

What's Included in the INHS Interim and Final Creel Reports

To help you interpret the Interim and Final Creel Reports from the Illinois Natural History Survey, we've included this guide to explain the contents of various pages. You will also find a copy of the *Statistical Design and Calculation of Each Creel*, Appendix A. of the 1990 Illinois Natural History Survey report 90/10: Creel Survey Manual for the District Fisheries Analysis System (FAS): A Package for Fisheries Management and Research. This appendix describes how the creel data are collected, their subdivision for analysis by five different categories: specifically the Year Period, Lake Section, Day Period (Morning, Midday, Afternoon), Day Type (Weekday vs. Weekend/Holidays), and Fishing Mode (Boat vs. Shore) that the data were collected from (in other words, the stratification scheme applied to the creel data), and the statistical methodology used to calculate the estimated total hours of fishing, harvest, and catch.

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Each creel report is composed of the following information (in this chronological order):

STRATIFICATION SUMMARY

Information presented here is intended to provide some background as to the pre- and post-stratification methods used in analysis. Creel surveys will be either day or night surveys, and this will be indicated first. Reported next will be the range of sampling dates for which estimates are made. No attempt is made to extrapolate estimates out to months in which no data are collected, unless otherwise noted.

SAMPLING RATIO

The SAMPLING RATIO value, listed directly below STRATIFICATION SUMMARY, is the ratio of the number of Day Periods sampled divided by the total number of day periods included in the estimates. In short, the SAMPLING RATIO gives an index of the intensity of the sampling schedule. For example, suppose 128 Day Periods were sampled between 3/15 and 6/15. To calculate the SAMPLING RATIO, the total number of Day Periods sampled is divided by the total number of possible Day Periods occurring during that span of dates. In this example, there are 93 days within the span of 3/15 to 6/15, thus 3×93 or 279 day periods. The Sampling Ratio = $(128/279) \times 100\%$, or 45.8%.

NUMBER OF INTERVIEWS

This is the total number of all angler interviews conducted during the season.

PART ONE: EFFORT, HARVEST, AND CATCH ESTIMATES

TABLE 1. TOTAL FISHING EFFORT

This table reports the estimated total angler-hours of fishing by all anglers. Unless otherwise noted, reports will always apply to all pole and line fishing activity on the entire lake.

As described in *The Statistical Design and Calculation of Each Creel*, the effort estimate, i.e. the estimated total angler-hours of fishing, is calculated separately for boat and shore anglers as well as for all anglers for each Day Period sampled. These estimates are based on the instantaneous counts of anglers and are scaled up by the effective hours available for fishing for that time of day and year, rather than on the hours of fishing reported in angler interviews. An estimated average effort is then calculated for each combination (i.e. stratum) of Year Period, Lake Section, Day Period, Day Type, and Fishing Mode by averaging the total hours of fishing from all days sampled within the stratum. Stratum averages are scaled up over all possible days in the stratum to provide an estimated stratum total effort. Finally, each stratum total effort is added together to give the separate estimates of total hours of fishing for boat and shore anglers for the lake and time period of interest.

A weighted estimate of the total hours of fishing for anglers is calculated using a stratified approach. Rather than combining the boat and shore instantaneous counts for each sample and ignoring any potential difference in the day to day variability of boat versus shore fishing, the stratified approach first calculates separate estimates of total effort for boat and for shore anglers for the entire time period being reported. These totals and their variances are then combined to give the overall total estimated hours of fishing.

The **FISHING MODE** column will usually include BOAT, SHORE, and BOAT & SHORE. Estimates are made separately for boat and for shore fishing, and these estimates are later combined into an overall total estimate of both boat and shore.

The **DAY TYPE** column shows estimates for WEEKDAY and HOLIDAY. The WEEKDAY estimates only include Monday through

Friday fishing, excluding holidays that fall on weekdays. The HOLIDAY estimates include all holidays and all weekend days (Saturdays and Sundays). Days that are considered holidays for the purposes of this creel only include: New Year's Day, Martin Luther King Jr.'s Birthday Observed, Presidents' Day, Memorial Day Observed, Independence Day, Labor Day, Columbus Day, Veterans' Day, Thanksgiving Day, and Christmas Day.

