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**A Roving Creel Survey of Selected Southeast Minnesota
Trout Streams - 2005**

by

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Abstract. – Thirty-three trout streams were surveyed from April 1 to September 30, 2005 throughout southeast Minnesota in a roving creel survey. Anglers were interviewed, counted, and given a post-card to return indicating total hours fished. Anglers consisted of mostly males (90.2%) using a variety of bait (37.0%), fly (35.3%), lure (20.7%), and mixed method (7.0%) gear types. Mean angler trip length was calculated as 3.77 hours with a catch rate of 1.10 trout/hour. An estimated 214,307 trout were caught in 52,687 angler trips totaling 190,859 angler-hours. Angler harvest rates were 17.3% for brown trout and 34.4% for rainbow trout. This creel will help natural resource managers meet their long-term goal to conserve, enhance, and restore self-sustaining trout populations and their habitats for anglers and the people of Minnesota.

Table of Contents

Abstract.....	2
Table of Contents.....	3
List of Tables.....	4
List of Figures.....	9
List of Appendices.....	10
Introduction.....	11
Methods.....	12
Sampling Design.....	12
Analysis.....	16
Results.....	20
Angler characteristics.....	20
Estimates of trip length, catch rate, catch, harvest, and pressure	24
Angler satisfaction and potential factors influencing satisfaction.....	27
Discussion.....	29
Angler characteristics.....	28
Estimates of trip length, catch rate, catch, harvest, and pressure	30
Angler satisfaction and potential factors influencing satisfaction.....	34
Management Implications.....	35
Acknowledgements.....	36
Literature Cited.....	37

List of Tables

<u>Table 1.</u> Stream name, route number, and corresponding regulation on trout streams in southeast Minnesota creeled from April 1 to September 30, 2005. Southeast Minnesota general trout regulation is 5 trout of any species with one over 16 inches in daily possession. Protected slot is for trout in the 12 to 16 inch range. Catch-and-release includes an artificials only gear restriction.....	42
<u>Table 2.</u> Cluster, stream, and clerk assignment on 33 trout streams in southeast Minnesota creeled from April 1 to September 30, 2005.....	43
<u>Table 3.</u> Stream, route, and length (feet) of 33 trout streams in southeast Minnesota creeled from April 1 to September 30, 2005.....	44
<u>Table 4.</u> Example calculations for Method 1 to estimate angler pressure for one replicate weekday for a group of three stream clusters (nine streams total) in southeast Minnesota in 2005.....	45
<u>Table 5.</u> Angling pressure from Vlaming and Fulton (2003), stream name, and kittle number used for analysis of creel data for 33 selected trout streams in southeast Minnesota creeled from April 1 to September 30, 2005.....	46
<u>Table 6.</u> Extrapolation probabilities for route, time, and cluster based on four methods used for catch and effort determination for creel data collected from April 1 to September 30, 2005 on 33 streams in southeast Minnesota.....	47
<u>Table 7.</u> Example calculations for Method 2 to estimate angler pressure for two replicate weekdays for routes on streams with high angler pressure in southeast Minnesota in 2005.....	48
<u>Table 8.</u> Hometown, zip code, and number of interviews taken from Minnesota resident anglers fishing selected southeast Minnesota trout streams between April 1 and September 30, 2005.....	49
<u>Table 9.</u> Hometown, zip code, and number of interviews taken from non-resident anglers fishing selected southeast Minnesota trout streams between April 1 and September 30, 2005.....	52
<u>Table 10.</u> Percent answer to the question “Why did you decide to fish here today? A) favorite stream, B) live close by, C) easy access, D) like regulation here, E) dislike regulation elsewhere, F) species present” taken from interviews of anglers fishing the Whitewater River Branches in southeast Minnesota between April 1 and September 30, 2005.....	53
<u>Table 11.</u> Percent answer by regulation to the question “Why did you decide to fish here today? A) favorite stream, B) live close by, C) easy access, D) like regulation here, E) dislike regulation elsewhere, F) species present” taken from interviews of anglers fishing 33 selected trout streams in southeast Minnesota between April 1 and September 30, 2005.....	53

<u>Table 12.</u> Percent gear use by time period based on interviews taken from resident and non-resident anglers fishing selected southeast Minnesota trout streams between April 1 and September 30, 2005.....	54
<u>Table 13.</u> Angling gear choice by age in percent from interviews of anglers fishing 33 selected trout streams in southeast Minnesota from April 1 and September 30, 2005.....	54
<u>Table 14.</u> Percent gear choice by local (those in Fillmore, Goodhue, Houston, Olmsted, Rice, Wabasha, Winona, Dodge, Freeborn, Mower, and Steele Counties), Metro (those in Dakota, Ramsey, Washington, Anoka, Scott, Carver, and Hennepin Counties), and other areas of Minnesota taken from interviews of angler fishing 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005.....	54
<u>Table 15.</u> Trip lengths (hours) for eight time periods by weekend and weekday for angler fishing 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005. Trip length on weekdays during the time period September 1-14 was a mean calculated using all weekdays in the creel survey.....	55
<u>Table 16.</u> Time period, number of interviews of anglers fishing more than one hour (n), and catch rates (per hour) resulting from information taken from anglers fishing 33 selected southeast Minnesota trout streams from April 1 and September 30, 2005.....	55
<u>Table 17.</u> Number of trout caught (percent of total) and number harvested (percent of total) on 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005.....	55
<u>Table 18.</u> Mean size caught (inches), mean size harvested, and mean size released by species resulting from information taken from interviews of anglers fishing 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005.....	56
<u>Table 19.</u> Total catch using Method 1 calculated from information taken for anglers interviewed on 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005. Clusters 1-3 represent the South Branch Root River, Canfield Creek, Forestville Creek, Camp Creek, Gribben Creek, Duschee Creek, Mill Creek, Trout Run Creek, and Torkelson Creek; Clusters 4-6 represent South Fork Root River, Wisel Creek, Riceford Creek and Sportsmen’s Pond, East Beaver Creek, West Beaver Creek, Beaver Creek, Winnebago Creek, North Fork Crooked Creek, and Bee Creek; Clusters 7-8 represent Rush Creek, Pine Creek, Big Springs Creek, Garvin Brook, Pickwick Creek, and Little Pickwick Creek; Cluster 9 represents North Branch Whitewater River, South Branch Whitewater River, and the Middle Branch Whitewater River; Clusters 10-11 represent the Whitewater River, Beaver Creek (Whitewater watershed), West Indian Creek, Hay Creek, Cold Spring Brook, and Spring Creek.....	57
<u>Table 20.</u> Total catch using Method 2 calculated from information taken for anglers interviewed on 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005. High pressure streams represent Forestville Creek, Main Beaver Creek, South Branch Whitewater River, Cold Spring Brook, East Beaver Creek, Canfield	

Creek, Middle Branch Whitewater River, Main Whitewater River, Duschee Creek, South Fork Root River, and Beaver Creek (Whitewater); Medium pressure streams represent Gribben Creek, Mill Creek, Trout Run Creek, South Branch Root River, North Branch Whitewater River, Bee Creek, West Beaver Creek, Camp Creek, Hay Creek, Torkelson Creek, and Winnebago Creek; Low pressure streams represent Wisel Creek, North Fork Crooked Creek, West Indian Creek, Rush Creek, Pine Creek, Big Springs Creek, Riceford Creek, Pickwick Creek, Garvin Brook, Little Pickwick Creek, and Spring Creek..... 57

Table 21. Total catch using Method 3 calculated from information taken for anglers interviewed on 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005. Special regulation streams (routes) are represented by South Branch Root River (route 2), Canfield Creek, Forestville Creek, Camp Creek (route 2), Gribben Creek, Trout Run Creek, South Fork Root River (route 2), Wisel Creek, East Beaver Creek, Garvin Brook (route 2), North Branch Whitewater River, Middle Branch Whitewater River, West Indian Creek, and Hay Creek; State regulation streams are represented by South Branch Root River (route 1 and 3), Camp Creek (route 1), Duschee Creek, Mill Creek, Torkelson Creek, South Fork Root River (route 1), Riceford Creek and Sportsmen’s Pond, West Beaver Creek, Main Beaver Creek, Winnebago Creek, North Fork Crooked Creek, Bee Creek, Rush Creek, Pine Creek, Big Springs Creek, Garvin Brook (route 1), Pickwick Creek, Little Pickwick Creek, South Branch Whitewater River, Main Whitewater River, Beaver Creek (Whitewater), Cold Spring Brook, and Spring Creek..... 58

Table 22. Angler pressure (hours) using Method 1 calculated from information taken for anglers interviewed on 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005. Clusters 1-3 represent the South Branch Root River, Canfield Creek, Forestville Creek, Camp Creek, Gribben Creek, Duschee Creek, Mill Creek, Trout Run Creek, and Torkelson Creek; Clusters 4-6 represent South Fork Root River, Wisel Creek, Riceford Creek and Sportsmen’s Pond, East Beaver Creek, West Beaver Creek, Beaver Creek, Winnebago Creek, North Fork Crooked Creek, and Bee Creek; Clusters 7-8 represent Rush Creek, Pine Creek, Big Springs Creek, Garvin Brook, Pickwick Creek, and Little Pickwick Creek; Cluster 9 represents North Branch Whitewater River, South Branch Whitewater River, and the Middle Branch Whitewater River; Clusters 10-11 represent the Whitewater River, Beaver Creek (Whitewater watershed), West Indian Creek, Hay Creek, Cold Spring Brook, and Spring Creek..... 58

Table 23. Number of angler trips using Method 1 calculated from information taken for anglers interviewed on 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005. Clusters 1-3 represent the South Branch Root River, Canfield Creek, Forestville Creek, Camp Creek, Gribben Creek, Duschee Creek, Mill Creek, Trout Run Creek, and Torkelson Creek; Clusters 4-6 represent South Fork Root River, Wisel Creek, Riceford Creek and Sportsmen’s Pond, East Beaver Creek, West Beaver Creek, Beaver Creek, Winnebago Creek, North Fork Crooked Creek, and Bee Creek; Clusters 7-8 represent Rush Creek, Pine Creek, Big Springs Creek, Garvin Brook, Pickwick Creek, and Little Pickwick Creek; Cluster 9 represents North Branch Whitewater River, South Branch Whitewater River, and the Middle Branch Whitewater River; Clusters 10-11 represent the Whitewater River, Beaver Creek (Whitewater watershed), West Indian Creek, Hay Creek, Cold Spring Brook, and Spring Creek..... 59

Table 24. Angler trips and angler-hours using Method 2 calculated from information taken for anglers interviewed on 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005. High pressure streams represent Forestville Creek, Main Beaver Creek, South Branch Whitewater River, Cold Spring Brook, East Beaver Creek, Canfield Creek, Middle Branch Whitewater River, Main Whitewater River, Duschee Creek, South Fork Root River, and Beaver Creek (Whitewater); Medium pressure streams represent Gribben Creek, Mill Creek, Trout Run Creek, South Branch Root River, North Branch Whitewater River, Bee Creek, West Beaver Creek, Camp Creek, Hay Creek, Torkelson Creek, and Winnebago Creek; Low pressure streams represent Wisel Creek, North Fork Crooked Creek, West Indian Creek, Rush Creek, Pine Creek, Big Springs Creek, Riceford Creek, Pickwick Creek, Garvin Brook, Little Pickwick Creek, and Spring Creek..... 59

Table 25. Angler trips and angler-hours using Method 3 calculated from information taken for anglers interviewed on 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005. Special regulation streams (routes) are represented by South Branch Root River (route 2), Canfield Creek, Forestville Creek, Camp Creek (route 2), Gribben Creek, Trout Run Creek, South Fork Root River (route 2), Wisel Creek, East Beaver Creek, Garvin Brook (route 2), North Branch Whitewater River, Middle Branch Whitewater River, West Indian Creek, and Hay Creek; State regulation streams are represented by South Branch Root River (route 1 and 3), Camp Creek (route 1), Duschee Creek, Mill Creek, Torkelson Creek, South Fork Root River (route 1), Riceford Creek and Sportsmen’s Pond, West Beaver Creek, Main Beaver Creek, Winnebago Creek, North Fork Crooked Creek, Bee Creek, Rush Creek, Pine Creek, Big Springs Creek, Garvin Brook (route 1), Pickwick Creek, Little Pickwick Creek, South Branch Whitewater River, Main Whitewater River, Beaver Creek (Whitewater), Cold Spring Brook, and Spring Creek..... 60

Table 26. Percent answer to the question, “How satisfied are you with your overall fishing experience today?” relative to gear methods used taken from interviews of anglers fishing 33 selected trout streams in southeast Minnesota between April 1 and September 30, 2005..... 61

Table 27. Percent answer to the question, “How satisfied are you with the size of the trout you caught today?” relative to gear methods used taken from interviews of anglers fishing 33 selected trout streams in southeast Minnesota between April 1 and September 30, 2005..... 61

Table 28. Percent answer to the question, “How satisfied are you with the number of the trout you caught today?” relative to gear methods used taken from interviews of anglers fishing 33 selected trout streams in southeast Minnesota between April 1 and September 30, 2005..... 61

Table 29. Stream name and number of interviews on streams with routes on a combination of regulations taken from anglers fishing selected trout streams in southeast Minnesota from April 1 to September 30, 2005..... 62

Table 30. Stream, gear type, and demographic comparisons with this creel conducted on 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005 and

other creel surveys across the United States..... 63

Table 31. Stream, catch rate, mean size harvested, release rate, and estimated pressure comparisons with this creel conducted on 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005 and other creel surveys across the United States..... 64

List of Figures

<p><u>Figure 1.</u> Clusters used in the southeast Minnesota 2005 roving trout stream creel. Clusters 1-3 represent the South Branch Root River, Canfield Creek, Forestville Creek, Camp Creek, Gribben Creek, Duschee Creek, Mill Creek, Trout Run Creek, and Torkelson Creek; Clusters 4-6 represent South Fork Root River, Wisel Creek, Riceford Creek and Sportsmen’s Pond, East Beaver Creek, West Beaver Creek, Beaver Creek, Winnebago Creek, North Fork Crooked Creek, and Bee Creek; Clusters 7-8 represent Rush Creek, Pine Creek, Big Springs Creek, Garvin Brook, Pickwick Creek, and Little Pickwick Creek; Cluster 9 represents North Branch Whitewater River, South Branch Whitewater River, and the Middle Branch Whitewater River; Clusters 10-11 represent the Whitewater River, Beaver Creek (Whitewater watershed), West Indian Creek, Hay Creek, Cold Spring Brook, and Spring Creek.....</p>	66
<p><u>Figure 2.</u> Age distribution of anglers interviewed on 33 selected trout streams in southeast Minnesota between April 1 and September 30, 2005.....</p>	67
<p><u>Figure 3.</u> Percent species sought by anglers interviewed in southeast Minnesota on 33 selected trout streams from April 1 to September 30, 2005. Number at top of column represents actual value (%)......</p>	68
<p><u>Figure 4.</u> Overall fishing experience satisfaction taken from interviews of anglers fishing 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005.....</p>	69
<p><u>Figure 5.</u> Satisfaction with the size of trout caught taken from interviews of anglers fishing 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005.....</p>	70
<p><u>Figure 6.</u> Satisfaction with the numbers of trout caught taken from interviews of anglers fishing 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005.....</p>	71
<p><u>Figure 7.</u> Percent gear use at angler age taken from interviews of anglers fishing 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005.....</p>	72
<p><u>Figure 8.</u> Mean trip length by time period taken from post-cards returned by anglers fishing 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005. Actual time period trip length (hours) is at the top of the column with “n” in parentheses following the time period on the x-axis.....</p>	73
<p><u>Figure 9.</u> Catch rate by time period taken from interviews of anglers fishing 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005. Actual catch rate (trout/hour) is at the top of the column with “n” in parentheses following the time period on the x-axis.....</p>	74
<p><u>Figure 10.</u> Length frequency of brown trout catch on state regulation streams versus length frequency of brown trout harvest on state regulation streams.....</p>	75

List of Appendices

Appendix A. – Route maps used in the southeast Minnesota 2005 roving trout stream creel.....	81
Appendix B. – Count data sheet used in the southeast Minnesota 2005 roving trout stream creel.....	121
Appendix C. – Interview data sheet used in the southeast Minnesota 2005 roving trout stream creel.....	122

Introduction

In 2003, the Minnesota Department of Natural Resources (MNDNR) produced a “Strategic Plan for Coldwater Resources Management in Southeast Minnesota” (MNDNR 2003a). This plan was to identify specific issues relative to the coldwater trout resource and provide a means to address them by providing goals and strategies. Later, the “Long Range Plan for Trout Stream Resource Management in Southeast Minnesota 2004-2009” (MNDNR 2003b) was written to guide the trout management program and to allocate staff resources and funds to manage southeast Minnesota’s coldwater resources.

