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Assessing Anglers Identification of Common Fish Species of Nebraska

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ASSESSING ANGLERS IDENTIFICATION OF COMMON FISH SPECIES OF NEBRASKA

By

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Abstract

Creel surveys, also known as angler surveys, entail individual interviews with anglers. The interviews include a variety of questions pertaining to their fishing trip on that particular day. The interviewer asks the angler questions that include, but are not limited to what species they caught that day, the size of the fish, how many hours they spent fishing that day, what bait they were using, etc. If the angler does not know the species caught or misidentifies the species there is the potential for the recorded data to negatively impact management techniques that rely on the creel survey data.

One hundred sixteen anglers from Nebraska were surveyed at Cabela's retail store in La Vista, Nebraska and tested on their ability to identify 14 common fish species found in Nebraska. Anglers were also asked their age, years of fishing experience, and the number of fishing outings the angler goes on annually. The results show that a potential problem exists when it comes to anglers being able to correctly identify common fish species found in Nebraska. The results show that age, years of fishing experience, and the number of fishing trips in the last year have almost no effect on the number of fish they were able to correctly identify.

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Acknowledgements

This research was inspired by a presentation conducted by University of Nebraska-Lincoln graduate, Carla Knight during a NRES 463 Fisheries Management course November, 18th 2010. I would like to thank Dr. Cody Knutson and Dr. Lisa Pennisi for their continued support and advice as well as the Nebraska Games and Parks Commission. I would also like to extend my thanks to the staff at Cabela's, for being so outgoing as well as allowing me to use their facility.

1. Introduction

One of the most common and valuable management techniques used in fisheries today are creel surveys. As described by the Minnesota Department of Natural Resources (2011) creel surveys, also known as angler surveys, entail an individual conducting an interview with an angler, which includes a variety of questions pertaining to their fishing trip on that particular day. The surveyor will ask the angler questions that include, but are not limited to what species they caught that day, the size of the fish, how many hours they spent fishing that day, what bait they were using, etc. The surveyors will also record how many anglers, boats, recreational craft, and fishing houses they saw.

Creel surveys provide a great deal of information to assist in fisheries monitoring and management. The fisheries manager can, "get information about the effort, harvest, (and) size distribution of several important species of fish" (Minnesota DNR, 2011). The data can also give information on the fishing quality of the lake, as well as an estimate of the total sports harvest of important trophy fish at the fishery (Texas Parks & Wildlife Department, 2007). "Needless to say, the creel survey is a valuable tool in the fisheries managers' tool box," states the Department of Natural Resources in Minnesota (Minnesota DNR, 2011). However, there can be some inconsistencies in the survey data that can lead to skewed results.

As stated previously, anglers are asked what species they caught that particular day and the surveyor is required to put down the anglers exact response. If the angler does not know the species caught or misidentifies the species there is the potential for the recorded data to negatively impact management techniques that rely on the creel survey data. Thus, the creel surveys can be negatively altered by the simple misidentification of

fish species. That is why it is very important that anglers are aware of the species of fish they are catching. Anglers play an important part in the management and conservation of recreational fisheries in Nebraska. However, as stated in Nebraska Game and Parks Commission's (n.d.) *Common Fishes of Nebraska* identification guide, "Although the Game and Parks Commission is responsible for managing the fish found in Nebraska's waters, it is the ANGLER in Nebraska who holds the power to make or break the management principles employed by the Commission." So, how many anglers are capable of making these sampling errors?

While it seems there will be no true way to ever completely eliminate the misidentification of species, it is possible to get an idea of how many anglers make these mistakes. By testing anglers' fish identifying skills through a survey, the results will show whether misidentifying species is a potential problem or not. In terms of creel surveys, the results could be used to determine whether anglers' responses are affecting the accuracy of the survey data.

2. Literature Review

Much of the available literature is focused more on the results of creel surveys rather than any variables or difficulties that come along with the process. However, reports and testimonials on state Department of Natural Resources websites do provide valuable information on the subject. For example, according to a report by Assistant Fisheries Biologist, Jennifer Smith, from the Adaptive Management Area Program (1999),

> "We posted an informational flyer at all creel box locations. We observed a 63 percent increase in angler response over the previous season. This study suggests anglers are more likely to record their catch when they are made aware of the value of this information. This study has also alerted us to the potential for misidentification of fish by anglers using our recreational areas. Inexperienced (and experienced) anglers likely misidentify several other warm water fish species."

There is a small variety of reports on other variables that affect the accuracy of the creel surveys such as a difference in traffic counters used, certain parts of the angling population not being surveyed adequately, as well as not employing enough surveyors or having short survey hours to name a few, but just a few concentrate on the misidentification of species (Douglas, 2001). In 2003, fisheries biologists, Paul Rister and Ryan Oster from the Kentucky Department of Fish and Wildlife Resources conducted a tagging study in which anglers caught tagged crappie. The returned tags indicated that, "47 percent of the harvested crappie were black and 43 percent were white." These results did,

> ". . . not support the information that had been collected in previous creel surveys. Previous creel surveys suggested only a small percentage of harvested crappie were black. This inconsistency is possibly an indication that anglers misidentified their catch. This theory is also supported by data that anglers returned with their tags. Of the tags returned, almost 35

> percent of the anglers misidentified what species of crappie they pulled the tag from (Rister and Oster, 2003)."

