

# MANAGING MUSKIE IN MINNESOTA



muskellunge  
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## Final Report

A cooperative study conducted by:

Minnesota Cooperative Fish and Wildlife Research Unit  
Minnesota Department of Natural Resources

# MANAGING MUSKIE IN MINNESOTA

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# Executive Summary

This study of muskie angling in Minnesota was conducted to:

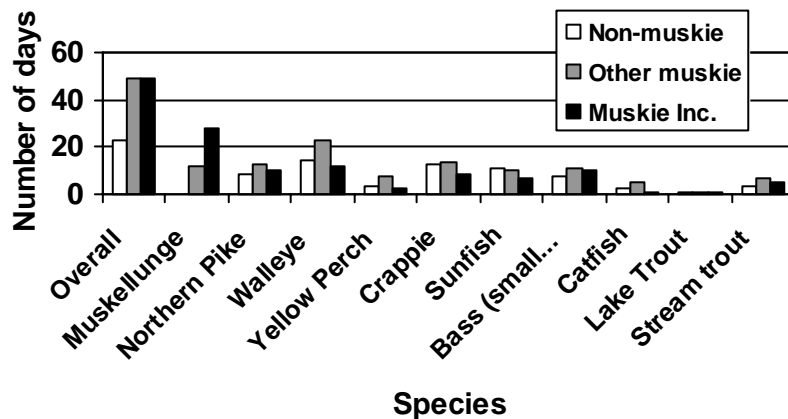
- Characterize the sociodemographics, motivations, preferred experiences, use histories, satisfaction levels, and management and regulatory preferences of muskie anglers;
- Compare muskie anglers who were members of an organized muskie group to muskie anglers who were not members of an organized muskie group;
- Examine and compare the attitudes and beliefs of muskie and non-muskie anglers concerning: (a) perceived impacts of muskie on other fishing opportunities and (b) preferences for muskie management and regulations.

Data were collected via mail-out surveys from three strata: (a) club (Muskie Inc.) muskie anglers, (b) other muskie anglers, and (c) Non-muskie anglers.

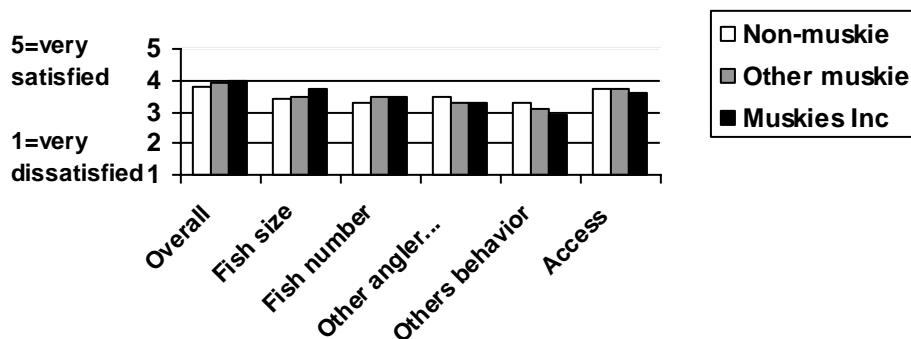
## Angling in Minnesota

Non-muskie and muskie anglers reported the time and money that they invested in angling in Minnesota. They also reported their satisfaction with Minnesota fishing. Results suggest that muskie anglers fish more days overall and more days specifically for muskie (Figure S-1). Muskie anglers, and Muskie Inc. members in particular, spent significantly more each year on fishing and had more money invested in fishing equipment. A greater proportion of these anglers also owned GPS units and underwater video cameras used for angling. On average, non-muskie anglers were less satisfied with fishing-related aspects of their angling experience and more satisfied with the behavior of other people including other anglers (Figure S-2).

**Figure S-1: Number of days fishing last season, by species and overall.**



**Figure S-2: Angling Satisfaction**

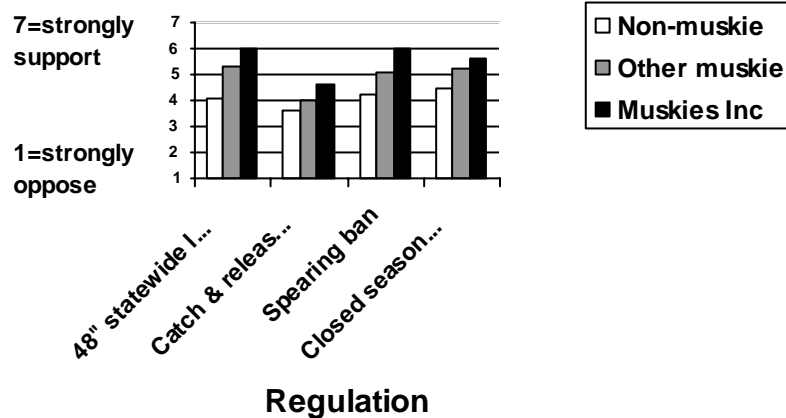


## Attitudes and Beliefs About Muskie and Muskie Management

Not surprisingly, muskie anglers and particularly Muskies Inc. members, indicated much stronger interest in fishing for muskie than non-muskie anglers did. Similarly, these respondents viewed muskie angling as far more important in attracting residents and nonresidents to Minnesota muskie angling locations. The muskie anglers, and particularly Muskies Inc. members, were also much more supportive of expanding muskie angling opportunities in the state.

Muskies Inc. and other muskie anglers were more supportive of more restrictive regulations on muskie angling, such as a 48" statewide limit, catch and release regulation, spearing ban, and closed season between December 1 and June 1, while

**Figure S-3: Support for special regulations for muskie**



non-muskie anglers were uncertain about these changes (Figure S-3). Support for the 48" statewide muskie limit, statewide catch-and-release limit on muskie, and ban on spearing in muskie waters were positively correlated with the number of days fished last year.

Non-muskie anglers were largely uncertain about the effects of muskie on other fish and angling opportunities, while muskie anglers largely perceived only benefits from muskie.

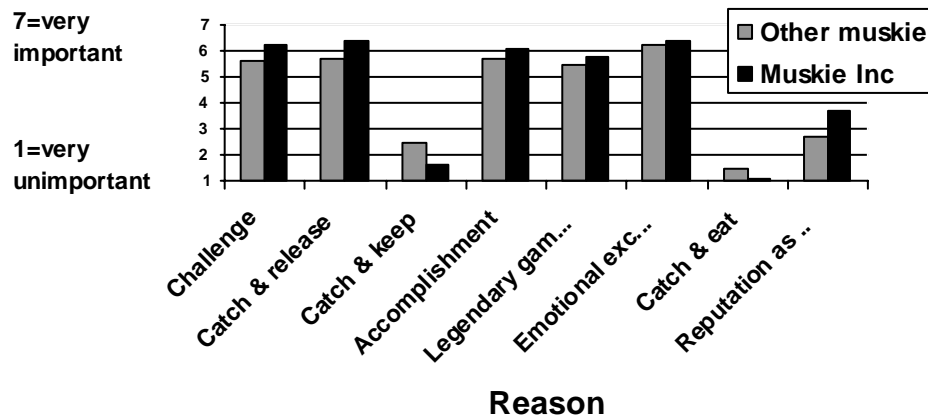
## Attitudes and Behaviors of Muskie Anglers

Respondents who were members of Muskies Inc. reported fishing for muskie nearly three times as many days during a typical year than other muskie anglers. The Muskies Inc. anglers also caught significantly more muskies during the year, but there was no significant difference between the groups in the number of fish caught per day of muskie fishing. Both groups primarily used artificial lures to fish for muskie, but Muskie Inc. anglers used these significantly more. Muskies Inc. respondents indicated that they spent significantly more on fishing for muskie in Minnesota in the past year than other muskie anglers did. The Muskie Inc. anglers also had significantly more money invested in muskie angling equipment.

There was no significant difference between the Muskies Inc. and other muskie anglers in the minimum outcome for what defined a successful muskie angling outing. Other muskie anglers, however, defined a trophy sized muskie as significantly smaller ( $\bar{x}$  =48.4 inches) than Muskie Inc. anglers did ( $\bar{x}$  =49.4 inches).

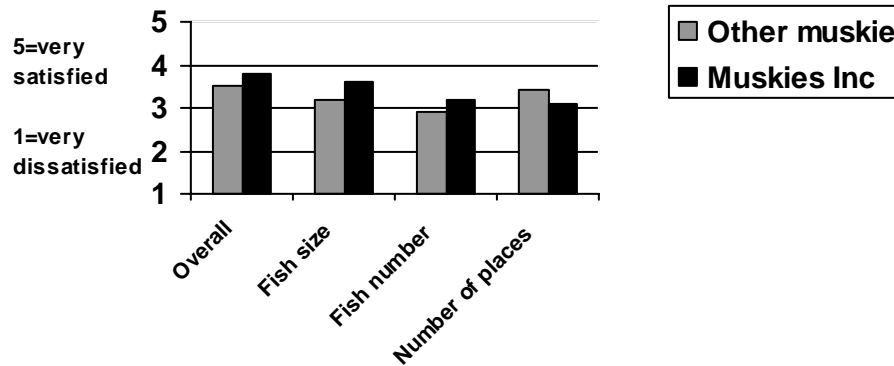
Muskie Inc. and other muskie anglers differed significantly in the importance that they placed on most reasons behind muskie angling, the one exception was the emotional excitement of catching a large muskie which was equally important to both groups (Figure S-4).

**Figure S-4: Motivations for muskie angling**



Muskies Inc. and other muskie anglers also differed significantly in their satisfaction with muskie angling in Minnesota. Muskies Inc. respondents were significantly more satisfied overall and with the size and number of muskies that they had caught. However, these Muskie Inc.

**Figure S-5: Muskie Angling Satisfaction**



respondents were less satisfied with the number of muskie fishing opportunities available to them (Figure S-5).

**Conclusions**

Overall, the results suggest that muskie anglers in Minnesota in general, and Muskies Inc. members in particular, are very avid anglers. In general, they fish more days than non-muskie anglers for muskie and for other types of game fish. They have substantial financial investments in angling, and they are generally fairly satisfied with their angling experiences in the state. Muskie anglers largely practice catch-and-release fishing and support more restrictive regulations for muskie.

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# Introduction

## **Background**

Approximately 9% of resident anglers in Minnesota reported that they fished for muskellunge (*Esox masqionongy*) in 2003 (Schroeder & Fulton, 2005). Assuming sales of 1.2 million resident fishing licenses, this corresponds to approximately 108,000 resident muskie anglers. Therefore, the demand for muskie fishing among resident anglers is similar to demand for stream trout (Love et al., 2002). A previous study of non-resident anglers found that approximately 5% of these individuals targeted muskie when they fished in Minnesota (Currie & Fulton, 2001).

Successful natural resource management integrates public opinion (Knuth & McMullin, 1996). Vanderpool (1981) states that even the most scientifically sound policy could be rejected by the public if it did not reflect fundamental views held by the public. Historically, fisheries managers have utilized creel surveys, interviews, public hearings, and chance encounters to obtain information about public attitudes related to fisheries management (Hunt and Ditton, 1996). Recently, fisheries managers have come to recognize human dimensions research as a valuable management tool (Wilde et al., 1996). Human dimensions research can be used to examine support for, or opposition to, policies related to angling.

Limited research has explored the human dimensions of muskellunge management (Margenau et al., 1994; Margenau & Petchenik, 2004). The research by Margenau and colleagues (1994, 2004) documented key attitudes, norms, and behaviors of muskie anglers. They found that dedication to muskie angling varied among club and other anglers and general anglers. Seventy percent of muskellunge club anglers had no substitute outdoor activity for muskellunge angling, while 36% of other muskellunge anglers and 10% of general anglers indicated they had no substitute. They also found that general anglers' definition of a trophy muskie was smaller than that of muskie anglers, and that support for more restrictive muskie harvest regulations was increasing among muskie anglers. Margenau and Petchenik (2004) documented strong catch-and-release ethics, which had been increasing over time.

