Summative Evaluation of MinnAqua's Angling and Aquatic Education Clinics

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by

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ABSTRACT

MinnAqua, a program of the Minnesota Department of Natural Resource's Division of Fish and Wildlife, strives to educate Minnesota's youth about angling and aquatics and increase their interest and participation in angling. A summative evaluation was carried out to examine the effectiveness of MinnAqua clinics in terms of two evaluation questions: (a) To what extent are MinnAqua clinics meeting their goals? and (b) To what extent does participation in MinnAqua clinics increase children's knowledge of angling and aquatic resources as identified by the MinnAqua key concepts? To answer these questions, pre- and post-surveys were administered to the summer 2005 population of MinnAqua clinic participants ages 8 - 12. Clinics met the four goals measured. However, clinics were most effective in addressing the goal of increasing participants' angling skills. Overall, clinic participants had a statistically significant increase in conceptual knowledge. Girls had a greater increase from pre to post than boys, while prior fishing experience and age did not affect increases in knowledge.

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INTRODUCTION

Minnesota is known for its "10,000 lakes" and the fishing opportunities these waters hold. In 2005, more than 1.4 million individuals fished Minnesota's waters (Minnesota Department of Natural Resources, 2006). The Minnesota Department of Natural Resource's (DNR) Division of Fish and Wildlife is responsible for managing the state's aquatic resources to ensure fishing continues to be a popular recreational activity. In the late 1980's, the Division of Fish and Wildlife recognized the need to educate Minnesota's citizen about the state's aquatic resources, fisheries management, and fishing regulations. From this need, an angling and aquatic education program, called MinnAqua, was created. MinnAqua's mission is to "provide life-long educational programming that will increase people's knowledge and understanding about aquatic ecosystems, management, and resource issues; help acquire skills related to aquatic recreation, careers, and teaching; and foster a better stewardship of the state's natural resources" (Minnesota Department of Natural Resources, 2002).

MinnAqua reaches its mission through a variety of educational outreach activities including educational programs, interpretive displays, educational trunks, publications, a youth activity booklet, and a Leaders' Guide composed of 39 lessons for grades 3 - 5. The MinnAqua staff consists of a Coordinator, four Education Specialists, and one staff member at each area Fisheries office to act as a MinnAqua Liaison by devoting 5% of their time to education outreach. Every summer, MinnAqua also hires nine interns to carryout MinnAqua programs throughout the state.

MinnAqua Clinics

MinnAqua's educational programs range from short activities which introduce people to MinnAqua at large-scale events such as fairs, conservation days, or sports shows to more in-depth programs, called clinics, which can run half a day to multiple days. Clinics take place throughout Minnesota in the summer. They are held at outdoor settings next to a water body so participants can investigate the aquatic environment and practice their fishing skills.

Clinics have five program goals, which address MinnAqua's mission. As a result of participating in a MinnAqua clinic, participants will:

1) Demonstrate basic fishing skills.

2) Explain the importance of fishing rules and regulations in Minnesota.

3) Improve basic aquatic ecology knowledge.

4) Give examples of various behaviors that keep aquatic environments healthy.

5) Display an increased desire to fish in the future.

Clinic content and activities address these five goals. Activities are chosen from the MinnAqua Leaders' Guide. The Leaders' Guide has 39 lessons arranged into six chapters: (1) Aquatic Habitats, (2) Minnesota Fish, (3) Water Stewardship, (4) Fish Management, (5) Fishing Equipment and Skills, and (6) Safety and the Fishing Trip. Clinics include one lesson from each chapter and end with an angling experience where participants can apply what they learned. Each lesson has behavioral objectives which specify what students should be able to do as a result of participating in the activity. MinnAqua programs that do not include one lesson from each of the six chapters and a fishing experience are considered an "event", not a clinic.

Clinics are primarily taught by seasonal interns, although there are also cases in which clinics are led by MinnAqua Education Specialists. In late spring, interns attend a three-day training led by the MinnAqua Coordinator and Education Specialists. At this training, interns learn about the MinnAqua program, practice activities from the Leaders' Guide, discuss MinnAqua's various types of educational outreach, and are introduced to the structure and content of MinnAqua clinics. Once the summer season begins, each intern is assigned to one of the three regions in state (metro, northern Minnesota, or southern Minnesota). Each region has an Education Specialist responsible for overseeing the interns in their region and ensuring they are comfortable with the MinnAqua lessons, types of programming, and structure of clinics.

Clinics are available free of charge to any organization interested in sponsoring a MinnAqua program. Examples of sponsoring organizations include summer school programs, community education, parks and recreation departments, scout troops, and 4H. The sponsoring organization reserves the clinic site and oftentimes provides fishing bait or contributes a monetary donation (MinnAqua suggests a three dollar per participant donation). The donation is used to support the cost of the take-home materials (tackle box, tackle, and youth activity

booklet) participants receive at the end of the clinic. Participants sign up for the clinic through the sponsoring organization.

Evaluation of MinnAqua Clinics

A summative evaluation was carried out to examine the effectiveness of MinnAqua clinics in meeting their goals and measure short-term increases in participants' knowledge of aquatic resources, aquatic stewardship behaviors, and angling. In addition to providing evidence of program effectiveness, MinnAqua wanted to identify possible areas of improvement to increase the effectiveness of future efforts.

The first evaluation question was, "To what extent are MinnAqua clinics meeting their goals?" As stated earlier, MinnAqua clinics have five program goals. These goals state what participants will be able to do as a result of participating in a MinnAqua clinic. The evaluation was carried out to determine clinics' effectiveness in meeting these goals.

While the first evaluation question examined the effectiveness of clinics in reaching their goals, the second question examined increases in participants' knowledge as a result of attending a MinnAqua clinic. The second evaluation question was, "To what extent does participation in MinnAqua clinics increase children's knowledge of angling and aquatic resources as identified by the MinnAqua key concepts?" As part of the evaluation planning process, MinnAqua was asked to specify how clinics were set up to address the five program goals. MinnAqua identified key concepts covered in clinics' activities that corresponded with each goal (see Table 1). The survey instruments were then designed to measure increases in children's knowledge in relation to specific key concepts, and in turn the clinic's goals.

Table 1: Clinic Goals and Corresponding Key Concepts

Clinic Goals	Key Concepts
Goal 1: Demonstrate basic fishing skills	• There is a proper technique for catch and release. • There is a certain way to rig a line. o Tie an improved clinch knot. o Put on a bobber, sinker and hook. o Set the depth of the line with the bobber. • There are various safety concerns to consider on a fishing trip. o If using long rods, practice casting on land before going to the water. o Safely walk with a rod and hook or pop can rig and hook. o Recognize the boundaries of where to fish along the lakeshore, riverbank, or on a pier. Refrain from sitting on pier railings. o Be aware of where their hook is at all times so they don't hook anyone. Look around you before you cast. o Ask an adult to help with a snag. o Stay on land. o Yell "danger!" if someone falls in the water or is caught by a hook or otherwise is in danger. o Drink water to stay hydrated and protect yourself from the sun.
Goal 2: Explain the importance of fishing rules and regulations in MN	• Fishing regulations are laws all anglers need to follow when they go fishing. • Basic fishing regulations include licenses, seasons and limits. • There are various reasons for regulations: o Protecting fish populations from over harvest. Limits help avoid over harvest by preventing people from keeping as many fish as they want. o To create a share of fishing opportunities for everyone because of growing numbers of anglers. o Maintain and ensure a certain quality of fishing opportunities, relates to size & species.
Goal 3: Improve basic aquatic ecology knowledge	• Fish's four basic habitat needs are food, water, shelter/cover, and space. • All energy initially comes from the sun and then is transferred to other organisms through the food chain: sun, plankton, prey fish, predator fish, and humans. Organisms are interdependent. Members of the food chain are impacted if one part is damaged or missing. • There are a diversity of fish species and families in Minnesota. • Fish can be identified by physical characteristics (Body shape and fin size are more reliable than body size and color).
Goal 4: Give examples of various behaviors that keep aquatic environments healthy	• Everyone makes choices that impact water quality, positively or negatively. There are a variety of actions people can to do to help take care of the water for fish. (Specifically actions in relation to: invasive species, aquarium fish, littering, picking up trash, etc.) • Do not dump leftover bait on the ground, put them in the trash or re-use.
Goal 5: Display an increased desire to fish in the future	• Fishing is a fun activity that anyone can do.

LITERATURE REVIEW

Summative Evaluation

Evaluation is an important tool to help ensure programs, such as MinnAqua, are reaching their program goals. The Recreational Boating and Fishing Foundation's Best Practices for Program Evaluation stress that effective program evaluation "is used as a learning tool to support program reflection, decision-making, and improvement" (Seng & Rushton, 2003, p. 4-1). The North American Association for Environmental Education's Nonformal Environmental Education Programs: Guidelines for Excellence (2004) also stress the importance of evaluation to environmental education programs, "Nonformal environmental education programs define and measure results in order to improve programs, ensure accountability, and maximize the effects of future efforts" (p. 23).

Summative evaluation is a type of evaluation that provides data to support decision-making and ensure accountability of efforts. Summative evaluation is "designed to present conclusions about the merit or worth of an object and recommendations about whether it should be retained, altered, or eliminated" (Joint Committee on Standards for Educational Evaluation, 1994, p. 208). The audience of summative evaluations extends beyond program staff to include funders, participants, and other personnel influential to the future of the program (Worthen, Sanders, & Fitzpatrick, 2001).

Summative evaluations can also become formative in nature. Results from summative evaluations often elicit recommendations for program improvement. In cases where the program is found ineffective, it may be decided to eliminate the program entirely. In other cases, results from the summative evaluation may be used to make changes to the program to increase its effectiveness. When a summative evaluation finds a program effective and the program continues, recommendations may be used to further increase the program's merit or worth. Over the course of time, as a program continues to evolve, there may be a number of summative and formative evaluations.

Factors Related to Fishing Participation

Like MinnAqua, many angling education programs have overarching goals of creating future anglers and increasing fishing participation. These goals are difficult to measure since

they are not immediate outcomes of angling education programs. To address this challenge, summative evaluations can focus on measuring factors related to fishing initiation, motivations and constraints to fishing, and reasons for desertion. Understanding these factors and measuring how successfully a program addresses them can help determine the impact a program can have on future angling participation.

Fishing Initiation

To create future anglers, exposure to fishing at an early age is critical. The earlier children are introduced to fishing, the more involved they will become in the sport (Dann, 1993). Most people experience fishing for the first time before they enter their teenage years. Nationally, 85% of today's adult anglers began fishing before the age of 12 and 92% before age 17 (Responsive Management, 1996). However, the likelihood of being initiated into the sport decreases by almost 50 percent for teens 15 and older (Fedler, 2000).

Fishing often occurs within a social context (Dann, 1993). Various studies have found fishing initiation to be largely dependent on family members, with most male and female anglers initiated into fishing by their fathers or another male family member (Duda, 2001; Duda, Young, & Bissell, 1995; Kuehn, 2003; Responsive Management, 2001, 2003a). Other family members, friends, organizations, and education programs are also influential in fishing initiation and continued involvement in the activity (Responsive Management, 2003c). Fathers were the most common fishing companion for all youth (Duda, 2001). The second most common companion for females was their mothers and for males, friends their own age (Duda, 2001).

As evident by the literature, it is unlikely angling education programs are the first exposure children have to angling. Instead, these programs are building children's prior angling knowledge and experiences. The focus of most angling education programs then becomes retention instead of initiation (Duda, 2001).

Once children are initiated into fishing, the intensity of their involvement during their youth can affect their future angling participation. Aas (1996) found a positive correlation between involvement in recreational activities as a child and as an adult. The more frequently children go fishing the more likely they will become avid anglers when they get older (Duda & Young, 1993; Responsive Management, 2003a). To influence children's continued involvement in the sport, angling education programs should focus on increasing children's motives for

fishing, decreasing constraints youth encounter and addressing reasons youth dropout of the sport.

Fishing Motivations

There are many reasons people fish. Motivations to fish lead to continued involvement in angling. The reasons youth fish include: to have fun, be with family and friends, enjoy the challenge of catching fish, catch fish, relax, be close to nature, learn a new sport, develop skills, and simply because they have opportunities to go fishing (Duda, 2001; Fedler, 2000; Kuehn, 2003; Responsive Management, 2001, 2003c; Reynolds, 1996). The rank in importance of these motivations differs depending on the age of the child. One motivation highly dependent on age is fishing to catch fish. As a child gets older, catching fish becomes a less important reason for going fishing (Aas, 1996; Duda, 2001; Responsive Management, 2003c). One study found that 23% of youth in grades 1-4 said they fished to catch fish, 16% of youth in grades 5-8, and 10% in grades 9-12 (Duda, 2001). The same study found that as children got older, being with friends became more important (Duda, 2001).

Angling programs can address motivations to fish by focusing on showing kids the enjoyment of fishing. Providing opportunities to fish, in which the likelihood of catching fish is high, may help motivate youth and increase their enjoyment of the experience, especially for younger children. Fishing experiences, which occur outdoors in a natural environment, give children a chance to be close to nature. For children who have never fished before, angling education programs can teach children a new sport and develop their fishing skills. For children who have already been initiated into the sport, angling programs can attempt to increase their confidence in their fishing abilities and teach them new skills.

Fishing Constraints

Even if youth are interested in fishing, obstacles may affect their level of participation. Constraints to fishing can affect a child's motivation to fish, how often they fish, and where they fish (Fedler, 2000). Like adults, the most common constraint children have is time (Fedler, 2000; Responsive Management, 2001, 2003b). In one study, the main reasons youth did not have enough time to go fishing were school commitments, work, family obligations, and other sports or hobbies (Responsive Management, 2001). Additional constraints include weather, not

knowing where to fish, lack of transportation to a fishing site, no one to go fishing with, parents not letting them go fishing, and not knowing enough about fishing (Responsive Management, 2001, 2003a). Some of these constraints can cause people to eventually dropout of the activity (Fedler, 2000).