Although the literature supports that the misidentification of species by anglers exists and some professionals in the field have brought this problem to light, the research is limited to a few species. More research is needed to investigate the degree to which anglers can identify a range of common fish species.

3. Materials and Methods

This research was inspired by a presentation conducted by University of Nebraska Lincoln graduate student Carla Knight during a NRES 463 Fisheries Science course in the fall of 2010. As a result, this study surveyed local anglers knowledge of 14 common fish species found in Nebraska. Daryl Bauer (Fisheries Outreach Program Manager at Nebraska Game and Parks Commission, personal communication, April 7, 2011), recommended the list of 14 species, which include Channel catfish (Ictalurus punctatus), Blue catfish (Ictalurus furcathus), Flathead catfish (Pylodictis olivaris), White bass (Morone chrysops), Wiper (Morone saxatilis X Morone chrysops), White perch (Morone americana), Largemouth bass (Micropterus salmoides), Bluegill (Lepomis macrochirus), Green Sunfish (Lepomis cyanellus), Bluegill/Green Sunfish (Hybrid Lepomis macrochirus X Lepomis cyanellus), Redear Sunfish (Lepomis microlophus), White crappie (Pomoxis annularis), Black crappie (Pomoxis nigromaculatus), and Walleye (Stizostedion vitreum). Bauer recommended Largemouth bass, Flathead catfish, and White perch due to how common they are whereas the remaining species were chosen not only because of how common they are, but also because of how likely anglers are to misidentify them.

Angler surveys were conducted at the Cabela's outdoor retail store in LaVista, Nebraska. To conduct the survey, a table was set up in the fishing department of the Cabela's store. Potential anglers were invited to take part in the survey, which consisted of the participant looking at a binder of color pictures of the 14 different fish. The color illustrations of the fishes were taken directly from the Nebraska Game and Parks

Commission's *Common Fishes of Nebraska* (n.d.) identification guide that is given out annually to anglers. Participants were asked to write down the correct fish species listed from 1 to 14 on the survey answer sheet. After the knowledge questions, a series of demographic questions were asked including gender, year of birth, and state and county of residence. In addition to the demographic questions, participants were asked if they had fished in Nebraska during the last year, how many years they have been fishing, and how often they usually fish in an average year. Traditional creel surveys from Nebraska Games and Parks Commission only ask anglers what county and state they reside in. With the added demographic questions, descriptive statistics were calculated from the results to determine which fish are misidentified most often, whether older or younger people are more likely to misidentify fish, whether males or females are more likely to misidentify, and lastly whether experienced anglers are less likely to misidentify fish. The results provided an idea of whether or not the misidentification of fish in Nebraska could be a detriment to the accuracy of creel surveys.

This survey was a convenience sample and therefore, limitations such that participants were selected based on their availability and willingness to participate could affect the generizability of the results. As a convenience sample, some of the angler population of Nebraska had very little chance of being surveyed. The University of California, Davis (1997) warns, "Inferences based on such data must be cautious because of the possibility of hidden systematic bias." Also, by sampling at Cabela's, the wealthier anglers of the area may have been over represented in the sample. Yale University (n.d.) states, "A group comprised of the wealthiest individuals in a given area would not accurately reflect the opinions of the entire population in that area. For this reason,

randomization is typically employed to achieve an unbiased sample". To achieve a degree of randomization, systematic random sampling was used by sampling every third person that walked by the table (Dereshiwsky, 1998). Although this exploratory research has its limitations, the results provided an idea of whether or not the misidentification of fish in Nebraska could be a detriment to the accuracy of creel surveys.

4. Results

One hundred sixteen people were surveyed at the Cabela's outdoor retail store located in La Vista, Nebraska. Participants were asked their age, gender, years of fishing experience, and number of fishing outings they average a year as well as to identify 14 common fish species found in Nebraska. The gender and county of residence data from the surveys were discarded because it was unrepresentative of the angler population. Out of the 116 completed surveys, only three participants were female where the remaining 113 individuals were male. The county of residence data was discarded because it wasn't representative of the angler population in Nebraska as the majority of the survey participants reside in Sarpy, Douglas, and Dodge County which all lie in close proximity to the Cabela's store in La Vista, Nebraska.

As seen in Figure 2, not one of the 116 participants registered a perfect score on the fish identity assessment portion of the survey. The closest any participant got to a perfect score was an 18 year old male who correctly identified 13 out of 14 fish. Figure 2 also shows that two participants were unable to correctly identify any of the 14 different fish species.

Figure 1shows how often each fish species was incorrectly identified throughout the entire 116 person survey sample. The Largemouth bass, the most well known fish was only misidentified in 15 of the 116 surveys or 12.9% of the time. This value was the lowest out of all 14 different fish species. The Bluegill/Green sunfish hybrid was incorrectly identified the most, being misidentified in 105 of the 116 surveys or 90.5% of the time. The White perch and Green sunfish were also misidentified quite often at an alarming 87.9% and 86.2% of the time respectively.

