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**MICHIGAN DEPARTMENT OF NATURAL RESOURCES  
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**Roger N. Lockwood**



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## **Sportfishing Angler Surveys on Michigan Inland Waters, 1993-99**

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*Abstract.*—Estimates of sport fishery angling harvest, catch and release, and effort were made using direct contact angler surveys for 50 inland lakes or rivers between spring 1993 and spring 1999. Purposes for angler creel surveys varied: 28% evaluated fish stockings, 24% estimated catch or harvest of a particular species of interest, 22% characterized the fishery, 22% both characterized the fishery and determined angler residency, and 4% estimated angling effort only. Thirty-five separate sites were surveyed, 30 lakes and 5 rivers. Some sites were sampled in multiple years and 1-14 surveys were conducted each year. Multiple fishing modes were sampled for a total of 69 mode-site surveys. Of these mode-specific surveys (MSS), 72% used indirect counts of anglers and 28% used direct counts. Most MSS counts (59%) used a roving count method, 22% used the progressive method, 16% used the proportional method, and 3% used aerial surveys. Most MSS indirect counts were of boats (40%). Trailer-vehicle counts represented 25%, and counts of ice shanties 8%, of MSS. Three percent of MSS collected counts only; catch or harvest was not estimated. Four interview types were collected: access angler party interviews (42%), voluntary-access party interviews (27%), roving party interviews (16%), and roving individual angler interviews (12%). Count and interview data were collected by Fisheries Division employees or employees of cooperating agencies at some locations, and by volunteers at others. Sources of data and specific methodology, or appropriate references, are given for each reported survey to allow duplication at a later date and to clarify limitations of each. In addition to harvest, catch-and-release, and effort estimates, many surveys collected angler residency, bait type used, targeted effort, number of fishing trips taken per day, and angler gender. Where possible, these data were summarized by month and season. To more thoroughly compile existing Michigan sport angler survey estimates, reference sources for additional surveys are given.

### **Introduction**

Angler creel surveys are conducted on Michigan waters to estimate angling effort and catch or harvest by species. These surveys may be conducted for specific purposes such as to: characterize the fishery (Herman 1989), evaluate fish stocking (Wagner et al. 1994), or evaluate fishing regulations (Lockwood et al. 1995). Different goals lead to different survey frequencies. For example, Fisheries Division has surveyed selected Great Lake ports annually since 1985 to measure long-term trends in angling effort and harvest (e.g., Rakoczy and Svoboda 1995b). These surveys provide essential information necessary to manage Great Lake stocks (e.g., Schorfhaar and Schneeberger 1997). However, surveys of smaller inland fisheries vary in frequency, purpose, and location (e.g., Ryckman and Lockwood 1985).

Angler surveys require consistent and appropriate methodology to provide comparable estimates that minimize bias. However angler surveys in Michigan date back to the 1930s (Tait 1953) and while methods have been summarized periodically (e.g., Guthrie et al. 1991; Pollock et al. 1994), they continue to be refined. For example, numerous changes in estimation methodology have occurred since 1993, and appropriate catch-rate estimators used with access and roving interviews have only recently been recognized (Jones et al. 1995; Lockwood 1997). Similarly, improvements in variance estimators have recently been documented and implemented in Michigan creel surveys (Lockwood et al. 1999).

The surveys of inland lake and river anglers described in this report varied in purpose, methodology, and duration. The purpose of this report was to present results from each survey and to provide the reader with an appropriate description of site locations and methods, as well as a summary of sources of error and correction methods. Specific survey estimates are presented in chapter format within the accompanying appendices. Each chapter describes location of a survey, and sub-sites or sampling units used. Starting and ending dates of the survey are also given, as are the types of interview or count data collected. Survey results are in alphabetical order by location and date of survey. Lake surveys are followed by river surveys.

## Methods

With two exceptions, each survey consisted of counts of fishing activity (e.g., number of anglers or boats) and interviews of anglers (e.g., information on catch, trip effort, etc.). These basic data were used to estimate angling effort, and number of fish caught (harvested or released) per hour, month, or season. For the two exceptions (Stanley Lake 1993 and Hagerman Lake 1994), only counts of fishing activity were gathered and used to estimate angling effort.

Angler creel surveys given in the appendix are described by type of count and interview data collected, and follow terms used by Pollock et al. (1997). A survey may, for example, be referred to as an aerial-roving design. In this example, counts were made from an aircraft and anglers were interviewed as they fished. Similarly, a roving-access design indicates that a ground-based clerk counted angling activity and interviewed anglers at access points after they completed their fishing trips.

Initiation of the surveys reported here follow the process described in Lockwood (2000). That is, field managers determined the need for a survey, and secured necessary funding and equipment; this study provided appropriate sampling design, data processing, calculation and reporting of estimates.

Common and binomial names for species reported here are given in Table 1. In some cases numerous species were included in a broad generic term (e.g., panfish). When such terms were used in appendices, species included within that group were listed in a footnote.

Unless otherwise noted, all estimates were given with 2 standard errors. These error bounds provide statistical significance of 75% to 95% depending on sample size (Dixon and Massey 1957:292).

### *Counts of angling effort*

Counts noted here were “aerial”, “roving”, “progressive”, or “proportional”. While these count types have similarities, aerial counts are instantaneous counts made from an aircraft; roving counts are instantaneous counts made from one or more vantage points by a ground-based clerk; progressive counts are counts made by a clerk progressing through an area; and proportional counts are instantaneous counts made at a non-random time. A true instantaneous count, whether aerial or roving, is a count of angling activity during an instant in time. An example of an instantaneous aerial count is when a plane flies over a pier and counts all anglers fishing from the pier. Examples of instantaneous roving counts are counts made by a clerk of all trailers in one or multiple parking lots,

or counts of boats made from one or multiple vantage points along a lake. Progressive counts are counts that take some measurable length of time. Typically, a clerk progresses through an area enumerating anglers encountered. For example, a clerk canoeing through a stretch of river counts anglers as they are passed. Specifically, when a clerk travels to multiple sites within a particular survey area (e.g., lake) and the order or starting point is randomized, the count type is referred to as progressive. When a clerk travels to multiple unique survey sites (e.g., different lakes), the count type is referred to as roving.

Parker (1956) and McNeish and Trial (1991) described an additional count method referred to here as the proportional count method. With this method, the proportion of angling activity at a given hour from the interview data set expands instantaneous counts of angling activity. If for example, 10% of anglers interviewed were present at some hour, a count made at that hour is assumed to represent 10% of angling activity for the daily period sampled. Since access interviews are required, surveys using this method are referred to as proportional-access or proportional-voluntary.

The same techniques are used to estimate angling effort from aerial, roving, and progressive counts (Lockwood et al. 1999); these are treated as counts made at an instant in time. However, sampling designs differ. Aerial and roving counts that take no appreciable length of time follow a random design (in terms of day and time of count) but by definition, with a non-random start location (assuming multiple count locations). Progressive counts use a random count order and count direction (Hoenig et al. 1993). Progressive counts noted in this current report fall into two categories: 1) progressive counts made from a vehicle, and 2) progressive counts made while canoeing a river. For progressive counts made from a vehicle, order and direction of count were both randomized. For progressive counts made while canoeing, only order of sections counted was randomized since river shape and current constrain direction.

#### *Interviews and catch rate estimation*

Catch rates are determined via interviews, and 3 types were collected and reported here: access, roving, and voluntary. Access interviews, also referred to as complete-trip interviews, contain information from one fishing trip, either per angler or per angling party. Roving interviews, also referred to as incomplete-trip interviews, are taken before a fishing trip was finished. Roving interviews collected prior to 1996 were roving party interviews. That is, catch was pooled for all anglers in a party. Lockwood (1997) showed there was potential for bias when roving interviews were recorded by angling party. Subsequent roving interviews, beginning in 1996, were collected by angler (note: anglers per party were also recorded for estimation of angler effort from boat effort). Voluntary interviews are usually complete-trip interviews, but the angler voluntarily reports the information. Voluntary information was reported on forms given to anglers or on forms anglers picked up at specific locations.

Until 1996, Michigan catch rates from inland creel surveys were estimated using the mean-of-ratios estimator,  $\bar{R}$ , regardless of interview type:

$$\bar{R} = \frac{\sum_{f=1}^k c_f / h_f}{k}, \quad (1)$$

where  $c_f$  is the total catch of party  $f$  which collectively fished  $h_f$  hours with  $k$  parties interviewed. Surveys conducted since then have used the ratio-of-means estimator,  $\hat{R}$ , for access interviews:

$$\hat{R} = \frac{\sum_{f=1}^k c_f}{\sum_{f=1}^k h_f}, \quad (2)$$

and the mean-of-ratios estimator,  $\bar{R}$ , for roving angler interviews collected by angler:

$$\bar{R} = \frac{\sum_{f'=1}^{k'} c_{f'} / h_{f'}}{k'}, \quad (3)$$

where  $c_{f'}$  is the total catch of angler  $f'$ , with  $h_{f'}$  hours fished, and  $k'$  anglers interviewed.

### *Effort and catch estimators*

Methods for estimating angling effort and catch from traditional access, roving, or progressive data were given in Lockwood et al. (1999). Estimated effort, catch, or harvest for surveys prior to 1996 were presented in Appendix 1 of Lockwood et al. (1999). Surveys completed in 1996 used the methods given in Appendix 1 of Lockwood et al. (1999) to estimate effort and the appropriate catch rate estimator (found in the main text of Lockwood et al. 1999) to estimate catch rate and catch. More recent surveys have followed methods presented in the main text of Lockwood et al. (1999). Regardless of method, references to the appropriate methods are given in each appendix chapter.

To estimate effort using the proportional count method, proportion ( $P_j$ ) of anglers at hour  $j$  in an access interview data set spanning  $m$  hours was calculated as:

$$P_j = \frac{a_j}{\sum_{j=1}^m a_j}, \quad (4)$$

where  $a_j$  is the number of anglers present at hour  $j$ . Variance was estimated as (Cochran 1977:60):

$$\hat{V}ar(P_j) = \frac{P_j Q_j}{m}, \quad (5)$$

where  $Q_j$  is  $1-P_j$ . Estimated effort,  $E_i$ , based on count  $C_i$  at time  $i$  then was:

$$E_i = \frac{FC_i}{P_i}, \quad (6)$$

where  $F$  is the total number of hours within the sample period. Within-day variance was estimated as (Freese 1962:17):

$$\hat{V}ar(E_i) = E_i^2 \left[ \frac{\hat{V}ar(P_i)}{P_i^2} \right]. \quad (7)$$

Mean estimated effort from  $n$  counts then was:

$$\hat{E} = \frac{\sum_{i=1}^n E_i}{n}, \quad (8)$$

with estimated variance (Cochran 1977:277):

$$\hat{V}ar(\hat{E}) = \left( 1 - \frac{n}{D} \right) \left( \frac{\sum_{i=1}^n (E_i - \hat{E})^2}{n(n-1)} \right) + \left( \frac{1}{Dn} \right) \left( \sum_{i=1}^n \hat{V}ar(E_i) \right), \quad (9)$$

for some period of  $D$  days.

## Demographics

In addition to fishing effort, catch, and harvest; anglers were often queried as to residency, bait type (in some instances fishing method was also recorded), species targeted, number of fishing trips taken per day, and gender. When any of these data were collected, results were given in appendices following effort and catch estimates. These demographic results were reported as percentages and include error bounds (EB). Error bounds were calculated after equation (5) as:

$$EB = 2 \cdot 100 \cdot \sqrt{\frac{(p \cdot q)}{k'}}, \quad (10)$$

where  $p$  is the fraction of anglers within some category,  $q$  is  $1-p$ , and  $k'$  the total number of anglers interviewed (Cochran 1977:60).

## Description of inland surveys

Fifty angler surveys were conducted at 35 different locations, between spring 1993 and spring 1999. Most sites were in the western end of the Upper Peninsula, the central Upper Peninsula, and the southern edge of the Lower Peninsula (Figure 1). Forty-two surveys were conducted on inland lakes and 8 surveys were conducted on inland rivers. Number of surveys conducted each year varied from 1-14 (1-12 for lakes and 0-3 for rivers).

Angler surveys were conducted for a variety of reasons. Twenty-eight percent of surveys evaluated fish stocking, 24% evaluated catch or harvest of specific species of interest, 22% characterized the fishery and determined angler residency, 22% characterized the fishery, and 4% estimated angling effort only.

These 50 angler surveys sampled 69 mode-site fisheries (Table 2). Most (72%) of these 69 mode-specific surveys used counts of units representing anglers (e.g., boats), with the remaining 28% being direct counts of anglers. Boats were the most frequent unit counted (40%), followed by direct counts of anglers (28%), trailers-vehicles (25%), and shanties (7%). Roving counts were most frequently used (59%), followed by progressive (22%), proportional (16%), and aerial (3%) counts.

Access interviews by angling party were most often used (42%), followed by voluntary party interviews (27%), roving party interviews (16%), and roving individual angler interviews (12%). Three percent of mode specific surveys did not collect interviews. Access party boating interviews were the dominant interview type (22%), with 14% voluntary party trailer-vehicle interviews, and 13% access party angler interviews. Lesser percentages of interview types were used for the remaining fishing modes sampled.

## Discussion

Surveys of inland anglers conducted between 1993 and 1999 used a wide variety of creel-survey techniques. Each method was appropriate for a local purpose, and the range of these reflects the diversity of inland fisheries and management questions. Some surveys evaluated management actions (such as stocking), while others documented the fishery and added to the basin unit managers' knowledge of fisheries within their management units. As such, comparisons among lakes are difficult, and global generalization is not possible and should not be expected.

Creel surveys are planned to follow a specific design. However, ease or difficulty of data collection may require a change in the data types collected after a study has begun. For example, a survey may be designed to collect access interviews. But if, after a survey begins, the clerk discovers that anglers are difficult to contact after they complete their trips and roving interviews are easily collected, then both interview types may be collected. In such situations, the predominance of one interview type or the other is determined and the appropriate catch rate estimator for that interview

type is used on all data. An exception to that procedure was noted in the Gogebic Lake, 1999 appendix. There, similar numbers of roving and access interviews were collected within many strata and weighted averages were calculated using the appropriate catch rate estimator.

Calendar year 1996 served as a transition period for estimation methods. Bias associated with catch rate estimators was removed in surveys conducted in 1996 and subsequent years. Similarly, accuracy of effort variance estimators improved with the 1997 surveys.

Catch for years prior to 1996 may have been overestimated. For catch rate estimates from specific sites, modes, and time periods, Lockwood (1997) showed that when the mean-of-ratios estimator is used with access interviews, catch rate is overestimated approximately 60% of the time and underestimated approximately 40% of the time. Overestimate or underestimate varied from 0.36-285.50%. However, seasonal point estimates are the summation of time period, mode, and site stratification estimates. Summation of these strata estimates should result in a moderate overestimation.

Variability of estimated effort for years prior to 1997 may have been underestimated. Lockwood et al. (1999) provided variance equations for angling effort that more appropriately account for between-day variation and sample-size variation (variation due to number of days sampled within a time period). Recalculation of Great Lakes creel survey estimates showed that effort variability, using methods found in Appendix 1 of Lockwood et al. (1999), is underestimated (Jim Bence, MSU-PERM).

Evaluations by Lockwood (1999) and McNeish and Trial (1991) showed that the proportional method produces a reliable estimate of angling effort. McNeish and Trial (1991) found within-day variability, estimated by equation (5), to be minor (0.02% to 0.08% of total variation) relative to between-day variation. Consequently, they chose to ignore within-day variation. Lockwood et al. (2000) using bootstrapping techniques to estimate within-day variation, also found within-day variation to be minor (0.10% to 7.78% of total variation). Nevertheless, within-day variation was estimated for surveys reported here.

Nineteen mode-site survey estimates relied on voluntary information and must be viewed with caution. Specifically, the probability of an individual angler being interviewed is unknown and cannot be approximated. Therefore, while voluntary interviews can provide relative fishery estimates, concerns over accuracy remain (Pollock et al. 1994).

Because of variation in purpose and methods; accurate, specific descriptions of individual surveys is essential. Such information is vital for comparisons with future surveys and replication of methods. Continued evaluation of angler survey methods and development of new methods remains crucial to future angler surveys, and accurate reporting is needed to estimate conversion factors. Providing accurate and precise estimates of angling effort, catch, and harvest are also essential to sound management practices and research conclusions, and is imperative to develop agreements with constituent groups.

In addition to current inland angler surveys, references for inland angler surveys conducted since the 1970's are presented in Table 3. For older surveys see Schneider and Lockwood (1979). (For documentation purposes, Great Lakes angler survey references are listed in Table 4.)

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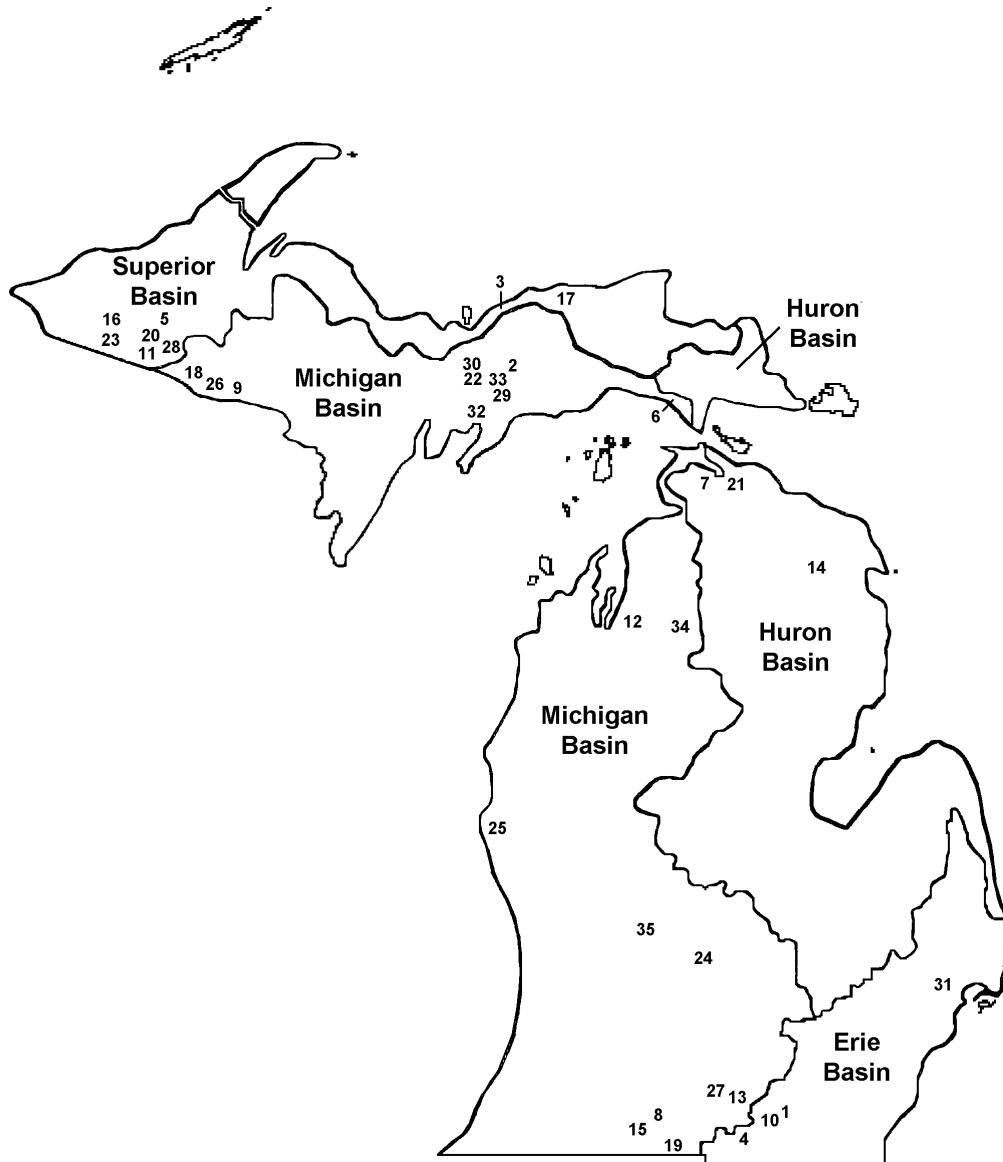


Figure 1.—Location of inland angler surveys conducted 1993-99, within Great Lake basin boundaries. Lakes are listed first, followed by rivers.

Number	Lake	Number	Lake	Number	Lake	Number	River
1	Allen L.	11	Duck L.	21	Mullett L.	31	Clinton R.
2	Bass L.	12	Elk L.	22	Petes L.	32	Fishdam R.
3	Beaver L.	13	Farwell L.	23	Pomeroy L.	33	Indian R.
4	Bird L.	14	Fletcher F.	24	Sessions L.	34	Manistee R.
5	Bond Falls F.	15	Gilead L.	25	Silver L.	35	Rogue R.
6	Brevoort L.	16	Gogebic L.	26	Stanley L.		
7	Burt L.	17	Grand Sable L.	27	Swains L.		
8	Cary L.	18	Hagerman L.	28	Tamarack L.		
9	Chicagon L.	19	Lavine L.	29	Thunder L.		
10	Deep L.	20	Marion L.	30	Wedge L.		

Table 1.–Common and scientific names of fish noted in this report.

Common name	Scientific name
Bass	<i>Micropterus spp.</i>
Black crappie	<i>Pomoxis nigromaculatus</i>
Bluegill	<i>Lepomis macrochirus</i>
Brook trout	<i>Salvelinus fontinalis</i>
Brown bullhead	<i>Ictalurus nebulosus</i>
Brown trout	<i>Salmo trutta</i>
Bullhead	<i>Ictalurus spp.</i>
Carp	<i>Cyprinus carpio</i>
Channel catfish	<i>Ictalurus punctatus</i>
Crappie	<i>Pomoxis spp.</i>
Lake herring or cisco	<i>Coregonus artedii</i>
Lake trout	<i>Salvelinus namaycush</i>
Largemouth bass	<i>Micropterus salmoides</i>
Muskellunge	<i>Esox masquinongy</i>
Northern pike	<i>Esox lucius</i>
Pumpkinseed	<i>Lepomis gibbosus</i>
Rainbow trout, steelhead	<i>Oncorhynchus mykiss</i>
Rock bass	<i>Ambloplites rupestris</i>
Smallmouth bass	<i>Micropterus dolomieu</i>
Sucker	<i>Catostomus spp.</i>
Sunfish	<i>Lepomis spp.</i>
Walleye	<i>Stizostedion vitreum vitreum</i>
White bass	<i>Morone chrysops</i>
White sucker	<i>Catostomus commersoni</i>
Yellow perch	<i>Perca flavescens</i>

Table 2.–Number of count and interview types. Since multiple fishing modes were sampled on some surveys (e.g., boat angling and shore angling), total from this table will be greater than the number of angler survey chapters presented in this report.

Count type/ mode	Interviews					Mode Totals
	Roving		Access Party	Voluntary Party	None	
	Party	Angler				
Roving						
Boat	1	-	14	3	2	20
Trailer-Vehicle	-	-	2	2	-	4
Shanty	3	-	1	-	-	4
Angler	3	-	8	2	-	13
Progressive						
Boat	2	2	1	-	-	5
Trailer-Vehicle	-	1	2	-	-	3
Shanty	-	1	-	-	-	1
Angler	2	3	1	-	-	6
Aerial						
Boat	-	1	-	1	-	2
Proportional						
Boat	-	-	-	1	-	1
Trailer-Vehicle	-	-	-	10	-	10
Interview Totals	11	8	29	19	2	69

Table 3.—Additional sources containing angler creel survey estimates for Michigan inland lakes and rivers. See also Schneider and Lockwood (1979).

Water	County	Years	Reference
<b>Inland lakes</b>			
Anderson	Marquette	1983-84	Wagner (1988)
Bankson	Van Buren	1985-86	Duffy (1991)
Gogebic	Gogebic	1940-41, 1947, 1976-77	Norcross (1986)
Big Shag	Marquette	1983-84	Wagner (1988)
Cass	Oakland	1986	Waybrant and Thomas (1988)
Cass	Oakland	1988	Schneider et al. (1989)
Chicago	Delta	1983-84	Wagner (1988)
Devils	Lenawee	1987	Herman (1989)
East	Schoolcraft	1983-84	Wagner (1988)
Gull	Kalamazoo	1986-87	Dexter (1991)
Kent	Oakland	1987	Thomas (1990)
Kent	Oakland	1988	Schneider et al. (1989)
Kent	Oakland	1980	Goudy (1981)
Lansing	Ingham	1987	Herman (1989)
Maceday-Lotus	Oakland	1986	Waybrant and Thomas (1988)
Many	Many	1975-82	Ryckman and Lockwood (1985)
Many	Gogebic	1989, 1991	Miller (1992)
Orchard	Oakland	1986	Waybrant and Thomas (1988)
Pontiac	Oakland	1980	Goudy (1981)
Stager	Iron	1983-84	Wagner (1988)
Tepee	Iron	1983-84	Wagner (1988)
Vineyard	Jackson	1987	Herman (1989)
Wakeley	Crawford	1987, 1990, 1998	Schneider (In press)
White	Oakland	1987	Thomas (1990)
Whitmore	Washtenaw	1980	Goudy (1981)

Table 3.—continued.

Water	County	Years	Reference
<b>Rivers</b>			
Au Sable	Crawford	1976, 1980-83	Clark and Alexander (1984)
Au Sable, North Branch	Crawford	1974-82, 1985-90	Clark and Alexander (1992)
Au Sable, North Branch	Crawford	1976, 1980-83	Clark and Alexander (1984)
Au Sable, South Branch	Crawford	1974-82, 1985-90	Clark and Alexander (1992)
Carp	Marquette	1984-87	Peck (1992)
Chocolatey	Marquette	1984-87	Peck (1992)
Dead	Marquette	1984-87	Peck (1992)
Escanaba, East Branch	Marquette	1988-89, 1990-92	Wagner et al. (1994)
Escanaba, West Branch	Dickinson	1988-89, 1990-92	Wagner et al. (1994)
Grand	Ingham	1987	Herman (1989)
Huron	Oakland	1975, 1987	Ostaszewski (1990)
Huron	Washtenaw	1985-88, 1990-93	Lockwood et al. (1995)
Iron	Iron	1988-89, 1990-92	Wagner et al. (1994)
Ontonagon, Middle Branch	Gogebic	1988-89, 1990-92	Wagner et al. (1994)

Table 4.—Additional sources containing angler creel survey estimates for Michigan Great Lakes waters.

Water	County	Years	Reference
Les Cheneaux Islands, Lake Huron	Mackinac	1986	Lucchesi (1988)
Saginaw Bay, Lake Huron	Many	1983-84	Ryckman (1986)
Superior (near Marquette)	Marquette	1984-87	Peck (1992)
Superior (near Isle Royale)	Keweenaw	1998	Lockwood et al. (2000)
Great Lakes	Many	1985-86	Rakoczy and Lockwood (1988)
Great Lakes	Many	1986-87	Rakoczy and Rogers (1987)
Great Lakes	Many	1987-88	Rakoczy and Rogers (1988)
Great Lakes	Many	1988-89	Rakoczy and Rogers (1990)
Great Lakes	Many	1989	Rakoczy and Rogers (1991a)
Great Lakes	Many	1989-90	Rakoczy and Rogers (1991c)
Great Lakes	Many	1990	Rakoczy and Rogers (1991b)
Great Lakes	Many	1990-91	Rakoczy (1992b)
Great Lakes	Many	1991	Rakoczy (1992a)
Great Lakes	Many	1991-92	Rakoczy (1992c)
Great Lakes	Many	1992	Rakoczy and Svoboda (1993)
Great Lakes	Many	1992-93	Rakoczy and Svoboda (1994b)
Great Lakes	Many	1993	Rakoczy and Svoboda (1994a)
Great Lakes	Many	1993-94	Rakoczy and Svoboda (1995b)
Great Lakes	Many	1994	Rakoczy and Svoboda (1995a)

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## Appendices

	<u>Page</u>
Appendix 1-1. –Allen Lake, Lenawee County, 1998. ....	17
Appendix 2-1. –Bass Lake, Schoolcraft County, 1995.....	19
Appendix 3-1.–Beaver Lake, Alger County, 1998. ....	25
Appendix 4-1.–Bird Lake, Hillsdale County, 1998. ....	30
Appendix 5-1.–Bond Falls Flowage, Ontonagon County, 1994.....	32
Appendix 6-1.–Brevoort Lake, Mackinac County, 1996.....	39
Appendix 7-1.–Burt Lake, Cheboygan County, 1993. ....	49
Appendix 8-1.–Cary Lake, Branch County, 1998. ....	67
Appendix 9-1.–Chicagon Lake, Iron County, 1993.....	69
Appendix 10-1.–Chicagon Lake, Iron County, 1993-94. ....	76
Appendix 11-1.–Chicagon Lake, Iron County, 1994.....	82
Appendix 12-1.–Deep Lake, Lenawee County, 1998.....	90
Appendix 13-1.–Duck Lake, Gogebic County, 1993. ....	92
Appendix 14-1.–Duck Lake, Gogebic County, 1994. ....	98
Appendix 15-1.–Elk Lake, Grand Traverse, Antrim and Kalkaska Counties, 1996.....	104
Appendix 16-1.–Farewell Lake, Jackson County, 1998. ....	108
Appendix 17-1.–Fletcher Floodwater, Alpena and Montmorency Counties, 1995. ....	110
Appendix 18-1.–Fletcher Floodwater, Alpena and Montmorency Counties, 1997. ....	120
Appendix 19-1.–Gilead Lake, Branch County, 1998. ....	125
Appendix 20-1.–Gogebic, Lake, Gogebic and Ontonagon Counties, 1998.....	127
Appendix 21-1.–Gogebic, Lake, Gogebic and Ontonagon Counties, 1999.....	133
Appendix 22-1.–Grand Sable Lake, Alger County, 1998.....	141
Appendix 23-1.–Hagerman Lake, Iron County, 1993. ....	147
Appendix 24-1.–Hagerman Lake, Iron County, 1993-94. ....	153
Appendix 25-1.–Hagerman Lake, Iron County, 1994. ....	158
Appendix 26-1.–Lavine Lake, Branch County, 1998.....	160
Appendix 27-1.–Marion Lake, Gogebic County, 1993. ....	162
Appendix 28-1.–Mullett Lake, Cheboygan County, 1998.....	166
Appendix 29-1.–Petes Lake, Schoolcraft County, 1993.....	174
Appendix 30-1.–Pomeroy Lake, Gogebic County, 1993.....	184
Appendix 31-1.–Pomeroy Lake, Gogebic County, 1994.....	190
Appendix 32-1.–Sessions Lake, Ionia County, 1996.....	195
Appendix 33-1.–Sessions Lake, Ionia County, 1997.....	200

	<u>Page</u>
Appendix 34-1.–Silver Lake, Oceana County, 1996.....	205
Appendix 35-1.–Silver Lake, Oceana County, 1997.....	210
Appendix 36-1.–Stanley Lake, Iron County, 1993.....	214
Appendix 37-1.–Stanley Lake, Iron County, 1993-94. ....	216
Appendix 38-1.–Stanley Lake, Iron County, 1994.....	222
Appendix 39-1.–Swains Lake, Jackson County, 1998. ....	227
Appendix 40-1.–Tamarack Lake, Gogebic and Iron Counties, 1993.....	229
Appendix 41-1.–Thunder Lake, Schoolcraft County, 1995. ....	234
Appendix 42-1.–Wedge Lake, Schoolcraft County, 1993. ....	239
Appendix 43-1.–Clinton River, Macomb County, 1996. ....	245
Appendix 44-1.–Clinton River, Macomb County, 1997. ....	248
Appendix 45-1.–Fishdam River, Delta County, 1995.....	252
Appendix 46-1.–Indian River, Schoolcraft County, 1995.....	257
Appendix 47-1.–Manistee River, Crawford and Kalkaska Counties, 1998. ....	263
Appendix 48-1.–Rogue River, Kent County, 1994. ....	269
Appendix 49-1.–Rogue River, Kent County, 1995. ....	290
Appendix 50-1.–Rogue River, Kent County, 1998. ....	311

Appendix 1-1. –Allen Lake, Lenawee County, 1998.

Site	Allen Lake
Year	1998
County	Lenawee
Location	T. 5 S., R. 2 E., Sec. 3,10
Survey period	June 19 to August 8 (16 Friday and Saturday nights)
Daily period	1800 h to 2400 h
Survey design	Proportional-voluntary
Count method	Instantaneous, trailer
Interview type	Voluntary, party, boating anglers, harvest, catch and release
Effort estimation	Proportional, Equations (1)-(7)
Catch estimation	Multiple-day period (Lockwood et al. 1999)
Clerk	Fisheries Division clerk, 1/8 time
Survey purpose	Evaluate rainbow trout plants
Notes	<p>One clerk traveled to access sites at each of eight lakes (see also Bird, Deep, Cary, Farwell, Gilead, Lavine, and Swains lakes, 1998 chapters) on Friday and Saturday nights and recorded the number of trailers, or vehicles that appeared to have transported boats, and the hour at which the count was made.</p> <p>Catch rate was estimated from postpaid interview cards placed on the windshields of vehicles in the public launch sites located at each lake. Voluntary access interviews were collected, by angling party, to estimate catch rate. A zip-lock bag containing a self-addressed post card, explanation of the survey, and a lead pencil was placed under each vehicle's windshield wiper. Anglers recorded number of anglers in their party, number of fish harvested, number of fish caught-and-released, start time, and finish time.</p>

Appendix 1-2.—Estimated harvest, harvest rate, catch and release, catch-and-release rate, and angling effort, Allen Lake, Lenawee County, June 19 – August 8, 1998. All estimates are given with 2 standard errors in parentheses.

Species	Catch/hour	Estimate
Rainbow trout - harvest	0.0000 (0.0000)	0 (0)
Rainbow trout - release	0.0870 (0.1806)	111 (220)
Angler hours		1,280 (831)
Angler trips		427 (322)

Appendix 2-1. –Bass Lake, Schoolcraft County, 1995.

Site	Bass Lake
Year	1995
County	Schoolcraft
Location	T. 44 N., R. 17 W., Sec. 31, 32
Survey period	May 28 through September 16, 1995
Daily period	See Appendix 2-2
Survey design	Roving-access
Count method	Instantaneous, fishing boats
Interview type	Access, party, boating anglers, harvest
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	See Appendix 1 of Lockwood et al. (1999)
Clerk	U. S. Forest Service clerk, ½ time
Survey purpose	Characterize general effort and catch aspects of the fishery
Notes	<p>One creel clerk was used to sample Bass Lake and Indian River (see Indian River, 1995 chapter). Boats were counted from several vantage points around Bass Lake, and anglers were interviewed at the public launch site. Only fishing boats were counted and only boat angling parties were interviewed. This was a cooperative project between Fisheries Division and the U. S. Forest Service. Logistical support, clerk supervision, data processing, and analysis were provided by Fisheries Division, and funding for the clerk and vehicle were provided by the U. S. Forest Service.</p> <p>The creel clerk followed a schedule that assigned 3 randomly-selected weekdays, both weekend days, and all holidays. The clerk randomly sampled one of the two sites (lake or river) assigned and remained at that site throughout the sampling day. One of two work shifts (early or late) was randomly selected for each sampling day (Appendix 2-2).</p> <p>Two counts were made each sampling day, and times of counts were varied randomly.</p> <p>Interviewing was done only on scheduled sampling days at each of the creel survey locations.</p>

Appendix 2-2.–Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Bass Lake, Schoolcraft County, 1995.

Month	Shift		Expansion values
	Early	Late	
May	0600 h – 1430 h	1400 h – 2200 h.	16
June	0600 h – 1430 h	1400 h – 2200 h.	18
July	0600 h – 1430 h	1400 h – 2200 h.	18
August	0600 h – 1430 h	1400 h – 2200 h.	17
September	0600 h – 1430 h	1400 h – 2100 h.	16

Appendix 2-3.–Estimated monthly harvest, catch per hour and fishing pressure by boat anglers, Bass Lake, Schoolcraft County, 1995. Two standard errors are given in parentheses.

Species	Catch/hour	May	June	July	Aug.	Sept.	Season
Yellow perch	0.9326 (0.7395)	0 (0)	164 (344)	1,722 (1,607)	1,114 (1,426)	85 (154)	3,085 (2,181)
Smallmouth bass	0.0057 (0.0058)	2 (5)	7 (11)	9 (14)	2 (4)	0 (0)	19 (18)
Largemouth bass	0.0082 (0.0107)	0 (0)	16 (23)	11 (25)	0 (0)	0 (0)	27 (34)
Bluegill	0.1539 (0.2372)	0 (0)	492 (762)	15 (33)	2 (4)	0 (0)	509 (763)
Rock bass	0.0033 (0.0078)	0 (0)	0 (0)	11 (25)	0 (0)	0 (0)	11 (25)
Total harvest	1.1037 (0.8032)	2 (5)	679 (836)	1,767 (1,608)	1,118 (1,426)	85 (154)	3,651 (2,311)
Angler hours		112 (81)	1,609 (866)	1,166 (752)	272 (228)	149 (194)	3,308 (1,188)
Angler trips		32 (24)	493 (268)	444 (289)	74 (70)	39 (51)	1,082 (404)



Appendix 2-4.—Angler residence (percent of anglers interviewed) by Michigan County, Bass Lake, Schoolcraft County, 1995. Two standard errors are given in parentheses.

Residence	May	Jun	Jul	Aug	Sep	Season
Alcona	0 (0)	0 (0)	0 (0)	3.85 (7.54)	0 (0)	0.61 (1.21)
Alger	0 (0)	0 (0)	9.84 (7.63)	3.85 (7.54)	0 (0)	4.24 (3.14)
Charlevoix	0 (0)	0 (0)	0 (0)	0 (0)	12.50 (16.54)	1.21 (1.70)
Cheboygan	0 (0)	0 (0)	16.39 (9.48)	7.69 (10.45)	0 (0)	7.27 (4.04)
Clinton	0 (0)	4.17 (5.77)	0 (0)	0 (0)	0 (0)	1.21 (1.70)
Delta	0 (0)	0 (0)	6.56 (6.34)	19.23 (15.46)	0 (0)	5.45 (3.54)
Dickinson	0 (0)	4.17 (5.77)	0 (0)	0 (0)	0 (0)	1.21 (1.70)
Genesee	7.14 (13.77)	0 (0)	0 (0)	11.54 (12.53)	0 (0)	2.42 (2.39)
Gladwin	0 (0)	0 (0)	0 (0)	0 (0)	6.25 (12.10)	0.61 (1.21)
Kent	7.14 (13.77)	2.08 (4.12)	0 (0)	0 (0)	12.50 (16.54)	2.42 (2.39)
Luce	7.14 (13.77)	10.42 (8.82)	0 (0)	0 (0)	0 (0)	3.64 (2.91)
Macomb	0 (0)	6.25 (6.99)	0 (0)	7.69 (10.45)	0 (0)	3.03 (2.67)
Menominee	0 (0)	0 (0)	9.84 (7.63)	0 (0)	0 (0)	3.64 (2.91)
Midland	0 (0)	0 (0)	0 (0)	0 (0)	12.50 (16.54)	1.21 (1.70)
Montcalm	0 (0)	4.17 (5.77)	0 (0)	0 (0)	0 (0)	1.21 (1.70)
Newaygo	21.43 (21.93)	0 (0)	0 (0)	0 (0)	0 (0)	1.82 (2.08)
Oakland	0 (0)	2.08 (4.12)	0 (0)	23.08 (16.53)	0 (0)	4.24 (3.14)
Ottawa	0 (0)	16.67 (10.76)	0 (0)	0 (0)	25.00 (21.65)	7.27 (4.04)

Appendix 2-4.--continued.

Residence	May	Jun	Jul	Aug	Sep	Season
Saginaw	7.14 (13.77)	0 (0)	3.28 (4.56)	0 (0)	0 (0)	1.82 (2.08)
Sanilac	0 (0)	0 (0)	4.92 (5.54)	0 (0)	12.50 (16.54)	3.03 (2.67)
Schoolcraft	50.00 (13.98)	37.50 (10.49)	21.31 (7.54)	3.85 (19.52)	18.75 (6.78)	25.45 (26.73)
Washtenaw	0 (0)	0 (0)	1.64 (3.25)	0 (0)	0 (0)	0.61 (1.21)
Wayne	0 (0)	0 (0)	0 (0)	11.54 (12.53)	0 (0)	1.82 (2.08)
Non-Michigan	0 (0)	8.33 (7.98)	26.23 (11.26)	7.69 (10.45)	0 (0)	13.33 (5.29)
Anglers interviewed	14	48	61	26	16	165

Appendix 2-5.--Type of bait used by anglers (percent of anglers interviewed), Bass Lake, Schoolcraft County, 1995. Two standard errors are given in parentheses.

Bait used	May	Jun	Jul	Aug	Sep	Season
Live	21.43 (21.93)	22.92 (12.13)	47.46 (13.00)	80.77 (15.46)	85.71 (18.70)	46.58 (7.86)
Artificial	78.57 (21.93)	31.25 (13.38)	22.03 (10.79)	19.23 (15.46)	14.29 (18.70)	28.57 (7.12)
Both	0 (0)	45.83 (14.38)	30.51 (11.99)	0 (0)	0 (0)	24.84 (6.81)
Anglers interviewed	14	48	59	26	14	161

Appendix 2-6.—Species of fish sought by anglers (percent of anglers interviewed), Bass Lake, Schoolcraft County, 1995. Two standard errors are given in parentheses.

Species sought	May	Jun	Jul	Aug	Sep	Season
Bass	14.29 (18.70)	10.64 (8.99)	14.75 (9.08)	19.23 (15.46)	14.29 (18.70)	14.20 (5.48)
Yellow perch	0 (0)	0 (0)	6.56 (6.34)	0 (0)	0 (0)	2.47 (2.44)
Bass & bluegill	0 (0)	6.38 (7.13)	0 (0)	0 (0)	0 (0)	1.85 (2.12)
Pike & bass	21.43 (21.93)	0 (0)	6.56 (6.34)	0 (0)	14.29 (18.70)	5.56 (3.60)
Panfish	0 (0)	0 (0)	70.49 (11.68)	69.23 (18.10)	42.86 (26.45)	41.36 (7.74)
Pike & perch	0 (0)	8.51 (8.14)	0 (0)	0 (0)	14.29 (18.70)	3.70 (2.97)
Anything	64.29 (25.61)	74.47 (12.72)	1.64 (3.25)	11.54 (12.53)	14.29 (18.70)	30.86 (7.26)
Anglers interviewed	14	47	61	26	14	162

Appendix 2-7.—Number of trips per day by anglers (percent of anglers interviewed), Bass Lake, Schoolcraft County, 1995. Two standard errors are given in parentheses.

Trips/day	May	Jun	Jul	Aug	Sep	Season
1	100.00 (0)	90.57 (8.03)	93.44 (6.34)	88.46 (12.53)	87.50 (16.54)	91.76 (4.22)
2	0 (0)	9.43 (8.03)	6.56 (6.34)	11.54 (12.53)	12.50 (16.54)	8.24 (4.22)
Anglers interviewed	14	53	61	26	16	170

Appendix 2-8.—Gender of anglers (percent of anglers interviewed), Bass Lake, Schoolcraft County, 1995. Two standard errors are given in parentheses.

Gender	May	Jun	Jul	Aug	Sep	Season
Male	92.86 (13.77)	92.45 (7.26)	85.71 (8.36)	84.62 (14.15)	87.50 (16.54)	88.27 (4.81)
Female	7.14 (13.77)	7.55 (7.26)	14.29 (8.36)	15.38 (14.15)	12.50 (16.54)	11.73 (4.81)
Anglers interviewed	14	53	70	26	16	179

Appendix 3-1.—Beaver Lake, Alger County, 1998.

Site	Beaver Lake
Year	1998
County	Alger
Location	T. 48 N., R. 16 W., Sec. 7, 8, 17, 18
Survey period	May 15 through September 30
Daily period	See Appendix 3-2
Survey design	Roving-access
Count method	Instantaneous, trailer
Interview type	Access, party, boating anglers, harvest, catch-and-release
Effort estimation	Multiple-day period (Lockwood et al. 1999)
Catch estimation	Multiple-day period (Lockwood et al. 1999)
Clerk	U. S. Forest Service clerk, ½ time
Survey purpose	Monitor Beaver Lake walleye stocking program
Notes	<p>This survey was a cooperative project between the Lake Superior Management Unit of Fisheries Division and the Pictured Rocks National Lakeshore (National Park Service). The National Park Service provided funding for a creel clerk and motor vehicle. Fisheries Division provided logistical support, data processing, and analysis. One clerk was used to collect count and interview data. This survey was done in conjunction with the Grand Sable Lake survey (see Grand Sable, 1998 chapter) and the clerk spent an entire sample day at either Beaver or Grand Sable lakes. Three randomly-selected weekdays and both weekends, as well as any holiday, were sampled each week. One of two shifts was selected each work day (Appendix 3-2).</p> <p>Instantaneous counts of trailers, or any vehicles transporting fishing craft, were made at the launch site. Since the clerk remained at the launch site the entire shift, hourly counts (on the hour) were done throughout each shift. No overlap in counting times occurred between shifts. Count times are given in Appendix 3-2.</p>

Appendix 3-2.—Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Beaver Lake, Alger County, 1998.

Month	Early		Late		Expansion value
	Shift	Count hours	Shift	Count hours	
May	0600 h – 1430 h	0600 h – 1400 h	1400 h – 2230 h	1500 h – 2200 h	17
June	0600 h – 1430 h	0600 h – 1400 h	1400 h – 2230 h	1500 h – 2200 h	17
July	0600 h – 1430 h	0600 h – 1400 h	1400 h – 2230 h	1500 h – 2200 h	17
August	0600 h – 1430 h	0600 h – 1300 h	1300 h – 2130 h	1400 h – 2100 h	16
September	0600 h – 1430 h	0600 h – 1300 h	1200 h – 2030 h	1400 h – 2000 h	15

Appendix 3-3.—Estimated harvest, catch and release, fishing pressure, and catch per hour by boat anglers, Beaver Lake, Alger County, 1998. All estimates are given with 2 standard errors in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Season
Walleye – harvest	0.0956 (0.0592)	18 (23)	296 (204)	201 (266)	84 (99)	22 (32)	621 (352)
Walleye – release	0.2960 (0.2465)	31 (46)	1,324 (1,361)	476 (683)	48 (76)	44 (80)	1,923 (1,527)
Northern pike – harvest	0.0045 (0.0060)	4 (7)	0 (0)	18 (35)	0 (0)	7 (12)	29 (38)
Northern pike – release	0.1733 (0.1152)	208 (205)	414 (543)	37 (76)	103 (136)	364 (345)	1,126 (693)
Yellow perch – harvest	0.0985 (0.1566)	0 (0)	0 (0)	640 (1,005)	0 (0)	0 (0)	640 (1,005)
Yellow perch – release	0.0865 (0.0902)	0 (0)	0 (0)	0 (0)	562 (569)	0 (0)	562 (569)
Smallmouth bass – release	0.0085 (0.0104)	0 (0)	13 (27)	18 (35)	24 (49)	0 (0)	55 (66)
Bluegill – release	0.0051 (0.0074)	0 (0)	0 (0)	0 (0)	33 (47)	0 (0)	33 (47)
Total harvest	0.1986 (0.1713)	22 (24)	296 (204)	859 (1,040)	84 (99)	29 (34)	1,290 (1,065)
Total release	0.5694 (0.3079)	239 (210)	1,751 (1,466)	531 (688)	770 (594)	408 (354)	3,699 (1,773)
Total catch	0.7680 (0.3721)	261 (211)	2,047 (1,480)	1,390 (1,247)	854 (602)	437 (356)	4,989 (2,069)
Angler hours		544 (389)	2,155 (894)	2,041 (1,105)	1,112 (464)	644 (511)	6,496 (1,627)
Angler trips		107 (83)	592 (320)	679 (539)	336 (162)	133 (124)	1,847 (664)

Appendix 3-4.—Angler residence (percent of angling parties interviewed), by Michigan County, U. S. State or Canadian Province, Beaver Lake, Alger County, 1998. Two standard errors are given in parentheses.

Residence	May	Jun	Jul	Aug	Sep	Season
Alger	55.56 (33.13)	6.67 (12.88)	12.50 (23.39)	25.00 (30.62)	0.00 (0.00)	20.93 (12.41)
Barry	0.00 (0.00)	6.67 (12.88)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	2.33 (4.60)
Charlevoix	0.00 (0.00)	20.00 (20.66)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	6.98 (7.77)
Delta	0.00 (0.00)	0.00 (0.00)	12.50 (23.39)	0.00 (0.00)	0.00 (0.00)	2.33 (4.60)
Genesee	22.22 (27.72)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	6.98 (7.77)
Jackson	0.00 (0.00)	0.00 (0.00)	12.50 (23.39)	0.00 (0.00)	0.00 (0.00)	2.33 (4.60)
Kent	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	12.50 (23.39)	0.00 (0.00)	2.33 (4.60)
Macomb	0.00 (0.00)	0.00 (0.00)	12.50 (23.39)	0.00 (0.00)	0.00 (0.00)	2.33 (4.60)
Marquette	0.00 (0.00)	20.00 (20.66)	25.00 (30.62)	0.00 (0.00)	0.00 (0.00)	16.28 (11.26)
Newaygo	0.00 (0.00)	0.00 (0.00)	12.50 (23.39)	0.00 (0.00)	0.00 (0.00)	2.33 (4.60)
Oakland	0.00 (0.00)	20.00 (20.66)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	6.98 (7.77)
Ottawa	0.00 (0.00)	6.67 (12.88)	0.00 (0.00)	0.00 (0.00)	33.33 (54.43)	4.65 (6.42)
Saginaw	0.00 (0.00)	6.67 (12.88)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	2.33 (4.60)
St. Clair	11.11 (20.95)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	2.33 (4.60)
Tuscola	0.00 (0.00)	0.00 (0.00)	12.50 (23.39)	0.00 (0.00)	0.00 (0.00)	2.33 (4.60)
Van Buren	11.11 (20.95)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	11.11 (9.59)
Washtenaw	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	12.50 (23.39)	0.00 (0.00)	2.33 (4.60)



Appendix 3-4.– continued.

Residence	May	Jun	Jul	Aug	Sep	Season
Wayne	0.00 (0.00)	6.67 (12.88)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	2.33 (4.60)
Illinois	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	33.33 (54.43)	2.33 (4.60)
Indiana	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	12.50 (23.39)	0.00 (0.00)	2.33 (4.60)
Wisconsin	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	12.50 (23.39)	0.00 (0.00)	2.33 (4.60)
Ontario	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	33.33 (54.43)	2.33 (4.60)
Parties interviewed	9	15	8	8	3	43

Appendix 4-1.–Bird Lake, Hillsdale County, 1998.

Site	Bird Lake
Year	1998
County	Hillsdale
Location	T. 7 S., R. 2 W., Sec. many
Survey period	June 19 to August 8 (16 Friday and Saturday nights)
Daily period	2100 h to 0400 h
Survey design	Proportional-voluntary
Count method	Instantaneous, trailer
Interview type	Voluntary, party, boating anglers, harvest, catch and release
Effort estimation	Proportional, Equations (1)-(7)
Catch estimation	Multiple-day period (Lockwood et al. 1999)
Clerk	Fisheries Division clerk, 1/8 time
Survey purpose	Evaluate rainbow trout plants
Notes	<p>One clerk traveled to access sites at each of eight lakes (see also Allen, Deep, Cary, Farwell, Gilead, Lavine, and Swains lakes, 1988 chapters) on Friday and Saturday nights and recorded the number of trailers, or vehicles that appeared to have transported boats, and the hour at which the count was made.</p> <p>Catch rate was estimated from postpaid interview cards placed on the windshields of vehicles in the public launch sites located at each lake. Voluntary access interviews were collected, by angling party, to estimate catch rate. A zip-lock bag containing a self-addressed post card, explanation of the survey, and a lead pencil, was placed under each vehicle's windshield wiper. Anglers recorded number of anglers in their party, number of fish harvested, number of fish caught-and-released, start time, and finish time.</p>

Appendix 4-2.—Estimated harvest, harvest rate, catch and release, catch and release rate, and angling effort, Bird Lake, Hillsdale County, 1998. All estimates are given with 2 standard errors in parentheses.

	Catch/hour	Estimate
Rainbow trout - harvest	0.2195 (0.3713)	158 (258)
Rainbow trout - release	0.0488 (0.0621)	35 (42)
Angler hours		718 (300)
Angler trips		189 (87)

Appendix 5-1.—Bond Falls Flowage, Ontanagon County, 1994.

Site	Bond Falls Flowage
Year	1994
County	Ontanagon
Location	T. 46 N., R. 38, 39 W., Sec. Many
Survey period	May 15 through September 6
Daily period	See Appendix 5-2
Survey design	Roving-access
Count method	Roving, fishing boats, shore anglers
Interview type	Access, party, boating anglers, shore anglers, harvest
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	See Appendix 1 of Lockwood et al. (1999)
Clerk	Fisheries Division clerk, full time
Survey purpose	Characterize general effort and catch aspects of the fishery, and angler residency
Notes	<p>Fishing boats and shore anglers were counted from several vantage points around the lake, and anglers were interviewed as they completed their fishing trips and exited the lake. Fisheries Division funded this creel survey; one clerk was used.</p> <p>Each week, three randomly-selected weekdays, both weekend days, and all holidays were sampled. Two shifts, early or late, were randomly selected each scheduled workday (Appendix 5-2). Two counts were made per scheduled workday and counts were made 1-hour apart (e.g., 0800h and 0900 h). Starting and ending count location was randomly selected and the clerk either started the count or ended the count at the dam. Count times were adjusted seasonally and were during daylight hours.</p> <p>Almost all (96%) of the interviews were of complete trips.</p>

Appendix 5-2.—Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Bond Falls Flowage, Ontanagon County, 1994.

Month	Shift		Expansion value
	Early	Late	
May	0600 h – 1500 h	1300 h – 2200 h	16
June	0600 h – 1500 h	1300 h – 2200 h	18
July	0600 h – 1500 h	1300 h – 2200 h	18
August	0600 h – 1500 h	1300 h – 2200 h	17
September	0600 h – 1500 h	1300 h – 2200 h	16

Appendix 5-3.—Total estimated harvest, fishing pressure, and catch per hour, Bond Falls Flowage, Ontanagon County, 1994. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Season
Northern pike	0.0007 (0.0014)	0 (0)	5 (11)	0 (0)	0 (0)	0 (0)	5 (11)
Yellow perch	0.0352 (0.0243)	0 (0)	28 (46)	190 (160)	49 (86)	8 (16)	275 (188)
Walleye	0.0362 (0.0194)	21 (21)	58 (75)	149 (99)	54 (80)	0 (0)	282 (150)
Smallmouth bass	0.0177 (0.0101)	32 (30)	87 (67)	4 (8)	15 (23)	0 (0)	138 (78)
Rock bass	0.0881 (0.0557)	18 (37)	510 (340)	4 (8)	156 (261)	0 (0)	688 (430)
Sunfish	0.0028 (0.0057)	0 (0)	22 (44)	0 (0)	0 (0)	0 (0)	22 (44)
Crappie	0.0029 (0.0059)	0 (0)	0 (0)	0 (0)	23 (46)	0 (0)	23 (46)
Total harvest	0.1834 (0.0667)	71 (52)	710 (360)	347 (188)	297 (291)	8 (16)	1,433 (503)
Angler hours		1,555 (330)	2,399 (413)	2,127 (352)	1,611 (368)	120 (97)	7,812 (741)
Angler trips		311 (70)	551 (102)	438 (82)	348 (82)	27 (22)	1,675 (171)

Appendix 5-4.—Estimated seasonal harvest, fishing pressure, and catch per hour by boat anglers, Bond Falls Flowage, Ontanagon County, 1994. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Season
Northern pike	0.0007 (0.0014)	0 (0)	5 (11)	0 (0)	0 (0)	0 (0)	5 (11)
Yellow perch	0.0355 (0.0245)	0 (0)	28 (46)	190 (160)	49 (86)	8 (16)	275 (188)
Walleye	0.0365 (0.0196)	21 (21)	58 (75)	149 (99)	54 (80)	0 (0)	282 (150)
Smallmouth bass	0.0179 (0.0102)	32 (30)	87 (67)	4 (8)	15 (23)	0 (0)	138 (78)
Rock bass	0.0889 (0.0562)	18 (37)	510 (340)	4 (8)	156 (261)	0 (0)	688 (430)
Sunfish	0.0028 (0.0057)	0 (0)	22 (44)	0 (0)	0 (0)	0 (0)	22 (44)
Crappie	0.0030 (0.0060)	0 (0)	0 (0)	0 (0)	23 (46)	0 (0)	23 (46)
Total harvest	0.1851 (0.0683)	71 (52)	710 (360)	347 (188)	297 (291)	8 (16)	1,433 (503)
Angler hours		1,555 (330)	2,384 (412)	2,127 (352)	1,555 (351)	120 (97)	7,741 (731)
Angler trips		311 (70)	547 (102)	438 (82)	336 (79)	27 (22)	1,659 (169)

Appendix 5-5.—Estimated fishing pressure by shore anglers, Bond Falls Flowage, Ontanagon County, 1994. Two standard errors are given in parentheses.

Angling effort	May	Jun	Jul	Aug	Sep	Season
Angler hours	0 (0)	15 (30)	0 (0)	56 (112)	0 (0)	71 (116)
Angler trips	0 (0)	4 (7)	0 (0)	12 (23)	0 (0)	16 (24)

Appendix 5-6.—Angler residence (percent of anglers interviewed), by Michigan County or U. S. State of residence, Bond Falls Flowage, Ontonagon County, 1994. Two standard errors are given in parentheses.

Residence	May	Jun	Jul	Aug	Sep	Season
Allegan	0 (0)	0 (0)	1.25 (2.48)	0 (0)	0 (0)	0.28 (0.56)
Alpena	0 (0)	0 (0)	0 (0)	1.67 (3.31)	0 (0)	0.28 (0.56)
Antrim	0 (0)	3.42 (3.36)	0 (0)	0 (0)	0 (0)	1.12 (1.11)
Berrien	0 (0)	0 (0)	0 (0)	5.00 (5.63)	0 (0)	0.84 (0.96)
Calhoun	0 (0)	0.85 (1.70)	0 (0)	0 (0)	0 (0)	0.28 (0.56)
Clare	0 (0)	0 (0)	0 (0)	3.33 (4.63)	0 (0)	0.56 (0.79)
Delta	0 (0)	1.71 (2.40)	0 (0)	0 (0)	0 (0)	0.56 (0.79)
Dickinson	2.20 (3.07)	0.85 (1.70)	0 (0)	0 (0)	0 (0)	0.84 (0.96)
Gogebic	10.99 (6.56)	2.56 (2.92)	12.50 (7.40)	6.67 (6.44)	0 (0)	7.54 (2.79)
Grand Traverse	2.20 (3.07)	0 (0)	0 (0)	0 (0)	0 (0)	0.56 (0.79)
Houghton	0 (0)	0 (0)	2.50 (3.49)	0 (0)	0 (0)	0.56 (0.79)
Ingham	0 (0)	1.71 (2.40)	0 (0)	0 (0)	0 (0)	0.56 (0.79)
Iron	4.40 (4.30)	1.71 (2.40)	0 (0)	3.33 (4.63)	0 (0)	2.23 (1.56)
Isabella	2.20 (3.07)	0 (0)	0 (0)	0 (0)	0 (0)	0.56 (0.79)
Jackson	0 (0)	1.71 (2.40)	0 (0)	0 (0)	0 (0)	0.56 (0.79)
Kalamazoo	2.20 (3.07)	0 (0)	0 (0)	0 (0)	0 (0)	0.56 (0.79)
Kent	5.49 (4.78)	0 (0)	0 (0)	0 (0)	0 (0)	1.40 (1.24)

Appendix 5-6.—continued.

Residence	May	Jun	Jul	Aug	Sep	Season
Lenawee	1.10 (2.19)	0 (0)	0 (0)	0 (0)	0 (0)	0.28 (0.56)
Macomb	0 (0)	0.85 (1.70)	0 (0)	1.67 (3.31)	0 (0)	0.56 (0.79)
Marquette	2.20 (3.07)	0 (0)	0 (0)	3.33 (4.63)	0 (0)	1.12 (1.11)
Ontonagon	17.58 (7.98)	30.77 (8.53)	16.25 (8.25)	16.67 (9.62)	0 (0)	20.95 (4.30)
Ottawa	0 (0)	0 (0)	1.25 (2.48)	0 (0)	0 (0)	0.28 (0.56)
Wayne	0 (0)	0 (0)	2.50 (3.49)	3.33 (4.63)	0 (0)	1.12 (1.11)
Non-resident	0 (0)	5.13 (4.08)	3.75 (4.25)	3.33 (4.63)	0 (0)	3.07 (1.82)
Wisconsin	27.47 (9.36)	27.35 (8.24)	47.50 (11.17)	40.00 (12.65)	40.00 (30.98)	34.36 (5.02)
Minnesota	0 (0)	2.56 (2.92)	6.25 (5.41)	0 (0)	0 (0)	2.23 (1.56)
Illinois	16.48 (7.78)	18.80 (7.22)	6.25 (5.41)	8.33 (7.14)	60.00 (30.98)	14.80 (3.75)
Indiana	5.49 (4.78)	0 (0)	0 (0)	3.33 (4.63)	0 (0)	1.96 (1.46)
Anglers interviewed	91	117	80	60	10	358



Appendix 5-7.—Type of bait used by anglers (percent of anglers interviewed), Bond Falls Flowage, Ontanagon County, 1994. Two standard errors are given in parentheses.

Bait used	May	Jun	Jul	Aug	Sep	Season
Live	59.34 (10.30)	77.19 (7.86)	68.67 (10.18)	67.24 (12.33)	50.00 (31.62)	68.26 (4.93)
Artificial	25.27 (9.11)	15.79 (6.83)	27.71 (9.83)	10.34 (8.00)	30.00 (28.98)	20.51 (4.28)
Both	15.38 (7.56)	7.02 (4.78)	3.61 (4.10)	22.41 (10.95)	20.00 (25.30)	11.24 (3.35)
Anglers interviewed	91	114	83	58	10	356

Appendix 5-8. —Species of fish sought by anglers (percent of anglers interviewed), Bond Falls Flowage, Ontanagon County, 1994. Two standard errors are given in parentheses.

Species sought	May	Jun	Jul	Aug	Sep	Season
Bass & bluegill	4.60 (4.49)	0 (0)	0 (0)	0 (0)	0 (0)	1.13 (1.12)
Pike & bass	4.60 (4.49)	12.17 (6.10)	0 (0)	0 (0)	0 (0)	5.07 (2.33)
Panfish	0 (0)	2.61 (2.97)	0 (0)	1.67 (3.31)	0 (0)	1.13 (1.12)
Bass	10.34 (6.53)	21.74 (7.69)	1.20 (2.40)	0 (0)	09 (0)	.86 (3.16)
Pike & perch	0 (0)	1.74 (2.44)	0 (0)	0 (0)	0 (0)	0.56 (0.79)
Walleye & perch	79.31 (8.69)	60.87 (9.10)	96.39 (4.10)	81.67 (9.99)	100.00 (0)	78.31 (4.37)
Anything	1.15 (2.29)	0.87 (1.73)	2.41 (3.37)	16.67 (9.62)	0 (0)	3.94 (2.07)
Anglers interviewed:	87	115	83	60	10	355

Appendix 5-9. –Number of trips per day by anglers (percent of anglers interviewed), Bond Falls Flowage, Ontanagon County, 1994. Two standard errors are given in parentheses.