A few of these constraints, not knowing where to fish and not knowing enough about fish, can be addressed at angling education programs. These programs can increase kids' angling knowledge and confidence in fishing by teaching fish ecology and angling skills.

Fishing Dropout

To understand how angling education programs can increase youth participation in fishing, it is important to understand the reasons youth withdraw from the sport. Studies have found a variety of reasons youth dropout of fishing. Some of these reasons include bored with fishing, not enough time to fish, dislike handling live bait, not catching fish, lack of fishing skills and knowledge, not confident with fishing abilities, don't want to kill fish, and no one to go fishing with (Fedler, 2000; Kuehn, 2003; Responsive Management, 2003a, 2003c). As children get older, they tend to either become avid anglers or dropout of the sport completely (Responsive Management, 2003c). A major decline in fishing participation among youth occurs between the ages of 15 and 16 (Dann, 1993; Fedler, 2000). The dropout rate of teens could be a result of their involvement in school and social activities, influence of peers, and higher awareness and self-consciousness of their fishing abilities (Dann, 1993).

Angling education programs can keep kids motivated to fish by not only addressing motivations and constraints, but also the reasons for desertion. Angling programs that include a fishing experience can help kids become more comfortable handling live bait, teach kids fishing skills which in turn may boost confidence in their fishing abilities, and show kids proper catch and release technique to increase a fish's chance of survival (Kuehn, 2003). As mentioned earlier, the angling education programs should also take place in an area known to provide a successful fishing experience so youth will be more likely to catch fish, thus helping to increase their enjoyment with fishing. Since teens have a higher dropout rate, angling programs for this group should focus on keeping these individuals interested in angling and building confidence in their angling abilities (Dann, 1993; Duda, 2001). By addressing reasons youth dropout of

fishing, angling education programs can increase a child's motivation to fish, which may lead to continued involvement in the activity.

Summative Evaluations of Angling and Aquatic Education Programs

As evident from the literature, creating future anglers is a complex task with many factors influencing a child's participation in the sport. Angling programs can attempt to address some of these factors in hopes of increasing the likelihood youth will continue to participate. A number of angling programs have carried out summative evaluations to determine their effectiveness in addressing some of these factors, particularly those related to angling knowledge, interest in fishing, and confidence in angling skills. Understanding the structure of various angling and aquatic education programs and how they were evaluated provided guidance in developing the evaluation of MinnAqua clinics.

Five summative evaluations of angling and aquatic education programs were reviewed. The review included evaluations of Arizona Game and Fish Department's Sportfishing Education Program (Reynolds, 1996), Georgia Kids' Fishing Events (Responsive Management, 2001), and New York's Sportfishing and Aquatic Resources Education Program (Siemer & Brown, 1998). The review also included two evaluations of the Future Fisherman Foundation's Hooked on Fishing-Not on Drugs program (HOF-NOD). One evaluation focused on Arkansas' use of the HOF-NOD program (Jackson & Khullar, 2001). The other evaluation examined the HOF-NOD program on a national level (Siemer & Knuth, 1998, 2001).

As demonstrated in the literature, summative evaluations of angling and aquatic education programs employ various methods to gather sufficient data to understand the effects of their programs on factors related to angling participation. Methods used in the evaluations reviewed included participant surveys, participant interviews, teacher or group leader surveys, parent surveys, and parent interviews.

Participant Feedback

All of the evaluations reviewed included a means to gather feedback from participants. One method utilized was surveys. The Arkansas evaluation of the HOF-NOD program included surveys for sixth and seventh grade students at participating schools throughout the state (Jackson & Khullar, 2001). A total of 611 students were surveyed. Students were asked about

their drug use, their prior fishing experiences with family members, their interest in fishing, what they learned from the program, and their fishing experience during the program. Siemer and Knuth (1998; 2001) carried out a national evaluation to compare HOF-NOD programs that contained a fishing experience to those which did not. Students in grades 6 – 8 at eight different schools were surveyed for a total of 619 respondents. The questionnaire measured outcomes related to fishing participation, angling skills, fishing interest, knowledge of fishing and aquatics, aquatic resources stewardship, and drug use prevention (Siemer & Knuth, 1998, 2001). Siemer and Brown (1998) developed a survey instrument to evaluate future New York Sportfishing and Aquatic Resources Education Programs. Questions were written to measure desired knowledge, skill, attitudinal, and behavioral outcomes related to fishing, aquatic resources stewardship, and fisheries management.

Some of the evaluations obtained data through interviews. The Georgia Kids' Fishing Event evaluation used phone interviews to gather data comparing kids' fishing events conducted by the Georgia Wildlife Resources Division to kids' fishing events offered by other groups in Georgia (Responsive Management, 2001). A total of 900 participants in grades 1 - 12 were interviewed about what they learned from the event, their experience at the event, and suggestions for improvement. They were also asked about their motivations for fishing, constraints to fishing, and fishing companions. The evaluation of the Arizona Game and Fish Department's Sportfishing Education Program included interviews with both program participants and a control group (Reynolds, 1996). Age-appropriate pre- and post-interviews were created for three different groups (K-3 students, 4-6 students, and cub scouts in grades 1 - 5). A total of 127 pre-interviews and 113 post-interviews were carried out. All interview instruments were designed to collect similar data on prior fishing experiences; fishing companions; interest in fishing; and knowledge of fish biology, regulations, angling ethics, safety, and angling equipment.

Teacher Feedback

Some evaluations also gathered data from teachers or group leaders involved with the program. The Arkansas evaluation of the HOF-NOD program included a survey sent to teachers in all 21 schools participating in the state's program (Jackson & Khullar, 2001). A total of 54 teachers provided feedback on the impact of the program on students' learning motivation,

academic performance, attendance, and angling participation. The evaluation of Arizona's Game and Fish Department's Sportfishing Education Program included a survey distributed to teachers and group leaders at the end of a program (Reynolds, 1996). Forty-one teachers provided feedback in regards to students' retention of fishing skills and knowledge, program effectiveness, and suggestions for improvement.

Parent Feedback

Some evaluations looked to parents to provide evaluative data about their child's increase in knowledge and fishing participation. The evaluation of the Arizona Game and Fish Department's Sportfishing Education Program included a survey completed by 144 parents of program participants (Reynolds, 1996). The survey asked about the adult's own fishing behaviors, motivations to fish, and barriers to fishing. It also asked about their child's barriers to fishing, attitudes about fishing, and angling behaviors. The national evaluation of the HOF-NOD programs included feedback from parents whose children participated in a HOF-NOD program which included a fishing experience (Siemer & Knuth, 2001). A total of 185 parents were interviewed. The interview was designed to cover content similar to the student survey. Parents were asked about their child's fishing participation, fishing skills, interest in fishing, aquatic knowledge, and drug use.

Summary of Methods Used in the Literature

As illustrated in Table 2, the designs of summative evaluations of angling and aquatic education programs can include feedback from participants, teachers or group leaders, and parents. When looking more closely at the literature, the data collection methods utilized and the angling participation factors measured varied across the evaluations.

Table 2: Methods Used in Summative Evaluations of Angling and Aquatic Education Programs

	Participant Survey	Participant Interview	Teacher/ Leader Survey	Parent Survey	Parent Interview
Arizona Game and Fish Department's Sportfishing Education Program (Reynolds, 1996)		X	X	X	
Arkansas HOF-NOD program (Jackson & Khullar, 2001)	X		X		
National HOF-NOD program (Siemer & Knuth, 1998, 2001)	X				X
Georgia Kids' Fishing Events (Responsive Management, 2001)		X			
New York's Sportfishing and Aquatic Resources Education Program (Siemer & Brown, 1998)	X				

EVALUATION DESIGN

The summative evaluation of the MinnAqua clinics was designed to determine if clinics were meeting their goals, addressing the key concepts, and increasing participants' angling and aquatics knowledge. The design took into account the structure and content of clinics, the purpose of the evaluation, and the methods used in summative evaluations of similar types of programs.

Pre-Post Design

Similar to Reynolds (1996), a pre-post design was used to obtain evaluation data. Pre-post designs are useful for looking at changes in individuals who participate in a particular program (Worthen et al., 2001). Participants completed a pre-survey at the beginning of the clinic and the same individuals were given a post-survey toward the end of the clinic. The pre- and post-surveys were matched so comparisons could be made between an individual's pre and post responses and thus measure knowledge gain in terms of the key concepts and clinic goals.

Preparing for Summative Evaluation

The evaluation took place spring 2003 through summer 2005. The first two years were used for evaluation planning and ensuring the clinics were ready for a summative evaluation. Summative evaluation data was gathered during the summer of 2005.

Summer 2003

MinnAqua clinics were observed over the summer of 2003, as part of the evaluation design phase, to gain an understanding of how clinics were structured, what educational content was covered at a clinic, and how clinics could be evaluated. After observing three clinics, it was apparent that there was a disconnect between what the MinnAqua Coordinator and Education Specialists felt was being taught in clinics, and what was actually being implemented. The key concepts deemed necessary to address the clinics' goals were not all covered at the observed clinics. As a result of these observations, the MinnAqua Coordinator and Education Specialists realized they were not effectively conveying the goals and key concepts to the interns teaching the clinics.

A document titled "MinnAqua Clinics Quality Control" (See Appendix A) was created to help ensure MinnAqua clinics addressed all of the key concepts. The Quality Control outlined the clinic structure and key concepts that needed to be covered in order to address the clinic's goals. In the past, clinics had been loosely defined as one lesson from each chapter of the MinnAqua Leaders' Guide, but specific concepts to address with each lesson had not been identified. This meant clinics could have been vastly different from each other in terms of lessons and concepts addressed since interns often taught lessons they were most familiar with or lessons requested by the sponsoring organization. MinnAqua saw the Quality Control as a way to create consistency between clinics and help clinics meet their five goals. To further ensure key concepts were covered, MinnAqua restructured intern trainings so the Quality Control was discussed, the key concepts were integrated into conversations, and interns practiced lessons that stressed the key concepts.

Summer 2004

The summer of 2004 served as a pilot test of the Quality Control, the evaluation instruments, and the survey administration procedures. Starting in 2004, interns used the Quality Control to guide the structure of their clinics. They were still able to choose the lessons they wanted to teach from the MinnAqua Leaders' Guide. However, they had to make sure they were addressing the key concepts in the lessons they chose. Interns also administered the pre- and post-surveys as they would for the summative evaluation in order to pilot the survey administration procedures and provide pilot data on the use of the Quality Control.

The Quality Control was refined as a result of summer 2004 intern feedback and participant data. Interns found it difficult to cover all of the key concepts during a typical clinic timeframe. A few measures were taken to address this difficulty. The list of key concepts was shortened taking into account pre-survey pilot data about participants' prior knowledge. Additionally, the definition of a clinic was changed so that starting in 2005, programs had to be a minimum of five hours in length to be considered a clinic (in the past they could be a minimum of three hours). This change was to help ensure staff had sufficient time to cover all key concepts during a clinic.

Pilot data also provided evidence that interns needed additional guidance on choosing lessons that addressed the key concepts. During the 2004 pilot test, interns completed a form

indicating the lessons they taught at each clinic. There were a number of instances in which the lessons listed failed to cover some of the key concepts. Some interns mentioned that even though they did not do an activity, they talked about the key concept. However, there were cases in which they felt as though they were "teaching to the test". It became clear that clinics needed a more structured format, similar to a "curriculum", if all clinic participants were to walk way with an understanding of a clinic's key concepts. For this reason, specific lessons addressing each key concept were added to the Quality Control. This change meant instead of allowing interns to choose lessons, which did not always guarantee key concepts were covered, the Quality Control indicated which lessons should be used from each chapter.

It also became apparent during the 2004 survey administration pilot test that the informal nature of clinics limited the breadth and depth of participant data that could be gathered. Summer clinics are usually not held for pre-existing groups, instead participants sign up for clinics through a sponsoring organization. This means pre- and post-surveys cannot be easily administered to these groups at separate times before or after a clinic, instead the surveys have to be part of the clinic. The original surveys were four-pages in length and included both knowledge and fishing participation questions. During the survey administration pilot test, it became apparent that a four-page survey was inappropriate for a clinic setting because it took considerable time to administer, making it difficult to keep students engaged in filling out the survey. In fact, some students were observed sharing answers, thus affecting the reliability of the data. For this reason, the surveys were limited to two-pages and the purpose of the evaluation was reconsidered.

The pilot test results also indicated that most clinic participants ages 8-12 (95%) have prior fishing experience. MinnAqua realized that for most 8-12 year old participants summer clinics were not playing a role in recruitment, but retention instead. Taking the various factors that influence angling participation in to account, it was decided that the effect of clinics on participants' desire to fish in the future (the fifth clinic goal) would best be measured in a separate study that would also include qualitative measures to obtain the depth of knowledge necessary to understand the impact of clinics on angler retention. Instead, the summative evaluation focused on the short-term effectiveness of clinics in terms of the first four clinic goals related to angling and aquatic knowledge and skills. This change, based on the literature,

focused on increasing youth's angling knowledge and skills in order to positively influence fishing participation by addressing constraints to participation and reasons for desertion.

The changes to the Quality Control, clinic structure, pre- and post-surveys, and survey administration were implemented in 2005. During the summer of 2005, the summative evaluation was carried out to obtain evidence of clinics' effectiveness in reaching the first four goals, addressing key concepts, and increasing participant knowledge.

METHODOLOGY

Sampling Plan

The population was all summer clinic participants ages 8-12. The population range began at eight years old based on guidelines in the literature that children eight and above have the reading skills appropriate for filling out self-administered surveys (Borgers, de Leeuw, & Hox, 2000). Age twelve was the cut off point because a majority of clinic participants are 12 or younger. The population was not sampled, instead the entire population of 278 eight to twelve year old participants was surveyed.

