
Anglers Who Use Baitfish in New York and Their Views on Recent Regulation Changes

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EXECUTIVE SUMMARY

In the winter of 2006-2007 the New York State Department of Environmental Conservation (DEC), Bureau of Fisheries modified the regulations regarding the transport, sale, and possession of baitfish in New York largely because of concerns over the spread of a fish disease called viral hemorrhagic septicemia (VHS). In June 2011 DEC modified the baitfish regulations again to allow the transport of personally collected or uncertified purchased baitfish within certain corridors along the Great Lakes, Niagara River, St. Lawrence River, and the Hudson River (between the Troy Dam and Tappan Zee Bridge). DEC also made recommendations regarding the use of baitfish that are intended to reduce the chances for the spread of aquatic invasive species.

The study, reported on herein and conducted by Cornell University, was designed to focus on a subset of anglers who used baitfish in New York State. Fishery managers were interested in knowing more about how anglers in New York used baitfish, the species they fished for when using baitfish, where they fished, and the type of fishing they were engaged in. Managers were also interested in knowing how the recent baitfish regulations and modifications impacted baitfish anglers, anglers' views about the regulations, and if they followed the recommendations.

The specific objectives of the study were to:

1. Determine New York anglers' use of baitfish, including how they obtained baitfish, where they were fishing when using baitfish, the type of fishing they were doing, and the species they were fishing for.
2. Assess angler views on baitfish regulations and their impact on fishing activity.
3. Determine what beliefs were held by anglers related to their compliance or attempted compliance with the regulations and recommendations using the Integrated Model of Behavioral Prediction as a guide.
4. Determine sources used to obtain information on baitfish regulations.
5. Assess socio-demographic characteristics that might influence the objectives above.

Anglers who participated in the 2007 New York Statewide Angler Survey (and gave explicit permission for Cornell University to recontact them with follow-up surveys) formed the basis for the sample for this study. A random sample of 2,500 anglers was drawn from this group. The survey was implemented in September, 2013 with a personalized letter sent by mail inviting anglers to access an online survey. We also included a postage-paid postcard that they could return to receive a mail-back version of the survey. A phone number option for requesting the mail survey was also included. Any of these response methods also could be used to indicate that they did not use baitfish in New York in the past five years. The questionnaire included sections on use of baitfish, views on recent regulations concerning the use of baitfish, impacts of these regulations on fishing activity, sources used to obtain information about the regulations, and socio-demographic characteristics.

Of the 2,500 letters mailed, 385 were undeliverable, and 1,297 anglers contacted us by web, postcard, or telephone indicating whether they used baitfish in New York in the past 5 years. The adjusted response rate was 61%. Of the 1,297 who responded, 864 indicated they had not used baitfish in the past five years, 92 indicated they did use baitfish but did not complete the

questionnaire, and 341 used baitfish and completed the questionnaire. These 341 people form the sample from which most of the analysis was done.

Although our sample has aged over the period since the original sample was drawn, and we have no “newly” licensed, presumably younger anglers, in the sample, we found no significant differences by age for any of the variables examined. Therefore, we are not concerned about any possible age-related bias in our results.

The proportion of anglers who used baitfish while fishing in New York in the past five years is estimated to be 42%, or roughly 337,300 anglers. Of those, we estimated 290,100 anglers used baitfish while fishing in New York in the past year.

Some anglers (23%) indicated that they previously used baitfish but have now stopped because of the baitfish regulations. We estimated that roughly 107,150 anglers were impacted in this way by the regulations.

In addition to fishing with baitfish, almost all anglers also used artificial lures (94%) or other types of bait. One-third (37%) used crayfish. Almost no anglers (3%) are just fishing using baitfish. Anglers use baitfish when fishing from a boat (77%), ice fishing (52%), and fishing from shore (51%). When fishing with baitfish in New York in the past year, 25% used personally collected baitfish some of the time and 75% used only purchased baitfish.

Most respondents (89%) obtained information about baitfish regulations from at least one of the four DEC sources listed in the questionnaire (i.e., fishing regulations guide, other DEC publications, DEC website, and DEC personnel). A majority also indicated they got information from the place where they bought baitfish, making baitfish sellers an important conduit of information from DEC to anglers.

Some anglers engaged in activities that might lead to the introduction of aquatic invasive species:

- 35% of those fishing from a boat placed their baitfish in a recirculating livewell, which is only a concern if water from other sources is added to the livewell.
- 25% moved purchased baitfish between water bodies some of the time, and 6% moved purchased baitfish between water bodies most or all of the time.
- 65% of those who bought certified baitfish indicated that at some point they had exchanged or supplemented the water in their bait bucket with water from the water body they were fishing in.

It is important to know how many anglers are engaged in these actions in order to gauge the risk they pose, and if regulatory or information/education actions need to be taken.

Thirty-four percent of baitfish anglers engaged in behaviors DEC recommends against - releasing unused purchased certified baitfish into any water, and releasing unused personally collected or uncertified baitfish into another body of water. Twenty-five percent of baitfish anglers likely engaged in a behavior that runs counter to the regulations. Since overland transport of personally collected or uncertified baitfish outside of the corridors by anglers is against the regulations, it is likely that anglers fishing outside the corridors who indicated that they kept baitfish for later use, including salting for later use, are violating the regulations

because it is more likely that such baitfish were transported illegally. Also keeping certified baitfish for more than 10 days is against the regulations, so anglers who indicated that they salted the fish for later use are likely violating the 10-day rule.

Most baitfish anglers in New York (84%) were at least slightly familiar with the 2006-2007 regulations. Far fewer (45%) were familiar with the newer 2011 regulations. Even among those who indicated they had fished within the corridors since 2011 (the majority of baitfish anglers), only one-third were moderately or very familiar with the 2011 regulations. Just over half (53%) of those who had personally collected baitfish in 2012-2013 were moderately or very familiar with the 2011 regulations.

Most anglers (91%) indicated that they are trying to follow the baitfish regulations. However, there was no difference in behavior (i.e., taking actions DEC recommended against or that were potentially illegal) between those who said they were trying to following the regulations and those who did not.

We applied concepts from the Integrated Model of Behavioral Prediction (IMBP) to identify beliefs held by anglers that were related to their compliance or attempted compliance with the regulations and recommendations. By understanding these relationships managers can refine how the regulations and recommendations are communicated to anglers to increase compliance. We found that those who held the following behavioral and normative beliefs were significantly less likely to engage in behaviors that could be considered illegal than those who did not hold the beliefs:

- I think it is very important that I follow the regulations.
- If I follow the regulations I will help limit the spread of fish diseases.
- I think following the regulations will help protect the waters I fish for future generations of anglers.
- Most of the people I go fishing with follow the regulations.
- Most of the people I go fishing with think it is important that I follow the regulations.

To maintain or increase compliance with the regulations managers might want to appeal to these beliefs in future communications. For example, emphasizing/explaining how following the regulations will help limit the spread of fish diseases, or reporting the large proportion of anglers who are already following the regulations.

Confusion about the regulations was not related to whether anglers engaged in behaviors that could be considered illegal or didn't follow the recommendations of DEC.

Certain statements about the regulations and their impact on fishing activity, cost of baitfish, or ability to collect baitfish had very little correlation with trying to follow the regulations, or actual behaviors, or recommendations of DEC. However, many anglers felt the cost of baitfish is too high because of the regulations (63%) and that baitfish at the store are less available now because of the regulations (52%). This was particularly true among those who personally collected baitfish in 2012-2013 (86% thought cost was too high, 76% thought baitfish were less available). However for most baitfish anglers, the concerns about cost or availability did not result in their fishing less or fishing more for species that are not typically caught with baitfish.

The majority of baitfish anglers (58%) were satisfied or very satisfied with the job the DEC Bureau of Fisheries is doing using regulations as part of their approach to prevent the spread of fish diseases in New York. Few were dissatisfied (11%). When asked what changes anglers would like to see in the baitfish regulations or why they were dissatisfied:

- The most common response to either question was suggesting that the amount of time baitfish could be kept be extended. The reasoning offered by some was if it is certified disease free it should be good forever.
- Another common suggestion was to allow baitfish caught in interconnected waters to be used anywhere in the connected system (e.g., baitfish caught in streams feeding the Allegheny River should be allowed to be used when fishing the Allegheny River).

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INTRODUCTION

The New York State Department of Environmental Conservation (DEC), Bureau of Fisheries is charged with managing and conserving the freshwater fisheries of New York State to serve the interests of current and future generations of New Yorkers. As part of their management efforts they seek systematically collected information from one of their primary stakeholder groups – anglers. For a number of years managers have obtained information from anglers on fishing patterns, preferences, and opinions as part of the New York Statewide Angler Survey. However, that survey is conducted every ten years on average, and does not provide opportunities for managers to gather more urgently needed information in the intervening period, or more specific information from a subset of anglers.

In the winter of 2006-07 DEC modified the regulations regarding the transport, sale and possession of baitfish largely because of concerns over the spread of a fish disease called viral hemorrhagic septicemia (VHS). The regulation that was finalized and initiated in June 2007 placed restrictions on both the personal collection and use of baitfish as well as the commercial collection, transport and sale of baitfish. The restriction on overland (motorized) transport was a key component of the regulation. Overland transport was strictly prohibited for any personally collected baitfish as well as for all commercial baitfish that had not been tested and certified as disease free. The intent of these restrictions was to prevent the movement of baitfish between different bodies of water as the baitfish can be carriers of fish diseases. In 2011, the regulations were modified to allow for the overland (motorized) transport of personally collected baitfish within three specified transportation corridors along specific water bodies (Fig. 1) as long as the uncertified baitfish were only used in the water from which they were collected. Commercial baitfish dealers are still required to obtain a permit from DEC for the overland transport of collected, uncertified baitfish in these corridors, but once transported to a facility-location, the uncertified (untested) baitfish can be sold to anglers for use as bait, again only as long as the baitfish are used on the same body of water from which they were collected. Such baitfish may not be transported outside of, nor used outside of, the individual transportation corridors. Only certified disease-free baitfish are allowed to be transported (overland) by anglers in motorized vehicles outside of the three defined corridors. DEC also made recommendations regarding the use of baitfish that are intended to reduce the chances for the spread of aquatic invasive species. For more detailed information about the regulations see Appendix A.

The study, reported on herein and conducted by Cornell University, was designed to focus on a subset of anglers who used baitfish in New York State. Fishery managers were interested in knowing more about how anglers in New York used baitfish, the species they fished for when using baitfish, where they fished, and the type of fishing they were engaged in. Managers were also interested in knowing how the recent regulations and modifications impacted baitfish anglers, anglers' views about the regulations, and if they followed the recommendations.

