 South Second St. Room 210
Springfield, IL 62701-1787 Phone 217 -785-3423

Device tags only are available from local license vendors.

All commercial fishing licenses expire on March 31st of each year; all resident and non-resident fish dealer and minnow dealer licenses expire on January 31st of each year. There is a $.50 issuing fee per license sold by a vendor. The prices listed below include the $.50 licensing fee.

Type	Resident	Non-Resident
Commercial Fishing License	$ 35.00	$ 150.00
Commercial Fishing Type A Device Tag: Hoop net, basket trap, trot line (l00 hooks), dip net	3.50	6.50
Commercial Fishing Type B Device Tag: Each 100 yards or fraction thereof, For seine, minnow seine*, trammel net, or gill net	18.50	36.50*
Resident Wholesale Fish Dealer License	50.00	
Non-resident Fish Dealer License		100.00
Resident Retail Fish Dealer License	10.00	
Wholesale Minnow Dealer (intra-state)	25.00	Resident Only
Retail Minnow Dealer (intra-state)	5.00	Resident Only
Minnow Dealer (inter-state)	500.00	Resident Only

* minnow seines are resident only devices

The Illinois Department of Natural Resources receives Federal financial assistance and therefore must comply with federal anti-discrimination laws. In compliance with the Illinois Human Rights Act, the Illinois Constitution, Title VE of the 1964 Civil Rights Act, Section 504 of the Rehabilitation Act of 1973 as amended, and the U.S. Constitution, the Illinois Department of Natural Resources does not discriminate on the basis of race, color, sex, national origin, age or disability. If you believe that you have been discriminated against in any program, activity, or facility, please contact the Equal Opportunity Officer, Department of Natural Resources, 524 S. Second Street, Springfield, IL 62701-1787, (217) 782-7616, or the Office of Human Resources, U.S. Fish and Wildlife Service, Washington, D.C. 20240.Department of Natural Resources information is available to the hearing impaired by calling DNR's Telecommunications Device for the Deaf: (217) 782-9175. The Ameritech Relay Number is (800) 526-0844.

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Appendix I. Estimated weight (kg) of paddlefish at a given length (mm) for five Ohio River Sub-basin locations based on polynomial equations in Table 13.

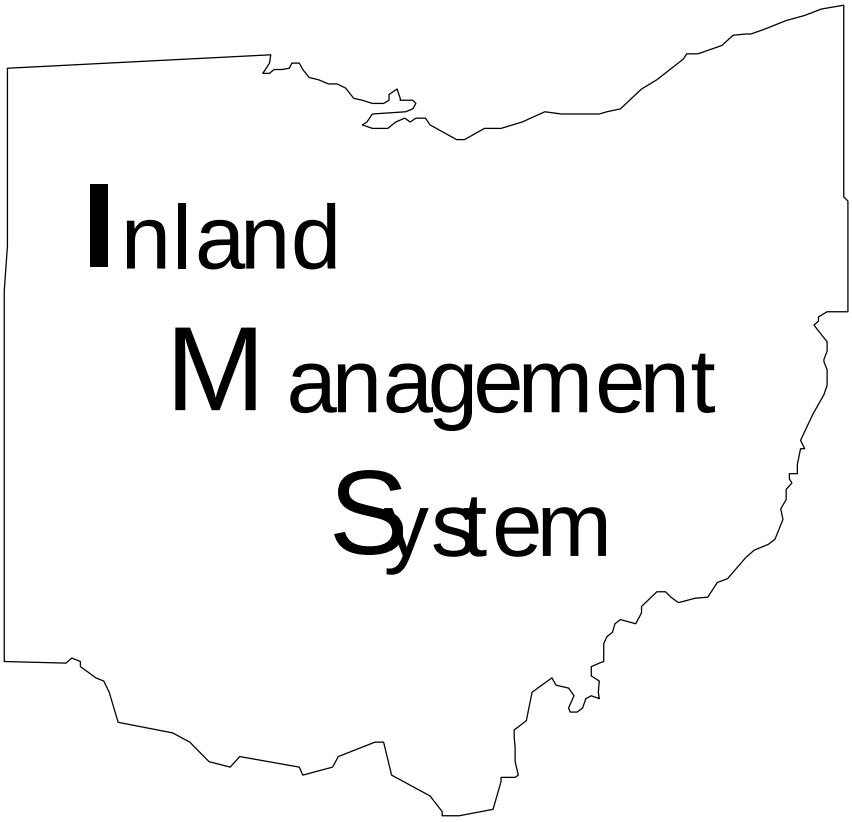
	Estimated weight (kg) at length (mm)				
Length (mm)	Ohio River	Hovey Lake	Wabash River	Cumberland River	Ohio River Sub-Basin
400	0.909	1.409	1.039	0.944	0.840
450	1.307	1.476	1.346	1.138	1.065
500	1.840	1.740	1.795	1.525	1.463
550	2.508	2.199	2.386	2.105	2.035
600	3.311	2.855	3.119	2.878	2.780
650	4.249	3.707	3.994	3.845	3.699
700	5.322	4.755	5.011	5.005	4.791
750	6.530	5.999	6.170	6.359	6.057
800	7.873	7.439	7.471	7.906	7.496
850	9.352	9.076	8.914	9.646	9.109
900	10.965	10.908	10.499	11.580	10.895
950	12.714	12.937	12.226	13.707	12.855
1000	14.597	15.162	14.095	16.027	14.988
1050	16.616	17.583	16.106	18.541	17.295
1100	18.769	20.200	18.259	21.248	19.775
1150	21.058	23.014	20.554	24.148	22.429
1200	23.481	26.023	22.991	27.242	25.256
1250	26.040	29.229	25.570	30.529	28.257
1300	28.734	32.631	28.291	34.009	31.431

Appendix J. Estimated weight (kg) of paddlefish at a given length (mm) for five Ohio River Sub-basin locations based on Log_{10} transformed length-weight equations in Table 13.

	Estimated weight (kg) at length (mm)				
Length (mm)	Ohio River	Hovey Lake	Wabash River	Cumberland River	Ohio River Sub-Basin
400	0.937	0.873	0.885	0.717	0.878
450	1.332	1.262	1.257	1.067	1.262
500	1.824	1.754	1.722	1.523	1.744
550	2.424	2.363	2.289	2.101	2.338
600	3.142	3.101	2.969	2.819	3.055
650	3.990	3.983	3.770	3.693	3.907
700	4.977	5.021	4.704	4.743	4.907
750	6.114	6.229	5.780	5.987	6.067
800	7.412	7.622	7.009	7.444	7.398
850	8.881	9.212	8.399	9.135	8.913
900	10.532	11.014	9.962	11.080	10.625
950	12.375	13.043	11.708	13.298	12.546
1000	14.421	15.311	13.646	15.812	14.689
1050	16.680	17.834	15.786	18.644	17.066
1100	19.163	20.625	18.138	21.814	19.690
1150	21.881	23.700	20.713	25.346	22.573
1200	24.843	27.072	23.520	29.263	25.728
1250	28.060	30.757	26.569	33.587	29.168
1300	31.542	34.769	29.870	38.342	32.905

Section 8.3.4

Inland Management System



Inland Management System

Standard Operating Procedures

A manual of standard field methods
for fishery assessment and monitoring

April 1, 2004

Ohio Department of Natural Resources

Division of Wildlife

Federal Aid in Sport Fish Restoration Project FIDR12

Inland Management System

Manual 2004.1: Standard Operating Procedures For Fishery Assessment and Monitoring

IMS Sampling Methods Committee (April 1, 2004)

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I. INTRODUCTION

Overview

Reductions in staff, constrained fiscal resources, and expanded responsibilities necessitate streamlining many Division of Wildlife (DOW) activities without compromising our history of excellent service and mission. Fisheries data collected during the past 20 years have provided a foundation for expanding angling opportunities, evaluating management practices, and responding to public concerns. These data are now coupled with improved computer technology to increase efficiency of data collection, storage, and distribution, which will allow more rapid responses to demand for information through the Inland Management System (IMS). This manual provides the first comprehensive sampling program for the primary sportfishes in Ohio reservoirs. The IMS sampling program is the starting point of a journey of continual improvement. Field procedures described herein can be expected to evolve through time to serve our goal and objectives.

Goal

The goal of the Inland Management System is to collect, store, use, and distribute uniform and statistically rigorous fisheries information for effective management of Ohio's inland fisheries. Development of this information base will provide insights into reservoir classification, reservoir ecosystems, and reservoir use patterns. These insights lead to efficient allocation of funding and personnel.

Annual Objectives

- Conduct standardized surveys of primary reservoir sportfish.
- Populate the Ohio Fisheries Information System (OFIS) with survey data.
- Summarize survey results for agency and public distribution.
- Revise IMS procedures and protocols as needed.

Long-term Objectives

- Classify Ohio reservoirs by biotic and abiotic characteristics.
- Monitor aquatic communities and habitats.
- Optimize fish stocking practices.
- Identify management issues and opportunities.

II. STATEWIDE SAMPLING STRATEGY

Ohio's reservoirs are the most frequently fished inland waters in the state. As a result, they are also the most extensively stocked, regulated, and monitored. The IMS sampling strategy primarily targets reservoir fishes and habitats because current information is essential to effectively manage them. Ohio has 186 public reservoirs of 2 hectares (5 acres) or larger (see Appendix A). Among these are 125 tributary reservoirs, 57 upground reservoirs, and 4 canal lakes. Small impoundments, less than 82 hectares (203 acres), are either tributary or upground reservoirs. Distribution of these reservoirs varies among Wildlife Districts. Fish assemblages may differ substantially as a result of variation in habitat and management.

Tributary Reservoirs. The majority of Ohio reservoirs are tributary reservoirs, created by construction of on-stream dams. Tributary reservoirs vary in size and productivity, although the majority are shallow and fertile.

Upground Reservoirs. The second most common type is upground reservoirs, located primarily in northwestern Ohio. The name upground is derived from their above-ground construction. Upground reservoirs vary in size, but they are typically infertile, receive and discharge water via pumping facilities, and have littoral zones comprised almost entirely of riprap.

Canal Lakes. Canal lakes are the least common of Ohio's reservoirs. We identify only four: Buckeye Lake, Indian Lake, Lake Loramie, and Grand Lake St. Mary's. They are among Ohio's earliest impounded waters and were developed to provide water sources for the Erie Canal system. Canal lakes are generally shallow, fertile, and large (340-5,138 hectares [851-12,844 acres]).

An important component of our sampling strategy is to provide information about the major sportfishes in all reservoirs; therefore, we will sample black bass, sunfish, crappie, percid species (i.e. walleye and saugeye), and hybrid-striped bass at least once in most publicly accessible reservoirs greater than 2 hectares (5 acres) during the next six years. We are also investigating sampling additional species and habitat assessment procedures.

The IMS statewide sampling strategy provides temporal and spatial data resolution to meet annual and long-term objectives through sampling events of similar intensity but different frequency among reservoirs. Sampled reservoirs will be of two types: reference & systematic. Sampling reference reservoirs provides the greatest temporal resolution and sampling systematic reservoirs provides the greatest spatial resolution. Each component allows the DOW to provide valuable information to the public while developing long-term datasets to address management and research needs.

REFERENCE RESERVOIRS

All standardized sampling components of the IMS are conducted at reference reservoirs each year. Annual coverage track responses of reservoir ecosystems to long-term changes in nutrient dynamics, aquatic communities, fisheries, and habitats and identify responses to wide-scale systematic perturbations such as weather events or watershed modification. Complete suites of standardized data collected each year at these reservoirs are the key to addressing future habitat changes and potential conflicts among publics with diverse interests.

Reference reservoirs were selected based upon availability of watershed information, historical fisheries and limnological data, sportfish assemblages, and sampling considerations. These reservoirs are geographically distributed throughout Ohio, but are not evenly distributed among DOW districts. Current reference reservoirs are:

- Delaware Reservoir (District 1)
- Pleasant Hill Reservoir (District 2)
- Findlay #2 Upground Reservoir (District 2)
- Berlin Lake (District 3)
- Tappan Lake (District 3)
- Burr Oak Lake (District 4)
- Acton Lake (District 5)

SYSTEMATIC RESERVOIRS AND PRIORITIZATION

Sampling systematically, provides the greatest spatial resolution of data for primary reservoir sportfishes. All standardized sampling components of the IMS are conducted at systematic reservoirs for the species present (except in upground reservoirs, where shoreline electrofishing may be ineffective for some species), but sampling is conducted once or twice during a six-year period rather than every year. This approach provides extensive snapshots of specific populations, rapidly builds a database for statewide perspectives. It also allows benchmarking, and comparisons, and the evaluation of management practices such as stocking or regulation changes. Systematic reservoirs will be sampled at different intervals depending on their priority. A prioritized approach was necessary due to manpower constraints, differences in effort required to assess different species, and different levels of management significance for each species. District biologists established sampling priorities based on their experience, insights and current fishery considerations.

Priority 1 Reservoirs

- Sampling is conducted two consecutive years during a six-year cycle.
- Reservoirs in this group are sampled because of an existing interest such as a new regulation, a new stocking strategy, or development of a new fishery.
- This priority level can be downgraded in the next six-year cycle if desired.

Priority 2 Reservoirs

- Sampling is conducted once every three years (i.e. twice during six years).
- Routine monitoring of regulations or other management actions may be a possibility for this group of reservoirs.

Priority 3 Reservoirs

- Sampling is conducted once every six years to contribute to spatial data and provide general fishery information for anglers.

Priorities of systematic reservoirs can be changed after the first six-year iteration of sampling. Our key concern is to assure that all major sportfishes are sampled at least once every six years, regardless of their priority.

III. LOGISTICS

SAMPLING EVENTS

Definition

- Each type of sampling conducted for a specific purpose on a single reservoir should be considered a single "sampling event". This is true whether a single crew is electrofishing for black bass for one night, two crews are gillnetting for percids for two nights, or one crew is trapnetting for crappie on four consecutive days. Each IMS sampling objective represents a sampling event.
- Defining a sampling event is particularly important when preparing for sampling, recording data during multiple sampling days, or sampling with more than one crew.
- ***It is essential that sample numbers (SampNo), and helpful if fish identification numbers (FishID), are unique for a sampling event. This approach facilitates data entry, proofreading, analysis, and troubleshooting.***

Sampling with Multiple Crews on a Single Day

- Prior to sampling, identify sampling sites and assign unique sample numbers (SampNo) to each crew. For example, crew 1 would be assigned sample numbers 1-4 and crew 2 would be assigned sample numbers 5-8.
- If FishID numbers are required in a protocol, assign a unique series of numbers to each crew. For example, if you know that each crew will not collect more than 500 fish, assign crew 1 FishID numbers 1-500 and assign crew 2 FishID numbers 501-999. These numbers can include more than one species for a sampling event, but should be not be unique for the entire sampling season because they will become large and cumbersome for data entry.

Sampling on Multiple Days with One Crew

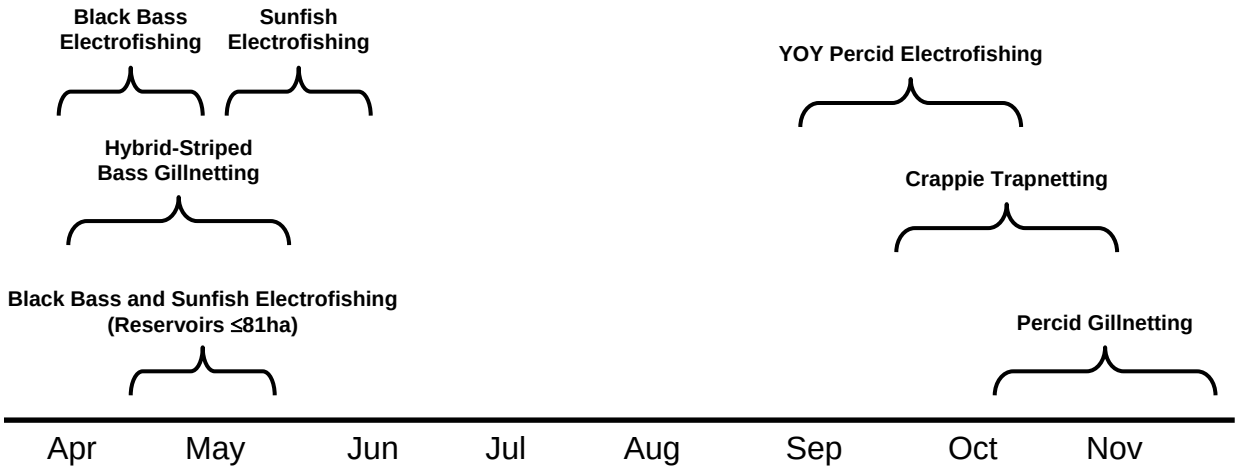
- Assign consecutive sample numbers (SampNo) for each day of sampling that begin where sampling left off on the previous day. For example, if 10 nets are set and fished for three consecutive days, assign SampNo 1-10 for nets run on the fist day, 11-20 for nets run on the second day, and 21-30 for nets run on the third day.
- Assign FishID numbers in a consecutive fashion similar to SampNo. For example, if FishID numbers 1-234 were assigned on the first day, start with FishID number 235 on the second day, and continue in this fashion until the sampling event is complete.

Sampling with Multiple Crews on Multiple Days

- Prior to sampling, organize sample numbers (SampNo) for each day that each crew will work to ensure that they do no overlap and are consecutive.
- Prior to sampling, assign FishID numbers to each crew for use throughout the sampling event.
- Coordinate between crews before and after each day of sampling to avoid confusion.

SAMPLING TIMELINE

IMS Sampling is primarily conducted in the spring and fall. Each spring black bass, sunfish, and a combination of black bass and sunfish are sampled with electrofishing. The spring surveys provide population assessments for black bass and general length-frequency information for sunfish. Spring is also the time when hybrid-striped bass populations are assessed with gillnets. During the fall, recruitment and growth of young-of-year percids is determined with electrofishing. Fall is also the time when crappie populations are assessed with trapnets and adult percid populations are assessed with gillnets.



GEOGRAPHICAL REFERENCING FIELD DATA

All Geographic Referencing of IMS data should be in Universal Transverse Mercator (UTM) format, and use NAD27 datum projections. All Ohio UTM data are in UTM zones 16 (western Ohio) and 17 (central and eastern Ohio). Rounding Easting and Northing coordinates is acceptable because most handheld GPS units do not provide greater accuracy. A typical coordinate should be reported as UTM zone 17, 499707 Easting, 4542278 Northing. If greater precision is available, this same location could be recorded as UTM zone 17, 499707.21 Easting, 4542278.43 Northing. Data reported at either level of precision will be accepted in the OFIS database.

RECORDING DATA IN THE FIELD

Field data are recorded on one of five IMS Forms:

- Form 1. Trip Meta-Data
- Form 2. Sample Data
- Form 3. Catch Data
- Form 4. Water Quality Data
- Form 5. Fish Collection Tally Sheet

Forms should be filled out as completely as possible, although use of numeric codes is not necessary for variables such as Species or GearSpec. Examples of using these forms are provided in Appendix C, and blank forms are available as MS Word documents.

DATA HANDLING

Data should be entered in the Ohio Fisheries Information System (OFIS) immediately following collection of field data. The OFIS Manual provides instruction on data entry, codes, and other related information.

Data Entry

- Data collected in conjunction with spring sampling should be entered into OFIS by August 31st of each year.
- Data collected in conjunction with fall sampling should be entered into OFIS by December 31st of each year.

Data Analysis

The following analysis will be conducted for all black bass, bluegill, hybrid-striped bass, and percid species for each reservoir sampled:

- Catch-per-unit effort (# of fish/hour)
- Length frequency

- PSD, RSD
- Relative weight
- Mean length at age

The following analysis will be conducted for all sunfish species other than bluegill sunfish for each reservoir sampled:

- Catch-per-unit effort (# of fish/hour)
- Length frequency

The following analysis will be conducted for YOY percid species for each reservoir sampled:

- Catch-per-unit effort (# of fish/hour)
- Length frequency

The following analysis will be conducted for all crappie species for each reservoir sampled:

- Catch-per-unit effort (# of fish age 1 and older fish/net night)
- Length frequency
- PSD, RSD
- Relative weight
- Size structure (% of age 1 and older fish that are greater than 229 mm)
- Mean length at age
- Age structure (% of age 1 and older fish that are age 4 and older)
- Total annual mortality between ages (if possible)

FISH HANDLING AND DISPOSAL

Sacrificing fish is a necessary part of obtaining complete information for some species. The following guidelines should be followed for proper handling and disposal of fish.

Procedures

Sacrificed fish can be disposed of as follows:

District Disposal. District-specific locations can be used if available.

- Grind, incinerate, or burry on site if facilities and equipment are available to do so. Do not dispose of fish in a trashcan or dumpster.

IFRE Disposal. Fish carcasses may be transported to IFRE for disposal within one day if fresh and one month if frozen if no other site is available for disposal.

Donation for Animal Use. Fish carcasses may be donated to animal care facilities such as zoos or raptor rehabilitation centers.

- District Fish Supervisors are responsible for identifying facilities to which fish are donated and working out related logistics.
- Donated fish carcasses must be bagged and frozen.

Donation for Human Use. *This is not recommended*. However, fish may be processed for human consumption only if they are donated to charitable organizations such as food banks and homeless shelters. District Fish Supervisors are responsible for identifying organizations to which fish are donated and working out related logistics. Please note that fish will be considered unfit for consumption when:

- They have not been carefully handled in the field (i.e. stored in coolers).
- They have been subjected to preservatives or other chemicals.
- A specific species or size is not recommended for consumption.
- They are known to be diseased or parasitized in some way.
- They have gills that are white, flesh that is soft, skin that has fungus, or rib bones that are separating from the flesh.

IV. RESERVOIR HABITAT ASSESSMENT

WATER QUALITY SAMPLING

Sampling Objectives: Collect temperature/oxygen profile and transparency data at the beginning of all sampling events, and additional information at selected times and locations.

Equipment: See equipment checklist in Appendix B.

Sample Site Selection and Effort

Number of sites sampled will be based on reservoir size.

Reservoir size (ha)	Samples (N)	Location
≤41	1	The middle of the reservoir
42-405	2	The dam and the upper basin
≥406	3	The dam, and the middle and lower basins

Data Collection

Temperature and oxygen profiles should be collected as follows:

- Reference Reservoirs: In conjunction with all sampling events, in addition to once during mid-July thru mid-August.
- Systematic Reservoirs: In conjunction with all sampling events.

Collect the following data:

- GPS coordinates and other sample number and site information
- Secchi disk reading (cm)
- Conductivity reading at the surface
- Temperature and dissolved oxygen profiles, beginning at the surface and continuing to the bottom at 1-meter intervals.

V. RESERVOIR FISH POPULATION ASSESSMENT

ELECTROFISHING

Gear Specifications

Standard 17’ or 18’ electrofishing boat:

- Smith-Root 5.0 GPP pulsator and Honda generator.
- Eight stainless steel electrodes hanging from each ring.
- A minimum of 6 halogen floodlights mounted on the front and side railings.
- 2 dip nets with the following mesh specifications:
  - 13 mm (½”) will be used for black bass and sunfish.
  - 6 mm (¼”) will be used for young-of-the-year (YOY) percids.
- Pulsator box settings (low power, 3-5.5 amps, pulse rate equal to 60 pulses/s).

General Data Recording (see Appendix C for examples of field form use)

Recording Trip Metadata

- Circle “Yes” under “IMS Sample”.
- Use IMS project code for your district or orgunit.
- Date is the date that fish are collected (MM/DD/YYYY).
- Location is the reservoir name or reservoir code.
- Purpose can be listed as “Black Bass Population Assessment”, “Black Bass and Sunfish Population Assessment”, “Sunfish Population Assessment” or “YOY Percid Assessment”.
- Target species is recorded as general black bass (77995), black bass and sunfish combined (77993), sunfish general (77994), or general percids (80901).
- Settings of the pulsator box including amps should be in comments section.

Recording Sampling Data

- Sample numbers (SampNo) are reported consecutively for each event, beginning with sample 1 on the first day of electrofishing, and continuing consecutively until all sampling is completed (this may occur over several days).
- Sample sites (transects) (SampSite in OFIS) are recorded as numeric codes.
- A coordinate should be collected at the beginning of each sample.
- A surface conductivity reading should be collected at the beginning of each sample
- Data are recorded for all samples, including those where no fish were captured (i.e. no fish on an electrofishing run).

- Effort should be recorded as “N” when catch per effort has been compromised by equipment failure or other problems. However, other data, such as fish length should be recorded. Identify gear problems in the metadata comments.
- Effort reduced to less than the standard 5 (sunfish) or 15 (all other species) due to equipment failure or other problems and other comments should be recorded.

Sampling Procedures and Schedules

Black Bass

Sampling Objectives: Estimate abundance, condition, growth, size structure, and age structure.

Sampling Periods and Conditions

- Mid-April thru mid-May (water temperature 15-20 ^{o}C) beginning at sunset.

Effort and Sample Site Selection

- Effort is 15 minutes per sample (approximately 375 meters).
- Number of samples is based on reservoir size:

Reservoir size (ha)	Samples/night	Nights	Sample sites (transects)
≤81	See page V-7, Black Bass and Sunfish Electrofishing Combined		
82-202	6	1	6
203-405	6	2	12
≥406	6	3	18

- Sample on consecutive nights if possible.
- Stratify reservoirs into 3 basins (upper, middle, and lower) when possible.
- Distribute sample sites (transects) between basins as follows:

	Sample sites (transects) per basin				
Basins (*n*)	**Upper**	**Upper middle**	**Middle**	**Lower middle**	**Lower**
			Reservoirs 82-202 ha		
2	3				3
3	2		2		2
4	2	2		1	1
	Sample sites (transects) per basin				

Basins (*n*)	Upper	Upper middle	Middle	Lower middle	Lower
Reservoirs 203-405 ha					
2	6				6
3	4		4		4
4	3	3		3	3
Reservoirs ≥406 ha					
2	9				9
3	6		6		6
4	5	5		4	4

- Within basins, randomly select sample sites (transects) from all 500-m shoreline sites on reservoir sampling maps.
- Sample parallel to the shoreline at depths of 0.3-1.6 m.
- If the selected sample site (transect) is not useable then (by flip of coin or other random manner) move site to the right or left until the next site is found.

Data Collection

Processing Black Bass Samples and Recording Data

- Collect only black bass and record by black bass species.
- Process black bass after each transect. If no black bass were caught, note this on the fish data collection form and continue to the next sample.
- If sample sites are adjacent, release fish so they will not be re-sampled.
- Assign a FishID number to all black bass sampled.
- Measure all black bass (nearest mm TL).
- Weigh (nearest g) 5 black bass per cm group for each species using an electronic balance (or spring scale for weighing large fish).
- Collect scale samples from black bass ≤381 mm that were weighed.
- Remove scales from the left side of the fish near the tip of a depressed pectoral fin, below the lateral line.
- Store scales in a coin envelope labeled with the reservoir name, date, FishID number, and length.
- After scales are collected, black bass should be released.
- Read scales to determine if black bass are age 1, 2, 3, or >3, and record age in the database unless black bass are >3. If black bass are >3, then leave age blank in database.

SAMPLING SCHEDULE: Black Bass Electrofishing

Note: Priority levels abbreviated “R” designate reference reservoir in all sampling schedules.

District 1: Black Bass Electrofishing, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Alum Creek	2	X			X		
Buckeye	3	X					
Deer Creek	3					X	
Delaware	R	X	X	X	X	X	X
Griggs	3			X			
Hoover	3		X				
Indian	2			X			X
Kiser	2	X			X		
Knox	2	X			X		
O’Shaughnessy	2		X			X	
Rush Creek	3						X

District 2: Black Bass Electrofishing, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Charles Mill	1	X	X				
Clear Fork	1	X	X				
Ferguson	1					X	X
Killdeer	1			X	X		
New London	1					X	X
Pleasant Hill	R	X	X	X	X	X	X

District 3: Black Bass Electrofishing, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Atwood	2		X			X	
Berlin	R	X	X	X	X	X	X
Clendening	1	X	X				
Dale Walborn	3						X
Deer Creek	3				X		
East Branch	3		X				
East Reservoir – Portage	3					X	
Guilford	2		X			X	
LaDue	1					X	X
Lake Milton	2			X			X
Leesville	2			X			X
Long Lake – Portage	1			X	X		
Mogadore	2			X			X
Mosquito	2	X			X		
Nimisila	2	X			X		
Pymatuning	2		X			X	
Springfield	3			X			
Tappan	R	X	X	X	X	X	X
Turkeyfoot – Portage	1			X	X		
West Branch	3					X	

District 4: Black Bass Electrofishing, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Burr Oak	R	X	X	X	X	X	X
Dillon	3		X				
Jackson	3			X			
Logan	3					X	
Piedmont	3				X		
Rupert	2			X			X
Salt Fork	2			X			X
Seneca	2	X			X		
White	3		X				
Wills Creek	3					X	

District 5: Black Bass Electrofishing, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Acton	R	X	X	X	X	X	X
Caesar Creek	3	X					
C. J. Brown	3				X		
Cowan	3			X			
East Fork	2		X			X	
Grand Lake St. Mary's	2		X			X	
Lake Loramie	3						X
Paint Creek	2			X			X
Rocky Fork	2	X			X		

Black Bass and Sunfish Combined

Sampling Objectives:

- Black Bass and bluegill sunfish: estimate relative abundance, condition, growth, size structure, and age structure.
- Sunfish other than bluegill: estimate relative abundance and size structure.

Sampling Periods and Conditions

- May (water temperature 18-22 ^{o}C). Sample reservoirs at night, EXCEPT where typical mid-reservoir secchi transparency readings are <1 m during May.

Effort and Sample Site Selection

- Effort is 15 minutes for black bass (375 m) and 5 minutes for sunfish (125 m), alternating between species.
- Separate sample numbers must be recorded for each electrofishing run. For example, 1 for black bass, 2 for sunfish, 3 for black bass, 4 for sunfish, etc.
- The number of samples is based on reservoir size:

Reservoir size (ha)	Samples/day	Days	Sample sites (transects)
≤41	4	1	4
42-81	6	1	6

- Stratify reservoirs into 3 basins when possible.
- Distribute sample sites (transects) between basins as follows:

	Sample sites (transects) per basin		
Basins (*n*)	**Upper**	**Middle**	**Lower**
	Reservoirs ≤41 ha		
2	2		2
3	2	1	1
	Reservoirs 42-81 ha		
2	3		3
3	2	2	2

- Within basins, randomly select sample sites (transects) from all 500-m shoreline sites on reservoir sampling maps.
- Sample parallel to the shoreline at depths of 0.3-1.6 m.
- If the selected sample site (transects) is not useable then (by flip of coin or other random manner) move site to the right or left until the next site is found.

Data Collection

Processing Black Bass and Sunfish Samples and Recording Fish Data

- For each 20-min sample:
    - Collect sunfish only during the first 5 min.
    - Collect black bass only during the final 15 min.
- Record data by species.
- Process fish after each sample. If no fish were caught, note this on all forms and continue to the next sample.
- If sample sites are adjacent, release fish so they will not be re-sampled.
- Assign a FishID number to all fish.

Black bass

- Identify species and measure all black bass (nearest mm TL).
- Weigh (nearest g) 5 black bass per cm group for each species using an electronic balance (or a spring scale can be used for large fish).
- Collect scale samples from black bass ≤381 mm that were weighed.
- Remove scales from the left side of the fish near the tip of a depressed pectoral fin, below the lateral line.
- Store in a coin envelope labeled with the reservoir name, date, FishID number, and length.
- Release black bass after processing.

Sunfish

- For all sunfish <100 mm:
    - Measure (nearest mm TL) the first 100 bluegill and concurrently measure and release all other Lepomis.
    - Once 100 bluegill <100 mm have been measured, remaining sunfish should be identified to species, enumerated, and released without being measured (i.e. grouped by species).
- For all sunfish (except bluegill) ≥100 mm, measure (nearest mm TL) and release.
- For bluegill sunfish ≥100 mm:
    - Measure all fish (nearest mm TL).
    - Weigh (nearest g) 10 bluegill sunfish per cm group using an electronic balance.
    - Remove otoliths from fish that were weighed. Fish can be processed after each net pull or stored in a plastic bag with a corresponding sample number or label, placed in a cooler, and processed in the lab.

SAMPLING SCHEDULE: Black Bass and Sunfish Electrofishing Combined

District 1: Black Bass and Sunfish Electrofishing Combined, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Hargus	2			X			X
Kokosing	2		X			X	
Madison	2			X			X
Oakthorpe	2			X			X

District 2: Black Bass and Sunfish Electrofishing Combined, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Aldrich	3				X		
Amick	3		X				
Archbold #1	3			X			
Beaver Creek	1	X	X				
Bellevue #4	3					X	
Bucyrus #1	3						X
Bucyrus #2	3			X			
Delta #1	3				X		
Fulton	3			X			
Harrison	3			X			
Killdeer #30	3			X			
Killdeer #33	3			X			
LeComte	3					X	
Lamberjack	3		X				
Leipsic	3				X		
Lima	2			X			X
Lost Creek	3					X	
Maumee Bay	3				X		
McComb #2	3					X	
Monroeville	3					X	
Mosier	3		X				
North Baltimore #2	3			X			
Nettle Lake	3						X
Norwalk #1	3					X	
Norwalk #2	3					X	
Norwalk #3	3					X	
Olander	3				X		
Ottawa	3				X		
Oxbow	1	X	X		X		
Powers	3		X				
Resthaven #7	3						X
Resthaven #8	1	X	X				
Riley	3			X			
Schoonover	3				X		
Shelby #3	3						X
Swanton	3			X			
Upper Sandusky #1	3						X
Upper Sandusky #2	3						X
Van Buren	3		X				
Van Wert #1	3		X				
Van Wert #2	3		X				
Veterans Memorial	2			X			X
Wauseon #2	1	X	X				

District 3: Black Bass and Sunfish Electrofishing Combined, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Aquilla	3						X
Findley	3				X		
Highlandtown	2		X			X	
Jefferson	3					X	
New Lyme	3					X	
North Reservoir – Portage	2			X			X
Petros	3				X		
Punderson	3				X		
Shreve	3				X		
Silver Creek	3			X			
Sippo	2		X			X	
Spencer	1		X	X			
Wellington South	3		X				
West Reservoir – Portage	2			X			X
Zepernick	3						X

District 4: Black Bass and Sunfish Electrofishing Combined, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Alma	3			X			
Barnsville #3	3				X		
Belmont	3				X		
Clouse	3					X	
Dow	3		X				
Forked Run	3		X				
Fox	3						X
Hope	3		X				
Jackson City	3			X			
Monroe	3				X		
Ross	3	X					
Snowden	3						X
Timbre Ridge	3					X	
Tycoon	2	X			X		
Vesuvius	3					X	
Veto	3						X
Wolf Run	3			X			

District 5: Black Bass and Sunfish Electrofishing Combined, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Adams	3		X				
Clark	3				X		
Eastwood	3			X			
Grant	3						X
Rush Run	3		X				
Stonelick	3					X	

Sunfish

Sampling Objectives

- Bluegill: estimate relative abundance, condition, growth, size structure, and age structure.
- Sunfish other than bluegill: estimate relative abundance and size structure.

Sampling Periods and Conditions

- Mid-May thru mid-June (water temperatures 20-25 ^{o}C) during the day, starting at any time.

Effort and Sample Site Selection

- Effort is 5 minutes per sample (approximately 125 meters).
- Conduct 12 samples on reservoirs ≥82 ha (for reservoirs ≤81 ha, see page V-7, Black Bass and Sunfish Electrofishing Combined).
- Stratify reservoirs into 3 basins.
- If necessary, take all samples in the middle basin to reduce travel time.
- Within the middle basin, randomly select sample sites (transects) from all possible shoreline sites marked on a reservoir map.
- Sample parallel to the shoreline at depths of 0.3-1.6 m.
- If the selected sample site (transect) is not useable then (by flip of coin or other random manner) move site to the right or left until the next site is found.

Data Collection

Processing Sunfish Samples and Recording Fish Data

- Collect only sunfish, and record by species.
- Process sunfish after each sample. If no sunfish were caught, note this on all forms and continue to the next sample.
- If sample sites (transects) are adjacent, released sunfish so they will not be re-sampled.
- Assign a FishID number to all sunfish sampled.
- For all sunfish <100 mm:
    - Measure (nearest mm TL) the first 100 bluegill and concurrently measure and release all other Lepomis.
    - Once 100 bluegill <100 mm have been measured, remaining sunfish should be identified to species, enumerated, and released without being measured (i.e. grouped by species).
- For all sunfish (except bluegill) ≥100 mm, measure (nearest mm TL) and release.

- For bluegill sunfish ≥100 mm:
    - Measure all fish (nearest mm TL).
    - Weigh (nearest g) 10 bluegill sunfish per cm group using an electronic balance.
    - Remove otoliths from fish that were weighed. Fish can be processed after each net pull or stored in a plastic bag with a corresponding sample number or label, placed in a cooler, and processed in the lab.

SAMPLING SCHEDULE: Sunfish Electrofishing

District 1: Sunfish Electrofishing, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Alum Creek	2	X			X		
Buckeye	2	X			X		
Deer Creek	2		X			X	
Delaware	R	X	X	X	X	X	X
Griggs	2		X			X	
Hoover	2			X			X
Indian	2			X			X
Kiser	2	X			X		
Knox	2	X			X		
O'Shaughnessy	2		X			X	
Rush Creek	2		X			X	

District 2: Sunfish Electrofishing, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Charles Mill	3	X					
Clear Fork	3	X					
Pleasant Hill	R	X	X	X	X	X	X

District 3: Sunfish Electrofishing, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Atwood	2		X			X	
Berlin	R	X	X	X	X	X	X
Clendening	3	X					
Dale Walborn	3				X		
Deer Creek	3						X
East Branch	3					X	
East Reservoir – Portage	2			X			X
Guilford	3		X				
LaDue	3			X			
Lake Milton	2		X			X	
Leesville	3		X				
Long Lake - Portage	3				X		
Mogadore	2			X			X
Mosquito	3	X					
Nimisila	3	X					
Pymatuning	2		X			X	
Springfield	3			X			
Tappan	R	X	X	X	X	X	X
Turkeyfoot - Portage	2			X			X
West Branch	3					X	

District 4: Sunfish Electrofishing, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Burr Oak	R	X	X	X	X	X	X
Dillon	3				X		
Jackson	3						X
Logan	3		X				
Piedmont	3			X			
Rupert	3					X	
Salt Fork	3						X
Seneca	3	X					
White	3					X	
Wills Creek	3				X		

District 5: Sunfish Electrofishing, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Acton	R	X	X	X	X	X	X
Caesar Creek	3	X					
C. J. Brown	3						X
Cowan	3				X		
East Fork	3			X			
Grand Lake St. Mary's	3		X				
Lake Loramie	3		X				
Paint Creek	3					X	
Rocky Fork	3	X					

Young-of-Year Percids

Sampling Objectives

- Age-0 percids: estimate relative abundance and growth.

Sampling Periods and Conditions

- Mid-September thru October (water temperatures <20 ^{o}C), beginning at sunset.

Effort and Sample Site Selection

- Effort is 15 minutes per sample (approximately 375 meters).
- The number of samples is based on reservoir size:

Reservoir size (ha)	Samples/night	Nights	Sample sites (transects)
≤202	6	1	6
≥203	6	2	12

- Sample on consecutive nights if possible.
- Stratify reservoirs into 3 basins if possible.
- Distribute sample sites (transects) between basins as follows:

	Sample sites (transects) per basin				
Basins (*n*)	**Upper**	**Upper middle**	**Middle**	**Lower middle**	**Lower**
			Reservoirs ≤202 ha		
2	3				3
3	2		2		2
4	2	2		1	1
			Reservoirs ≥203 ha		
2	6				6
3	4		4		4
4	3	3		3	3

- Within basins, sample sites (transects) are randomly selected from all possible shoreline sites marked on a reservoir map.
- Sample parallel to the shoreline at depths of 0.3-1.6 m.
- If the selected sample site (transect) is not useable then (by flip of coin or other random manner) move site to the right or left until the next site is found.

Data Collection

Processing Fish Samples and Recording Fish Data

- Collect only YOY percids and record by species.
- Process fish after each sample; if no fish were caught, note this on all forms and continue to the next sample.
- If sample sites (transects) are adjacent, released fish so they will not be re-sampled.
- Assign a FishID number to all YOY percids.
- Measure all YOY percids (nearest mm TL).
- Collect scales from 3 fish per cm group for each species of YOY percids between 200 and 350 mm.
- Collected from the left side of the fish above the lateral line and below the dorsal fin.
- Store scales in a coin envelope labeled with the reservoir name, date, FishID number, and length.
- After processing YOY percids should be released.

SAMPLING SCHEDULE: YOY Percid Electrofishing

District 1: YOY Percid Electrofishing, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Alum Creek	1	X	X			X	
Buckeye	2		X			X	
Deer Creek	3				X		
Delaware	R	X	X	X	X	X	X
Griggs	3				X		
Hoover	2			X			X
Indian	3	X					
Kiser	2	X			X		
O'Shaughnessy	2			X			X

District 2: YOY Percid Electrofishing, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Beaver Creek	3	X					
Charles Mill	2		X		X		
Ferguson	3		X				
Findlay #2	3	X	X	X	X	X	X
New London	3		X				
Pleasant Hill	R	X	X	X	X	X	X

District 3: YOY Percid Electrofishing, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Atwood	1	X	X				
Berlin	R	X	X	X	X	X	X
Clendening	2		X			X	
Dale Walborn	3				X		
LaDue	3						X
Lake Milton	3			X			
Leesville	2	X			X		
Mosquito	1			X	X		
Nimisila	3	X					
Pymatuning	1					X	X
Springfield	2			X			X
Tappan	R	X	X	X	X	X	X
Turkeyfoot – Portage	3		X				

District 4: YOY Percid Electrofishing, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Burr Oak	R	X	X	X	X	X	X
Belmont	3					X	
Dillon	3				X		
Hope	3			X			
Jackson City	3					X	
Logan	3				X		
Piedmont	1	X	X				
Rupert	3					X	
Salt Fork	3		X				
Seneca	3			X			
Snowden	3			X			
White	3						X
Wills Creek	3	X					
Wolf Run	3						X

District 5: YOY Percid Electrofishing, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Acton	R		X	X	X	X	X
Caesar Creek	2			X			X
C. J. Brown	3						X
Cowan	2		X			X	
East Fork	3					X	
Eastwood	3					X	
Grand Lake St. Mary's	1			X	X		
Lake Loramie	2	X			X		
Paint Creek	1	X	X				
Rocky Fork	2	X			X		

TRAPNETTING

Gear Specifications

Standardized trapnets (Missouri-style trapnets)

- Two 92 cm (36”) X 184 cm (72”) fiberglass or steel frames with center braces and four 76 cm (30”) diameter fiberglass or steel hoops arranged as follows.
    - The frames are 76 cm (30”) apart.
    - The first hoop is 81 cm (32”) from the second frame.
    - Hoops are 61 cm (24”) apart.
    - The second frame has a slit throat and the first hoop is the only one with a throat.
    - Net material is 13 mm (½”) square no. 126 knotless nylon treated with Netset.
    - Cod end has a draw string closure with a 152 cm (60”) no. 5 braided nylon string.
- A single 107 cm (42”) deep lead is attached to the center brace of the first frame, and is constructed as follows.
    - 13 mm (½”) mesh square no. 126 knotless nylon hung on 516-braided polypropylene and treated with Netset.
    - 51-mm (2”) X 38-mm (1½”) floats (SB-2) spaced at 61 cm (24”) intervals
    - 57-g (2-oz) weights spaced at 61 cm (24”) intervals.
    - Length of the lead is 21 m (70’).

General Data Recording (see Appendix C for examples of field form use)

Recording Trip Metadata

- Circle “Yes” under “IMS Sample”.
- Use IMS project code for your district or orgunit.
- Date is the date that fish are collected (MM/DD/YYYY).
- Location is the reservoir name or reservoir code.
- Purpose can be listed as “Crappie Population Assessment.”
- Target species is recorded as general crappie (77906).

Recording Sampling Data

- Sample numbers (SampNo) are reported consecutively for each event, beginning with sample 1 on the first day of trapnetting, and continuing consecutively until all sampling is completed.
- Sample sites (SampSite in OFIS) are recorded as numeric codes.
- A coordinate should be collected at each sample site.

- Record sample data for each net, including empty nets.
- Do not record effort from nets which have been significantly vandalized or disturbed, or could not be fished in 24 hours due to inclement weather. In these cases, report "N" for effort. However, all other data should be collected and recorded. Specific problem should be recorded in the metadata comments.

Sampling Procedures and Schedules

Crappie

***Sampling Objectives*:** Estimate relative abundance, condition, growth, size structure, and age structure of white crappie and black crappie (one, or both species if present).

Sampling Period and Conditions

- Sample during October thru mid-November (water temperatures near 15 ^{o}C).

Effort and Sample Site Selection

- Number of samples (net sets) and sampling sites are based on reservoir size.

Reservoir size (ha)	Nets	Sets/night	Nights	Net nights
≤81	5	1	4	20
82-202	10	1	2	20
≥203	10	1	3	30

- For reservoirs >202 ha, evaluation of past data may indicate that low precision results from only 30 net nights of effort. In these situations, an extra night of sampling will be conducted. Number of net nights for these reservoirs will be 40.
- Sample on consecutive nights.
- Each sample represents approximately 24 hours of effort (1440 minutes).
- Sampling Site Selection

  For reservoirs not previously sampled:

  - Try to locate sites near sloping points or other features in 2-5 meter depths adjacent to deep water, such as the creek channel, if possible
  - Randomly choose net sites from the entire pool of possible nets sites

  For reservoirs previously sampled:

  - Randomly choose sampling sites from a pool of possible locations within each basin.
- Stratify reservoirs into 3 basins when possible.

- Distribute sampling sites between basins as follows:

Basins	Nets per basin				
	Upper	Upper middle	Middle	Lower middle	Lower
Reservoirs ≤81 ha					
2	3				2
3	2		2		1
Reservoirs ≥82 ha					
2	6				4
3	4		4		2
4	3	3		2	2

- If the selected sampling site is not useable then (by flip of coin or other random manner) move site to the right or left until the next suitable site is found.

Data Collection

Processing Fish Samples and Recording Fish Data

- Nets should be retrieved in the order in which they were set
- As each net is emptied, store fish in a tub or plastic bag with a corresponding sample number or label and place in a cooler. Alternately, fish can be processed after each net pull. ***Processing fish on the reservoir after each net pull is not recommended.***
- Bycatch should be released immediately or, if survival is unlikely, placed in trash containers for transport for disposal off site.
- If no fish were caught, note this on catch data form and continue to the next net.
- Record crappie species and length (TL mm) and assign a FishID number to all crappie.
- Weigh (nearest g) 5 crappie per cm group for each species using an electronic balance.
- Remove otoliths according to the following procedures:
    - Age-0 Crappie (fish <120 mm). Remove otoliths from the first 10 crappie caught of each crappie species and store in a labeled coin envelope.
    - Age-1 and Older Crappie (fish >110 mm). Remove otoliths from all crappie (total catch) from every other net. Remove both otoliths, store in a coin envelope labeled with the location, date, and FishID number. Once the number of otolith samples reaches 200 for each crappie species, discontinue removing otoliths. If you will not catch enough fish to reach the 200 fish target, then keep fish from all nets.

SAMPLING SCHEDULE: Crappie Trapnetting

District 1: Crappie Trapnetting, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Alum Creek	1			X	X		
Buckeye	3					X	
Deer Creek	1			X	X		
Delaware	R	X	X	X	X	X	X
Griggs	3		X				
Hargus	3			X			
Hoover	3						X
Indian	3						X
Kiser	3						X
Knox	3	X					
Kokosing	3	X					
Madison	3				X		
O'Shaughnessy	3		X				
Rush Creek	3					X	

District 2: Crappie Trapnetting, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Bresler	3						X
Charles Mill	3			X			
Clear Fork	3				X		
Ferguson	3						X
Findlay #2	1	X	X				
Harrison	3			X			
LeComte	3	X					
Lima	3					X	
Lost Creek	3					X	
Metzger	3				X		
Nettle	3		X				
Pleasant Hill	R	X	X	X	X	X	X
Veteran's Memorial	3	X					

District 3: Crappie Trapnetting, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Atwood	2	X			X		
Berlin	R	X	X	X	X	X	X
Clendening	3			X			
Dale Walborn	3				X		
Deer Creek	3						X
East Branch	3		X				
East Reservoir – Portage	2		X			X	
Guilford	3					X	
Highlandtown	2			X			X
LaDue	2		X			X	
Lake Milton	2			X			X
Leesville	2		X			X	
Long Lake – Portage	2	X			X		
Mogadore	3			X			
Mosquito	1	X	X				
Nimisila	3	X					
North Reservoir – Portage	2	X			X		
Pymatuning	1			X	X		
Springfield	3	X					
Tappan	R	X	X	X	X	X	X
Turkeyfoot – Portage	2		X			X	
West Branch	3						X
West Reservoir – Portage	2			X			X

District 4: Crappie Trapnetting, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Burr Oak	R	X	X	X	X	X	X
Dillon	3					X	
Jackson	3				X		
Logan	3			X			
Piedmont	3						X
Rupert	3			X			
Salt Fork	3						X
Seneca	1	X	X				
White	3				X		
Wills Creek	3					X	

District 5: Crappie Trapnetting, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Acton	R	X	X	X	X	X	X
Caesar Creek	1			X	X		
C. J. Brown	3		X				
Clark	3					X	
Cowan	3			X			
East Fork	3						X
Eastwood	3	X					
Grand Lake St. Mary's	3	X					
Grant	3		X				
Lake Loramie	3					X	
Paint Creek	3	X					
Rocky Fork	3				X		
Stonelick	3						X

GILLNETTING

Gear Specifications

Standardized gillnets:

- Gillnets will be 54.9 m (180') long by 1.8 m (6') deep, consisting of six 9.15-m (30') panels of different mesh size.
- Bar measure sizes for the five panels hung in order from the smallest to largest: will be 19 mm (¾"), 25 mm (1"), 38 mm (1½"), 51 mm (2"), 64 mm (2½"), and 76 mm (3").
- Panels must be constructed of monofilament webbing material.
- Float lines will consist of foam core rope.
- Lead lines will consist of lead core rope.