This creel was designed to satisfy the objectives of one of two action items listed in one of four goals in the Long Range Plan (MNDNR 2003b). Anglers are the primary clientele of the MNDNR Section of Fisheries and Goal 3.2 in the Long Range Plan addresses the need for angler use and attitude information. Effective fisheries management strategies rely, in part, on understanding angler use and attitudes (Malvestuto 1996).

This single action item (Action Item 22) states that southeast MNDNR fisheries managers will “obtain an unbiased estimate of fishing pressure and angling success for the entire southeast trout stream resource.” This was mostly accomplished through this roving creel survey and will be explained to what detail throughout this report.

In addition, the Long Range Plan (Action Item 6, MNDNR 2003b) proposed angling regulation changes. On April 15th, 2005 several new regulations were implemented to increase angler catch rate of medium (12-16 inch) and large (16 inches and larger) brown trout (*Salmo trutta*) in southeast Minnesota streams. These regulations include a protected slot (12-16 inches), which allows the use of bait, a protected slot (12-16 inches), which allows artificials only, and an artificials-only catch-and-release regulation. Also, one stream received an artificials-only, 12-inch minimum for brook

trout (*Salvelinus fontinalis*) (possession limit of 1) and on several non-designated trout waters, a catch-and-release regulation for all trout allowing the use of bait. This new set of regulations was added to the current southeast Minnesota general regulation of five trout of any species with one over 16 inches in possession.

The specific objective of this creel was “to characterize catch, harvest, pressure, and angler satisfaction on popular trout streams in southeast Minnesota. These streams will include those with state and special regulations.” This objective was changed slightly from Action Item 22, as stated above, to focus on popular streams rather than the entire southeast trout stream resource and to provide a minimum regional estimate of pressure, catch, and harvest. It was also important to many southeast MNDNR fisheries biologists to see what we could learn from this creel to better understand the affects of regulation implementation on angler satisfaction. This limitation to “popular streams” allowed the creel to be logistically and financially possible but still provide valuable and much needed information as stated above.

This creel will allow fisheries managers to better understand angler use and attitudes following a newly implemented set of regulations. From this information, fisheries managers may be able to foresee possible conflicts and be better equipped with tools to maintain overall angler satisfaction. This creel will also help natural resource managers meet their long-term goal to conserve, enhance, and restore self-sustaining trout populations and their habitats for anglers and the people of Minnesota.

Methods

Sampling Design -

Thirty-three trout streams were selected for a roving creel survey throughout southeast Minnesota (Figure 1). Streams surveyed were selected based on management

interest, geographical distribution, angler popularity and regulation (Table 1). The 33 selected streams represented 74% of the estimated pressure (i.e. number of angler-days) in 2001 (Vlaming and Fulton 2003) and were considered to provide a good minimum estimate of regional angler pressure across most southeast Minnesota streams. Many of those selected had also been included in previous creels (i.e. Smith 1948, Schumacher 1957, Hirsch 1989, Wiechman 1990, Bushong 1996, Weiss 1999, Weiss 2000, Nelson 2002), which will allow us to examine historical patterns.

The 33 streams were grouped into 11 stream clusters of three streams each (Figure 1) to further control logistic and geographic limitations. Streams selected for a stream cluster were within a 30-minute drive from one another. Funding had been provided for four clerks and each was assigned a set of three stream clusters (nine streams) with an overlap of two clerks on Cluster 9 (Whitewater River system) (Table 2).

Specific routes were created on each stream to help clerks stay on schedule to maintain survey design integrity and allow use of known lengths of stream for pressure determination analysis. Routes were entirely on land accessible to the general public through either an MNDNR fishing easement, city property (Lanesboro), state park (Forestville State Park and Beaver Creek Valley State Park), state forest (Whitewater branches and Gribben Creek), or on streams where the property owner has historically allowed angler access (Wisel Creek, Bee Creek, Riceford Creek, Beaver Creek, and Hay Creek)(see Appendix A). Routes were also chosen based on access and ease of surveying within the allotted time to maintain design integrity. Because of this, some streams had one route where others had as many as three. Routes ranged from 1400 to 5600 feet along the stream corridor (Table 3). There were 99,400 feet of routes on special regulation streams and 120,589 feet of routes on southeast Minnesota general regulation streams totaling 41.66 miles.

Four creel clerks were hired to begin the survey on April 1, 2005, the beginning of a spring two-week catch-and-release season. The creel continued through the summer to include the regular angling season and end on September 30, 2005, the end of the fall two-week catch-and-release season. Each clerk sampled all weekend days and holidays. Six weekdays were randomly sampled in each 10-day weekday period (Monday-Friday and Monday-Friday). Each selected survey day (15 hours) was divided into two possible shifts. Those shifts included an AM shift (6am to 1:30pm) and a PM shift (1:30pm to 9pm).

We randomly selected survey locations and times from the following strata: weekend/weekdays, AM/PM shifts, stream clusters, and specific routes on individual streams where necessary. All sampling units within the strata were given an equal probability of being sampled (e.g., AM/PM time period = 0.50 probability; stream cluster = 0.33 for selecting one of three possible stream clusters/creel clerk) with examples following below.

Once the selected survey day was determined for each clerk, the shift and stream cluster surveyed was selected. One of the three stream clusters and one of the two shifts each clerk was assigned to was randomly selected for each sampling day. All combinations of shifts (AM/PM) and stream clusters (1-11) were selected randomly as pairs (with replacement) within each clerk's stream cluster assignment. Clerks were also given the order (random) by which the three streams in the selected shift/stream cluster would be surveyed on a survey day. On any specific survey day, clerks spent two hours collecting interviews and counting anglers on each selected route on each of the three streams assigned for that day.

Progressive counts and post-cards were used to determine angler pressure. Progressive counts are ideal for situations where clerks must walk the bank of a stream

and make best use of their time for interviews (Pollock et al. 1994). The count began at the beginning of the 2-hour shift for the stream and continued as the clerk walked through the route. Clerks recorded the start and end time and total anglers observed within the route. This data sheet was also used to record water temperature, air temperature, water clarity (clear, stained, muddy), water level (low, normal, high), and the weather conditions on each stream surveyed that day (see Appendix B). This data was recorded as basic creel survey information and to possibly explain angler satisfaction choices.

To estimate angler catch rates, harvest rates, and satisfaction, encountered anglers were interviewed (see Appendix C). It was also important for us to ask several questions with regards to other variables that would allow us to better understand our constituency and possibly describe angler satisfaction choices as well as affects of regulation implementation. Stream, route, date, shift (AM or PM), stream cluster (1-11), day (M, T, W, TH, F, SAT, SUN), gear used, and angler gender was recorded. Anglers were asked their zip code, age, and when they started their fishing trip that day. They were also asked how many times they fish this trout stream per year and how many times they fished other trout streams in Minnesota per year.

In addition, anglers were asked why they decided to fish this stream today. They were given a choice of six possible answers and asked to pick their primary reason; a) favorite stream, b) live close by, c) easy access, d) like regulation here, e) dislike regulation elsewhere, and f) fish species present. Harvested trout were identified to species and measured to the nearest 0.1 inch by the clerk. Most anglers estimated lengths of released fish.

When it was determined, during the interview, that anglers had been fishing more than 1 hour, a series of satisfaction questions were also asked. Those questions were:

“How satisfied or dissatisfied are you with...

Your overall fishing experience you had today?

The size of the trout you caught today?

The numbers of trout you caught today?"

Anglers were given five levels of satisfaction to choose from; very satisfied, satisfied, neither, dissatisfied, and very dissatisfied as recommended by D. Fulton (personnel communication). When the interview was completed, the clerk entered the time and recorded any comments.

Post-cards were placed on angler's vehicles for determination of completed trip length. The post-card asked whether the occupants of the vehicle were fishing and if so, how many angler's were in their party. The date, angler's zip code, and length of their fishing trip were also requested. Finally, a space was provided for clerks to indicate the stream where the post-card was left.

To better understand characteristics of trout anglers fishing southeast Minnesota streams we examined the percentage of anglers by zip code, age, gender, fish species sought, angling frequency, reasons for fishing particular streams, gear type, and length of time spent fishing.

Analysis –

Pressure, catch, and harvest data were analyzed following methods in Pollock et al. (1994). All creel computations were calculated independently for each of eight time periods representing temporal changes in angling regulations or month. Those time periods were: April 1 – April 15 (Catch-and-release), April 16 – April 30 (Harvest season begins with the newly implemented regulations in effect), May, June, July, August, September 1 – 14 (Harvest season ends), and September 15 – 30 (Catch-and-release). Analysis was always calculated using weekend and weekday as strata.

The data were analyzed with three different methods to help check assumptions of each method. Grouping of data in this manner will facilitate potential management application. We describe each method and then provide an example calculation as suggested by Hoenig et al. 1993.

Method 1 used stream clusters as was used in the data collecting design above. For example, Clerk 1 was responsible for sampling stream clusters 1, 2, and 3 (Table 2). The first replicate weekday selected was Monday April 4, 2005. Then stream cluster 3 and the morning shift were selected. Stream cluster 3 included three streams: Torkelson Creel (with only one route), Trout Run Creek (with three routes), and Mill Creek (with two routes). Routes were given equal probabilities within streams and randomly selected.

The creel clerk then surveyed each stream and route and counted the number of anglers seen in the two hours he/she walked each stream (Table 4). The number of anglers counted on each stream in the two-hours he/she walked the route was first extrapolated to the total numbers of anglers on that route for the entire 15 hour day.

For Trout Run Creek, where 1 angler was seen in the 2 hours, we divided the number of anglers seen (i.e., 1) by the probability of sampling 2 hours out of the 15 possible hours ($\frac{2}{15} = 0.133$). Thus, $\frac{1}{0.133} = 7.5$ anglers estimated to be fishing route 2 of Trout Run Creek for the entire 15-hour day (Table 4). We then extrapolated by the route probability (one of three possible routes, $\frac{1}{3} = 0.33$) so $\frac{7.5}{0.33} = 22.7$ anglers fishing all three routes on Trout Run Creek for the entire 15-hour day.

After repeating this for Torkelson and Mill creeks and summing these values we have an estimate of the number of anglers fishing all the routes on all three streams in stream cluster 3 (Table 2) for an entire 15-hour day. We then divided this value by the probability of selecting this stream cluster out of the three possible stream clusters Clerk

1 was responsible for (i.e., 1 stream cluster / 3 possible stream clusters = 0.33)(Table 4).

This value equals one replicate weekday.

Similar calculations were completed for other replicate weekdays and weekend days and means were calculated from these replicates with subsequent calculations following Pollock et al. (1994). We treated each clerk as conducting his/her own creel survey on a group of nine streams grouped into three stream clusters with three streams in each (Table 2).

Method 2 grouped streams by three levels of angler effort (high, medium, low) previously published in Vlaming and Fulton (2003) (Table 5). This was done to help minimize potential differences in angler effort among our logistically selected stream clusters. As such, stream cluster probabilities were not considered in these calculations (Table 6).

Estimates of angler pressure for each replicate day were calculated only from extrapolation probabilities for time (i.e., 2 hrs walked per route / 15 total hours in the angling day = 0.133) and routes grouped within high, medium, and low angler effort streams (Table 7). For example, April 4, 2005 was a randomly selected weekday for one creel clerk to survey anglers on streams in Stream Cluster 9 (Main Branch Whitewater River, Beaver Creek in the Whitewater River system, and West Indian Creek). Two of these three streams, Main Whitewater and Beaver Creek, were considered high angler effort. Therefore, the reaches sampled on this day represented all high effort stream routes surveyed in this study.

No other high effort streams were selected to be surveyed on this day, so these two routes represented this one weekday replicate for high effort routes. The clerk counted one angler on Beaver Creek and no anglers on Main Whitewater River. These numbers were first extrapolated from the 2-hrs sampled up to the 15 hours in the day,

$\frac{1}{0.133} = 7.5$ and $\frac{0}{0.133} = 0$, respectively. Then these values were extrapolated to represent all high effort routes. There were 22 high effort routes so extrapolation probabilities for each route were $\frac{1}{22} = 0.0455$.

The estimate for all high pressure routes from Beaver Creek would be $\frac{7.5}{0.0455} = 164.8$ and for Main Whitewater River, $\frac{0}{0.0455} = 0$. We then took a mean of these two estimates $\left(\frac{(164.8 + 0)}{2} = 82.4\right)$ to determine the value for the one replicate weekday of April 4. Because the number of high pressure routes sampled on any given day was dependent on random selection of streams from the initial stream cluster design, the number of routes used to generate an estimate for each replicate day varied (see Table 7 for an example of different numbers of routes sampled on different days).

Method 3 grouped streams and routes in the creel by regulation type (catch-and-release – artificials only, protected slot 12-16 inches – bait allowed, protected slot 12-16 inches – artificials only, and the current southeast Minnesota general trout regulation). Angler pressure, catch, and harvest estimates were calculated for each of the eight time periods and for weekday and weekends from replicate days within each stratum. All estimates were then added together to provide overall estimates.

Completed trip lengths were calculated from the post-card returns for each of the eight time periods independently. A mean for each time period from all returned post-cards was used to calculate angler pressure. Standard errors were calculated for each time period. Only one post-card was returned for the first two weeks of September for weekdays and rather than use that single trip length we used a mean of all weekday returns throughout the year for that time period. Standard error for that time period was calculated using all weekday returns as above.

The percentage of anglers that rated their fishing experience as either very satisfied, satisfied, neither, dissatisfied, or very dissatisfied was tabulated and examined for differences in angler gender, gear use, age, and angling regulation type. We also examined how satisfied anglers were with their overall fishing experience and number and size of fish caught.

Results

Between April 1st and September 30th, four creel clerks interviewed 747 and counted 899 anglers on 33 selected trout streams in southeast Minnesota. This required 5.2 hours of clerk effort to obtain each interview. Three anglers refused interviews, one on Pickwick Creek and two on Wisel Creek. Two anglers on Canfield Creek declined zip code and age information. Questions pertaining to angler satisfaction were obtained from 456 interviews.

Angler characteristics –

Anglers came from across Minnesota and the Midwest to fish southeast Minnesota trout streams (Table 8 and Table 9). Minnesota residents consisted of 90.6% of anglers interviewed, while Wisconsin and Iowa residents consisted of 3.9 and 0.9% of anglers, respectively. About 40% of anglers traveled 50 miles or less to fish, while about 20% drove between 50 and 100 miles.