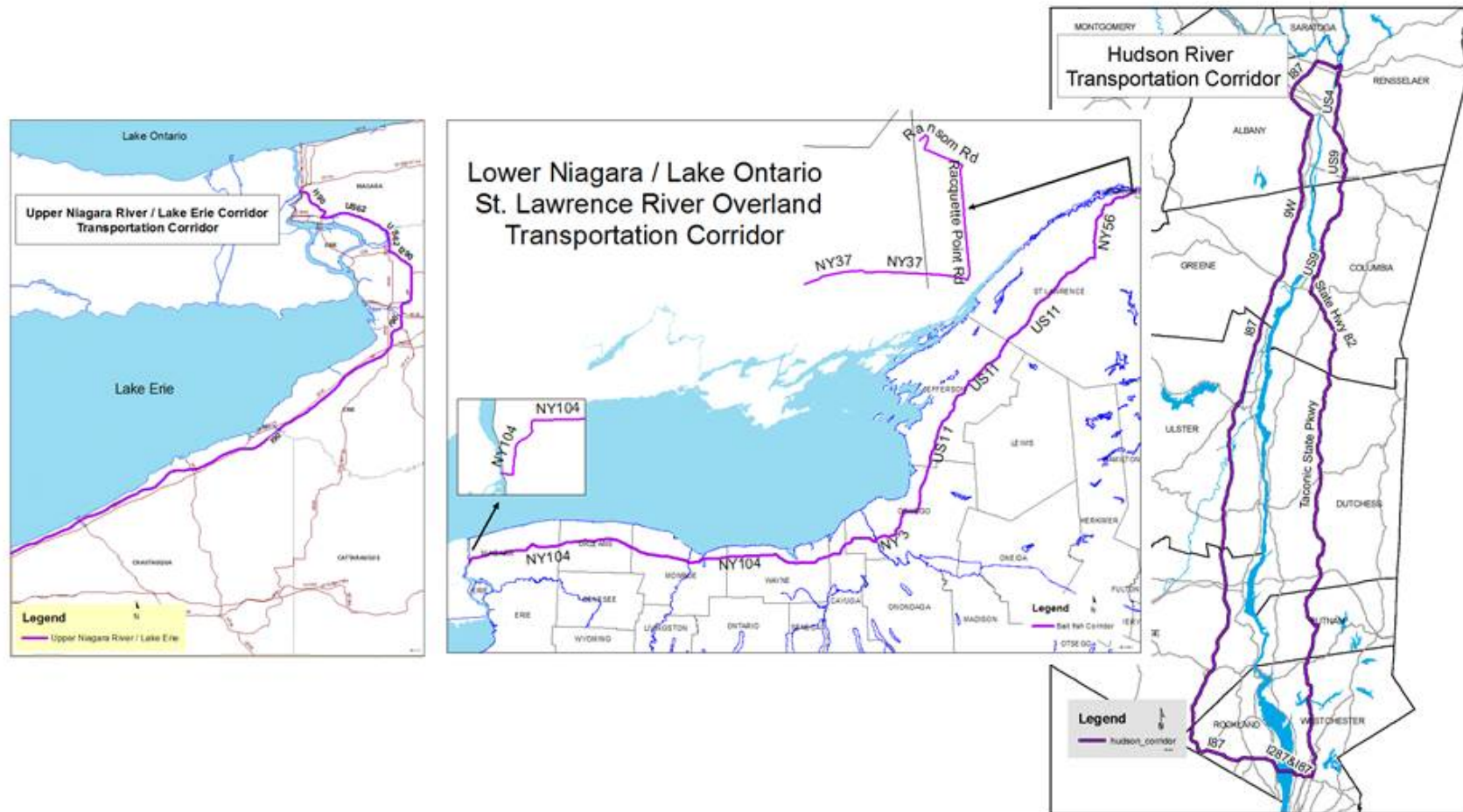


Figure 1. Transportation corridors developed as part of the 2011 modification to the baitfish regulations.

We applied concepts from the Integrated Model of Behavioral Prediction (IMBP; Fishbein and Yzer 2003; Fishbein and Ajzen 2009) to identify beliefs held by anglers that were related to their compliance or attempted compliance with the regulations and recommendations. By understanding these relationships, managers may be able to refine how the regulations and recommendations are communicated to anglers to increase compliance. We measured specific behavioral, normative, and control beliefs related to the use of baitfish. Behavioral beliefs are beliefs about the consequences of performing relevant behaviors (Fishbein and Ajzen 2009). For example, an angler might believe that following the regulations will help limit the spread of fish diseases. If so, future communication with anglers might appeal to their desire to protect the environment as a reason for them to comply with the regulations. Normative beliefs are beliefs about the degree to which a behavior is being performed by others (e.g., most of the people I go fishing with follow the regulations) and beliefs about the degree to which others think a behavior should be performed (e.g., most of the people I go fishing with think it is important that I follow the regulations). If these normative beliefs are important, then perhaps methods of communication such as contacting fishing organizations or writers of fishing blogs might be most effective. Different types of persuasive language might be used depending on whether it is anglers' own personal beliefs or what they think their peers believe that is motivating them to comply. Control beliefs are beliefs about the presence or absence of situational factors that enhance or impede performance of the behavior (e.g., do anglers perceive it is harder for them to collect baitfish because of the regulations) and perceptions about whether these factors will make the behavior easier or more difficult (e.g., if anglers find the regulations confusing it might be harder to follow them). If this is the case, efforts to simplify the regulations or communicate them more simply might be the best course of action.

The specific objectives of the study were to:

1. Determine New York anglers' use of baitfish, including how they obtained baitfish, where they were fishing when using baitfish, the type of fishing they were doing, and the species they were fishing for.
2. Assess angler views on baitfish regulations and their impact on fishing activity.
3. Determine what beliefs were held by anglers related to their compliance or attempted compliance with the regulations and recommendations using the Integrated Model of Behavioral Prediction as a guide.
4. Determine sources used to obtain information on baitfish regulations.
5. Assess socio-demographic characteristics that might influence the objectives above.

METHODS

Sample Selection

Anglers who participated in the 2007 New York Statewide Angler Survey (and gave explicit permission for Cornell University to recontact them with follow-up surveys) formed the basis for the sample for this study (n=10,724). A random sample of 2,500 anglers was drawn from this group.

Questionnaire Design

The questionnaire was designed to address the specific project objectives listed above, and was reviewed by leadership and staff in the Bureau of Fisheries. Some questions are identical to those used in a larger survey of anglers fishing in the Great Lakes region conducted at the same time, so that comparisons could be made between the audiences. The questionnaire (Appendix B) included sections on use of baitfish, views on recent regulations concerning the use of baitfish, impacts of these regulations on fishing activity, sources used to obtain information about the regulations, and socio-demographic characteristics.

Survey Implementation

We sent a personalized letter by mail inviting anglers in our sample to use their unique ID (as listed in the letter) to access an online survey, developed using Qualtrics. We also included a postage-paid postcard with the angler ID number that they could return to receive a mail-back version of the survey. A phone number option for requesting the mail survey was also included. Any of these response methods also could be used to indicate that they did not use baitfish in New York in the past five years.

The initial letter was sent in September 2013, with up to three follow-up mailings to non-respondents to encourage their response. Those opting for the mail questionnaire received up to one reminder to return the questionnaire.

Tests for Non-response Bias

Data available from the fishing license was used to compare respondents and non-respondents. Comparative information included age, gender, and state of residence.

A telephone follow-up survey of 100 non-respondents was implemented approximately two months after the first mailing to estimate the degree to which non-respondents differed from respondents. Key questions from the mail survey (listed in Appendix B) were asked over the telephone about use of baitfish, familiarity with the regulations, and impacts of the regulations on fishing activity.

Analysis Methods

Data from returned mail questionnaires were entered into the computer file containing the data collected online, and analysis was done using SPSS (IBM SPSS Statistics 20). Chi-square and t-tests were used to test for statistically significant differences between groups of anglers at the $P \leq 0.05$ level.

RESULTS AND DISCUSSION

Survey Response

Of the 2,500 letters mailed, 385 were undeliverable, and 1,297 anglers contacted us by web, postcard, or telephone indicating whether they used baitfish in New York in the past 5 years. The adjusted response rate was 61% ($1,297 / [2,500-385]$). Of the 1,297 who responded, 19% did so online, 16% returned a mail questionnaire, and the remainder returned a postcard or contacted us by telephone. Of the 1,297 who responded, 864 indicated they had not used baitfish in the past five years, 92 indicated they did use baitfish but did not complete the questionnaire, and 341 used baitfish and completed the questionnaire. These 341 people form the sample from which most of the analysis was done.

Non-response Bias Analysis

Respondents and non-respondents to the web/mail survey were compared using information available from the fishing license. No differences were found based on gender, and the difference based on state of residence was small (Appendix Table C-1). However, respondents were significantly older than non-respondents. This demographic difference is common with the mail survey method (e.g., Connelly and Knuth 2010, 2013; Connelly et al. 1992), but unexpected given the opportunity for completion by web. The difference in age between respondents and non-respondents suggests that weighting the data for age should be considered if differences by age are found in the results.

Non-respondents were more likely than respondents to have used baitfish while fishing in New York in the past five years (Appendix Table C-2). This result is counterintuitive because most non-respondent follow-up surveys find that non-respondents are less likely to do the activity than respondents. The most plausible explanation for the difference in this case may be that it was easy to indicate on the postcard that the angler did not use baitfish and so the number returning postcards was higher than if a respondent had to complete an entire survey. Adjustments for this bias will be discussed in the next section where an estimate of the proportion of anglers using baitfish in New York is made.

Respondents and non-respondents did not differ in their answer to the question of whether the 2007 baitfish regulations caused them to stop using baitfish. Nor did they differ in the type of fishing gear they used, or the type of fishing that they engaged in when using baitfish.

Respondents were more likely to be familiar with the 2007 regulations and the change in 2011 than non-respondents. Respondents were also more likely to indicate they changed their behavior as a result of the regulations. Non-respondents were more likely than respondents to be confused by the current regulations, and have no opinion about the job DEC Bureau of Fisheries is doing using regulations to prevent the spread of fish diseases. These findings are typical of expected views of non-respondents – less familiar, less engaged. The implications of these differences are discussed in more detail in the subsequent section of the report on opinions about regulations.

Estimated Proportion of Anglers Using Baitfish in New York

The proportion of anglers who used baitfish while fishing in New York in the past five years is estimated to be 42%. This number was derived by assuming the non-respondents interviewed by telephone were representative of all non-respondents, and adding their results to respondent data to calculate an overall proportion. Based on fishing license sales in 2012-2013 (967,661 licenses sold) and an estimate of 83% of fishing license buyers being active anglers (Connelly et al. 1997), we estimate that roughly 337,300 anglers used baitfish in the past 5 years while fishing in New York ($967,661 \times 83\% \times 42\%$). Caution is advised when reporting this number because the estimate of the number of license buyers who were active anglers (83%) is quite dated. Further, to estimate the number of anglers who used baitfish in the past year (Oct. 1, 2012 through Sept. 30, 2013) we used the percent of respondents who used baitfish when fishing in the past year (86%) to arrive at a rough estimate of 290,100 anglers who used baitfish while fishing in New York in the past year.