General Data Recording (see Appendix C for examples of field form use)

Recording Trip Metadata

- Circle "Yes" under "IMS Sample".
- Use IMS project code for your district or orgunit.
- Date is the date that fish are collected (MM/DD/YYYY).
- Location is the reservoir name or reservoir code.
- Purpose can be listed as "Hybrid-Striped Bass Population Assessment" or "Percid Population Assessment."
- Target species is recorded as either hybrid-striped bass (74005) or general percids (80901).

Recording Sampling Data

- Sample numbers (SampNo) are reported consecutively for each event, beginning with sample 1, and continuing consecutively until all sampling is completed.
- Sample sites (SampSite in OFIS) are recorded as numeric codes.
- A coordinate should be collected at each sample site.
- Record sample data for each net, including empty nets.
- Do not record effort from nets which have been significantly vandalized or disturbed, or could not be fished due to inclement weather. In these cases, report "N" for effort. However, all other data should be collected and recorded. Specific problem should be recorded in the metadata comments.

Sampling Procedures and Schedules

Hybrid-Striped Bass

Sampling Objectives: Estimate relative abundance, condition, growth, size structure, and age structure of hybrid-striped bass.

Sampling Periods and Conditions

- Sample during mid-April thru May (water temperatures 10 -20 ^{o}C).

Effort and Sample Site Selection

- Set nets during daylight hours for a total of 2 hours of effort (120 minutes).
- Sampling consists of 6 nets set on each of two days.
- Sample on consecutive days if possible.
- After each day, move nets to different sampling sites.
- Sampling Site Selection

  For reservoirs not previously sampled:
  - Try to locate sites near sloping points or other features in 2-5 meter depths adjacent to deep water if possible.
  - Randomly choose net sites from the entire pool of possible nets sites.

  For reservoirs previously sampled:
  - Randomly choose sampling sites from a pool of possible locations within each basin.
- Stratify reservoirs into 3 basins if possible.
- Distribute sampling sites between basins as follows:

	Sample sites per basin				
Basins (*n*)	**Upper**	**Upper middle**	**Middle**	**Lower middle**	**Lower**
2	6				6
3	4		4		4
4	3	3		3	3

- Set nets on the bottom oriented perpendicular to the nearest shoreline with the smallest mesh adjacent to the shoreline.
- If the selected sampling site is not useable then (by flip of coin or other random manner) move site to the right or left until the next pre-selected site is found.
- In reservoirs where bycatch is high, set times for nets can be staggered.

Data Collection

Processing Fish Samples and Recording Fish Data

- Fish should be processed after each net pull. If no fish were caught, note this on all forms and continue to the next net.
- Record data from fish and record species as appropriate code.
- Assign a FishID number to all percids and morones sampled. FishID numbers are unique for each fish.
- Bycatch should be released immediately or, if survival is unlikely, placed in trash containers for transport back to the lab.
- Measure all hybrid-striped bass (nearest mm TL).
- Weigh (nearest g) 5 hybrid-striped bass per cm group using an electronic balance (or spring scale for weighing large fish).
- Collect scale samples from hybrid-striped bass that were also weighed.
- Remove scales from the left side of the fish near the tip of a depressed pectoral fin, below the lateral line.
- Store scales in a coin envelope labeled with the reservoir name, date, FishID number, and length.
- Keep 3 hybrid-striped bass per cm group for removal of otoliths.
- Release percids only if mortality is not evident. If mortality is evident, place fish in trash containers for transport back to the lab.
- Label bags of hybrid-striped bass collected for otolith removal (reservoir name, date, and sample number), place on ice, and transported back to the lab.

SAMPLING SCHEDULE: Hybrid-Striped Bass Gillnetting

District 1: Hybrid-Striped Bass Gillnetting, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Buckeye	1	X	X				
Kiser	1	X	X				

District 2: Hybrid-Striped Bass Gillnetting, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Charles Mill	1	X	X				

District 5: Hybrid-Striped Bass Gillnetting, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
East Fork	1		X	X			

Percids

Sampling Objectives: Estimate relative abundance, condition, growth, size structure, and age structure of adult walleye and saugeye.

Sampling Periods and Conditions

- Sample during mid-October thru November (water temperatures 7-15 ^{o}C).

Effort and Sample Site Selection

- Set nets approximately 2 hours before sunset and pull 2 hours after sunset for a minimum total of 4 hours of effort (240 minutes).
- The number of net sets and sampling sites is based on reservoir size.

Reservoir size (ha)	Nets	Sets/night	Nights	Sites sampled
≤81	4	1	1	4
82-405	4	1	2	8
≥406	4	1	3	12

- Sample on consecutive nights if possible.
- After each night, move nets to different sampling sites.
- Sampling Site Selection

  For reservoirs not previously sampled:
  - Try to locate sites near sloping points or other features in 2-5 meter depths adjacent to deep water, such as the creek channel, if possible.
  - Randomly choose net sites from the entire pool of possible nets sites.

  For reservoirs previously sampled:
  - Randomly choose sampling sites from a pool of possible locations within each basin.
- Stratify reservoirs into 3 basins if possible.
- Distribute sampling sites between basins as follows:

Basins (*n*)	Sample sites per basin				
	Upper	Upper middle	Middle	Lower middle	Lower
Reservoirs ≤81 ha					
2	2				2
3	2		1		1
Reservoirs 82-405 ha					
2	4				4
3	3		3		2
4	2	2		2	2
Reservoirs ≥406 ha					
2	6				6
3	4		4		4
4	3	3		3	3

- Set nets on the bottom oriented perpendicular to the nearest shoreline with the smallest mesh adjacent to the shoreline.
- If the selected sampling site is not useable then (by flip of coin or other random manner) move site to the right or left until the next pre-selected site is found.
- In reservoirs where bycatch is high, set times for nets can be staggered.

Data Collection

Processing Fish Samples and Recording Fish Data

- Fish should be processed after each net pull. If no fish were caught, note this on all forms and continue to the next net.
- Record data from fish and record species as appropriate code.
- Assign a FishID number to all percids, morones, and catfish sampled. FishID numbers are unique for each fish.
- Bycatch should be released immediately or, if survival is unlikely, placed in trash containers for transport back to the lab.

Channel Catfish and Morone species (bycatch of interest):

- Measure all channel catfish and morone species (nearest mm TL).
- After measurements are taken, all channel catfish and morone species should be released or, if survival is unlikely, placed in trash containers for transport back to the lab.

Percids (target species):

- A target number of 200 percids will be kept (sacrificed) as follows.

  On the first night of sampling**:**

  - Keep all percids until 200-fish target are collected.
  - Measure and release (nearest mm TL) all remaining percids.

On the second night of sampling**:**

- If ≥200 percids were kept during the first night of sampling, then all percids will be measured (nearest mm TL) and released.
- If 100-199 percids were kept during the first night of sampling, then percids will be sacrificed from alternate samples (beginning with the first net) until the 200-fish target is reached; percids from remaining nets will be measured (nearest mm TL) and released.
- If <100 percids were sacrificed during the first night of sampling, then all percids will be kept until 200 are collected; percids from remaining nets will be measured and released.

On the third night of sampling (for reservoirs >405 ha):

- If ≥200 percids were kept during the first two nights of sampling, then all percids will be measured and released.
- If 100-199 percids were kept during the first two nights of sampling, then percids will be kept from alternate samples (beginning with the first net) until a total of 200 fish are collected; percids from remaining nets will be measured and released.
- If <100 percids were kept during the first two nights of sampling, then all percids will be kept until 200 fish are collected; percids from remaining nets will be measured and released.

- ***Note: If the 200-fish target is reached in mid-pull, then keep all fish remaining in that net.***
- Release percids only if mortality is not evident. If mortality is evident, label the fish in a sample bag (reservoir name, date, and sample number), place on ice, and transported to the lab.
- Label bags of percids collected for otolith removal (reservoir name, date, and sample number), place on ice, and transported back to the lab.
- Prior to otolith removal, all fish will be measured (nearest mm TL) and 5 individuals per cm group for each species will be weighed (nearest g) using an electronic balance (or spring scale for weighing large fish).

SAMPLING SCHEDULE: Percid Gillnetting

District 1: Percid Gillnetting, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Alum Creek	1	X	X			X	
Buckeye	2		X			X	
Deer Creek	3				X		
Delaware	R	X	X	X	X	X	X
Griggs	3				X		
Hoover	2			X			X
Indian	3	X					
O'Shaughnessy	2			X			X

District 2: Percid Gillnetting, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Ammick	3					X	
Archibold #2	2			X			X
Beaver Creek	2	X			X		
Bellevue #5	2			X			X
Bresler	1	X	X		X		
Charles Mill	2	X			X		
Delta #2	2			X			X
Ferguson	2		X			X	
Findlay #1	2		X			X	
Findlay #2	1	X	X		X		
Killdeer	2			X			X
LeComte	2			X			X
Lima	2	X			X		
Lost Creek	2			X			X
McComb #2	3					X	
Metzger	2		X			X	
North Baltimore #2	2			X			X
New London	2		X			X	
Norwalk #3	3					X	
Ottawa	2			X			X
Outhwaite	2		X			X	
Paulding	2	X			X		
Pleasant Hill	R	X	X	X	X	X	X
Powers	3					X	
Raccoon Creek	2			X			X
Riley	2			X			X
Shelby #3	2	X			X		
Upper Sandusky #1	2			X			X
Upper Sandusky #2	2			X			X
Van Wert #1	2	X			X		
Van Wert #2	2	X			X		
Veteran's Memorial	2		X			X	
Wauseon #2	2	X			X		
Willard	2		X			X	

District 3: Percid Gillnetting, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Atwood	1	X	X				
Berlin	R	X	X	X	X	X	X
Clendening	2		X			X	
Dale Walborn	3				X		
LaDue	3						X
Lake Milton	3			X			
Leesville	2	X			X		
Mosquito	1			X	X		
Nimisila	3	X					
Pymatuning	1					X	X
Springfield	2			X			X
Tappan	R	X	X	X	X	X	X
Turkeyfoot – Portage	3		X				

District 4: Percid Gillnetting, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Burr Oak	R	X	X	X	X	X	X
Belmont	3					X	
Dillon	3				X		
Hope	3			X			
Jackson City	3					X	
Logan	3				X		
Piedmont	1	X	X				
Rupert	3					X	
Salt Fork	3		X				
Seneca	3			X			
Snowden	3			X			
White	3						X
Wills Creek	3	X					
Wolf Run	3						X

District 5: Percid Gillnetting, 2003-2008

		Year					
Reservoir	**Priority**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Acton	R		X	X	X	X	X
Caesar Creek	2			X			X
C. J. Brown	3						X
Cowan	2		X			X	
East Fork	3					X	
Grand Lake St. Mary's	1			X	X		
Lake Loramie	2	X			X		
Paint Creek	1	X	X				
Rocky Fork	2	X			X		

VI. OTOLITH AND SCALE PROCESSING

Objectives: Determine growth (mean length at age) and age structure of fish populations.

Equipment Needed

- Dissecting microscope (8-40X magnification)
- Electric balance
- Glycerin
- Knife
- Measuring board
- Mounting adhesive
- Micro-projector/microfiche reader
- Mounting medium
- OFIS forms
- Pencils
- Plastic vials
- Regular and acetate slides
- Scale press
- Spring scale

Data Processing

Field Forms

- Form 4.0: Variable Definitions for Fish Age & Growth sheet
- Form 4.1: Age, Growth, and Back-calculation Datasheet
- Form 4.2: Age & Growth Datasheet (typically used for age 1 vs. age 0 determination)

Scales

- Scales will be either compressed in a microfiche or mounted on glass slides or pressed into acetate using a scale press.
- Scales will be read using a microprojector or microfiche reader magnified to achieve maximum clarity and size (8 – 40X magnification).
- Read scales to determine fish age only. We are not back-calculating growth at this time.

Otoliths

- Read otoliths using a dissecting microscope (8-40X magnification).

  Wholes View. Otoliths from All crappie, bluegill, and young percid can be immersed in glycerin or water and read whole view. Difficult to read otoliths can be cracked to read cross sections.

  Cross Sections. Otoliths that cannot be read in whole view, such as those from older crappie, bluegill, and most percids should be cracked and a cross section can then be read.

  - Place cracked otoliths in a medium (clay, agar, etc) or mount them with an adhesive in order to hold the otolith in place while viewing.

- View otoliths against a dark background in order to see annuli more clearly. This can be done by using a dark medium or by placing mounted otoliths over a dark sheet or paper or a black otolith-viewing tray.
- Fiber optic lights should be used to view annuli from either whole or cracked otoliths.

- Age Determination
  - Age of individual fish will be determined from annuli of otoliths or scales.
  - Aging will be in whole years only.
  - All fish will have a birth date of January 1. For instance, a fish hatched in April 2002 will be considered age 0 until January 1, 2003, after which it will be considered age 1 until January 1, 2004.

APPENDIX A: IMS RESERVIOR CHARACTERISTICS

Note: “C”=canal lake, “U”=upground reservoir, and “T”=tributary reservoir

IMS Reservoirs: District 1

Name	Code	Type	Size (ha)	Size (a)
Alum Creek	80101	T	1293	3,192
Antrim Park	80119	T	16	40
Buckeye	80102	C	1153	2,847
Cenci	801122	T	4	9
Deer Creek	80103	T	522	1,290
Delaware	80104	T	384	948
Greenfield	80105	T	5	12
Griggs	80106	T	146	361
Hargus	80107	T	53	132
Hoover	80108	T	1097	2,708
Indian	80109	C	2041	5,040
Kiser	80110	T	157	387
Knox	80111	T	190	468
Kokosing	80114	T	60	149
Madison	80112	T	42	104
Mount Gilead	80113	T	4	11
Oakthorpe	80115	T	17	41
O'Shaughnessy	80116	T	342	845
Rush Creek	80118	T	111	273

IMS Reservoirs: District 2

Name	Code	Type	Size (ha)	Size (a)
Aldrich	80201	U	13	33
Amick	80204	U	22	54
Archbold #1	80205	U	8	19
Archbold #2	80206	U	18	44
Beaver Creek	80208	U	41	102
Bellevue #4	80209	U	13	31
Bellevue #5	80210	U	34	85
Bresler	80211	U	231	571
Bucyrus #1	80212	T	17	42
Bucyrus #2	80276	T	13	32
Charles Mill	80213	T	542	1,338
Clear Fork	80214	T	391	966
Delta #1	80215	U	16	39
Delta #2	80278	U	20	50
Deshler #2	80279	U	6	16
Ferguson	80218	U	124	307
Findlay #1	80219	U	72	178
Findlay #2	80220	U	255	629
Fulton	80280	U	8	20
Geirtz	802003	U	2	5
Harrison	80223	U	115	285
Killdeer #30	802006	U	2	5
Killdeer #33	802007	U	6	15
Killdeer	80226	U	103	254
Lake Le Comte	80227	U	54	133
Lamberjack	802010	U	18	45
Leipsic	80228	U	11	27
Lima	80229	U	34	85
Lost Creek	80230	U	51	127
Maumee Bay	80294	U	11	28
McComb #1	80231	U	2	6
McComb #2	80232	U	8	20
Metzger	80233	U	62	154
Monroeville	802009	U	21	51
Mosier	802004	U	36	88
Nettle	80234	T	38	94
New London	80235	U	89	220
North Baltimore #2	802012	U	12	29
Northwalk #1	80238	U	5	12
Northwalk #2	80239	U	20	50
Northwalk #3	80240	U	39	97
Olander	80281	U	9	22

Ottawa	80241	U	8	20
Outhwaite	80277	U	61	150
Oxbow	80243	T	15	36
Paulding	80245	U	26	63
Pleasant Hill	80246	T	318	784
Powers	80247	U	12	29
Raccoon Creek	80248	U	14	35
Resthaven #10	80291	T	49	121
Resthaven #11	80292	T	11	26
Resthaven #7	80289	T	28	69
Resthaven #8	80290	T	49	120
Riley	80249	U	12	30
Schoonover	80250	U	9	21
Shelby #1	80284	U	5	12
Shelby #2	80285	U	12	29
Shelby #3	80283	U	21	51
Swanton	80253	U	6	15
Upper Sandusky #1	80254	U	13	33
Upper Sandusky #2	802013	U	51	125
Van Buren	80255	T	16	40
Van Wert #1	80256	U	26	65
Van Wert #2	80257	U	26	65
Veterans Memorial	80293	U	54	133
Wauseon #1	80258	U	4	9
Wauseon #2	80259	U	20	49
Willard	80260	U	79	194

IMS Reservoirs: District 3

Name	Code	Type	Size (ha)	Size (a)
Aquilla	80301	T	11	28
Atwood	80302	T	619	1,529
Beach City	80303	T	79	196
Berlin	80305	T	1345	3,321
Clendening	80308	T	667	1,646
Dale Walborn	80309	T	264	651
Deer Creek	80310	T	130	322
East Branch	80311	T	160	394
East Res.-Portage	80330	T	84	208
Findley	80313	T	33	82
Granger	80365	T	13	33
Guilford	80315	T	133	328
Highlandtown	80316	T	74	182
Hinckley	80317	T	34	84
Jefferson	80319	T	8	19
LaDue	80357	T	561	1,384
Lake Medina	80321	T	41	100
Lake Milton	80325	T	677	1,671
Leesville Lake	80323	T	398	983
Long Lake-Portage	80334	T	90	222
Mill Creek	80324	T	43	105
Mogadore	80326	T	436	1,076
Mosquito	80327	T	2851	7,040
New Lyme	80348	T	24	60
Nimisila	80328	T	265	654
North Res.-Portage	80333	T	67	165
Petro	80370	T	2	5
Punderson	80335	T	33	82
Pymatuning	80336	T	5933	14,650
Shreve	80338	T	24	60
Silver Creek	80358	T	38	95
Sippo	80368	T	36	89
Spencer	80339	T	20	50
Springfield	80340	T	117	290
Tappan	80341	T	863	2,131
Turkeyfoot-Portage	80332	T	196	483
Wellington	80344	U	65	160
West Branch	80345	T	1073	2,650
West Res.-Portage	80331	T	43	105
Zepernick	80346	T	16	40
Zoar	80347	T	17	41

IMS Reservoirs: District 4

Name	Code	Type	Size (ha)	Size (a)
Alma	80413	T	26	65
Barnsville #1	80454	T	10	24
Barnsville #2	80455	T	4	11
Barnsville #3	80456	T	36	90
Barnsville #4	80457	T	5	13
Belmont	80401	T	46	114
Blue Rock	80403	T	6	16
Burr Oak	80404	T	254	628
Clouse	80405	T	13	33
Crooksville East	80406	T	5	13
Crooksville South	80407	T	6	14
Dillon	80408	T	568	1,403
Dow	80426	T	64	157
Forked Run	80409	T	39	97
Fox	80410	T	21	51
Jackson City	80411	T	64	157
Jackson	80412	T	102	253
Hope	80414	T	51	126
Logan	80415	T	128	317
Monroe	80436	T	15	38
New Lexington	80417	T	31	76
Piedmont	80418	T	921	2,273
Pike	80419	T	5	12
Pine	80420	T	5	12
Rio Grande	80442	T	2	6
Roosevelt	80490	T	6	15
Rose	80438	T	7	17
Ross	80421	T	20	49
Rupert	80431	T	130	322
Salt Fork	80422	T	1140	2,815
Scioto Trail	80439	T	3	7
Seneca	80423	T	1421	3,508
Snowden	80424	T	57	141
St. Clairsville	80443	T	4	10
TimbreRidge	80444	T	39	96
Turkey Creek	80435	T	17	43
Tycoon	80428	T	72	177
Vesuvius	80429	T	43	105
Veto	80430	T	59	145
White	80416	T	140	345
Wills Creek	80432	T	171	421
Wolf Run	80433	T	79	196

IMS Reservoirs: District 5

Name	Code	Type	Size (ha)	Size (a)
Acton	80501	T	239	590
Adams	80502	T	15	37
C.J. Brown	80504	T	818	2,019
Caesar Creek	80503	T	1103	2,723
Clark	80505	T	40	98
Cowan	80506	T	276	681
East Fork	80509	T	799	1,973
Eastwood	80505	T	76	188
Grand Lk. St. Mary's	80512	C	5202	12,844
Grant	80513	T	67	166
Loramie	80515	C	345	851
Paint Creek	80517	T	471	1,162
Rocky Fork	80519	T	806	1,991
Rush Run	80520	T	21	52
Stonelick	80522	T	63	155
Tawawa	80523	T	4	9

APENDIX B: EQUIPMENT CHECKLIST

Sampling Equipment

Electrofishing

- ❑ Electrofishing boat and trailer
- ❑ Dipnets (2)

Gillnetting

- ❑ Workboat and trailer
- ❑ Standard gillnets (6)
- ❑ Weights (2 per gillnet)
- ❑ Floats (2 or more per gillnet)

Trapnetting

- ❑ Workboat and trailer
- ❑ Standard trapnets (6)
- ❑ Weights (2 per trapnet)
- ❑ Floats (2 per trapnet)

Boat Preparation

- ❑ Boat battery charged
- ❑ Boat tied down properly
- ❑ Oil reservoir full
- ❑ Trailer bearings greased
- ❑ Trailer lights working
- ❑ Trailer tires properly inflated

General Data Collection

- ❑ Field data forms (all weather paper only)
- ❑ GPS unit
- ❑ Lake maps
- ❑ Pencils

Boat Equipment

- ❑ Anchor
- ❑ First aid kit
- ❑ Paddles
- ❑ Q-Beam
- ❑ Rope
- ❑ Stern light
- ❑ Tank light (tractor light)
- ❑ Throwable floatation cushion
- ❑ Tool box

Personal Equipment

- ❑ Personal flotation device (1 each)
- ❑ Personal raingear
- ❑ Watch

Fish Processing Gear

- ❑ Cooler(s) with ice
- ❑ Electric balance, tray, and batteries
- ❑ Knife for scale removal
- ❑ Labels
- ❑ Livewell dipnet
- ❑ Measuring board
- ❑ Plastic bags
- ❑ Scale envelopes
- ❑ Spring scale
- ❑ Stock tanks or tubs for livewell
- ❑ Tally devise
- ❑ Zip ties

Water Quality Sampling

- ❑ Secchi Disk
- ❑ Tape measure
- ❑ YSI meter

Miscellaneous

- ❑ Extra batteries in water-proof container
- ❑ Flashlights and/or headlamps
- ❑ Net picks (4)
- ❑ Oval tubs (for transporting dead fish)
- ❑ Rope
- ❑ Twine
- ❑ Whistle
- ❑ Wire cutters (for fish removal from gillnets)

APPENDIX C: SAMPLING FACT SHEET

Overview

The Division of Wildlife (DOW) is responsible for managing fish populations for Ohio's citizens. Management of fisheries requires population assessment and monitoring to determine the abundance, species composition, and health of fish communities. The Inland Management System allows the Fish Section to address statewide fisheries issues with current and historical fisheries information.

Why do we sample fish?

Fisheries biologists collect and analyze large amounts of information to manage fish populations. Important types of data include:

- Abundance *(i.e. how many fish are in the lake?)*
- Lengths, weights, and condition *(i.e. how healthy are the fish?)*
- Diets, food abundance *(i.e. what are fish eating and is the food supply sufficient?)*
- Age- and size-ranges *(i.e. does the population have both young and old fish?)*
- Growth rates *(i.e. how quickly are fish growing and are growth rates suitable to produce large fish?)*
- Survival rates *(i.e. how many fish live from year to year?)*
- Recruitment *(i.e. how many new fish are produced each year?)*

Most important, though, is how all of the above *change through time*. Fish populations can show large year-to-year changes in these factors, which can be collectively termed as *population dynamics*. Changing population dynamics of fish are why the DOW has to constantly monitor Ohio's lakes and streams.

How do we sample fish?

Below are the most common methods for collecting fish for analysis:

Method	Target Species	Characteristics
Electrofisher - *Creates an electric field to stun and collect fish.*	Black bass, sunfish, and juvenile hybrid-striped bass, white bass, saugeye, and walleye	▪ Most fish can be released alive ▪ Effective for fish in shallow habitats
Gillnet - *Thin mesh net hung vertically in the water to catch fish as they swim through it.*	Hybrid-striped bass, white bass, saugeye, walleye, catfish, and paddlefish	▪ Few fish can be released alive ▪ Effective at a variety of depths ▪ Effective for fish in open water
Trapnet - *Large net with sections that funnel fish into a mesh box.*	Walleye, saugeye, crappie, and muskellunge	▪ Most fish can be released alive ▪ Effective at moderate depths ▪ Effective on structure-oriented fish

What are the effects of sampling fish?

The public sometimes questions if DOW sampling negatively impacts fish populations. This is not the case. In fact, most fish die of natural causes or are taken by anglers. To illustrate this point, consider the following example:

> *A certain reservoir has a walleye population numbering 100,000. Typically, in any given year, about 10 – 30% (10,000 – 30,000) walleye will die of natural causes. In addition, usually between 5 – 25% (5,000 – 25,000) will be harvested by anglers. To manage this population, DOW might remove 100 – 200 walleye for examination. That is only 0.1 – 0.2% percent of the beginning population…not a bad bargain considering that the information these fish provide allows management of factors that remove 15 – 55% of the total walleye population.*

To conclude, DOW fish sampling activities have a negligible impact on fish populations:

- Only a very small fraction of the fish in a given lake is ever sampled.
- Sampling times and procedures are designed to minimize fish mortality. For example, most sampling is done in spring and fall when water temperatures are low to reduce stress on fish.
- While some fish are sacrificed for certain analyses, these are an extremely low proportion of the total population.

APPENDIX D: FIELD FORMS

All IMS forms are available as MS Word documents. This includes the field forms for entering data, the backs of the field forms where variables are described, an age and growth form, and a sample labels form.

The following IMS forms are used for recording data:

- Form 1. Trip Meta-Data
- Form 2. Sample Data
- Form 3. Catch Data
- Form 4. Water Quality Data
- Form 5. Fish Collection Tally Sheet
- Form 6. Age and Growth Reporting (lab/office form)
- Form 8. Group Catch Data

The following IMS form is for printing out sample labels:

- Form 7. Sample Labels

Examples of using field forms are included in the following pages.

Form 1: Trip Meta-Data
ODNR, Division of Wildlife
Inland Management System

Form Current: 9/1/2003

Project* FIDR14	**Date*** 5/1/2003	**Location*** 80104, Delaware Reservoir

Crew IFRE _____ **Target*** Black Bass_____

IMS Sampling (circle one): **YES** **NO**

Purpose: Standard black bass population assessment_____

Comments: Water level 1.5 m below summer pool, water color very turbid due to recent rain. Crew included Ken Cunningham, Stacy Xenakis, and Chris Goings._____

Trip Meta-Data Variables

Project – ODNR, DOW project code (ex. FIDR07)

Date – date, in month, day, year (mm/dd/yyyy)

Location – name of the waterbody sampled, or code number (ex. Alum Creek Lake, or 80101)

Crew - TARS code, or descriptive code not exceeding six characters as determined by investigator (ex. WDST1)

Target – species name, fish group name, or code for either that is targeted by the sampling effort (ex. largemouth bass or 77006; black bass general or 77995)

IMS Sampling- Is this an IMS survey or another type of data collection (YES or NO)

Purpose – primary reason for sampling (ex. evaluate 14-inch length limit for largemouth bass)

Comments – any point of interest related to the sampling event (ex. water elevation at 952 feet and falling; boat broke down halfway through the evening; sampling crew included Tom Hall, Marty Lundquist, and Elmer Heyob; storm passed through before sampling began)

***required by the database**

Form 2: Sample Data
ODNR, Division of Wildlife
Inland Management System

Form Current: 9/1/2003 **Page __1__ of __1___**

Project* FIDR14	**Date*** 5/1/2003	**Location*** 80104, Delaware Reservoir

Etype* ___T___ **GearSpec*** 17' reservoir electrofishing boat _____

Record Temperature, Secchi, and Conductivity data for first sample of day in the boxes below:

SampNo _1_ **SurfTemp** _15_**C** **Secchi** _ 83 _**cm** **SurfCond** _ 320_**mSiem**

Samp No	Samp Site	UTM Zone	UTM East	UTM North	STime	Effort
1	A11	17	325772	4475182	21:00	15
2	A14	17	326184	4474411	21:22	15
3	B10	17	326070	4437710	21:50	15
4	B12	17	326149	4473236	22:10	15

Comments: _____

Form 3: Catch Data
ODNR, Division of Wildlife
Inland Management System

Form Current: 9/1/2003 **Page __1__ of __1__**

Project* FIDR14	**Date*** 5/1/2003	**Location*** 80104, Delaware Reservoir

Samp No*	Fish ID	Species	Length (mm)	Weight (g)	Samp No*	Fish ID	Species	Length (mm)	Weight (g)
1	1	77006	235	224					
1	2	77006	321	420					
1	3	77006	452	520					
1	4	77006	144	88					
2	5	77006	234	221					
2	6	77006	180	158					
3		No Fish							
4	7	77006	180	158					
4	8	77006	180	158					

**required by the database*

Form 4: Water Quality Data
ODNR, Division of Wildlife
Inland Management System

Form Current: 9/1/2003 **Page** __1__ **of** __1__

Project* FIDR14	**Date*** 5/1/2003	**Location*** 80104, Delaware Reservoir

Samp No* __1__ **Samp Site** __W01__ **UTM Zone** _17_ **UTM E** ___3422422_____ **UTM N** ___4469555_____

Stime* _21:00_ **Etype*** _N_ **Effort** __N__ **GearSpec*** _YSI 95_

SurfTemp _15__ **Secchi** __83__ **SurfCond** _320_ **GearID** _____

ReadDepth	Temp	DO
0	15.0	9.25
1	14.8	9.01
2	14.4	9.00
3	14.1	8.77
4	14.0	8.21

ReadDepth	Temp	DO
5	13.8	8.14
6	13.2	8.02
7	12.6	7.25

Samp No* _____ **Samp Site** _____ **UTMS Zone** _____ **UTM E** _____ **UTM N** _____

Stime* _____ **Etype*** _____ **Effort** _____ **GearSpec*** _____

SurfTemp _____ **Secchi** _____ **SurfCond** _____ **GearID** _____

ReadDepth	Temp	DO

ReadDepth	Temp	DO

**required by the database*

Form 5: Fish Collection Tally Sheet
ODNR, Division of Wildlife
Inland Management System

Form Current: 9/1/2003 **Page __1__ of __1__**

Project* FIDR14	**Date*** 5/1/2003	**Location*** 80104, Delaware Reservoir

Crew IFRE _____ **Target*** Black Bass _____

CM Class	Weight	Age/Growth
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		

CM Class	Weight	Age/Growth
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		
46		
47		
48		
49		
50		
51		
52		
53		
54		
55		
56		
57		
58		
59		
60		
61		
62		
63		
64		
65		
66		
67		
68		

Comments: _____

Form 6: Mean Length At Age Data
ODNR, Division of Wildlife
Inland Management System

Form Current: 9/1/2003 **Page _ 1_ of _1_**

Project* FIDR14	Date* 5/1/2003	Location* 80104, Delaware Reservoir

Struc _S_ ***Reader*** _ Xenakis ___ ***Mag*** _____ ***Species*** Largemouth Bass

FishID	*Age*	*FishID*	*Age*	*FishID*	*Age*
1	2				
2	4				
3	6				
4	0				

Comments: _____

Form 8: Group Catch Data
ODNR, Division of Wildlife
Inland Management System

Form Current: 4/1/2004 **Page _1_ of _1_**

Project* FIDR14	**Date*** 5/26/2004	**Location*** Delaware Reservoir (80104)

*SampNo**	*GroupID*	*Species*	*Centimeter class*	*Total number of fish*	*Total weight (g) of fish*
4	1	77009		72	
4	1	77011		11	
4	1	77008		4	
6	2	77009		44	
6	2	77008		12	

**required by the database*

Form 7: Sample Labels for Labeling Sample Bags, Tubs and Coolers

Project: _____ **Date:** _____ **Location:** _____ **SampleNo:** _____ **Comments:** _____ _____ _____	**Project:** _____ **Date:** _____ **Location:** _____ **SampleNo:** _____ **Comments:** _____ _____ _____
Project: _____ **Date:** _____ **Location:** _____ **SampleNo:** _____ **Comments:** _____ _____ _____	**Project:** _____ **Date:** _____ **Location:** _____ **SampleNo:** _____ **Comments:** _____ _____ _____
Project: _____ **Date:** _____ **Location:** _____ **SampleNo:** _____ **Comments:** _____ _____ _____	**Project:** _____ **Date:** _____ **Location:** _____ **SampleNo:** _____ **Comments:** _____ _____ _____

Section 8.3.5

Ohio Fisheries Information System

O hio
F isheries
I nformation
System

Version 1.1

A database user manual developed by

Andrew M. Burt and Richard D. Zweifel
Inland Fisheries Research Unit

August 10, 2004

Ohio Department of Natural Resources
Division of Wildlife

Federal Aid in Sport Fish Restoration Project FIDR07

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Preface

The Ohio Fisheries Information Systems (OFIS) was developed to consolidate fisheries monitoring, management, and research data from an array of sources into one location. Standardized reporting of data is critical for timely and effective management and research. OFIS was developed to house data collected by the Ohio Department of Natural Resources, Division of Wildlife (ODNR, DOW) and its partners in fisheries management. The first version of this database was released on March 1, 2001 and the current version (OFIS 1.1) was released on June 28, 2004. Evolution of the database and OFIS, the central repository for DOW fisheries data, will continue indefinitely as needs evolve and expand.

The database described in this manual was developed, tested, and implemented through a self-directed work team composed of one representative from each ODNR, DOW District, the Inland Fisheries Research Unit (IFRE), and The Ohio State University, Aquatic Ecology Laboratory (AEL). The project has received full support of the DOW Fisheries Administration and is the sanctioned repository for inland fisheries data collected by the agency. Database support is provided by a Local OFIS Manager (LOM) in each DOW district and the AEL, and coordinated through a program manager (PM) at the IFRE.

This manual describes the detailed use of the database and provides related information such as reference tables for data codes and descriptions of variables, examples of reporting fish marking data in the field and database, and sample field forms for recording data. Please review the manual and view it as a desk reference for the database. Suggestions for improvement of the manual and the database are welcome.

Acknowledgements

We thank Gary Isbell, Randy Miller, Ray Petering, Jack Henry, Steve Graham, Larry Goedde, Phil Hillman, Dave Bright, Doug Maloney, Joe Mion, Jim Stafford, Mike Costello, and Roy Stein for their support of the project. Special thanks to Jeff Rowley for vastly improving OFIS by upgrading the original Access database to a Sequel Server version. We also gratefully acknowledge the many DOW fisheries staff and AEL students who contributed to development and testing.

Citation of this manual should be as follows:

Burt, A. W. and R. D. Zweifel. 2004. Ohio Fisheries Information System: User manual, version 1.1. Ohio Department of Natural Resources, Division of Wildlife, Columbus, OH. Project FIDR07.

User Authorization

Access to OFIS is authorized at four different levels to facilitate technical support, database stability, and security. Personnel included in each level and their access to the database are specified below:

- **Level 1: Database Administrator** (Jeff Rowley) authorization provides complete access to the database for use and modification. This level is limited to the Database Administrator because the database structure has become highly technical with the current SQL version of OFIS.

- **Level 2: Program Manager** (Scott Hale / Rich Zweifel) authorization provides access to enter data, edit records at all levels, and use the maintenance tables for upgrading codes lists.

- **Level 3: Local OFIS Manager** authorization provides access to enter data and edit records up to and including the sample table level.

District 1:	Marty Lundquist
District 2:	Ed Lewis
District 3:	Andy Burt
District 4:	Tim Parrett
District 5:	Glenn Trueb
OSU:	vacant

- **Level 4: OFIS Associate** (all other users) authorization provides access to enter and edit data records at the fish, angler, water, and plankton levels.

User authorization levels 1-4 for OFIS.

OFIS Users (Authorization Level)	Access			
	Edit records Data entry Data browsing Data export Query module	Edit sample table data	Maintenance menus Full edition Edit at all levels	Complete access
(1) Database Administrator	**yes**	**yes**	**yes**	**yes**
(2) OFIS Program Managers	**yes**	**yes**	**yes**	**no**
(3) Local OFIS Manager	**yes**	**yes**	**no**	**no**
(4) OFIS Associate	**yes**	**no**	**no**	**no**

User Agreement

Database and data security depends upon good communication and a complete understanding of protocols for database use and data sharing. All OFIS users will be asked to read and accept an agreement pertaining to database modification and data sharing. This agreement provides a reminder to OFIS users to be considerate of fellow OFIS users for everyone's mutual benefit. The agreement is specifically intended to:

- Ensure that new database users are familiar with OFIS procedures and protocols.
- Clarify the means of database modification and data sharing.
- Establish an agreement among OFIS users to follow protocols and procedures for database modification and data sharing.
- Remind OFIS users to be considerate of the data contributions from all project leaders. Each of us should make good faith efforts to communicate with the originators of data when information will be used for summary, analysis, or presentation.

OFIS USER AGREEMENT
Ohio Fisheries Information System
Current: July1, 2004

The following overview is provided as a reminder to OFIS users that use of protocols and procedures are important to security of our database and data. Please review these protocols and procedures before using the database.

Database Modification

- New data codes, variables, and suites of variables will be added to the database only through protocols established in the OFIS manual.
- Modification of the database is limited to Level 1 authorization (Database Administrator).

Data Sharing

- Complete downloads of any portion of OFIS to non-authorized parties are strictly prohibited. A complete download is defined as transfer of ANY data provided in the format of the OFIS database structure (i.e. a complete table or groups of tables).
- Data sharing procedures in the OFIS user manual should be reviewed and followed upon receiving a request for data from parties not authorized to use OFIS.
- Distribution of OFIS data to parties not authorized to use OFIS is limited to Level 2 authorization.

OFIS Data Use

- OFIS users who intend to formally use data for presentation or publication that were not collected under their direction are **strongly encouraged** to review any intended use of those data with the project leader who directed the data collection prior to such use.

Introduction

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Introduction

Purpose of this database

The **O**hio **F**isheries **I**nformation **S**ystem inland fisheries database (OFIS) was created to standardize data entry, store data, and provide a conduit for the dissemination of information among users in real-time. This database was designed to accept data pertaining to a wide array of sample types pertinent to understanding the structure, function, and use of Ohio's inland waters. Data pertaining to fish, water, zooplankton and icthyoplankton collections as well as angler surveys can all be entered and stored within and retrieved from this database.

What to expect from this manual

The following pages provide step-by-step instructions for using the **O**hio **F**isheries **I**nformation **S**ystem inland fisheries database.

In this manual you will find descriptions of all fields, data entry standards, and help sections. There are also sections on protocols, data administration, and database security. Eventually, data reporting and summary components will be developed in Microsoft Access as a companion to the current database.

This manual is arranged with one main concept per page with a figure or illustration on the facing page. Under the text on each page there is room to write down helpful notes. The notes you write may clarify problems or questions that may occur in the future.

Introduction

System Requirements

The OFIS database was created using Sequel (SQL) server. Database users must have Microsoft Access XP© and network access (M-drive).

In our computer dependant society, new or upgraded software is released every couple of years. The OFIS database will need to be upgraded to keep pace with changing technology. Local OFIS managers will assist with these upgrades.

Minimum System Requirements

- Pentium Processor
- Access to the M-drive
- RAM
  Windows XP 256 (512 is preferred)
  Access XP installed
- 20 GB hard drive

Introduction

General Database Structure and Terms

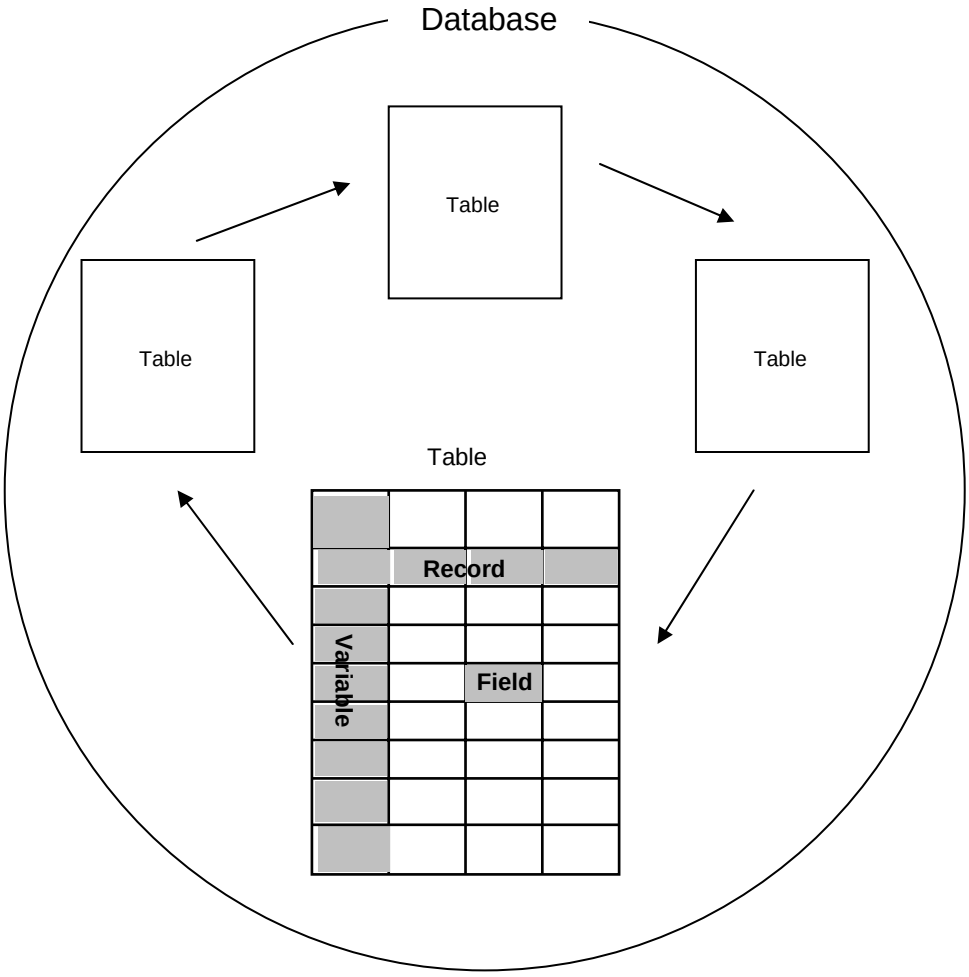
Database terminology can be confusing and overwhelming. However, it is essential to understand some of the basic terminology and how it relates to the collection, reporting, and storage of field data. By definition, a **database** is a collection of data structured and organized in a disciplined fashion so that quick access to the information of interest is possible. Databases can be small and simple to understand, like a personal address book, or very large and complex. Data within a database are housed within many **tables**. Each table is a collection of data in which each item is arranged in relation to the other (i.e. a spreadsheet of data). Each column of data in the database is called a **field**. A field is the specific location of data within a record and is the database term for a **variable** measured within the project such as date, location, species, etc. Lastly, a **record** is a group of related data items treated as one unit of information. A record can be pictured as a row of data in a spreadsheet.

In its simplest form, a **database is a series of tables that have common fields linking one table to another**. It is the common associations between tables, known as relations, that allow databases to perform advanced queries (search and retrieval of data).

Each of the tables within a database is linked to a related table(s). Linking of tables and their data eliminates data redundancy and provides a finer data resolution. For instance, one table may house sample details such as equipment used, time of sample, etc. A related table will contain fish data such as species, age, and tagging information. A third table may refine the sample data even further by containing fish diets.

OFIS users will not enter the data directly into the tables. Instead, a **form** is used for data entry. Forms simplify data entry by organizing and grouping data. Forms can be designed to look exactly like the field data sheets or customized to eliminate unused data fields.

- **Database –** a collection of data structured and organized in a disciplined fashion so that quick access to information of interest is possible.
- **Table –** a collection of data in which each item is arranged in relation to the other (ex. a spreadsheet of data).
- **Record –** a group of related data items treated as one unit of information.
- **Field –** the specific location of data within a record. It is the database term for a variable measured within a project.
- **Variable –** a) a property with respect to which individuals within a sample differ in some discernible way. b) The name given to a symbol that represents or substitutes for a number, letter, or combination of letters.
- **Form –** a way of viewing or entering data in a table one record at a time.



Introduction

Goal of the Ohio Fisheries Information System (OFIS)

The goal of the Ohio Fisheries Information System (OFIS) is to:

1. Facilitate data storage, security, and access
2. Encourage inter- and intra-agency data analysis and sharing
3. Increase the speed of information transfer

OFIS not only allows for centralized storage of all fisheries data, but it also allows convenient reporting and interpretation of data.

Access to OFIS

Personnel at the five Division of Wildlife District offices, as well as the Inland Fisheries Research Unit (IFRE), DOW Fisheries Administration, The Ohio State University Aquatic Ecology Lab (AEL), and Miami University currently use OFIS. Each District has a copy of the database installed on their computers. An OFIS representative at each District office can answer questions concerning the database, or refer questions to the Database Administrator at IFRE. Each District will always have access to their District's data through one or more computers in their office. In addition, each District will receive periodic updates of OFIS from the program manager at IFRE.

Introduction

What can the database do for me?

OFIS will benefit all those associated with management and research of Ohio's inland fisheries.

Individuals that collect field data will find the field data sheets organized and simple to use. Data entry personnel will appreciate the point and click navigation of the database and the similarity between field data sheets and data entry forms. Personnel who analyze data will appreciate the analysis programs that are provided to accompany OFIS data. Fisheries managers will find that quick access to both historical and current fisheries data is invaluable in the management of Ohio's fisheries, in addressing the public, and in developing operation plans.

OFIS does not limit or alter fieldwork, rather, field data collections shape the database. The OFIS database was designed to incorporate present sampling techniques, such as Inland Management System (IMS) data, but it is flexible enough to adapt as needs change.

Introduction

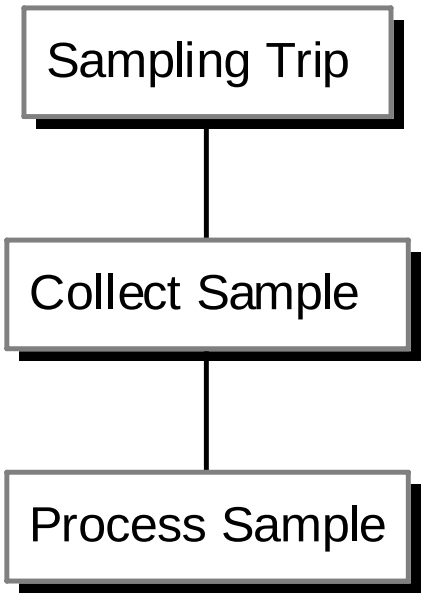
Structure of OFIS

There is a logical hierarchy to the flow of data through the database that follows the process of data collection. The forms in OFIS are arranged to parallel data collection in a project. The most critical data to be entered in OFIS are the trip meta data contained within the *Trip Entry Form*. Meta data consist of the most general data concerning a trip. Information entered in the *Trip Entry Form* includes project number, the water body being sampled, and date, along with other items such as the purpose of the trip and the field crew.

Once a crew arrives at a study site, the next logical step is for them to collect a sample. The corresponding sampling form in the database is the *Sample Entry Form*. This form contains information such as what gear was used, effort expended, and location of the sample. After a sample is collected, processing information needs to be recorded. For example, the initial fish processing information, such as species and individual lengths and weights are entered into the *Individual Fish Sample Entry Form.* Data pertaining to groups of fish, such as count data or batch-marking, can be entered into the *Group Fish Sample Entry Form*. If further processing of samples, such as back-calculation of growth or diet analysis is required, other forms in the database are available. The form for entering annuli measurements is called *Fish Annuli Measurements Form*. There are several data entry forms in the OFIS database, but they can all be considered variations of either sample collection or sample processing forms.

Because the database structure follows a hierarchy, it is necessary to start at the beginning with the trip meta data form, then work through the sample entry and sample processing forms. **Data entry into the Sample forms cannot precede entry of Trip Meta Data into the *Trip Entry Form***. The program will either not allow the person to proceed to enter sample data in the field, or it will not allow the person to save the data.

Flow diagram of data collection and OFIS data entry



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Getting Started

Opening OFIS

The file name for the OFIS database is ***OFIS***. The OFIS file will be located in a folder titled "OFIS" on the computer's hard drive. **See your District Representative for assistance if it cannot be found.**

There are three ways to open OFIS.

