

Ice Fishing in Massachusetts

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TECHNOLOGY AND ENVIRONMENT

An Interactive Qualifying Project Report

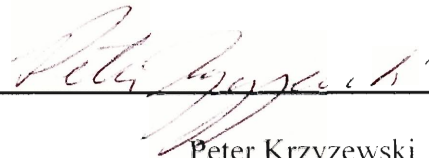
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by



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ABSTRACT

Creel surveys were performed during the 2005 ice fishing season on Lake Quinsigamond and Asnacomet pond. The purpose was to collect data from the anglers regarding the species targeted, number of fish creeled or released, and background about the anglers. The surveys findings supported that there was a high awareness of conservation, and concern regarding pollution in Lake Quinsigamond. This information will be submitted to Massachusetts Division of Fisheries and Wildlife to assist with their future fisheries management.

TABLE OF CONTENT

| | |
|----------------------------|----|
| Acknowledgments..... | 2 |
| Abstract..... | 3 |
| List of Illustrations..... | 5 |
| List of Tables..... | 5 |
| Introduction..... | 6 |
| Creel Survey Methods..... | 10 |
| Results and Data..... | 13 |
| Discussion..... | 19 |
| Summary..... | 25 |
| Work Cited..... | 29 |

LIST OF ILLUSTRATIONS

| | Page |
|----------------|------|
| Figure 1..... | 11 |
| Figure 2..... | 13 |
| Figure 3..... | 14 |
| Figure 4..... | 15 |
| Figure 5..... | 21 |
| Figure 6..... | 24 |
| Figure 7a..... | 25 |
| Figure 7b..... | 25 |
| Figure 7c..... | 25 |
| Figure 7d..... | 25 |
| Figure 8a..... | 27 |
| Figure 8b..... | 27 |

LIST OF TABLES

| | |
|---------------|----|
| Table 1. | 13 |
| Table 2. | 14 |
| Table 3. | 15 |
| Table 4. | 16 |
| Table 5. | 16 |
| Table 6. | 16 |
| Table 7. | 16 |
| Table 8. | 16 |
| Table 9. | 17 |
| Table 10..... | 17 |
| Table 11..... | 18 |

INTRODUCTION

Fishing, once a method of obtaining food, has become one of the most popular forms of recreation. Though many people still eat the fish they catch, they participate in this activity for the enjoyment not necessity. There are many sport fish species recognized in Massachusetts, which provides a wide variety for anglers to choose from. There are also many different fishing methods practiced, which include fly fishing, spinning rod and reel, and ice fishing.

Massachusetts Division of Fisheries and Wildlife is an agency that was founded in 1886 concerning Atlantic salmon loss. Since then it has grown, and extends too many other aspects of outdoor recreation and conservation. It is responsible for the management and regulation of fishing and hunting in Massachusetts. There are programs in land protection, wildlife monitoring and restoration, providing recreation activities, regulating wildlife possession and use, supporting wildlife research and management, and spreading the wildlife message. This agency is a large part of why fisheries conservation in Massachusetts is so well recognized, and has been very beneficial to helping man and nature interact for the best.

Many people participate in fishing; according to the Massachusetts Wildlife 2002 annual report there were 208,966 fishing and sporting licenses sold. A breakdown of the resident licenses which composes the majority of sales shows participants span a wide age group. The total number of licenses for each of seven categories is as follows: resident fishing 126,092, minor resident fishing, (age15-17) 5491, senior (age 65-69) 4,201, senior 70 and over 12,169, resident sporting 37,248, senior (age 65-69) sporting 2,161, senior sporting 70 and over, 10,042. As shown anglers cover a broad age range

which extends from children to seniors over 70 (1). Also the number of woman anglers is surprisingly high adding to the fishing population's diversity. Of the 30 million individuals that participate in fishing in the United States, nearly one third of them are woman (9). This is contrary to the image of fishing as being a primarily a male pastime.

The fees of fishing and sporting licenses alone amount to almost 5 million dollars in Massachusetts. License and stamps for hunting and fishing combined in Massachusetts amount to over nine million dollars annually. Many of these fees are put directly back into the fisheries and outdoors programs. For example hatcheries receive about 1.4 million dollars, game farms, 300,000 dollars, and 3.4 million dollars was put into wildlife management. A study conducted in 2000 based on data from a 1996 national survey showed that over 25 billion dollars was spent by fishermen on various fishing expenses including over 500 million spent in Massachusetts. This has an obvious benefit to the economy (9).