Estimates of the total hours of fishing (the **ANGLER-HOURS** column) by BOAT anglers, SHORE anglers, and BOAT & SHORE anglers are reported in separate blocks in the table. The strata total estimates for each type of angler are further subdivided by Day Type (WEEKDAY versus HOLIDAY).

The **95% CI** columns follow estimated totals, such as ANGLER HOURS in TABLE 1, and in TABLES 3-8. These report the 95% confidence interval for the estimated totals. In other words, 95% of the time we'd expect the true total to fall within that given range. In cases where the lower limit of the confidence interval is a negative number, a value of zero is shown in the table. The percentage listed in () after the confidence interval is another indicator of the precision of the estimate. This percentage is calculated as: $(\text{Upper value of the 95\% CI} - \text{Estimated Total}) / \text{Estimated Total}$. The larger this percentage is, the less accurate the estimate. For example, if the Total Angler Hours Estimate is 30,293, with an upper 95% confidence interval of 34,952, the precision percentage is calculated as $(34,952 - 30,293) / 30,293$ or 15.38%. The percentage is rounded to the nearest integer for the tabular output.

The **HOURS/ACRE** column gives the Hours of Fishing per acre of lake surface area. This is calculated by dividing the ANGLER HOURS value in each row by the acreage value shown at the top of the page.

The **% EFF INTVD** column, located on the right margin of the effort table, is the percentage of the estimated total effort actually accounted for by angler interviews. This number is calculated by summing the total hours of fishing reported by anglers from each stratum (i.e. Day Period, Year Period, Day Type, and Fishing Mode combination) and dividing it by the estimated total fishing effort (calculated from the instantaneous counts) for that period. For instance, a total of 120 hours of weekday fishing might be reported by BOAT anglers for Day Period 1 (Sunrise to

10:00 A.M.) between 6/01/94 and 6/15/94. The estimated total BOAT effort, however, based on the average BOAT angler instantaneous counts of Day Period 1 extrapolated by the 11 weekdays within 6/01/94 and 6/15/94, turns out to be 360 hours. The % EFF INTVD value for this stratum would be: (120 angler-hours from interviews) / (360 angler-hours from instantaneous counts) x 100 = 33.33%. Like SAMPLING RATIO, this number gives an indication of the effectiveness of the sampling intensity. A higher % EFF INTVD value indicates a more complete job of obtaining information on all of the angling activity for that type of angler. If you sampled every day within a stratum and interviewed every angler (in other words conducted a census rather than a survey), this percentage would approach or possibly exceed 100%.

TABLE 2. TOTAL FISHING HARVEST AND HARVEST RATES, IN NUMBERS OF FISH

The **# HARVESTED** column is the estimated total number of fish harvested for the season, by species. The top number in this column will always contain the estimated total number of all fish harvested for the season, as indicated by "All species" under the SPECIES column header. For any given species, a "**** NOT RECORDED ****" entry indicates that no harvested fish were recorded from the angler interviews, and therefore no estimate of the total harvest could be made.

The **95% CI** column next to the # HARVESTED column contains the 95% confidence interval estimate of the # HARVESTED value. The lower confidence limit is shown on the left and is separated by a dash from the upper confidence limit shown on the right. In cases where the lower limit of the confidence interval is a negative number, a value of zero is shown in the table. A negative or zero value for the lower 95% confidence interval is usually the result of very few fish of a particular species being sampled in the angler interviews. Next to the upper confidence limit, in parentheses, is an additional estimate of the precision of the # HARVESTED estimate, and is calculated as:

$$((\text{Upper } 95\% \text{ CI} - \# \text{ HARVESTED}) / \# \text{ HARVESTED}) \times 100\%$$

The **#/HOUR** estimate is the population harvest rate, and is defined as the number of fish harvested per angler-hour of fishing. Note that angler-hours are the same units as are

reported in TABLE 1. Also, note that this is not an estimate of the average harvest rate per angler. Rate estimates with a value of .000 have a harvest rate that is less than 0.001 but greater than zero. A zero rate is not recorded.