The Minnesota Department of Natural Resources (MNDNR) manages muskie as trophy fish (Minnesota Department of Natural Resources, 1994). Over time, muskie fishing regulations in the state have become more conservative, and the number of muskellunge anglers has increased (Younk & Pereira, 2003). The MNDNR has taken steps to provide quality muskie angling opportunities, including stocking, promoting catch and release ethics, and introducing stricter harvest regulations (Younk & Pereira, 2003). As a result, both size and catch of muskellunge have improved (Younk & Pereira, 2003).

The MNDNR recently began increasing the minimum harvest length of muskellunge on specific lakes. This study was designed to help gauge support for these changes and proposed regulations.

## **Purpose**

Very little systematic information characterizing muskie anglers has been collected. Likewise, little is known about the demand for muskie fishing among non-muskie anglers or about how non-muskie anglers perceive potential impacts to their fishing experiences related to muskie management.

The purpose of this study was to:

1. Characterize the sociodemographics, motivations, preferred experiences, use histories, satisfaction levels, and management and regulatory preferences of muskie anglers;
2. Compare muskie anglers who were members of an organized muskie group to muskie anglers who were not members of an organized muskie group;
3. Examine and compare the attitudes and beliefs of muskie and non-muskie anglers concerning: (a) perceived impacts of muskie on other fishing opportunities and (b) preferences for muskie management and regulations.

## **Methods**

### **Sampling**

The study populations included: 1) resident Minnesota anglers who do not fish for muskie; 2) resident Minnesota anglers who fish for muskie; and 3) Minnesota residents who are members Muskies Inc. The sampling frame for general anglers was the Minnesota Electronic License Data System (ELS). We drew a random sample of 1000 licensed anglers from the ELS who were Minnesota residents over the age of 18. There were two sampling frames for muskie anglers: (a) the statewide membership list of Muskies, Inc. (n = 500) and (b) all anglers from previous studies of Minnesota resident anglers who reported fishing for muskie during the past 6 years (n = 286).

### **Data Collection**

Data were collected using a mail-back survey (Appendix A) following a process outlined by Dillman (2000) to enhance response rates. We constructed a relatively straightforward questionnaire, created personalized cover letters, and made multiple contacts with the targeted respondents. Potential study respondents were contacted four times between March and July 2007. In the initial contact, a cover letter, survey questionnaire, and business-reply envelope were mailed to all potential study participants. The personalized cover letter explained the purpose of the study and made a personal appeal for respondents to complete and return the survey questionnaire. Approximately 3 weeks later, a second letter with another copy of the survey and business-reply envelope was sent to all study participants who had not responded to the first mailing. Three weeks after the second mailing a third mailing that included a personalized cover letter and replacement questionnaire with business-reply envelope was sent to all individuals with valid addresses who had not yet replied. Finally, in order to assess nonresponse bias, a one-page postcard (Appendix B) was sent to individuals who had not responded to the earlier mailings.

### *Response Rate*

Of the 1000 licensed anglers sampled from the ELS, 51 had undeliverable addresses, were deceased or otherwise could not be contacted. Of the 949 eligible respondents, 482 completed a survey for a response rate of 50.8%. Of these respondents, 394 reported that they did not fish for muskie. Of the 500 Muskies Inc. members sent surveys 385 returned a completed survey for a response rate of 77%. Of the 286 “other muskie” anglers identified in previous studies, 187 (65.4%) completed surveys. Of these 187 “muskie” anglers, 47 indicated that they did not fish for muskie and 1 identified that they were a member of Muskies Inc. In total, 441 non-muskie anglers completed surveys, 386 Muskies Inc. members completed surveys and 227 other muskie anglers completed surveys.

A total of 88 anglers, or 18.3%, from the 2006 ELS sample reported fishing for muskie during the year preceding the study. Because the survey was focused on muskie, we anticipated a response bias that would over estimate the proportion of muskie anglers in the population. The non-response bias survey

(Appendix B) indicated that among non-respondents, 10.6% reported fishing for muskie. Based on these findings, an adjusted estimate of licensed Minnesota anglers who report fishing for muskie is 14%.

### **Survey Instrument**

The data collection instrument was a 12-page self-administered survey with 11 pages of questions (Appendix A). The questionnaire addressed a variety of topics including: (a) days fishing in the last year, (b) days targeting specific species, (c) satisfaction with various aspects of Minnesota fishing, (d) motivations for fishing, (e) financial investment in fishing generally and muskie fishing in particular, (f) experience with muskie fishing, (g) muskie fishing techniques, (h) satisfaction with Minnesota muskie fishing, (i) motivations for muskie angling, (j) interest and intention to fish for muskie in the future, (k) attitudes about possible muskie management policies, (l) beliefs about muskie, and (m) demographic information.

### **Data Entry and Analysis**

Data were professionally keypunched and the data were analyzed using the Statistical Program for the Social Sciences (SPSS for Windows 15.0). We computed basic descriptive statistics and frequencies for the results. Respondents were compared by study strata (i.e. non-muskie anglers, Muskie anglers, and other muskie anglers) using chi-square analysis, t-tests, and cross-tabulations. In addition to chi-square analysis, we present Cramer's V which is a statistic measuring the strength of association or dependency between two categorical variables. Cramer's V ranges from 0 to 1, with values closer to 1 having the strongest association.

# Section 1: Angling in Minnesota

## ***Time Spent Angling***

Respondents were asked to report the number of days they fished overall as well as for specific types of fish. On average, non-muskie anglers fished 21.4 days during the year, compared to 45.9 days for other muskie anglers and 47.0 days for the members of Muskies Inc. (Table 1-1). Respondents from Muskies Inc. fished significantly more days for muskie ( $\bar{x}$  =25.8 days) compared to other muskie ( $\bar{x}$  =10.6 days) anglers (Table 1-2). Muskies Inc. anglers fished significantly fewer days for northern pike, walleye, yellow perch, crappie, and sunfish. Muskies Inc. anglers spent over half of their angling days fishing for muskie (Table 1-3). Non-muskie and other muskie anglers spent about one-third of their angling days targeting walleye.

Other muskie anglers were more likely to report participating in spear fishing and ice fishing in Minnesota. About 30% of other muskie anglers had spear fished compared to less than one-fifth of non-muskie or Muskies Inc. anglers (Table 1-4). About 10% of other muskie anglers had spear fished in the past 12 months (Table 1-5). Only 4% of other muskie anglers reported never participating in ice fishing, compared to 15.9% of Muskies Inc. anglers and 19.2% of non-muskie anglers (Table 1-7). Other muskie anglers who had ice fished during the past 12 months had fished an average of 12.4 days in the past 12 months, compared to 7.4 days for Muskies Inc. anglers and 5.5 days for non-muskie anglers (Table 1-9).

## ***Satisfaction with Angling in Minnesota***

Compared to non-muskie anglers and other muskie anglers, Muskies Inc. anglers reported greater satisfaction with the overall fishing experience (Table 1-10) and with the size of fish they caught (Table 1-11). Compared to the Muskies Inc. and other muskie anglers, non-muskie anglers were less satisfied with the number of fish they caught (Table 1-12) and more satisfied with the behavior of other anglers (Table 1-13) and non-anglers (Table 1-14). Muskies Inc. anglers were very slightly less satisfied with access at lakes and streams compared to non-muskie and other muskie anglers (Table 1-15).

Respondents were asked to rate the importance of 27 experiences to their satisfaction with fishing in Minnesota. There was no significant difference among the groups in the importance of eight experiences: (a) being with friends, (b) being alone, (c) competing with friends who fish, (d) relaxing, (e) catching fish, (f) doing something with your family, (g) giving your mind a rest, and (h) getting away from family for a while (Table 1-16). Muskies Inc. anglers, and to a lesser extent other muskie anglers, rated (a) catching a particular species of fish, (b) releasing fish, (c) catching a trophy, (d) developing fishing skills, (e) sharing skills and knowledge with others, and (f) using your fishing equipment significantly higher than non-muskie anglers did. Muskies Inc. anglers rated the importance of being around other anglers and meeting new people higher than the other two groups did.

## **Section 1: Angling in Minnesota**

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### ***Investments in Angling***

Compared to respondents from the other two groups, a greater proportion of Muskies Inc. anglers reported ownership of GPS units (Table 1-17) and underwater video cameras (Table 1-18) used for angling. Similarly, Muskies Inc. anglers reported higher financial investments in fishing, including (a) investments in fishing equipment (Table 1-20), (b) annual expenditures on fishing (Table 1-22), and (c) number of fishing rods owned (Table 1-23). Interestingly, Muskies Inc. anglers spent an average of \$35,184 on boats used specifically for fishing, compared to \$40,913 for other muskie anglers and \$60,211 for non-muskie anglers (Table 1-21).

## Section 1: Angling in Minnesota

Table 1-1: Number of days angling in Minnesota last year (March 1, 2006-February 1, 2007)

Angler	N	Mean
Non-muskie	441	21.4
Muskie Inc.	386	47.0
Other	227	45.9
F=50.366***, $\eta=0.296$		

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 1-2: Number of days targeting specific species in Minnesota last year (March 1, 2006-February 1, 2007), by angler group

Species	Mean			F
	Non-muskie	Muskellunge		
		Muskie Inc.	Other	
Muskellunge	--	25.8	10.6	201.248***
Northern Pike	5.4	5.2	8.7	3.593*
Walleye	11.3	9.6	21.3	19.127***
Yellow Perch	1.7	1.0	4.0	8.028***
Crappie	9.0	5.0	10.4	7.309**
Sunfish	7.0	3.5	6.6	5.057**
Bass- Largemouth or Smallmouth	4.7	6.3	7.7	3.560*
Catfish	0.9	0.4	2.2	1.599
Laketrout	0.4	0.2	0.4	2.180
Stream Trout (brookies, browns, rainbows)	0.5	0.5	0.9	1.733

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 1-3: Percent time spent angling for specific species per angler group

Species Sought	Percentage time spent angling		
	Non-muskie	Muskellunge	
		Muskie Inc.	Other Muskie
Muskellunge	--	51.5%	17.2%
Northern Pike	11.7%	6.4%	11.3%
Walleye	33.3%	17.1%	32.3%
Yellow Perch	3.6%	1.7%	3.0%
Crappie	18.3%	7.3%	13.2%
Sunfish	16.5%	5.7%	8.3%
Bass- Largemouth or Smallmouth	11.4%	8.8%	11.8%
Catfish	1.1%	0.5%	1.2%
Laketrout	1.5%	0.3%	0.4%
Stream Trout (brookies, browns, rainbows)	2.1%	0.7%	1.4%



## Section 1: Angling in Minnesota

Table 1-4 : Spear fishing frequency

Angler	n	Never	Seldom	Occasionally	Frequently	Mean
Non-muskie	435	83.4%	8.3%	6.0%	2.3%	1.3
Muskie Inc.	377	84.1%	6.4%	7.4%	2.1%	1.3
Other Muskie	227	70.0%	12.8%	14.1%	3.1%	1.5
$X^2=23.980^{**}$ , Cramer's $V=0.107$						$F=8.912^{***}$ , $\eta=0.130$

\* $p<0.05$ , \*\* $p<0.01$ , \*\*\* $p<0.001$

Table 1-5: Participation in spear fishing during past 12 months

Angler	n	Yes
Non-muskie	428	4.9%
Muskie Inc.	372	6.2%
Other Muskie	222	9.9%
$\chi^2=6.131^*$ , Cramer's $V=0.077$		