Massachusetts has 22 different varieties of sport fish which range from small blue gills and pumpkin seeds, several bass and trout species, salmon, pike and the sterile hybrid tiger muskie. Trout are the most heavily fished type of fish in Massachusetts and are a target for about half of the anglers. Trout are also excellent eating, so people keep them more often than other types of fish. The main reason Massachusetts is able to support such heavy pressure on one type of fish is the contribution of the hatcheries. Bitzer, McLaughlin, Sunderland and Sandwich hatcheries stock a total of about 500,000 pounds per year. The species stocked include rainbow, brook, brown, and tiger trout. Salmon pike and tiger muskie are also stocked though not as extensively as trout (1).

Different species of fish require different types of water bodies. Trout require cold, highly oxygenated water; where as bass can live in comparatively warm and less oxygenated water. Some bodies of water do not have the ability to support trout others do not have the ability to maintain high populations of bass. Lake Quinsigamond has two parts that behave differently. The southern half has a lot of vegetation and is far shallower than the northern half which is up to 90 feet deep in some areas. Therefore in the southern section few trout and salmon are caught.

Though the trout and salmon are heavily fished and often creeded for the purpose of consumption the amount eaten should be monitored. There are certain bodies of water in Massachusetts that have fish consumption advisories due to pollutants in the water. Even though the water may be safe for humans, fish have a higher concentration of heavy metals in their system than the water in which they live. The heavy metals get more concentrated the larger and older a fish is, because once certain pollutants, such as mercury, are taken in they are not easily removed. People do have a general awareness of the pollution and tend not to eat fish from these areas.

Ice fishing is the most common type of fishing in the winter, often because it is the only kind possible. Ice fishing is done by chiseling or auguring a hole in the ice. Ice fishing tilts can be used to set over the hole and a flag tips up indicating when a fish has hit. Another method is jigging through the holes with a small pole. Ice fishermen tend to be a subgroup of the fishing population. This is not always the case as there are some fishermen that only go ice fishing. Most species of fish that are targeted using other methods can be sought after by ice fishing.

Fly fishing is a common method of fishing especially, but not limited to trout in rivers and streams. In Massachusetts there are areas designated fly fishing only or fly fishing only catch and release. This method of fishing requires more technique than others. There are many people that only fly fish and are deeply involved in fly fishing that do not participate in other methods of fishing.

Fishing with a spinning rod and reel, or a bait caster, are the two most common methods of fishing for all species of fish. There are many different types of artificial lures that imitate almost any live bait imaginable in every sense, from appearance, to swimming action, even smell. Even with all the various imitations the real thing is what people prefer. Live bait can range from worms, shiners, to frogs depending on the species targeted.

There have been many studies on fishing and people who fish. An ice fishing creel survey of Lake Quinsigamond, an urban lake, was conducted and compared to a smaller survey of Ansacommet Pond, a clean rural pond. There are many differences in these bodies of water and the areas that surround them which lead to different types of fishing and attitude towards the fish in the pond. Topics of conversation, pollution, fishing methods, sportfishing awards program

CREEL SURVEY METHODS

The creel survey was conducted on Lake Quinsigamond located in Worcester, Massachusetts during the months of January- March 2003. During the winter months a creel survey is performed on the ice, walking around and asking fishermen survey questions. At the start of the survey a couple trips around the lake were taken. The purpose of these trips was to find possible access locations to get on the lake when the ice was frozen. When the lake finally froze over we went back to these locations to determine if they were safe access points. Many possible entry points at the beginning of the ice fishing season were deemed unsafe due to thin ice. There are many springs and small streams feeding into Lake Quinsigamond which make certain parts of the lake dangerous to walk on. It took a while to get a feel for the lake and considerable caution was used when accessing certain parts of the lake. Performing the survey on this lake gave a little trouble. The access to the lake was limited due to housing and privately owned property around the lakes edge. After the first couple of trips we determined the spots that were most helpful and tried to stay with them in order to receive the most data. When at a location the team headed to the ice on foot, splitting up and traveling to different groups of anglers to conduct the survey.

Each survey started by recording the time and date. Then the angler was asked when their group started fishing so the hours fished by their group could be calculated. After this a series of questions were asked to one angler in the group or the single angler if fishing alone. This is the survey card we used to gather information.