1. Using the desktop shortcut
2. Using the Start Menu
3. Using "My Computer"

1. Using the desktop shortcut:
   - Double click on the OFIS icon

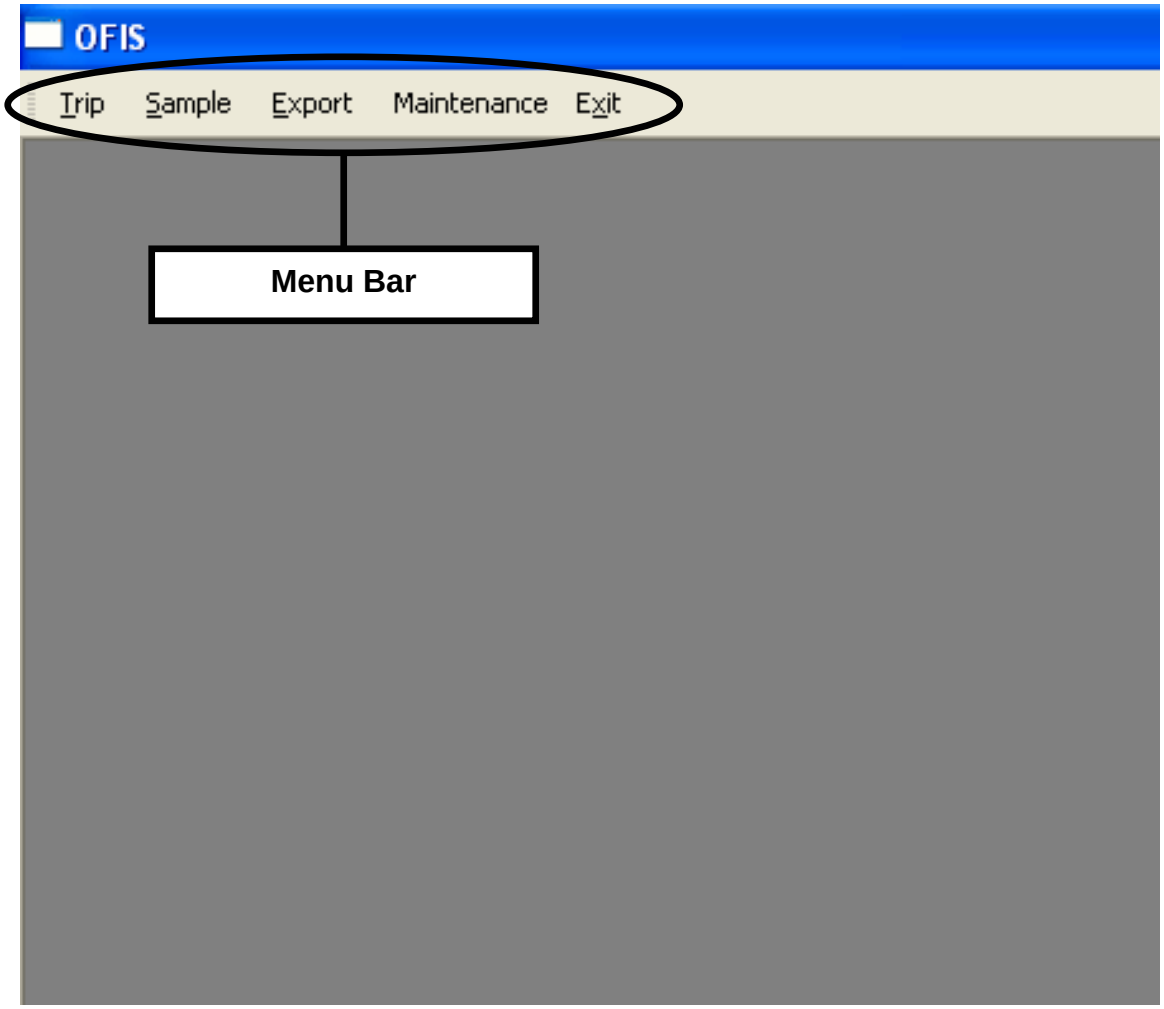
2. Using the Start Menu:
   - Click start in the lower left corner of the display
   - Select "All Programs"
   - Highlight the OFIS option
   - Click on the OFIS icon (green crankbait)

3. Using "My Computer"
   - Click on "My Computer" from the start menu
   - Double click "Local Disk (C:)"
   - Double click the "Program Files" folder
   - Double click the OFIS folder
   - Double click the OFIS Access icon

Main Menu

Database Organization

Previous versions of OFIS were organized via a switchboard containing buttons for navigation through the various forms. Navigation through the current version of OFIS is accomplished through selections on the menu bar like many other word processing and spread sheet applications. However, instead of the standard File, Edit, etc… options, the menu bar in OFIS has been customized for navigation through the database. Options on the menu bar in OFIS are *Trip, Sample, Export, Maintenance,* and *Exit*. Each of these options will be discussed in detail in the following sections.



Main Menu

Trip Option

The first option on the menu bar is *Trip*. All data entry will begin with selection of this option.

Within the *Trip* option you have two choices:

1. *Add – New Trip Data*
2. *Browse – Trip Information*.

The *Add – New Trip Data* option is where data entry begins for a new sampling trip. Selection of this option will bring up the *Trip Entry Form*. The *Trip Entry Form* creates a new trip and records essential meta data from a sampling event such as Project Number, Date, Location, and Target Species.

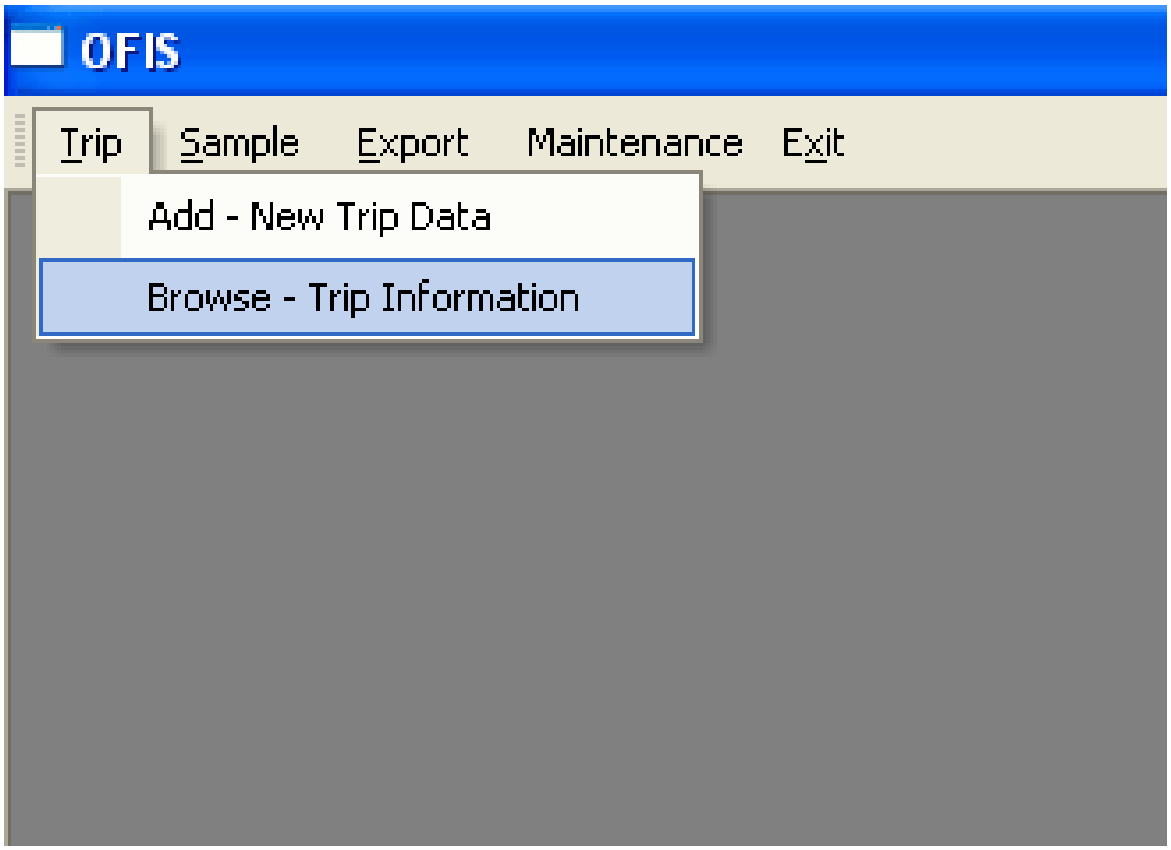
The Browse – Trip Information selection is one of two options a user can select to navigate to data entry forms for trips that have already been created. This option contains the forms for entry of sample and catch data. Additional trip meta data such as crew, designating a trip as an IMS survey, and additional comments can be entered into the trip entry form using this option. This option is the only means by which a user can access the form for entering fish annuli measurements for back-calculating growth. For more information, please refer to the Data Entry section in this manual.

To open a sample file using the Trip option:

1. From the main menu click on Trip and select Browse Trip Information

2. Enter or select the appropriate Trip Sample Type (Fish, Water, Plankton), Project Number, Date and Location.

Notes:


OFIS
Trip
Sample
Export
Maintenance
Exit
Add - New Trip Data
Browse - Trip Information

Main Menu

Sample Option

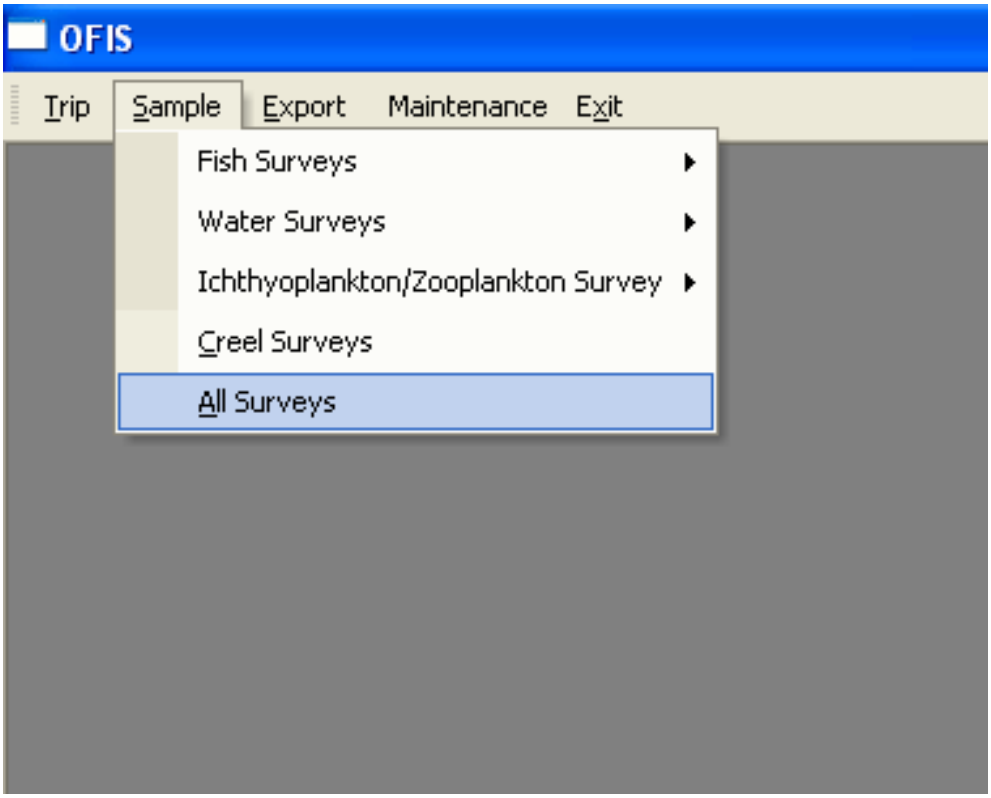
The Sample option is another method of navigating to an appropriate sample for data entry and editing**.** This option allows the user to navigate to a desired sample if the trip meta data has already been completed. This option will take a user directly to the sample, bypassing the Trip Entry Form. If additional meta data or fish annuli measurements need to be entered use the Trip option from the menu bar and select Browse – Trip Information.

To open a sample file using the Sample option:

1. From the main menu select the Sample option

2. Using the mouse move the to the desired survey type (Fish survey – Individual Fish)

3. Enter or click on the appropriate Project Number, Date, and Location



Main Menu

Export Option

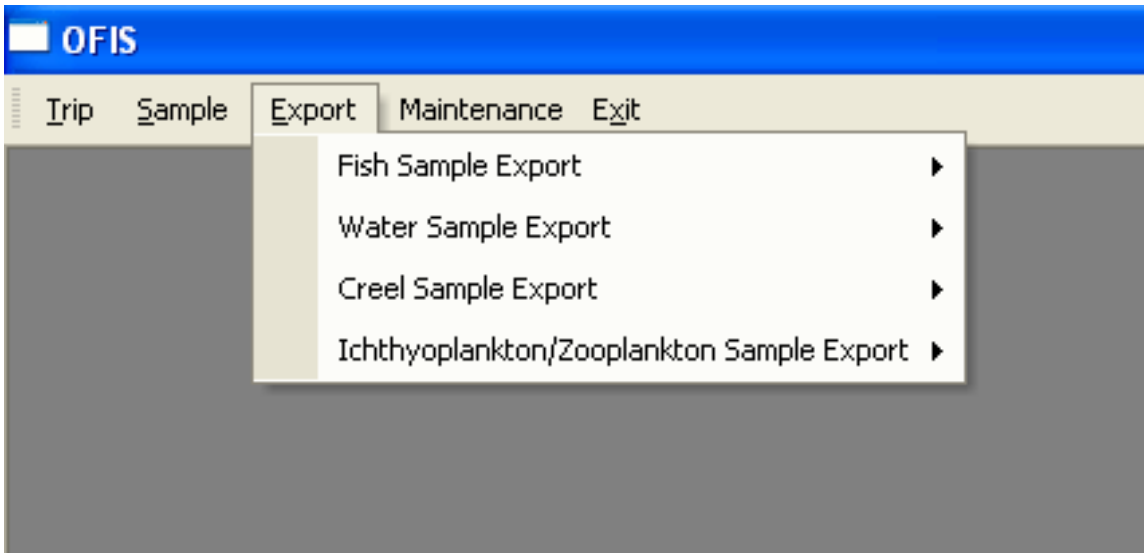
The export option allows a user to export data from OFIS as either a fixed-width (space-delimited) text file or as a spreadsheet. Since data analysis programs are not available within OFIS itself, exporting data for analysis in another software application (SAS) is necessary. The export option is set up much like the Sample option discussed in the previous section.

To export a file:

1. Select Export from the main menu and click on the desired survey type (i.e. Fish Survey; Individual Fish)

2. Type or select the appropriate Project Number, Date and Location

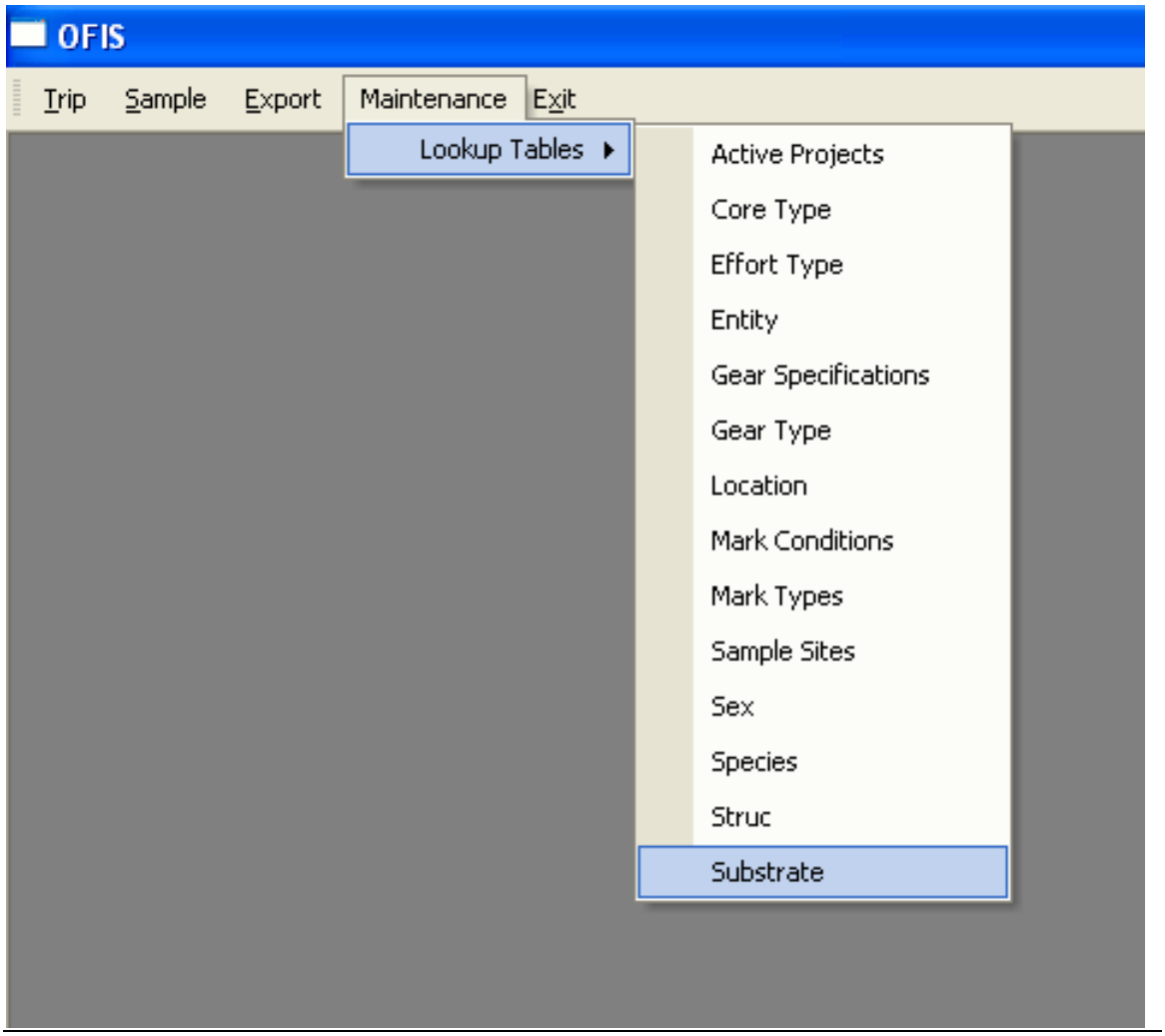
3. Select the desired export format from the Export Preference Box in the upper right hand corner: fixed width text or Excel spreadsheet.



Main Menu

Maintenance Option

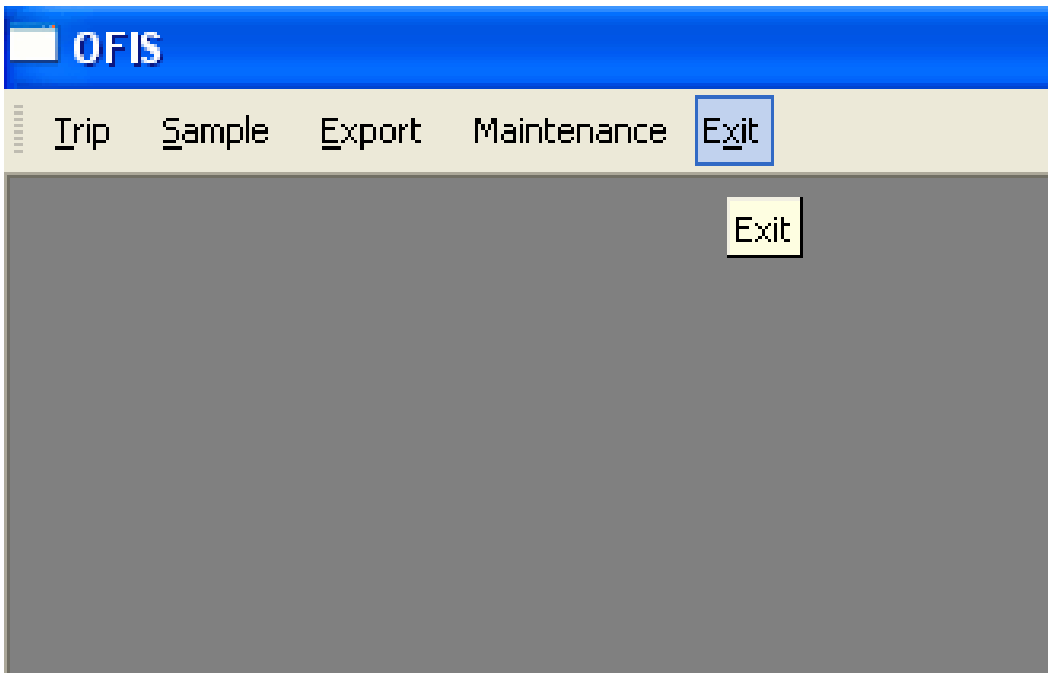
The maintenance option contains the codes tables that correspond to the form variables used in OFIS. These code tables can only be accessed and edited by the Program Manager. Other database users will not see this menu item. **Appendices 1 and 2** contain a complete list of all code tables.



Main Menu

Exit Option

The Exit option closes the OFIS database. The database can either be closed using the Exit option on the menu bar or by clicking the **x** in the upper right hand corner of the screen.

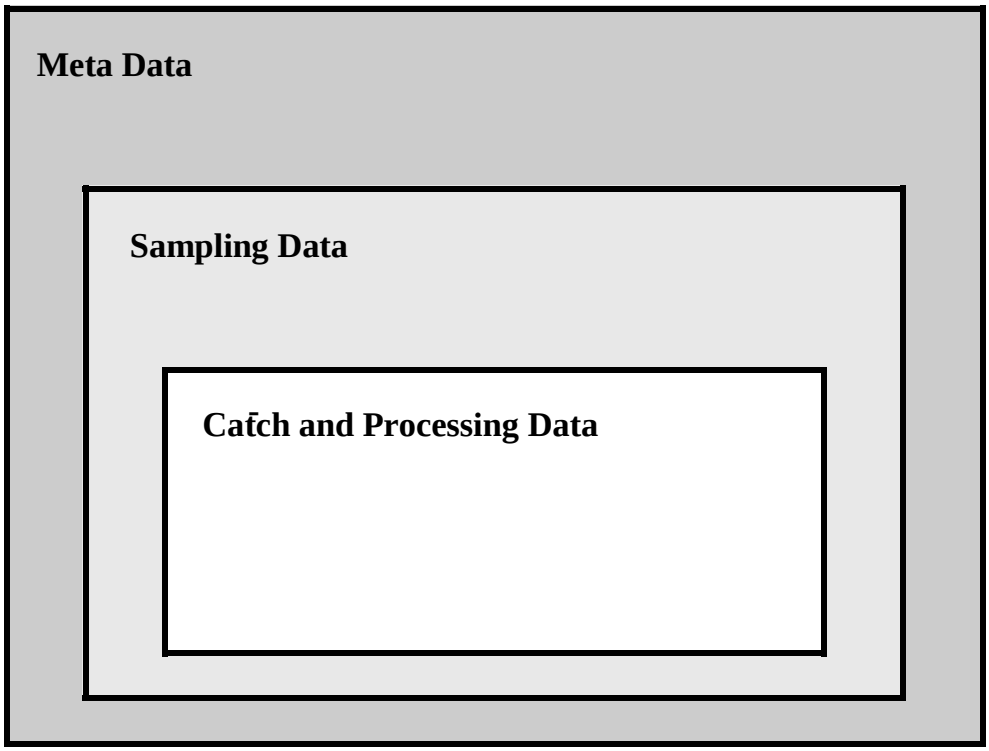


Data Entry Basics

The OFIS database is designed to meet a wide array of data entry needs. Some variables are common to all investigators, such as project number, location, and date, and are entered by all OFIS users, whereas other data are not always collected and are not universally needed. **The presence of a field on a data entry form does not necessarily mean that the field must be populated.** Therefore, some fields are “required fields” and others are “optional fields.”

OFIS forms are arranged with a nested hierarchy. The main form contains trip meta data such as project number, date, and location, which are required for entry of all data. Contained within the Trip form is a sample form for entering sampling details, such as sample number, gear and effort. Nested within the sample form are the processing forms for entering catch or measurements, such as lengths and weights, temperature and DO profiles, and angler interview responses. Processing forms are specific to the type of sampling conducted. Nesting one form with another reduces the amount of redundant data entry, but requires users to pay attention to database hierarchies.

Illustration of the hierarchy used for data entry in OFIS.



Data Entry Basics

Layout

Database forms help users navigate through the database, simplify data entry, and reduce errors. However, it takes an introduction to the layout of the forms to understand the different aspects of them.

At the bottom of the display on the left side of most forms, vertical bars containing an arrow identify each record. These bars are called *Record Selectors*. *Each* form and its nested forms will also have its own navigation buttons.

IT IS CRITICAL TO KNOW WHAT INFORMATION IS CONTAINED WITHIN EACH FORM TO ENSURE THAT SAMPLE DATA ARE ENTERED CORRECTLY.

Notes:

Data Entry Basics

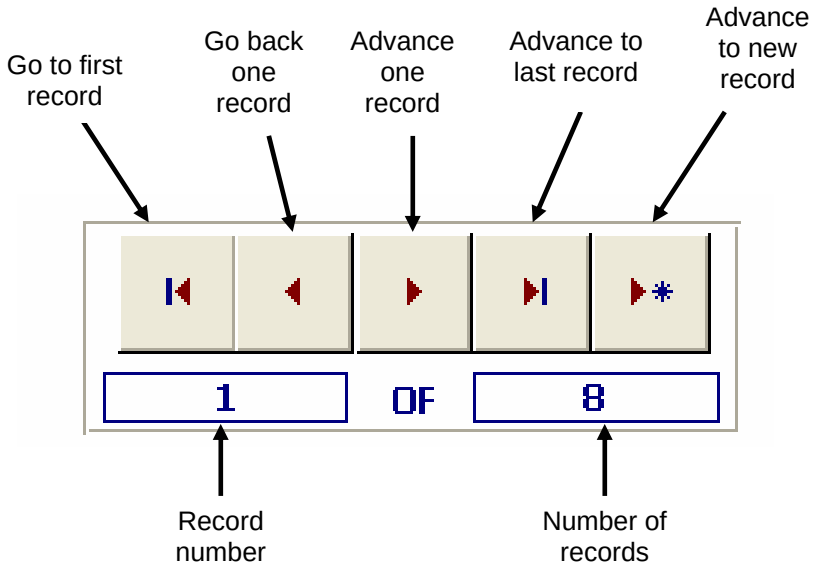
Navigation Buttons and Scroll Bars

Navigation buttons allow for advancing to the next, previous, or new set of records in a form or subform. Depending on the form, one or more sets of navigation buttons may be present. It is important to know which navigation buttons are associated with the different subforms of data within each form to locate specific records and to ensure data are entered properly. The Record Selector (the bar on the left side of each form, subform, and sub-subform) will indicate the various subforms and which navigation buttons are required for their navigation.

Representation of Navigation Buttons used in this manual:

- ▸* advance to a new record
- ▸ advance to the next record
- ▸| advance to the last record
- ◂ return to previous record
- |◂ return to the first record

Navigation buttons on each form and subform.



Data Entry Basics

Data Entry Errors

Anyone that enters data in OFIS will at one time or another enter data incorrectly or encounter a incorrect entry. Some errors will be obvious and the database will notify you of your error by beeping and giving you an error message. If you receive an error message, you cannot continue with data entry or even exit the form until the error is corrected.

In most cases, errors occur because a required field on the form was left blank. Users should clear the error message and correct the data.

In some instances, users will not know where the error occurred and cannot fix the problem. This can be a very frustrating and annoying problem. You do not know what is causing the error so it cannot be fixed, yet you cannot exit the form or a field because the database keeps beeping and giving more error messages.

IF YOU ENCOUNTER AN ERROR AND CANNOT CORRECT IT, USE THE **ESC** KEY ON THE KEYBOARD UNTIL YOU CAN PROCEED.

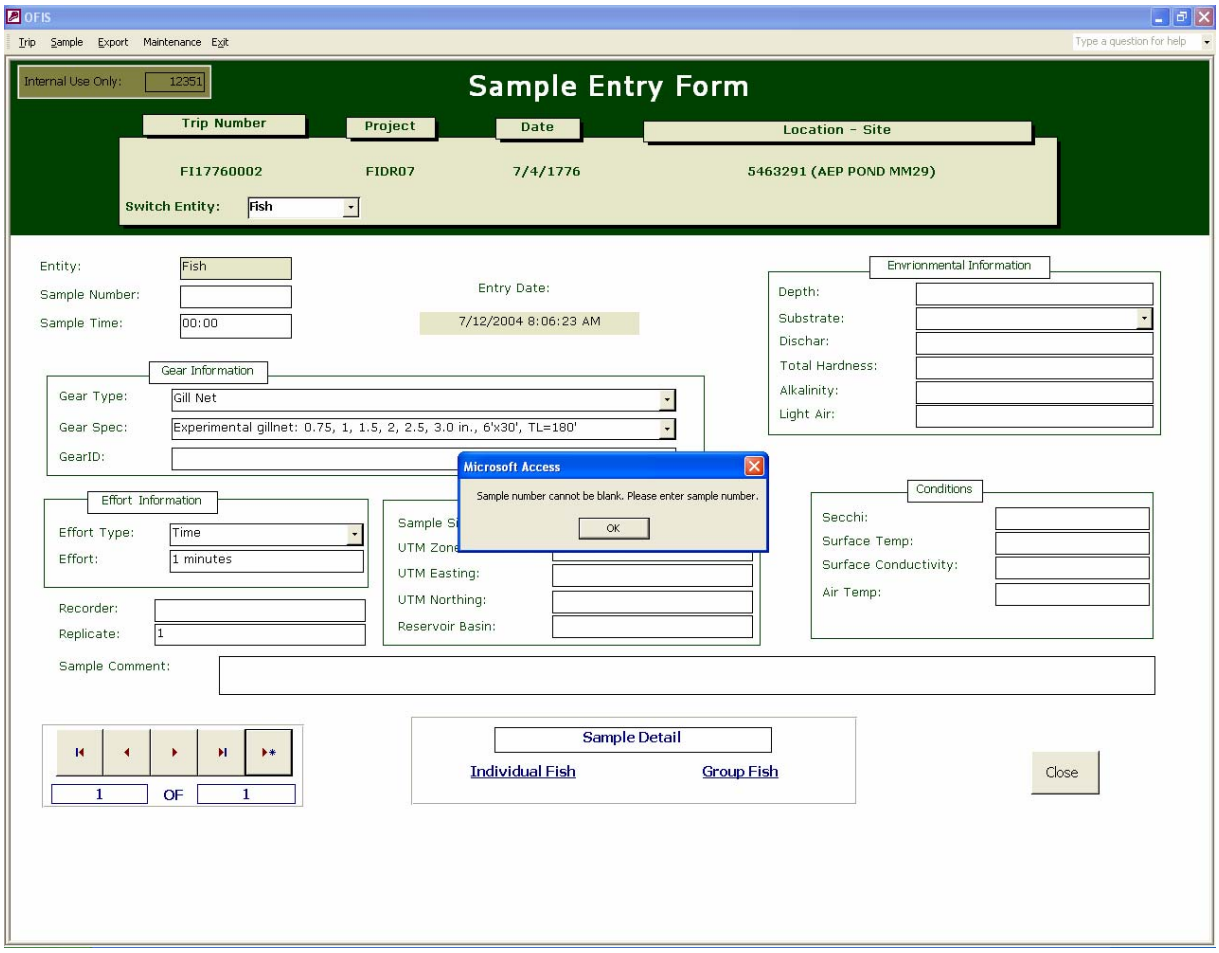
The escape key “undoes” data entry in a record, which then allows you to go back and enter the data correctly.

Likewise, if you catch yourself entering data in the wrong field or record, you can use the ESC key to undo the typing. However, once the record is advanced, it is saved, and the ESC key cannot reset it.

In the lower right corner of several data entry forms there is a button that will delete the current record. This function can be useful if, for example, fish lengths and weights are entered under the wrong sample number.

Notes:

A typical error message. This error occurred because the required Sample Number field was left blank.



Data Entry

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Helpful Hints

Like all computer applications, OFIS has tricks and keyboard shortcuts to make data entry easier and less frustrating.

- <Tab> through records.
  Use the **Tab** key on the keyboard to advance to the next field instead of using the mouse. Some less-commonly used fields require use of the mouse to enter data.
- <Ctrl '> to copy data forward.
  To copy data from the previous record's field to the current record's field, hold down **Ctrl** (Control) and press the **'** (apostrophe) key.
- Ask for help.
  If you have problems with OFIS, ask for help. Contact your Local OFIS Manager first. Then, if necessary, contact the Program Manager (Rich Zweifel / Scott Hale).

Notes:

Data Entry

Adding New Projects, Locations, or Target Species

New projects, locations, and target species must be added to the database before the corresponding data can be entered. The addition of new codes can only be done by the Program Manager. Coordinating new code additions through the Program Manager is an effort to maintain statewide continuity within the database and avoid confusion when interpreting data obtained from a number of different sources. Sampling trips that do not have a target fish species should be entered as “Non-fish Sampling” (99990).

NOTE: If a code is not presently in the database refer to the protocol section (page 6-1) of the manual.

Notes:

Data Entry

Add Trip Information

A new trip must be added to the database before specific data for the trip can be entered. When combined, four fields are unique to each trip and identify data associated with that sampling trip. These fields link all sampling and processing data for each trip.

- **Project ─** Project code from DOW Inservice Document 13
- **Date** – Date of sampling event
- **Location –** Water body name
- **Target -** Species being sought, or "Non fish Sampling" if no fish species is being targeted.

To add a new trip click on *Trip* from the menu bar and select *Add – New Trip Data*. The *Submit Trip Information* form will appear. The project, date location, and target fields are required and must have values entered before you can proceed. Target species should be submitted whenever fish data are being entered. Not all sample data entered into OFIS target a specific species (i.e. water chemistry samples).

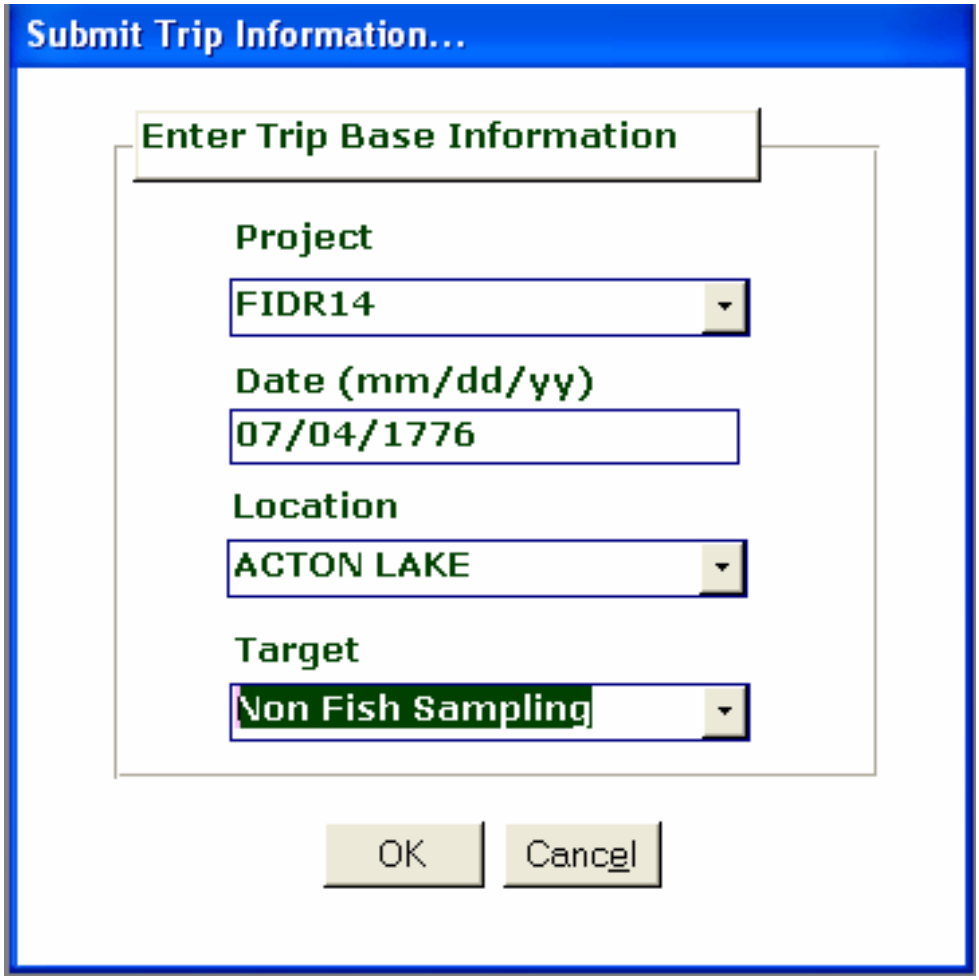
1. Type or select the project number
2. Enter the trip date as numeric month/day/year (mm/dd/yyyy)
3. Type or select the location of the sampling trip
4. Type or select the target of the trip

A list box with all previously added projects, locations and target species is present on the form so users can choose the appropriate selection from the dropdown list.

Hint – It is often easier to begin typing in a dropdown box and allow the box to auto-complete the rest of the name.

NOTE: Think of the Project, Date, Location, and Target fields as ONE unit. **Every unit will be unique**. Therefore, you will **NEVER** enter in the same combination of these data more than once in these fields.

The Submit Trip Information Form is used to create a new trip



Trip Meta Data

Once a new trip has been created, the next step is to provide specific data pertaining to the sampling trip. The Trip Entry Form is where all data entry will begin. Entry of all sample data requires the meta data (Project, Date, Location, and Target) be provided before sample or catch data can be recorded. This form contains fields to enter general information from a specific sampling trip. The Project, Date, Location, and Target specified when the trip was created are displayed and any additional information regarding the sampling trip such as the crew that collected the sample and detail pertaining to the overall purpose of the trip can be entered into this form.

To access the Trip Entry Form:

1. Click *Trip* on the menu bar from the main menu and select *Browse – Trip Information*.

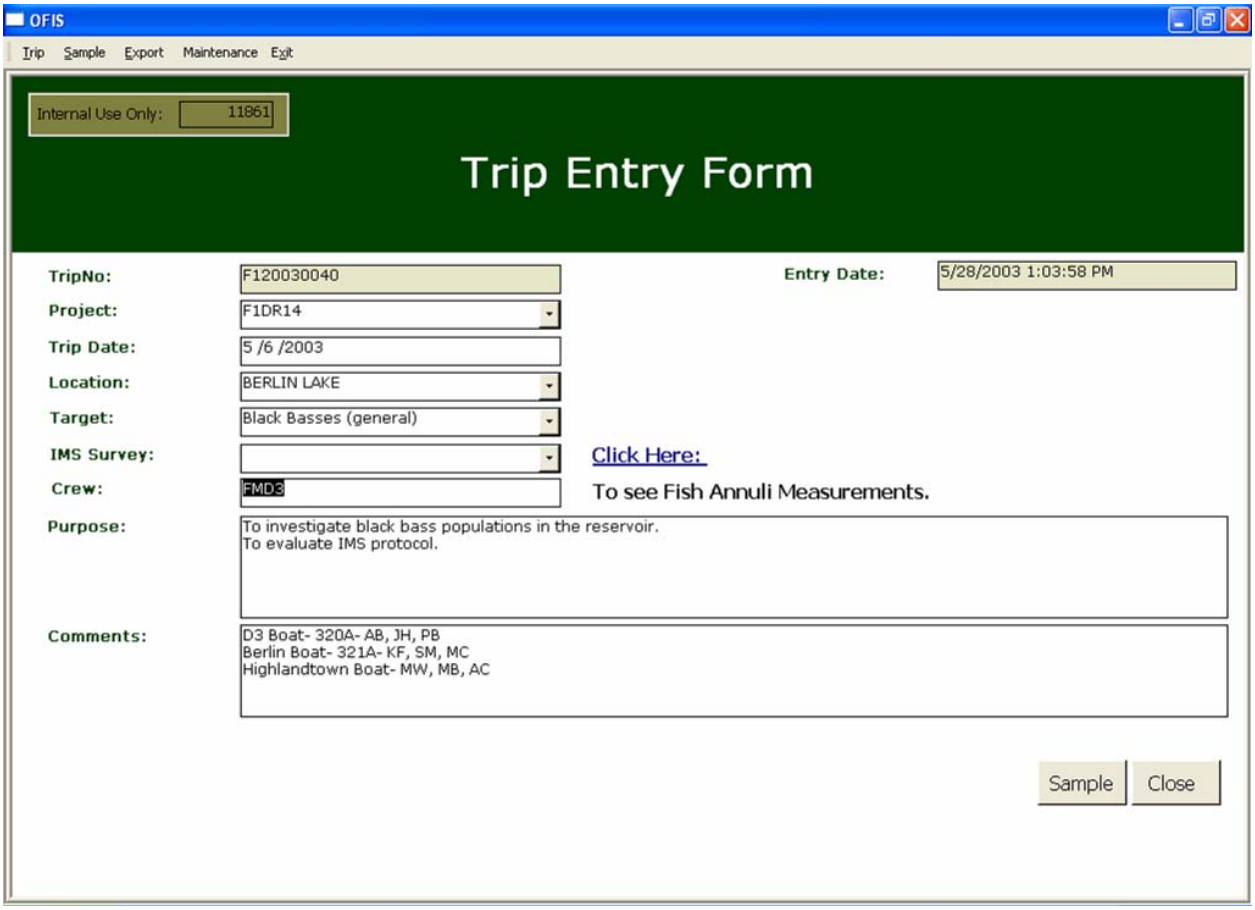
2. Enter or select the desired Trip Sample Type, Project Number, Date, and Location.

3. Double click the desired trip from the list to bring up the Trip Entry Form.

THE *META DATA CONTAINED WITHIN THE TRIP ENTRY* FORM IS THE MOST IMPORTANT FORM IN THE DATABASE. It provides fields to record general information about a sampling trip and specific data about the Project, Date, Location and Target. If data are not entered into this form correctly, all data pertaining to that sampling event will be incorrect.

Notes:

Trip entry form



Variables within the Trip Entry Form

Variable Name	**Description**
TripNo.	Trip number automatically assigned to each new trip.
Project[1]	Project code from DOW Inservice Document 13 (ex. FADR00).
Date[1]	Date of sampling (mm/dd/yyyy).
Location[1,2]	Water body name.
Target[1]	Species or combination of species targeted.
IMS Survey	Was this survey conducted as part of the **I**nland **M**anagement **S**ystem?
Crew	Crew conducting the sampling (ex. WDST2). If desired, names of individuals can be placed in the Comments field.
Purpose	Description of the reason for sampling, if applicable.
Comments	Other comments from sampling trip including names of people sampling, an explanation of gear, weather problems, observations, etc.

[1] required field for data entry
[2] if a desired water body name does not appear in the location list, it must be added by the Program Manager

Sample Entry Form

The Sample Entry Form contains fields to record details about a sampling event (i.e. gear and effort). The form contains two parts 1) the general sampling information, and 2) subforms for the entry of measurement and processing data. The appropriate Trip Meta Data (Project, Date, and Location) is displayed at the top of the screen. Confirm that this information is correct before entering any data. Trip Meta Data cannot be altered in the Sample Entry Form, if this information is not correct close this form and return to the Trip Entry Form. Entry of sampling and catch data are described below.

To open the *Sample Entry Form*:

1. Click the sample button in the lower right hand corner of the Trip Entry Form. Always make sure the meta data are correct before proceeding.

- or -

2. From the main menu select Sample and click on the appropriate survey type. Type or select the project, date, and/or location. Search for the sample of interest and double click on the sample to activate the sample entry form.

The sampling form includes specific sampling gear, procedure, and effort data. Five fields in the sampling form are required fields for entry of fish, plankton, and water data. The Sample Entry form pertaining to angler surveys differs from that of fish, plankton, and water samples and is discussed in the Angler Survey section below.

The required fields in the Sample Entry form are:

- Sample Number
- Sample Time
- Gear Type
- Gear Spec
- Effort Type

Users cannot proceed with sample data entry until these fields have been populated.

Notes:

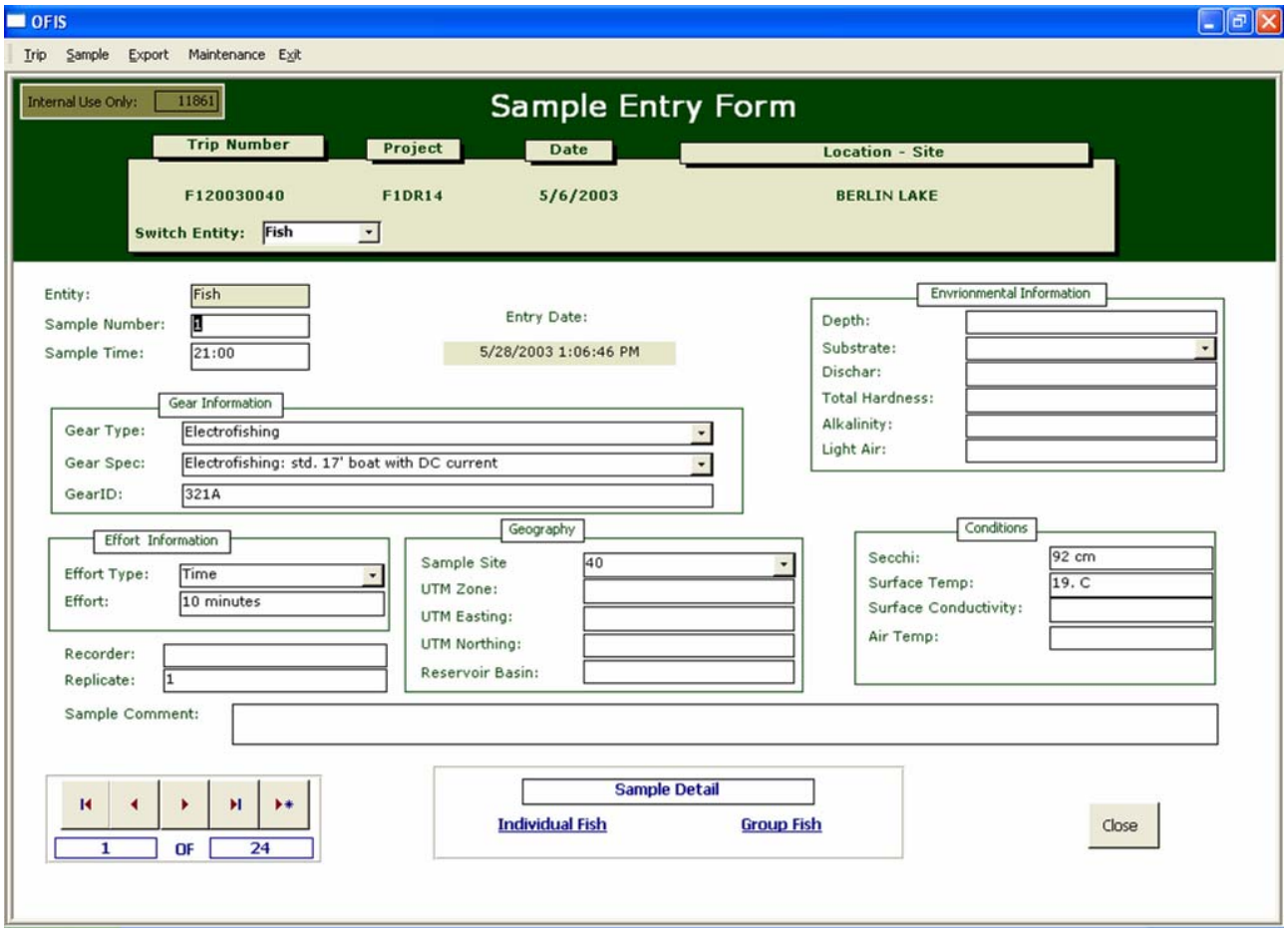
Sample Entry Form

Sample Data Entry Steps

WARNING – DO NOT TYPE OVERTOP OF DATA IN A FIELD UNLESS THAT VARIABLE IS BEING EDITED! IT WILL BE PERMANENTLY DELETED!

1. Select the entity that corresponds with the data being entered from the entity drop-down list. Multiple sample types can be entered for a given trip. For example, temperature and dissolved oxygen profiles associated with fish sampling events.
2. Use the navigation bar to bring up the desired record or select the ▸* button on the navigation bar to add a new record.
3. Enter sampling event details (Sample Number, Gear Type, Effort, etc…) in the appropriate fields. Data must be entered into all required fields for each record before you can proceed.
4. Enter additional sampling records by selecting the ▸* button on the navigation bar. Each sample should be recorded in a separate record. For example, if 10 nets were set on a trip there should be 10 records, one for each net.
5. Close the form by clicking on the close button in the lower right hand corner.

NOTE: It is important to understand when to use the "Effort not measured" option in the Effort Type field. **Effort Type should be entered as "Effort not measured" anytime the effort is not reliable or the data is not intended to be used in CPUE calculations**. Unreliable data includes: bad weather, tampered gear, improperly set gear, etc. The data collected may still be valuable (length-weight, age and growth, etc…), but if used in CPUE calculations, the results would be inaccurate. In addition, "Effort not Measured" should be entered as the Effort Type field for **all water samples.**


OFIS
Trip Sample Export Maintenance Exit
Internal Use Only: 11861
Sample Entry Form
Trip Number
Project
Date
Location - Site
F120030040
F1DR14
5/6/2003
BERLIN LAKE
Switch Entity: Fish
Entity: Fish
Sample Number: 1
Sample Time: 21:00
Entry Date:
5/28/2003 1:06:46 PM
Envrionmental Information
Depth:
Substrate:
Dischar:
Total Hardness:
Alkalinity:
Light Air:
Gear Information
Gear Type: Electrofishing
Gear Spec: Electrofishing: std. 17' boat with DC current
GearID: 321A
Effort Information
Effort Type: Time
Effort: 10 minutes
Geography
Sample Site 40
UTM Zone:
UTM Easting:
UTM Northing:
Reservoir Basin:
Conditions
Secchi: 92 cm
Surface Temp: 19. C
Surface Conductivity:
Air Temp:
Recorder:
Replicate: 1
Sample Comment:
1 OF 24
Sample Detail
Individual Fish
Group Fish
Close

Variables within the Sample Entry form.