\* $p<0.05$ , \*\* $p<0.01$ , \*\*\* $p<0.001$

Table 1-6: Number days spent spear fishing by respondents that indicated participation

Angler	n	Days
Non-muskie	438	0.49
Muskie Inc.	386	0.45
Other Muskie	226	0.97
$F=3.075^*$ , $\eta=0.052$		

\* $p<0.05$ , \*\* $p<0.01$ , \*\*\* $p<0.001$

Table 1-7: Ice fishing frequency

Angler	n	Never	Seldom	Occasionally	Frequently	Mean
Non-muskie	437	19.2%	30.2%	32.7%	17.8%	2.5
Muskie Inc.	377	15.9%	24.7%	36.9%	22.5%	2.7
Other Muskie	227	4.0%	24.7%	35.2%	36.1%	3.0
$X^2=49.601^{***}$ , Cramer's $V=0.154$						$F=23.352^{***}$ , $\eta=0.208$

\* $p<0.05$ , \*\* $p<0.01$ , \*\*\* $p<0.001$

Table 1-8: Participation in ice fishing during past 12 months

Angler	n	Yes
Non-muskie	435	47.8%
Muskie Inc.	375	60.3%
Other Muskie	222	73.0%
$\chi^2=39.652^{***}$ , Cramer's $V=0.196$		

\* $p<0.05$ , \*\* $p<0.01$ , \*\*\* $p<0.001$

## Section 1: Angling in Minnesota

Table 1-9: Number days spent ice fishing by respondents that indicated participation

Angler	n	Days
Non-muskie	439	5.5
Muskie Inc.	386	7.4
Other Muskie	227	12.4
F=10.732***, $\eta=0.142$		

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 1-10: Satisfaction with overall fishing experience

Angler	n	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied	Mean
Non-muskie	422	1.4%	5.5%	22.5%	55.2%	15.4%	3.8
Muskie Inc.	368	0.8%	3.5%	13.9%	58.7%	23.1%	4.0
Other Muskie	225	0.0%	5.8%	15.1%	61.8%	17.3%	3.9
$\chi^2=22.497^{**}$ , Cramer's V=0.105							F=7.832***, $\eta=0.123$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 1-11: Satisfaction with size of fish caught

Angler	n	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied	Mean
Non-muskie	421	1.7%	15.4%	34.9%	41.3%	6.7%	3.4
Muskie Inc.	369	1.9%	7.3%	26.3%	50.7%	13.8%	3.7
Other Muskie	224	0.4%	12.5%	34.4%	46.0%	6.7%	3.5
$\chi^2=35.232^{***}$ , Cramer's V=0.132							F=13.228***, $\eta=0.160$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 1-12: Satisfaction with number of fish caught

Angler	n	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied	Mean
Non-muskie	421	1.4%	20.0%	33.5%	39.2%	5.9%	3.3
Muskie Inc.	366	2.2%	9.8%	32.5%	44.5%	10.9%	3.5
Other Muskie	222	0.9%	12.6%	28.8%	48.2%	9.5%	3.5
$\chi^2=26.068^{**}$ , Cramer's V=0.114							F=9.018***, $\eta=0.133$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

## Section 1: Angling in Minnesota

Table 1-13: Satisfaction with the behavior of other anglers

Angler	n	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied	Mean
Non-muskie	418	1.9%	8.6%	33.3%	47.1%	9.1%	3.5
Muskie Inc.	368	3.3%	15.8%	39.1%	36.4%	5.4%	3.3
Other Muskie	222	3.2%	16.2%	35.6%	40.1%	5.0%	3.3
$\chi^2=24.514^{**}$ , Cramer's V=0.110							F=11.532 <sup>***</sup> , $\eta=0.150$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 1-14: Satisfaction with the behavior of non-anglers

Angler	n	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied	Mean
Non-muskie	414	2.9%	10.9%	44.2%	36.2%	5.8%	3.3
Muskie Inc.	365	11.2%	18.9%	41.6%	23.8%	4.4%	2.9
Other Muskie	224	7.1%	13.8%	45.5%	30.4%	3.1%	3.1
$\chi^2=41.030^{***}$ , Cramer's V=0.143							F=17.942 <sup>***</sup> , $\eta=0.186$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 1-15: Satisfaction with access to lakes and streams

Angler	n	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied	Mean
Non-muskie	418	2.4%	5.5%	24.4%	54.8%	12.9%	3.7
Muskie Inc.	367	2.2%	12.0%	23.7%	53.1%	9.0%	3.6
Other Muskie	222	1.8%	5.9%	23.9%	56.3%	12.2%	3.7
$\chi^2=15.293$ n.s., Cramer's V=0.087							F=3.966*, $\eta=0.089$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

## Section 1: Angling in Minnesota

Table 1-16: Mean scores and significant differences between angler groups relating to level of satisfaction with fishing in Minnesota

Statement	Mean Score			F	$\eta$
	Non-muskie	Muskellunge			
		Muskie Inc.	Other Muskie		
Being with friends	5.8	5.9	6.0	1.468 n.s.	.053
Being alone	4.3	4.4	4.4	0.262 n.s.	.023
Competing with friends who fish	3.7	3.8	3.8	0.360 n.s.	.027
Being around other anglers	3.8	4.4	3.9	12.068***	.152
Using your fishing equipment	5.2	5.8	5.6	24.059***	.212
The size of the fish you catch	5.1	5.4	5.2	6.797**	.115
Learning about nature	5.6	6.0	5.7	13.242***	.159
Relaxing	6.4	6.4	6.5	0.977 n.s.	.044
Catching fish	5.6	5.6	5.6	0.515 n.s.	.032
Getting exercise	5.0	5.1	4.7	4.094*	.089
Enjoying nature and the outdoors	6.4	6.5	6.5	4.863**	.097
Catching some fish to eat	5.4	3.8	4.8	85.338***	.378
Sharing your skills & knowledge with others	5.0	5.5	5.3	19.146***	.191
Thinking about your personal values	5.2	5.6	5.3	6.897**	.116
Being in a quiet and peaceful place	6.1	6.2	6.3	3.848*	.086
Visiting areas you've fished in the past	5.6	5.8	5.8	4.055*	.089
Meeting new people	4.4	5.0	4.3	19.199***	.191
Doing something with your family	6.1	6.2	6.2	0.790 n.s.	.039
Developing your fishing skills	5.4	6.1	5.8	37.649***	.262
Giving your mind a rest	6.0	6.0	6.0	0.148 n.s.	.017
Fishing in a wilderness setting	5.6	5.9	6.0	6.966**	.116
Getting away from crowds of people	6.0	6.2	6.2	4.319*	.092
Getting away from family for a while	4.0	4.1	4.0	0.073 n.s.	.012
Catching a trophy	4.0	5.2	4.7	56.990***	.317
Releasing fish	5.0	6.4	5.8	96.005***	.398
Catching your limit	4.0	3.0	3.5	34.301***	.251
Catching a particular species of fish	4.8	5.6	5.3	34.620***	.252

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 1-17: Households owning a GPS unit

Angler	n	Yes
Non-muskie	435	32.6%
Muskie Inc.	378	84.9%
Other Muskie	226	59.3%
$\chi^2=226.520***$ , Cramer's V=0.467		

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

## Section 1: Angling in Minnesota

Table 1-18: Households owning an underwater camera

Angler	n	Yes
Non-muskie	436	14.0%
Muskie Inc.	378	33.6%
Other Muskie	225	27.6%
$\chi^2=44.517^{***}$ , Cramer's V=0.207		

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 1-19: Number of fishing Muskie Inc.s/organizations respondent belongs to

Angler	n	0	1 or 2	3 to 5	More than 5
Non-muskie	234	1.7%	96.6%	1.7%	0.0%
Muskie Inc.	375	0.0%	92.8%	6.9%	0.3%
Other Muskie	141	4.3%	93.6%	1.4%	0.7%
$\chi^2=28.678^{***}$ , Cramer's V=0.138					

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 1-20: Amount invested in fishing equipment (excluding boat(s))

Angler	n	<\$100	\$100-500	\$500-\$999	\$1000-\$1999	\$2000-\$4999	\$5000-\$9999	\$10000+
Non-muskie	431	23.2%	32.3%	15.8%	13.2%	11.4%	3.0%	1.2%
Muskie Inc.	376	2.7%	4.8%	9.6%	11.7%	30.6%	25.3%	15.4%
Other Muskie	225	2.7%	14.2%	16.0%	17.8%	27.6%	12.4%	9.3%
$\chi^2=354.727^{***}$ , Cramer's V=0.415								

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 1-21: Respondents owning a boat used specifically for fishing

Angler	n	Yes	Average Purchase Price
Non-muskie	432	45.4%	\$60,210.50
Muskie Inc.	379	87.1%	\$35,183.57
Other Muskie	225	73.8%	\$40,912.57
$\chi^2=164.606^{***}$ , Cramer's V=0.399		F=40.306 <sup>***</sup> , $\eta=0.268$	

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 1-22: Amount spent each year on fishing (trips, equipment, licenses, bait, ect.)

Angler	n	<\$100	\$100-500	\$500-\$999	\$1000-\$1999	\$2000-\$4999	\$5000-\$9999	\$10000+
Non-muskie	430	21.6%	38.1%	19.1%	10.9%	8.6%	1.4%	.2%
Muskie Inc.	377	3.2%	8.8%	14.3%	25.7%	33.4%	11.1%	3.4%
Other Muskie	225	4.4%	19.6%	20.4%	28.0%	23.1%	3.6%	.9%
$\chi^2=295.136^{***}$ , Cramer's V=0.378								

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

## Section 1: Angling in Minnesota

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Table 1-23: Number of fishing rods owned

Angler	n	1 or 2	3 to 5	6 to 10	More than 10
Non-muskie	426	19.2%	36.2%	27.7%	16.9%
Muskie Inc.	381	6.0%	8.9%	21.5%	63.5%
Other Muskie	225	5.3%	17.3%	27.6%	49.8%
$\chi^2=225.204^{***}$ , Cramer's V=0.330					

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

### Section 2: Views of Minnesota Anglers Regarding Muskie

#### ***Interest and Importance***

Not surprisingly, non-muskie anglers reported far less interest in fishing for muskie in the future compared to Muskies Inc. and other muskie anglers (Table 2-1). About 40% of non-muskie anglers were 'not at all' interested in fishing for muskie in Minnesota in the future. Over half of non-muskie anglers indicated that muskie fishing opportunities were either 'not at all' or 'slightly' important to attracting non-residents to Minnesota to fish (Table 2-2) or to attracting people from other parts of Minnesota to muskie waters to fish (Table 2-3). Alternatively, over half of Muskies Inc. members felt that muskie fishing opportunities were 'very important' to attracting people to the state or area.

#### ***Muskie Fishing Opportunities in Minnesota***

About two-thirds of Non-muskie anglers felt that there were 'about the right amount' of places to fish for muskie in Minnesota, compared to 49.3% of other Muskie anglers and 25.7% of Muskies Inc. anglers (Table 2-4). Non-muskie anglers were generally neutral about expanding muskie angling opportunities in the state; about half of these anglers neither supported nor opposed increasing muskie angling opportunities (Tables 2-5 through 2-8). Muskies Inc. and other muskie anglers were significantly more supportive of expanding muskie angling opportunities with Muskies Inc. respondents showing the strongest support.