For those who indicated they had not used baitfish in the past five years, we asked how many had used baitfish prior to 2007 and stopped using it after 2007 because of the baitfish regulations. Almost one-quarter (23%) indicated this was the case. Again, we can roughly estimate the number of anglers who used baitfish and stopped because of the regulations. We calculated that roughly 107,150 anglers were impacted in this way by the regulations ($967,661 \times 83\% \times 58\% \times 23\%$).

Baitfish Angler Characteristics and Information Sources Used

The detailed survey focused on anglers who used baitfish in New York in the past five years. Respondents who indicated this was the case ($n=341$) form the sample for all further analysis. Thus, the results are intended to be representative of anglers who use baitfish in New York.

Most respondents were male (Table 1). For the most part respondents lived in New York, with the majority characterizing the area they lived in as rural. Few lived in an urban area. Baitfish anglers appear to be older. However, the true age distribution of baitfish anglers may be artificially shifted six years toward the older end because the sample of anglers for this study was drawn in 2007 as part of the statewide angler survey. New, presumably younger, anglers were not included in the sample. Therefore comparisons by age group are particularly important.

Comparisons between questions on baitfish regulations and the socio-demographic characteristics of gender, age, rural vs. urban/suburban are discussed later in the report. Statistically significant differences ($P \leq 0.05$) are highlighted. If no differences are reported, the reader may assume there were no significant differences.

Table 1. Baitfish angler characteristics.

Angler Characteristics	Percent
Gender	
Male	93.2
Female	6.8
Age	
<50	21.9
50-64	44.7
65+	33.4
Primary residence	
Urban	11.3
Suburban	34.6
Rural	54.1
State of residence	
New York	91.8
Other	8.2

In addition to fishing with baitfish, almost all anglers also used artificial lures (94%), many used other natural baits such as insects, pork rinds, or worms (82%), and about one-third (37%) used crayfish. Therefore, almost no anglers (3%) are just fishing using baitfish.

Anglers use baitfish when fishing from a boat (77%), ice fishing (52%), and fishing from shore (51%). A third (35%) of those fishing from a boat placed their baitfish in a recirculating livewell that allows for water exchange, which could become a possible source of exchange of aquatic invasive species if water was mixed from other sources.

Two-thirds of baitfish anglers used baitfish when fishing for yellow perch (Table 2). About half of the anglers also used baitfish when fishing for black bass, walleye, and northern pike. Fewer than one-quarter of the anglers used baitfish when fishing for lake trout. Respondents could also list additional species that they used baitfish for. The most frequently listed species included crappie, other species of trout, other panfish, and striped bass.

Table 2. Species of fish anglers were fishing for when they used baitfish.

Species fished for	Percent checking*
Yellow Perch	68.9
Black Bass (largemouth, smallmouth)	51.0
Walleye	49.6
Northern Pike/Pickerel	47.2
Lake Trout	22.3
Other:	37.0
Crappie	14.1
Other Trout	12.6
Other Panfish	5.9
Striped Bass	2.6

*Percentages add to more than 100% because more than one species could be checked.

Anglers went to a variety of sources for information on baitfish regulations in New York, but the source most anglers went to was the fishing regulations guide (Table 3). The DEC website was also popular and was accessed by 36% of anglers. In fact, 89% of respondents obtained information about baitfish regulations from at least one of the four DEC sources listed in the questionnaire (i.e., fishing regulations guide, other DEC publications, DEC website, and DEC personnel). A majority also indicated they got information from the place where they bought baitfish, making baitfish sellers an important conduit of information from DEC to anglers. Other anglers were also a source of information for about one-quarter of respondents. The other sources, such as guides or organizations, were used by fewer than 10% of the anglers.

Table 3. Sources used by anglers when asked where they went for information on baitfish regulations in New York State.

Information Sources	Percent checking*
<u>DEC printed materials:</u>	
Fishing regulations guide	85.5
Other DEC publications	11.8
<u>Personal contact:</u>	
Place where I buy baitfish	53.7
Other anglers	27.4
DEC personnel	10.9
Charterboat captains or fishing guides	6.2
Outdoor expos	5.0
Other government employees (e.g., state parks)	1.5
<u>Websites/Organizations:</u>	
DEC website	35.7
Fishing organizations	6.2
Other websites	4.4

*Percentages add to more than 100% because more than one source could be checked.

Use of Baitfish in New York

Almost all respondents (94%) fished in New York in the past year (Oct. 1, 2012 – Sept.30, 2013), and almost all of them (86%) used baitfish when fishing. Anglers were asked what waters they fished using baitfish and about one-quarter indicated they fished Lake Ontario (Table 4). Other waters listed were fished by fewer than 20% of respondents. However, 53% of anglers fished one or more of the four major waters inside the corridors outlined in the 2011 regulations (Lake Ontario, Lake Erie, St. Lawrence River, and Hudson River). The percent fishing inside the corridors in the past year is likely higher because connecting and tributary waters were not listed individually but were included in “other waters in NYS,” and a majority of anglers indicated they fished other waters in NYS using baitfish. Angler opinion of baitfish regulations will be examined by location fished, where sample size permits, later in this report.

For each of the major locations fished in New York, anglers were asked if they used personally collected baitfish and/or purchased baitfish when fishing that location (Table 4). Almost all anglers used purchased baitfish at each location. The most notable exception was Lake Erie where fewer than 80% used purchased baitfish, and 40% used personally collected baitfish. The pattern of use was similar for the Hudson River, but the sample size was small suggesting caution should be used when reporting those numbers. Overall 75% of baitfish anglers used only purchased baitfish when fishing in New York in the past year. Eighteen percent used both purchased and personally collected baitfish, and 7% used only personally collected baitfish. Those using only personally collected baitfish were not clustered fishing any specific water. They reported fishing all of the waters listed, and many indicated they fished other waters in New York. For comparisons later in the report, anglers were grouped by those using personally collected baitfish some of the time (25%) versus those using only purchased baitfish (75%).

Table 4. Use of baitfish by location fished in 2012-2013 and whether baitfish was personally collected or purchased.

Fishing Location	Of those fishing the location:		
	% baitfish anglers who fished location using baitfish	% using personally collected baitfish	% using purchased baitfish
Lake Ontario	25.5	13.2	92.6
Finger Lakes	19.1	19.6	90.2
Oneida Lake	18.7	6.0	96.0
Lake Erie	16.1	39.5	79.1
St. Lawrence River	13.1	8.6	97.1
Chautauqua Lake	11.2	13.3	93.3
Other large rivers (e.g., Susquehanna, Mohawk)	10.9	17.2	82.7
Hudson River	9.0	37.5*	75.0*
Lake Champlain	8.2	13.6*	90.9*
Other waters in NYS	58.8	14.0	89.2

*Sample size <30.

For those anglers personally collecting baitfish, the most commonly collected type was emerald shiners, followed by herring (which includes alewife) (Table 5). Almost one-third of anglers wrote in additional types of baitfish they collected; primary among those written in were other types of shiners, minnow, and chubs. A few anglers did not know what type of baitfish they had collected. When anglers purchased baitfish the majority purchased fathead minnows. A number also purchased emerald or golden shiners. Again, a few anglers did not know what type of baitfish they purchased.

Most anglers (69%) never use purchased baitfish in more than one water body, thus reducing the chances of spreading disease or aquatic invasive species. However, one-quarter moved purchased baitfish between water bodies some of the time, and 6% moved purchased baitfish between water bodies most or all of the time.

Table 5. Types of baitfish personally collected and purchased between Oct. 1, 2012 and Sept. 30, 2013.

Baitfish	Percent checking*
<u>Types of personally collected baitfish</u>	
Emerald Shiners	36.4
Herring (includes alewife)	23.9
Golden Shiners	13.6
Other	30.7
Other Shiners, Minnows, Chubs	13.6
Not sure what type	17.0
<u>Types of purchased baitfish</u>	
Fathead Minnows	61.4
Emerald Shiners	44.9
Golden Shiners	29.5
Herring (includes alewife)	10.6
Other	11.0
Not sure what type	18.1

*Percentages add to more than 100% because more than one type of baitfish could be collected or purchased.

Some baitfish available for purchase in New York are “certified” free of fish diseases. Almost all (94%) baitfish anglers have used “certified” baitfish in the past five years. Two-thirds of them (65%) indicated that at some point they had exchanged or supplemented the water in their bait bucket with water from the water body they were fishing in, thus introducing the possibility of aquatic invasive species being mixed with “certified” baitfish.

Almost half of the anglers that used “certified” baitfish kept the unused fish for later use, which is acceptable under the current regulations as long as they are not kept for more than 10 days (Table 6). About one-third of them released them into the water where they were fishing, and a few released them into another body of water. Both actions are discouraged by DEC because of the chance that the water contains aquatic invasive species. Spread of potentially harmful invasive species is the primary concern, but also releasing the baitfish in a water they did not come from is technically considered an illegal stocking of fish. Fewer than 20% salted the baitfish for use at a later time, however this action could be unacceptable under the current regulations if the fish were kept for more than 10 days.

Table 6. For anglers that used “certified” baitfish, what they did with the extra when they were done fishing.

What was done with the extra “certified” baitfish	Percent checking*
Kept them for later use	44.4
Released them into the water where I was fishing	34.5
Salted them for use at a later time	17.1
Disposed of them on land	13.7
Disposed of them in the trash	12.1
Released them into another body of water	2.5
Didn’t have any extra baitfish	21.4

*Percentages add to more than 100% because more than one option could be checked.

Anglers who fished inside the corridors since they were created in 2011 and personally collected baitfish or bought uncertified baitfish (estimated to be 47% of all baitfish anglers based on the number of respondents who answered the question) typically kept extra personally collected or uncertified baitfish for later use, released them into the water where they were fishing, or salted them for use at a later time (Table 7). Also on occasion, some of the anglers did not have any extra baitfish at the end of their fishing trip. The same was true for anglers fishing outside the corridors who personally collected baitfish or bought uncertified baitfish in the past five years. Of the 48% of anglers who were in this group (based on the number of respondents who answered this question), 44% didn’t have any extra baitfish on occasion. About one-quarter of anglers did keep extras for later use and 17% salted them for use at a later time. Since it is illegal to move these types of baitfish, it is possible that many of these anglers were not following the regulations.

Table 7. What anglers did with the extra personally collected or uncertified baitfish when they were done fishing inside or outside the corridors established in 2011.

What was done with extra personally collected or uncertified baitfish	Inside	Outside the
	the corridors	corridors
	Percent checking*	
Kept them for later use	23.3	23.3
Released them into the water where I was fishing	22.6	19.0
Salted them for use at a later time	20.1	16.6
Disposed of them on land	10.1	13.5
Disposed of them in the trash	13.2	14.1
Released them into another body of water	1.3	1.2
Didn’t have any extra baitfish	39.0	43.6

*Percentages add to more than 100% because more than one option could be checked.