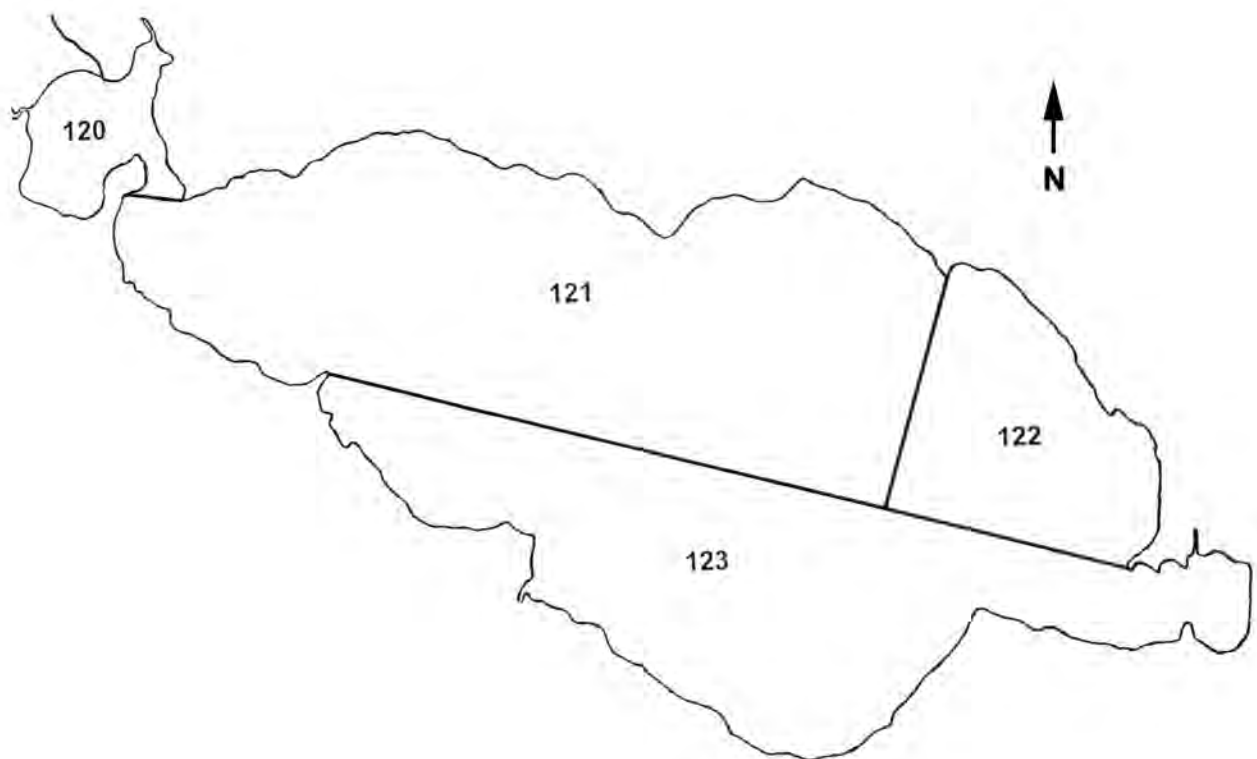
Trips per day	May	Jun	Jul	Aug	Sep	Season
1	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)
Anglers interviewed	91	117	85	60	10	363

Appendix 5-10. –Gender of anglers (percent of anglers interviewed), Bond Falls Flowage, Ontanagon County, 1994. Two standard errors are given in parentheses.

Gender	May	Jun	Jul	Aug	Sep	Season
Male	86.81 ( 7.09)	81.20 ( 7.22)	87.21 ( 7.20)	85.00 ( 9.22)	80.00 (25.30)	84.62 ( 3.78)
Female	13.19 ( 7.09)	18.80 ( 7.22)	12.79 ( 7.20)	15.00 ( 9.22)	20.00 (25.30)	15.38 ( 3.78)
Anglers interviewed	91	117	86	60	10	364

Appendix 6-1.—Brevoort Lake, Mackinac County, 1996.

Site	Brevoort Lake
Year	1996
County	Mackinac
Location	T. 42 N., R. 4, 5 W., Sec. Many
Survey period	May 15 through August 31
Daily period	See Appendix 6-2
Survey design	Roving-access/voluntary
Count method	Roving, fishing boats
Interview type	Access and voluntary, party, boating anglers, harvest
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	Mean-of-ratios estimator, Lockwood et al. (1999)
Clerk	U. S. Forest Service clerk, full time
Survey purpose	Evaluate walleye fishery
Notes	<p>Brevoort Lake was stratified into four grids (Appendix Figure 6-1) and boat angling effort and catch was estimated for each. Estimates and their variances were summed to provide lake-wide estimates. Boats were counted from several vantage points around the lake. This was a joint project between Fisheries Division and the U. S. Forest Service. Both weekend days, and all holidays, and three randomly-selected weekdays were sampled each week. Two randomly-selected shifts, early and late, were used (Appendix 6-2).</p> <p>Two counts were made per scheduled workday and the order in which grids were counted was randomized.</p> <p>The creel clerk interviewed anglers at access sites. In addition, interview forms were supplied to resorts and private residences for voluntary completion because anglers fishing from them were not readily accessible for interviewing.</p> <p>Walleye catch rates and walleye angling success were compared between the two interview sources to evaluate potential biases. On one occasion in grid 120, walleye catch per hour was significantly greater for clerk-interviewed anglers and on one occasion in grid 123, walleye catch per hour was significantly greater for voluntary interviews. Percentage of successful walleye angling parties was never significantly different between those two interview sources. Thus, walleye catch rates from these two sources were not considered different and interview types were pooled.</p>



Appendix figure 6-1.—Counting and interviewing grids used for the Brevoort Lake, Mackinac County, angler survey, 1996.

Appendix 6-2.—Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Brevoort Lake, Mackinac County, 1996.

Month	Shift		Expansion value
	Early	Late	
May	0500 h – 1400 h	1200 h – 2100 h	16
June	0500 h – 1400 h	1300 h – 2200 h	18
July	0500 h – 1400 h	1300 h – 2200 h	18
August	0500 h – 1400 h	1300 h – 2200 h	17

Appendix 6-3.—Estimated harvest, catch per hour and fishing pressure by boat anglers, Brevoort Lake, Mackinac County, 1996. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Season
Walleye	0.0146 (0.0048)	82 (60)	259 (101)	11 (13)	30 (34)	383 (123)
Yellow perch	0.2699 (0.0973)	88 (125)	290 (398)	1,314 (1,019)	5,415 (2,224)	7,106 (2,482)
Northern pike	0.0078 (0.0034)	49 (35)	70 (64)	45 (39)	40 (29)	204 (88)
Bluegill	0.0151 (0.0114)	0 (0)	4 (6)	127 (167)	267 (246)	398 (298)
Pumpkinseed	0.0025 (0.0019)	0 (0)	0 (0)	26 (30)	39 (38)	65 (49)
Rock Bass	0.0137 (0.0068)	16 (22)	151 (102)	92 (120)	102 (77)	362 (177)
Smallmouth bass	0.0043 (0.0022)	0 (0)	36 (33)	37 (30)	40 (34)	113 (56)
Musky	0.0003 (0.0010)	0 (0)	9 (26)	0 (0)	0 (0)	9 (26)
Black crappie	0.0004 (0.0002)	0 (0)	2 (5)	8 (3)	0 (0)	10 (6)
Bullhead	0.0008 (0.0013)	0 (0)	3 (6)	2 (3)	16 (32)	20 (33)
Total harvest	0.3293 (0.0999)	234 (144)	826 (430)	1,661 (1,042)	5,949 (2,240)	8,670 (2,512)
Angler hours		3,419 (807)	8,531 (1,490)	6,582 (993)	7,797 (1,312)	26,329 (2,362)
Angler trips		934 (258)	1,882 (380)	2102 (353)	2,521 (465)	7,438 (743)

Appendix 6-4.—Angler residence (percent of anglers interviewed) by Michigan County or Michigan non-resident, Brevoort Lake, Mackinac County, 1996. Results are from creel clerk collected interviews. Two standard errors are given in parentheses.

Residence	May	June	July	August	Season
Alcona	2.53 (3.53)	0.00 (0.00)	0.00 (0.00)	0.66 (0.93)	0.52 (0.52)
Allegan	0.00 (0.00)	1.40 (1.96)	0.00 (0.00)	0.00 (0.00)	0.26 (0.36)
Alpena	0.00 (0.00)	0.00 (0.00)	0.40 (0.80)	0.00 (0.00)	0.13 (0.26)
Antrim	2.53 (3.53)	0.00 (0.00)	0.40 (0.80)	2.64 (1.84)	1.42 (0.85)
Barry	0.00 (0.00)	2.80 (2.76)	0.00 (0.00)	1.32 (1.31)	1.03 (0.73)
Bay	0.00 (0.00)	0.00 (0.00)	0.40 (0.80)	0.00 (0.00)	0.13 (0.26)
Berrien	0.00 (0.00)	2.10 (2.40)	0.00 (0.00)	0.66 (0.93)	0.65 (0.58)
Branch	0.00 (0.00)	0.00 (0.00)	0.80 (1.13)	0.00 (0.00)	0.26 (0.36)
Cass	0.00 (0.00)	0.00 (0.00)	0.80 (1.13)	0.66 (0.93)	0.52 (0.52)
Charlevoix	3.80 (4.30)	0.00 (0.00)	0.80 (1.13)	3.30 (2.05)	1.94 (0.99)
Cheboygan	7.59 (5.96)	2.80 (2.76)	0.00 (0.00)	0.00 (0.00)	1.29 (0.81)
Chippewa	7.59 (5.96)	4.90 (3.61)	2.41 (1.94)	4.62 (2.41)	4.26 (1.45)
Clare	0.00 (0.00)	1.40 (1.96)	0.00 (0.00)	0.66 (0.93)	0.52 (0.52)
Clinton	0.00 (0.00)	0.00 (0.00)	2.81 (2.10)	0.66 (0.93)	1.16 (0.77)
Crawford	0.00 (0.00)	5.59 (3.84)	0.00 (0.00)	0.00 (0.00)	1.03 (0.73)
Eaton	1.27 (2.52)	0.00 (0.00)	0.80 (1.13)	0.99 (1.14)	0.78 (0.63)
Emmet	2.53 (3.53)	0.00 (0.00)	2.81 (2.10)	1.98 (1.60)	1.94 (0.99)
Genesee	8.86 (6.39)	5.59 (3.84)	6.83 (3.20)	0.33 (0.66)	4.26 (1.45)

Appendix 6-4.—continued.

Residence	May	June	July	August	Season
Gladwin	7.59 (5.96)	1.40 (1.96)	0.00 (0.00)	0.00 (0.00)	1.03 (0.73)
Grand Traverse	0.00 (0.00)	4.90 (3.61)	1.61 (1.59)	1.98 (1.60)	2.20 (1.05)
Gratiot	0.00 (0.00)	0.00 (0.00)	2.81 (2.10)	1.32 (1.31)	1.42 (0.85)
Huron	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.98 (1.60)	0.78 (0.63)
Ingham	0.00 (0.00)	0.00 (0.00)	4.02 (2.49)	0.99 (1.14)	1.68 (0.92)
Iosco	0.00 (0.00)	0.00 (0.00)	1.61 (1.59)	0.00 (0.00)	0.52 (0.52)
Isabella	2.53 (3.53)	0.00 (0.00)	0.80 (1.13)	0.00 (0.00)	0.52 (0.52)
Jackson	0.00 (0.00)	0.00 (0.00)	2.01 (1.78)	0.00 (0.00)	0.65 (0.58)
Kalamazoo	0.00 (0.00)	0.70 (1.39)	2.81 (2.10)	0.00 (0.00)	1.03 (0.73)
Kalkaska	0.00 (0.00)	2.10 (2.40)	0.40 (0.80)	0.00 (0.00)	0.52 (0.52)
Kent	8.86 (6.39)	8.39 (4.64)	5.62 (2.92)	3.96 (2.24)	5.81 (1.68)
Lake	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.98 (1.60)	0.78 (0.63)
Lapeer	0.00 (0.00)	0.70 (1.39)	0.80 (1.13)	1.65 (1.46)	1.03 (0.73)
Leelanau	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.66 (0.93)	0.26 (0.36)
Livingston	0.00 (0.00)	1.40 (1.96)	0.40 (0.80)	0.00 (0.00)	0.39 (0.45)
Luce	7.59 (5.96)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.78 (0.63)
Mackinac	20.25 (9.04)	21.68 (6.89)	3.61 (2.37)	18.48 (4.46)	14.47 (2.53)



Appendix 6-4.—continued.

Residence	May	June	July	August	Season
Macomb	0.00 (0.00)	1.40 (1.96)	2.41 (1.94)	8.58 (3.22)	4.39 (1.47)
Manistee	0.00 (0.00)	0.00 (0.00)	4.02 (2.49)	0.66 (0.93)	1.55 (0.89)
Macosta	0.00 (0.00)	0.00 (0.00)	2.01 (1.78)	2.97 (1.95)	1.81 (0.96)
Midland	0.00 (0.00)	0.00 (0.00)	0.80 (1.13)	0.00 (0.00)	0.26 (0.36)
Missaukee	2.53 (3.53)	0.00 (0.00)	0.00 (0.00)	0.66 (0.93)	0.52 (0.52)
Monroe	0.00 (0.00)	0.00 (0.00)	5.22 (2.82)	2.31 (1.73)	2.58 (1.14)
Montcalm	0.00 (0.00)	1.40 (1.96)	0.40 (0.80)	0.00 (0.00)	0.39 (0.45)
Montmorency	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.66 (0.93)	0.26 (0.36)
Muskegon	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.99 (1.14)	0.39 (0.45)
Newaygo	0.00 (0.00)	1.40 (1.96)	0.00 (0.00)	1.98 (1.60)	1.03 (0.73)
Oakland	3.80 (4.30)	1.40 (1.96)	6.02 (3.02)	1.98 (1.60)	3.36 (1.30)
Otsego	0.00 (0.00)	3.50 (3.07)	1.61 (1.59)	0.00 (0.00)	1.16 (0.77)
Ottawa	1.27 (2.52)	1.40 (1.96)	3.21 (2.24)	0.66 (0.93)	1.68 (0.92)
Presque Isle	3.80 (4.30)	2.80 (2.76)	1.61 (1.59)	3.96 (2.24)	2.97 (1.22)
Roscommon	2.53 (3.53)	4.20 (3.35)	3.21 (2.24)	2.97 (1.95)	3.23 (1.27)
Saginaw	0.00 (0.00)	0.00 (0.00)	4.42 (2.60)	0.00 (0.00)	1.42 (0.85)
St. Clair	0.00 (0.00)	1.40 (1.96)	0.00 (0.00)	2.97 (1.95)	1.42 (0.85)

Appendix 6-4.—continued.

Residence	May	June	July	August	Season
St. Joseph	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.99 (1.14)	0.39 (0.45)
Tuscola	2.53 (3.53)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.26 (0.36)
Van Buren	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.33 (0.66)	0.13 (0.26)
Washtenaw	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	3.30 (2.05)	1.29 (0.81)
Wayne	0.00 (0.00)	0.00 (0.00)	13.25 (4.30)	6.27 (2.79)	6.72 (1.80)
Non-resident	0.00 (0.00)	13.29 (5.68)	6.02 (3.02)	6.27 (2.79)	6.85 (1.82)
Anglers interviewed	79	143	249	303	774

Appendix 6-5.—Species of fish sought by anglers (percent of anglers interviewed), Brevoort Lake, Mackinac County, 1996. Results are from creel clerk collected interviews. Two standard errors are given in parentheses.

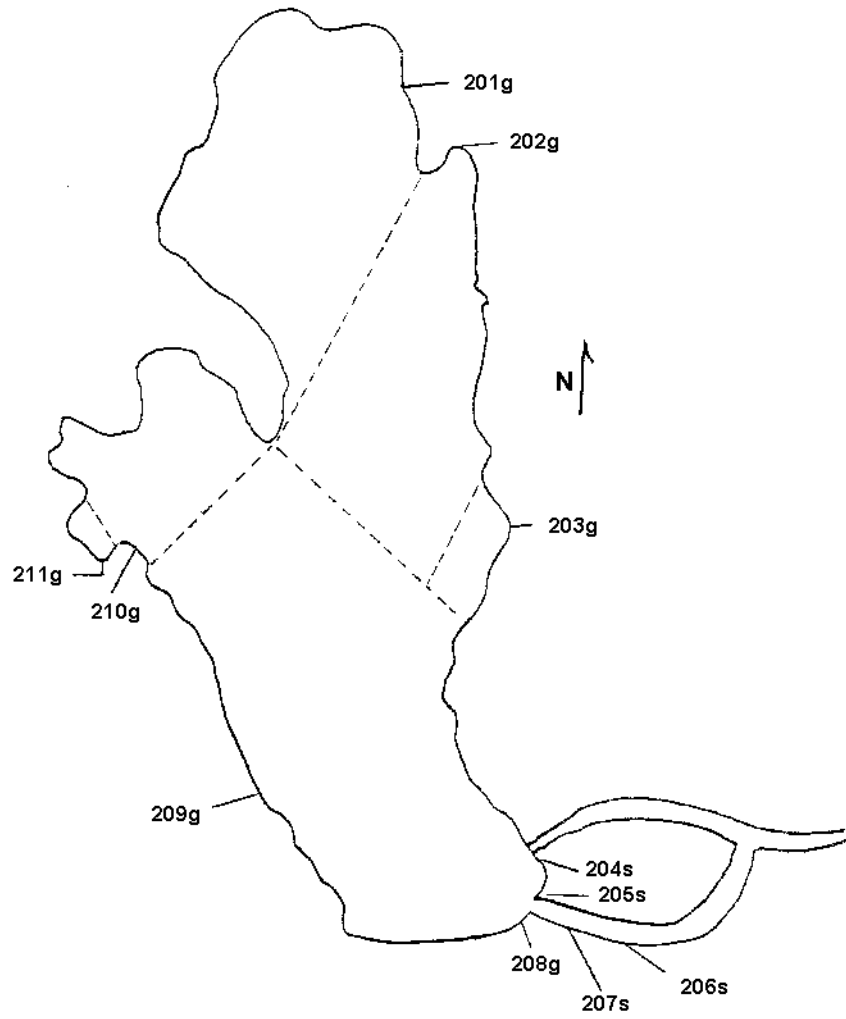
Species	May	June	July	August	Season
Walleye	69.05 (14.27)	57.89 (13.08)	24.55 (8.21)	15.08 (6.38)	32.24 (5.11)
Yellow perch	0.00 (0.00)	0.00 (0.00)	8.18 (5.23)	15.08 (6.38)	8.36 (3.02)
Northern pike	4.76 (6.57)	10.53 (8.13)	11.82 (6.16)	9.52 (5.23)	9.85 (3.26)
Bluegill	0.00 (0.00)	3.51 (4.87)	1.82 (2.55)	1.59 (2.23)	1.79 (1.45)
Smallmouth bass	0.00 (0.00)	5.26 (5.92)	2.73 (3.11)	1.59 (2.23)	2.39 (1.67)
Musky	0.00 (0.00)	0.00 (0.00)	0.91 (1.81)	0.00 (0.00)	0.30 (0.60)
Walleye & northern pike	11.90 (9.99)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.49 (1.32)
Walleye & smallmouth bass	2.38 (4.70)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.30 (0.60)
Walleye & yellow perch	2.38 (4.70)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.30 (0.60)
Anything	9.52 (9.06)	22.81 (11.12)	50.00 (9.53)	57.14 (8.82)	42.99 (5.41)
Anglers interviewed	42	57	110	126	335

Appendix 6-6.—Gender of anglers (percent of anglers interviewed), Brevoort Lake, Mackinac County, 1996. Results are from creel clerk collected interviews. Two standard errors are given in parentheses.

Gender	May	June	July	August	Season
Male	91.14 (6.39)	77.70 (7.06)	78.35 (5.17)	73.60 (5.06)	77.68 (2.99)
Female	8.86 (6.39)	22.30 (7.06)	21.65 (5.17)	26.40 (5.06)	22.32 (2.99)
Anglers interviewed	79	139	254	303	775

Appendix 7-1.—Burt Lake, Cheboygan County, 1993.

Site	Burt Lake
Year	1993
County	Cheboygan
Location	T. 35, 36 N., R. 3 W., Sec. Many
Survey period	April 24 through September 11
Daily period	See Appendix 7-2
Survey design	Progressive-access
Count method	Progressive, fishing and non-fishing boats, shore anglers
Interview type	Access, party, boating anglers, boating non-fishing, shore anglers, harvest
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	See Appendix 1 of Lockwood et al. (1999)
Clerk	Fisheries Division clerks, two full time
Survey purpose	Evaluate walleye fishery
Notes	<p>Burt Lake was divided into six grids, and effort and harvest were estimated by grid (Appendix figure 7-1). Grid estimates were summed to provide total lake estimates. Boat count and interview grids were 201g-203g and 209g-211g. Boat interviews were also collected at sites 205s and 208s. Shore angler count and interview sites were 204s, 206s, and 207s.</p> <p>Two sampling shifts were used during April, May, and June that covered the pre-dawn to post-sunset period. During July, August, and September two additional shifts were added to provide 24 h coverage. Specific times are given in Table 29.</p> <p>One count per shift was made and direction of count varied randomly. Counts either began at Maple Bay (west end of lake) and proceeded in a counter clockwise direction, or began at the northeast corner of the lake (road ending off of East Burt Lake Road at Hoppies Bar) and proceeded in a clockwise direction.</p> <p>Both fishing and non-fishing boaters were interviewed and mode (fishing or non-fishing) recorded. All boats (except sailboats), boat trailers, and shore anglers were counted from several vantage points around the lake, and anglers were interviewed as they completed fishing trips and exited the lake. Effort estimates were adjusted by the proportion of fishing parties in the interview data set.</p>



Appendix figure 7-1.—Counting and interviewing grids used for the Burt Lake, Cheboygan County, angler survey, 1993.

Appendix 7-2.—Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Burt Lake, Cheboygan County, 1993.

Month	Shift				Expansion value
	Early	Mid-day	Evening	Night	
April	0700 h – 1600 h		1200 h - 2100 h		15
May	0500 h – 1400 h		1400 h – 2300 h		19
June	0500 h – 1400 h		1400 h – 2300 h		19
July	0600 h – 1500 h	1100 h – 2000 h	1600 h – 0100 h	2100 h – 0600 h	24
August	0600 h – 1500 h	1100 h – 2000 h	1600 h – 0100 h	2100 h – 0600 h	24
September	0600 h – 1500 h	1100 h – 2000 h	1600 h – 0100 h	2100 h – 0600 h	24

Appendix 7-3.—Total 1993 Burt Lake, Cheboygan County, estimated harvest, fishing pressure, and catch per hour by day time boat anglers in grids 201g, 202g, 203g, 209g, 210g, 211g; night time boat anglers in grids 201g, 202g, 209g, 210g; and day time shore anglers at sites 204s, 206s, 207s. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout	0.0021 (0.0012)	0 (0)	0 (0)	56 (78)	63 (68)	145 (111)	19 (32)	283 (155)
Brown trout	0.0014 (0.0018)	0 (0)	159 (238)	21 (45)	9 (18)	0 (0)	1 (3)	190 (243)
Lake trout	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	11 (18)	6 (12)	17 (22)
Northern pike	0.0003 (0.0004)	0 (0)	0 (0)	26 (52)	7 (15)	4 (7)	2 (5)	39 (55)
Yellow perch	0.0032 (0.0025)	0 (0)	0 (0)	0 (0)	89 (108)	260 (276)	84 (155)	433 (335)
Walleye	0.1273 (0.0233)	78 (89)	1,294 (561)	4,279 (1,405)	3,371 (1,169)	6,827 (1,713)	1,337 (731)	17,186 (2,670)
Smallmouth bass	0.0098 (0.0081)	0 (0)	29 (40)	692 (768)	515 (755)	81 (64)	0 (0)	1,317 (1,079)
Rock bass	0.0087 (0.0064)	0 (0)	0 (0)	202 (395)	333 (315)	607 (694)	32 (38)	1,174 (859)
Black crappie	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	12 (24)	0 (0)	0 (0)	12 (24)
White sucker	0.0003 (0.0003)	14 (25)	22 (36)	0 (0)	0 (0)	0 (0)	0 (0)	36 (44)
Bullhead	0.0003 (0.0005)	0 (0)	0 (0)	0 (0)	0 (0)	47 (63)	0 (0)	47 (63)
Total harvest	0.1536 (0.0270)	92 (92)	1,504 (611)	5,276 (1,651)	4,399 (1,431)	7,982 (1,873)	1,481 (749)	20,734 (3,038)
Angler hours		1,036 (399)	16,138 (3,857)	35,431 (7,441)	37,323 (7,115)	36,896 (6,420)	8,133 (2,942)	134,957 (13,073)
Angler trips		358 (160)	4,511 (1,079)	8,269 (1,764)	8,870 (1,689)	9,708 (1,713)	2,207 (761)	33,923 (3,266)



Appendix 7-4.—Estimated harvest, fishing pressure, and catch per hour by day time boat anglers in grids 201g, 202g, 203g, 209g, 210g, and 211g and night time boat anglers in grids 201g, 202g, 209g, and 210g, Burt Lake, Cheboygan County, 1993. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout	0.0021 (0.0012)	0 (0)	0 (0)	56 (78)	63 (68)	134 (106)	19 (32)	272 (152)
Brown trout	0.0014 (0.0019)	0 (0)	154 (238)	21 (45)	9 (18)	0 (0)	1 (3)	185 (243)
Lake trout	0.0001 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	11 (18)	6 (12)	17 (22)
Northern pike	0.0003 (0.0004)	0 (0)	0 (0)	26 (52)	7 (15)	4 (7)	2 (5)	39 (55)
Yellow perch	0.0033 (0.0026)	0 (0)	0 (0)	0 (0)	89 (108)	260 (276)	84 (155)	433 (335)
Walleye	0.1300 (0.0244)	0 (0)	1,048 (545)	4,249 (1,403)	3,371 (1,169)	6,823 (1,713)	1,337 (731)	16,828 (2,664)
Smallmouth bass	0.0097 (0.0084)	0 (0)	29 (40)	692 (768)	497 (754)	36 (52)	0 (0)	1,254 (1,078)
Rock bass	0.0083 (0.0066)	0 (0)	0 (0)	202 (395)	233 (264)	607 (694)	32 (38)	1,074 (842)
Bullhead	0.0002 (0.0004)	0 (0)	0 (0)	0 (0)	0 (0)	32 (55)	0 (0)	32 (55)
Total harvest	0.1556 (0.0282)	0 (0)	1,231 (595)	5,246 (1,650)	4,269 (1,420)	7,907 (1,873)	1,481 (749)	20,134 (3,027)
Angler hours		448 (267)	14,352 (3,818)	34,980 (7,437)	36,243 (7,102)	35,816 (6,406)	7,584 (2,915)	129,423 (13,035)
Angler trips		123 (71)	3,673 (1,037)	8,046 (1,759)	8,198 (1,665)	9,221 (1,700)	1,981 (741)	31,242 (3,223)

Appendix 7-5.—Estimated harvest, fishing pressure, and catch per hour by shore anglers at sites 204s, 206s, and 207s, Burt Lake, Cheboygan County, 1993. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout	0.0020 (0.0058)	0 (0)	0 (0)	0 (0)	0 (0)	11 (32)	0 (0)	11 (32)
Brown trout	0.0009 (0.0022)	0 (0)	5 (12)	0 (0)	0 (0)	0 (0)	0 (0)	5 (12)
Walleye	0.0647 (0.0340)	78 (89)	246 (133)	30 (75)	0 (0)	4 (8)	0 (0)	358 (177)
Smallmouth bass	0.0114 (0.0087)	0 (0)	0 (0)	0 (0)	18 (29)	45 (37)	0 (0)	63 (47)
Rock bass	0.0181 (0.0312)	0 (0)	0 (0)	0 (0)	100 (172)	0 (0)	0 (0)	100 (172)
Crappie	0.0022 (0.0044)	0 (0)	0 (0)	0 (0)	12 (24)	0 (0)	0 (0)	12 (24)
White sucker	0.0065 (0.0081)	14 (25)	22 (36)	0 (0)	0 (0)	0 (0)	0 (0)	36 (44)
Bullhead	0.0027 (0.0054)	0 (0)	0 (0)	0 (0)	0 (0)	15 (30)	0 (0)	15 (30)
Total harvest	0.1084 (0.0508)	92 (92)	273 (138)	30 (75)	130 (176)	75 (58)	0 (0)	600 (260)
Angler hours		588 (296)	1,786 (547)	451 (253)	1,080 (423)	1,080 (424)	549 (398)	5,534 (984)
Angler trips		235 (144)	838 (298)	223 (127)	672 (286)	487 (211)	226 (174)	2,681 (531)

Appendix 7-6.—Boat angler residence (percent of anglers interviewed), by Michigan County or U. S. State, Burt Lake, Cheboygan County, 1993. Two standard errors are given in parentheses.

Residence	Apr	May	Jun	Jul	Aug	Sep	Season
Alcona	0 (0)	0 (0)	0 (0)	0 (0)	0.190 (0.27)	0 (0)	0.08 (0.11)
Allegan	0 (0)	1.70 (1.51)	3.93 (1.77)	1.14 (0.93)	0.67 (0.51)	3.88 (2.20)	1.84 (0.52)
Alpena	0 (0)	0.68 (0.96)	0 (0)	0.38 (0.54)	0.58 (0.47)	0 (0)	0.38 (0.24)
Antrim	0 (0)	0 (0)	0.21 (0.41)	0 (0)	0 (0)	0 (0)	0.04 (0.08)
Arenac	0 (0)	0 (0)	1.24 (1.01)	0.38 (0.54)	0 (0)	0 (0)	0.30 (0.21)
Barry	0 (0)	0 (0)	2.69 (1.47)	0.57 (0.66)	1.15 (0.66)	1.62 (1.44)	1.24 (0.43)
Bay	0 (0)	0.68 (0.96)	4.75 (1.93)	3.05 (1.50)	2.31 (0.93)	3.24 (2.01)	2.82 (0.64)
Berrien	0 (0)	0 (0)	0 (0)	0.19 (0.38)	0.10 (0.19)	0 (0)	0.08 (0.11)
Branch	0 (0)	0 (0)	0.41 (0.58)	0 (0)	0 (0)	0 (0)	0.08 (0.11)
Calhoun	0 (0)	1.02 (1.17)	0.83 (0.82)	3.43 (1.59)	0.77 (0.54)	0.32 (0.65)	1.28 (0.44)
Cass	0 (0)	0 (0)	0.21 (0.41)	0 (0)	0 (0)	0 (0)	0.04 (0.08)
Charlevoix	16.67 (30.43)	0.34 (0.68)	0 (0)	1.52 (1.07)	1.54 (0.76)	0 (0)	0.98 (0.38)
Cheboygan	0 (0)	8.16 (3.19)	8.68 (2.56)	8.57 (2.44)	5.77 (1.45)	7.12 (2.93)	7.26 (1.01)
Chippewa	0 (0)	1.36 (1.35)	0 (0)	0.19 (0.38)	0.38 (0.38)	0.32 (0.65)	0.38 (0.24)
Clare	0 (0)	0.68 (0.96)	1.03 (0.92)	1.71 (1.13)	2.60 (0.99)	1.94 (1.57)	1.84 (0.52)
Clinton	0 (0)	0.68 (0.96)	1.65 (1.16)	1.33 (1.00)	1.73 (0.81)	0.97 (1.12)	1.43 (0.46)
Delta	0 (0)	2.72 (1.90)	2.48 (1.41)	0.38 (0.54)	0.38 (0.38)	0 (0)	0.98 (0.38)
Eaton	0 (0)	1.36 (1.35)	3.10 (1.58)	2.10 (1.25)	1.54 (0.76)	1.94 (1.57)	1.96 (0.54)
Emmet	0 (0)	10.54 (3.58)	3.10 (1.58)	4.57 (1.82)	5.10 (1.37)	3.56 (2.11)	5.04 (0.85)

Appendix 7-6.--continued.

Residence	Apr	May	Jun	Jul	Aug	Sep	Season
Genesee	0 (0)	8.16 (3.19)	0.83 (0.82)	8.19 (2.39)	1.73 (0.81)	1.29 (1.29)	3.50 (0.71)
Gladwin	0 (0)	0 (0)	0 (0)	1.14 (0.93)	0.19 (0.27)	0 (0)	0.30 (0.21)
GrandTraverse	0 (0)	2.04 (1.65)	0.62 (0.71)	0.76 (0.76)	0.77 (0.54)	2.59 (1.81)	1.09 (0.40)
Gratiot	0 (0)	0 (0)	0.83 (0.82)	2.48 (1.36)	0.10 (0.19)	0.65 (0.91)	0.75 (0.34)
Hillsdale	0 (0)	0 (0)	0 (0)	0 (0)	0.38 (0.38)	0.32 (0.65)	0.19 (0.17)
Houghton	0 (0)	0 (0)	0 (0)	0.19 (0.38)	0 (0)	0 (0)	0.04 (0.08)
Ingham	0 (0)	2.38 (1.78)	0.62 (0.71)	0.76 (0.76)	1.73 (0.81)	8.09 (3.10)	2.15 (0.56)
Ionia	50.00 (40.82)	0 (0)	1.45 (1.09)	0.38 (0.54)	1.06 (0.64)	0 (0)	0.87 (0.36)
Iosco	0 (0)	0.68 (0.96)	0.41 (0.58)	0.19 (0.38)	0.29 (0.33)	0 (0)	0.30 (0.21)
Iron	0 (0)	0.34 (0.68)	0 (0)	0 (0)	0 (0)	0 (0)	0.04 (0.08)
Isabella	0 (0)	0 (0)	0.62 (0.71)	2.29 (1.30)	0.10 (0.19)	0 (0)	0.60 (0.30)
Jackson	0 (0)	0.34 (0.68)	0 (0)	0.95 (0.85)	0.10 (0.19)	0.32 (0.65)	0.30 (0.21)
Kalamazoo	0 (0)	0.68 (0.96)	0.83 (0.82)	1.90 (1.19)	4.14 (1.24)	1.29 (1.29)	2.37 (0.59)
Kalkaska	0 (0)	0 (0)	0.62 (0.71)	1.90 (1.19)	0 (0)	3.88 (2.20)	0.94 (0.37)
Kent	0 (0)	1.70 (1.51)	6.20 (2.19)	2.67 (1.41)	4.62 (1.30)	4.85 (2.45)	4.22 (0.78)
Keweenaw	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.32 (0.65)	0.04 (0.08)
Lake	0 (0)	0 (0)	0 (0)	0 (0)	0.10 (0.19)	0 (0)	0.04 (0.08)
Lapeer	0 (0)	1.02 (1.17)	0.41 (0.58)	1.52 (1.07)	2.41 (0.95)	1.29 (1.29)	1.58 (0.48)
Leelanau	0 (0)	0 (0)	0 (0)	0.38 (0.54)	0 (0)	0 (0)	0.08 (0.11)

Appendix 7-6.–continued.

Residence	Apr	May	Jun	Jul	Aug	Sep	Season
Lenawee	0 (0)	0 (0)	0 (0)	0.57 (0.66)	0.38 (0.38)	0 (0)	0.26 (0.20)
Livingston	0 (0)	3.74 (2.21)	0.41 (0.58)	2.48 (1.36)	1.54 (0.76)	0 (0)	1.58 (0.48)
Luce	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.32 (0.65)	0.04 (0.08)
Mackinac	16.67 (30.43)	0 (0)	0.83 (0.82)	0 (0)	0.10 (0.19)	0 (0)	0.23 (0.18)
Macomb	0 (0)	2.38 (1.78)	3.31 (1.63)	1.33 (1.00)	2.12 (0.89)	2.59 (1.81)	2.26 (0.58)
Manistee	0 (0)	2.04 (1.65)	0.21 (0.41)	0 (0)	0.48 (0.43)	0 (0)	0.45 (0.26)
Marquette	0 (0)	0 (0)	0 (0)	0.19 (0.38)	0 (0)	0 (0)	0.04 (0.08)
Mason	0 (0)	0.34 (0.68)	0.41 (0.58)	2.29 (1.30)	0.87 (0.57)	0 (0)	0.90 (0.37)
Macosta	0 (0)	0 (0)	0 (0)	0.76 (0.76)	0.58 (0.47)	0.65 (0.91)	0.45 (0.26)
Midland	0 (0)	3.74 (2.21)	2.48 (1.41)	1.14 (0.93)	0.77 (0.54)	0.97 (1.12)	1.51 (0.47)
Missaukee	0 (0)	0.68 (0.96)	0 (0)	0.38 (0.54)	0.67 (0.51)	3.24 (2.01)	0.79 (0.34)
Monroe	0 (0)	0 (0)	0.41 (0.58)	1.90 (1.19)	0 (0)	0 (0)	0.45 (0.26)
Montcalm	0 (0)	0.34 (0.68)	0.21 (0.41)	0.19 (0.38)	1.25 (0.69)	0 (0)	0.60 (0.30)
Montmorency	0 (0)	0.34 (0.68)	0.41 (0.58)	0 (0)	0 (0)	0 (0)	0.11 (0.13)
Muskegon	0 (0)	1.02 (1.17)	0 (0)	0.95 (0.85)	0.48 (0.43)	0 (0)	0.49 (0.27)
Newaygo	0 (0)	1.02 (1.17)	1.86 (1.23)	0.95 (0.85)	0.77 (0.54)	2.27 (1.69)	1.20 (0.42)
Oakland	16.67 (30.43)	5.78 (2.72)	1.86 (1.23)	2.86 (1.45)	7.03 (1.59)	8.41 (3.16)	5.31 (0.87)
Oceana	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.65 (0.91)	0.08 (0.11)
Ogemaw	0 (0)	1.02 (1.17)	3.10 (1.58)	0 (0)	1.25 (0.69)	5.18 (2.52)	1.77 (0.51)

Appendix 7-6.--continued.

Residence	Apr	May	Jun	Jul	Aug	Sep	Season
Osceola	0 (0)	0.68 (0.96)	0.62 (0.71)	0 (0)	0.96 (0.61)	0 (0)	0.56 (0.29)
Otsego	0 (0)	7.14 (3.00)	3.51 (1.67)	2.48 (1.36)	1.64 (0.79)	0 (0)	2.56 (0.61)
Ottawa	0 (0)	7.48 (3.07)	19.63 (3.61)	4.95 (1.89)	10.78 (1.92)	10.03 (3.42)	10.76 (1.20)
Presque Isle	0 (0)	1.36 (1.35)	0 (0)	0.95 (0.85)	0.48 (0.43)	0 (0)	0.53 (0.28)
Roscommon	0 (0)	0.68 (0.96)	0 (0)	0 (0)	0.67 (0.51)	0 (0)	0.34 (0.23)
Saginaw	0 (0)	2.72 (1.90)	4.75 (1.93)	6.29 (2.12)	2.41 (0.95)	3.88 (2.20)	3.80 (0.74)
St .Clair	0 (0)	0 (0)	0.83 (0.82)	0 (0)	1.83 (0.83)	0.32 (0.65)	0.90 (0.37)
St. Joseph	0 (0)	0.34 (0.68)	0.62 (0.71)	0 (0)	0.58 (0.47)	0 (0)	0.38 (0.24)
Sanilac	0 (0)	0 (0)	0 (0)	0.38 (0.54)	0.29 (0.33)	0.32 (0.65)	0.23 (0.18)
Schoolcraft	0 (0)	0.68 (0.96)	0 (0)	0 (0)	0 (0)	0 (0)	0.08 (0.11)
Shiawassee	0 (0)	0 (0)	0 (0)	1.52 (1.07)	5.39 (1.40)	2.91 (1.91)	2.75 (0.63)
Tuscola	0 (0)	0.34 (0.68)	0.62 (0.71)	0 (0)	5.39 (1.40)	0.32 (0.65)	2.30 (0.58)
VanBuren	0 (0)	1.36 (1.35)	0 (0)	0.57 (0.66)	0 (0)	0 (0)	0.26 (0.20)
Washtenaw	0 (0)	1.36 (1.35)	0 (0)	0.38 (0.54)	0.10 (0.19)	0 (0)	0.26 (0.20)
Wayne	0 (0)	1.36 (1.35)	2.89 (1.52)	6.29 (2.12)	2.89 (1.04)	1.94 (1.57)	3.27 (0.69)
Wexford	0 (0)	0.34 (0.68)	0.21 (0.41)	0 (0)	1.06 (0.64)	0 (0)	0.49 (0.27)
Indiana,Kentucky, Florida	0 (0)	0 (0)	0.83 (0.82)	2.67 (1.41)	2.98 (1.06)	6.15 (2.73)	2.56 (0.61)
Wisconsin	0 (0)	0.68 (0.96)	1.03 (0.92)	0.57 (0.66)	1.35 (0.72)	0 (0)	0.90 (0.37)
Ohio	0 (0)	0 (0)	0.83 (0.82)	0.38 (0.54)	0.29 (0.33)	0 (0)	0.34 (0.23)

Appendix 7-6.--continued.

Residence	Apr	May	Jun	Jul	Aug	Sep	Season
Virginia,Texas	0 (0)	3.74 (2.21)	0.41 (0.58)	1.14 (0.93)	0.10 (0.19)	0 (0)	0.75 (0.34)
Arizona	0 (0)	0 (0)	0 (0)	0.19 (0.38)	0 (0)	0 (0)	0.04 (0.08)
Anglers interviewed	6	294	484	525	1,039	309	2,657

Appendix 7-7.--Type of bait used by boat anglers (percent of anglers interviewed), Burt Lake, Cheboygan County, 1993. Two standard errors are given in parentheses.

Bait	May	Jun	Jul	Aug	Sep	Season
Live	0 (0)	56.72 (4.54)	60.57 (4.27)	70.41 (2.85)	80.06 (4.57)	66.67 (1.95)
Artificial	0 (0)	19.54 (3.63)	17.52 (3.32)	11.62 (2.00)	14.71 (4.05)	14.97 (1.48)
Both	0 (0)	23.74 (3.90)	21.90 (3.61)	17.97 (2.40)	5.23 (2.54)	18.36 (1.60)
Anglers interviewed	0	476	525	1,024	306	2,331

Appendix 7-8.—Species of fish sought by boat anglers (percent of boat anglers interviewed), Burt Lake, Cheboygan County, 1993. Two standard errors are given in parentheses.

Species sought	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout	0 (0)	0 (0)	0 (0)	0 (0)	0.10 (0.19)	0 (0)	0.04 (0.08)
Trout sp.	0 (0)	0 (0)	0.21 (0.41)	1.14 (0.92)	0 (0)	0.32 (0.64)	0.30 (0.21)
Pike & walleye	0 (0)	1.69 (1.50)	0.41 (0.58)	1.52 (1.06)	2.21 (0.91)	1.61 (1.43)	1.61 (0.49)
Northern pike	0 (0)	2.71 (1.89)	1.44 (1.08)	0 (0)	0.19 (0.27)	0 (0)	0.64 (0.31)
Yellow perch	0 (0)	0.34 (0.68)	0 (0)	1.70 (1.13)	0.77 (0.54)	2.58 (1.80)	0.98 (0.38)
Walleye	100.00 (0)	76.95 (4.90)	90.14 (2.70)	66.67 (4.10)	86.14 (2.14)	90.32 (3.36)	82.51 (1.47)
Smallmouth bass	0 (0)	4.41 (2.39)	3.70 (1.71)	3.03 (1.49)	0 (0)	0 (0)	1.76 (0.51)
Rock bass	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.97 (1.11)	0.11 (0.13)
Panfish	0 (0)	0 (0)	0.41 (0.58)	2.27 (1.30)	0.19 (0.27)	0 (0)	0.60 (0.30)
Walleye & bass	0 (0)	0 (0)	0 (0)	0.38 (0.53)	0.19 (0.27)	0.65 (0.91)	0.23 (0.18)
Northern pike & bass	0 (0)	0 (0)	0 (0)	0.57 (0.65)	0 (0)	0 (0)	0.11 (0.13)
Trout & bass	0 (0)	0 (0)	0 (0)	0 (0)	0.19 (0.27)	0 (0)	0.08 (0.11)
Northern pike & yellow perch	0 (0)	0 (0)	0 (0)	0 (0)	0.19 (0.27)	0 (0)	0.08 (0.11)
Anything	0 (0)	13.90 (4.03)	3.70 (1.71)	22.73 (3.65)	9.82 (1.85)	3.55 (2.10)	10.96 (1.21)
Anglers interviewed:	6	295	487	528	1,039	310	2,665



Appendix 7-9.—Number of trips by boat anglers (percent of boat anglers interviewed), Burt Lake, Cheboygan County, 1993. Two standard errors are given in parentheses.

Trips/day	Apr	May	Jun	Jul	Aug	Sep	Season
1	66.67 (38.49)	92.59 (3.04)	84.29 (3.29)	78.68 (3.56)	87.55 (2.04)	99.68 (0.64)	87.11 (1.30)
2	33.33 (38.49)	7.41 (3.04)	15.71 (3.29)	21.32 (3.56)	12.45 (2.04)	0.32 (0.64)	12.89 (1.30)
Anglers interviewed	6	297	490	530	1,044	310	2,677

Appendix 7-10.—Gender of boat anglers (percent of boat anglers interviewed), Burt Lake, Cheboygan County, 1993. Two standard errors are given in parentheses.

Gender	Apr	May	Jun	Jul	Aug	Sep	Season
Male	100.00 (0)	93.31 (2.89)	82.45 (3.44)	80.57 (3.44)	77.39 (2.59)	80.97 (4.46)	81.19 (1.51)
Female	0 (0)	6.69 (2.89)	17.55 (3.44)	19.43 (3.44)	22.61 (2.59)	19.03 (4.46)	18.81 (1.51)
Anglers interviewed	6	299	490	530	1,044	310	2,679

Appendix 7-11.—Residence of shore anglers (percent of shore anglers interviewed) by Michigan County or U. S. State, Burt Lake, Cheboygan County, 1993. Two standard errors are given in parentheses.

Residence	Apr	May	Jun	Jul	Aug	Sep	Season
Allegan	0 (0)	0 (0)	0 (0)	0.76 (1.51)	0 (0)	0 (0)	0.19 (0.39)
Alpena	0 (0)	0 (0)	0 (0)	0.76 (1.51)	0 (0)	0 (0)	0.19 (0.39)
Antrim	0 (0)	3.87 (3.10)	12.50 (16.54)	0 (0)	0 (0)	0 (0)	1.56 (1.09)
Barry	2.13 (4.21)	0 (0)	0 (0)	0 (0)	0.65 (1.29)	0 (0)	0.39 (0.55)
Bay	0 (0)	0 (0)	0 (0)	1.52 (2.13)	0 (0)	0 (0)	0.39 (0.55)
Calhoun	0 (0)	1.94 (2.21)	0 (0)	0 (0)	0 (0)	0 (0)	0.58 (0.67)
Charlevoix	0 (0)	0 (0)	0 (0)	0.76 (1.51)	0 (0)	0 (0)	0.19 (0.39)
Cheboygan	57.45 (14.42)	42.58 (7.94)	43.75 (24.80)	11.36 (5.52)	16.13 (5.91)	22.22 (27.72)	27.63 (3.94)
Clare	0 (0)	0 (0)	0 (0)	1.52 (2.13)	2.58 (2.55)	0 (0)	1.17 (0.95)
Crawford	0 (0)	0 (0)	0 (0)	0 (0)	1.94 (2.21)	0 (0)	0.58 (0.67)
Eaton	0 (0)	0.65 (1.29)	0 (0)	0.76 (1.51)	0 (0)	0 (0)	0.39 (0.55)
Emmet	19.15 (11.48)	9.03 (4.60)	0 (0)	0 (0)	0.65 (1.29)	0 (0)	4.67 (1.86)
Genesee	0 (0)	1.29 (1.81)	0 (0)	1.52 (2.13)	12.90 (5.39)	0 (0)	4.67 (1.86)
Grand Traverse	0 (0)	0 (0)	0 (0)	1.52 (2.13)	1.29 (1.81)	0 (0)	0.78 (0.78)
Gratiot	0 (0)	5.16 (3.55)	0 (0)	0 (0)	0 (0)	0 (0)	1.56 (1.09)
Hillsdale	0 (0)	0 (0)	0 (0)	0 (0)	4.52 (3.34)	0 (0)	1.36 (1.02)
Ingham	0 (0)	0.65 (1.29)	6.25 (12.10)	0.76 (1.51)	1.29 (1.81)	0 (0)	0.97 (0.87)
Ionia	0 (0)	0 (0)	0 (0)	1.52 (2.13)	0 (0)	0 (0)	0.39 (0.55)
Iosco	0 (0)	0 (0)	0 (0)	0.76 (1.51)	0 (0)	0 (0)	0.19 (0.39)

Appendix 7-11.--continued.

Residence	Apr	May	Jun	Jul	Aug	Sep	Season
Kalamazoo	0 (0)	1.29 (1.81)	0 (0)	0.76 (1.51)	2.58 (2.55)	0 (0)	1.36 (1.02)
Kalkaska	0 (0)	0 (0)	0 (0)	0.76 (1.51)	0 (0)	0 (0)	0.19 (0.39)
Kent	0 (0)	0.65 (1.29)	0 (0)	0.76 (1.51)	5.16 (3.55)	0 (0)	1.95 (1.22)
Lapeer	0 (0)	2.58 (2.55)	0 (0)	0 (0)	0 (0)	0 (0)	0.78 (0.78)
Leelanau	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	44.44 (33.13)	0.78 (0.78)
Livingston	0 (0)	3.87 (3.10)	0 (0)	0 (0)	0 (0)	0 (0)	1.17 (0.95)
Macomb	2.13 (4.21)	2.58 (2.55)	6.25 (12.10)	7.58 (4.61)	0.65 (1.29)	0 (0)	3.31 (1.58)
Marquette	0 (0)	0.65 (1.29)	0 (0)	0 (0)	0 (0)	0 (0)	0.19 (0.39)
Midland	0 (0)	0.65 (1.29)	0 (0)	0.76 (1.51)	0 (0)	0 (0)	0.39 (0.55)
Monroe	0 (0)	0 (0)	0 (0)	0 (0)	1.29 (1.81)	0 (0)	0.39 (0.55)
Oakland	0 (0)	5.16 (3.55)	12.50 (16.54)	6.06 (4.15)	3.87 (3.10)	0 (0)	4.67 (1.86)
Osceola	0 (0)	0 (0)	0 (0)	0 (0)	1.29 (1.81)	0 (0)	0.39 (0.55)
Otsego	4.26 (5.89)	0 (0)	0 (0)	1.52 (2.13)	4.52 (3.34)	0 (0)	2.14 (1.28)
Ottawa	2.13 (4.21)	0.65 (1.29)	0 (0)	2.27 (2.59)	1.94 (2.21)	0 (0)	1.56 (1.09)
Presque Isle	4.26 (5.89)	0.65 (1.29)	0 (0)	0 (0)	1.29 (1.81)	0 (0)	0.97 (0.87)
Roscommon	0 (0)	0.65 (1.29)	0 (0)	0 (0)	0 (0)	0 (0)	0.19 (0.39)
Saginaw	0 (0)	1.94 (2.21)	0 (0)	6.82 (4.39)	7.10 (4.12)	0 (0)	4.47 (1.82)
St. Clair	0 (0)	3.87 (3.10)	0 (0)	0 (0)	0 (0)	0 (0)	1.17 (0.95)
St. Joseph	0 (0)	0 (0)	0 (0)	1.52 (2.13)	0 (0)	0 (0)	0.39 (0.55)

Appendix 7-11.--continued.

Residence	Apr	May	Jun	Jul	Aug	Sep	Season
Sanilac	0 (0)	0 (0)	0 (0)	6.06 (4.15)	0.65 (1.29)	0 (0)	1.75 (1.16)
Shiawassee	0 (0)	0 (0)	0 (0)	0 (0)	4.52 (3.34)	0 (0)	1.36 (1.02)
Tuscola	0 (0)	1.94 (2.21)	0 (0)	0 (0)	7.10 (4.12)	0 (0)	2.72 (1.44)
VanBuren	0 (0)	0.65 (1.29)	0 (0)	0 (0)	0 (0)	0 (0)	0.19 (0.39)
Washtenaw	0 (0)	1.29 (1.81)	0 (0)	3.03 (2.98)	0 (0)	0 (0)	1.17 (0.95)
Wayne	4.26 (5.89)	3.23 (2.84)	6.25 (12.10)	12.12 (5.68)	5.16 (3.55)	33.33 (31.43)	6.81 (2.22)
Indiana,Kentucky, Florida	0 (0)	0 (0)	0 (0)	12.12 (5.68)	1.29 (1.81)	0 (0)	3.50 (1.62)
Wisconsin	0 (0)	0.65 (1.29)	0 (0)	6.82 (4.39)	3.23 (2.84)	0 (0)	2.92 (1.48)
Ohio	0 (0)	1.29 (1.81)	12.50 (16.54)	5.30 (3.90)	4.52 (3.34)	0 (0)	3.50 (1.62)
Virginia&Texas	4.26 (5.89)	0.65 (1.29)	0 (0)	2.27 (2.59)	1.94 (2.21)	0 (0)	1.75 (1.16)
Anglers interviewed	47	155	16	132	155	9	514

Appendix 7-12.—Species of fish sought by shore anglers (percent of shore anglers interviewed), Burt Lake, Cheboygan County, 1993. Two standard errors are given in parentheses.

Species sought	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout	6.38 (7.13)	0 (0)	0 (0)	0 (0)	1.34 (1.89)	0 (0)	0.99 (0.88)
Brown trout	0 (0)	0.64 (1.27)	0 (0)	0 (0)	0 (0)	0 (0)	0.20 (0.40)
Brook trout	0 (0)	0.64 (1.27)	0 (0)	0 (0)	0 (0)	0 (0)	0.20 (0.40)
Trout	0 (0)	2.55 (2.52)	0 (0)	1.57 (2.21)	0.67 (1.34)	0 (0)	1.39 (1.04)
Pike & walleye	2.13 (4.21)	0 (0)	0 (0)	1.57 (2.21)	0.67 (1.34)	0 (0)	0.79 (0.79)
Walleye	76.60 (12.35)	62.42 (7.73)	31.25 (23.18)	18.90 (6.95)	22.82 (6.88)	22.22 (27.72)	39.41 (4.35)
Smallmouth bass	0 (0)	0.64 (1.27)	0 (0)	7.09 (4.55)	12.75 (5.47)	0 (0)	5.74 (2.07)
Largemouth bass	0 (0)	0 (0)	18.75 (19.52)	0 (0)	0 (0)	0 (0)	0.59 (0.68)
Rock bass	0 (0)	0 (0)	0 (0)	0.79 (1.57)	0 (0)	0 (0)	0.20 (0.40)
Crappie	0 (0)	0 (0)	0 (0)	1.57 (2.21)	0 (0)	0 (0)	0.40 (0.56)
White sucker	10.64 (8.99)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.99 (0.88)
Bullhead	0 (0)	1.27 (1.79)	0 (0)	0 (0)	0 (0)	0 (0)	0.40 (0.56)
Walleye & bass	0 (0)	0 (0)	0 (0)	0 (0)	2.01 (2.30)	0 (0)	0.59 (0.68)
Bass & bluegill	0 (0)	0 (0)	0 (0)	2.36 (2.70)	0 (0)	0 (0)	0.59 (0.68)
Pike & bass	0 (0)	0 (0)	0 (0)	0 (0)	1.34 (1.89)	0 (0)	0.40 (0.56)
Trout & bass	0 (0)	0 (0)	0 (0)	0 (0)	0.67 (1.34)	0 (0)	0.20 (0.40)
Walleye & trout	0 (0)	0 (0)	0 (0)	0 (0)	0.67 (1.34)	0 (0)	0.20 (0.40)
Anything	4.26 (5.89)	31.85 (7.44)	50.00 (25.00)	66.14 (8.40)	57.05 (8.11)	77.78 (27.72)	46.73 (4.44)
Anglers interviewed	47	157	16	127	149	9	505

Appendix 7-13.—Type of bait used by shore anglers (percent of shore anglers interviewed), Burt Lake, Cheboygan County, 1993. Two standard errors are given in parentheses.

Bait used	Apr	May	Jun	Jul	Aug	Sep	Season
Live	0 (0)	100.00 (0)	68.75 (23.18)	63.46 (8.43)	76.77 (6.78)	77.78 (27.72)	71.15 (5.13)
Artificial	0 (0)	0 (0)	25.00 (21.65)	13.84 (6.06)	1.94 (2.21)	22.22 (27.72)	8.65 (3.18)
Both	0 (0)	0 (0)	6.25 (12.10)	22.31 (7.30)	21.29 (6.58)	0 (0)	20.19 (4.54)
Anglers interviewed	0	2	16	130	155	9	312

Appendix 7-14.—Number of trips per day by shore anglers (percent of shore anglers interviewed), Burt Lake, Cheboygan County, 1993. Two standard errors are given in parentheses.

Trips/day	Apr	May	Jun	Jul	Aug	Sep	Season
1	61.70 (14.18)	89.81 (4.83)	81.25 (19.52)	88.64 (5.52)	94.84 (3.55)	100.00 (0)	88.37 (2.82)
2	36.17 (14.02)	9.55 (4.69)	18.75 (19.52)	10.61 (5.36)	5.16 (3.55)	0 (0)	11.05 (2.76)
3	2.13 (4.21)	0.64 (1.27)	0 (0)	0 (0)	0 (0)	0 (0)	0.39 (0.55)
6	0 (0)	0 (0)	0 (0)	0.76 (1.51)	0 (0)	0 (0)	0.19 (0.39)
Total:	47	157	16	132	155	9	516

Appendix 7-15.—Gender of shore anglers (percent of shore anglers interviewed), Burt Lake, Cheboygan County, 1993. Two standard errors are given in parentheses.

Gender	Apr	May	Jun	Jul	Aug	Sep	Season
Male	91.49 (8.14)	81.65 (6.16)	81.25 (19.52)	68.94 (8.06)	79.35 (6.50)	88.89 (20.95)	78.72 (3.60)
Female	8.51 (8.14)	18.35 (6.16)	18.75 (19.52)	31.06 (8.06)	20.65 (6.50)	11.11 (20.95)	21.28 (3.60)
Anglers interviewed	47	158	16	132	155	9	517

Appendix 8-1.—Cary Lake, Branch County, 1998.

Site	Carey Lake
Year	1998
County	Branch
Location	T. 6, 7 S., R. 7 W., Sec. 3, 34
Survey period	June 19 to August 8 (16 Friday and Saturday nights)
Daily period	1800 h to 0100 h
Survey design	Proportional-voluntary
Count method	Instantaneous, trailer
Interview type	Voluntary, party, boating anglers, harvest, catch and release
Effort estimation	Proportional, Equations (1)-(7)
Catch estimation	Multiple-day period (Lockwood et al. 1999)
Clerk	Fisheries Division clerk, 1/8 time
Survey purpose	Evaluate rainbow trout plants
Notes	<p>One clerk traveled to access sites at each of eight lakes (see also Allen, Bird, Deep, Farwell, Gilead, Lavine, and Swains lakes, 1988 chapters) on Friday and Saturday nights and recorded the number of trailers, or vehicles that appeared to have transported boats, and the hour at which the count was made.</p> <p>Catch rate was estimated from postpaid interview cards placed on the windshields of vehicles in the public launch sites located at each lake. Voluntary access interviews were collected, by angling party, to estimate catch rate. A zip-lock bag containing a self-addressed post card, explanation of the survey, and a lead pencil, was placed under each vehicle's windshield wiper. Anglers recorded number of anglers in their party, number of fish harvested, number of fish caught-and-released, start time, and finish time.</p>

Appendix 8-2.-Estimated harvest, harvest rate, catch and release, catch and release rate, and angling effort, Cary Lake, Branch County, 1998. All estimates are given with 2 standard errors in parentheses.

	Catch/hour	Estimate
Rainbow trout - harvest	0.2105 (0.4462)	68 (137)
Rainbow trout - release	0.0789 (0.1831)	25 (57)
Angler hours		323 (203)
Angler trips		105 (72)



Appendix 9-1.—Chicagon Lake, Iron County, 1993.

Site	Chicagon Lake
Year	1993
County	Iron
Location	T. 42 N., R. 34 W., Sec. 1,2,11-14
Survey period	May 15 through November 13
Daily period	See Appendix 9-2
Survey design	Roving-access
Count method	Instantaneous, boat
Interview type	Access, party, boating anglers, harvest
Effort estimation	See Appendix 1of Lockwood et al. (1999)
Catch estimation	See Appendix 1of Lockwood et al. (1999)
Clerk	Fisheries Division clerk, 1/3 time
Survey purpose	Characterize general effort and catch aspects of the fishery, and angler residency
Notes	<p>One Fisheries Division funded clerk was used to collect count and interview data on Chicagon, Hagerman, and Stanley lakes (see also Hagerman and Stanley lakes, 1993 chapters). No interviews were collected at Stanley Lake, only effort was estimated. Chicagon and Hagerman lakes were sampled each scheduled workday with approximately equal time spent at each lake for interviewing. Three randomly-selected weekdays, each weekend day, and all holidays were selected for sampling. One of two shifts was selected each workday (Appendix 9-2).</p> <p>Order of count was randomized; the clerk began a scheduled count at one of these three lakes and then proceeded to the others. One count per day of fishing boats was made at each lake. Time of count was adjusted within shifts to sample the sunrise to sunset fishery.</p> <p>Interviewing was done at the access site.</p>

Appendix 9-2.—Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Chicagon Lake, Iron County, 1993.

Month	Shift		Expansion value
	Early	Late	
May	0600 h – 1500 h	1300 h – 2200 h	16
June	0600 h – 1500 h	1300 h – 2200 h	18
July	0600 h – 1500 h	1300 h – 2200 h	18
August	0600 h – 1500 h	1300 h – 2200 h	17
September	0600 h – 1500 h	1300 h – 2200 h	16
October	0600 h – 1500 h	1300 h – 2200 h	14
November	0600 h – 1500 h	1100 h – 2000 h	12

Appendix 9-3.—Estimated harvest, fishing pressure, and catch per hour by boat anglers, Chicagon Lake, Iron County, 1993. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Oct	Nov	Season
Lake trout	0.0027 (0.0037)	0 (0)	11 (22)	57 (98)	8 (17)	0 (0)	0 (0)	0 (0)	76 (102)
Northern pike	0.0081 (0.0083)	12 (28)	2 (5)	104 (194)	49 (94)	54 (70)	5 (10)	0 (0)	226 (229)
Musky	0.0004 (0.0006)	0 (0)	7 (14)	0 (0)	0 (0)	5 (9)	0 (0)	0 (0)	12 (17)
Yellow perch	0.2873 (0.0926)	11 (24)	1,231 (1,110)	3,079 (1,148)	1,815 (1,051)	1,377 (961)	483 (467)	0 (0)	7,996 (2,190)
Walleye	0.0928 (0.0588)	207 (333)	259 (190)	373 (251)	1,236 (1,484)	287 (213)	218 (169)	3 (8)	2,583 (1,577)
Smallmouth bass	0.0024 (0.0021)	0 (0)	54 (52)	0 (0)	0 (0)	12 (26)	0 (0)	0 (0)	66 (58)
Bluegill	0.0048 (0.0057)	0 (0)	0 (0)	71 (137)	35 (67)	27 (35)	0 (0)	0 (0)	133 (156)
Rock bass	0.0026 (0.0047)	0 (0)	5 (11)	68 (129)	0 (0)	0 (0)	0 (0)	0 (0)	73 (129)
Sunfish	0.0011 (0.0017)	0 (0)	0 (0)	16 (32)	0 (0)	16 (34)	0 (0)	0 (0)	32 (47)
Total harvest	0.4023 (0.1192)	230 (335)	1,569 (1,128)	3,768 (1,210)	3,143 (1,822)	1,778 (988)	706 (497)	3 (8)	11,197 (2,719)
Angler hours		2,661 (2,153)	6,022 (2,276)	6,608 (1,322)	6,663 (2,798)	3,855 (1,516)	1,979 (827)	47 (68)	27,835 (4,731)
Angler trips		480 (380)	1,459 (585)	1,705 (415)	1,465 (660)	894 (384)	566 (241)	16 (24)	6,585 (1,140)

Appendix 9-4.—Residence of anglers (percent of anglers interviewed), by Michigan County or U. S. State of residence, Chicagon Lake, Iron County, 1993. Two standard errors are given in parentheses.

Residence	May	Jun	Jul	Aug	Sep	Oct	Nov	Season
Alger	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.80 (1.59)	0 (0)	0.08 (0.16)
Delta	0 (0)	5.19 (2.70)	2.54 (1.67)	2.73 (2.04)	1.14 (1.60)	0 (0)	0 (0)	2.52 (0.88)
Dickinson	12.00 (7.50)	2.96 (2.06)	12.11 (3.46)	11.72 (4.02)	2.27 (2.25)	3.20 (3.15)	0 (0)	7.72 (1.50)
Genesee	0 (0)	0.37 (0.74)	0.56 (0.79)	0 (0)	0 (0)	0 (0)	0 (0)	0.24 (0.27)
Ionia	0 (0)	0 (0)	0 (0)	0.39 (0.78)	0 (0)	0 (0)	0 (0)	0.08 (0.16)
Iron	38.67 (11.25)	18.15 (4.69)	21.97 (4.40)	16.02 (4.58)	17.61 (5.74)	14.40 (6.28)	16.67 (21.52)	19.54 (2.23)
Isabella	0 (0)	0 (0)	0 (0)	0 (0)	1.14 (1.60)	0 (0)	0 (0)	0.16 (0.22)
Jackson	0 (0)	0 (0)	0.28 (0.56)	0 (0)	0 (0)	0 (0)	0 (0)	0.08 (0.16)
Kalamazoo	0 (0)	1.11 (1.28)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.24 (0.27)
Kent	0 (0)	0.74 (1.04)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.16 (0.22)
Livingston	0 (0)	0 (0)	0 (0)	1.17 (1.35)	0 (0)	0 (0)	0 (0)	0.24 (0.27)
Marquette	0 (0)	2.22 (1.79)	0.56 (0.79)	0 (0)	0 (0)	0 (0)	0 (0)	0.63 (0.44)
Menominee	0 (0)	3.70 (2.30)	5.92 (2.50)	3.91 (2.42)	14.77 (5.35)	4.00 (3.51)	16.67 (21.52)	5.83 (1.32)
Monroe	0 (0)	0 (0)	0 (0)	0.78 (1.10)	0 (0)	0 (0)	0 (0)	0.16 (0.22)
Otsego	0 (0)	0 (0)	0 (0)	0.39 (0.78)	0 (0)	0 (0)	0 (0)	0.08 (0.16)
Saginaw	0 (0)	1.48 (1.47)	1.69 (1.37)	0 (0)	0 (0)	0 (0)	0 (0)	0.79 (0.50)
Shiawassee	0 (0)	0 (0)	0.28 (0.56)	0 (0)	0 (0)	0 (0)	0 (0)	0.08 (0.16)

Appendix 9-4.-continued.