There was a significant positive correlation between the number of days fishing last year and (a) expanding muskie fishing opportunities in (a) Minnesota in general ( $r=0.161$ ,  $p<0.001$ ), (b) northeast Minnesota ( $r=0.169$ ,  $p<0.001$ ), (c) northwest Minnesota ( $r=0.153$ ,  $p<0.001$ ), and (d) southwest Minnesota ( $r=0.157$ ,  $p<0.001$ ). There was a significant positive correlation between the number of muskies caught in a typical year and expanding muskie fishing opportunities in (a) Minnesota in general ( $r=0.165$ ,  $p<0.001$ ), (b) northeast Minnesota ( $r=0.192$ ,  $p<0.001$ ), (c) northwest Minnesota ( $r=0.194$ ,  $p<0.001$ ), and (d) southwest Minnesota ( $r=0.196$ ,  $p<0.001$ ). However, there was a significant negative correlation between the number of muskies caught per day in a typical year and expanding muskie fishing opportunities in (a) northeast Minnesota ( $r=-0.164$ ,  $p<0.01$ ), (b) northwest Minnesota ( $r=-0.166$ ,  $p<0.01$ ), and (c) southwest Minnesota ( $r=-0.139$ ,  $p<0.01$ ). There was no significant difference in support for expanding muskie angling opportunities between respondents who reported spearing fish in Minnesota in the last year and those who did not. There was, however, significantly stronger support for expanding muskie fishing opportunities among respondents who had ice fished in the last year, compared to those who had not.

#### ***Muskie Regulations***

Generally, respondents from Muskies Inc. were more supportive of increasing restrictions on muskie angling, compared to respondents from the other two strata. These respondents were more supportive of (a) increasing the statewide minimum size limit from 40" to 48" muskies on all muskie waters (Table 2-10), (b) a statewide catch-and-release only regulation for muskie (Table 2-11), and (c) a ban on spearing in muskie waters (Table 2-12). For each of these restrictions, non-muskie anglers showed less support than both groups of muskie anglers. Similarly, Muskies Inc. respondents were more supportive the planned closure of the muskie season between December 1 and June 1 starting in 2007-2008 than were the other muskie or non-muskie anglers (Table 2-13). There was no significant difference among the three strata in support for maintaining a statewide 40" size limit with 48" size limits in some waters and catch-

## **Section 2: View of Minnesota Anglers Regarding Muskie**

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and-release regulations in a few select areas (Table 2-9). On average, respondents from all groups reported slight support for this regulation.

Support for the 48" statewide muskie limit ( $r=0.204$ ,  $p<0.001$ ), statewide catch-and-release limit on muskie ( $r=0.094$ ,  $p<0.01$ ), and ban on spearing in muskie waters ( $r=0.103$ ,  $p<0.01$ ) were positively correlated with the number of days fished last year. Support for maintaining the statewide 40" size limit on muskie was negatively correlated with the number of days fished last year ( $r=-0.074$ ,  $p<0.05$ ). There was no significant correlation between the group size for muskie angling and support for muskie regulations. There was a significant positive correlation between the number of muskies caught in a typical year and (a) support for increasing the muskie size limit to 48" ( $r=0.114$ ,  $p<0.01$ ) and (b) support for a ban on spearing in muskie waters ( $r=0.105$ ,  $p<0.05$ ). There was no significant difference in support for most muskie regulations between respondents who reported spearing fish in Minnesota in the last year and those who did not. There was, however, significantly less support for a ban on spearing in muskie waters among respondents who had speared fished in the last year ( $\bar{x}=3.5$  anglers who had speared vs.  $\bar{x}=5.2$  anglers who had not speared) ( $F=43.530$ ,  $p<0.001$ ,  $\eta=0.206$ ). There was significantly stronger support for increasing the muskie size limit to 48 inches and banning spearing among respondents who had ice fished in the last year, compared to those who had not. There was a significant positive correlation between the reported minimum size of a trophy muskie and support for increasing the minimum size limit on muskie to 48" ( $r=0.191$ ,  $p<0.001$ ). There was a significant negative correlation between the reported minimum size of a trophy muskie and support for maintaining the minimum size limit on muskie at 40" ( $r=-0.129$ ,  $p<0.01$ ).

### ***Beliefs Concerning Muskie and Their Effects on Other Fisheries***

Respondents from the three strata differed significantly in 13 of 15 beliefs about muskies and their effect on other fisheries. On average, non-muskie anglers reported neutral to slight agreement that: (a) muskie have negative effects on walleye populations (Table 2-16), (b) muskie should NOT be stocked into waters where there is already a naturally reproducing population (Table 2-19), (c) in general muskie will decrease the quality of other fishing opportunities (Table 2-21), and (d) muskie have negative effects on northern pike populations (Table 2-24), while muskie anglers felt neutral to moderate disagreement with these statements. Non-muskie anglers disagreed slightly that muskie anglers are disruptive to other anglers, while muskie anglers disagreed more strongly (Table 2-27). Non-muskie anglers and other muskie anglers agreed very slightly that muskie tournaments conflict with trying to manage for trophy muskie fishing, while Muskies Inc. anglers disagreed slightly (Table 2-26). For seven other beliefs, Muskies Inc. respondents agreed most strongly, followed by other muskie anglers, then non-muskie anglers. These seven beliefs included: (a) muskie fishing opportunities should be increased by stocking them in "new" waters (Table 2-14), (b) muskie DO NOT have negative impacts on other game fish (Table 2-15), (c) muskie are good to have around (Table 2-18), (d) if competitive muskie tournaments are allowed in Minnesota, they should only be for immediate catch and release (Table 2-20), (e) I think it is very positive to have healthy populations of muskie in our lakes (Table 2-22), (f) muskie are an important game fish in Minnesota (Table 2-23), and (g) it is good to have muskie in a lake or river (Table 2-25).



## Section 2: View of Minnesota Anglers Regarding Muskie

Table 2-1: Interest level in fishing for muskie in Minnesota in the future

Angler	n	Not at all interested	Slightly interested	Moderately interested	Very interested
Non-muskie	431	39.9%	42.2%	13.0%	4.9%
Muskie Inc.	382	0.8%	2.4%	6.3%	90.6%
Other Muskie	226	2.7%	13.7%	22.1%	61.5%
$\chi^2=716.419^{***}$ , Cramer's V=0.587					

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 2-2: Importance of muskie fishing opportunities in attracting non-residents to Minnesota as a fishing destination

Angler	n	Not At All Important	Slightly Important	Moderately Important	Very Important
Non-muskie	430	18.6%	40.9%	29.5%	10.9%
Muskie Inc.	382	5.0%	8.6%	30.1%	56.3%
Other Muskie	226	7.1%	29.2%	39.4%	24.3%
$\chi^2=263.506^{***}$ , Cramer's V=0.356					

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 2-3: Importance of muskie fishing opportunities in attracting residents from other areas of Minnesota to muskie waters as fishing destinations

Angler	n	Not At All Important	Slightly Important	Moderately Important	Very Important
Non-muskie	430	14.2%	42.6%	31.9%	11.4%
Muskie Inc.	381	3.1%	7.9%	32.3%	56.7%
Other Muskie	226	5.3%	26.1%	38.9%	29.6%
$\chi^2=258.086^{***}$ , Cramer's V=0.353					

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 2-4: Opinion on number of places to fish for muskie in Minnesota

Angler	n	Way too few	Too few	About the right amount	Too many	Way too many
Non-muskie	414	4.3%	22.5%	65.9%	3.9%	3.4%
Muskie Inc.	382	27.5%	45.5%	25.7%	1.3%	0.0%
Other Muskie	225	11.6%	35.1%	49.3%	2.7%	1.3%
$\chi^2=193.419$ , Cramer's V=0.308						

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

## Section 2: View of Minnesota Anglers Regarding Muskie

**Table 2-5: Level of support or opposition to expanding the current level of muskie fishing opportunities in Minnesota**

Angler	n	Strongly Oppose	Moderately Oppose	Slightly Oppose	Neutral	Slightly Support	Moderately Support	Strongly Support	Mean
Non-muskie	409	7.3%	7.1%	4.6%	47.4%	15.6%	10.5%	7.3%	4.2
Muskie Inc.	380	1.3%	1.6%	0.5%	4.5%	7.1%	15.5%	69.5%	6.4
Other Muskie	225	2.2%	4.0%	4.9%	22.2%	15.1%	17.8%	33.8%	5.3
$\chi^2=419.081$ , Cramer's V=0.455									F=242.025***, $\eta=0.569$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

**Table 2-6: Level of support or opposition to expanding the current level of muskie fishing opportunities in Northeast Minnesota**

Angler	n	Strongly Oppose	Moderately Oppose	Slightly Oppose	Neutral	Slightly Support	Moderately Support	Strongly Support	Mean
Non-muskie	406	7.4%	7.4%	3.9%	47.5%	15.3%	10.1%	8.4%	4.2
Muskie Inc.	377	1.3%	1.3%	0.5%	10.3%	11.4%	19.4%	55.7%	6.1
Other Muskie	225	4.9%	3.6%	4.9%	28.0%	13.8%	18.7%	26.2%	5.0
$\chi^2=299.549$ , Cramer's V=0.385									F=163.343***, $\eta=0.495$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

**Table 2-7: Level of support or opposition to expanding the current level of muskie fishing opportunities in Northwest Minnesota**

Angler	n	Strongly Oppose	Moderately Oppose	Slightly Oppose	Neutral	Slightly Support	Moderately Support	Strongly Support	Mean
Non-muskie	404	6.9%	7.2%	3.5%	49.3%	15.6%	9.7%	7.9%	4.2
Muskie Inc.	377	0.8%	1.3%	1.1%	13.0%	10.1%	18.3%	55.4%	6.1
Other Muskie	224	4.0%	2.7%	4.0%	29.5%	17.0%	16.5%	26.3%	5.1
$\chi^2=290.921$ , Cramer's V=0.380									F=164.282***, $\eta=0.497$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

**Table 2-8: Level of support or opposition to expanding the current level of muskie fishing opportunities in Southwest Minnesota**

Angler	n	Strongly Oppose	Moderately Oppose	Slightly Oppose	Neutral	Slightly Support	Moderately Support	Strongly Support	Mean
Non-muskie	404	7.4%	7.2%	4.0%	53.0%	13.1%	8.2%	7.2%	4.1
Muskie Inc.	377	1.3%	1.3%	2.1%	18.0%	9.8%	14.6%	52.8%	5.9
Other Muskie	225	4.4%	5.3%	3.6%	37.8%	10.7%	14.2%	24.0%	4.8
$\chi^2=255.156$ , Cramer's V=0.356									F=138.632***, $\eta=0.465$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

## Section 2: View of Minnesota Anglers Regarding Muskie

**Table 2-9: Level of support or opposition for maintaining a statewide 40” muskie size limit with 48” size limits in some waters and catch-and-release regulations in a few select areas.**

Angler	n	Strongly Oppose	Moderately Oppose	Slightly Oppose	Neutral	Slightly Support	Moderately Support	Strongly Support	Mean
Non-muskie	408	4.2%	1.7%	4.7%	47.8%	15.7%	15.0%	11.0%	4.8
Muskie Inc.	381	14.4%	7.9%	9.7%	15.0%	11.0%	19.7%	22.3%	4.5
Other Muskie	224	8.9%	5.4%	8.5%	22.3%	10.7%	23.7%	20.5%	4.7
$\chi^2=149.051$ , Cramer's V=0.271									F=1.395 n.s., $\eta=0.052$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

**Table 2-10: Level of support or opposition for increasing the statewide minimum size limit from 40” to 48” muskies on all muskie waters.**