Variable Name	Description
Entity[1]	Type of sample collected. Either Angler, Fish, Plankton, or Water.
SampNo[1]	The sample number for each individual gear effort that is consecutive and unique within each Project, Date, and Location.
Stime[1]	Sampling start time in military hours (hh:mm). ex. the time that nets were pulled or electrofishing began.
Etype[1]	Type of sample effort: Time, Distance, Area, Volume, or Effort not measured.
Effort	Total effort used in sampling. Either in minutes, meters, square meters, or cubic meters depending upon the Etype selection.
SampSite	Alpha-numeric code (up to 7 characters) that specifies the location of the Sample Number.
GearType[1]	Category of sample gear auto populated through the selection of GearSpec.
GearSpec[1]	Specific gear used to collect the sample.
GearID	The gear inventory number of the sampling equipment used.
UTM Zone	Number used to identify a specific GPS area on the Earth's surface. Ohio is either Zone 16 or Zone 17.
UTM Easting	East-West coordinates.
UTM Northing	North-South coordinates.
Reservoir Basin	Basin from which the sample was taken.
Depth	Water Depth (m).
Substrate	Type of substrate.
Discharge	Rate of water discharge (m^3).
Total Hardness	Total hardness of the water.
Alkilinity	Alkalinity of the water.
Light Air	Light reading above the surface of the water.
Secchi	Secchi depth (cm).
SurfTemp	Surface temperature of the water (C).
SurfCond	Conductivity on the surface of the water (micro-Siemens).
AirTemp	Air temperature (C).

[1] Required field for data entry.

Fish Catch Data

Entering Fish Processing Data

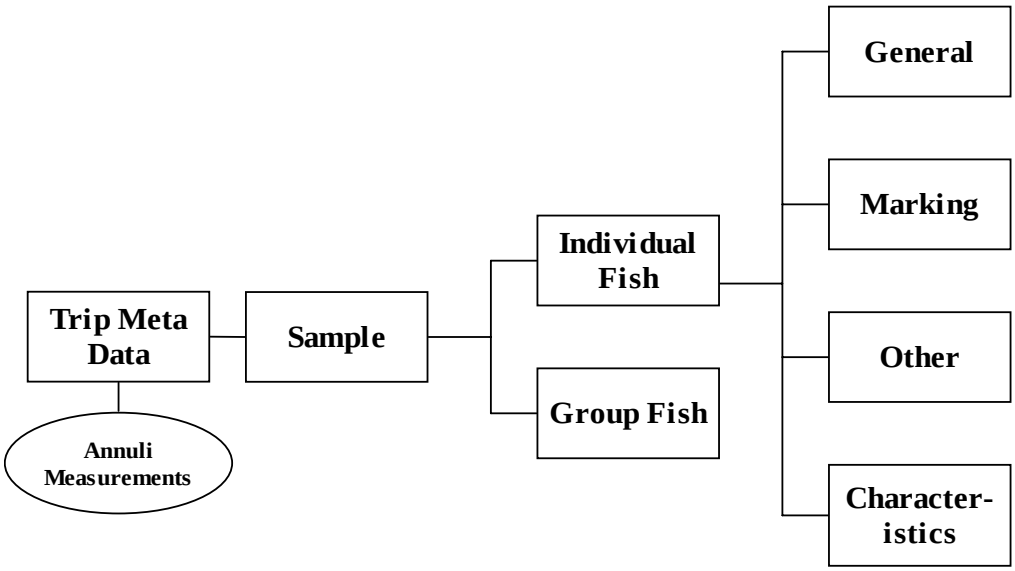
Once the appropriate Trip Meta Data (Project, Date, and Location) and sample number have been selected, catch data can be entered into one of the fish catch forms.

Before entering fish catch data it is important to recognize the most appropriate location for the type of data to be entered. OFIS has been designed to accommodate multiple types of fish data. OFIS has forms to accept species count data, commonly-collected fish data (length-weight), as well as more detailed data that are not collected during most sampling trips (diet, gonad weight, etc…). Data pertaining to individual fish and groups of fish are entered into separate forms.

Locate the *Sample Detail* box at the bottom center of the Sample Entry Form. If the data to be entered involves groups of fish handled in the aggregate (such as counts) click *Group Fish* otherwise click *Individual Fish*. A majority of fish data, including all IMS sample data, will be entered using the *Individual Fish* option.

Notes:

Organization of fish data entry forms.



Individual Fish

The Individual Fish Sample Form contains four sub-forms.

1. General – Catch data recorded in this form are from individual fish collected in each sample. These data include FishID, species, length and weight measurements, age, and sex / maturity. If annuli measurements are to be entered, FishID, species, and age fields in this form are required. Annuli measurements can be entered by clicking on “Click Here: To see Fish Annuli Measurements” in the Trip Entry Form. Annuli measurements are discussed further below.

2. Marking – This form should be used when fish were given some type of mark but measurements of individual fish were also recorded. Marks can either be unique (e.g. numbered tags) or batch markings (e.g. fin clips). For examples of recording tagging data, See Appendix 5.

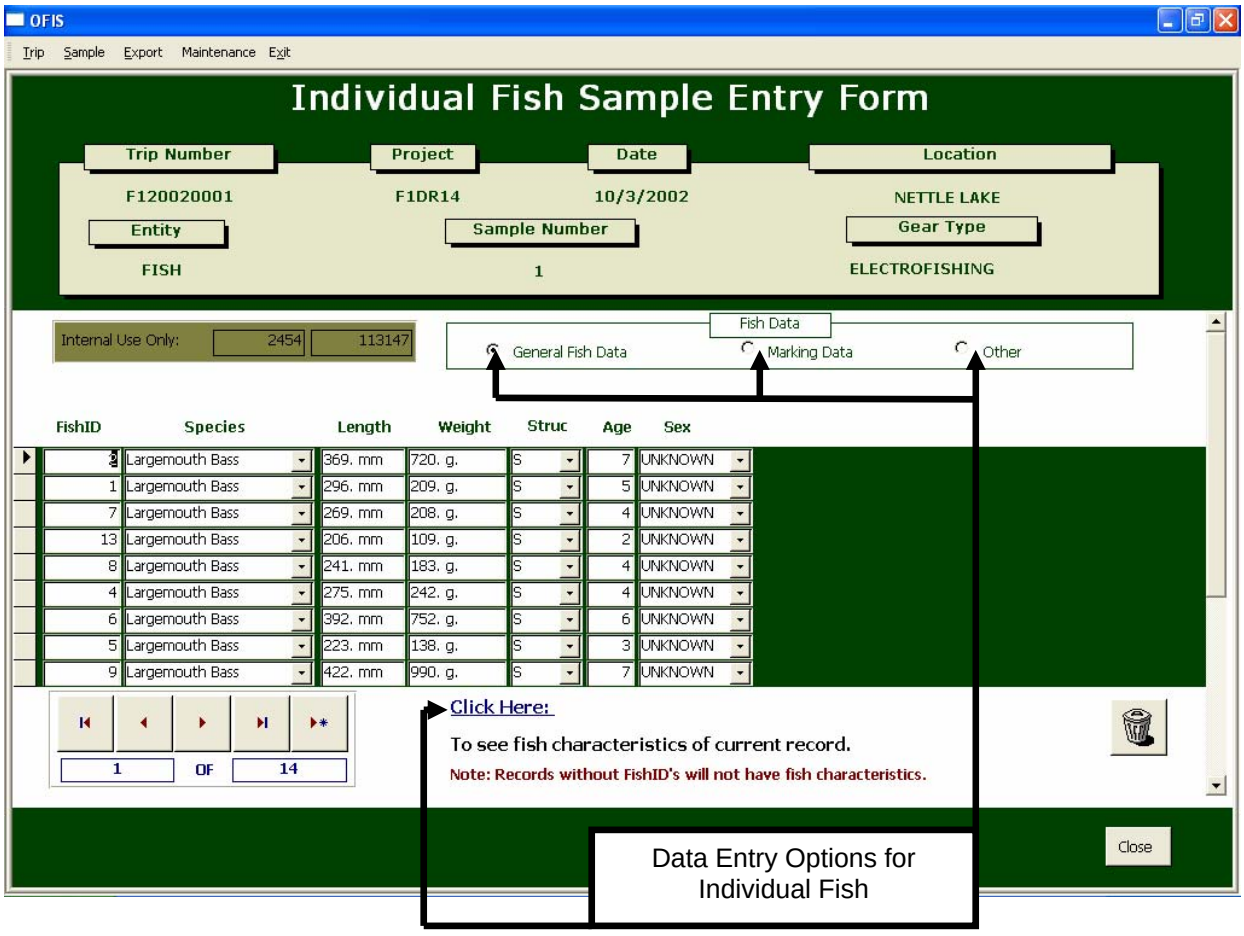
3. Other - This form allows for entry of additional information pertaining to individual fish. Data pertaining to gonad measurements, caloric density, weight of stomach contents, etc... can be entered into this form.

4. Fish Characteristics – This form contains data on individual fish measurements at an even finer resolution than #3. Data such as frequency and size of specific diet taxa can be entered into this form.

NOTE: If a sample caught no fish, enter the Individual Fish form and place a space (press space bar once) in the FishID field and select “No Target Species” in the species field. Do not enter data in any other field. The space will allow the CPUE calculations to account for no fish.

Notes:

Individual Fish Sample Entry Form, showing the general data option.



General catch data variables within the Individual Fish Sample Entry form.

Variable	Description
FishID[2]	A fish identification number unique within a Project, Date, and Location regardless of species or sample number. These numbers tend to be most useful when they are consecutive and continue from the previous sample number, although this is not required. This number is assigned at the time of the sample.
Species[1,2]	Species of fish collected.
Length	Total length of fish (mm).
Weight	Wet weight of fish (grams).
Struc[2]	Structure used to determine fish age.
Age[2]	Age in years.
Sex	The sex of the fish.

[1] Required field for data entry.
[2] Additional fields required for entering annuli measurements.

Marking variables within the Individual Fish Sample Entry form.

Variable	Description
FishID	A fish identification number unique within a Project, Date, and Location regardless of species or sample number. These numbers tend to be most useful when they are consecutive and continue from the previous sample number, although this is not required. This number is assigned at the time of the sample.
Species[1]	Species of fish collected.
Type	Type of mark given to a fish.
Recap	Mark observed on a recaptured fish.
Condition	Condition of the fish when released.
Prior	Four-digit year (yyyy) followed by two-digit mark type (e.g. 199902 = 1999 right pelvic clip).
Capture	Number of times the fish has been recaptured .
Tag	Unique alpha-numeric identifier on the first tag.
Tag2	Unique alpha-numeric identifier on the second tag .
TransNo	Transmitter number.
Translife	Expected transmitter battery life.

[1] Required field for data entry.

“Other” variables withing the individual fish sample entry form.

Variable	Description
FishID	A fish identification number unique within a Project, Date, and Location regardless of species or sample number. These numbers tend to be most useful when they are consecutive and continue from the previous sample number, although this is not required. This number is assigned at the time of the sample.
Species	Species of fish collected.
GonadWeight	Weight of both gonads in grams.
OvDryWeight	Dry weight of ovaries in grams.
DietDryWeight	Dry weight of stomach contents.
Calories1	Whole-fish caloric density – replicate 1.
Calories2	Whole-fish caloric density – replicate 2.
OFileName	
DFileName	
Age in Days	Age of a larval fish in days.

[1] Required field for data entry.

Annuli Measurements

The Annuli Measurements form is used for recording annuli measurements for back calculation of growth rates. Annuli measurement data can be entered once the catch data in the Individual Fish Sample Entry Form has been completed.

As with all other data entry forms, select the appropriate trip Meta Data (Project, Date, Location) from the Zipbox before entering any data.

Fish Age and Growth Data Entry Steps

WARNING – DO NOT TYPE OVERTOP OF DATA IN A FIELD UNLESS THAT VARIABLE IS BEING EDITED!

To enter annuli measurement data:

1. Select Trip from the menu bar and click on Browse – Trip Information.
2. Select the appropriate Meta Data from the *Zipbox* to bring up the Trip Entry Form.
3. In the center of the Trip Entry Form click where it says:

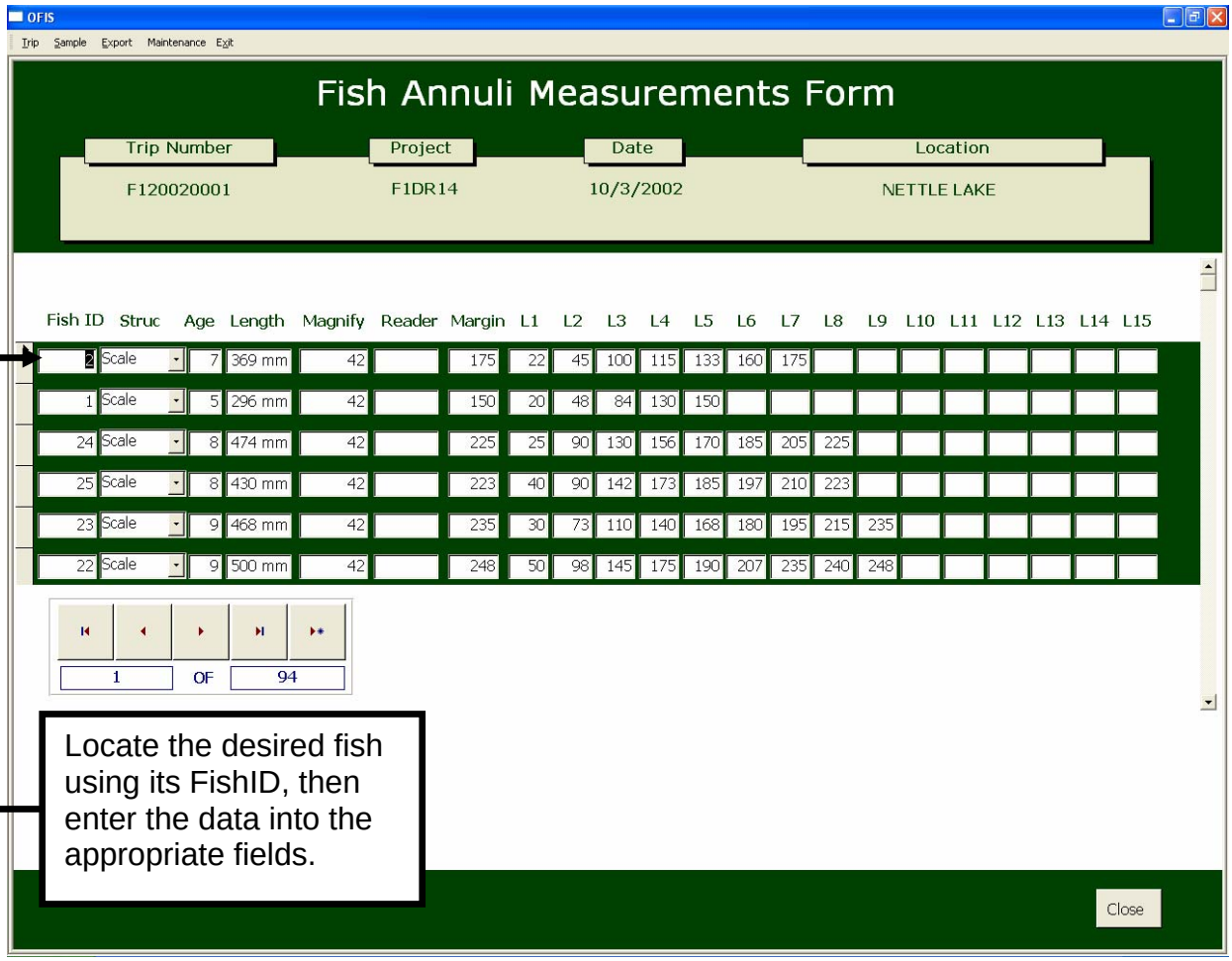
   "Click here:

   To see Fish Annuli Measurements"
4. All *FishID, Length*, and *Struc* data previously entered in the Individual Fish Sample Entry Form will automatically appear in this form. Use the navigation buttons and scroll bar to locate the appropriate fish record FishID.
   a. Edit or add annuli measurements for the corresponding FishID.
5. Close the form.

HINT: To order records for easy location place the cursor in the FISHID field, right click, and select "sort ascending".

Notes:

Fish annuli measurements form



Variables associated with the Annuli Measurements form.

Variable Name	Description
FishID[1]	Fish identification number unique within a Project, Date, and Location regardless of species or sample number. This is the same ID as in the catch data on the Individual Fish Sample Entry form.
Species[1]	Species of fish as recorded in the Fish Sampling and Catch Form.
Length[1]	Total length in mm.
Struc[1]	Structure used to age the fish.
Magnify	Magnification used to read the annuli measurements.
Reader	Initials of the person who read the aging structures.
Age[1]	Age of the fish in years. Age equals the total number of annuli present and assumes the fish hatched on January 1.
Margin	Measurement from the focus to the margin.
L1 – Lx	Measurement of each consecutive annulus from the focus.

[1] Auto populated from previous data entry in the Individual Fish Sample Entry form.

Group Fish

The Group Fish Sampling Form is similar to the Individual Fish Sample Entry form except that it is used for entry of data for fish that have been grouped or subsampled. The most common use of the Group Fish Sampling Form is for quadrat rotenone sampling, but it can also be used if subsampling is necessary.

Individual fish within a group will have no weights or measures associated with them. Instead, only the overall group characteristics are recorded.

Like the Individual Fish Entry Form trip metadata and sample information must be recorded before data can be entered into the Group Fish form. The Individual Fish Sample Entry form and the Group Fish Sample Entry form are accessed from the same Sample Entry form for given trip Meta Data. This makes it possible to have both group fish data and individual fish data for the same sample as long as the Sample Number is the same in both forms. If Group Fish data are from a different sample, be sure to enter a different Sample Number in the Sample Entry form.

NOTE: If each fish has a corresponding weight and length then the data should be entered into the Individual Fish Sample Entry form.

Notes:

Group Fish

Group Fish Sampling Data Entry Steps

To enter data into the Group Fish Sample Entry Form:

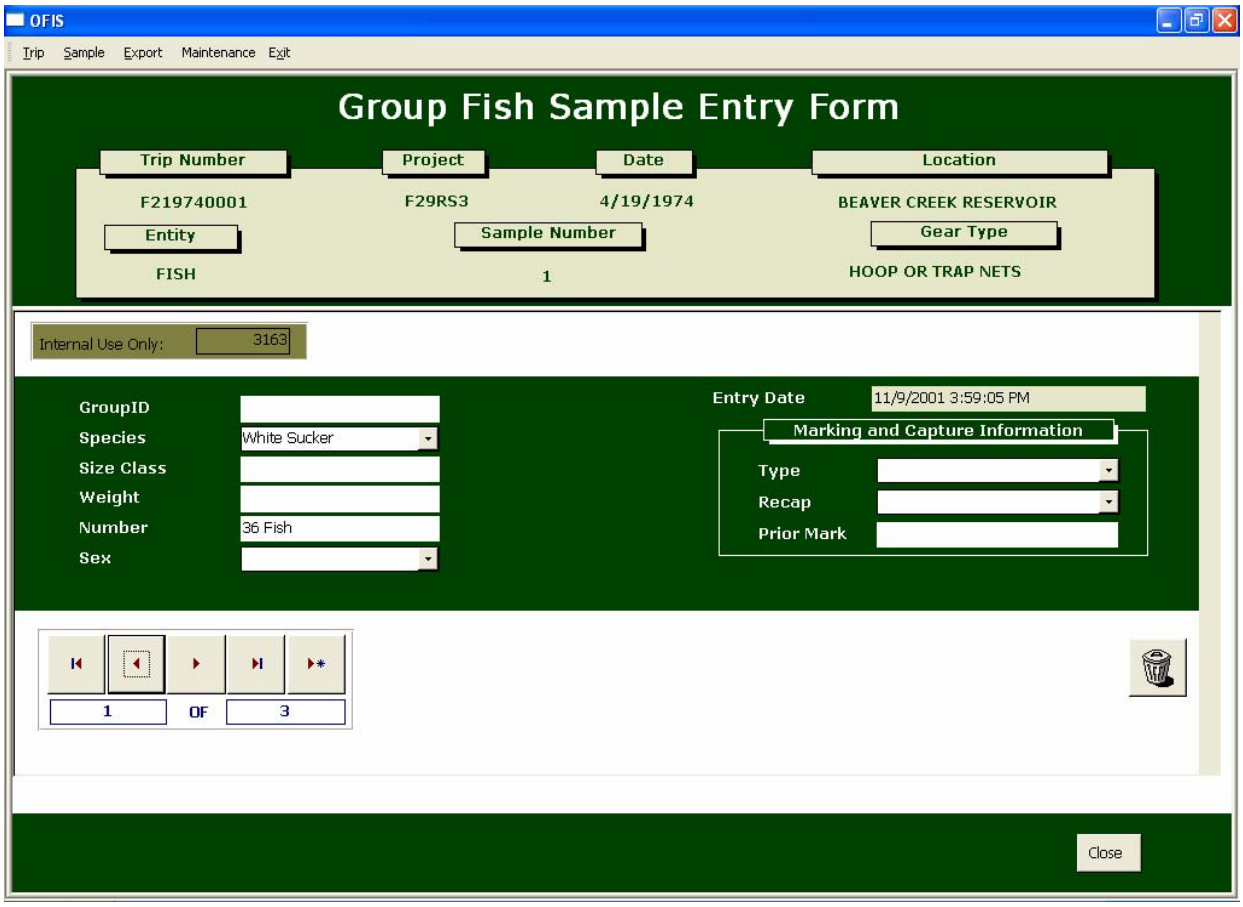
WARNING – DO NOT TYPE OVERTOP OF DATA IN A FIELD UNLESS THAT VARIABLE IS BEING EDITED!

To enter data:

1. From the Sample Entry Form click on the Group Fish option in the sample details box at the bottom center of the form.
2. Use the navigation buttons to enter a new record or to locate the appropriate sampling record.
3. Enter group data in the corresponding fields.
4. Click on the close button in the lower right corner to close the form.

Notes:

Group Fish Sample Entry form



Sampling variables within the Group Fish sampling form.

Variable Name	Description
GroupID	Unique group fish identification number within a sampling trip regardless of species or sample number.
Species[1]	Species of fish.
Size Class	The size class of the grouped fish (mm).
Weight	Total weight of the group (g).
Number[1]	Number of fish in the group.
Sex	Sex of the fish in the group.
Type	Type of mark given to a fish.
Recap	Mark observed on a recaptured fish.
Prior Mark	Four-digit year (yyyy) followed by two-digit mark type (e.g. 199902 = 1999 right pelvic clip).

[1] Required field for data entry.

Water Sampling

The water sampling forms are for entry of water quality variables such as temperature and dissolved Oxygen. Other water quality variables such as conductivity, chlorophyll$_a$, nitrogen, and phosphorous can be entered in these forms as well.

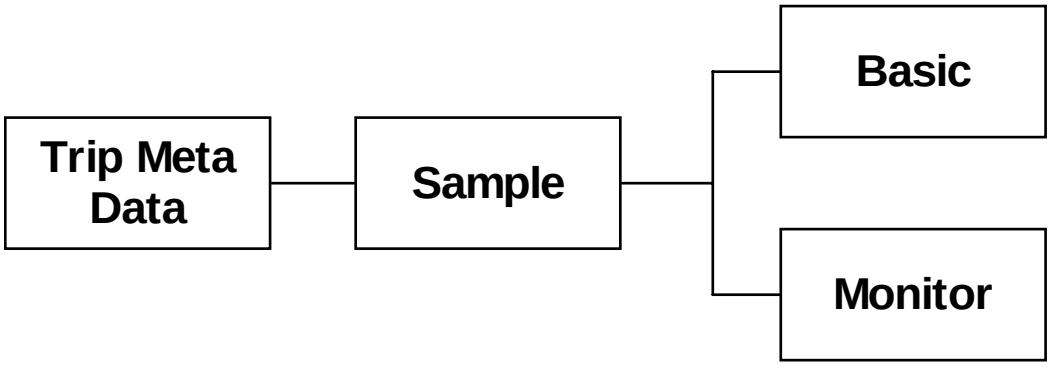
The benefit of the water sampling component in OFIS is its capability to accept depth-specific water quality measures. Water sampling data are entered in the same manner as for the fish data in that sample measurement/processing data can only be entered after the Trip Meta Data and Sample data have been completed.

OFIS will accept both stand alone water sampling data and water sampling conducted in association with another sampling event, such as temperature and DO profiles taken during fish sampling. Secchi depth, surface temperature, surface conductivity, and air temperature measurements taken during fish sampling events should be entered into the Sample Entry form corresponding to the fish sampling information.

There are two forms associated with water samples: 1. Basic Water Sampling, and 2. Water Monitoring. The Basic Water Sample form is for the entry of depth specific water quality measurements such as temperature and dissolved oxygen profiles. The Water Monitor Sample form is for the entry of multiple water quality measurements from the same site over time, such as on-site monitoring stations (hobotemp data).

NOTE: "Effort not measured" should be entered in the Effort Type field in the Sample Entry form for all water samples.

Organization of water sampling data entry forms



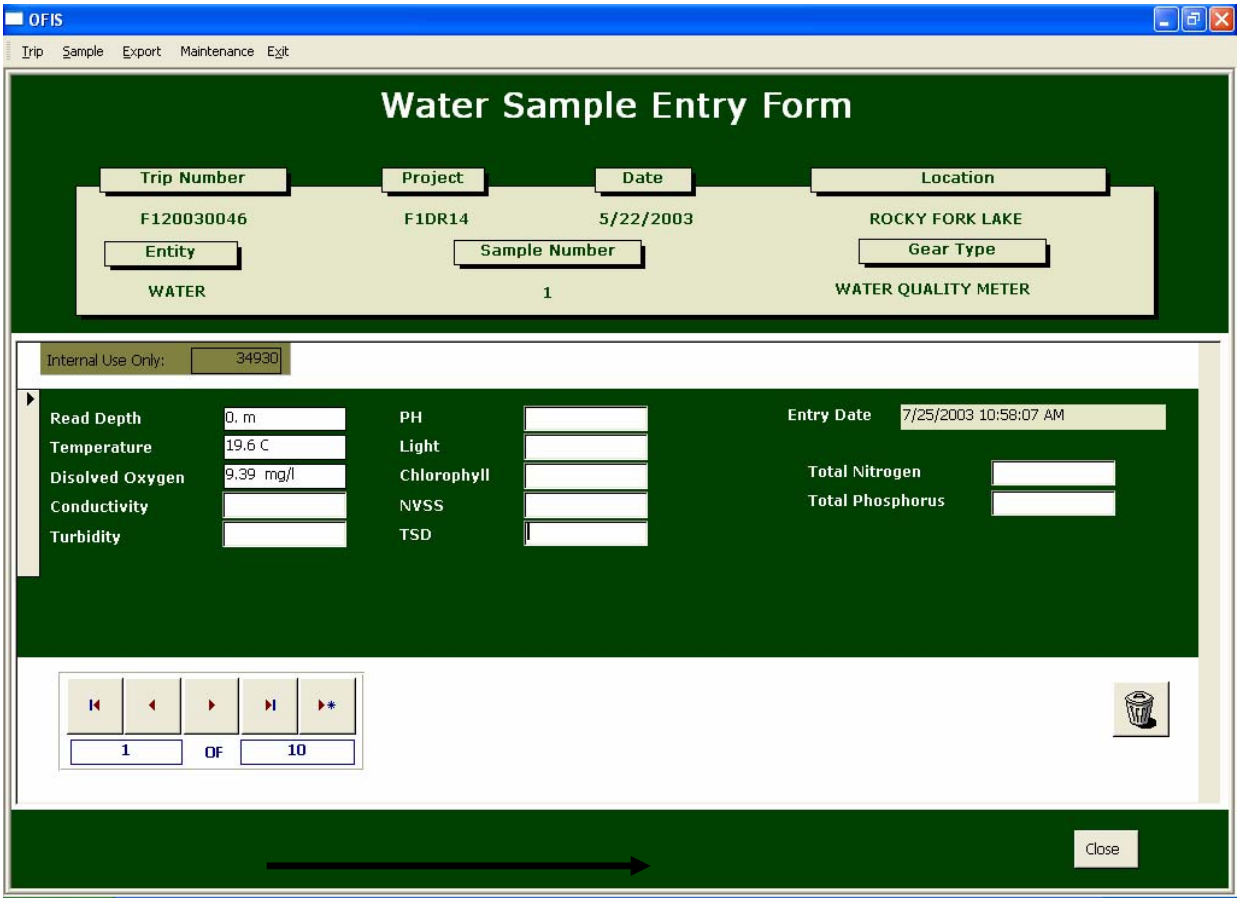
Water Sample Entry Form

To enter depth-specific water measurements in the Water Sample Entry form:

1. Select the appropriate trip meta data (Project, date, and location) to access the desired sampling trip.
2. Use the navigation bar to select the appropriate sample number or click on the ▸* button to add a new sample. If the water sampling data are associated with another sampling trip (fish sampling) switch the entity to *Water*, and enter the sampling information in the required fields.
3. Enter all required sample data.
4. Click on Basic Water in the Sample Details box at the bottom center of the Sample Entry Form.
5. Enter the depth (meters) the water sample was taken in the Read Depth field and water measurement data into the corresponding fields. Read Depth should be entered as 0 for water samples taken at the surface.
6. Click the ▸* button on the navigation bar to add a new record for each depth-specific measurement. For example, if measurements were taken at 1m intervals from the surface to 5m then six records are required for entry of the entire profile (0, 1, 2, 3, 4, and 5 m).
7. When all data have been entered click on the close button to close the form.

Notes:

Basic Water Sample Entry Form for entry of depth-specific measurements.



Variables within the Water Sample Entry form.

Variable Name	**Description**
Read Depth[1]	Depth (m) water sampling was conducted.
Temperature	Temperature in degrees C, to the tenth decimal place.
Dissolved Oxygen	Dissolved oxygen, in mg/L, to the hundredth decimal place.
Conductivity	Conductivity as micro-Siemens (μS).
Turbidity	NTU's in whole numbers.
PH	pH to the tenth.
Light	Light intensity as micro-moles per second per square meter (μmoles/s/m^2).
Chlorophyll	$Chlorophyll_a$ in micrograms per Liter (μg/L).
NVSS	Non-Volatile Suspended Solids in milligrams per liter (mg/L).
TDS	Total dissolved solids in milligrams per liter (mg/L).
Total Nitrogen	Total nitrogen concentration of the water in micrograms per liter (μg/L).
Total Phosphorous	Total phosphorous concentration of the water in micrograms per liter (μg/L)

[1] Required field for data entry.

Water Monitoring Entry Form

The water monitor form is for string data from repeated samples at the same site over time. This form is intended to house streams of data logger (hobotemp) data and would be used to browse rather than enter data. Protocols for uploading streams of water monitor data will be provided in the future.

Notes:

Plankton

The plankton sampling forms pertain to zooplankton or icthyoplankton sample processing data (hereafter referred to as plankton). Plankton data are handled much the same as fish data. OFIS can accommodate either course-grain processing data such as frequency or fine-scale data such as individual lengths and egg counts.

Like fish data, plankton data are entered as either groups or individuals. However, in contrast to fish data, most plankton data will be entered into the group entry form. Plankton samples often capture too many individuals to count and measure each organism, thus enumerating only a random subsample is common practice. Therefore the calculation of CPE for plankton and fish should be handled differently as well. Plankton CPE should be calculated only from the counts provided in the group entry form not from a combination of the individual and group forms. The individual entry form is for the generation of plankton size structure only.

Notes:

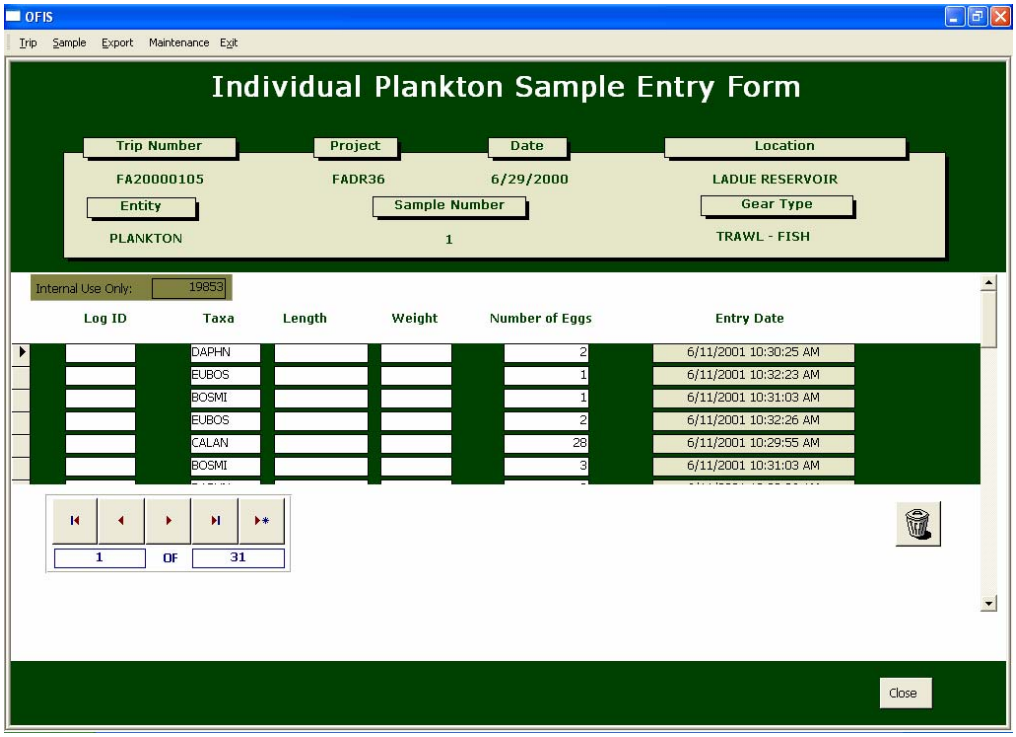
Individual Plankton

The Individual Plankton Sample Entry Form is for entering taxa-specific measurements of length, weight and fecundity from individual plankters. Data entered into this form pertain exclusively to measurements of individuals, for size structure or fecundity/production calculations. This form should not be used to enter data for calculation of CPE. CPE data should be entered into the Group Plankton Sample Entry Form.

Since taxonomic resolution of plankton samples is dependent on the objectives of the study, taxa names for plankters are left to the discretion of the investigator. Often, plankters are only identified to genus (*Daphnia* spp., *Bosmina* spp.), but some researchers may find it necessary to differentiate between species. When entering plankton data please use logical taxonomic delineations that can be easily interpreted. Examples of taxonomic names currently being used are provided in appendix 2.16. Try to keep as much consistency between studies as possible.

Notes:

Individual Plankton entry form



Variables associated with the Individual Plankton Sample Entry Form.

Variable	**Description**
Log ID	Unique identification number.
Taxa	Taxonomic delineation.
Length	Plankter length in mm.
Weight	Plankter weight in mg.
Number of Eggs	Number of eggs borne by a plankter.

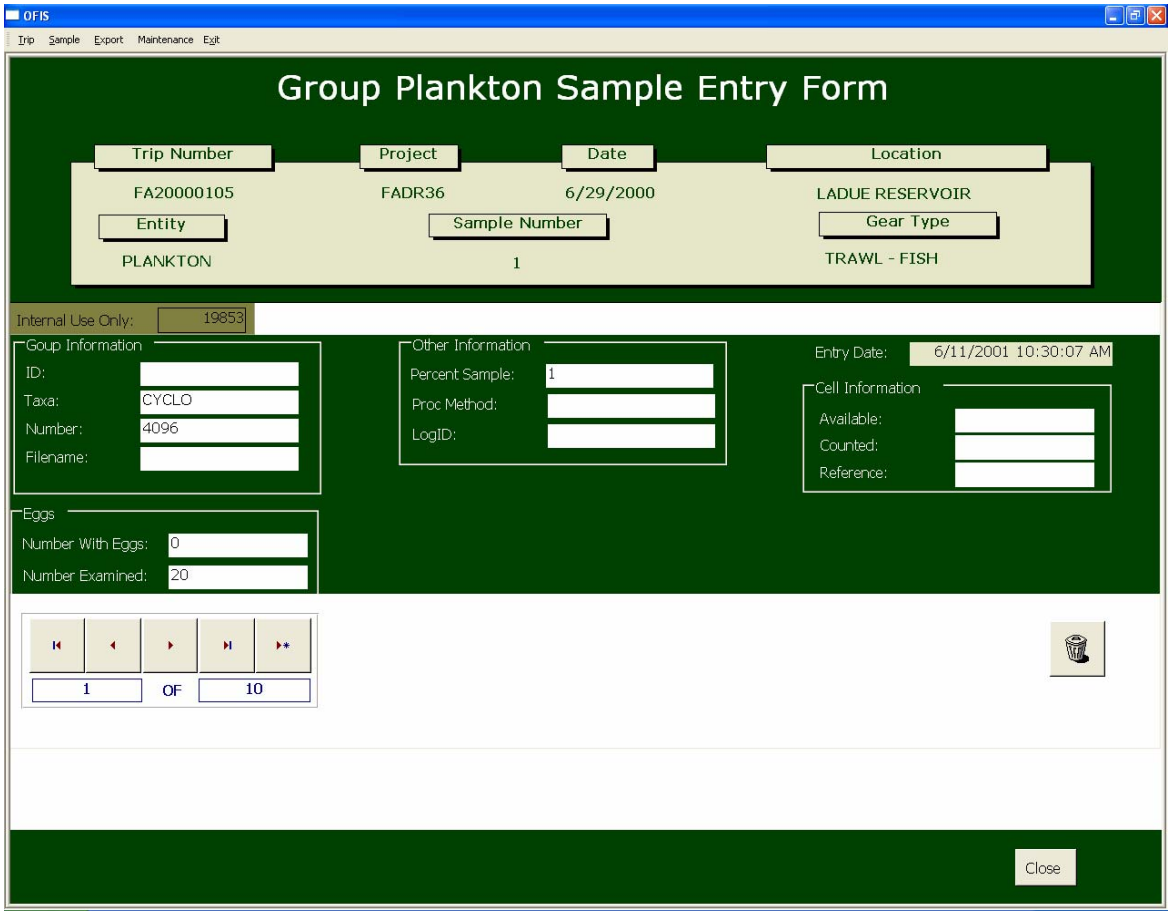
Group Plankton

The Group Plankton Sample Entry Form is for data pertaining to taxa-specific maturity, subsampling methods, and count data for the calculation of CPE.

As for the Individual Plankton Form taxonomic delineations are left to the discretion of the investigator. However, when entering plankton data please use logical taxonomic delineations that can be easily interpreted. Examples of taxonomic names currently being used are provided in appendix 2.16. Try to keep as much consistency between studies as possible.

Notes:

Group Plankton entry form



Variables associated with the Group Plankton Sample Entry Form.

Variable	Description
ID	Unique identification number.
Taxa	Taxonomic delineation.
Number	Frequency of taxa occurrence.
Filename	
Number with eggs	Number of individuals observed bearing eggs.
Number examined	Number of individuals examined for eggs.
Percent Sample	Percent of the total sample enumerated.
Proc Method	Method used to extract subsample.
Log ID	
Available	
Counted	
Reference	

Angler Sampling Form

The angler sampling form in OFIS was designed to accept data from annual angler surveys conducted by the Division of Wildlife. The angler Sample Entry form can accept instantaneous counts, angler catch statistics, and responses to interview questions.

Like the Sample Entry forms for fish, plankton and water samples, angler data cannot be entered until a trip has been created for each sampling day. Angler survey trips will always be created using project number FIDR01 and No Target Species (99998) as the target.

There are three required fields for entry of records into the Angler Sample Entry form as well.

Required fields for entry of angler data:

Sample Number
Sample Time
Survey Type

After the survey type has been selected (Interview or Count) the fields associated only with that type of data are available for data entry. Additional angler survey data are entered by clicking on the various options within the Sample Entry form rather than entering data into sample subforms as with fish, plankton and water samples.

Notes:

Angler Sampling Form

Angler data entry

To enter angler data:

1. Create a new trip by clicking Trip from the menu bar and select Add – New Trip Data. A new trip must be created for each survey day.
   a. Type or select the appropriate Project, Date, Location and Target. Project number will always be FIDR01 and Target will always be No Target Species.

2. From the menu bar select Trip and click on Browse – Trip Information.
   a. Type or select the desired trip metadata (project FIDR01, date, and location) and double click the appropriate trip.

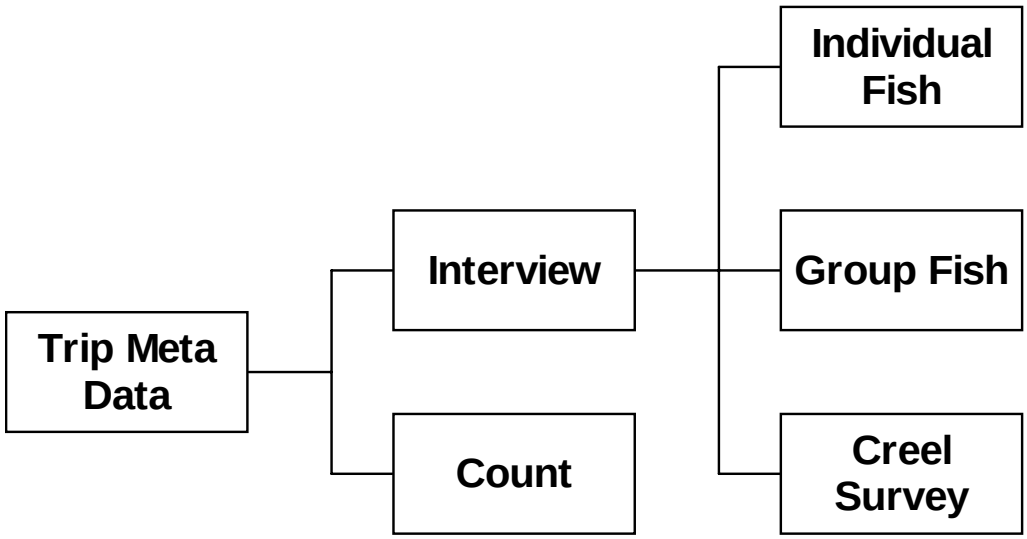
3. Use the navigation bar to select the appropriate sample number or click on the ▸* button to add a new sample.

4. To enter interview data select Interview in the Survey Type field. To enter count data select count in the Survey Type field. Interview and count data should not be entered using the same sample number. Count data should only be given sample numbers 1 to 9 and interviews should be assigned a sample number greater than or equal to 10.

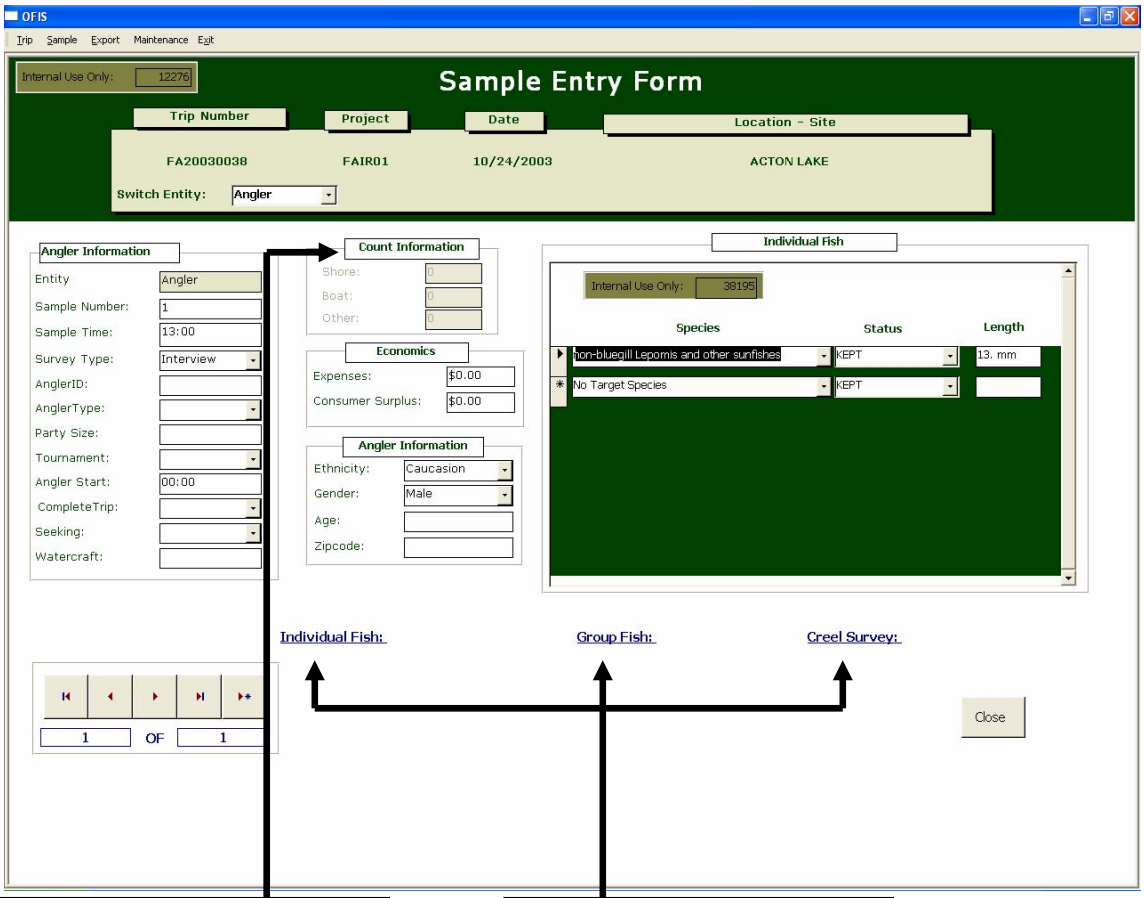
5. Enter data into the appropriate fields.
   a. Fish catch and additional question response data are entered into the Survey Box by clicking on the appropriate options (discussed in the next section).

Notes:

Diagram of angler sampling data form hierarchy.



Angler sample entry form showing entry of interview data. Note: Count fields are unavailable when Interview is displayed in the Survey Type field.



The three fields used to enter count data are unavailable when entering interview data

Options for entry of additional interview data

Interview Data

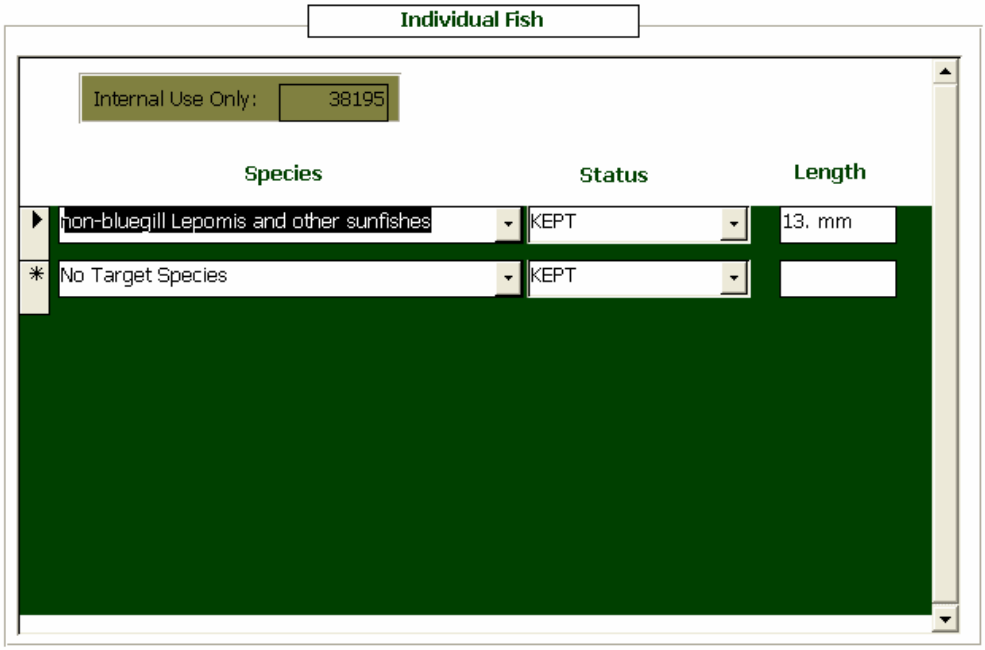
Additional information associated with angler interviews are entered into the Angler Sample Form using the Individual Fish:, Group Fish:, and Creel Survey: options (blue text) provided within the form. The Individual Fish and Group fish options are for entering species-specific catch, harvest, and length information. The Creel Survey option is for recording data pertaining to additional interview questions.

There are two options for entering fish catch data associated with an angler interview. Angler catch data where individual fish lengths were recorded are entered by clicking on the Individual Fish: option to bring up the data entry form in the Sample Box in the upper right corner of the form. The individual fish option is for entering species-specific harvest information when fish lengths were recorded. All other angler catch data are entered using the Group Fish: option. The group fish form should be used to enter species-specific catch and harvest where individual fish lengths were not recorded, such as released fish. Catch data from a single angler will often be entered into both forms. For example, if an angler caught 9 saugeye but harvested only one; the length for the one measured fish should be entered into the Individual Fish form; and 9 entered into the caught and 1 entered into the kept fields in Group Fish.

