Foreword

Creel survey data has been collected and compiled in many ways; by many fisheries biologists.

Probably the two most important factors affecting creel survey design are the amount of funds available and the objective (s) of the survey.

These guidelines were written for biologists conducting creel surveys on small bodies of water where instantaneous angler counts can be made (fishing pressure) and it is possible to examine the catch of a high percentage of the fishermen (catch rates).

The information presented describes a simple but accurate procedure for collecting and compiling creel survey data.

Instructions for creel survey clerks and those supervising creel clerks are presented.

Creel surveys are expensive to conduct but they are vital for sound, progressive fish management.

CREEL SURVEY GUIDELINES

FISH LAKE
8 Acres

JANUARY 1980

SUN	MON	TUE	WED	THU	FRI	SAT
X New Year's Day	2	3	4	5	6 Epiphany	7
	9	10	11	12	13	14 X
	16	17	18	19 Lee's Birthday	20	21 X
X	23	24	25	26	27	28
	30	31		LAST QUARTER 2-31 NEW MOON 9	FIRST QUARTER 16 FULL MOON 24	

JANUARY

S	M	T	W	T	F	S
				1	2	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

FEBRUARY

S	M	T	W	T
			1	2
5	6	7	8	9
12	13	14	15	16
19	20	21	22	23
26	27	28		

The fishing day starts at 6 a.m. and ends at 10 p.m. A fishing day involves 16 hours. Interview periods shall be divided into two periods, "A" (Early) and "B" (Late). The "A" interview period shall run from 7 a.m. to 2 p.m. "B" periods run from 3 p.m. to 10 p.m. Each interview period totals 8 hours or one half the fishing day (Table 1).

TABLE 1. Length of a Fishing Day, "A" and "B" Periods, and Hourly Count Information.

LENGTH OF FISHING DAY	HOUR	NUMBER AND TIME HOURLY FISHERMEN COUNTS ARE MADE FOR "A" & "B" PERIODS	
1	6 - 7	1	
2	7 - 8	2	
3	8 - 9	3	
4	9 - 10	4	
5	10 - 11	5	"A" PERIOD
6	11 - 12	6	
7	12 - 1	7	
8	1 - 2	8	
9	2 - 3	1	
10	3 - 4	2	
11	4 - 5	3	
12	5 - 6	4	
13	6 - 7	5	"B" PERIOD
14	7 - 8	6	
15	8 - 9	7	
16	9 - 10	8	
16 Hours			

Fishing starts at 6 a.m.

Fishing ends at 10 p.m.

Length of a fishing day is 16 hours.

A Period fishermen are counted at 7,8,9,10,11,12,1, and 2.

B Period fishermen are counted at 3,4,5,6,7,8,9, and 10.

The fishermen counted each hour represents the number of fishermen for the preceding hour. Fishermen counted at 7 a.m. represents the number of fishermen from 6 a.m. - 7 a.m., fishermen counted at 9 p.m. represents the number of fishermen from 8 p.m.- 9 p.m., etc.

EXAMPLE: We're conducting a weekend creel survey during the month of January, 1980.

There are 8 weekend days and each fishing day is 16 hours in length.

(8) (16) = 128 Fishing Hours

The creel survey shall be conducted for four, 8 hour periods.

The survey will cover two "A" periods and two "B" periods for a total of 32 survey hours. The number of days the creel survey is conducted is determined by the budget and the fish manager's objectives. The actual days the survey is conducted shall be randomly selected.

The number of fishermen shall be counted HOURLY to determine the number of fishermen hours per hour. If the interview period is an "A" period that runs from 7 a.m. to 2 p.m. fishermen should be counted at 7,8,9,10,11,12,1, and 2. For "B" periods, fishermen should be counted at 3,4,5,6,7,8,9, and 10.

Dividing the total number of fishermen counted each hour, by the number of counts, equals the average number of fishermen hours per hour.

EXAMPLE: Number of Fishermen and Hourly Counts for Four Interview Periods January, 1980.