Data Collection Instruments

Pre- and Post-Surveys

As mentioned earlier, the evaluation used a pre-post survey design to collect data. The pre-survey gathered information about participants' characteristics (age, gender, zip code), their prior knowledge, and previous fishing experience. Some of the closed-ended survey questions provided a "not sure" option. This was added to increase reliability of the data by decreasing the likelihood participants would guess a correct answer, which would have provided an inaccurate measure of their conceptual knowledge. The post-survey content questions were the same as the pre-survey in order to examine changes in participants' knowledge. The post-survey also included an open-ended question asking participants to describe something they learned from the clinic. To match participants' pre- and post-surveys while ensuring anonymity, the end of each survey included an area for participants to create a unique identification code based on their name and birth date. The pre- and post-surveys can be found in Appendix B.

Knowledge questions on the survey were aligned with the key concepts MinnAqua felt were most important to address in clinics. Table 3 outlines the key concepts and goal addressed by each survey question. The open-ended question on the post-survey was also written to examine what participants learned in terms of the first four clinic goals. MinnAqua staff provided input into the survey design to ensure relevant topics were included and the instrument was indeed measuring knowledge related to the key concepts, thus helping to increase the validity of the results.

Table 3: Key Concepts and Clinic Goals Addressed by Survey Questions

Survey Question	Clinic Goal Addressed	Key Concept(s) Addressed
Q2a. Minnesota has fishing regulation so people can keep as many fish as they want. True or false?	Goal 2: Explain the importance of fishing rules and regulations in MN	• Basic fishing regulations include licenses, seasons and limits. • There are various reasons for regulations: o Protecting fish populations from over harvest. Limits help avoid over harvest by preventing people from keeping as many fish as they want.
Q2b. Minnesota has fishing regulations so there are enough fish in the lakes and rivers for people to catch. True or false?	Goal 2: Explain the importance of fishing rules and regulations in MN	• There are various reasons for regulations: o To create a share of fishing opportunities for everyone because of growing numbers of anglers.
Q3a. Putting fish from an aquarium, fish tank, or fish bowl in the lake. Harmful or not harmful?	Goal 4: Give examples of various behaviors that keep aquatic environments healthy	• Everyone makes choices that impact water quality, positively or negatively. (Specifically actions in relation to: aquarium fish)
Q3b. Placing leftover bait (like minnows or worms) in the lake. Harmful or not harmful?	Goal 4: Give examples of various behaviors that keep aquatic environments healthy	• Do not dump leftover bait on the ground, put them in the trash or re-use.
Q4. Imagine you caught a fish. You need to be able to identify it so you can follow the state's fishing laws (called regulations). What two characteristics of the fish would be the best features to look at so you can tell what kind of fish it is?	Goal 3: Improve basic aquatic ecology knowledge	• Fish can be identified by physical characteristics (Body shape and fin size are more reliable than body size and color).
Q5. Imagine you are going fishing. You need to get ready by attaching a hook, sinker, and bobber to your fishing line. Write the letter next to the appropriate object to indicate where it should be placed on the line.	Goal 1: Demonstrate basic fishing skills	• There is a certain way to rig a line. o Put on a bobber, sinker and hook.

The pre-surveys were administered at the beginning of the clinic to obtain an accurate measure of participants' prior knowledge. Post-surveys were administered near the end of the clinic, instead of the very last clinic activity. This was decided upon based on findings from the 2004 survey administration pilot test. If surveys were the very last clinic activity, interns noticed that some participants rushed through the survey so they could leave, especially if their ride had already arrived. There were also some parents who were observed helping their child complete the survey. To avoid these issues, surveys were administered toward the end of the clinic once all key concepts in the Quality Control were covered. After surveys were complete, youth participated in a short activity and/or a wrap up discussion.

Pilot Test

Pilot testing survey instruments are an important part of the evaluation process. Pilot testing the surveys with children helped ensure the instruments were obtaining valid and reliable data. One pilot test was with third graders at a private school and another was with a fourth grade class at a public school. Each pilot test consisted of an entire classroom taking the pre-survey and two students participating in think-aloud interviews. Before all students took the survey, they were told about the MinnAqua program, the reason surveys were being administered at clinics, and why their help was needed. It was also stressed that the survey was not going to be graded and they should answer the questions to the best of their knowledge. If they didn't understand what a question was asking, they were instructed to put a question mark by the question.

Think-aloud interviews were carried out to pilot test the clinic pre-survey. Think-alouds are advantageous because they provide an understanding of how questions are interpreted and thus answered (Borgers et al., 2000; Dillman, 2000; Patten, 2001). The think-alouds of the clinic surveys were carried out with one boy and one girl at each school, for a total of four think-alouds. Each teacher was asked to choose two students they considered "average" in their academic performance. During the think-alouds, students read each question out loud, vocalized their answer, and stated their reason for choosing the answer. Anything the student said was noted. The data from the think-alouds were looked at in conjunction with the self-administered survey data to understand how students were interpreting the questions and identify any potential

difficulties with the survey. Some questions were changed or removed as a result of the two pilot tests.

As mentioned earlier, the summer of 2004 served as a pilot test of both the surveys and the survey administration process. Specific changes to survey administration procedures based on pilot feedback were implemented during the 2005 evaluation and are described under the Survey Administration heading below.

MinnAqua Clinic Program Leader Questionnaire and MinnAqua Program Report

In addition to the pre- and post-surveys, a MinnAqua Clinic Program Leader Questionnaire was created to obtain feedback from the staff person leading the clinic (see Appendix C for the questionnaire). The questionnaire provided a variety of information about the clinic structure, the key concepts and activities covered in the clinic, explanations of why a chapter or key concept may not have been addressed, anything out of the ordinary that happened at the clinic (i.e. a child got a hook caught in their finger), and any problems with survey administration. The data from these questionnaires were used to decide if the program evaluated fit the definition of a clinic by covering all the necessary content, identify any problems with survey administration that needed to be addressed, and bring to light any circumstances that could explain irregularities in the data.

In addition to the MinnAqua Clinic Program Leader Questionnaire, staff also submitted a copy of their MinnAqua Program Report (Appendix D) for each clinic. The MinnAqua Program Reports were created by MinnAqua and existed before the evaluation. Staff completed a MinnAqua Program Report for every MinnAqua program administered to keep track of overall program types, participant demographics, and program locations. The MinnAqua Program Reports were used during the evaluation to obtain information about a clinic's length, the region the clinic was held, and the staff member(s) who led the clinic.

Survey Administration

Clinics occurred throughout the state, making it impossible for same person to administer surveys at all of the clinics. For this reason, the staff member leading the clinic was responsible for administering the surveys. The staff were instructed to administer surveys only at programs that fit the definition of a clinic as described in the MinnAqua Clinics Quality Control document.

A number of steps were taken to ensure consistency in survey administration across clinics. At intern training, all staff received the MinnAqua Clinics Quality Control so they were aware of the goals and key concepts to be addressed at each clinic. At this training, staff also learned about the MinnAqua evaluation process and their role in the evaluation before, during, and after a clinic.

Before the Clinic

Before clinics occurred, staff sent a letter to the sponsoring organization describing the evaluation process (see sponsor letter in Appendix E). Since staff were unaware of who the participants were before clinics took place, the sponsoring organizations were also sent the passive consent letters (see Appendix F for passive consent letter), which they were asked to give to participants' parents or guardians. The passive consent letter was approved by the University of Minnesota's Institutional Review Board[1]. If a parent did not want their child to take the pre- and post-surveys, they were instructed to contact the MinnAqua Education Specialist in the region where the clinic was taking place. The Education Specialist would then contact the staff member leading the clinic to let them know who was not supposed to take the surveys. This ended up not being an issue since none of the parents requested that their child not participate in the evaluation.

At the Clinic

MinnAqua staff had a variety of evaluation-related responsibilities during the clinic. They were responsible for making sure all chaperones and volunteers knew why surveys were being administered, finding a volunteer to oversee the administration of the activity for participants under age eight, and administering the pre- and post-surveys.

MinnAqua staff had to ensure all volunteers and chaperones were aware surveys were going to be administered at the clinic. To address this, a volunteer/chaperone handout was given to these individuals at the beginning of a clinic if staff were unable to talk to each person individually. The handout was developed in response to 2004 pilot test observations of some chaperones and volunteers helping youth fill out the surveys, talking loudly to each other while

[1] "The Institutional Review Board reviews research projects involving human subjects to ensure that two broad standards are upheld: first, that subjects are not placed at undue risk; second, that they give uncoerced, informed consent to their participation." (University of Minnesota, 2005).

participants were filling out the survey, or looking annoyed that surveys were being administered. The handout explained why surveys were administered during the clinic. It also requested that chaperones and volunteers refrain from helping participants complete the surveys. If participants had problems with a survey question, the chaperones and volunteers were asked to encourage kids to answer the question to the best of their ability or mark "not sure" if they did not know the answer. Chaperones and volunteers were also asked to alert MinnAqua staff if they noticed any kids sharing answers.

The survey population was youth ages 8 - 12, so a separate activity was created for kids under eight. It was important that their activity was a paper-based activity so the older kids would not be distracted or lose interest in filling out the survey. During the pre-survey, the younger kids sat in a separate area and were told they had their own special project to work on while the older kids completed the surveys. They were then given an activity sheet titled "My Fishing Trip". One side of the sheet had a blank space for kids to draw a picture of a fishing trip they had been on or what they thought it would be like to go on a fishing trip. The other side was a coloring sheet for students to color once they finished their drawing. A volunteer or chaperone supervised the younger kids to ensure they worked quietly on their activity sheets until the other participants were done with the surveys. During the post-survey, kids were given an activity sheet titled "What I Learned Today". On this sheet they were instructed to draw a picture of something they learned at the clinic. The other side of the sheet was a coloring page.

Before administering the survey, MinnAqua staff introduced the surveys to participants. Survey introductions (see Appendix G) were created, based on 2004 pilot test feedback, to ensure kids understood why they were taking the survey, that the survey was not a test, and thus there was no need to share answers. Staff were instructed to memorize the introductions so they could maintain eye contact with the students during the introductions in attempt to keep their attention. Memorization of introductions was stressed based on a 2004 pilot study observation of an intern reading the introductions directly from a sheet of paper and the participants appearing bored and unfocused. Reading directly from the paper also made the surveys feel more test-like because it gave the survey administration process a different tone than all other clinic activities.

As suggested in Borgers et al. (2000), the survey questions and answer choices were read out loud to participants to ensure a participant's reading level would not affect his/her ability to

answer a question, thus helping to minimize item non-response and increase reliability of the data obtained. Staff were also reminded to read the questions exactly as written and not rephrase them in order to avoid the introduction of potential bias. If participants did not understand a question, they were encouraged to answer the question to the best of their ability and mark "not sure" if they did not know an answer.

After participants handed in their post-survey, they received a small tackle box, tackle, and MinnAqua youth activity book. These hand-outs were given to clinic participants in the past, so for the evaluation they served as an incentive for youth to complete the surveys since they did not receive the items until they turned in their post-survey. Participants under age eight also received the materials as an incentive for completing their drawing activities during survey administration.

After the Clinic

Immediately after the clinic, staff completed a MinnAqua Clinic Program Leader Questionnaire and MinnAqua Program Report. Staff then submitted the surveys, Program Leader Questionnaire, and Program Report for analysis.

Data Analysis

Since the entire population was surveyed, inferential statistics are inappropriate. Instead, frequencies are reported for clinic characteristics, participant demographics, prior angling experience, prior knowledge, correct answers to individual survey questions on both the pre- and post-surveys, and comparisons of overall performance on both the pre- and post-surveys. Responses to the open-ended question on the post-survey were analyzed using the qualitative analysis software *Atlas Ti.* Participants' responses were coded into themes based on the first four clinic goals.

Limitations

There were several limitations to the evaluation design. One limitation was external validity, or the generalizability of the results beyond MinnAqua clinics. The results are generalizable to summer MinnAqua clinics, assuming future clinics remain similar in structure, content, and participant recruitment. However, the results are not generalizable to other types of

MinnAqua programming since the structure, content, and population of these programs may differ from clinics. Additionally, the results are not generalizable to clinics carried out with school groups because teachers make the choice for their students to attend, unlike summer clinics where participants self-select to attend a clinic. For this reason, the population of school clinics may be different from summer clinics in terms of participants' prior fishing experience and prior knowledge.

Surveys have potential sources of error that had to be addressed in the evaluation: sampling error, coverage error, non-response error, and measurement error. A variety of measures were taken to address these potential sources of error and help ensure the reliability and validity of the survey results. Sampling error occurs whenever a population is sampled and coverage error occurs when all members of the population do not have an equal chance of being sampled (Dillman, 2000). Since the entire population was surveyed and a sample was not drawn, sampling and coverage error were not issues in this evaluation. Non-response error results when part of a population does not complete the survey (Dillman, 2000). Survey non-response error was not an issue since there were no parents who did not want their child to participate in the survey so the entire population was surveyed. To minimize item non-response, the surveys were pilot tested so any questions difficult for children to understand could be changed. A "not sure" option was also added to some of the questions so if participants were unsure of an answer they could chose that response instead of leaving a question blank. Additionally, MinnAqua staff read surveys aloud so a child's reading level would not affect their ability to answer a question. Measurement error occurs when questions are poorly written, making answers difficult to interpret (Dillman, 2000). If a child misinterprets a question and thus answers it differently than if they had interpreted the question correctly, measurement error occurs and the reliability and validity of the results are threatened. To address this type of error, the survey was pilot tested with two classrooms. Four children also participated in think-aloud interviews where they answered the questions aloud and explained their reasoning for answering the questions as they did. This brought to light any potential misunderstanding with questions and guided question revisions in order to avoid those misinterpretations.