Waterbody: Flint Pond

Town: Worcester

Date _____ Day: _____

Fishing start Time: _____

Interview time: _____

of anglers: _____

of lines: _____

Ice fishing _____

Completed angling or incomplete

Target species:

| Species | Number Creeled | Number released | |
|--------------------|----------------|-----------------|-------|
| | | Sublegal | legal |
| Bluegill | | | |
| Brook Trout | | | |
| Brown Trout | | | |
| Bullhead | | | |
| Chain Pickerel | | | |
| Channel Catfish | | | |
| Crappie | | | |
| LandLocked Salmon | | | |
| Largemouth Bass | | | |
| Northern Pike | | | |
| Pumpkinseed | | | |
| Rainbow Trout | | | |
| American Shad | | | |
| Smallmouth Bass | | | |
| Tiger Muskellunge | | | |
| White Catfish | | | |
| White Perch | | | |
| Yellow Perch | | | |
| Brood stock salmon | | | |
| | | | |
| | | | |

1.) How far did you travel to fish today?

- a. 0-10 miles
- b. 11-20 miles
- c. 20+

2.) How far have you traveled to fish in the past or are you willing to travel? _____

3.) If releasing fish, what is the reason for release?

- a. fear of pollution
- b. do not like fish or do not want to clean fish
- c. fisheries conservation
- d. other _____

4. What types of fishing do you participate in(eg. Fly fishing, deep seas, surf...)? _____

5. Approximately how often do you fish, (depending on the season)? a.

- rarely
- b. once a month
- c. once a week
- d. more than once a week

6. Do you usually fish alone or in a group, if group approximate size?

Figure. 1

It was found that the surveys were easily conducted if an explanation was given to let the angler know what was being done and what types of questions would be asked. Most anglers were willing to participate, with only a few exceptions.

We found that the weekends were the best days to get on the lake and receive data. These two days had the most anglers on the lake while the weekdays were considerably slower. In order to get representative data of the fishing season week days and weekends were sampled. We learned that late morning and early afternoon were the best times to be on the lake. This period of time gave us the best opportunity to receive data from a full fishing trip rather than just a period of the trip (6).

RESULTS

Results and Data: (Background data from Massachusetts Division of Fish and Wildlife annual reports from 1980 to 2003)

Table 1. Trout stocking data comparing weight stocked per year to number of fish per year from 1980 to 2003.

| Year | Trout Stocked (weight) | Trout stocked (number) |
|------|------------------------|------------------------|
| 1980 | 544,299 | 1,090,171 |
| 1981 | 475,849 | 1,290,775 |
| 1982 | 437,075 | 1,163,596 |
| 1983 | 508,942 | 1,490,828 |
| 1984 | 543,375 | 1,324,505 |
| 1985 | 455,893 | 1,087,600 |
| 1986 | 513,936 | 967,494 |
| 1988 | 523,910 | 904,720 |
| 1989 | 480,059 | 770,212 |
| 1990 | 447,483 | 687,523 |
| 1991 | 519,000 | 800,000 |
| 1992 | 529,000 | 800,000 |
| 1993 | 456,875 | 779,013 |
| 1994 | 462,460 | 878,518 |
| 1995 | 543,098 | 812,759 |
| 1997 | 506,002 | 668,525 |
| 1998 | 527,574 | 742,621 |
| 1999 | 525,817 | 724,222 |
| 2000 | 501,309 | 662,239 |
| 2001 | 480,380 | 690,370 |
| 2002 | 437,913 | 628,393 |
| 2003 | 408,940 | 567,667 |

Figure 2. Graph comparing weight stocked per year to number of fish per year from 1980 to 2003.