JAN 1		JAN 14		JAN 21		JAN 22	
7 a.m.	2	3 p.m.	2	3 p.m.	2	7 a.m.	3
8 a.m.	2	4 p.m.	4	4 p.m.	2	8 a.m.	3
9 a.m.	3	5 p.m.	4	5 p.m.	2	9 a.m.	3
10 a.m.	5	6 p.m.	5	6 p.m.	3	10 a.m.	5
11 a.m.	5	7 p.m.	5	7 p.m.	4	11 a.m.	5
12 Noon	4	8 p.m.	5	8 p.m.	4	12 Noon	3
1 p.m.	2	9 p.m.	2	9 p.m.	3	1 p.m.	1
2 p.m.	2	10 p.m.	1	10 p.m.	0	2 p.m.	1
8	25	8	28	8	20	8	24
	3.13		3.50		2.5		3.00

$$\frac{25}{8} + \frac{28}{8} + \frac{20}{8} + \frac{24}{8} \qquad \frac{97}{32}$$

Fishermen Counts

$$\frac{97 \text{ Fishermen}}{32 \text{ Hourly Counts}} = 3.0 \text{ Fishermen Hours Per Hour}$$

January weekend days = 8

Fishing hours per day = 16

Total number of January weekend fishing hours = 128

Total number of fishing hours in the survey period TIMES average number of fishermen hours per hour = fishing pressure for the survey period.

EXAMPLE: (128) (3.0) = 384 Hours (Total Fishing Pressure)

*INFORMATION TO BE OBTAINED FROM THE ANGLER INTERVIEWS

(1) Time started fishing and time stopped fishing. (Necessary to determine the catch/hour)

(2) Number of fish harvested

Species of fish harvested.

Size of fish harvested (measure to 0.1")

(Average weights can be assigned from survey data)

(3) Depending on the objective (s) of the creel survey you could ask:

(A) Hometown, county of residence, etc.

(B) What are you fishing for? walleye, trout, etc.

(C) Fish caught and released, especially on LMB size limit lakes.

(D) Satisfied with fishing? Why not?

(E) Etc.

**Fishing trips can be either partial or complete as you are calculating catch per hour.

*CALCULATE CATCH PER HOUR FROM THE ANGLER INTERVIEWS

DATE	ANGLERS INTERVIEWED	HOURS FISHED*	BG	LMB
Jan. 1	12	27.50	34	8
Jan. 14	14	25.25	39	7
Jan. 21	10	20.75	22	6
Jan. 22	12	24.00	26	9
	48	97.50	121	30

*See Appendix 1.

TOTAL: 151 Fish caught

Total Number of Fish Harvested = 151
BG Harvested = 121
LMB Harvested = 30

$$\frac{\text{Fish Caught}}{\text{Hours Fished}} = \text{Catch/Hour} = \frac{151}{97.50} = 1.548 \text{ Fish/Hour}$$

$$\frac{121 \text{ BG Caught}}{97.50 \text{ Hours Fished}} = 1.24 \text{ BG/Hr.}$$

$$\frac{30 \text{ LMB Caught}}{97.50 \text{ Hours Fished}} = 0.30 \text{ LMB/Hr}$$

* Catch per Hour X Total Fishing Hours = Total Catch

* Total January Weekend Fishing Pressure = 384 Hours (page 4)

(1) 384 Hours X 1.24 BG/Hour = Total BG Harvested
476.1 (476) BG Harvested

(2) 384 Hours X 0.30 LMB/Hour = Total LMB Harvested
115.0 LMB Harvested

(3) (384 Hours) (1.548 Fish/Hr) = Total Fish Harvested
594.0 Fish Harvested

* ANOTHER WAY TO CALCULATE TOTAL HARVEST OR CATCH BY SPECIES IS TO MULTIPLY THE OBSERVED CATCH TIMES THE EXPANSION FACTOR.

$$\frac{\text{Total Fishing Pressure}}{\text{Angler Interview Hours}} = \text{Expansion Factor}$$

Total Catch - Expansion Factor TIMES the Interview or Observed Catch. (The expansion figure is the same for all species)

Hopefully, creel survey time will cover at least one-fourth of the fishing hours. Theoretically, the smaller the coefficient of expansion, the more reliable the data.

EXAMPLE: $\frac{\text{Total Fishing pressure} = 384 \text{ Hours}}{\text{Angler Interview Hours} = 97.5} = \text{Expansion Factor } 3.938$

$$\frac{384}{97.5} = 3.938$$

Bluegill Catch = (3.938) (121) = 476.4 = 476

121 - Number of BG harvested as determined from the angler interviews.

3.938 = the expansion factor

476 = Total number of BG caught during the 8 weekend days, January, 1980.

*NUMBER, % AND SIZE OF BG HARVEST (AS DETERMINED FROM ANGLER INTERVIEWS).

SIZE	NUMBER	%	AVE. WEIGHT*
6.5	40	33.1	.24
7.0	40	33.1	.30
7.5	30	24.7	.35
8.0	11	9.1	.40
	121	100	

*NUMBER OF BG HARVESTED BY SIZE GROUP.