Two variables were created based on the acceptability of actions taken by anglers with regards to the regulations and recommendations of DEC. The first variable distinguished anglers who engaged in actions that DEC recommends against - releasing unused purchased certified baitfish

into any water, and releasing unused personally collected or uncertified baitfish into another body of water. Thirty-four percent of baitfish anglers engaged in behaviors DEC recommends against. The second variable measured the potential for engaging in behavior that runs counter to the regulations. Since overland transport of personally collected or uncertified baitfish outside of the corridors by anglers is against the regulations, it is likely that anglers fishing outside the corridors who indicated that they kept baitfish for later use, including salting for later use, are violating the regulations because it is more likely that such baitfish were transported illegally. Also keeping certified baitfish for more than 10 days is against the regulations, so anglers who indicated that they salted the fish for later use are likely violating the 10-day rule. Twenty-five percent of all baitfish anglers engaged in one or more of these behaviors that potentially run counter to the regulations; compared with the 75% of baitfish anglers who did not engage in any of these behaviors. Interestingly, very few anglers (5%) engaged in actions DEC recommends against and likely engaged in behaviors that run counter to the regulations. Later in the report we will use these variables to examine whether these groups believe they are following the regulations and their beliefs associated with the regulations.

Opinions on Baitfish Regulations in New York

In the winter of 2006-2007 DEC modified the regulations regarding the transport, sale, and possession of baitfish in New York largely because of concerns over the spread of a fish disease called viral hemorrhagic septicemia (VHS). (See Appendix A for a more detailed description of the regulations.) Over 90% of respondents indicated that they were at least slightly familiar with these regulations; two-thirds were moderately or very familiar (Table 8). As reported earlier, non-respondents were less likely to be familiar with the regulations, so the proportion weighted for non-response bias is closer to 84% of all baitfish anglers in New York being at least slightly familiar with the regulations. Those who personally collected baitfish in the 2012-2013 season were much more likely than those who only purchased baitfish to be moderately or very familiar with the regulations.

Table 8. Baitfish anglers’ familiarity with 2006-2007 baitfish regulations, overall and by whether they used personally collected baitfish or only purchased baitfish in 2012-2013.

Familiarity with 2006-2007 regulations	Overall	Personally collected some baitfish in 2012-2013*	Only used purchased baitfish in 2012-2013
		Percent	
Not at all familiar	9.8	7.8	6.0
Slightly familiar	24.0	7.8	30.5
Moderately familiar	44.6	48.5	42.0
Very familiar	21.6	35.9	21.5

*Statistically significant difference between personally collected and only used purchased baitfish at P = 0.05 using chi-square test.

Just over half of the respondents changed their use of baitfish after the regulations were issued in 2006-2007 (Table 9). Non-respondents were less likely to have made changes, so the proportion weighted for non-response bias is closer to 43% for all baitfish anglers in New York. The most frequently made changes included using baitfish less often, using artificial lures and other types of bait more often, and buying baitfish more often. For example, 54% of those who made a change indicated they used baitfish less often. This equates to 29% of all baitfish anglers. Those who personally collected baitfish in 2012-2013 were more likely than those who only purchased baitfish to indicate that they collected baitfish less often since the 2006-2007 regulations (35% vs. 15%).

Table 9. Changes made by baitfish anglers in response to the 2006-2007 regulations.

Change use of baitfish after 2006-2007 because of regulations		Percent
No		47.2
Yes		52.8

In what ways:	Among those saying made change	Among all baitfish anglers
	Percent checking*	
Used baitfish less often	54.2	28.6
Used artificial lures more often	50.3	26.6
Bought baitfish more often	44.1	23.3
Used other types of bait more often	38.4	20.3
Collected my own baitfish <u>less</u> often	19.2	10.1
Stopped using baitfish	4.0	2.1
Used baitfish more often	0.0	0.0

*Percentages add to more than 100% because more than one way could be checked.

Fewer than half of all baitfish anglers indicated they changed what they did with unused baitfish because of the regulations (Table 10). None of the changes listed were made by more than 50% of anglers who said they made a change. The most frequently made change was keeping the baitfish for later use, which might be a reaction to the higher cost of baitfish, but is generally not recommended because you are not supposed to keep the baitfish for more than 10 days. Other changes were made by about one-quarter of respondents. Very few anglers released baitfish into another body of water from the one they were fishing, which is good because this action is not recommended due to the chance of spreading fish diseases or invasive species.

Anglers' familiarity with the baitfish regulations was not related to whether they made changes because of the regulations, nor the type of changes made, with one exception. Those who were more familiar with the regulations were more likely to indicate that because of the regulations they collected their own baitfish less often (36% of those very familiar vs. 5% of those slightly familiar).

Appendix Table D-1 shows the proportion of anglers who were familiar with the 2006-2007 regulations and subsequent changes they made because of the regulations by water body fished between Oct. 1, 2012 and Sept. 30, 2013. These results are useful in describing what anglers who fish a certain water body did, but comparisons between water bodies should be made cautiously because the same angler could fish multiple water bodies and their responses are included in each water body (i.e., statistical tests cannot be done to compare water bodies because the groups are not mutually exclusive). Also readers should keep in mind that an angler who indicates he/she changed their behavior did not specify that they changed their behavior while fishing at that specific water. Further, some water bodies had fewer than 30 respondents fishing them, and even more had fewer than 30 respondents making changes because of the regulations. Those results are highlighted in italics, along with sample sizes to indicate the small number of respondents on which some of the percentages are based. These results should be used very cautiously.

Table 10. Changes made by baitfish anglers in what they did with unused baitfish because of the 2006-2007 baitfish regulations.

Change what you did with unused baitfish because of regulations		Percent	
No		57.6	
Yes		42.4	
		Among those saying made change	Among all baitfish anglers
In what ways:		Percent checking*	
Kept them for later use		36.5	14.7
Disposed of them in the trash		24.8	10.0
Disposed of them on land		24.1	9.7
Salted them for use at a later time		21.2	8.5
Released them into the water where I was fishing		18.2	7.3
Released them into another body of water		1.5	0.6
Didn't have any extra baitfish		25.5	10.3

*Percentages add to more than 100% because more than one way could be checked.

In June 2011 DEC modified the baitfish regulations to allow the transport of personally collected or uncertified purchased baitfish within certain corridors along the Great Lakes, Niagara River, St. Lawrence River, and the Hudson River (between the Troy Dam and the Tappan Zee Bridge) (Fig. 1). Far fewer respondents (Table 11) and baitfish anglers in general were familiar with these newer regulations (45%, weighted to account for non-response bias). Even among those who indicated they had fished within the corridors since 2011 (the majority of baitfish anglers), only one-third were moderately or very familiar with the regulations. Those who had personally collected baitfish in 2012-2013 were much more likely than those who had only used purchased baitfish to be moderately or very familiar with the regulations. This is not surprising because the regulations were largely intended to address concerns of those who personally collected baitfish.

Table 11. Baitfish anglers' familiarity with the 2011 baitfish regulations, overall, by those who fished within the corridors since 2011, and by whether they personally collected baitfish or only purchased baitfish in 2012-2013.

Familiarity with 2011 regulations	Overall	Fished within the corridors since 2011	Personally collected some baitfish in 2012-2013*	Only used purchased baitfish in 2012-2013
		Percent		
Not at all familiar	37.8	32.4	22.6	44.1
Slightly familiar	32.8	34.0	24.2	32.6
Moderately familiar	18.7	20.5	24.2	16.6
Very familiar	10.7	13.1	29.0	6.7

*Statistically significant difference between personally collected and only used purchased baitfish at P = 0.05 using chi-square test.

Among those fishing within the corridors since 2011, one-third indicated they changed their use of baitfish because of the regulations (Table 12). The most frequently made changes were the same as those listed in response to the 2006-007 regulations and included using baitfish less often, using artificial lures and other types of bait more often, and buying baitfish more often. A few respondents indicated that as a result of the regulations they collected their own baitfish more often. Among those personally collecting their own baitfish in 2012-2013, the proportion collecting more often was larger (44%).

Table 12. Changes made by baitfish anglers in response to the 2011 regulations.

Change use of baitfish after 2011 because of new regulations	Percent	
No	65.3	
Yes	34.7	

In what ways:	Among those saying made change	Among those fishing within corridor
	Percent checking*	
Used baitfish less often	45.2	15.7
Used artificial lures more often	43.0	14.9
Bought baitfish more often	32.3	11.2
Used other types of bait more often	35.5	12.3
Collected my own baitfish <u>more</u> often	11.8	4.1
Stopped using baitfish	11.8	4.1
Used baitfish more often	3.2	1.1

*Percentages add to more than 100% because more than one way could be checked.

Anglers' familiarity with the baitfish regulations was not related to whether they made changes because of the regulations, nor the type of changes made.

Appendix Table D-2 shows the proportion of anglers who were familiar with the 2011 regulations and subsequent changes they made because of the regulations by water body fished between Oct. 1, 2012 and Sept. 30, 2013. These results are useful in describing what anglers who fish a certain water body did, but comparisons between water bodies should be made cautiously because the same angler could fish multiple water bodies and their responses are included in each water body (i.e., statistical tests cannot be done to compare water bodies because the groups are not mutually exclusive). Also readers should keep in mind that an angler who indicates he/she changed their behavior did not specify that they changed their behavior while fishing at that specific water. Further some water bodies had fewer than 30 respondents fishing them, and even more had fewer than 30 respondents making changes because of the regulations. Those results are highlighted in italics, along with sample sizes to indicate the small number of respondents on which some of the percentages are based. These results should be used very cautiously.

Factors Influencing Compliance with the Baitfish Regulations

Most anglers indicated that they are trying to follow the baitfish regulations (Table 13). Those who only purchased baitfish in 2012-2013 were more likely than those who personally collected baitfish to indicate that they tried to follow the baitfish regulations (94% vs. 88%). While this difference is statistically significant at $P=0.05$, the practical implications may be minor. Anglers who indicated they were more familiar with the regulations were more likely to say they were trying to follow them. However, there was no difference in behavior (i.e., taking actions DEC recommended against or that were potentially illegal) between those who said they were trying to following the regulations and those who did not.

Table 13. Angler intentions related to compliance with the baitfish regulations.

Intentions	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
	Percent					
I try to follow the baitfish regulations	53.1	37.6	5.9	0.3	0.9	2.2

Two-thirds of all baitfish anglers thought it was very important to follow the regulations on the transport, sale and possession of baitfish (Table 14). The correlation between importance of following the regulations and trying to follow the regulations was very strong (Table 15). In other words, anglers who thought it was important to follow the regulations indicated they tried to follow them, and those who thought it was not important to follow the regulations did not try to follow them. While this relationship seems obvious, it is important to understand why anglers thought it was important to follow the regulations. The most highly correlated beliefs with trying to follow the regulations were “following the regulations will help limit the spread of fish diseases” and “following the regulations will help protect the waters I fish for future generations of anglers.” Over two-thirds of anglers agreed with these statements. Women were more likely

than men to hold these beliefs (96% vs. 75%, and 100% vs. 74%, respectively). Those who personally collected baitfish in 2012-2013 were more likely than those who only purchased baitfish to disagree with the statement that following the regulations will help protect the waters I fish for future generations of anglers (22% vs. 8%). Regulations restricting the transport of baitfish are needed to keep fish diseases from spreading was also a statement with which the majority of anglers agreed.