Figure 2 shows the number of correctly identified fish in correlation to how many times that individual goes fishing in a year. The R^2 value on Figure 2 is a .089. R^2 values demonstrate a measure of how "good" of a predictor the x variable is of the y variable. R^2 values range between 0 and 1; 0 means that your x variable doesn't predict it well at all, and a value of 1 means your x variable does a perfect job of predicting the y value. As Downing and Clark (1996) state, "The R^2 value gives the percent of variation in y that can be accounted for by variations in x." The r value was calculated by taking the square root of the R^2 value. Correlation Coefficient r is a measure of how much linear relationship exists between the values for the two variables. The r value can range from -1 to 1, with positive values indicating a relationship between the two variables so that as the x variable increases, so does the y. A negative r indicates that the relationship between x and y is such that as values for x increase, values for y decrease and a value near zero means that there is a random, nonlinear relationship between the two variables. Figure 2's r value is a .299 indicating that as the x variable increases, so does the y. This r value isn't that close to zero showing that a small positive correlation exists between these two variables. So, Figure 2 shows that the number of fishing trips in the last year vs. number of fish correctly identified in the survey does not do a very good job of predicting how many fish the angler could correctly identify.

Although the R^2 value in Figure 2 was very low at .089, there was an outlier present for whom one of the participants fished 200 times a year and only registered 5 correct answers. Figure 3 was created without this outlier to see if there was any difference in R^2 values. Figure 3 shows an increase in the R^2 value after the outlier was dropped resulting in .138 instead of Figure 2's R^2 value which was .089. This was an

increase as far as the R^2 value is concerned. The r value of Figure 3 is .371 showing a positive value demonstrating as the x variable increases, so does the y. This r value is the highest of any of the figures.

Figure 4 plots the number of correctly identified fish in correlation to the age of the survey participant. The R^2 value for Figure 3 is very low at 0.0007. The r value is very low at .026 showing a nonlinear relationship between the two variables in Figure 4. In conclusion, it seems age has almost no effect on the number of questions the participant could get right.

Figure 5 exhibits the number of correctly identified fish in relation to how many years that individual has been fishing. The R^2 value is also very low at .0201, indicating the number of times someone fishes in a year does not do a good job of predicting how many fish the angler could correctly identify. The r value is a low .142 suggesting that the two variables have a random, nonlinear relationship

5. Discussion

While the R^2 value for the number of times an individual goes fishing in a year is the highest and is the best predictor of the Figures 2-4, all of these have extremely low R^2 values and it seems that age, years of fishing experience, and the number of fishing outings in a year have almost no effect on the number of fish anglers were able to correctly identify.

It is very interesting that not one participant was able to correctly identify all 14 fish species. However, it is not too surprising since the fish species list was compiled of species not only based on how commonly they are found in Nebraska, but were also chosen due to how likely individuals are to misidentify that species. A deeper look into why the top four most missed species (Wiper, Bluegill/Green sunfish hybrid, White perch, and Green sunfish) on the list were misidentified more than 66% of the time is needed. Are anglers unaware of the species or are they misidentifying species for "look alike" species? To determine the answer to this question, all of the incorrect answers were complied for the four species to see what participants were most often misidentifying the species as. The four species were chosen not only because of how often they were incorrectly identified, but also because they all share at least some apparent visual similarities with other fish species.

First, this study examined the Wiper which was incorrectly identified in 66.3% of the surveys. Figure 6 shows a pie chart dissecting the wrong answers participants recorded on the surveys in hopes of determining why the Wiper was incorrectly identified so often. As seen in Figure 6, the Wiper was misidentified as the Striped bass for 44% of the wrong answers and was misidentified as the White bass 21% of the time. This makes

sense as similarities exist between the three species. The Wiper is a hybrid between a White bass and Striped bass with offspring exhibiting characteristics of both parents. Figure 10 shows the picture of the Wiper participants were given and Figure 11 shows the picture of the Striped bass. It is easy to understand why participants may have had some difficulty in identifying the Wiper. For the Wiper, it seems a large amount of the sample survey had a hard time identifying the Wiper due to how similar it is in comparison to Striped bass.

The Bluegill/Green sunfish hybrid was incorrectly identified in 90.5% of the surveys. Figure 7 exhibits a pie chart containing the variety of incorrect answers participants recorded in the surveys in reference to this particular species. It shows that the Bluegill/Green sunfish hybrid was most often misidentified as a Bluegill 57% of the time. This seems to be another case of having two visually similar species being mistaken for each other. This can be seen by looking at pictures of the Bluegill/Green sunfish hybrid and Bluegill (Figures 12 and 13 respectively). The Bluegill/Green sunfish hybrid as it says in its name is a hybrid between a Bluegill and Green sunfish. As with the Wiper, the Bluegill/Green sunfish hybrid will demonstrate characteristics of both parents, resulting in an increased difficulty in ability of individuals to correctly identify the species.

Out of 116 surveys taken, the White perch was misidentified 87.9% of the time. Figure 8 shows what participants were marking as their wrong answer for the White perch. The White perch (Figure 14) was mistaken as a freshwater Drum (Figure 15) for 27% of those wrong answers and 26% of those wrong answers were left blank. As Figures 14 and 15 show, visual similarities exist between the two species, but the

similarities are very minimal. This observation plus the statistic of 26% of the wrong answers being left blank suggests that anglers were not misidentifying the White perch due to visual similarities, but more likely due to anglers not being familiar with this particular species.