33.1%	of	476	=	157.5 Total Number of 6.5"BG Harvested
33.1%	of	476	=	157.5 Total Number of 7.0"BG Harvested
24.7%	of	476	=	117.5 Total Number of 7.5"BG Harvested
9.1%	of	476	=	43.3 Total Number of 8.0"BG Harvested

* WEIGHT OF BG HARVESTED BY SIZE GROUP.

6.5"	= (157.5)	(.24)	=	37.8 Pounds 6.5" BG Harvested
7.0"	= (157.5)	(.30)	=	47.3 Pounds 7.0" BG Harvested
7.5"	= (117.5)	(.35)	=	41.1 Pounds 7.5" BG Harvested
8.0"	= (43.3)	(.40)	=	17.3 Pounds 8.0" BG Harvested
				143.5 Pounds BG Harvested

*POUNDS OF BLUEGILL HARVESTED PER ACRE

$$\frac{\text{Pounds of Fish}}{\text{Acres}} = \text{Pounds/Acre}$$

$$\frac{143.5 \text{ \# BG Harvested}}{8 \text{ Acres}} = 17.9 \text{ \# BG/Acre}$$

* TABULATING HARVEST INFORMATION FOR THE COMPLETE CREEL CENSUS PERIOD.

MONTH	TOTAL FISH PRESSURE	HOURS FISHED (INTERVIEW HOURS)	BG CAUGHT	LMB CAUGHT
Jan.	384 Hrs.	97.50	121	30
Feb.	408 Hrs.	112.60	160	26
Mar.	450 Hrs.	120.80	159	44
	1,242 Hrs.	330.90	440	100

$$\frac{1{,}242}{330.9} = 3.753 = \text{Exp. factor}$$

(3.753) (440) = 1651 = Total BG catch

(3.753) (100) = 375 = Total LMB catch

Instruction for Creel Survey Clerks

1. Length of fishing day should be adjusted to specific fishing conditions.

2. Don't ask fishermen how long they've been fishing. Ask start time and end time and calculate hours fished at the station.

3. Round off to whole fish - 416.8 = 417 fish
   416.4 = 416 fish

4. Use 3 significant figures for the expansion factor - 3.4462 = 3.446
   3.4465 = 3.447

5. A high percentage of angler interviews is very important.

6. Data for weekdays and weekend days should be kept separately. Also shore and boat fishing, especially if catch rates are not similar.

7. Creel census data can be worked up for different periods, weekly, monthly, etc. We'll use two week periods.

8. Creel clerks represent the Division of Fish and Wildlife and they are in contact with many fishermen. They should be courteous, clean, and well-groomed.

9. Creel clerks should introduce themselves, state the purpose of the creel, collect all necessary data, thank anglers for their cooperation and move on.

10. Due to their inexperience, creel clerks are going to be asked questions they can't answer. This is understandable and they can legitimately say they don't know as they are new on the job. Provide creel clerks with some of your business cards so they can give them to persons requesting fishing information.

11. Creel clerks should carry copies of the "Where to Fish in Indiana" booklets to hand out to people requesting fishing information.

12. During the first couple of weeks check some of the completed forms making sure the clerk is recording all necessary information.

13. Stress the importance of creel survey data and make sure the clerk stores or files the data sheets in a safe place. Be sure and gather the forms frequently so they don't get lost or stolen.

14. Provide creel clerks with a list of telephone numbers of people to contact for assistance if problems develop.

15. Creel clerks should know the name and telephone number of local Conservation Officers.

16. Creel clerks should know <u>why</u> they are conducting a creel. What's the objective? measure bass harvest? trout harvest? They should be provided copies of previous investigations on the lake/stream.

17. Don't let creel clerks cheat on the job. You should spend enough time checking on these people so they can't cheat.

18. Prior to compiling creel survey data, review Creel Survey Guidelines.

19. Make sure your creel clerk can identify fish.

    Redear vs. pumpkinseed

    Walleye vs. sauger

    Northern pike vs. grass pickerel

    White crappie vs. black crappie

Creel clerks are your responsibility. Supervise them, don't just turn them loose with a truck and a stack of forms.