The final limitation was the subjective nature of the evaluation process and the potential for evaluator bias. Evaluation is a value-laden process, from designing the evaluation to generating recommendations. However, an evaluator must ensure their personal values and

beliefs do not bias the evaluation in such a way that they significantly affect the overall outcome of the evaluation (Worthen et al., 2001). This is especially important for internal evaluators because of their intimate relationship with the program. Measures were taken to ensure the internal evaluator's intense involvement did not bias the results and recommendations. The evaluator was not directly involved with developing the MinnAqua Clinics Quality Control or leading the intern training, which provided distance from the project and made it easier to remain objective. Throughout the data analysis and reporting period, the goals of the evaluation were always kept in mind and MinnAqua staff were reminded to look to the data for guidance instead of anecdotal information they may have remembered hearing from interns or observed as a clinic instructor.

RESULTS

During the summer of 2005, 21 clinics were held and 279 youth ages 8-12 participated. Reported below are results from the MinnAqua Clinic Program Leader Questionnaires, MinnAqua Program Reports and the pre- and post-surveys.

MinnAqua Clinic Program Leader Questionnaire and MinnAqua Program Report Results

MinnAqua Clinic Program Leader Questionnaires and MinnAqua Program Reports were completed for each of the 21 clinics. These documents provided information about the length of the clinic, clinic instructor, and characteristics of the clinics. As illustrated in Table 4, clinics ranged in length from five to twenty-four hours. The most common clinic length was five hours (62% of clinics). The effect of clinic length or clinic instructor on participants' post-survey scores could not be compared because some of the variables had low numbers of 8-12 year old participants (eight and twelve hour clinics had five or fewer eligible participants and three instructors had less than ten eligible participants).

The demographic data from all 21 programs that had been advertised as clinics were used to understand the characteristics of youth who sign up to participate in a clinic. However, when looking at the effectiveness of the clinics in terms of the two evaluation questions, pre-post data could only be used for the 17 clinics which fit the definition of a clinic (one activity from each of the six chapters of the Leaders' Guide and a fishing experience). As indicated on the MinnAqua Clinic Program Leader Questionnaires, there were four clinics that did not fit this definition. The interns teaching the two twenty-four hour clinics said they did not have time to cover a chapter three activity, so key concepts related to aquatic stewardship were not covered. One of the five hour clinics and one of the six hour clinics were unable to offer participants an angling experience because of inclement weather. Since the 48 participants in these four clinics did not receive a full clinic experience, their data was not included in the pre-post data analysis.

Table 4: Length of MinnAqua Clinics (n=21)

	Percent of Clinics	Number of Clinics
Five hours	62%	13
Six hours	14%	3
Eight hours	10%	2
Twelve hours (two days)	5%	1
Twenty-four hours (four days)	10%	2

Participant Characteristics

To understand who attends summer clinics, the pre-survey asked participants to indicate their age, gender, zip code, and prior angling experience. Participant demographic data obtained during the 2004 pilot test are also included in the tables below to illustrate the commonality from year to year of the population of clinic participants. There were a total of 309 8-12 year old clinic participants during the 2004 pilot test and 278 participants during the 2005 summative evaluation. Demographic information was voluntary so a few participants declined to answer some of the questions as reflected by the different "n" sizes.

Age

As illustrated in Table 5, more than half the participants were ages 8 and 9 (53% summer 2004, 56% summer 2005). As participants get older, fewer numbers participate in clinics.

Table 5: Age of Clinic Participants

	Summer 2004 (n=309)	Summer 2005 (n=278)
Age 8	21%	26%
Age 9	32%	30%
Age 10	25%	20%
Age 11	17%	15%
Age 12	8%	9%

Gender

For participants ages 8 – 12, more boys than girls participate in clinics. As shown in Table 6, around two-thirds (67% summer 2004, 64% summer 2005) of participants ages 8 – 12 were boys.

Table 6: Gender of Clinic Participants

	Summer 2004 (n=309)	Summer 2005 (n=276)
Boys	67%	64%
Girls	33%	36%

Home Region

Clinics were held throughout Minnesota and included participants from across the state. Figure 1 illustrates Minnesota's six regions as designated by the DNR and the regions where summer 2005 participants were from based on their zip code. As illustrated in Table 7, the highest percentages of participants were from the metro and central Minnesota in 2004 (41% metro region, 27% central region) and southern Minnesota in 2005 (35% southwest region, 21% southeast region). For both years, the smallest number of participants came from northern Minnesota (Summer 2004: 4% northwest region, <1% northeast region; Summer 2005: 6% northwest region, 2% northeast region). Clinics also had a small percentage of participants from outside of Minnesota (1% summer 2004, 4% summer 2005). Home counties of 2004 and 2005 participants included:

- Northwest Counties: Clearwater, Douglas, Hubbard, Ottertail, Roseau, Stevens, Wilkin
- Northeast Counties: Carlton, St. Louis
- Central Counties: Chisago, Crow Wing, Isanti, Mille Lacs, Morrison, Stearns, Todd, Wadena, Wright
- Metro Counties: Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, Washington
- Southwest Counties: Blue Earth, Brown, Lincoln, Martin, Nicollet, Renville, Sibley, Watonwan
- Southeast Counties: Fillmore, Freeborn, Goodhue, Rice

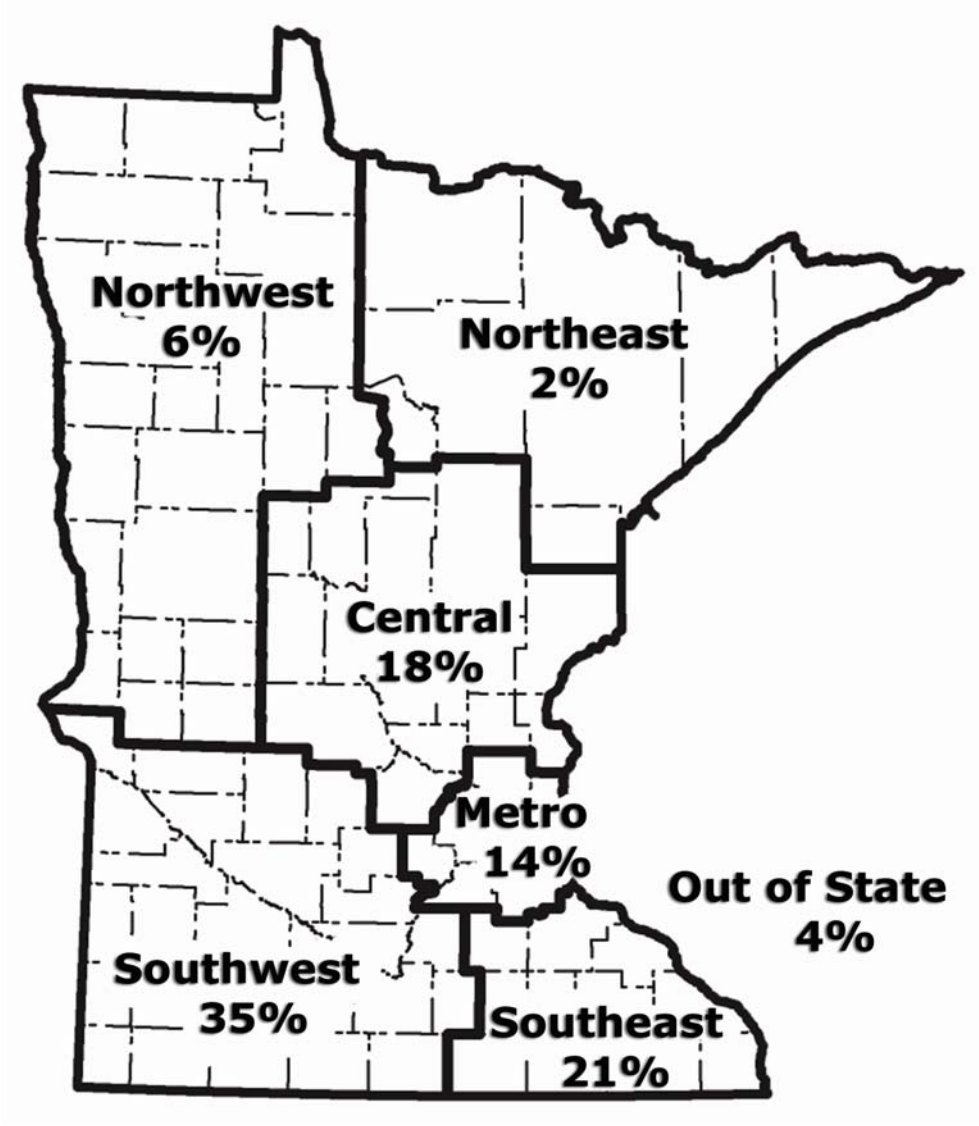

Figure 1: Summer 2005 Clinic Participants by Their Home Region (n=274)

Table 7: Home Regions of Clinic Participants

	Summer 2004 (n=295)	Summer 2005 (n=274)
Southwest	14%	35%
Southeast	13%	21%
Metro	41%	14%
Central	27%	18%
Northwest	4%	6%
Northeast	<1%	2%
Out of State	1%	4%

Prior Angling Experience

Clinic participants were asked if they had prior angling experience. As illustrated in Table 8, most clinic participants ages 8 – 12 (95% summer 2004, 91% summer 2005) have gone fishing before attending a clinic. This means summer clinics play a larger role in angler retention than angler initiation for this age group.

Table 8: Prior Angling Experience of Clinic Participants

	Summer 2004 (n=320)	Summer 2005 (n=279)
Angling Experience	95%	91%
No Angling Experience	5%	9%

Pre- and Post-Survey Results

Since the evaluation was designed to examine the effectiveness of clinics, where clinics are defined as a lesson from each of the six chapters in the Leaders' Guide and a fishing experience, only clinics that actually ended up fitting this definition were included in the analysis of the pre-post data. Seventeen of the 21 clinics fit this definition so of the 279 clinic participants, 230 participated in a "true" clinic. All of the remaining results are based on these 230 participants. The demographics of the 230 participants were similar to the demographics of all 279 summer 2005 clinic participants.

Prior Knowledge of Key Concepts

Pre-survey data provided an understanding of participants' prior knowledge associated with the specific key concepts measured by the survey questions. Figure 2 illustrates the prior knowledge of 8 – 12 year old summer clinic participants. (The questions are numbered based on the pre-survey, which can be found in Appendix B). Most participants have prior knowledge regarding fishing regulations (85% know about fishing limits and 81% know why fishing regulations are important). Around two-thirds of participants know how to rig a line (67%) and where to dispose of pet fish (62%). Only 35% of participants know how to correctly identify fish and 27% know what to do with bait when they are done fishing.

Post-Clinic Knowledge of Key Concepts

The post-survey contained the same six knowledge questions as the pre-survey in order to measure increases in knowledge of key concepts. Figure 2 shows the percent of participants who correctly answered these individual knowledge questions on the pre- and post-surveys. At the end of the clinic, at least 87% of participants knew about fishing limits, why we have regulations, what to do with pet fish, what to do with bait, and how to rig a line. However, only 70% of participants were able to correctly articulate how to identify fish.

The percentage of participants correctly answering questions increased across all of the questions. The smallest increases in knowledge were related to fishing limits and regulations (Questions 2a and 2b), although most participants already had this prior knowledge so there was little room for scores to improve. The largest increase in knowledge was related to properly disposing of bait after going fishing (Question 3b).

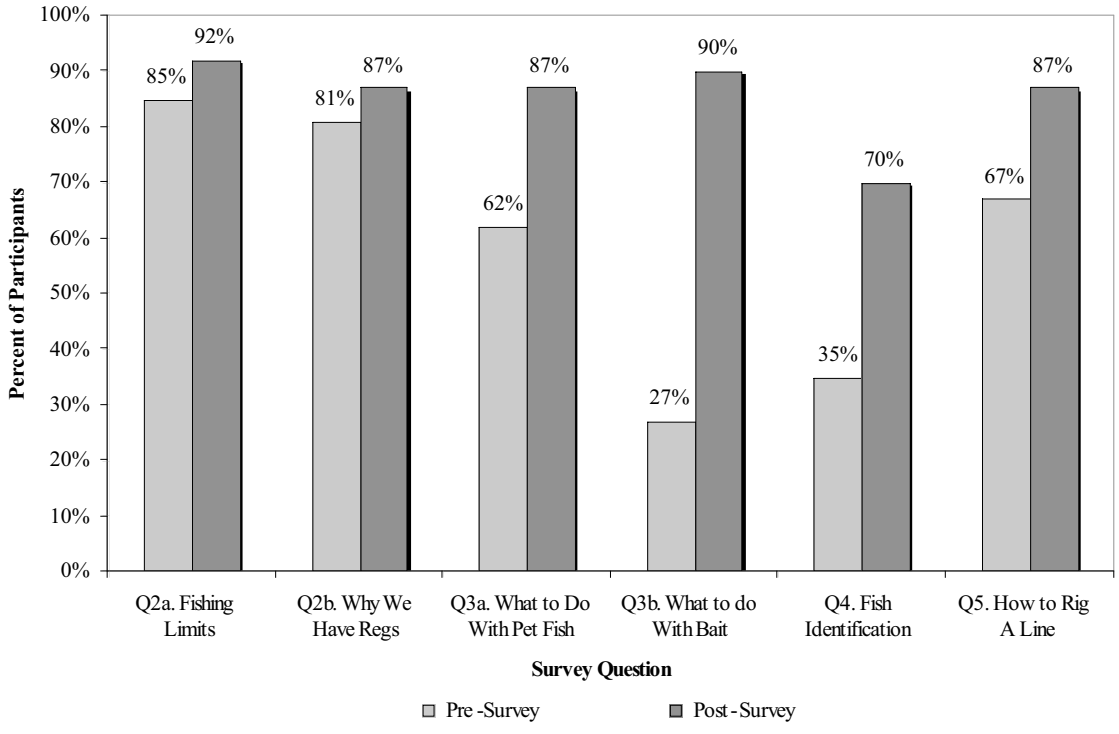

Figure 2: Percent of Participants Correctly Answering Pre- and Post-Survey Questions (n=230)

Overall Increases in Participant Knowledge

As previously mentioned, each survey contained six knowledge questions. Figure 3 illustrates participants' overall performance on the pre- and post-surveys in terms of the number of questions they answered correctly. For the purpose of this evaluation, target post-survey performance was five or six correct responses. "Not sure" and no responses were considered incorrect answers. More then three-quarters of participants (77%) answered five or six questions correctly on the post-survey. This improvement in performance was a 56% increase from the pre-survey. Looking only at participants who answered all six questions correctly, there was a substantial increase from pre to post (3% on pre-survey, 47% on post-survey).