Residence	May	Jun	Jul	Aug	Sep	Oct	Nov	Season
Washtenaw	0 (0)	0 (0)	0 (0)	0.78 (1.10)	0 (0)	0 (0)	0 (0)	0.16 (0.22)
Wayne	0 (0)	0 (0)	0 (0)	1.17 (1.35)	0 (0)	0 (0)	0 (0)	0.24 (0.27)
Illinois	17.33 (8.74)	25.19 (5.28)	23.94 (4.53)	11.72 (4.02)	20.45 (6.08)	12.80 (5.98)	0 (0)	19.54 (2.23)
Indiana	0 (0)	0 (0)	0 (0)	0.78 (1.10)	0 (0)	0 (0)	0 (0)	0.16 (0.22)
Wisconsin	32.00 (10.77)	38.89 (5.93)	30.14 (4.87)	47.66 (6.24)	42.61 (7.46)	64.80 (8.54)	66.67 (27.22)	41.13 (2.76)
Kentucky	0 (0)	0 (0)	0 (0)	0.78 (1.10)	0 (0)	0 (0)	0 (0)	0.16 (0.22)
Anglers interviewed	75	270	355	256	176	125	12	1,269

Appendix 9-5.-Type of bait used by anglers (percent of anglers interviewed), Chicagon Lake, Iron County, 1993. Two standard errors are given in parentheses.

Bait used	May	Jun	Jul	Aug	Sep	Oct	Nov	Season
Live	65.28 (11.22)	43.12 (6.04)	42.55 (6.45)	56.56 (6.35)	38.92 (7.55)	74.56 (8.16)	90.00 (18.97)	50.41 (3.00)
Artificial	4.17 (4.71)	15.24 (4.38)	16.17 (4.80)	11.48 (4.08)	26.95 (6.87)	8.77 (5.30)	0 (0)	14.85 (2.13)
Both	30.56 (10.86)	41.64 (6.01)	41.28 (6.42)	31.97 (5.97)	34.13 (7.34)	16.67 (6.98)	10.00 (18.97)	34.74 (2.86)
Anglers interviewed	72	269	235	244	167	114	10	1,111

Appendix 9-6.—Species of fish sought by anglers (percent of anglers interviewed), Chicagon Lake, Iron County, 1993. Two standard errors are given in parentheses.

Species sought	May	Jun	Jul	Aug	Sep	Oct	Nov	Season
Bass & bluegill	0 (0)	1.90 (1.68)	0 (0)	3.46 (2.27)	0 (0)	0 (0)	0 (0)	1.11 (0.59)
Pike & bass	0 (0)	0.76 (1.07)	0.85 (0.98)	0 (0)	0 (0)	0 (0)	0 (0)	0.40 (0.35)
Panfish sp.	0 (0)	0 (0)	0.57 (0.80)	0.77 (1.08)	0 (0)	0 (0)	0 (0)	0.32 (0.32)
Bass	0 (0)	4.56 (2.57)	0.57 (0.80)	0 (0)	0 (0)	0 (0)	0 (0)	1.11 (0.59)
Pike & perch	0 (0)	0 (0)	0.85 (0.98)	0 (0)	1.80 (2.06)	0.78 (1.56)	0 (0)	0.56 (0.42)
Pike & musky	2.60 (3.63)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.16 (0.22)
Walleye, northern pike & yellow perch	0 (0)	0.38 (0.76)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.08 (0.16)
Walleye & yellow perch	75.32 (9.83)	55.13 (6.13)	69.60 (4.90)	72.31 (5.55)	69.46 (7.13)	69.53 (8.14)	83.33 (21.52)	67.59 (2.64)
Trout	0 (0)	2.66 (1.99)	0 (0)	1.15 (1.32)	1.20 (1.68)	0 (0)	0 (0)	0.95 (0.55)
Lake whitefish	2.60 (3.63)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.16 (0.22)
Musky	0 (0)	3.42 (2.24)	6.82 (2.69)	7.31 (3.23)	14.37 (5.43)	20.31 (7.11)	16.67 (21.52)	8.26 (1.55)
Yellow perch	0 (0)	1.14 (1.31)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.24 (0.27)
Walleye	0 (0)	0.76 (1.07)	0 (0)	0.77 (1.08)	0 (0)	0 (0)	0 (0)	0.32 (0.32)
Smallmouth bass	2.60 (3.63)	12.17 (4.03)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2.70 (0.91)
Bluegill	1.30 (2.58)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.08 (0.16)
Lake trout	0 (0)	0.38 (0.76)	1.14 (1.13)	0 (0)	0 (0)	0 (0)	0 (0)	0.40 (0.35)
Anything	15.58 (8.27)	16.73 (4.60)	19.60 (4.23)	14.23 (4.33)	13.17 (5.23)	9.37 (5.15)	0 (0)	15.57 (2.04)
Anglers interviewed	77	263	352	260	167	128	12	1,259

Appendix 9-7.—Number of trips taken per day by anglers (percent of anglers interviewed), Chicagon Lake, Iron County, 1993. Two standard errors are given in parentheses.

Trips/day	May	Jun	Jul	Aug	Sep	Oct	Nov	Season
1	96.05 (4.47)	99.63 (0.73)	94.83 (2.37)	95.74 (2.52)	97.73 (2.25)	96.87 (3.08)	100.00 (0)	96.77 (0.99)
2	3.95 (4.47)	0 (0)	5.17 (2.37)	4.26 (2.52)	2.27 (2.25)	3.12 (3.08)	0 (0)	3.15 (0.98)
3	0 (0)	0.37 (0.73)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.08 (0.16)
Anglers interviewed	76	272	348	258	176	128	12	1,270

Appendix 9-8.—Gender of anglers (percent of anglers interviewed), Chicagon Lake, Iron County, 1993. Two standard errors are given in parentheses.

Gender	May	Jun	Jul	Aug	Sep	Oct	Nov	Season
Male	88.31 (7.32)	89.78 (3.66)	84.51 (3.84)	86.92 (4.18)	86.93 (5.08)	95.31 (3.74)	100.00 (0)	87.91 (1.82)
Female	11.69 (7.32)	10.22 (3.66)	15.49 (3.84)	13.08 (4.18)	13.07 (5.08)	4.69 (3.74)	0 (0)	12.09 (1.82)
Anglers interviewed	77	274	355	260	176	128	12	1,282

Appendix 10-1.–Chicagon Lake, Iron County, 1993-94.

Site	Chicagon Lake
Year	1993-94
County	Iron
Location	T. 42 N., R. 34 W., Sec. 1,2,11-14
Survey period	December 13, 1993 through March 15, 1994
Daily period	See Appendix 10-2
Survey design	Roving-roving
Count method	Roving, occupied ice shanties, open-ice anglers
Interview type	Roving, party, ice-shanty anglers, open-ice anglers, harvest
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	See Appendix 1 of Lockwood et al. (1999)
Clerk	Fisheries Division clerk, 1/3 time
Survey purpose	Characterize general effort and catch aspects of the fishery, and angler residency
Notes	<p>One Fisheries Division supported clerk was used to collect count and interview data from Chicagon, Hagerman, and Stanley lakes (see also Hagerman and Stanley lakes, 1993-94 chapters). While time allocated at each lake was not specified, the clerk spent the most time at Chicagon Lake and consequently collected the most interviews from Chicagon Lake. Each week three randomly-selected weekdays, each weekend, and all holidays were selected for sampling. (Note December 25 and January 1 were not sampled.) One of two shifts was selected for sampling (Appendix 10-2).</p> <p>One count per day was made, and order of count was randomized allowing each of the lakes to be counted first, second, or third. At each lake, the clerk roved the lake counting occupied ice fishing shanties and open ice anglers.</p> <p>Predominantly incomplete-trip party interviews were collected (259 out of 360). All interviews (access and roving) were treated the same with catch rate estimated using the mean-of-ratios catch rate estimator by angling party (catch was not recorded by individual angler).</p>



Appendix 10-2.—Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Chicagon Lake, Iron County, 1993-94.

Month	Shift		Expansion value
	Early	Late	
December	0700 h – 1530 h	1100 h – 1930 h	10
January	0700 h – 1530 h	1100 h – 1930 h	10
February	0600 h – 1500 h	1200 h – 2030 h	11
March	0600 h – 1500 h	1200 h – 2030 h	11

Appendix 10-3.—Total estimated harvest, fishing pressure, and catch per hour, Chicagon Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Species	Catch/hour	Dec	Jan	Feb	Mar	Season
Lake trout	0.0453 (0.0264)	207 (184)	59 (44)	66 (46)	38 (61)	370 (204)
Northern pike	0.0002 (0.0004)	0 (0)	2 (3)	0 (0)	0 (0)	2 (3)
Yellow perch	0.7255 (0.2870)	234 (334)	1,572 (1,139)	1,121 (524)	2,999 (1,589)	5,926 (2,051)
Walleye	0.0437 (0.0169)	186 (94)	99 (63)	53 (33)	19 (21)	357 (120)
Total harvest	0.8148 (0.2970)	627 (393)	1,732 (1,141)	1,240 (526)	3,056 (1,589)	6,655 (2,064)
Anger hours		1,240 (405)	1,822 (500)	2,064 (625)	3,042 (1,283)	8,168 (1,565)
Angler trips		290 (108)	368 (123)	465 (145)	533 (246)	1,656 (329)

Appendix 10-4.—Estimated harvest, fishing pressure, and catch per hour by shanty anglers, Chicagon Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Species	Catch/hour	Dec	Jan	Feb	Mar	Season
Lake trout	0.0543 (0.0403)	190 (180)	29 (27)	52 (44)	0 (0)	271 (187)
Yellow perch	0.6782 (0.3905)	82 (170)	1,409 (1,127)	855 (477)	1,036 (1,196)	3,382 (1,719)
Walleye	0.0535 (0.0264)	159 (89)	76 (60)	32 (25)	0 (0)	267 (110)
Total harvest	0.7860 (0.4074)	431 (262)	1,514 (1,129)	939 (479)	1,036 (1,195)	3,920 (1,733)
Angler hours		878 (345)	1,451 (458)	338 (420)	1,320 (1,147)	4,987 (1,349)
Angler trips		170 (79)	284 (114)	301 (94)	261 (229)	1,016 (284)

Appendix 10-5.—Estimated harvest, fishing pressure, and catch per hour by open ice anglers, Chicagon Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Species	Catch/hour	Dec	Jan	Feb	Mar	Season
Lake trout	0.0311 (0.0263)	17 (37)	30 (35)	14 (14)	38 (61)	99 (80)
Northern pike	0.0006 (0.0010)	0 (0)	2 (3)	0 (0)	0 (0)	2 (3)
Yellow perch	0.7997 (0.4042)	152 (288)	163 (165)	266 (216)	1,963 (1,046)	2,544 (1,118)
Walleye	0.0283 (0.0167)	27 (32)	23 (19)	21 (22)	19 (21)	90 (48)
Total harvest	0.8598 (0.4129)	196 (292)	218 (169)	301 (217)	2,020 (1,047)	2,735 (1,122)
Angler hours		362 (212)	371 (201)	726 (463)	1,722 (575)	3,181 (794)
Angler trips		120 (74)	84 (47)	164 (110)	272 (91)	640 (168)

Appendix 10-6.—Residence of anglers (percent of anglers interviewed) by Michigan County or U. S. State of residence, Chicagon Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Residence	Dec	Jan	Feb	Mar	Season
Baraga	0 (0)	0 (0)	0.39 (0.78)	0 (0)	0.13 (0.25)
Clinton	0 (0)	0 (0)	0 (0)	1.00 (1.40)	0.25 (0.36)
Delta	0 (0)	0 (0)	0 (0)	1.99 (1.97)	0.51 (0.51)
Dickinson	12.07 (8.56)	33.46 (5.89)	17.78 (4.65)	30.35 (6.49)	25.70 (3.12)
Iron	34.48 (12.48)	26.07 (5.48)	40.00 (5.96)	15.42 (5.09)	28.75 (3.23)
Menominee	0 (0)	0 (0)	1.48 (1.47)	0 (0)	0.51 (0.51)
Non-resident	0 (0)	0 (0)	2.59 (1.93)	0 (0)	0.89 (0.67)
Wisconsin	53.45 (13.10)	40.08 (6.11)	38.15 (5.91)	51.24 (7.05)	43.26 (3.53)
Anglers interviewed	58	257	270	201	786

Appendix 10-7.—Bait type or fishing method used by anglers (percent of anglers interviewed), Chicagon Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Bait or method used	Dec	Jan	Feb	Mar	Season
Live	0 (0)	0.80 (1.12)	0 (0)	0.51 (1.01)	0.39 (0.45)
Tip-up	74.14 (11.50)	54.98 (6.28)	34.22 (5.85)	12.63 (4.72)	38.44 (3.51)
Spearing	0 (0)	0 (0)	2.39 (1.93)	0 (0)	0.78 (0.63)
Jigging	0 (0)	0 (0)	0.40 (0.80)	0 (0)	0.13 (0.26)
Jigging + live	17.24 (9.92)	15.94 (4.62)	25.10 (5.35)	35.35 (6.79)	24.16 (3.09)
Jigging + tip-up	6.90 (6.65)	25.50 (5.50)	39.92 (6.04)	51.52 (7.10)	35.71 (3.45)
Jigging + artificial	1.72 (3.42)	0 (0)	0.76 (1.07)	0 (0)	0.39 (0.45)
Anglers interviewed	58	251	263	198	770

Appendix 10-8.—Species of fish sought by anglers (percent of anglers interviewed), Chicagon Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Species sought	Dec	Jan	Feb	Mar	Season
Trout	18.97 (10.30)	3.07 (2.13)	9.26 (3.53)	10.00 (4.05)	8.16 (1.92)
Walleye & perch	74.14 (11.50)	93.49 (3.05)	90.00 (3.65)	90.00 (4.05)	89.99 (2.11)
Trout & walleye	6.90 (6.65)	0 (0)	0 (0)	0 (0)	0.49 (0.49)
Walleye, pike & yellow perch	0 (0)	0 (0)	1.53 (1.52)	0 (0)	0.49 (0.49)
Walleye, yellow perch & trout	0 (0)	0 (0)	0.74 (1.04)	0 (0)	0.25 (0.35)
Northern pike & bass	0 (0)	0 (0)	1.92 (1.70)	0 (0)	0.62 (0.55)
Anglers interviewed	58	261	270	220	809

Appendix 10-9.—Number of trips per day by anglers (percent of anglers interviewed), Chicagon Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Trips/day	Dec	Jan	Feb	Mar	Season
1	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)
Anglers interviewed	58	259	275	218	810

Appendix 10-10.—Gender of anglers (percent of anglers interviewed), Chicagon Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Gender	Dec	Jan	Feb	Mar	Season
Male	94.83 (5.82)	93.49 (3.05)	95.64 (2.46)	87.73 (4.42)	92.75 (1.82)
Female	5.17 (5.82)	6.51 (3.05)	4.36 (2.46)	12.27 (4.42)	7.25 (1.82)
Anglers interviewed	58	261	275	220	814

Appendix 11-1.–Chicagon Lake, Iron County, 1994.

Site	Chicagon Lake
Year	1994
County	Iron
Location	T. 42 N., R. 34 W., Sec. 1,2,11-14
Survey period	May 15 through October 31
Daily period	See Appendix 11-2
Survey design	Roving-roving
Count method	Roving, fishing boats
Interview type	Roving, party, boating anglers, harvest
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	See Appendix 1 of Lockwood et al. (1999)
Clerk	Fisheries Division clerk, 1/3 time
Survey purpose	Characterize general effort and catch aspects of the fishery, and angler residency
Notes	<p>Boats were counted from a vantage point. One Fisheries Division creel clerk collected both count and interview data from Chicagon and Stanley lakes, and only count data from Hagerman Lake (see also Stanley and Hagerman lakes, 1994 chapter). Similar amounts of time were allocated for Chicagon and Stanley lakes with only count time allocated to Hagerman Lake. Three randomly-selected weekdays and each weekend day plus any holidays were selected for sampling. Sampling shifts are given in Appendix 11-2.</p> <p>One count per day was made at each lake. Counting order was randomized with each lake sampled first, second, or third. Only boats were counted at Chicagon Lake.</p> <p>Interviewing was done at the access site and mostly incomplete-trip interviews collected (457 out of 802 party interviews).</p>

Appendix 11-2.—Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Chicagon Lake, Iron County, 1994.

Month	Shift		Expansion value
	Early	Late	
May	0600 h – 1500 h	1300 h – 2200 h	16
June	0600 h – 1500 h	1300 h – 2200 h	18
July	0600 h – 1500 h	1300 h – 2200 h	18
August	0600 h – 1500 h	1300 h – 2200 h	17
September	0600 h – 1500 h	1300 h – 2200 h	16
October	0600 h – 1500 h	1300 h – 2200 h	14

Appendix 11-3.—Estimated harvest, fishing pressure, and catch per hour by boat anglers, Chicagon Lake, Iron County, 1994. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Oct	Season
Rainbow trout	0.0001 (0.0002)	0 (0)	3 (7)	0 (0)	0 (0)	0 (0)	0 (0)	3 (7)
Lake trout	0.0005 (0.0007)	0 (0)	17 (24)	0 (0)	0 (0)	0 (0)	0 (0)	17 (24)
Northern pike	0.0064 (0.0073)	0 (0)	0 (0)	59 (81)	126 (247)	37 (45)	11 (23)	233 (264)
Musky	0.0004 (0.0007)	0 (0)	0 (0)	10 (21)	0 (0)	0 (0)	5 (11)	15 (24)
Yellow perch	0.3649 (0.1093)	191 (404)	2,611 (1,633)	3,555 (1,571)	4,488 (2,275)	1,973 (1,339)	444 (413)	13,262 (3,527)
Walleye	0.0402 (0.0141)	138 (96)	123 (90)	209 (162)	598 (373)	221 (155)	172 (122)	1,461 (471)
Smallmouth bass	0.0028 (0.0022)	0 (0)	42 (52)	33 (50)	14 (25)	12 (19)	0 (0)	101 (79)
Largemouth bass	0.0004 (0.0006)	0 (0)	13 (21)	0 (0)	0 (0)	0 (0)	0 (0)	13 (21)
Bluegill	0.0056 (0.0077)	0 (0)	36 (57)	0 (0)	37 (57)	130 (266)	0 (0)	203 (278)
Rock bass	0.0133 (0.0095)	0 (0)	287 (290)	21 (33)	95 (150)	80 (86)	0 (0)	483 (339)
Sunfish	0.0027 (0.0026)	0 (0)	0 (0)	51 (80)	40 (48)	8 (17)	0 (0)	99 (95)
Crappie	0.0007 (0.0015)	0 (0)	0 (0)	0 (0)	27 (55)	0 (0)	0 (0)	27 (55)
Total harvest	0.4380 (0.1159)	329 (415)	3,132 (1,663)	3,938 (1,584)	5,425 (2,325)	2,461 (1,377)	632 (431)	15,917 (3,597)
Angler hours		3,143 (1,138)	8,257 (2,217)	8,658 (2,477)	8,608 (2,811)	5,536 (1,954)	2,139 (970)	36,341 (5,000)
Angler trips		819 (319)	2,102 (576)	2,013 (609)	2,255 (761)	1,284 (484)	507 (229)	8,980 (1,292)



Appendix 11-4.—Residence of anglers (percent of anglers interviewed) by Michigan County or U. S. State, Chicagon Lake, Iron County, 1994. Two standard errors are given in parentheses.

Residence	May	Jun	Jul	Aug	Sep	Oct	Season
Allegan	0 (0)	0 (0)	0 (0)	0 (0)	0.82 (1.16)	0 (0)	0.12 (0.17)
Baraga	0 (0)	0 (0)	2.56 (1.79)	0 (0)	0 (0)	0 (0)	0.48 (0.34)
Barry	0 (0)	0 (0)	0 (0)	0 (0)	0.41 (0.82)	0 (0)	0.06 (0.12)
Calhoun	0 (0)	0 (0)	0 (0)	0 (0)	0.82 (1.16)	0 (0)	0.12 (0.17)
Chippewa	0 (0)	0.27 (0.54)	0 (0)	0 (0)	0 (0)	0 (0)	0.06 (0.12)
Delta	0 (0)	2.17 (1.52)	2.24 (1.68)	2.72 (1.70)	0 (0)	0 (0)	1.51 (0.60)
Dickinson	19.66 (5.96)	13.04 (3.51)	15.06 (4.05)	8.42 (2.90)	6.58 (3.18)	6.99 (3.74)	11.48 (1.57)
Genesee	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1.08 (1.51)	0.12 (0.17)
Gogebic	0 (0)	0 (0)	0 (0)	0 (0)	0.82 (1.16)	0 (0)	0.12 (0.17)
Huron	0 (0)	0 (0)	0.96 (1.10)	0 (0)	0 (0)	0 (0)	0.18 (0.21)
Ingham	0 (0)	0 (0)	1.92 (1.56)	0.54 (0.77)	0 (0)	0 (0)	0.48 (0.34)
Iron	23.60 (6.36)	13.04 (3.51)	14.74 (4.01)	21.74 (4.30)	15.23 (4.61)	17.20 (5.53)	17.22 (1.86)
Isabella	0 (0)	0 (0)	0 (0)	0 (0)	0.82 (1.16)	0 (0)	0.12 (0.17)
Jackson	0 (0)	0 (0)	0.32 (0.64)	0 (0)	0 (0)	1.08 (1.51)	0.18 (0.21)
Kalamazoo	0 (0)	0.54 (0.77)	0 (0)	0 (0)	0.82 (1.16)	0 (0)	0.24 (0.24)
Livingston	2.25 (2.22)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.24 (0.24)

Appendix 11-4.-continued.

Residence	May	Jun	Jul	Aug	Sep	Oct	Season
Marquette	0 (0)	1.36 (1.21)	2.56 (1.79)	1.09 (1.08)	0.82 (1.16)	0 (0)	1.15 (0.52)
Macosta	0 (0)	0 (0)	0.64 (0.90)	0 (0)	0 (0)	0 (0)	0.12 (0.17)
Menominee	5.62 (3.45)	6.25 (2.52)	8.33 (3.13)	8.42 (2.90)	3.70 (2.42)	2.15 (2.13)	6.22 (1.19)
Muskegon	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1.08 (1.51)	0.12 (0.17)
Oakland	0 (0)	0.54 (0.77)	0 (0)	0 (0)	0.82 (1.16)	0 (0)	0.24 (0.24)
Osceola	0.56 (1.12)	0.54 (0.77)	0 (0)	0 (0)	0 (0)	0 (0)	0.18 (0.21)
Saginaw	0 (0)	0 (0)	0.32 (0.64)	0 (0)	0 (0)	0 (0)	0.06 (0.12)
Tuscola	0.56 (1.12)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.06 (0.12)
Wayne	0 (0)	0 (0)	0 (0)	0.27 (0.54)	0 (0)	0 (0)	0.06 (0.12)
Non-resident	11.80 (4.84)	21.74 (4.30)	13.14 (3.83)	16.85 (3.90)	25.51 (5.59)	24.73 (6.33)	18.85 (1.92)
Wisconsin	35.96 (7.19)	40.49 (5.12)	37.18 (5.47)	39.95 (5.11)	42.80 (6.35)	45.70 (7.31)	40.18 (2.41)
Anglers interviewed	178	368	312	368	243	186	1,655

Appendix 11-5.—Fishing method used by anglers (percent of anglers interviewed), Chicagon Lake, Iron County, 1994. Two standard errors are given in parentheses.

Method used	May	Jun	Jul	Aug	Sep	Oct	Season
Casting	42.47 (8.18)	36.73 (6.16)	24.35 (4.89)	19.18 (4.12)	18.52 (4.98)	27.78 (6.68)	26.36 (2.29)
Still fishing	18.49 (6.43)	29.80 (5.84)	62.66 (5.51)	74.25 (4.58)	69.14 (5.93)	56.67 (7.39)	56.09 (2.57)
Trolling	6.16 (3.98)	12.65 (4.25)	0.97 (1.12)	3.29 (1.87)	3.70 (2.42)	7.78 (3.99)	5.25 (1.16)
Fly fishing	0.68 (1.37)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.07 (0.13)
Drifting	0 (0)	0 (0)	0 (0)	0.82 (0.95)	1.65 (1.63)	2.22 (2.20)	0.74 (0.44)
Jigging	32.19 (7.73)	20.82 (5.19)	12.01 (3.71)	2.47 (1.62)	7.00 (3.27)	5.56 (3.41)	11.50 (1.65)
Anglers interviewed	146	245	308	365	243	180	1,487

Appendix 11-6.—Species of fish sought by anglers (percent of anglers interviewed), Chicagon Lake, Iron County, 1994. Two standard errors are given in parentheses.

Species sought	May	Jun	Jul	Aug	Sep	Oct	Season
Bass & bluegill	0 (0)	3.06 (1.81)	0 (0)	0 (0)	0 (0)	0 (0)	0.69 (0.41)
Northern pike & bass	4.12 (2.86)	2.78 (1.73)	0 (0)	0.28 (0.56)	0.90 (1.27)	0 (0)	1.31 (0.57)
Panfish	0 (0)	9.17 (3.04)	16.14 (4.36)	0 (0)	0.90 (1.27)	0 (0)	5.07 (1.10)
Bass	0 (0)	6.11 (2.52)	1.05 (1.21)	0.56 (0.80)	0 (0)	0 (0)	1.69 (0.64)
Northern pike & yellow perch	0 (0)	0 (0)	0.70 (0.99)	0 (0)	0 (0)	0 (0)	0.13 (0.18)
Northern pike & musky	2.58 (2.28)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.31 (0.28)
Walleye, northern pike, & yellow perch	1.03 (1.45)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.13 (0.18)
Walleye & yellow perch	81.96 (5.52)	54.44 (5.25)	57.19 (5.86)	65.25 (5.06)	76.02 (5.74)	72.28 (6.60)	65.71 (2.37)
Trout	2.06 (2.04)	8.33 (2.91)	0 (0)	0.85 (0.97)	0.90 (1.27)	0 (0)	2.44 (0.77)
Musky	4.12 (2.86)	7.78 (2.82)	7.72 (3.16)	11.30 (3.37)	11.76 (4.33)	23.37 (6.24)	10.45 (1.53)
Yellow perch	0 (0)	0 (0)	0.70 (0.99)	0 (0)	0 (0)	0 (0)	0.13 (0.18)
Anything	4.12 (2.86)	8.33 (2.91)	16.49 (4.40)	21.75 (4.39)	9.50 (3.95)	4.35 (3.01)	11.95 (1.62)
Anglers interviewed	194	360	285	354	221	184	1,598

Appendix 11-7.—Number of trips per day by anglers (percent of anglers interviewed), Chicagon Lake, Iron County, 1994. Two standard errors are given in parentheses.

Trips/day	May	Jun	Jul	Aug	Sep	Oct	Season
1	99.48 (1.03)	97.30 (1.69)	100.00 (0)	99.73 (0.54)	100.00 (0)	100.00 (0)	99.28 (0.41)
2	0.52 (1.03)	2.70 (1.69)	0 (0)	0.27 (0.54)	0 (0)	0 (0)	0.72 (0.41)
Anglers interviewed	194	370	312	368	243	186	1,673

Appendix 11-8.—Gender of anglers (percent of anglers interviewed), Chicagon Lake, Iron County, 1994. Two standard errors are given in parentheses.

Gender	May	Jun	Jul	Aug	Sep	Oct	Season
Male	90.72 (4.17)	89.19 (3.23)	86.86 (3.83)	78.26 (4.30)	83.13 (4.80)	95.70 (2.98)	86.37 (1.68)
Female	9.28 (4.17)	10.81 (3.23)	13.14 (3.83)	21.74 (4.30)	16.87 (4.80)	4.30 (2.98)	13.63 (1.68)
Anglers interviewed	194	370	312	368	243	186	1,673

Appendix 12-1.–Deep Lake, Lenawee County, 1998.

Site	Deep Lake
Year	1998
County	Lenawee
Location	T. 5 S., R. 2 E., Sec. 18
Survey period	June 19 to August 8 (16 Friday and Saturday nights)
Daily period	2000 h to 0100 h
Survey design	Proportional-voluntary
Count method	Instantaneous, trailer
Interview type	Voluntary, party, boating anglers, harvest, catch and release
Effort estimation	Proportional, Equations (1)-(7)
Catch estimation	Multiple-day period (Lockwood et al. 1999)
Clerk	Fisheries Division clerk, 1/8 time
Survey purpose	Evaluate rainbow trout plants
Notes	<p>One clerk traveled to access sites at each of eight lakes (see also Allen, Bird, Cary, Farwell, Gilead, Lavine, and Swains lakes, 1988 chapters) on Friday and Saturday nights and recorded the number of trailers, or vehicles that appeared to have transported boats, and the hour at which the count was made.</p> <p>Catch rate was estimated from postpaid interview cards placed on the windshields of vehicles in the public launch sites located at each lake. Voluntary access interviews were collected, by angling party, to estimate catch rate. A zip-lock bag containing a self-addressed post card, explanation of the survey, and a lead pencil, was placed under each vehicle's windshield wiper. Anglers recorded number of anglers in their party, number of fish harvested, number of fish caught-and-released, start time, and finish time.</p>

Appendix 12-2.-Estimated harvest, harvest rate, catch and release, catch and release rate, and angling effort, Deep Lake, Lenawee County, 1998. All estimates are given with 2 standard errors in parentheses.

	Catch/hour	Estimate
Rainbow trout - harvest	0.0795 (0.1160)	30 (41)
Rainbow trout - release	0.0927 (0.1965)	35 (71)
Angler hours		374 (185)
Angler trips		107 (58)

Appendix 13-1.–Duck Lake, Gogebic County, 1993.

Site	Duck Lake
Year	1993
County	Gogebic
Location	T. 44 N., R. 39 W., Sec. 8,17-20,29
Survey period	May 15 through September 6
Daily period	See Appendix 13-2
Survey design	Roving-access
Count method	Instantaneous, fishing boats, shore anglers
Interview type	Access, party, boating anglers, shore anglers, harvest
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	See Appendix 1 of Lockwood et al. (1999)
Clerk	Fisheries Division clerk, ½ time
Survey purpose	Characterize general effort and catch aspects of the fishery
Notes	<p>Both shore and boat angling fisheries were sampled. One Fisheries Division supported clerk collected count and interview data from Duck and Tamarack lakes (see also Tamarack Lake, 1993 chapter). Both lakes were sampled each scheduled workday. Three randomly-selected weekdays and each weekend day plus any holidays were selected for sampling. One of two shifts was randomly selected each workday (Appendix 13-2).</p> <p>Order of count was randomized allowing each lake to be counted either first or second. Fishing boats and shore anglers were counted once per scheduled day. Time of count was adjusted within shifts to sample sunrise to sunset fishery.</p> <p>Interviewing was done at the public access site.</p>



Appendix 13-2.—Shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Duck Lake, Gogebic County, 1993.

Month	Shift		Expansion value
	Early	Late	
May	0600 h – 1500 h	1300 h – 2200 h	16
June	0600 h – 1500 h	1300 h – 2200 h	18
July	0600 h – 1500 h	1300 h – 2200 h	18
August	0600 h – 1500 h	1300 h – 2200 h	17
September	0600 h – 1500 h	1300 h – 2200 h	16

Appendix 13-3.—Estimated total harvest, fishing pressure, and catch per hour, Duck Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Season
Northern pike	0.0059 (0.0057)	8 (18)	33 (40)	3 (8)	6 (13)	0 (0)	50 (46)
Yellow perch	0.0288 (0.0219)	0 (0)	153 (136)	70 (97)	20 (30)	0 (0)	243 (170)
Walleye	0.0127 (0.0167)	17 (31)	90 (133)	0 (0)	0 (0)	0 (0)	107 (137)
Smallmouth bass	0.0056 (0.0056)	0 (0)	14 (22)	27 (37)	6 (13)	0 (0)	47 (45)
Bluegill	0.3057 (0.2135)	404 (603)	1,775 (1,409)	391 (562)	6 (13)	0 (0)	2,576 (1,632)
Rock bass	0.0345 (0.0330)	20 (50)	265 (260)	6 (17)	0 (0)	0 (0)	291 (265)
Sunfish	0.1281 (0.1696)	653 (1347)	298 (280)	28 (48)	100 (212)	0 (0)	1,079 (1,393)
Crappie	0.2819 (0.2046)	283 (377)	1,559 (1,125)	78 (140)	455 (1,028)	0 (0)	2,375 (1,576)
Total harvest	0.8032 (0.3966)	1,385 (1,524)	4,187 (1,853)	603 (590)	593 (1,050)	0 (0)	6,768 (2,685)
Angler hours		1,259 (1,178)	4,878 (1,714)	1,002 (986)	1,071 (802)	216 (435)	8,426 (2,476)
Angler trips		275 (250)	998 (359)	277 (275)	258 (184)	65 (131)	1,873 (564)

Appendix 13-4.—Estimated harvest, fishing pressure, and catch per hour by boat anglers, Duck Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Season
Northern pike	0.0060 (0.0058)	8 (18)	33 (40)	3 (8)	6 (13)	0 (0)	50 (46)
Yellow perch	0.0291 (0.0221)	0 (0)	153 (136)	70 (97)	20 (30)	0 (0)	243 (170)
Walleye	0.0128 (0.0168)	17 (31)	90 (133)	0 (0)	0 (0)	0 (0)	107 (137)
Smallmouth bass	0.0056 (0.0056)	0 (0)	14 (22)	27 (37)	6 (13)	0 (0)	47 (45)
Bluegill	0.3085 (0.2157)	404 (603)	1,775 (1,409)	391 (562)	6 (13)	0 (0)	2,576 (1,632)
Rock bass	0.0348 (0.0334)	20 (50)	265 (260)	6 (17)	0 (0)	0 (0)	291 (265)
Sunfish	0.1292 (0.1711)	653 (1347)	298 (280)	28 (48)	100 (212)	0 (0)	1,079 (1,393)
Crappie	0.2844 (0.2066)	283 (377)	1,559 (1,125)	78 (140)	455 (1,028)	0 (0)	2,375 (1,576)
Total harvest	0.8104 (0.4012)	1,385 (1,524)	4,187 (1,853)	603 (590)	593 (1,050)	0 (0)	6,768 (2,685)
Angler hours		1,184 (1,169)	4,878 (1,714)	1,002 (986)	1,071 (802)	216 (435)	8,351 (2,472)
Angler trips		260 (248)	998 (359)	277 (275)	258 (184)	65 (131)	1,858 (563)

Appendix 13-5.—Estimated fishing pressure by shore anglers, Duck Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Effort	May	Jun	Jul	Aug	Sep	Season
Angler hours	75 (149)	0 (0)	0 (0)	0 (0)	0 (0)	75 (149)
Angler trips	15 (30)	0 (0)	0 (0)	0 (0)	0 (0)	15 (30)

Appendix 13-6.—Type of bait used by anglers (percent of anglers interviewed), Duck Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Bait used	May	Jun	Jul	Aug	Sep	Season
Live	56.86 (13.87)	70.16 (8.22)	60.00 (13.86)	43.75 (24.80)	100.00 (0)	64.08 (6.13)
Artificial	13.73 (9.64)	11.29 (5.68)	14.00 (9.81)	25.00 (21.65)	0 (0)	13.06 (4.31)
Both	29.41 (12.76)	18.55 (6.98)	26.00 (12.41)	31.25 (23.18)	0 (0)	22.86 (5.36)
Anglers interviewed	51	124	50	16	4	245

Appendix 13-7.—Species of fish sought by anglers (percent of anglers interviewed), Duck Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Species sought	May	Jun	Jul	Aug	Sep	Season
Bass & bluegill	8.93 (7.62)	2.31 (2.63)	4.00 (5.54)	0 (0)	0 (0)	3.91 (2.42)
Northern pike & bass	0 (0)	0.77 (1.53)	4.00 (5.54)	12.50 (16.54)	0 (0)	1.95 (1.73)
Panfish	21.43 (10.97)	32.31 (8.20)	36.00 (13.58)	18.75 (19.52)	0 (0)	29.30 (5.69)
Bass	0 (0)	0 (0)	2.00 (3.96)	0 (0)	0 (0)	0.39 (0.78)
Northern pike	0 (0)	3.85 (3.37)	0 (0)	0 (0)	0 (0)	1.95 (1.73)
Walleye	25.00 (11.57)	13.85 (6.06)	0 (0)	18.75 (19.52)	0 (0)	13.67 (4.29)
Smallmouth bass	16.07 (9.82)	3.08 (3.03)	12.00 (9.19)	0 (0)	0 (0)	7.42 (3.28)
Bluegill	3.57 (4.96)	10.00 (5.26)	8.00 (7.67)	0 (0)	0 (0)	7.42 (3.28)
Crappie	0 (0)	3.08 (3.03)	6.00 (6.72)	0 (0)	100.00 (0)	4.30 (2.53)
Anything	25.00 (11.57)	30.77 (8.10)	28.00 (12.70)	50.00 (25.00)	0 (0)	29.69 (5.71)
Anglers interviewed	56	130	50	16	4	256

Appendix 13-8.—Number of trips per day by anglers (percent of anglers interviewed), Duck Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Trips/day	May	Jun	Jul	Aug	Sep	Season
1	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)
Anglers interviewed	56	131	50	16	4	257

Appendix 13-9.—Gender of anglers (percent of anglers interviewed), Duck Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Gender	May	Jun	Jul	Aug	Sep	Season
Male	71.43 (12.07)	76.34 (7.43)	74.00 (12.41)	100.00 (0)	50.00 (50.00)	75.88 (5.34)
Female	28.57 (12.07)	23.66 (7.43)	26.00 (12.41)	0 (0)	50.00 (50.00)	24.12 (5.34)
Anglers interviewed	56	131	50	16	4	257

Appendix 14-1.–Duck Lake, Gogebic County, 1994.

Site	Duck Lake
Year	1994
County	Gogebic
Location	T. 44 N., R. 39 W., Sec. 8,17-20,29
Survey period	May 15 through September 6
Daily period	See Appendix 14-2
Survey design	Roving-access
Count method	Instantaneous, fishing boats
Interview type	Access, party, boating anglers, harvest
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	See Appendix 1 of Lockwood et al. (1999)
Clerk	Fisheries Division clerk, ½ time
Survey purpose	Characterize general effort and catch aspects of the fishery, and angler residency
Notes	<p>Only the boat angling fisheries were sampled. One Fisheries Division supported clerk collected count and interview data from Duck and Pomeroy lakes (see also Pomeroy Lake, 1994 chapter). Only one lake was sampled per scheduled workday, and the clerk remained at the selected lake for the entire shift. Both weekend days, all holidays and three randomly-selected weekdays were sampled each week. One of two shifts was randomly selected each workday (Appendix 14-2).</p> <p>Since the clerk remained at the lake the entire shift, hourly counts were made throughout the shift.</p> <p>Interviewing was done at the public access site.</p>

Appendix 14-2.—Shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Duck Lake, Gogebic County, 1994.

Month	Early		Late		Expansion value
	Shift	Count hours	Shift	Count hours	
May	0600 h – 1500 h	0700 h – 1300 h	1300 h – 2200 h	1400 h – 2100 h	16
June	0600 h – 1500 h	0700 h – 1300 h	1300 h – 2200 h	1400 h – 2100 h	18
July	0600 h – 1500 h	0700 h – 1300 h	1300 h – 2200 h	1400 h – 2100 h	18
August	0600 h – 1500 h	0700 h – 1300 h	1300 h – 2200 h	1400 h – 2100 h	17
September	0600 h – 1500 h	0700 h – 1300 h	1300 h – 2200 h	1400 h – 2100 h	16

Appendix 14-3.—Estimated harvest, fishing pressure, and catch per hour by boat anglers, Duck Lake, Gogebic County, 1994. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Season
Northern pike	0.0057 (0.0066)	39 (62)	7 (10)	0 (0)	0 (0)	22 (47)	68 (78)
Yellow perch	0.0381 (0.0242)	165 (191)	208 (174)	0 (0)	49 (99)	33 (69)	455 (285)
Walleye	0.0137 (0.0167)	24 (40)	108 (190)	17 (35)	14 (29)	0 (0)	163 (199)
Smallmouth bass	0.0121 (0.0081)	52 (55)	53 (49)	11 (22)	28 (58)	0 (0)	144 (96)
Largemouth bass	0.0091 (0.0113)	18 (20)	28 (41)	62 (126)	0 (0)	0 (0)	108 (134)
Bluegill	0.1291 (0.0758)	251 (284)	1,126 (801)	0 (0)	122 (248)	42 (86)	1,541 (889)
Rock Bass	0.0207 (0.0178)	51 (73)	196 (198)	0 (0)	0 (0)	0 (0)	247 (211)
Sunfish	0.0561 (0.0456)	154 (259)	417 (429)	0 (0)	98 (198)	0 (0)	669 (539)
Crappie	0.2444 (0.1331)	1,391 (1,180)	1,525 (1,016)	0 (0)	0 (0)	0 (0)	2,916 (1,557)
Total harvest	0.5289 (0.1709)	2,145 (1,260)	3,668 (1,402)	90 (132)	311 (338)	97 (120)	6,311 (1,923)
Angler hours		2,088 (510)	4,326 (764)	2,960 (625)	1,758 (520)	800 (364)	11,932 (1,280)
Angler trips		578 (166)	1,009 (198)	747 (180)	527 (179)	215 (102)	3,076 (376)



Appendix 14-4.—Residence of anglers (percent of anglers interviewed), by Michigan County or U. S. State, Duck Lake, Gogebic County, 1994. Two standard errors are given in parentheses.

Residence	May	Jun	Jul	Aug	Sep	Season
Berrien	2.78 (3.87)	0 (0)	3.64 (5.05)	0 (0)	0 (0)	1.43 (1.42)
Cheboygan	0 (0)	0 (0)	0 (0)	7.69 (10.45)	0 (0)	0.72 (1.01)
Gogebic	12.50 (7.80)	13.64 (6.54)	1.82 (3.60)	15.38 (14.15)	0 (0)	10.39 (3.65)
Ingham	0 (0)	0 (0)	1.82 (3.60)	0 (0)	0 (0)	0.36 (0.72)
Marquette	2.78 (3.87)	0 (0)	0 (0)	0 (0)	0 (0)	0.72 (1.01)
Menominee	8.33 (6.51)	0 (0)	0 (0)	0 (0)	0 (0)	2.15 (1.74)
Ontonagon	0 (0)	0 (0)	3.64 (5.05)	0 (0)	0 (0)	0.72 (1.01)
Non-resident	1.39 (2.76)	2.73 (3.11)	0 (0)	0 (0)	0 (0)	1.43 (1.42)
Wisconsin	62.50 (11.41)	69.09 (8.81)	50.91 (13.48)	42.31 (19.38)	62.50 (24.21)	60.93 (5.84)
Illinois	9.72 (6.98)	12.73 (6.36)	34.55 (12.82)	26.92 (17.40)	6.25 (12.10)	17.20 (4.52)
Indiana	0 (0)	1.82 (2.55)	3.64 (5.05)	7.69 (10.45)	31.25 (23.18)	3.94 (2.33)
Anglers interviewed	72	110	55	26	16	279

Appendix 14-5.—Type of bait used by anglers (percent of anglers interviewed), Duck Lake, Gogebic County, 1994. Two standard errors are given in parentheses.

Bait used	May	Jun	Jul	Aug	Sep	Season
Live	64.81 (13.00)	70.19 (8.97)	56.25 (14.32)	52.17 (20.83)	68.75 (23.18)	64.49 (6.11)
Artificial	7.41 (7.13)	10.58 (6.03)	12.50 (9.55)	13.04 (14.04)	0 (0)	9.80 (3.80)
Both	27.78 (12.19)	19.23 (7.73)	31.25 (13.38)	34.78 (19.86)	31.25 (23.18)	25.71 (5.58)
Anglers interviewed	54	104	48	23	16	245

Appendix 14-6.—Species of fish sought by anglers (percent of anglers interviewed), Duck Lake, Gogebic County, 1994. Two standard errors are given in parentheses.

Species sought	May	Jun	Jul	Aug	Sep	Season
Bass & bluegill	4.62 (5.20)	14.74 (7.27)	22.22 (13.86)	11.54 (12.53)	12.50 (16.54)	12.61 (4.30)
N. Pike & bass	0 (0)	3.16 (3.59)	5.56 (7.64)	0 (0)	0 (0)	2.10 (1.86)
Panfish	0 (0)	11.58 (6.57)	16.67 (12.42)	23.08 (16.53)	0 (0)	9.66 (3.83)
Bass	3.08 (4.28)	4.21 (4.12)	11.11 (10.48)	0 (0)	0 (0)	4.20 (2.60)
Northern pike & yellow perch	0 (0)	3.16 (3.59)	0 (0)	0 (0)	0 (0)	1.26 (1.45)
Walleye & yellow perch	23.08 (10.45)	15.79 (7.48)	8.33 (9.21)	19.23 (15.46)	18.75 (19.52)	17.23 (4.90)
Smallmouth bass	0 (0)	0 (0)	5.56 (7.64)	0 (0)	0 (0)	0.84 (1.18)
Crappie	9.23 (7.18)	0 (0)	0 (0)	0 (0)	0 (0)	2.52 (2.03)
Anything	60.00 (12.15)	47.37 (10.25)	30.56 (15.35)	46.15 (19.55)	68.75 (23.18)	49.58 (6.48)
Anglers interviewed	65	95	36	26	16	238

Appendix 14-7.—Number of trips per day by anglers (percent of anglers interviewed), Duck Lake, Gogebic County, 1994. Two standard errors are given in parentheses.

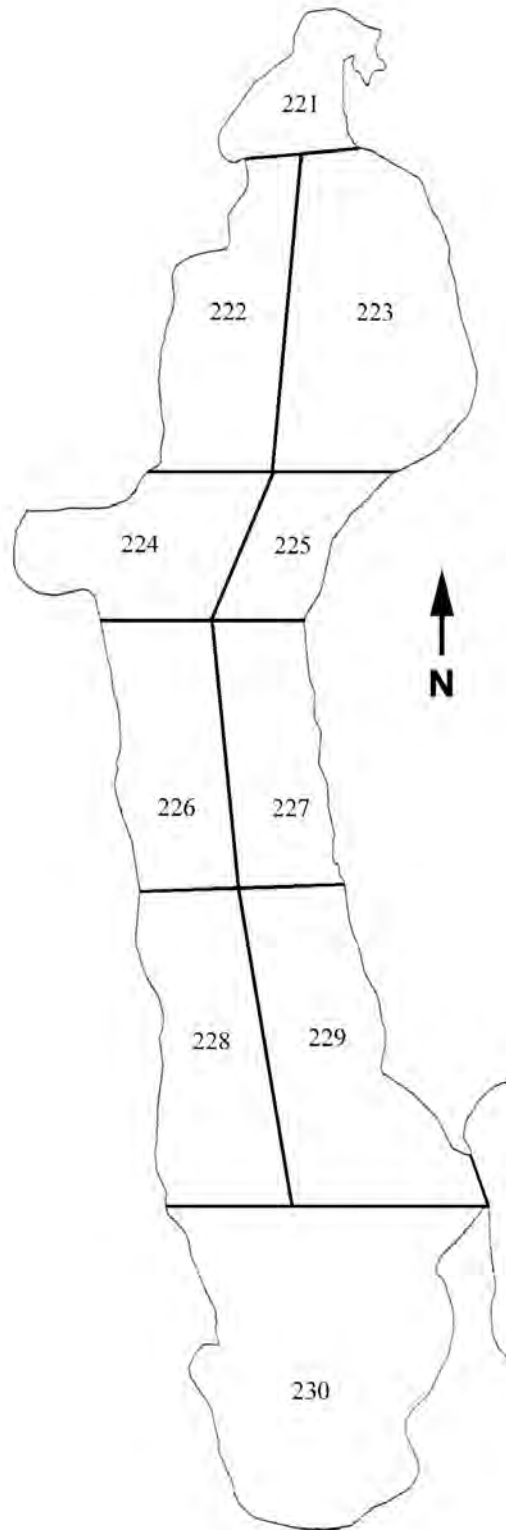
Trips/day	May	Jun	Jul	Aug	Sep	Season
1	100.00 (0)	100.00 (0)	90.00 (8.49)	100.00 (0)	100.00 (0)	98.15 (1.63)
2	0 (0)	0 (0)	10.00 (8.49)	0 (0)	0 (0)	1.85 (1.63)
Anglers interviewed	68	111	50	26	16	271

Appendix 14-8.—Gender of anglers (percent of anglers interviewed), Duck Lake, Gogebic County, 1994. Two standard errors are given in parentheses.

Gender	May	Jun	Jul	Aug	Sep	Season
Male	81.94 ( 9.07)	86.73 ( 6.38)	78.18 (11.14)	80.77 (15.46)	81.25 (19.52)	82.98 ( 4.48)
Female	18.06 ( 9.07)	13.27 ( 6.38)	21.82 (11.14)	19.23 (15.46)	18.75 (19.52)	17.02 ( 4.48)
Anglers interviewed	72	113	55	26	16	282

Appendix 15-1.–Elk Lake, Grand Traverse, Antrim and Kalkaska Counties, 1996.

Site	Elk Lake
Year	1996
County	Grand Traverse, Antrim and Kalkaska
Location	T 28, 29 N., R 8, 9 W., Sec. Many
Survey period	August 1-31
Daily period	See Appendix 15-2
Survey design	Roving-voluntary
Count method	Instantaneous, fishing boats
Interview type	Voluntary, party, boating anglers, harvest
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	Multiple-day period (Lockwood et al. 1999)
Clerk	Volunteers, Elk Lake Association
Survey purpose	Characterize general effort and catch aspects of the fishery
Notes	<p>This was a cooperative survey between Fisheries Division and the Elk Lake Association. Elk Lake was divided into 10 grids (Appendix figure 15-1). Estimated effort was calculated by grid and summed to provide a total lake estimate. Interviews were not grid specific. Each week of the survey, three randomly-selected weekdays and each weekend day were chosen for counting and interviewing. Additional voluntary interview forms were supplied to anglers during the month long period. Thus, catch rates included angler interview information on days not randomly selected for counting.</p> <p>Elk Lake Association members made one boat count per sample day in each of the grids. Only suspected fishing boats were counted. All grids were counted at the same time to avoid double counting of boats.</p> <p>Association members collected boat-angling party interviews at public launch facilities. In addition, interview forms were made available to Association members and the general lake population, and these data are included in this survey.</p>



Appendix figure 15-1.-Counting grids (221-230) used to estimate angling effort, Elk Lake, Grand Traverse, Antrim and Kalkaska Counties, 1996.

Appendix 15-2.—Estimated harvest, catch per hour, and angling effort by boat anglers, Elk Lake, Grand Traverse, Antrim and Kalkaska Counties, August 1996. Two standard errors are given in parentheses.

Species	Catch/hour	Harvest
Steelhead	0.0051 (0.0071)	58 (80)
Lake trout	0.0097 (0.0077)	110 (85)
Smallmouth bass	0.1054 (0.0415)	1,200 (428)
Rock bass	0.1583 (0.0753)	1,802 (803)
Yellow perch	0.2459 (0.1196)	2,799 (1,278)
Cisco	0.0021 (0.0031)	24 (35)
Salmon <sup>1</sup>	0.0020 (0.0029)	22 (32)
Total harvest	0.5285 (0.1642)	6,016 (1,574)
Angler hours		11,384 (1,908)
Angler trips		3,860 (737)

<sup>1</sup> This term may include steelhead and lake trout.

Appendix 15-3.—Species of fish sought by anglers (percent of anglers interviewed), Elk Lake, Grand Traverse, Antrim and Kalkaska Counties, 1996. Two standard errors are given in parentheses.

Species sought	Aug
Trout	22.80 (4.69)
Bass	36.88 (4.69)
Bass & yellow perch	36.88 (4.69)
Panfish <sup>1</sup>	3.44 (2.04)
Anglers interviewed	320

<sup>1</sup> This term may include such species as yellow perch, bluegill, rock bass, and pumpkinseed sunfish.

Appendix 16-1.-Farewell Lake, Jackson County, 1998.

Site	Farewell Lake
Year	1998
County	Jackson
Location	T. 4 S., R. 2 W., Sec. 25, 36
Survey period	June 19 to August 8 (16 Friday and Saturday nights)
Daily period	2000 h to 0300 h
Survey design	Proportional-voluntary
Count method	Instantaneous, trailer
Interview type	Voluntary, party, boating anglers, harvest, catch and release
Effort estimation	Proportional, Equations (1)-(7)
Catch estimation	Multiple-day period (Lockwood et al. 1999)
Clerk	Fisheries Division clerk, 1/8 time
Survey purpose	Evaluate rainbow trout plants
Notes	<p>One clerk traveled to access sites at each of eight lakes (see also Allen, Bird, Deep, Cary, Gilead, Lavine, and Swains lakes, 1988 chapters) on Friday and Saturday nights and recorded the number of trailers, or vehicles that appeared to have transported boats, and the hour at which the count was made.</p> <p>Catch rate was estimated from postpaid interview cards placed on the windshields of vehicles in the public launch sites located at each lake. Voluntary access interviews were collected, by angling party, to estimate catch rate. A zip-lock bag containing a self-addressed post card, explanation of the survey, and a lead pencil, was placed under each vehicle's windshield wiper. Anglers recorded number of anglers in their party, number of fish harvested, number of fish caught-and-released, start time, and finish time.</p>



Appendix 16-2.-Estimated harvest, harvest rate, catch and release, catch and release rate, and angling effort, Farewell Lake, Jackson County, 1998. All estimates are given with 2 standard errors in parentheses.

	Catch/hour	Estimate
Rainbow trout – harvest	0.2114 (0.4058)	248 (366)
Rainbow trout – release	0.0000 (0.0000)	0 (0)
Angler hours		1,173 (1,437)
Angler trips		273 (345)

Appendix 17-1.-Fletcher Floodwater, Alpena and Montmorency Counties, 1995.

Site	Fletcher Floodwater
Year	1995
County	Alpena and Montmorency
Location	T. 30 N., R. 4, 5 E., Sec. Many
Survey period	January 7 through March 15
Daily period	See Appendix 17-2
Survey design	Roving-access
Count method	Instantaneous, occupied shanties, open ice anglers
Interview type	Access, party, shanty anglers, open-ice anglers, harvest, catch and release (pike only)
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	See Appendix 1 of Lockwood et al. (1999)
Clerk	Fisheries Division technician, full time
Survey purpose	Monitor northern pike fishery
Notes	<p>Fisheries Division personnel from the Northern Lake Huron Gaylord office collected count and interview data. One employee worked per scheduled day. The clerk counted and interviewed from a snowmobile. Three randomly-selected weekdays and both weekend days were sampled each week of the survey. Any holidays occurring during the survey were not sampled. One shift per month was used and 2 hours travel time was allotted per day.</p> <p>Two instantaneous counts of occupied shanties and open ice anglers were made per day.</p> <p>Most interviews were of complete-fishing trips (657 of 715 total interviews). Interviews of angling parties were obtained as the anglers left the lake. Both released and harvested northern pike were recorded. For other species, only harvest was recorded.</p>

Appendix 17-2.—Shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Fletcher Floodwater, Alpena and Montmorency Counties, 1995.

Month	Shift	Expansion value
January	0900 h – 1900 h	12
February	1000 h – 2000 h	12
March	1000 h – 2000 h	12

Appendix 17-3.—Estimated total catch, fishing pressure, and catch per hour, Fletcher Floodwater, Alpena and Montmorency Counties, 1995. Two standard errors are given in parentheses.

Species	Catch/hour	Jan	Feb	Mar	Season
Northern pike – harvest	0.0248 (0.0078)	528 (231)	451 (206)	147 (153)	1,126 (345)
Legal northern pike – release	0.0036 (0.0027)	86 (74)	76 (96)	0 (0)	162 (121)
Sublegal northern pike – release	0.0168 (0.0075)	539 (316)	120 (80)	104 (79)	763 (336)
Yellow perch – harvest	0.3249 (0.0704)	6,354 (2,084)	3,865 (1,335)	4,550 (1,737)	14,769 (3,023)
Bluegill – harvest	0.3713 (0.0957)	6,769 (2,343)	2,064 (868)	8,048 (3,351)	16,881 (4,180)
Rock bass – harvest	0.0002 (0.0004)	7 (13)	4 (9)	0 (0)	11 (16)
Sunfish – harvest	0.0700 (0.0314)	1,063 (894)	341 (347)	1,778 (1,031)	3,182 (1,408)
Black crappie – harvest	0.1001 (0.0344)	3,408 (1,401)	213 (172)	929 (586)	4,550 (1,528)
Total harvest	0.8913 (0.1379)	18,129 (3,556)	6,938 (1,652)	15,452 (3,959)	40,519 (5,572)
Total release	0.0203 (0.0080)	625 (325)	196 (125)	104 (79)	925 (357)
Total catch	0.9117 (0.1388)	18,754 (3,570)	7,134 (1,656)	15,556 (3,960)	41,444 (5,583)
Angler hours		20,899 (2,310)	13,455 (1,200)	11,105 (1,909)	45,459 (3,228)
Angler trips		4,741 (577)	3,095 (316)	2,794 (512)	10,630 (833)

Appendix 17-4.—Estimated catch, fishing pressure, and catch per hour by shanty anglers, Fletcher Floodwater, Alpena and Montmorency Counties, 1995. Two standard errors are given in parentheses.

Species	Catch/hour	Jan	Feb	Mar	Season
Northern pike – harvest	0.025 (0.0103)	342 (215)	344 (175)	83 (124)	769 (304)
Legal northern pike – release	0.0034 (0.0037)	27 (55)	76 (96)	0 (0)	103 (111)
Sublegal northern pike release	0.0155 (0.0104)	361 (301)	67 (60)	42 (51)	470 (311)
Yellow perch – harvest	0.3274 (0.0930)	4,852 (2,014)	2,994 (1,273)	2,089 (1,144)	9,935 (2,643)
Bluegill – harvest	0.3325 (0.1258)	3,457 (1,951)	1,485 (752)	5,149 (3,030)	10,091 (3,681)
Sunfish – harvest	0.0573 (0.0373)	805 (844)	240 (316)	694 (660)	1,739 (1,117)
Black crappie – harvest	0.0842 (0.0442)	1,985 (1,225)	155 (142)	417 (459)	2,557 (1,316)
Total harvest	0.8269 (0.1801)	11,441 (3,181)	5,218 (1,529)	8,432 (3,339)	25,091 (4,859)
Total release	0.0189 (0.0110)	88 (306)	143 (113)	42 (51)	573 (330)
Total catch	0.8457 (0.1813)	11,829 (3,196)	5,361 (1,533)	8,474 (3,339)	25,664 (4,870)
Angler hours		14,679 (2,187)	9,607 (1,122)	6,059 (1,770)	30,345 (3,029)
Angler trips		3,286 (544)	2,030 (271)	1,517 (465)	6,833 (765)

Appendix 17-5.—Estimated catch, fishing pressure, and catch per hour by open ice anglers, Fletcher Floodwater, Alpena and Montmorency Counties, 1995. Two standard errors are given in parentheses.

Species	Catch/hour	Jan	Feb	Mar	Season
Northern pike – harvest	0.0236 (0.0110)	186 (84)	107 (108)	64 (90)	357 (164)
Legal northern pike – release	0.0039 (0.0033)	59 (49)	0 (0)	0 (0)	59 (49)
Sublegal northern pike – release	0.0193 (0.0085)	178 (99)	53 (53)	62 (60)	293 (127)
Yellow perch – harvest	0.3198 (0.0999)	1,502 (534)	871 (402)	2,461 (1,307)	4,834 (1,467)
Bluegill – harvest	0.4493 (0.1351)	3,312 (1,297)	579 (433)	2,899 (1,432)	6,790 (1,980)
Rock bass – harvest	0.0007 (0.0011)	7 (13)	4 (9)	0 (0)	11 (16)
Sunfish – harvest	0.0954 (0.0572)	258 (296)	101 (143)	1,084 (792)	1,443 (858)
Black crappie – harvest	0.1319 (0.0523)	1,423 (680)	58 (97)	512 (364)	1,993 (777)
Total harvest	1.0208 (0.1956)	6,688 (1,589)	1,720 (625)	7,020 (2,128)	15,428 (2,728)
Total release	0.0233 (0.0092)	237 (110)	53 (53)	62 (60)	352 (136)
Total catch	1.0441 (0.1964)	6,925 (1,592)	1,773 (626)	7,082 (2,128)	15,780 (2,731)
Angler hours		6,220 (743)	3,848 (424)	5,046 (716)	15,114 (1,115)
Angler trips		1,455 (192)	1,065 (163)	1,277 (213)	3,797 (330)

Appendix 17-6.—Residence of anglers (percent of anglers interviewed) by Michigan County or U. S. State, Fletcher Floodwater, Alpena and Montmorency Counties, 1995. Two standard errors are given in parentheses.

Residence	Jan	Feb	Mar	Season
Alcona	4.59 (1.76)	2.83 (1.49)	7.44 (2.99)	4.60 (1.13)
Alpena	37.57 (4.07)	19.84 (3.59)	31.07 (5.27)	29.71 (2.47)
Antrim	0.18 (0.35)	0 (0)	0 (0)	0.07 (0.15)
Bay	1.94 (1.16)	1.62 (1.14)	1.94 (1.57)	1.82 (0.72)
Berrien	0.18 (0.35)	0 (0)	0 (0)	0.07 (0.15)
Cheboygan	0.18 (0.35)	0.81 (0.81)	0.32 (0.65)	0.44 (0.36)
Chippewa	0.18 (0.35)	0 (0)	0 (0)	0.07 (0.15)
Clinton	0.18 (0.35)	0.61 (0.70)	1.94 (1.57)	0.73 (0.46)
Eaton	0.18 (0.35)	0.61 (0.70)	0 (0)	0.29 (0.29)
Emmet	0 (0)	0.61 (0.70)	0 (0)	0.22 (0.25)
Genesee	1.59 (1.05)	3.85 (1.73)	3.56 (2.11)	2.85 (0.90)
Gladwin	0 (0)	0.40 (0.57)	0 (0)	0.15 (0.21)
Gratiot	0 (0)	0 (0)	0.65 (0.91)	0.15 (0.21)
Hillsdale	0 (0)	0.40 (0.57)	1.62 (1.44)	0.51 (0.39)
Ingham	0 (0)	1.01 (0.90)	0.65 (0.91)	0.51 (0.39)
Ionia	0 (0)	0.20 (0.40)	1.29 (1.29)	0.36 (0.33)
Jackson	0.71 (0.70)	0.81 (0.81)	0.65 (0.91)	0.73 (0.46)
Kalamazoo	0 (0)	0 (0)	0.65 (0.91)	0.15 (0.21)

Appendix 17-6.--continued.

Residence	Jan	Feb	Mar	Season
Kalkaska	0 (0)	0.40 (0.57)	0 (0)	0.15 (0.21)
Kent	0.18 (0.35)	0 (0)	0.65 (0.91)	0.22 (0.25)
Lapeer	0.35 (0.50)	1.21 (0.99)	0 (0)	0.58 (0.41)
Leelanau	0 (0)	0.20 (0.40)	0 (0)	0.07 (0.15)
Lenawee	0 (0)	2.02 (1.27)	0 (0)	0.73 (0.46)
Livingston	0 (0)	0.61 (0.70)	0 (0)	0.22 (0.25)
Mackinac	0 (0)	0.20 (0.40)	0.97 (1.12)	0.29 (0.29)
Macomb	0.35 (0.50)	0.20 (0.40)	0.32 (0.65)	0.29 (0.29)
Midland	0.53 (0.61)	0.20 (0.40)	0 (0)	0.29 (0.29)
Monroe	0 (0)	0.40 (0.57)	0 (0)	0.15 (0.21)
Montcalm	0 (0)	0.61 (0.70)	0.32 (0.65)	0.29 (0.29)
Montmorency	29.81 (3.84)	39.47 (4.40)	31.07 (5.27)	33.58 (2.55)
Muskegon	0 (0)	0.20 (0.40)	0.32 (0.65)	0.15 (0.21)
Oakland	2.47 (1.30)	2.02 (1.27)	0.65 (0.91)	1.90 (0.74)
Ogemaw	1.41 (0.99)	0 (0)	0.65 (0.91)	0.73 (0.46)
Osceola	0 (0)	0.40 (0.57)	0.32 (0.65)	0.22 (0.25)
Oscoda	2.29 (1.26)	1.42 (1.06)	0.97 (1.12)	1.68 (0.69)
Otsego	1.41 (0.99)	4.66 (1.90)	3.24 (2.01)	2.99 (0.92)
Presque Isle	6.17 (2.02)	4.25 (1.82)	3.88 (2.20)	4.96 (1.17)



Appendix 17-6.-continued.