Appendix 1. Angler Interview Data

Jan. 1

ANGLER	HRS. FISHED	BG	SIZE	LMB	SIZE
1	2.00	2			
2	2.25	3		1	12.0
3	3.25	6			
4	3.50	2		2	12.0-13.5
5	1.50	1			
6	1.50	3			
7	1.50				
8	2.00	3			
9	2.75	4		3	10.0-11.5-14.0
10	2.75				
11	2.50				
12	2.00	10		2	13.5-15.0
12	27.50	34		8	

Jan. 14

ANGLER	HRS. FISHED	BG	SIZE	LMB	SIZE
1	2.00	2			
2	2.50	3			
3	2.50	4			
4	1.00	4			
5	1.00			1	
6	0.50	1			
7	0.50				
8	4.00	5		2	
9	2.75	8			
10	2.00	7		3	
11	1.75				
12	1.75	2			
13	1.50			1	
14	1.50	3			
14	25.25	39		7	

Appendix 1. continued

Jan. 21

ANGLER	HRS. FISHED	BG	SIZE	LMB	SIZE
1	3.00	6		2	
2	1.50	1			
3	1.50	2			
4	2.00			1	
5	2.25	4			
6	1.50			1	
7	2.50	5			
8	2.50			1	
9	2.00	2			
10	2.00	2		1	
10	20.75	22		6	

Jan. 22

ANGLER	HRS. FISHED	BG	SIZE	LMB	SIZE
1	1.50	2		1	
2	1.50	2			
3	1.50			1	
4	5.00	10		2	
5	2.00	4			
6	2.00			1	
7	1.50	3			
8	1.50			1	
9	0.50	1			
10	2.25	2			
11	2.25			2	
12	2.50	2		1	
12	24.00	26		9	

GUIDELINES FOR USING CREEL ANALYSIS SOFTWARE

Before you run your data -

(1) Separate field sheets by weekend (WE) and Weekday (WD).

(2) Determine how many days were available for fishing and how many days were sampled (WE & WD)

(3) Precode each individual interview.

(A) Boat = 1 Shore = 2

(B) Complete trip = 1 Incomplete = 2

(C) Start time, end time, and # in party are self explanatory.

(D) Make a list of all preference categories selected for that stratum then numerically code the field sheets for the appropriate category/interview.

(E) Determine how many species were harvested.

(F) Determine how many species were caught and released.

(G) If you're using the mngt question then:

0=No Response 1=Yes 2=No 3=Interviewed before

(H) Residence information should be numerically precoded:

0=Lake Residents 1-92=Number/county 93=Out-of-State

(I) Angler satisfaction has same coding as mngt query:

0=No Response 1=Yes 2=No 3=Interviewed before

Fishing pressure will be computed separately for boat and shore fishing effort if used. Harvest will be expanded using two methods. The first method multiplies the observed harvest times the ratio of total pressure divided by total interview hours. This is the least biased estimate of total harvest but because it is based on a single observation no variance can be computed or error range determined. The second method computes a mean angler catch rate per species and multiplies that catch rate times total pressure to estimate expanded harvest. An error estimate is computed for this expansion. However, due to the skewed nature of these catch rate curves the second estimate is often considerably different from the first and should probably be ignored.

After all your field sheets for that month have been divided by WE and WD and each interview precoded begin data input.

(1) Double click on the "creel analysis" icon.

(2) Type in a file name as prompted.

(3) Input number of days in stratum.

(4) Input number of days sampled.

(5) Input number of hours fished per day.

(6) Input number of counts per day.

(7) Indicate whether data is for WE or WD.

(8) Determine what kind of counts you used Boat and/or Shore.

(9) Input date of first sample.

(10) Input counts and time of counts for that date.

(11) Repeat until all days have been input.

(12) Prompt will ask for output format (just press return twice).

(13) Check counts data for errors and correct if present.

(14) After error correction output format again requested (just press return twice).

Note: Do not attempt to change the print format. Most of the options presented in the two printer prompt windows <u>are not</u> supported by Microsoft Basic and you will not receive an output report if they're modifed.

The next series of steps will set up the format for the interview data then permit input of the individual interviews. If you have not yet precoded those interviews do so now!

(1) Input the number and names for all preference categories listed.

(2) Input number and names of species harvested (only use 3 letter designations for each species name).

(3) Input number and names of species caught and released if this option is selected (again 3 letter designations for species names should be used).

(4) Select use of the angler satisfaction, residency, and management question if used in your survey.

Begin input of individual interviews for that date directly from the <u>precoded</u> field sheets.

Use military time for start and end hour.

(5) After the interviews have been stored the printer prompt will come up. Again press return twice and wait for a listing of the individual data. Check for errors and correct if necessary.

(6) After all errors have been corrected, you will again see the printer prompt (press return twice) will send the completion report to the printer.

After all your data for that month has been analyzed you can quit the program by answering NO to the additional data query. This will send you back to the initial desktop. Notice that there are now two additional documents on your desktop (one ending in "CNT" for the count data and one ending in "INT" for interview data). I'd recommend that you back these files up on floppy disk and store the original in a creel "folder" you create on the hard disk.