Angler	n	Strongly Oppose	Moderately Oppose	Slightly Oppose	Neutral	Slightly Support	Moderately Support	Strongly Support	Mean
Non-muskie	408	7.8%	7.4%	8.6%	46.6%	11.3%	7.1%	11.3%	4.1
Muskie Inc.	382	5.8%	1.3%	2.4%	6.0%	6.0%	14.4%	64.1%	6.0
Other Muskie	227	6.2%	4.8%	5.3%	18.5%	8.8%	15.4%	41.0%	5.3
$\chi^2=331.132$ , Cramer's V=0.403									F=130.221***, $\eta=0.452$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

**Table 2-11: Level of support or opposition for a statewide catch-and-release only regulation for muskie.**

Angler	n	Strongly Oppose	Moderately Oppose	Slightly Oppose	Neutral	Slightly Support	Moderately Support	Strongly Support	Mean
Non-muskie	409	19.3%	9.3%	8.8%	42.1%	6.6%	5.1%	8.8%	3.6
Muskie Inc.	381	17.1%	6.6%	6.8%	14.4%	10.8%	10.5%	33.9%	4.6
Other Muskie	226	21.2%	9.7%	11.5%	15.9%	10.2%	11.9%	19.5%	4.0
$\chi^2=151.479$ , Cramer's V=0.273									F=25.720***, $\eta=0.220$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

**Table 2-12: Level of support or opposition for a ban on spearing in muskie waters.**

Angler	n	Strongly Oppose	Moderately Oppose	Slightly Oppose	Neutral	Slightly Support	Moderately Support	Strongly Support	Mean
Non-muskie	407	13.5%	6.9%	8.1%	38.1%	5.2%	6.4%	21.9%	4.2
Muskie Inc.	381	4.5%	3.1%	1.8%	11.3%	4.5%	5.0%	69.8%	6.0
Other Muskie	226	12.8%	6.2%	6.2%	10.6%	5.8%	11.5%	46.9%	5.1
$\chi^2=229.631$ , Cramer's V=0.336									F=86.031***, $\eta=0.381$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

## Section 2: View of Minnesota Anglers Regarding Muskie

Table 2-13: Level of support or opposition for a closed season for muskie from December 1<sup>st</sup> to June 1<sup>st</sup> starting in the 2007-2008 fishing season.

Angler	n	Strongly Oppose	Moderately Oppose	Slightly Oppose	Neutral	Slightly Support	Moderately Support	Strongly Support	Mean
Non-muskie	410	5.4%	3.2%	5.9%	50.2%	9.8%	9.0%	16.6%	4.5
Muskie Inc.	381	7.3%	3.9%	3.9%	10.2%	4.7%	15.7%	54.1%	5.6
Other Muskie	227	7.9%	4.8%	3.1%	16.7%	10.1%	22.9%	34.4%	5.2
$\chi^2=240.451$ , Cramer's V=0.344									F=42.679***, $\eta=0.279$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 2-14: Muskie fishing opportunities should be increased by stocking them in “new” waters.

Angler	n	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree	Mean
Non-muskie	408	16.2%	10.3%	10.3%	29.9%	18.1%	8.8%	6.4%	3.8
Muskie Inc.	379	2.6%	1.3%	0.5%	7.7%	11.1%	16.6%	60.2%	6.1
Other Muskie	227	10.6%	4.8%	9.3%	22.0%	16.7%	14.5%	22.0%	4.6
$\chi^2=359.801$ , Cramer's V=0.421									F=205.883***, $\eta=0.538$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 2-15: Muskie DO NOT have negative impacts on other game fish.

Angler	n	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree	Mean
Non-muskie	407	16.2%	14.5%	19.4%	34.9%	8.1%	5.7%	1.2%	3.3
Muskie Inc.	379	2.6%	2.4%	5.8%	9.5%	9.2%	27.7%	42.7%	5.7
Other Muskie	227	10.6%	10.6%	14.1%	23.8%	9.3%	15.0%	16.7%	4.2
$\chi^2=381.623$ , Cramer's V=0.434									F=237.343***, $\eta=0.565$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 2-16: Muskie have negative effects on walleye populations.

Angler	n	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree	Mean
Non-muskie	406	6.7%	5.7%	6.2%	40.1%	21.2%	11.1%	9.1%	4.3
Muskie Inc.	381	42.3%	19.4%	8.9%	11.5%	6.0%	5.2%	6.6%	2.6
Other Muskie	227	15.4%	9.7%	11.9%	25.1%	18.5%	11.5%	7.9%	3.9
$\chi^2=263.353$ , Cramer's V=0.360									F=100.763***, $\eta=0.408$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

## Section 2: View of Minnesota Anglers Regarding Muskie

Table 2-17: Muskie fishing opportunities bring too much attention to some lakes and rivers in Minnesota.

Angler	n	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree	Mean
Non-muskie	406	4.4%	5.7%	14.5%	55.2%	10.1%	4.9%	5.2%	4.0
Muskie Inc.	381	15.5%	8.9%	8.1%	21.0%	22.0%	13.6%	10.8%	4.1
Other Muskie	227	7.5%	8.4%	15.9%	31.3%	18.5%	11.0%	7.5%	4.1
$\chi^2=145.832$ , Cramer's V=0.268									F=0.752 n.s., $\eta=0.039$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 2-18: Muskie are good to have around.

Angler	n	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree	Mean
Non-muskie	402	5.7%	3.2%	6.7%	41.3%	21.1%	14.9%	7.0%	4.4
Muskie Inc.	381	1.0%	0.0%	0.3%	5.2%	5.8%	20.2%	67.5%	6.5
Other Muskie	226	1.3%	1.8%	2.2%	17.3%	19.9%	23.5%	34.1%	5.6
$\chi^2=413.535$ , Cramer's V=0.453									F=255.481***, $\eta=0.580$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 2-19: Muskie should NOT be stocked into waters where there is already a naturally reproducing population.

Angler	n	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree	Mean
Non-muskie	408	2.2%	3.4%	6.6%	30.9%	23.3%	16.2%	17.4%	4.9
Muskie Inc.	381	18.4%	13.6%	17.6%	28.3%	10.2%	6.6%	5.2%	3.4
Other Muskie	226	7.1%	11.1%	14.6%	20.8%	19.0%	8.8%	18.6%	4.3
$\chi^2=172.729$ , Cramer's V=0.292									F=83.271***, $\eta=0.376$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 2-20: If competitive muskie tournaments are allowed in Minnesota, they should only be for immediate catch-and-release.

Angler	n	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree	Mean
Non-muskie	408	3.9%	3.4%	5.1%	28.4%	11.3%	14.0%	33.8%	5.2
Muskie Inc.	381	1.6%	0.3%	0.3%	2.9%	2.1%	8.9%	84.0%	6.7
Other Muskie	227	2.2%	1.3%	0.9%	4.8%	7.5%	12.3%	70.9%	6.3
$\chi^2=263.899$ , Cramer's V=0.360									F=124.321***, $\eta=0.444$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

## Section 2: View of Minnesota Anglers Regarding Muskie

Table 2-21: In Non-muskie muskie will decrease the quality of other fishing opportunities

Angler	n	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree	Mean
Non-muskie	407	4.2%	5.4%	11.3%	41.5%	18.7%	7.6%	11.3%	4.3
Muskie Inc.	381	63.3%	16.3%	8.1%	5.8%	2.1%	2.1%	2.4%	1.8
Other Muskie	226	23.9%	10.2%	17.3%	29.2%	11.1%	3.1%	5.3%	3.2
$\chi^2=450.392$ , Cramer's V=0.471									F=274.053***, $\eta=0.593$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 2-22: I think it is very positive to have healthy populations of muskie in our lakes.

Angler	n	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree	Mean
Non-muskie	405	6.9%	4.2%	5.7%	39.8%	23.0%	14.6%	5.9%	4.4
Muskie Inc.	382	0.5%	0.3%	0.3%	3.4%	7.1%	24.3%	64.1%	6.5
Other Muskie	227	2.6%	1.8%	4.0%	20.7%	20.7%	22.5%	27.8%	5.3
$\chi^2=424.334$ , Cramer's V=0.457									F=267.641***, $\eta=0.588$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 2-23: Muskie are an important game fish in Minnesota.

Angler	n	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree	Mean
Non-muskie	408	5.6%	2.7%	2.9%	31.6%	24.3%	21.8%	11.0%	4.8
Muskie Inc.	380	0.5%	0.5%	0.0%	1.1%	3.4%	13.4%	81.1%	6.7
Other Muskie	227	0.9%	0.9%	2.2%	9.3%	15.9%	29.1%	41.9%	5.9
$\chi^2=464.123$ , Cramer's V=0.478									F=262.991***, $\eta=0.585$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 2-24: Muskie have negative effects on northern pike populations.

Angler	n	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree	Mean
Non-muskie	408	3.7%	4.2%	10.8%	55.6%	16.4%	5.6%	3.7%	4.1
Muskie Inc.	381	39.1%	18.9%	8.1%	21.5%	5.8%	3.7%	2.9%	2.6
Other Muskie	227	13.2%	11.5%	17.2%	34.4%	11.9%	6.6%	5.3%	3.6
$\chi^2=268.915$ , Cramer's V=0.364									F=105.336***, $\eta=0.415$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

## Section 2: View of Minnesota Anglers Regarding Muskie

Table 2-25: It is good to have muskie in a lake or river.

Angler	n	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree	Mean
Non-muskie	407	6.1%	2.9%	4.2%	44.2%	20.9%	15.7%	5.9%	4.4
Muskie Inc.	380	1.1%	0.0%	0.3%	6.6%	5.3%	23.4%	63.4%	6.4
Other Muskie	226	0.9%	1.3%	2.2%	22.6%	20.4%	22.1%	30.5%	5.5
$\chi^2=399.192$ , Cramer's V=0.444									F=243.803***, $\eta=0.571$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 2-26: Muskie tournaments conflict with trying to manage for trophy muskie fishing.

Angler	n	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree	Mean
Non-muskie	407	4.2%	5.7%	12.5%	50.9%	9.8%	8.8%	8.1%	4.2
Muskie Inc.	381	22.3%	17.8%	9.4%	22.0%	10.0%	9.7%	8.7%	3.4
Other Muskie	227	11.5%	5.3%	14.5%	25.1%	16.7%	13.2%	13.7%	4.2
$\chi^2=160.791$ , Cramer's V=0.281									F=23.545***, $\eta=0.211$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 2-27: Muskie anglers are disruptive to other anglers.

Angler	n	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree	Mean
Non-muskie	407	12.0%	12.8%	15.2%	48.6%	5.7%	1.0%	4.7%	3.4
Muskie Inc.	382	63.1%	18.3%	5.2%	6.5%	2.4%	2.6%	1.8%	1.8
Other Muskie	227	38.3%	15.0%	13.7%	20.7%	6.2%	4.0%	2.2%	2.6
$\chi^2=315.535$ , Cramer's V=0.394									F=121.675***, $\eta=0.440$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 2-28: Too many muskie in a lake can cause muskie to be stunted.

Angler	n	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree	Mean
Non-muskie	407	1.5%	3.7%	4.9%	61.4%	13.3%	9.1%	6.1%	4.3
Muskie Inc.	382	10.5%	8.1%	8.6%	32.7%	17.5%	12.6%	9.9%	4.2
Other Muskie	227	7.0%	2.2%	6.2%	40.5%	22.0%	15.4%	6.6%	4.4
$\chi^2=96.526$ , Cramer's V=0.218									F=2.465 n.s., $\eta=0.070$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

## **Section 3: Muskie Anglers**

### ***Background***

On average, Muskies Inc. respondents began muskie fishing at a slightly but significantly older age ( $\bar{x}$  =28.1 years) compared to other muskie anglers ( $\bar{x}$  =27.2 years) (Table 3-1). However, Muskies Inc. respondents had spent significantly more years fishing muskie anywhere ( $\bar{x}$  =16.9 years) compared to other muskie anglers ( $\bar{x}$  =13.9), although there was no difference in the average number of years of muskie fishing in Minnesota (Table 3-2). Muskies Inc. anglers fished nearly three times as many days for muskie ( $\bar{x}$  =29.3) as other muskie anglers did ( $\bar{x}$  =10.9) (Table 3-3), and caught over twice the number of muskie during the year (Table 3-4). However, there was no significant difference between the Muskie Inc. and other muskie anglers in average number of muskies caught per day of muskie angling.