Table 14. Attitudes, behavioral beliefs, normative beliefs, and control beliefs of baitfish anglers related to following the baitfish regulations.

	Very important	Moderately important	Slightly important	Not at all important		
	Percent					
<u>Attitude</u>						
How important is it to you to follow the baitfish regulations	<u>68.0</u>	20.4	7.2	4.4		
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
	Percent					
<u>Behavioral Beliefs</u>						
If I follow the regulations I will help limit the spread of fish diseases	<u>44.4</u>	<u>29.2</u>	12.9	5.6	3.8	4.1
I think following the regulations will help protect the waters I fish for future generations of anglers	<u>41.9</u>	<u>30.7</u>	13.1	6.6	3.4	4.4
Regulations restricting the transport of baitfish are needed to keep fish diseases from spreading	<u>30.9</u>	<u>31.8</u>	19.1	7.5	4.1	6.6
<u>Normative Beliefs</u>						
Most of the people I go fishing with follow the regulations	<u>27.2</u>	<u>53.3</u>	11.2	3.3	0.9	4.1
Most of the people I go fishing with think it is important that I follow the regulations	<u>19.9</u>	<u>42.2</u>	21.2	6.5	4.0	6.2
I trust DEC, Bureau of Fisheries when it comes to the importance of following the regulations	<u>25.3</u>	<u>39.9</u>	22.3	6.5	4.2	1.8
I trust the opinions of the people I fish with about the importance of following the regulations	<u>20.5</u>	<u>46.7</u>	23.5	4.8	2.7	1.8

Table 14 (cont).

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
	Percent					
Control Beliefs						
I find the current regulations confusing	6.9	20.9	40.0	<u>22.2</u>	<u>5.3</u>	4.7
I know enough about the regulations to follow them	<u>19.6</u>	<u>56.4</u>	13.7	5.0	2.2	3.1
The regulations make it harder for me to collect baitfish	19.9	23.9	28.9	<u>14.1</u>	<u>4.6</u>	8.6
The cost of baitfish is too high because of the regulations	31.4	31.7	20.8	<u>9.6</u>	<u>0.3</u>	6.2
I fish less now because of the cost or limited availability of baitfish	8.4	13.1	15.3	<u>34.8</u>	<u>25.9</u>	2.5
I think baitfish at the store are less available now because of the regulations	23.1	29.2	15.6	<u>15.6</u>	<u>3.7</u>	12.8
The spread of fish disease is inevitable	9.0	26.5	28.7	<u>18.4</u>	<u>6.9</u>	10.5
I fish more for species now that are not typically caught with baitfish	4.1	9.4	28.2	<u>35.4</u>	<u>21.6</u>	1.3

Note: Underlined values reflect categories expected to be positively associated with trying to follow the regulations or engaging in recommended behaviors.

Those who held the first two behavioral beliefs discussed above (following the regulations will help limit the spread of fish diseases and help protect the waters I fish for future generations of anglers) and those who thought it was very important to follow the regulations were significantly less likely to engage in behaviors that could be considered illegal compared with those who did not hold these beliefs or did not think it was very important to follow the regulations (Table 16). Those believing that regulations are needed, the third behavioral belief, followed a similar pattern, but the results were not statistically significant. There was a similar difference, again not statistically significant, in the percent following the recommendations of DEC about baitfish between those holding these beliefs versus not (Table 17).

Table 15. Correlation of attitudes and beliefs with intention to follow the baitfish regulations.

Attitudes and Beliefs	Try to follow the regulations Correlation
<u>Attitudes</u>	
Importance of following the regulations	0.657*
<u>Behavioral Beliefs</u>	
If I follow the regulations I will help limit the spread of fish diseases	0.578*
I think following the regulations will help protect the waters I fish for future generations of anglers	0.572*
Regulations restricting the transport of baitfish are needed to keep fish diseases from spreading	0.529*
<u>Normative Beliefs</u>	
Most of the people I go fishing with follow the regulations	0.559*
Most of the people I go fishing with think it is important that I follow the regulations	0.543*
I trust DEC, Bureau of Fisheries when it comes to the importance of following the regulations	0.497*
I trust the opinions of the people I fish with about the importance of following the regulations	0.330*
<u>Control Beliefs</u>	
I find the current regulations confusing	-0.343*
I know enough about the regulations to follow them	0.277*
The regulations make it harder for me to collect baitfish	-0.157*
The cost of baitfish is too high because of the regulations	-0.148*
I fish less now because of the cost or limited availability of baitfish	-0.143*
I think baitfish at the store are less available now because of the regulations	-0.119
The spread of fish diseases is inevitable	-0.080
I fish more for species now that are not typically caught with baitfish	0.012

*Statistically significant correlation.

Two other beliefs that were highly correlated with trying to follow the regulations were “most of the people I go fishing with follow the regulations” and “most of the people I go fishing with think it is important that I follow the regulations” (Table 15). For each of these normative beliefs the majority of anglers agreed or strongly agreed with the statement (Table 14). Somewhat fewer anglers strongly agreed that they trusted the DEC, Bureau of Fisheries or the opinions of the people they fish with concerning the importance of following the regulations, but still a majority agreed with the statement. Trust in DEC, Bureau of Fisheries was more strongly correlated with trying to follow the regulations than anglers’ trust in the opinions of people they fish with (Table 15). Those who personally collected baitfish in 2012-2013 were less likely to trust DEC than those who only bought baitfish (21% vs. 10%).

Table 16. Percent of anglers potentially not following regulations, among anglers who do and do not hold specific attitudes, intentions, or beliefs.

Attitudes, Intentions, and Beliefs	Among anglers who DO hold the belief	Among anglers who DO NOT hold the belief
	% potentially not following the regulations	
<u>Attitudes</u>		
Importance of following the regulations	19.1	37.2*
<u>Intentions</u>		
I try to follow the baitfish regulations	24.8	26.7
<u>Behavioral Beliefs</u>		
If I follow the regulations I will help limit the spread of fish diseases	21.9	33.3*
I think following the regulations will help protect the waters I fish for future generations of anglers	22.2	32.9*
Regulations restricting the transport of baitfish are needed to keep fish diseases from spreading	21.6	31.1
<u>Normative Beliefs</u>		
Most of the people I go fishing with follow the regulations	23.0	34.8*
Most of the people I go fishing with think it is important that I follow the regulations	19.8	33.6*
I trust DEC, Bureau of Fisheries when it comes to the importance of following the regulations	22.5	30.2
I trust the opinions of the people I fish with about the importance of following the regulations	22.3	31.8
<u>Control Beliefs</u>		
I find the current regulations confusing	21.6	26.5
I know enough about the regulations to follow them	25.9	22.1
The regulations make it harder for me to collect baitfish	26.2	25.9
The cost of baitfish is too high because of the regulations	21.9	25.7
I fish less now because of the cost or limited availability of baitfish	25.3	24.8
I think baitfish at the store are less available now because of the regulations	17.7	27.2
The spread of fish diseases is inevitable	24.1	25.9
I fish more for species now that are not typically caught with baitfish	27.2	22.6

*Statistically significant difference between those who do and do not hold the attitude, intention or belief at P = 0.05 using chi-square test.

Table 17. Percent of anglers potentially not following recommendations, among anglers who do and do not hold specific attitudes, intentions, or beliefs.

Attitudes and Beliefs	Among anglers who DO hold the belief	Among anglers who DO NOT hold the belief
	% potentially not following the recommendations	
<u>Attitudes</u>		
Importance of following the regulations	31.2	37.2
<u>Intentions</u>		
I try to follow the baitfish regulations	33.1	40.0
<u>Behavioral Beliefs</u>		
If I follow the regulations I will help limit the spread of fish diseases	30.9	41.7
I think following the regulations will help protect the waters I fish for future generations of anglers	30.9	40.9
Regulations restricting the transport of baitfish are needed to keep fish diseases from spreading	32.7	35.3
<u>Normative Beliefs</u>		
Most of the people I go fishing with follow the regulations	34.4	33.3
Most of the people I go fishing with think it is important that I follow the regulations	32.5	36.1
I trust DEC, Bureau of Fisheries when it comes to the importance of following the regulations	33.0	37.1
I trust the opinions of the people I fish with about the importance of following the regulations	35.3	32.7
<u>Control Beliefs</u>		
I find the current regulations confusing	27.3	36.1
I know enough about the regulations to follow them	31.7	40.3
The regulations make it harder for me to collect baitfish	27.9	36.1
The cost of baitfish is too high because of the regulations	28.1	34.4
I fish less now because of the cost or limited availability of baitfish	33.0	35.2
I think baitfish at the store are less available now because of the regulations	35.5	33.5
The spread of fish diseases is inevitable	28.9	36.4
I fish more for species now that are not typically caught with baitfish	32.2	35.0

Again, those who held the first two normative beliefs discussed above were significantly less likely to engage in behaviors that could be considered illegal compared with those who did not hold these beliefs (Table 16). The other two normative beliefs regarding trust in DEC and trust in other anglers, followed a similar pattern, but the results were not statistically significant. There was no difference in the percent following the recommendations of DEC about baitfish between those holding any of these beliefs versus not (Table 17).

When examining control beliefs, those who did not find the current regulations confusing were more likely than those who did to be trying to follow the regulations (Table 15). However, a plurality of anglers were neutral in their view on whether the current regulations were confusing or not (Table 14). More anglers thought they knew enough about the regulations to follow them. Those who indicated they were more familiar with the regulations were more likely to think they knew enough about the regulations and not find them confusing. Women were more likely than men to indicate that they knew enough about the regulations to follow them (91% vs. 78%) and did not find them confusing (64% vs. 24%). Anglers living in urban or suburban areas were more likely than anglers living in rural areas to indicate that they don't know enough about the regulations to follow them (12% vs. 4%). Neither of these control beliefs were related to whether anglers engaged in behaviors that could be considered illegal or didn't follow the recommendations of DEC (Tables 16 and 17).

Certain statements about the regulations and their impact on fishing activity, cost of baitfish, or ability to collect baitfish had very little correlation with trying to follow the regulations, or actual behaviors, or recommendations of DEC (Tables 15, 16, and 17). However, many anglers felt the cost of baitfish is too high because of the regulations and that baitfish at the store are less available now because of the regulations (Table 14). This was particularly true among those who personally collected baitfish in 2012-2013 (86% thought cost was too high, 76% thought baitfish were less available). Those who personally collected baitfish in 2012-2013 were more likely than those who only purchased baitfish to believe that the regulations made it harder for them to collect baitfish (59% vs. 46%). These findings are consistent with the regulations that focus on restrictions associated with personally collected baitfish (including the overland transport restriction), and an emphasis on buying "certified" baitfish which are likely more expensive because of the costs associated with testing for diseases. Those who indicated they were more familiar with the regulations were more likely to think the cost was too high, baitfish were less available, and it was harder to collect baitfish as a result of the regulations. However for most anglers, the concerns about cost or availability did not result in their fishing less or fishing more for species that are not typically caught with baitfish (Table 14).