The **95% CI** column next to the #/HOUR column is the 95% Confidence Interval estimate of the #/HOUR estimate, and is calculated similarly to the methods described earlier.

The **#/HA** column is the estimated total number of fish harvested per hectare of lake surface area. One hectare is equivalent to 2.4711 acres.

The **#/ACRE** column is the estimated total number of fish harvested per acre of lake surface area. Lake surface area is reported at the top of Page 1.

The **SPECIES** column lists all species recorded in angler interviews. Note that this is different from the original Apple II/e creel analysis reports. These original reports were memory-limited to only 9 species per table. Additional species were either included in an additional table or were listed under "MSC" (Miscellaneous species) in the harvest table. Beginning with the 1999 creel analysis reports, all species recorded in angler interviews will be listed in Table 2 through Table 7. Any species that does not appear in these tables was not recorded in angler interviews, and therefore no estimate could be made of the harvest or catch for that species.

TABLE 3. TOTAL FISHING HARVEST AND HARVEST RATES, IN KILOGRAMS.

Table 3 contains the estimated total fishing harvest and harvest rates in kilograms, and is structurally similar to TABLE 2. See TABLE 2 for a further discussion of the estimates under the 95% CI and SPECIES headers. Unique features of TABLE 3 are discussed below.

The **KG HARVESTED** column contains the estimated total harvest biomass, in kilograms.

The **KG/HOUR** column is the estimated total harvest biomass per angler-hour of fishing effort.

The **KG/HA** column is the estimated total harvest biomass per hectare of lake surface area.

The **AVE KG** column is the estimated average weight per harvested fish, in kilograms. Note that TABLES 3,4,6,and 7 do not contain a per acre estimate of harvest or catch.

TABLE 4. TOTAL FISHING HARVEST AND HARVEST RATES, IN POUNDS.

TABLE 4 is structurally similar to TABLE 3, except that all biomass estimates are reported in pounds rather than in kilograms. For a discussion of the organization of TABLE 4, see the discussion for TABLE 2 and TABLE 3.

TABLES 5-7. TOTAL FISHING CATCH AND CATCH RATES

TABLES 5-7 are structurally similar to TABLES 2-4, respectively, except that all harvest estimates are replaced with catch estimates. Catch estimates contain estimates of both harvested fish and released fish. For a discussion of the organization of TABLES 5-7, see the discussions for TABLES 2-4, respectively.

A NOTE ON BIOMASS ESTIMATES

Rather than measuring fish weights directly during interviews, weights are estimated based on the standard length to weight relationship:

$$Weight = a * TotalLength^b$$

These length-weight relationships were developed for each species from IDNR population survey data stored in the Illinois STATE FAS database, or from fisheries literature. Average fish weights reported in the AVG KG and AVG LB are calculated by dividing the estimated total biomass caught (e.g. KG CAUGHT) by the estimated total number caught (e.g. # CAUGHT) for each species.

PART TWO: SUPPLEMENTAL INTERVIEW INFORMATION

The pages following the effort, harvest, and catch tables summarize various data collected during angler interviews. Numbers reported here differ from those of the previous tables since these numbers are unweighted averages based solely on interview data rather than estimated totals for an entire year. Rather than stratifying these data as is done for the effort, harvest, and catch estimates, these tables take all interview data, combine it regardless of when it was collected during the survey and report simple averages.