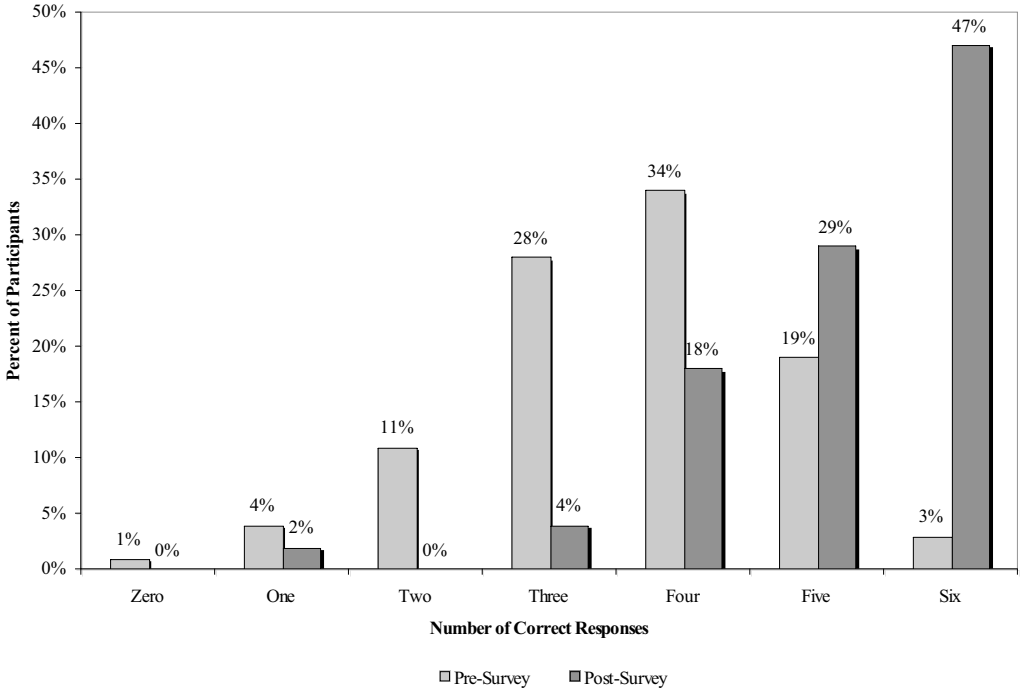

Figure 3: Number of Correct Responses on Pre- and Post-Surveys (n=230)

Increases in Knowledge Based on Gender

Figures 4 and 5 illustrate participant performance on the pre- and post-surveys based on gender. Boys had slightly more prior knowledge of the key concepts than girls as evident by the higher percentage of boys (29%) answering five or six questions correctly on the pre-survey than girls (9%). However, girls and boys performed similarly on the post-survey (74% of boys and 78% of girls had five or six correct responses). This means girls' performance improved more from pre to post than boys' (girls 69% pre-post increase, boys 45% pre-post increase).

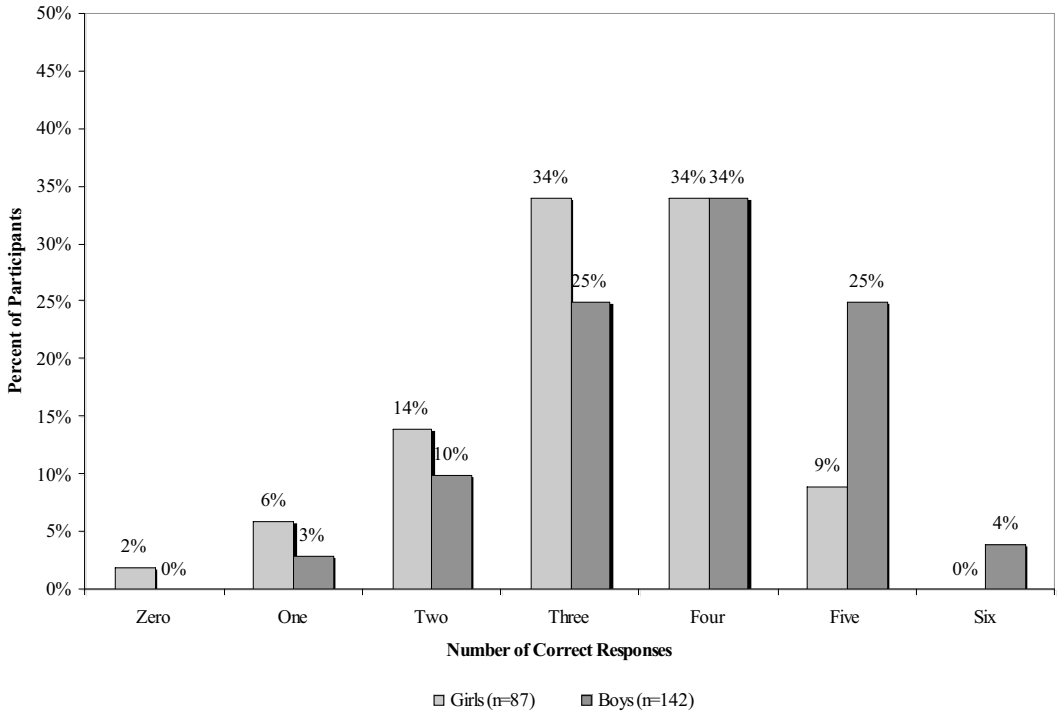

Figure 4: Number of Correct Responses on Pre-Survey Based on Gender

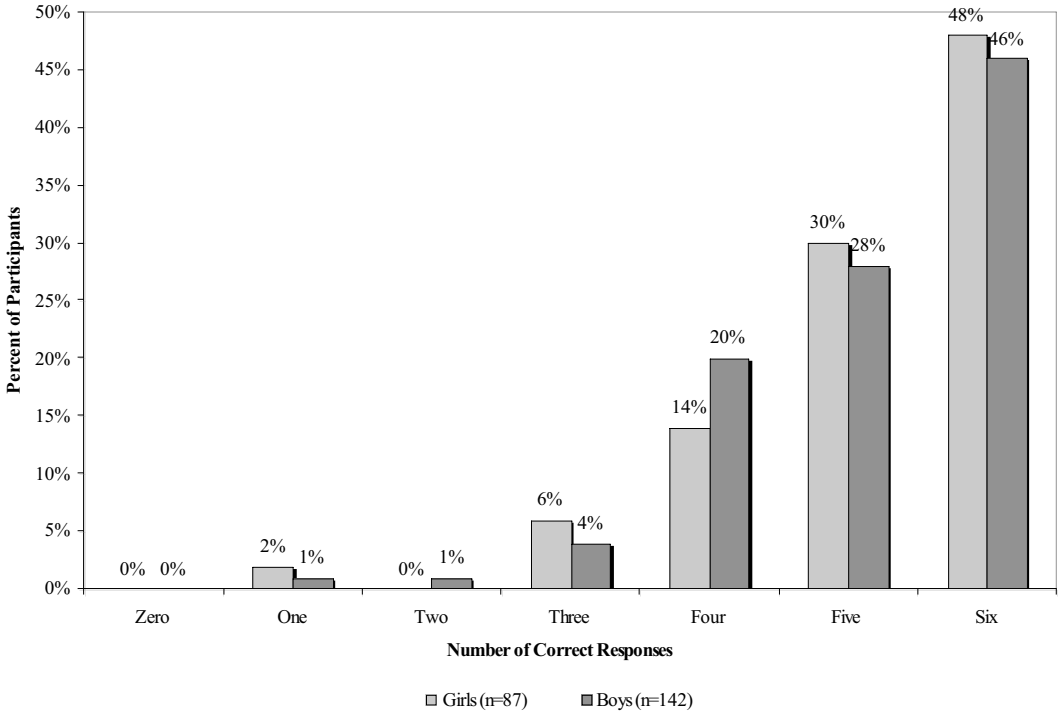

Figure 5: Number of Correct Responses on Post-Survey Based on Gender

Increases in Knowledge Based on Age

Figures 6 and 7 illustrate participant performance on the pre- and post-surveys based on age (See Appendix F for the values of the percentages illustrated in the figures). As illustrated in Figure 6 and Table 9, eight year olds had less prior knowledge of the key concepts than all other participants as evident by the lower percentage of eight year olds answering five or six questions correctly on the pre-survey than all other ages (8% compared to 23% or higher). Eight year olds also performed lower on the post-survey (63% compared to 77% or higher). Performance on the post-survey improves as participants increase in age, as shown in Table 9. However when looking at improvement from pre- to post-surveys, all ages had similar increases in percentage of participants correctly answering five or six of the survey questions.

Table 9: Percent of Participants Answering Five or Six Questions Correctly Based on Age

	Pre-Survey	Post-Survey	Percent Increase
8 years old (n=59)	8%	63%	55%
9 years old (n=70)	23%	77%	54%
10 years old (n=46)	29%	80%	51%
11 years old (n=35)	23%	80%	57%
12 years old (n=19)	32%	89%	57%

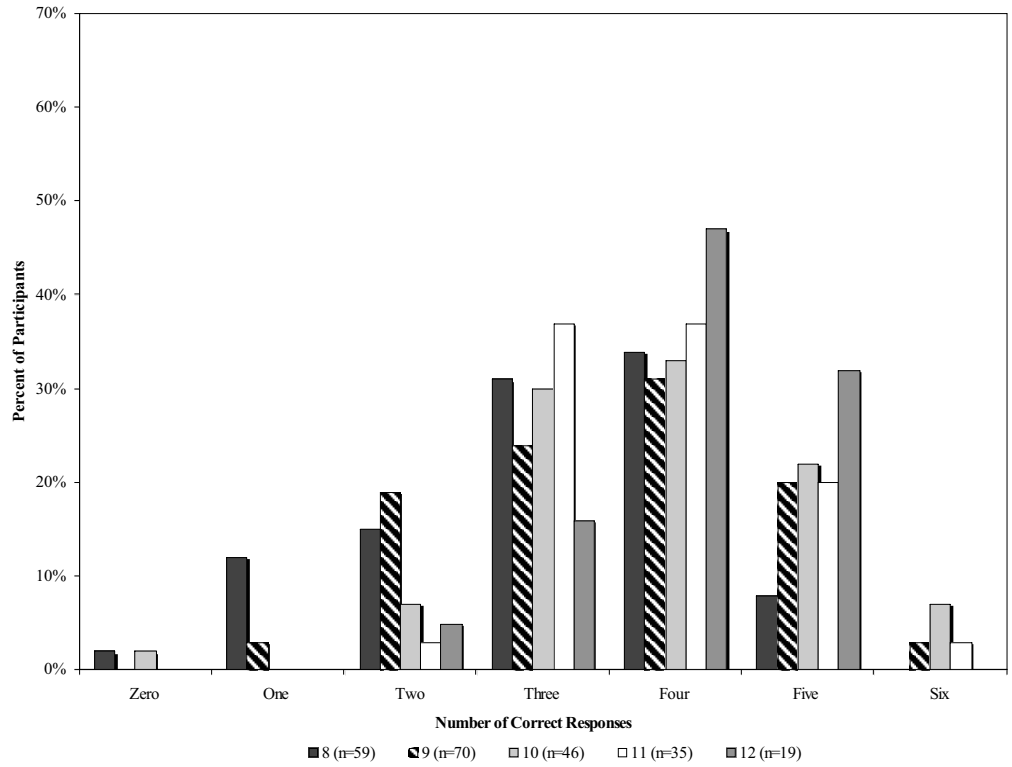

Figure 6: Number of Correct Responses on Pre-Survey Based on Age

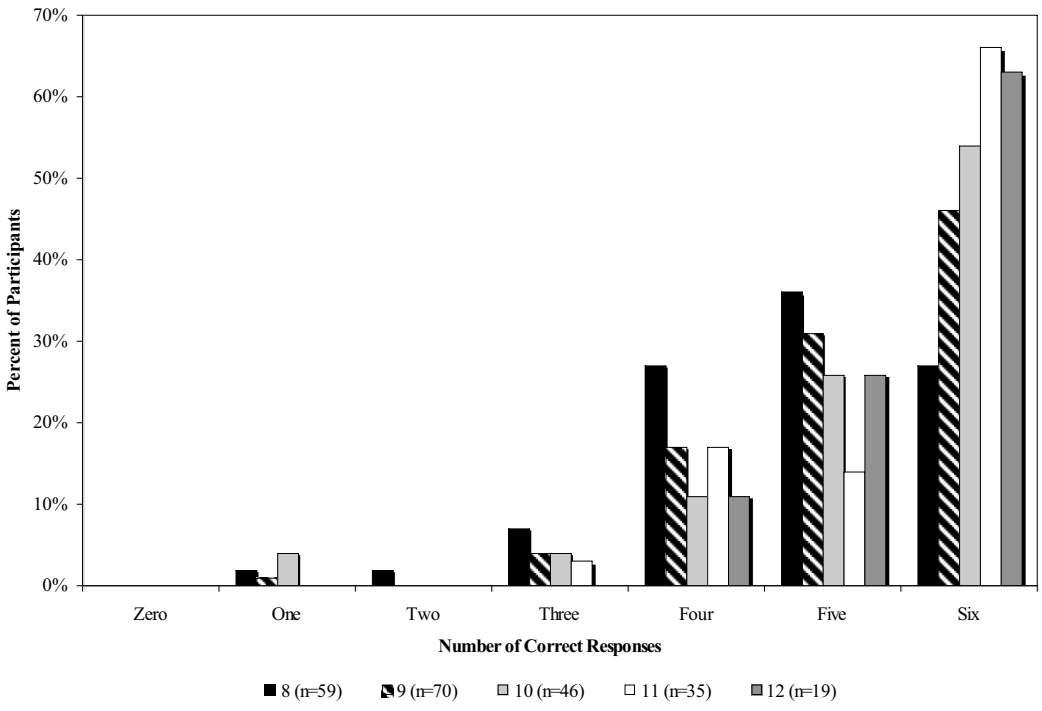

Figure 7: Number of Correct Responses on Post-Survey Based on Age

Increases in Knowledge Based on Prior Angling Experience

Figures 8 and 9 illustrate participant performance on the pre- and post-surveys based on prior angling experience (when looking at the percentages, note that of the 230 participants there were only 17 non-anglers). In terms of answering five or six survey questions correctly, anglers performed better on both the pre- and post-surveys (22% pre-survey, 77% post-survey) than non-anglers (12% pre-survey, 58% post-survey). Although prior angling experience influenced performance on both surveys, it had little influence on the change from pre to post in the percent of participants with five or six correct responses (prior angling experience 55% pre-post increase, no prior angling experience 46% pre-post increase).