Anglers varied widely in their views on whether the spread of fish diseases was inevitable, but this was not correlated with their intention to follow the regulations or their behavior.

The majority of baitfish anglers were satisfied or very satisfied with the job the DEC Bureau of Fisheries is doing using regulations as part of their approach to prevent the spread of fish diseases in New York (Table 18). Familiarity with the 2006-2007 regulations or the 2011 regulations was not related to satisfaction with the job DEC is doing. Few baitfish anglers were dissatisfied. For those indicating they were dissatisfied, we asked what could be improved. The responses provided were similar to the 33% of respondents who suggested changes to the baitfish regulations.

- The most common response to either question was suggesting that the amount of time baitfish could be kept be extended. The reasoning offered by some was if it is certified disease free it should be good forever.

- Another common suggestion was to allow baitfish caught in interconnected waters to be used anywhere in the connected system (e.g., baitfish caught in streams feeding the Allegheny River should be allowed to be used when fishing the Allegheny River).
- Some suggested that more effort should be put on reducing the spread of aquatic invasive species from watercraft, which was seen as a bigger threat than baitfish.
- Some wondered what could be done to reduce the cost of baitfish. It seemed to them that regulations were driving up prices, it was like an extra tax, and it puts small businesses out of business.
- Some also expressed a general dislike of any type of regulation.
- Some suggested allowing certain actions that were in fact already permitted, such as collecting baitfish and using it within the same water.

Table 18. Baitfish angler satisfaction with the job DEC Bureau of Fisheries is doing using regulations as part of their approach to prevent the spread of fish diseases in New York State.

Satisfaction with the job DEC Bureau of Fisheries is doing using regulations	Percent
Very satisfied	13.3
Satisfied	44.2
Neither satisfied nor dissatisfied	27.5
Dissatisfied	7.4
Very dissatisfied	3.8
No opinion	3.8

SUMMARY OF FINDINGS

The response rate to this survey was high compared to recent angler surveys (e.g., Connelly and Knuth 2010, Connelly and Brown 2009), but similar to the survey conducted last year with the same sample frame (i.e., respondents to the 2007 statewide angler survey who indicated a willingness to be recontacted) (Connelly and Knuth 2013). This gives us more confidence that the results are representative of baitfish anglers in New York. Although our sample has aged over the period since the original sample was drawn, and we have no “newly” licensed, presumably younger anglers, in the sample, we found no significant differences by age for any of the variables examined. Therefore, we are not concerned about any possible age-related bias in our results.

Key Findings Regarding the Use of Baitfish in New York

- The proportion of anglers who used baitfish while fishing in New York in the past five years is estimated to be 42%, or roughly 337,300 anglers. Of those, we estimated 290,100 anglers used baitfish while fishing in New York in the past year.

- Some anglers (23%) indicated that they previously used baitfish but have now stopped because of the baitfish regulations. We estimated that roughly 107,150 anglers were impacted in this way by the regulations.
- In addition to fishing with baitfish, almost all anglers also used artificial lures (94%) or other types of bait. One-third (37%) used crayfish. Almost no anglers (3%) are just fishing using baitfish.
- Anglers use baitfish when fishing from a boat (77%), ice fishing (52%), and fishing from shore (51%). When fishing with baitfish in New York in the past year, 25% used personally collected baitfish some of the time and 75% used only purchased baitfish.
- Most respondents (89%) obtained information about baitfish regulations from at least one of the four DEC sources listed in the questionnaire (i.e., fishing regulations guide, other DEC publications, DEC website, and DEC personnel). A majority also indicated they got information from the place where they bought baitfish, making baitfish sellers an important conduit of information from DEC to anglers.
- Some anglers engaged in activities that might lead to the introduction of aquatic invasive species. It is important to know how many anglers are engaged in these actions in order to gauge the risk they pose, and if regulatory or information/education actions need to be taken. We found:
 - 35% of those fishing from a boat placed their baitfish in a recirculating livewell , which is only a concern if water from other sources is added to the livewell.
 - 25% moved purchased baitfish between water bodies some of the time, and 6% moved purchased baitfish between water bodies most or all of the time.
 - 65% of those who bought certified baitfish indicated that at some point they had exchanged or supplemented the water in their bait bucket with water from the water body they were fishing in.
- Thirty-four percent of baitfish anglers engaged in behaviors DEC recommends against - releasing unused purchased certified baitfish into any water, and releasing unused personally collected or uncertified baitfish into another body of water.
- Twenty-five percent of baitfish anglers likely engaged in a behavior that runs counter to the regulations. Since overland transport of personally collected or uncertified baitfish outside of the corridors by anglers is against the regulations, it is likely that anglers fishing outside the corridors who indicated that they kept baitfish for later use, including salting for later use, are violating the regulations because it is more likely that such baitfish were transported illegally. Also keeping certified baitfish for more than 10 days is against the regulations, so anglers who indicated that they salted the fish for later use are likely violating the 10-day rule.

Key Findings Regarding the Baitfish Regulations

- Most baitfish anglers in New York (84%) were at least slightly familiar with the 2006-2007 regulations.
- Far fewer (45%) were familiar with the newer 2011 regulations. Even among those who indicated they had fished within the corridors since 2011 (the majority of baitfish anglers), only one-third were moderately or very familiar with the 2011 regulations. Just over half (53%) of those who had personally collected baitfish in 2012-2013 were moderately or very familiar with the 2011 regulations.
- Most anglers (91%) indicated that they are trying to follow the baitfish regulations. However, there was no difference in behavior (i.e., taking actions DEC recommended against or that were potentially illegal) between those who said they were trying to following the regulations and those who did not.

Key Factors that Could Influence Compliance with the Regulations and Recommendations

We found that those who held the following behavioral and normative beliefs were significantly less likely to engage in behaviors that could be considered illegal than those who did not hold the beliefs:

- I think it is very important that I follow the regulations.
- If I follow the regulations I will help limit the spread of fish diseases.
- I think following the regulations will help protect the waters I fish for future generations of anglers.
- Most of the people I go fishing with follow the regulations.
- Most of the people I go fishing with think it is important that I follow the regulations.

To maintain or increase compliance with the regulations managers might want to appeal to these beliefs in future communications. For example, emphasizing/explaining how following the regulations will help limit the spread of fish diseases, or reporting the large proportion of anglers who are already following the regulations.

Confusion about the regulations was not related to whether anglers engaged in behaviors that could be considered illegal or didn't follow the recommendations of DEC.

Key Opinions about the Regulations and Satisfaction with DEC

- Many anglers felt the cost of baitfish is too high because of the regulations (63%) and that baitfish at the store are less available now because of the regulations (52%). This was particularly true among those who personally collected baitfish in 2012-2013 (86% thought cost was too high, 76% thought baitfish were less available).
- For most anglers, the concerns about cost or availability did not result in their fishing less or fishing more for species that are not typically caught with baitfish.

- The majority of baitfish anglers (58%) were satisfied or very satisfied with the job the DEC Bureau of Fisheries is doing using regulations as part of their approach to prevent the spread of fish diseases in New York. Few were dissatisfied (11%). When asked what changes anglers would like to see in the baitfish regulations or why they were dissatisfied:
 - The most common response to either question was suggesting that the amount of time baitfish could be kept be extended. The reasoning offered by some was if it is certified disease free it should be good forever.
 - Another common suggestion was to allow baitfish caught in interconnected waters to be used anywhere in the connected system (e.g., baitfish caught in streams feeding the Allegheny River should be allowed to be used when fishing the Allegheny River).

LITERATURE CITED

- Connelly, N. A., and T. L. Brown. 2009. New York statewide angler survey 2007, Report 1: Angler effort and expenditures. NYS Department of Environmental Conservation, Bureau of Fisheries. 104pp.
- Connelly, N. A., T. L. Brown, and B. A. Knuth. 1997. New York statewide angler survey 1996, Report 1: Angler effort and expenditures. NYS Department of Environmental Conservation, Bureau of Fisheries. 107pp.
- Connelly, N. A., and B. A. Knuth. 2010. 2010 Vermont angler survey report. HDRU Publ. No. 10-3. Dept. of Nat. Resour., N.Y.S. Coll. Agric. and Life Sci., Cornell Univ., Ithaca, N.Y. 139pp.
- Connelly, N.A. and B.A. Knuth. 2013. Black bass anglers' experiences in New York and their views on tournaments and fisheries management. HDRU Publ. No. 13-3. Dept of Nat. Resour., N.Y.S. Coll. Agric. And Life Sci., Cornell Univ., Ithaca, N.Y. 31 pp.
- Connelly, N. A., B. A. Knuth, and C. A. Bisogni. 1992. Effects of the health advisory and advisory changes on fishing habits and fish consumption in New York sport fisheries. Human Dimensions Research Unit Publ. 92-9, Dep. Nat. Resour., N.Y.S. Coll. of Agric. and Life Sci., Cornell Univ., Ithaca, N.Y. 120pp.
- Fishbein, M. and I. Ajzen. 2009. Predicting and changing behavior: the reasoned action approach. New York, NY: Psychology Press.
- Fishbein, M. and M.C. Yzer. 2003. Using theory to design effective health behavior interventions. *Communication Theory* 13(2):164-183.

APPENDIX A

On June 6, 2007, fish health regulations to prevent the spread of Viral Hemorrhagic Septicemia (VHS) and other fish diseases into the inland waters of New York were finalized (*a preceding emergency regulation had been put in place in November of 2006*). A principal part of the fish health regulation was to restrict the movement of uncertified (i.e. not tested as being disease-free) baitfish between water bodies, both personally collected baitfish as well as commercially purchased baitfish.

Core of the 2007 regulations, as pertaining to the angler use and purchase of baitfish

The regulation that initiated in June 2007 placed restrictions on both the personal collection and use of baitfish as well as the commercial collection, transport and sale of baitfish. The restriction of overland (motorized) transport was a key component of the regulation. Overland transport was strictly prohibited for any personally collected baitfish as well as for all commercial baitfish that had not been tested and certified as disease free. The intent of these restrictions was to prevent the movement of baitfish between different bodies of water as the baitfish can be carriers of fish diseases.

Baitfish could be sold (e.g. retail sale by baitfish shops to anglers), and thus be transported and used as bait if the baitfish had been certified as disease free *and provided a receipt was kept with the fish containing the name of the selling vendor, date sold, species of fish sold and quantity of fish sold*. The receipt was valid for 7 days, and subsequently extended (in 2009) to 10 days. Baitfish (dead and uncertified) could be packaged (as part of a commercial sale) and sold for use as bait if preserved by methods other than by solely freezing (i.e. salting), *and each package of dead baitfish is required to be individually labeled, identifying the name of the packager-processor, the name of the fish species, the quantity of the fish packaged and the means of preservation*.

The 2007 regulations did include an exception to the overland transport restriction for the Marine District which allowed for overland transport, of baitfish for use as bait, that was collected and used only within the counties of Queens, Kings, Richmond, New York, Bronx, Suffolk, Nassau Rockland and Westchester.