TABLE 8. TRIP LENGTH, DISTANCE TRAVELED, AND SUCCESS RATING

TABLE 8 contains summary statistics for fishing trip length, distance traveled from home to the fishing site, and fishing success rating. Fishing trip length is identified by the header HOURS PER COMPLETED TRIP, and is defined as the number of decimal hours between the start and end of an angler's fishing trip on a given day. MILES TRAVELED is defined as the number of miles that an angler traveled from home to arrive at the fishing site. SUCCESS RATING is an angler's interpretation of his or her fishing success during the trip for which he or she was interviewed. The angler can provide an answer on a scale from 1 to 10, with 10 being the most successful. While this rating is subjected to each individual angler's interpretation, anglers are asked not to consider social or other factors influencing their fishing experience, and to focus only on their catch.

The **MEAN** is calculated as a simple, unweighted, and unstratified average.

The **95% CI** column is the 95% confidence interval of the MEAN. (For a discussion of the 95% CI, see the discussion of TABLE 1.)

The **MIN** and **MAX** columns represent the range of values reported in the interviews, or the minimum value and maximum value, respectively.

The **#SAMPLES** column contains the sample size, or number of interviews, used in the calculations.

Two footnotes appear at the bottom of TABLE 8. The first footnote indicates the number of split interviews used in the calculation of HOURS PER COMPLETED TRIP. A split interview is defined as an interview that falls over two or three Day Periods (Morning, Midday, and Afternoon). For example, a fishing trip that began at 7:00am and ended at 12:00pm falls over both the Morning Day Period and the Midday Day Period. The second footnote indicates the percentage of all interviews that were completed trip interviews. All other interviews are considered incomplete, and are defined as interviews of anglers that are still actively fishing at the time of the interview.

ILLEGAL HARVEST

Illegally harvested fish are defined as fish that are in the possession of the angler at the time of the interview that have been harvested in violation of (1) the Illinois Fishing Information regulation booklet, published by the Illinois Department of Natural Resources, or (2) any additional site-specific regulations not outlined in the regulation booklet. Creel clerks witnessing harvest violations do not notify the angler, nor do they notify the authorities. The ILLEGAL HARVEST information reported here is simply a tally of the number of interviews that had illegally harvested fish at the time of the interview.

TABLE 9. FREQUENCY DISTRIBUTION OF ANGLER PARTY SIZE

An angler party is defined as a group of anglers fishing together and combined into a single angler interview. For example, two anglers fishing in the same boat are often interviewed together as an angler party size of 2. TABLE 9 shows the frequency distribution of angler party sizes for boat and shore interviews.

TABLE 10. TARGETED SPECIES

TABLE 10 is a tally of all species that anglers are targeting, along with a percentage of the total in parentheses. During an interview, anglers are asked what species they are trying to catch, or are *targeting*. Anglers can respond by saying they are targeting a specific species (i.e. bluegill), a family of species (i.e. sunfish), or any fish at all.

TABLE 11. CATCH FREQUENCY DISTRIBUTION

TABLE 11 is a frequency distribution of anglers reporting a given number of harvested and released fish, by species, for completed trip interviews only. It examines each interview for the number of fish of a single species or species group reported as harvested and released. It then calculates the average harvest and catch per angler by dividing the total number harvested and the total released for that species by the number of anglers in the party. The table reports the number of anglers, broken down by their catch rate. An example of this table, for walleye reported as harvested in 500 completed trip interviews might be:

# OF FISH:	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+
Walleye																
HARVEST	651	50	7	-	-	-	-	-	-	-	-	-	-	-	-	-
RELEASE	578	101	26	3	-	-	-	-	-	-	-	-	-	-	-	-

The 500 completed trip interviews actually cover the catch of 708 anglers in this case, since a number of angler parties had more than one angler. Of these 708 anglers, 651 anglers reported no walleye harvested on their trip (or averaged less than 1 walleye per angler per angler party), 50 anglers were in parties that harvested an average of 1 walleye/angler, and 7 anglers were in parties that harvested an average of 2 walleye/angler. No anglers were in parties that harvested more than 2 walleye/angler. Each zero value is represented by a dash.