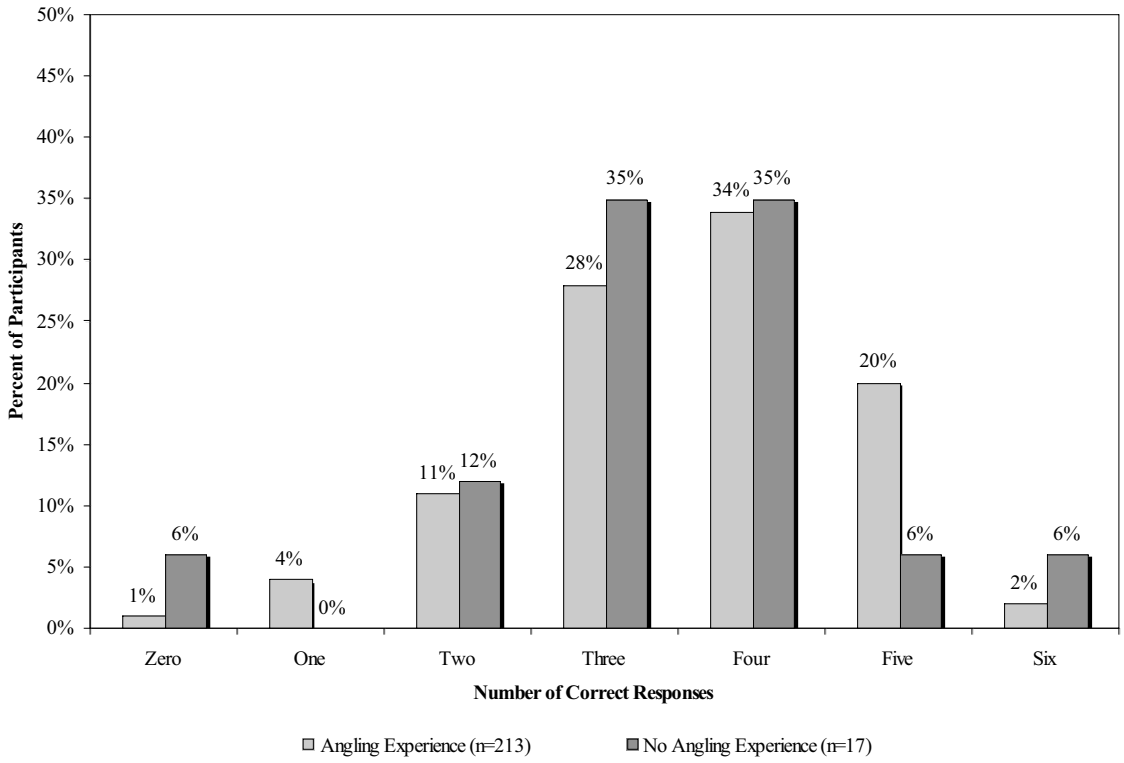

Figure 8: Number of Correct Responses on Pre-Survey Based on Prior Angling Experience

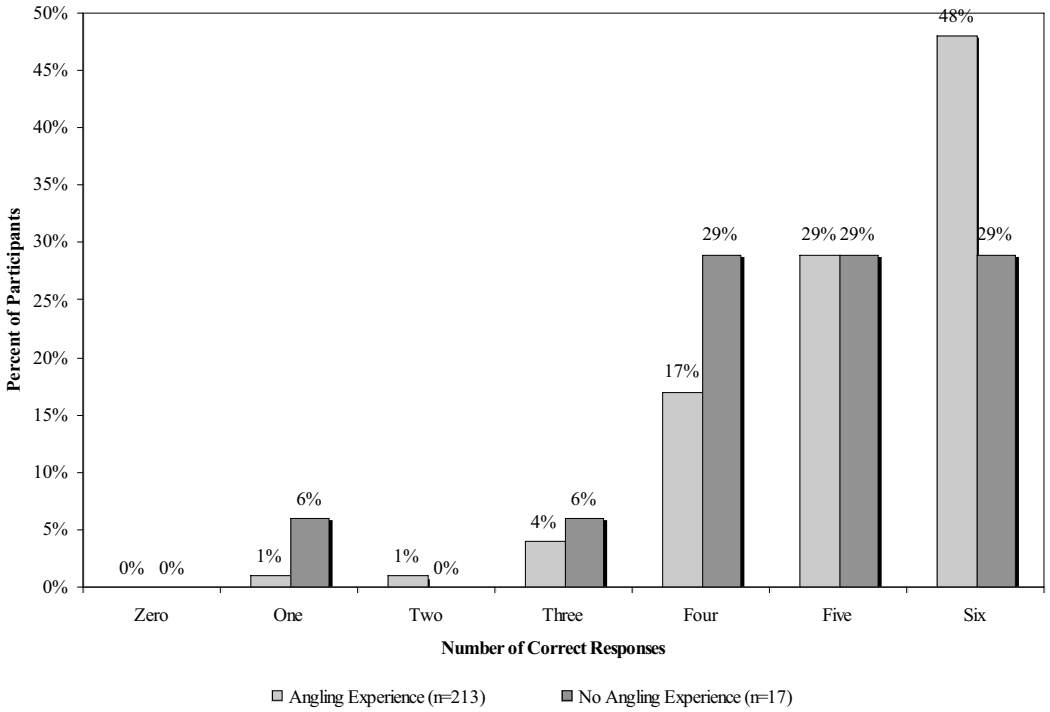

Figure 9: Number of Correct Responses on Post-Survey Based on Prior Angling Experience

Self-Reported Learning Related to Clinic Goals

Participants were asked on the post-survey, "Thinking about all of the activities you did today, what is one thing you would tell your parents or friends that you learned?" Participant responses were coded based on the clinic goals and sample responses are included for each goal in Table 10. Some participants stated more than one thing they learned so their responses may have been coded into more than one goal (which is why total responses add to more than 100%). Participants most frequently mentioned learning something related to the goal "Demonstrate fishing skills" (61%). A much smaller percentage of participants (15% or less) mentioned learning something related to the other three goals. There were a small number of participants (6%) who said they had fun at the clinic, but did not specify what they learned. Only 3% of participants said they did not learn anything new from the clinics.

Table 10: What Participants Learned By Clinic Goals (n=230)

Clinic Goal	Percent of Participants	Sample Responses
Goal 1: Demonstrate fishing skills	61%	• How to fish. • How to cast safely. How to carry poles safely. • How to put on bobber, weight, hook. • How to tie a fishing knot. • How to put a worm on the hook. • How to make a fishing pole out of a pop can. • To not throw fish back in the water. Let it swim out of your hand.
Goal 3: Improve basic aquatic ecology knowledge	15%	• I would tell them I learned the kinds and how to identify them. • You can tell the difference between fish by the shape and fins. • Fish families and groups. • There is oxygen in water.
Goal 4: Give examples of various behaviors that keep aquatic environments healthy	14%	• I learned not to throw bait in the water after fishing. • We learned not to litter because it is bad for the fish and other animals as well. • You cannot throw away dead fish on shore. • To not put fish from tanks into rivers, lakes, and streams.
Goal 2: Explain the importance of fishing rules and regulations in Minnesota	7%	• I learned the fishing regulations. • That you can only keep a certain amount of fish. • You need to have a license to fish. • The seasons that fish are caught in.
Learned a new game (not related to a clinic goal)	1%	• I have learned how to play cool games.
Did not specify what they learned	6%	
Did not learn anything new	3%	

DISCUSSION & RECOMMENDATIONS

Addressing the Evaluation Questions

The summative evaluation provided evidence to answer the overarching evaluation questions: (a) To what extent are MinnAqua clinics meeting their goals?, and (b) To what extent does participation in MinnAqua clinics increase children's knowledge of angling and aquatic resources as identified by the MinnAqua key concepts?

MinnAqua Clinics Meeting Their Goals

The summative evaluation focused on the short-term effectiveness of clinics in terms of the first four clinic goals related to angling and aquatic knowledge and skills. Goals were measured by specific survey questions and a post-survey open-ended question where participants self-reported what they learned. The effect of clinics on participants' desire to fish in the future (fifth clinic goal) was not measured after deciding a separate evaluation was necessary to adequately study the various factors that influence angling participation.

Clinics were highly effective in addressing the first goal, "Demonstrate basic fishing skills". When asked what they learned at the clinic, participants most frequently mentioned learning angling content or skills (61%). There were also increases in knowledge of how to rig a line (Question 5). As discussed in the literature, building participants' knowledge and confidence in angling skills can address constraints to fishing and reasons for desertion from the sport, thus influencing angling participation (Fedler, 2000; Kuehn, 2003; Responsive Management, 2003a, 2003c).

Clinics had the least impact in relation to the second goal, "Explain the importance of fishing rules and regulations in Minnesota". This was not a result of the clinic, but participants' prior knowledge; suggesting that clinics may play more of a role in reinforcing participants' knowledge of rules and regulations than increasing their knowledge. Only 7% of participants reported learning something related to rules or regulations. Additionally, over 80% of participants already knew why fishing regulations and limits were important (as measured by survey questions 2a and 2b), leaving little room for growth. This high percentage of correct answers on the pre-survey could be due to prior knowledge of these concepts. However, anytime

there are a high percentage of correct responses on a pre-survey question, the question's wording should be examined to determine if it may have biased the results.

Clinics were somewhat effective in addressing the third goal, "Improve basic aquatic ecology knowledge." There was substantial increase in knowledge about fish identification (35% increase on Question 4). However, looking across individual survey questions, the fish identification question had the lowest percent of post-survey correct responses (70%). Additionally, only 15% of participants mentioned aquatic ecology concepts as self-reported new knowledge. Challenges with teaching fish identification first came to light after the 2004 pilot test and it is clear some of these challenges still exist. As suggested from the data, there are opportunities to strengthen fish identification and other aquatic ecology content to further address the third goal.

Clinics were effective in addressing the fourth goal, "Give examples of various behaviors that keep aquatic environments healthy." There were substantial increases in knowledge on aquatic stewardship questions (Question 3b and 3a), with the highest improvement of all survey questions related to disposing of bait (63% increase). However, when asked to self-report what they learned, only 14% of participants mentioned aquatic stewardship behaviors. This could be a result of the survey already measuring two of the behaviors stressed in the clinics. Additionally, participants may already be aware of many stewardship behaviors, such as where to dispose of garbage, so clinics may also play a role in reinforcing certain stewardship behaviors in youth.

Increase in Participant Knowledge

The second evaluation question, "To what extent does participation in MinnAqua clinics increase children's knowledge of angling and aquatic resources as identified by the MinnAqua key concepts?", examined increases in participants' knowledge as a result of attending a MinnAqua clinic. More then three-quarters of participants (77%) answered five or six questions correctly on the post-survey. This improvement in performance was a 56% increase from the pre-survey. When looking more closely at the data in terms of participant characteristics, girls increased more from pre to post than boys, while prior fishing experience and age did not have an effect on the amount of change from pre to post.

When looking at individual survey questions, all survey questions had an increase in the percent of students responding correctly from pre to post. The smallest increases in knowledge

were related to fishing rules and regulations, although most participants already had this prior knowledge so there was little room for improvement. The largest increase in knowledge across all survey questions was in relation to how to dispose of bait with a 63% increase from pre to post.

Additional Findings of Interest

The evaluation provided additional findings of interest beyond supplying evidence to answer the evaluation questions. A major outcome of the evaluation was the improvement of MinnAqua clinics. The overall evaluation process helped MinnAqua better define the clinic format and content, causing clinics to change considerably over the course of the evaluation. As demonstrated by the evaluation data, the resulting clinics met their goals and increased participants' aquatic and angling knowledge.

The evaluation also provided MinnAqua with a better understanding of 8 to 12 year old summer clinic participants. Clinics reach the most participants at the lower end of this age range, with around three-quarters of participants are 8-10 years old (78% summer 2004, 76% summer 2005). Clinics are composed of more boys (67% summer 2004, 64% summer 2005) than girls (33% summer 2004, 36% summer 2005). Participants are from throughout Minnesota, with the smallest numbers of participants from northern Minnesota (5% summer 2004, 8% summer 2005). These numbers are reflective of the regions in which clinic requests originate and where the clinics are held. Almost all 8-12 year old participants (95% summer 2004, 91% summer 2005) have gone fishing before attending a clinic.