Modifications of Baitfish Transport Regulations in 2011

In 2011, the regulations for protecting fish health, as related to the angler use and purchase of baitfish were modified to allow for the overland transport of personally collected baitfish within three specified transportation corridors along specific water bodies. The three transportation corridors include: along Lake Erie-Upper Niagara River; the Lower Niagara River-Lake Ontario-St Lawrence River; and the Hudson River from the Federal Dam at Troy south to the Tappan Zee Bridge. While motorized transport of uncertified baitfish that are personally collected are allowed within each of these corridors, the uncertified baitfish can only be used in the water from which they are collected from. Commercial baitfish dealers are still required to obtain a permit from DEC for the overland transport of collected uncertified baitfish,

but once transported to a facility, the uncertified (untested) baitfish can only be sold to anglers for use as bait as long as it's used on the same body of water from which the baitfish were obtained. The seller must provide the purchaser (angler) with a receipt that identifies the water body from which the baitfish were collected. While within the boundaries of these corridors baitfish may be retained and preserved in any manner, they may not be transported outside of and utilized outside of the transportation corridors. Only certified disease-free baitfish continue to be allowed to be transported (overland) by anglers in motorized vehicles outside of the three defined corridors.

APPENDIX B

Study Questionnaire

SURVEY OF ANGLERS WHO USE BAITFISH IN NEW YORK



New York State Department of
Environmental Conservation
Bureau of Fisheries



Cornell University
Human Dimensions Research Unit

SURVEY OF ANGLERS WHO USE BAITFISH IN NEW YORK

Research conducted by the
Human Dimensions Research Unit
Department of Natural Resources
Cornell University

in cooperation with the
New York State Dept. of Environmental Conservation (DEC)
Bureau of Fisheries

The purpose of this survey is to learn about your use of baitfish (i.e., live fish) in New York and how recent regulations on the transport, sale and possession of baitfish might have affected your fishing.

If you have not used baitfish in New York in the past 5 years, please stop here, check the box and return the questionnaire to us, so we don't bother you with reminder mailings.

Cornell University is conducting this survey to provide DEC Bureau of Fisheries with important information on the views of anglers who use baitfish in New York. The Bureau of Fisheries will use this information to guide decisions about baitfish regulations and how best to communicate with anglers.

Your name was selected from a list of people who responded to the New York statewide angler survey we conducted in 2007 and who agreed to be contacted again by us for further information about their fishing experiences and preferences.

Please complete this questionnaire as soon as you can, seal it with the white re-sealable label provided, and drop it in any mailbox; return postage has been paid. Your participation in this survey is voluntary, but we sincerely hope you will take just a few minutes to answer our questions. Your identity will be kept confidential and the information you give us will never be associated with your name.

THANK YOU FOR YOUR HELP!

1. Which of the following have you used when you have gone fishing in New York in the past 5 years? (Check all that apply.)

- Artificial lures
 Baitfish (i.e., live fish) → If you have not used baitfish, stop here and return the questionnaire to us.
 Crayfish
 Other natural baits (e.g., insects, pork rinds, worms)

2. When you used baitfish were you: (Check all that apply.)

- ice fishing
 fishing from shore
 fishing from a boat → Did you place your bait in a recirculating livewell? No
 Yes

3. For what species of fish do you use baitfish when you are fishing? (Check all that apply.)

- Black Bass (largemouth, smallmouth)
 Lake Trout
 Northern Pike / Pickerel
 Walleye
 Yellow Perch
 Other (please list): _____

4. Did you go fishing in New York State between Oct. 1, 2012 and Sept. 30, 2013?

- No (SKIP to Question 9)
 Yes

5. Did you use baitfish while fishing in New York State between Oct. 1, 2012 and Sept. 30, 2013?

- No (SKIP to Question 9)
 Yes

6. Did you fish using baitfish on the following waters between Oct. 1, 2012 and Sept. 30, 2013? Was the baitfish used on the water personally collected by you? Was it purchased at a store?

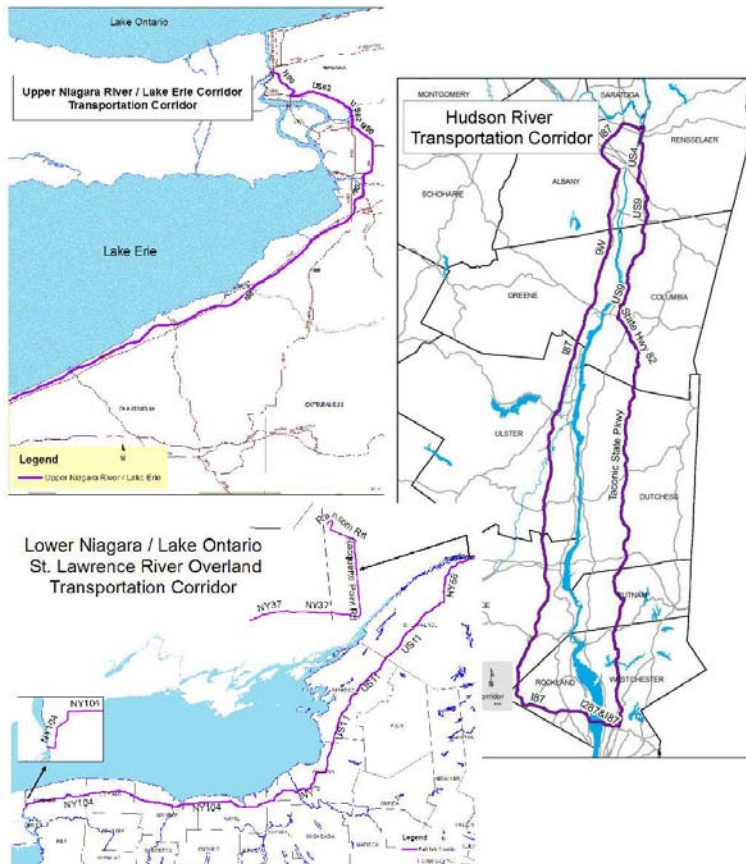
Fishing Location	Did you use baitfish while fishing	Was the baitfish: (check all that apply)	
		Personally collected	Purchased
Lake Ontario	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lake Erie	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lake Champlain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oneida Lake	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chautauqua Lake	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Finger Lakes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hudson River	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
St. Lawrence River	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other large rivers (e.g., Susquehanna, Mohawk)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other waters in NYS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. If you personally collected baitfish between Oct. 1, 2012 and Sept. 30, 2013, which of the following types did you collect? (Check all that apply.)

- Emerald Shiners
 Golden Shiners
 Herring (includes alewife)
 Other (Please list): _____
 I'm not sure what type of baitfish it was

8. If you purchased baitfish between Oct. 1, 2012 and Sept. 30, 2013, which of the following types did you purchase? (Check all that apply.)

- Emerald Shiners
- Golden Shiners
- Fathead Minnows
- Herring (includes alewife)
- Other (Please list): _____
- I'm not sure what type of baitfish it was



9. How often do you use a single purchase of baitfish in more than one water body?

- Never
- Some of the time
- Most or all of the time

10. Some baitfish you can buy in New York are “certified” free of fish diseases. If you bought “certified” baitfish, what did you do with the extra when you were done fishing? (Check all that apply.)

- Kept them for later use
- Released them into the water where I was fishing
- Released them into another body of water
- Disposed of them in the trash
- Disposed of them on land
- Salted them for use at a later time
- Didn't have any extra baitfish

11. If you bought “certified” baitfish, did you ever exchange or supplement the water in your bait bucket with water from the water body you were fishing in?

- No
- Yes

12. In June 2011 DEC created the corridors marked on the map on the previous page to allow for the transport of personally collected or uncertified baitfish. If you were fishing in the corridors since June 2011 and personally collected baitfish or bought uncertified baitfish, what did you do with the extra baitfish when you were done fishing? (Check all that apply.)

- Kept them for later use
- Released them into the water where I was fishing
- Released them into another body of water
- Disposed of them in the trash
- Disposed of them on land
- Salted them for use at a later time
- Didn't have any extra baitfish

13. If you were fishing in parts of New York State outside the corridors since June 2011 and personally collected baitfish or bought uncertified baitfish, what did you do with the extra baitfish when you were done fishing? (Check all that apply.)

- Kept them for later use
- Released them into the water where I was fishing
- Released them into another body of water
- Disposed of them in the trash
- Disposed of them on land
- Salted them for use at a later time
- Didn't have any extra baitfish

Opinions on Baitfish Regulations in New York

14. In the winter of 2006-2007 DEC began to regulate the transport, sale, and possession of baitfish in New York largely because of concerns over the spread of a fish disease called VHS (viral hemorrhagic septicemia). How familiar are you with those regulations?

- Not at all familiar
- Slightly familiar
- Moderately familiar
- Very familiar

15. Did you change your use of baitfish after 2006-2007 because of the baitfish regulations?

- No
- Yes → In what way? (Check all that apply.)
 - After 2006-2007:
 - I used baitfish less often
 - I stopped using baitfish
 - I used baitfish more often
 - I used other types of bait, like crayfish and worms, more often
 - I used artificial lures more often
 - I collected my own baitfish less often
 - I bought baitfish more often

16. Did you change what you did with unused baitfish because of the baitfish regulations?

- No
- Yes → In what way? (Check all that apply.)
 - After 2006-2007:
 - Kept them for later use
 - Released them into the water where I was fishing
 - Released them into another body of water
 - Disposed of them in the trash
 - Disposed of them on land
 - Salted them for use at a later time
 - Didn't have any extra baitfish

17. In June 2011 DEC changed the baitfish regulations to allow the transport of personally collected or uncertified purchased baitfish within the corridors shown on the map on page 4. How familiar are you with these new, current regulations?

- Not at all familiar
- Slightly familiar
- Moderately familiar
- Very familiar

18. If you fished within the corridors since June 2011, did you change your use of baitfish because of the baitfish regulations?

- No
- Yes → In what way? (Check all that apply.)
 - After 2011:
 - I used baitfish less often
 - I stopped using baitfish
 - I used baitfish more often
 - I used other types of bait, like crayfish and worms, more often
 - I used artificial lures more often
 - I collected my own baitfish more often
 - I bought baitfish more often

19. How important is it to you to follow the regulations on the transport, sale and possession of baitfish?

- Very important
- Moderately important
- Slightly important
- Not at all important

20. Anglers have expressed a variety of opinions about the baitfish regulations. Please indicate how strongly you agree or disagree with the following statements about the regulations? (Check one box for each statement.)