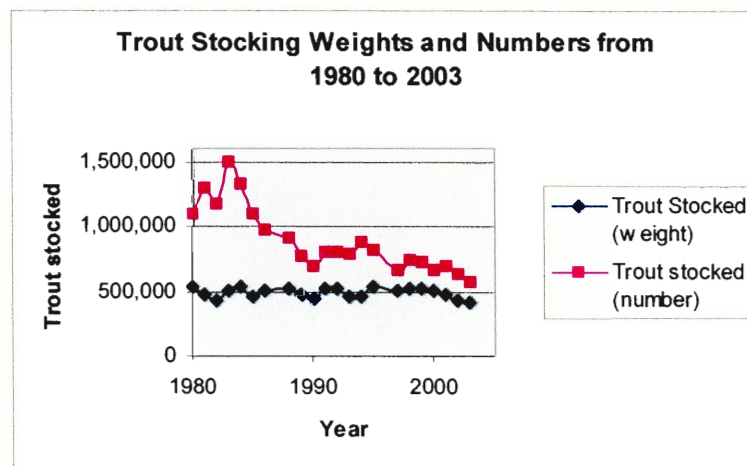


Table 2. Year vs. Weight of Stocked Trout

| Year | Average weight |
|------|----------------|
| 1980 | 0.4990 |
| 1981 | 0.3687 |
| 1982 | 0.3756 |
| 1983 | 0.3414 |
| 1984 | 0.4102 |
| 1985 | 0.4192 |
| 1986 | 0.5312 |
| 1988 | 0.5791 |
| 1989 | 0.6233 |
| 1990 | 0.6509 |
| 1991 | 0.6488 |
| 1992 | 0.6613 |
| 1993 | 0.5865 |
| 1994 | 0.5264 |
| 1995 | 0.6682 |
| 1997 | 0.7569 |
| 1998 | 0.7104 |
| 1999 | 0.7260 |
| 2000 | 0.7570 |
| 2001 | 0.6958 |
| 2002 | 0.6969 |
| 2003 | 0.7204 |

Figure 3. Graph showing average weight of fish per year.

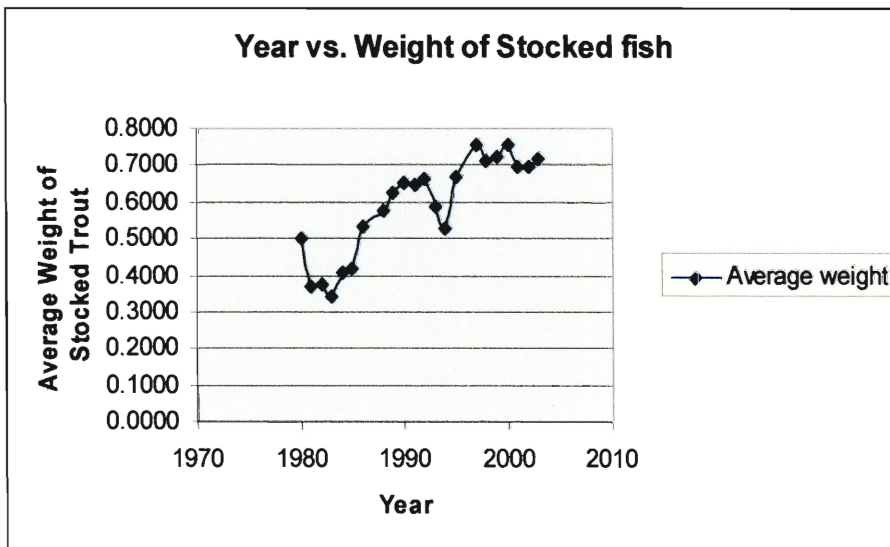
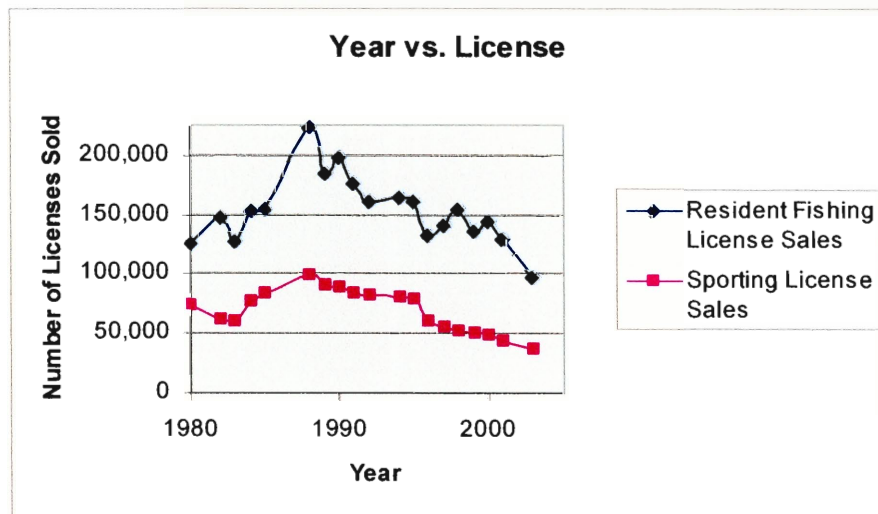


Table 3. Data showing fishing and sporting license sales

| Year | Resident Fishing License Sales | Sporting License Sales |
|------|--------------------------------|------------------------|
| 1980 | 125,688 | 74,255 |
| 1982 | 148,201 | 61,391 |
| 1983 | 127,127 | 60,822 |
| 1984 | 152,623 | 77,171 |
| 1985 | 154,981 | 84,095 |
| 1988 | 223,163 | 99,307 |
| 1989 | 185,176 | 90,295 |
| 1990 | 198,076 | 88,328 |
| 1991 | 176,845 | 84,241 |
| 1992 | 161,484 | 82,095 |
| 1994 | 165,177 | 80,442 |
| 1995 | 160,462 | 79,515 |
| 1996 | 131,996 | 60,078 |
| 1997 | 140,353 | 55,343 |
| 1998 | 154,570 | 52,410 |
| 1999 | 136,388 | 50,353 |
| 2000 | 144,070 | 48,625 |
| 2001 | 128,870 | 44,350 |
| 2003 | 97,189 | 37,365 |

Figure 4. Graph of fishing and sporting license sales from 1980 to 2003



In the creel survey questions were added to gather the following information.