Figure 9 shows the breakdown of wrong answers for the Green sunfish, depicted in Figure 16. Twenty nine percent of the incorrect identifications were left blank, 27% generically recorded sunfish as their answer which the family of fish it belongs to, and 18% of the time the Green sunfish was misidentified as the Rock bass (Figure 17). The Rock bass and Green sunfish have very similar body outlines, however the coloring is quite different when these two species (Figures 16 and 17) are compared to one another. This observation in addition to 29% of the sample having no idea and 27% being unable to be specific enough, it seems that participants were most likely to be unfamiliar with this species.

Although it seems that the majority of the participants missed the same species due to visual similarities, participants indicated in oral discussion during the surveys that regional differences in the species common names exist which added to the incorrect results. For example, a number of participants said they called Green sunfish a Rock bass where they were from. However, the pictures of these two fish in Figures 16 and 17, clearly shows that these are two different species, suggesting that some anglers were misinformed. Also, anglers surveyed were all from the same region, which indicated that misinformation, rather than true differences in common names could be the culprit.

6. Conclusion

By testing anglers' fish identifying skills through this simple survey, the results show that misidentifying species is a potential problem. In terms of creel surveys, the results show that the potential exists for anglers' to negatively affect the accuracy of the survey data.

More research needs to be conducted on this subject matter in hopes of finding a more representative sample of Nebraska anglers as well as other locations to gain more knowledge, but the results of the survey does show that a potential problem exists when it comes to anglers being able to correctly identify common fish species found in Nebraska. Thus, there lies the potential for creel survey data to negatively impact management techniques that rely on the data and the anglers to correctly identify the fish they're catching. It seems that age, years of fishing experience, and the number of fishing trips in the last year have almost no effect on the number of fish they were able to correctly identify.