“Local” anglers were defined as those living in the eleven counties in our management area (Fillmore, Goodhue, Houston, Olmsted, Rice, Wabasha, Winona, Dodge, Freeborn, Mower, and Steele) and were 52.3% of anglers interviewed. “Metro” anglers were defined as those living in the seven counties surrounding Minneapolis/St.

Paul (Dakota, Ramsey, Washington, Anoka, Scott, Carver, and Hennepin). Those anglers consisted of approximately 31.1% of anglers interviewed.

Most anglers interviewed (75.9%) were between 20 and 59 years old (Figure 2). Mean and median ages were 38.8 and 39 years old, respectively. Anglers less than 16 years old consisted of 7.4% of those interviewed while 3.1% were anglers 70 years old or older. Most anglers interviewed were males (90.2%).

Brown trout were the most sought after species in the creel, as 38.9% of anglers indicated (Figure 3), and were available to anglers in all routes. Most anglers (39.5%) however were angling for any trout species. Rainbow trout (*Oncorhynchus mykiss*) were sought exclusively (relative to other trout species) by 7.3% of those interviewed and in combination with brown trout by 10.7% of those interviewed. Rainbow trout were available in 41.3% of routes. Brook trout were sought exclusively by 0.8% of anglers interviewed and in combination with brown trout by 2.7% of anglers interviewed. Brook trout were available in 20.6% of routes.

Anglers estimated they fish a mean of 6.6 times (median = 2, mode = 1) on their interviewed stream each year. Anglers also indicated that they fish other trout streams in Minnesota a mean of 14.7 times (median = 5.5, mode = 0).

Anglers fished the stream they were interviewed on for a variety of reasons. “Easy access” was the most frequent reply (29.8%) followed by “favorite stream” (28.1%) and “live close by” (20.7%). “Species present” was the primary reason for 13.7% of those interviewed followed by “like the regulation” (6.4%) and “dislike the regulation elsewhere” (1.4%).

Of the 156 interviews conducted on the three Whitewater branches (North, Middle, and South), anglers reported they were fishing their “favorite stream” on the South Branch Whitewater in 41.8% of 67 interviews conducted on that stream (Table 10).

Results from the North Branch Whitewater indicated that this was also the reason the majority of anglers were there (40.0%). Anglers fishing the Middle Branch Whitewater indicated that “easy access” was the primary reason they decided to fish that stream (33.0%). It is also important to note that more anglers (15.4%) on the Middle Branch indicated that they were there because they liked the regulation (Catch-and-release) than on the North Branch (6.0%, Protected Slot - artificials only) or the South Branch (3.0%, State regulations).

When streams were grouped by regulation, anglers fishing state regulation streams indicated that they were primarily there because it was their “favorite stream” (32.1%)(Table 11). Those anglers fishing “Protected slot (12-16”) bait allowed” streams indicated that they were there more often (42.2%) because of easy access. This was also the case with those anglers fishing catch-and-release regulation streams (38.4% indicated “easy access”). Anglers on streams with a “Protected slot (12-16”) artificials only” regulation were there primarily because they lived close by (32.7%).

Bait anglers consisted of 37.0% of all anglers interviewed. Fly and lure anglers were 35.3 and 20.7% of all anglers interviewed, respectively. Mixed method anglers (bait/fly, bait/lure, and lure/fly) were 7.0% of all anglers.

When gear type use was examined by time period, it became apparent that certain gear types dominated within specific time periods. During the first 2 weeks of the season (catch-and-release), fly anglers comprised the majority (62.1%) of anglers interviewed (n = 58)(Table 12). Bait (19.0%), lure (13.8%), and mixed method (5.2%) were also represented in this time period.

When the traditional harvest season opened (April 16th) the dominant gear type changed to bait angling (48.1%, n = 258). Bait angling remained the dominant gear choice in May (46.9%, n = 130) with a change back to fly angling in June (43.7%, n =

71). July was again dominated by fly angling (40.0%) but lure angling also was a common gear type (39.0%, n = 82). Fly angling was the most common gear type for the remainder of the harvest season (August 41.2%, n = 80 and September 1-14, 39.5%, n = 43) though bait angling was also popular in August (35.0%) and the first two weeks of September (30.2%). Fly angling strongly dominated the methods (76.5%) used during the late catch-and-release season (September 15-30, n = 17) while mixed method angling decreased to 0.0%.

Those anglers less than 16 years old used bait angling techniques more than any other method (67.9%)(Table 13 and Figure 4). Bait angling dominated the gear type used through age 39 though less so as age increased. Fly angling then became the most common choice of gear in the 40-49 year old category (42.4%) and remained that way through the age category of 50-59 (50.4%) and 60-69 years old (56.9%). Bait angling, once again, became the most common technique with those over 70 years old. Only three anglers were interviewed that were 80 years old or older and all were bait angling.

Lure angling was most common with those in the 16-19, 20-29 and 30-39 year old category (26.5, 28.5 and 29.3 % within those age groups, respectively) relative to other age groups. Lure angling was never a dominant gear type choice with any age group. Mixed method angling was most common with those in the 20-29 (10.9%) and 40-49 (9.0%) year-old category and was never a dominant angling technique.

Local anglers were primarily composed of bait anglers (43.3%)(Table 14) with a smaller percentage (23.0%) fly angling. Fly anglers represented the majority (46.0%) of anglers from the Metro area with a smaller percentage (33.6%) bait angling. Anglers from other areas of Minnesota mostly used bait (39.2%) and fly (33.3%) angling techniques.

Estimates of trip length, catch rate, catch, harvest, and pressure –

One hundred post-cards were returned resulting in a 46% return rate. Because more than one angler responded on each post-card, 149 angler trip lengths were recorded. The last two weeks of April had the most post-card returns (37). Turkey hunters returned several post-cards in this time period.

Mean trip length was 3.77 hours during this creel survey (Figure 5). The longest mean trip length (5.39 hours, $n = 10$) was during the last two weeks of September. The shortest mean trip length (2.78 hours, $n = 31$) was during August.

The mean weekend trip length was 3.27 hours ($n = 90$, $SE = 1.66$)(Table 15). Mean weekday trip length was 4.26 hours ($n = 59$, $SE = 2.92$). The longest mean trip length for the creel came from weekdays during the last two weeks of September (7.33 hours, $n = 6$, $SE = 2.86$). The shortest mean trip length was on weekends in July (2.13 hours, $n = 4$, $SE = 1.39$).

Catch rates varied greatly throughout the season. The highest catch rate of the eight time periods was during August when the catch rate was 2.12 trout/hour ($n = 48$, $SE = 1.76$)(Table 16 and Figure 6) though the last two weeks of April was also high at 2.09 trout/hour ($n = 191$, $SE = 3.03$). The lowest catch rate was during the first two weeks of September when the catch rate was 0.25 trout/hour ($n = 25$, $SE = 0.52$). The overall catch rate for the creel through the eight time periods was 1.10 trout/hour ($n = 445$, $SE = 1.65$).

Brown trout were the most common species caught representing 72.2% of the total catch (Table 17) while rainbow trout represented 26.1% of the total catch. Brown trout harvest rate was 17.3% and rainbow trout harvest rate was 34.4%. Brook trout were caught in the creel but none were harvested.

Mean catch size for brown trout was 9.6 inches while rainbow trout mean catch size was 10.3 inches (Table 18). Brook trout mean catch size was 8.2 inches. The largest trout caught in the creel was a 20" brown trout caught on Bee Creek.

Twelve white suckers (*Catostomus commersoni*), one creek chub (*Semotilus atromaculatus*), one common carp (*Cyprinus carpio*), and one smallmouth bass (*Micropterus dolomieu*) were also caught in the creel survey. Seven of the white suckers were harvested. All other species were released.

The estimated total trout catch using stream clusters (i.e. Method 1) was 214,307 trout (SE = 29,070) (Table 19). Total weekday catch was 163,187 trout and total weekend catch was 51,120 trout. The highest estimated catch for a time period was on the weekdays in the first two weeks of April (49,572 trout). The lowest estimated catch for an individual time period was in the last two weeks of September on the weekends (912 trout).

The estimated total trout catch for streams grouped by angler pressure (i.e. Method 2 – Vlaming/Fulton effort estimates) was smaller at 132,118 trout (Table 20). Estimated number of trout caught was lower in high effort streams (41,216 trout) than in medium effort streams (66,702 trout). The estimated total trout catch was 82,167 for weekends and 49,951 for weekdays.

Streams grouped by regulation (i.e. Method 3) resulted in a total catch estimate of 34,183 trout. An estimated 13,963 trout were caught on special regulation streams and 20,219 on southeast Minnesota general regulation streams (Table 21). It should be noted that there were less special regulation routes than southeast Minnesota general regulation routes, which makes comparisons difficult. The total trout catch was estimated to be 20,826 on weekends and 13,357 for weekdays.

Using Method 1 (grouping by stream clusters), angling pressure was estimated as 190,859 angler-hours (Table 22). Pressure estimates were lowest in early September at 8,977 angler-hours. Pressure estimates were highest in May at 44,631 angler-hours. As the fishing season progressed through the first three time periods (April 1-15, April 16-30, and May) angler pressure increased. By June, angler pressure dropped to less than half of the previous month's total (15,402 angler-hours).

Total angler trips for all clusters was 52,687 using Method 1 (Table 23). The least number of angling trips was during the final two weeks of the season (1,669 angler trips). Anglers took the most trips in May (11,334 angler trips). Again, angler trips increased as the season progressed through the first three time periods (April 1-15, April 16-30, and May). By June, the number of angler trips dropped to almost half of the previous month's total and remained relatively constant through August.

Angling pressure, using Method 2, was estimated as 142,140 angler-hours (Table 24). The high effort stream total estimate was 51,024 angler-hours and was considerably lower than the 66,191 total angler-hours estimated on medium effort streams. When low effort streams in all time periods was summed, the total angler-hours was estimated as 24,925 angler-hours.

For high effort streams, angler-hours were the lowest in June (2,151 hours) yet for medium streams angler-hours were the lowest in the first two weeks of September (3,441 hours) and on low effort streams, the first two weeks of April (0 hours). The highest amount of angler-hours within the high effort category streams was within the April 16-30 time period. This was also the case for streams in the medium effort and low effort category. However, angler-hours for medium effort streams for the first two weeks of April (10,899 hours) were almost twice as high as those same weeks for high effort streams (5,779 hours).

When angler trips were calculated using Method 2, high effort streams had the most trips the last two weeks of April (3,018 trips) and the least number of trips the last two weeks of September (397 trips)(Table 24). Medium effort streams had the most trips during May (3,978 trips) and the least number of trips the last two weeks of September (495 trips). Like high effort streams, low effort streams had the most estimated angler trips the last two weeks of April (2,481 trips). But unlike any of the other strata, low effort streams had the least number of angler trips during the first two weeks of April (no trips).

Method 3 (grouped by regulation) resulted in the highest total pressure estimates compared to other methods (Table 25). Total angler-hours resulted in an estimate of 192,664 angler-hours. Streams in the special regulation grouping had an estimate of 57,370 angler-hours while streams in the southeast Minnesota general regulation group had an estimated 135,294 angler-hours.

Angler-hours were the highest on special regulation streams in May (13,553 angler-hours) and the lowest the first two weeks of September (3,481 angler-hours). The highest amount of angler-hours on southeast Minnesota general regulation streams was during the last two weeks of April (32,710 angler-hours). June had the least amount of estimated angler-hours (1,173 angler-hours) on southeast Minnesota general regulation streams.

Angler satisfaction and potential factors influencing satisfaction -

When anglers were asked how satisfied they were with their overall fishing experience most indicated they were “satisfied” or “very satisfied” (Table 26)(Figure 7). Mixed method anglers had the highest percentage of interviews (38.7%) in the “very

satisfied” category and bait anglers had the lowest percentage of interviews (17.3%) in the “very satisfied” category.

Interviews from bait and fly anglers indicated that 3.5 and 1.9% were “very dissatisfied”, respectively. Lure and mixed method anglers never reported being “very dissatisfied” with their overall fishing experience though mixed method anglers had the highest levels of dissatisfaction (12.9%) relative to the other gear types.

Asking anglers how satisfied they were with the size of their catch also resulted in a high percentage of satisfied anglers (Table 27)(Figure 8). Lure anglers were most satisfied among gear types with 14.4% responding “very satisfied” and 51.5% responding “satisfied”. Mixed method anglers had the smallest percent response in the “very satisfied” (6.7%) and “satisfied” (43.3%) categories yet responded “neither” to this question more frequently than other gear types (36.7%).

Fly anglers were 10.5% “very satisfied” with the size of their catch. Bait anglers were 7.5% “very satisfied” with the size of their catch. Again, a large percentage of anglers using these two gear types responded “neither” (Fly 27.6%, Bait 20.2%), meaning they were neither satisfied nor dissatisfied with the size of their catch. No mixed method anglers were “very dissatisfied” with the size of their catch.

The final question asked to anglers was how satisfied they were with the numbers of trout they caught that day. Again, lure anglers were most “very satisfied” (14.4%) and “satisfied” (46.4%) with the numbers of trout caught (Table 28)(Figure 9). Bait anglers were the least “very satisfied” (8.1%) relative to other gear types. Again, a large portion of anglers using all gear types was neither satisfied nor dissatisfied with the numbers of trout they caught. Fly anglers responded “neither” to this question most frequently (27.6%). Bait anglers used this answer the least (17.3%).

More bait anglers (5.2%) responded “very dissatisfied” than any of the other gear types. Lure anglers used the response “dissatisfied” (14.4%) and “very dissatisfied” (1.0%) the least. Mixed method anglers were the most dissatisfied when “dissatisfied” (26.7%) and “very dissatisfied” (3.3%) were combined.

Nine anglers were interviewed that failed to adhere to the regulations on the stream they were fishing. Three bait anglers were interviewed on the Middle Branch Whitewater River (catch-and-release - artificials only) that kept rainbow trout and violated the gear restriction. Two were from the Metro area but one was a local angler. Four anglers on the North Branch Whitewater River (12-16 inch protected slot – artificials only) harvested trout in the protected slot. Two of those anglers were using bait, one was using lures and one was flyfishing. The lure angler was local but the others were from the Metro Area. Two young bait anglers in violation were interviewed on Riceford Sportsmen’s Pond. Both had rainbows that they kept out of season on September 18th, 2005.

Discussion

Angler characteristics -

The southeast Minnesota trout resource is primarily used by resident anglers and is not a primary travel destination for non-resident trout anglers (Table 30). Several groups from Nebraska, Missouri, and the Chicago area do take annual trips to this area. To increase trout stamp revenue and fishing license sales it may be appropriate to market our trout stream resource to a national audience.

Age and gender of southeast Minnesota trout anglers were similar to the general angling public and to other salmonid fisheries across North America (Table 30). We do not appear to have a unique angling group fishing southeast Minnesota trout streams.

Mean age of anglers purchasing trout stamps in Minnesota has increased slightly in the past 5 years from a mean age of 38.4 years old in 2000 to a mean age of 39.6 years old in 2005 (MNDNR files).

Effects of regulation change did not seem to be a primary reason for anglers fishing where they were interviewed as only 6.4 and 1.4% answered with “like the regulation” and “dislike the regulation elsewhere” respectively. Clerks did report anglers that were very happy and unhappy with regulation changes.

Fishing easement acquisition remains an important part of our fisheries management program. Most anglers felt that “easy access” was their primary reason for fishing the stream they were interviewed on. Stream easement guides, easement signs and stiles are also an important part of this program. Reasons why anglers fished where they were interviewed were partially a function of the location of the route. Most routes were on easements, which would only emphasize the use of the answer “easy access” as being an important reason why anglers were where they were.