Table 4.

| Distance traveled to fish at Lake Quinsigamond: | # of anglers |
|---|--------------|
| 0-10 miles | 25 |
| 11-20 miles | 27 |
| 20+ miles | 6 |

Table 5.

| How far was the angler willing to travel: | # of anglers |
|---|--------------|
| To the Ocean | 4 |
| Out of New England | 7 |
| Locally | 5 |
| Over 30 miles | 35 |

Table 6.

| If releasing reason for release: | # of anglers |
|---|--------------|
| Concern of Pollution | 35 |
| Do not like the taste of or Cleaning fish | 0 |
| Fisheries conservation | 34 |
| Fish For sport | 3 |

Table 7.

| Did the angler participate in other types of fishing: | # of anglers |
|---|--------------|
| Fly | 11 |
| Ocean | 17 |
| Lake/Pond | 19 |
| River | 9 |
| Baiting Casting | 6 |
| Trolling | 4 |
| All | 6 |

Table 8.

| How often did they go fishing: | # of anglers |
|--------------------------------|--------------|
| Rarely | 1 |
| Once a month | 21 |
| Once a week | 34 |
| More Than Once a Week | 2 |

Table 9.

| | |
|--|----|
| Did they fish in a group, if so what size: | |
| Alone | 5 |
| 1-2 people | 25 |
| 3-4 people | 26 |
| 4+ | 1 |

The total fish from the season are shown as follows. The number of fish divided by the hours fished gives the fish per hour. The hours fished divided by the number of anglers gives the average hours per angler.

Table 10. Fishing season totals.

| Species | Number Creeled | Sublegal Released | Legal Released | Total |
|--------------------|----------------|-------------------|----------------|------------|
| Bluegill | | | 10 | 10 |
| Brook Trout | | | | |
| Brown Trout | 2 | | 5 | 7 |
| Bullhead | | | 2 | 2 |
| Chain Pickerel | | 2 | 8 | 10 |
| Channel Catfish | | | | |
| Crappie | | | 3 | 3 |
| Brood Stock Salmon | 4 | | 4 | 8 |
| Largemouth Bass | | 40 | 132 | 172 |
| Northern Pike | | 15 | | 15 |
| Pumkinseed | | | 2 | 2 |
| Rainbow Trout | 1 | | 8 | 9 |
| American Shad | | | | |
| Smallmouth Bass | | | 1 | 1 |
| Tiger Muskellunge | | | | |
| White Catfish | | | | |
| White Perch | | | 12 | 12 |
| Yellow Perch | | 4 | 48 | 52 |
| Total | 7 | 61 | 235 | 303 |

Fish per Hour
0.466

Hours per Angler
4.27

Table 11. Sampling hours and estimated season totals.

| | Weekend | Weekday | | |
|--|---------|---------|--|------------------------------------|
| Total Hours Of Survey Anglers | 580.6 | 172.5 | | |
| | | | | |
| Days Surveyed | 6 | 5 | | |
| Average % of anglers that were able to be sampled. | 50 | 95 | | |
| Fishing hours per day | 193.5 | 34.50 | | |
| | | | | |
| possible days | 15 | 35 | | |
| | | | | |
| | | | | Estimated fishing hours per season |
| total fishing hours | 2902 | 1207.5 | | 4901.5 |

DISCUSSION

The fish stocking program in Massachusetts is a major help in maintaining some of the fisheries in Massachusetts. Rainbow trout are a heavily sought after species of trout. If it were not for the stocking programs this would not be possible. The rainbow trout was introduced into Massachusetts in 1883 and were stocked as fingerlings or minnow sized fish until the 1940's. The majority of rainbow trout caught today are fish that come from hatcheries that are stocked at sizes over 9 inches. There are only reproducing and sustaining populations of rainbow trout in about a dozen streams that feed the major rivers such as the Connecticut and the Deerfield (8).