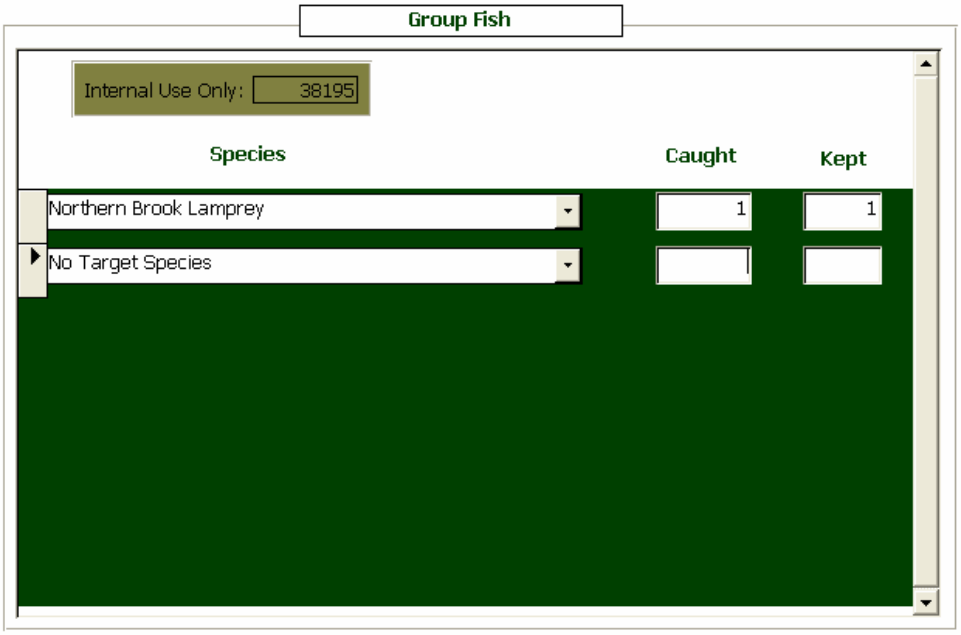
The Creel Survey: option provides for the entry of angler responses to six questions. These questions were intentionally not programmed into the form to allow for annual flexibility in angler interviews. This allows for annual evaluation and adaptation of the interview module by the addition / deletion of questions. When this option is selected the questions are displayed at the top of the Survey Box with space provided below to enter the corresponding angler response. Responses to general questions can be typed into the space provided. Responses to categorical questions are programmed into the form and are entered by simply clicking on the appropriate response.

Notes:

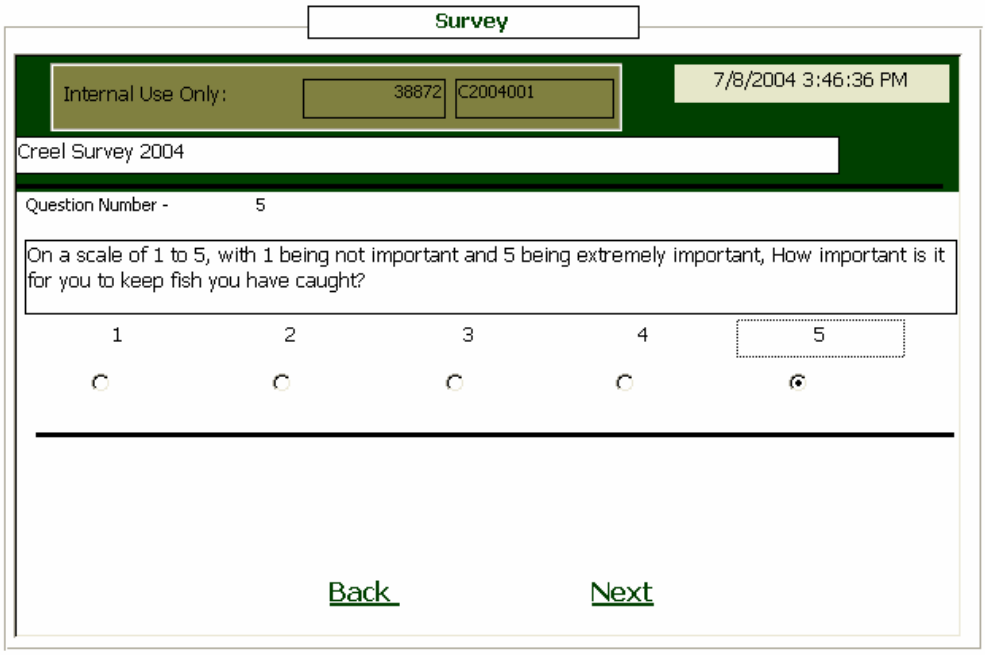
The individual fish form for entering species-specific catch and harvest information when fish lengths were measured.



The group fish form for entering species-specific catch and harvest information when fish lengths were not recorded.



The creel survey form for entering angler responses to additional interview questions.



Variables associated with the angler sampling form.

Variable Name	Description
Sample Number[1]	A unique number assigned to each count and interview (1-9 for counts, interviews start at 10). Sample numbers are sequential for a given sample day.
Sample Time[1]	Time the interview was conducted (in military time). If this is a completed trip enter the value for “End Time” instead of “Time of Interview”.
Survey Type[1]	Type of data being entered, count or interview.
AnglerID	We replaced this variable on the interview data sheet with one called "Mail Survey" (responses are "Y" for yes, the spokesman agreed to take a mail survey or "N" for no, the spokesman did not take a mail survey.)
Angler Type	Is the angler or angling party fishing from a boat or from shore ("B" for boat angler or "S" for shore angler).
Party Size	Number of anglers in the party.
Tournament	Is the angler or angling party fishing as part of a tournament ("Y" for yes or "No" for no)?
Angler Start	The time the angler or angling party began fishing (in military time).
Complete Trip	Is this a completed trip interview ("Y" for yes or "N" for no)?
Seeking	The species the angler or angling party was seeking.
Watercraft	The watercraft ID number of boat anglers.
Expenses	The dollar amount the angler or angling party spent on gas, bait, food, lodging, and related items for this trip only.
Consumer Surplus	The dollar amount the angler or angling party would be willing to spend over and above what had already been spent.
Ethnicity	The ethnicity of the party spokesperson ("Caus" for caucasian, "Afri" for African-American, "Hisp" for Hispanic, "Asia" for Asian-American, and "Oth" for other).
Gender	The gender of the party spokesperson ("M" for male or "F" for female).
Age	The approximate age of the party spokesperson (years).
Zipcode	The zip-code of the spoksperson's place of residence.
Status	Either “KEPT” or “RELEASED”.
Length	Length of the fish in mm.
Caught	Number of fish caught by an angler.
Kept	Number of fish kept by an angler.

[1] required fields

Data Analysis

DATA ANALYSIS ..... 5 - 1
Data Export ..... 5 - 3
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Data Analysis

OFIS is designed to facilitate data collection, storage, and analysis. Provided with OFIS are standardized SAS programs for routine fisheries analysis. If SAS is not installed on the computer, these programs cannot be used for analysis. However, data could exported as an Excel spreadsheet and analyzed with that program.

A researcher is required to have some rudimentary knowledge of SAS in order to analyze the data. Some user input is required to run the programs. The input data file name needs to be changed every time a new analysis is conducted in order to import the correct data for analysis.

Notes:

Data Export

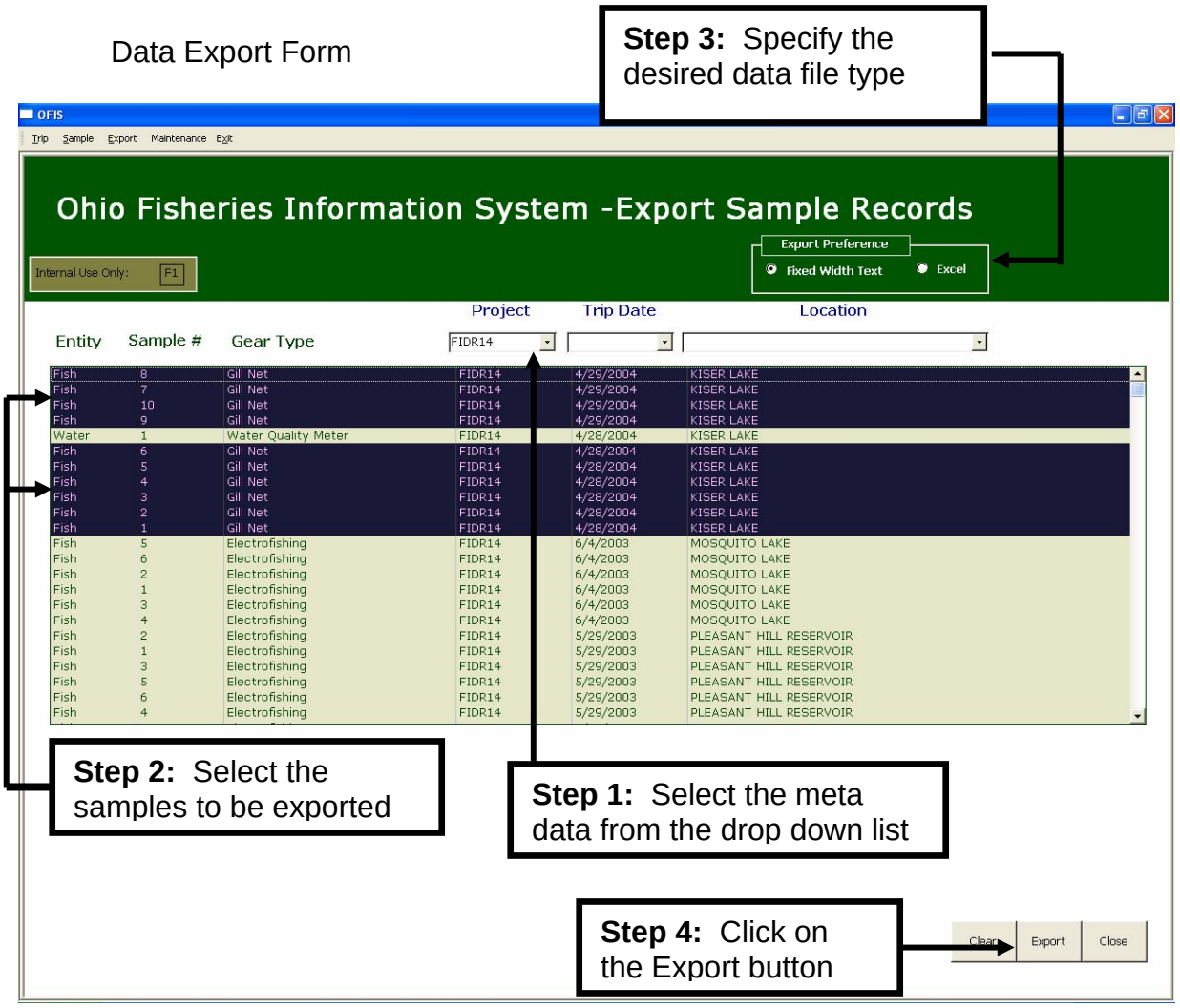
The Export option from the menu bar is used to export data so that routine analyses can be performed in SAS. The export option generates an output data set containing the most commonly used variables. If additional variables are desired for export, they can be obtained using the OFIS Querying Module (discussed below). Use the Export option to export data for calculations of catch per unit effort, length-weight regressions, length-at-age back-calculation, length-frequency distributions, and other basic analyses.

To export an OFIS dataset:

1) From the menu bar select Export and choose the desired export type. For example, to export annulus measurement data for back-calculation, select “Fish Sample Export” then “Backcalculated Growth Export”.
2) Type or select the appropriate Project, Date(s), Location(s), and sample number(s).
   a) To select multiple samples, hold the <Ctrl> key down on the keyboard while selecting discontinuous data, or hold the <Shift> key down to select contiguous items in a list.
3) Select the type of file to be exported. Data can be exported as either a fixed-width text or as an Excel spreadsheet. The analysis programs will accept only fixed-width text files, thus in order to analyze the exported data using the SAS programs provided choose “Fixed Width Text” as the export file format.
4) Click the export button in the lower right corner.
   a) Specify the directory to which the data are being exported. Data should be exported to the “C:\OFIS Analysis” folder in order for the SAS program to find the dataset.

NOTE: If a desired trip contains both individual fish and group fish data then two separate exports must be conducted. In order for the IMS2.sas program to calculate catch statistics properly, both individual fish and group fish data sets must be exported. Individual fish data are exported using the “Individual Fish Export” option and the group fish are exported using the “Group Fish Export” option.

Data Export Form



Data Analysis Programs

Three SAS programs are provided to facilitate analysis of fisheries data exported from OFIS. These programs are not meant to be all encompassing. They are, however, the most commonly used fishery analysis tools.

The IMS1.sas and IMS2.sas programs are provided to summarize catch data and calculate common catch statistics. IMS1.sas is for the calculation of population statistics when only individual fish data are to be analyzed (no group data). IMS2.sas can accommodate trips that include both individual and grouped fish data.

Statistics calculated by IMS1.sas and IMS2.sas:

- Catch per unit effort (CPUE)
- Length frequency distributions
- Length-weight regressions
- Length-at-age
- Stock density indices (PSD and RSD-P)
- Relative weight (Wr)

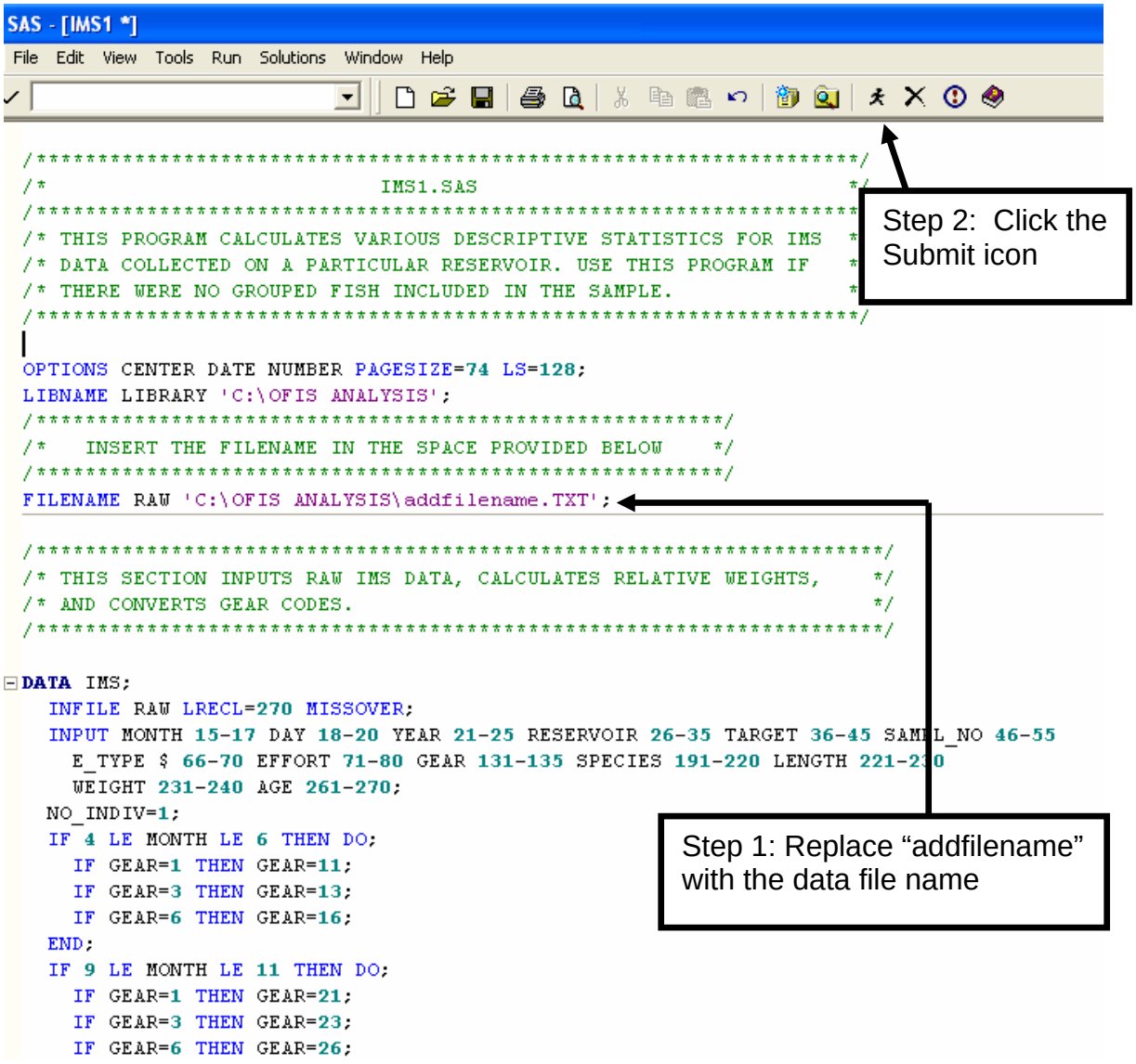
Also included is an additional SAS program for back-calculating length-at-age (annulus formation). The BACKCALC.sas program is used to estimate length-at-age from scale annulus measurement data contained in Backcalculated Growth Export datasets.

Data Analysis Steps

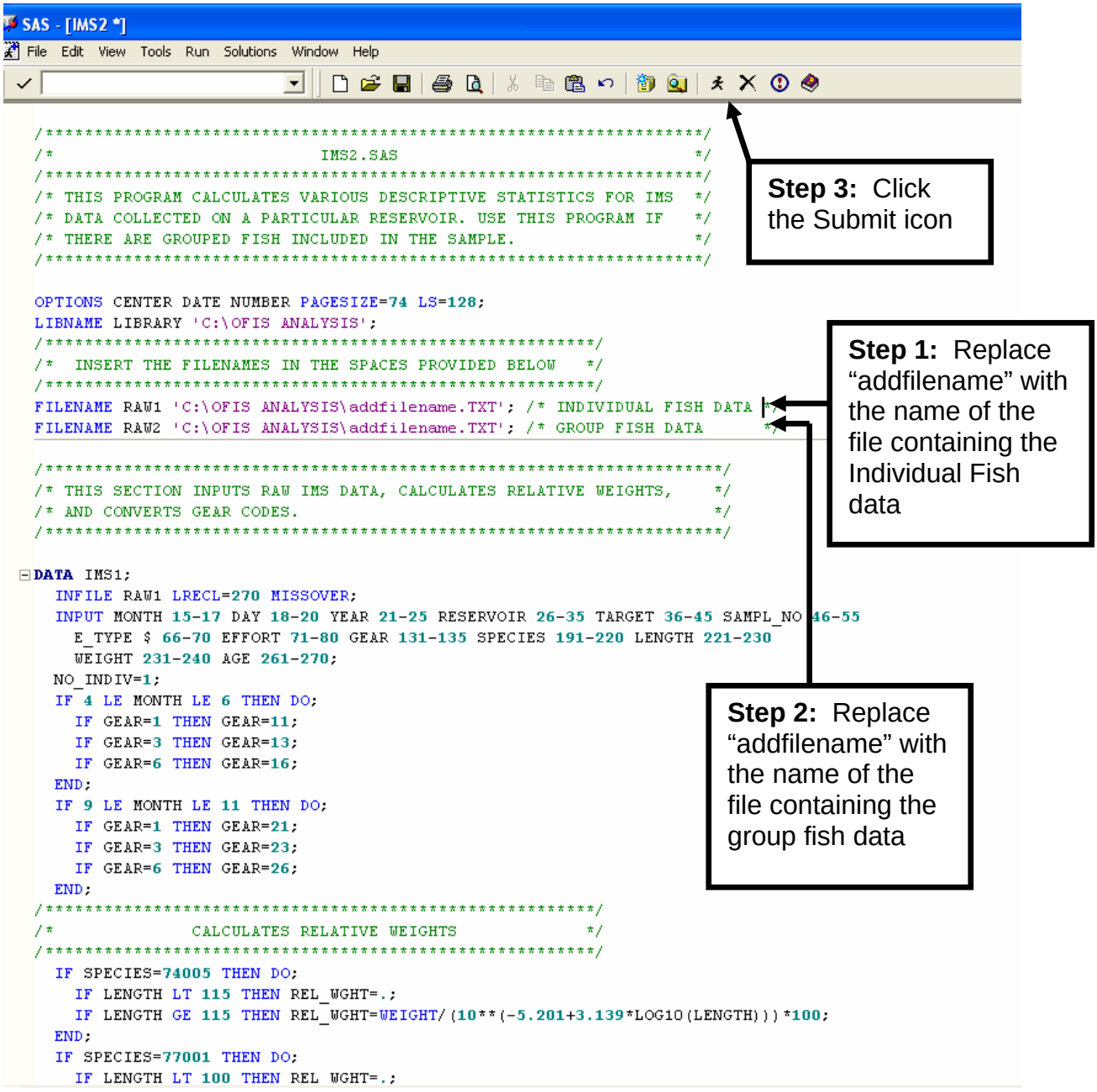
To analyze OFIS export data in SAS:

1) Open the desired data analysis program in SAS from the folder *OFIS SAS programs* located in the OFIS folder.
   a) IMS1.sas calculates catch statistics for “Individual Fish” export datasets only
   b) IMS2.sas calculates catch statistics for a combination of “Individual Fish” and “Group Fish” export data sets.
      i) Individual fish data and group fish data are exported separately. Both data sets are required for analysis with IMS2.sas.
   c) BACKCALC.sas back-calculates length-at-age (annulus formation) from “Backcalculated Growth” export data sets.
2) Change the input file name(s) to the desired data file name(s).
   a) IMS2.sas requires two input datasets. The first dataset is for individual fish data and the second is for group data.
3) Click the Submit icon to start the analysis.

Procedures for running analyses on an exported Individual Fish data set.



Procedures for running analysis on samples containing both individual and group fish data.



Querying Module

Provided with the OFIS software is a querying module for extracting data from the database. This module provides access to the entire database and operates with all the capabilities of MS Access. The querying module allows a user to select specific criteria for customizing an output data set. A user can select the variables to be exported as well as specific records for those variables by specifying query criteria.

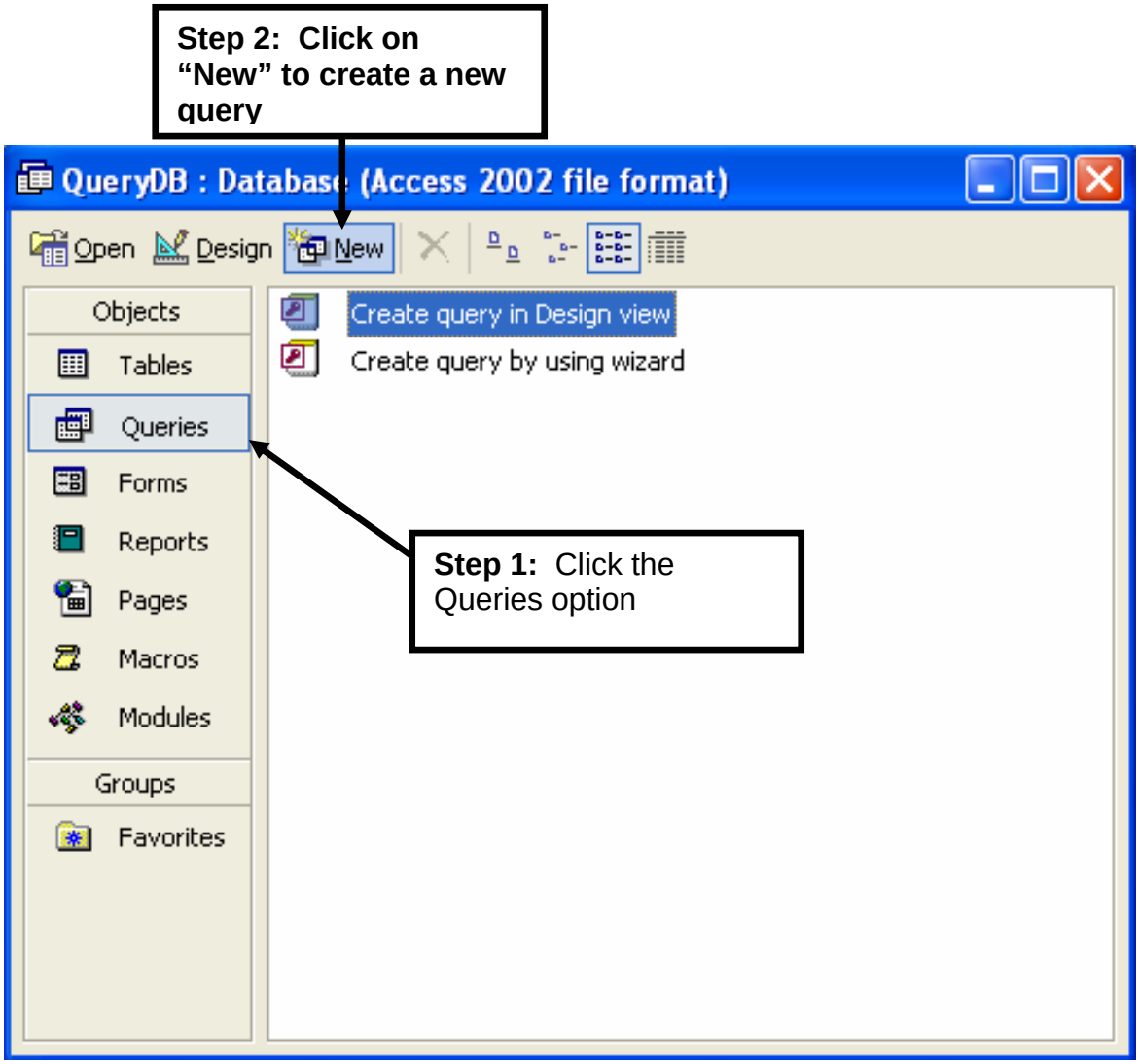
The OFIS querying module is located in "C:\Program Files\ OFIS \ Data Export". To open the querying module double click the QueryDB icon:

If the QueryDB file cannot be found contact your Local OFIS Manager for further assistance.

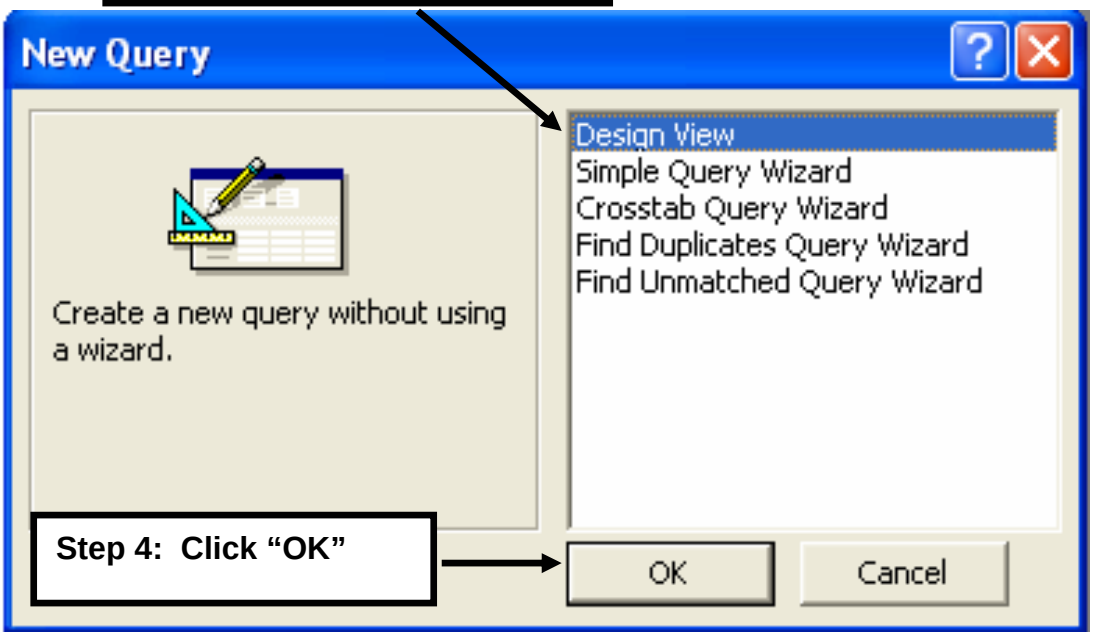
Creating a new query

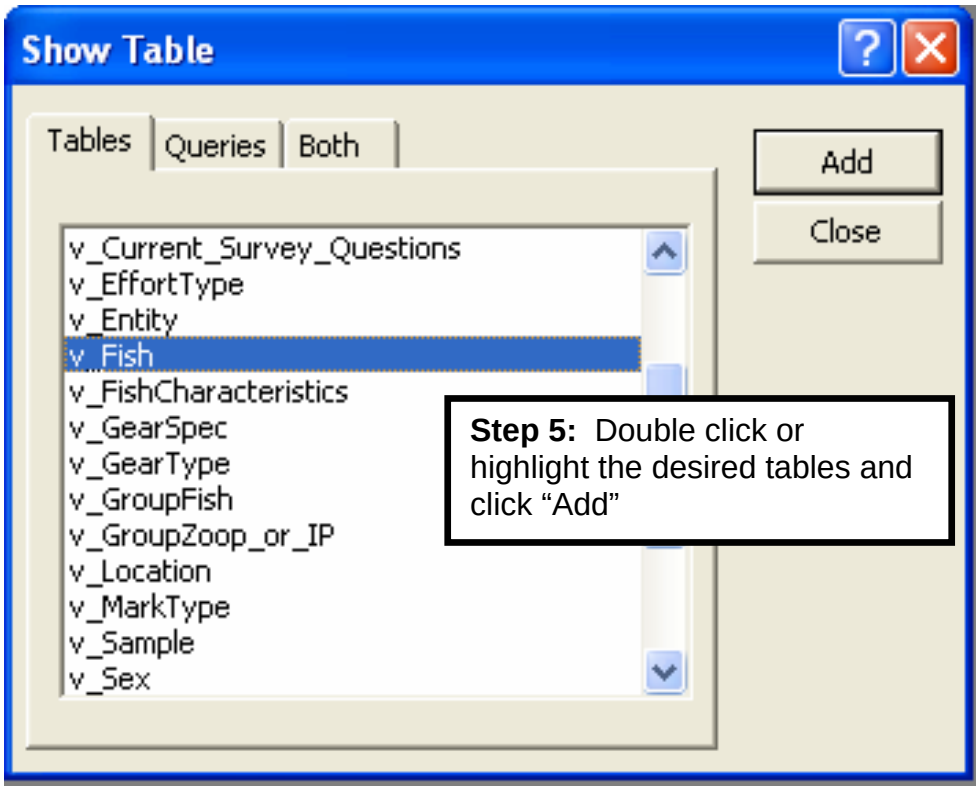
To create a new query:

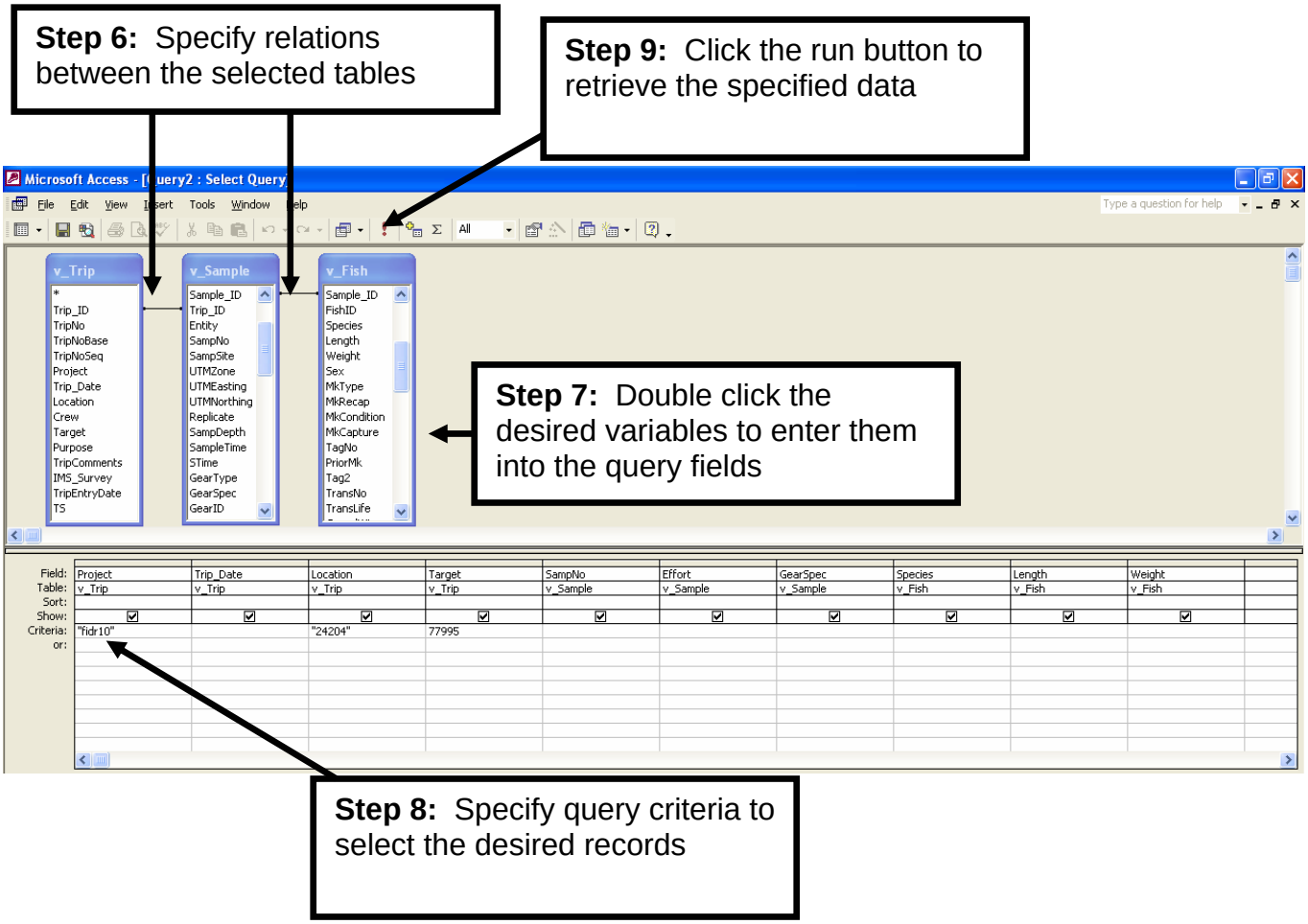
1) Click on the Queries option under Objects on the left side of the QueryDB window. Click “New” from the menu bar on the QueryDB window to create a new query. This will bring up the New Query window.
2) Highlight “Design View” and click “OK” to bring up the “Show Table” window.
3) Select the tables containing all the desired variables by either double clicking or highlighting each and clicking on the “Add” button to bring them into the select query window.
4) Once all the necessary tables have been selected the user must set up the table relations by linking common variables within the selected tables. It is important that a user understands the nested structure of the tables within the database in order to set up the appropriate table relations.
   a) Table relations can be set up by dragging a linking variable from one table to the next. For example, Trip_ID is the variable that links the Trip and Sample tables (Trip_ID occurs in both). Dragging Trip_ID from the Trip table to Trip_ID in the Sample table creates a line between that variable in those two tables, linking those tables by Trip_ID.
   b) This can be done for as many tables as necessary but understand that relations should be shaped according to the nested hierarchy within the database. Fish data should be linked to sample data which is first linked to Trip Meta data.
5) Variables with each table can be selected for export by double clicking on them within the table itself or by entering (typing or selecting from the dropdown list) the desired table and field names into the appropriate query cells.
6) The data set can be further customized to extract only particular records for one or more variables by specifying the corresponding record-type in the “Criteria” field under the Field and Table names. For example, to extract only saugeye data from Buckeye Lake a user can enter 80026 under species and 80102 under location to select only those records. **NOTE: Codes must be used for all coded variables. Refer to the codes list in Appendix 2.**
   a) More than one selection criteria can be specified by entering multiple values, such as selecting samples from multiple dates.
7) Once all variables have been selected and search criteria entered click on the run button to retrieve the selected data.


Step 2: Click on "New" to create a new query
QueryDB : Database (Access 2002 file format)
Open
Design
New
Objects
Tables
Queries
Forms
Reports
Pages
Macros
Modules
Groups
Favorites
Create query in Design view
Create query by using wizard
Step 1: Click the Queries option

Step 3: Highlight “Design View”






Step 6: Specify relations between the selected tables
Step 9: Click the run button to retrieve the specified data
Microsoft Access - [Query2 : Select Query]
File Edit View Insert Tools Window Help
Type a question for help
v_Trip
*
Trip_ID
TripNo
TripNoBase
TripNoSeq
Project
Trip_Date
Location
Crew
Target
Purpose
TripComments
IMS_Survey
TripEntryDate
TS
v_Sample
Sample_ID
Trip_ID
Entity
SampNo
SampSite
UTMZone
UTMEasting
UTMNorthing
Replicate
SampDepth
SampleTime
STime
GearType
GearSpec
GearID
v_Fish
Sample_ID
FishID
Species
Length
Weight
Sex
MkType
MkRecap
MkCondition
MkCapture
TagNo
PriorMk
Tag2
TransNo
TransLife
Step 7: Double click the desired variables to enter them into the query fields
Field: Project Trip_Date Location Target SampNo Effort GearSpec Species Length Weight
Table: v_Trip v_Trip v_Trip v_Trip v_Sample v_Sample v_Sample v_Fish v_Fish v_Fish
Sort:
Show:
Criteria: "fidr10" "24204" 77995
or:
Step 8: Specify query criteria to select the desired records

Exporting Data Queries

Once the data have been retrieved from OFIS they can be exported for summary and analysis. To export a data query:

1) From the menu bar Click on “File” and select “Export”.
2) Specify the directory to which the data are to be exported, the filename, and type of data file to be exported (text, excel, etc…).
3) Click the “Export All” button to save the data to the specified filename and directory.

NOTE: The SAS programs provided for analysis of fisheries data are written to accept standard OFIS export data sets. New programs must be written to analyze customized data sets exported using the querying module.

Protocols for Additions to the Database

PROTOCOLS FOR ADDITIONS TO THE DATABASE..... 6 - 1
Protocols: Data Codes..... 6 - 4
Protocols: Variables..... 6 - 6
Protocols: Suites of Variables..... 6 - 8

Protocols for Additions to the Database

All OFIS users and individuals that collect data in the field or laboratory will occasionally find that the database does not meet their needs for data storage. Updates of the database are expected as new needs arise. These updates must be implemented through procedures that ensure compatibility with the established database. Protocols to make additions to the database are outlined in this section. Always check Appendix 1 to see if the variable is already present in the database.

The protocols in this section are intended to prevent ambiguity of data codes, redundancy of database variables, and to provide guidelines for the introduction of new suites of variables. When data codes or variables are needed in the field, but are not available in the database, the first step will always be to assign temporary codes and variables. However, these temporary field codes and variables should never be entered into the database.

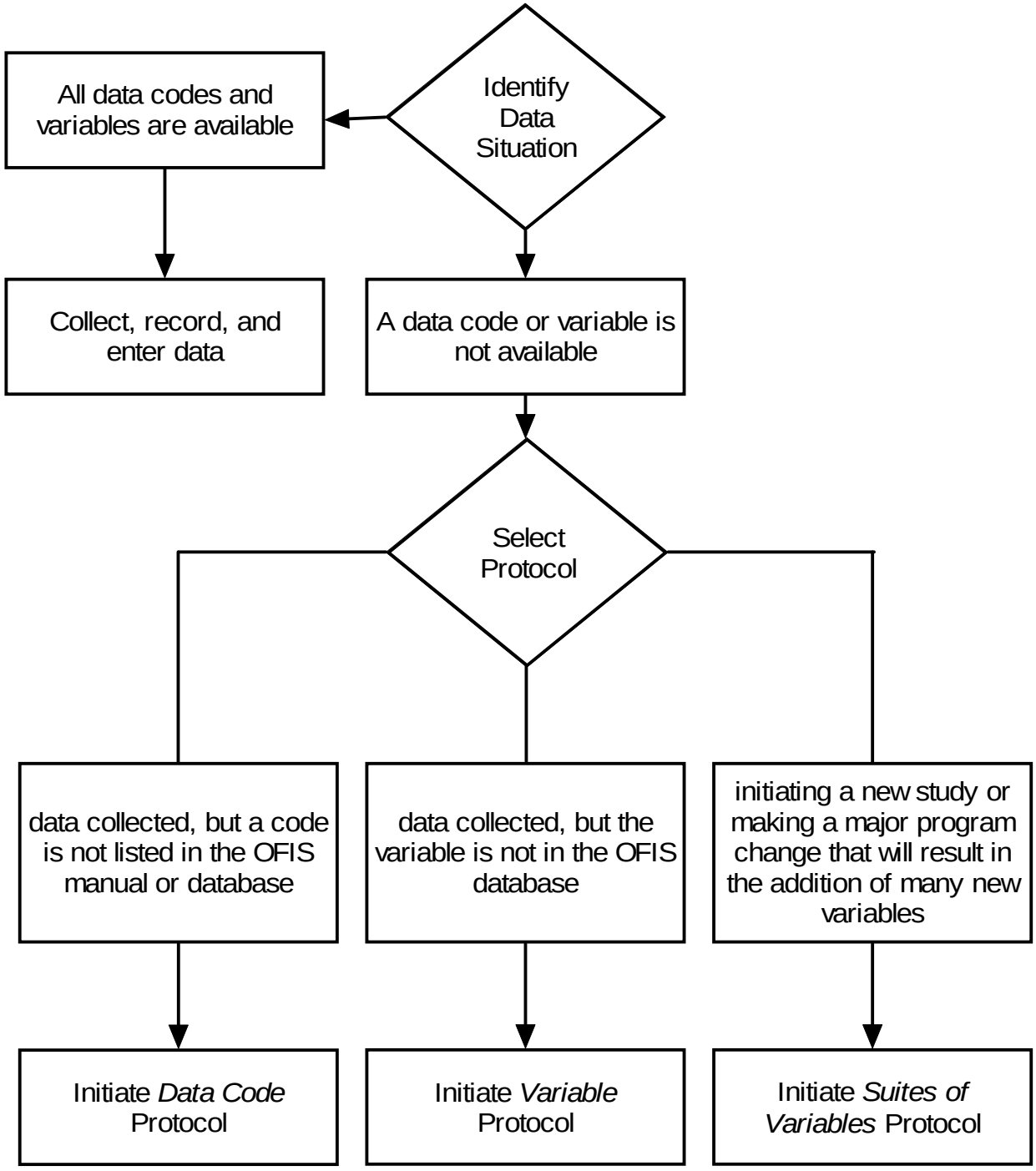
Protocols

- **Data codes** - protocols for new data codes are used to add codes to qualitative variables such as location, species, or gear type. Additions of new codes are expected as new locations are sampled, new species are introduced into Ohio waters, or new types of gear are used.

- **Variables** - protocols for new variables are used to add variables required by increased data needs for projects and programs. These variables may be qualitative, such as location, species, or geartype, or quantitative, such as fish length, ovary weight, or age.

- **Suites of variables (tables)** – protocols for new suites of variables will be used to add groups of variables to the database that may differ somewhat from the existing database structure. These types of changes can be expected with the addition of new projects or project objectives. Consultation with an OFIS representative will help clarify whether a request involves the addition of variables, or the addition of a suite of variables, to indicate which protocol to follow.

Choosing a protocol for database changes.



Protocols: Data Codes

Introduction of New Data Codes

Data codes are qualitative codes that identify individual data for specific variables such as a location, species, or gear code. The protocol for obtaining a new data code is as follows:

1. If a new code is needed immediately, field personnel assign a temporary code for use only on field data sheets. The new code should be described in the comments section of field notes. A temporary code should never be entered into the database.

2. An individual that needs a new code contacts their OFIS representative, indicates which variable the datum is identified with, and fully describes the datum.

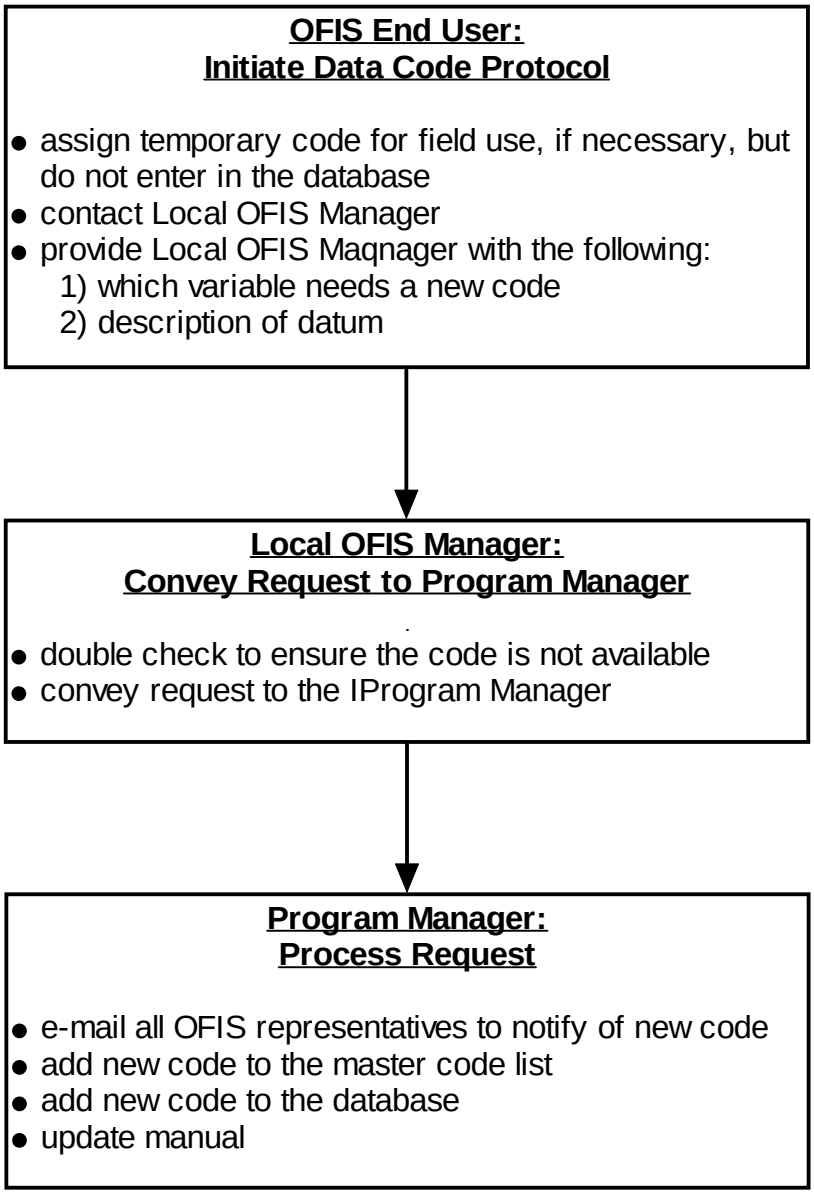
3. The OFIS representative contacts the Program Manager, conveys the variable and descriptive information.

4. The Program Manager sends an e-mail to all OFIS representatives to indicate that a new code has been added.

5. The IFRE representative adds the new code through the OFIS Maintenance menu.

6. The Program Manaer updates the OFIS manual.

Protocol for adding a data code.



Protocols: Variables

Introduction of New Variables

Variables are categories of specific types of data that can be either qualitative or quantitative. Qualitative variables include location, geartype, or crew, whereas quantitative variables include fish length, ovary weight, or age. OFIS contains many variables that are not present on the data entry forms. BEFORE INITIATING THE PROTOCOL TO ADD A NEW VARIABLE, CHECK APPENDIX 1 TO SEE IF THE PROPOSED VARIABLE ALREADY EXISTS IN OFIS.

The protocol for adding a new variable is as follows:

1. Field personnel develop a temporary variable for use only on field data sheets if a new variable is needed immediately. The new variable should be described in the comments section of field notes. A temporary variable cannot be entered into the database.

2. A request for a new variable is sent to the Local OFIS Manager. The request should include:
    a. brief discussion of why the variable is needed;
    b. description of the variable;
    c. suggestions for codes, if applicable.

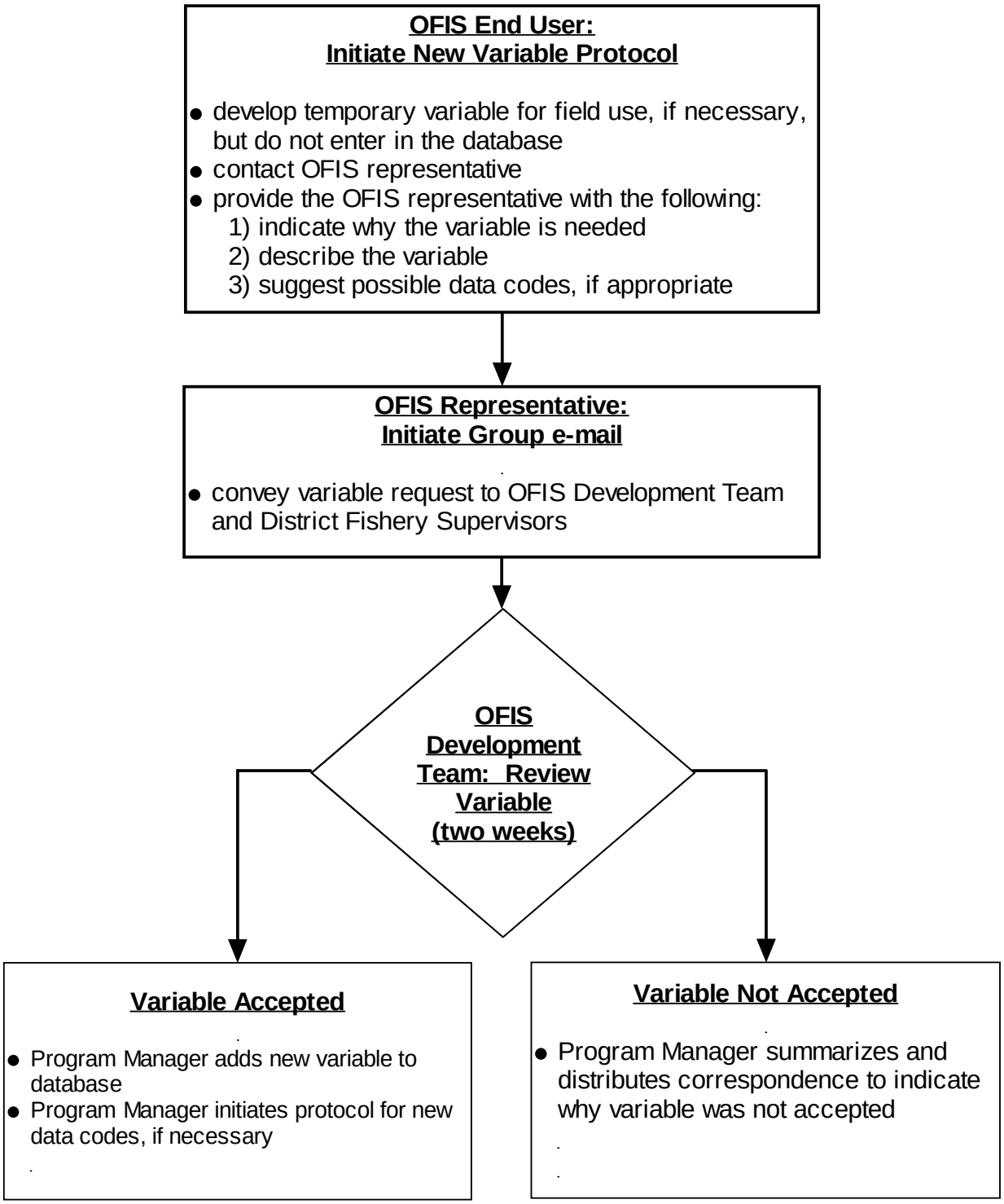
3. The OFIS representative initiates a group e-mail (OFIS Development Team) to indicate that a new variable is needed.