Trout anglers fishing southeast Minnesota streams used a variety of techniques that are similar in other salmonid fisheries across the United States (Table 30). Southeast Minnesota has a distribution of 37.0% bait anglers, 35.3% fly anglers, 20.7% lure anglers, and 7.0% mixed method anglers. In the past, the number of bait anglers was slightly higher and anglers using fly fishing gear were lower in southeast Minnesota. Western trout streams seem to be dominated by fly anglers with very few anglers using bait-fishing techniques.

Estimates of trip length, catch rate, catch, harvest, and pressure –

Catch rates for salmonids fisheries vary across the United States (Table 31). Overall catch rate for trout in southeast Minnesota have been consistently at or above

1.00 trout/hour through the 90's and into this decade. These rates represent some of the best throughout the United States. Western trout streams have had overall catch rates that are less than that recorded in several Midwest creel surveys.

Catch rate changes through the angling season partially reflect our rainbow trout stocking program. The MNDNR currently stocks about 55,000 catchable sized rainbow trout in southeast Minnesota with about 35,600 of those to streams in this creel. The large increase in catch rates during August (Table 16) may be attributed to a combination of fly anglers remaining a dominant gear type and the abundance of terrestrial foods (grasshoppers and crickets) that are available and eaten by trout (Sotiropoulos et al. 2006) and the ease at which fly anglers can imitate these foods.

Mean brown trout harvest size has been similar in southeast Minnesota for some time (Table 31). On the Straight River, Minnesota, mean brown trout harvest size was considerably larger (14.0") than in the southeast (10.7") (Evarts and Sewell 2002). Limited access and angler knowledge of the presence of large trout may contribute to the release of smaller trout on the Straight River (Edie Evarts, MNDNR Assistant Fisheries Supervisor, personnel communication). Rainbow trout mean harvest size has not changed in southeast Minnesota but is attributable to hatchery and stocking practices.

When examining catch and harvest of brown trout on state regulation streams it is evident that certain length classes encumber a greater portion of the harvest relative to the catch than others (Figure 10). Those brown trout harvested ranged from the 7-inch group to the 15-inch group. However, percent harvest was most intense on the 10- and 11-inch length groups relative to their catch.

Release rates can be quite different across fisheries (Table 31). On western trout streams, release rates are much higher (~94 to 98%) than on streams in the Midwest (~20 to 83%). Release rates have increased dramatically on trout streams in Minnesota from

68% in the 1950's (Schumacher 1954) to ~83% in this creel. This was also observed in Michigan where anglers released approximately 40% of their catch, but by 1990 the release rate had increased to 80-90% (Clark and Alexander 1992).

Differences in reported units for angler pressure make it difficult to compare stream creels with lake creels. Pressure estimates for streams should be presented in angler-hours versus angler days or angler-hours per acre to compensate for the disparity between the different types of water present in streams and lakes. Lakes are typically fished in a few locations such as points or bars. Streams are typically fished along the entire length from bank to bank. This accentuates any pressure estimate reported in area units.

As an example, Lake Pepin angler pressure was reported as 16.9 hours/acre in 1999-2000 and 11.3 hours/acre in 2000-2001 (Hoxmeier 2002). A Mille Lacs creel survey reported slightly less pressure at 8.4 hours/acre in 2005 (Jones 2006). Angler pressure in southeast Minnesota, if calculated using similar methods, would result in 1,609 angler-hours/acre. This calculation uses the 118 acres of routes on the 33 selected streams with the estimated 190,859 angler-hours of pressure from this creel. Therefore one must not compare stream angler pressure to lake angler pressure in this manner.

Because several previous southeast Minnesota creels reported angler pressure in this manner those values have been listed in Table 31. Weiss (1999; 2000) and Bushong (1996) used larger stream section acreages to calculate their reported angler pressures while our estimate of 1,609 angler-hours/acre used strictly route acreage.

Because we used equal probabilities within strata, Method 1 (i.e. by stream cluster) assumed that all stream clusters and routes were similar. However, there may have been differences among routes, such as angler effort, especially where different routes on the same stream had different angling regulations. Also, not all stream clusters

contained streams of similar size. This prompted us to consider an alternative method of calculating statistics to determine if the estimates were similar between two methods.

Method 2 (Vlaming/Fulton angler effort estimates) assumed that all high effort routes (or alternatively, medium and low effort routes) were similar. It also resulted in unequal samples of routes within replicate days because routes were selected based on the stream cluster design presented initially for logistical reasons. However, this method still failed to estimate statistics for stream routes grouped by angling regulation.

Angling pressure (using Method 3 – by regulation) per length of stream on special regulation streams was significantly lower than the amount of pressure on state regulation streams. Special regulation streams experienced approximately 0.58 angler-hours/foot of route. State regulation streams, however, experienced approximately 1.12 angler-hours/foot of route.

Relative to other fisheries, the amount of angler-hours estimated on streams in southeast Minnesota is low. On an 11.5-mile reach of the Waupaca River in Wisconsin, Avery et al. (2001) reported 11,032 angler-hours in 1995 through the angling season (first Saturday of May to September 30). Information from a preliminary report from the reopening of Upper Red Lake to walleye angling reported approximately 81,000 angler-hours from the May 13th opener to May 31st (Gary Barnard, MNDNR Fisheries Supervisor, personal communication). Our estimate of 190,859 angler-hours (Method 1) reflects pressure on 33 trout streams in southeast Minnesota.

On Rock Creek, Montana, Peters and Robison (1997) reported $12,241 \pm 381$ (95% CI) angler days of pressure from April 1 to November 30, 1997. Our estimate of 52,687 angler trips (Method 1) is comparable and reflects the low amount of pressure on our streams especially when this creel included some of the more popular trout streams.

Angler satisfaction and potential factors influencing satisfaction -

A major goal of fisheries management is to optimize human benefits or user satisfaction (Pollock et al. 1994). Anglers seek a number of benefits from a fishing experience and overall satisfaction of anglers in this creel was high (Table 26). However, a rather large percentage of anglers in our creel answered the satisfaction questions with “neither”, meaning they were neither satisfied or dissatisfied. As fisheries managers we would like to see the majority of anglers very satisfied with their experience, which we have, but with those answering “neither” we are not quite achieving that goal.

What specifically made anglers dissatisfied was not completely understood and is always difficult to determine. Anglers could be dissatisfied because they did not catch and harvest their limit on streams where harvest is allowed. Cook et al. (2001) presented evidence that fisheries with high creel limits may cause anglers to have unrealistic expectations and therefore a goal should be to select creel limits that are more attainable by more anglers. They stated that dissatisfied anglers were due, in part, to the inability of some to successfully meet fishing expectations.

Bait anglers kept a higher percentage of their catch on average (42.8%) than other anglers using flies (5.2%), lures (18.4%) or mixed method techniques (24.6%). Anglers using bait were also the least “very satisfied” and “satisfied” and the most “very dissatisfied” with their overall fishing experience (Table 26). This group of anglers was also the most “dissatisfied” and “very dissatisfied” with the numbers of trout they caught (Table 28).

Management Implications -

Another creel survey conducted soon would help refine information collected in this creel and would likely result in more precise estimates of pressure, catch, and harvest. Focusing on fewer streams, with an equivalent diversity of regulations and opportunities, could reduce standard errors within strata and improve findings. Using unequal time probabilities determined from this creel (ex. using 0.75 to represent the time probability for the AM shift and 0.25 for the PM shift) could also strengthen our standard error estimates making more precise our estimates of pressure, catch, and harvest. Fisheries managers would be able to access temporal changes in angler satisfaction and determine why specifically anglers were satisfied or dissatisfied. Creel statistics could also be monitored and compared temporally.

Despite implementation of a new set of regulations, many of which were strongly opposed, southeast Minnesota still maintains a satisfied angling clientele. However, the reason why so many anglers chose “neither” as an answer to some satisfaction questions may indicate a partial disconnect from the current angling atmosphere. It will be most important to monitor this condition and for fisheries managers to be proactive in helping anglers understand the social and biological implications of specific fisheries management techniques. Maintaining angler satisfaction with a diverse array of opportunities should provide for a higher level of satisfaction.

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Table 1. Stream name, route number, and corresponding regulation on trout streams in southeast Minnesota creel from April 1 to September 30, 2005. Southeast Minnesota general trout regulation is 5 trout of any species with one over 16 inches in daily possession. Protected slot is for trout in the 12 to 16 inch range. Catch-and-release includes an artificials only gear restriction.

Stream	Route	Regulation
South Branch Root River	1, 3	State
	2	Protected Slot – Bait allowed
Canfield Creek	1	Protected Slot – Artificials only
Forestville Creek	1, 2	Protected Slot – Bait allowed
Camp Creek	1	State
	2	Catch-and-release
Gribben Creek	1, 2	Protected Slot – Artificials only
Duschee Creek	1, 2, 3	State
Mill Creek	1, 2	State
Trout Run Creek (Root River)	1, 2, 3	Protected Slot – Artificials only
Torkelson Creek	1	State
South Fork Root River	1	State
	2	Catch-and-release
Wisel Creek	1, 2	Protected Slot – Bait allowed
Riceford Creek/Sportsmen's Pond	1	State
East Beaver Creek	1, 2	Protected Slot – Bait allowed
West Beaver Creek	1	State
Beaver Creek	1, 2	State
Winnebago Creek	1, 2	State
North Fork Crooked Creek	1	State
Bee Creek	1, 2	State
Rush Creek	1, 2	State
Pine Creek	1	State
Big Springs Creek	1	State
Garvin Brook	1	State
	2	Protected Slot – Artificials only
Pickwick Creek	1, 2	State
Little Pickwick Creek	1, 2	State
North Branch Whitewater River	1, 2	Protected Slot – Artificials only
South Branch Whitewater River	1, 2	State
Middle Branch Whitewater River	1, 2, 3	Catch-and-release
Whitewater River	1, 2	State
Beaver Creek (Whitewater)	1, 2	State
West Indian Creek	1, 2	Protected Slot – Bait allowed
Hay Creek	1, 2, 3	Protected Slot – Artificials only
Cold Spring Brook	1	State
Spring Creek	1, 2	State

Table 2. Cluster, stream, and clerk assignment on 33 trout streams in southeast Minnesota creeled from April 1 to September 30, 2005.

Cluster	Stream	Clerk assignment
1	South Branch Root River Canfield Creek Forestville Creek	1
2	Camp Creek Gribben Creek Duschee Creek	1
3	Mill Creek Trout Run Creek Torkelson Creek	1
4	South Fork Root River Wisel Creek Riceford Creek and Sportsmen's Pond	2
5	East Beaver Creek West Beaver Creek Beaver Creek	2
6	Winnebago Creek North Fork Crooked Creek Bee Creek	2
7	Rush Creek Pine Creek Big Springs Creek	3
8	Garvin Brook Pickwick Creek Little Pickwick Creek	3
9	North Branch Whitewater River South Branch Whitewater River Middle Branch Whitewater River	3 & 4
10	Whitewater River Beaver Creek (Whitewater watershed) West Indian Creek	4
11	Hay Creek Cold Spring Brook Spring Creek	4

Table 3. Stream, route, and length (feet) of 33 trout streams in southeast Minnesota creel from April 1 to September 30, 2005.

Stream	Route	Length (feet)
South Branch Root River	1	2065
	2	4800
	3	4400
Canfield Creek	1	3000
Forestville Creek	1	3000
	2	3000
Camp Creek	1	4224
	2	4300
Gribben Creek	1	3000
	2	4000
Duschee Creek	1	5000
	2	5600
	3	3300
Mill Creek	1	3800
	2	3500
Trout Run Creek	1	5000
	2	4000
	3	4000
Torkelson Creek	1	4000
South Fork Root River	1	4000
	2	3000
Wisel Creek	1	3000
	2	4000
Riceford Creek and Sportsmen's Pond	1	2100
East Beaver Creek	1	3000
	2	3000
West Beaver Creek	1	4000
Beaver Creek	1	2000
	2	2000
Winnebago Creek	1	4000
	2	4000
North Fork Crooked Creek	1	4000
Bee Creek	1	2000
	2	2000
Rush Creek	1	4100
	2	3000
Pine Creek	1	4000
Big Springs Creek	1	4300
Garvin Brook	1	2000
	2	4000
Pickwick Creek	1	2000
	2	4000
Little Pickwick Creek	1	3500
	2	2500
North Branch Whitewater River	1	4000
	2	3000
South Branch Whitewater River	1	3000
	2	3500
Middle Branch Whitewater River	1	4600
	2	4000
	3	4000
Whitewater River	1	4000
	2	4000
Beaver Creek (Whitewater watershed)	1	3000
	2	3000
West Indian Creek	1	3000
	2	4000
Hay Creek	1	4000
	2	4000
	3	4700
Cold Spring Brook	1	4000
Spring Creek	1	1400
	2	2100

Table 4. Example calculations for Method 1 to estimate angler pressure for one replicate weekday for a group of three stream clusters (nine streams total) in southeast Minnesota in 2005.

Date	Cluster (probability)	Stream	Route (probability)	Anglers counted	Time probability	Estimated anglers for 15hrs	Estimated anglers – all routes
April 4 th	Rt. 3 of 3 (0.33)	Torkelson Creek	Rt. 1 of 1 (1.00)	0	0.133	$0/0.133 = 0$	$0/1.00 = 0$
		Trout Run Creek	Rt. 2 of 3 (0.33)	1	0.133	$1/0.133 = 7.5$	$7.5/0.33 = 22.7$
		Mill Creek	Rt. 2 of 2 (0.50)	0	0.133	$0/0.133 = 0$	$0/0.50 = 0$
Total number of anglers fishing for 15 hrs on April 4 th on all routes on these three streams							$0 + 22.7 + 0 = 22.7$
Total number of anglers fishing 15 hrs on all streams in all three clusters							$22.7/0.33 = 68.8$

Table 5. Angling pressure from Vlaming and Fulton (2003), stream name, and kittle number used for analysis of creel data for 33 selected trout streams in southeast Minnesota creeled from April 1 to September 30, 2005.

Pressure	Stream	Kittle Number	Vlaming/Fulton angler days/mile
High	Forestville Creek	M-009-025-009	3181.56
	Beaver Creek, Main	M-009-010-003	2965.71
	South Branch Whitewater River	M-031-017	2902.77
	Cold Spring Brook	M-034-048	2842.32
	East Beaver Creek	M-009-010-003-008	2312.61
	Canfield Creek	M-009-025-010	2269.87
	Middle Branch Whitewater River	M-031-019	1983.10
	Whitewater, Main	M-031	1958.47
	Duschee Creek	M-009-025-001	1740.51
	South Fork Root River	M-009-010	1626.02
Medium	Beaver Creek (Whitewater)	M-031-006	1561.79
	Gribben Creek	M-009-024	1545.84
	Mill Creek	M-009-034	1483.21
	Trout Run Creek	M-009-029	1460.10
	South Branch Root River	M-009-025	1390.47
	North Branch Whitewater River	M-031-018	1327.34
	Bee Creek	I-006	1064.92
	West Beaver Creek	M-009-010-003-009	914.16
	Camp Creek	M-009-025-003	856.57
	Hay Creek	M-046	855.88
	Torkelson Creek	M-009-026	774.06
	Winnebago Creek	M-001	738.76
	Low	Wisel Creek	M-009-010-010
North Fork Crooked Creek		M-004	647.39
West Indian Creek		M-034-017	636.54
Rush Creek		M-009-017	480.66
Pine Creek		M-009-017-005	428.39
Big Springs Creek		M-009-021	390.03
Riceford Creek		M-009-010-005	387.41
Pickwick Creek		M-017	380.06
Garvin Brook		M-026-001	362.85
Little Pickwick Creek		M-017-002	234.41
Spring Creek		M-047	148.21

Table 6. Extrapolation probabilities for route, time, and cluster based on four methods used for catch and effort determination for creel data collected from April 1 to September 30, 2005 on 33 streams in southeast Minnesota.