Brown trout were introduced in 1887 and currently are reproducing in most cold water streams in western half of Massachusetts. Brown trout are stocked in the many rivers and ponds throughout Massachusetts this is how the population is maintained (8).

Lake trout are the largest species of trout and grow to over 66, pounds the current rod and reel world record. They are an aggressive trout that requires deep cold water. They are not native to Massachusetts and were introduced into two bodies of water in 1952 with fingerlings from Lake Ontario. In 1965 a different strain of lake trout was introduced. They were only stocked into the Quabin and Wachusett reservoirs. These fish thrive in the environment of the deep, clean, cold water, and have become a major target species in both these bodies of water. These fish are self sustaining and are the only trout species in Massachusetts where the current population is independent from stocking (8).

The trout stocked in Massachusetts waters come from 4 hatcheries; Bitzer, Mclaughlin, Sunderland and Sandwich hatcheries stock a total of about 500,000 pounds per year. Since the early 1980's the number of trout produced from the hatcheries has

been nearly cut in half. This is often perceived to be a problem. In reality this is better for the anglers. The weight of the fish as seen in figure 1. (purple line) is maintained over the 20 year period. The number of fish stocked figure 1. (pink line) shows a large reduction. This leads to figure 2. the average weight of a stocked trout. From 1980 to 2003 there is a significant increase in the size. This leads to larger fish being stocked which are more desirable to the angler (3).

The hatcheries do not just focus on stocking trout in Massachusetts there are other species stocked such as pike, tiger muskie, and Atlantic salmon. There is actually a large focus on an Atlantic salmon restoration program. Each year the hatcheries produce over 2 million salmon fry that are stocked in the Connecticut River tributaries. The hope is that these salmon will grow up go out to sea and return to these rivers four years later to spawn. The Atlantic salmon population of the Connecticut River and other rivers in Massachusetts was depleted due to dams. Salmon go up the main rivers to its tributaries to spawn. Dams prevent salmon from reaching their spawning grounds and this eliminates populations of salmon from these rivers.

An interesting set of data is the decline in the recent sporting and fishing license sales. As seen in Figure 3. there was an increase in sales of licenses through the 1980's but since then the licenses sales have been steadily declining. Possible explanations for this could be the age demographics of anglers and who are buying the majority of fishing licenses. It is possible that young adults were fishing and have started a family and no longer have time to fish. It is also possible that people went fishing with their children as a bonding activity and their children have grown. As seen in the introduction there are age categories but the resident license category, excluding minor or senior, extends from

age 18 to age 64. This could be a future study with the questions posed. Why is there a decrease in license sales? Is it due to the population of each generation? Or is it due to something completely different such as the state of the economy and people having extra money to spend on fishing equipment?

When performing the creel survey each angler or angling group was asked a question concerning their fish catch. A total of each parties catch was recorded on the survey. If the angler was in the middle of his outing the total fish count till that time was used. The survey covered, species caught, number creeled, sub legal released, and legal release. Each survey was analyzed and the data was organized and totaled in a spread sheet. When the data was entered in and totaled we received an accumulative catch count of 303 fish.