### ***Muskie Fishing Techniques***

A significantly smaller proportion of Muskies Inc. respondents reported using live bait to fish for muskies, compared to other muskie anglers (Table 3-5). Similarly, a larger proportion of Muskies Inc. respondents reported using artificial lures (Table 3-7). The mean use of trolling as a technique for muskie angling did not differ between Muskie Inc. and other muskie anglers (Table 3-6). The majority of both Muskie Inc. and other muskie anglers fished with one partner, but twice as many Muskies Inc. respondents reported fishing alone (16.3%) on a typical trip to fish for muskie compared to other muskie anglers (8.0%) (Table 3-8).

### ***Muskie Fishing Success and Trophy Size***

There was no significant difference between Muskies Inc. and other muskie anglers in what defined a successful day of muskie fishing. Most Muskie Inc. and other muskie anglers defined as successful day of muskie fishing as either “just have to be fishing for muskie” or “a muskie has to follow my lure or bait” (Table 3-9). Other muskie anglers defined a trophy-sized muskie one-inch smaller ( $\bar{x}$  =48.4”) than Muskies Inc. anglers did ( $\bar{x}$  =49.4”) (Table 3-10).

### ***Satisfaction***

Compared to other muskie anglers, Muskies Inc. respondents were significantly more satisfied with (a) the overall muskie fishing experience in Minnesota (Table 3-11), (b) the size of the muskie they caught (Table 3-12), and (c) the number of muskie that they caught (Table 3-13). However, they were less satisfied than other muskie anglers with the number of places you can fish for muskie in Minnesota (Table 3-14).



## **Section 3: Muskie Anglers**

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### ***Investment in Muskie Fishing***

Compared to other muskie anglers, Muskies Inc. respondents reported having significantly more money invested in equipment used specifically to fish for muskie (Table 3-17). They also reported spending significantly more on muskie angling in Minnesota in the past year (Table 3-18).

### ***Personal Reasons Behind Muskie Angling***

Muskies Inc. respondents rated a number of motivations for muskie angling as significantly more important than other muskie anglers did, including: (a) the personal challenge of catching a muskie (Table 3-19), (b) catching and releasing a trophy muskie (Table 3-20), (c) the sense of accomplishment from landing a muskie (Table 3-22), (d) the lure of fishing for a legendary game fish (Table 3-23), and (e) building a reputation as a muskie angler (Table 3-26). Other muskie anglers rated two items significantly more important (although both items were rated unimportant overall by respondents in both strata); these were: (a) catching and keeping a trophy muskie (Table 3-21) and (b) catching and eating a muskie (Table 3-25). There was no significant difference between the two strata in the importance of the emotional excitement of catching a large muskie (Table 3-24).

### ***Likelihood of Fishing for Muskie in Minnesota in the Next Year***

More than nine of 10 Muskies Inc. respondents indicated that it was very likely that they would fish for muskie in Minnesota in the next year, compared to 58.0% of other muskie anglers and 3.3% of Non-muskie anglers (Table 3-27).

### Section 3: Muskie Anglers

Table 3-1: Age when began muskie fishing

Muskie Angler	n	Age
Muskie Inc.	372	28.1
Other Muskie	226	27.2
F=0.649**, $\eta=0.033$		

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 3-2: Number of years spent muskie fishing

Muskie Angler	n	Anywhere	n	% of life fishing muskies	n	Minnesota	n	% of life in MN fishing muskies
Muskie Inc.	319	16.9	316	36.2%	372	14.1	359	46.5%
Other Muskie	180	13.9	178	29.3%	225	14.1	215	35.1%
F=6.915**, $\eta=0.117$				F=.000 n.s., $\eta=0.001$				

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 3-3: Days spent muskie fishing in Minnesota in typical year

Muskie Angler	n	Days
Muskie Inc.	372	29.3
Other Muskie	226	10.9
F=86.230***, $\eta=0.356$		

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 3-4: Number of muskie caught in a typical year

Muskie Angler	n	Fish	n	Fish/day
Muskie Inc.	370	8.6	242	0.30
Other Muskie	222	3.5	134	0.42
F=31.280***, $\eta=0.224$		F=3.429 n.s.		

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 3-5: Livebait use in muskie fishing

Muskie Angler	n	Never	Seldom	Sometimes	Most Times	Always	Mean
Muskie Inc.	373	78.6%	16.1%	5.4%	0.0%	0.0%	1.3
Other Muskie	224	73.2%	13.4%	9.8%	2.2%	1.3%	1.5
$\chi^2=18.472$ **, Cramer's V=0.176							F=9.986**, $\eta=0.128$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

### Section 3: Muskie Anglers

Table 3-6: Trolling for muskie expressed

Muskie Angler	n	Never	Seldom	Sometimes	Most Times	Always	Mean
Muskie Inc.	373	8.0%	25.5%	57.4%	8.0%	1.1%	2.7
Other Muskie	225	17.3%	25.8%	38.2%	14.7%	4.0%	2.6
$\chi^2=32.141^{***}$ , Cramer's V=0.232							F=.723 n.s. $\eta=0.035$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 3-7: Artificial lure use in muskie fishing

Muskie Angler	n	Never	Seldom	Sometimes	Most Times	Always	Mean
Muskie Inc.	374	0.3%	0.0%	1.6%	25.7%	72.5%	4.7
Other Muskie	224	0.9%	0.9%	6.7%	33.0%	58.5%	4.5
$\chi^2=21.523^{***}$ , Cramer's V=0.190							F=19.236*** $\eta=0.177$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 3-8: Number of fishing partners during a typical muskie fishing trip

Muskie Angler	n	None	One	Two	Three or more
Muskie Inc.	375	16.3%	68.5%	12.5%	2.7%
Other Muskie	225	8.0%	72.4%	15.1%	4.4%
$\chi^2=9.632^*$ , Cramer's V=0.127					

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 3-9: Minimum result for a successful muskie fishing trip

Muskie Angler	n	Just have to be fishing for muskie	A muskie has to follow lure/bait	Have to have at least one muskie on or hooked	Must land or catch at least one muskie	Must land or catch at trophy muskie
Muskie Inc.	374	38.2%	38.2%	13.6%	9.1%	0.8%
Other Muskie	224	34.8%	46.0%	10.3%	8.9%	0.0%
$\chi^2=5.571$ n.s., Cramer's V=0.097						

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

### Section 3: Muskie Anglers

Table 3-10: Minimum length of “trophy-sized” muskie

Muskie Angler	n	Length (inches)
Muskie Inc.	367	49.4
Other Muskie	214	48.4
$F=6.868^{**}$ , $\eta=0.108$		

\* $p<0.05$ , \*\* $p<0.01$ , \*\*\* $p<0.001$

Table 3-11: Overall muskie fishing experience in Minnesota

Muskie Angler	n	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied	Mean
Muskie Inc.	365	0.8%	7.1%	20.5%	52.6%	18.9%	3.8
Other Muskie	217	1.4%	9.2%	30.9%	53.5%	5.1%	3.5
$\chi^2=26.088^{***}$ , Cramer’s V=0.212							$F=17.936^{***}$ , $\eta=0.173$

\* $p<0.05$ , \*\* $p<0.01$ , \*\*\* $p<0.001$

Table 3-12: Size of muskie caught

Muskie Angler	n	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied	Mean
Muskie Inc.	358	2.5%	7.5%	27.4%	47.8%	14.8%	3.6
Other Muskie	211	7.1%	12.3%	39.3%	35.5%	5.7%	3.2
$\chi^2=30.120^{***}$ , Cramer’s V=0.230							$F=29.958^{***}$ , $\eta=0.224$

\* $p<0.05$ , \*\* $p<0.01$ , \*\*\* $p<0.001$

Table 3-13: Number of muskie caught

Muskie Angler	n	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied	Mean
Muskie Inc.	358	4.2%	20.7%	35.5%	33.2%	6.4%	3.2
Other Muskie	212	11.8%	18.9%	37.7%	28.8%	2.8%	2.9
$\chi^2=15.593^{**}$ , Cramer’s V=0.165							$F=8.507^{**}$ , $\eta=0.121$

\* $p<0.05$ , \*\* $p<0.01$ , \*\*\* $p<0.001$

### Section 3: Muskie Anglers

Table 3-14: Number of muskie angling opportunities

Muskie Angler	n	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied	Mean
Muskie Inc.	365	11.5%	22.7%	20.0%	31.0%	14.8%	3.1
Other Muskie	217	5.5%	16.1%	25.3%	42.4%	10.6%	3.4
$\chi^2=16.806^{**}$ , Cramer's V=0.170							F=4.550*, $\eta=0.088$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 3-15: Membership in an organized muskie angling group

Muskie Angler	n	Yes
Muskie Inc.	343	97.7%
Other Muskie	219	5.9%
$\chi^2=477.001^{***}$ , Cramer's V=0.921		

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 3-16: Interest level in joining organized muskie angling group

Muskie Angler	n	Not at all	Slightly interested	Moderately interested	Very interested
Other Muskie	201	61.2%	27.4%	9.5%	2.0%

Table 3-17: Amount invested in equipment specifically for muskie fishing

Muskie Angler	n	<\$100	\$100-500	\$500-\$999	\$1000-\$1999	\$2000-\$4999	\$5000-\$9999	\$10000 +
Muskie Inc.	375	2.7%	10.7%	10.1%	17.9%	32.0%	18.1%	8.5%
Other Muskie	225	18.2%	43.6%	14.2%	11.1%	7.1%	2.2%	3.6%
$\chi^2=185.288^{***}$ , Cramer's V=0.556								

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 3-18: Amount spent in past year specifically to fish for muskie in Minnesota (Includes: trips, equipment, licenses, bait, etc.)