Grouping	Route	Time	Cluster
Method 1	0.33, 0.50, or 1.00	0.133	0.33
Method 2	0.0455	0.133	None
Method 3	0.04	0.133	None

Table 7. Example calculations for Method 2 to estimate angler pressure for two replicate weekdays for routes on streams with high angler pressure in southeast Minnesota in 2005.

Date	Effort	Stream	Route (Probability)	Anglers counted	Time probability	Estimated anglers for 15 hrs	Estimated anglers - all routes on High Pressure streams
April 4 th	High	Beaver (Whitewater)	1 of 22 = 0.0455	1	0.133	1/0.133 = 7.5	7.5/0.0455 = 164.8
		Main Whitewater River	1 of 22 = 0.0455	0	0.133	0/0.133 = 0	0/0.0455 = 0
Estimated number of anglers on all routes on High Pressure streams on April 4 th						(164.8 + 0) / 2 = 82.4	
April 14 th	High	Forestville Creek	1 of 22 = 0.0455	0	0.133	0/0.133 = 0	0/0.0455 = 0
		Canfield Creek	1 of 22 = 0.0455	1	0.133	1/0.133 = 7.5	7.5/0.0455 = 164.8
		Middle Branch	1 of 22 = 0.0455	2	0.133	2/0.133 = 15.0	15.0/0.0455 = 329.6
		Whitewater River South Branch	1 of 22 = 0.0455	0	0.133	0/0.133 = 0	0/0.0455 = 0
		Whitewater River					
Estimated number of anglers on all routes on High Pressure streams on April 14 th						(0+164.8+329.6+0)/4 = 123.6	

Table 8. Hometown, zip code, and number of interviews taken from Minnesota resident anglers fishing selected southeast Minnesota trout streams between April 1 and September 30, 2005.

Town	Zip code	Number of interviews
Bethel	55005	1
Cannon Falls	55009	3
Cedar	55011	2
Blaine	55014	5
Cottage Grove	55016	3
Dalbo	55017	1
Elko	55020	2
Faribault	55021	8
Farmington	55024	2
Forest Lake	55025	5
Hampton	55031	1
Hastings	55033	9
Hugo	55038	1
Isanti	55040	1
Lake City	55041	4
Lakeville	55044	3
Medford	55049	1
Morristown	55052	2
Northfield	55057	4
Owatonna	55060	7
Red Wing	55066	5
Rosemont	55068	10
Inver Grove Heights	55077	3
Stacy	55079	1
Stillwater	55082	2
St. Paul	55102	3
St. Paul	55103	2
St. Paul	55104	1
St. Paul	55105	3
St. Paul	55106	5
St. Paul	55107	4
St. Paul	55109	4
St. Paul	55110	2
St. Paul	55112	6
St. Paul	55113	3
St. Paul	55116	1
St. Paul	55117	4
St. Paul	55118	2
St. Paul	55119	5
St. Paul	55123	1
Apple Valley	55124	3
Woodbury	55125	3
North Oaks	55127	1
Landfall Village	55128	1
Woodbury	55129	1
Albertville	55301	1
Andover	55304	4
Hopkins	55305	2
Burnsville	55306	2
Big Lake	55309	2
Osseo	55311	6
Champlin	55316	3
Chanhassen	55317	1
Chaska	55318	1

Cokato	55321	1
Dassel	55325	1
Excelsior	55331	1
Burnsville	55337	4
Hamel	55340	1
Eden Prairie	55343	3
Minnetonka	55345	1
Eden Prairie	55346	4
Kimball	55353	1
Loretto	55357	1
Maple Lake	55358	2
Mound	55364	2
Osseo	55369	1
Prior Lake	55372	4
Savage	55378	2
Shakopee	55379	2
Wayzata	55391	1
Minneapolis	55404 - 55411	10
Edina	55416	3
Minneapolis	55417	3
St. Anthony	55418	4
Bloomington	55420	1
Columbia Heights	55421	2
Crystal	55422	2
Richfield	55423	1
Edina	55424	2
Bloomington	55425	2
Golden Valley	55426	2
Brooklyn Center	55430	6
Bloomington	55431	1
Fridley	55432	2
Coon Rapids	55433	1
Edina	55436	2
Bloomington	55438	3
Plymouth	55442	1
Brooklyn Center	55443	2
Brooklyn Park	55445	2
Blaine	55449	2
Chisholm	55719	1
Soudan	55782	1
Tamarack	55787	1
Hermantown	55811	1
Rochester	55901	35
Rochester	55902	15
Rochester	55904	15
Rochester	55906	16
Adams	55909	1
Altura	55910	3
Austin	55912	31
Byron	55920	2
Caledonia	55921	14
Canton	55922	3
Chatfield	55923	32
Claremont	55924	2
Dodge Center	55927	4
Dover	55929	2
Eyota	55934	5
Fountain	55935	1
Grand Meadow	55936	1

Harmony	55939	6
Hokah	55941	1
Homer	55942	1
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Houston	55943	14
Kasson	55944	2
Kellogg	55945	1
Kenyon	55946	1
LaCrescent	55947	7
Lanesboro	55949	8
LeRoy	55951	1
Lewiston	55952	6
Mabel	55954	10
Mantorville	55955	1
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Minnesota City	55959	2
Oronoco	55960	2
Pine Island	55963	4
Plainview	55964	4
Preston	55965	6
Rollingstone	55969	1
Rushford	55971	13
St Charles	55972	6
Sargeant	55973	1
Spring Grove	55974	12
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Spring Valley	55975	3
Stewartville	55976	11
Winona	55987	36
Wykoff	55990	1
Zumbro Falls	55991	4
Zumbrota	55992	5
Mankato	56001	12
Albert Lea	56003	8
Alden	56009	2
Clarks Grove	56016	2
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Fairmont	56031	2
Glenville	56036	1
Granada	56039	1
Janesville	56048	1
LeSueur	56058	1
New Prague	56071	3
New Richland	56072	3
New Ulm	56073	2
St Peter	56082	5
Sleepy Eye	56085	1
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Waseca	56093	1
Wells	56097	2
St Cloud	56301	1
Onamia	56359	1
Rice	56367	1
Sartell	56377	4
Verndale	56481	1
Bemidji	56601	1
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Table 9. Hometown, zip code, and number of interviews taken from non-resident anglers fishing selected southeast Minnesota trout streams between April 1 and September 30, 2005.

Town	State	Zip code	Number of interviews
Brooklyn	New York	11215	1
Raleigh	North Carolina	27603	1
Mt. Pleasant	South Carolina	29466	1
Woodbine	Georgia	31569	1
Mims	Florida	32754	1
Birmingham	Alabama	35226	1
LaGrange	Kentucky	40031	1
Louisville	Kentucky	40245	1
Tipton	Indiana	46072	1
Marshalltown	Iowa	50158	1
Des Moines	Iowa	50310	1
McIntire	Iowa	50455	1
Janesville	Iowa	50647	1
LeMars	Iowa	51031	1
Lime Springs	Iowa	52155	1
Davenport	Iowa	52807	1
Dousman	Wisconsin	53118	2
Milwaukee	Wisconsin	53212	1
Rio	Wisconsin	53960	1
Hudson	Wisconsin	54016	4
Prescott	Wisconsin	54021	2
LaCrosse	Wisconsin	54601	4
LaCrosse	Wisconsin	54603	4
Arcadia	Wisconsin	54612	1
Cochrane	Wisconsin	54622	1
Coon Valley	Wisconsin	54623	1
Holmen	Wisconsin	54636	1
Menomonie	Wisconsin	54751	1
Fredric	Wisconsin	54837	1
Luck	Wisconsin	54853	2
Oshkosh	Wisconsin	54902	1
Appleton	Wisconsin	54911	2
Sioux Falls	South Dakota	57104	1
Lake Forest	Illinois	60045	1
Lake Zurich	Illinois	60047	1
Northbrook	Illinois	60062	1
Wilmette	Illinois	60091	1
Carpentersville	Illinois	60110	1
Roselle	Illinois	60172	1
La Grange Park	Illinois	60526	1
St Louis	Missouri	63108	1
Maryville	Missouri	64468	1
Columbia	Missouri	65201	1
Lincoln	Nebraska	68504	1
Lincoln	Nebraska	68510	2
Cody	Wyoming	82414	1
Santa Fe	New Mexico	87506	1
Redmond	Washington	98053	2
Seattle	Washington	98119	1
Olympia	Washington	98502	1
Seattle	Washington	99104	1
Anchorage	Alaska	99520	2
Montclair	New Jersey	07043	1
Kendell Park	New Jersey	08825	1

Table 10. Percent answer to the question “Why did you decide to fish here today? A) favorite stream, B) live close by, C) easy access, D) like regulation here, E) dislike regulation elsewhere, F) species present” taken from interviews of anglers fishing the Whitewater River Branches in southeast Minnesota between April 1 and September 30, 2005.

Stream (# of interviews)	%A	%B	%C	%D	%E	%F
North Branch Whitewater (50)	40.0	32.0	14.0	6.0	0.0	8.0
Middle Branch Whitewater (39)	23.1	17.9	33.3	15.4	0.0	10.3
South Branch Whitewater (67)	41.8	20.9	22.4	3.0	3.0	9.0

Table 11. Percent answer by regulation to the question “Why did you decide to fish here today? A) favorite stream, B) live close by, C) easy access, D) like regulation here, E) dislike regulation elsewhere, F) species present” taken from interviews of anglers fishing 33 selected trout streams in southeast Minnesota between April 1 and September 30, 2005.

Regulation	%A	%B	%C	%D	%E	%F
State	32.1	20.2	27.0	5.4	1.2	14.1
Protected slot (12-16”) bait allowed	19.0	8.4	42.2	12.6	0.0	17.8
Protected slot (12-16”) artificials only	19.9	32.7	25.2	3.4	0.0	18.8
Catch-and-release	15.9	13.3	38.4	16.4	0.0	16.0

Table 12. Percent gear use by time period based on interviews taken from resident and non-resident anglers fishing selected southeast Minnesota trout streams between April 1 and September 30, 2005.

Gear	April 1 st – 15 th	April 16 th – 30 th	May	June	July	August	September 1 st – 14 th	September 15 th – 30 th
Bait	19.0	48.1	46.9	29.6	16.0	35.0	30.2	11.8
Fly	62.1	21.3	33.1	43.7	40.0	41.2	39.5	76.5
Lure	13.8	19.4	19.2	23.9	39.0	15.0	16.3	11.8
Mixed	5.2	11.2	0.8	2.8	5.0	8.8	14.0	0.0
n	58	258	130	71	82	80	43	17

Table 13. Angling gear choice by age in percent from interviews of anglers fishing 33 selected trout streams in southeast Minnesota from April 1 and September 30, 2005.

Gear	Age								
	< 16	16-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89
Bait	67.9	51.0	32.1	35.7	36.1	27.8	29.3	50.0	100.0
Fly	11.3	14.3	28.5	30.7	42.4	50.4	56.9	25.0	0.0
Lure	13.2	26.5	28.5	29.3	12.5	18.0	8.6	20.0	0.0
Mixed	7.5	8.2	10.9	4.3	9.0	3.8	5.2	5.0	0.0
n	53	49	137	140	144	133	58	20	3

Table 14. Percent gear choice by local (those in Fillmore, Goodhue, Houston, Olmsted, Rice, Wabasha, Winona, Dodge, Freeborn, Mower, and Steele Counties), Metro (those in Dakota, Ramsey, Washington, Anoka, Scott, Carver, and Hennepin Counties), and other areas of Minnesota taken from interviews of angler fishing 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005.

Gear	Local	Metro	Other
Bait	43.3	33.6	39.2
Fly	23.0	46.0	33.3
Lure	26.4	14.2	13.7
Mixed	7.4	6.2	13.7
n	379	226	51

Table 15. Trip lengths (hours) for eight time periods by weekend and weekday for angler fishing 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005. Trip length on weekdays during the time period September 1-14 was a mean calculated using all weekdays in the creel survey.

Time Period	Weekend	n	SE	Weekday	n	SE	All
April 1 st – 15 th	3.69	11	1.76	4.63	2	2.65	4.16
April 16 th – 30 th	3.56	32	1.70	2.60	5	1.14	3.08
May 1 st – 31 st	3.56	13	2.65	3.39	19	2.30	3.48
June 1 st – 30 th	2.90	10	0.57	2.81	4	0.75	2.86
July 1 st – 31 st	2.13	4	1.39	6.75	7	5.04	4.44
August 1 st – 31 st	2.93	15	1.03	2.63	16	1.09	2.78
Sept 1 st – 14 th	4.00	1	NA	3.92	0	2.92	3.96
Sept 15 th – 30 th	3.44	4	1.05	7.33	6	2.86	5.39
Total	3.27	90	1.66	4.26	59	2.92	N =149

Table 16. Time period, catch rates (per hour), number of interviews of anglers fishing more than one hour (n), and standard errors (SE) resulting from information taken from anglers fishing 33 selected southeast Minnesota trout streams from April 1 and September 30, 2005.

Time period	Catch rate	n	SE
April 1 st – 15 th	1.36	32	2.58
April 16 th – 30 th	2.09	191	3.03
May 1 st – 31 st	0.65	64	1.24
June 1 st – 30 th	0.78	29	1.46
July 1 st – 31 st	0.78	43	1.24
August 1 st – 31 st	2.12	48	1.76
September 1 st – 14 th	0.25	25	0.52
September 15 th – 30 th	0.74	13	4.87
Total (All time periods)	1.10	445	1.65

Table 17. Percent of total catch and harvest percent by species on 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005.

	% Total catch (n)	Harvest rate (n)
Brown Trout	72.2 (915)	17.3 (158)
Rainbow Trout	26.1 (331)	34.4 (114)
Brook Trout	1.7 (22)	0.00 (0)

Table 18. Mean size caught (inches), mean size harvested, and mean size released by species resulting from information taken from interviews of anglers fishing 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005.

Species	Mean size caught	Mean size harvested	Mean size released
Brown trout	9.6	10.7	9.4
Brook trout	8.2	NA	8.2
Rainbow trout	10.3	11.1	9.9
Total	9.8	11.0	9.3

Table 19. Total catch (\pm SE) using stream clusters (i.e. Method 1) calculated from information taken for anglers interviewed on 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005. Clusters 1-3 represent the South Branch Root River, Canfield Creek, Forestville Creek, Camp Creek, Gribben Creek, Duschee Creek, Mill Creek, Trout Run Creek, and Torkelson Creek; Clusters 4-6 represent South Fork Root River, Wisel Creek, Riceford Creek and Sportsmen's Pond, East Beaver Creek, West Beaver Creek, Beaver Creek, Winnebago Creek, North Fork Crooked Creek, and Bee Creek; Clusters 7-8 represent Rush Creek, Pine Creek, Big Springs Creek, Garvin Brook, Pickwick Creek, and Little Pickwick Creek; Cluster 9 represents North Branch Whitewater River, South Branch Whitewater River, and the Middle Branch Whitewater River; Clusters 10-11 represent the Whitewater River, Beaver Creek (Whitewater watershed), West Indian Creek, Hay Creek, Cold Spring Brook, and Spring Creek.