Residence	Jan	Feb	Mar	Season
Roscommon	0.53 (0.61)	0 (0)	0 (0)	0.22 (0.25)
Saginaw	0.35 (0.50)	2.43 (1.39)	0.65 (0.91)	1.17 (0.58)
St. Clair	0.71 (0.70)	0.61 (0.70)	0 (0)	0.51 (0.39)
Schoolcraft	0.18 (0.35)	0.40 (0.57)	0.65 (0.91)	0.36 (0.33)
Shiawassee	0.53 (0.61)	0 (0)	0 (0)	0.22 (0.25)
Tuscola	1.94 (1.16)	0 (0)	0.97 (1.12)	1.02 (0.54)
VanBuren	0 (0)	0 (0)	0.32 (0.65)	0.07 (0.15)
Washtenaw	0 (0)	1.62 (1.14)	0 (0)	0.58 (0.41)
Wayne	2.47 (1.30)	0.61 (0.70)	0.32 (0.65)	1.31 (0.62)
Ohio	0.88 (0.79)	2.23 (1.33)	1.94 (1.57)	1.46 (0.65)
Anglers interviewed	567	494	309	1,370

Appendix 17-7.—Type of bait used by anglers (percent of anglers interviewed), Fletcher Floodwater, Alpena and Montmorency Counties, 1995. Two standard errors are given in parentheses.

Bait used	Jan	Feb	Mar	Season
Live	96.10 (1.67)	99.36 (0.73)	100.00 (0)	98.17 (0.74)
Artificial	0.37 (0.52)	0 (0)	0 (0)	0.15 (0.22)
Both	3.53 (1.59)	0.64 (0.73)	0 (0)	1.68 (0.71)
Anglers interviewed	538	472	301	1,311

Appendix 17-8.—Species of fish sought by anglers (percent of anglers interviewed), Fletcher Floodwater, Alpena and Montmorency Counties, 1995. Two standard errors are given in parentheses.

Species sought	Jan	Feb	Mar	Season
Panfish	14.66 (2.96)	17.98 (3.45)	37.25 (5.53)	20.89 (2.19)
Northern pike & yellow perch	12.22 (2.74)	19.80 (3.58)	4.25 (2.31)	13.17 (1.82)
Northern pike & panfish	11.17 (2.63)	17.17 (3.39)	23.53 (4.85)	16.08 (1.98)
Northern pike & black crappie	0.35 (0.49)	0 (0)	0 (0)	0.15 (0.21)
Northern pike	31.76 (3.89)	23.64 (3.82)	7.84 (3.07)	23.51 (2.29)
Yellow perch	4.89 (1.80)	4.04 (1.77)	4.90 (2.47)	4.59 (1.13)
Bluegill	3.66 (1.57)	1.82 (1.20)	1.96 (1.59)	2.62 (0.86)
Black crappie	2.44 (1.29)	0 (0)	0.33 (0.65)	1.09 (0.56)
Anything	18.85 (3.27)	15.56 (3.26)	19.93 (4.57)	17.90 (2.07)
Anglers interviewed	573	495	306	1,374

Appendix 17-9.—Number of trips per day by anglers (percent of anglers interviewed), Fletcher Floodwater, Alpena and Montmorency Counties, 1995. Two standard errors are given in parentheses.

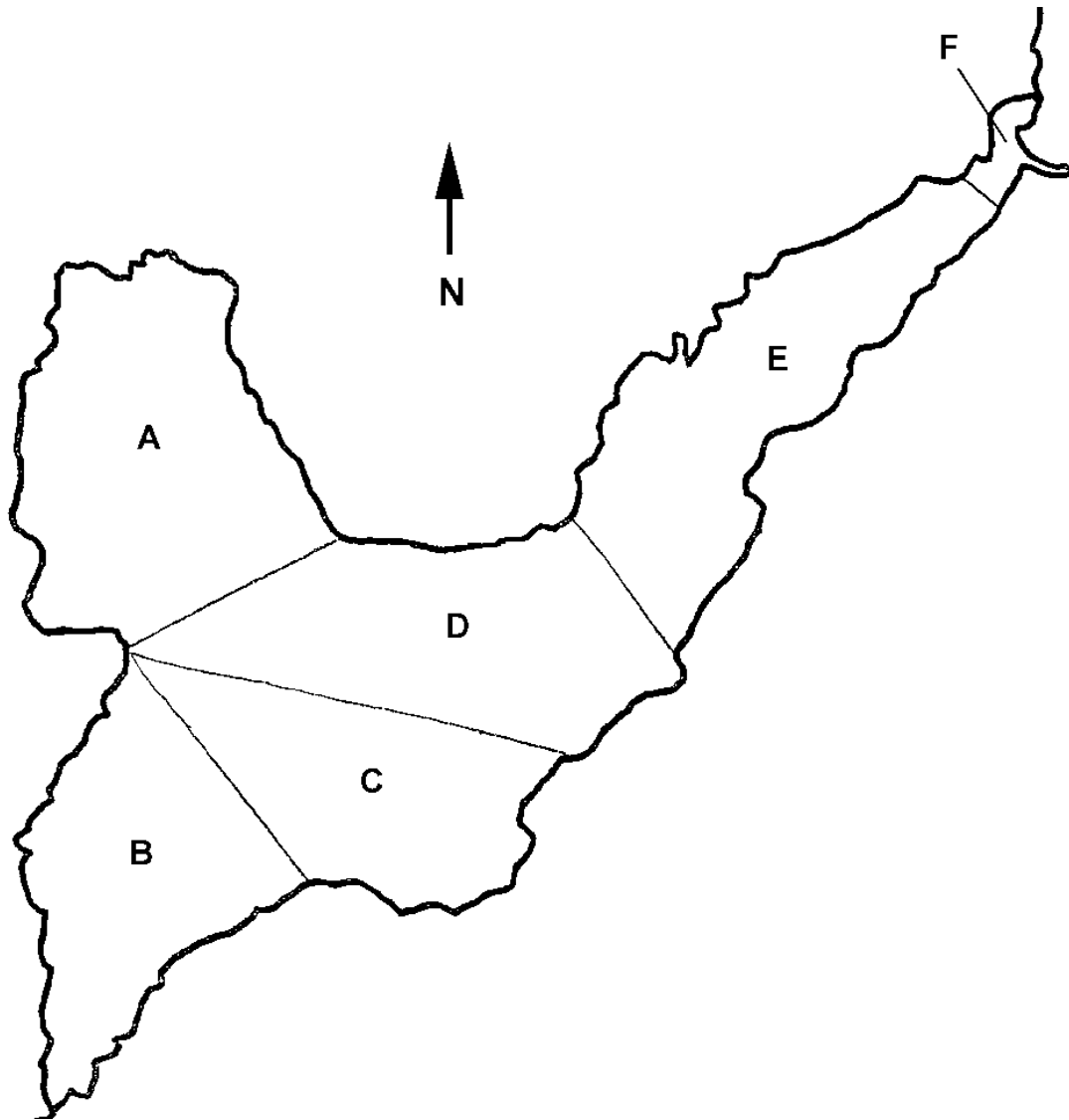
Trips/day	Jan	Feb	Mar	Season
1	98.49 1.13)	100.00 (0)	98.69 (1.30)	99.12 (0.53)
2	1.51 (1.13)	0 (0)	1.31 (1.30)	0.88 (0.53)
Anglers interviewed	464	481	305	1,250

Appendix 17-10.—Gender of anglers (percent of anglers interviewed), Fletcher Floodwater, Alpena and Montmorency Counties, 1995. Two standard errors are given in parentheses.

Gender	Jan	Feb	Mar	Season
Male	89.01 2.61)	90.52 2.63)	89.00 3.56)	89.55 (1.65)
Female	10.99 (2.61)	9.48 (2.63)	11.00 3.56)	10.45 (1.65)
Anglers interviewed	573	496	309	1,378

Appendix 18-1.–Fletcher Floodwater, Alpena and Montmorency Counties, 1997.

Site	Fletcher Floodwater
Year	1997
County	Alpena and Montmorency
Location	T. 30 N., R. 4, 5 E., Sec. Many
Survey period	May 17 through September 1
Daily period	See Appendix 18-2
Survey design	Aerial-voluntary
Count method	Instantaneous, fishing boats
Interview type	Voluntary, party, boating anglers, harvest, catch and release
Effort estimation	Multiple-day period, Lockwood et al. (1999)
Catch estimation	Multiple-day period, Lockwood et al. (1999)
Clerk	Airplane pilot (counter), Fletcher Floodwater resort owners
Survey purpose	Monitor northern pike fishery
Notes	<p>This survey was a cooperative project between Fisheries Division and the Fletcher Floodwater resort owners. The resort owners collected interview data and contracted the pilot/plane. This survey was prompted by reported declines in pike catch and harvest rates from historical levels. While catch of pike may indeed be lower, this lake also supports an excellent fishery for a variety of warmwater species (e.g., smallmouth and largemouth bass, yellow perch, and bluegills).</p> <p>Fletcher Floodwater was divided into six grids and boat-angling effort was estimated for each (Appendix figure 18-1). Grid estimates were summed to estimate total boat angling effort. August and September were treated as a single time period.</p> <p>Counting followed a randomized schedule with three randomly-selected weekdays and both weekend days selected each week of the survey. All holidays were sampled. One instantaneous count was made per scheduled sample day. Only boats appearing to be fishing were counted.</p> <p>Resort owners provided interview forms to their guests and a proportion of anglers using the public launch site. Thus, all interviews were voluntary. Interview data were not grid specific, so the lake was treated as a single unit.</p>



Appendix figure 18-1.—Counting grids used to estimate angling effort, Fletcher Floodwater, Alpena and Montmorency Counties, 1997.

Appendix 18-2.—Count time range and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Fletcher Floodwater, Alpena and Montmorency Counties, 1997.

Month	Count range	Expansion value
May	0700 h – 2100 h	16
June	0500 h – 2100 h	18
July	0500 h – 2100 h	18
August - September	0600 h - 2100 h	16

Appendix 18-3.—Total estimated harvest, catch and release, fishing pressure, and catch per hour, Fletcher Floodwater, Alpena and Montmorency Counties, 1997. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug-Sep	Season
Northern pike – harvest	0.0194 (0.0041)	284 (131)	472 (143)	953 (276)	1,623 (567)	3,332 (660)
Northern pike – release	0.0828 (0.0125)	936 (325)	3,432 (663)	4,283 (915)	5,552 (1,373)	14,203 (1,808)
Yellow perch – harvest	0.2729 (0.0442)	2,126 (945)	12,533 (2,491)	15,240 (3,322)	16,914 (5,019)	46,813 (6,582)
Yellow perch – release	1.1110 (0.1818)	4,605 (1,692)	45,774 (7,856)	67,119 (13,358)	73,059 (22,251)	190,557 (27,166)
Black crappie – harvest	0.0180 (0.0071)	772 (1,012)	865 (334)	644 (244)	801 (482)	3,082 (1,195)
Black crappie – release	0.0381 (0.0091)	380 (433)	1,706 (679)	2,329 (906)	2,120 (820)	6,535 (1,463)
Bluegill – harvest	0.2314 (0.0497)	1,831 (1,120)	9,007 (2,019)	13,607 (3,407)	15,241 (6,743)	39,686 (7,900)
Bluegill – release	0.4647 (0.0736)	1,927 (889)	21,527 (4,056)	32,132 (6,614)	24,126 (7,565)	79,712 (10,873)
Sunfish – harvest	0.0824 (0.0163)	588 (450)	3,910 (932)	5,442 (1,623)	4,194 (1,669)	14,134 (2,548)
Sunfish – release	0.3042 (0.0515)	1,226 (587)	15,016 (2,926)	18,387 (4,458)	17,554 (5,631)	52,183 (7,777)
Rock bass – harvest	0.0290 (0.0063)	73 (63)	2,154 (551)	1,620 (525)	1,129 (658)	4,976 (1,008)
Rock bass – release	0.2140 (0.0324)	1,185 (700)	19,252 (3,748)	11,543 (2,332)	4,724 (1,456)	36,704 (4,701)
Smallmouth bass – harvest	0.0043 (0.0023)	67 (92)	160 (145)	247 (212)	272 (284)	746 (394)
Smallmouth bass – release	0.0135 (0.0029)	168 (100)	744 (230)	818 (236)	584 (293)	2,314 (452)
Largemouth bass – harvest	0.0208 (0.0042)	327 (155)	1,355 (344)	1,000 (305)	890 (456)	3,572 (666)
Largemouth bass – release	0.0871 (0.0127)	1,039 (384)	6,178 (1,202)	4,629 (960)	3,093 (890)	14,939 (1,818)
White sucker – harvest	0.0001 (0.0002)	0 (0)	0 (0)	21 (51)	0 (0)	21 (51)

Appendix 18-3.–continued.

Species	Catch/hour	May	Jun	Jul	Aug-Sep	Season
White sucker – release	0.0001 (0.0000)	0 (0)	0 (0)	9 (2)	0 (0)	9 (2)
Brown bullhead – harvest	0.0101 (0.0059)	9 (2)	165 (102)	1,289 (974)	276 (239)	1,739 (1,008)
Brown bullhead – release	0.0059 (0.0019)	37 (51)	199 (89)	562 (241)	220 (185)	1,018 (321)
Total harvest	0.6886 (0.0838)	6,077 (1,851)	30,621 (3,426)	40,063 (5,175)	41,340 (8,647)	118,101 (10,804)
Total release	2.3214 (0.2589)	11,503 (2,223)	113,828 (10,158)	141,811 (15,817)	131,032 (24,282)	398,174 (30,788)
Total catch	3.0100 (0.3078)	17,580 (2,893)	144,449 (10,720)	181,874 (16,642)	172,372 (25,776)	516,275 (32,628)
Angler hours		19,391 (5,325)	49,199 (6,605)	56,103 (7,584)	46,828 (7,782)	171,521 (13,786)
Angler trips		4,533 (1,258)	11,093 (1,532)	13,784 (1,963)	11,313 (2,104)	40,723 (3,494)
Percent anglers interviewed		9.16 (2.54)	6.93 (0.96)	4.66 (0.66)	2.51 (0.47)	5.18 (0.44)



Appendix 19-1.–Gilead Lake, Branch County, 1998.

Site	Gilead Lake
Year	1998
County	Branch
Location	T. 8 S., R. 7 W., Sec. 6,7
Survey period	June 19 to August 8 (16 Friday and Saturday nights)
Daily period	1800 h to 0200 h
Survey design	Proportional-voluntary
Count method	Instantaneous, trailer
Interview type	Voluntary, party, boating anglers, harvest, catch and release
Effort estimation	Proportional, Equations (1)-(7)
Catch estimation	Multiple-day period (Lockwood et al. 1999)
Clerk	Fisheries Division clerk, 1/8 time
Survey purpose	Evaluate rainbow trout plants
Notes	<p>One clerk traveled to access sites at each of eight lakes (see also Allen, Bird, Deep, Cary, Farwell, Lavine, and Swains lakes, 1988 chapters) on Friday and Saturday nights and recorded the number of trailers, or vehicles that appeared to have transported boats, and the hour at which the count was made.</p> <p>Catch rate was estimated from postpaid interview cards placed on the windshields of vehicles in the public launch sites located at each lake. Voluntary access interviews were collected, by angling party, to estimate catch rate. A zip-lock bag containing a self-addressed post card, explanation of the survey, and a lead pencil, was placed under each vehicle's windshield wiper. Anglers recorded number of anglers in their party, number of fish harvested, number of fish caught-and-released, start time, and finish time.</p>

Appendix 19-2.—Estimated harvest, harvest rate, catch and release, catch and release rate, and angling effort, Gilead Lake, Branch County, 1998. All estimates are given with 2 standard errors in parentheses.

	Catch/hour	Estimate
Rainbow trout – harvest	0.6339 (0.4381)	375 (206)
Rainbow trout – release	0.0541 (0.0670)	32 (37)
Angler hours		591 (247)
Angler trips		156 (68)

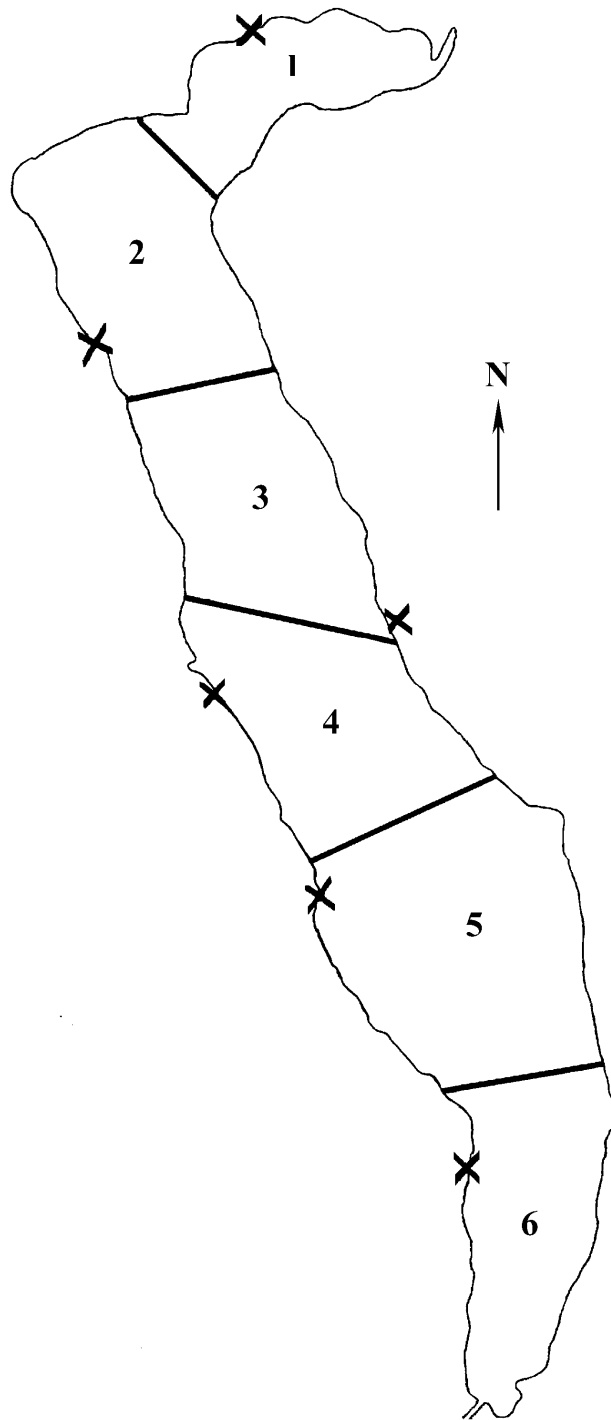
Appendix 20-1.–Gogebic, Lake, Gogebic and Ontonagon Counties, 1998.

Site	Gogebic, Lake
Year	1998
County	Gogebic and Ontonagon
Location	T. 46, 47, 48 N., R. 42 W., Sec. Many
Survey period	May 19 through September 30
Daily period	See Appendix 20-1
Survey design	Proportional, voluntary
Count method	Instantaneous, fishing boats
Interview type	Voluntary, access, party, boating anglers, harvest, catch and release
Effort estimation	Proportional, Equations (1)-(7)
Catch estimation	Multiple-day period (Lockwood et al. 1999).
Clerk	Lake Gogebic resort owners
Survey purpose	Evaluate walleye and yellow perch fisheries
Notes	<p>Lake Gogebic was divided into six grids (Appendix figure 20-1). Catch and effort estimates cover the period May 19 through September 17 and September 21 through September 30. Only effort estimates were made during September 18-20. During the September 18-21 period a fishing tournament was held on Lake Gogebic, but these anglers were not sampled for catch information.</p> <p>Instantaneous boat counts were made each day during the survey period at 0830h Central Standard Time. Initial intent was to estimate boat-angling effort by grid and then sum grid estimates for a total lake estimate. However, counts were often missing for grids 1, 3 and 5. When counts were not made, total boat count (sum of all six grids) was imputed using linear regression analysis. Regression models were derived from time periods when all six sections of the lake were counted. Models used for missing grids were:</p> <p>Grid 1 missing: Total boats = <math>-2.7756*(1.2485x)</math>; <math>r^2 = 0.92, F &lt; 0.05</math>,</p> <p>Grid 3 missing: Total boats = <math>2.9840*(1.0656x)</math>; <math>r^2 = 0.96, F &lt; 0.05</math>,</p> <p>Grid 5 missing: Total boats = <math>3.1401*(1.0703x)</math>; <math>r^2 = 0.89, F &lt; 0.05</math>,</p> <p>Grids 1 and 3 missing: Total boats = <math>0.1578*(1.3868x)</math>; <math>r^2 = 0.89, F &lt; 0.05</math>,</p> <p>Grids 3 and 5 missing: Total boats = <math>7.8339*(1.0685x)</math>; <math>r^2 = 0.78, F &lt; 0.05</math>,</p> <p>When all grids were counted, grid counts were summed to give a lake-wide count. Otherwise, the regressions were used to estimate total angling effort. Resort owners distributed interview forms to their guests.</p> <p>One interview form was to be filled out for each trip.</p>

Appendix 20-1.–continued.

Notes

Lake Gogebic was also surveyed during the winter 1999. The Lake Gogebic, 1999 chapter presenting the winter estimates also provides an approximate one-year estimate – which includes estimates found in Appendix 20-3 but not estimates given in Appendix 20-4.



Appendix figure 20-1.—Grids used to estimate angling effort, Lake Gogebic, Gogebic and Ontonagon Counties, 1998. Count locations are denoted with “X”.

Appendix 20-2.– Daily time period coverage, Lake Gogebic, Gogebic and Ontonagon Counties, 1998.

Month	Day type	Times
Non- tournament period		
May	Week	0530 h – 2130 h
	Weekend	0630 h – 2130 h
June	Week	0530 h – 2130 h
	Weekend	0630 h – 2230 h
July	Week	0430 h - 2130 h
	Weekend	0530 h – 2130 h
August	Week	0630 h – 2130 h
	Weekend	0630 h – 2130 h
September	Week	0730 h - 2030 h
	Weekend	0630 h - 2130 h
Tournament period		
September 18-20		0630 h – 2130 h

Appendix 20-3.—Estimated harvest, catch and release, fishing pressure, and catch rate by boat anglers, Lake Gogebic, Gogebic and Ontonagon Counties, 1998. Effort and catch during September 18-20 walleye tournament are not included in these estimates. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Season
Walleye – harvest	0.0986 (0.0406)	875 (620)	1,394 (747)	3,371 (2,314)	2,273 (1,527)	965 (873)	8,878 (3,064)
Walleye (legal) –release	0.0086 (0.0056)	34 (60)	43 (62)	551 (448)	86 (119)	63 (87)	777 (479)
Walleye (sublegal) – release	0.8027 (0.2937)	16,055 (10,962)	11,601 (5,580)	25,789 (15,053)	11,778 (6,277)	7,093 (4,321)	72,316 (20,880)
Yellow perch – harvest	0.0526 (0.0298)	126 (133)	0 (0)	2,881 (2,221)	1,049 (813)	685 (689)	4,741 (2,467)
Yellow perch – release	0.0057 (0.0041)	60 (81)	148 (200)	73 (152)	136 (170)	94 (150)	511 (348)
Northern pike – harvest	0.0058 (0.0065)	9 (16)	179 (330)	265 (462)	37 (74)	31 (65)	521 (576)
Northern pike (legal) – harvest	0.0096 (0.0067)	138 (155)	0 (0)	433 (482)	259 (259)	31 (61)	861 (572)
Northern pike (sublegal) – release	0.0199 (0.0104)	380 (288)	485 (426)	609 (622)	159 (179)	157 (182)	1,790 (846)
Rock bass – release	0.0108 (0.0078)	34 (56)	127 (195)	532 (543)	184 (256)	94 (192)	971 (662)
Smallmouth bass – harvest	0.0179 (0.0123)	0 (0)	537 (594)	808 (825)	50 (100)	218 (237)	1,613 (1,049)
Smallmouth bass (legal) – release	0.0263 (0.0140)	224 (240)	148 (226)	853 (825)	742 (623)	406 (373)	2,373 (1,147)
Smallmouth bass (sublegal) – release	0.0463 (0.0232)	143 (170)	548 (612)	2,099 (1,504)	729 (720)	656 (556)	4,175 (1,869)
Largemouth bass (sublegal) – release	0.0008 (0.0016)	0 (0)	0 (0)	73 (145)	0 (0)	0 (0)	73 (145)
Black crappie – release	0.0004 (0.0008)	0 (0)	0 (0)	0 (0)	37 (74)	0 (0)	37 (74)
Total – harvest	0.1749 (0.0602)	1,010 (634)	2,110 (1,010)	7,325 (3,344)	3,409 (1,734)	1,899 (1,139)	15,753 (4,112)
Total – release	0.9312 (0.3174)	17,068 (10,971)	13,100 (5,641)	31,012 (15,189)	14,110 (7,734)	8,594 (4,384)	83,884 (21,492)
Total catch	1.1060 (0.3475)	18,078 (10,989)	15,210 (5,731)	38,337 (15,553)	17,519 (7,926)	10,493 (4,530)	99,637 (21,882)
Angler hours		11,249 (6,115)	26,549 (11,259)	20,791 (10,751)	21,132 (9,903)	10,365 (5,657)	90,086 (20,244)
Angler trips		1,585 (932)	5,364 (2,558)	5,459 (3,007)	5,884 (2,924)	2,854 (1,588)	21,146 (5,246)

Appendix 20-4.—Estimated effort by boat anglers during September 18-20 walleye tournament, Lake Gogebic, Gogebic and Ontonagon Counties, 1998. Two standard errors are given in parentheses.

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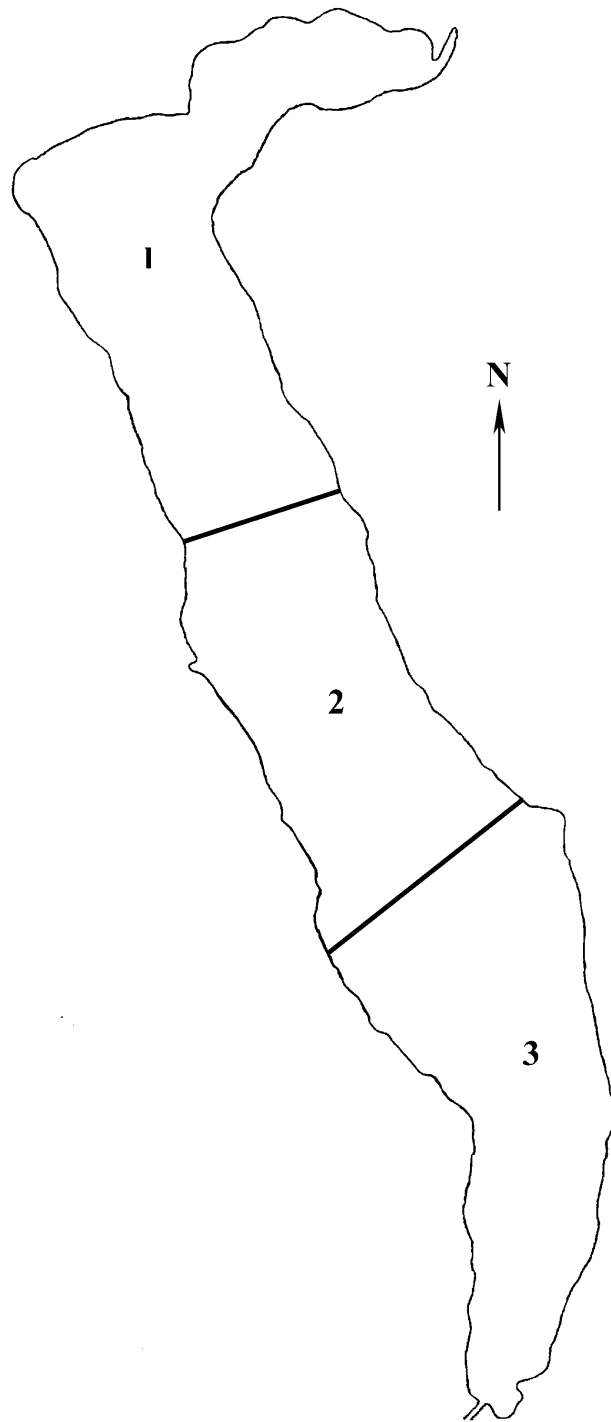
Effort	Estimate
Angler hours	8,027 (7,141)
Angler trips	2,258 (2,033)

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Appendix 21-1.–Gogebic, Lake, Gogebic and Ontonagon Counties, 1999.

Site	Gogebic, Lake
Year	1999
County	Gogebic and Ontonagon
Location	T. 46, 47, 48 N., R. 42 W., Sec. Many
Survey period	January 4 through April 10
Daily period	See Appendix 21-2
Survey design	Progressive-roving
Count method	Instantaneous, occupied ice shanties, open ice anglers
Interview type	Roving and access, individual angler, ice shanty anglers, open ice anglers, harvest, catch and release
Effort estimation	Multiple-day period (Lockwood et al. 1999)
Catch estimation	Multiple-day period (Lockwood et al. 1999), see notes
Clerk	Fisheries Division clerk, full time
Survey purpose	Monitor yellow perch fishery
Notes	<p>Three randomly-selected weekdays and both weekend days were sampled each week of the survey. Any holidays occurring during the survey were also sampled. The clerk counted and interviewed anglers from a snowmobile. Lake Gogebic, Gogebic and Ontonagon Counties was divided into three grids (Appendix figure 21-1), and catch and effort estimates were made by grid and summed for total lake estimates. Two shifts per month were used.</p> <p>One instantaneous count of occupied shanties and open ice anglers was made per day. Counting order of grids was randomized. Direction (within) each grid was counted, following selection of grid order, was optimized using most direct route. This served to reduce overall count time.</p> <p>This survey was primarily designed to collect incomplete-trip interviews (roving). However in addition to these roving interviews, the clerk was also instructed to interview any anglers leaving the lake (complete trip-interviews).</p> <p>Similar numbers of complete trip (835 anglers) and incomplete trip (689 anglers) interviews were collected. When 80% or more of interviews within a stratum were of a single type (complete or incomplete trip), the catch rate estimator for that interview type was used for all interviews within that stratum. That is, ratio-of-means for complete-trip interviews and mean-of-ratios for incomplete-trip interviews. When less than 80% of interviews were of either type, the appropriate catch rate estimator was used for each interview type and a weighted average catch rate (number of anglers interviewed by interview type) and variance calculated. Approximate one-year estimates are given in Appendix 21-6. These estimates include those previously given in Appendix 20-3.</p>



Appendix figure 21-1.—Counting and interviewing grids, Lake Gogebic, Gogebic and Ontonagon Counties, 1999.

Appendix 21-2.—Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Lake Gogebic, Gogebic and Ontonagon Counties, 1999.

Month	Shifts		Expansion value
	Early	Late	
January	0800 h – 1630 h	0930 h 1800 h	10
February	0800 h – 1630 h	0930 h 1800 h	12
March	0800 h – 1630 h	0930 h 1800 h	12
April	0800 h – 1630 h	0930 h 1800 h	12

Appendix 21-3.—Total harvest, catch and release, fishing pressure, and catch per hour, Lake Gogebic, Gogebic and Ontonagon Counties, 1999. Two standard errors are given in parentheses.

Species	Catch/hour	Jan	Feb	Mar	Apr	Season
Yellow perch – harvest	0.3247 (0.0988)	371 (175)	1,748 (578)	7,851 (2,746)	238 (160)	10,208 (2,816)
Yellow perch – release	0.0065 (0.0048)	98 (134)	52 (43)	55 (48)	0 (0)	205 (148)
Walleye – harvest	0.0132 (0.0061)	162 (89)	254 (161)	0 (0)	0 (0)	416 (184)
Walleye – release	0.0694 (0.0178)	615 (261)	1,059 (366)	476 (176)	31 (31)	2,181 (484)
Lake herring – harvest	0.0037 (0.0023)	5 (10)	50 (68)	52 (28)	8 (13)	115 (78)
Lake herring – release	0.0006 (0.0007)	0 (0)	4 (6)	16 (12)	0 (0)	20 (23)
Rock bass – release	0.0019 (0.0031)	13 (26)	46 (93)	0 (0)	0 (0)	59 (97)
Northern pike – harvest	0.0022 (0.0020)	46 (58)	23 (24)	0 (0)	0 (0)	69 (63)
Northern pike – release	0.0068 (0.0042)	48 (65)	142 (109)	25 (25)	0 (0)	215 (129)
Black crappie – harvest	0.0004 (0.0005)	6 (13)	0 (0)	7 (11)	0 (0)	13 (17)
White sucker – harvest	0.0015 (0.0010)	17 (24)	0 (0)	31 (20)	0 (0)	48 (31)
White sucker – release	0.0044 (0.0022)	0 (0)	9 (12)	129 (65)	0 (0)	138 (66)
Total harvest	0.3457 (0.1002)	607 (207)	2,075 (605)	7,941 (2,746)	246 (160)	10,869 (2,824)
Total release	0.0896 (0.0205)	774 (302)	1,312 (395)	701 (196)	31 (31)	2,818 (535)
Total catch	0.4354 (0.1072)	1,381 (366)	3,387 (722)	8,642 (2,754)	277 (163)	13,687 (2,875)
Angler hours		5,922 (1,405)	10,807 (1,927)	13,996 (3,231)	714 (432)	31,439 (4,039)
Angler trips		1,171 (306)	2,151 (431)	2,781 (647)	129 (77)	6,232 (839)

Appendix 21-4.–Estimated harvest, catch and release, fishing pressure, and catch per hour by shanty anglers, Lake Gogebic, Gogebic and Ontonagon Counties, 1999. Two standard errors are given in parentheses.

Species	Catch/hour	Jan	Feb	Mar	Apr	Season
Yellow perch – harvest	0.4171 (0.1711)	182 (103)	973 (424)	5,917 (2,655)	179 (152)	7,251 (2,695)
Yellow perch – release	0.0071 (0.0079)	63 (125)	16 (25)	44 (45)	0 (0)	123 (135)
Walleye – harvest	0.0158 (0.0093)	107 (72)	168 (137)	0 (0)	0 (0)	275 (155)
Walleye – release	0.0752 (0.0258)	328 (163)	687 (316)	265 (149)	28 (31)	1,308 (387)
Lake herring – harvest	0.0030 (0.0037)	0 (0)	34 (61)	11 (15)	8 (13)	53 (64)
Lake herring – release	0.0005 (0.0011)	0 (0)	0 (0)	9 (20)	0 (0)	9 (20)
Rock bass – release	0.0026 (0.0053)	0 (0)	46 (93)	0 (0)	0 (0)	46 (93)
Northern pike – harvest	0.0033 (0.0035)	46 (58)	12 (16)	0 (0)	0 (0)	58 (60)
Northern pike – release	0.0072 (0.0053)	45 (65)	67 (59)	14 (23)	0 (0)	126 (91)
Black crappie – harvest	0.0003 (0.0006)	0 (0)	0 (0)	5 (10)	0 (0)	5 (10)
White sucker – harvest	0.0007 (0.0011)	8 (17)	0 (0)	5 (10)	0 (0)	13 (20)
White sucker – release	0.0062 (0.0039)	0 (0)	6 (12)	101 (64)	0 (0)	107 (65)
Total harvest	0.4403 (0.1732)	343 (139)	1,187 (450)	5,938 (2,655)	187 (153)	7,655 (2,701)
Total release	0.0989 (0.0304)	436 (216)	822 (335)	433 (171)	28 (31)	1,719 (435)
Total catch	0.5392 (0.1831)	779 (257)	2,009 (561)	6,371 (2,660)	215 (156)	9,374 (2,735)
Angler hours		3,909 (1,183)	6,045 (1,542)	6,988 (2,280)	444 (385)	17,386 (3,021)
Angler trips		744 (240)	1,207 (349)	1,455 (477)	78 (68)	3,484 (642)

Appendix 21-5.—Estimated harvest, catch and release, fishing pressure, and catch per hour by open ice anglers, Lake Gogebic, Gogebic and Ontonagon Counties, 1999. Two standard errors are given in parentheses.

Species	Catch/hour	Jan	Feb	Mar	Apr	Season
Yellow perch – harvest	0.2104 (0.0708)	189 (141)	775 (394)	1,934 (703)	59 (47)	2,957 (819)
Yellow perch – release	0.0058 (0.0046)	35 (49)	36 (35)	11 (17)	0 (0)	82 (63)
Walleye – harvest	0.0100 (0.0073)	55 (52)	86 (86)	0 (0)	0 (0)	141 (100)
Walleye – release	0.0621 (0.0237)	287 (203)	372 (184)	211 (92)	3 (4)	873 (289)
Lake herring – harvest	0.0044 (0.0030)	5 (10)	16 (31)	41 (24)	0 (0)	62 (40)
Lake herring – release	0.0008 (0.0008)	0 (0)	4 (6)	7 (9)	0 (0)	11 (11)
Rock bass – release	0.0009 (0.0018)	13 (26)	0 (0)	0 (0)	0 (0)	13 (26)
Northern pike – harvest	0.0008 (0.0013)	0 (0)	11 (18)	0 (0)	0 (0)	11 (18)
Northern pike – release	0.0063 (0.0067)	3 (6)	75 (92)	11 (11)	0 (0)	89 (93)
Black crappie – harvest	0.0006 (0.0011)	6 (13)	0 (0)	2 (5)	0 (0)	8 (14)
White sucker – harvest	0.0025 (0.0018)	9 (17)	0 (0)	26 (17)	0 (0)	35 (24)
White sucker – release	0.0022 (0.0010)	0 (0)	3 (1)	28 (13)	0 (0)	31 (13)
Total harvest	0.2287 (0.0733)	264 (153)	888 (404)	2,003 (704)	59 (47)	3,214 (827)
Total release	0.0782 (0.0269)	338 (211)	490 (209)	268 (95)	3 (4)	1,099 (312)
Total catch	0.3069 (0.0859)	602 (260)	1,378 (455)	2,271 (710)	62 (47)	4,313 (884)
Angler hours		2,013 (758)	4,762 (1,156)	7,008 (2,290)	270 (198)	14,053 (2,682)
Angler trips		427 (190)	944 (252)	1,326 (438)	51 (37)	2,748 (541)

Appendix 21-6.—Estimated harvest, catch and release, fishing pressure, and catch per hour, Lake Gogebic, Gogebic and Ontonagon Counties, May 1998 to April 1999. Legal and sublegal released estimates (by species) from Table 99 have been combined. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Jan	Feb	Mar	Apr	Season
Walleye – harvest	0.0765 (0.0284)	875 (620)	1,394 (747)	3,371 (2,314)	2,273 (1,527)	965 (873)	162 (89)	254 (161)	0 (0)	0 (0)	9,294 (3,070)
Walleye – release	0.6194 (0.2015)	16,089 (10,962)	11,644 (5,580)	26,340 (15,060)	11,864 (6,278)	7,156 (4,322)	615 (261)	1,059 (366)	476 (176)	31 (31)	75,274 (20,891)
Yellow perch – harvest	0.1230 (0.0372)	126 (133)	0 (0)	2,881 (2,221)	1,049 (813)	685 (689)	371 (175)	1,748 (578)	7,851 (2,746)	238 (160)	14,949 (3,744)
Yellow perch – release	0.0059 (0.0033)	60 (81)	148 (200)	73 (152)	136 (170)	94 (150)	98 (134)	52 (43)	55 (48)	0 (0)	716 (378)
Northern pike – harvest	0.0049 (0.0049)	9 (16)	179 (330)	265 (462)	37 (74)	31 (65)	46 (58)	23 (24)	0 (0)	0 (0)	590 (580)
Northern pike – release	0.0236 (0.0094)	518 (327)	485 (426)	1,042 (787)	418 (315)	188 (192)	48 (65)	142 (109)	25 (25)	0 (0)	2,866 (1,030)
Smallmouth bass – harvest	0.0133 (0.0089)	0 (0)	537 (594)	808 (825)	50 (100)	218 (237)	0 (0)	0 (0)	0 (0)	0 (0)	1,613 (1,049)
Smallmouth bass – release	0.0539 (0.0202)	367 (294)	696 (652)	2,952 (1,715)	1,471 (952)	1,062 (670)	0 (0)	0 (0)	0 (0)	0 (0)	6,548 (2,193)
Largemouth bass – release	0.0006 (0.0012)	0 (0)	0 (0)	73 (145)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	73 (145)
Pumpkinseed – release	0.0001 (0.0001)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	11 (10)	0 (0)	11 (10)
Rock bass – release	0.0085 (0.0057)	34 (56)	127 (195)	532 (543)	184 (256)	94 (192)	13 (26)	46 (93)	0 (0)	0 (0)	1,030 (669)
Black crappie – harvest	0.0001 (0.0001)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	6 (13)	0 (0)	7 (11)	0 (0)	13 (17)
Black crappie – release	0.0003 (0.0006)	0 (0)	0 (0)	0 (0)	37 (74)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	37 (74)

Appendix 21-6.–continued.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Jan	Feb	Mar	Apr	Season
Lake herring – harvest	0.0009 (0.0006)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	5 (10)	50 (68)	52 (28)	8 (13)	115 (75)
Lake herring – release	0.0002 (0.0002)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	4 (6)	16 (22)	0 (0)	20 (23)
White sucker – harvest	0.0004 (0.0003)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	17 (24)	0 (0)	31 (20)	0 (0)	48 (31)
White sucker – release	0.0011 (0.0006)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	9 (12)	129 (65)	0 (0)	138 (66)
Total harvest	0.2191 (0.0554)	1,010 (634)	2,110 (1,010)	7,325 (3,344)	3,409 (1,734)	1,899 (1,139)	607 (207)	2,075 (604)	7,941 (2,746)	246 (161)	26,622 (4,988)
Total release	0.7128 (0.2113)	17,068 (10,971)	13,100 (5,641)	30,939 (15,188)	14,110 (6,365)	8,594 (4,385)	774 (302)	1,312 (396)	701 (197)	31 (31)	86,629 (21,045)
Total catch	0.9319 (0.2382)	18,078 (10,989)	15,210 (5,731)	38,264 (15,552)	17,519 (6,597)	10,493 (4,531)	1,381 (366)	3,387 (722)	8,642 (2,753)	277 (164)	113,251 (21,628)
Angler hours		11,249 (6,115)	26,549 (11,259)	20,791 (10,751)	21,132 (9,903)	10,365 (5,657)	5,922 (1,405)	10,807 (1,927)	13,996 (3,231)	714 (432)	121,525 (20,643)
Angler trips		1,585 (932)	5,364 (2,558)	5,459 (3,007)	5,884 (2,924)	2,854 (1,588)	1,171 (306)	2,151 (431)	2,781 (647)	129 (77)	27,378 (5,313)



Appendix 22-1.–Grand Sable Lake, Alger County, 1998.

Site	Grand Sable Lake
Year	1998
County	Alger
Location	T. 49 N., R. 14 W., Sec. 10, 11, 14, 15, 22
Survey period	May 15 through September 30
Daily period	See Appendix 22-2
Survey design	Roving-access
Count method	Instantaneous, trailer
Interview type	Access, party, boating anglers, harvest, catch and release
Effort estimation	Multiple-day period Lockwood et al. (1999).
Catch estimation	Multiple-day period Lockwood et al. (1999).
Clerk	U. S. Forest Service clerk, ½ time
Survey purpose	Monitor lake trout stocking program
Notes	<p>This survey was done in conjunction with the Beaver Lake survey (see also Beaver Lake, 1998 chapter) and the clerk spent an entire sample day at either Grand Sable or Beaver Lake. Three randomly-selected weekdays, both weekends, and all holidays were sampled each week.</p> <p>Instantaneous counts of trailers, or any vehicles transporting fishing craft, were made at the launch site. Since the clerk remained at the launch site the entire shift, hourly counts (on the hour) were done throughout each shift. No overlap in counting times occurred between shifts.</p> <p>Angling parties were interviewed at the launch site.</p>

Appendix 22-2.–Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Grand Sable Lake, Alger County, 1998.

Month	Early		Late		Expansion value
	Shift	Count hours	Shift	Count hours	
May	0600 h – 1430 h	0600 h – 1400 h	1400 h – 2230 h	1500 h – 2200 h	17
June	0600 h – 1430 h	0600 h – 1400 h	1400 h – 2230 h	1500 h – 2200 h	17
July	0600 h – 1430 h	0600 h – 1400 h	1400 h – 2230 h	1500 h – 2200 h	17
August	0600 h – 1430 h	0600 h – 1300 h	1300 h – 2130 h	1400 h – 2100 h	16
September	0600 h – 1430 h	0600 h – 1300 h	1200 h – 2030 h	1400 h – 2000 h	15

Appendix 22-3.—Estimated harvest, fishing pressure, and catch per hour by boat anglers, Grand Sable Lake, Alger County, 1998. All estimates are given with 2 standard errors in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Season
Northern pike – harvest	0.0018 (0.0021)	9 (10)	0 (0)	0 (0)	0 (0)	0 (0)	9 (10)
Northern pike – release	0.0454 (0.0303)	25 (29)	33 (44)	144 (127)	0 (0)	31 (44)	233 (144)
Rock bass – harvest	0.0086 (0.0187)	0 (0)	44 (95)	0 (0)	0 (0)	0 (0)	44 (95)
Rock bass – release	0.0097 (0.0083)	6 (9)	11 (18)	12 (16)	0 (0)	21 (32)	50 (41)
Yellow perch – harvest	0.0300 (0.0472)	20 (43)	0 (0)	6 (11)	128 (235)	0 (0)	154 (239)
Yellow perch – release	0.3113 (0.2009)	34 (63)	123 (167)	812 (661)	201 (264)	429 (605)	1,599 (951)
Smallmouth bass – harvest	0.0066 (0.0085)	3 (6)	0 (0)	31 (43)	0 (0)	0 (0)	34 (43)
Smallmouth bass – release	0.0715 (0.0552)	14 (25)	149 (228)	60 (74)	113 (107)	31 (48)	367 (268)
Lake trout – harvest	0.0308 (0.0248)	23 (40)	61 (83)	74 (78)	0 (0)	0 (0)	158 (121)
Lake trout – release	0.0023 (0.0035)	0 (0)	0 (0)	12 (18)	0 (0)	0 (0)	12 (18)
Total – harvest	0.0777 (0.0594)	55 (60)	105 (126)	111 (90)	128 (235)	0 (0)	399 (288)
Total – release	0.4402 (0.2238)	79 (74)	316 (287)	1,040 (678)	314 (285)	512 (609)	2,261 (1,000)
Total catch	0.5179 (0.2406)	134 (95)	421 (313)	1,151 (684)	442 (369)	512 (609)	2,660 (1,040)
Angler hours		811 (342)	1,193 (636)	1,675 (831)	935 (502)	522 (442)	5,136 (1,288)
Angler trips		306 (138)	348 (202)	401 (203)	303 (177)	110 (103)	1,468 (378)

Appendix 22-4.—Residence of anglers (percent of anglers interviewed) by Michigan County and U.S. State, Grand Sable Lake, Alger County, 1998. Two standard errors are given in parentheses.

Residence	May	Jun	Jul	Aug	Sep	Season
Alger	45.00 (22.25)	7.14 (13.77)	19.23 (15.46)	10.00 (18.97)	0.00 (0.00)	21.91 (9.68)
Allegan	0.00 (0.00)	0.00 (0.00)	3.85 (7.54)	0.00 (0.00)	0.00 (0.00)	1.37 (2.72)
Arenac	0.00 (0.00)	7.14 (13.77)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.37 (2.72)
Bay	5.00 (9.75)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.37 (2.72)
Calhoun	5.00 (9.75)	7.14 (13.77)	3.85 (7.54)	0.00 (0.00)	0.00 (0.00)	2.74 (3.82)
Charlevoix	5.00 (9.75)	0.00 (0.00)	3.85 (7.54)	0.00 (0.00)	0.00 (0.00)	2.74 (3.82)
Cheboygan	0.00 (0.00)	7.14 (13.77)	3.85 (7.54)	0.00 (0.00)	0.00 (0.00)	2.74 (3.82)
Chippewa	5.00 (9.75)	0.00 (0.00)	3.85 (7.54)	10.00 (18.97)	0.00 (0.00)	4.11 (4.65)
Clare	0.00 (0.00)	7.14 (13.77)	3.85 (7.54)	0.00 (0.00)	0.00 (0.00)	2.74 (3.82)
Clinton	5.00 (9.75)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.37 (2.72)
Crawford	0.00 (0.00)	0.00 (0.00)	3.85 (7.54)	0.00 (0.00)	0.00 (0.00)	1.37 (2.72)
Genesee	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	10.00 (18.97)	33.33 (54.43)	2.74 (3.82)
Gladwin	0.00 (0.00)	7.14 (13.77)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.37 (2.72)
Grand Traverse	0.00 (0.00)	7.14 (13.77)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.37 (2.72)
Gratiot	0.00 (0.00)	0.00 (0.00)	3.85 (7.54)	0.00 (0.00)	0.00 (0.00)	1.37 (2.72)
Isabella	0.00 (0.00)	0.00 (0.00)	7.69 (10.45)	10.00 (18.97)	0.00 (0.00)	4.11 (4.65)
Kalamazoo	0.00 (0.00)	0.00 (0.00)	7.69 (10.45)	10.00 (18.97)	0.00 (0.00)	4.11 (4.65)
Kalkaska	0.00 (0.00)	0.00 (0.00)	3.85 (7.54)	20.00 (25.30)	0.00 (0.00)	4.11 (4.65)

Appendix 22-4.—continued.

Residence	May	Jun	Jul	Aug	Sep	Season
Kent	5.00 (9.75)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.37 (2.72)
Lapeer	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	33.33 (54.43)	1.37 (2.72)
Luce	0.00 (0.00)	0.00 (0.00)	3.85 (7.54)	0.00 (0.00)	0.00 (0.00)	1.37 (2.72)
Macomb	0.00 (0.00)	0.00 (0.00)	3.85 (7.54)	10.00 (18.97)	33.33 (54.43)	4.11 (4.65)
Midland	0.00 (0.00)	0.00 (0.00)	7.69 (10.45)	0.00 (0.00)	0.00 (0.00)	2.74 (3.82)
Montcalm	0.00 (0.00)	7.14 (13.77)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.37 (2.72)
Montmorency	5.00 (9.75)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.37 (2.72)
Muskegon	0.00 (0.00)	0.00 (0.00)	3.85 (7.54)	0.00 (0.00)	0.00 (0.00)	1.37 (2.72)
Oakland	0.00 (0.00)	0.00 (0.00)	3.85 (7.54)	0.00 (0.00)	0.00 (0.00)	1.37 (2.72)
Ottawa	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	10.00 (18.97)	0.00 (0.00)	1.37 (2.72)
Saginaw	0.00 (0.00)	7.14 (13.77)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.37 (2.72)
Sanilac	5.00 (9.75)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.37 (2.72)
Schoolcraft	5.00 (9.75)	7.14 (13.77)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	4.11 (4.65)
Shiawassee	0.00 (0.00)	14.29 (18.70)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	2.74 (3.82)
Wayne	0.00 (0.00)	5.00 (11.65)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.37 (2.72)
Wexford	0.00 (0.00)	7.14 (13.77)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.37 (2.72)

Appendix 22-4.--continued.

Residence	May	Jun	Jul	Aug	Sep	Season
Pennsylvania	0.00 (0.00)	0.00 (0.00)	3.85 (7.54)	0.00 (0.00)	0.00 (0.00)	1.37 (2.72)
Florida	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	10.00 (18.97)	0.00 (0.00)	1.37 (2.72)
Wisconsin	5.00 (9.75)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.37 (2.72)
Missouri	5.00 (9.75)	0.00 (0.00)	3.85 (7.54)	0.00 (0.00)	0.00 (0.00)	2.74 (3.82)
Parties interviewed	20	14	26	10	3	73

Appendix 23-1.–Hagerman Lake, Iron County, 1993.

Site	Hagerman Lake
Year	1993
County	Iron
Location	T. 42 N., R. 36 W., Sec. 2, 3, 10, 11
Survey period	May 15 through November 13
Daily period	See Appendix 23-2
Survey design	Roving-access
Count method	Instantaneous, fishing boats
Interview type	Access, party, boating anglers, harvest
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	See Appendix 1 of Lockwood et al. (1999)
Clerk	Fisheries Division clerk, 1/3 time
Survey purpose	Characterize general effort and catch aspects of the fishery, and angler residency
Notes	<p>One Fisheries Division clerk was used to collect count and interview data on Hagerman, Chicagon, and Stanley lakes (see also Chicagon and Stanley lakes, 1993 chapters). No interviews were collected at Stanley Lake, only effort was estimated. Hagerman and Chicagon lakes were sampled each scheduled workday with approximately equal time spent at each lake for interviewing. Three randomly-selected weekdays, each weekend day, and all holidays were selected for sampling during each week of the survey.</p> <p>Order of count was randomized and the clerk began a scheduled count at one of the three lakes and then proceeded to the others. One instantaneous count of fishing boats was made per day at each lake. Time of count was adjusted within shifts to sample the sunrise to sunset fishery.</p> <p>Interviewing was done at the access site.</p>

Appendix 23-2.—Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Hagerman Lake, Iron County, 1993.

Month	Shift		Expansion value
	Early	Late	
May	0600 h – 1500 h	1300 h – 2200 h	16
June	0600 h – 1500 h	1300 h – 2200 h	18
July	0600 h – 1500 h	1300 h – 2200 h	18
August	0600 h – 1500 h	1300 h – 2200 h	17
September	0600 h – 1500 h	1300 h – 2200 h	16
October	0600 h – 1500 h	1300 h – 2200 h	14
November	0600 h – 1500 h	1100 h – 2000 h	12



Appendix 23-3.—Estimated harvest, fishing pressure, and catch per hour by boat anglers, Hagerman Lake, Iron County, 1993. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Oct	Nov	Season
Northern pike	0.0014 (0.0021)	2 (5)	9 (20)	5 (10)	0 (0)	0 (0)	0 (0)	0 (0)	16 (23)
Yellow perch	0.0271 (0.0264)	0 (0)	0 (0)	149 (200)	0 (0)	154 (213)	4 (10)	0 (0)	307 (292)
Walleye	0.0993 (0.0415)	182 (151)	293 (222)	36 (33)	43 (47)	233 (177)	336 (238)	0 (0)	1,123 (404)
Smallmouth bass	0.0090 (0.0107)	0 (0)	59 (107)	9 (14)	31 (50)	3 (6)	0 (0)	0 (0)	102 (119)
Largemouth bass	0.0017 (0.0022)	0 (0)	0 (0)	14 (22)	0 (0)	5 (10)	0 (0)	0 (0)	19 (24)
Bluegill	0.0285 (0.0297)	0 (0)	24 (29)	260 (318)	39 (81)	0 (0)	0 (0)	0 (0)	323 (329)
Rock bass	0.0502 (0.0450)	0 (0)	185 (213)	383 (447)	0 (0)	0 (0)	0 (0)	0 (0)	568 (495)
Sunfish	0.0048 (0.0098)	0 (0)	0 (0)	54 (110)	0 (0)	0 (0)	0 (0)	0 (0)	54 (110)
Total harvest	0.2220 (0.0846)	184 (151)	570 (327)	910 (595)	113 (105)	395 (277)	340 (237)	0 (0)	2,512 (793)
Angler hours		1,387 (666)	3,457 (1,776)	2,124 (810)	2,059 (911)	1,381 (561)	906 (644)	0 (0)	11,314 (2,411)
Angler trips		262 (120)	906 (544)	894 (338)	671 (329)	245 (116)	172 (121)	0 (0)	3,150 (749)

Appendix 23-4.—Residence of anglers (percent of anglers interviewed), by Michigan County or U. S. State, Hagerman Lake, Iron County, 1993. Two standard errors are given in parentheses.

Residence	May	Jun	Jul	Aug	Sep	Oct	Season
Delta	0 (0)	0 (0)	2.06 (2.89)	0 (0)	0 (0)	0 (0)	0.48 (0.68)
Dickinson	0 (0)	6.73 (4.91)	0 (0)	0 (0)	3.85 (5.33)	0 (0)	2.18 (1.44)
Iron	10.17 (7.87)	11.54 (6.27)	9.28 (5.89)	10.17 (7.87)	3.85 (5.33)	4.76 (6.57)	8.96 (2.81)
Marquette	0 (0)	0 (0)	2.06 (2.89)	0 (0)	0 (0)	0 (0)	0.48 (0.68)
Menominee	0 (0)	0 (0)	2.06 (2.89)	0 (0)	0 (0)	2.38 (4.70)	0.73 (0.84)
Oakland	0 (0)	0 (0)	2.06 (2.89)	0 (0)	0 (0)	0 (0)	0.48 (0.68)
Ottawa	0 (0)	0 (0)	2.06 (2.89)	0 (0)	0 (0)	0 (0)	0.48 (0.68)
Wayne	0 (0)	0 (0)	1.03 (2.05)	0 (0)	0 (0)	0 (0)	0.24 (0.48)
Illinois	3.39 (4.71)	31.73 (9.13)	18.56 (7.89)	22.03 (10.79)	7.69 (7.39)	0 (0)	16.95 (3.69)
Wisconsin	86.44 (8.91)	50.00 (9.81)	60.82 (9.91)	67.80 (12.17)	84.62 (10.01)	92.86 (7.95)	69.01 (4.55)
Anglers interviewed	59	104	97	59	52	42	413

Appendix 23-5.—Type of bait used by anglers (percent of anglers interviewed), Hagerman Lake, Iron County, 1993. Two standard errors are given in parentheses.

Bait used	May	Jun	Jul	Aug	Sep	Oct	Season
Live	96.61 (4.71)	63.81 (9.38)	46.58 (11.68)	61.54 (13.49)	62.75 (13.54)	90.24 (9.27)	67.98 (4.78)
Artificial	1.69 (3.36)	0.95 (1.90)	2.74 (3.82)	1.92 (3.81)	0 (0)	9.76 (9.27)	2.36 (1.56)
Both	1.69 (3.36)	35.24 (9.32)	50.68 (11.70)	36.54 (13.36)	37.25 (13.54)	0 (0)	29.66 (4.68)
Anglers interviewed	59	105	73	52	51	41	381

Appendix 23-6.—Species of fish sought by anglers (percent of anglers interviewed), Hagerman Lake, Iron County, 1993. Two standard errors are given in parentheses.

Species sought	May	Jun	Jul	Aug	Sep	Oct	Season
Bass & bluegill	0 (0)	4.95 (4.32)	4.17 (4.08)	0 (0)	0 (0)	0 (0)	2.24 (1.48)
Pike & bass	0 (0)	2.97 (3.38)	7.29 (5.31)	0 (0)	0 (0)	4.76 (6.57)	2.99 (1.70)
Panfish	0 (0)	11.88 (6.44)	6.25 (4.94)	0 (0)	0 (0)	0 (0)	4.48 (2.06)
Bass	0 (0)	0 (0)	8.33 (5.64)	1.89 (3.74)	0 (0)	0 (0)	2.24 (1.48)
Pike & perch	0 (0)	0 (0)	1.04 (2.07)	0 (0)	3.92 (5.44)	0 (0)	0.75 (0.86)
Pike & walleye	3.39 (4.71)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.50 (0.70)
Walleye & perch	94.92 (5.72)	57.43 (9.84)	41.67 (10.06)	45.28 (13.67)	84.31 (10.18)	90.48 (9.06)	64.43 (4.78)
Musky	0 (0)	0 (0)	2.08 (2.92)	0 (0)	0 (0)	4.76 (6.57)	1.00 (0.99)
Walleye	0 (0)	1.98 (2.77)	0 (0)	0 (0)	0 (0)	0 (0)	0.50 (0.70)
Smallmouth bass	0 (0)	9.90 (5.94)	0 (0)	3.77 (5.23)	0 (0)	0 (0)	2.99 (1.70)
Bluegill	1.69 (3.36)	0.99 (1.97)	0 (0)	0 (0)	0 (0)	0 (0)	0.50 (0.70)
Anything	0 (0)	9.90 (5.94)	29.17 (9.28)	49.06 (13.73)	11.76 (9.02)	0 (0)	17.41 (3.78)
Anglers interviewed	59	101	96	53	51	42	402

Appendix 23-7.—Number of fishing trips per day by anglers (percent of anglers interviewed), Hagerman Lake, Iron County, 1993. Two standard errors are given in parentheses.

Trips/day	May	Jun	Jul	Aug	Sep	Oct	Season
1	96.61 (4.71)	100.00 (0)	82.98 (7.75)	100.00 (0)	90.38 (8.18)	100.00 (0)	94.40 (2.27)
2	3.39 (4.71)	0 (0)	17.02 (7.75)	0 (0)	9.62 (8.18)	0 (0)	5.60 (2.27)
Anglers interviewed	59	105	94	59	52	42	411

Appendix 23-8.—Gender of anglers (percent of anglers interviewed), Hagerman Lake, Iron County, 1993. Two standard errors are given in parentheses.

Gender	May	Jun	Jul	Aug	Sep	Oct	Season
Male	96.61 (4.71)	87.62 (6.43)	83.51 (7.54)	81.36 (10.14)	82.69 (10.49)	92.86 (7.95)	86.96 (3.31)
Female	3.39 (4.71)	12.38 (6.43)	16.49 (7.54)	18.64 (10.14)	17.31 (10.49)	7.14 (7.95)	13.04 (3.31)
Anglers interviewed	59	105	97	59	52	42	414

Appendix 24-1.–Hagerman Lake, Iron County, 1993-94.

Site	Hagerman Lake
Year	1993-94
County	Iron
Location	T. 42 N., R. 36 W., Sec. 2, 3, 10, 11
Survey period	December 13, 1993 through March 15, 1994
Daily period	See Appendix 24-2
Survey design	Roving-roving
Count method	Instantaneous, occupied ice shanties, open ice anglers
Interview type	Roving, party, shanty anglers, open ice anglers, harvest
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	See Appendix 1 of Lockwood et al. (1999)
Clerk	Fisheries Division clerk, 1/3 time
Survey purpose	Characterize general effort and catch aspects of the fishery, and angler residency
Notes	<p>One Fisheries Division supported clerk was used to collect count and interview data from Hagerman, Chicagon, and Stanley lakes (see also Chicagon and Stanley lakes, 1993-94 chapters). While time allocated at each lake was not specified, the clerk spent the most time at Chicagon Lake and consequently collected the most interviews from Chicagon Lake. Three randomly-selected weekdays, each weekend day, and all holidays were selected for sampling during each week of the survey. (Note December 25 and January 1 were not sampled.)</p> <p>One instantaneous count per day was made and order of count was randomized allowing each of the lake to be counted first, second, or third. At each lake, the clerk roved the lake counting occupied ice fishing shanties and open ice anglers.</p> <p>Predominantly incomplete party interviews were collected (20 out of 23). All interviews (access and roving) were treated the same with catch rate estimated using the mean-of-ratios catch rate estimator.</p>

Appendix 24-2.—Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Hagerman Lake, Iron County, 1993-94.