4. Addition of the variable is discussed (via e-mail) by the OFIS Development Team for a two-week period.

5. If accepted:
    a. the new variable is added to the database through the Program Manager;
    b. the database with the updated variable will be provided as soon as possible;
    c. the protocol is followed for the development of new codes (if applicable).

6. If not accepted:
    a. the reason why the variable was not accepted is summarized and distributed by the Program Manager (the most likely reason a variable may not be accepted is redundancy).

Protocol for adding a variable.



Protocols: Suites of Variables

Introduction of New Suites of Variables (Tables)

Suites of variables will periodically be added to the database as new projects are initiated, or program objectives change. Unlike adding a single variable, these suites of variables may differ enough from other variables currently in the database to warrant modification of database structure. These additions require significant thought about how the new data will be used, and how they will relate to other data. The protocol for adding a new suite of variables is as follows:

1. Individual requesting a new suite of variables submits a request to their Local OFIS Manager. The request should include:
    a. indication of why the new variables are needed;
    b. detailed description of the new variables;
    c. discussion of how the new variables might relate to existing variables;
    d. explanation of how the new information will be used;
    e. suggest data codes, if appropriate.

2. Local OFIS Manager contacts the Program Manager to review addition of the new suite of variables.

3. Program Manager reviews the request with the initiator of the protocol.

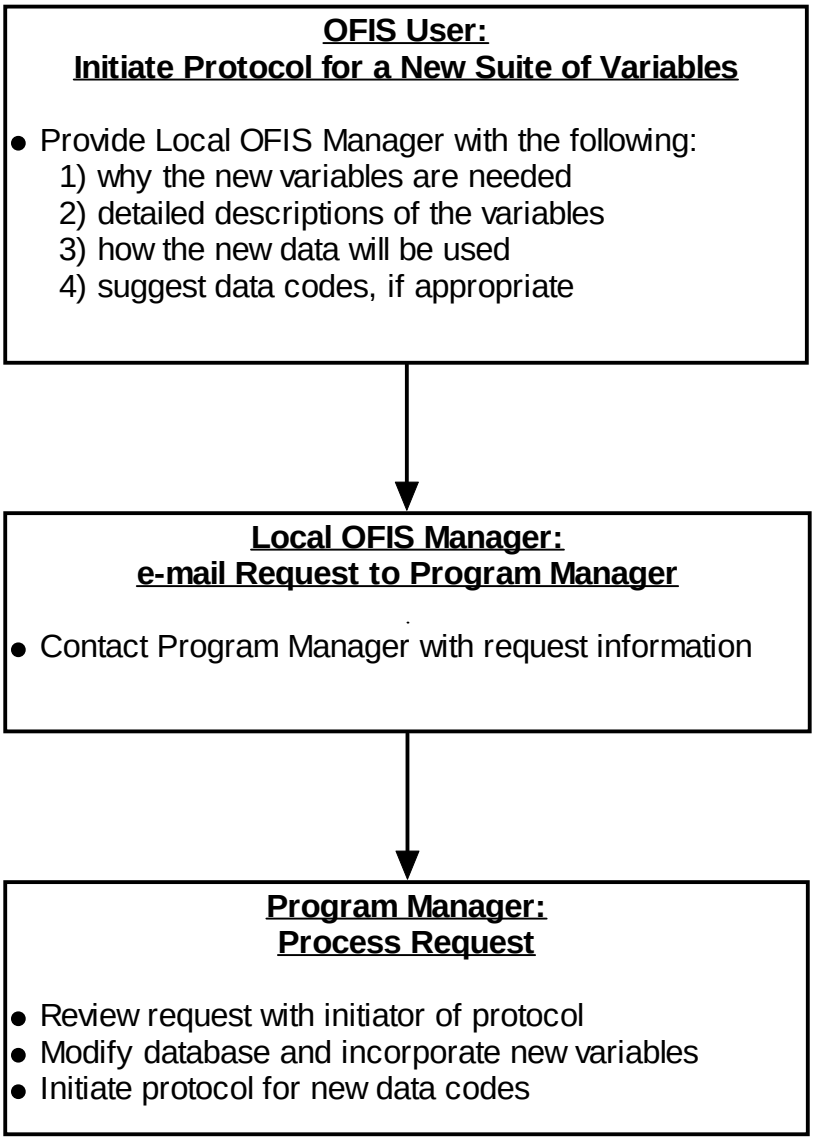
4. The Program Manager requests to modify the database as necessary.

5. Program Manager initiates the protocol for the addition of new data codes.

6. The updated database will be provided to the requesting party as soon as possible, and at the time of normal updates for the rest of OFIS end users.

Note: Requests for suites of variables should be made prior to initiating field collections of data.

Protocol for adding a new suite of variables.



Data Administration

DATA ADMINISTRATION ..... 7 - 1
Data Integrity ..... 7 - 3
Data Storage ..... 7 - 5
Data Sharing Policy ..... 7 - 6

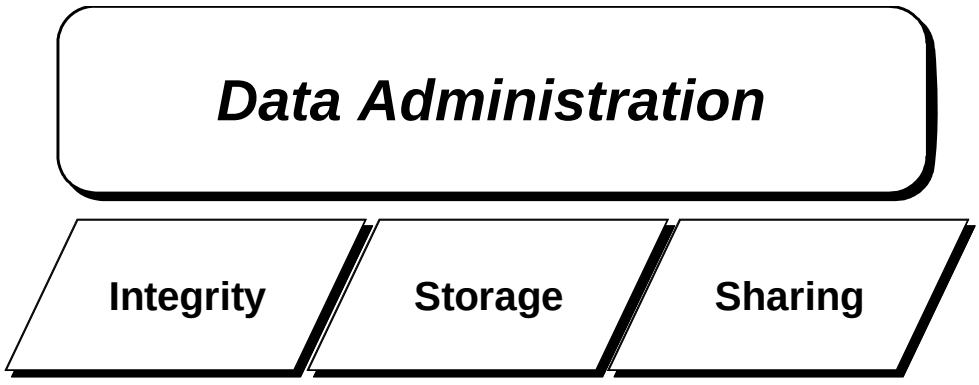
Data Administration

Data administration is a critical part of developing and maintaining a database. Five components of data administration in OFIS are: 1) ensuring data integrity, or quality control; 2) maintaining data accuracy; 3) transferring current data; 4) storing current and historical data; and, 5) sharing data. Data will be administered at individual, organizational unit, and central levels. Data administration is a shared responsibility.

Data Integrity, Maintenance, Transfer, Storage, and Sharing

- **Integrity** – Data integrity is the reliability of data that results from quality control in every step of data acquisition. The integrity of data is the joint responsibility of individuals that are collecting, reporting, entering, and using data. Good data integrity results from appropriate sampling strategies and field procedures, accurate data reporting, careful data entry, and thoughtful use of data. Data integrity is the most widely shared responsibility.
- **Storage** – OFIS data are backed up daily by the ODNR Office of Information Technology. Data are stored on servers located in a climate controlled, fireproof, secure storage area. Data backed up at OSU or Miami U are backed up locally and less frequently than at Fountain Square.
- **Sharing** – Sharing data stored in OFIS will provide opportunities to allow other investigators to use Ohio fisheries data for monitoring or analysis. Only authorized OFIS end users are provided access to the entire database. Data requests from non-OFIS users will be addressed through procedures for data sharing.

Data administration is a shared responsibility of all OFIS end users.



Data Integrity

Data integrity is the foundation of a useful database. Integrity of data is a function of how carefully data are collected, reported, and entered into a database. Virtually everyone involved with OFIS has a role in ensuring quality control of data, from biologists who design studies, to field crews that collect data, to personnel that enter data on the computer. These are the first and most critical steps in data administration.

Steps to Data Integrity

- Study Design – Carefully designed studies will help ensure that field procedures are valid and consider the best available information. Field studies and simulation models are often based upon literature review, investigator experience, and preliminary data when available. Once OFIS is populated with data, the database itself will assist biologists in the design of studies by providing background data for use in study design. In this sense, data integrity can be self-perpetuating.

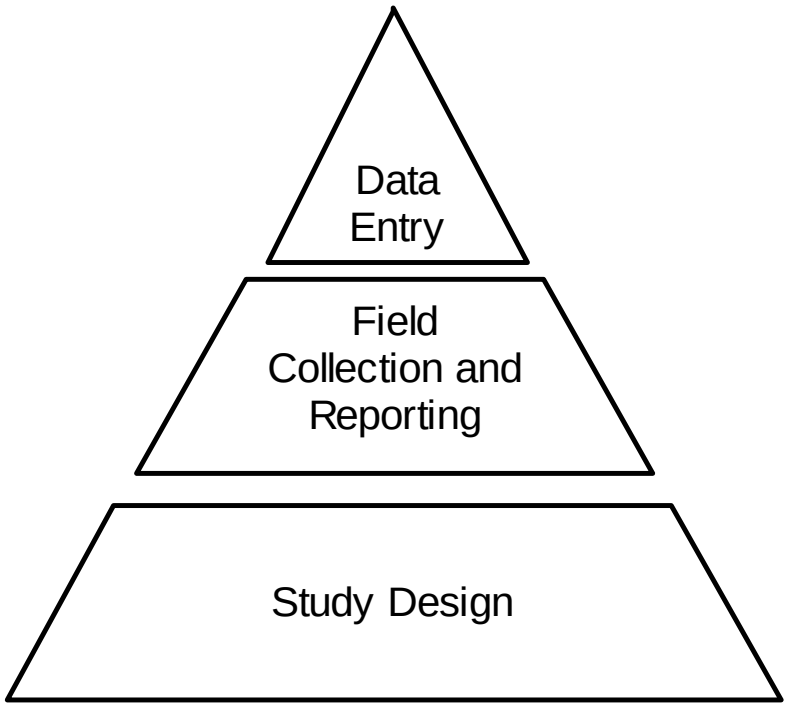
- Field Collection - Field data must be collected and reported with sound and uniform methods to facilitate data integrity. Field crews must make every effort to collect reliable data and report them in a clear and error-free manner.

- Data Entry - Data entry is the final step toward ensuring data integrity. Data entry must be proofed and edited as a minimum standard for OFIS:
    1) run data through an error-trapping program;
    2) detect errors;
    3) correct raw data as necessary.

  Data may also be edited with line-by-line field proofreading, although this level of detail is not required by OFIS guidelines.

Note: Deletion of some data will not be possible until a modification in the database is made.

Data Integrity is the Foundation of a Useful Database



Data Storage

Central storage of the OFIS database ensures that a current copy is always secure and available. Storage of the database is the responsibility of the Database Administrator and the ODNR Office of Information Technology.

Data Storage Procedures

The Database Administrator will ensure that back up of the most current database is performed daily at Fountain Square, Columbus, OH. The Program Manager will ensure that the most current codes files are backed up at the Inland Fisheries Research Unit, Hebron, OH.

Data Sharing Policy

Sharing data is one of the main reasons that OFIS was created. Data must be shared carefully to ensure database security and avoid intellectual property and conflict of interest issues. Authorized OFIS end users are strictly prohibited from transferring any portion of the database to non-authorized parties. All data transfers must proceed as follows:

Data Sharing Procedures

1) Direct all data requests from external sources (requests by non-authorized OFIS users) to the Program Manager.

2) The Program Manager will inform the party requesting data to submit a formal letter of request that includes:
   a. Full name, affiliation, position, address, phone number, e-mail address, date;
   b. Itemized list of requested data;
   c. Desired data format;
   d. Intent for use of the data;
   e. Agreement to recognize the source of the data in the acknowledgements or citations of any written publication;
   f. Agreement to recognize the source of the data in the acknowledgements or citations of any professional presentation.

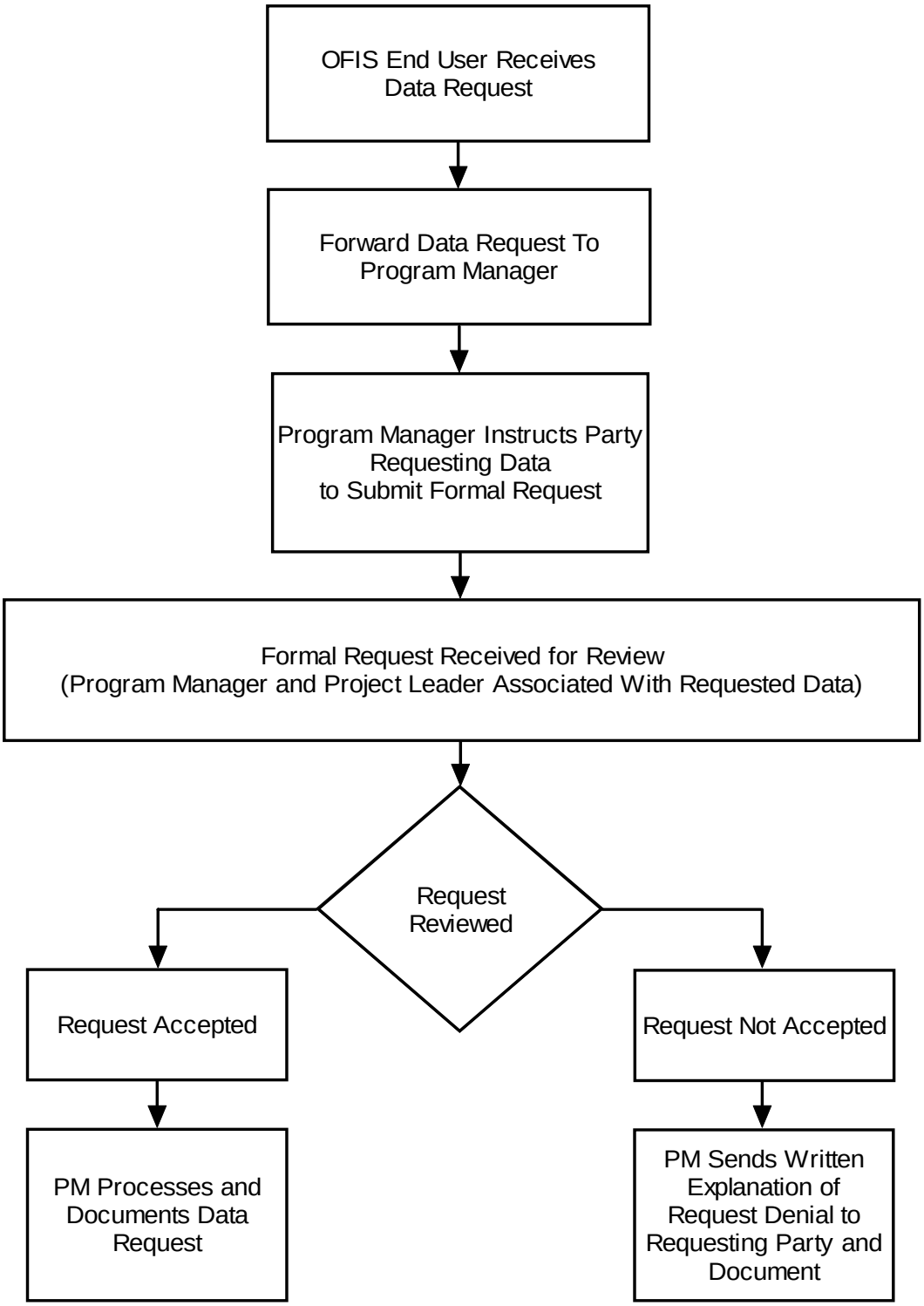
3) Upon receipt of the formal request, the Program Manager will forward a copy of the request to the project leader associated with the data for joint review of the request.

4) The request will be accepted or rejected based upon reviews by the Program Manager and the project leader.

   a) If the request is accepted, the Program Manager will query the database to fill the request and provide either raw or summary data. **Complete downloads of any portion of OFIS are strictly prohibited.**

   b) If the request is not accepted, the Program Manager will send a formal letter to the requesting party to specify why the request cannot be filled.

Procedure for responding to external OFIS data requests.



Security

Database security is necessary to ensure that the database continues to function properly, whereas **data security** is essential to protect data from corruption or misuse. This section of the manual provides details about security issues central to OFIS, including authorization levels of users, a user agreement, database modification, and data use and sharing.

Security Topics Important to OFIS Users

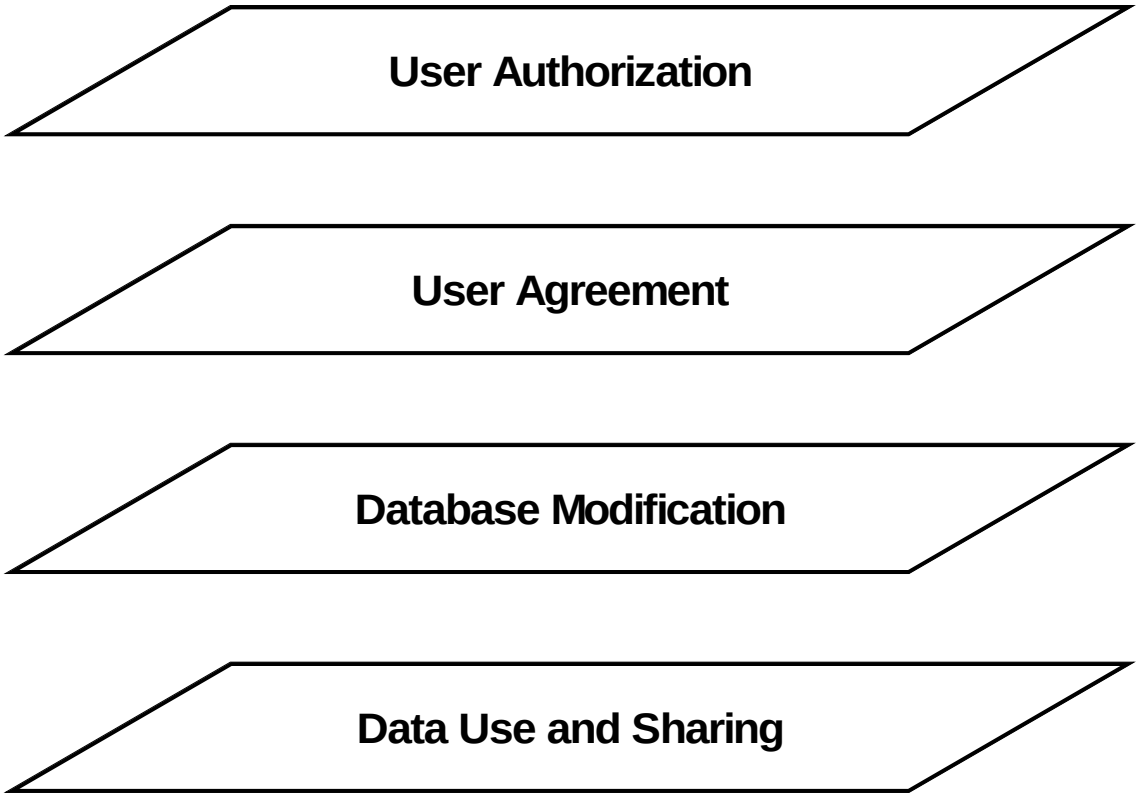
- **User Authorization** – Four levels of authorization are specified for OFIS end users. Each level provides a different degree of access to the database.

- **User Agreement** – All OFIS end users are requested to read and follow OFIS protocols and procedures.

- **Database Modification** – The database is intended to meet the needs of all OFIS users. Modifications of OFIS will be necessary through time as needs expand. Protocols for some modifications, such as the introduction of new data codes, new variables, and new suites of variables are available in the *Protocols* section. Procedures for the modification of forms are specified in this section on security.

- **Data Use and Sharing Policy** – Sharing OFIS data to meet requests of parties that are interested in OFIS data but are not authorized for use, such as other state agencies, universities, or consultants is discussed in the *Data Administration* section under Data Sharing. Specific procedures are outlined in that section for reviewing and meeting data requests. **Complete downloads of any portion of OFIS to non-authorized parties are strictly prohibited. A complete download is defined as transfer of ANY data provided in the format of the OFIS database structure.**

Security


User Authorization
User Agreement
Database Modification
Data Use and Sharing

User Authorization

Access to OFIS is authorized at four different levels to facilitate technical support, database stability, and security. Personnel included in each level and their access to the database are specified below:

- **Level 1: Database Administrator** (Jeff Rowley) authorization provides complete access to the database for use and modification. This level is limited to the Database Administrator because the database structure has become highly technical with the current SQL version of OFIS.

- **Level 2: Program Manager** (Scott Hale / Rich Zweifel) authorization provides access to enter data, editing records at all levels, and the maintenance tables for upgrading codes lists.

- **Level 3: Local OFIS Manager** authorization provides access to enter data and edit records up to and including the sample table level.

  District 1: Marty Lundquist
  District 2: Ed Lewis
  District 3: Andy Burt
  District 4: Tim Parrett
  District 5: Glen Trueb

- **Level 4: OFIS Associate** (all other users) authorization provides access to enter and edit data records at the fish, angler, water, and plankton levels.

Use authorization levels 1-4 for OFIS.

OFIS Users (Authorization Level)	Access: Edit records Data entry Data browsing Data export Query module	Access: Edit sample table data	Access: Maintenance menus Full edition	Access: Complete access
(1) Database Administrator	**yes**	**yes**	**yes**	**yes**
(2) OFIS Program Managers	**yes**	**yes**	**yes**	**no**
(3) Local OFIS Manager	**yes**	**yes**	**no**	**no**
(4) OFIS Associate	**yes**	**no**	**no**	**no**

User Agreement

Database security and data security depends upon good communication and a complete understanding of procedures and protocols for database use and data sharing. All OFIS users will be asked to read and accept an agreement pertaining to database modification and data sharing. This agreement provides a reminder to OFIS users to be considerate of fellow OFIS users for everyone's mutual benefit. The agreement is specifically intended to:

- Ensure that new database users are familiar with OFIS procedures and protocols.
- Clarify the means of database modification and data sharing.
- Establish an agreement among OFIS users to follow protocols and procedures for database modification and data sharing.
- Remind OFIS users to be considerate of the data contributions from all project leaders. Each of us should make good faith efforts to communicate with the originators of data when information will be used for summary, analysis, or presentation.

OFIS USER AGREEMENT
Ohio Fisheries Information System
Current: July1, 2004

The following overview is provided as a reminder to OFIS users to know and use protocols and procedures that are important to security of our database and data for the mutual consideration of all database users. Please review these protocols and procedures before using the database.

Database Modification

- New data codes, variables, and suites of variables will be added to the database only through protocols established in the OFIS manual.
- Modification of the database is limited to Level 1 authorization (Database Administrator).

Data Sharing

- Complete downloads of any portion of OFIS to non-authorized parties are strictly prohibited. A complete download is defined as transfer of ANY data provided in the format of the OFIS database structure (i.e. a complete table or groups of tables).
- Data sharing procedures in the OFIS user manual should be reviewed and followed upon receiving a request for data from parties not authorized to use OFIS.
- Distribution of OFIS data to parties not authorized to use OFIS is limited to Level 2 authorization.

OFIS Data Use

- OFIS users who intend to formally use data for presentation or publication that were not collected under their direction are **strongly encouraged** to review any intended use of those data with the project leader who directed the data collection prior to such use.

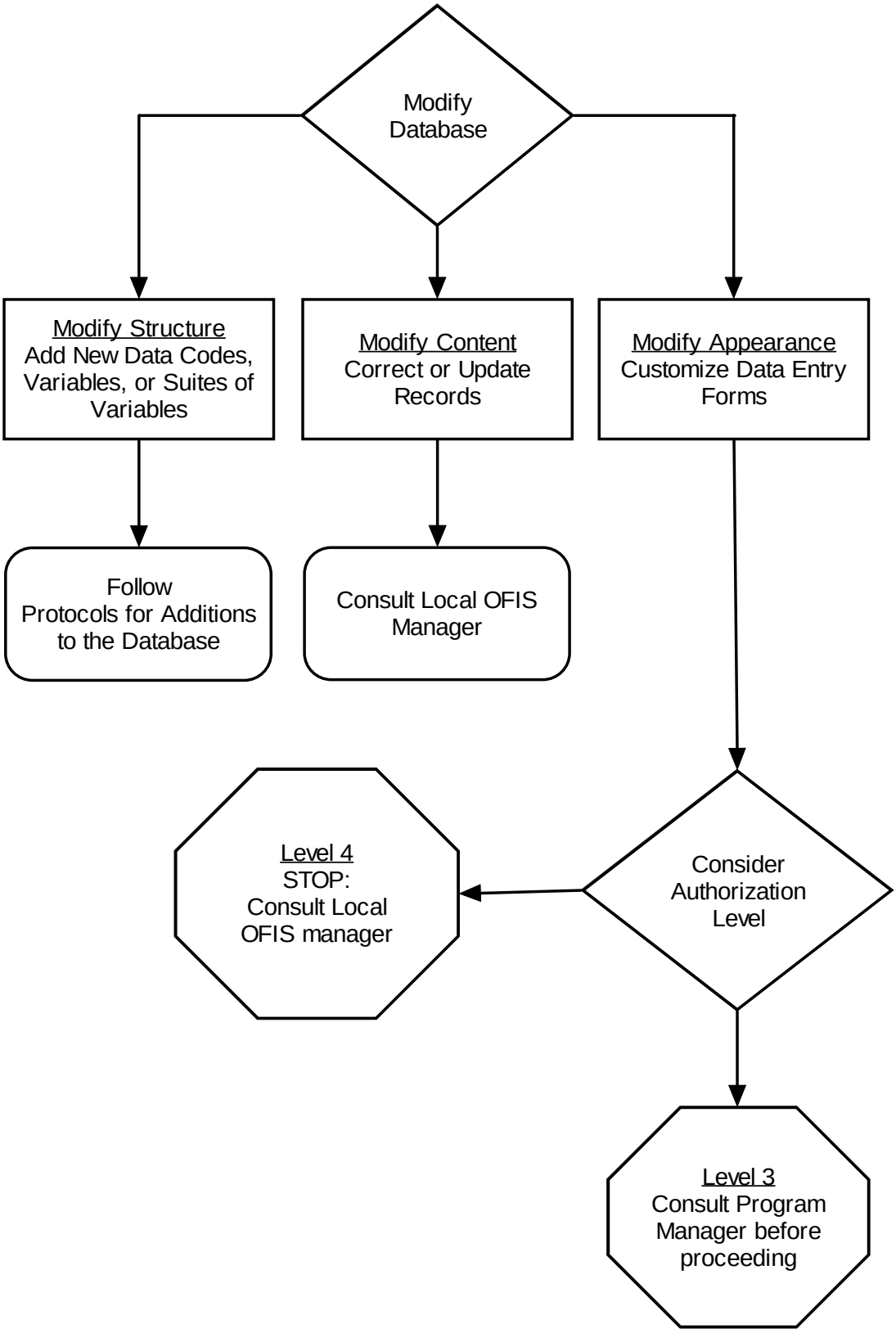
Database Modification

The database can be modified in structure, content, or appearance. Database structure is the collection of working parts of the database, such as the variables, and how they relate to one another. Database content refers to the records of data that have been entered into the database. Database appearance is the “look” of the forms used for data entry. Access to modify the database varies among the authorized level of use. OFIS protocols and procedures guide end users through the steps necessary to modify the database.

Modification of database **structure** is necessary to make additions to the database and is conducted by the Database Administrator (DBA). Allowing only one person to make these changes facilitates production of uniform updates. Protocols for the introduction of new data codes, variables, and suites of variables in the *Protocols for Additions to the Database* section outlines the steps for all OFIS users to take when these types of additions to the database are required.

Modification of database **content** is necessary to periodically correct data records and regularly update data records. Procedures for data maintenance, when records need corrected or supplemented, or transfer, when data need to be regularly routed for updating the database, are specified in the *Data Administration* section.

Modification of database **appearance** may be desired in some cases to make data entry easier. OFIS users should submit requests for database modification to the Program Manager and cc all Database Development Team members in the correspondence.


Modify Database
Modify Structure
Add New Data Codes, Variables, or Suites of Variables
Modify Content
Correct or Update Records
Modify Appearance
Customize Data Entry Forms
Follow Protocols for Additions to the Database
Consult Local OFIS Manager
Consider Authorization Level
Level 4
STOP:
Consult Local OFIS manager
Level 3
Consult Program Manager before proceeding

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Appendix 1: Table Fields and Descriptions

Appendix 1.1: Active Projects

Variable	Description
ProjectID	Project number
ProjectOrgUnit	Organizational unit responsible for project implementation
ProjectActive	Is this project active? (True / False)

Appendix 1.2: Core Type

Variable	Description
CoreType	Abbreviated code for tissue core sample location
CoreDescription	Location of tissue core sample

Appendix 1.3: Effort Type

Variable	Description
EType	Abbreviated code for sample effort type.
EDescription	Description of the sample effort used.

Appendix 1.4 Entity

Variable	Description
Entity	Abbreviated code describing the type of sampling conducted
EntityDesc	Type of sampling conducted

Appendix 1.5: Gear Specifications

Variable	Description
GearSpec	Numeric code assigned to a sampling gear
GearSpecName	Specific description of a sampling gear
GearType	Numeric code assigned to each family of gears (gillnets, electrofishing, etc…)

GearDescript	

Appendix 1.6: GearType Codes

Variable	Description
GearType	Numeric code assigned to a family of gears
GearTypeName	Name given to a family of gears
GearEntity	Entity sampled by a family of gears

Appendix 1.7 Location Codes

Variable	Description
Location	Numeric code assigned to a water body
Lake	Water body name
Acreage	Surface acreage (acres)
County	County(s) water body is located
Township	Township(s) water body is located
Watershed	
Watershed2	
Shoreline	
Type	
Latitude	
Longitude	
MaxDepth	Maximum depth (m)
PondAcess	
PondRefSiteNo	
PondInflow	Does the water body have an inflow? (true/false)
PondOutflow	Does the water body have an outflow? (true/false)
PondHistory	
Comments	

Appendix 1.8: Mark Condition

Variable	Description
MkCondition	Numeric code assigned to a fish condition
MkConditionDesc	Description of a fish condition

Appendix 1.9: Mark type

Variable	Description
MkType	
MkTypeDesc	

Appendix 1.**10:** Sample Sites

Variable	Description
SiteNo	Sample site number
Location	Waterbody name
UTM Zone	UTM Zone of the sample site
UTM Northing	UTM Northing coordinates of the sample site
UTM Easting	UTM Easting coordinates of the sample site

Appendix 1.11: Sex

Variable	Description
Sex	Abbreviated code used to indicate fish sex and maturity
SexDescription	Description of sex / maturity codes

Appendix 1.12: Species

Variable	Description
Species	Numeric code assigned to a fish species or group of species
SpeciesName	Common name
Latin Name	Latin binomial – genus and species
EPA Code	
Yintercept	Intercept used for Fraser-Lee growth backcalculations
CmLength-RangeLow	Minimum length observed for a species
CmLength-RangeHigh	Maximum length observed for a species

Appendix 1.13: Structure

Variable	Description
Struc	Abbreviated code used to signify the structure used to age a fish
StrucDescription	Structure used to age a fish

Appendix 1.14: Substrate

Variable	Description
Substrate	Abbreviated code used to indicate substrate type
SubstrateDesc	Description of a substrate category

Appendix 2: Field Codes

Appendix 2.1: Active project codes

ProjectID:	ProjectOrgUnit:	ProjectActive:
ADFM05	AD	False
ADFM06	AD	False
ADFM09	AD	False
ADFM27	AD	False
F1DM03	F1	True
F1DR14	F1	False
F1DX06	F1	False
F1NB01	F1	False
F1NB02	F1	False
F1NX01	F1	False
F1SM01	F1	True
F29R02	F2	False
F29R03	F2	False
F29R27	F2	False
F29RS3	F2	False
F2BN01	F2	False
F2DM58	F2	True
F2DM59	F2	False
F2DM60	F2	True
F2DR19	F2	False
F2DR23	F2	False
F2DR25	F2	False
F2DX06	F2	False
F2NB01	F2	False
F2NM03	F2	False
F2NX01	F2	False
F2SM01	F2	True
F2SM02	F2	False
F3DM02	F3	True
F3DR19	F3	False
F3DX06	F3	False
F3NB01	F3	False
F3NB02	F3	False
F3NX01	F3	False
F3SM01	F3	True
F3SM02	F3	True
F4DM01	F4	False
F4DM02	F4	False

Appendix 2.1 (cont…)

ProjectID:	ProjectOrgUnit:	ProjectActive:
F4DM03	F4	False
F4DM05	F4	False
F4DM06	F4	False
F4DM07	F4	True
F4DR09	F4	False
F4DR10	F4	True
F4DR11	F4	True
F4DX06	F4	False
F4NB01	F4	False
F4NX01	F4	False
F4NX02	F4	False
F4SM01	F4	False
F4SR02	F4	True
F53RS0	F5	False
F5DM02	F5	True
F5DR07	F5	True
F5DR19	F5	True
F5DX06	F5	False
F5NB01	F5	False
F5NX01	F5	False
F5SM01	F5	True
FADB01	FA	True
FADB02	FA	True
FADB03	FA	True
FADM03	FA	True
FADM04	FA	True
FADM05	FA	True
FADR29	FA	True
FADR36	FA	True
FADR37	FA	True
FADR38	FA	True
FADR39	FA	True
FADR40	FA	True
FADR41	FA	True
FADR42	FA	True
FADX03	FA	True
FADX07	FA	True
FADX09	FA	True
FADX10	FA	True
FADX11	FA	True
FAIR01	FA	True

Appendix 2.1 (cont…)

ProjectID:	ProjectOrgUnit:	ProjectActive:
FANB01	FA	True
FASR01	FA	True
FCCM01	FC	True
FCDR01	FC	True
FCFX01	FC	True
FCNB01	FC	True
FCNB02	FC	True
FCNM01	FC	True
FCNM02	FC	True
FCNM03	FC	True
FCNM04	FC	True
FCNX04	FC	True
FCSM01	FC	True
FCSR01	FC	True
FFDB01	FF	True
FFDB02	FF	True
FFDR01	FF	True
FFDR04	FF	True
FFDR05	FF	True
FFDR06	FF	True
FFDX01	FF	True
FFNB01	FF	True
FFSM01	FF	True
FIDB01	FI	True
FIDR01	FI	True
FIDR03	FI	True
FIDR06	FI	True
FIDR07	FI	True
FIDR08	FI	True
FIDR10	FI	True
FIDR11	FI	True
FIDR12	FI	True
FIDR13	FI	True
FIDR14	FI	True
FINB01	FI	True
FINX01	FI	True
FISR01	FI	True
FMD202	FM	False
FMD203	FM	False
FMD207	FM	False
FMD224	FM	False
FMD225	FM	False

Appendix 2.1 (cont…)

ProjectID:	ProjectOrgUnit:	ProjectActive:
FMD236	FM	False
FMD2S0	FM	False
FMD2SO	FM	False
FPDX01	FP	True
FPDX02	FP	True
FPDX03	FP	True
FPDX04	FP	True
FPDX05	FP	True
FPDX06	FP	True
FPDX09	FP	True
FPDX10	FP	True
FPNB01	FP	True
FPNX01	FP	True
FSDB01	FS	True
FSDB02	FS	True
FSDB03	FS	True
FSDR03	FS	True
FSDR06	FS	True
FSDR11	FS	True
FSDR13	FS	True
FSDR17	FS	True
FSDR18	FS	True
FSDX01	FS	True
FSNB01	FS	True
FSSR01	FS	True
NSF859	NS	False
WWSR04	WW	False

Appendix 2.2: Core type codes

CoreType	CoreDescription
LD	Left Dorsal
LM	Left Middle
LV	Left Ventral
RD	Right Dorsal
RM	Right Middle
RV	Right Ventral
UK	Unknown

Appendix 2.3: Effort type codes

EType:	EDesc:
A	Area
D	Distance
N	Effort not measured
T	Time
V	Volume

Appendix 2.4: Entity codes

Entity Code	Entity Type
A	Angler
F	Fish
P	Plankton
W	Water

Appendix 2.5: Gear specification codes

GearSpec:	GearSpecName:	GearType:
99	No Gear: Observed	99
96	Water Collection: Unknown Water Collection Sampler	17
59	Integrated tube sampler for water collection	17
48	Integrated Tube Sampler for water collection	17
40	Water Collection: VanDorn, 2.2 liter horizontal alpha bottle	17
98	Plankton: Unknown Plankton Sampler	16
47	Plankton: Schindler-Patalis sampler (12 liter); 53 um mesh	16
46	Plankton: Schindler-Patalis sampler (10 liter); 60 um mesh	16
39	Plankton: Schindler-Patalis sampler (30 liter), 53 um mesh	16
38	Plankton: Wisconsin-style plankton net, 53 um mesh	16
100	Water Quality: YSI model 85 temp., conductivity, and DO meter	15
97	Water Quality: Unknown Water Quality Sampler	15
45	Water Quality: Licor underwater quantum meter and Horiba U-10 Meter	15
44	Water Quality: Secchi disk	15
43	Water Quality: Licor underwater quantum meter, spherical sensor	15
42	Water Quality: Hanna Total Dissolved Solids & Conductivity meter	15
41	Water Quality: Horiba U-10 Water Quality meter	15
15	Water Quality: YSI model 55 temp. and DO meter	15
86	Angling: Unknown	14
53	Angling: Creel surveys	14
87	Explosives and Concussion: Unknown	13
95	Poisons: Unknown Poison	12
37	Poisons: Quadrat rotenone sampling	12
88	Traps: Unknown Traps	11
89	Trammel Net: Unknown Trammel Net	10
93	Trawl: Unknown Trawl	7
35	Trawl: Miller High Speed Sampler with 0.5 mm mesh	7

Appendix 2.5 (cont…)

GearSpec:	GearSpecName:	GearType:
34	Trawl: Bottom Trawl: 12' net, 12"x24" doors, 3/8" body mesh, 1/4" cod mesh	7
14	Trawl: Neuston net: 1x2m frame, 1.8 mm mesh	7
13	Trawl: Neuston net: 1x2m frame, 0.5 mm mesh	7
92	Gill Net: Unknown Gill Net	6
64	Seine, 8-m, 3-mm mesh	6
62	Experimental gillnet: 0.75, 1, 1.5, 2, 2.5, 3.0 in., 6'x30', TL=180'	6
61	Experimental gillnet: 0.75, 1, 1.5, 2, 2.5 in., 6'x20' panel, TL=100'	6
58	Gill Net: 5" mesh, 100' long, 18' deep	6
57	Gill Net: 5" mesh, 100' long, 12' deep	6
56	Gill Net: 5" mesh, 100' long, 6' deep	6
55	Gill Net: 6" mesh, 200' long, 15' deep	6
54	Gill Net: 5" mesh, 100' long, 18' deep	6
31	Gill Net: Exp 8 panel; 3x0.75x54, 2x1x41, 3x1.5x27, 4x2x20, 4x2.5x16, 6x3x13, 6x3.5x11, 6x4x10	6
30	Gill Net: (Double) 5" mesh, 12 (hobbled to 8') x 200 x 2 nets = 400T	6
29	Gill Net: (Double) 5" mesh, 18 (hobbled to15') x 200 x 2 nets = 400T	6
28	Gill Net: (Double) 5" mesh, 21 (hobbled to18) x 200 x 2 nets = 400T	6
27	Gill Net: 3" mesh, 15' (hobbled to 12') x 150	6
26	Gill Net: 5" mesh, 12' (hobbled to 8') x 200'	6
25	Gill Net: 5" mesh, 18' (hobbled to 15') x 200'	6
24	Gill Net: 5" mesh, 21'(hobbled to 18') x 200'	6
23	Gill Net: Floating, 1.25, 1.5 mesh, 6x50 panel, TL=100'	6
22	Gill Net: Exp .75, 1, 1.5, 1.5, 2 mesh, 5x25 panel, TL=125'	6
21	Gill Net: Exp, .75, 1, 1.25, 1.5, 2 mesh,5x25 panel, TL=125'	6
20	Gill Net: Exp, .75, 1, 1.5, 2 mesh, 4x25 panel,TL=100'	6
19	Gill Net: Sinking 1.75, 2 mesh, 6X50 panel, TL=100'	6
18	Gill Net: Floating, 0.75, 1 mesh, 6x50 panel, TL=100'	6

Appendix 2.5 (cont…)

GearSpec:	GearSpecName:	GearType:
17	Gill Net: Sinking, 0.5, 0.75 mesh, 6x50 panel, TL=100'	6
16	Gill Net: Exp. 0.75, 1, 1.5, 2, 2.5 mesh, 8x20 panel, TL=100'	6
94	Seine: Unknown Seine	4
60	Seine: minnow seine 8'x4'	4
36	Seine: Bag seine, 10 m x 1.2 m, 3-5 mm mesh	4
91	Trap Nets: Unknown Trap Net	3
52	Trap Nets: Ohio-style trapnet, 4' lead height	3
50	Trap Nets: Ohio-style trapnet, 22' lead height	3
49	Trap Nets: Ohio-style trapnet, 10' lead height	3
12	Trap Nets: Ohio-style trapnet, 6' lead height	3
11	Trap Nets: Ohio-style trapnet, 14' lead height	3
10	Trap Nets: Missouri-style trapnet	3
90	Electrofishing: Unknown Electrofishing	1
63	Electrofishing: Smith-Root Catfish Zapper	1
51	Rolling Electrofishing Boat	1
9	Electrofishing: AC backpack	1
8	Electrofishing: DC backpack	1
7	Electrofishing: stream pull-behind with AC current	1
6	Electrofishing: stream pull-behind with DC current	1
5	Electrofishing: std. Stream boat with AC current	1
4	Electrofishing: Zodiac stream boat with DC current	1
3	Electrofishing: std. stream boat with DC current	1
2	Electrofishing: std. 17' boat with AC current	1
1	Electrofishing: std. 17' boat with DC current	1

Appendix 2.6: Gear type codes

GearType:	GearTypeName:	GearEntity:
1	Electrofishing	F
3	Hoop or Trap Nets	F
4	Seine	F
6	Gill Net	F
7	Trawl - Fish	F
10	Trammel Net	F
11	Traps	F
12	Poisons	F
13	Explosives and Concussion	F
14	Angling-Fish	F
15	Water Quality Meter	W
16	Plankton Sampler	P
17	Water Collection Device	W
18	Trapnet lead (only)	F
19	Acoustic survey (hydroacoustics)	F
99	No Gear Used	F
20	Plankton Sampler - Water	W
21	Water Collection Device - Plankton	P
22	Data Logger	W
23	Angling - Creel	A
24	Trawl - Plankton	P

Appendix 2.7: Location codes

Location:	Lake:
01001	HOCKING RIVER
01400	CLEAR CREEK
02000	SCIOTO RIVER
02038	HONEY CREEK
02110	ALUM CREEK
02200	BIG DARBY CREEK
02300	DEER CREEK TAILWATER
02500	PAINT CREEK
02530	ROCKY FORK CREEK
02600	SALT CREEK
02610	LITTLE SALT CREEK
02700	SCIOTO BRUSH CREEK
02800	SUNFISH CREEK
03000	LAKE ERIE: GRAND RIVER
04000	LAKE ERIE: MISC WEST TRIBS
04001	MAUMEE RIVER
04100	AUGLAIZE RIVER
05000	LAKE ERIE: SANDUSKY RIVER
05001	SANDUSKY RIVER
06000	OHIO RIVER TRIBS: MUSKINGUM TO MAHONING
06400	LITTLE MUSKINGUM RIVER
07000	LAKE ERIE: ASH TO CONN
08001	LITTLE BEAVER CREEK
08100	NORTH FORK LITTLE BEAVER CREEK
08300	WEST FORK LITTLE BEAVER CREEK
09000	OHIO R TRIBS SCIOTO TO HOCK
10000	OHIO RIVER TRIBS LITTLE MIAMI TO SCIOTO RIVER
11000	LITTLE MIAMI RIVER
11209	COWAN CREEK
12000	LAKE ERIE: HURON RIVER
13000	LAKE ERIE: ROCKY RIVER
14000	GREAT MIAMI RIVER
14100	MAD RIVER
14122	DEER CREEK
14138	MAC-O-CHEE
14200	STILLWATER RIVER
14414	PAINT CREEK TAILWATER
15000	LAKE ERIE: CHAGRIN RIVER
16000	LAKE ERIE: OTTER CREEK TRIBS

Appendix 2.7 (cont…)

Location:	Lake:
17000	MUSKINGUM RIVER
17200	LICKING RIVER
17650	KOKOSING RIVER
17750	CLEAR FORK OF MOHICAN RIVER
17751	PINE RUN
17761	CEDAR FORK
17800	WILLS CREEK
18000	MAHONING RIVER
18018	WEST BRANCH MAHONING RIVER
19000	LAKE ERIE: CUYAHOGA RIVER
20000	LAKE ERIE: BLACK RIVER
2004L	LAKE MOSIER
200ZL	LAKE DAUGHERTY (FOSTORIA #1)
21000	LAKE ERIE: VERMILION RIVER
22000	WABASH RIVER
23000	OHIO RIVER TRIBS: MUDDY TO MILL CREEK
24000	OHIO RIVER
24054	OHIO RIVER: NEW CUMBERLAND POOL
24084	OHIO RIVER: PIKE ISLAND POOL
24127	OHIO RIVER: HANNIBAL POOL
24162	OHIO RIVER: WILLOW ISLAND POOL
24204	OHIO RIVER: BELLEVILLE POOL
24237	OHIO RIVER: RACINE POOL
24279	OHIO RIVER: GALLIPOLIS POOL
24341	OHIO RIVER: GREENUP POOL
24437	OHIO RIVER: MELDAHL POOL
24531	OHIO RIVER: MARKLAND POOL
24606	MARKLAND
24631	OHIO RIVER: SMITHLAND POOL
24720	MCALPINE
24731	OHIO RIVER: CANNELTON POOL
24918	J.T. MEYER
5463291	5463291 (AEP POND MM29)
5463341	5463341 (AEP POND MM34)
5463401	5463401 (AEP POND MB40)
5463411	5463411 (AEP POND MB41)
5463421	5463421 (AEP POND MB42)
5463431	5463431 (AEP POND NB43)
80101	ALUM CREEK LAKE

Appendix 2.7 (cont…)

Location:	Lake:
80102	BUCKEYE LAKE
80103	DEER CREEK LAKE
80104	DELAWARE LAKE
80105	GREENFIELD LAKE
80106	GRIGGS RESERVOIR
80107	HARGUS LAKE
80108	HOOVER RESERVOIR
80109	INDIAN LAKE
80110	KISER LAKE
80111	KNOX LAKE
80112	MADISON LAKE
80113	MT. GILEAD LAKES
80114	KOKOSING LAKE
80115	OAKTHORPE LAKE
80116	O'SHAUGHNESSY RESERVOIR
80117	ROCKMILL LAKE
80118	RUSH CREEK LAKE
80119	ANTRIM LAKE
80121	RICHWOOD LAKE
80197	WDST1 PRIVATE PONDS
80199	WDST1 OTHER IMPOUNDMENTS
802001	CROSROADS INDUSTRIAL PONDS
802002	DAUGHERTY LAKE FOSTORIA #1
802003	GEIRTZ LAKE
802004	MOSIER LAKE FOSTORIA #4
802005	PEARSON METROPARKS
802006	KILLDEER POND #30
802007	KILLDEER POND #33
802008	HANCOCK COUNTY WETLANDS
802009	MONROEVILLE RESERVOIR
80201	ALDRICH POND
80202	ALLEND POND
80203	AMANN RESERVOIR
80204	AMICK RESERVOIR
80205	ARCHBOLD RESERVOIR #1
80206	ARCHBOLD RESERVOIR #2
80207	ATTICA RESERVOIR
80208	BEAVER CREEK RESERVOIR
80209	BELLEVUE RESERVOIR #4

Appendix 2.7 (cont…)