Figures

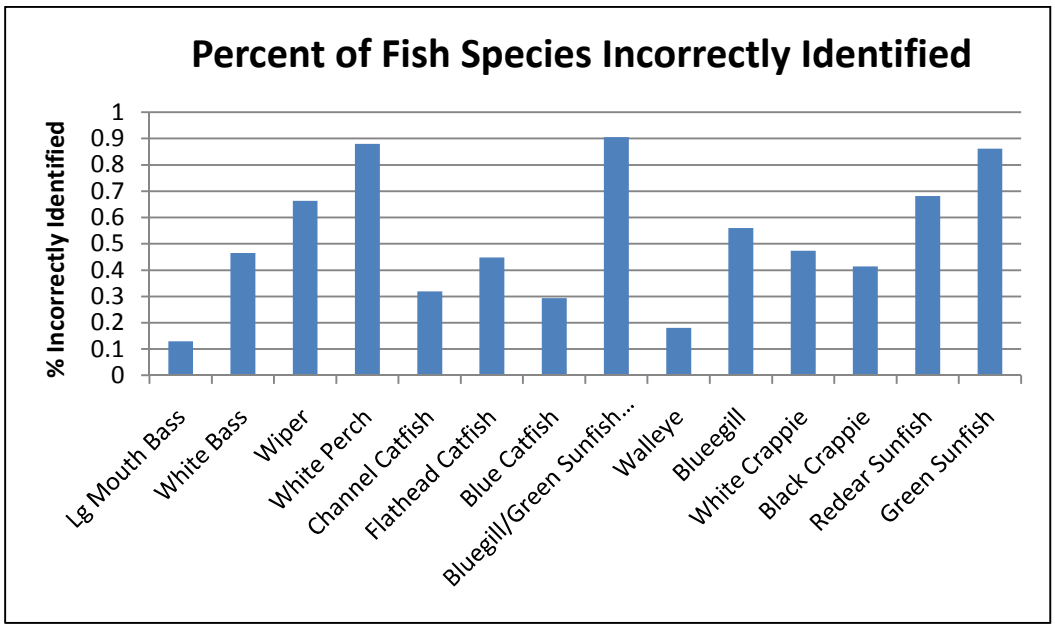

Figure 1: Percent of fish incorrectly identified by species

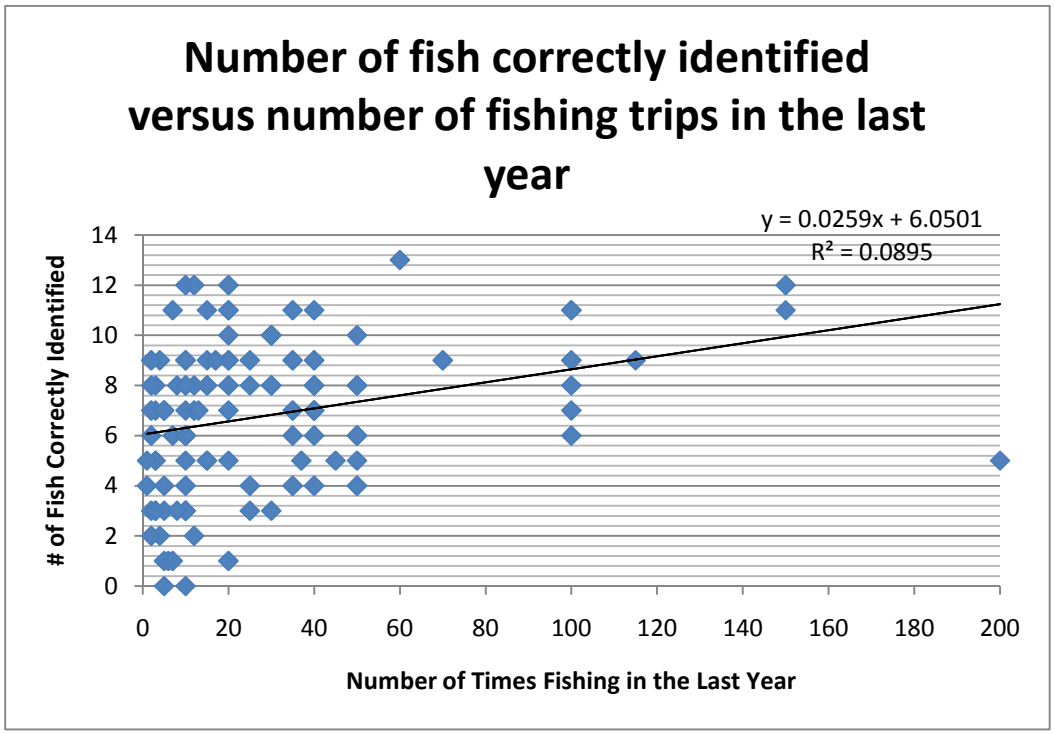

Figure 2: Number of fish correctly identified vs. number of fishing outings a year

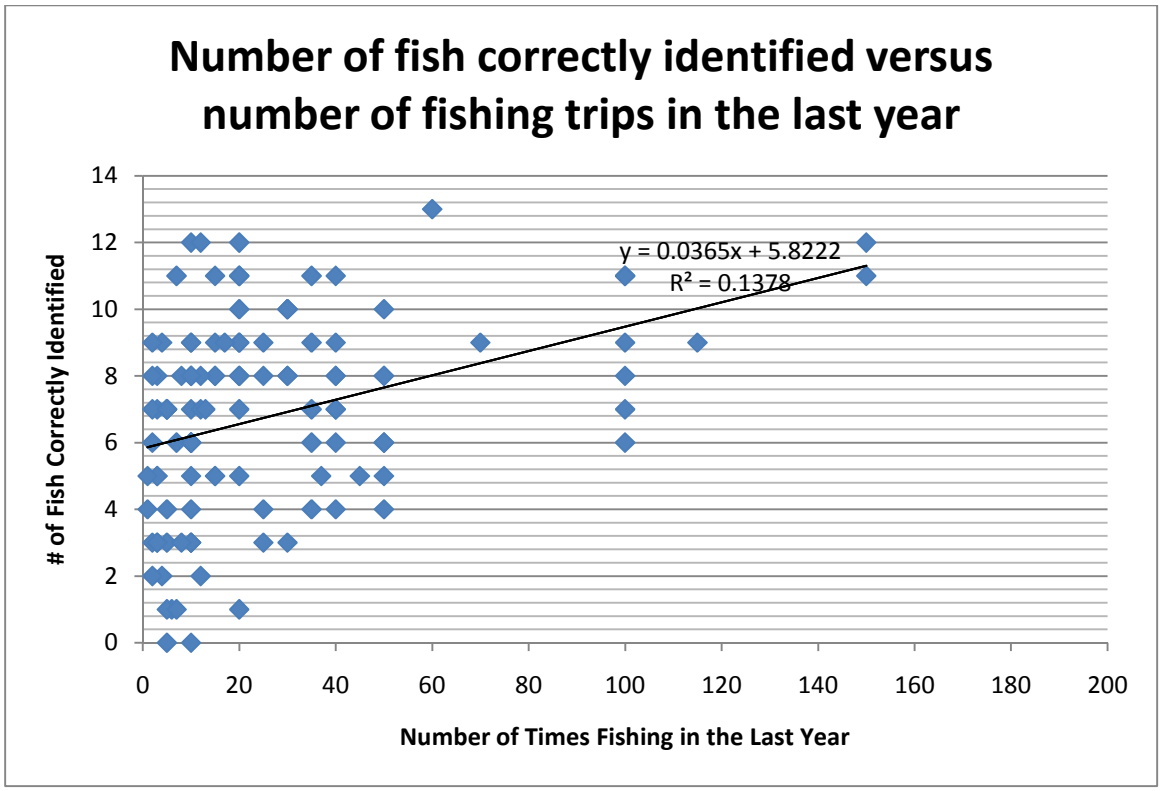

Figure 3: Number of fish correctly identified vs. number of fishing outings in the last year (with outlier removed)