Month	Shift		Expansion value
	Early	Late	
December	0700 h – 1530 h	1100 h – 1930 h	10
January	0700 h – 1530 h	1100 h – 1930 h	10
February	0600 h – 1500 h	1200 h – 2030 h	11
March	0600 h – 1500 h	1200 h – 2030 h	11

Appendix 24-3.—Total estimated harvest, fishing pressure, and catch per hour, Hagerman Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Species	Catch/hour	Dec	Jan	Feb	Mar	Season
Northern pike	0.0209 (0.0309)	0 (0)	0 (0)	0 (0)	8 (11)	8 (11)
Yellow perch	0.0026 (0.0158)	1 (6)	0 (0)	0 (0)	0 (0)	1 (6)
Walleye	0.1309 (0.1840)	22 (57)	2 (6)	0 (0)	26 (31)	50 (65)
Total harvest	0.1545 (0.1915)	23 (57)	2 (6)	0 (0)	34 (33)	59 (66)
Angler hours		72 (92)	186 (153)	0 (0)	124 (99)	382 (204)
Angler trips		24 (33)	62 (52)	0 (0)	26 (28)	112 (67)

Appendix 24-4.—Estimated harvest, fishing pressure, and catch per hour by shanty anglers, Hagerman Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Species	Catch/hour	Dec	Jan	Feb	Mar	Season
Yellow perch	0.0050 (0.0301)	1 (6)	0 (0)	0 (0)	0 (0)	1 (6)
Walleye	0.0498 (0.1168)	1 (6)	0 (0)	0 (0)	9 (21)	10 (22)
Total harvest	0.0547 (0.1183)	2 (8)	0 (0)	0 (0)	9 (21)	11 (22)
Angler hours		20 (40)	153 (149)	0 (0)	28 (59)	201 (165)
Angler trips		7 (13)	51 (50)	0 (0)	9 (20)	67 (55)

Appendix 24-5.—Estimated harvest, fishing pressure, and catch per hour by open ice anglers, Hagerman Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Species	Catch/hour	Dec	Jan	Feb	Mar	Season
Northern pike	0.0442 (0.0675)	0 (0)	0 (0)	0 (0)	8 (11)	8 (11)
Walleye	0.2210 (0.3726)	21 (57)	2 (6)	0 (0)	17 (23)	40 (62)
Total harvest	0.2652 (0.3900)	21 (57)	2 (6)	0 (0)	25 (25)	48 (63)
Angler hours		52 (83)	33 (33)	0 (0)	96 (79)	181 (120)
Angler trips		17 (30)	11 (13)	0 (0)	17 (20)	45 (38)

Appendix 24-6.—Residence of anglers (percent of anglers interviewed) by Michigan County or U. S. State, Hagerman Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Residence	Dec	Jan	Feb	Mar	Season
Iron	0 (0)	72.73 (26.86)	100.00 (0)	52.94 (24.21)	50.00 (15.81)
Wisconsin	100.00 (0)	27.27 (26.86)	0 (0)	47.06 (24.21)	50.00 (15.81)
Anglers interviewed	9	11	3	17	40

Appendix 24-7.—Type of bait or method used by anglers (percent of anglers interviewed), Hagerman Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Bait or method used	Dec	Jan	Feb	Mar	Season
Live & artificial	0 (0)	9.09 (17.34)	0 (0)	0 (0)	2.50 (4.94)
Tip-up	55.56 (33.13)	36.36 (29.01)	0 (0)	70.59 (22.10)	52.50 (15.79)
Spear	0 (0)	54.55 (30.03)	100.00 (0)	0 (0)	22.50 (13.21)
Jigging & tip-up	44.44 (33.13)	0 (0)	0 (0)	29.41 (22.10)	22.50 (13.21)
Anglers interviewed:	9	11	3	17	40



Appendix 24-8.—Species of fish sought by anglers (percent of anglers interviewed), Hagerman Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Species sought	Dec	Jan	Feb	Mar	Season
Pike	0 (0)	0 (0)	100.00 (0)	0 (0)	6.98 (7.77)
Walleye & perch	100.00 (0)	36.36 (29.01)	0 (0)	75.00 (19.36)	65.12 (14.54)
Walleye, pike & perch	0 (0)	0 (0)	0 (0)	10.00 (13.42)	4.65 (6.42)
Pike & Bass	0 (0)	63.64 (29.01)	0 (0)	15.00 (15.97)	23.26 (12.88)
Anglers interviewed	9	11	3	20	43

Appendix 24-9.—Number of trips per day by anglers (percent of anglers interviewed), Hagerman Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Trips/day	Dec	Jan	Feb	Mar	Season
1	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)
Anglers interviewed	9	11	3	20	43

Appendix 24-10.—Gender of anglers (percent of anglers interviewed), Hagerman Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Gender	Dec	Jan	Feb	Mar	Season
Male	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)
Anglers interviewed	9	11	3	20	43

Appendix 25-1.-Hagerman Lake, Iron County, 1994.

Site	Hagerman Lake
Year	1994
County	Iron
Location	T. 42 N., R. 36 W., Sec. 2, 3, 10, 11
Survey period	May 15 through October 31
Daily period	See Appendix 25-2
Survey design	Roving (counts only)
Count method	Instantaneous, fishing boats
Interview type	
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	
Clerk	Fisheries Division clerk, 1/3 time
Survey purpose	Estimate angling effort
Notes	<p>Instantaneous boat counts were made from a single vantage point. One Fisheries Division creel clerk collected count and interview data from Chicagon and Stanley lakes (see also Chicagon and Stanley lakes, 1994 chapter), and count data only from Hagerman Lake. Similar amounts of time were allocated for Chicagon and Stanley lakes with only count time allocated to Hagerman Lake. Three randomly-selected weekdays, each weekend day, and all holidays were selected each week for sampling.</p> <p>One count per day was made at each lake. Counting order was randomized with each lake sampled first, second, or third.</p> <p>Since no interviews were collected from Hagerman Lake during 1994, angler trips were calculated using mean length of trip from Stanley Lake (1994) interview data.</p>

Appendix 25-2.—Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Hagerman Lake, Iron County, 1994.

Month	Shift		Expansion value
	Early	Late	
May	0600 h – 1500 h	1300 h – 2200 h	16
June	0600 h – 1500 h	1300 h – 2200 h	18
July	0600 h – 1500 h	1300 h – 2200 h	18
August	0600 h – 1500 h	1300 h – 2200 h	17
September	0600 h – 1500 h	1300 h – 2200 h	16
October	0600 h – 1500 h	1300 h – 2200 h	14

Appendix 25-3.—Estimated fishing pressure by boat anglers, Hagerman Lake, Iron County, 1994. Two standard errors are given in parentheses.

Effort	May	Jun	Jul	Aug	Sep	Oct	Season
Angler hours	1,764 (887)	2,560 (1,018)	1,628 (647)	2,,023 (614)	1,615 (594)	1,047 (557)	10,637 (1812)
Angler trips	669 (375)	887 (382)	451 (188)	581 (190)	414 (174)	346 (235)	3,348 (666)

Appendix 26-1.-Lavine Lake, Branch County, 1998.

Site	Lavine Lake
Year	1998
County	Branch
Location	T. 8 S., R. 6 W., Sec. Many
Survey period	June 19 to August 8 (16 Friday and Saturday nights)
Daily period	2100 h to 2400 h
Survey design	Proportional-voluntary
Count method	Instantaneous, trailer
Interview type	Voluntary, party, boating anglers, harvest, catch and release
Effort estimation	Proportional, Equations (1)-(7)
Catch estimation	Multiple-day period (Lockwood et al. 1999)
Clerk	Fisheries Division-supported
Survey purpose	Evaluate rainbow trout plants
Notes	<p>One clerk traveled to access sites at each of eight lakes (see also Allen, Bird, Deep, Cary, Farwell, Gilead, and Swains lakes, 1988 chapters) on Friday and Saturday nights and recorded the number of trailers, or vehicles that appeared to have transported boats, and the hour at which the count was made.</p> <p>Catch rate was estimated from postpaid interview cards placed on the windshields of vehicles in the public launch sites located at each lake. Voluntary access interviews were collected, by angling party, to estimate catch rate. A zip-lock bag containing a self-addressed post card, explanation of the survey, and a lead pencil, was placed under each vehicle's windshield wiper. Anglers recorded number of anglers in their party, number of fish harvested, number of fish caught-and-released, start time, and finish time.</p>

Appendix 26-2.-Estimated harvest, harvest rate, catch and release, catch and release rate, and angling effort, Lavine Lake, Branch County, 1998. All estimates are given with 2 standard errors in parentheses.

	Catch/hour	Estimate
Rainbow trout – harvest	0.2727 (0.6419)	15 (25)
Rainbow trout - release	0.0 (0.0)	0 (0)
Angler hours		53 (86)
Angler trips		13 (21)

Appendix 27-1.-Marion Lake, Gogebic County, 1993.

Site	Marion Lake
Year	1993
County	Gogebic
Location	T. 45 N., R. 38 W., Sec. 29, 30, 32
Survey period	May 15 through September 6
Daily period	See Appendix 27-2
Survey design	Roving-access
Count method	Instantaneous, fishing boats, shore anglers
Interview type	Access, party, boating anglers, shore anglers
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	No fish harvested
Clerk	Fisheries Division clerk, ½ time
Survey purpose	Characterize general effort and catch aspects of the fishery, and angler residency
Notes	<p>One Fisheries Division clerk collected count and interview data from Marion and Pomeroy lakes (see also Pomeroy Lake, 1993 chapter). Both lakes were sampled each scheduled workday. Three randomly-selected weekdays, each weekend day, and all holidays were selected for sampling each week of the survey period.</p> <p>Order of instantaneous counts was randomized allowing each lake to be counted either first or second. Fishing boats and shore anglers were counted once per scheduled day.</p> <p>Interviewing was done at the public access site. The clerk observed no harvested fish and fish caught-and-released were not recorded.</p>

Appendix 27-2.—Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Marion Lake, Gogebic County, 1993.

Month	Shift		Expansion value
	Early	Late	
May	0600 h – 1500 h	1300 h – 2200 h	16
June	0600 h – 1500 h	1300 h – 2200 h	18
July	0600 h – 1500 h	1300 h – 2200 h	18
August	0600 h – 1500 h	1300 h – 2200 h	17
September	0600 h – 1500 h	1300 h – 2200 h	16

Appendix 27-3.—Estimated total fishing pressure, Marion Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Effort	May	Jun	Jul	Aug	Sep	Season
Angler hours	0 (0)	581 (521)	1,475 (1,161)	1,204 (1,002)	105 (149)	3,365 (1,627)
Angler trips	0 (0)	182 (182)	461 (418)	377 (353)	33 (49)	1,053 (578)

Appendix 27-4.—Estimated fishing pressure by boat anglers, Marion Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Effort	May	Jun	Jul	Aug	Sep	Season
Angler hours	0 (0)	581 (521)	1,475 (1,161)	1,151 (996)	105 (149)	3,312 (1,623)
Angler trips	0 (0)	182 (182)	461 (418)	360 (351)	33 (49)	1,036 (577)

Appendix 27-5.—Estimated fishing pressure by shore anglers, Marion Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Effort	May	Jun	Jul	Aug	Sep	Season
Angler hours	0 (0)	0 (0)	0 (0)	53 (107)	0 (0)	53 (107)
Angler trips	0 (0)	0 (0)	0 (0)	17 (34)	0 (0)	17 (34)

Appendix 27-6.—Residence of anglers (percentage of anglers interviewed) by U. S. State, Marion Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Residence	Season
Michigan	0.0 (0.0)
Wisconsin	80.00 (35.78)
Other	20.00 (35.78)
Anglers interviewed	5

Appendix 27-7.—Type of bait used by anglers (percent of anglers interviewed), Marion Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Bait used	Jul	Aug	Sep	Season
Live	66.67 (54.43)	100.00 (0)	0 (0)	60.00 (43.82)
Live & artificial	33.33 (54.43)	0 (0)	100.00 (0)	40.00 (43.82)
Anglers interviewed	3	1	1	5



Appendix 27-8.—Species of fish sought by anglers (percent of anglers interviewed), Marion Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Species sought	Jul	Aug	Sep	Season
Walleye & northern pike	33.33 (54.43)	0 (0)	100.00 (0)	40.00 (43.82)
Anything	66.67 (54.43)	100.00 (0)	0 (0)	60.00 (43.82)
Anglers interviewed	3	1	1	5

Appendix 27-9.—Number of fishing trips per day by anglers (percent of anglers interviewed), Marion Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Trips/day	Jul	Aug	Sep	Season
1	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)
Anglers interviewed	3	1	1	5

Appendix 27-10.—Gender of anglers (percent of anglers interviewed), Marion Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

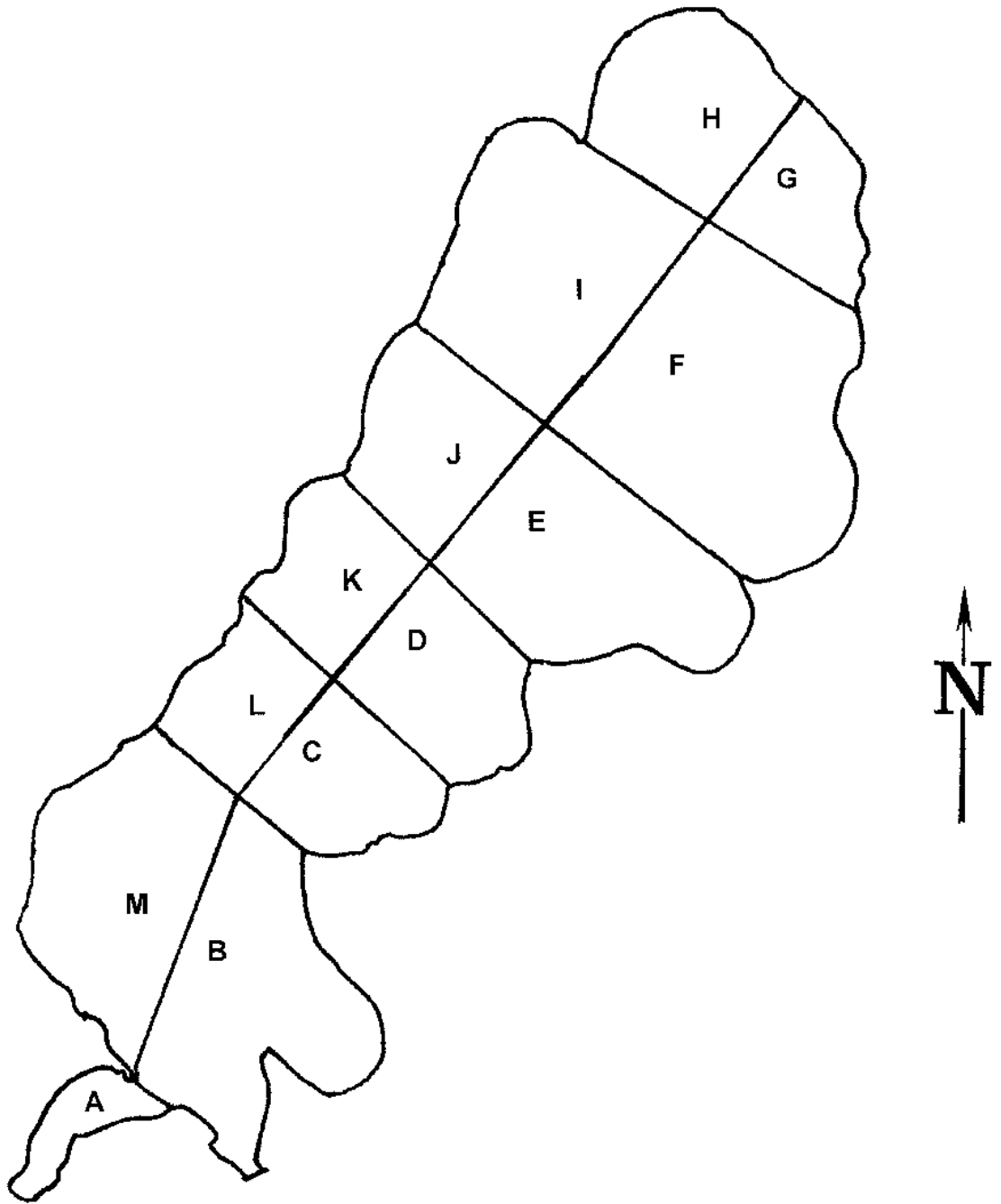
Gender	Jul	Aug	Sep	Season
Male	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)
Anglers interviewed	3	1	1	5

Appendix 28-1.–Mullett Lake, Cheboygan County, 1998.

Site	Mullett Lake
Year	1998
County	Cheboygan
Location	T. 35-37 N., R 1, 2 W., Sec. Many
Survey period	May 17 through August 31
Daily period	See Appendix 28-2
Survey design	Aerial-roving
Count method	Instantaneous, fishing boats
Interview type	Roving, individual angler, boating anglers, harvest, catch and release
Effort estimation	Multiple-day period (Lockwood et al. 1999)
Catch estimation	Multiple-day period (Lockwood et al. 1999)
Clerk	Airplane pilot, one full time clerk, both funded by MAPS
Survey purpose	Evaluate walleye fishery
Notes	<p>Mullett Lake was divided into 13 grids (Appendix figure 28-1). All estimates were calculated by grid and then summed to provide lake-wide estimates. This was a cooperative project between the Mullett Area Preservation Society (MAPS ) and Fisheries Division. The Mullett Area Preservation Society provided funding for air counts, clerk salary, and boat fuel. Fisheries Division supervised the project and supplied boat, motor, and any other necessary equipment. Three randomly-selected weekdays, both weekend days, and all holidays were sampled weekly throughout the project. Two sampling shifts were used throughout the survey and air counts were done within these shift periods (Appendix 28-2).</p> <p>One instantaneous count of fishing boats was made per scheduled sample day. The plane flew out of the Cheboygan Airport. Grids on the west side of Mullett Lake were counted from north to south and grids on the east side were counted from south to north. This counting pattern was not changed due to the relatively short time it took to count the entire lake (~10 min.). The aircraft maintained an altitude of approximately 500-700 feet while the pilot counted fishing boats by grid. Counts were made on the hour <math>\pm 0.5</math>h. That is, a count could have been made 0.5 h before or after the scheduled time. This was done to avoid storm fronts moving through the area that may have prevented counting right on the specific hour. During the survey period two air counts were not made due to fog, August 20 and 23. Since the interview clerk recorded start time of fishing trips, approximate number of boats present at the scheduled time of the count was known. On August 20 the clerk was not scheduled to work and the count for all grids was assumed to be 0. On August 23 one boating party, from the interview data set, was present in grid F and was used as the count (all other grid counts were assumed to be 0).</p>

Appendix 28-1.–continued.

Notes	<p>The clerk roved the lake in a boat and interviewed anglers as they fished (incomplete trip interviews). All angling parties fished a minimum of 0.5 h (Pollock et al. 1997). Starting location (either end of the lake) and direction (clockwise or counter clockwise) of the clerk's interviewing route were randomly selected. To avoid party-size bias, both harvested and caught-and-released fish were recorded by individual angler (Lockwood 1997). Interviews were recorded by grid.</p> <p>Since only incomplete-trip interviews were collected, mean length of completed trip was not measured. Estimated trip length from 1993 Burt Lake survey was used (<math>\bar{x} = 4.1382, s_{\bar{x}}^2 = 0.09178</math>).</p>
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Appendix figure 28-1.—Counting and interviewing grids, Mullett Lake, Cheboygan County, 1998.

Appendix 28-2.—Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Mullett Lake, Cheboygan County, 1998.

Month	Shift		Expansion value
	Early	Late	
May	0600 h – 1430 h	1330 h – 2200 h	16
June	0600 h – 1430 h	1330 h – 2200 h	18
July	0600 h – 1430 h	1300 h – 2130 h	18
August	0630 h – 1500 h	1230 h – 2100 h	17

Appendix 28-3.—Estimated harvest, catch-and-release, angling effort, and catch per hour by boat anglers, Mullett Lake, Cheboygan County, 1998. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Season
Walleye – harvest	0.0381 (0.0080)	112 (76)	732 (310)	1,573 (472)	921 (299)	3,338 (643)
Walleye – release	0.0211 (0.0067)	11 (15)	204 (132)	785 (444)	844 (321)	1,844 (564)
Northern pike – harvest	0.0066 (0.0022)	47 (47)	163 (94)	260 (132)	106 (87)	576 (190)
Northern pike – release	0.0386 (0.0101)	490 (264)	1,477 (679)	805 (299)	609 (296)	3,381 (841)
Rock bass – harvest	0.0108 (0.0065)	84 (80)	88 (65)	575 (526)	202 (190)	949 (569)
Rock bass – release	0.0109 (0.0042)	107 (117)	62 (59)	697 (324)	84 (73)	950 (357)
Yellow perch – harvest	0.1404 (0.0285)	184 (111)	3,857 (1,477)	5,084 (1,510)	3,161 (823)	12,286 (2,270)
Yellow perch – release	0.2128 (0.0351)	74 (68)	1,990 (967)	10,657 (2,030)	5,905 (1,372)	18,626 (2,635)
Pumpkinseed sunfish – harvest	0.0044 (0.0034)	0 (0)	0 (0)	0 (0)	381 (290)	381 (290)
Pumpkinseed sunfish – release	0.0002 (0.0004)	0 (0)	0 (0)	0 (0)	14 (28)	14 (28)
Smallmouth bass – harvest	0.0105 (0.0036)	49 (43)	520 (230)	203 (164)	146 (117)	918 (309)
Smallmouth bass – release	0.0147 (0.0043)	224 (137)	569 (280)	290 (139)	205 (112)	1,288 (359)
Lake trout – harvest	0.0002 (0.0003)	0 (0)	5 (9)	12 (23)	0 (0)	17 (25)
Lake trout – release	0.0002 (0.0004)	0 (0)	0 (0)	21 (37)	0 (0)	21 (37)
Rainbow trout – harvest	0.0016 (0.0012)	14 (28)	20 (27)	48 (63)	54 (69)	136 (101)
Rainbow trout – release	0.0002 (0.0002)	3 (4)	0 (0)	0 (0)	16 (22)	19 (22)
Cisco – harvest	0.0002 (0.0003)	0 (0)	0 (0)	0 (0)	18 (24)	18 (24)

Appendix 28-3.–continued.

Species	Catch/hour	May	Jun	Jul	Aug	Season
Cisco – release	0.0002 (0.0003)	0 (0)	0 (0)	15 (22)	0 (0)	15 (22)
White sucker – release	0.0004 (0.0006)	0 (0)	0 (0)	0 (0)	35 (56)	35 (56)
White bass – harvest	0.0007 (0.0008)	46 (62)	14 (28)	0 (0)	0 (0)	60 (68)
White bass – release	0.0003 (0.0004)	2 (3)	11 (22)	14 (29)	0 (0)	27 (37)
Bullhead – harvest	0.0005 (0.0006)	0 (0)	0 (0)	40 (57)	8 (13)	48 (58)
Bullhead – release	0.0042 (0.0020)	9 (14)	28 (55)	182 (129)	149 (99)	368 (172)
Total harvest	0.2140 (0.0336)	536 (183)	5,399 (1,531)	7,795 (1,683)	4,997 (956)	18,727 (2,475)
Total release	0.3038 (0.0417)	920 (328)	4,341 (1,224)	13,466 (2,134)	7,861 (1,451)	26,588 (2,875)
Total catch	0.5178 (0.0616)	1,456 (375)	9,740 (1,960)	21,261 (2,717)	12,858 (1,738)	45,315 (3,793)
Angler hours		4,220 (1,175)	21,969 (4,467)	38,557 (4,600)	22,774 (3,502)	87,520 (7,400)
Angler trips		1,020 (288)	5,309 (1,097)	9,317 (1,157)	5,502 (869)	21,148 (1,839)

Appendix 28-4.—Species of fish sought by boat anglers (percent of anglers interviewed), Mullett Lake, Cheboygan County, 1998. Percentages are given with 2 standard errors in parentheses.

Species	May	Jun	Jul	Aug	Season
Anything	0.94 (0.83)	0.00 (0.00)	0.11 (0.15)	0.00 (0.00)	0.14 (0.10)
Musky	0.37 (0.53)	0.08 (0.16)	0.00 (0.00)	0.14 (0.19)	0.10 (0.09)
Northern pike	15.92 (3.17)	9.64 (1.69)	7.75 (1.24)	7.23 (1.35)	8.91 (0.80)
Northern pike & smallmouth bass	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.07 (0.14)	0.02 (0.04)
Northern pike & yellow perch	1.12 (0.91)	0.00 (0.00)	1.12 (0.49)	0.68 (0.43)	0.73 (0.24)
Pumpkinseed sunfish	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.20 (0.24)	0.06 (0.07)
Rock bass	1.31 (0.98)	1.23 (0.63)	1.01 (0.46)	0.48 (0.36)	0.94 (0.27)
Rock bass & smallmouth bass	0.00 (0.00)	0.00 (0.00)	0.32 (0.26)	0.00 (0.00)	0.12 (0.10)
Rock bass & yellow perch	1.12 (0.91)	0.16 (0.23)	1.60 (0.58)	0.89 (0.49)	1.00 (0.28)
Rock bass, yellow perch & pumpkinseed sunfish	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.75 (0.45)	0.22 (0.13)
Smallmouth bass	10.67 (2.67)	12.83 (1.91)	4.81 (0.99)	4.57 (1.09)	7.28 (0.73)
Trout	0.75 (0.75)	1.14 (0.61)	1.87 (0.63)	1.36 (0.61)	1.43 (0.33)
Walleye	55.06 (4.31)	62.42 (2.77)	58.97 (2.27)	57.67 (2.58)	59.02 (1.38)
Walleye & northern pike	1.87 (1.17)	0.49 (0.40)	1.12 (0.49)	1.16 (0.56)	1.06 (0.29)
Walleye & rainbow trout	0.00 (0.00)	0.00 (0.00)	0.21 (0.21)	1.16 (0.56)	0.41 (0.18)
Walleye & rock bass	0.56 (0.65)	0.00 (0.00)	0.00 (0.00)	0.07 (0.14)	0.08 (0.08)
Walleye & smallmouth bass	0.56 (0.65)	0.00 (0.00)	0.05 (0.11)	0.20 (0.24)	0.14 (0.10)
Walleye & yellow perch	0.37 (0.53)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.04 (0.06)
White bass	1.31 (0.98)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.14 (0.10)



Appendix 28-4.—continued.

Species	May	Jun	Jul	Aug	Season
Yellow perch	7.30 (2.25)	12.01 (1.86)	20.57 (1.87)	22.22 (2.17)	17.60 (1.07)
Yellow perch & pumpkinseed sunfish	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.14 (0.19)	0.04 (0.06)
Not recorded	0.75 (0.75)	0.00 (0.00)	0.48 (0.32)	1.02 (0.53)	0.55 (0.21)
Total anglers interviewed	534	1,224	1,872	1,467	5,097

Appendix 29-1.–Petes Lake, Schoolcraft County, 1993.

Site	Petes Lake
Year	1993
County	Schoolcraft
Location	T. 44 N., R. 18 W., Sec. 7, 8
Survey period	May 15 through September 11
Daily period	See Appendix 29-2
Survey design	Roving-access
Count method	Instantaneous, fishing boats, shore anglers
Interview type	Access, party, boating anglers, shore anglers, harvest
Effort estimation	See Appendix 1 of Lockwood et al. (1999).
Catch estimation	See Appendix 1 of Lockwood et al. (1999).
Clerk	U. S. Forest Service clerk, ½ time
Survey purpose	Characterize general effort and catch aspects of the fishery
Notes	<p>One clerk was used to collect count and interview data at Petes Lake and at Wedge Lake (see also Wedge Lake, 1993 chapter). Three randomly-selected weekdays, each weekend day, plus all holidays were sampled each week. One of two shifts was selected each workday (Appendix 29-2). Both lakes were sampled each workday and the clerk spent approximately equal time at each lake. This survey was a cooperative project with the United States Forest Service. Creel clerk salary and vehicle expenses were paid by the U.S.F.S.; Fisheries Division provided supervision, sample design, data processing, and calculation of estimates.</p> <p>One instantaneous boat count and one instantaneous shore angler count were made at each lake per sample day. Counting order of lakes was randomized.</p> <p>Sixteen incomplete boat-party trip interviews and 135 complete boat-party trip interviews were collected; no shore anglers were interviewed.</p>

Appendix 29-2.—Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Petes Lake, Schoolcraft County, 1993.

Month	Shift		Expansion value
	Early	Late	
May	0600 h – 1500 h	1300 h – 2200 h	16
June	0600 h – 1500 h	1300 h – 2200 h	18
July	0600 h – 1500 h	1300 h – 2200 h	18
August	0600 h – 1500 h	1300 h – 2200 h	17
September	0600 h – 1500 h	1300 h – 2200 h	16

Appendix 29-3.—Estimated harvest, fishing pressure, and catch per hour by all modes of fishing, Petes Lake, Schoolcraft County, 1993. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Season
Yellow perch	0.0050 (0.0104)	0 (0)	0 (0)	0 (0)	15 (31)	0 (0)	15 (31)
Walleye	0.0721 (0.0634)	0 (0)	15 (28)	2 (4)	143 (159)	57 (81)	217 (181)
Smallmouth bass	0.0229 (0.0200)	0 (0)	10 (15)	30 (48)	25 (25)	4 (8)	69 (57)
Largemouth bass	0.0010 (0.0020)	3 (6)	0 (0)	0 (0)	0 (0)	0 (0)	3 (6)
Bluegill	0.0518 (0.0446)	0 (0)	14 (33)	20 (31)	81 (82)	41 (87)	156 (127)
Rock bass	0.0013 (0.0030)	0 (0)	4 (9)	0 (0)	0 (0)	0 (0)	4 (9)
Total harvest	0.1542 (0.0878)	3 (6)	43 (46)	52 (57)	264 (183)	102 (119)	464 (230)
Angler hours		135 (208)	382 (350)	1,186 (497)	1,074 (509)	232 (194)	3,009 (842)
Angler trips		44 (68)	140 (129)	453 (192)	401 (217)	69 (61)	1,107 (330)

Appendix 29-4.—Estimated harvest, fishing pressure, and catch per hour by boat anglers, Petes Lake, Schoolcraft County, 1993. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Season
Yellow perch	0.0050 (0.0104)	0 (0)	0 (0)	0 (0)	15 (31)	0 (0)	15 (31)
Walleye	0.0724 (0.0638)	0 (0)	15 (28)	2 (4)	143 (159)	57 (81)	217 (181)
Smallmouth bass	0.0230 (0.0201)	0 (0)	10 (15)	30 (48)	25 (25)	4 (8)	69 (57)
Largemouth bass	0.0010 (0.0020)	3 (6)	0 (0)	0 (0)	0 (0)	0 (0)	3 (6)
Bluegill	0.0521 (0.0448)	0 (0)	14 (33)	20 (31)	81 (82)	41 (87)	156 (127)
Rock bass	0.0013 (0.0030)	0 (0)	4 (9)	0 (0)	0 (0)	0 (0)	4 (9)
Total harvest	0.1549 (0.0882)	3 (6)	43 (46)	52 (57)	264 (183)	102 (119)	464 (230)
Angler hours		135 (208)	382 (350)	1,173 (497)	1,074 (509)	232 (194)	2,996 (842)
Angler trips		44 (68)	140 (129)	447 (192)	401 (217)	69 (61)	1,101 (330)

Appendix 29-5.—Estimated fishing pressure by shore anglers, Petes Lake, Schoolcraft County, 1993. Two standard errors are given in parentheses.

Effort	May	Jun	Jul	Aug	Sep	Season
Angler hours	0 (0)	0 (0)	13 (26)	0 (0)	0 (0)	13 (26)
Angler trips	0 (0)	0 (0)	6 (12)	0 (0)	0 (0)	6 (12)

Appendix 29-6.—Residence of anglers (percent of anglers interviewed) by Michigan County or U. S. State, Petes Lake, Schoolcraft County, 1993. Two standard errors are given in parentheses.

Residence	May	Jun	Jul	Aug	Sep	Season
Alger	15.79 (16.73)	6.49 (5.62)	5.50 (4.37)	6.85 (5.91)	9.09 (17.34)	6.92 (2.99)
Allegan	0 (0)	0 (0)	0 (0)	2.74 (3.82)	0 (0)	0.69 (0.98)
Alpena	0 (0)	0 (0)	0 (0)	1.37 (2.72)	0 (0)	0.35 (0.69)
Bay	0 (0)	0 (0)	3.67 (3.60)	0 (0)	0 (0)	1.38 (1.37)
Cass	5.26 (10.25)	0 (0)	0 (0)	0 (0)	0 (0)	0.35 (0.69)
Chippewa	0 (0)	2.60 (3.63)	3.67 (3.60)	2.74 (3.82)	0 (0)	2.77 (1.93)
Crawford	10.53 (14.08)	0 (0)	0 (0)	0 (0)	0 (0)	0.69 (0.98)
Delta	0 (0)	24.68 (9.83)	13.76 (6.60)	17.81 (8.96)	18.18 (23.26)	16.96 (4.41)
Eaton	0 (0)	10.39 (6.95)	6.42 (4.70)	13.70 (8.05)	0 (0)	8.65 (3.31)
Emmet	0 (0)	0 (0)	2.75 (3.13)	0 (0)	0 (0)	1.04 (1.19)
Genesee	0 (0)	0 (0)	5.50 (4.37)	0 (0)	0 (0)	2.08 (1.68)
Grand Traverse	0 (0)	0 (0)	1.83 (2.57)	0 (0)	0 (0)	0.69 (0.98)
Gratiot	0 (0)	0 (0)	0 (0)	2.74 (3.82)	0 (0)	0.69 (0.98)
Ingham	0 (0)	1.30 (2.58)	4.59 (4.01)	0 (0)	0 (0)	2.08 (1.68)
Iosco	10.53 (14.08)	0 (0)	0 (0)	0 (0)	0 (0)	0.69 (0.98)
Jackson	0 (0)	5.19 (5.06)	0.92 (1.83)	0 (0)	0 (0)	1.73 (1.53)

Appendix 29-6.--continued.

Residence	May	Jun	Jul	Aug	Sep	Season
Kalamazoo	0 (0)	0 (0)	0 (0)	0 (0)	18.18 (23.26)	0.69 (0.98)
Kalkaska	0 (0)	0 (0)	0 (0)	4.11 (4.65)	0 (0)	1.04 (1.19)
Kent	0 (0)	1.30 (2.58)	1.83 (2.57)	6.85 (5.91)	0 (0)	2.77 (1.93)
Livingston	0 (0)	0 (0)	1.83 (2.57)	4.11 (4.65)	0 (0)	1.73 (1.53)
Mackinac	0 (0)	0 (0)	0 (0)	2.74 (3.82)	0 (0)	0.69 (0.98)
Macomb	0 (0)	2.60 (3.63)	5.50 (4.37)	6.85 (5.91)	0 (0)	4.50 (2.44)
Marquette	0 (0)	3.90 (4.41)	7.34 (5.00)	2.74 (3.82)	0 (0)	4.50 (2.44)
Mason	0 (0)	1.30 (2.58)	0 (0)	0 (0)	0 (0)	0.35 (0.69)
Midland	0 (0)	0 (0)	6.42 (4.70)	4.11 (4.65)	0 (0)	3.46 (2.15)
Montmorency	0 (0)	2.60 (3.63)	0 (0)	0 (0)	0 (0)	0.69 (0.98)
Muskegon	0 (0)	0 (0)	4.59 (4.01)	0 (0)	54.55 (30.03)	3.81 (2.25)
Newaygo	0 (0)	0 (0)	0.92 (1.83)	0 (0)	0 (0)	0.35 (0.69)
Oakland	0 (0)	2.60 (3.63)	8.26 (5.27)	2.74 (3.82)	0 (0)	4.50 (2.44)
Ogemaw	0 (0)	0 (0)	0 (0)	4.11 (4.65)	0 (0)	1.04 (1.19)
Otsego	0 (0)	0 (0)	0.92 (1.83)	0 (0)	0 (0)	0.35 (0.69)
Ottawa	0 (0)	0 (0)	3.67 (3.60)	0 (0)	0 (0)	1.38 (1.37)
Saginaw	0 (0)	2.60 (3.63)	0 (0)	1.37 (2.72)	0 (0)	1.04 (1.19)

Appendix 29-6.--continued.

Residence	May	Jun	Jul	Aug	Sep	Season
St. Joseph	0 (0)	0 (0)	0.92 (1.83)	0 (0)	0 (0)	0.35 (0.69)
Schoolcraft	5.26 (10.25)	3.90 (4.41)	0.92 (1.83)	8.22 (6.43)	0 (0)	3.81 (2.25)
Shiawassee	0 (0)	1.30 (2.58)	0 (0)	0 (0)	0 (0)	0.35 (0.69)
Tuscola	21.05 (18.71)	0 (0)	0 (0)	0 (0)	0 (0)	1.38 (1.37)
Washtenaw	0 (0)	2.60 (3.63)	0.92 (1.83)	0 (0)	0 (0)	1.04 (1.19)
Wayne	0 (0)	1.30 (2.58)	0.92 (1.83)	2.74 (3.82)	0 (0)	1.38 (1.37)
Florida	0 (0)	2.60 (3.63)	0 (0)	0 (0)	0 (0)	0.69 (0.98)
Wisconsin	0 (0)	5.19 (5.06)	2.75 (3.13)	0 (0)	0 (0)	2.42 (1.81)
Illinois	0 (0)	0 (0)	0 (0)	1.37 (2.72)	0 (0)	0.35 (0.69)
Indiana	0 (0)	2.60 (3.63)	0 (0)	0 (0)	0 (0)	0.69 (0.98)
Ohio	31.58 (21.33)	12.99 (7.66)	3.67 (3.60)	0 (0)	0 (0)	6.92 (2.99)
Anglers interviewed	19	77	109	73	11	289



Appendix 29-7.—Type of bait used by anglers (percent of anglers interviewed), Petes Lake, Schoolcraft County, 1993. Two standard errors are given in parentheses.

Bait used	May	Jun	Jul	Aug	Sep	Season
Live	26.32 (20.20)	25.97 (9.99)	35.78 (9.18)	41.10 (11.52)	70.00 (28.98)	35.07 (5.62)
Artificial	42.11 (22.65)	20.78 (9.25)	18.35 (7.41)	12.33 (7.70)	0 (0)	18.40 (4.57)
Both	31.58 (21.33)	53.25 (11.37)	45.87 (9.55)	46.58 (11.68)	30.00 (28.98)	46.53 (5.88)
Anglers interviewed	19	77	109	73	10	288

Appendix 29-8.—Species of fish sought by anglers (percent of anglers interviewed), at Petes Lake, Schoolcraft County, 1993. Two standard errors are given in parentheses.

Species sought	May	Jun	Jul	Aug	Sep	Season
Bass & bluegill	0 (0)	2.60 (3.63)	2.75 (3.13)	4.11 (4.65)	0 (0)	2.77 (1.93)
Pike & bass	21.05 (18.71)	15.58 (8.27)	14.68 (6.78)	8.22 (6.43)	0 (0)	13.15 (3.98)
Panfish	0 (0)	0 (0)	1.83 (2.57)	0 (0)	0 (0)	0.69 (0.98)
Bass	0 (0)	0 (0)	0 (0)	0 (0)	27.27 (26.86)	1.04 (1.19)
Pike & perch	0 (0)	0 (0)	2.75 (3.13)	0 (0)	0 (0)	1.04 (1.19)
Northern pike	36.84 (22.13)	0 (0)	4.59 (4.01)	0 (0)	0 (0)	4.15 (2.35)
Yellow perch	0 (0)	0 (0)	0 (0)	2.74 (3.82)	0 (0)	0.69 (0.98)
Walleye	0 (0)	16.88 (8.54)	25.69 (8.37)	42.47 (11.57)	72.73 (26.86)	27.68 (5.26)
Smallmouth bass	26.32 (20.20)	18.18 (8.79)	11.01 (6.00)	1.37 (2.72)	0 (0)	11.07 (3.69)
Largemouth bass	10.53 (14.08)	0 (0)	0 (0)	0 (0)	0 (0)	0.69 (0.98)
Bluegill	0 (0)	0 (0)	0 (0)	2.74 (3.82)	0 (0)	0.69 (0.98)
Anything	5.26 (10.25)	46.75 (11.37)	36.70 (9.23)	38.36 (11.38)	0 (0)	36.33 (5.66)
Anglers interviewed	19	77	109	73	11	289

Appendix 29-9.—Number of trips per day by anglers (percent of anglers interviewed), Petes Lake, Schoolcraft County, 1993. Two standard errors are given in parentheses.

Trips/day	May	Jun	Jul	Aug	Sep	Season
1	78.95 (18.71)	92.21 (6.11)	67.89 (8.94)	53.42 (11.68)	100.00 (0)	72.66 (5.24)
2	21.05 (18.71)	7.79 (6.11)	32.11 (8.94)	42.47 (11.57)	0 (0)	26.30 (5.18)
3	0 (0)	0 (0)	0 (0)	2.74 (3.82)	0 (0)	0.69 (0.98)
4	0 (0)	0 (0)	0 (0)	1.37 (2.72)	0 (0)	0.35 (0.69)
Anglers interviewed	19	77	109	73	11	289

Appendix 29-10.—Gender of anglers (percent of anglers interviewed), Petes Lake, Schoolcraft County, 1993. Two standard errors are given in parentheses.

Gender	May	Jun	Jul	Aug	Sep	Season
Male	84.21 (16.73)	81.82 (8.79)	89.91 (5.77)	83.56 (8.68)	72.73 (26.86)	85.12 (4.19)
Female	15.79 (16.73)	18.18 (8.79)	10.09 (5.77)	16.44 (8.68)	27.27 (26.86)	14.88 (4.19)
Anglers interviewed	19	77	109	73	11	289

Appendix 30-1.-Pomeroy Lake, Gogebic County, 1993.

Site	Pomeroy Lake
Year	1993
County	Gogebic
Location	T. 45 N., R. 42 W., Sec. 20, 21, 28, 29
Survey period	May 15 through September 6
Daily period	See Appendix 30-2
Survey design	Roving-access
Count method	Instantaneous, fishing boats, shore anglers
Interview type	Access, party, boating anglers, shore anglers, harvest
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	See Appendix 1 of Lockwood et al. (1999)
Clerk	Fisheries Division clerk, ½ time
Survey purpose	Characterize general effort and catch aspects of the fishery, and angler residency
Notes	<p>One Fisheries Division supported clerk collected count and interview data from Pomeroy and Marion lakes (see also Marion Lake, 1993 chapter). Both lakes were sampled each scheduled workday. Three randomly-selected weekdays, each weekend day, plus all holidays were selected for sampling each week. One of two shifts was randomly selected each workday (Appendix 30-2).</p> <p>Order of instantaneous count was randomized allowing each lake to be counted either first or second. Fishing boats and shore anglers were counted once per scheduled day.</p> <p>Interviewing was done at the public access site. No shore angling parties were interviewed.</p>

Appendix 30-2.—Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Pomeroy Lake, Gogebic County, 1993.

Month	Shift		Expansion value
	Early	Late	
May	0600 h – 1500 h	1300 h – 2200 h	16
June	0600 h – 1500 h	1300 h – 2200 h	18
July	0600 h – 1500 h	1300 h – 2200 h	18
August	0600 h – 1500 h	1300 h – 2200 h	17
September	0600 h – 1500 h	1300 h – 2200 h	16

Appendix 30-3.—Estimated total harvest, fishing pressure, and catch per hour, Pomeroy Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Season
Northern pike	0.0012 (0.0029)	0 (0)	0 (0)	10 (23)	0 (0)	0 (0)	10 (23)
Walleye	0.0311 (0.0292)	93 (99)	61 (80)	99 (187)	0 (0)	0 (0)	253 (226)
Bluegill	0.0300 (0.0455)	21 (33)	164 (340)	59 (124)	0 (0)	0 (0)	244 (363)
Sunfish	0.0363 (0.0566)	52 (106)	243 (439)	0 (0)	0 (0)	0 (0)	295 (452)
Crappie	0.1447 (0.1444)	228 (256)	893 (1,090)	55 (88)	0 (0)	0 (0)	1,176 (1,123)
Total harvest	0.2433 (0.1731)	394 (296)	1,361 (1,225)	223 (242)	0 (0)	0 (0)	1,978 (1,284)
Angler hours		2,102 (1,427)	3,110 (1,245)	2,146 (1,273)	451 (583)	320 (243)	8,129 (2,367)
Angler trips		507 (355)	832 (342)	590 (365)	146 (215)	84 (65)	2,159 (653)

Appendix 30-4.—Estimated harvest, fishing pressure, and catch per hour by boat anglers, Pomeroy Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Season
Northern pike	0.0013 (0.0029)	0 (0)	0 (0)	10 (23)	0 (0)	0 (0)	10 (23)
Walleye	0.0317 (0.0298)	93 (99)	61 (80)	99 (187)	0 (0)	0 (0)	253 (226)
Bluegill	0.0305 (0.0463)	21 (33)	164 (340)	59 (124)	0 (0)	0 (0)	244 (363)
Sunfish	0.0369 (0.0576)	52 (106)	243 (439)	0 (0)	0 (0)	0 (0)	295 (452)
Crappie	0.1472 (0.1471)	228 (256)	893 (1,090)	55 (88)	0 (0)	0 (0)	1,176 (1,123)
Total harvest	0.2476 (0.1766)	394 (296)	1,361 (1,225)	223 (242)	0 (0)	0 (0)	1,978 (1,284)
Angler hours		1,990 (1,409)	3,081 (1,244)	2,146 (1,273)	451 (583)	320 (243)	7,988 (2,356)
Angler trips		481 (351)	824 (342)	590 (365)	146 (215)	84 (65)	2,125 (651)

Appendix 30-5.—Estimated fishing pressure by shore anglers, Pomeroy Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Effort	May	Jun	Jul	Aug	Sep	Season
Angler hours	112 (224)	29 (58)	0 (0)	0 (0)	0 (0)	141 (231)
Angler trips	26 (53)	8 (16)	0 (0)	0 (0)	0 (0)	34 (55)

Appendix 30-6.—Residence of anglers (percent of anglers interviewed), by U. S. State, Pomeroy Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Residence	Season
Michigan	51.22 (9.01)
Wisconsin	27.64 (8.07)
Other	21.14 (7.36)
Anglers interviewed	123

Appendix 30-7.—Type of bait used by anglers (percent of anglers interviewed), Pomeroy Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Bait used	May	Jun	Jul	Aug	Sep	Season
Live	61.76 (16.67)	41.03 (15.75)	44.00 (19.86)	45.45 (21.23)	0 (0)	46.40 (8.92)
Artificial	0 (0)	17.95 (12.29)	16.00 (14.66)	0 (0)	60.00 (43.82)	11.20 (5.64)
Both	38.24 (16.67)	41.03 (15.75)	40.00 (19.60)	54.55 (21.23)	40.00 (43.82)	42.40 (8.84)
Anglers interviewed	34	39	25	22	5	125

Appendix 30-8.—Species of fish sought by anglers (percent of anglers interviewed), Pomeroy Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Species sought	May	Jun	Jul	Aug	Sep	Season
Pike & bass	0 (0)	0 (0)	2.38 (4.70)	0 (0)	0 (0)	0.68 (1.37)
Panfish	0 (0)	24.44 (12.81)	0 (0)	0 (0)	0 (0)	7.53 (4.37)
Pike & perch	0 (0)	0 (0)	0 (0)	9.09 (12.26)	0 (0)	1.37 (1.92)
Walleye & pike	8.82 (9.73)	8.89 (8.48)	38.10 (14.99)	81.82 (16.45)	33.33 (54.43)	28.77 (7.49)
Walleye	8.82 (9.73)	4.44 (6.14)	0 (0)	0 (0)	0 (0)	3.42 (3.01)
Crappie	26.47 (15.13)	4.44 (6.14)	0 (0)	0 (0)	0 (0)	7.53 (4.37)
Anything	55.88 (17.03)	57.78 (14.73)	59.52 (15.15)	9.09 (12.26)	66.67 (54.43)	50.68 (8.28)
Anglers interviewed	34	45	42	22	3	146

Appendix 30-9.—Number of trips per day by anglers (percent of anglers interviewed), Pomeroy Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Trips/day	May	Jun	Jul	Aug	Sep	Season
1	85.29 (12.15)	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)	96.62 (2.97)
2	14.71 (12.15)	0 (0)	0 (0)	0 (0)	0 (0)	3.38 (2.97)
Anglers interviewed	34	45	42	22	5	148



Appendix 30-10.—Gender of anglers (percent of anglers interviewed), Pomeroy Lake, Gogebic County, 1993. Two standard errors are given in parentheses.

Gender	May	Jun	Jul	Aug	Sep	Season
Male	88.24 (11.05)	93.33 (7.44)	88.10 (9.99)	95.45 (8.88)	80.00 (35.78)	90.54 (4.81)
Female	11.76 (11.05)	6.67 (7.44)	11.90 (9.99)	4.55 (8.88)	20.00 (35.78)	9.46 (4.81)
Anglers interviewed	34	45	42	22	5	148

Appendix 31-1.-Pomeroy Lake, Gogebic County, 1994.

Site	Pomeroy Lake
Year	1994
County	Gogebic
Location	T. 45 N., R. 42 W., Sec. 20, 21, 28, 29
Survey period	May 15 through September 6
Daily period	See Appendix 31-2
Survey design	Roving-access
Count method	Instantaneous, fishing boats
Interview type	Access, party, boating anglers, harvest
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	See Appendix 1 of Lockwood et al. (1999)
Clerk	Fisheries Division clerk, ½ time
Survey purpose	Characterize general effort and catch aspects of the fishery, and angler residency
Notes	<p>One clerk collected count and interview data at Pomeroy and Duck lakes (see also Duck Lake, 1994 chapter). Only one lake was sampled per scheduled workday, the clerk remained at the selected lake for the entire shift. Three randomly-selected weekdays, each weekend day, plus all holidays were sampled each week. One of two shifts was randomly selected each workday (Appendix 31-2).</p> <p>Since the clerk remained at the lake the entire shift, hourly counts were made throughout the shift. Only fishing boats were counted.</p> <p>Interviewing was done at the public access site.</p>

Appendix 31-2.–Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Pomeroy Lake, Gogebic County, 1994.

Month	Early		Late		Expansion value
	Shift	Count hours	Shift	Count hours	
May	0600 h – 1500 h	0700 h – 1300 h	1300 h – 2200 h	1400 h – 2100 h	16
June	0600 h – 1500 h	0700 h – 1300 h	1300 h – 2200 h	1400 h – 2100 h	18
July	0600 h – 1500 h	0700 h – 1300 h	1300 h – 2200 h	1400 h – 2100 h	18
August	0600 h – 1500 h	0700 h – 1300 h	1300 h – 2200 h	1400 h – 2100 h	17
September	0600 h – 1500 h	0700 h – 1300 h	1300 h – 2200 h	1400 h – 2100 h	16

Appendix 31-3.–Estimated harvest, fishing pressure, and catch per hour by boat anglers, Pomeroy Lake, Gogebic County, 1994. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Season
Northern pike	0.0005 (0.0011)	0 (0)	5 (10)	0 (0)	0 (0)	0 (0)	5 (10)
Yellow perch	0.0297 (0.0375)	140 (281)	83 (168)	51 (104)	0 (0)	0 (0)	274 (344)
Walleye	0.0811 (0.0562)	100 (80)	89 (180)	114 (235)	406 (405)	38 (27)	747 (509)
Smallmouth bass	0.0061 (0.0114)	0 (0)	5 (10)	51 (104)	0 (0)	0 (0)	56 (105)
Largemouth bass	0.0077 (0.0120)	0 (0)	71 (111)	0 (0)	0 (0)	0 (0)	71 (111)
Bluegill	0.0149 (0.0303)	0 (0)	0 (0)	0 (0)	137 (278)	0 (0)	137 (278)
Sunfish	0.0029 (0.0058)	0 (0)	26 (53)	0 (0)	0 (0)	0 (0)	26 (53)
Crappie	0.0144 (0.0295)	133 (271)	0 (0)	0 (0)	0 (0)	0 (0)	133 (271)
Total harvest	0.1573 (0.0834)	373 (398)	279 (275)	216 (277)	543 (491)	38 (27)	1,449 (744)
Angler hours		2,122 (436)	1,724 (410)	2,393 (794)	2,862 (684)	108 (72)	9,209 (1,209)
Angler trips		587 (147)	586 (162)	681 (257)	613 (178)	21 (17)	2,488 (382)

Appendix 31-4.—Residence of anglers (percent of anglers interviewed) by Michigan County or U. S. State, Pomeroy Lake, Gogebic County, 1994. Two standard errors are given in parentheses.

Residence	May	Jun	Jul	Aug	Sep	Season
Dickinson	1.27 (2.52)	0 (0)	0 (0)	0 (0)	0 (0)	0.54 (1.08)
Genesee	0 (0)	4.26 (5.89)	0 (0)	0 (0)	0 (0)	1.09 (1.53)
Gogebic	46.84 (11.23)	36.17 (14.02)	33.33 (22.22)	44.44 (16.56)	25.00 (43.30)	41.85 (7.27)
Livingston	0 (0)	2.13 (4.21)	0 (0)	0 (0)	0 (0)	0.54 (1.08)
Midland	1.27 (2.52)	0 (0)	0 (0)	0 (0)	0 (0)	0.54 (1.08)
Ontonagon	0 (0)	6.38 (7.13)	0 (0)	0 (0)	0 (0)	1.63 (1.87)
Non-resident	0 (0)	2.13 (4.21)	16.67 (17.57)	0 (0)	0 (0)	2.17 (2.15)
Wisconsin	43.04 (11.14)	38.30 (14.18)	33.33 (22.22)	22.22 (13.86)	75.00 (43.30)	37.50 (7.14)
Illinois	7.59 (5.96)	10.64 (8.99)	16.67 (17.57)	22.22 (13.86)	0 (0)	11.96 (4.78)
Indiana	0 (0)	0 (0)	0 (0)	11.11 (10.48)	0 (0)	2.17 (2.15)
Anglers interviewed	79	47	18	36	4	184

Appendix 31-5.—Type of bait used by anglers (percent of anglers interviewed), Pomeroy Lake, Gogebic County, 1994. Two standard errors are given in parentheses.

Bait	May	Jun	Jul	Aug	Sep	Season
Live	51.47 (12.12)	62.22 (14.45)	38.89 (22.98)	50.00 (16.67)	50.00 (50.00)	52.63 (7.64)
Artificial	13.24 (8.22)	2.22 (4.39)	0 (0)	16.67 (12.42)	0 (0)	9.36 (4.45)
Both	35.29 (11.59)	35.56 (14.27)	61.11 (22.98)	33.33 (15.71)	50.00 (50.00)	38.01 (7.42)
Anglers interviewed	68	45	18	36	4	171

Appendix 31-6.—Species of fish sought by anglers (percent of anglers interviewed), Pomeroy Lake, Gogebic County, 1994. Two standard errors are given in parentheses.

Species sought	May	Jun	Jul	Aug	Sep	Season
Pike & bass	0 (0)	11.43 (10.76)	0 (0)	5.56 (7.64)	0 (0)	3.55 (2.85)
Panfish	0 (0)	11.43 (10.76)	0 (0)	2.78 (5.48)	0 (0)	2.96 (2.61)
Bass	2.53 (3.53)	0 (0)	0 (0)	0 (0)	0 (0)	1.18 (1.66)
Walleye & perch	58.23 (11.10)	25.71 (14.78)	26.67 (22.84)	33.33 (15.71)	100.00 (0)	44.38 (7.64)
Crappie	8.86 (6.39)	0 (0)	0 (0)	0 (0)	0 (0)	4.14 (3.07)
Anything	30.38 (10.35)	51.43 (16.90)	73.33 (22.84)	58.33 (16.43)	0 (0)	43.79 (7.63)
Anglers interviewed	79	35	15	36	4	169

Appendix 31-7.—Number of trips per day by anglers (percent of anglers interviewed), Pomeroy Lake, Gogebic County, 1994. Two standard errors are given in parentheses.

Trips/day	May	Jun	Jul	Aug	Sep	Season
1	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)
Anglers interviewed	80	47	18	36	4	185

Appendix 31-8.—Gender of anglers (percent of anglers interviewed), Pomeroy Lake, Gogebic County, 1994. Two standard errors are given in parentheses.

Gender	May	Jun	Jul	Aug	Sep	Season
Male	82.50 (8.50)	82.98 (10.96)	94.44 (10.80)	83.33 (12.42)	100.00 (0)	84.32 (5.35)
Female	17.50 (8.50)	17.02 (10.96)	5.56 (10.80)	16.67 (12.42)	0 (0)	15.68 (5.35)
Anglers interviewed	80	47	18	36	4	185

Appendix 32-1.–Sessions Lake, Ionia County, 1996.

Site	Sessions Lake
Year	1996
County	Ionia
Location	T. 6 N., R. 7 W., Sec. 3 T. 7 N., R. 7 W., Sec 34
Survey period	April 27 through September 2
Daily period	See Appendix 32-2
Survey design	Roving-voluntary
Count method	Instantaneous, boat trailers, shore anglers
Interview type	Voluntary, access, party, boating anglers, shore anglers, harvest, catch and release
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	Multiple-day period (Lockwood et al. 1999)
Clerk	One Parks Division employee made counts
Survey purpose	Evaluate walleye stocking program
Notes	<p>This survey was a cooperative creel survey between Fisheries Division and Ionia Recreation Area (MDNR Parks Division). Every day within the survey period was sampled and three counts were made each day. Daily sample hours and expansion values are given in Appendix 32-2.</p> <p>Park employees made instantaneous counts of boat trailers (and any other vehicles which appeared to have transported watercraft) at the launch site and shore anglers for the entire lake.</p> <p>Interview cards were made available at the launch site and cards were distributed to shore anglers. Cards could be dropped off at the Park office or in a drop box at the launch site.</p>

Appendix 32-2.–Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Sessions Lake, Ionia County, 1996.

Month	Shift	Expansion value
April	0800 h – 2000 h	13
May	0800 h – 2000 h	13
June	0800 h – 2300 h	16
July	0800 h – 2300 h	16
August	0800 h – 2300 h	16
September	0800 h – 2300 h	16



Appendix 32-3.—Total estimated harvest, catch and release, fishing pressure, and catch per hour, Sessions Lake, Ionia County, 1996. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug-Sep	Season
Bass – harvest	0.0054 (0.0043)	0 (0)	78 (102)	52 (82)	74 (94)	0 (0)	204 (162)
Bass – release	0.2386 (0.0765)	0 (0)	1,397 (961)	1,870 (1,071)	3,398 (1,467)	2,354 (1,800)	9,019 (2,732)
Crappie – harvest	0.0658 (0.0320)	0 (0)	1,458 (1,101)	991 (423)	37 (73)	0 (0)	2,486 (1,182)
Crappie – release	0.0504 (0.0259)	0 (0)	404 (446)	933 (622)	74 (105)	494 (564)	1,905 (957)
Panfish <sup>1</sup> – harvest	0.0794 (0.0399)	0 (0)	586 (678)	1,463 (1,193)	145 (101)	806 (529)	3,000 (1,474)
Panfish <sup>1</sup> – release	0.2157 (0.2102)	0 (0)	225 (190)	1,056 (891)	6,772 (7,844)	99 (162)	8,152 (7,898)
Walleye – harvest	0.0489 (0.0182)	1 (2)	715 (338)	251 (190)	74 (81)	806 (529)	1,847 (661)
Walleye – release	0.3256 (0.1120)	2 (5)	2,142 (979)	5,189 (3,025)	663 (696)	4,313 (2,381)	12,309 (4,033)
Yellow perch – harvest	0.0379 (0.0317)	0 (0)	594 (498)	839 (1,081)	0 (0)	0 (0)	1,433 (1,190)
Yellow perch – release	0.2155 (0.1318)	0 (0)	865 (546)	5,368 (4,690)	680 (682)	1,234 (1,156)	8,147 (4,909)
Channel catfish – harvest	0.0013 (0.002)	0 (0)	0 (0)	14 (27)	37 (73)	0 (0)	51 (78)
Carp – harvest	0.0038 (0.0009)	0 (0)	0 (0)	0 (0)	145 (32)	0 (0)	145 (32)
Carp – release	0.0028 (0.0041)	0 (0)	104 (153)	0 (0)	0 (0)	0 (0)	104 (153)
Total harvest	0.2425 (0.0668)	1 (2)	3,431 (1,430)	3,610 (1,678)	512 (193)	1,612 (748)	9,166 (2,336)
Total release	1.0485 (0.2999)	2 (5)	5,137 (1,562)	14,416 (5,786)	11,587 (8,040)	8,494 (3,254)	39,636 (10,543)
Grand total	1.2910 (0.3163)	3 (5)	8,568 (2,117)	18,026 (6,024)	12,099 (8,042)	10,106 (3,339)	48,802 (10,798)
Angler hours		366 (88)	8,992 (1,319)	9,371 (1,558)	10,799 (2,969)	8,273 (1,675)	37,801 (3,974)
Angler trips		74 (26)	1,932 (408)	2,727 (675)	5,176 (2,257)	2,709 (1,851)	12,618 (3,024)

<sup>1</sup> This term includes species such as rock bass, bluegills, and pumpkinseed sunfish.

Appendix 32-4.—Estimated harvest, catch and release, fishing pressure, and catch per hour by boat anglers, Sessions Lake, Ionia County, 1996. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug-Sep	Season
Bass – harvest	0.0073 (0.0058)	0 (0)	78 (102)	52 (82)	74 (94)	0 (0)	204 (162)
Bass – release	0.2005 (0.0816)	0 (0)	831 (427)	1,451 (913)	1,367 (805)	1,991 (1,739)	5,640 (2,165)
Crappie – harvest	0.0605 (0.0409)	0 (0)	1,337 (1,067)	328 (356)	37 (73)	0 (0)	1,702 (1,127)
Crappie – release	0.0494 (0.0302)	0 (0)	387 (444)	435 (404)	74 (105)	494 (564)	1,390 (830)
Panfish <sup>1</sup> – harvest	0.0786 (0.0509)	0 (0)	398 (534)	1,187 (1,191)	0 (0)	625 (510)	2,210 (1,401)
Panfish <sup>1</sup> – release	0.2226 (0.2689)	0 (0)	208 (186)	1,056 (891)	4,901 (7,460)	99 (162)	6,264 (7,517)
Walleye – harvest	0.0546 (0.0237)	1 (2)	585 (312)	251 (190)	74 (81)	625 (510)	1,536 (633)
Walleye – release	0.3196 (0.1186)	2 (5)	1,784 (911)	2,954 (1,732)	663 (696)	3,588 (2,314)	8,991 (3,109)
Yellow perch – harvest	0.0476 (0.0426)	0 (0)	556 (491)	784 (1,080)	0 (0)	0 (0)	1,340 (1,186)
Yellow perch – release	0.2324 (0.1617)	0 (0)	490 (426)	4,278 (4,238)	536 (654)	1,234 (1,156)	6,538 (4,462)
Channel catfish – harvest	0.0018 (0.0028)	0 (0)	0 (0)	14 (27)	37 (73)	0 (0)	51 (78)
Total harvest	0.2503 (0.0869)	1 (2)	2,954 (1,331)	2,616 (1,660)	222 (161)	1,250 (721)	7,043 (2,252)
Total release	1.0245 (0.3669)	2 (5)	3,700 (1,194)	10,174 (4,770)	7,541 (7,565)	7,406 (3,172)	28,823 (9,563)
Grand total	1.2748 (0.3892)	3 (5)	6,654 (1,788)	12,790 (5,050)	7,763 (7,566)	8,656 (3,253)	35,866 (9,825)
Angler hours		277 (63)	7,187 (1,134)	6,480 (1,425)	7,837 (2,911)	6,353 (1,607)	28,134 (3,792)
Angler trips		52 (17)	1,473 (288)	1,416 (399)	3,558 (2,146)	2,011 (1,732)	8,510 (2,801)

<sup>1</sup> This term includes species such as rock bass, bluegills, and pumpkinseed sunfish.

Appendix 32-5.–Estimated harvest, catch and release, fishing pressure, and catch per hour by shore anglers, Sessions Lake, Ionia County, 1996. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug-Sep	Season
Bass – release	0.3495 (0.1776)	0 (0)	566 (861)	419 (559)	2,031 (1,226)	363 (466)	3,379 (1,666)
Crappie – harvest	0.0811 (0.0381)	0 (0)	121 (271)	663 (229)	0 (0)	0 (0)	784 (355)
Crappie – release	0.0533 (0.0496)	0 (0)	17 (40)	498 (473)	0 (0)	0 (0)	515 (475)
Panfish <sup>1</sup> – harvest	0.0817 (0.0484)	0 (0)	188 (418)	276 (72)	145 (101)	181 (140)	790 (458)
Panfish <sup>1</sup> – release	0.1953 (0.2520)	0 (0)	17 (39)	0 (0)	1,871 (2,425)	0 (0)	1,888 (2,425)
Walleye – harvest	0.0322 (0.0203)	0 (0)	130 (131)	0 (0)	0 (0)	181 (140)	311 (192)
Walleye – release	0.3432 (0.2690)	0 (0)	358 (359)	2,235 (2,480)	0 (0)	725 (561)	3,318 (2,568)
Yellow perch – harvest	0.0096 (0.0103)	0 (0)	38 (84)	55 (53)	0 (0)	0 (0)	93 (99)
Yellow perch – release	0.1664 (0.2127)	0 (0)	375 (341)	1,090 (2,009)	144 (194)	0 (0)	1,609 (2,047)
Carp – harvest	0.0150 (0.0038)	0 (0)	0 (0)	0 (0)	145 (32)	0 (0)	145 (32)
Carp – release	0.0108 (0.0159)	0 (0)	104 (153)	0 (0)	0 (0)	0 (0)	104 (153)
Total harvest	0.2196 (0.0695)	0 (0)	477 (522)	994 (246)	290 (106)	362 (198)	2,123 (619)
Total release	1.1185 (0.4792)	0 (0)	1,437 (1,006)	4,242 (3,275)	4,046 (2,724)	1,088 (729)	10,813 (4,437)
Grand total	1.3382 (0.4918)	0 (0)	1,914 (1,134)	5,236 (3,284)	4,336 (2,726)	1,450 (756)	12,936 (4,480)
Angler hours		89 62	1,805 673	2,891 631	2,962 583	1,920 471	9,667 1,190
Angler trips		22 20	459 289	1,311 544	1,618 699	698 652	4,108 1,137

<sup>1</sup> This term includes species such as rock bass, bluegills, and pumpkinseed sunfish.