Time Period	Clusters 1-3	Clusters 4-6	Clusters 7-8	Cluster 9	Clusters 10-11	Weekend Catch	Weekday Catch	Total Catch
April 1 st – 15 th	22,724	5,595	0	26,620	892	6,259	49,572	55,830 (\pm 18,698)
April 16 th – 30 th	6,582	10,193	1,356	11,917	11,004	15,285	25,767	41,051 (\pm 14,342)
May	19,668	12,281	688	7,833	0	10,277	30,192	40,469 (\pm 9,097)
June	4,977	6,294	3,130	0	0	4,364	10,036	14,400 (\pm 3,532)
July	5,065	13,058	0	6,875	0	8,382	16,616	24,998 (\pm 5,351)
August	2,538	9,186	12,228	2,586	2,194	4,141	24,590	28,730 (\pm 12,619)
Sept 1 st – 14 th	608	2,243	0	0	32	1,501	1,381	2,883 (\pm 892)
Sept 15 th – 30 th	1,287	765	97	2,337	1,458	912	5,032	5,944 (\pm 2,420)
Total	63,449	59,615	17,498	58,166	15,579	51,120	163,187	214,307 (\pm 29,070)

Table 20. Total catch using angler pressure (i.e. Method 2 – Vlaming/Fulton effort estimates) calculated from information taken for anglers interviewed on 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005. High pressure streams represent Forestville Creek, Main Beaver Creek, South Branch Whitewater River, Cold Spring Brook, East Beaver Creek, Canfield Creek, Middle Branch Whitewater River, Main Whitewater River, Duschee Creek, South Fork Root River, and Beaver Creek (Whitewater); Medium pressure streams represent Gribben Creek, Mill Creek, Trout Run Creek, South Branch Root River, North Branch Whitewater River, Bee Creek, West Beaver Creek, Camp Creek, Hay Creek, Torkelson Creek, and Winnebago Creek; Low pressure streams represent Wisel Creek, North Fork Crooked Creek, West Indian Creek, Rush Creek, Pine Creek, Big Springs Creek, Riceford Creek, Pickwick Creek, Garvin Brook, Little Pickwick Creek, and Spring Creek.

Time Period	High effort	Medium effort	Low effort	Weekend Catch	Weekday Catch	Total Catch
April 1 st – 15 th (Catch-and-release)	12,627	12,369	0	16,287	8,709	24,996
April 16 th – 30 th	4,900	17,924	4,684	17,029	10,481	27,509
May 1 st – 31 st	4,292	13,179	5,281	16,037	6,715	22,751
June 1 st – 30 th	5,218	1,860	2,198	5,535	3,741	9,275
July 1 st – 31 st	10,120	13,655	755	10,555	13,975	24,530
August 1 st – 31 st	2,254	5,047	11,137	14,501	3,937	18,438
September 1 st – 14 th	1,805	422	144	0	2,372	2,372
September 15 th – 30 th (Catch-and-release)	0	2,246	0	2,224	23	2,246
Total	41,216	66,702	24,199	82,167	49,951	132,118

Table 21. Total catch grouped by regulation (i.e. Method 3) calculated from information taken for anglers interviewed on 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005. Special regulation streams (routes) are represented by South Branch Root River (route 2), Canfield Creek, Forestville Creek, Camp Creek (route 2), Gribben Creek, Trout Run Creek, South Fork Root River (route 2), Wisel Creek, East Beaver Creek, Garvin Brook (route 2), North Branch Whitewater River, Middle Branch Whitewater River, West Indian Creek, and Hay Creek; State regulation streams are represented by South Branch Root River (route 1 and 3), Camp Creek (route 1), Duschee Creek, Mill Creek, Torkelson Creek, South Fork Root River (route 1), Riceford Creek and Sportsmen's Pond, West Beaver Creek, Main Beaver Creek, Winnebago Creek, North Fork Crooked Creek, Bee Creek, Rush Creek, Pine Creek, Big Springs Creek, Garvin Brook (route 1), Pickwick Creek, Little Pickwick Creek, South Branch Whitewater River, Main Whitewater River, Beaver Creek (Whitewater), Cold Spring Brook, and Spring Creek.

Time Period	Special regulations	State-wide regulations	Weekend Catch	Weekday Catch	Total Catch
April 1 st – 15 th (Catch-and-release)	1,743	2,088	2,562	1,269	3,831
April 16 th – 30 th	3,633	3,185	1,709	5,110	6,819
May 1 st – 31 st	2,804	3,713	3,262	3,255	6,517
June 1 st – 30 th	697	2,034	1,612	1,119	2,731
July 1 st – 31 st	4,067	2,707	5,506	1,268	6,774
August 1 st – 31 st	785	5,773	6,045	512	6,557
September 1 st – 14 th	52	370	52	370	422
September 15 th – 30 th (Catch-and-release)	182	350	78	454	532
Total	13,963	20,219	20,826	13,357	34,183

Table 22. Angler pressure (hours) using stream clusters (i.e. Method 1) calculated from information taken for anglers interviewed on 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005. Clusters 1-3 represent the South Branch Root River, Canfield Creek, Forestville Creek, Camp Creek, Gribben Creek, Duschee Creek, Mill Creek, Trout Run Creek, and Torkelson Creek; Clusters 4-6 represent South Fork Root River, Wisel Creek, Riceford Creek and Sportsmen's Pond, East Beaver Creek, West Beaver Creek, Beaver Creek, Winnebago Creek, North Fork Crooked Creek, and Bee Creek; Clusters 7-8 represent Rush Creek, Pine Creek, Big Springs Creek, Garvin Brook, Pickwick Creek, and Little Pickwick Creek; Cluster 9 represents North Branch Whitewater River, South Branch Whitewater River, and the Middle Branch Whitewater River; Clusters 10-11 represent the Whitewater River, Beaver Creek (Whitewater watershed), West Indian Creek, Hay Creek, Cold Spring Brook, and Spring Creek.

Time Period	Clusters 1-3	Clusters 4-6	Clusters 7-8	Cluster 9	Clusters 10-11	Total Angler-hours
April 1 st – 15 th (Catch-and-release)	7,342	5,118	0	16,608	2,685	31,753
April 16 th – 30 th	9,701	7,981	3,622	8,108	2,643	32,055
May 1 st – 31 st	17,360	9,451	5,299	11,902	619	44,631
June 1 st – 30 th	7,620	3,246	2,643	1,893	0	15,402
July 1 st – 31 st	5,108	9,554	692	12,246	2,427	30,027
August 1 st – 31 st	4,503	2,579	1,223	5,587	3,319	17,211
September 1 st – 14 th	4,181	2,370	365	0	2,061	8,977
September 15 th – 30 th (Catch-and-release)	723	714	334	8,363	669	10,803
Total	56,538	41,013	14,178	64,707	14,423	190,859

Table 23. Number of angler trips using Method 1 (i.e. grouped by stream clusters) calculated from information taken for anglers interviewed on 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005. Clusters 1-3 represent the South Branch Root River, Canfield Creek, Forestville Creek, Camp Creek, Gribben Creek, Duschee Creek, Mill Creek, Trout Run Creek, and Torkelson Creek; Clusters 4-6 represent South Fork Root River, Wisel Creek, Riceford Creek and Sportsmen's Pond, East Beaver Creek, West Beaver Creek, Beaver Creek, Winnebago Creek, North Fork Crooked Creek, and Bee Creek; Clusters 7-8 represent Rush Creek, Pine Creek, Big Springs Creek, Garvin Brook, Pickwick Creek, and Little Pickwick Creek; Cluster 9 represents North Branch Whitewater River, South Branch Whitewater River, and the Middle Branch Whitewater River; Clusters 10-11 represent the Whitewater River, Beaver Creek (Whitewater watershed), West Indian Creek, Hay Creek, Cold Spring Brook, and Spring Creek.

Time Period	Clusters 1-3	Clusters 4-6	Clusters 7-8	Cluster 9	Clusters 10-11	Total Angler trips
April 1 st – 15 th (Catch-and-release)	1,788	1,260	0	3,832	660	7,540
April 16 th – 30 th	2,943	2,416	1,186	2,479	865	9,889
May 1 st – 31 st	5,041	1,129	1,533	3,449	182	11,334
June 1 st – 30 th	2,698	1,853	927	659	0	6,137
July 1 st – 31 st	1,354	934	326	3,067	627	6,308
August 1 st – 31 st	1,600	934	466	2,030	1,232	6,262
September 1 st – 14 th	1,207	905	91	820	525	3,548
September 15 th – 30 th (Catch-and-release)	99	122	46	1,311	91	1,669
Total	16,730	9,553	4,575	17,647	4,182	52,687

Table 24. Angler trips and angler-hours using Method 2 (i.e. grouped by angler pressure from Vlaming/Fulton) calculated from information taken for anglers interviewed on 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005. High pressure streams represent Forestville Creek, Main Beaver Creek, South Branch Whitewater River, Cold Spring Brook, East Beaver Creek, Canfield Creek, Middle Branch Whitewater River, Main Whitewater River, Duschee Creek, South Fork Root River, and Beaver Creek (Whitewater); Medium pressure streams represent Gribben Creek, Mill Creek, Trout Run Creek, South Branch Root River, North Branch Whitewater River, Bee Creek, West Beaver Creek, Camp Creek, Hay Creek, Torkelson Creek, and Winnebago Creek; Low pressure streams represent Wisel Creek, North Fork Crooked Creek, West Indian Creek, Rush Creek, Pine Creek, Big Springs Creek, Riceford Creek, Pickwick Creek, Garvin Brook, Little Pickwick Creek, and Spring Creek.

Time Period	High Effort		Medium Effort		Low Effort		Total Angler trips	Total Angler-hours
	Angler trips	Angler-hours	Angler trips	Angler-hours	Angler trips	Angler-hours		
April 1 st – 15 th (Catch-and-release)	1,361	5,779	2,590	10,899	0	0	3,951	16,678
April 16 th – 30 th	3,018	10,120	3,534	10,993	2,481	7,743	9,033	28,856
May 1 st – 31 st	2,241	7,709	3,978	13,744	2,212	7,688	8,431	29,141
June 1 st – 30 th	750	2,151	3,174	8,984	1,427	4,065	5,351	15,200
July 1 st – 31 st	2,360	11,077	2,100	9,217	418	1,265	4,878	21,559
August 1 st – 31 st	1,936	5,283	1,958	5,457	1,091	2,864	4,985	13,604
September 1 st – 14 th	1,632	6,469	873	3,441	99	397	2,604	10,307
September 15 th – 30 th (Catch-and-release)	397	2,436	495	3,456	193	903	1,085	6,795
Total	13,695	51,024	18,702	66,191	7,921	24,925	40,318	142,140

Table 25. Angler trips and angler-hours using Method 3 (i.e. grouped by regulation) calculated from information taken for anglers interviewed on 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005. Special regulation streams (routes) are represented by South Branch Root River (route 2), Canfield Creek, Forestville Creek, Camp Creek (route 2), Gribben Creek, Trout Run Creek, South Fork Root River (route 2), Wisel Creek, East Beaver Creek, Garvin Brook (route 2), North Branch Whitewater River, Middle Branch Whitewater River, West Indian Creek, and Hay Creek; State regulation streams are represented by South Branch Root River (route 1 and 3), Camp Creek (route 1), Duschee Creek, Mill Creek, Torkelson Creek, South Fork Root River (route 1), Riceford Creek and Sportsmen's Pond, West Beaver Creek, Main Beaver Creek, Winnebago Creek, North Fork Crooked Creek, Bee Creek, Rush Creek, Pine Creek, Big Springs Creek, Garvin Brook (route 1), Pickwick Creek, Little Pickwick Creek, South Branch Whitewater River, Main Whitewater River, Beaver Creek (Whitewater), Cold Spring Brook, and Spring Creek.

Time Period	Special Regulations		State-wide Regulations		Total Angler Trips	Total Angler-hours
	Angler Trips	Angler-hours	Angler Trips	Angler-hours		
April 1 st – 15 th (Catch-and-release)	2,239	9,299	3,100	12,981	5,339	22,280
April 16 th – 30 th	2,637	8,375	9,937	32,710	12,574	41,085
May 1 st – 31 st	3,914	13,553	9,343	32,282	13,257	45,835
June 1 st – 30 th	1,949	5,522	4,114	1,173	6,063	6,695
July 1 st – 31 st	2,099	7,746	5,230	23,988	7,329	31,734
August 1 st – 31 st	2,049	5,783	5,288	14,193	7,337	19,976
September 1 st – 14 th	881	3,481	3,262	12,926	4,143	16,407
September 15 th – 30 th (Catch-and-release)	612	3,611	764	5,041	1,376	8,652
Total	16,380	57,370	41,038	135,294	57,418	192,664

Table 26. Percent answer to the question, "How satisfied are you with your overall fishing experience today?" relative to gear methods used taken from interviews of anglers fishing 33 selected trout streams in southeast Minnesota between April 1 and September 30, 2005.

Gear	Very Satisfied	Satisfied	Neither	Dissatisfied	Very Dissatisfied
Bait	17.3	61.8	10.4	6.9	3.5
Fly	21.3	65.2	5.8	5.8	1.9
Lure	24.7	61.9	5.2	8.2	0.0
Mixed	38.7	45.2	3.2	12.9	0.0

Table 27. Percent answer to the question, "How satisfied are you with the size of the trout you caught today?" relative to gear methods used taken from interviews of anglers fishing 33 selected trout streams in southeast Minnesota between April 1 and September 30, 2005.

Gear	Very Satisfied	Satisfied	Neither	Dissatisfied	Very Dissatisfied
Bait	7.5	51.4	20.2	16.8	4.1
Fly	10.5	47.4	27.6	12.5	2.0
Lure	14.4	51.5	21.7	10.3	2.1
Mixed	6.7	43.3	36.7	13.3	0.0

Table 28. Percent answer to the question, "How satisfied are you with the number of the trout you caught today?" relative to gear methods used taken from interviews of anglers fishing 33 selected trout streams in southeast Minnesota between April 1 and September 30, 2005.

Gear	Very Satisfied	Satisfied	Neither	Dissatisfied	Very Dissatisfied
Bait	8.1	45.7	17.3	23.7	5.2
Fly	9.9	44.1	27.6	17.1	1.3
Lure	14.4	46.4	23.7	14.4	1.0
Mixed	10.0	36.7	23.3	26.7	3.3

Table 29. Stream name and number of interviews on streams with routes on a combination of state-wide and special regulations taken from anglers fishing 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005.

Stream	State	Special	Total
Camp Creek	14	1	15
Garvin Brook	0	4	4
South Branch Root River	20	38	58
South Fork Root River	47	1	48
Total	81	44	125

Table 30. Stream, gear type, and demographic comparisons with this creel conducted on 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005 and other creel surveys across the United States.

Stream	Gear type (%)				Gender distribution	Age distribution	Angler residence
	Bait	Fly	Lure	Mixed			
SE MN trout stream creel 2005	37.0	35.3	20.7	7.0	90.2% male 9.8% female	Mean age = 38.8 yrs old Median age = 39 yrs old	90.6% residents 52.3% local 31.1% Metro
Madison River, MT (Lere 1996)							94% non-residents
Rock Creek, MT (Peters and Robison 1997)	1.9	84.0	10.9		94% male 6% female		62% Montana residents
Blackfoot River, MT (Schmetterling and Bohneman 2000)	6	63			65-66% male 34-35% female	Wading - Mean = 36 yrs old Floating - Mean = 38 yrs old	Wading - 70% resident Floating - 69% resident
Four Wisconsin streams ¹ (Avery and Hunt 1981)	61	10-12	14-15	12-13	94% male 6% female		
Straight River, MN (Evarts and Sewell 2002)	31	43			< 2% female	27.2% male < 16 yrs old 32.3% male 26-35 yrs old	
Nine Minnesota streams ² (Weiss 1999)							
Lanesboro area streams							93% MN residents 21% Metro 20% Rochester
Lake City area streams							98% MN residents 37% Metro 17% Rochester
Five Minnesota streams ³ (Bushong 1996)							38.1% Metro area 26.8% southeast MN 3.9% non-residents
Six Minnesota streams ⁴ (Weichman 1990)	49	25	8	17			

¹Emmons Creek, Radley Creek, South Branch Wedde Creek, and Mekan River

²South Branch Root River, South Fork Root River, Camp Creek, Gribben Creek, Diamond Creek, North Branch Whitewater River, Beaver Creek (Whitewater), West Indian Creek, and Cold Spring Brook

³Hay Creek, Spring Creek, South Branch Whitewater River, Main Whitewater River, Middle Branch Whitewater River

⁴Garvin Brook, Main Branch Whitewater River, Rupprecht Creek, South Branch Root River, Trout Run Creek, West Indian Creek

Table 31. Stream, catch rate, mean size harvested, release rate, and estimated pressure comparisons with this creel conducted on 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005 and other creel surveys across the United States. RBT = Rainbow trout, BNT = Brown trout.