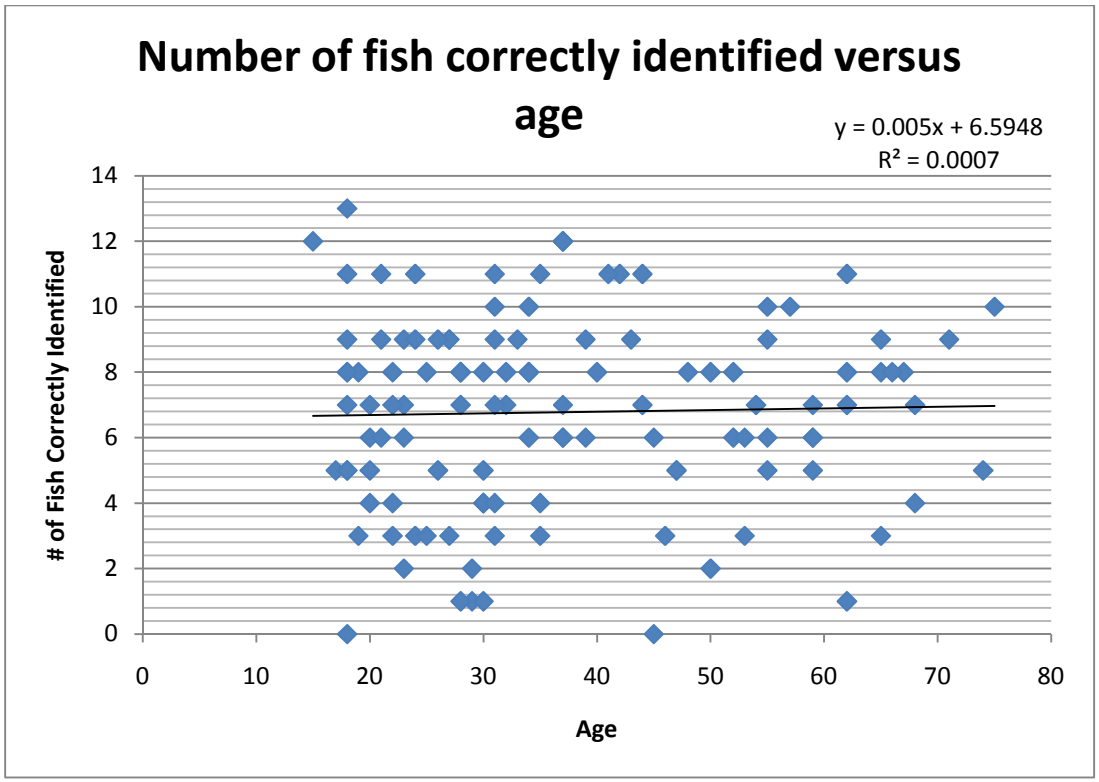

Figure 4: Number of fish correctly identified vs. angler's age

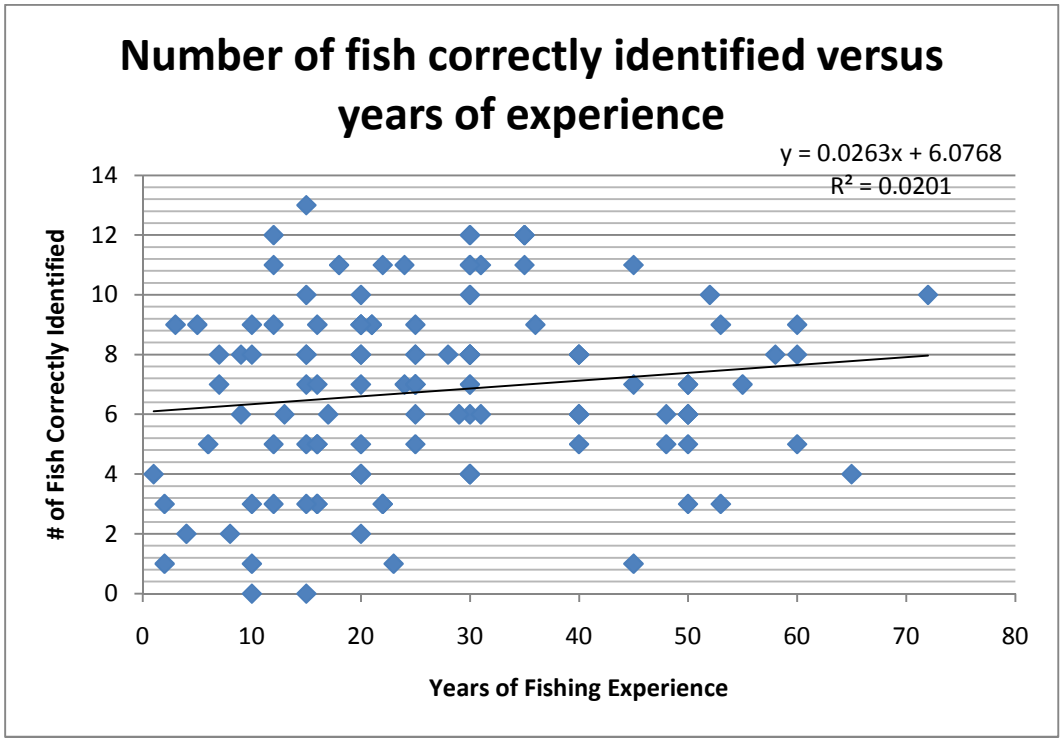

Figure 5: Number of fish correctly identified vs. years of fishing experience

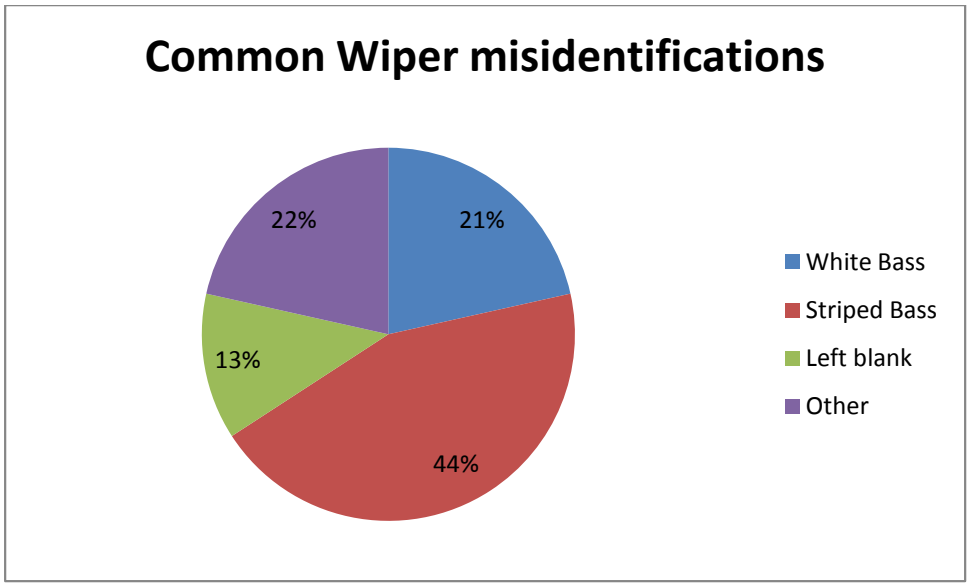

Figure 6: Common Wiper misidentifications

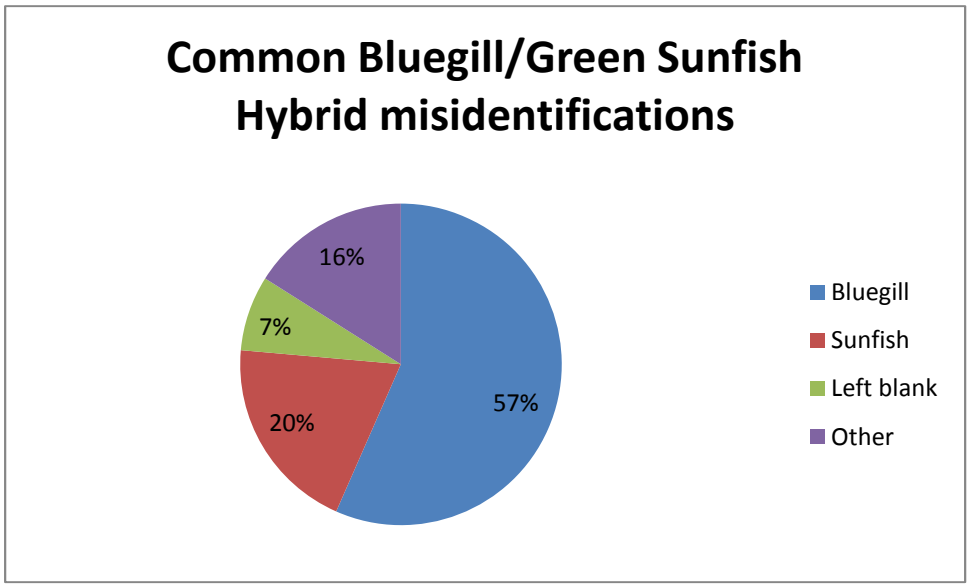

Figure 7: Common Bluegill/Green Sunfish Hybrid misidentifications