Appendix 33-1.–Sessions Lake, Ionia County, 1997.

Site	Sessions Lake
Year	1997
County	Ionia
Location	T. 6 N., R. 7 W., Sec. 3 T. 7 N., R. 7 W., Sec 34
Survey period	April 26 through September 1
Daily period	See Appendix 33-2
Survey design	Roving-voluntary
Count method	Instantaneous, boat trailers, shore anglers
Interview type	Voluntary, access, party, boating anglers, shore anglers, harvest, catch and release
Effort estimation	Multiple-day period (Lockwood et al. 1999)
Catch estimation	Multiple-day period (Lockwood et al. 1999)
Clerk	One Parks Division employee made counts
Survey purpose	Evaluate walleye stocking program
Notes	<p>This survey was a cooperative creel survey between Fisheries Division and Ionia Recreation Area (MDNR Parks Division). Every day within the survey period was sampled and three counts were made each day. Daily sample hours and expansion values are given in Appendix 33-2.</p> <p>Park employees made instantaneous counts of boat trailers (and any other vehicles which appeared to have transported watercraft) at the launch site and shore anglers for the entire lake.</p> <p>Interview cards were made available at the launch site and cards were distributed to shore anglers. Cards could be dropped off at the Park office or in a drop box at the launch site. Also, an intern student from the University of Michigan interviewed anglers each Saturday during the month of June.</p>

Appendix 33-2.–Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Sessions Lake, Ionia County, 1997.

Month	Shift	Expansion value
April 26, 27	0800 h – 2000 h	13
April 28-30	0800 h - 1800 h	11
May	0800 h – 2000 h	13
June	0800 h – 2300 h	16
July	0800 h – 2300 h	16
August	0800 h – 2300 h	16
September	0800 h – 2300 h	16

Appendix 33-3.—Estimated total harvest, catch and release, fishing pressure, and catch per hour, Sessions Lake, Ionia County, 1997. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug-Sep	Season
Bass – harvest	0.0079 (0.0064)	0 (0)	126 (152)	113 (141)	25 (54)	0 (0)	264 (214)
Bass – release	0.1702 (0.1407)	215 (107)	514 (452)	564 (310)	195 (175)	4,224 (4,653)	5,712 (4,690)
Crappie – harvest	0.1524 (0.0914)	0 (0)	3,115 (2,445)	1,555 (1,577)	444 (840)	0 (0)	5,114 (3,029)
Crappie – release	0.0326 (0.0324)	0 (0)	602 (1,004)	170 (164)	184 (260)	138 (266)	1,094 (1,083)
Panfish <sup>1</sup> – harvest	0.1415 (0.0953)	0 (0)	925 (1,746)	3,002 (2,099)	753 (1,591)	69 (176)	4,749 (3,165)
Panfish <sup>1</sup> – release	0.1450 (0.1302)	0 (0)	891 (1,320)	1,632 (1,556)	559 (558)	1,786 (3,797)	4,868 (4,347)
Walleye – harvest	0.0280 (0.0185)	212 (104)	244 (186)	351 (525)	73 (115)	59 (202)	939 (613)
Walleye – release	0.1126 (0.0476)	222 (110)	807 (445)	2,038 (1,125)	160 (294)	553 (923)	3,780 (1,554)
Yellow perch – harvest	0.1205 (0.1055)	0 (0)	278 (419)	3,348 (3,380)	73 (163)	346 (877)	4,045 (3,521)
Yellow perch – release	0.0302 (0.0242)	0 (0)	33 (55)	684 (785)	112 (145)	185 (106)	1,014 (807)
Channel catfish – harvest	0.0007 (0.0015)	0 (0)	0 (0)	0 (0)	25 (54)	0 (0)	25 (54)
Channel catfish – release	0.0023 (0.0024)	0 (0)	0 (0)	28 (44)	49 (68)	0 (0)	77 (81)
Carp – harvest	0.0115 (0.0188)	0 (0)	0 (0)	386 (631)	0 (0)	0 (0)	386 (631)
Carp – release	0.0004 (0.0007)	4 (12)	10 (23)	0 (0)	0 (0)	0 (0)	14 (26)
Total harvest	0.4625 (0.1755)	212 (104)	4,688 (3,043)	8,755 (4,360)	1,393 (1,812)	474 (917)	15,522 (5,693)
Total release	0.4934 (0.2058)	441 (154)	2,857 (1,776)	5,116 (2,104)	1,259 (722)	6,886 (6,083)	16,559 (6,718)
Total catch	0.9559 (0.2784)	653 (186)	7,545 (3,523)	13,871 (4,842)	2,652 (1,950)	7,360 (6,152)	32,081 (8,806)
Angler hours		1,608 (324)	5,874 (1,120)	12,278 (2,261)	7,377 (1,613)	6,424 (1,265)	33,561 (3,267)
Angler trips		447 (114)	1,458 (323)	2,688 (694)	1,525 (534)	2,078 (1,019)	8,196 (1,387)

<sup>1</sup> This term includes species such as rock bass, bluegills, and pumpkinseed sunfish.

Appendix 33-4.—Estimated harvest, catch and release, fishing pressure, and catch per hour by boat anglers, Sessions Lake, Ionia County, 1997. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug-Sep	Season
Bass – harvest	0.0105 (0.0086)	0 (0)	126 (152)	113 (141)	25 (54)	0 (0)	264 (214)
Bass – release	0.0797 (0.0535)	0 (0)	514 (452)	408 (228)	195 (175)	889 (1,210)	2,006 (1,323)
Crappie – harvest	0.1581 (0.1037)	0 (0)	1,980 (1,837)	1,555 (1,577)	444 (840)	0 (0)	3,979 (2,563)
Crappie – release	0.0390 (0.0426)	0 (0)	602 (1,004)	170 (164)	73 (181)	138 (266)	983 (1,067)
Panfish <sup>1</sup> – harvest	0.1064 (0.0883)	0 (0)	93 (216)	1,763 (1,489)	753 (1,591)	69 (176)	2,678 (2,197)
Panfish <sup>1</sup> – release	0.0900 (0.0673)	0 (0)	323 (449)	1,321 (1,469)	504 (550)	118 (362)	2,266 (1,671)
Walleye – harvest	0.0274 (0.0240)	0 (0)	206 (166)	351 (525)	73 (115)	59 (202)	689 (598)
Walleye – release	0.1321 (0.0612)	0 (0)	807 (445)	1,805 (1,032)	160 (294)	553 (923)	3,325 (1,484)
Yellow perch – harvest	0.0487 (0.0438)	0 (0)	13 (28)	795 (630)	73 (163)	346 (877)	1,227 (1,092)
Yellow perch – release	0.0144 (0.0088)	0 (0)	33 (55)	217 (150)	112 (145)	0 (0)	362 (216)
Channel catfish – harvest	0.0010 (0.0022)	0 (0)	0 (0)	0 (0)	25 (54)	0 (0)	25 (54)
Channel catfish – release	0.0031 (0.0033)	0 (0)	0 (0)	28 (44)	49 (68)	0 (0)	77 (81)
Carp – release	0.0004 (0.0009)	0 (0)	10 (23)	0 (0)	0 (0)	0 (0)	10 (23)
Total harvest	0.3520 (0.1496)	0 (0)	2,418 (1,864)	4,577 (2,323)	1,393 (1,811)	474 (917)	8,862 (3,605)
Total release	0.3587 (0.1203)	0 (0)	2,289 (1,271)	3,949 (1,823)	1,093 (691)	1,698 (1,587)	9,029 (2,817)
Total catch	0.7107 (0.2017)	0 (0)	4,707 (2,256)	8,526 (2,953)	2,486 (1,939)	2,172 (1,833)	17,891 (4,575)
Angler hours		1,350 (306)	4,041 (997)	9,456 (2,169)	5,299 (1,529)	5,028 (1,225)	25,174 (3,103)
Angler trips		395 (106)	1,051 (280)	1,978 (498)	1,152 (412)	1,257 (457)	5,833 (846)

<sup>1</sup> This term includes species such as rock bass, bluegills, and pumpkinseed sunfish.

Appendix 33-5.—Estimated harvest, catch and release, fishing pressure, and catch per hour by shore anglers, Sessions Lake, Ionia County, 1997. Two standard errors are given in parentheses.

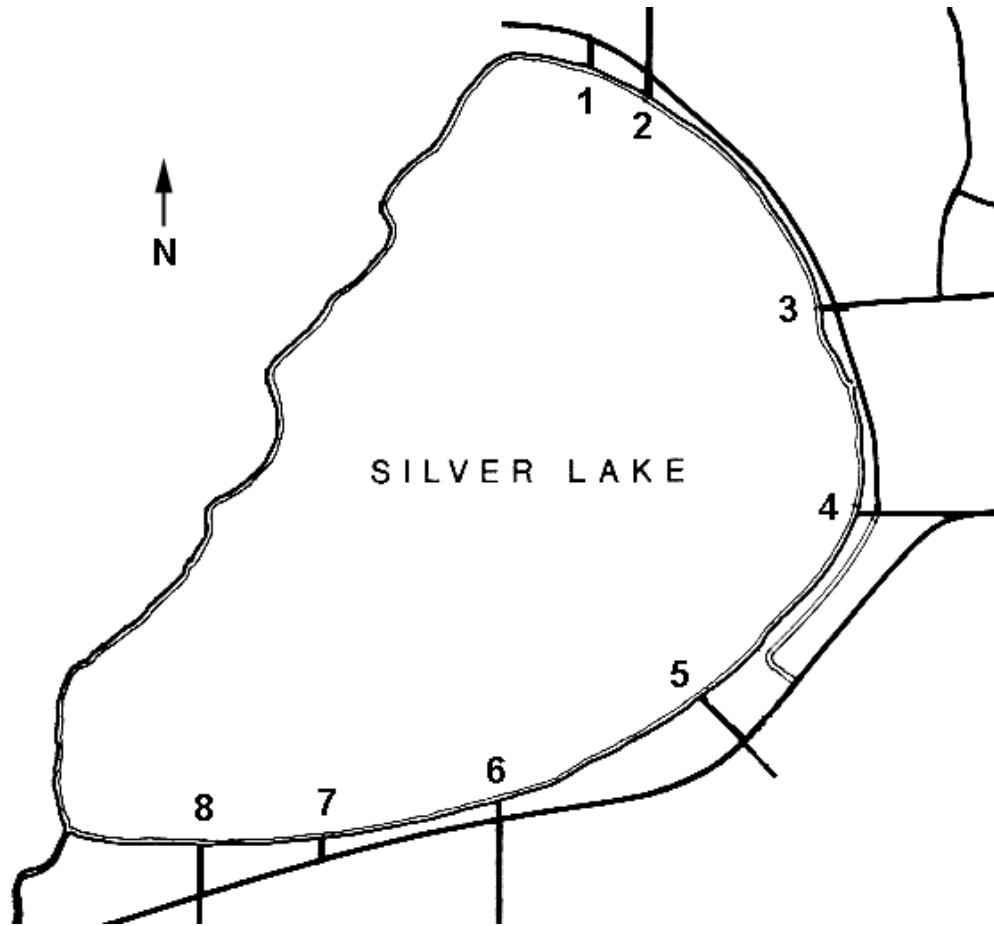
Species	Catch/hour	Apr	May	Jun	Jul	Aug-Sep	Season
Bass – release	0.4419 (0.5391)	215 (107)	0 (0)	156 (210)	0 (0)	3,335 (4,493)	3,706 (4,499)
Crappie – harvest	0.1353 (0.1931)	0 (0)	1,135 (1,614)	0 (0)	0 (0)	0 (0)	1,135 (1,614)
Crappie – release	0.0132 (0.0222)	0 (0)	0 (0)	0 (0)	111 (186)	0 (0)	111 (186)
Panfish <sup>1</sup> – harvest	0.2469 (0.2734)	0 (0)	832 (1,733)	1,239 (1,480)	0 (0)	0 (0)	2,071 (2,279)
Panfish <sup>1</sup> – release	0.3102 (0.4799)	0 (0)	568 (1,241)	311 (514)	55 (93)	1,668 (3,780)	2,602 (4,013)
Walleye – harvest	0.0298 (0.0163)	212 (104)	38 (83)	0 (0)	0 (0)	0 (0)	250 (133)
Walleye – release	0.0543 (0.0553)	222 (110)	0 (0)	233 (447)	0 (0)	0 (0)	455 (460)
Yellow perch – harvest	0.3360 (0.4012)	0 (0)	265 (418)	2,553 (3,321)	0 (0)	0 (0)	2,818 (3,347)
Yellow perch – release	0.0777 (0.0932)	0 (0)	0 (0)	467 (771)	0 (0)	185 (106)	652 (778)
Carp – harvest	0.0460 (0.0754)	0 (0)	0 (0)	386 (631)	0 (0)	0 (0)	386 (631)
Carp – release	0.0005 (0.0015)	4 (12)	0 (0)	0 (0)	0 (0)	0 (0)	4 (12)
Total harvest	0.7940 (0.5342)	212 (104)	2,270 (2,406)	4,178 (3,690)	0 (0)	0 (0)	6,660 (4,406)
Total release	0.8978 (0.7352)	441 (154)	568 (1,241)	1,167 (1,050)	166 (208)	5,188 (5,872)	7,530 (6,099)
Total catch	1.6918 (0.9204)	652 (186)	2,838 (2,707)	5,345 (3,836)	166 (208)	5,188 (5,872)	14,190 (7,524)
Angler hours		258 (106)	1,833 (510)	2,822 (638)	2,078 (515)	1,396 (314)	8,387 (1,021)
Angler trips		52 (41)	407 (162)	710 (484)	373 (339)	821 (911)	2,363 (1,099)

<sup>1</sup> This term includes species such as rock bass, bluegills, and pumpkinseed sunfish.



Appendix 34-1.–Silver Lake, Oceana County, 1996.

Site	Silver Lake
Year	1996
County	Oceana
Location	T. 15 N., R. 18 W., Sec. 29-31
Survey period	April 27 through September 2
Daily period	See Appendix 34-2
Survey design	Roving-voluntary
Count method	Instantaneous, fishing boats, non-fishing watercraft
Interview type	Voluntary, access, party, fishing boats, harvest, catch and release
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	Multiple-day period (Lockwood et al. 1999)
Clerk	One Parks Division employee made counts
Survey purpose	Evaluate Silver Lake walleye stocking program
Notes	<p>This was a joint survey between Fisheries Division and Silver Lake State Park (MDNR Parks Division). Daily survey period and expansion values are given in Appendix 34-2. Every day within the survey dates was sampled.</p> <p>Park employees made instantaneous counts of fishing and non-fishing watercraft twice each day, at randomly-selected times.</p> <p>Interview cards were available to anglers at eight access locations around the lake. Cards could be dropped off at the Park office or in any of eight-drop boxes at the access sites (Appendix figure 34-1).</p>



Appendix figure 34-1.-Interview card source and drop-off box locations 1-8, Silver Lake, Oceana County, 1996.

Appendix 34-2.–Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Silver Lake, Oceana County, 1996.

Month	Shift	Expansion value
April	0800 h – 1800 h	11
May 1-15	0800 h – 1800 h	11
May 16-31	0800 h – 2100 h	14
June	0800 h – 2100 h	14
July	0800 h – 2100 h	14
August	0800 h – 2100 h	14
September	0800 h – 2100 h	14

Appendix 34-3.—Estimated harvest, catch and release, fishing pressure, and catch per hour by boat anglers, Silver Lake, Oceana County, 1996. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug-Sep	Season
Bass – harvest	0.0064 (0.0065)	0 (0)	36 (78)	102 (115)	0 (0)	0 (0)	138 (138)
Bass – release	0.0260 (0.0187)	33 (59)	208 (124)	173 (193)	0 (0)	147 (316)	561 (395)
Crappie – harvest	0.0067 (0.0046)	0 (0)	145 (97)	0 (0)	0 (0)	0 (0)	145 (97)
Crappie – release	0.0035 (0.0073)	0 (0)	76 (158)	0 (0)	0 (0)	0 (0)	76 (158)
Panfish <sup>1</sup> – harvest	0.0210 (0.0172)	0 (0)	170 (137)	135 (121)	0 (0)	147 (316)	452 (365)
Panfish <sup>1</sup> – release	0.0632 (0.0441)	0 (0)	226 (135)	548 (519)	0 (0)	588 (760)	1,362 (931)
Walleye – harvest	0.1537 (0.0565)	130 (234)	952 (609)	1,404 (632)	824 (653)	0 (0)	3,310 (1,119)
Walleye – release	0.0346 (0.0210)	0 (0)	301 (283)	231 (213)	213 (259)	0 (0)	745 (439)
Yellow perch – harvest	0.0303 (0.0307)	0 (0)	223 (144)	135 (106)	0 (0)	294 (628)	652 (653)
Yellow perch – release	0.0502 (0.0315)	0 (0)	188 (190)	191 (162)	262 (320)	441 (522)	1,082 (661)
Northern pike – harvest	0.0422 (0.0405)	0 (0)	122 (102)	147 (159)	346 (561)	294 (628)	909 (863)
Northern pike – release	0.1098 (0.0458)	98 (152)	1,109 (628)	625 (305)	532 (589)	0 (0)	2,364 (926)
Channel catfish – harvest	0.0478 (0.0502)	0 (0)	0 (0)	0 (0)	0 (0)	1,029 (1,071)	1,029 (1,071)

<sup>1</sup> This term includes species such as rock bass, bluegills, and pumpkinseed sunfish.

Appendix 34-3.--continued.

Species	Catch/hour	Apr	May	Jun	Jul	Aug-Sep	Season
Total harvest	0.3081 (0.1000)	130 (234)	1,648 (661)	1,923 (681)	1,170 (861)	1,764 (1,427)	6,635 (1,932)
Total release	0.2874 (0.0847)	130 (163)	2,108 (754)	1,768 (686)	1,007 (719)	1,176 (975)	6,190 (1,592)
Total catch	0.5955 (0.1445)	261 (285)	3,756 (1,003)	3,691 (967)	2,177 (1,122)	2,940 (1,728)	12,825 (2,503)
Angler hours		371 (271)	4,711 (1,195)	5,606 (1,327)	5,851 (1,857)	4,998 (1,708)	21,537 (3,103)
Angler trips		102 (81)	1,038 (353)	1,479 (483)	1,377 (553)	2,221 (836)	6,218 (1,170)

Appendix 34-4.--Estimated pleasure craft (non-fishing) activity, Silver Lake, Oceana County, 1996. Two standard errors are given in parentheses.

Effort	Apr	May	Jun	Jul	Aug-Sep	Season
Person hours	0 (0)	3,034 (3,067)	22,131 (17,549)	67,238 (46,780)	70,030 (52,838)	162,433 (72,785)
Craft hours	0 (0)	633 (341)	4,690 (1,213)	14,616 (3,139)	14,917 (3,175)	34,856 (4,639)

Appendix 34-5.--Estimated total craft (fishing and non-fishing) activity, Silver Lake, Oceana County, 1996. Two standard errors are given in parentheses.

Effort	Apr	May	Jun	Jul	Aug-Sep	Season
Person hours	371 (271)	7,745 (3,292)	27,737 (17,599)	73,089 (46,817)	75,028 (52,866)	183,969 (72,851)
Craft hours	165 (115)	2,667 (497)	7,252 (1,319)	17,164 (3,175)	17,416 (3,201)	44,664 (4,725)

Appendix 35-1.–Silver Lake, Oceana County, 1997.

Site	Silver Lake
Year	1997
County	Oceana
Location	T. 15 N., R. 18 W., Sec. 29-31
Survey period	April 26 through September 1
Daily period	See Appendix 35-2
Survey design	Roving-voluntary
Count method	Instantaneous, fishing boats, non-fishing watercraft
Interview type	Voluntary, access, party, boating anglers, harvest, catch and release
Effort estimation	Multiple-day period (Lockwood et al. 1999)
Catch estimation	Multiple-day period (Lockwood et al. 1999)
Clerk	One Parks Division employee made counts
Survey purpose	Evaluate Silver Lake walleye stocking program
Notes	<p>This was a joint survey between Fisheries Division and Silver Lake State Park (MDNR Parks Division). Daily survey period and expansion values are given in Appendix 35-2. Every day within the survey dates was sampled.</p> <p>Park employees made instantaneous counts of fishing and non-fishing watercraft twice each day, at randomly-selected times.</p> <p>Interview cards were available to anglers at eight access locations around the lake. Cards could be dropped off at the Park office or in any of eight-drop boxes at the access sites (Appendix figure 34-1 Silver Lake 1996 chapter ). Also, an intern student from Grand Valley State University interviewed anglers on randomly-selected weekend days during April and May.</p>

Appendix 35-2.–Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Silver Lake, Oceana County, 1997.

Month	Shift	Expansion value
April	0800 h – 1800 h	11
May 1-15	0800 h – 1800 h	11
May 16-31	0800 h – 2100 h	14
June	0800 h – 2100 h	14
July	0800 h – 2100 h	14
August	0800 h – 2100 h	14
September	0800 h – 2100 h	14

Appendix 35-3.—Estimated harvest, catch and release, fishing pressure, and catch per hour by boat anglers, Silver Lake, Oceana County, 1997. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug-Sep	Season
Bass – harvest	0.0064 (0.0058)	0 (0)	18 (20)	26 (41)	50 (71)	0 (0)	94 (84)
Bass – release	0.0205 (0.0149)	8 (5)	33 (34)	99 (137)	126 (153)	37 (64)	303 (218)
Crappie – harvest	0.0290 (0.0331)	0 (0)	27 (41)	136 (280)	229 (389)	37 (77)	429 (487)
Crappie – release	0.0123 (0.0093)	17 (36)	38 (54)	86 (95)	40 (73)	0 (0)	181 (136)
Panfish <sup>1</sup> – harvest	0.0087 (0.0080)	0 (0)	90 (100)	19 (18)	19 (59)	0 (0)	128 (117)
Panfish <sup>1</sup> – release	0.0644 (0.1015)	50 (86)	51 (40)	63 (60)	103 (107)	684 (1487)	951 (1495)
Walleye – harvest	0.2042 (0.0605)	201 (189)	693 (359)	385 (221)	1,177 (612)	560 (311)	3,016 (827)
Walleye – release	0.0779 (0.0394)	46 (67)	176 (112)	643 (523)	135 (133)	151 (113)	1,151 (567)
Yellow perch – harvest	0.0254 (0.0205)	4 (3)	19 (21)	43 (53)	252 (284)	57 (77)	375 (300)
Yellow perch – release	0.0282 (0.0241)	0 (0)	0 (0)	12 (35)	196 (255)	208 (241)	416 (353)
Northern pike – harvest	0.0140 (0.0106)	8 (5)	57 (98)	63 (52)	79 (108)	0 (0)	207 (155)
Northern pike – release	0.0948 (0.0323)	63 (63)	520 (259)	609 (323)	209 (166)	0 (0)	1,401 (450)
Channel catfish – harvest	0.0026 (0.0043)	0 (0)	0 (0)	19 (18)	19 (59)	0 (0)	38 (62)
Total harvest	0.2902 (0.0770)	213 (189)	904 (389)	691 (368)	1,825 (794)	654 (330)	4,287 (1,030)
Total release	0.2981 (0.1211)	184 (131)	818 (292)	1,512 (641)	809 (388)	1,080 (1,512)	4,403 (1,718)
Total catch	0.5883 (0.1509)	397 (230)	1,722 (486)	2,203 (739)	2,634 (884)	1,734 (1,547)	8,690 (2,002)
Angler hours		1,261 (647)	2,572 (649)	2,617 (608)	4,085 (842)	4,237 (924)	14,772 (1,665)
Angler trips		231 (124)	619 (199)	641 (181)	872 (217)	881 (331)	3,244 (494)

<sup>1</sup> This term includes species such as rock bass, bluegills, and pumpkinseed sunfish.



Appendix 35-4.—Estimated pleasure craft (non-fishing) activity, Silver Lake, Oceana County, 1997. Two standard errors are given in parentheses.

Effort	Apr	May	Jun	Jul	Aug-Sep	Season
Person hours	0 (0)	2,541 (1,511)	25,707 (17,858)	63,079 (37,866)	30,008 (17,035)	121,335 (45,224)
Craft hours	0 (0)	546 (272)	5,523 (2,487)	13,552 (3,847)	6,447 (1,329)	26,068 (4,778)

Appendix 35-5.—Estimated total water craft (fishing and non-fishing) activity, Silver Lake, Oceana County, 1997. Two standard errors are given in parentheses.

Effort	Apr	May	Jun	Jul	Aug-Sep	Season
Person hours	1,261 (647)	5,113 (1,644)	28,324 (17,868)	67,164 (37,875)	34,245 (17,060)	136,107 (45,254)
Craft hours	528 (267)	2,148 (407)	6,979 (2,497)	15,470 (3,858)	8,330 (1,357)	33,455 (4,816)

Appendix 36-1.--Stanley Lake, Iron County, 1993.

Site	Stanley Lake
Year	1993
County	Iron
Location	T. 42 N., R. 35 W., Sec. 4, 5, 8
Survey period	May 15 through November 13
Daily period	See Appendix 36-2
Survey design	Roving (effort only)
Count method	Instantaneous, fishing boats
Interview type	
Effort estimation	See Appendix 1 (Lockwood et al. 1999)
Catch estimation	
Clerk	Fisheries Division clerk, 1/3 time
Survey purpose	Estimate angling effort
Notes	<p>One Fisheries Division clerk collected count and interview data on Hagerman and Chicagon lakes (see also Hagerman and Chicagon lakes, 1993 chapter), only count data were collected at Stanley Lake - no interviews were collected. Stanley Lake was sampled each scheduled workday. Three randomly-selected weekdays, each weekend day, and all holidays were selected for sampling each week of the survey period. One of two shifts was selected each workday (Appendix 36-2).</p> <p>Order of count was randomized and the clerk began a scheduled count at one of these three lakes and then proceeded to the others. One instantaneous count per day of fishing boats was made at each lake.</p> <p>Since no interviews were collected from Stanley Lake anglers, the mean length of fishing trips from interviews collected at Hagerman Lake, 1993 were used to calculate angler trips for Stanley Lake.</p>

Appendix 36-2.—Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Stanley Lake, Iron County, 1993.

Month	Shift		Expansion value
	Early	Late	
May	0600 h – 1500 h	1300 h – 2200 h	16
June	0600 h – 1500 h	1300 h – 2200 h	18
July	0600 h – 1500 h	1300 h – 2200 h	18
August	0600 h – 1500 h	1300 h – 2200 h	17
September	0600 h – 1500 h	1300 h – 2200 h	16
October	0600 h – 1500 h	1300 h – 2200 h	14
November	0600 h – 1500 h	1100 h – 2000 h	12

Appendix 36-3.—Estimated fishing pressure by boat anglers, Stanley Lake, Iron County, 1993. Two standard errors are given in parentheses.

Effort	May	Jun	Jul	Aug	Sep	Oct	Nov	Season
Angler hours	1,666 (711)	2,057 (827)	1,666 (646)	2,127 (981)	1,191 (465)	1,463 (555)	0 (0)	10,170 (1,759)
Angler trips	362 (167)	527 (237)	696 (303)	695 (335)	196 (88)	276 (112)	0 (0)	2,752 (555)

Appendix 37-1.–Stanley Lake, Iron County, 1993-94.

Site	Stanley Lake
Year	1993-94
County	Iron
Location	T. 42 N., R. 35 W., Sec. 4, 5, 8
Survey period	December 13, 1993 through March 15, 1994
Daily period	See Appendix 37-2
Survey design	Roving-roving
Count method	Instantaneous, occupied ice shanties, open-ice anglers
Interview type	Roving, party, ice-shanty anglers, open-ice anglers, harvest
Effort estimation	See Appendix 1 (Lockwood et al. 1999)
Catch estimation	See Appendix 1 (Lockwood et al. 1999)
Clerk	Fisheries Division clerk, 1/3 time
Survey purpose	Characterize general effort and catch aspects of the fishery, and angler residency
Notes	<p>One Fisheries Division supported clerk was used to collect count and interview data from Stanley, Chicagon and Hagerman lakes (see also Chicagon and Hagerman lakes, 1993-94 chapters). While time allocated at each lake was not specified, the clerk spent the most time at Chicagon Lake and collected the most interviews from there. Three randomly-selected weekdays, each weekend day, and all holidays were sampled each week of the survey period. (Note December 25 and January 1 were not sampled.) One of two shifts was selected for sampling (Appendix 37-2).</p> <p>One instantaneous count per day was made and the order in which lakes were visited was randomized. At each lake, the clerk roved the lake counting occupied ice fishing shanties and open-ice anglers.</p> <p>Predominantly incomplete-trip party interviews were collected (53 out of 59). All interviews (access and roving) were treated the same with catch rate estimated using the mean-of-ratios catch rate estimator by angling party.</p>

Appendix 37-2.—Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Stanley Lake, Iron County, 1993-94.

Month	Shift		Expansion value
	Early	Late	
December	0700 h – 1530 h	1100 h – 1930 h	10
January	0700 h – 1530 h	1100 h – 1930 h	10
February	0600 h – 1500 h	1200 h – 2030 h	11
March	0600 h – 1500 h	1200 h – 2030 h	11

Appendix 37-3.—Total estimated harvest, fishing pressure, and catch per hour, Stanley Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Species	Catch/hour	Dec	Jan	Feb	Mar	Season
Yellow perch	0.7112 (0.5032)	512 (503)	0 (0)	353 (364)	103 (94)	968 (628)
Walleye	0.0213 (0.0214)	0 (0)	0 (0)	14 (22)	15 (18)	29 (28)
Total harvest	0.7325 (0.5063)	512 (503)	0 (0)	367 (365)	118 (96)	997 (629)
Angler hours		342 (182)	174 (130)	391 (240)	454 (200)	1,361 (384)
Angler trips		83 (50)	46 (40)	73 (52)	107 (51)	309 (98)

Appendix 37-4.—Estimated harvest, fishing pressure, and catch per hour by shanty anglers, Stanley Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Species	Catch/hour	Dec	Jan	Feb	Mar	Season
Yellow perch	0.9399 (0.9418)	390 (491)	0 (0)	282 (349)	0 (0)	672 (602)
Walleye	0.0196 (0.0320)	0 (0)	0 (0)	14 (22)	0 (0)	14 (22)
Total harvest	0.9594 (0.9470)	390 (491)	0 (0)	296 (350)	0 (0)	686 (603)
Angler hours		160 (152)	174 (130)	259 (206)	122 (144)	715 (321)
Angler trips		43 (45)	46 (40)	44 (45)	33 (41)	166 (86)

Appendix 37-5.—Estimated harvest, fishing pressure, and catch per hour by open ice anglers, Stanley Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Species	Catch/hour	Dec	Jan	Feb	Mar	Season
Yellow perch	0.4582 (0.3149)	122 (111)	0 (0)	71 (104)	103 (94)	296 (179)
Walleye	0.0232 (0.0289)	0 (0)	0 (0)	0 (0)	15 (18)	15 (18)
Total harvest	0.4814 (0.3199)	122 (111)	0 (0)	71 (104)	118 (96)	311 (180)
Angler hours		182 (100)	0 (0)	132 (123)	332 (139)	646 (211)
Angler trips		40 (22)	0 (0)	29 (27)	74 (31)	143 (47)

Appendix 37-6.—Residence of anglers (percent of anglers interviewed) by Michigan County or U. S. State, Stanley Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Residence	Dec	Jan	Feb	Mar	Season
Dickinson	0 (0)	0 (0)	0 (0)	4.55 (6.28)	1.80 (2.53)
Iron	23.08 (23.37)	100.00 (0)	63.04 (14.23)	50.00 (15.08)	55.86 (9.43)
Non-resident	0 (0)	0 (0)	4.35 (6.01)	0 (0)	1.80 (2.53)
Wisconsin	76.92 (23.37)	0 (0)	32.61 (13.82)	45.45 (15.01)	40.54 (9.32)
Anglers interviewed	13	8	46	44	111

Appendix 37-7.—Species of fish sought by anglers (percent of anglers interviewed), Stanley Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Species sought	Dec	Jan	Feb	Mar	Season
Walleye & perch	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)
Anglers interviewed	13	9	51	48	121

Appendix 37-8.—Type of bait or method used by anglers (percent of anglers interviewed), Stanley Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Bait or method used	Dec	Jan	Feb	Mar	Season
Tip-up	30.77 (25.60)	0 (0)	12.50 (9.55)	65.91 (14.29)	34.51 (8.94)
Jigging	0 (0)	0 (0)	0 (0)	2.27 (4.49)	0.88 (1.76)
Jigging + live	46.15 (27.65)	62.50 (34.23)	29.17 (13.12)	9.09 (8.67)	25.66 (8.22)
Jigging + tip-up	23.08 (23.37)	37.50 (34.23)	58.33 (14.23)	22.73 (12.64)	38.94 (9.17)
Anglers interviewed	13	8	48	44	113

Appendix 37-9.—Number of trips per day by anglers (percent of anglers interviewed), Stanley Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Trips/day	Dec	Jan	Feb	Mar	Season
1	100.00 (0)	100.00 (0)	93.75 (6.99)	100.00 (0)	97.46 (2.90)
2	0 (0)	0 (0)	6.25 (6.99)	0 (0)	2.54 (2.90)
Anglers interviewed	13	9	48	48	118



Appendix 37-10.—Gender of anglers (percent of anglers interviewed), Stanley Lake, Iron County, 1993-94. Two standard errors are given in parentheses.

Gender	Dec	Jan	Feb	Mar	Season
Male	92.31 (14.78)	66.67 (31.43)	84.31 (10.18)	87.50 (9.55)	85.12 (6.47)
Female	7.69 (14.78)	33.33 (31.43)	15.69 (10.18)	12.50 (9.55)	14.88 (6.47)
Anglers interviewed	13	9	51	48	121

Appendix 38-1.–Stanley Lake, Iron County, 1994.

Site	Stanley Lake
Year	1994
County	Iron
Location	T. 42 N., R. 35 W., Sec. 4, 5, 8
Survey period	May 15, 1994 through October 31
Daily period	See Appendix 38-2
Survey design	Roving-access
Count method	Instantaneous, fishing boats
Interview type	Access, party, boating anglers, harvest
Effort estimation	See Appendix 1 (Lockwood et al. 1999)
Catch estimation	See Appendix 1 (Lockwood et al. 1999)
Clerk	Fisheries Division clerk, 1/3 time
Survey purpose	Characterize general effort and catch aspects of the fishery, and angler residency
Notes	<p>One Fisheries Division clerk was used to collect count and interview data from Stanley and Chicagon lakes, and count data only from Hagerman Lake (see also Chicagon and Hagerman lakes, 1994 chapters). Similar amounts of time were allocated to Stanley and Chicagon lakes, only count time allocated to Hagerman Lake. Three randomly-selected weekdays, each weekend day, and all holidays were sampled each week during the survey period. Sampling shifts are given in Appendix 38-2.</p> <p>One count per day was made at each lake. The order in which lakes were counted was randomized. Only boats were counted at Chicagon Lake.</p> <p>Only boat angling parties were interviewed.</p>

Appendix 38-2.—Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Stanley Lake, Iron County, 1994.

Month	Shift		Expansion value
	Early	Late	
May	0600 h – 1500 h	1300 h – 2200 h	16
June	0600 h – 1500 h	1300 h – 2200 h	18
July	0600 h – 1500 h	1300 h – 2200 h	18
August	0600 h – 1500 h	1300 h – 2200 h	17
September	0600 h – 1500 h	1300 h – 2200 h	16
October	0600 h – 1500 h	1300 h – 2200 h	14

Appendix 38-3.—Estimated harvest, fishing pressure, and catch per hour by boat anglers, Stanley Lake, Iron County, 1994. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Oct	Season
Yellow perch	0.4246 (0.1671)	336 (353)	1,194 (1,093)	1,317 (805)	839 (688)	1,071 (861)	988 (1,033)	5,745 (2,061)
Walleye	0.0252 (0.0139)	16 (22)	126 (101)	28 (32)	36 (36)	98 (126)	36 (58)	340 (180)
Smallmouth bass	0.0006 (0.0011)	8 (15)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	8 (15)
Bluegill	0.0405 (0.0617)	0 (0)	370 (755)	15 (23)	0 (0)	163 (345)	0 (0)	548 (830)
Total harvest	0.4908 (0.1828)	360 (354)	1,690 (1,331)	1,360 (806)	875 (688)	1,332 (935)	1,024 (1,034)	6,641 (2,229)
Angler hours		1,506 (822)	3,533 (1,046)	3,102 (1,013)	2,637 (949)	1,677 (871)	1,075 (570)	13,530 (2,186)
Angler trips		548 (313)	1,220 (414)	867 (301)	762 (296)	405 (210)	353 (234)	4,155 (739)

Appendix 38-4.—Residence of anglers (percent of anglers interviewed) by Michigan County or U. S. State, Stanley Lake, Iron County, in 1994. Two standard errors are given in parentheses.

Residence	May	Jun	Jul	Aug	Sep	Oct	Season
Berrien	0 (0)	0 (0)	1.05 (1.48)	0 (0)	0 (0)	0 (0)	0.31 (0.43)
Delta	0 (0)	0 (0)	1.05 (1.48)	0 (0)	0 (0)	0 (0)	0.31 (0.43)
Dickinson	0 (0)	0 (0)	2.11 (2.08)	3.36 (3.30)	0 (0)	0 (0)	1.22 (0.86)
Hillsdale	0 (0)	0 (0)	0 (0)	1.68 (2.36)	1.15 (2.29)	0 (0)	0.46 (0.53)
Ingham	0 (0)	0 (0)	1.05 (1.48)	0 (0)	0 (0)	0 (0)	0.31 (0.43)
Iron	27.91 (9.67)	10.17 (5.56)	22.63 (6.07)	18.49 (7.12)	22.99 (9.02)	12.96 (9.14)	19.57 (3.10)
Marquette	0 (0)	0 (0)	1.58 (1.81)	0 (0)	0 (0)	0 (0)	0.46 (0.53)
Menominee	3.49 (3.96)	4.24 (3.71)	0 (0)	1.68 (2.36)	6.90 (5.43)	0 (0)	2.45 (1.21)
Muskegon	0 (0)	3.39 (3.33)	1.58 (1.81)	0 (0)	0 (0)	0 (0)	1.07 (0.80)
Oakland	0 (0)	0 (0)	0 (0)	1.68 (2.36)	0 (0)	0 (0)	0.31 (0.43)
St. Clair	0 (0)	0 (0)	1.05 (1.48)	0 (0)	0 (0)	0 (0)	0.31 (0.43)
Washtenaw	0 (0)	3.39 (3.33)	1.05 (1.48)	0 (0)	0 (0)	0 (0)	0.92 (0.75)
Non-resident	15.12 (7.73)	22.03 (7.63)	19.47 (5.75)	13.45 (6.25)	13.79 (7.39)	20.37 (10.96)	17.58 (2.98)
Wisconsin	53.49 (10.76)	56.78 (9.12)	47.37 (7.24)	59.66 (8.99)	55.17 (10.66)	66.67 (12.83)	54.74 (3.89)
Anglers interviewed	86	118	190	119	87	54	654

Appendix 38-5.—Type of method used by anglers (percent of anglers interviewed), Stanley Lake, Iron County, 1994. Two standard errors are given in parentheses.

Method used	May	Jun	Jul	Aug	Sep	Oct	Season
Casting	54.93 (11.81)	44.32 (10.59)	33.15 (7.00)	40.34 (8.99)	27.59 (9.58)	38.00 (13.73)	38.42 (3.98)
Still fishing	28.17 (10.68)	34.09 (10.11)	58.56 (7.32)	57.14 (9.07)	65.52 (10.19)	58.00 (13.96)	52.01 (4.09)
Trolling	2.82 (3.93)	2.27 (3.18)	3.31 (2.66)	1.68 (2.36)	6.90 (5.43)	0 (0)	3.02 (1.40)
Jigging	14.08 (8.26)	19.32 (8.42)	4.97 (3.23)	0.84 (1.67)	0 (0)	4.00 (5.54)	6.54 (2.03)
Anglers interviewed	71	88	181	119	87	50	596

Appendix 38-6.—Species of fish sought by anglers (percent of anglers interviewed), Stanley Lake, Iron County, 1994. Two standard errors are given in parentheses.

Species sought	May	Jun	Jul	Aug	Sep	Oct	Season
Bass & bluegill	0 (0)	3.36 (3.30)	0 (0)	0 (0)	0 (0)	0 (0)	0.61 (0.61)
Pike & bass	1.03 (2.05)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.15 (0.31)
Panfish	0 (0)	7.56 (4.85)	9.50 (4.38)	0 (0)	0 (0)	0 (0)	3.98 (1.53)
Bass	0 (0)	0 (0)	5.59 (3.43)	0 (0)	0 (0)	0 (0)	1.53 (0.96)
Pike & musky	8.25 (5.59)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1.23 (0.86)
Walleye & perch	77.32 (8.50)	59.66 (8.99)	44.13 (7.42)	54.62 (9.13)	61.90 (10.60)	52.73 (13.46)	56.81 (3.88)
Musky	13.40 (6.92)	24.37 (7.87)	26.26 (6.58)	38.66 (8.93)	36.90 (10.53)	47.27 (13.46)	29.40 (3.57)
Perch	0 (0)	0 (0)	0 (0)	0 (0)	1.19 (2.37)	0 (0)	0.15 (0.31)
Anything	0 (0)	5.04 (4.01)	14.53 (5.27)	6.72 (4.59)	0 (0)	0 (0)	6.13 (1.88)
Anglers interviewed	97	119	179	119	84	55	653

Appendix 38-7.—Number of trips per day by anglers (percent of anglers interviewed), Stanley Lake, Iron County, 1994. Two standard errors are given in parentheses.

Trips/day	May	Jun	Jul	Aug	Sep	Oct	Season
1	100.00 (0)	95.80 (3.68)	100.00 (0)	100.00 (0)	98.85 (2.29)	90.91 (7.75)	98.35 (0.99)
2	0 (0)	4.20 (3.68)	0 (0)	0 (0)	1.15 (2.29)	9.09 (7.75)	1.65 (0.99)
Anglers interviewed	97	119	190	118	87	55	666

Appendix 38-8.—Gender of anglers (percent of anglers interviewed), Stanley Lake, Iron County, 1994. Two standard errors are given in parentheses.

Gender	May	Jun	Jul	Aug	Sep	Oct	Season
Male	85.57 (7.14)	83.19 (6.86)	84.74 (5.22)	88.24 (5.91)	94.25 (4.99)	89.09 (8.41)	86.81 (2.62)
Female	14.43 (7.14)	16.81 (6.86)	15.26 (5.22)	11.76 (5.91)	5.75 (4.99)	10.91 (8.41)	13.19 (2.62)
Anglers interviewed	97	119	190	119	87	55	667

Appendix 39-1–Swains Lake, Jackson County, 1998.

Site	Swains Lake
Year	1998
County	Jackson
Location	T. 4 S., R. 3 W., Sec. 3,4
Survey period	June 19 to August 8 (16 Friday and Saturday nights)
Daily period	1900 h to 2400 h
Survey design	Proportional-voluntary
Count method	Instantaneous, trailer
Interview type	Voluntary, party, boating anglers, harvest, catch and release
Effort estimation	Proportional, Equations (1)-(7)
Catch estimation	Multiple-day period (Lockwood et al. 1999)
Clerk	Fisheries Division clerk, 1/8 time
Survey purpose	Evaluate rainbow trout plants
Notes	<p>One clerk traveled to access sites at each of eight lakes (see also Allen, Bird, Deep, Cary, Farwell, Gilead, and Lavine lakes, 1988 chapters) on Friday and Saturday nights and recorded the number of trailers, or vehicles that appeared to have transported boats, and the hour at which the count was made.</p> <p>Catch rate was estimated from postpaid interview cards placed on the windshields of vehicles in the public launch sites located at each lake. Voluntary access interviews were collected, by angling party, to estimate catch rate. A zip-lock bag containing a self-addressed post card, explanation of the survey, and a lead pencil, was placed under each vehicle's windshield wiper. Anglers recorded number of anglers in their party, number of fish harvested, number of fish caught-and-released, start time, and finish time.</p>

Appendix 39-2.-Estimated harvest, harvest rate, catch and release, catch and release rate, and angling effort, Swains Lake, Jackson County, June 19 – August 8, 1998. All estimates are given with 2 standard errors in parentheses.

	Catch/hour	Estimate
Rainbow trout – harvest	0.0 (0.0)	0 (0)
Rainbow trout - release	0.0 (0.0)	0 (0)
Angler hours		184 (194)
Angler trips		61 (66)



Appendix 40-1–Tamarack Lake, Gogebic and Iron Counties, 1993.

Site	Tamarack Lake
Year	1993
County	Gogebic and Iron
Location	T. 44 N., R. 38 W., Sec. 1, 12
Survey period	May 15 through September 6
Daily period	See Appendix 40-2
Survey design	Roving-access
Count method	Instantaneous, fishing boats, shore anglers
Interview type	Access, party, boating anglers, shore anglers, harvest
Effort estimation	See Appendix 1 (Lockwood et al. 1999)
Catch estimation	See Appendix 1 (Lockwood et al. 1999)
Clerk	Fisheries Division clerk, ½ time
Survey purpose	Characterize general effort and catch aspects of the fishery
Notes	<p>One Fisheries Division clerk collected count and interview data from Tamarack and Duck lakes (see Duck Lake, 1993 chapter). Both lakes were sampled each scheduled workday. Three randomly-selected weekdays, each weekend day, and all holidays were sampled during each week of the survey period. One of two shifts was randomly selected each workday (Appendix 40-2).</p> <p>The order in which lakes were counted was randomized. Fishing boats and shore anglers were counted once per scheduled day.</p> <p>Interviewing was done at the public access site.</p>

Appendix 40-2.—Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Tamarack Lake, Gogebic and Iron Counties, 1993.

Month	Shift		Expansion value
	Early	Late	
May	0600 h – 1500 h	1300 h – 2200 h	16
June	0600 h – 1500 h	1300 h – 2200 h	18
July	0600 h – 1500 h	1300 h – 2200 h	18
August	0600 h – 1500 h	1300 h – 2200 h	17
September	0600 h – 1500 h	1300 h – 2200 h	16

Appendix 40-3.—Total estimated harvest, fishing pressure, and catch per hour, Tamarack Lake, Gogebic and Iron Counties, 1993. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Season
Yellow perch	0.0103 (0.0232)	25 (52)	0 (0)	0 (0)	0 (0)	0 (0)	25 (52)
Walleye	0.0256 (0.0418)	28 (41)	34 (76)	0 (0)	0 (0)	0 (0)	62 (86)
Crappie	0.0029 (0.0078)	7 (18)	0 (0)	0 (0)	0 (0)	0 (0)	7 (18)
Total harvest	0.0388 (0.0538)	60 (68)	34 (76)	0 (0)	0 (0)	0 (0)	94 (102)
Angler hours		1,584 (1,978)	624 (613)	134 (268)	81 (163)	0 (0)	2,423 (2,094)
Angler trips		341 (446)	220 (224)	45 (91)	17 (34)	0 (0)	623 (508)

Appendix 40-4.—Estimated harvest, fishing pressure, and catch per hour by boat anglers, Tamarack Lake, Gogebic and Iron Counties, 1993. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Season
Yellow perch	0.0105 (0.0237)	25 (52)	0 (0)	0 (0)	0 (0)	0 (0)	25 (52)
Walleye	0.0260 (0.0426)	28 (41)	34 (76)	0 (0)	0 (0)	0 (0)	62 (86)
Crappie	0.0029 (0.0080)	7 (18)	0 (0)	0 (0)	0 (0)	0 (0)	7 (18)
Total harvest	0.0394 (0.0550)	60 (68)	34 (76)	0 (0)	0 (0)	0 (0)	94 (102)
Angler hours		1,547 (1,977)	624 (613)	134 (268)	81 (163)	0 (0)	2,386 (2,093)
Angler trips		334 (446)	220 (224)	45 (91)	17 (34)	0 (0)	616 (508)

Appendix 40-5.—Estimated fishing pressure by shore anglers, Tamarack Lake, Gogebic and Iron Counties, 1993. Two standard errors are given in parentheses.

Effort	May	Jun	Jul	Aug	Sep	Season
Angler hours	37 (75)	0 (0)	0 (0)	0 (0)	0 (0)	37 (75)
Angler trips	7 (14)	0 (0)	0 (0)	0 (0)	0 (0)	7 (14)

Appendix 40-6.—Species of fish sought by anglers (percent of anglers interviewed), Tamarack Lake, Gogebic and Iron Counties, 1993. Two standard errors are given in parentheses.

Species sought	May	Jun	Jul	Aug	Season
Panfish <sup>1</sup>	0 (0)	0 (0)	50.00 (50.00)	0 (0)	3.92 (5.44)
Walleye & pike	2.70 (5.33)	0 (0)	0 (0)	0 (0)	1.96 (3.88)
Walleye	91.89 (8.97)	100.00 (0)	50.00 (50.00)	100.00 (0)	90.20 (8.33)
Anything	5.41 (7.43)	0 (0)	0 (0)	0 (0)	3.92 (5.44)
Anglers interviewed	37	6	4	4	51

<sup>1</sup> This term includes species such as rock bass, bluegills, and pumpkinseed sunfish.

Appendix 40-7.—Type of bait used by anglers (percent of anglers interviewed), Tamarack Lake, Gogebic and Iron Counties, 1993. Two standard errors are given in parentheses.

Bait used	May	Jun	Jul	Aug	Season
Live	94.44 (7.64)	100.00 (0)	50.00 (50.00)	50.00 (50.00)	88.00 (9.19)
Artificial	0 (0)	0 (0)	50.00 (50.00)	50.00 (50.00)	8.00 (7.67)
Both	5.56 (7.64)	0 (0)	0 (0)	0 (0)	4.00 (5.54)
Anglers interviewed	36	6	4	4	50

Appendix 40-8.—Number of fishing trips per day by anglers (percent of anglers interviewed), Tamarack Lake, Gogebic and Iron Counties, 1993. Two standard errors are given in parentheses.

Trips/day	May	Jun	Jul	Aug	Season
1	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)
Anglers interviewed	37	6	4	4	51

Appendix 40-9.—Gender of anglers (percent of anglers interviewed), Tamarack Lake, Gogebic and Iron Counties, 1993. Two standard errors are given in parentheses.

Gender	May	Jun	Jul	Aug	Season
Male	94.59 (7.43)	100.00 (0)	75.00 (43.30)	100.00 (0)	94.12 (6.59)
Female	5.41 (7.43)	0 (0)	25.00 (43.30)	0 (0)	5.88 (6.59)
Anglers interviewed	37	6	4	4	51

Appendix 41-1.–Thunder Lake, Schoolcraft County, 1995.

Site	Thunder Lake
Year	1995
County	Schoolcraft
Location	T. 43 N., R. 17 W., Sec. 19, 20, 29, 30
Survey period	May 15 through September 16
Daily period	See Appendix 41-2
Survey design	Roving-access
Count method	Instantaneous, fishing boats
Interview type	Access, party, boating anglers, harvest
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	See Appendix 1 of Lockwood et al. (1999)
Clerk	U. S. Forest Service clerk, ½ time
Survey purpose	Characterize general effort and catch aspects of the fishery
Notes	<p>One creel clerk was used to sample Thunder Lake and Fish Dam River (see also Fish Dam River, 1995 chapter). Boats were counted from several vantage points around Thunder Lake, and anglers were interviewed at the public launch site. This was a cooperative project between Fisheries Division and the U. S. Forest Service. Logistical support, clerk supervision, data processing, and analysis were provided by Fisheries Division; funding for the clerk and vehicle was provided by the U. S. Forest Service. The creel clerk followed a weekly sampling schedule that assigned three randomly-selected weekdays, both weekend days, and all holidays. Sites (lake or river) were randomly assigned and the clerk remained at that site throughout the sampling day. One of two work shifts (early or late) was randomly selected for each sampling day (Appendix 41-2).</p> <p>Two counts were made each sampling day, and times of counts were varied randomly. Only fishing boats were counted.</p> <p>Only boat angling parties were interviewed.</p>

Appendix 41-2.—Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Thunder Lake, Schoolcraft County, 1995.

Month	Shift		Expansion value
	Early	Late	
May	0600 h – 1430 h	1400 h – 2200 h.	16
June	0600 h – 1430 h	1400 h – 2200 h.	18
July	0600 h – 1430 h	1400 h – 2200 h.	18
August	0600 h – 1430 h	1400 h – 2200 h.	17
September	0600 h – 1430 h	1400 h – 2100 h.	16

Appendix 41-3.—Estimated harvest, fishing pressure, and catch per hour by boat anglers, Thunder Lake, Schoolcraft County, 1995. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Season
Northern pike	0.0635 (0.0609)	0 (0)	0 (0)	93 (195)	128 (169)	160 (242)	381 (354)
Yellow perch	0.7148 (1.0344)	0 (0)	0 (0)	3,622 (6,087)	346 (446)	322 (473)	4,289 (6,122)
Smallmouth bass	0.0128 (0.0267)	0 (0)	0 (0)	0 (0)	77 (159)	0 (0)	77 (159)
Bluegill	0.3282 (0.3230)	0 (0)	0 (0)	1,539 (1,826)	359 (442)	72 (91)	1,969 (1,881)
Rock bass	0.0060 (0.0078)	0 (0)	0 (0)	0 (0)	0 (0)	36 (46)	36 (46)
Sunfish	0.0030 (0.0062)	0 (0)	0 (0)	18 (37)	0 (0)	0 (0)	18 (37)
Total harvest	1.1283 (1.1024)	0 (0)	0 (0)	5,272 (6,358)	908 (669)	590 (541)	6,770 (6,416)
Angler hours		1,040 (564)	1,060 (402)	2,335 (1,153)	852 (392)	713 (259)	6,000 (1,425)
Angler trips		380 (207)	446 (225)	1,001 (521)	363 (174)	416 (191)	2,606 (657)

Appendix 41-4.—Residence of anglers (percent of anglers interviewed) by Michigan County, Thunder Lake, Schoolcraft County, 1995. Two standard errors are given in parentheses.

Residence	May	Jun	Jul	Aug	Sep	Season
Alger	0 (0)	0 (0)	11.11 (14.81)	0 (0)	0 (0)	4.08 (5.65)
Delta	0 (0)	60.00 (43.82)	44.44 (23.42)	40.00 (30.98)	16.67 (30.43)	32.65 (13.40)
Eaton	0 (0)	0 (0)	5.56 (10.80)	0 (0)	0 (0)	2.04 (4.04)
Gratiot	40.00 (30.98)	0 (0)	0 (0)	0 (0)	0 (0)	8.16 (7.82)
Jackson	0 (0)	0 (0)	5.56 (10.80)	0 (0)	0 (0)	2.04 (4.04)
Manistee	0 (0)	0 (0)	0 (0)	20.00 (25.30)	0 (0)	4.08 (5.65)
Ottawa	0 (0)	0 (0)	0 (0)	0 (0)	16.67 (30.43)	2.04 (4.04)
Saginaw	0 (0)	0 (0)	22.22 (19.60)	0 (0)	0 (0)	8.16 (7.82)
Schoolcraft	60.00 (30.98)	40.00 (43.82)	11.11 (14.81)	20.00 (25.30)	66.67 (38.49)	32.65 (13.40)
Wayne	0 (0)	0 (0)	0 (0)	20.00 (25.30)	0 (0)	4.08 (5.65)
Anglers interviewed	10	5	18	10	6	49



Appendix 41-5.—Type of bait used by anglers (percent of anglers interviewed), Thunder Lake, Schoolcraft County, 1995. Two standard errors are given in parentheses.

Bait	May	Jun	Jul	Aug	Sep	Season
Live	0 (0)	0 (0)	66.67 (22.22)	60 (30.98)	0 (0)	36.73 (13.77)
Artificial	0 (0)	0 (0)	0 (0)	0 (0)	66.67 (38.49)	8.16 (7.82)
Both	100.00 (0)	100.00 (0)	33.33 (22.22)	40.00 (30.98)	33.33 (38.49)	55.10 (14.21)
Anglers interviewed	10	5	18	10	6	49

Appendix 41-6.—Species of fish sought by anglers (percent of anglers interviewed), Thunder Lake, Schoolcraft County, 1995. Two standard errors are given in parentheses.

Species sought	May	Jun	Jul	Aug	Sep	Season
Northern pike	30.00 (28.98)	0 (0)	0 (0)	0 (0)	0 (0)	6.12 (6.85)
Pike & perch	0 (0)	0 (0)	0 (0)	0 (0)	66.67 (38.49)	8.16 (7.82)
Walleye & perch	0 (0)	0 (0)	0 (0)	20.00 (25.30)	0 (0)	4.08 (5.65)
Anything	70.00 (28.98)	100.00 (0)	100.00 (0)	80.00 (25.30)	33.33 (38.49)	81.63 (11.06)
Anglers interviewed	10	5	18	10	6	49

Appendix 41-7.—Number of trips per day by anglers (percent of anglers interviewed), Thunder Lake, Schoolcraft County, 1995. Two standard errors are given in parentheses.

Trips/day	Aug	Sep	Season
1	100.00 (0)	100.00 (0)	100.00 (0)
Anglers interviewed	2	5	7

Appendix 41-8.—Gender of anglers (percent of anglers interviewed), Thunder Lake, Schoolcraft County, 1995. Two standard errors are given in parentheses

Gender	May	Jun	Jul	Aug	Sep	Season
Male	80.00 (25.30)	80.00 (35.78)	83.33 (17.57)	70.00 (28.98)	83.33 (30.43)	79.59 (11.52)
Female	20.00 (25.30)	20.00 (35.78)	16.67 (17.57)	30.00 (28.98)	16.67 (30.43)	20.41 (11.52)
Anglers interviewed	10	5	18	10	6	49

Appendix 42-1–Wedge Lake, Schoolcraft County, 1993.

Site	Wedge Lake
Year	1993
County	Schoolcraft
Location	T. 44 N., R. 18 W., Sec. 17, 18
Survey period	May 15 through September 11
Daily period	See Appendix 42-2
Survey design	Roving-access
Count method	Instantaneous, fishing boats, shore anglers
Interview type	Access, party, boating anglers, shore anglers, harvest
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	See Appendix 1 of Lockwood et al. (1999)
Clerk	U. S. Forest Service clerk, ½ time
Survey purpose	Characterize general effort and catch aspects of the fishery
Notes	<p>One clerk was used to collect count and interview data at Wedge Lake and at Petes Lake (see also Petes Lake, 1993 chapter). Three randomly-selected weekdays, each weekend day, and all holidays were sampled each week. One of two shifts was selected each workday (Appendix 42-2). Both lakes were sampled each workday and the clerk spent approximately equal time at each lake. This survey was a cooperative project with the U. S. Forest Service.</p> <p>One instantaneous boat count and one instantaneous shore angler count were made at each lake per sample day. Counting order of lakes was randomized.</p> <p>Two incomplete-trip interviews and 40 complete- trip interviews were collected; no shore anglers were interviewed.</p>

Appendix 42-2.—Work shifts and expansion values (referred to as “*F*” in Lockwood et al. 1999) used to estimate catch and effort, Wedge Lake, Schoolcraft County, 1993.

Month	Shift		Expansion value
	Early	Late	
May	0600 h – 1500 h	1300 h – 2200 h	16
June	0600 h – 1500 h	1300 h – 2200 h	18
July	0600 h – 1500 h	1300 h – 2200 h	18
August	0600 h – 1500 h	1300 h – 2200 h	17
September	0600 h – 1500 h	1300 h – 2200 h	16

Appendix 42-3.—Estimated harvest, fishing pressure, and catch per hour by boat anglers, Wedge Lake, Schoolcraft County, 1993. Two standard errors are given in parentheses.

Species	Catch/hour	May	June	Jul	Aug	Sep	Season
Walleye	0.0040 (0.0111)	0 (0)	0 (0)	3 (8)	0 (0)	0 (0)	3 (8)
Largemouth bass	0.0027 (0.0056)	0 (0)	0 (0)	2 (4)	0 (0)	0 (0)	2 (4)
Bluegill	1.3763 (1.4061)	0 (0)	203 (295)	269 (419)	461 (584)	91 (264)	1,024 (820)
Total harvest	1.3831 (1.4088)	0 (0)	203 (295)	274 (419)	461 (583)	91 (264)	1,029 (820)
Angler hours		0 (0)	237 (300)	247 (282)	218 (213)	42 (89)	744 (472)
Angler trips		0 (0)	69 (90)	68 (80)	70 (76)	16 (33)	223 (146)

Appendix 42-4.—Residence of anglers (percent of anglers interviewed) by Michigan County or U. S. State, Wedge Lake, Schoolcraft County, 1993. Two standard errors are given in parentheses.

Residence	May	Jun	Jul	Aug	Sep	Season
Alger	50.00 (70.71)	34.48 (17.65)	0 (0)	8.33 (15.96)	20.00 (20.66)	15.96 (7.55)
Barry	0 (0)	0 (0)	8.33 (9.21)	0 (0)	0 (0)	3.19 (3.63)
Branch	0 (0)	0 (0)	0 (0)	0 (0)	13.33 (17.55)	2.13 (2.98)
Calhoun	0 (0)	0 (0)	19.44 (13.19)	8.33 (15.96)	0 (0)	8.51 (5.76)
Chippewa	0 (0)	3.45 (6.78)	0 (0)	0 (0)	0 (0)	1.06 (2.12)
Delta	0 (0)	17.24 (14.03)	19.44 (13.19)	0 (0)	0 (0)	12.77 (6.88)
Eaton	0 (0)	0 (0)	2.78 (5.48)	0 (0)	0 (0)	1.06 (2.12)
Genesee	0 (0)	0 (0)	11.11 (10.48)	0 (0)	0 (0)	4.26 (4.16)
Ingham	50.00 (70.71)	0 (0)	0 (0)	41.67 (28.46)	20.00 (20.66)	9.57 (6.07)
Jackson	0 (0)	0 (0)	2.78 (5.48)	0 (0)	0 (0)	1.06 (2.12)
Kalamazoo	0 (0)	0 (0)	0 (0)	8.33 (15.96)	33.33 (24.34)	6.38 (5.04)
Kent	0 (0)	0 (0)	25.00 (14.43)	0 (0)	0 (0)	9.57 (6.07)
Lapeer	0 (0)	0 (0)	0 (0)	25.00 (25.00)	0 (0)	3.19 (3.63)
Livingston	0 (0)	0 (0)	0 (0)	0 (0)	6.67 (12.88)	1.06 (2.12)
Marquette	0 (0)	13.79 (12.81)	0 (0)	0 (0)	0 (0)	4.26 (4.16)
Saginaw	0 (0)	3.45 (6.78)	0 (0)	0 (0)	0 (0)	1.06 (2.12)
St. Joseph	0 (0)	0 (0)	0 (0)	8.33 (15.96)	0 (0)	1.06 (2.12)

Appendix 42-4.--continued.

Residence	May	Jun	Jul	Aug	Sep	Season
Schoolcraft	0 (0)	0 (0)	5.56 (7.64)	0 (0)	0 (0)	2.13 (2.98)
Wayne	0 (0)	0 (0)	5.56 (7.64)	0 (0)	0 (0)	2.13 (2.98)
Florida	0 (0)	10.34 (11.31)	0 (0)	0 (0)	0 (0)	3.19 (3.63)
Illinois	0 (0)	6.90 (9.41)	0 (0)	0 (0)	6.67 (12.88)	3.19 (3.63)
Ohio	0 (0)	10.34 (11.31)	0 (0)	0 (0)	0 (0)	3.19 (3.63)
Anglers interviewed	2	29	36	12	15	94

Appendix 42-5.--Type of bait used by anglers (percent of anglers interviewed), Wedge Lake, Schoolcraft County, 1993. Two standard errors are given in parentheses.

Bait used	May	Jun	Jul	Aug	Sep	Season
Live	100.00 (0)	48.28 (18.56)	77.78 (13.86)	58.33 (28.46)	73.33 (22.84)	65.96 (9.77)
Artificial	0 (0)	24.14 (15.89)	22.22 (13.86)	0 (0)	0 (0)	15.96 (7.55)
Both	0 (0)	27.59 (16.60)	0 (0)	41.67 (28.46)	26.67 (22.84)	18.09 (7.94)
Anglers interviewed	2	29	36	12	15	94

Appendix 42-6.—Species of fish sought by anglers (percent of anglers interviewed), Wedge Lake, Schoolcraft County, 1993. Two standard errors are given in parentheses.