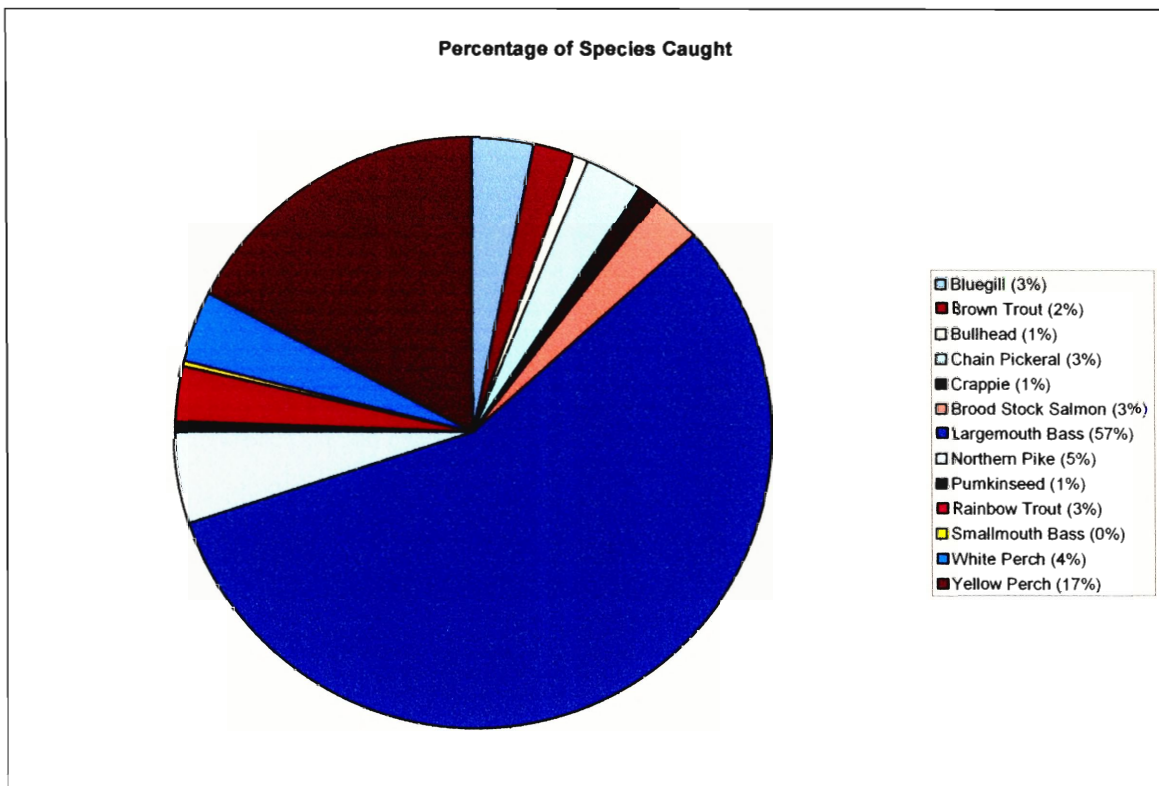


Figure 5. Percent of Each Species Caught

The total hours fished was the next set of data taken into consideration. In each survey the fishing start time and interview time were recorded. The period between these two times would count as the total fishing hours for each group. Each time period was multiplied by the number of anglers, giving us the total fishing hours per survey. The fishing hours per survey was added up to receive a total fishing hours for the whole survey. The total fish count was then divided by the total fishing hours to give a rate of 0.466 fish per hour. Dividing the total fishing hours by the number of anglers gave us the rate of 4.27 hours per angler. The information gave us rates that can be used to help manage the fishery. Multiplying these rates by the number of fishing days in a season, helps determine the pressure on the lake and an estimate of the number of fish taken from the lake each winter.

The average hours per day spent fishing was also calculated using the data. The total hours spent fishing on the weekend was divided by the number of days that were surveyed on a Saturday or Sunday (96.763 hours per day). This was also done for the total weekday hours and the surveyed weekdays (34.5 hours per day). When multiplied by the possible fishing days, the total hours spent fishing can be estimated for any period of time.

In the creel survey data was also obtained from the fisherman about themselves. The fishermen were asked 6 questions. The first question asked how far they had traveled to fish that day. As seen in table 4, the majority of the fisherman came from either 0-10 miles or 11-20 miles with only six fishermen coming from over 20 miles. This data is slightly different than anticipated. The original belief was that the fishermen were mostly local or 0-10 miles. There were actually more fishermen in the 11-20 mile radius of the

lake. A possible explanation for this is; people were willing to travel to the lake to target the stocked pike, tiger muskie, and broodstock salmon.

A second question was asked in open ended fashion to find anglers willingness to travel for fishing. Some common answers were over 30+ miles, to the ocean, and answers that fell in the category of out of New England. This can be seen in table 5. Some notable answers were Montana, Quebec, upstate New York, Bahamas, and Caribbean. This data was generally as anticipated. People ranged from only willing to travel locally to traveling around the world to fish.

The third question asked was one of the most important and we were anticipating the answers. If the fishermen were releasing the fish why were they doing so? The fishermen had two very common answers, fisheries conservation and fear of pollution, and some had both reasons. A surprising finding was that no anglers reported not liking fish or not wanting to clean them, which was one of our original assumptions.

There was also an interest to find out what other methods of fishing the people who participated in ice fishing practiced. There were many other methods that were practiced by the ice fisherman, most often more than one other method and sometimes fishermen even said they participate in all other types of fishing. There were only three ice fisherman that said they exclusively ice fished. These findings can be seen in table 7. Also fisherman most commonly got out on the water once a week as 34 of the men surveyed did or once a month as did 21 of the surveyed fisherman (Table 8).

Fishing is also a social activity, a method of interacting with friends; people are not always going out to only catch fish. Sometimes they are going to spend time with their friends and relax. This can be seen in table 9. with 26 of the surveyed fisherman

going in groups of 3 or 4 people and 25 of them going in groups of 1-2 people. This is compared to only 5 fishermen who usually went out alone.