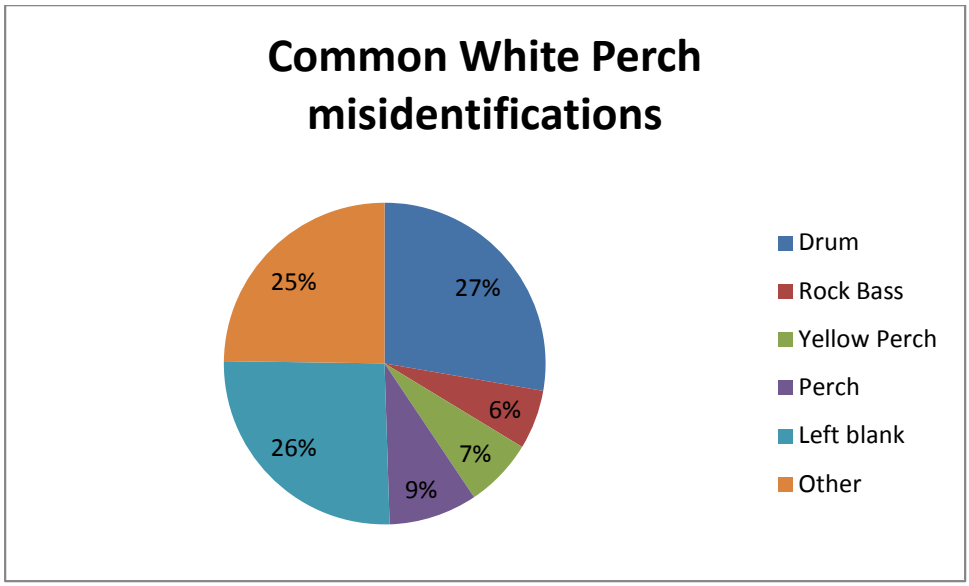

Figure 8: Common White Perch misidentifications

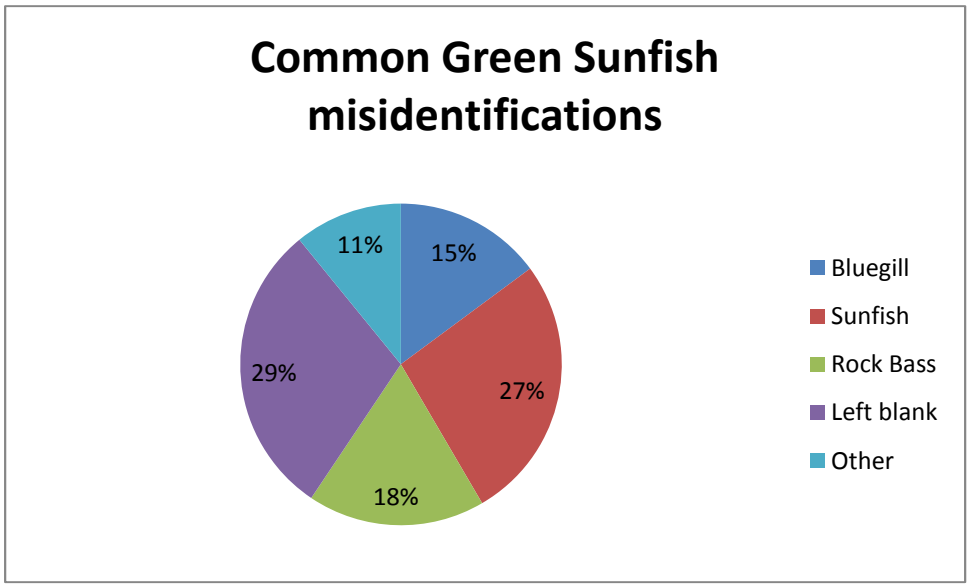

Figure 9: Common Green Sunfish misidentifications

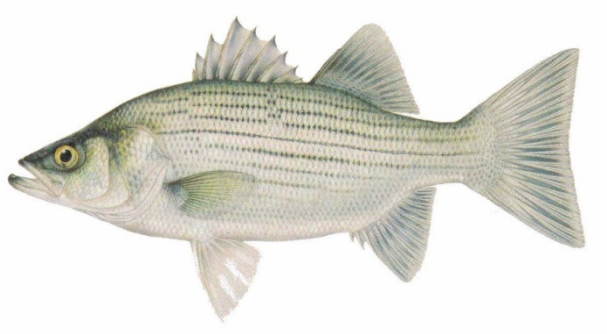

Figure 10: Wiper

Figure 11: Striped bass

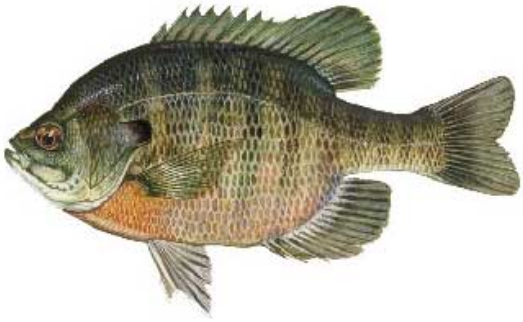

Figure 12: Bluegill/Green sunfish hybrid