Species sought	May	Jun	Jul	Aug	Sep	Season
Bass & bluegill	0 (0)	34.48 (17.65)	54.55 (17.34)	0 (0)	13.33 (17.55)	32.97 (9.86)
Pike & bass	0 (0)	0 (0)	0 (0)	25.00 (25.00)	0 (0)	3.30 (3.74)
Panfish	0 (0)	0 (0)	0 (0)	0 (0)	13.33 (17.55)	2.20 (3.07)
Walleye	0 (0)	0 (0)	3.03 (5.97)	0 (0)	0 (0)	1.10 (2.19)
Smallmouth bass	0 (0)	17.24 (14.03)	12.12 (11.36)	0 (0)	0 (0)	9.89 (6.26)
Bluegill	100.00 (0)	48.28 (18.56)	30.30 (16.00)	75.00 (25.00)	73.33 (22.84)	50.55 (10.48)
Anglers interviewed	2	29	33	12	15	91

Appendix 42-7.—Number of trips per day by anglers (percent of anglers interviewed), Wedge Lake, Schoolcraft County, 1993. Two standard errors are given in parentheses.

Trips/day	May	Jun	Jul	Aug	Sep	Season
1	100.00 (0)	100.00 (0)	72.22 (14.93)	66.67 (27.22)	80.00 (20.66)	81.91 (7.94)
2	0 (0)	0 (0)	25.00 (14.43)	33.33 (27.22)	20.00 (20.66)	17.02 (7.75)
3	0 (0)	0 (0)	2.78 (5.48)	0 (0)	0 (0)	1.06 (2.12)
Anglers interviewed	2	29	36	12	15	94

Appendix 42-8.—Gender of anglers (percent of anglers interviewed), Wedge Lake, Schoolcraft County, 1993. Two standard errors are given in parentheses.

Gender	May	Jun	Jul	Aug	Sep	Season
Male	100.00 (0)	96.55 (6.78)	86.11 (11.53)	83.33 (21.52)	60.00 (25.30)	85.11 (7.34)
Female	0 (0)	3.45 (6.78)	13.89 (11.53)	16.67 (21.52)	40.00 (25.30)	14.89 (7.34)
Anglers interviewed	2	29	36	12	15	94



Appendix 43-1.–Clinton River, Macomb County, 1996.

Site	Clinton River
Year	1996
County	Macomb
Location	Ryan Road: T. 3 N., R. 12 E., Sec. 19, 20 Yates Road: T. 3 N., R. 12 E., Sec. 18
Survey period	Ryan Road: March 8 through April 30 Yates Road: March 7 through April 30
Daily period	See Appendix 43-2
Survey design	Proportional-voluntary
Count method	Instantaneous, vehicle
Interview type	Voluntary, party, shore/wading anglers, harvest, catch and release
Effort estimation	Proportional, Equations (1)-(7)
Catch estimation	Multiple-day period (Lockwood et al. 1999)
Clerk	Volunteers from local sport-fishing club
Survey purpose	Monitor the Clinton River steelhead fishery
Notes	<p>Members of a local sport-fishing club collected all data. These volunteers did not follow a random schedule, rather they visited the two sites as often as possible to collect count and interview data. However, daily coverage was fairly intense. At Ryan Road 32 -100% of the days within each stratum (day type within each month) were sampled and at Yates Road 41-100% of the days within each stratum were sampled.</p> <p>Parked vehicles were counted at each of the sites. For each count, the volunteers recorded site number, number of vehicles present, and hour at which the count was made.</p> <p>Voluntary access interviews were collected, by angling party, to estimate catch rate. A zip-lock bag containing a self-addressed post card, explanation of the survey, and a lead pencil, was placed under each vehicle's windshield wiper. Anglers then recorded number of anglers in their party, numbers of fish by species harvested, numbers of fish by species released, start time, and finish time.</p>

Appendix 43-2.—Daily coverage by site and month, Clinton River, Macomb County, 1996.

Site	Month	Hours
Ryan Road	March	0600 h – 2000 h
Ryan Road	April	0500 h – 2200 h
Yates Road	March	0500 h - 1900 h
Yates Road	April	0600 h - 1900 h

Appendix 43-3.—Estimated catch, harvest, angling pressure, and catch per hour, Ryan Road survey site, Clinton River, Macomb County, 1996. Two standard errors are given in parentheses.

Species	Catch/hour	Mar	Apr	Season
Steelhead – harvest	0.0124 (0.0145)	75 (84)	0 (0)	75 (84)
Steelhead – release	0.0880 (0.0569)	241 (147)	291 (252)	532 (292)
Brown trout – harvest	0.0038 (0.0039)	17 (18)	6 (12)	23 (22)
Northern pike – harvest	0.0013 (0.0022)	8 (13)	0 (0)	8 (13)
Sucker – harvest	0.0549 (0.0520)	48 (60)	284 (287)	332 (293)
Walleye – harvest	0.0010 (0.0022)	0 (0)	6 (13)	6 (13)
Total harvest	0.0734 (0.0565)	148 (106)	296 (288)	444 (306)
Total release	0.0880 (0.0569)	241 (147)	291 (252)	532 (292)
Total catch	0.1614 (0.0892)	389 (181)	587 (383)	976 (424)
Angler hours		3,312 (1,681)	2,735 (1,200)	6,047 (2,065)
Angler trips		905 (501)	546 (249)	1,451 (559)

Appendix 43-4. Estimated catch, harvest, angling effort, and catch per hour, Yates Road survey site, Clinton River, Macomb County, 1996. Two standard errors are given in parentheses.

Species	Catch/hour	Mar	Apr	Season
Steelhead – harvest	0.0108 (0.0065)	69 (53)	95 (75)	164 (92)
Steelhead – release	0.0674 (0.0294)	491 (200)	534 (341)	1,025 (395)
Brown trout – harvest	0.0022 (0.0025)	5 (10)	29 (37)	34 (38)
Northern pike – harvest	0.0008 (0.0016)	0 (0)	12 (24)	12 (24)
Sucker – harvest	0.0460 (0.0330)	73 (71)	627 (476)	700 (481)
Walleye – harvest	0.0060 (0.0063)	0 (0)	91 (94)	91 (94)
Carp – harvest	0.0007 (0.0014)	11 (22)	0 (0)	11 (22)
Total harvest	0.0665 (0.0356)	158 (92)	854 (493)	1,012 (501)
Total release	0.0674 (0.0294)	491 (200)	534 (341)	1,025 (395)
Total catch	0.1339 (0.0501)	649 (220)	1,388 (599)	2,037 (638)
Angler hours		6,763 (1,580)	8,453 (2,689)	15,216 (3,119)
Angler trips		1,651 (407)	1,888 (639)	3,539 (758)

Appendix 44-1.–Clinton River, Macomb County, 1997.

Site	Clinton River
Year	1997
County	Macomb
Location	Ryan Road: T. 3 N., R. 12 E., Sec. 19, 20 Yates Road: T. 3 N., R. 12 E., Sec. 18
Survey period	Ryan Road: March 1 through April 30 Yates Road: February 15 through April 30
Daily period	See Appendix 44-2
Survey design	Proportional-voluntary
Count method	Instantaneous, vehicle
Interview type	Voluntary, party, shore/wading anglers harvest, catch and release
Effort estimation	Proportional, Equations (1)-(7)
Catch estimation	Multiple-day period (Lockwood et al. 1999)
Clerk	Volunteers from local sport-fishing club
Survey purpose	Monitor the Clinton River steelhead fishery
Notes	<p>Similar to the Clinton River 1996 survey, members of a local sport-fishing club collected all data. These volunteers did not follow a random schedule, rather they visited the two sites as often as possible to collect count and interview data. However, daily coverage was fairly heavy. At Ryan Road 46-62% of days within each stratum (day type within each month) were sampled, and at Yates Road 62-80% of days within each stratum were sampled.</p> <p>Vehicles were counted at each of the sites. For each count, the volunteers recorded site number, number of vehicles present, and the hour at which the count was made.</p> <p>Voluntary access interviews were collected, by angling party, to estimate catch rate. A zip-lock bag containing a self-addressed post card, explanation of the survey and a lead pencil, was placed under each vehicle's windshield wiper. Anglers recorded number of anglers in their party, numbers of fish by species harvested, numbers of fish by species released, and start time, and finish time.</p>

Appendix 44-2.-Daily coverage by site and month, Clinton River, Macomb County, 1997.

Site/day type	February	March	April
Ryan Road			
Weekday		0700 h – 2100 h	0800 h – 2000 h
Weekend		0700 h – 2000 h	0700 h – 2100 h
Yates Road			
Weekday	1000 h – 1800 h	0600 h – 2000 h	0600 h – 2000 h
Weekend	0700 h – 1200 h	0600 h – 1900 h	0500 h – 2000 h

Appendix 44-3.—Estimated harvest, catch and release, and fishing pressure, and catch per hour, Ryan Road survey site, Clinton River, Macomb County, 1997. Two standard errors are given in parentheses.

Species	Catch/hour	Mar	Apr	Season
Steelhead – harvest	0.0012 (0.0024)	8 (16)	0 (0)	8 (16)
Steelhead – release	0.0712 (0.0532)	150 (107)	335 (328)	485 (345)
Brown trout – harvest	0.0637 (0.0865)	43 (71)	391 (577)	434 (581)
Northern pike – harvest	0.0012 (0.0026)	8 (17)	0 (0)	8 (17)
Sucker – harvest	0.0845 (0.1453)	42 (64)	533 (978)	575 (980)
Walleye – harvest	0.0024 (0.0036)	16 (24)	0 (0)	16 (24)
Carp – harvest	0.0013 (0.0026)	9 (18)	0 (0)	9 (18)
Rainbow – harvest	0.0179 (0.0398)	0 (0)	122 (270)	122 (270)
Total harvest	0.1722 (0.1765)	126 (103)	1,046 (1,167)	1,172 (1,171)
Total release	0.0712 (0.0532)	150 (107)	335 (328)	485 (345)
Total catch	0.2434 (0.1878)	276 (148)	1,381 (1,212)	1,657 (1,221)
Angler hours		2,458 (630)	4,350 (1,424)	6,808 (1,557)
Angler trips		688 (193)	1,268 (488)	1,956 (525)

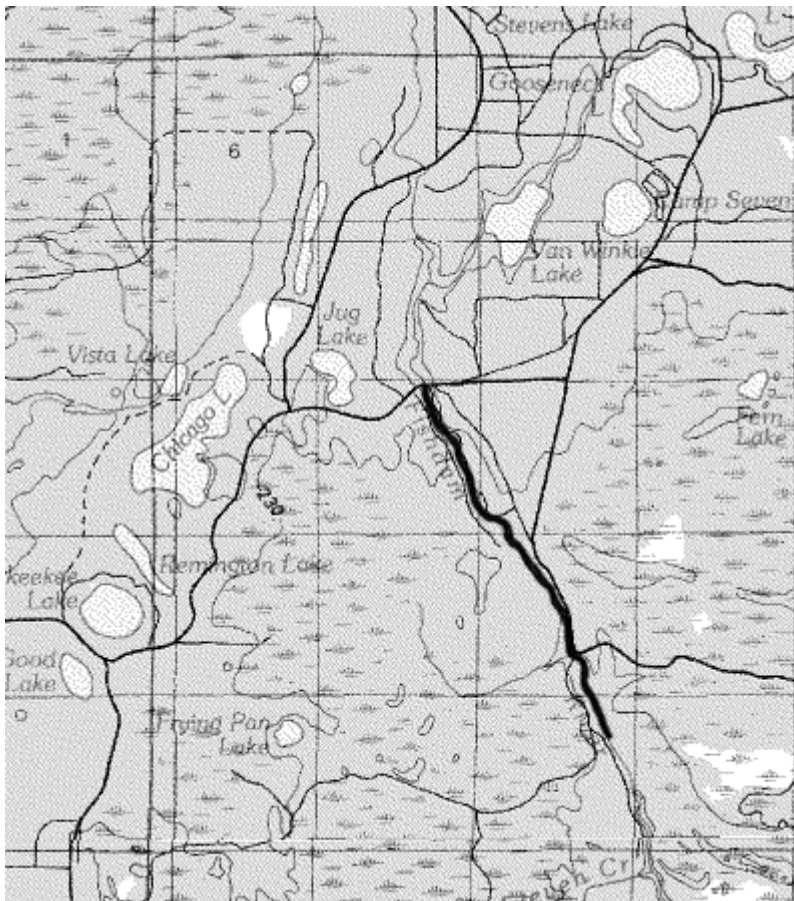
Appendix 44-4.–Estimated harvest, catch and release, fishing pressure, and catch per hour, Yates Road, Clinton River, Macomb County, 1997. Two standard errors are given in parentheses.

Species	Catch/hour	Feb	Mar	Apr	Season
Steelhead – harvest	0.0165 (0.0107)	0 (0)	86 (78)	151 (126)	237 (148)
Steelhead – release	0.0674 (0.0302)	8 (15)	490 (239)	469 (323)	967 (402)
Brown trout – harvest	0.0187 (0.0129)	16 (21)	135 (108)	117 (141)	268 (179)
Sucker – harvest	0.0771 (0.0584)	16 (30)	330 (258)	760 (775)	1,106 (817)
Walleye – harvest	0.0247 (0.0236)	0 (0)	46 (46)	308 (330)	354 (333)
Carp – harvest	0.0009 (0.0019)	0 (0)	13 (27)	0 (0)	13 (27)
Rainbow trout – harvest	0.0059 (0.0085)	0 (0)	26 (52)	58 (108)	84 (120)
Total harvest	0.1438 (0.0686)	32 (37)	636 (300)	1,394 (870)	2,062 (921)
Total release	0.0674 (0.0302)	8 (15)	490 (239)	469 (323)	967 (402)
Total catch	0.2112 (0.0786)	40 (40)	1,126 (383)	1,863 (928)	3,029 (1,005)
Angler hours		566 (321)	7,415 (1,643)	6,362 (1,742)	14,343 (2,416)
Angler trips		225 (150)	2,259 (557)	1,662 (456)	4,146 (735)

Appendix 45-1.–Fishdam River, Delta County, 1995.

Site	Fishdam River
Year	1995
County	Delta
Location	T. 42 N., R. 18 W., Sec. 16, 17, 21, 28
Survey period	May 15 through September 16
Daily period	See Appendix 45-2
Survey design	Progressive-access
Count method	Instantaneous, vehicles
Interview type	Access, party, fishing and non-fishing, harvest
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	See Appendix 1 of Lockwood et al. (1999)
Clerk	U. S. Forest Service clerk, ½ time
Survey purpose	Characterize general effort and catch aspects of the fishery
Notes	<p>One creel clerk was used to sample Fish Dam River and Thunder Lake (see also Thunder Lake, 1995 chapter). This was a cooperative project between Fisheries Division and the U. S. Forest Service. Logistical support, clerk supervision, data processing, and analysis were provided by Fisheries Division; funding for the clerk and vehicle was provided by the U. S. Forest Service.</p> <p>Canoeing, wading, and shore anglers were sampled. Counts of vehicles parked at access sites along the river were made. The creel clerk followed a weekly schedule that included three randomly-selected weekdays, both weekend days, and all holidays. Sites (river or lake) were randomly assigned and the clerk remained at a site throughout the sampling day. One of two work shifts (early or late) was randomly selected for each sampling day (Appendix 45-2). The survey section was approximately 2.6 miles in length (Appendix figure 45-1).</p> <p>Two counts were made each sampling day, and times of counts were varied randomly. All vehicles parked at access sites were counted.</p> <p>Since all vehicles were counted, all persons seen returning to parked vehicles at access sites were interviewed. Estimated effort was adjusted to account for vehicles transporting non-fishers and only fishing effort was estimated. Only 13 interviews of anglers and one interview of non-anglers were collected. No distinction between angling modes was made.</p>





Appendix figure 45-1.—Location of Fishdam River, Delta County angler creel survey, 1995. Section surveyed is highlighted with heavy black line.

Appendix 45-2.—Work shifts and expansion values (referred to as “F” in Lockwood et al. 1999) used to estimate catch and effort, Fishdam River, Delta County, 1995.

Month	Shift		Expansion value
	Early	Late	
May	0600 h – 1430 h	1400 h – 2200 h.	16
June	0600 h – 1430 h	1400 h – 2200 h.	18
July	0600 h – 1430 h	1400 h – 2200 h.	18
August	0600 h – 1430 h	1400 h – 2200 h.	17
September	0600 h – 1430 h	1400 h – 2100 h.	16

Appendix 45-3.—Estimated harvest, catch per hour and fishing pressure, Fishdam River, Delta County, 1995. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Season
Brook trout	1.3723 (3.0887)	0 (0)	0 (0)	420 (1,194)	50 (124)	94 (108)	564 (1,205)
Angler hours		48 (94)	20 (42)	105 (212)	74 (112)	164 (129)	411 (291)
Angler trips		30 (59)	12 (26)	65 (134)	74 (124)	166 (133)	347 (235)

Appendix 45-4.—Residence of anglers (percent of anglers interviewed) by Michigan County and Michigan non-resident, Fishdam River, Delta County, 1995. Two standard errors are given in parentheses.

Residence	May	Jun	Jul	Aug	Sep	Season
Arenac	0 (0)	0 (0)	0 (0)	0 (0)	25.00 (25.00)	15.00 (15.97)
Benzie	0 (0)	100.00 (0)	0 (0)	0 (0)	0 (0)	10.00 (13.42)
Delta	100.00 (0)	0 (0)	0 (0)	0 (0)	33.33 (27.22)	25.00 (19.36)
Marquette	0 (0)	0 (0)	0 (0)	0 (0)	8.33 (15.96)	5.00 (9.75)
Schoolcraft	0 (0)	0 (0)	100.00 (0)	25.00 (43.30)	25.00 (25.00)	25.00 (19.36)
VanBuren	0 (0)	0 (0)	0 (0)	75.00 (43.30)	0 (0)	15.00 (15.97)
Non-resident	0 (0)	0 (0)	0 (0)	0 (0)	8.33 (15.96)	5.00 (9.75)
Anglers interviewed	1	2	1	4	12	20

Appendix 45-5.—Type of bait used by anglers (percent of anglers interviewed), Fishdam River, Delta County, 1995. Two standard errors are given in parentheses.

Bait used	May	Jun	Jul	Aug	Sep	Season
Live	0 (0)	0 (0)	100.00 (0)	0 (0)	90.91 (17.34)	57.89 (22.65)
Artificial	0 (0)	100.00 (0)	0 (0)	75.00 (43.30)	0 (0)	26.32 (20.20)
Both	100.00 (0)	0 (0)	0 (0)	25.00 (43.30)	9.09 (17.34)	15.79 (16.73)
Anglers interviewed	1	2	1	4	11	19

Appendix 45-6.—Species of fish sought by anglers (percent of anglers interviewed), Fishdam River, Delta County, 1995. Two standard errors are given in parentheses.

Species sought	May	Jun	Jul	Aug	Sep	Season
Trout	0 (0)	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)	94.74 (10.25)
Brown trout	100.00 (0)	0 (0)	0 (0)	0 (0)	0 (0)	5.26 (10.25)
Anglers interviewed	1	2	1	4	11	19

Appendix 45-7.—Number of trips per day by anglers (percent of anglers interviewed), Fishdam River, Delta County, 1995. Two standard errors are given in parentheses.

Trips/day	Sep
1	77.78 (27.72)
2	11.11 (20.95)
3	11.11 (20.95)
Anglers interviewed	9

Appendix 45-8.—Gender of anglers (percent of anglers interviewed), Fishdam River, Delta County, 1995. Two standard errors are given in parentheses.

Gender	May	Jun	Jul	Aug	Sep	Season
Male	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)	66.67 (27.22)	80.00 (17.89)
Female	0 (0)	0 (0)	0 (0)	0 (0)	33.33 (27.22)	20.00 (17.89)
Anglers interviewed	1	2	1	4	12	20

Appendix 46-1.–Indian River, Schoolcraft County, 1995.

Site	Indian River
Year	1995
County	Schoolcraft
Location	T. 44 N., R. 17 W., Sec. 20, 28, 34 T. 43 N., R. 17 W., sec. 2, 11, 14, 22, 23, 27
Survey period	May 28 through September 30
Daily period	See Appendix 46-2
Survey design	Progressive-access
Count method	Instantaneous, vehicles or campsites
Interview type	Access, party, fishing and non-fishing, harvest
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	See Appendix 1 of Lockwood et al. (1999)
Clerk	U. S. Forest Service clerk, ½ time
Survey purpose	Characterize general effort and catch aspects of the fishery
Notes	<p>Estimates apply to the stretch from the bridge in Steuben downstream to the bridge in T. 43 N., R. 17 W., sec. 27. This stretch was divided into three sampling sections: upstream bridge to upper edge of the U. S. Forest Service Indian River Camp and Picnic Grounds (T. 44 N., R. 17 W., Sec. 34); area within camp and picnic grounds; and downstream to lower bridge. One creel clerk was used to sample Indian River and Bass Lake (see also Bass Lake, 1995 chapter). This was a cooperative project between Fisheries Division and the U. S. Forest Service. Logistical support, clerk supervision, data processing, and analysis were provided by Fisheries Division; funding for the clerk and vehicle were provided by the U. S. Forest Service.</p> <p>The creel clerk followed a weekly schedule that included three randomly-selected weekdays, both weekend days, and all holidays. The clerk randomly sampled one of the two sites (lake or river) assigned and remained at a site throughout the sampling day. One of two work shifts (early or late) was randomly selected for each sampling day (Appendix 46-2).</p> <p>Two counts were made each sampling day, and times of counts were varied randomly. Direction of count was also randomly varied. The clerk began the count at Steuben and proceeded downstream counting along the way, or began at the lower end of the stretch and proceeded upstream counting along the way. Vehicles parked at access sites in the upper and lower sections were counted. In the campground, occupied campsites were counted (and treated as vehicles) using the following criteria: a campsite had fishing gear visible, no one was around and their vehicle was present; occupants of a campsite had previously been interviewed (the clerk knew they were there to fish); no one was around and their vehicle was present. Additional campsites, that the clerk had reason to believe were occupied by anglers fishing at the time of the count, were also counted.</p>

Appendix 46-1.–continued.

Notes

In the upper and lower sections, all parties observed returning to vehicles parked at an access site were interviewed and their activity recorded as fishing or non-fishing. All interviews were by party, no individual harvest data were recorded. Fifteen complete-trip interviews and 13 incomplete-trip interviews were collected.

Ultimately, section stratification was not used due to sparse data and only one estimate was calculated. Counts were summed and entered as individual counts for the entire length of river surveyed. Similarly, interviews from sections of fishing and non-fishing parties were considered representative of the stretch.

Appendix 46-2.—Work shifts and expansion values (referred to as “F” in Lockwood et al. 1999) used to estimate catch and effort, Indian River, Schoolcraft County, 1995.

Month	Shift		Expansion value
	Early	Late	
May	0600 h – 1430 h	1400 h – 2200 h.	16
June	0600 h – 1430 h	1400 h – 2200 h.	18
July	0600 h – 1430 h	1400 h – 2200 h.	18
August	0600 h – 1430 h	1400 h – 2200 h.	17
September	0600 h – 1430 h	1400 h – 2100 h.	16

Appendix 46-3.—Estimated harvest, fishing pressure, and catch per hour, Indian River, Schoolcraft County, 1995. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Sep	Season
Brown trout	0.0258 (0.0368)	0 (0)	0 (0)	58 (120)	61 (115)	0 (0)	119 (166)
Brook trout	0.0471 (0.0683)	0 (0)	62 (104)	139 (288)	16 (33)	0 (0)	217 (308)
Total harvest	0.0729 (0.0789)	0 (0)	62 (104)	197 (312)	77 (120)	0 (0)	336 (350)
Angler hours		0 (0)	1,605 (822)	2,011 (914)	672 (371)	316 (336)	4,604 (1,327)
Angler trips		0 (0)	192 (104)	1,269 (679)	144 (110)	90 (97)	1,695 (702)

Appendix 46-4.—Residence of anglers (percent of anglers interviewed) by Michigan County and Michigan non-resident, Indian River, Schoolcraft County, 1995. Two standard errors are given in parentheses.

Residence	May	Jun	Jul	Aug	Sep	Season
Alger	0 (0)	0 (0)	17.39 (15.81)	0 (0)	0 (0)	4.40 (4.30)
Alpena	0 (0)	0 (0)	0 (0)	5.26 (7.24)	0 (0)	2.20 (3.07)
Calhoun	0 (0)	0 (0)	13.04 (14.04)	0 (0)	0 (0)	3.30 (3.74)
Clinton	0 (0)	0 (0)	0 (0)	0 (0)	6.67 (12.88)	1.10 (2.19)
Crawford	0 (0)	57.14 (26.45)	0 (0)	0 (0)	0 (0)	8.79 (5.94)
Delta	0 (0)	0 (0)	0 (0)	0 (0)	33.33 (24.34)	5.49 (4.78)
Gladwin	0 (0)	0 (0)	0 (0)	2.63 (5.19)	0 (0)	1.10 (2.19)
Hillsdale	0 (0)	0 (0)	0 (0)	0 (0)	6.67 (12.88)	1.10 (2.19)
Iron	0 (0)	0 (0)	8.70 (11.75)	0 (0)	0 (0)	2.20 (3.07)
Kent	0 (0)	14.29 (18.70)	0 (0)	0 (0)	26.67 (22.84)	6.59 (5.20)
Lenawee	0 (0)	0 (0)	8.70 (11.75)	0 (0)	0 (0)	2.20 (3.07)
Livingston	0 (0)	0 (0)	0 (0)	2.63 (5.19)	0 (0)	1.10 (2.19)
Luce	0 (0)	0 (0)	8.70 (11.75)	0 (0)	0 (0)	2.20 (3.07)
Mackinac	0 (0)	7.14 (13.77)	0 (0)	0 (0)	0 (0)	1.10 (2.19)
Macomb	0 (0)	0 (0)	0 (0)	5.26 (7.24)	0 (0)	2.20 (3.07)
Macosta	0 (0)	0 (0)	0 (0)	2.63 (5.19)	0 (0)	1.10 (2.19)
Oakland	0 (0)	0 (0)	4.35 (8.50)	5.26 (7.24)	0 (0)	3.30 (3.74)
Osceola	0 (0)	0 (0)	0 (0)	2.63 (5.19)	0 (0)	1.10 (2.19)



Appendix 46-4.--continued.

Residence	May	Jun	Jul	Aug	Sep	Season
St. Clair	0 (0)	0 (0)	0 (0)	5.26 (7.24)	0 (0)	2.20 (3.07)
Schoolcraft	0 (0)	21.43 (21.93)	30.43 (19.19)	52.63 (16.20)	0 (0)	32.97 (9.86)
Washtenaw	0 (0)	0 (0)	0 (0)	2.63 (5.19)	0 (0)	1.10 (2.19)
Wayne	0 (0)	0 (0)	8.70 (11.75)	7.89 (8.75)	0 (0)	5.49 (4.78)
Non-resident	100.00 (0)	0 (0)	0 (0)	5.26 (7.24)	26.67 (22.84)	7.69 (5.59)
Anglers interviewed	1	14	23	38	15	91

Appendix 46-5.--Type of bait used by anglers (percent of anglers interviewed), Indian River, Schoolcraft County, 1995. Two standard errors are given in parentheses.

Bait used	May	Jun	Jul	Aug	Sep	Season
Live	0 (0)	21.43 (21.93)	38.10 (21.19)	31.25 (23.18)	100.00 (0)	37.93 (12.74)
Artificial	100.00 (0)	21.43 (21.93)	47.62 (21.80)	31.25 (23.18)	0 (0)	32.76 (12.33)
Both	0 (0)	57.14 (26.45)	14.29 (15.27)	37.50 (24.21)	0 (0)	29.31 (11.95)
Anglers interviewed	1	14	21	16	6	58

Appendix 46-6.—Species of fish sought by anglers (percent of anglers interviewed), Indian River, Schoolcraft County, 1995. Two standard errors are given in parentheses.

Species sought	May	Jun	Jul	Aug	Sep	Season
Trout	100.00 (0)	100.00 (0)	71.43 (19.72)	93.75 (12.10)	100.00 (0)	87.93 (8.56)
Brown trout	0 (0)	0 (0)	9.52 (12.81)	0 (0)	0 (0)	3.45 (4.79)
Brook trout	0 (0)	0 (0)	19.05 (17.14)	6.25 (12.10)	0 (0)	8.62 (7.37)
Anglers interviewed	1	14	21	16	6	58

Appendix 46-7.—Number of trips per day by anglers (percent of anglers interviewed), Indian River, Schoolcraft County, 1995. Two standard errors are given in parentheses.

Trips/day	May	Jun	Jul	Aug	Sep	Season
1	0 (0)	85.71 (18.70)	100.00 (0)	100.00 (0)	92.31 (14.78)	95.92 (4.00)
2	100.00 (0)	14.29 (18.70)	0 (0)	0 (0)	7.69 (14.78)	4.08 (4.00)
Anglers interviewed	1	14	34	36	13	98

Appendix 46-8.—Gender of anglers (percent of anglers interviewed), Indian River, Schoolcraft County, 1995. Two standard errors are given in parentheses.

Gender	May	Jun	Jul	Aug	Sep	Season
Male	100.00 (0)	71.43 (24.15)	85.29 (12.15)	73.68 (14.29)	80.00 (20.66)	78.43 (8.14)
Female	0 (0)	28.57 (24.15)	14.71 (12.15)	26.32 (14.29)	20.00 (20.66)	21.57 (8.14)
Anglers interviewed	1	14	34	38	15	102

Appendix 47-1.–Manistee River, Crawford and Kalkaska Counties, 1998.

Site	Manistee River
Year	1998
County	Crawford and Kalkaska
Location	T. 28 N., R. 4 W., Sec. 7, 18, 19, 30, 31 T. 27 N., R. 4 W., Sec. 6, 7, 17, 18, 20, 29-31 T. 27 N., R. 5 W., Sec. 36 T. 26 N., R. 5 W., Sec. 1, 2, 10, 11, 15, 16, 21, 28-30 T. 26 N., R. 6 W., Sec. 25, 26, 24, 25 T. 25 N., R. 6 W., Sec. 3-6
Survey period	June 13 to July 5
Daily period	0600h to 2400h
Survey design	Progressive-roving
Count method	Instantaneous, fishing boats, shore/wading anglers
Interview type	Roving, individual angler, boating anglers, shore/wading anglers, harvest, catch and release
Effort estimation	Multiple-day period (Lockwood et al. 1999)
Catch estimation	Multiple-day period (Lockwood et al. 1999)
Clerk	Minimum of 4 Fisheries Division employees or members of the Upper Manistee River Association
Survey purpose	Characterize the trout fishery and provide sampling criteria for future Manistee River angler surveys
Notes	<p>This 39.43-mile stretch of the Manistee River was divided into seven sections, A-G (Appendix 47-2). Effort, catch, and harvest were estimated for each section. Two modes of fishing were sampled, wading anglers and boating (canoeing) anglers. This was a cooperative project between Fisheries Division and the Upper Manistee River Association. Each weekend day (including the July 4<sup>th</sup> holiday) and three randomly-selected weekdays were selected for sampling each week. Two creel crews were used each sample day. Each creel crew collected count data and roving interviews while canoeing through a section. Number of clerks per crew varied, but two persons per crew were considered minimal. Number of sections sampled per sample day varied from two to five. Order of section counting and interviewing was randomly varied. Each section was sampled approximately equally.</p> <p>No adjustment was made to account for “shadowing” that can occur using this count-as-you-go method (Wade 1991). However, interview time was kept to a minimum and the canoeing clerk rarely needed to stop to complete an interview. Wading anglers or anglers fishing from boats were counted as a clerk passed them. Direction of count was not alternated – only downstream counts were made.</p>

Appendix 47-1.-continued.

Notes

All interviewed anglers fished a minimum of 0.5h (Pollock et al. 1997). Interviews were predominantly roving – 40 of 44 boat-angler interviews and 183 of 200 wading-angler interviews were of incomplete trips. All interviews were treated as roving interviews.

Appendix 47-2.—Creel survey section codes, description of upper and lower boundaries, approximate section canoe times, and length of each section, Manistee River, Crawford and Kalkaska Counties, 1998.

Section	Description	Canoeing time (hours)	River distance (miles)
A	Deward to Cameron Bridge	2.0	4.00
B	Cameron Bridge to Co. Rd. 612 Bridge	1.0	2.36
C	612 Br. To Long's Livery (Goose Creek area)	1.5	5.19
D	Long's Livery to M-72 Bridge	2.0	4.17
E	M-72 Br. To Yellow Trees Landing	3.5	7.90
F	Yellow Trees Landing to CCC Bridge	2.5	6.83
G	CCC Bridge to Upper Sharon Bridge	3.0	8.98

Appendix 47-3.—Estimated harvest, catch and release, fishing pressure, and catch per hour, by wading and boat anglers, Manistee River, Crawford and Kalkaska Counties (Deward to Upper Sharon Bridge), 1998. Two standard errors are given in parentheses.

Species	Catch/hour	River sections							Total
		A	B	C	D	E	F	G	
Brown trout – harvest	0.0389 (0.0316)	0 (0)	60 (91)	69 (108)	0 (0)	204 (223)	0 (0)	82 (126)	415 (293)
Brown trout – legal release	0.2407 (0.1842)	285 (393)	401 (400)	406 (424)	85 (138)	1,179 (1,495)	91 (153)	119 (168)	2,566 (1,674)
Brown trout – sublegal release	0.4095 (0.3350)	108 (156)	234 (184)	311 (311)	262 (300)	2,104 (2,806)	346 (436)	1,001 (1,180)	4,366 (3,114)
Brook trout – harvest	0.0188 (0.0164)	0 (0)	49 (72)	14 (29)	28 (45)	41 (83)	38 (76)	30 (59)	200 (156)
Brook trout – legal release	0.1990 (0.1982)	296 (371)	89 (105)	142 (150)	60 (77)	921 (1,804)	363 (489)	251 (272)	2,122 (1,935)
Brook trout – sublegal release	0.7301 (0.4663)	1,043 (955)	906 (621)	381 (451)	656 (694)	1,665 (2,670)	1,479 (1,636)	1,654 (1,793)	7,784 (3,873)
Rainbow trout – harvest	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Rainbow trout – legal release	0.0085 (0.0104)	0 (0)	0 (0)	0 (0)	34 (55)	0 (0)	0 (0)	57 (89)	91 (104)
Rainbow trout – sublegal release	0.0297 (0.0352)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	34 (57)	283 (349)	317 (354)
Total harvest	0.0577 (0.0387)	0 (0)	109 (116)	83 (112)	28 (45)	245 (238)	38 (76)	112 (139)	615 (331)
Total legal release	0.4482 (0.2998)	581 (540)	490 (413)	548 (450)	179 (167)	2,100 (2,343)	454 (512)	427 (333)	4,779 (2,560)
Total sublegal release	1.1693 (0.6616)	1,151 (967)	1,140 (648)	692 (547)	918 (756)	3,769 (3,873)	1,859 (1,693)	2,938 (2,175)	12,467 (4,983)
Total catch	1.6752 (0.8527)	1,732 (1,108)	1,739 (777)	1,323 (717)	1,125 (776)	6,114 (4,533)	2,351 (1,771)	3,477 (2,204)	17,861 (5,612)
Angler hours		1,226 (819)	976 (525)	941 (726)	555 (447)	2,388 (2,723)	2,571 (2,227)	2,005 (2,045)	10,662 (4,270)

Appendix 47-4.—Estimated harvest, catch and release, fishing effort, and catch per hour by wading anglers, Manistee River, Crawford and Kalkaska Counties (Deward to Upper Sharon Bridge), 1998. Two standard errors are given in parentheses.

Species	Catch/hour	River sections							Total
		A	B	C	D	E	F	G	
Brown trout – harvest	0.0432 (0.0376)	0 (0)	60 (91)	69 (108)	0 (0)	163 (207)	0 (0)	82 (126)	374 (280)
Brown trout – legal released	0.2632 (0.2227)	285 (393)	390 (399)	311 (391)	85 (138)	1,000 (1,469)	91 (153)	119 (168)	2,281 (1,642)
Brown trout – sublegal released	0.4507 (0.4088)	90 (152)	218 (181)	235 (284)	142 (181)	1,873 (2,789)	346 (436)	1,001 (1,180)	3,905 (3,087)
Brook trout – harvest	0.0183 (0.0172)	0 (0)	49 (72)	14 (29)	28 (45)	0 (0)	38 (76)	30 (59)	159 (132)
Brook trout – legal released	0.2325 (0.2458)	296 (371)	84 (104)	104 (138)	43 (69)	921 (1,804)	352 (489)	215 (263)	2,015 (1,933)
Brook trout – sublegal released	0.8411 (0.5814)	948 (936)	884 (620)	362 (449)	571 (673)	1,573 (2,667)	1,367 (1,629)	1,583 (1,787)	7,288 (3,857)
Rainbow trout – harvest	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Rainbow trout – legal released	0.0097 (0.0127)	0 (0)	0 (0)	0 (0)	27 (53)	0 (0)	0 (0)	57 (89)	84 (104)
Rainbow trout – sublegal released	0.0366 (0.0439)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	34 (57)	283 (349)	317 (354)
Total harvest	0.0615 (0.0450)	0 (0)	109 (116)	83 (112)	28 (45)	163 (207)	38 (76)	112 (139)	533 (310)
Total legal released	0.5055 (0.3692)	581 (540)	474 (412)	415 (415)	155 (163)	1,921 (2,326)	443 (512)	391 (325)	4,380 (2,537)
Total sublegal released	1.3283 (0.8220)	1,038 (948)	1,102 (646)	597 (531)	713 (697)	3,446 (3,859)	1,747 (1,687)	2,867 (2,170)	11,510 (4,953)
Total catch	1.8953 (1.0603)	1,619 (1,091)	1,685 (775)	1,095 (683)	896 (717)	5,530 (4,511)	2,228 (1,765)	3,370 (2,198)	16,423 (5,574)
Angler hours		1,169 (811)	952 (523)	855 (717)	427 (366)	1,976 (2,680)	2,136 (2,198)	1,150 (1,121)	8,665 (3,854)

Appendix 47-5.—Estimated harvest, catch and release, fishing pressure, and catch per hour by boating anglers, Manistee River, Crawford and Kalkaska Counties (Deward to Upper Sharon Bridge), 1998. Two standard errors are given in parentheses.

Species	Catch/hour	River sections							Total
		A	B	C	D	E	F	G	
Brown trout – harvest	0.0205 (0.0457)	0 (0)	0 (0)	0 (0)	0 (0)	41 (83)	0 (0)	0 (0)	41 (83)
Brown trout – legal release	0.1427 (0.2093)	0 (0)	11 (22)	95 (164)	0 (0)	179 (280)	0 (0)	0 (0)	285 (325)
Brown trout – sublegal release	0.2308 (0.2960)	18 (35)	16 (33)	76 (127)	120 (239)	231 (306)	0 (0)	0 (0)	461 (411)
Brook trout – harvest	0.0205 (0.0457)	0 (0)	0 (0)	0 (0)	0 (0)	41 (83)	0 (0)	0 (0)	41 (83)
Brook trout – legal release	0.0536 (0.0707)	0 (0)	5 (11)	38 (59)	17 (34)	0 (0)	11 (21)	36 (71)	107 (101)
Brook trout – sublegal release	0.2484 (0.2906)	95 (190)	22 (43)	19 (38)	85 (171)	92 (131)	112 (148)	71 (143)	496 (358)
Rainbow trout – harvest	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Rainbow trout – legal release	0.0035 (0.0073)	0 (0)	0 (0)	0 (0)	7 (13)	0 (0)	0 (0)	0 (0)	7 (13)
Rainbow trout – sublegal release	0.0000 (0.0000)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total harvest	0.0411 (0.0697)	0 (0)	0 (0)	0 (0)	0 (0)	82 (117)	0 (0)	0 (0)	82 (117)
Total legal release	0.1998 (0.2509)	0 (0)	16 (25)	133 (174)	24 (36)	179 (280)	11 (21)	36 (71)	399 (341)
Total sublegal release	0.4792 (0.5190)	113 (193)	38 (54)	95 (133)	205 (294)	323 (333)	112 (148)	71 (143)	957 (545)
Total catch	0.7201 (0.7396)	113 (193)	54 (60)	228 (219)	229 (296)	584 (451)	123 (149)	107 (160)	1,438 (654)
Angler hours		57 (114)	24 (49)	86 (117)	128 (257)	412 (483)	435 (360)	855 (1,710)	1,997 (1,839)



Appendix 48-1.–Rogue River, Kent County, 1994.

Site	Rogue River
Year	1994
County	Kent
Location	T. 9 N., R. 11 W., Sec. 22-25, 27, 28, 33
Survey period	April 30 to September 30
Daily period	See Appendix 48-3
Survey design	Progressive-roving
Count method	Instantaneous, fishing boats, wading anglers, shore anglers
Interview type	Roving, party, boating anglers, wading anglers, shore anglers, harvest, catch and release
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	See Appendix 1 of Lockwood et al. (1999)
Clerk	Fisheries Division clerks, 2 full time
Survey purpose	Characterize the trout fishery
Notes	<p>This 6.82-mile stretch of the Rogue River was divided into three sections of similar length (Appendix 48-2). Three randomly-selected weekdays, each weekend day, and all holidays were sampled each week of the survey.</p> <p>Two counts were made each sample day. Counting order of sections was randomized, however count direction was always downstream. Wading anglers, shore anglers, and fishing boats (canoes) were enumerated as a clerk passed them. Vehicle counts were also made at bridge crossings and parking areas within sections. These counts were not used to calculate 1994 estimates.</p> <p>Angling parties were interviewed by the clerk making counts (roving interviews) and by the spotting clerk at bridge crossings and parking areas (access interviews). Interviews were predominantly roving – 107 of 125 for shore-angler parties, 333 of 394 for wading-angler parties, and 6 of 9 for boat-angler parties. For analysis, all interviews were treated as roving interviews. All anglers fished a minimum of 0.5h (Pollock et al. 1997). No adjustment was made to account for “shadowing” that can occur using this count-as-you-go method (Wade 1991). However, interview time was kept to a minimum and the canoeing clerk rarely needed to stop to complete an interview.</p> <p>Fin clips were recorded for planted fish.</p>

Appendix 48-2.—Creel survey section descriptions of upper and lower boundaries, approximate section canoe times, and length of each section, Rogue River, Kent County, 1994.

Section	Description	Canoeing times (hours)	River distance (miles)
301	Grange Road Bridge to 12 Mile Road Bridge	0.75	2.28
302	12 Mile Rd. Br. downstream 12 Mile Rd. Br.	0.57	2.34
303	12 Mile Rd. Br. to Rockford Dam	0.75	2.20

Appendix 48-3.—Work shifts and expansion values (referred to as “F” in Lockwood et al. 1999) used to estimate catch and effort, Rogue River, Kent County, 1994.

Month	Shift		Expansion value
	Early	Late	
April	0600 h – 1500 h	1300 h – 2200 h	14
May	0600 h – 1500 h	1300 h – 2200 h	16
June	0600 h – 1500 h	1300 h – 2200 h	18
July	0600 h – 1500 h	1300 h – 2200 h	18
August	0600 h – 1500 h	1300 h – 2200 h	17
September	0600 h – 1500 h	1300 h – 2200 h	16

Appendix 48-4.—Estimated total monthly and seasonal catch, fishing pressure, and seasonal catch per hour on the Rogue River, Kent County (section 301) in 1994. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout – harvest	0.1129 (0.0671)	28 (37)	294 (234)	383 (389)	29 (51)	71 (77)	0 (0)	805 (465)
Brown trout – harvest	0.2745 (0.1410)	113 (95)	1,196 (630)	447 (693)	33 (61)	123 (201)	46 (71)	1,958 (968)
Brown trout. – harvest Left ventral clip	0.0006 (0.0011)	4 (8)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	4 (8)
Brook trout – harvest	0.0167 (0.0316)	1 (2)	118 (225)	0 (0)	0 (0)	0 (0)	0 (0)	119 (225)
Rainbow trout – release Legal	0.2254 (0.2325)	0 (0)	1,253 (1,613)	355 (316)	0 (0)	0 (0)	0 (0)	1,608 (1,643)
Rainbow trout – release Sublegal	0.1898 (0.1214)	52 (57)	620 (406)	642 (736)	41 (54)	0 (0)	0 (0)	1,355 (845)
Brown trout – release Legal	0.5926 (0.3764)	248 (342)	3,421 (2,506)	391 (635)	8 (16)	109 (230)	50 (85)	4,227 (2,619)
Brown trout – release Sublegal	0.2591 (0.2077)	0 (0)	1,716 (1,455)	62 (74)	54 (78)	0 (0)	16 (35)	1,848 (1,459)
Total harvest	0.4046 (0.1639)	146 (102)	1,608 (709)	830 (795)	62 (80)	194 (215)	46 (71)	2,886 (1,097)
Total release	1.2669 (0.5246)	300 (347)	7,010 (3,341)	1,450 (1,025)	103 (96)	109 (230)	66 (92)	9,038 (3,522)
Total catch	1.6715 (0.5675)	446 (361)	8,618 (3,414)	2,280 (1,297)	165 (125)	303 (315)	112 (116)	11,924 (3,688)
Angler hours		497 (157)	3,718 (759)	1,498 (450)	684 (345)	315 (129)	421 (238)	7,133 (998)
Angler trips		156 (103)	1,474 (584)	705 (481)	250 (167)	103 (65)	158 (124)	2,846 (794)

Appendix 48-5.—Estimated harvest, fishing pressure, and catch per hour by boat anglers, Rogue River, Kent County (section 301), 1994. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Brown trout – harvest	0.1182 (0.2361)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	37 (70)	37 (70)
Angler hours		49 (27)	70 (97)	58 (120)	81 (107)	18 (35)	37 (53)	313 (200)
Angler trips		14 (9)	21 (29)	17 (35)	24 (32)	5 (10)	11 (16)	92 (59)

Appendix 48-6.—Estimated harvest, catch and release, fishing pressure, and catch per hour by shore anglers, Rogue River, Kent County (section 301), 1994. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout – harvest	0.1272 (0.1042)	28 (37)	149 (195)	352 (384)	5 (12)	12 (25)	0 (0)	546 (433)
Brown trout – harvest	0.3078 (0.2200)	113 (95)	780 (577)	416 (690)	0 (0)	12 (23)	0 (0)	1,321 (905)
Brown trout – harvest Left ventral clip	0.0009 (0.0019)	4 (8)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	4 (8)
Brook trout – harvest	0.0277 (0.0527)	1 (2)	118 (225)	0 (0)	0 (0)	0 (0)	0 (0)	119 (225)
Rainbow trout – release Legal	0.0580 (0.0638)	0 (0)	143 (233)	106 (134)	0 (0)	0 (0)	0 (0)	249 (269)
Rainbow trout – release Sublegal	0.2069 (0.1868)	52 (57)	268 (316)	534 (710)	34 (52)	0 (0)	0 (0)	888 (781)
Brown trout – release Legal	0.4504 (0.4772)	248 (342)	1,563 (1,975)	84 (128)	0 (0)	0 (0)	38 (83)	1,933 (2,010)
Brown trout – release Sublegal	0.1880 (0.2265)	0 (0)	768 (956)	39 (55)	0 (0)	0 (0)	0 (0)	807 (958)
Total harvest	0.4637 (0.2574)	146 (102)	1,047 (649)	768 (790)	5 (12)	24 (34)	0 (0)	1,990 (1,028)
Total release	0.9033 (0.5831)	300 (347)	2,742 (2,229)	763 (736)	34 (52)	0 (0)	38 (83)	3,877 (2,375)
Total catch	1.3670 (0.6638)	446 (361)	3,789 (2,321)	1,531 (1,079)	39 (53)	24 (34)	38 (83)	5,867 (2,587)
Angler hours		273 (14)	2,192 (703)	1,116 (379)	363 (296)	151 (76)	197 (173)	4,292 (873)
Angler trips		84 (83)	905 (561)	580 (471)	149 (154)	55 (55)	91 (113)	1,864 (764)

Appendix 48-7.—Estimated harvest, catch and release, fishing pressure, and catch per hour by wading anglers, Rogue River, Kent County (section 301), 1994. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout – harvest	0.1025 (0.0696)	0 (0)	145 (130)	31 (65)	24 (50)	59 (73)	0 (0)	259 (170)
Brown trout – harvest	0.2373 (0.1388)	0 (0)	416 (253)	31 (65)	33 (61)	111 (200)	9 (13)	600 (335)
Rainbow trout – release Legal	0.5376 (0.6480)	0 (0)	1110 (1596)	249 (286)	0 (0)	0 (0)	0 (0)	1,359 (1,621)
Rainbow trout – release Sublegal	0.1843 (0.1314)	0 (0)	351 (255)	108 (196)	7 (15)	0 (0)	0 (0)	466 (322)
Brown trout – release Legal	0.9074 (0.6828)	0 (0)	1,858 (1,542)	307 (622)	8 (16)	109 (230)	12 (19)	2,294 (1,679)
Brown trout – release Sublegal	0.4118 (0.4410)	0 (0)	948 (1,096)	23 (49)	54 (78)	0 (0)	16 (35)	1,041 (1,100)
Total harvest	0.3398 (0.1601)	0 (0)	561 (284)	62 (92)	57 (79)	170 (213)	9 (13)	859 (376)
Total release	2.0411 (1.0884)	0 (0)	4,267 (2,488)	687 (714)	69 (81)	109 (230)	28 (40)	5,160 (2,600)
Total catch	2.3809 (1.1191)	0 (0)	4,828 (2,504)	749 (720)	126 (113)	279 (313)	37 (41)	6,019 (2,627)
Angler hours		175 (154)	1,456 (270)	324 (210)	240 (141)	146 (98)	187 (155)	2,528 (441)
Angler trips		58 (61)	548 (158)	108 (93)	77 (56)	43 (33)	56 (48)	890 (209)

Appendix 48-8.—Residence of anglers (percent of anglers interviewed), by Michigan County and Michigan non-resident, Rogue River, Kent County (section 301), 1994. Two standard errors are given in parentheses.

Residence	Apr	May	Jun	Jul	Aug	Sep	Season
Eaton	0 (0)	0.97 (1.93)	0 (0)	0 (0)	0 (0)	0 (0)	0.52 (1.03)
Ingham	0 (0)	0.97 (1.93)	0 (0)	0 (0)	0 (0)	20.00 (25.30)	1.55 (1.77)
Ionia	0 (0)	0 (0)	9.09 (8.67)	0 (0)	0 (0)	0 (0)	2.06 (2.04)
Isabella	0 (0)	0.97 (1.93)	0 (0)	0 (0)	0 (0)	0 (0)	0.52 (1.03)
Jackson	0 (0)	0.97 (1.93)	2.27 (4.49)	0 (0)	0 (0)	0 (0)	1.03 (1.45)
Kalamazoo	0 (0)	0 (0)	2.27 (4.49)	0 (0)	0 (0)	0 (0)	0.52 (1.03)
Kent	78.57 (21.93)	77.67 (8.21)	79.55 (12.16)	70.00 (20.49)	66.67 (54.43)	70.00 (28.98)	76.80 (6.06)
Mackinac	0 (0)	0.97 (1.93)	0 (0)	0 (0)	0 (0)	0 (0)	0.52 (1.03)
Macasta	7.14 (13.77)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.52 (1.03)
Montcalm	7.14 (13.77)	2.91 (3.31)	0 (0)	0 (0)	0 (0)	0 (0)	2.06 (2.04)
Muskegon	0 (0)	2.91 (3.31)	0 (0)	0 (0)	0 (0)	0 (0)	1.55 (1.77)
Newaygo	0 (0)	0.97 (1.93)	0 (0)	0 (0)	33.33 (54.43)	10.00 (18.97)	1.55 (1.77)
Ottawa	7.14 (13.77)	4.85 (4.24)	2.27 (4.49)	5.00 (9.75)	0 (0)	0 (0)	4.12 (2.86)
Washtenaw	0 (0)	0 (0)	0 (0)	15.00 (15.97)	0 (0)	0 (0)	1.55 (1.77)
Wayne	0 (0)	5.83 (4.62)	0 (0)	0 (0)	0 (0)	0 (0)	3.09 (2.49)
Non-resident	0 (0)	0 (0)	4.55 (6.28)	10.00 (13.42)	0 (0)	0 (0)	2.06 (2.04)
Anglers interviewed	14	103	44	20	3	10	194

Appendix 48-9.—Type of bait used by anglers (percent of anglers interviewed), Rogue River, Kent County (section 301), 1994. Two standard errors are given in parentheses.

Bait used	Apr	May	Jun	Jul	Aug	Sep	Season
Live	92.31 (14.78)	45.05 (9.44)	54.72 (13.67)	62.96 (18.59)	28.57 (34.15)	40.00 (30.98)	51.58 (6.72)
Artificial	7.69 (14.78)	38.74 (9.25)	37.74 (13.32)	37.04 (18.59)	71.43 (34.15)	50.00 (31.62)	38.01 (6.53)
Both	0 (0)	16.22 (7.00)	7.55 (7.26)	0 (0)	0 (0)	10.00 (18.97)	10.41 (4.11)
Anglers interviewed	13	111	53	27	7	10	221

Appendix 48-10.—Species of fish sought by anglers (percent of anglers interviewed), Rogue River, Kent County (section 301), 1994. Two standard errors are given in parentheses.

Species sought	Apr	May	Jun	Jul	Aug	Sep	Season
Trout	66.67 (27.22)	79.31 (8.69)	93.33 (7.44)	66.67 (20.57)	50.00 (40.82)	50.00 (31.62)	77.90 (6.17)
Anything	33.33 (27.22)	20.69 (8.69)	6.67 (7.44)	33.33 (20.57)	50.00 (40.82)	50.00 (31.62)	22.10 (6.17)
Anglers interviewed	12	87	45	21	6	10	181



Appendix 48-11.—Number of trips per day by anglers (percent of anglers interviewed), Rogue River, Kent County (section 301), 1994. Two standard errors are given in parentheses.

Trips/day	Apr	May	Jun	Jul	Aug	Sep	Season
1	85.71 (18.70)	88.12 (6.44)	100.00 (0)	88.89 (14.81)	100.00 (0)	100.00 (0)	91.92 (3.87)
2	14.29 (18.70)	11.88 (6.44)	0 (0)	11.11 (14.81)	0 (0)	0 (0)	8.08 (3.87)
Anglers interviewed	14	101	49	18	6	10	198

Appendix 48-12.—Gender of anglers (percent of anglers interviewed), Rogue River, Kent County (section 301), 1994. Two standard errors are given in parentheses.

Gender	Apr	May	Jun	Jul	Aug	Sep	Season
Male	100.00 (0)	93.22 (4.63)	90.74 (7.89)	89.66 (11.31)	100.00 (0)	100.00 (0)	93.10 (3.33)
Female	0 (0)	6.78 (4.63)	9.26 (7.89)	10.34 (11.31)	0 (0)	0 (0)	6.90 (3.33)
Anglers interviewed	14	118	54	29	7	10	232

Appendix 48-13.–Total estimated harvest, catch and release, fishing pressure, and catch per hour, Rogue River, Kent County (section 302), 1994. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout – harvest	0.0025 (0.0050)	0 (0)	30 (60)	0 (0)	0 (0)	0 (0)	0 (0)	30 (60)
Brown trout – harvest	0.0245 (0.0427)	24 (44)	270 (507)	0 (0)	0 (0)	0 (0)	0 (0)	294 (510)
Brown trout – harvest Left ventral clip	0.0003 (0.0004)	3 (5)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	3 (5)
Brook trout –harvest	0.0020 (0.0030)	11 (24)	13 (27)	0 (0)	0 (0)	0 (0)	0 (0)	24 (36)
Rainbow trout – release Legal	0.0145 (0.0279)	0 (0)	162 (332)	0 (0)	12 (25)	0 (0)	0 (0)	174 (333)
Rainbow trout – release Sublegal	0.3556 (0.1558)	224 (345)	2,313 (1,347)	1,383 (966)	69 (80)	141 (160)	134 (251)	4,264 (1,722)
Brown trout – release Legal	0.0138 (0.0279)	0 (0)	162 (332)	0 (0)	4 (9)	0 (0)	0 (0)	166 (333)
Brown trout – release Sublegal	1.0208 (0.3943)	301 (212)	7,557 (3,918)	2,555 (1,443)	832 (542)	532 (438)	464 (242)	12,241 (4,245)
Total harvest	0.0293 (0.0432)	38 (50)	313 (511)	0 (0)	0 (0)	0 (0)	0 (0)	351 (515)
Total released	1.4048 (0.4523)	525 (405)	10,194 (4,170)	3,938 (1,736)	917 (548)	673 (466)	598 (349)	16,845 (4,605)
Total catch	1.4341 (0.4570)	563 (408)	10,507 (4,201)	3,938 (1,736)	917 (548)	673 (466)	598 (349)	17,196 (4,633)
Angler hours		215 (58)	5,363 (1,482)	2,988 (1,118)	1,263 (469)	1,139 (595)	1,023 (373)	11,991 (2,040)
Angler trips		83 (28)	2,349 (1,085)	1,151 (624)	490 (208)	439 (262)	392 (228)	4,904 (1,316)

Appendix 48-14.—Estimated harvest, catch and release, fishing pressure, and catch per hour by boat anglers, Rogue River, Kent County (section 302), 1994. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Brown trout – release Sublegal	0.0809 (0.1752)	0 (0)	0 (0)	0 (0)	0 (0)	22 (44)	0 (0)	22 (44)
Angler hours		12 (25)	70 (94)	21 (43)	133 (193)	18 (35)	18 (37)	272 (226)
Angler trips		4 (7)	21 (28)	6 (13)	39 (57)	5 (10)	5 (11)	80 (67)

Appendix 48-15.—Estimated harvest, catch and release, fishing pressure, and catch per hour by shore anglers, Rogue River, Kent County (section 302), 1994. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Brown trout – harvest	0.2155 (0.4284)	24 (44)	240 (504)	0 (0)	0 (0)	0 (0)	0 (0)	264 (506)
Brown trout – harvest Left ventral clip	0.0024 (0.0043)	3 (5)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	3 (5)
Brook trout – harvest	0.0090 (0.0202)	11 (24)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	11 (24)
Rainbow – release Sublegal	0.0776 (0.1604)	6 (12)	89 (190)	0 (0)	0 (0)	0 (0)	0 (0)	95 (190)
Brown trout – release Sublegal	1.2873 (2.5657)	56 (120)	1,521 (3,029)	0 (0)	0 (0)	0 (0)	0 (0)	1,577 (3,031)
Total harvest	0.2269 (0.4308)	38 (50)	240 (504)	0 (0)	0 (0)	0 (0)	0 (0)	278 (506)
Total release	1.3649 (2.5816)	62 (121)	1,610 (3,035)	0 (0)	0 (0)	0 (0)	0 (0)	1,672 (3,037)
Total catch	1.5918 (2.6499)	100 (131)	1,850 (3,076)	0 (0)	0 (0)	0 (0)	0 (0)	1,950 (3,079)
Angler hours		42 (32)	493 (252)	342 (545)	110 (117)	195 (187)	42 (84)	1,224 (646)
Angler trips		19 (16)	222 (145)	154 (253)	50 (56)	88 (91)	19 (39)	552 (313)

Appendix 48-16.–Estimated harvest, catch and release, fishing pressure, and catch per hour by wading anglers, Rogue River, Kent County (section 302), 1994. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout – harvest	0.0028 (0.0057)	0 (0)	30 (60)	0 (0)	0 (0)	0 (0)	0 (0)	30 (60)
Brown trout – harvest	0.0029 (0.0057)	0 (0)	30 (60)	0 (0)	0 (0)	0 (0)	0 (0)	30 (60)
Brook trout – harvest	0.0012 (0.0026)	0 (0)	13 (27)	0 (0)	0 (0)	0 (0)	0 (0)	13 (27)
Rainbow trout – release Legal	0.0166 (0.0319)	0 (0)	162 (332)	0 (0)	12 (25)	0 (0)	0 (0)	174 (333)
Rainbow trout – release Sublegal	0.3972 (0.1785)	218 (345)	2,224 (1,334)	1,383 (966)	69 (80)	141 (160)	134 (251)	4,169 (1,711)
Brown trout – release Legal	0.0158 (0.0319)	0 (0)	162 (332)	0 (0)	4 (9)	0 (0)	0 (0)	166 (333)
Brown trout – release Sublegal	1.0140 (0.3386)	245 (175)	6,036 (2,485)	2,555 (1,443)	832 (542)	510 (436)	464 (242)	10,642 (2,972)
Total harvest	0.0070 (0.0086)	0 (0)	73 (89)	0 (0)	0 (0)	0 (0)	0 (0)	73 (89)
Total release	1.4436 (0.4227)	463 (387)	8,584 (2,859)	3,938 (1,736)	917 (548)	651 (464)	598 (349)	15,151 (3,462)
Total catch	1.4506 (0.4235)	463 (387)	8,657 (2,860)	3,938 (1,736)	917 (548)	651 (464)	598 (349)	15,224 (3,461)
Angler hours		161 (42)	4,800 (1,457)	2,625 (975)	1,020 (411)	926 (564)	963 (362)	10,495 (1,922)
Angler trips		60 (22)	2,106 (1,075)	991 (570)	401 (192)	346 (245)	368 (224)	4,272 (1,276)

Appendix 48-17.—Residence of anglers (percent of anglers interviewed) by Michigan County and Michigan non-residence, Rogue River, Kent County (section 302), 1994, per month and season. Two standard errors are given in parentheses.

Residence	Apr	May	Jun	Jul	Aug	Sep	Season
Allegan	0 (0)	1.71 (2.40)	0 (0)	3.45 (6.78)	0 (0)	0 (0)	1.15 (1.32)
Barry	0 (0)	0 (0)	0 (0)	3.45 (6.78)	0 (0)	0 (0)	0.38 (0.76)
Berrien	0 (0)	0 (0)	0 (0)	0 (0)	3.45 (6.78)	3.57 (7.01)	0.77 (1.08)
Gratiot	0 (0)	0 (0)	2.00 (3.96)	0 (0)	0 (0)	0 (0)	0.38 (0.76)
Ingham	0 (0)	7.69 (4.93)	4.00 (5.54)	10.34 (11.31)	0 (0)	0 (0)	5.36 (2.79)
Kalamazoo	0 (0)	6.84 (4.67)	8.00 (7.67)	6.90 (9.41)	0 (0)	0 (0)	5.36 (2.79)
Kent	100.00 (0)	65.81 (8.77)	54.00 (14.10)	34.48 (17.65)	68.97 (17.18)	75.00 (16.37)	62.45 (5.99)
Livingston	0 (0)	2.56 (2.92)	0 (0)	3.45 (6.78)	0 (0)	0 (0)	1.53 (1.52)
Macomb	0 (0)	1.71 (2.40)	2.00 (3.96)	0 (0)	0 (0)	0 (0)	1.15 (1.32)
Montcalm	0 (0)	0 (0)	2.00 (3.96)	0 (0)	0 (0)	0 (0)	0.38 (0.76)
Muskegon	0 (0)	0.85 (1.70)	8.00 (7.67)	0 (0)	0 (0)	7.14 (9.73)	2.68 (2.00)
Oakland	0 (0)	2.56 (2.92)	0 (0)	3.45 (6.78)	3.45 (6.78)	0 (0)	1.92 (1.70)
Ottawa	0 (0)	7.69 (4.93)	8.00 (7.67)	17.24 (14.03)	3.45 (6.78)	0 (0)	7.28 (3.22)
St. Clair	0 (0)	0 (0)	2.00 (3.96)	0 (0)	0 (0)	0 (0)	0.38 (0.76)
Shiawassee	0 (0)	0 (0)	0 (0)	3.45 (6.78)	0 (0)	0 (0)	0.38 (0.76)
VanBuren	0 (0)	0.85 (1.70)	2.00 (3.96)	0 (0)	0 (0)	0 (0)	0.77 (1.08)
Washtenaw	0 (0)	0 (0)	0 (0)	0 (0)	3.45 (6.78)	3.57 (7.01)	0.77 (1.08)

Appendix 48-17.--continued.

Residence	Apr	May	Jun	Jul	Aug	Sep	Season
Wayne	0 (0)	0 (0)	0 (0)	0 (0)	17.24 (14.03)	3.57 (7.01)	2.30 (1.86)
Non-resident	0 (0)	1.71 (2.40)	8.00 (7.67)	13.79 (12.81)	0 (0)	7.14 (9.73)	4.60 (2.59)
Anglers interviewed	8	117	50	29	29	28	261

Appendix 48-18.--Type of bait used by anglers (percent of anglers interviewed), Rogue River, Kent County (section 302), 1994. Two standard errors are given in parentheses.