Stream	Catch Rate (Mean)	Mean size harvested			Release rate	Estimated pressure
		BNT	BKT	RBT		
SE MN trout stream creel 2005	1.10 trout/hr	10.7"		11.1"	82.7% BNT 65.6% RBT	190,859 angler-hours on 33 selected trout streams
Madison River, MT (Lere 1996)						
Pine Butte	0.63 RBT/hr					
Upper river	0.19 RBT/hr					
Lower river	0.19 RBT/hr					
Rock Creek, MT (Peters and Robison 1997)					97.7% trout 98.3% BNT 94.3% BKT	12,241 ± 381 (95% CI) angler days
Blackfoot River, MT (Schmetterling and Bohneman 2000)	0.79 fish/hr 0.26 RBT/hr 0.06 BNT/hr				95% all fish 94% RBT 94% BNT 99% Westslope cutthroat trout	2,514 angler days (1989) 16,081 angler days (1999)
Four Wisconsin streams ¹ (Avery and Hunt 1981)		8.9 to 9.0"				331 to 428 angler-hours/acre
Straight River, MN (Evarts and Sewell 2002)	0.28 trout/hr	14.0"			79% BNT	
Nine Minnesota streams ² (Weiss 1999)	1.90 trout/hr	11.2"	10.1"	11.1"	83% trout	617 angler-hours/acre
Four Minnesota streams ³ (Weiss 2000)	1.90 trout/hr	10.6"			79% trout	284 angler-hours/acre
Four Minnesota streams ⁴ (Hirsch 1989)						
1981 - Middle Branch WW	0.44 trout/hr	11.3"			51% trout	
Beaver Creek (WW)	0.75 trout/hr	9.6"				
1982 - Middle Branch WW	0.31 trout/hr	10.0"			46% trout	
Beaver Creek (WW)	0.63 trout/hr	10.2"			61% trout	
1983 - Beaver Creek (WW)	0.91 trout/hr	10.2"			NA	
Duschee Creek, MN (Schumacher 1954)	0.45 trout/hr				68% trout	7,377 (May 1 to Sept 15, 1954)
Three Michigan streams ⁵ (Peck 1992)						37,000 angler-hours annually
Five Minnesota streams ⁶ (Bushong 1996)	0.116 BKT/hr	8.9 to 13.0"				369 angler-hours/mile
	0.220 BNT/hr				19.7 to 82.6% trout	397 angler-hours/acre
State regulations	1.23 trout/hr					
Special regulations	0.363 to 1.179 trout/hr					
	0.816 to 3.475 trout/hr					
Seven Michigan streams ⁷ (Wills 2005)	1.013 BNT/hr					

¹Emmons Creek, Radley Creek, South Branch Wedde Creek, and Mekan River

²South Branch Root River, South Fork Root River, Camp Creek, Gribben Creek, Diamond Creek, North Branch Whitewater River, Beaver Creek (Whitewater), West Indian Creek, and Cold Spring Brook

³Camp Creek, Rush Creek, Trout Run Creek, and Winnebago Creek

⁴South Branch Whitewater River, Middle Branch Whitewater River, Beaver Creek (Whitewater)

⁵Dead River, Carp River, and Chocoday River

⁶Spring Creek, Hay Creek, Main Branch Whitewater River, South Branch Whitewater River, and Middle Branch Whitewater River

⁷Coldwater River, Fish Creek, Indian River, Manistee River, Muskegon River, Paint Creek, and Rogue River

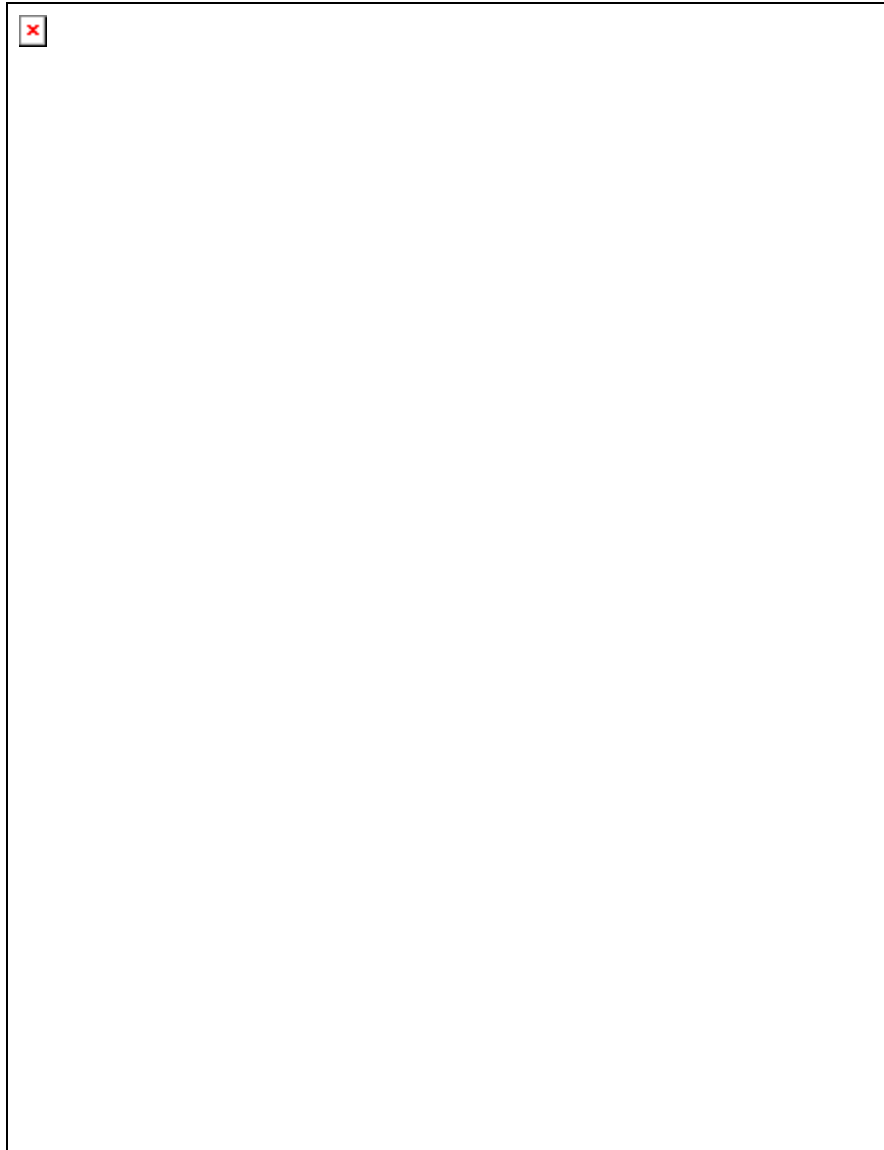


Figure 1. Clusters used in the southeast Minnesota 2005 roving trout stream creel. Clusters 1-3 represent the South Branch Root River, Canfield Creek, Forestville Creek, Camp Creek, Gribben Creek, Duschee Creek, Mill Creek, Trout Run Creek, and Torkelson Creek; Clusters 4-6 represent South Fork Root River, Wisel Creek, Riceford Creek and Sportsmen's Pond, East Beaver Creek, West Beaver Creek, Beaver Creek, Winnebago Creek, North Fork Crooked Creek, and Bee Creek; Clusters 7-8 represent Rush Creek, Pine Creek, Big Springs Creek, Garvin Brook, Pickwick Creek, and Little Pickwick Creek; Cluster 9 represents North Branch Whitewater River, South Branch Whitewater River, and the Middle Branch Whitewater River; Clusters 10-11 represent the Whitewater River, Beaver Creek (Whitewater watershed), West Indian Creek, Hay Creek, Cold Spring Brook, and Spring Creek.

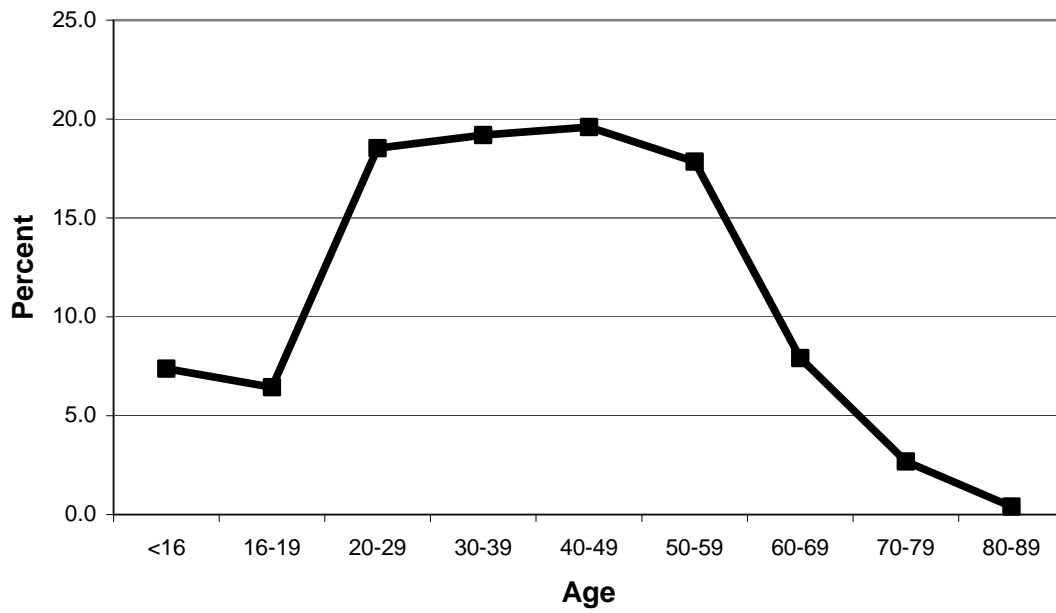


Figure 2. Age distribution of anglers interviewed on 33 selected trout streams in southeast Minnesota between April 1 and September 30, 2005.

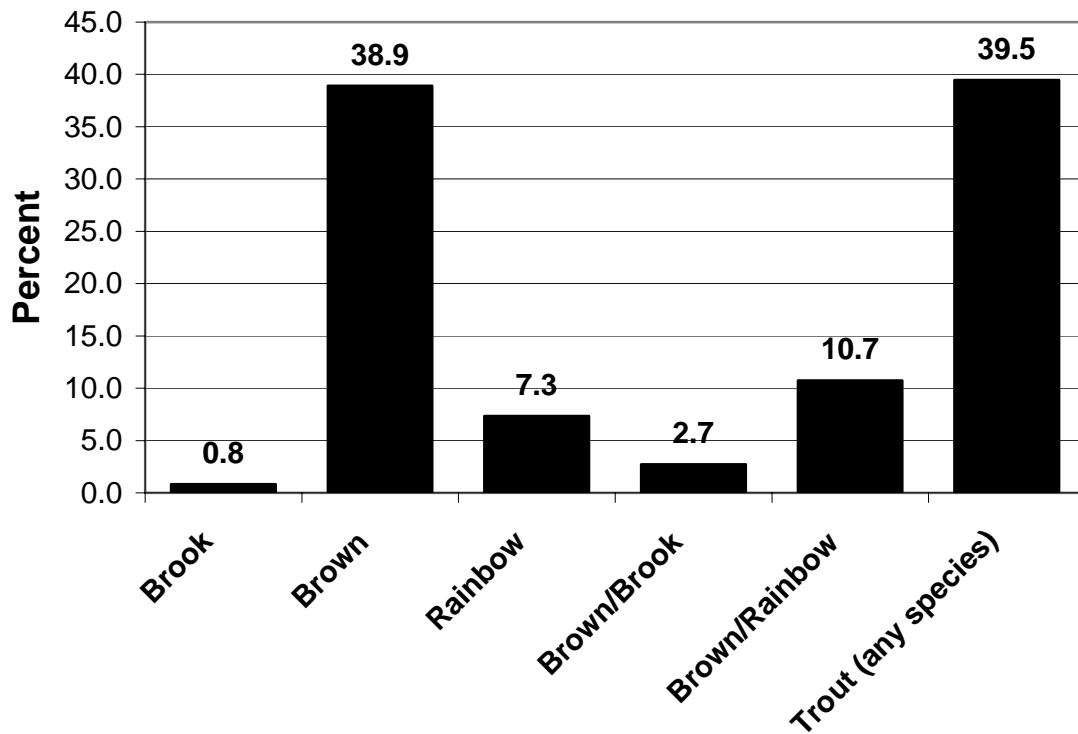


Figure 3. Percent species sought by anglers interviewed in southeast Minnesota on 33 selected trout streams from April 1 to September 30, 2005. Number at top of column represents actual value (%).

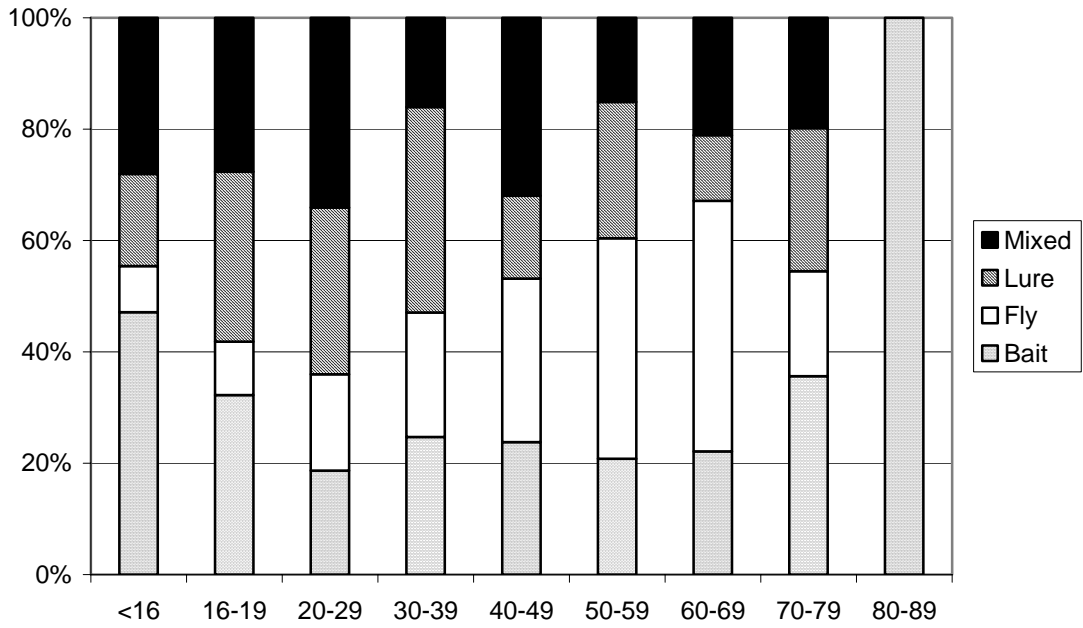


Figure 4. Percent gear use at angler age taken from interviews of anglers fishing 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005.