Figure 13: Bluegill

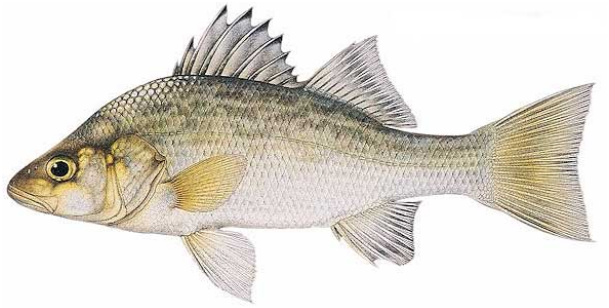

Figure 14: White perch

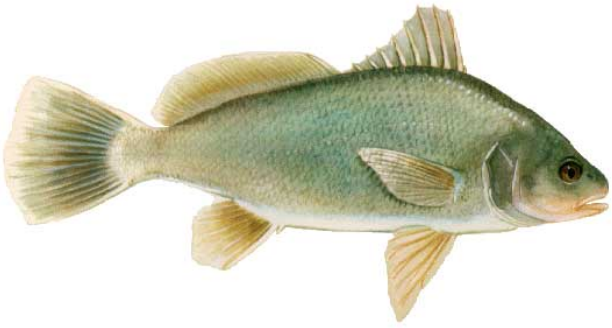

Figure 15: Freshwater Drum

Figure 16: Green sunfish

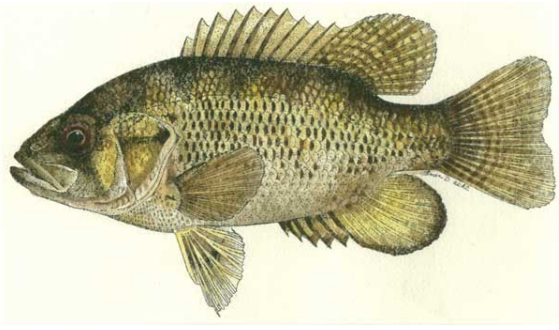

Figure 17: Rock bass

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[NOTE: Italicize "Statistical methods"]

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