Bait used	Apr	May	Jun	Jul	Aug	Sep	Season
Live	25.00 (30.62)	0.68 (1.37)	0 (0)	1.96 (3.88)	6.06 (8.31)	0 (0)	1.85 (1.49)
Artificial	75.00 (30.62)	99.32 (1.37)	100.00 (0)	98.04 (3.88)	93.94 (8.31)	100.00 (0)	98.15 (1.49)
Anglers interviewed	8	146	58	51	33	29	325

Appendix 48-19.--Species of fish sought by anglers (percent of anglers interviewed), Rogue River, Kent County (section 302), 1994, by species sought per month and season. Two standard errors are given in parentheses.

Species sought	Apr	May	Jun	Jul	Aug	Sep	Season
Trout	0 (0)	85.45 (6.72)	100.00 (0)	86.67 (12.41)	90.00 (10.95)	58.62 (18.29)	85.83 (4.44)
Anything	0 (0)	14.55 (6.72)	0 (0)	13.33 (12.41)	10.00 (10.95)	41.38 (18.29)	14.17 (4.44)
Anglers interviewed	0	110	48	30	30	29	247

Appendix 48-20.—Number of trips per day by anglers (percent of anglers interviewed), Rogue River, Kent County (section 302), 1994. Two standard errors are given in parentheses.

Trips/day	Apr	May	Jun	Jul	Aug	Sep	Season
1	100.00 (0)	92.04 (5.09)	97.87 (4.21)	93.55 (8.82)	100.00 (0)	100.00 (0)	95.40 (2.59)
2	0 (0)	6.19 (4.54)	2.13 (4.21)	6.45 (8.82)	0 (0)	0 (0)	3.83 (2.38)
5	0 (0)	1.77 (2.48)	0 (0)	0 (0)	0 (0)	0 (0)	0.77 (1.08)
Anglers interviewed	8	113	47	31	33	29	261

Appendix 48-21.—Gender of anglers (percent of anglers interviewed), Rogue River, Kent County (section 302), 1994. Two standard errors are given in parentheses.

Gender	Apr	May	Jun	Jul	Aug	Sep	Season
Male	100.00 (0)	99.32 (1.37)	88.14 (8.42)	100.00 (0)	96.97 (5.97)	100.00 (0)	97.24 (1.81)
Female	0 (0)	0.68 (1.37)	11.86 (8.42)	0 (0)	3.03 (5.97)	0 (0)	2.76 (1.81)
Totals:	8	146	59	51	33	29	326

Appendix 48-22.—Estimated total harvest, catch and release, fishing pressure, and catch per hour, Rogue River, Kent County (section 303), 1994. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout – harvest	0.0810 (0.0738)	0 (0)	270 (225)	257 (500)	47 (100)	28 (57)	24 (62)	626 (564)
Brown trout – harvest	0.1440 (0.0754)	360 (404)	567 (346)	94 (148)	0 (0)	66 (99)	26 (54)	1113 (563)
Brook trout – harvest	0.0050 (0.0102)	0 (0)	39 (79)	0 (0)	0 (0)	0 (0)	0 (0)	39 (79)
Brown trout – harvest Left ventral clip	0.0013 (0.0019)	0 (0)	10 (15)	0 (0)	0 (0)	0 (0)	0 (0)	10 (15)
White sucker – harvest	0.0109 (0.0222)	0 (0)	84 (171)	0 (0)	0 (0)	0 (0)	0 (0)	84 (171)
Rainbow trout – release Legal	0.0757 (0.0449)	0 (0)	245 (224)	240 (216)	100 (132)	0 (0)	0 (0)	585 (338)
Rainbow trout – release Sublegal	0.1695 (0.0941)	0 (0)	876 (606)	210 (286)	224 (221)	0 (0)	0 (0)	1,310 (705)
Brown trout – release Legal	0.1744 (0.1047)	176 (383)	482 (360)	251 (354)	390 (451)	0 (0)	49 (125)	1,348 (788)
Brown trout – release Sublegal	0.2061 (0.1262)	327 (711)	767 (504)	213 (258)	246 (273)	0 (0)	40 (70)	1,593 (951)
Total harvest	0.2422 (0.1110)	360 (404)	970 (454)	351 (521)	47 (100)	94 (114)	50 (82)	1,872 (819)
Total release	0.6256 (0.2074)	503 (808)	2,370 (895)	914 (566)	960 (857)	0 (0)	89 (143)	4,836 (1,462)
Total catch	0.8678 (0.2468)	863 (903)	3,340 (1,002)	1,265 (769)	1,007 (595)	94 (114)	139 (165)	6,708 (1,675)
Angler hours		350 (219)	3,619 (635)	1,349 (654)	1,082 (305)	814 (206)	516 (301)	7,730 (1,052)
Angler trips		83 (56)	1,357 (364)	549 (299)	449 (152)	345 (138)	225 (169)	3,008 (544)



Appendix 48-23.—Estimated fishing pressure by boat anglers, Rogue River, Kent County (section 303), 1994. Two standard errors are given in parentheses.

Effort	Apr	May	Jun	Jul	Aug	Sep	Season
Angler hours	35 (30)	27 (41)	55 (114)	158 (136)	0 (0)	70 (145)	345 (235)
Angler trips	10 (9)	8 (12)	16 (34)	46 (41)	0 (0)	21 (43)	101 (70)

Appendix 48-24.—Estimated harvest, catch and release, fishing pressure, and catch per hour by shore anglers, Rogue River, Kent County (section 303), 1994. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout – harvest	0.0230 (0.0366)	0 (0)	42 (86)	16 (34)	0 (0)	0 (0)	0 (0)	58 (92)
Brown trout – harvest	0.1003 (0.0984)	0 (0)	213 (231)	40 (81)	0 (0)	0 (0)	0 (0)	253 (245)
White sucker – harvest	0.0333 (0.0680)	0 (0)	84 (171)	0 (0)	0 (0)	0 (0)	0 (0)	84 (171)
Rainbow trout – release Legal	0.0927 (0.1010)	0 (0)	125 (190)	109 (165)	0 (0)	0 (0)	0 (0)	234 (252)
Rainbow trout – release Sublegal	0.1320 (0.1216)	0 (0)	249 (282)	0 (0)	84 (107)	0 (0)	0 (0)	333 (302)
Brown trout – release Legal	0.0329 (0.0652)	0 (0)	83 (164)	0 (0)	0 (0)	0 (0)	0 (0)	83 (164)
Brown trout – release Sublegal	0.1340 (0.1380)	0 (0)	338 (344)	0 (0)	0 (0)	0 (0)	0 (0)	338 (344)
Total harvest	0.1566 (0.1266)	0 (0)	339 (300)	56 (88)	0 (0)	0 (0)	0 (0)	395 (313)
Total release	0.3916 (0.2261)	0 (0)	795 (511)	109 (165)	84 (107)	0 (0)	0 (0)	988 (548)
Total catch	0.5482 (0.2647)	0 (0)	1,134 (591)	165 (187)	84 (107)	0 (0)	0 (0)	1,383 (630)
Angler hours		70 (56)	1,240 (311)	318 (138)	345 (100)	488 (169)	62 (75)	2,523 (404)
Angler trips		31 (28)	481 (175)	139 (88)	151 (82)	213 (122)	27 (35)	1,042 (249)

Appendix 48-25.–Estimated harvest, catch and release, fishing pressure, and catch per hour by wading anglers, Rogue River, Kent County (section 303), 1994. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout – harvest	0.1168 (0.1166)	0 (0)	228 (208)	241 (499)	47 (100)	28 (57)	24 (62)	568 (556)
Brown trout – harvest	0.1769 (0.1098)	360 (404)	354 (257)	54 (124)	0 (0)	66 (99)	26 (54)	860 (507)
Brown trout – harvest Left ventral clip	0.0021 (0.0031)	0 (0)	10 (15)	0 (0)	0 (0)	0 (0)	0 (0)	10 (15)
Brook trout – harvest	0.0080 (0.0163)	0 (0)	39 (79)	0 (0)	0 (0)	0 (0)	0 (0)	39 (79)
Rainbow trout – release Legal	0.0722 (0.0483)	0 (0)	120 (118)	131 (139)	100 (132)	0 (0)	0 (0)	351 (225)
Rainbow trout – release Sublegal	0.2009 (0.1367)	0 (0)	627 (536)	210 (286)	140 (193)	0 (0)	0 (0)	977 (637)
Brown trout – release Legal	0.2602 (0.1664)	176 (383)	399 (321)	251 (354)	390 (451)	0 (0)	49 (125)	1,265 (771)
Brown trout – release Sublegal	0.2581 (0.1892)	327 (711)	429 (368)	213 (258)	246 (273)	0 (0)	40 (70)	1,255 (887)
Total harvest	0.3038 (0.1665)	360 (404)	631 (340)	295 (514)	47 (100)	94 (114)	50 (82)	1,477 (757)
Total release	0.7914 (0.3183)	503 (808)	1,575 (735)	805 (541)	876 (577)	0 (0)	89 (143)	3,848 (1,356)
Total catch	1.0952 (0.3833)	863 (903)	2,206 (809)	1,100 (746)	923 (585)	94 (114)	139 (165)	5,325 (1,552)
Angler hours		245 (210)	2,352 (552)	976 (629)	579 (254)	326 (118)	384 (253)	4,862 (942)
Angler trips		42 (48)	868 (319)	394 (284)	252 (121)	132 (64)	177 (160)	1,865 (479)

Appendix 48-26.—Residence of anglers (percent of anglers interviewed), by Michigan Country or Michigan non-residence, Rogue River, Kent County (section 303), 1994. Two standard errors are given in parentheses.

Residence	Apr	May	Jun	Jul	Aug	Sep	Season
Allegan	0 (0)	0 (0)	7.41 (10.08)	5.26 (10.25)	0 (0)	0 (0)	1.81 (2.07)
Ingham	0 (0)	2.04 (2.86)	3.70 (7.27)	0 (0)	0 (0)	0 (0)	1.81 (2.07)
Kalamazoo	0 (0)	0 (0)	0 (0)	0 (0)	11.11 (20.95)	0 (0)	0.60 (1.20)
Kent	66.67 (54.43)	87.76 (6.62)	62.96 (18.59)	52.63 (22.91)	66.67 (31.43)	50.00 (31.62)	75.90 (6.64)
Montcalm	0 (0)	1.02 (2.03)	0 (0)	0 (0)	0 (0)	20.00 (25.30)	1.81 (2.07)
Muskegon	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	20.00 (25.30)	1.20 (1.69)
Oakland	0 (0)	1.02 (2.03)	0 (0)	0 (0)	0 (0)	0 (0)	0.60 (1.20)
Ottawa	33.33 (54.43)	6.12 (4.84)	14.81 (13.67)	36.84 (22.13)	0 (0)	0 (0)	10.84 (4.83)
Saginaw	0 (0)	1.02 (2.03)	0 (0)	0 (0)	0 (0)	0 (0)	0.60 (1.20)
Washtenaw	0 (0)	1.02 (2.03)	11.11 (12.10)	0 (0)	0 (0)	0 (0)	2.41 (2.38)
Wayne	0 (0)	0 (0)	0 (0)	0 (0)	22.22 (27.72)	0 (0)	1.20 (1.69)
Non-resident	0 (0)	0 (0)	0 (0)	5.26 (10.25)	0 (0)	10.00 (18.97)	1.20 (1.69)
Anglers interviewed	3	98	27	19	9	10	166

Appendix 48-27.—Type of bait used by anglers (percent of anglers interviewed), Rogue River, Kent County (section 303), 1994. Two standard errors are given in parentheses.

Bait used	Apr	May	Jun	Jul	Aug	Sep	Season
Live	0 (0)	33.02 (9.14)	46.43 (18.85)	17.24 (14.03)	27.27 (26.86)	16.67 (21.52)	30.85 (6.74)
Artificial	100.00 (0)	61.32 (9.46)	46.43 (18.85)	68.97 (17.18)	72.73 (26.86)	83.33 (21.52)	62.77 (7.05)
Both	0 (0)	5.66 (4.49)	7.14 (9.73)	13.79 (12.81)	0 (0)	0 (0)	6.38 (3.57)
Anglers interviewed	2	106	28	29	11	12	188

Appendix 48-28.—Species of fish sought by anglers (percent of anglers interviewed), Rogue River, Kent County (section 303), 1994. Two standard errors are given in parentheses.

Species sought	Apr	May	Jun	Jul	Aug	Sep	Season
Trout	0 (0)	65.93 (9.94)	80.00 (16.00)	76.47 (20.58)	81.82 (23.26)	75.00 (25.00)	70.70 (7.26)
Pike & panfish	0 (0)	1.10 (2.19)	0 (0)	0 (0)	0 (0)	0 (0)	0.64 (1.27)
Pike	0 (0)	1.10 (2.19)	0 (0)	11.76 (15.63)	0 (0)	0 (0)	1.91 (2.19)
Anything	100.00 (0)	31.87 (9.77)	20.00 (16.00)	11.76 (15.63)	18.18 (23.26)	25.00 (25.00)	26.75 (7.07)
Anglers interviewed	1	91	25	17	11	12	157

Appendix 48-29.—Number of trips per day by anglers (percent of anglers interviewed), Rogue River, Kent County (section 303), 1994. Two standard errors are given in parentheses.

Trips/day	Apr	May	Jun	Jul	Aug	Sep	Season
1	100.00 (0)	94.38 (4.88)	100.00 (0)	94.74 (10.25)	100.00 (0)	90.91 (17.34)	95.51 (3.32)
2	0 (0)	2.25 (3.14)	0 (0)	5.26 (10.25)	0 (0)	9.09 (17.34)	2.56 (2.53)
3	0 (0)	2.25 (3.14)	0 (0)	0 (0)	0 (0)	0 (0)	1.28 (1.80)
5	0 (0)	1.12 (2.23)	0 (0)	0 (0)	0 (0)	0 (0)	0.64 (1.28)
Anglers interviewed	3	89	23	19	11	11	156

Appendix 48-30.—Gender of anglers (percent of anglers interviewed), Rogue River, Kent County (section 303), 1994. Two standard errors are given in parentheses.

Gender	Apr	May	Jun	Jul	Aug	Sep	Season
Male	100.00 (0)	98.20 (2.53)	96.55 (6.78)	100.00 (0)	100.00 (0)	100.00 (0)	98.47 (1.75)
Female	0 (0)	1.80 (2.53)	3.45 (6.78)	0 (0)	0 (0)	0 (0)	1.53 (1.75)
Anglers interviewed	3	111	29	30	11	12	196

Appendix 49-1.–Rogue River, Kent County, 1995.

Site	Rogue River
Year	1995
County	Kent
Location	T. 9 N., R. 11 W., Sec. 22-25, 27, 28, 33
Survey period	April 29 to September 30
Daily period	See Appendix 49-3
Survey design	Progressive-roving
Count method	Instantaneous, fishing boats, wading anglers, shore anglers
Interview type	Roving, party, boating anglers, wading anglers, shore anglers, harvest, catch and release
Effort estimation	See Appendix 1 of Lockwood et al. (1999)
Catch estimation	See Appendix 1 of Lockwood et al. (1999)
Clerk	Fisheries Division clerks, 2 full time
Survey purpose	Characterize the trout fishery
Notes	<p>This 6.82-mile stretch of the Rogue River was divided into three sections of similar length (Appendix 49-2). Three randomly-selected weekdays, each weekend day, and all holidays were sampled each week of the survey.</p> <p>Two counts were made each sample day. Counting order of sections was randomized, however direction of count was always downstream. Wading anglers, shore anglers, and fishing boats (canoes) were enumerated as a clerk passed them.</p> <p>Anglers were interviewed as they fished by the clerk making counts (roving interviews), and as they completed their fishing trips by the spotting clerk at bridge crossings and parking areas (access interviews). Interviews were predominantly roving – 114 of 135 for shore-angler parties, 181 of 345 for wading-angler parties, and 0 of 2 for boat-angler parties. For analysis, all interviews were treated as roving interviews. All anglers fished a minimum of 0.5h (Pollock et al. 1997). No adjustment was made to account for “shadowing” that can occur using this count-as-you-go method (Wade 1991). However, interview time was kept to a minimum and the canoeing clerk rarely or never stopped to complete an interview.</p> <p>Fin clips were recorded for planted fish.</p>

Appendix 49-2.—Creel survey section descriptions of upper and lower boundaries, approximate section canoe times, and length of each section, Rogue River, Kent County, 1995.

Section	Description	Canoeing times (hours)	River distance (miles)
301	Grange Road Bridge to 12 Mile Road Bridge	0.75	2.28
302	12 Mile Rd. Br. downstream 12 Mile Rd. Br.	0.57	2.34
303	12 Mile Rd. Br. to Rockford Dam	0.75	2.20

Appendix 49-3.—Work shifts and expansion values (referred to as “F” in Lockwood et al. 1999) used to estimate catch and effort, Rogue River, Kent County, 1995.

Month	Shift		Expansion value
	Early	Late	
April	0600 h – 1500 h	1300 h – 2200 h	14
May	0600 h – 1500 h	1300 h – 2200 h	16
June	0600 h – 1500 h	1300 h – 2200 h	18
July	0600 h – 1500 h	1300 h – 2200 h	18
August	0600 h – 1500 h	1300 h – 2200 h	17
September	0600 h – 1500 h	1300 h – 2200 h	16

Appendix 49-4.–Estimated total harvest, catch and release, fishing pressure, and catch per hour, Rogue River, Kent County (section 301), 1995. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout – harvest	0.0950 (0.0898)	30 (46)	187 (172)	323 (473)	0 (0)	0 (0)	0 (0)	540 (505)
Brown trout – harvest	0.0610 (0.0439)	6 (8)	259 (209)	82 (128)	0 (0)	0 (0)	0 (0)	347 (245)
Brook trout – harvest	0.0012 (0.0032)	7 (18)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	7 (18)
Rock bass – harvest	0.0037 (0.0088)	0 (0)	0 (0)	0 (0)	21 (50)	0 (0)	0 (0)	21 (50)
White sucker – harvest	0.0375 (0.0375)	23 (41)	118 (158)	66 (134)	6 (12)	0 (0)	0 (0)	213 (211)
Rainbow trout – release Legal	0.1316 (0.0770)	139 (184)	567 (381)	36 (41)	6 (12)	0 (0)	0 (0)	748 (425)
Rainbow trout – release Sublegal	0.3308 (0.1762)	212 (154)	1,586 (950)	76 (88)	4 (8)	0 (0)	3 (7)	1,881 (967)
Brown trout – release Legal	0.0417 (0.0265)	13 (27)	185 (137)	27 (39)	12 (25)	0 (0)	0 (0)	237 (147)
Brown trout – release Sublegal	0.2666 (0.1765)	212 (238)	1,244 (948)	18 (30)	35 (58)	0 (0)	7 (12)	1,516 (981)
Total harvest	0.1984 (0.1094)	66 (65)	564 (313)	471 (508)	27 (51)	0 (0)	0 (0)	1,128 (602)
Total release	0.7706 (0.2766)	576 (339)	3,582 (1,402)	157 (109)	57 (65)	0 (0)	10 (14)	4,382 (1,449)
Total catch	0.9690 (0.3073)	642 (345)	4,146 (1,436)	628 (520)	84 (83)	0 (0)	10 (14)	5,510 (1,569)
Angler hours		406 (185)	3,228 (584)	1,098 (406)	562 (177)	228 (209)	164 (130)	5,686 (794)
Angler trips		565 (372)	3,219 (1,297)	539 (275)	340 (227)	185 (162)	160 (158)	5,008 (1,414)



Appendix 49-5.—Estimated harvest, catch and release, fishing pressure, and catch per hour by boat anglers, Rogue River, Kent County (section 301), 1995. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout – harvest	0.0441 (0.1566)	0 (0)	10 (34)	0 (0)	0 (0)	0 (0)	0 (0)	10 (34)
Angler hours		0 (0)	102 (147)	27 (57)	0 (0)	98 (176)	0 (0)	227 (236)
Angler trips		0 (0)	34 (67)	9 (22)	0 (0)	33 (73)	0 (0)	76 (102)

Appendix 49-6.–Estimated harvest, catch and release, fishing pressure, and catch per hour by shore anglers, Rogue River, Kent County (section 301), 1995. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout – harvest	0.1429 (0.1547)	30 (46)	133 (160)	307 (472)	0 (0)	0 (0)	0 (0)	470 (500)
Brown trout – harvest	0.0672 (0.0605)	6 (8)	133 (146)	82 (128)	0 (0)	0 (0)	0 (0)	221 (194)
Rock Bass – harvest	0.0064 (0.0153)	0 (0)	0 (0)	0 (0)	21 (50)	0 (0)	0 (0)	21 (50)
White sucker – harvest	0.0629 (0.0654)	23 (41)	118 (158)	66 (134)	0 (0)	0 (0)	0 (0)	207 (211)
Rainbow trout – release Legal	0.0851 (0.0693)	139 (184)	109 (116)	32 (40)	0 (0)	0 (0)	0 (0)	280 (221)
Rainbow trout – release Sublegal	0.3347 (0.2502)	198 (151)	855 (774)	48 (80)	0 (0)	0 (0)	0 (0)	1,101 (793)
Brown trout – release Legal	0.0272 (0.0258)	13 (27)	76 (79)	0 (0)	0 (0)	0 (0)	0 (0)	89 (83)
Brown trout – release Sublegal	0.1663 (0.1243)	170 (213)	341 (325)	13 (28)	23 (56)	0 (0)	0 (0)	547 (394)
Total harvest	0.2793 (0.1844)	59 (62)	384 (268)	455 (507)	21 (50)	0 (0)	0 (0)	919 (578)
Total release	0.6131 (0.3044)	520 (321)	1,381 (851)	93 (94)	23 (56)	0 (0)	0 (0)	2,017 (916)
Total catch	0.8924 (0.3751)	579 (327)	1,765 (892)	548 (516)	44 (75)	0 (0)	0 (0)	2,936 (1,084)
Angler – hours		357 (169)	1,868 (484)	715 (358)	153 (157)	104 (101)	93 (108)	3,290 (661)
Angler trips		535 (369)	2,648 (1,281)	378 (260)	204 (218)	139 (141)	124 (149)	4,028 (1,391)

Appendix 49-7.–Estimated harvest, catch and release, fishing pressure, and catch per hour by wading anglers, Rogue River, Kent County (section 301), 1995. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout – harvest	0.0277 (0.0294)	0 (0)	44 (53)	16 (34)	0 (0)	0 (0)	0 (0)	60 (63)
Brown trout – harvest	0.0581 (0.0694)	0 (0)	126 (149)	0 (0)	0 (0)	0 (0)	0 (0)	126 (149)
Brook trout – harvest	0.0032 (0.0083)	7 (18)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	7 (18)
White sucker – harvest	0.0028 (0.0056)	0 (0)	0 (0)	0 (0)	6 (12)	0 (0)	0 (0)	6 (12)
Rainbow trout – release Legal	0.2158 (0.1714)	0 (0)	458 (363)	4 (8)	6 (12)	0 (0)	0 (0)	468 (363)
Rainbow trout – release Sublegal	0.3596 (0.2623)	14 (28)	731 (551)	28 (37)	4 (8)	0 (0)	3 (7)	780 (553)
Brown trout – release Legal	0.0682 (0.0570)	0 (0)	109 (112)	27 (39)	12 (25)	0 (0)	0 (0)	148 (121)
Brown trout – release Sublegal	0.4467 (0.4210)	42 (106)	903 (891)	5 (11)	12 (17)	0 (0)	7 (12)	969 (898)
Total harvest	0.0917 (0.0768)	7 (18)	170 (158)	16 (34)	6 (12)	0 (0)	0 (0)	199 (163)
Total release	1.0904 (0.5496)	56 (109)	2,201 (1,114)	64 (55)	34 (34)	0 (0)	10 (14)	2,365 (1,121)
Total catch	1.1821 (0.5608)	63 (111)	2,371 (1,126)	80 (65)	40 (36)	0 (0)	10 (14)	2,564 (1,134)
Angler hours		49 (75)	1,258 (292)	356 (183)	409 (81)	26 (51)	71 (72)	2,169 (372)
Angler trips		30 (47)	537 (192)	152 (87)	136 (65)	13 (32)	36 (54)	904 (234)

Appendix 49-8.—Residence of anglers (percent of anglers interviewed) by Michigan County or Michigan non-resident, Rogue River, Kent County (section 301), 1995. Two standard errors are given in parentheses.

Residence	Apr	May	Jun	Jul	Aug	Sep	Season
Alcona	0 (0)	1.01 (2.01)	0 (0)	0 (0)	0 (0)	0 (0)	0.45 (0.90)
Allegan	0 (0)	0 (0)	0 (0)	0 (0)	20.00 (35.78)	0 (0)	0.45 (0.90)
Barry	0 (0)	1.01 (2.01)	2.17 (4.30)	0 (0)	0 (0)	0 (0)	0.90 (1.27)
Clinton	0 (0)	0 (0)	4.35 (6.01)	0 (0)	0 (0)	0 (0)	0.90 (1.27)
Ingham	0 (0)	1.01 (2.01)	0 (0)	0 (0)	0 (0)	0 (0)	0.45 (0.90)
Ionia	0 (0)	0 (0)	2.17 (4.30)	5.26 (10.25)	0 (0)	0 (0)	0.90 (1.27)
Kalamazoo	0 (0)	0 (0)	4.35 (6.01)	0 (0)	0 (0)	5.56 (10.80)	1.36 (1.56)
Kalkaska	0 (0)	2.02 (2.83)	0 (0)	0 (0)	0 (0)	0 (0)	0.90 (1.27)
Kent	88.24 (11.05)	80.81 (7.92)	78.26 (12.16)	84.21 (16.73)	60.00 (43.82)	61.11 (22.98)	79.64 (5.42)
Montcalm	0 (0)	3.03 (3.45)	4.35 (6.01)	0 (0)	0 (0)	0 (0)	2.26 (2.00)
Muskegon	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	11.11 (14.81)	0.90 (1.27)
Newaygo	0 (0)	2.02 (2.83)	0 (0)	0 (0)	20.00 (35.78)	0 (0)	1.36 (1.56)
Oakland	0 (0)	0 (0)	4.35 (6.01)	0 (0)	0 (0)	11.11 (14.81)	1.81 (1.79)
Ottawa	11.76 (11.05)	8.08 (5.48)	0 (0)	10.53 (14.08)	0 (0)	0 (0)	6.33 (3.28)
St. Clair	0 (0)	1.01 (2.01)	0 (0)	0 (0)	0 (0)	0 (0)	0.45 (0.90)
Washtenaw	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	5.56 (10.80)	0.45 (0.90)
Non-resident	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	5.56 (10.80)	0.45 (0.90)
Anglers interviewed	34	99	46	19	5	18	221

Appendix 49-9.—Type of bait used by anglers (percent of anglers interviewed), Rogue River, Kent County (section 301), 1995. Two standard errors are given in parentheses.

Bait used	Apr	May	Jun	Jul	Aug	Sep	Season
Live	61.76 (16.67)	64.65 (9.61)	69.57 (13.57)	68.42 (21.33)	20.00 (35.78)	33.33 (22.22)	61.99 (6.53)
Artificial	23.53 (14.55)	30.30 (9.24)	30.43 (13.57)	31.58 (21.33)	80.00 (35.78)	66.67 (22.22)	33.48 (6.35)
Both	14.71 (12.15)	5.05 (4.40)	0 (0)	0 (0)	0 (0)	0 (0)	4.52 (2.80)
Anglers interviewed	34	99	46	19	5	18	221

Appendix 49-10.—Species of fish sought by anglers (percent of anglers interviewed), Rogue River, Kent County (section 301), 1995. Two standard errors are given in parentheses.

Species	Apr	May	Jun	Jul	Aug	Sep	Season
Trout	91.18 (9.73)	97.98 (2.83)	88.89 (9.37)	89.47 (14.08)	100.00 (0)	100.00 (0)	94.55 (3.06)
Anything	8.82 (9.73)	2.02 (2.83)	11.11 (9.37)	10.53 (14.08)	0 (0)	0 (0)	5.45 (3.06)
Anglers interviewed	34	99	45	19	5	18	220

Appendix 49-11.—Number of trips per day by anglers (percent of anglers interviewed), Rogue River, Kent County (section 301), 1995. Two stand errors are given in parentheses.

Trips/day	Apr	May	Jun	Jul	Aug	Sep	Season
1	91.18 (9.73)	90.82 (5.83)	95.65 (6.01)	100.00 (0)	100.00 (0)	100.00 (0)	93.64 (3.29)
2	8.82 (9.73)	9.18 (5.83)	4.35 (6.01)	0 (0)	0 (0)	0 (0)	6.36 (3.29)
Anglers interviewed	34	98	46	19	5	18	220

Appendix 49-12.—Gender of anglers (percent of anglers interviewed), Rogue River, Kent County (section 301), 1995. Two standard errors are given in parentheses.

Gender	Apr	May	Jun	Jul	Aug	Sep	Season
Male	97.06 (5.80)	96.97 (3.45)	91.30 (8.31)	100.00 (0)	100.00 (0)	83.33 (17.57)	95.02 (2.93)
Female	2.94 (5.80)	3.03 (3.45)	8.70 (8.31)	0 (0)	0 (0)	16.67 (17.57)	4.98 (2.93)
Anglers interviewed	34	99	46	19	5	18	221

Appendix 49-13.—Estimated total harvest, catch and release, fishing pressure, and catch per hour, Rogue River, Kent County (section 302), 1995. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout – harvest	0.0127 (0.0160)	0 (0)	124 (155)	0 (0)	0 (0)	0 (0)	0 (0)	124 (155)
Brown trout – harvest	0.0047 (0.0077)	0 (0)	46 (75)	0 (0)	0 (0)	0 (0)	0 (0)	46 (75)
White sucker – harvest	0.0012 (0.0032)	0 (0)	0 (0)	0 (0)	12 (31)	0 (0)	0 (0)	12 (31)
Rainbow trout – release Legal	0.1072 (0.1147)	0 (0)	849 (1,074)	118 (244)	76 (93)	0 (0)	0 (0)	1,043 (1,105)
Rainbow trout – release Sublegal	0.3815 (0.1865)	4 (9)	3,329 (1,691)	137 (140)	0 (0)	27 (67)	215 (324)	3,712 (1,728)
Brown trout – release Legal	0.0600 (0.0527)	0 (0)	218 (272)	262 (406)	20 (36)	46 (95)	38 (79)	584 (505)
Brown trout – release Sublegal	0.3302 (0.1676)	4 (9)	1,912 (1,246)	870 (831)	80 (89)	234 (377)	113 (188)	3,213 (1,558)
Total harvest	0.0187 (0.0182)	0 (0)	170 (172)	0 (0)	12 (31)	0 (0)	0 (0)	182 (175)
Total release	0.8790 (0.3000)	8 (12)	6,308 (2,375)	1,387 (967)	176 (134)	307 (394)	366 (383)	8,552 (2,625)
Total catch	0.8977 (0.3017)	8 (12)	6,478 (2,380)	1,387 (967)	188 (137)	307 (394)	366 (383)	8,734 (2,630)
Angler hours		140 (66)	4,329 (972)	2,643 (861)	1,112 (322)	611 (400)	894 (393)	9,729 (1,452)
Angler trips		62 (28)	1,545 (477)	764 (257)	653 (224)	311 (213)	454 (235)	3,789 (667)

Appendix 49-14.—Estimated fishing pressure by boat anglers, Rogue River, Kent County (section 302), 1995. Two standard errors are given in parentheses.

Effort	Apr	May	Jun	Jul	Aug	Sep	Season
Angler hours	0 (0)	183 (238)	14 (32)	54 (65)	0 (0)	24 (38)	275 (252)
Angler trips	0 (0)	61 (114)	5 (12)	18 (32)	0 (0)	8 (17)	92 (120)

Appendix 49-15.—Estimated harvest, catch and release, fishing pressure, and catch per hour by shore anglers, Rogue River, Kent County (section 302), 1995. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout – harvest	0.0321 (0.0682)	0 (0)	34 (71)	0 (0)	0 (0)	0 (0)	0 (0)	34 (71)
Brown trout – harvest	0.0321 (0.0682)	0 (0)	34 (71)	0 (0)	0 (0)	0 (0)	0 (0)	34 (71)
White sucker – harvest	0.0113 (0.0296)	0 (0)	0 (0)	0 (0)	12 (31)	0 (0)	0 (0)	12 (31)
Rainbow trout – release Legal	0.0482 (0.1018)	0 (0)	51 (106)	0 (0)	0 (0)	0 (0)	0 (0)	51 (106)
Rainbow trout – release Sublegal	1.0491 (1.2400)	4 (9)	1,106 (1,244)	0 (0)	0 (0)	0 (0)	0 (0)	1,110 (1,244)
Brown trout – release Sublegal	0.3837 (0.8134)	4 (9)	402 (847)	0 (0)	0 (0)	0 (0)	0 (0)	406 (847)
Total harvest	0.0756 (0.1032)	0 (0)	68 (100)	0 (0)	12 (31)	0 (0)	0 (0)	80 (105)
Total release	1.4811 (1.5307)	8 (13)	1,559 (1,509)	0 (0)	0 (0)	0 (0)	0 (0)	1,567 (1,509)
Total catch	1.5567 (1.5439)	8 (13)	1,627 (1,512)	0 (0)	12 (31)	0 (0)	0 (0)	1,647 (1,512)
Angler hours		70 (20)	658 (298)	84 (105)	62 (77)	164 (223)	20 (40)	1,058 (397)
Angler trips		39 (19)	405 (249)	52 (68)	38 (50)	101 (143)	12 (25)	647 (301)



Appendix 49-16.—Estimated harvest, catch and release, fishing pressure, and catch per hour by wading anglers, Rogue River, Kent County (section 302), 1995. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout – harvest	0.0107 (0.0165)	0 (0)	90 (138)	0 (0)	0 (0)	0 (0)	0 (0)	90 (138)
Brown trout – harvest	0.0014 (0.0029)	0 (0)	12 (25)	0 (0)	0 (0)	0 (0)	0 (0)	12 (25)
Rainbow trout – release Legal	0.1182 (0.1324)	0 (0)	798 (1,069)	118 (244)	76 (93)	0 (0)	0 (0)	992 (1,100)
Rainbow trout – release Sublegal	0.3099 (0.1517)	0 (0)	2,223 (1,145)	137 (140)	0 (0)	27 (67)	215 (324)	2,602 (1,200)
Brown trout – release Legal	0.0696 (0.0612)	0 (0)	218 (272)	262 (406)	20 (36)	46 (95)	38 (79)	584 (505)
Brown trout – release Sublegal	0.3343 (0.1651)	0 (0)	1,510 (914)	870 (831)	80 (89)	234 (377)	113 (188)	2,807 (1,308)
Total harvest	0.0121 (0.0168)	0 (0)	102 (140)	0 (0)	0 (0)	0 (0)	0 (0)	102 (140)
Total release	0.8319 (0.2898)	0 (0)	4,749 (1,834)	1,387 (967)	176 (134)	307 (294)	366 (383)	6,985 (2,148)
Total catch	0.8441 (0.2912)	0 (0)	4,851 (1,838)	1,387 (967)	176 (134)	307 (394)	366 (383)	7,087 (2,152)
Angler hours		70 (63)	3,488 (894)	2,545 (854)	996 (306)	447 (332)	850 (389)	8,396 (1,374)
Angler trips		23 (21)	1,079 (390)	707 (248)	597 (216)	210 (158)	434 (233)	3,050 (583)

Appendix 49-17.—Residence of anglers (percent of anglers interviewed) by Michigan County or Michigan non-resident, Rogue River, Kent County (section 302), 1995. Two standard errors are given in parentheses.

Residence	Apr	May	Jun	Jul	Aug	Sep	Season
Allegan	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	11.76 (15.63)	1.20 (1.68)
Berrien	0 (0)	0 (0)	0 (0)	3.57 (7.01)	0 (0)	0 (0)	0.60 (1.19)
Kalamazoo	0 (0)	8.33 (6.51)	0 (0)	14.29 (13.23)	18.18 (23.26)	0 (0)	7.19 (4.00)
Kent	81.82 (23.26)	63.89 (11.32)	67.86 (17.65)	60.71 (18.46)	63.64 (29.01)	64.71 (23.18)	65.27 (7.37)
Livingston	18.18 (23.26)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1.20 (1.68)
Macosta	0 (0)	1.39 (2.76)	0 (0)	0 (0)	0 (0)	0 (0)	0.60 (1.19)
Montcalm	0 (0)	1.39 (2.76)	0 (0)	3.57 (7.01)	0 (0)	5.88 (11.41)	1.80 (2.06)
Muskegon	0 (0)	2.78 (3.87)	0 (0)	0 (0)	0 (0)	0 (0)	1.20 (1.68)
Oakland	0 (0)	4.17 (4.71)	7.14 (9.73)	0 (0)	0 (0)	0 (0)	2.99 (2.64)
Ottawa	0 (0)	9.72 (6.98)	14.29 (13.23)	7.14 (9.73)	0 (0)	0 (0)	7.78 (4.15)
VanBuren	0 (0)	2.78 (3.87)	0 (0)	0 (0)	0 (0)	5.88 (11.41)	1.80 (2.06)
Wayne	0 (0)	0 (0)	10.71 (11.69)	0 (0)	0 (0)	0 (0)	1.80 (2.06)
Non-resident	0 (0)	5.56 (5.40)	0 (0)	10.71 (11.69)	18.18 (23.26)	11.76 (15.63)	6.59 (3.84)
Anglers interviewed	11	72	28	28	11	17	167

Appendix 49-18.—Type of bait used by anglers (percent of anglers interviewed), Rogue River, Kent County (section 302), 1995. Two standard errors are given in parentheses.

Bait used	Apr	May	Jun	Jul	Aug	Sep	Season
Live	0 (0)	12.68 (7.90)	0 (0)	21.43 (15.51)	9.09 (17.34)	5.88 (11.41)	10.24 (4.71)
Artificial	100.00 (0)	85.92 (8.26)	100.00 (0)	78.57 (15.51)	90.91 (17.34)	94.12 (11.41)	89.16 (4.83)
Both	0 (0)	1.41 (2.80)	0 (0)	0 (0)	0 (0)	0 (0)	0.60 (1.20)
Anglers interviewed	11	71	28	28	11	17	166

Appendix 49-19.—Species of fish sought by anglers (percent of anglers interviewed), Rogue River, Kent County (section 302), 1995. Two standard errors are given in parentheses.

Species sought	Apr	May	Jun	Jul	Aug	Sep	Season
Trout	81.82 (23.26)	93.06 (5.99)	92.86 (9.73)	88.89 (12.10)	100.00 (0)	100.00 (0)	92.77 (4.02)
Anything	18.18 (23.26)	6.94 (5.99)	7.14 (9.73)	11.11 (12.10)	0 (0)	0 (0)	7.23 (4.02)
Anglers interviewed	11	72	28	27	11	17	166

Appendix 49-20.—Number of trips per day by anglers (percent of anglers interviewed), Rogue River, Kent County (section 302), 1995. Two stand errors are given in parentheses.

Trips/day	Apr	May	Jun	Jul	Aug	Sep	Season
1	75.00 (30.62)	92.75 (6.24)	96.43 (7.01)	96.43 (7.01)	100.00 (0)	88.24 (15.63)	93.17 (3.98)
2	25.00 (30.62)	7.25 (6.24)	3.57 (7.01)	3.57 (7.01)	0 (0)	11.76 (15.63)	6.83 (3.98)
Anglers interviewed	8	69	28	28	11	17	161

Appendix 49-21.—Gender of anglers (percent of anglers interviewed), Rogue River, Kent County (section 302), 1995. Two standard errors are given in parentheses.

Gender	Apr	May	Jun	Jul	Aug	Sep	Season
Male	100.00 (0)	100.00 (0)	92.86 (9.73)	100.00 (0)	100.00 (0)	100.00 (0)	98.80 (1.68)
Female	0 (0)	0 (0)	7.14 (9.73)	0 (0)	0 (0)	0 (0)	1.20 (1.68)
Anglers interviewed	11	72	28	28	11	17	167

Appendix 49-22.—Estimated total harvest, catch and release, fishing pressure, and catch per hour, Rogue River, Kent County (section 303), 1995. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout – harvest	0.0308 (0.0325)	38 (87)	27 (44)	92 (147)	14 (29)	0 (0)	0 (0)	171 (178)
Brown trout – harvest	0.0326 (0.0304)	8 (19)	101 (121)	29 (72)	43 (87)	0 (0)	0 (0)	181 (166)
Brown trout – harvest Left ventral clip	0.0081 (0.0164)	0 (0)	45 (91)	0 (0)	0 (0)	0 (0)	0 (0)	45 (91)
White sucker – harvest	0.0047 (0.0071)	15 (35)	0 (0)	0 (0)	0 (0)	8 (17)	3 (6)	26 (39)
Rainbow trout – release Legal	0.4460 (0.3220)	220 (438)	1,757 (1,632)	371 (394)	105 (110)	11 (17)	15 (25)	2,479 (1,739)
Rainbow trout – release Sublegal	0.2217 (0.1293)	122 (215)	860 (610)	160 (208)	41 (64)	31 (74)	18 (38)	1,232 (687)
Brown trout – release Legal	0.0916 (0.0835)	7 (15)	315 (435)	64 (90)	37 (48)	50 (64)	36 (53)	509 (456)
Brown trout – release Sublegal	0.1105 (0.0845)	19 (45)	353 (365)	178 (265)	28 (40)	0 (0)	36 (53)	614 (458)
Total harvest	0.0761 (0.0491)	61 (96)	173 (158)	121 (164)	57 (92)	8 (17)	3 (6)	423 (263)
Total release	0.8697 (0.3857)	368 (490)	3,285 (1,832)	773 (526)	211 (142)	92 (99)	105 (88)	4,834 (1,978)
Total catch	0.9458 (0.3937)	429 (499)	3,458 (1,839)	894 (551)	268 (167)	100 (100)	108 (87)	5,257 (1,995)
Angler hours		329 (254)	2,158 (502)	1,132 (497)	1,062 (459)	490 (317)	387 (172)	5,558 (950)
Angler trips		97 (105)	815 (315)	424 (205)	399 (212)	199 (128)	140 (92)	2,074 (471)

Appendix 49-23.—Estimated fishing pressure by boat anglers, Rogue River, Kent County (section 303), 1995. Two standard errors are given in parentheses.

Effort	Apr	May	Jun	Jul	Aug	Sep	Season
Angler hours	0 (0)	72 (59)	60 (82)	27 (42)	76 (81)	106 (105)	341 (172)
Angler trips	0 (0)	24 (38)	20 (38)	9 (18)	25 (43)	35 (59)	113 (92)

Appendix 49-24.—Estimated harvest, catch and release, fishing pressure, and catch per hour by shore anglers, Rogue River, Kent County (section 303), 1995. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout – harvest	0.0154 (0.0319)	0 (0)	21 (43)	0 (0)	0 (0)	0 (0)	0 (0)	21 (43)
Brown trout – harvest	0.0829 (0.1040)	0 (0)	84 (118)	29 (72)	0 (0)	0 (0)	0 (0)	113 (138)
Rainbow trout – release Legal	0.0924 (0.0997)	22 (50)	84 (118)	9 (20)	0 (0)	11 (17)	0 (0)	126 (131)
Rainbow trout – release Sublegal	0.1702 (0.2492)	34 (59)	168 (325)	30 (45)	0 (0)	0 (0)	0 (0)	232 (333)
Brown trout – release Legal	0.0264 (0.0282)	7 (15)	0 (0)	14 (30)	4 (9)	11 (13)	0 (0)	36 (37)
Brown trout – release Sublegal	0.0609 (0.1020)	0 (0)	62 (129)	21 (46)	0 (0)	0 (0)	0 (0)	83 (137)
Total harvest	0.0983 (0.1101)	0 (0)	105 (126)	29 (72)	0 (0)	0 (0)	0 (0)	134 (145)
Total release	0.3500 (0.2999)	63 (79)	314 (369)	74 (74)	4 (9)	22 (21)	0 (0)	477 (385)
Total catch	0.4483 (0.3274)	63 (79)	419 (389)	103 (102)	4 (8)	22 (21)	0 (0)	611 (410)
Angler hours		182 (177)	530 (214)	107 (82)	307 (237)	103 (79)	134 (90)	1,363 (393)
Angler trips		68 (94)	199 (208)	40 (49)	115 (142)	52 (40)	50 (59)	524 (282)

Appendix 49-25.—Estimated harvest, catch and release, fishing pressure, and catch per hour by wading anglers, Rogue River, Kent County (section 303), 1995. Two standard errors are given in parentheses.

Species	Catch/hour	Apr	May	Jun	Jul	Aug	Sep	Season
Rainbow trout – harvest	0.0390 (0.0458)	38 (87)	6 (11)	92 (147)	14 (29)	0 (0)	0 (0)	150 (173)
Brown trout – harvest	0.0175 (0.0242)	8 (19)	17 (25)	0 (0)	43 (87)	0 (0)	0 (0)	68 (92)
Brown trout – harvest Left ventral	0.0117 (0.0238)	0 (0)	45 (91)	0 (0)	0 (0)	0 (0)	0 (0)	45 (91)
White sucker – harvest	0.0066 (0.0102)	15 (35)	0 (0)	0 (0)	0 (0)	8 (17)	3 (6)	26 (39)
Rainbow trout – release Legal	0.6106 (0.4696)	198 (435)	1,673 (1,628)	362 (394)	105 (110)	0 (0)	15 (25)	2,353 (1,734)
Rainbow trout – release Sublegal	0.2595 (0.1661)	88 (207)	692 (516)	130 (203)	41 (64)	31 (74)	18 (38)	1,000 (601)
Brown trout – release Legal	0.1227 (0.1208)	0 (0)	315 (435)	50 (85)	33 (47)	39 (63)	36 (53)	473 (454)
Brown trout – release Sublegal	0.1379 (0.1173)	19 (45)	291 (341)	157 (261)	28 (40)	0 (0)	36 (53)	531 (437)
Total harvest	0.0750 (0.0594)	61 (96)	68 (95)	92 (147)	57 (92)	8 (17)	3 (6)	289 (220)
Total release	1.1305 (0.5615)	305 (484)	2,971 (1,795)	699 (521)	207 (141)	70 (97)	105 (88)	4,357 (1,940)
Total catch	1.2055 (0.5717)	366 (493)	3,039 (1,797)	791 (541)	264 (167)	78 (98)	108 (87)	4,646 (1,952)
Angler hours		147 (182)	1,556 (450)	965 (483)	728 (391)	311 (296)	147 (102)	3,854 (848)
Angler trips		29 (46)	592 (234)	364 (195)	275 (156)	122 (114)	55 (40)	1,437 (366)

Appendix 49-26.—Residence of anglers (percent of anglers interviewed) by Michigan County or Michigan non-resident, Rogue River, Kent County (section 303), 1995. Two standard errors are given in parentheses.

Residence	Apr	May	Jun	Jul	Aug	Sep	Season
Allegan	0 (0)	0 (0)	7.14 (9.73)	0 (0)	0 (0)	0 (0)	1.08 (1.51)
Arenac	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	5.00 (9.75)	0.54 (1.07)
Bay	0 (0)	3.57 (4.96)	0 (0)	0 (0)	0 (0)	0 (0)	1.08 (1.51)
Clinton	0 (0)	0 (0)	0 (0)	0 (0)	9.68 (10.62)	0 (0)	1.61 (1.85)
Eaton	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	5.00 (9.75)	0.54 (1.07)
Ingham	0 (0)	0 (0)	0 (0)	2.50 (4.94)	0 (0)	0 (0)	0.54 (1.07)
Kent	63.64 (29.01)	80.36 (10.62)	60.71 (18.46)	60.00 (15.49)	51.61 (17.95)	70.00 (20.49)	66.13 (6.94)
Macomb	0 (0)	0 (0)	3.57 (7.01)	0 (0)	3.23 (6.35)	0 (0)	1.08 (1.51)
Montcalm	0 (0)	3.57 (4.96)	7.14 (9.73)	7.50 (8.33)	9.68 (10.62)	0 (0)	5.38 (3.31)
Muskegon	0 (0)	0 (0)	7.14 (9.73)	0 (0)	0 (0)	0 (0)	1.08 (1.51)
Oakland	0 (0)	1.79 (3.54)	3.57 (7.01)	0 (0)	0 (0)	0 (0)	1.08 (1.51)
Ottawa	27.27 (26.86)	7.14 (6.88)	0 (0)	15.00 (11.29)	12.90 (12.04)	15.00 (15.97)	10.75 (4.54)
Washtenaw	0 (0)	1.79 (3.54)	0 (0)	0 (0)	0 (0)	0 (0)	0.54 (1.07)
Wayne	9.09 (17.34)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.54 (1.07)
Non-resident	0 (0)	1.79 (3.54)	10.71 (11.69)	15.00 (11.29)	12.90 (12.04)	5.00 (9.75)	8.06 (3.99)
Anglers interviewed	11	56	28	40	31	20	186



Appendix 49-27.—Type of bait used by anglers (percent of anglers interviewed), Rogue River, Kent County (section 303), 1995. Two standard errors are given in parentheses.

Bait used	Apr	May	Jun	Jul	Aug	Sep	Season
Live	45.45 (30.03)	33.93 (12.65)	32.14 (17.65)	47.50 (15.79)	41.94 (17.73)	15.00 (15.97)	36.56 (7.06)
Artificial	18.18 (23.26)	62.50 (12.94)	67.86 (17.65)	52.50 (15.79)	58.06 (17.73)	85.00 (15.97)	60.22 (7.18)
Both	36.36 (29.01)	3.57 (4.96)	0 (0)	0 (0)	0 (0)	0 (0)	3.23 (2.59)
Anglers interviewed	11	56	28	40	31	20	186

Appendix 49-28.—Species of fish sought by anglers (percent of anglers interviewed), Rogue River, Kent County (section 303), 1995. Two standard errors are given in parentheses.

Species sought	Apr	May	Jun	Jul	Aug	Sep	Season
Trout	81.82 (23.26)	98.21 (3.54)	82.14 (14.48)	72.50 (14.12)	90.32 (10.62)	90.00 (13.42)	87.10 (4.92)
Brown trout	0 (0)	0 (0)	3.57 (7.01)	0 (0)	0 (0)	0 (0)	0.54 (1.07)
Northern pike	0 (0)	0 (0)	0 (0)	0 (0)	3.23 (6.35)	0 (0)	0.54 (1.07)
Anything	18.18 (23.26)	1.79 (3.54)	14.29 (13.23)	27.50 (14.12)	6.45 (8.82)	10.00 (13.42)	11.83 (4.74)
Anglers interviewed	11	56	28	40	31	20	186

Appendix 49-29.—Number of trips per day by anglers (percent of anglers interviewed), Rogue River, Kent County (section 303), 1995. Two standard errors are given in parentheses.

Trips/day	Apr	May	Jun	Jul	Aug	Sep	Season
1	81.82 (23.26)	88.89 (8.55)	92.86 (9.73)	100.00 (0)	87.10 (12.04)	100.00 (0)	92.39 (3.91)
2	0 (0)	11.11 (8.55)	7.14 (9.73)	0 (0)	12.90 (12.04)	0 (0)	6.52 (3.64)
3	18.18 (23.26)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1.09 (1.53)
Anglers interviewed	11	54	28	40	31	20	184

Appendix 49-30.—Gender of anglers (percent of anglers interviewed), Rogue River, Kent County (section 303), 1995. Two standard errors are given in parentheses.

Gender	Apr	May	Jun	Jul	Aug	Sep	Season
Male	100.00 (0)	96.43 (4.96)	92.86 (9.73)	100.00 (0)	90.32 (10.62)	90.00 (13.42)	95.16 (3.15)
Female	0 (0)	3.57 (4.96)	7.14 (9.73)	0 (0)	9.68 (10.62)	10.00 (13.42)	4.84 (3.15)
Anglers interviewed	11	56	28	40	31	20	186

Appendix 50-1.–Rogue River, Kent County, 1998.

Site	Rogue River
Year	1998
County	Kent
Location	T. 9 N., R. 11 W., Sec. 22-25, 27, 28, 33
Survey period	May 20 to August 31
Daily period	See Appendix 50-3
Survey design	Progressive-roving
Count method	Instantaneous, fishing boats, wading anglers, shore anglers, vehicles
Interview type	Roving, individual angler, boating anglers, wading anglers, shore anglers, harvest, catch and release
Effort estimation	Multiple-day period (Lockwood et al. 1999)
Catch estimation	Multiple-day period (Lockwood et al. 1999)
Clerk	Fisheries Division clerks, 2 full time
Survey purpose	Characterize the trout fishery
Notes	<p>This 6.82-mile stretch of the Rogue River was divided into three sections of similar length (Appendix 50-2). Three randomly-selected weekdays, each weekend day, and all holidays were sampled each week of the survey.</p> <p>Two counts were made each sample day. Counting order of sections was randomized, however count direction was always downstream. Two modes were counted, anglers (enumerated from a canoe) and number of vehicles parked at access sites along the river. Catch and effort were not stratified by previously used fishing modes such as, boat, shore, or wading (see Rogue River, 1994 and Rogue River, 1995 chapters). On some sample days, a clerk canoed the river and counted anglers in each section while the second clerk counted vehicles parked at access sites along the river; on other days, only vehicles parked at access locations along the river were counted. Care was taken to make angler and vehicle counts at approximately the same time. A summary of count type composition is given in Appendix 50-4. On days vehicles <math>x</math> but not anglers were counted, the following regressions, by section, were used to estimate the number of anglers <math>\hat{y}</math> present:</p> <p style="text-align: center;">Site 301; <math>\hat{y} = 0.01323 + (0.97231x)</math>; <math>r^2 = 0.87</math>; <math>F &lt; 0.01</math>,</p> <p style="text-align: center;">Site 302; <math>\hat{y} = 0.11666 + (1.32120x)</math>; <math>r^2 = 0.86</math>; <math>F &lt; 0.01</math>,</p> <p style="text-align: center;">Site 303; <math>\hat{y} = 0.04218 + (1.16743x)</math>; <math>r^2 = 0.77</math>; <math>F &lt; 0.01</math>.</p> <p>These regressions were derived from paired 1998 angler count and vehicle count data.</p> <p>Angler counts made by the canoeing clerk and angler counts predicted using the previously described regressions were treated as instantaneous counts.</p>

Appendix 50-1.–continue.

Notes

Anglers were interviewed as they fished by the clerk making counts (roving interviews), and as they completed their fishing trips by the spotting clerk at bridge crossings and parking areas (access interviews). Interviews were predominantly roving – 52 of 92 angler interviews were of incomplete trips. For analysis, all interviews were treated as roving interviews. All anglers fished a minimum of 0.5h (Pollock et al. 1997). No adjustment was made to account for “shadowing” that can occur using this count-as-you-go method (Wade 1991). However, interview time was kept to a minimum and the canoeing clerk rarely or never stopped to complete an interview.

Fin clips were recorded for planted fish were not recorded.

Appendix 50-2.—Creel survey section descriptions of upper and lower boundaries, approximate section canoe times, and length of each section, Rogue River, Kent County, 1998.

Section	Description	Canoeing times (hours)	River distance (miles)
301	Grange Road Bridge to 12 Mile Road Bridge	0.75	2.28
302	12 Mile Rd. Br. downstream 12 Mile Rd. Br.	0.57	2.34
303	12 Mile Rd. Br. to Rockford Dam	0.75	2.20

Appendix 50-3.—Work shifts and expansion values (referred to as “F” in Lockwood et al. 1999) used to estimate catch and effort, Rogue River, Kent County, 1998.

Month	Shift		Expansion value
	Early	Late	
May	0600 h – 1500 h	1300 h – 2200 h	16
June	0600 h – 1500 h	1300 h – 2200 h	18
July	0600 h – 1500 h	1300 h – 2200 h	18
August	0600 h – 1500 h	1300 h – 2200 h	17

Appendix 50-4.—Occurrence of angler counts made by canoe only, count of vehicles parked at access sites along the river only, counts made by canoe and count of vehicles, and number of missed counts, Rogue River, Kent County, 1998.

Month	Canoe only	Vehicle only	Canoe and vehicle	No count
May	0	11	6	1
June	0	22	20	0
July	0	4	38	0
August	2	3	26	1

Appendix 50-5.—Total estimated harvest, catch and release, fishing pressure, and catch rate, Rogue River, Kent County (section 301), 1998. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul-Aug	Season
Rainbow trout – harvest	0.0257 (0.0533)	21 (43)	0 (0)	0 (0)	21 (43)
Brown trout – harvest	0.0735 (0.1273)	50 (100)	0 (0)	10 (20)	60 (102)
Northern pike – harvest	0.0245 (0.0485)	0 (0)	0 (0)	20 (39)	20 (39)
Rainbow trout – release Sublegal	0.6912 (0.7022)	407 (442)	0 (0)	157 (315)	564 (542)
Brown trout – release Legal	0.1140 (0.2299)	93 (185)	0 (0)	0 (0)	93 (185)
Brown trout – release Sublegal	0.4436 (0.6144)	77 (85)	285 (479)	0 (0)	362 (487)
Total harvest	0.1238 (0.1491)	71 (109)	0 (0)	30 (44)	101 (117)
Total release	1.2488 (1.0093)	577 (487)	285 (479)	157 (315)	1,019 (752)
Total catch	1.3726 (1.0366)	648 (499)	285 (479)	187 (318)	1,120 (761)
Angler hours		388 (148)	310 (214)	118 (69)	816 (269)
Angler trips		342 (306)	273 (344)	104 (125)	719 (477)

Appendix 50-6.—Residence of anglers (percent of anglers interviewed) by Michigan County, Rogue River, Kent County (section 301), 1998. Two standard errors are given in parentheses.

County	May	Jun	Jul	Aug	Season
Kent	88.89 (20.95)	100.00 (0.00)	100.00 (0.00)	50.00 (70.71)	86.67 (17.55)
Ottawa	11.11 (20.95)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	6.67 (12.88)
Washtenaw	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	50.00 (70.71)	6.67 (12.88)
Anglers interviewed	9	3	1	2	15

Appendix 50-7.—Type of bait used by anglers (percent of anglers interviewed), Rogue River, Kent County (section 301), 1998. Two standard errors are given in parentheses.

Bait	May	Jun	Jul	Aug	Season
Live	50.00 (35.36)	0.00 (0)	0.00 (0)	0.00 (0)	28.57 (24.15)
Artificial	50.00 (35.35)	1.00 (0)	1.00 (0)	1.00 (0)	71.43 (24.15)
Anglers interviewed	8	3	1	2	14

Appendix 50-8.—Species of fish sought by anglers (percent of anglers interviewed), Rogue River, Kent County (section 301), 1998. Two standard errors are given in parentheses.

Species sought	May	Jun	Jul	Aug	Season
Trout	50.00 (35.36)	100.00 (0.00)	100.00 (0.00)	100.00 (0.00)	71.43 (24.15)
Anything	50.00 (35.36)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	28.57 (24.15)
Anglers interviewed	8	3	1	2	14

Appendix 50-9.—Number of trips per day by anglers (percent of anglers interviewed), Rogue River, Kent County (section 301), 1998. Two standard errors are given in parentheses.

Trips/day	May	Jun	Jul	Aug	Season
1	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)
Anglers interviewed	8	3	1	2	14

Appendix 50-10.—Gender of anglers (percent of anglers interviewed), Rogue River, Kent County (section 301), 1998. Two standard errors are given in parentheses.

Gender	May	Jun	Jul	Aug	Season
Male	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)	100.00 (0)
Anglers interviewed	8	3	1	2	14



Appendix 50-11.—Total estimated harvest, catch and release, fishing pressure, and catch per hour, Rogue River, Kent County (section 302), 1998. Two standard errors are given in parentheses.

Species	Catch/hour	May	Jun	Jul	Aug	Season
Rainbow trout – harvest	0.0107 (0.0217)	49 (99)	0 (0)	0 (0)	0 (0)	49 (99)
Brown trout – harvest	0.0107 (0.0217)	49 (99)	0 (0)	0 (0)	0 (0)	49 (99)
Brown trout – release Legal	0.0325 (0.0414)	66 (132)	0 (0)	63 (127)	19 (38)	148 (187)
Brown trout – release Sublegal	0.2412 (0.1298)	208 (247)	598 (415)	179 (255)	115 (127)	1,100 (561)
Rainbow trout – release Legal	0.0228 (0.0305)	104 (138)	0 (0)	0 (0)	0 (0)	104 (138)
Rainbow trout – release Sublegal	0.1730 (0.1471)	637 (633)	0 (0)	94 (131)	58 (115)	789 (657)
Total harvest	0.0215 (0.0309)	98 (140)	0 (0)	0 (0)	0 (0)	98 (140)
Total release	0.4695 (0.2121)	1,015 (706)	598 (415)	336 (314)	192 (175)	2,141 (895)
Total catch	0.4910 (0.2159)	1,113 (720)	598 (415)	336 (314)	192 (175)	2,239 (905)
Angler hours		1,132 (520)	1,813 (424)	774 (282)	841 (280)	4,560 (780)
Angler trips		997 (878)	1,597 (1,291)	682 (565)	741 (612)	4,017 (1,770)

Appendix 50-12.—Residence of anglers (percent of anglers interviewed) by Michigan County or Michigan non-resident, Rogue River, Kent County (section 302), 1998. Two standard errors are given in parentheses.

County	May	Jun	Jul	Aug	Season
Alcona	4.17 (8.16)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.45 (2.88)
Alpena	0.00 (0.00)	6.67 (12.88)	0.00 (0.00)	0.00 (0.00)	1.45 (2.88)
Bay	0.00 (0.00)	6.67 (12.88)	0.00 (0.00)	0.00 (0.00)	1.45 (2.88)
Ingham	8.33 (11.28)	6.67 (12.88)	0.00 (0.00)	0.00 (0.00)	4.35 (4.91)
Kent	83.33 (15.22)	66.67 (24.34)	81.82 (16.45)	75.00 (30.62)	78.26 (9.93)
Macomb	4.17 (8.16)	0.00 (0.00)	4.55 (8.89)	0.00 (0.00)	2.90 (4.04)
Ottawa	0.00 (0.00)	6.67 (12.88)	4.55 (8.89)	25.00 (30.62)	5.80 (5.63)
St. Joseph	0.00 (0.00)	0.00 (0.00)	4.55 (8.89)	0.00 (0.00)	1.45 (2.88)
Washtenaw	0.00 (0.00)	0.00 (0.00)	4.55 (8.89)	0.00 (0.00)	1.45 (2.88)
Out of state	0.00 (0.00)	6.67 (12.88)	0.00 (0.00)	0.00 (0.00)	1.45 (2.88)
Anglers interviewed	24	15	22	8	69

Appendix 50-13.—Type of bait used by anglers (percent of anglers interviewed), Rogue River, Kent County (section 302), 1998. Two standard errors are given in parentheses.

Bait	May	Jun	Jul	Aug	Season
Live	25.00 (17.68)	18.75 (19.52)	0.00 (0.00)	0.00 (0.00)	12.50 (7.80)
Artificial	66.67 (19.24)	75.00 (21.65)	100.00 (0.00)	100.00 (0.00)	83.33 (8.78)
Both	8.33 (11.28)	6.25 (12.10)	0.00 (0.00)	0.00 (0.00)	4.17 (4.71)
Anglers interviewed	24	16	22	10	72

Appendix 50-14.—Species of fish sought by anglers (percent of anglers interviewed), Rogue River, Kent County (section 302), 1998. Two standard errors are given in parentheses.

Species sought	May	Jun	Jul	Aug	Season
Trout	86.96 (14.04)	73.33 (22.84)	100.00 (0.00)	100.00 (0.00)	90.00 (7.17)
Anything	13.04 (14.04)	26.67 (22.84)	0.00 (0.00)	0.00 (0.00)	10.00 (7.17)
Anglers interviewed	23	15	22	10	70

Appendix 50-15.—Number of trips per day by anglers (percent of anglers interviewed), Rogue River, Kent County (section 302), 1998. Two standard errors are given in parentheses.

Trips/day	May	Jun	Jul	Aug	Season
1	94.74 (10.29)	100.00 (0)	100.00 (0)	100.00 (0)	98.48 (3.01)
5	5.26 (10.29)	0.00 (0)	0.00 (0)	0.00 (0)	1.52 (3.01)
Anglers interviewed	19	15	22	10	66

Appendix 50-16.—Gender of anglers (percent of anglers interviewed), Rogue River, Kent County (section 302), 1998. Two standard errors are given in parentheses.

Gender	May	Jun	Jul	Aug	Season
Female	16.67 (15.22)	12.50 (16.54)	13.64 (14.63)	10.00 (18.97)	13.89 (8.15)
Male	83.33 (15.22)	87.50 (16.54)	86.36 (14.63)	90.00 (18.97)	86.11 (8.15)
Anglers interviewed	24	16	22	10	72

Appendix 50-17.—Total estimated fishing pressure, Rogue River, Kent County (section 303), 1998. Two standard errors are given in parentheses.

Effort	May	Jun	Jul	Aug	Season
Angler hours	540 (334)	596 (199)	182 (127)	187 (150)	1,506 (435)
Angler trips	476 (464)	525 (434)	160 (164)	165 (190)	1,326 (683)