Location:	Lake:
80210	BELLEVUE RESERVOIR #5
80211	BRESLER RESERVOIR
80212	BUCYRUS RESERVOIR #1
80213	CHARLES MILL RESERVOIR
80214	CLEARFORK RESERVOIR
80215	DELTA RESERVOIR #1
80216	DESHLER RESERVOIR #1
80217	EVERGREEN LAKE
80218	FERGUSON RESERVOIR
80219	FINDLAY RESERVOIR #1
80220	FINDLAY RESERVOIR #2
80221	GREENWICH RESERVOIR
80222	HAMLER RESERVOIR
80223	HARRISON LAKE
80224	INDEPENDENCE DAM
80225	KILLDEER PONDS
80226	KILLDEER RESERVOIR
80227	LAKE LE COMTE
80228	LEIPSIC RESERVOIR
80229	LIMA LAKE
80230	LOST CREEK RESERVOIR
80231	MC COMB RESERVOIR #1
80232	MC COMB RESERVOIR #2
80233	METZGER RESERVOIR
80234	NETTLE LAKE
80235	NEW LONDON RESERVOIR
80236	NEW WASHINGTON RESERVOIR #1
80237	NORTH BALTIMORE RESERVOIR
80238	NORWALK RESERVOIR #1
80239	NORWALK RESERVOIR #2
80240	NORWALK RESERVOIR #3
80241	OTTAWA RESERVOIR
80242	OTTOVILLE QUARRIES
80243	OXBOW LAKE
80244	PAULDING PONDS
80245	PAULDING RESERVOIR
80246	PLEASANT HILL RESERVOIR
80247	POWERS RESERVOIR
80248	RACCOON CREEK RESERVOIR

Appendix 2.7 (cont…)

Location:	Lake:
80249	RILEY RESERVOIR
80250	SCHOONOVER LAKE
80251	SPORTSMAN LAKE
80252	SWANTON RAILROAD RESERVOIR
80253	SWANTON W.W. RESERVOIR
80254	UPPER SANDUSKY RESERVOIR
80255	VAN BUREN RESERVOIR
80256	VAN WERT RESERVOIR #1
80257	VAN WERT RESERVOIR #2
80258	WAUSEON RESERVOIR #1
80259	WAUSEON RESERVOIR #2
80260	WILLARD RESERVOIR
80261	LAKE MEL
80262	LAKE US
80263	JERRY'S POND
80264	HOGBACK POND
80265	LOU'S POND
80266	CLEM'S POND
80267	ED'S POND
80268	LAKE ANN
80269	LAKE SUE
80270	LAKE LAVERE
80271	LAKE LA SU AN
80272	LAKE WOOD DUCK
80273	LAKE TEAL
80274	ALLEN LAKE
80276	BUCYRUS RESERVOIR #2
80277	OUTHWAITE RESERVOIR (BUCYRUS 4)
80278	DELTA RESERVOIR #2
80279	DESHLER RESERVOIR #2
80280	FULTON POND
80281	OLANDER LAKE
80282	MCCOMB RESERVOIR #2
80283	NEW WASHINGTON RESERVOIR #2
80284	SHELBY RESERVOIR #1
80285	SHELBY RESERVOIR #2
80286	RESTHAVEN POND #01
80287	RESTHAVEN POND #02
80288	RESTHAVEN POND #06

Appendix 2.7 (cont…)

Location:	Lake:
80289	RESTHAVEN POND #07
80290	RESTHAVEN POND #08
80291	RESTHAVEN POND #10
80292	RESTHAVEN POND #11
80293	VETERAN'S MEMORIAL RESERVOIR
80294	MAUMEE BAY STATE PARK POND
80295	MILLER BLUE HOLE
80297	WDST2 PRIVATE PONDS
80298	WDST2 OTHER UPGROUND
80299	WDST2 OTHER IMPOUNDMENTS
80301	AQUILLA LAKE
80302	ATWOOD LAKE
80303	BEACH CITY RESERVOIR
80304	BEREA QUARRY
80305	BERLIN LAKE
80306	CAMDEN LAKE
80307	CANAL FULTON
80308	CLENDENING LAKE
80309	DALE WALBORN RESERVOIR
80310	DEER CREEK RESERVOIR
80311	EAST BRANCH RESERVOIR
80312	EAST PALESTINE RESERVOIR
80313	FINDLEY LAKE
80314	FRIENDSHIP PARK LAKE
80315	GUILFORD LAKE
80316	HIGHLANDTOWN LAKE
80317	HINCKLEY LAKE
80318	JEFFERSON LAKE
80319	JEFFERSON RESERVOIR
80320	KIPTON RESERVOIR
80321	LAKE MEDINA
80322	LAKE PARK
80323	LEESVILLE LAKE
80324	MILL CREEK LAKE
80325	LAKE MILTON
80326	MOGADORE RESERVOIR
80327	MOSQUITO LAKE
80328	NIMISILA RESERVOIR
80329	OBERLIN RESERVOIR

Appendix 2.7 (cont…)

Location:	Lake:
80330	EAST RESERVOIR - PORTAGE LAKE
80331	WEST RESERVOIR - PORTAGE LAKE
80332	TURKEYFOOT -PORTAGE LAKE
80333	NORTH RESERVOIR - PORTAGE LAKE
80334	LONG LAKE - PORTAGE LAKE
80335	PUNDERSON LAKE
80336	PYMATUNING LAKE
80337	SHADOW LAKE
80338	SHREVE LAKE
80339	SPENCER LAKE
80340	SPRINGFIELD LAKE
80341	TAPPAN LAKE
80342	WALLACE RESERVOIR
80343	WELLINGTON RESERVOIR SOUTH
80344	WELLINGTON UPGROUND RESERVOIR
80345	WEST BRANCH RESERVOIR (MICHAEL J. KI
80346	ZEPERNICK LAKE
80347	ZOAR LAKE
80348	NEW LYME LAKE
80357	LADUE RESERVOIR
80358	SILVER CREEK LAKE
80361	RUFF POND
80362	ISMOND POND
80364	CHIPPEWA LAKE
80397	WDST3 PRIVATE PONDS
80398	WDST3 OTHER UPGROUND
80399	WDST3 OTHER IMPNDMNTS
80401	BELMONT LAKE
80403	BLUE ROCK LAKE (CUTLER LAKE)
80404	BURR OAK LAKE
80405	CLOUSE LAKE
80406	CROOKSVILLE RESERVOIR EAST
80407	CROOKSVILLE RESERVOIR SOUTH
80408	DILLON LAKE
80409	FORKED RUN LAKE
80410	FOX LAKE
80411	JACKSON CITY RESERVOIR (HAMMERTOWN LAKE)
80412	JACKSON LAKE
80413	LAKE ALMA

Appendix 2.7 (cont…)

Location:	Lake:
80414	LAKE HOPE
80415	LAKE LOGAN
80416	LAKE WHITE
80417	NEW LEXINGTON RESERVOIR
80418	PIEDMONT LAKE
80419	PIKE LAKE
80420	PINE LAKE
80421	ROSS LAKE
80422	SALT FORK LAKE
80423	SENECA LAKE (SENECAVILLE)
80424	LAKE SNOWDEN
80426	DOW LAKE
80427	TAR HOLLOW LAKE
80428	TYCOON LAKE
80429	VESUVIUS LAKE
80430	VETO LAKE
80431	WELLSTON RESERVOIR
80432	WILLS CREEK LAKE
80433	WOLF RUN LAKE
80435	TURKEY CREEK LAKE
80436	MONROE LAKE
80437	OHIO POWER PONDS
80438	ROSE LAKE
80439	SCIOTO TRAIL AREA LAKES
80440	THE WILDS PONDS
80441	MUNRO BASIN
80442	RIO GRANDE RESERVOIR
80443	ST. CLAIRSVILLE RESERVOIR
80444	TIMBRE RIDGE LAKE
80467	CALDWELL LAKE
80468	STEWART HOLLOW LAKE
80490	ROOSEVELT LAKE
80497	WDST4 PRIVATE PONDS
80499	WDST4 OTHER IMPNDMNTS
80500	NEERS POND
80501	ACTON LAKE
80502	ADAMS LAKE
80503	CAESAR CREEK LAKE
80504	C.J. BROWN RESERVOIR

Appendix 2.7 (cont…)

Location:	Lake:
80505	CLARK LAKE
80506	COWAN LAKE
80507	DARKE WILDLIFE AREA PONDS
80508	DECKER LAKE
80509	EAST FORK LAKE
80510	EASTWOOD LAKE
80511	ENGLEWOOD DAM
80512	GRAND LAKE ST. MARYS
80513	GRANT LAKE
80514	HILLSBORO RESERVOIR
80515	LAKE LORAMIE
80516	OLDAKER PONDS
80517	PAINT CREEK LAKE
80518	REID PARK PONDS
80519	ROCKY FORK LAKE
80520	RUSH RUN LAKE
80521	SPRING VALLEY LAKE
80522	STONELICK LAKE
80523	TAWAWA LAKE
80524	BRUSH LAKE
80525	ECHO LAKE
80526	HOSTERMAN LAKE
80589	SWIFT RUN LAKE
80597	WDST5 PRIVATE PONDS
80599	WDST5 OTHER IMPNDMNTS
80600	LAKE ERIE
80601	HURON WEST (LAKE ERIE)
80602	HURON TO FAIRPORT (LAKE ERIE)
80603	FAIRPORT EAST
80604	SANDUSKY BAY
82010	LAMERJACK LAKE (FOSTORIA NUMBER 3)
82011	MOTTRAM LAKE (FOSTORIA NUMBER 3)
80359	LITTLE TURTLE POND
80370	PESTOS LAKE

Appendix 2.8: Condition codes

MkCondition:	MkConditionDesc:
1	Good
2	Dead
3	Poor
4	Unknown

Appendix 2.9: Mark Type Codes

MkType:	MkTypeDesc:
0	No Previous Mark
1	Left Pelvic Clip
2	Right Pelvic Clip
3	Left Pectoral Clip
4	Right Pectoral Clip
5	Top Caudal Clip
6	Bottom Caudal Clip
7	Adipose Clip
8	Dorsal Hole Punch
10	PIT Tag
20	Coded Wire Tag
30	Floy Anchor Tag
40	Opercular Tag
50	Jaw Tag
60	Telemetry Transmitter

Appendix 2.10: Sex Codes

Sex:	**SexDescription:**
1	MALE
2	FEMALE
3	IMMATURE
4	UNKNOWN

Appendix 2.11: Species code and common name of Ohio fishes.

Species Code	Species Name
1000	Lamprey (general)
1001	Silver Lamprey
1002	Northern Brook Lamprey
1003	Ohio Lamprey
1004	Mountain Brook Lamprey
1005	Sea Lamprey
1006	Least Brook Lamprey
1007	American Brook Lamprey
4001	Paddlefish
8000	Sturgeon (general)
8001	Lake Sturgeon
8002	Shovelnose Sturgeon
10000	Gar (general)
10001	Alligator Gar
10002	Shortnose Gar
10003	Spotted Gar
10004	Longnose Gar
15001	Bowfin
18000	Hiodon (general)
18001	Goldeye
18002	Mooneye
18003	Skipjack Herring
20000	Clupeids (general)
20002	Alewife
20003	Gizzard Shad
20004	Theadfin Shad
25000	Salmonids (general)
25001	Brown Trout
25002	Rainbow Trout
25003	Brook Trout
25004	Lake Trout
25005	Coho Salmon
25006	Chinook Salmon
25007	Cisco
25008	Lake Whitefish
30001	Rainbow Smelt
34001	Mudminnow
37000	Pike Family

Appendix 2.11 (cont...)

Species Code	Species Name
37001	Grass Pickerel
37002	Chain Pickerel
37003	Northern Pike
37004	Muskellunge
37005	Tiger Muskie
37006	Grass Pickerel X Chain Pickerel
40000	Sucker Family
40001	Blue Sucker
40002	Bigmouth Buffalo
40003	Black Buffalo
40004	Smallmouth Buffalo
40005	Quillback Carpsucker
40006	River Carpsucker
40007	Highfin Carpsucker
40008	Silver Redhorse
40009	Black Redhorse
40010	Golden Redhorse
40011	Shorthead Redhorse
40012	Greater Redhorse
40013	River Redhorse
40014	Harelip Redhorse
40015	Hog Sucker
40016	White Sucker
40017	Longnose Sucker
40018	Spotted Sucker
40019	Chubsucker
40020	Creek Chubsucker
40900	Suckers (general)
40901	Buffalo fishes (general)
40902	Carpsuckers (general)
40903	Redhorse suckers (general)
43001	Common Carp
43002	Goldfish
43003	Golden Shiner
43004	Hornyhead Chub
43005	River Chub
43006	Silver Chub
43007	Bigeye Chub
43008	Streamline Chub
43009	Gravel Chub

Appendix 2.11 (cont…)

Species Code	Species Name
43010	Speckled Chub
43011	Blacknose Dace
43012	Longnose Dace
43013	Creek Chub
43014	Tonguetied Minnow
43015	Suckermouth Minnow
43016	Southern Redbelly Dace
43017	Redside Dace
43018	Rosyside Dace
43019	Pugnose Minnow
43020	Emerald Shiner
43021	Silver Shiner
43022	Rosyface Shiner
43023	Redfin Shiner
43024	Rosefin Shiner
43025	Striped Shiner
43026	Common Shiner
43027	River Shiner
43028	Spottail Shiner
43029	Blackchin Shiner
43030	Bigeye Shiner
43031	Steelcolor Shiner
43032	Spotfin Shiner
43033	Bigmouth Shiner
43034	Sand Shiner
43035	Mimic Shiner
43036	Ghost Shiner
43037	Blacknose Shiner
43038	Pugnose Shiner
43039	Silverjaw Minnow
43040	MS Silvery Minnow
43041	Bullhead Minnow
43042	Fathead Minnow
43043	Bluntnose Minnow
43044	Central Stonroller
43045	Carp X Goldfish
43046	Popeye Shiner
43047	Grass Crap
43048	Red Shiner

Appendix 2.11 (cont…)

Species Code	Species Name
43049	Common X Rosyface
43050	Striped Shiner X River Chub
43051	River Chub X Stoneroller
43052	Striped Shiner X Rosyface
43053	Creek Chub X Redside Dace
43054	Striped Shiner X Creek Chub
43055	Common Shiner X River Chub
43056	Blacknose Dace X Stoneroller
43057	Striped Shiner X Stoneroller
43058	Common Shiner X Stoneroller
43059	Striped Shiner X Hornyhead Chub
43060	Common Shiner X Striped Shiner
43061	Striped Shiner X Rosefin Shiner
43062	Creek Chub X S. Redbelly Dace
43063	Channel Shiner
43064	Striped X Silver
43071	Whitetail Shiner
43079	Silver Carp
43901	Shiners (general)
43902	Chubs (general)
43903	Dace (general)
43904	Minnows (general)
43999	Hybrid X Minnow
47000	Catfishes (general)
47001	Blue Catfish
47002	Channel Catfish
47003	White Catfish
47004	Yellow Bullhead
47005	Brown Bullhead
47006	Black Bullhead
47007	Flathead Catfish
47008	Stonecat Madtom
47009	Mountain Madtom
47010	Northern Madtom
47011	Scioto Madtom
47012	Brindled Madtom
47013	Tadpole Madtom
47014	Yellow Bullhead X Brown Bullhead
47015	Brown Bullhead X Black Bullhead

Appendix 2.11 (cont…)

Species Code	Species Name
47901	Blue, Channel, Flathead, White catfishes
47902	Bullheads (general)
47903	Madtoms (general)
50001	American Eel
54000	Western Banded Killifish
54001	Eastern Banded Killifish
54002	Blackstripe Topminnow
54901	Northern Studfish
57001	Mosquitofish
60001	Burbot
63001	Trout-perch
68001	Pirate Perch
70001	Brook Silverside
74001	White Bass
74002	Striped Bass
74003	White Perch
74005	Striped Bass x White Bass (general)
74015	White Bass (male) x Striped Bass (female)
74025	Striped Bass (male) x White bass (female)
77000	Sunfish Family
77001	White Crappie
77002	Black Crappie
77003	Rock Bass
77004	Smallmouth Bass
77005	Spotted Bass
77006	Largemouth Bass
77007	Warmouth
77008	Green Sunfish
77009	Bluegill
77010	Orangespot
77011	Longear Sunfish
77012	Redear Sunfish
77013	Pumpkinseed
77014	Bluegill X Pumpkinseed
77015	Green X Bluegill
77016	Green Sunfish X Pumpkinseed
77017	Longear Sunfish X Bluegill

Appendix 2.11 (cont…).

Species Code	Species Name
77018	Bluegill X Orangespot
77019	Green Sunfish X Orangespot
77020	Pumpkinseed X Longear Sunfish
77021	Green Sunfish X Longear Sunfish
77022	Orangspotted X Pumpkinseed
77023	Longear X Orangespotted
77024	Green Sunfish X Warmouth
77025	Warmouth X Pumpkinseed
77994	sunfish (panfish, general)
77995	Black Basses (general)
77996	Crappie (general)
77997	Lepomis and sunfish hybrids
77998	Green Sunfish X Hybrid
77999	Hybrid x sunfish
80000	Perch Family
80001	Sauger
80002	Walleye
80003	Yellow Perch
80004	Dusky Darter
80005	Blackside Darter
80006	Longhead Darter
80007	Slenderhead Darter
80008	River Darter
80009	Channel Darter
80010	Gilt Darter
80011	Log Perch
80012	Crystal Darter
80013	Sand Darter
80014	Johnny Darter
80015	Greenside Darter
80016	Banded Darter
80017	Variegate Darter
80018	Spotted Darter
80019	Bluebreasted Darter
80020	Tippecanoe Darter
80021	Iowa Darter
80022	Rainbow Darter
80023	Orangethroated Darter
80024	Fantail Darter
80025	Least Darter

Appendix 2.11 (cont...)

Species Code	Species Name
80026	Saugeye
80027	Rainbow X Orangethroat
80901	Walleye, sauger, and saugeye
80902	Darters (general)
85001	Freshwater Drum
87001	Round Goby
87002	Tubenose Goby
90000	Sculpin Family
90001	Spoonhead Sculpin
90002	Mottled Sculpin
90003	Slimy Sculpin
90004	Deepwater Sculpin
95001	Brook Stickleback
95002	3-spine Stickleback
99000	All reservoir prey fishes
99001	Carp and all suckers
99002	non-bluegill sunfishes
99990	Non Fish Sampling
99999	Anything

Appendix 2.12: Aging structure (Struc) codes

Code	Description
S	Scale
O	Otolith
F	Fin Spine
J	Jaw

Appendix 2.13: Substrate codes

Substrate	SubstrateDesc	Substrate Definition
CS	COBLE/SAND	
OS	ORGANIC	Organic material including muck and coarse detritus
RS	ROCK	
H	SHALE	
SS	SAND	Gritty texture when rubbed between fingers, .06-2 mm

Appendix 2.14: Zooplankton codes

Code	Description
BOSMI	bosmina
BYTHO	bythotrephes
CALAN	calanoid
CERIO	ceriodaphnia
CHAOB	chaoborus
CHYDO	chydorus
CLADO	cladoceron
COPEP	copepod
CYCLO	cyclopoid
DAPHN	daphnia
DIAPH	diaphanosoma
HARPA	harpactacoid
LEPTO	leptodora
MODAP	moinadaphnia
MOINA	moina
NAUP	nauplius
OSTRA	ostracod
SCAPH	scapholebrius
SIMOC	simocephalus
ZEBVE	zebra mussel veliger larva -- introduced spp.
CORBI	Corbicula -- introduced spp.
DAPLU	Daphnia lumholtzi -- introduced spp.

Appendix 2.15: Invertebrate codes

Code	Description
ACARI	acarina
AMPHI	amphipod
ANISO	anisoptera
ANNEL	annelid
APHID	aphididae
ARACH	arachnid
ARGUL	argulus
BIVAL	bivalve
CERAT	ceratapogonidae
CHIRO	chironomid
COLEO	coleoptera
COLLE	collembola
CORIX	corixidae
CRAYF	crayfish
DIPTE	diptera
EPHEM	ephemeroptera
GERRI	gerridae
HEMIP	hemiptera
HEPTA	heptageniidae
HEXAG	hexageniidae
HYDRA	hydracarina
HYMEN	hymenoptera
ISOPO	isopod
LEECH	leech
LEPID	lepidoptera
NEMAT	nematode
NEURO	neuroptera
NOTON	notonectidae
ODONA	odonata
PLECO	plecoptera
SALDI	saldidae
SCIRT	scirtidae
TERRI	terrestrial insect
TICK	tick
TRICH	trichoptera
VALVA	valvata
WORM	worm
ZYGOP	zygoptera
THRIP	thrip
MITE	mite
CRICK	cricket

Appendix 3: Field Data Forms

Description of OFIS Field Forms (current 7/1/2004)

FIELD FORMS ARE LOCATED ON THE "M" DRIVE FOR PRINTING.

Form Number	Description
1	Trip Meta-Data Form
	Variable Descriptions for Trip, Sampling, and Fish Variables (back of forms 2 and 3)
2	Sample Data Form
3	Catch Data Form
4	Water Quality Data Form
5	Fish Collection Taly Sheet
6	Mean Length at Age Data
7	Sample Labels
8	Group Catch Data
9	

Form 1: Trip Meta-Data
ODNR, Division of Wildlife
Inland Management System

Form Current: 9/1/2003

Project*	Date*	Location*

Crew _____ **Target*** _____

IMS Sampling (circle one): YES NO

Purpose: _____

_____

_____

Comments: _____

_____

_____

_____

Trip Meta-Data Variables

Project – ODNR, DOW project code (ex. FIDR07)

Date – date, in month, day, year (mm/dd/yyyy)

Location – name of the waterbody sampled, or code number (ex. Alum Creek Lake, or 80101)

Crew - TARS code, or descriptive code not exceeding six characters as determined by investigator (ex. WDST1)

Target – species name, fish group name, or code for either that is targeted by the sampling effort (ex. largemouth bass or 77006; black bass general or 77995)

IMS Sampling- Is this an IMS survey, or another type of data collection (YES or NO)

Purpose – primary reason for sampling (ex. evaluate 14-inch length limit for largemouth bass)

Comments – any point of interest related to the sampling event (ex. water elevation at 952 feet and falling; boat broke down halfway through the evening; sampling crew included Tom Hall, Marty Lundquist, and Elmer Heyob; storm passed through before sampling began)

***required by the database**

Form 2 and 3: Sample Data and Catch Data

Trip Variables

Project – ODNR, DOW project code (ex. FIDR07)
Date – date, in month, day, year (mm/dd/yyyy)
Location – name of the waterbody sampled, or code number (ex. Alum Creek Lake, or 80101)

Sample Variables

Stime - starting time of sampling in military hours (ex. 1:31 PM= 13:31)
SampNo - number used to identify sample, typically consecutive starting at 1 for the project, date, and location
SampSite - name given to site up to six characters long (ex. A01, or RM0135)
UTM E- UTM Easting (ex. 372364)
UTM N- UTM Northing (ex. 4420403)
UTM Zone- UTM Zone for sampling area (ex. 17)
Etype - type of effort used (T=time; D=distrance; A=area; V=volume)
Effort - sampling effort in minutes (ex. 24 hours=1440 minutes)
GearSpec - specific type of gear used for sampling (ex. 17' reservoir electrofishing boat, or code=001)
GearID - gear inventory number (optional for all gear except electrofishing boats)
SurfTemp - surface temperature in C
Secchi - water transparency measured as visible Secchi depth (cm)
SurfCond - surface conductivity, measured as micro siemens

Fish Variables

FishID - fish identification number unique within the project, date, and location
Struc – the fish structure used to age fish (S=scale, O=otolith, F=fin structure, J=jaw)
Species - name of species, or 5-digit species code
Length - length of fish (mm)
Weight - weight of fish (g)
Sex - sex of fish (1=male; 2=female; 3=immature; 4=unknown)
MKCODE - a combination of variable codes described below
TagNo - specific numeric, or alpha-numeric tag identification (i.e. the number on a floy tag)

MKCODE Explanation

The fish marking code, **MKCODE, is a combination of four codes** which indicate the type of tag an untagged, or re-tagged fish is tagged with (first bracket), the type of tag a recaptured fish is bearing (second bracket), the condition of the recaptured fish (third bracket), and the number of times a fish has been recaptured (fourth bracket).

EXAMPLE: In the example below, a largemouth bass (FISHID=5; LENGTH=452 mm; WEIGHT=1200 g; SEX=4;) was tagged with a Floy Anchor Tag (30), was not a recapture (0), was released alive (1), and had never been recaptured before (0). The Floy Anchor Tag Number (TAGNO) is DOW147199. Brackets that are not used are left blank.

FISHID	SPECIES	LENGTH	WEIGHT	SEX	MKCODE	TAGNO
5	Largemouth Bass	452 mm	1200 g	4	**(30) (0) (1) (0)**	DOW147199

First Bracket (MKTYPE)

Code	Description
1	Left Pelvic Clip
2	Right Pelvic Clip
3	Left Pectoral Clip
4	Right Pectoral Clip
5	Top Caudal
6	Bottom Caudal
7	Adipose
8	Dorsal Hole Punch
10	PIT Tag
20	Coded Wire Tag
30	Floy Anchor Tag
40	Opercular Tag
50	Jaw Tag
60	Telemetry Transmitter

Second Bracket (MKRECAP)

Code	Description
1	Left Pelvic Clip
2	Right Pelvic Clip
3	Left Pectoral Clip
4	Right Pectoral Clip
5	Top Caudal
6	Bottom Caudal
7	Adipose
8	Dorsal Hole Punch
10	PIT Tag
20	Coded Wire Tag
30	Floy Anchor Tag
40	Opercular Tag
50	Jaw Tag
60	Telemetry Transmitter

Third Bracket (MKCONDITION)

Code	Description
1	Alive
2	Dead
3	Poor

The **Fourth Bracket (MKCAPTURE)** is simply the number of times that you have recaptured a particular fish (99= unknown).

NOTE: Also available, but not listed on the field forms, are the variables **PRIORMK**, the year when a fish was previouly marked (yyyy), and **TAG2,** a variable for double-tagging a fish.

Form 2: Sample Data

ODNR, Division of Wildlife

Inland Management System

Form Current: 9/1/2003 **Page _____ of _____**

Project*	Date*	Location*

Etype* _____ **GearSpec*** _____

Record Temperature, Secchi, and Conductivity data for first sample of day in the boxes below:

Sampno ___ **SurfTemp** _____**C** **Secchi** _____**cm** **SurfCond** _____**mSiem**

Samp No	Samp Site	UTM Zone	UTM East	UTM North	STime	Effort

Comments: _____

Form 3: Catch Data
ODNR, Division of Wildlife
Inland Management System

Form Current: 9/1/2003 **Page _____ of _____**

Project*	**Date***	**Location***

Samp No*	Fish ID	Species	Length (mm)	Weight (g)	Samp No*	Fish ID	Species	Length (mm)	Weight (g)

Form 4 : Water Quality Data
ODNR, Division of Wildlife
Inland Management System

Form Current: 9/1/2003 **Page _____ of _____**

Project*	Date*	Location*

Samp No*_____ **Samp Site _____** **UTM Zone _____** **UTM E _____** **UTM N _____**

Stime* _____ **Etype* _____** **Effort _____** **GearSpec* _____**

SurfTemp _____ **Secchi _____** **SurfCond _____** **GearID _____**

ReadDepth	Temp	DO

ReadDepth	Temp	DO

Samp No*_____ **Samp Site _____** **UTMS Zone _____** **UTM E _____** **UTM N _____**

Stime* _____ **Etype* _____** **Effort _____** **GearSpec* _____**

SurfTemp _____ **Secchi _____** **SurfCond _____** **GearID _____**

ReadDepth	Temp	DO

ReadDepth	Temp	DO

*required by the database

Form 5: Fish Collection Tally Sheet

ODNR, Division of Wildlife

Inland Management System

Form Current: 9/1/2003 **Page _____ of _____**

Project*	Date*	Location*

Crew _____ **Target*** _____

CM Class	Weight	Age/Growth
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		

CM Class	Weight	Age/Growth
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		
46		
47		
48		
49		
50		
51		
52		
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54		
55		
56		
57		
58		
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62		
63		
64		
65		
66		
67		
68		

Comments: _____

Form 6: Mean Length At Age Data
ODNR, Division of Wildlife
Inland Management System

Form Current: 9/1/2003 **Page _____ of _____**

Project*	Date*	Location*

Struc ___ Reader _____ Mag _____ Species _____

FishID	Age	FishID	Age	FishID	Age

Project: _____ **Date:** _____ **Location:** _____ **SampleNo:** _____ **Comments:** _____ _____ _____	**Project:** _____ **Date:** _____ **Location:** _____ **SampleNo:** _____ **Comments:** _____ _____ _____
Project: _____ **Date:** _____ **Location:** _____ **SampleNo:** _____ **Comments:** _____ _____ _____	**Project:** _____ **Date:** _____ **Location:** _____ **SampleNo:** _____ **Comments:** _____ _____ _____
Project: _____ **Date:** _____ **Location:** _____ **SampleNo:** _____ **Comments:** _____ _____ _____	**Project:** _____ **Date:** _____ **Location:** _____ **SampleNo:** _____ **Comments:** _____ _____ _____

Form 8: Group Catch Data
ODNR, Division of Wildlife
Inland Management System

Form Current: 9/1/2003 **Page _____ of _____**

Project*	Date*	Location*

SampNo*	GroupID	Species	Centimeter class	Total number of fish	Total weight (g) of fish

Appendix 4: Analysis Reference Tables

Appendix 4.1: Length categories used for calculation of stock density indicies.

	Length Category (mm)					
Species	Stock	Quality	Preferred	Memorable	Trophy	Source
Black crappie	130	200	250	300	380	2
Bluegill	80	150	200	250	300	2
Channel catfish	280	41	610	710	910	2
Flathead Catfish	350	510	710	860	1020	3
Hybrid striped bass	200	300	380	510	630	2
Largemouth bass	200	300	380	510	630	2
Muskellunge	510	760	970	1070	1270	2
Sauger	200	300	380	510	630	2
Saugeye	230	350	460	560	690	1
Smallmouth bass	180	280	350	430	510	2
Spotted bass	180	280	350	430	510	2
Striped bass	300	510	760	890	1140	2
Walleye	250	380	510	630	760	2
White bass	150	230	300	380	460	2
White crappie	130	200	250	300	380	2
Yellow perch	130	200	250	300	380	2

1 Flammang et al. (1991)
2 Gabelhouse (1984)
3 Quinn (1991)

Appendix 4.2: Parameter estimates of standard weight (Ws) equations used for calculation of relative weight (Wr).

Species	Intercept	Slope	Min TL (mm)	Source
Black crappie	-5.618	3.345	100	Neumann and Murphy (1991)
Bluegill	-5.374	3.316	80	Hillman (1982)
Channel catfish	-5.8	3.294	70	Brown et al. (1995)
Hybrid striped bass	-5.201	3.139	115	Brown and Murphy (1991)
Largemouth bass	-5.316	3.191	150	Wege and Anderson (1978)
Muskellunge	-6.066	3.325	380	Neumann and Willis (1994)
Sauger	-5.492	3.187	70	C. S. Guy, Montana State University, unpublished
Saugeye	-5.692	3.266	170	Flammang et al. (1993)
Smallmouth bass	-5.329	3.2	150	Kolander et al. (1993)
Spotted bass	-5.392	3.215	100	Wiens et al. (1996)
Striped bass	-4.924	3.007	150	Brown and Murphy (1991)
Walleye	-5.453	3.18	150	Murphy et al. (1990)
White bass	-5.066	3.081	115	Brown and Murphy (1991)
White crappie	-5.642	3.332	100	Neumann and Murphy (1991)
Yellow perch	-5.386	3.23	100	Willis et al (1991)

Appendix 4.3: Fraser-Lee intercept values (a) used in length-at-age back calculations.

Species	Intercept (a)	Source
Black Crappie	35	1
Bluegill	20	1
Largemouth Bass	20	1
Sauger	55	1
Saugeye	55	1
Smallmouth Bass	35	1
Striped Bass	25	2
White Bass	40	3
White Crappie	35	1
Walleye	55	1
Yellow Perch	30	1

1: Carlander (1982) TAFS 111:332-336
2: Carlander (1997) Handbook of Freshwater Fish Biology
3: Beck et al. (1997) NAJFM 17:488-492

Appendix 5: Examples of Recording Fish Marking

Reporting Fish Marking (Tagging) Data in the Field and Database

The following are examples of reporting fish tagging data from the field with codes used in the Ohio Fisheries Information System (OFIS). These examples are not all-inclusive. Please keep in mind that study objectives dictate the choice of tagging strategies, not the database, and that good meta-data and project descriptions will be the key to understanding some of these data in the future.

Definitions

Batch mark - a generic mark that is placed on a fish in the hatchery or field that can only distinguish the fish as part of a particular group (examples include fin clips, fish staining, elastomers, blank coded wire tags, and genetic marks).

Unique mark - a mark that is placed on a fish in the hatchery or field that uniquely identifies it from other fish (examples include numeric Floy, PIT, and jaw tags).

General Overview (Example from Data Sheet 2.0)

MkCode Explanation

The fish marking code, **MkCode, is a combination of four codes** which indicate the type of mark an unmarked, or re-marked fish is identified with (first bracket), the type of tag a recaptured fish is bearing (second bracket), the condition of the recaptured fish (third bracket), and the number of times a fish has been recaptured (fourth bracket).

EXAMPLE: In the example below, a largemouth bass (FishID=5; Length=452 mm; Weight=1200 g; Sex=4;) was marked with a Floy anchor tag (MkType=30), was not a recapture (MkRecap=0), was released alive (MkCondition=1), and had never been recaptured before (MkCapture=0). The Floy anchor tag number (TagNo) is DOW147199. Brackets that are not used are left blank.

FishID	Species	Length	Weight	Sex	MkCode	TagNo
5	Largemouth Bass	452 mm	1200 g	4	**(30) (0) (1) (0)**	DOW147199

First Bracket (MkType) (MkCondition)

Code	Description
0	Not previously marked
1	Left Pelvic Clip
2	Right Pelvic Clip
3	Left Pectoral Clip
4	Right Pectoral Clip
5	Top Caudal
6	Bottom Caudal
7	Adipose
8	Dorsal Hole Punch
10	PIT Tag
20	Coded Wire Tag
30	Floy Anchor Tag
40	Opercular Tag
50	Jaw Tag
60	Telemetry Transmitter

Second Bracket (MkRecap)

Code	Description
0	Not previously marked
1	Left Pelvic Clip
2	Right Pelvic Clip
3	Left Pectoral Clip
4	Right Pectoral Clip
5	Top Caudal
6	Bottom Caudal
7	Adipose
8	Dorsal Hole Punch
10	PIT Tag
20	Coded Wire Tag
30	Floy Anchor Tag
40	Opercular Tag
50	Jaw Tag
60	Telemetry Transmitter

Third Bracket

Code	Description
1	Alive
2	Dead
3	Poor

The **Fourth Bracket (MkCapture)** is simply the number of times that you have recaptured a particular fish (99=unknown).

***NOTE:** Also available are **PriorMk**, previous year marked plus a MkType code (yyyy_ _), **Tag2,** a variable for double-tagging a fish, and **TransNo** for telemetry tag serial numbers.

*PriorMk, Tag2 and TransNo are not currently listed on field data forms because the rarely needed.

Overview of Examples

First Capture of Hatchery Batch-Marked Fish

1) ***No New Marks.*** Channel catfish were fin clipped with an adipose fin clip (batch mark) in a hatchery during 1999 and released into a reservoir. These fish were later captured, released alive, and no additional marks were added.

2) ***Batch Marks in the Field.*** Channel catfish were fin clipped with an adipose fin clip in a hatchery during 1999 and released into a reservoir. These fish were later captured, marked with a left pectoral fin clip, and released alive.

3) ***Unique Marks in the Field.*** Channel catfish were fin clipped with an adipose fin clip in a hatchery during 1999 and released into a reservoir. These fish were later recaptured, marked with a uniquely numbered Floy anchor tag, and released alive.

First Capture of Unmarked Fish in the Field that are Being Marked

1) ***Batch Marks.*** Largemouth bass were captured by electrofishing, the left pectoral fin was clipped, and the fish were released alive.

2) ***Unique Marks in the Field.*** A largemouth bass was captured by electrofishing, a uniquely-numbered Floy anchor tag was implanted, and the fish was released alive.

3) ***A Combination of Batch and Unique Marks in the Field.*** A saugeye was captured by electrofishing, the right pectoral fin was clipped, then the fish was marked with a uniquely numbered Floy tag, and released alive. This was done to determine tag loss.

4) ***A Combination of Batch Marks in the Field.*** Muskellunge were captured in trapnets during April 1999 and marked with a left pectoral fin clip, and recaptured during April 2000 and marked with a right pelvic fin clip prior to release. This was done to report the second capture of batch-marked fish.

5) ***A Combination of Unique Marks in the Field.*** A telemetry transmitter was placed in a saugeye and the fish was also tagged with a Floy anchor tag.

Recaptures of Marked Fish

1) ***Recapture of Batch-Marked Fish.*** Largemouth bass marked with a left pectoral fin clip during prior sampling were recaptured and released alive. No new marks were added.

2) ***First Recapture of Uniquely-Marked Fish.*** A largemouth bass marked with a uniquely-numbered Floy tag during prior sampling was recaptured and released alive. No new marks were added.

3) ***Second Recapture of Uniquely-Marked Fish.*** A largemouth bass marked with a uniquely-numbered Floy tag during prior sampling was recaptured for the second time and released alive. No new marks were added.

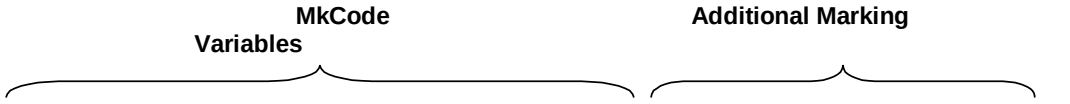
4) ***Recapture of a Fish Marked with a Combination of Batch and Unique Marks.*** A saugeye previously marked with both a right pectoral fin clip and a unique Floy tag was captured and released alive. No new marks were added.

5) ***Recapture of a Fish Marked with a Combination of Batch Marks.***
Muskellunge previously marked with a left pectoral fin clip during 1999 and a right pelvic clip during 2000 were recaptured during 2001 and released alive. No new marks were added.

EXAMPLES: First Capture of Hatchery Batch-Marked Fish

1) ***No New Marks.*** Channel catfish were fin clipped with an adipose fin clip (batch mark) in a hatchery during 1999 and released into a reservoir. These fish were later captured, released alive, and no additional marks were added.

VARIABLE	CODE	EXPLANATION
MkType	0	the fish was not marked in the field
MkRecap	0	the fish was not previously marked in the field
MkCondition	1	the fish was released alive
MkCapture	99	99, because the number of times that a batch-marked fish has been recaptured cannot be determined
TagNo		leave blank, because batch-marked fish do not have unique numbers
PriorMk	199907	this is the year that the fish was tagged in the hatchery (1999) plus the code for an adipose fin clip (07) used to separate batch-marked fish from the hatchery from wild fish sampled
Tag2		not applicable



MkType	MkRecap	MkCondition	MkCapture	TagNo	PriorMk	Tag2
0	0	1	99		199907	

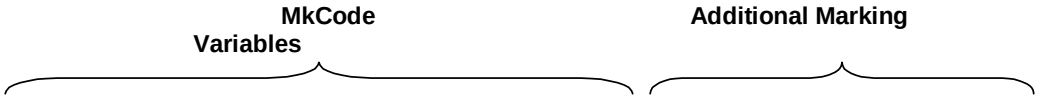
2) ***Batch Marks in the Field.*** Channel catfish were fin clipped with an adipose fin clip in a hatchery during 1999 and released into a reservoir. These fish were later captured, marked with a left pectoral fin clip, and released alive.

VARIABLE	CODE	EXPLANATION
MkType	3	the left pectoral fin was clipped in the field
MkRecap	0	the fish was not previously marked in the field
MkCondition	1	the fish was released alive
MkCapture	99	99, because the number of times that a batch-marked fish has been recaptured cannot be determined
TagNo		leave blank, because batch-marked fish do not have unique numbers
PriorMk	199907	this is the year that the fish was tagged in the hatchery (1999) plus the code for an adipose fin clip (07) used to separate batch-marked fish from the hatchery from wild fish sampled
Tag2		not applicable

MkType	MkRecap	MkCondition	MkCapture	TagNo	PriorMk	Tag2
3	0	1	99		199907	

1) ***Unique Marks in the Field.*** Channel catfish were fin clipped with an adipose fin clip in a hatchery during 1999 and released into a reservoir. These fish were later recaptured, marked with a uniquely numbered Floy anchor tag, and released alive.

VARIABLE	CODE	EXPLANATION
MkType	30	Floy anchor tag was applied in the field
MkRecap	0	the fish was not previously marked in the field
MkCondition	1	the fish was released alive
MkCapture	99	99, because the number of times that a batch-marked fish has been recaptured cannot be determined
TagNo	ODW028	unique number of the Floy anchor tag
PriorMk	199907	this is the year that the fish was tagged in the hatchery (1999) plus the code for an adipose fin clip (07) used to separate batch-marked fish from the hatchery from wild fish sampled
Tag2		not applicable

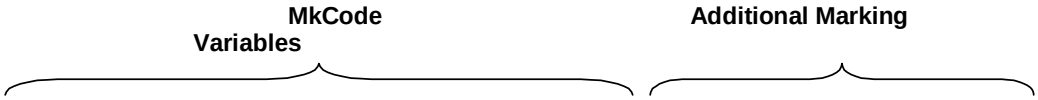


MkType	MkRecap	MkCondition	MkCapture	TagNo	PriorMk	Tag2
30	0	1	99	ODW028	199907	

EXAMPLES: First Capture of Unmarked Fish in the Field that are Being Marked

1) ***Batch Marks.*** Largemouth bass were captured by electrofishing, the left pectoral fin was clipped, and the fish were released alive.

VARIABLE	CODE	EXPLANATION
MkType	3	the left pectoral fin was clipped in the field
MkRecap	0	the fish was not previously marked in the field
MkCondition	1	the fish was released alive
MkCapture	0	the fish was sampled in the field for the first time (99 if the fish already had a batch mark)
TagNo		leave blank, because batch-marked fish do not have unique numbers
PriorMk		leave blank because there was no prior mark
Tag2		not applicable



MkType	MkRecap	MkCondition	MkCapture	TagNo	PriorMk	Tag2
3	0	1	0			

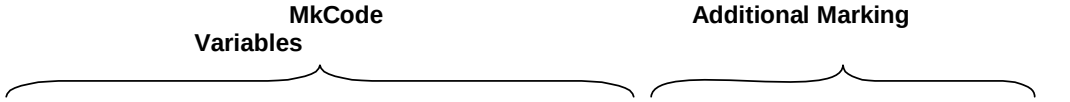
1) ***Unique Marks in the Field.*** A largemouth bass was captured by electrofishing, a uniquely-numbered Floy anchor tag was implanted, and the fish was released alive.

VARIABLE	CODE	EXPLANATION
MkType	30	because a Floy anchor tag was implanted
MkRecap	0	the fish was not previously marked in the field
MkCondition	1	the fish was released alive
MkCapture	0	the fish was sampled in the field for the first time (99 if the fish already had a batch mark)
TagNo	DOW1572	unique number of the Floy anchor tag
PriorMk		leave blank because there was no prior mark
Tag2		not applicable

MkType	MkRecap	MkCondition	MkCapture	TagNo	PriorMk	Tag2
30	0	1	0	DOW1572		

2) ***A Combination of Batch and Unique Marks in the Field.*** A saugeye was captured by electrofishing, the right pectoral fin was clipped, then the fish was marked with a uniquely numbered Floy tag, and released alive. This was done to determine tag loss.

VARIABLE	CODE	EXPLANATION
MkType	30	because a Floy anchor tag was implanted
MkRecap	0	the fish was not previously marked in the field
MkCondition	1	the fish was released alive
MkCapture	0	the fish was sampled in the field for the first time (99 if the fish already had a batch mark)
TagNo	DOW931	unique number of the Floy anchor tag
PriorMk		leave blank because there was no prior mark
Tag2	4	the fish was marked with a right pectoral fin clip in addition to the Floy tag



MkType	MkRecap	MkCondition	MkCapture	TagNo	PriorMk	Tag2
30	0	1	0	DOW931		4

1) ***A Combination of Batch Marks in the Field.*** Muskellunge were captured in trapnets during April 1999 and marked with a left pectoral fin clip, and recaptured during April 2000 and marked with a right pelvic fin clip prior to release. This was done to report the second capture of batch-marked fish.

VARIABLE	CODE	EXPLANATION
MkType	2	the fish was marked with a right pelvic fin clip
MkRecap	3	the fish was previously marked with a left pectoral fin clip
MkCondition	1	the fish was released alive
MkCapture	99	because we do not know how many times this batch marked fish was recaptured
TagNo		leave blank because there was no prior mark
PriorMk	199903	the year that the fish was originally fin clipped (1999) plus the code for a left pectoral fin clip (03)
Tag2	3	because the fish was also marked with a left pectoral fin clip

MkType	MkRecap	MkCondition	MkCapture	TagNo	PriorMk	Tag2
2	3	1	99		199903	3

2) ***A Combination of Unique Marks in the Field.*** A telemetry transmitter was placed in a saugeye and the fish was also tagged with a Floy anchor tag.

VARIABLE	CODE	EXPLANATION
MkType	60	the fish had a telemetry transmitter implanted
MkRecap	0	the fish was previously unmarked
MkCondition	1	the fish was released alive
MkCapture	0	the fish was sampled in the field for the first time
TagNo	ODW32	unique number of the Floy anchor tag
PriorMk		leave blank because there was no prior mark
Tag2	30	Because the fish was also marked with a Floy anchor tag in addition to the telemetry transmitter
TransNo	B703224	Manufacturer serial number from the telemetry transmitter

MkType	MkRecap	MkCondition	MkCapture	TagNo	PriorMk	Tag2	TransNo
60	0	1	0	ODW32		30	B70324

EXAMPLES: Recaptures of Marked Fish

1) ***Recapture of Batch-Marked Fish.*** Largemouth bass marked with a left pectoral fin clip during prior sampling were recaptured and released alive. No new marks were added.

VARIABLE	CODE	EXPLANATION
MkType	3	the fish was marked with left pectoral fin clip
MkRecap	3	the fish was previously marked with a left pectoral fin clip
MkCondition	1	the fish was released alive
MkCapture	99	Because we do not know how many times this batch marked fish was recaptured
TagNo		unique number of the Floy anchor tag
PriorMk		report the year the fish was marked if certain and the type of mark (optional), or leave blank
Tag2		leave blank

MkCode Variables | **Additional Marking**

MkType	MkRecap	MkCondition	MkCapture	TagNo	PriorMk	Tag2
3	3	1	99			

2) ***First Recapture of Uniquely-Marked Fish.*** A largemouth bass marked with a uniquely-numbered Floy tag during prior sampling was recaptured and released alive. No new marks were added.

VARIABLE	CODE	EXPLANATION
MkType	30	the fish was released with a Floy anchor tag in place
MkRecap	30	the fish was previously marked with a Floy anchor tag
MkCondition	1	the fish was released alive
MkCapture	1	Because this is the first time that the fish was recaptured
TagNo	DOW521	unique number of the Floy anchor tag
PriorMk		report the year the fish was marked if certain and the type of mark (optional), or leave blank
Tag2		leave blank

MkCode Variables | **Additional Marking**

MkType	MkRecap	MkCondition	MkCapture	TagNo	PriorMk	Tag2
30	30	1	1	DOW521		

1) ***Second Recapture of Uniquely-Marked Fish.*** A largemouth bass marked with a uniquely-numbered Floy tag during prior sampling was recaptured for the second time and released alive. No new marks were added.

VARIABLE	CODE	EXPLANATION
MkType	30	the fish was released with a Floy anchor tag in place
MkRecap	30	the fish was previously marked with a Floy anchor tag
MkCondition	1	the fish was released alive
MkCapture	2	because this is the first time that the fish was recaptured
TagNo	DOW521	unique number of the Floy anchor tag
PriorMk		report the year the fish was marked if certain and the type of mark (optional), or leave blank
Tag2		leave blank

MkCode Variables | **Additional Marking**

MkType	MkRecap	MkCondition	MkCapture	TagNo	PriorMk	Tag2
30	30	1	2	DOW521		

2) ***Recapture of a Fish Marked with a Combination of Batch and Unique Marks.*** A saugeye previously marked with both a right pectoral fin clip and a unique Floy tag was captured and released alive. No new marks were added.

VARIABLE	CODE	EXPLANATION
MkType	30	the fish was released with a Floy anchor tag in place
MkRecap	30	the fish was previously marked with a Floy anchor tag
MkCondition	1	the fish was released alive
MkCapture	1	because this is the first time that the fish was recaptured
TagNo	DOW822	unique number of the Floy anchor tag
PriorMk		report the year the fish was marked if certain and the type of mark (optional), or leave blank
Tag2	4	the fish was marked with a right pectoral fin clip in addition to the Floy anchor tag

MkCode Variables | **Additional Marking**

MkType	MkRecap	MkCondition	MkCapture	TagNo	PriorMk	Tag2
30	30	1	1	DOW822		4

1) ***Recapture of a Fish Marked with a Combination of Batch Marks.*** Muskellunge previously marked with a left pectoral fin clip during 1999 and a right pelvic clip during 2000 were recaptured during 2001 and released alive. No new marks were added.

VARIABLE	CODE	EXPLANATION
MkType	*	the fish was released with a Floy anchor tag in place
MkRecap	*	the fish was previously marked with a Floy anchor tag
MkCondition	1	the fish was released alive
MkCapture	99	If unknown
TagNo		leave blank
PriorMk	199903	the year that the fish was originally fin clipped (1999) plus the code for a left pectoral fin clip (03)
Tag2	*	the fish was marked with a right pectoral fin clip in addition to the Floy anchor tag

MkCode Variables **Additional Marking**

MkType	MkRecap	MkCondition	MkCapture	TagNo	PriorMk	Tag2
*	*	1	99		199903	

*If we follow a procedure such as this, or begin using combinations of batch marks, we will need an additional fin clip code for combinations. We can address these situations as they arise.