Muskie Angler	n	<\$100	\$100-500	\$500-\$999	\$1000-\$1999	\$2000-\$4999	\$5000-\$9999	\$10000 +
Muskie Inc.	374	10.4%	19.5%	17.9%	21.9%	22.7%	5.1%	2.4%
Other Muskie	221	38.9%	30.3%	13.6%	10.0%	6.3%	0.5%	0.5%
$\chi^2=111.339^{***}$ , Cramer's V=0.306								

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

### Section 3: Muskie Anglers

Table 3-19: Personal challenge of catching a muskie

Muskie Angler	n	Very Unimportant	Unimportant	Somewhat Unimportant	Neither	Somewhat Important	Important	Very Important	Mean
Muskie Inc.	376	0.3%	1.1%	1.1%	3.2%	14.4%	34.6%	45.5%	6.2
Other Muskie	224	1.8%	0.9%	4.0%	6.7%	22.8%	38.8%	25.0%	5.6
$\chi^2=37.167^{***}$ , Cramer's V=0.176									F=15.147 <sup>***</sup> , $\eta=0.220$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 3-20: Catching and releasing a trophy muskie

Muskie Angler	n	Very Unimportant	Unimportant	Somewhat Unimportant	Neither	Somewhat Important	Important	Very Important	Mean
Muskie Inc.	377	0.5%	0.5%	1.3%	1.3%	10.1%	24.7%	61.5%	6.4
Other Muskie	224	2.2%	3.1%	3.1%	10.3%	13.4%	31.3%	36.6%	5.7
$\chi^2=57.478^{***}$ , Cramer's V=0.218									F=25.105 <sup>***</sup> , $\eta=0.278$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 3-21: Catching and keeping a trophy muskie

Muskie Angler	n	Very Unimportant	Unimportant	Somewhat Unimportant	Neither	Somewhat Important	Important	Very Important	Mean
Muskie Inc.	377	74.0%	11.7%	3.4%	4.5%	2.1%	2.4%	1.9%	1.6
Other Muskie	224	43.3%	22.3%	6.7%	8.0%	12.5%	4.5%	2.7%	2.5
$\chi^2=107.311^{***}$ , Cramer's V=0.299									F=27.027 <sup>***</sup> , $\eta=0.288$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 3-22: Sense of accomplishment from landing a muskie

Muskie Angler	n	Very Unimportant	Unimportant	Somewhat Unimportant	Neither	Somewhat Important	Important	Very Important	Mean
Muskie Inc.	377	1.1%	1.1%	.5%	3.4%	12.2%	40.8%	40.8%	6.1
Other Muskie	224	1.3%	1.3%	3.6%	6.3%	18.8%	40.2%	28.6%	5.7
$\chi^2=21.914^*$ , Cramer's V=0.135									F=7.085 <sup>**</sup> , $\eta=0.152$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

### Section 3: Muskie Anglers

Table 3-23: Lure of fishing for a legendary gamefish

Muskie Angler	n	Very Unimportant	Unimportant	Somewhat Unimportant	Neither	Somewhat Important	Important	Very Important	Mean
Muskie Inc.	377	1.1%	1.1%	1.3%	12.5%	17.0%	33.7%	33.4%	5.8
Other Muskie	224	1.8%	3.6%	2.2%	10.7%	26.3%	32.6%	22.8%	5.5
$\chi^2=19.918$ n.s., Cramer's V=0.129									F=5.196**, $\eta=0.131$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 3-24: Emotional excitement from catching a large muskie

Muskie Angler	n	Very Unimportant	Unimportant	Somewhat Unimportant	Neither	Somewhat Important	Important	Very Important	Mean
Muskie Inc.	373	0.3%	0.0%	0.0%	3.2%	9.4%	30.0%	57.1%	6.4
Other Muskie	223	0.9%	0.9%	0.4%	3.1%	10.8%	33.2%	50.7%	6.2
$\chi^2=8.723$ n.s., Cramer's V=0.085									F=2.289 n.s., $\eta=0.087$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 3-25: Catching and eating a muskie

Muskie Angler	n	Very Unimportant	Unimportant	Somewhat Unimportant	Neither	Somewhat Important	Important	Very Important	Mean
Muskie Inc.	376	94.4%	3.7%	0.5%	0.5%	0.3%	0.3%	0.3%	1.1
Other Muskie	224	76.3%	12.5%	1.3%	7.1%	1.3%	0.4%	0.9%	1.5
$\chi^2=46.100$ ***, Cramer's V=0.196									F=16.700***, $\eta=0.230$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 3-26: Building a reputation as a muskie angler

Muskie Angler	n	Very Unimportant	Unimportant	Somewhat Unimportant	Neither	Somewhat Important	Important	Very Important	Mean
Muskie Inc.	378	22.5%	13.8%	5.6%	17.7%	20.9%	9.8%	9.8%	3.7
Other Muskie	224	34.4%	19.6%	6.7%	25.9%	8.0%	3.6%	1.8%	2.7
$\chi^2=55.308$ ***, Cramer's V=0.214									F=19.482***, $\eta=0.247$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

### Section 3: Muskie Anglers

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Table 3-27: Likelihood of fishing for muskie in Minnesota during the next year

Muskie Angler	n	Not At All Likely	Slightly Likely	Moderately Likely	Very Likely	Mean
Non-muskie	424	66.0%	25.7%	5.0%	3.3%	1.5
Muskie Inc.	381	2.1%	3.7%	3.4%	90.8%	3.8
Other Muskie	226	3.5%	14.6%	23.9%	58.0%	3.4
$\chi^2=823.808^{***}$ , Cramer's V=0.632						F=1208.346 <sup>***</sup> , $\eta=0.838$

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001



## **Section 4: Demographic Information**

Respondents from the three study strata did not differ significantly in age. However, respondents from Muskies Inc. had lived fewer years (Table 4-2) and a smaller proportion (Table 4-3) of their lives in Minnesota. Non-muskie anglers and respondents from Muskies Inc. included a greater proportion of women (Table 4-4). Muskies Inc. respondents reported higher average household incomes, followed by other muskie anglers, then Non-muskie anglers (Table 4-5).

## Section 4: Demographic Information

Table 4-1: Birth year

Angler	n	Average Age
Non-muskie	428	48.0
Muskie Inc.	380	46.1
Other Muskie	222	46.0
F=2.269 n.s., $\eta=0.066$		

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 4-2: Length of residency in Minnesota

Angler	n	Average Residency Time (years)
Non-muskie	419	41.9
Muskie Inc.	370	37.9
Other Muskie	217	41.2
F=5.885**, $\eta=0.108$		

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 4-3: Percent of life living in Minnesota

Angler	n	%
Non-muskie	416	88.3%
Muskie Inc.	368	82.6%
Other Muskie	216	90.5%
F=7.776***, $\eta=0.124$		

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 4-4: Gender

Angler	n	Male	Female
Non-muskie	429	82.1%	17.9%
Muskie Inc.	381	85.0%	15.0%
Other Muskie	225	93.3%	6.7%
$\chi^2=15.400$ ***, Cramer's V=0.122			

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

Table 4-5: Annual household income from all sources, before taxes, in 2006 (estimated to nearest \$10,000).

Angler	n	Annual Household Income
Non-muskie	363	\$70,202.30
Muskie Inc.	333	\$89,649.01
Other Muskie	194	\$79,226.98
F=9.471***, $\eta=0.145$		

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

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## **Appendix A: Survey Instrument**

# MANAGING MUSKIE IN MINNESOTA



A cooperative study conducted by the University of Minnesota for the Minnesota  
Department of Natural Resources

**Your help on this study is greatly appreciated!**

Please return your completed questionnaire in the enclosed envelope. The envelope is self-addressed and no postage is required. Thanks!

Minnesota Cooperative Fish and Wildlife Research Unit,  
Department of Fisheries, Wildlife and Conservation Biology  
University of Minnesota  
St. Paul, Minnesota 55108

**Q1. Approximately how many total days did you fish in Minnesota last year (Mar. 1, 2006 to Feb. 1, 2007)?**

\_\_\_\_\_ DAYS

**Q2. We would like to know which fish are most popular with Minnesotans. How many days did you fish for each of these species in Minnesota last year (March 1, 2006 and Feb.1, 2007)?**

	Estimated Number of Days
Muskellunge	_____
Northern Pike	_____
Walleye	_____
Yellow Perch	_____
Crappie	_____
Sunfish	_____
Bass-Smallmouth or Largemouth	_____
Catfish	_____
Lake Trout	_____
Stream Trout (brookies, browns, rainbows)	_____

**Q3. Do you ever participate in spearing fish in Minnesota?**

- NEVER
- SELDOM
- OCCASIONALLY
- FREQUENTLY

**Q4. Did you participate in spearing in Minnesota during the past 12 months?**

- YES → If yes report the number of days you went in the past 12 months \_\_\_\_\_
- NO

**Q5. Do you ever ice fish in Minnesota?**

- NEVER
- SELDOM
- OCCASIONALLY
- FREQUENTLY


**Q6. Did you participate in ice fishing in Minnesota during the past 12 months?**

- YES → If yes report the number of days you went in the past 12 months \_\_\_\_\_
- NO

**Q7. How satisfied or dissatisfied were you in the past year (March 1, 2006 to Feb. 1, 2007) with the following:**

<i>(Circle one for each statement.)</i>	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
The overall fishing experience you had in Minnesota	1	2	3	4	5
The size of the fish you caught	1	2	3	4	5
The number of fish you caught	1	2	3	4	5
The behavior of other anglers	1	2	3	4	5
The behavior of non-anglers	1	2	3	4	5
Access at lakes/streams	1	2	3	4	5

**Q8. Have you ever fished specifically for muskie in Minnesota?**

- YES → COMPLETE Q9 THRU Q23 ONLY IF YOU FISH FOR MUSKIE
- NO → PLEASE SKIP TO  **Q23 ON PAGE 6**

**Q9. How old were you when you began fishing for muskie?**

\_\_\_\_\_ years old

**Q10. How many years have you fished for muskie:**

Anywhere? \_\_\_\_\_ years

In Minnesota ? \_\_\_\_\_ years

**Q11. In the typical year how many days do you spend fishing specifically for muskie in Minnesota?**  
 \_\_\_\_\_ days

**Q12. How many muskie do you catch in a typical year in Minnesota?**  
 \_\_\_\_\_ number of muskie/year

**Q13. Please tell us how you typically fish for muskie in Minnesota . (Circle one for each.)**

	NEVER	SELDOM	SOMETIMES	MOST OF THE TIME	ALWAYS
↓ How often do you use livebait to fish for muskie?	1	2	3	4	5
How often do you use trolling as a technique to fish for muskie?	1	2	3	4	5
How often do you use artificial lures to fish for muskie?	1	2	3	4	5

**Q14. On a typical trip to fish for muskie, how many other people do you fish with?**

- FISH BY MYSELF
- ONE OTHER PERSON
- A COUPLE OF OTHER PEOPLE
- 3 OR MORE PEOPLE

**Q15. When you go fishing for muskie, what has to happen for you to consider that day of fishing successful? (Check one.)**

- JUST HAVE TO BE FISHING FOR MUSKIE
- A MUSKIE HAS TO FOLLOW MY LURE OR BAIT
- I HAVE TO HAVE AT LEAST ONE MUSKIE ON OR HOOKED
- I MUST LAND OR CATCH AT LEAST ONE MUSKIE
- I MUST LAND OR CATCH A “TROPHY” MUSKIE

**Q16. How large does a muskie have to be for you to consider it “trophy-sized”? Please write in the length in inches below:**

A minimum of \_\_\_\_\_ inches in length



**Q17. How satisfied or dissatisfied were you with each of the following factors related to muskie fishing in Minnesota from March 1, 2006 through February 2007?**

<i>(Circle one for each statement.)</i>	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied
Overall muskie fishing experience you had in Minnesota	1	2	3	4	5
The size of the muskie you caught.	1	2	3	4	5
The number of muskie you caught.	1	2	3	4	5
The number of places you can fish for muskie in Minnesota	1	2	3	4	5

**Q18. Do you belong to an organized muskie angling group?**

- YES → **IF YES WHICH GROUP(S) (check all that apply)**
  - MUSKIES, INC.
  - OTHER GROUP \_\_\_\_\_
- NO → **IF NO, HOW INTERESTED ARE YOU IN JOINING AN ORGANIZED MUSKIE ANGLING GROUP? (check one)**
  - NOT AT ALL
  - SLIGHTLY INTERESTED
  - MODERATELY INTERESTED
  - VERY INTERESTED

**Q19. What benefits do you think there are in belonging to a muskie angling group or Muskie Inc.?**

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_

**Q20. How much have you invested in equipment specifically to fish for muskie? (DO NOT INCLUDE ANY BOATS OR VEHICLES)**

- < \$100
- \$100 to \$500
- \$500 to \$999
- \$1000 TO \$1999
- \$2000 TO \$4999
- \$5,000 TO \$9,999
- \$10,000 OR MORE