Participants have a range of prior knowledge related to the clinic content. Before attending a clinic, participants are most familiar with fishing regulations and why they are important. Participants are least familiar with how to identify fish and dispose of bait. Gender, age, and prior angling experience all influenced prior knowledge. Boys, older participants (ages 9 – 12), and anglers had more prior knowledge related to clinic content than girls, the youngest participants (age 8), and non-anglers. Understanding participants' prior knowledge provides guidance for structuring educational activities that not only build on this knowledge, but introduce new concepts. It also provides a baseline to measure changes in participant conceptual knowledge and thus gauge clinics' impact.

Recommendations for Future Clinics

Based on the summative evaluation results, recommendations for future clinics were generated. These recommendations included continued use of the MinnAqua Clinics Quality Control and MinnAqua Clinic Program Leader Questionnaire, as well as suggestions for future marketing efforts to expand clinics' population base.

As a result of the evaluation process, the MinnAqua Clinics Quality Control was created and clinics were restructured. The Quality Control served, in essence, as the clinic "curriculum" to outline how clinics should be structured and what key concepts should be addressed in clinic activities. The restructuring of the clinics was advantageous in that MinnAqua staff and interns became more aware of the key concepts and in turn, delivered effective programs as evident by increases in participant knowledge. It is recommended to continue using the Quality Control as a framework for carrying out clinics in order to ensure future success of clinics in meeting their goals and providing a meaningful learning experience for participants.

A version of the MinnAqua Clinic Program Leader Questionnaire could also remain in use. The Questionnaire could function as a reminder to staff of what activities and key concepts should be included in a clinic. If necessary, MinnAqua Education Specialists can also use the Questionnaire to monitor clinics to ensure interns are covering the appropriate content and are comfortable with clinics' structure, especially at the beginning of the season when interns are first starting out.

If MinnAqua would like to expand its audience base, marketing efforts for clinics could focus on specific populations found to have low participant numbers. These populations include girls, 11 and 12 year olds, youth living in northern Minnesota, and non-anglers. One means to increase the audience base may be to hold clinics specifically for these populations. Currently, a "one size fits all" approach is used for clinics. It may be appropriate to develop separate clinics based on the age of participants, their gender, their prior angling experience, and/or their prior knowledge. For example, the literature states that participation in angling starts to drop off for teenagers (Dann, 1993; Fedler, 2000). Although this evaluation only went to age 12, there was a decrease in participant numbers after age 9. If the trend continues as suggested by the literature, the number of older participants would be even fewer. The decrease in clinic participants 10 and older could be attributed to the mixed clinic audiences, which sometimes include a wide range of participants (under 8 years old to above age 12). Older students may not want to participate in a

clinic with early elementary participants. Also, the activities appropriate for youth under age 8 may be too basic and uninteresting for older participants. Tailoring clinics to the prior knowledge and interests of older participants is one means to attempt to increase summer clinics' audience base.

Future Directions

This evaluation examined the short-term impact clinics have on participants' angling and aquatic ecology knowledge. This evaluation did not measure participants' desire to fish in the future and the long-term impact of the MinnAqua clinics in creating future anglers. Evaluating angling education programs to determine their impact on creating future anglers is difficult since it is not an immediate outcome of angling programs. For this reason, a longitudinal study could be conducted to look more closely at the effects of MinnAqua clinics on the variety of factors that impact fishing involvement, as discussed in the Literature Review. Findings from a longitudinal study could help determine the impact clinics and other MinnAqua programs have on constraints to fishing, reasons why youth drop out of the sport, and motivations to continue angling.

A future study could also be carried out to determine which types of MinnAqua programs reach the most non-anglers and could thus have the largest impact on angler recruitment. One population to consider is clinic participants under the age of 8 since the literature indicates that initiation occurs for many youth before age 8. One study of New York youth found the average age of initiation to be 9.8 for girls and 6.8 for boys (Kuehn, 2003). According to a study conducted by Harrington Market Research (1992), around 70% of anglers were initiated into angling before the age of 9. School groups are another population where clinics could possibly have a larger impact on angler recruitment. This population could potentially differ from summer clinics because students do not choose to sign up for the clinic, their teacher decides for them. For this reason, the population may be more diverse and include a higher proportion of non-anglers. This assumption is based on a survey administration pilot test with a school group of 8 - 10 year olds where there were a higher percentage of non-anglers (23% of the 68 participants) in comparison to the summative evaluation findings of the summer clinics (95% of the 320 summer 2004 participants and 91% of the 279 summer 2005 participants). This example is just one clinic in an urban setting, but this difference is worth further exploring to understand

the role school programs (both in and out of urban settings) could play in angler recruitment and retention. To gain a better understanding of the different audience groups MinnAqua programs reach, a short survey could be administered at all programs to determine which reach the highest number of participants with no prior angling experience. If differences are found among programs, MinnAqua may want to reconsider the structure of their programs so they are more tailored to the audience and their angling experience.

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APPENDIX A:
MinnAqua Clinics Quality Control
or What to Cover in a MinnAqua Fishing Clinic

****Length of Clinic:** You will need at least five hours to cover everything in this Quality Control sheet.

Introduction

- Greet everyone and introduce yourself as part of DNR Fisheries (and your cooperating agency, if applicable.)
- Take care of registration, collect all the permission slips, and have the kids fill out nametags.
- Greet your chaperones and let them know how they can help. Hand them the "Volunteer/Chaperone Brief" that discusses expectations during the survey and clinic activities.
- Find someone who will volunteer to sit with the children under age 8 while the other kids are taking the surveys. Explain to them their role and give them the "Under Age 8 Instructions for Volunteer/Chaperone" handout.
- Go over your expectations with everyone (respect yourself, others, the equipment and the environment).
- Tell the kids what activities they will be doing that day. (Don't forget to schedule lunch and a few water/bathroom breaks.)

Icebreaker

- Do an icebreaker game to get to know the participants.

Conduct Clinic Pre-Survey

- Refer to "Instructions for Administrating Surveys".
- Make sure to explain to kids under age 8 what their task is while the other kids take the surveys.

Cover Key Concepts for Each Chapter

- For chapters 2-5 do one lesson listed for that chapter. Make sure when you do a lesson that you cover the key concepts listed for that chapter.
- For chapters 1 and 6 there are not lessons listed, instead do the activity or discussion suggested in order to cover the key concepts for that chapter.
- Review key concepts at the end of your lesson. If possible, refer to these same concepts throughout the clinic to help reinforce what kids learned.

Chapter 1: Aquatic Habitats

MinnAqua Lessons: None – instead do a review of the following key concepts

- The four basic habitat needs of fish are food, water, shelter/cover, and space.
- All energy initially comes from the sun and then is transferred to other organisms through the food chain: sun, plankton, prey fish, predator fish, humans. Organisms are interdependent. Members of the food chain are impacted if one part is damaged or missing. May use food chain cards from Food Chain Tag.

Chapter 2: MN Fish

MinnAqua Lessons: Fish Families (outdoor setting extension)

- There is a diversity of fish species and families in Minnesota
- How to identify fish by physical characteristics (Body shape and fin size, shape, location are more reliable than body size and color)

Chapter 3: Water Stewardship

MinnAqua Lesson: The Lake Game (do at least the first ten cards)

- Everyone makes choices that impact water quality, positively or negatively.
- Everyone can help take care of water for fish. (See 1st 10 cards of Lake Game to cover invasive species, leftover bait, aquarium fish, littering, etc.)
- With provided gloves, ask each student to pick up 10 pieces trash at your site.

Chapter 4: Fish Management

MinnAqua Lessons (Choose one): Fishing Regs & Sportsmanship (Part 1) or Fisheries Mgmt and You

- Fishing regulations are laws all anglers need to follow when they go fishing. Define sportsmanship.
- Basic fishing regulations including licenses, seasons and limits.
- Reasons for regulations
    - Protecting fish populations from over harvest. Limits help avoid over harvest by preventing people from keeping as many fish as they want.
    - To create a share of fishing opportunities for everyone because of growing numbers of anglers.
    - Maintain and ensure a certain quality of fishing opportunities, relates to size & species

Chapter 5: Fishing Equipment and Skills

MinnAqua Lessons (Choose one): Pop Can Casting or Fishing with a Closed Faced Rod & Reel

- How to rig a line
    - How to tie an improved clinch knot
    - Put on a bobber, sinker and hook
    - How to set the depth of the line with the bobber

Chapter 6: Safety & the Fishing Trip

MinnAqua Lesson: No lessons – Instead do a safety discussion and catch and release demonstration

- If using long rods, practice casting on land before going to the water.
- Demonstrate how to safely walk with a rod and hook or pop can rig and hook.
- Show the boundaries of where to fish along the lakeshore, riverbank, or on a pier. Refrain from sitting on pier railings.
- Be aware of where their hook is at all times so they don't hook anyone. Look around you before you cast.
- Ask an adult to help with a snag.
- Stay on land.
- Yell "danger!" if someone falls in the water or is caught by a hook or otherwise is in danger.

- Drink water to stay hydrated and protect yourself from the sun.
- Demonstrate catch & release with a fish pillow. Correct procedures are found in the Catch & Release brochure. (Wet your hands, handle the fish gently supporting the belly, remove hooks with a forceps, cut the line if the fish is hooked deeply, and gently slide the fish back into the water.)

Fishing Time

- Allow 45 – 60 minutes for kids to fish. This time includes equipment handling and clean up.
- Discuss what to do with leftover bait, do not dump worms on the ground, put them in the trash or re-use.

Conduct post-survey

- Refer to the "Instructions for Administrating Surveys" sheet.
- Make sure to explain to kids under age 8 what their task is while the other kids take the surveys.

Conclusion

Do a verbal wrap up. If time, do any one lesson from Chapter 1 following the verbal wrap up.
Points to include in verbal wrap up:

  - Review the different activities you covered that day.
  - Ask the kids, "What is one thing you learned today? and What is your favorite memory from the day?"
- Hand out to each kid:
  - Starter tackle box and activity book
  - Pier map or fishing site brochure
  - State Park brochure with fishing access
  - Fish advisory magnet (looks like a fish)
- Thank your students and chaperones.
- Keep track of the kids until their parents pick them up or the bus leaves.

APPENDIX B:

MinnAqua Clinic Pre-Survey

We want to make your day at a MinnAqua Clinic even better! Your answers to questions about your fishing experiences and what you know about fishing will help us improve future MinnAqua clinics. It will take about 15 minutes to fill out this survey. Thank you for helping us out!

YOUR FISHING EXPERIENCE

1. Have you ever been fishing? (Check one box.)

- ☐ No
- ☐ Yes

FISHING AND WATER ENVIRONMENTS

2. Minnesota has many fishing laws (called regulations) that people need to follow when they go fishing. Why does Minnesota need to have fishing regulations? Look at the statements below about why there are fishing regulations in Minnesota and decide if they are true or false.

	True	False	Not Sure
a. Minnesota has fishing regulation so people can keep as many fish as they want.	☐	☐	☐
b. Minnesota has fishing regulations so there are enough fish in the lakes and rivers for people to catch.	☐	☐	☐

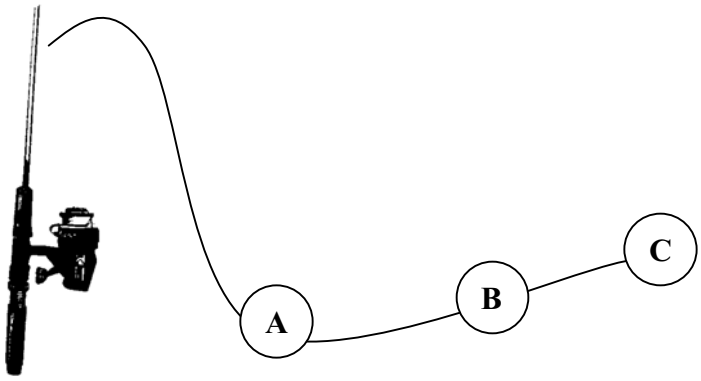
3. For each of the following activities, decide if it is harmful or not harmful to the lake.

	Not Harmful	Harmful	Not Sure
a. Putting fish from an aquarium, fish tank, or fish bowl in the lake	☐	☐	☐
b. Placing leftover bait (like minnows or worms) in the lake	☐	☐	☐

4. Imagine you caught a fish. You need to be able to identify it so you can follow the state's fishing laws (called regulations). What two characteristics of the fish would be the best features to look at so you can tell what kind of fish it is?

- ☐ Body shape and size
- ☐ Size and fins
- ☐ Fins and body shape

5. Imagine you are going fishing. You need to get ready by attaching a hook, sinker, and bobber to your fishing line. Write the letter next to the appropriate object to indicate where it should be placed on the line.



_____ Hook 

_____ Bobber 

_____ Sinker 

ABOUT YOURSELF

6. Create your own identification number so we can match up the surveys you take today.

_____ The first letter of your first name (Example: If your first name is Jane, write the letter J)

_____ The second letter of your last name (Example: If your last name is Doe, write the letter O)

_____ The date of your birthday (Example: If your birthday is May 3, write the number 3)

The following questions are optional and your answers will be kept private.

7. How old are you? _____ years old

8. Are you a boy or a girl?

- ☐ Boy
- ☐ Girl

9. What is your zip code? _____

Thank you for taking the time to fill out this survey!

When you are done, please return it to a MinnAqua staff person.

MinnAqua Clinic Post-Survey

We want to make your day at a MinnAqua Clinic even better! Your answers to questions about your fishing experiences as well as what you know about fishing and water environments will help us improve future MinnAqua clinics. It will take about 15 minutes to fill out this survey. Thank you for helping us out!