The data supported the assumption that people were concerned with pollution. The most prevalent concern in Massachusetts is mercury contamination. According to the bureau of environment health assessment in MA of the 121 water bodies tested 64% were above the standard level of mercury for safe consumption. This means that the fish had a mercury concentration of over 1 part per million. Fish that are stocked are stocked by mass wildlife and are deemed safe to eat from all bodies of water in Massachusetts (5).

Mercury is not just a pollutant from man. It is a naturally occurring chemical in the environment. “According to FDA toxicologist Dr. Mike Bolger, approximately 2,700 to 6,000 tons of mercury is released annually into the atmosphere naturally by degassing from the Earth's crust and oceans. Another 2,000 to 3,000 tons are released annually into the atmosphere by human activities, primarily from burning household and industrial wastes, and especially from fossil fuels such as coal.” With this much mercury being release it accumulates in the environment. Also through the process of biomagnification it concentrates in large predatory fish (4).

The process of bioaccumulation occurs when mercury is taken in faster than it can be metabolized and/or excreted the process of biomagnification occurs when larger organisms eat smaller organism containing mercury. This leads to increased levels of mercury in larger organisms. This is shown graphically in figure 6. (2).

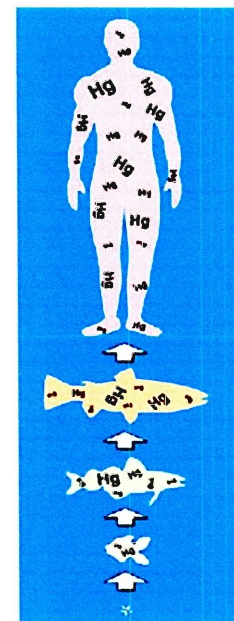


Figure 6.
Small fish eat mercury containing bacteria, the larger fish eat the smaller fish and so on as a process of concentration occurs.

SUMMARY

Oligotrophic lakes are classified by deep, clear, water with little vegetation. Eutrophic are defined as shallow lakes that have a lot of vegetation. Often one lake can have both eutrophic and oligotrophic parts. Very rarely is a body of water strictly oligotrophic or eutrophic (7).

Asnacomet pond is an extremely clean oligotrophic body of water. When surveying there it was found that the anglers were either targeting trout or salmon and intending to creel fish more often than at Quinsigamond. This is because trout and salmon are known to be the best fish species to eat in Massachusetts fresh waters. Also the anglers were not concerned with pollution in this body of water which is much different than the general consensus of anglers at Quinsigamond.

Quinsigamond is 772 acres right in the middle of the Worcester County. The lake is divided up in to two distinct sections. The northern half, the deeper of the two has an average depth of 33 ft, where the shallower southern portion averages 9 ft. (Massachusetts Division of Fisheries and Wildlife map of Lake Quinsigamond). In the shallower southern portion people were fishing for mostly bass although there were some people targeting pike.

Figure 7a is from the Southern shallow part of the lake and figure 7b-d show the Northern part.



Figure 7a - Southern (Flint Pond)

In the deeper portion people were fishing for salmon pike and trout more often. Pictures shown below are from the northern part of Quinsigamond.



Figure 7b.



Figure 7c.



Figure 7d.

Photos of Asnacomet pond in Hubbardston, MA, this pond is a rural and extremely clean, supporting trout and salmon stocked by mass wildlife.



Figure 8a



Figure 8b

The two lakes we surveyed were very different. We only obtained a small sample from Asnacomet pond. Because more time was spent on Lake Quinsigamond we learned more about this ice fishery. Anglers on this lake were very aware of fisheries conservation. Anglers were also concerned with the pollution of this lake. These two concerns lead to most fish being released. Thirteen species were caught in the ice fishing season, this is a good indicator of the diversity of the Lake, and it's abilities to support many types of fish.

Another thing we noticed was that that most fishermen were out in groups and were tended to be middle aged men. These groups were often prepared to stay for several hours or a whole day. Some transported grills and coolers filled with food and beverages out onto the ice. They often represented people that were going out in groups for social purposes not just fishing.

Fishing in Massachusetts is an excellent resource that is utilized by many, and more are welcome to this source of recreation and socialization. We were able to get a detailed, and hands on, view of ice fishing and the people that were participating. The

Lake Quinsigamond ice fishery is mostly enjoyed by people from the Worcester area and some from beyond. Fishing Quinsigamond is not limited to the ice and people utilize it year round. Fishing is a healthy recreational activity that enhances the local economy and is environmentally sustainable.

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