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
I try to follow the baitfish regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think baitfish at the store are less available now because of the regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The cost of baitfish is too high because of the regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I follow the regulations I will help limit the spread of fish diseases	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think following the regulations will help protect the waters I fish for future generations of anglers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I fish less now because of the cost or limited availability of baitfish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I fish more for species now that are not typically caught with baitfish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Regulations restricting the transport of baitfish are needed to keep fish diseases from spreading	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I find the current regulations confusing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I know enough about the regulations to follow them	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Most of the people I go fishing with think it is important that I follow the regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Don't know
Most of the people I go fishing with follow the regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I trust the opinions of the people I fish with about the importance of following the regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I trust DEC, Bureau of Fisheries when it comes to the importance of following the regulations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The regulations make it harder for me to collect baitfish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The spread of fish diseases is inevitable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

21. Overall, how satisfied are you with the job the DEC Bureau of Fisheries is doing using regulations as part of their approach to prevent the spread of fish diseases in New York State?

- Very satisfied
- Satisfied
- Neither satisfied nor dissatisfied
- Dissatisfied
- Very dissatisfied
- No opinion

If you are dissatisfied, what do you think needs to be improved?

22. Would you suggest any changes to the current baitfish regulations?

- No
 - Yes → _____
- _____

BACKGROUND INFORMATION

Hold for back cover with business reply

23. Where do you go for information on baitfish regulations in New York State? (Check all that apply.)

- Fishing regulations guide
- Other DEC publications
- DEC website
- Other websites
- DEC personnel
- Other government employees (e.g., state parks)
- Place where I buy baitfish
- Charter boat captains or fishing guides
- Fishing organizations
- Other anglers
- Outdoor expos

24. Is your primary residence: (Check one.)

- Urban Suburban Rural

25. Are you male or female? (Check one.) Male Female

26. In what year were you born? 19 ____

Please use the space below for any comments you wish to make.

Thank you for your time and effort!

To return this questionnaire, simply seal it with the white removable seal, and drop it in the mail (return postage has been paid).

APPENDIX C

Tests for Non-response Bias

Table C- 1. Tests for non-response bias, using data available from entire sample.

Information available from the license	<u>Respondents</u>	<u>Non-respondents</u>
	Percent	
Gender		
Male	89.2	90.1
Female	10.8	9.9
	NS	
State of residence		
New York	87.0	82.7
Other	13.0	17.3
	($x^2 = 7.3$, $df = 1$, $p = 0.007$)	
	Mean	
Age	60.4	52.9
	($t = 10.4$, $df = 1187$, $p < 0.001$)	

Table C- 2. Tests for non-response bias from non-respondent telephone follow-up.

Questions	Respondents	Non-respondents
	Percent	
Did you use baitfish while fishing in New York in the past 5 years?		
Yes	33.4	57.0
No	66.6	43.0
	($\chi^2 = 22.7$, $df = 1$, $p < 0.001$)	
If no, did you use baitfish prior to 2007 AND stop using it after 2007 because of the baitfish regulations?		
Yes	23.4	20.9
No	76.6	79.1
	NS	
Fishing gear used in New York in past 5 years		
Artificial lures	94.4	94.7
	NS	
Baitfish	100.0	100.0
	NS	
Crayfish	37.0	35.1
	NS	
Other natural baits	82.4	94.7
	($\chi^2 = 5.6$, $df = 1$, $p = 0.02$)	
Used baitfish when:		
Ice fishing	52.2	42.1
	NS	
Fishing from shore	50.7	61.4
	NS	
Fishing from a boat	77.1	78.9
	NS	
Familiar with 2006-2007 baitfish regulations		
Not at all familiar	9.8	21.1
Slightly familiar	24.0	17.5
Moderately familiar	44.6	26.3
Very familiar	21.6	35.1
	($\chi^2 = 14.0$, $df = 3$, $p = 0.003$)	
Change use after 2006-2007 because of regulations		
No	47.2	66.7
Yes	52.8	33.3
	($\chi^2 = 7.4$, $df = 1$, $p = 0.006$)	
Familiar with 2011 new regulations		
Not at all familiar	37.7	71.9
Slightly familiar	32.8	12.3
Moderately familiar	18.7	12.3
Very familiar	10.7	3.5
	($\chi^2 = 23.9$, $df = 3$, $p < 0.001$)	
Change use since June 2011 because of regulations		
No	65.3	89.5
Yes	34.7	10.5
	($\chi^2 = 13.0$, $df = 1$, $p < 0.001$)	

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Table C-2 (cont.)

	<u>Respondents</u>	<u>Non-respondents</u>
If I follow the regulations I will help limit the spread of fish diseases		
	Percent	
Agree	73.6	64.9
Neutral	12.9	14.0
Disagree	9.4	19.3
Don't know	4.1	1.8
	NS	
I find the current regulations confusing		
Agree	27.8	36.9
Neutral	40.0	12.3
Disagree	27.5	42.0
Don't know	4.7	8.8
	($\chi^2 = 16.7$, $df = 3$, $p = 0.001$)	
Satisfaction with job DEC Bureau of Fisheries is doing using regulations to prevent spread of fish diseases		
Satisfied	57.5	52.6
Neither satisfied nor dissatisfied	27.5	19.3
Dissatisfied	11.2	12.3
No opinion	3.8	15.8
	($\chi^2 = 14.0$, $df = 3$, $p = 0.003$)	

APPENDIX D

Additional Tables

Table D- 1. Baitfish anglers’ familiarity with 2006-2007 baitfish regulations and the changes they made because of the regulations, by water body fished between Oct. 1, 2012 and Sept. 30, 2013. Note: Anglers could fish more than one water body, so columns are not mutually exclusive.

	Lake Ontario	Finger Lakes	Oneida Lake	Lake Erie	St. Lawrence River	Chautauqua Lake	Other large rivers	Hudson River	Lake Champlain	Other NYS Waters
Familiarity with 2006-2007 regulations	(n=67)	(n=50)	(n=50)	(n=43)	(n=35)	(n=30)	(n=29)	(n=23)	(n=21)	(n=156)
Not at all familiar	10.4	6.0	10.0	7.0	11.4	13.3	6.9	4.3	9.5	7.1
Slightly familiar	28.4	12.0	22.0	14.0	22.9	10.0	20.7	17.4	19.0	23.7
Moderately familiar	32.8	50.0	42.0	46.4	34.3	36.7	48.3	60.9	57.2	42.9
Very familiar	28.4	32.0	26.0	32.6	31.4	40.0	24.1	17.4	14.3	26.3
Change use because of baitfish regulations										
No	48.5	49.0	50.0	42.9	41.2	40.0	27.6	30.4	33.3	39.2
Yes	51.5	51.0	50.0	57.1	58.8	60.0	72.4	69.6	66.7	60.8
In what ways:	(n=34)	(n=25)	(n=24)	(n=24)	(n=20)	(n=18)	(n=21)	(n=16)	(n=14)	(n=93)
Used baitfish less often	44.1	52.0	37.5	45.8	40.0	50.0	71.4	62.5	57.1	54.8
Used artificial lures more often	44.1	52.0	37.5	37.5	55.0	38.9	61.9	62.5	57.1	51.6
Bought baitfish more often	47.1	44.0	54.2	62.5	45.0	38.9	38.1	50.0	42.9	54.8
Used other types of bait more often	38.2	44.0	37.5	33.3	40.0	44.4	42.9	56.3	35.7	36.6
Collected my own baitfish <u>less</u> often	17.6	20.0	16.7	16.7	10.0	33.3	19.0	31.3	21.4	23.7
Stopped using baitfish	2.9	0.0	0.0	4.2	0.0	11.1	0.0	0.0	0.0	1.1
Used baitfish more often	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Changed what you did with unused baitfish										
No	51.5	58.3	50.0	27.5	65.6	40.7	63.0	42.9	40.0	48.6
Yes	48.5	41.7	50.0	72.5	34.4	59.3	37.0	57.1	60.0	51.4

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Table D-1 (cont).

	Lake Ontario	Finger Lakes	Oneida Lake	Lake Erie	St. Lawrence River	Chautauqua Lake	Other large rivers	Hudson River	Lake Champlain	Other NYS Waters
	(n=32)	(n=20)	(n=23)	(n=29)	(n=11)	(n=16)	(n=10)	(n=12)	(n=12)	(n=76)
In what ways:										
Kept them for later use	37.5	45.0	52.2	27.6	63.6	37.5	40.0	66.7	50.0	44.7
Disposed of them in the trash	34.4	20.0	30.4	17.2	63.6	18.8	50.0	16.7	25.0	26.3
Disposed of them on land	31.3	20.0	26.1	27.6	27.3	31.3	30.0	25.0	33.3	27.6
Salted them for use at a later time	15.6	45.0	26.1	44.8	18.2	43.8	20.0	25.0	8.3	25.0
Released them into the water where I was fishing	15.6	15.0	17.4	27.6	0.0	25.0	30.0	8.3	16.7	17.1
Released them into another body of water	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3
Didn't have any extra baitfish	15.6	35.0	21.7	13.8	9.1	25.0	20.0	33.3	33.3	19.7

Table D- 2. Baitfish anglers’ familiarity with 2011 baitfish regulations and the changes they made because of the regulations, by water body fished between Oct. 1, 2012 and Sept. 30, 2013. Note: Anglers could fish more than one water body, so columns are not mutually exclusive.

	Lake Ontario	Finger Lakes	Oneida Lake	Lake Erie	St. Lawrence River	Chautauqua Lake	Other large rivers	Hudson River	Lake Champlain	Other NYS Waters
Familiarity with 2011 regulations	(n=66)	(n=50)	(n=47)	(n=40)	(n=34)	(n=27)	(n=27)	(n=21)	(n=20)	(n=150)
Not at all familiar	36.4	42.0	36.2	15.0	32.4	22.2	33.3	33.3	35.0	40.0
Slightly familiar	27.3	34.0	40.4	32.5	38.2	25.9	44.5	28.6	35.0	30.6
Moderately familiar	22.7	14.0	8.5	22.5	20.6	29.7	14.8	28.6	20.0	18.7
Very familiar	13.6	10.0	14.9	30.0	8.8	22.2	7.4	9.5	10.0	10.7
Change use because of baitfish regulations										
No	62.9	64.9	63.2	56.4	69.7	55.6	63.2	44.4	43.8	58.8
Yes	37.1	35.1	38.8	43.6	30.3	44.4	36.8	55.6	56.3	41.2
In what ways:	(n=23)	(n=13)	(n=14)	(n=17)	(n=10)	(n=12)	(n=7)	(n=10)	(n=9)	(n=49)
Used baitfish less often	39.1	46.2	35.7	47.1	30.0	50.0	71.4	50.0	44.4	49.0
Used artificial lures more often	39.1	38.5	28.6	35.3	30.0	41.7	71.4	60.0	66.7	44.9
Bought baitfish more often	43.5	30.8	35.7	35.3	60.0	25.0	57.1	50.0	33.3	46.9
Used other types of bait more often	47.8	38.5	42.9	29.4	60.0	25.0	28.6	30.0	44.4	32.7
Collected my own baitfish <u>more</u> often	13.0	15.4	21.4	35.3	0.0	25.0	14.3	20.0	22.2	12.2
Stopped using baitfish	8.7	0.0	0.0	17.6	10.0	25.0	0.0	0.0	11.1	12.2
Used baitfish more often	0.0	0.0	7.1	11.8	0.0	16.7	14.3	0.0	0.0	0.0