Section 9.0

Terrestrial Program, Tactical Plan, and Project Monitoring and Evaluation

Section 9.1

Terrestrial Program, Tactical Plan, and Project Monitoring and Evaluation

Ohio Department of Natural Resources
Division of Wildlife

Comprehensive Wildlife Conservation Strategy

Terrestrial Program, Tactical Plan, and Project Monitoring & Evaluation

The Division of Wildlife works within the structure of the Comprehensive Management System to facilitate an effective and efficient mechanism to guide the activities and operations of the agency. The Wildlife Management and Research Group works in concert with this system to identify and develop programs and activities to fulfill the goals and objectives established in the Strategic Plan.
Within this system the Division employs the tools necessary to ensure that an effective and efficient control mechanism is in place. This system provides for accountability while giving Division staff, who serve as project managers, the flexibility to get the job done. It reduces "brush fires@ because managers at all levels know what is expected. Collectively, it is the tool the Division uses to keep focused on the goals and objectives we have set with the ultimate benefit being stable wildlife populations and opportunities for the people of Ohio.

Wildlife monitoring programs are necessary to determine the effectiveness of wildlife management activities. The impact of the Grassland, Forestland, Wetland, and Unique Habitats Tactical Plans and their associated Focus Area Plans will be best determined by information collected from an intensive and extensive monitoring program. The monitoring portion of the focus area plans will entail two phases. First, a long-term population monitoring program will be established on at least one focus area within each habitat type. Several representative target species identified in the strategic plan will be surveyed to gauge population responses to focus area management activities while ensuring the highest statistical rigor possible. Surveys are currently underway or being developed in collaboration with Division staff and The Ohio State University faculty to ensure the highest statistical rigor possible. The second phase of the overall monitoring phase will involve developing a population viability model for the suite of wildlife associated with each of the principal habitat types identified in each of the principal Focus Area Tactical Plans. The first survey to be developed will involve grassland bird species. Modeling will begin on at least one grassland focus area and be expanded to the other habitat focus areas upon completion of the initial grassland work. Population viability estimates of grassland target species will be determined using estimates of abundance from the first phase of the monitoring program with productivity and survival measures from the literature. This modeling effort will help determine the long-term impact of focus areas on Ohio grassland bird populations in addition to determining needs for site-specific grassland bird demographic data. This portion would begin after the long-term monitoring phase was initiated. This strategy will be employed as the first tier in the evaluation of effectiveness of the following Focus Area and Tactical Plans:

- Grassland Habitat Tactical Plan
- Killdeer-Big Island Focus Area Tactical Plan
- Paint Creek Focus Area Tactical Plan
- Lake La Su An Focus Area Tactical Plan
- Wetland Habitat Tactical Plan
- Killbuck Wetland Focus Area Tactical Plan

- Grand River/Mosquito Creek Wetland Focus Area Tactical Plan
- Lake Erie Marshes Wetland Focus Area Tactical Plan
- Forest Habitat Tactical Plan
- Zaleski Forestland Focus Area Tactical Plan
- Shawnee Forestland Focus Area Tactical Plan

Within each tactical plan are current and new projects to help meet the objectives of the plan. Individual projects in all tactical plans, including focus area plans, will be monitored through the Division=s project monitoring framework. The purpose of the project monitoring system is to ensure that every effort is made to accomplish project objectives. The system monitors schedules, completion dates and fiscal information for a project's major activities or tasks. It allows managers to identify potential problems and resolve them before they have an irreversible impact on the project. Furthermore, the agency can easily adapt and modify our actions, if needed. This allows for the most flexibility in project design to meet the goals set forth in the tactical plans. This strategy will be employed for all individual projects in each tactical plan. This strategy will be the principal evaluation tool applied to monitor the success of the following tactical plans:

- State-listed Terrestrial Wildlife Tactical Plan
- Unique Habitats Tactical Plan
- White-tailed Deer Tactical Plan
- Wild Turkey Tactical Plan
- Waterfowl Tactical Plan
- Furbearer/Small Game Tactical Plan
- Wildlife Recreation Tactical Plan
- Human/Wildlife Conflict Tactical Plan
- Facility Development Tactical Plan

The task of project evaluation measures the success of projects and helps identify improvements/modifications that may be needed in future years. As a result, project performance reports close the loop for operational planning by providing project leaders, managers and administrators an objective view and subsequent documentation of project performance and evaluation.

Both State and federally funded projects are formally evaluated by a project performance report. These reports focus on accomplishments, planned vs. actual personnel and non-personnel costs, and recommendations concerning the future of the project. All projects are evaluated.

Performance reports will be written for most projects at the end of the biennium, or for federal aid projects, at the end of every fiscal year. Projects performance reports (both state and federal aid projects) are typically less than one page in length, with additional personnel cost summary sheets attached. Any variation of 25% or greater from the planned vs. actual personnel and/or non-personnel expenditures must be explained.

Through combined monitoring and evaluation at the tactical plan and individual project levels, the Division is confident that an effective and efficient mechanism will be employed to determine the success of our strategic planning process and all its components.

Section 10.0

Wildlife-Associated Recreation Tactical Plans

Section 10.1

Facility Development Tactical Plan

Facility Development Tactical Plan

Goal: Provide facilities that substantially increase opportunities for people to participate in wildlife recreation and target shooting.

Intro/Background: As part of the Division of Wildlife=s mission of conserving and improving fish and wildlife resources and their habitats, and promoting their use and appreciation by the public, physical facilities play an important role. The various types of facilities meet the needs of the public by providing opportunities to view and photograph wildlife, sharpen their skills in the use of hunting implements, training their animals in hunting activities and providing access to individuals with physical disabilities.

A variety of facilities already exist on wildlife areas. They represent: 1) Watchable Wildlife sites (28) which are areas where visitors are free to hunt, fish, and trap but are especially encouraged to watch wildlife 365 days a year. These sites are distributed around the state and are supplemented by 52 other sites, owned and operated by other government agencies or private concerns. 2) Shooting ranges (29) designed for rifle, pistol, shotgun and archery and are classified into four categories. These facilities are both supervised and unsupervised and provide for stationary, walking and angle shooting, allowing individuals to increase their skills. 3) Observation towers (6) which provide elevated areas over flat terrain, allowing the public to view larger expanses of habitat that cannot be seen from ground level, thus providing better overall views of wildlife which inhabit those areas. 4) Boardwalks (4), elevated wooden walkways, provide easy entry into areas of wetlands so that people can experience the habitat, view the many inhabitants and plant species, and listen to the sound of the wild. Hunters and researchers also use these facilities to gain access and as observation platforms. 5) Facilities for persons with physical disabilities (69) are available for many activities, including wildlife watching, shooting and archery ranges, visitor centers, and hunting activities such as deer, waterfowl and small game. Many of these areas are wheelchair accessible. There are 9 locations which are open for disabled persons to drive their cars/trucks to designated interior areas for hunting of deer or small game while there is an additional area designated specifically for controlled deer hunting using wheelchairs. There are 8 maintained hunting blinds designated specifically for the hunting of waterfowl by persons with physical disabilities. The majority of boardwalks and observation towers are also handicapped accessible.

Need/Justification: The human population of the state of Ohio has been steadily increasing over the years. Wildlife areas attract predominantly visitors from Ohio. These visitors mostly come from the larger cities and the more densely populated urban areas. Wildlife areas are most commonly used for hunting, although fishing and other activities are also quite popular. The kinds of other activities most frequently utilized are target shooting, walking and hiking, and boating.

Sportspersons are able to practice and develop their skill with rifles, shotguns, pistols, crossbows, and longbows at a variety of locations. There are numerous un-manned ranges around the state which can be utilized year-round. There are five (5) ranges which are manned Wednesday through Sunday and are open an average of 21 days a month. Three (Deer Creek, Spring Valley and Delaware) were visited by 55,109 persons during 1999 with Spring Valley

leading with 32,500 persons. An average of 23 persons participated per day at Deer Creek and Delaware. The most popular day to shoot was Sunday. Other unmanned ranges were utilized but not to the extent of the manned ranges.

The boardwalk at Magee Marsh is considered to be the best birding location in Ohio. While numbers aren=t available for use of the boardwalk, the Migratory Bird Center which is also located at Magee Marsh had over 90,000 visitors in 1999. Many other areas along the Lake Erie marshes are visited by birders regularly. Eleven wildlife areas around the state (Mallard Club - 5000; Metzger Marsh - 25,000; Toussaint - 5000; Little Portage - 10,000; Pickerel Creek - 5000; Resthaven - 200; Spring Valley - 15,000; Caesar Creek - 5,000; Beaver Creek - 10,000; Mercer - 7500; Indian Creek - 500) were visited by over 89,000 persons.

With an increase in human population, the number of persons with physical disabilities has also increased. The passage of the Americans with Disabilities Act has emphasized the need for facilities which will accommodate these Americans. Sixty-nine (69) of the wildlife areas provide handicapped accessible, wildlife-associated recreational opportunities which include boat fishing, shore fishing, wildlife watching, shooting ranges, archery ranges, waterfowl hunts, and deer hunting. Hunting activities are the most challenging. The Division has designated nine (9) wildlife areas around Ohio as handicapped accessible, allowing occupants to drive their vehicles onto wildlife areas via designated roads/trails. Controlled hunts also provide persons with physical disabilities special access at one (1) deer hunt and six (6) waterfowl hunts.

Although there are many facilities now available to the general public, the Division of Wildlife desires to expand all people=s access to public lands while protecting those environments for which it is responsible. This expansion will be accomplished by upgrading existing facilities as well as developing new facilities which can be utilized by all people.

Objective: Add one (1) new major facility and construct/upgrade five (5) other facilities annually.

Approach: It is important to not only provide the public with wildlife oriented programs and a diversity of wildlife, but also with physical facilities which will allow them to access, view, and utilize these programs and animals. Even though new facilities will be built, existing facilities will continue to be maintained (W3NX07, W4NX08, W5NX26, W1,2,3,4,5PX01, W1,2,3,4,5PX02, WANX04) and upgraded which will also benefit the public. New structures will be constructed and old upgraded which the public will be able to utilize directly (WANX05, W1NM32).

Proposed projects are organized in five (5) categories. 1) Areas where wildlife can be seen by the construction and renovation of viewing platforms (Deer Creek (W1WM01), Mosquito Creek, Magee Marsh (boardwalk), Killbuck Marsh, Tycoon, Dillon, Woodland Trails) and watchable wildlife sites (Shenango, LaDue Public Hunting Area, Killbuck Marsh); 2) Areas where the public can get off the roads and park on the wildlife areas (3-5 pull-offs on WPAs, Tri-Valley, Wolf Creek, Ales Run, Woodbury, any newly acquired areas); 3) Areas where hunters and sportsman can improve their skills with shotguns, rifles, handguns and archery equipment (Camp Perry National Guard Base, Delaware, Resthaven, Grand River, Berlin, Wolf Creek, Woodbury,

Salt Fork, Spring Valley, Rush Run, Tranquility); 4) Areas where the health of the public will be protected as well as the comfort of persons with physical disabilities by providing port-a-johns which are accessible by such persons (Killdeer Plains) and general restroom facilities (Wolf Creek Camp Ground); and 5) Areas where the general public can be better informed through kiosk/bulletin board type structures (Pickerel Creek, Spring Valley, Paint Creek).

Section 10.2

Furbearer/Small Game Tactical Plan

Furbearer/Small Game Tactical Plan

Goal: Increase opportunities for furbearers and small game species for which supply exceeds demand and increase populations of furbearers and small game for which demand exceeds supply.

Intro/Background: Ohio's small game species include rabbits, squirrels, doves, groundhogs, rails, common moorhens, crows, woodcock, pheasants, quail and grouse. Our abundant furbearer populations were an important part of our early history and include raccoons, opossums, mink, weasels, skunks, foxes, coyotes, muskrats and beavers. These species have provided considerable recreational opportunity over the past century. However, our hunter profile has changed dramatically over the past 60 years generally following changes in Ohio's small game and furbearer populations. In the 1940s and 50s, pheasant hunting was the driving force. Resident hunting license sales peaked in 1949 at 736,381, about 9.2% of Ohio's population. There was no deer hunting season that year. In 1999, preliminary figures show 377,910 hunting license buyers (3.0% of the population) with nearly 300,000 deer hunters among that group. Trapping and hunting of furbearers have followed similar patterns but for different reasons. Trapping licenses were not sold separately until 1991 and sales declined 1991 through 1993. Then they were replaced by a furtaker permit required for both hunting and trapping of furbearers. Furtaker Permit Sales have stabilized at just over 20,000. Interest in trapping and furbearer hunting generally follows fur prices as opposed to furbearer populations. Fur prices have been depressed in recent years from the lack of demand for fur garments.

Pheasant and quail populations have continuously declined since 1950, stabilizing considerably below historical levels. Pheasants have experienced some localized improvements from the federal Conservation Reserve Program which idles environmentally sensitive cropland. Quail have yet to fully recover from high winter mortality in the late 1970s. Rabbits have declined but are still fairly abundant and adequate to meet current demand. Grouse populations improved after the 1940s as Ohio's forest cover returned. Recently, grouse populations have declined due to maturing forest and a lack of early successional hardwoods. Most other small game species have relatively stable or increasing populations and demand is perceived to be light.

Furbearers have had stable long-term populations with two exceptions. Coyote and raccoon populations have soared causing many sociological problems including human-disease concerns and livestock depredation.

Data are lacking for supply/demand analysis of most species discussed in this Plan, however, it is assumed that demand exceeds supply for grouse, pheasants and quail, and supply exceeds demand for all other species mentioned.

Need/Justification: Hunting and trapping are an important part of Ohio's wildlife heritage and address the core of the Division of Wildlife's mission. They are also critical tools for addressing human/wildlife conflict. Changes in society have decreased the likelihood that an individual will participate in hunting or trapping and have increased the availability of other forms of recreation. There is increased competition for recreational time and money therefore, hunting and trapping opportunities must be convenient with a reasonable expectation of success. If the Division of Wildlife loses its core constituency, there will likely be a decline of societal support for wildlife

management activities; both financially and politically.

Decreased participation rates by hunters and trappers influence some furbearer populations. This increases nuisance/damage and health problems associated with over abundant populations. The attention and resources required to address these problems detracts from important habitat management activities. Many of these problems are discussed in the Human/Wildlife Conflict Tactical Plan.

An important component of this plan is to ensure adequate data are collected to properly set season dates and bag limits. The Division is required by law to set seasons using professionally accepted scientific practices. There is also a need to continually evaluate hunting and trapping regulations to look for ways to expand opportunities.

Objectives:

1) Increase hunting opportunity for rabbits, squirrels, doves, groundhogs, rails, common moorhens, crows, and woodcock.
2) Increase hunting and trapping efforts for furbearers within the constraints of pelt primeness.
3) Double hunting participation rates for rabbits, squirrels, and doves from current (2002) levels.
4) Increase ring-necked pheasant and northern bobwhite quail populations by 50% from current (2002) levels as measured by spring crowing cock and whistle count surveys, respectively.
5) Increase grouse populations by 50% from current (2002) levels.

Approach: Efforts should focus on providing more animals where demand exceeds supply with species such as pheasants, quail and grouse. In all other species, efforts should concentrate on either increasing access or opportunities. The increases in habitat discussed under the various habitat and focus area plans will result in increases in wildlife species associated with those habitat types. As demonstrated by the sale of deer and turkey permits, there is a strong correlation between game population levels and license sales.

Population status and harvest information is critical so efforts in this arena must include adequate monitoring of populations to set and evaluate hunting and trapping seasons. Current projects that address this are Grouse Management (WFPR05), Squirrel Management (WFPR06), Woodcock Monitoring (WUPR07), Upland Game Monitoring (WUPR05), Dove Monitoring (WUPR06), Furbearer Population Survey (WWPR04), and the Wildlife Population and Harvest Summary (WANM29). These projects will continue and we will investigate the use of the Point of Sale system to determine hunter participation rates and harvest levels on game species.

In accordance with Ohio Revised Code Section 1531.04, hunting and trapping seasons must be based on professionally accepted practices. Existing projects that are improving our ability to adjust seasons and will continue include Mourning Dove Harvest Evaluation (WUNR05),

Grouse Harvest Mortality (WFPR08), Furbearer Harvest Evaluation (WWPR05) and Trapping Best Management Practices (WWPR11). In addition, efforts will be made to 1) evaluate a river otter trapping season, 2) determine trapping pressure on furbearers and 3) determine muskrat recruitment.

The Division of Wildlife must continually examine innovative ways of expanding hunting and trapping seasons and providing additional areas to hunt and trap. Projects such as Cooperative Hunting (W1,2,3,4,&5PM07), Youth Hunts (W1,3&5NX01 and W4NX07), Hunting and Trapping Season Proposals (WANM05), and Agreement Lands (WANM06) will continue. New initiatives should consider ways to provide more dove hunting opportunities on wildlife areas, establishment of a cormorant season and providing additional opportunities created by season/bag limit modifications and youth hunts.

There is a direct, positive correlation between game population levels and hunter participation. Hunters need to have a reasonable expectation of success before going afield. Efforts to increase local populations or opportunities such as Bobwhite Quail Stocking (WUNR02) and Pheasant Rearing and Stocking (WPNX01 and W1,2,3,4&5NX03) will continue. New initiatives included within the Focus Area and Habitat Tactical Plans should also have a positive impact on game species' populations.

Section 10.3

Human-Wildlife Conflict Tactical Plan

Human/Wildlife Conflict Tactical Plan

Goal: Minimize human-wildlife conflicts and expediently resolve public complaints of wildlife damage and/or conflict.

Intro/Background: Ohio's landscape is home to a wide diversity of wildlife. This is possible because federal cost share programs have been available to help protect habitat and conduct research. In addition, there has been active support by sportsmen and women of wildlife management practices and habitat restoration efforts, and professionals have utilized the most current wildlife management techniques across the state. The combination of these elements has allowed many species of wildlife to thrive and dramatically increase in abundance in the past 50 years. Success stories such as the recovery of the bald eagle, reintroduction of river otters, rise in black bear sightings, and increased populations of white-tailed deer, Canada geese and wild turkey are the products of these efforts.

During this same time period, Ohio's human population has also increased dramatically. Increasing human and wildlife populations, changing land use, urban sprawl, increased mobility and traffic volume (2-3% annually) have all allowed humans and wildlife to encounter one another more frequently. Further, the adaptability of some species to urban environments has also contributed to the growth in conflicts between humans and wildlife.

Need/Justification: Almost all human-wildlife conflicts are caused by three major factors: **1)** Direct Actions of Animals - these are usually classified as a conflict or damage problems related to animal activity. Conflict problems in general are an aggravation to an individual or organization, while damage problems cause financial loss and/or personal injury. **2)** Public Health Concerns - concerns over animal waste, sick and/or dead animals, rabies, and other communicable diseases create many different conflicts. **3)** Captive, Injured and Orphaned Animals - conflicts often occur over concerns related to animal care, cage specifications, and public perception of agency responsibility.

The types of perceived or actual problems for each species are wide ranging. Deer cause the most frequent and widest variety of problems. Examples include: individual deer damaging landscaping at a residence, potential disease transmission to humans and domestic animals, disposition of orphan fawns, crop and property damage, loss of human life, and motor vehicle damage as a result of accidents. Canada goose problems range from an individual nuisance goose at a residence, health concerns from waste left on public recreation areas by a flock of geese, and crop damage, to loss of human life resulting from collisions with aircraft. Perceived wild turkey problems and conflicts for the most part have been associated with agricultural crop damage. Raccoons are an aggravation to homeowners when they live in chimneys. They also are a concern regarding potential disease transmission to humans and domestic animals. Raccoons are the cause of serious economic damage in both urban and rural settings. Beaver activity can result in problems as small as damage to an ornamental plant in a residential area to much more serious problems such as flooded roads and cropland due to dam development, or depredation of crops and nursery stock. Groundhogs can be a minor nuisance as a garden pest or do serious damage to structures and crops. Squirrel damage ranges from digging in flower beds and raiding bird feeders to economic loss in the form of structure and crop damage. The potential for additional damage situations could expand as the number of river otters and black

bears in the state increases.

There are many factors that contribute to this list of problems. Some of the most frequently mentioned from internal and external input are:

A. Limited available personnel, information, training and equipment
B. High populations of wildlife species that cause problems
C. Lack of public understanding or agreement with the position and/or practices of the Division of Wildlife regarding human-wildlife concerns
D. Inconsistent application of Division of Wildlife policies and procedures
E. Slow response time to problems by Division of Wildlife personnel
F. Lack of knowledge about the Division of Wildlife by other agencies and organizations.

Additional factors that contribute which the division cannot control include urban sprawl, changing land use which limits access for managing populations through hunting and trapping, local regulations and policies that inhibit the use of proven management techniques, and changing social values that make traditional management techniques difficult to implement or ineffective.

Objectives:

1) Reduce the percentage of farmers claiming moderate to severe deer damage in the Farmer-Deer Survey by 25%.
2) Stabilize or reduce deer-vehicle accidents to levels at or below those in 1996.
3) Reduce by 10% the number of persons, responding to OSU's Wildlife Damage Survey, that report damage caused by wildlife.
4) Reduce by 10% the number of nuisance and/or damage goose complaints from the 2000 level of 700 complaints.

Approach: The problems associated with humans and wildlife coexisting in both urban and rural situations will continue to compound efforts to address these complaints over the next ten years. Priority should be focused on specific means to deal with these complaints in an efficient and professional manner. Technical expertise, training, research, public education, and cooperation with associated interest groups and agencies are major priorities in achieving the plan's goal.

In order to meet Objectives 1 and 2 we will need to maintain deer numbers at or near target levels for each county. More effective delivery of services through the existing White-tailed Deer Management project (WFPR01) and the information gained from the Deer Fawn Cause-Specific Mortality research project (WFPR10) can help us meet these objectives.

In order to determine whether we met Objective 3 we will need to re-conduct OSU's Farmer Survey of actual and perceived damage done by wildlife. Problems associated with urban wildlife populations also have created similar problems in and around expanding cities. Actions under the following existing projects need to continue to address Objectives 3 and 4: Wildlife

Specialist Partnership (WANM30), Wildlife Damage Control (W1NM04, W2NM04, W3NM04, W4NM04, & W5NM04), and Canada Goose Conflicts (WWNR07). In addition, we will need to continue an aggressive training effort for our personnel (WANX02) to ensure that wildlife conflicts are addressed in a timely and consistent manner throughout the state.

Continued cooperation and assistance from the Ohio Wildlife Rehabilitators Association is vital to address problems related to orphaned and injured animals (WANM20). Diseases that affect both domestic and wild animals should be monitored (W3NM06) in the counties that currently have documented cases. Wildlife control methods that would be acceptable to the public while providing an efficient means of maintaining wildlife populations (WWPR11) need to be developed and implemented.

Educational outreach to other agencies, municipalities, school groups, and the public is an important consideration in providing proper guidance concerning human/wildlife conflicts. The Information/Education Group should be asked to provide information regarding the division's responsibilities and services to these groups to ensure that problems are understood and addressed correctly.

New initiatives such as production of videos that identify and recommend techniques to alleviate various nuisance and damage problems, developing techniques to control depredation by river otters, pushing raccoon-rabies back to the east, developing a means of efficiently tracking the movements of urban Canada goose populations, discouraging the spread of feral hog populations, establishing a better system to ensure that the possibility for escapes from commercial shooting preserves and private propagation facilities is minimized, and establishing a better system for obtaining tranquilizer drugs needs to be pursued. In addition, more emphasis on updating the current Wildlife Crop Damage Manual and funding more Wildlife Specialist positions in the SWCDs can be effective at addressing many of the objectives.

Section 10.4

Waterfowl Tactical Plan

Waterfowl Tactical Plan

Goal: Increase waterfowl-related recreational opportunities to keep pace with increasing demand.

Intro/Background: The demand for waterfowl-related recreation has increased in Ohio due to increasing waterfowl populations, improved habitat conditions, and longer Canada goose hunting seasons. Despite a decreasing trend in the total number of licensed hunters, the number of active waterfowl hunters has increased to levels rivaling the 1970s (i.e., 32,000 hunters). This greater interest in waterfowl hunting and viewing is a testament to the increasing quality and quantity of opportunities to appreciate waterfowl in Ohio and the enjoyment that many people derive from these activities.

In the early 1990s, the Adaptive Harvest Management system was implemented by the U.S. Fish and Wildlife Service (USFWS) to provide maximum long-term harvest while maintaining the mallard population goal of the North American Waterfowl Management Plan. Improved habitat conditions have allowed duck populations to rebound from the low numbers of the late-1980s, and as a result, hunters have been offered some of the most liberal and stable hunting regulations in history.

Ohio has many public wildlife areas that provide quality recreational opportunities through controlled waterfowl hunts (offering assigned hunt units, blinds, and handicapped-hunter blinds) and areas which are open to the public without access restrictions ("open areas"). In addition, cooperative hunting agreements provide some opportunity for the public to hunt waterfowl on private land.

Hunting Canada geese is an important tool for managing human/goose conflicts. In parts of northern Ohio, where goose conflicts are high, restrictive hunting regulations have been implemented to minimize harvest of the Southern James Bay Population (SJBP) of Canada geese, which migrate through Ohio. The SJBP has experienced low numbers and productivity since the early 1990s, while resident giant Canada goose numbers have been increasing. Restrictive hunting regulations compromise the Division's ability to manage resident giant Canada geese in this region. The September and experimental Late Canada goose seasons were established to deal with increasing numbers of resident birds and have created new goose hunting opportunities; however, there is still a need to further increase hunting opportunity for resident giants, while minimizing SJBP harvest.

Need/Justification: Waterfowl hunting is an important tradition in Ohio. Changes in society and Ohio's landscape have increased the number of urban residents and decreased hunter access to private property. This has necessitated that public hunting opportunities be located within a reasonable distance of urban centers and satisfy a reasonable expectation of hunter success. Controlled waterfowl hunting areas are needed to provide quality hunting opportunities (particularly near metropolitan areas), "open areas" are needed to satisfy the overflow from controlled hunts. Hunters must be informed of the location of non-Division "open areas" (i.e., state parks, Corps lakes, river systems, etc.). However, public lands alone will not be able to meet the increasing demand for places to waterfowl hunt. Therefore, strategies must be identified to increase hunter access to private lands.

Changes in weather patterns and migration timing have made it necessary for the Division to consider adjustments to zone boundaries and season timing to improve hunter satisfaction. The Division should conduct periodic surveys to evaluate whether recreational demand is being met, whether hunters are satisfied with hunting opportunities (i.e., seasons, zones, controlled hunts, etc.), and what their attitudes and preferences are.

The habit of resident Canada geese to utilize urban "refuges" may be limiting their vulnerability to harvest. There is a need to band urban Canada geese to evaluate their vulnerability to harvest, to identify the timing and magnitude of urban goose movements, and to identify strategies to increase harvest of urban geese. Season modifications to increase harvest of resident geese outside the migration period for SJBP geese need to be explored. Access to private land goose hunting needs to be increased in regions of high agricultural goose damage through cooperative hunting agreements and by working with agricultural organizations such as the Ohio Farm Bureau.

The USFWS and the Mississippi and Atlantic Flyway Councils have been investigating the potential to increase hunting opportunity for wood ducks. It is unclear at this time whether additional opportunity will be offered through an increased bag limit or a more liberal wood duck season length. The Division needs to continue participation in wood duck management efforts (i.e., pre-season banding, nest box monitoring, development of harvest management strategy) and to participate in discussions of future wood duck harvest opportunity.

Critical to meeting the increasing demand for waterfowl is knowledge of habitat conditions which attract and hold waterfowl and provide benefits to waterfowl populations. Very little is known regarding Ohio's contribution to the Mississippi Flyway's fall flight, and the effect of several years of liberal harvest on waterfowl populations that use Ohio wetland habitat for breeding, migrating, staging or molting. The Lake Erie Marsh region, in combination with other wetland complexes (Grand River, Killbuck, Killdeer Plains, and Big Island) may serve as important breeding areas in addition to providing staging and migration habitat. Each year the Lake Erie marsh region attracts thousands of mallards during July and August, and tens of thousands of black ducks during November and December, but little is known about these birds' origin, destination, or use of specific habitats. More information is needed on the importance of these areas to waterfowl to maximize waterfowl benefits from management activities.

Objectives:

1) Increase hunter-days at Division of Wildlife controlled waterfowl hunts from 17,000 to (assuming 60-day duck seasons and 70-day goose seasons) 18,500.
2) Acquire or develop 2500 acres of additional wetland habitat available for public waterfowl hunting and wildlife viewing.
3) Maintain our resident giant Canada goose population at the spring population objective at a minimum of 60,000 (MS Flyway Council Objective).
4) Increase wood duck hunting opportunity.

Approach: Increasing the opportunities to access waterfowl-related recreation can be achieved through existing projects and better informing the public of the numerous waterfowl hunting and viewing opportunities already present in Ohio. Youth Hunts for waterfowl and the addition of

controlled waterfowl hunting areas are excellent avenues for providing waterfowl hunting opportunities on state lands. In addition, acquisition and restoration of wetlands at wildlife areas can substantially increase waterfowl hunting and viewing opportunities.

Private Lands Hunter Access Projects (W1,2,3,4&5PM07) can be effective in making additional areas available to waterfowl hunters through cooperative hunting agreements, particularly on the large river systems of southern Ohio where additional access sites could be developed. The Information and Education Group should be asked to keep the public informed of the numerous waterfowl viewing and hunting opportunities. This is critical to meeting the demand for waterfowl-related recreational activities, and is essential for increasing the public's awareness of such opportunities. Posting the results of the aerial waterfowl surveys on the Division website, and alerting hunters to the availability of this information, could substantially increase hunter-trips, and inform the public of viewing opportunities.

Determining whether demands for recreational opportunities are being met can be accomplished by using frequent waterfowl hunter-satisfaction surveys and waterfowl hunter/harvest statistics (WWPR07). Maximizing opportunities to harvest waterfowl, especially Canada geese and wood ducks, can be identified through independent and cooperative research through the Mississippi Flyway Council (WWPR01). Research on the abundance, distribution and timing of waterfowl migration should continue (WWPR06) to identify the best opportunities to harvest waterfowl. Additional research should be directed at gaining a better understanding of the benefits Ohio wetlands provide to waterfowl during breeding, migration, staging and molting. Results of this effort should be provided to wetland wildlife managers for use in guiding management activities.

Researchers need to analyze the spatial and temporal distribution of both resident giant Canada geese and SJBP birds in Ohio during fall and winter so that additional harvest opportunities can be targeted at resident birds while minimizing harvest of migrant interiors (WWPR03, WWPR07).

Research also needs to continue to better define the derivation of Ohio harvested ducks. This will allow us to target habitat improvement at these regions, and to provide insight into whether regulations based on mid-continent mallards may be too liberal or too conservative for the portion of the fall flight that migrates through Ohio (WWPR03, WWPR07).

Section 10.5

White-tailed Deer Tactical Plan

Deer Tactical Plan

Goal: Maintain a quality deer herd that provides maximum recreational opportunity and minimal conflicts with agriculture, motor travel, and other areas of human endeavor.

Intro/Background: White-tailed deer were extirpated from Ohio by 1904 due to unregulated shooting and extensive deforestation that occurred during settlement. Deer were reintroduced to southern Ohio in 1932 and slowly immigrated into the border counties of eastern and northwest Ohio from deer populations in Pennsylvania and Michigan. An estimated 2,000 deer were present in 28 counties by 1940 and the population had increased to 22,000 deer in all 88 counties by 1968. Deer densities were relatively low during that period and far below ecological carrying capacity in most of the state. Rapid population growth occurred in the 1970's and early 1980's due to conservative harvest regulations and abundant, but declining, early-successional forest cover. Current estimates place the herd at between 450,000 – 500,000 animals and annual harvests have exceeded 100,000 deer since 1991.

Deer range expansion and population growth were the primary goals of Ohio's early deer management program. As early as the 1950's, the potential cost of these goals was recognized and measures were incorporated into the management program to minimize deer-human conflicts. Beginning in the late 1970's, management decisions were made on the basis of herd status relative to the maximum tolerable number of deer (i.e., the sociological carrying capacity) in each county as set by farmer attitude surveys and deer-vehicle accident rates. For the past 40 years, attainment of the deer program goals has been successful; approval ratings have averaged 70-80% among constituent groups.

Despite holding populations below ecological carrying capacity, declines in reproductive rates of younger age classes and in body condition of all sex and age classes have occurred as deer populations have increased in eastern Ohio. Populations in many eastern counties may currently be near maximum sustained yield (i.e., $\geq$50% of ecological carrying capacity). Further reductions in reproductive performance and condition are expected unless herd growth can be stabilized. Fewer reproductive and condition parameters have declined in western Ohio where populations are projected at 35-40% of ecological carrying capacity. Primary reasons for the declines in reproductive rates and condition in eastern counties include increased deer population densities and concurrent reductions in habitat quality. Although total forest cover has increased in Ohio since the late 1960's, the proportion of early-successional forest cover (i.e., high quality deer habitat) has declined over this same time period.

Needs/Justification: Current methods for establishing optimum deer population goals will need modification to maintain desired reproductive performance and condition while providing maximum recreational opportunity. Public tolerance of deer has increased along with deer populations. Continued reliance on sociologically derived objectives may contribute to further declines in the quality of the deer herd in eastern counties. The position of the deer population in relation to ecological carrying capacity must be considered when establishing county target levels to maintain herd quality. Implementation of adaptive harvest management will allow biologists to predict changes in reproductive rates and body condition in relation to varying deer population sizes.

Our current model for predicting deer population size and setting harvest regulations depends on a constant buck harvest mortality rate. Some variation does occur in this parameter, is difficult to detect, and can limit our ability to accurately predict fall population size. Changes in hunter selection and hunting pressure may be eroding the usefulness of harvest data in some counties. An accounting-style population model would not be vulnerable to factors that affect the harvest. After an initial population size is estimated by reconstruction or other techniques, annual changes in deer populations would be projected with inputs of age-specific reproductive and mortality rates. For modeling to be successful, research projects need to be conducted to determine survival, cause-specific mortality, and recruitment rates of does and fawns in both southeastern and western Ohio. Accounting-style models are presently being developed for each Ohio county.

Accounting-style population models will increase the precision of county deer population estimates and harvest goals. However, to derive maximum benefits from population models, modifications to the present harvest management system will be required. Changes in bag limits and season length are used to affect population size. Under the current 3-zone system, insufficient control over county deer harvests may result in population sizes only within an order of magnitude of the county goal. A return to county-based antlerless deer quotas would provide increased control over the harvest, and also provide estimates of hunter success rates. The implementation of the Point-of-Sale licensing system provides the means to control the number of county-specific antlerless deer permits made available to hunters.

As the next decade unfolds, "traditional" deer management approaches will become increasingly difficult to implement in areas where hunter harvest will either be no longer an option or of limited use. While human-deer conflicts and the demand for alternative methods of deer population management will intensify, hunter numbers and license revenues will likely decline. Cooperative management and research projects with city metroparks will be required to collect biological data on urban deer herds and implement both lethal and non-lethal management techniques to minimize deer conflicts in these areas.

Finally, hunter attitudes regarding deer and deer hunting will continue to evolve. Having had the opportunity to harvest multiple deer for many years, quality rather than quantity will likely become more important to many Ohio deer hunters. We should plan on addressing requests from hunters for "quality managed" deer herds. However, an improved buck age structure and herd productivity, two of the benefits of quality deer management (QDM), might result in substantial reductions in recreational opportunity. Consideration will need to be given to this small but growing group of hunters.

Objectives:

1) Maintain deer populations at minimum conflict levels defined by farmer attitude surveys, deer vehicle accident rates, and maximum acceptable biological limits.
2) Maintain present deer herd quality as defined by yearling antler development (22 mm and 25

mm beam diameter for eastern and western Ohio, respectively) and herd productivity (incidence of fawn breeding at 50% and 30% for western and eastern Ohio, respectively).

3) Maintain approval ratings of our deer program at 80% or greater.

Approach: The addition of a quality dimension to the objectives of our deer program will require additional work within our two existing deer projects, White-tailed Deer Management (WFPR01) and White-tailed Deer Cause Specific Mortality (WFPR10). Project WFPR01 will continue to provide annual condition data collected at check stations during deer gun season and will require another assessment of changes in reproductive rates in 5-10 years. Project WFPR10 will provide data inputs to population models and provides the means to monitor changes in harvest rates and productivity under various harvest management scenarios. New projects such as development of an accounting-style population model and the use of computer technology to facilitate the allocation of deer permits and the collection of harvest information will be initiated to improve the deer management program.

Education and the dissemination of information to the public through projects WFPR01 and Forest Wildlife Research and Public Information (WFNX01) will be critical to the success of the deer management program. Changes in the quality of the deer herd are subtle and it will be difficult to convince hunters that the maintenance of a high quality deer herd will require stable or lower deer populations in some areas. We will need to continue our rural landowner and deer hunter surveys at least every 3 years through project WFPR01 and a motorist survey should be developed to improve target goals in urban counties. Efforts to educate, interact, and better understand the attitudes and values of our constituents will improve our ability to respond to new issues and challenges in deer management as they develop in Ohio.

Section 10.6

Wild Turkey Tactical Plan

Wild Turkey Tactical Plan

Goal: Provide maximum recreational opportunity without lowering the quality of wild turkey hunting and non-consumptive uses.

Intro/Background: The wild turkey once inhabited forested areas in every Ohio county and was an important food source for early settlers. Extensive loss of forest, coupled with unregulated hunting, led to the extirpation of the wild turkey in 1904.

By 1950 large tracts of forest land had returned to southeastern Ohio. From 1952 to 1957, the Division of Wildlife reared 1,400 game farm turkeys and released them in several southeastern forests. This attempt to establish a turkey population using game farm birds failed. From 1956 to 1963, wild turkeys trapped in West Virginia, Kentucky, Texas, Alabama, Arkansas, Missouri, and Florida were transplanted to Ohio. These birds prospered and became the source of turkeys for in-state trapping and transplanting efforts that have been conducted since 1963. Between 1963 and 2000, 4,165 live-trapped turkeys were released at 210 sites across the state. In spring 2000, Ohio's wild turkey population was estimated to number over 203,000 birds that occupy over 20,000 mi^2 in all 88 counties.

As the distribution and abundance of wild turkeys increased in Ohio, so did the popularity of turkey hunting. In 1966, 321 hunters harvested 12 turkeys during Ohio's first modern spring turkey season. In 2000, 61,942 hunters harvested 20,276 birds. During the previous 35 spring turkey hunting seasons, hunter success rates increased from 3.7 to 29.1% and the number of open counties increased from 9 to 88.

Ohio held its first ever fall, either-sex wild turkey hunting season in 1996 in 22 southeastern counties. Criteria to determine county eligibility for fall, either-sex wild turkey hunting includes a spring turkey harvest $\geq$200 birds during the previous 2 years, $\geq$30% forested, and not isolated, but adjacent to 2 or more counties that meet the first 2 criteria. During the 1996 and 1997 fall seasons, a limited number of permits were allotted to each county to ensure that the fall harvest would be <3% of the county's fall turkey population. All hunters who applied received a turkey permit as applications were fewer than the permit quota for each county. Permits were sold over-the-counter at regular license vending outlets with no county limits during the 1998 and 1999 seasons. During Ohio's first 4 fall either-sex turkey hunting seasons (1996-99), <3% of the turkey population in open counties was harvested. Adult hens comprised an average of 32% of the harvest. In 1999 the number of open counties increased to 25 and in 2000 to 28. There are at least 6 other potential fall hunting counties in Ohio and as turkey populations continue to grow these, too, will be opened.

Need/Justification: While turkeys are established in all 88 counties, there are portions of 20 western and south-central counties with suitable, unoccupied habitat. Birds will continue to be relocated until these sites are occupied.

Turkey densities are at or nearing the biological carrying capacity in southeastern and east-central Ohio counties. Current densities in these counties average 10-15 turkeys/mi^2 and will fluctuate with annual productivity, but are not expected to increase in the future. Turkey populations in northeastern Ohio are rapidly growing. Current densities average 8 turkeys/mi^2 and are expected to increase to, and then level off, around 10-15 turkeys/mi^2 within the next 10-15 years. In the western farmland counties, densities range from 0.5 to 1.0 turkey/mi^2 and are not expected to exceed 2 turkeys/mi^2.

Population modeling suggests that a spring harvest of $\leq$35% of the male turkey population would allow for continued quality hunting. During winters of 1997-2000, 1,018 wild turkey gobblers were captured, banded, and released throughout eastern Ohio. One hundred eighty-five banded birds were harvested during the following spring hunting seasons for an overall harvest rate of 18.2%. The regulations that directly affect gobbler harvest rate include season timing, season length, bag limit, and limits on the number of hunters. The best available evidence suggests that current regulations are maintaining harvest rates well below sustainable levels and that hunting opportunity during the spring turkey season can be expanded.

Removals of over 10% of the turkey population during fall either-sex seasons would likely result in population declines. Studies have shown that turkey populations are particularly sensitive to adult hen mortality. Vulnerability of adult hens to harvest is influenced by annual recruitment because juveniles are more susceptible to harvest than adults. When reproduction is poor there are few juveniles in the population to buffer the effect of fall hunting on the adults. In the Midwest, most states strive to keep the fall harvest less than the spring harvest (or <10% of the fall population).

With wild turkeys in all 88 counties, an increasing statewide population and projected increased demand for consumptive and non-consumptive uses, information on the species' population dynamics is needed to develop a sound management plan. Measurements of survival and productivity are fundamental to an understanding of the changes in wild turkey populations. Documentation of survival and cause-specific mortality rates of all age-sex classes and reproductive parameters of hens is needed to understand wild turkey population dynamics and develop a sound management plan. Banding data provide the only information on wild turkey survival and harvest rates in Ohio. Hunter harvest is a significant mortality factor of wild turkeys. Additional knowledge of the effects of spring gobbler-only and fall either-sex hunting seasons on wild turkey populations is needed to better manage this species.

The increase in abundance and distribution of wild turkeys in Ohio caused concern among farmers among regarding crop damage during the early 1990s. A study was initiated by the Division in 1995 to determine the extent of wild turkey crop damage in Ohio. Results from this study indicated that only in southeastern Ohio was turkey crop damage a potential management issue. Findings from investigations of wild turkey crop damage complaints indicated that most crop damage attributed to turkeys was actually caused by other less visible wildlife, especially raccoons, squirrels, and crows.

Objectives:

1) Maintain spring gobbler harvest rates near, but below, 35% of the gobbler population and fall harvest rates less than 10% of the total fall population in counties open to fall hunting.

2) Establish wild turkey populations in all suitable, rural habitats.

Approach: For all practical purposes, counties in the southeastern, east-central, and northeastern part of the state can be considered fully occupied by wild turkeys. The only remaining unoccupied habitat that can support turkeys occurs along wooded corridors in 16 western farmland counties (Sandusky, Ottawa, Wood, Allen, Van Wert, Putnam, Hancock, Wyandot, Paulding, Hardin, Montgomery, Auglaize, Clark, Mercer, Miami, and Darke) and 7 central/south-central counties (Ross, Delaware, Fayette, Madison, Marion, Pickaway, and Union). Turkeys will be released in the most forested and expansive rural river corridors or watersheds in these counties. Releases of wild turkeys in these counties will continue until natural expansion of the reintroduced birds fills all suitable rural habitat in Ohio. To maximize turkey hunting opportunity and avoid human-turkey conflicts, turkeys will not be released in parks, areas closed to hunting, or areas near human developments.

All objectives can be accomplished by continuing the following current projects and activities: monitor spring and fall turkey harvests through mandatory hunter registration and relative abundance and distribution through annual surveys and expand hunting opportunity whenever possible (WFPR09), identify suitable but unoccupied habitat and release live-trapped birds (WFPR09), monitor spring gobbler harvest rates through leg band returns and annual/seasonal survival and cause-specific mortality rates through radiotelemetry (WFPR09 and WFPR11), monitor annual/seasonal survival and cause-specific mortality rates and reproductive parameters of wild turkey hens through radiotelemetry (WFPR11), monitor spring and fall turkey hunter preferences, concerns, and attitudes every 5 years (WFPR09), provide technical assistance to private landowners wishing to create or enhance wild turkey habitat (WFPR09, W1NX05, W1PM05, W3NM05, W4PM05, W5NM05, and W5PM05), maintain or improve wild turkey habitat on public lands (W1PM01, W3PM01, W4PM01, and W5PM01), and investigate wild turkey crop damage complaints (WFPR09). It is anticipated that funding to assist with many of the above projects will be available through our partnership with the National Wild Turkey Federation (WFNX02).

Section 10.7

Wildlife Recreation Tactical Plan

Wildlife Recreation Tactical Plan

Goal: 1) Provide more and larger places for the public to participate in wildlife-related recreation with increased emphasis on areas in proximity to large urban/suburban centers. 2) Reduce conflicts between and among users.

Intro/Background: Approximately 5% of Ohio is publicly owned (1,425,000 acres). This includes lands owned or controlled by the Ohio Department of Natural Resources, U.S. Army Corps of Engineers, U.S. Forest Service, National Park Service, U.S. Fish and Wildlife Service, counties and townships. Over 1 million acres of these lands are open to public hunting.

The rate of land acquisition by the Division of Wildlife and its predecessors has varied widely over time (acres acquired prior to 1950: 14,030, 1950s: 47,631, 1960s: 12,083, 1970s: 9,367, 1980s: 11,821, 1990s: 73,076). The Division of Wildlife currently owns 172,785 acres and has approximately 220,000 additional acres enrolled in public hunting agreements with various entities. In addition, over 600,000 acres are enrolled in the Cooperative Hunting with Permission program with private landowners. This acreage is distributed throughout the state, however the vast majority of public property is located in southeastern Ohio.

Need/Justification: Hunting, trapping, fishing and wildlife viewing are popular and traditional pastimes for Ohioans. According to the U.S. Fish and Wildlife Service, in 1999 Ohio ranked 7th in the number of fishing licenses sold among the states and 8th in the number of hunting licenses sold. Many of these activities occur on public lands and the demand for places to pursue wildlife-related recreation is anticipated to increase in the future. In a survey conducted by the state of Texas in 1990, Ohio ranked 47th in the United States in the amount of public lands available for recreation per capita with 95% of the state being privately owned. With relatively large numbers of participants and a lack of public places to recreate, our citizens appear to strongly support additional acquisition to address this imbalance. The Division of Wildlife's 1995 General Survey of Ohioans indicated that 86% of respondents felt that buying land for fish and wildlife purposes was important. In addition, wildlife-related recreation appears to be a significant factor in attracting nonresidents to the state. According to a 1993 Ohio Department of Transportation Travelers Survey, fishing was the top activity that attracted visitors to the state and hunting ranked 3rd. While fishing and hunting appear to be important in attracting nonresidents, there is a limit to how far urban/suburban Ohioans will travel to recreate at a wildlife area. A 1997 study conducted by the Institute for Local Government Administration and Rural Development indicated that people who lived in urban/suburban areas would travel up to, but generally not more than, 50 miles to visit a wildlife area. In that study, hunting (46.8%) was the visitors' most popular use of the wildlife areas followed by fishing (24.9%) and birdwatching (7.2%). People also used the wildlife areas for target shooting, trapping, walking and hiking, dog training/field trials and boating. While District 4 attracted the most visitors for hunting, District 3 rated high in fishing, and District 2 rated high in bird watching. The estimated total number of visitor-days was approximately 1 million (956,410) annually for all wildlife areas combined. Because of the relative scarcity of publically owned land in Ohio, these areas are subjected to heavy use by a wide variety of user groups. Conflicts among user groups are expected to increase under present conditions. A further complicating factor is that most of the public lands available for wildlife recreation are located in eastern and southern Ohio away from large urban/suburban areas which make these areas less convenient to use for most Ohioans.

Objectives: 1) Increase the wildlife area system by 1% per year with at least half of the land acquired within 50 miles of a major urban center (>100,000 people). 2) Maintain the existing amount of private/corporate land available for public use by agreement.

Approach: Providing convenient opportunities to participate in wildlife-related recreation is very important to Ohioans and the demand for these activities is expected to increase. Priorities should be focused on acquiring more land and working with both public and private landowners to open new areas for these purposes.

Objective #1 will be addressed by acquiring property within 50 miles of major urban centers; purchasing relatively large (>500 acres), contiguous tracts anywhere in the state when they become available at an attractive price; and adding key inholdings at existing areas. These properties will be acquired from willing sellers, by donation or through easements/agreements. It is anticipated that funding for additional acquisition will continue to be available from conservation partners such as the National Wild Turkey Federation, Ducks Unlimited, and The Conservation Fund and will greatly enhance acquisition opportunities.

Property enrolled in public hunting and fishing agreements will continue to play an important role in providing areas for wildlife recreation. Current agreements need to be maintained and efforts to add new corporate lands will be a high priority. Objective #2 will be addressed by maintaining current cooperative hunting agreements (WANM06, W4PM04), hunting with permission agreements (W1PM07, W2PM07, W3PM07, W4PM07 & W5PM07) and pursuing the opening of additional lands by developing partnerships with other state and federal agencies and private entities.

Along with providing additional lands and waters for hunting, fishing and trapping, the Division of Wildlife must also provide additional opportunities to participate in these activities. Projects such as youth hunts (W1NX01, W3NX01, W5NX01 and W4NX07), pheasant rearing and stocking (WPNX01, & W1,2,3,4,&5NX03), special deer and turkey hunts (W2NX06, W3NX06, W4NX06) and controlled hunts for waterfowl (W2PX01, W3PX01) will continue and will be expanded when feasible. In addition, the potential for more opportunities for young and handicapped sportspersons on private lands seems high and will be explored.

Conflicts among user groups on public lands continue to increase due to heavy demand by a wide variety of people interested in pursuing a large number of activities. These conflicts need to be minimized by providing additional lands, scheduling to avoid incompatible activities occurring at the same time or restricting certain activities to areas where they are less likely to interfere with other users. Field trial projects (WANX01, W1NX02, W2NX02, W3NX02 and W5NX02) will continue but may need to be modified to address some of these concerns.