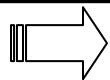
**Q21. During the past year how much money did you spend specifically to fish for muskie in Minnesota? (Please include expenses for trips, equipment, licenses, bait, etc.)**

- |   |   |
|---|---|
| <input type="checkbox"/> < \$100          | <input type="checkbox"/> \$2000 TO \$4999 |
| <input type="checkbox"/> \$100 to \$500   | <input type="checkbox"/> \$5000 to \$9999 |
| <input type="checkbox"/> \$500 to \$999   | <input type="checkbox"/> \$10,000 OR MORE |
| <input type="checkbox"/> \$1000 to \$1999 |   |

**Q22. We are interested in knowing why you choose to fish for muskie.**

For each of the reasons listed below please indicate how important that reason is for fishing for muskie to you personally. (check one)

	Very Unimportant	Unimportant	Somewhat Unimportant	Neither	Somewhat Important	Important	Very Important
The personal challenge of catching a muskie.	1	2	3	4	5	6	7
Catching and <b>releasing</b> a trophy muskie.	1	2	3	4	5	6	7
Catching and <b>keeping</b> a trophy muskie	1	2	3	4	5	6	7
The sense of accomplishment from landing a muskie	1	2	3	4	5	6	7
The lure of fishing for a legendary game fish.	1	2	3	4	5	6	7
The emotional excitement of catching a large muskie.	1	2	3	4	5	6	7
Catching and <b>eating</b> a muskie.	1	2	3	4	5	6	7
Building a reputation as a muskie angler.	1	2	3	4	5	6	7



**Q23 IS BELOW—EVERYONE PLEASE COMPLETE ALL REMAINING QUESTIONS**

**Q23. How likely is it that you will fish for muskie in Minnesota during the next year (Check one.)**

- NOT AT ALL LIKELY
- SLIGHTLY LIKELY
- MODERATELY LIKELY
- VERY LIKELY

**Q24. How interested are you in fishing for muskie in Minnesota in the future? (Check one.)**

- NOT AT ALL INTERESTED
- SLIGHTLY INTERESTED
- MODERATELY INTERESTED
- VERY INTERESTED

**Q25. How important do you think muskie fishing opportunities are to attracting non-residents to Minnesota as a destination to fish? (Check one.)**

- NOT AT ALL IMPORTANT
- SLIGHTLY IMPORTANT
- MODERATELY IMPORTANT
- VERY IMPORTANT

**Q26. How important do you think muskie fishing opportunities are to attracting residents from other areas of Minnesota to muskie waters as a destination to fish? (Check one.)**

- NOT AT ALL IMPORTANT
- SLIGHTLY IMPORTANT
- MODERATELY IMPORTANT
- VERY IMPORTANT

**Q27. In Non-muskie would you say there are TOO FEW, the RIGHT AMOUNT or TOO MANY places to fish for muskie in Minnesota (Check one.)**

- WAY TOO FEW
- TOO FEW
- ABOUT THE RIGHT AMOUNT
- TOO MANY
- WAY TOO MANY

**Q28. For each question below please circle one response that best represents how you feel.**

**To what extent would you SUPPORT or OPPOSE expanding the current level of opportunities to fish for muskie....**  
*(Circle one for each.)*

	Strongly Oppose	Moderately Oppose	Slightly Oppose	Neutral	Slightly Support	Moderately Support	Strongly Support
In Minnesota in general	1	2	3	4	5	6	7
In Northeast Minnesota	1	2	3	4	5	6	7
In Northwest Minnesota	1	2	3	4	5	6	7
In Southwest Minnesota	1	2	3	4	5	6	7

**Q29. Currently the statewide minimum size limit on muskie is 40". During the 2006-2007 fishing season, a 48" inch minimum size limit was in place on 6 lakes/ivers in Minnesota. In 2007-2008 a new experimental/special regulation extends the 48" minimum size limit for muskie to additional waters. We are interested in knowing what you think should be done with muskie size limits and other regulations in the future.**

**Would you SUPPORT or OPPOSE the following management regulations for muskie? (Circle one response for each)**

	Strongly Oppose	Moderately Oppose	Slightly Oppose	Neutral	Slightly Support	Moderately Support	Strongly Support
Maintaining a statewide 40" size limit with 48" size limits in some waters and catch-and-release regulations in a few select areas.	1	2	3	4	5	6	7
Increasing the statewide minimum size limit of 40" to 48" for muskie on all waters?	1	2	3	4	5	6	7
A statewide catch-and-release only regulation for muskie?	1	2	3	4	5	6	7
A ban on spearing in muskie waters?	1	2	3	4	5	6	7
Beginning 2007-2008, the muskie season will be closed between December 1 and June 1, do you support or oppose this new regulation?	1	2	3	4	5	6	7

**Q30. Next we have a few questions about your beliefs concerning muskie and their effect on other fisheries.**

**For each statement please indicate whether or not you AGREE or DISAGREE with the statement.**  
*(Please circle one response for each.)*

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
A. Muskie fishing opportunities should be increased by stocking them in "new" waters.	1	2	3	4	5	6	7
B. Muskie DO NOT have negative impacts on other game fish.	1	2	3	4	5	6	7
C. Muskie have negative effects on walleye	1	2	3	4	5	6	7

**For each statement please indicate whether or not you AGREE or DISAGREE with the statement. (Please circle one response for each.)**

Strongly Disagree	Moderately Disagree	Slightly Disagree	Neutral	Slightly Agree	Moderately Agree	Strongly Agree
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populations.							
D. Muskie fishing opportunities bring too much attention to some lakes and rivers in Minnesota.	1	2	3	4	5	6	7
E. Muskie are good to have around.	1	2	3	4	5	6	7
F. Muskie should NOT be stocked into waters where there is already a naturally reproducing population.	1	2	3	4	5	6	7
G. If competitive muskie tournaments are allowed in Minnesota, they should only be for immediate catch-and-release.	1	2	3	4	5	6	7
H. In general muskie will decrease the quality of other fishing opportunities	1	2	3	4	5	6	7
I. I think it is very positive to have healthy populations of muskie in our lakes.	1	2	3	4	5	6	7
J. Muskie are an important game fish in Minnesota.	1	2	3	4	5	6	7
K. Muskie have negative effects on northern pike populations.	1	2	3	4	5	6	7
L. It is good to have muskie in a lake or river.	1	2	3	4	5	6	7
M. Muskie tournaments conflict with trying to manage for trophy muskie fishing.	1	2	3	4	5	6	7
N. Muskie anglers are disruptive to other anglers.	1	2	3	4	5	6	7
O. Too many muskie in a lake can cause muskie to be stunted.	1	2	3	4	5	6	7

**Q31. For each experience below, please tell us how important that experience is to your overall satisfaction with fishing in Minnesota.**

Experience <i>(Please circle one response for each)</i>	Very Unimportant	Unimportant	Somewhat Unimportant	Neither	Somewhat Important	Important	Very Important
Being with friends	1	2	3	4	5	6	7
Being alone	1	2	3	4	5	6	7
Competing with friends who fish	1	2	3	4	5	6	7
Being around other anglers	1	2	3	4	5	6	7
Using your fishing equipment	1	2	3	4	5	6	7
The size of the fish you catch	1	2	3	4	5	6	7
Learning about nature	1	2	3	4	5	6	7
Relaxing	1	2	3	4	5	6	7
Catching fish	1	2	3	4	5	6	7
Getting exercise	1	2	3	4	5	6	7
Enjoying nature and the outdoors	1	2	3	4	5	6	7
Catching some fish to eat	1	2	3	4	5	6	7
Sharing your skills & knowledge with others	1	2	3	4	5	6	7

<b>Experience</b> <i>(Please circle one response for each)</i>	Very Unimportant	Unimportant	Somewhat Unimportant	Neither	Somewhat Important	Important	Very Important
Thinking about your personal values	1	2	3	4	5	6	7
Being in a quiet and peaceful place	1	2	3	4	5	6	7
Visiting areas you've fished in the past	1	2	3	4	5	6	7
Meeting new people	1	2	3	4	5	6	7
Doing something with your family	1	2	3	4	5	6	7
Developing your fishing skills and abilities	1	2	3	4	5	6	7
Giving your mind a rest	1	2	3	4	5	6	7
Fishing in a wilderness setting	1	2	3	4	5	6	7
Getting away from crowds of people	1	2	3	4	5	6	7
Getting away from family for awhile	1	2	3	4	5	6	7
Catching a trophy	1	2	3	4	5	6	7
Releasing fish	1	2	3	4	5	6	7
Catching your limit	1	2	3	4	5	6	7
Catching a particular species of fish	1	2	3	4	5	6	7

**Q32. Do you or a member of your household own a GPS unit that is used for fishing?**

- NO
- YES

**Q33. Do you or a member of your household own an underwater video camera that is used for fishing? (CHECK ONLY ONE)**

- No
- Yes

**Q34. How many fishing clubs/organizations do you belong to? (CHECK ONLY ONE)**

- 1 or 2
- 3 to 5
- more than 5

**Q35. Please estimate how much money you have invested in fishing equipment (DO NOT include boat(s) used primarily for fishing)? (CHECK ONLY ONE)**

- < \$100
- \$100 to \$500
- \$500 to \$999
- \$1000 to \$1999
- \$2000 to \$4999
- \$5000 to \$9999
- \$10,000 or more

**Q36. Do you own a boat specifically for fishing?**

- NO
- YES (please describe the boat in the space below)

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Original purchase price of the boat? \$ \_\_\_\_\_

**Q37. Please estimate how much money you spend each year on fishing (trips, equipment, licenses, bait, etc.) (CHECK ONLY ONE)**

- < \$100
- \$100 to \$500
- \$500 to \$999
- \$1000 to \$1999
- \$2000 to \$4999
- \$5000 to \$9999
- \$10,000 or more

**Q38. How many fishing rods/reels do you own?**

- 1 or 2       3 to 5       6 to 10       more than 10

**Q39. What was your annual household income from all sources, before taxes, in 2006? (Please estimate to the nearest \$10,000).**

\$ \_\_\_\_\_ dollars

**Q40. In what year were you born?**

\_\_\_\_\_ year

**Q41. How many years have you lived in Minnesota?**

\_\_\_\_\_ years

**Q42. What is your gender?**

- MALE  
 FEMALE

**Q43. What is the highest level of education you have completed? (Check one)**

- SOME HIGH SCHOOL  
 GRADUATED HIGH SCHOOL OR GED  
 SOME VOCATION OR TECHNICAL SCHOOL  
 GRADUATE FROM VO-TECH SCHOOL  
 SOME COLLEGE  
 GRADUATED FROM COLLEGE  
 SOME POSTGRAD STUDY  
 POSTGRADUATE DEGREE

**THANK YOU FOR YOUR HELP!**  
**Please return the completed questionnaire in the enclosed self-addressed, stamped envelope.**



## **Appendix B: Nonresponse Postcard**

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During the past few months, we have sent you several survey mailings. We are sending you this postcard because we are concerned that people who did not respond may differ from those who responded. We appreciate your willingness to complete this short survey as we conclude this effort to better understand fishing in Minnesota.

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**Q1. In what year were you born?**

\_\_\_\_\_ (year)

**Q2. What is your gender?**

Male     Female

**Q3. Approximately how many total days did you fish in Minnesota last year (Mar. 1, 2006 to Feb. 1, 2007)?**

\_\_\_\_\_ DAYS

**Q4. Have you ever fished specifically for muskie in Minnesota?**

NO *If no, please return the postcard.*

YES. *If yes, please answer Q5.*

**Q5. How many days did you spend fishing specifically for muskie in Minnesota in the past 12 months?**

\_\_\_\_\_ DAYS