MINNAQUA PROGRAM
Minnesota Waters - Fishing, Sharing, Caring

YOUR FISHING EXPERIENCE

1. Thinking about all of the activities you did today, what is one thing would tell your parents or friends that you learned? (Write your response below.)

FISHING AND WATER ENVIRONMENTS

2. Minnesota has many fishing laws (called regulations) that people need to follow when they go fishing. Why does Minnesota need to have fishing regulations? Look at the statements below about why there are fishing regulations in Minnesota and decide if they are true or false.

	True	False	Not Sure
a. Minnesota has fishing regulation so people can keep as many fish as they want.	☐	☐	☐
b. Minnesota has fishing regulations so there are enough fish in the lakes and rivers for people to catch.	☐	☐	☐

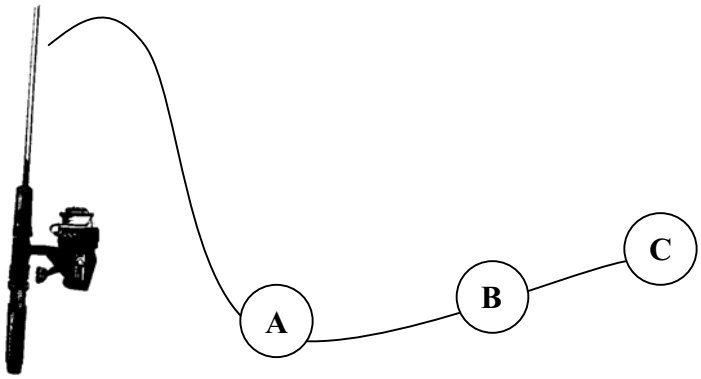
3. For each of the following activities, decide if it is harmful or not harmful to the lake.

	Not Harmful	Harmful	Not Sure
a. Putting fish from an aquarium, fish tank, or fish bowl in the lake	☐	☐	☐
b. Placing leftover bait (like minnows or worms) in the lake	☐	☐	☐

4. Imagine you caught a fish. You need to be able to identify it so you can follow the state's fishing laws (called regulations). What two characteristics of the fish would be the best features to look at so you can tell what kind of fish it is?

- ☐ Body shape and size
- ☐ Size and fins
- ☐ Fins and body shape

5. Imagine you are going fishing. You need to get ready by attaching a hook, sinker, and bobber to your fishing line. Write the letter next to the appropriate object to indicate where it should be placed on the line.



_____ Hook 

_____ Bobber 

_____ Sinker 

ABOUT YOURSELF

6. Create your own identification number so we can match up the surveys you take today.

_____ The first letter of your first name (Example: If your first name is Jane, write the letter J)

_____ The second letter of your last name (Example: If your last name is Doe, write the letter O)

_____ The date of your birthday (Example: If your birthday is May 3, write the number 3)

Thank you for taking the time to fill out this survey!

When you are done, please return it to a MinnAqua staff person.

APPENDIX C: MinnAqua Clinic Program Leader Questionnaire

Please fill out this survey <u>every time</u> you give the pre and post clinic surveys to a group.

Also <u>attach a copy of the program report</u> for the clinic.

Name(s) of MinnAqua Program Leader(s):_____

Date(s) of Clinic: _____

Weather conditions can affect what you were able to do at a clinic, children's engagement, and their fishing experience. Please check below if any of the following weather conditions were present at the time of the clinic. (Check all that apply. If the clinic ran more than one day, make a note as to what day the weather conditions were present.)

- ☐ Raining
- ☐ Thunderstorm
- ☐ Humid
- ☐ Windy (defined as when the wind makes it difficult to administer surveys)
- ☐ Cold temperature (under 55º F)
- ☐ Hot temperature (over 85º F)

Did you do the following lessons & discussions during the clinic?

Activity	**Yes**	**No**	**If no, explain why you didn't do it.**
Chapter 1: Discussed habitat needs	☐	☐	
Chapter 1: Discussed food chain	☐	☐	
Chapter 2: Fish Families	☐	☐	
Chapter 3: The Lake Game (at least the first 10 cards)	☐	☐	
Chapter 4: (check which lesson you did) ☐ Fishing Regulations & Sportsmanship (Part 1) ☐ Fisheries Management and You	☐	☐	
Chapter 5: (check which lesson you did) ☐ Pop Can Casting ☐ Fishing with a Closed Faced Rod & Reel	☐	☐	
Chapter 6: Safety discussion	☐	☐	
Chapter 6: Catch & Release demonstration	☐	☐	
Fishing Time	☐	☐	

List any other activities/lessons you did BEFORE you administered the post-surveys:

_____

Did you encounter any problems while administering the surveys? If so, describe the problems below. Also talk to your supervisor directly and alert him/her to the problem so it can be addressed in future clinics if necessary.

_____

_____

_____

_____

_____

_____

For the most part, how did the kids react to doing the surveys?

- ☐ They enjoyed doing them
- ☐ They didn't seem to mind
- ☐ They were reluctant
- ☐ They complained about it

Please describe any circumstances that you think could affect how the kids answered the survey questions. Circumstances can include problems with the fishing site, a child that was disruptive, safety issues, unforeseen complications, etc. An example: During a clinic a kid got hooked and quite a few kids mentioned on the post-survey, "Don't get hooked" as what they learned. This wasn't something MinnAqua staff taught, but something kids learned from seeing it happen.

_____

_____

_____

_____

_____

Additional Comments:

Thank you for filling out this form.

Please attach it to the participant surveys and program report for this clinic.

APPENDIX D: MinnAqua Program Report

Program Information:

Contact Person _____ Group Name_____

Phone_____ Address _____

E-mail _____ _____

Program Date_____ Site _____

Start Time_____ DOW # or

End Time_____ GIS coordinates X:_____Y:_____

Nearest Town _____

County of Site _____

Staff and Volunteers (list lead instructor first)**:**

Name	DNR discipline or Agency/ Affiliation	Location, Address or Phone	Total Hours (Prep, driving & pgm time)

Program Type: *description*

____ School Pgm. Fish mgmt talk or educational program given to school group, school hatchery tour
____ Talk Fish mgmt talk to Lake Assoc, sports club, gen public but not attendance at gen mtg
____ Nibble Fairs, conservation days, sports shows
____ Event Activ from MinnAqua Leaders Guide or hatch tour to non-school group, scouts, 4-H, etc
____ Clinic 1 activ from each of the 6 chapters from MinnAqua Leaders Guide to a non-school grp
____ Training Training MinnAqua Volunteers
____ Sponsor Activ. Volunteers stuffing tackle boxes, fixing poles, etc

Education Materials Used or Distributed:

____ Education Trunk
- Fishing Trunk
- Aquatic Exotics Trunk
- EnviroScape watershed Trunk

____ Videos, Posters, Handouts
____ Displays
____ Fisheries Tour Packet
____ Other_____

Participant Information:

Total (#)	Age (#)	Race (#)		Disability (#)
____	____0-8	____Asian Am	____Mixed	___Emotional
	____9-15	____African Am	____Russian	___Hearing
Gender (#)	____16-20	____Caucasian	____Somalia	___Motor
____Female	____21-64	____Hispanic	____SE Asian	___Multiple
____Male	____0ver 65	____Am Indian	(Hmong, Loa, Vietnamese)	___Sight
		____Other _____		

Program Donations:

Company/Group Donating	Quantity & Item Donated (bait, mileage, etc)	$ Amount

Program Description and General Comments:

_____

_____

Please send form to MinnAqua staff serving your area. Thank you.

APPENDIX E: Letter to Sponsoring Organization

Dear MinnAqua Sponsor,

MinnAqua Evaluation
This summer MinnAqua is working evaluating our programs to assess the impact MinnAqua clinics have on children's knowledge, attitudes, and behaviors in relation to fishing and aquatic resources. The results of this evaluation will be used to improve our future MinnAqua clinics. We appreciate your sponsorship of MinnAqua clinics and need your help to make this a successful process.

We Need Your Help
Since this evaluation is carried out with children we need to follow certain guidelines. Attached is the passive consent letter that needs to go to the children's parents/guardians, prior to the MinnAqua clinic. If the parents/guardians do not wish to have their child participate in the evaluation, the letter instructs them to call me and let me know. Otherwise, I will assume the parent is okay with their child participating in the evaluation and filling out the surveys at the clinic.

Evaluation Surveys
All children ages 8 and above participating in MinnAqua clinics have the opportunity to participate in this evaluation by completing two surveys. MinnAqua staff will be administering surveys at the beginning and end of the clinic. The surveys will ask questions about fishing experiences and knowledge. Each survey will take approximately 15 minutes to complete.

Questions?
Your help in distributing the consent letters to the parents/guardians prior to the MinnAqua clinic is greatly appreciated. If there is a concern with postage or other costs associated with this request, please contact me and MinnAqua will make arrangements to assist you in this effort. If you have any questions about the MinnAqua clinic evaluation, feel free to call me at (Education Specialist's phone number).

Thanks for your help!

Sincerely,

(Education Specialist's Name)
MinnAqua Education Specialist

APPENDIX F: Passive Consent Letter to Parents and Guardians

Dear Parent or Guardian,
Thank you for signing your child up for a MinnAqua fishing clinic. This summer MinnAqua is conducting an evaluation study of the educational quality of MinnAqua clinics. The results of this evaluation will be used to improve future MinnAqua clinics. If your child is between the ages of 8 – 12, he or she has the opportunity to help us complete this evaluation.

In addition to being the MinnAqua evaluator, I am also a graduate student in the University of Minnesota's College of Natural Resources pursuing Masters Degrees in Environmental Education and Evaluation Studies. I am conducting this study in affiliation with the Minnesota Department of Natural Resources – Section of Fisheries. The purpose of this study is to evaluate the impact of MinnAqua clinics on children's knowledge, attitudes, and behaviors in relation to fishing and aquatic resources. This research will attempt to answer the questions: (a) To what extent are MinnAqua clinics meeting their goals?, and (b) To what extent does participation in MinnAqua clinics increase children's knowledge of angling and aquatic resources as identified by the MinnAqua key concepts? In order to help answer these questions, your child will be asked to complete two surveys. One will be administered at the beginning of the MinnAqua clinic, the other at the end of the clinic. The surveys will ask questions about fishing experiences and knowledge. The pre-survey has 9 questions and the post-survey has 6 questions. Each survey will take approximately 15 minutes to complete. There are no known risks or benefits for participating in this study.

The records of this study will be kept private and stored at the Center for 4-H Youth Development at the University of Minnesota, St Paul. In any sort of report we might publish, **we will not include any information that will make it possible to identify a participant**.

If you approve letting your child help in this study, you are not required to do anything. However, if you decide you **would not** like your child to participate in this study, please contact me at the Minnesota Department of Natural Resources at (Amy's phone number).

Your decision whether or not to allow your child to participate will not affect your current or future relations with the University of Minnesota, Center for 4-H Youth Development, MinnAqua, or the Minnesota Department of Natural Resources. If you decide to allow your child to participate, he/she is free to withdraw at any time without affecting those relationships. Questions you may have about the study can be answered by calling me at the number above. You may also contact my University of Minnesota advisor, Dr. Stephan Carlson, at (Dr. Carlson's phone number). If you have any questions or concerns regarding the study and would like to talk to someone other than the researcher, contact Research Subjects' Advocate line, D528 Mayo, 420 Delaware Street S.E., Minneapolis, Minnesota 55455; telephone (612) 625-1650.

Sincerely,

Amy L. Grack
Graduate Research Assistant

APPENDIX G: Survey Introductions

Pre-Survey Introduction:

Before we start today's clinic, we are going to take a short survey. Your answers to the survey questions will help us understand what you already know about fish, fishing and water environments. At the end of our program, you will receive a similar survey that has questions about your experience today and what you learned. The surveys will give us ideas of how we can make MinnAqua programs more fun for you next year. After we finish taking the post-surveys, you will receive a tackle box. I want to stress that this is not a test. You will not be graded and if you are not sure of an answer that is okay. Just answer the questions with what you think sounds best or mark "not sure". Please do not share answers and look only at your own survey. I will be reading the survey aloud to you, so please follow along. If you have any questions as I go through the survey, please raise your hand. If you need more time to answer a question, you can go back and finish it after we have completed the survey.

Post-Survey Introduction:

Now that you have completed a MinnAqua clinic, we would like to know about your experience today and what you learned. This survey is similar to the one you took at the beginning of the clinic. Again, it is okay if you are not sure of an answer. Simply answer the questions with what you think sounds best or mark "not sure". When we finish this survey, you will receive a tackle box. Please do not share answers and look only at your own survey. I will be reading the survey aloud to you, so please follow along. If you have any questions as I go through the survey, please raise your hand. If you need more time to answer a question, you can go back and finish it after we have completed the survey.

APPENDIX H:
Number of Correct Responses on Pre- and Post-Surveys Based on Age

Table 11: Number of Correct Responses on Pre-Survey Based on Age

	Zero	One	Two	Three	Four	Five	Six
8 years old (n=59)	2%	12%	15%	31%	34%	8%	0%
9 years old (n=70)	0%	3%	19%	24%	31%	20%	3%
10 years old (n=46)	2%	0%	7%	30%	33%	22%	7%
11 years old (n=35)	0%	0%	3%	37%	37%	20%	3%
12 years old (n=19)	0%	0%	5%	16%	47%	32%	0%

Table 12: Number of Correct Responses on Post-Survey Based on Age

	Zero	One	Two	Three	Four	Five	Six
8 years old (n=59)	0%	2%	2%	7%	27%	36%	27%
9 years old (n=70)	0%	1%	0%	4%	17%	31%	46%
10 years old (n=46)	0%	4%	0%	4%	11%	26%	54%
11 years old (n=35)	0%	0%	0%	3%	17%	14%	66%
12 years old (n=19)	0%	0%	0%	0%	11%	26%	63%