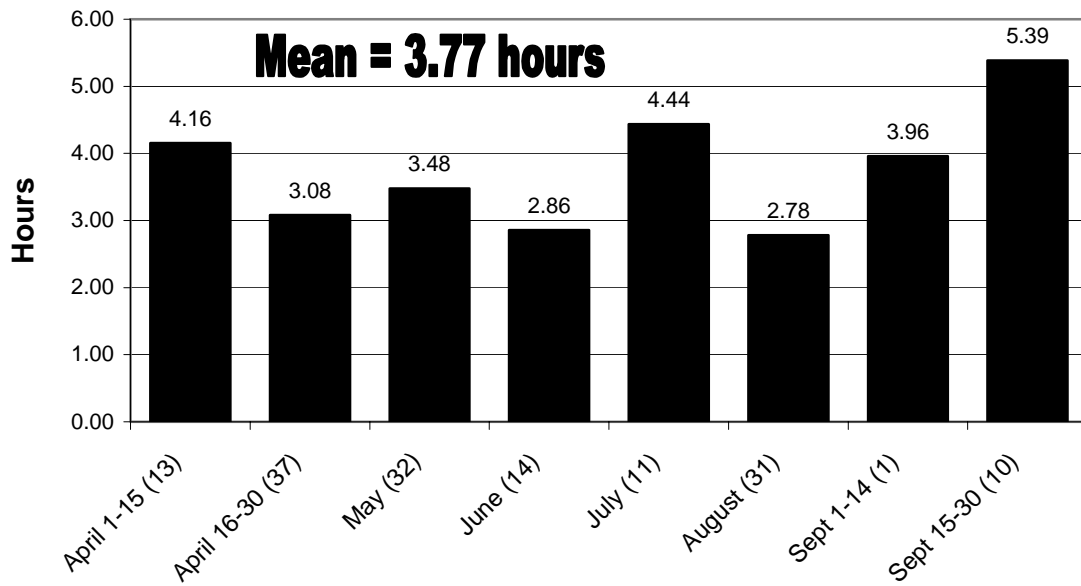


Figure 5. Mean trip length by time period taken from post-cards returned by anglers fishing 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005. Actual time period trip length (hours) is at the top of the column with “n” in parentheses following the time period on the x-axis.

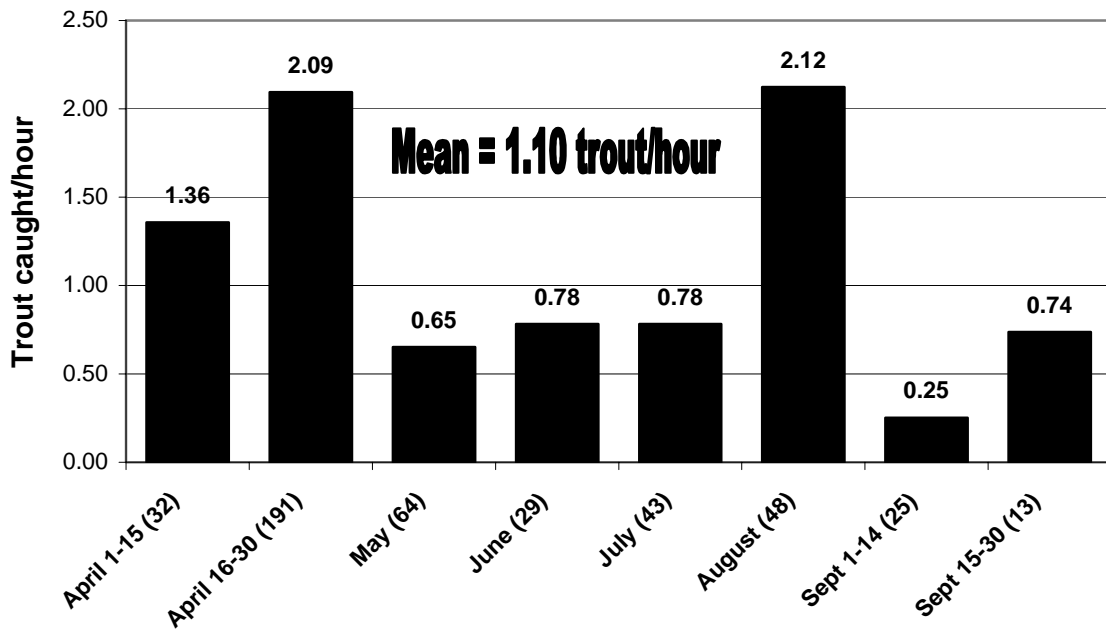


Figure 6. Catch rate by time period taken from interviews of anglers fishing 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005. Actual catch rate (trout/hour) is at the top of the column with “n” in parentheses following the time period on the x-axis.

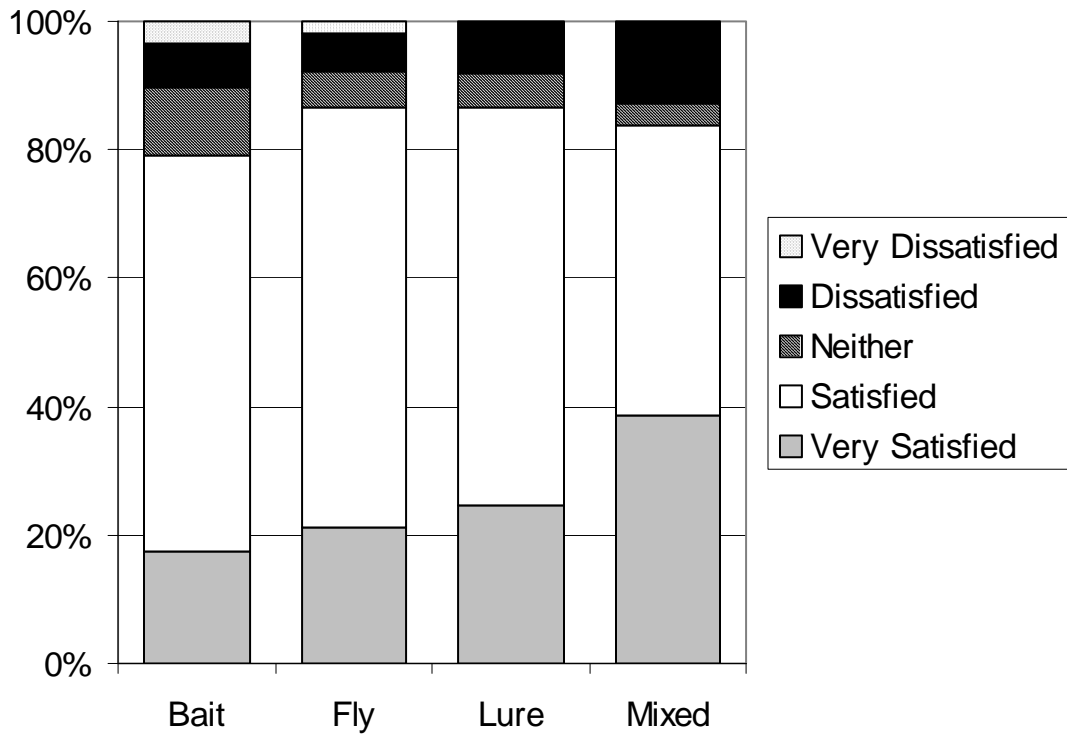


Figure 7. Overall fishing experience satisfaction taken from interviews of anglers fishing 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005.

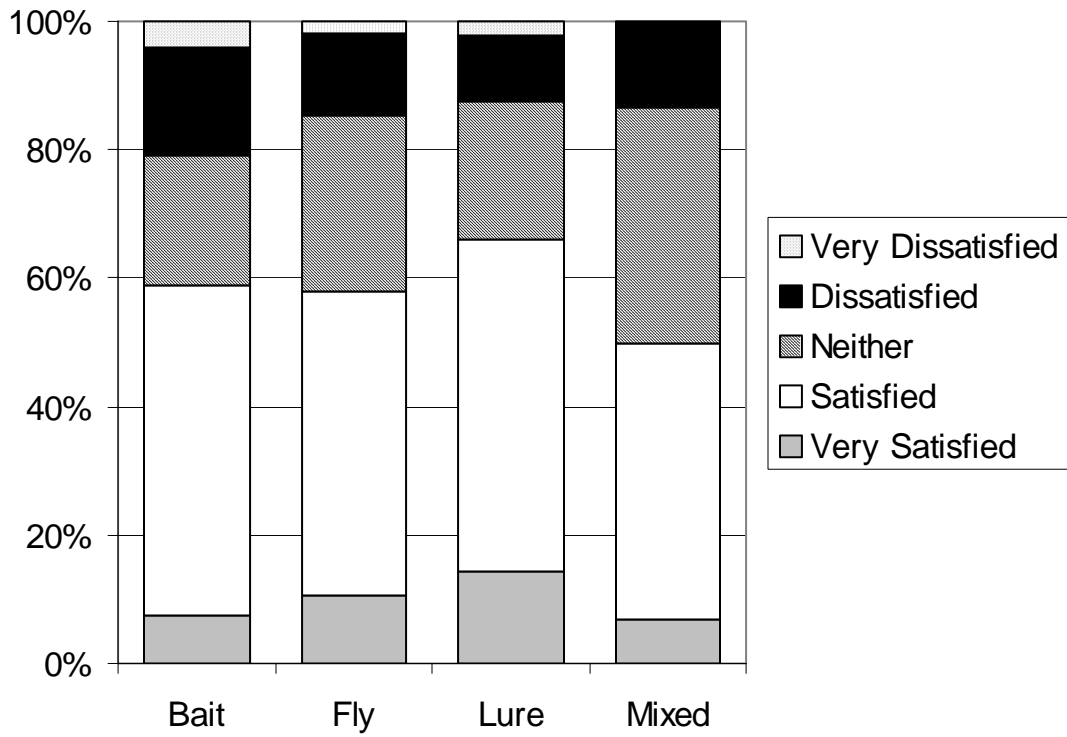


Figure 8. Satisfaction with the size of trout caught taken from interviews of anglers fishing 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005.

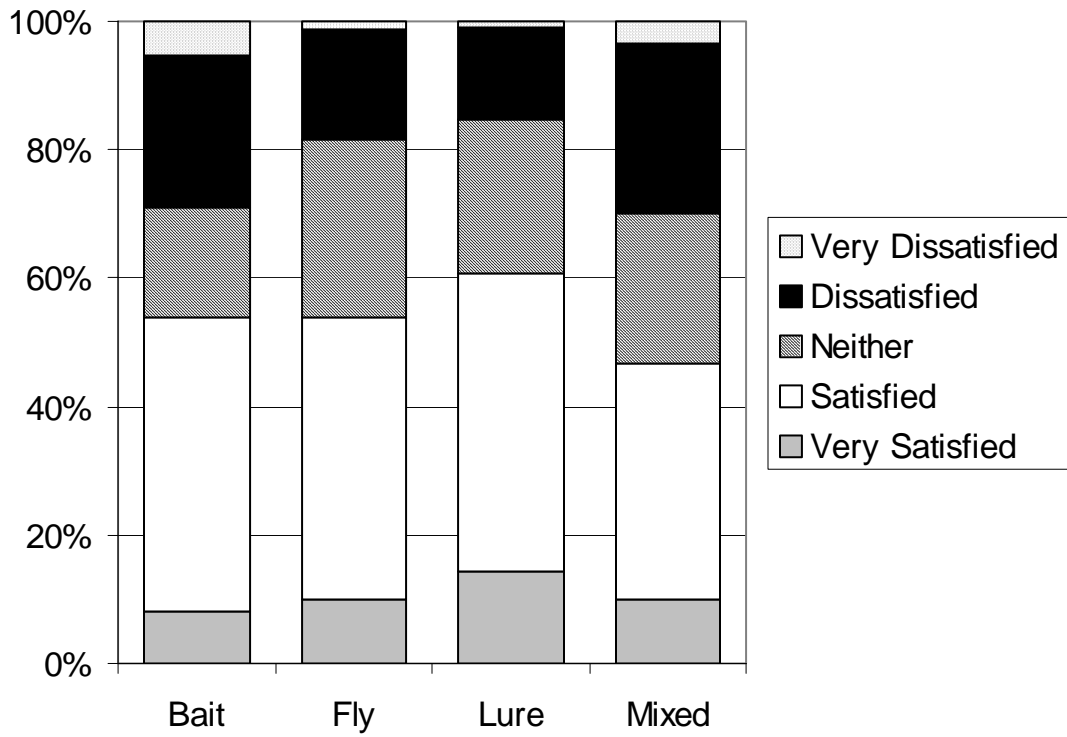


Figure 9. Satisfaction with the numbers of trout caught taken from interviews of anglers fishing 33 selected trout streams in southeast Minnesota from April 1 to September 30, 2005.

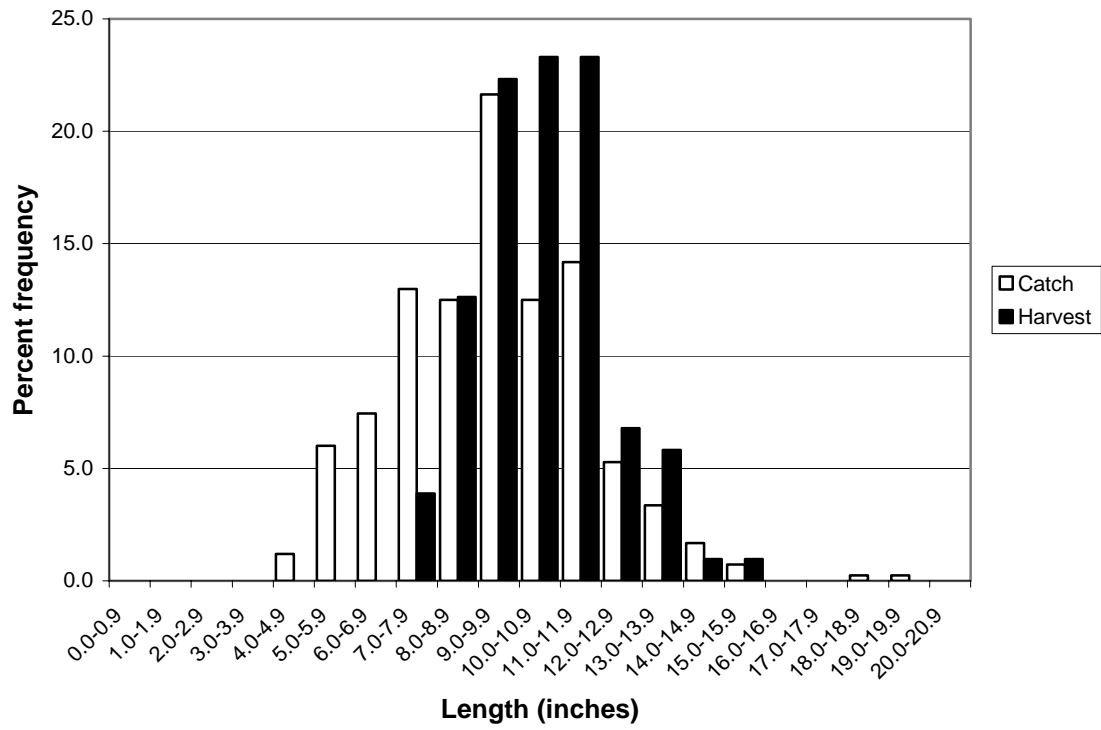


Figure 10. Length frequency of brown trout catch on state regulation streams versus length frequency of brown trout harvest on state regulation streams.