
Assessment of the Great Lakes States' Fish Consumption Advisory Programs



October 2011

HDRU Series No 11-7

Prepared by:

T. Bruce Lauber, Nancy A. Connelly, Barbara A. Knuth, and Jeff Niederdeppe
Human Dimensions Research Unit
Department of Natural Resources
Cornell University

HUMAN DIMENSIONS RESEARCH UNIT PUBLICATION SERIES

This publication is one of a series of reports resulting from investigations dealing with public issues in environmental and natural resources management. The Human Dimensions Research Unit (HDRU) in the Department of Natural Resources at Cornell University studies the social and economic aspects of natural resources and the environment and the application of social and economic insights in management planning and policy. A list of HDRU publications may be obtained by writing to the Human Dimensions Research Unit, Department of Natural Resources, Bruckner Hall, Cornell University, Ithaca, NY 14853, or by accessing our website at:

<http://www.dnr.cornell.edu/hdru>.



TO CITE THIS REPORT

Lauber, T.B., N.A. Connelly, B.A. Knuth, and J. Niederdeppe. 2011. Assessment of the Great Lakes states' fish consumption advisory programs. HDRU Publ. No. 11-7. Dept. of Nat. Resour., N.Y.S. Coll. Agric. and Life Sci., Cornell Univ., Ithaca, N.Y. 54 pp.

This report is available electronically at <http://dnr.cornell.edu/hdru/pubs/HDRURReport11-7.pdf>.

EXECUTIVE SUMMARY

A consortium of the eight Great Lakes states' health, environmental, and natural resource agencies was funded by the U.S. Environmental Protection Agency to work together to enhance state fish consumption advisory programs by determining how to communicate information to the public more effectively, thereby increasing public knowledge about the risks and benefits of fish consumption and reducing exposure of the public to toxic substances from consumption of contaminated fish. As part of this work, Cornell University's Human Dimensions Research Unit conducted an assessment of current fish consumption advisory communication program activities taking place in the states. The purpose of the assessment, and the subject of this report, is to:

- Provide states in the Consortium information needed to develop a shared understanding of, and a consistent approach to, communicating and evaluating fish consumption advisories.
- Identify barriers to and opportunities for greater coordination on the communication programs associated with fish consumption advisories among states in the Consortium.

This report is organized into three sections. The first describes similarities and differences in the states' fish consumption advisory programs. The second identifies factors influencing coordination between the states, and the third provides recommendations for ways in which the states could improve coordination and consistency between their programs. Information for this report was gathered in four ways: presentations and discussions that took place during a November 2010 meeting of the Consortium; an analysis of all available documents and websites used by the states to communicate advisory information; telephone interviews with key personnel involved in the fish consumption advisory program in each state; and a social network survey to explore patterns of relationships among members of the Consortium and identify those individuals and organizations contributing to advisory programs in each state.

The Consortium has many characteristics that mark it as a very successful collaborative partnership. The individuals and organizations that belong to the Consortium have strong, long-standing relationships. It has served as a forum for constructive dialogue about fish consumption advisories with the periodic face-to-face meetings having proven to be particularly valuable. Considerable agreement about program advisory goals and approaches exist. The group has been able to secure grant support for its activities. There is a record of tangible accomplishments.

Based on our analysis of similarities and differences in existing advisory materials and our synthesis of Consortium members' insights, we identified additional opportunities for the states to increase the consistency and coordination of their advisory programs. Ultimately, the Consortium must decide which of these areas are important to address, but we present options here for consideration. These include:

- Developing protocols for contaminants in addition to PCBs, mercury, and chlordane;
- Increasing efforts at sharing data and cooperating on data collection;
- Expanding the target audiences addressed through outreach; and
- Increasing the consistency of messages communicated.

We see the greatest number of opportunities for increased consistency in relation to advisory messages. A number of examples exist of states adopting different approaches in message topics, content, terminology, and tone, and many Consortium members thought that aiming for more consistent messages was an important goal. Possible areas in which states could make an effort to increase message consistency include:

- Develop a consistent approach to communicating about commercially-caught fish.
- Develop a common set of clear, concise, simple messages regarding types of fish to consume, amount of fish to consume, and fish preparation methods.
- Develop consistent terminology to describe women of childbearing age.
- Adopt common message tone with regard to cajoling vs. directive messages and messages about what to do vs. what not to do.
- Evaluate the importance of including information on the level of exposure depending on the types of fish consumed.

One of the key barriers to more similar message content is a lack of information about how target populations are likely to respond to different types of wording; this barrier is one that can be addressed. Some of this information is being generated through focus groups and surveys conducted as part of this project. Ultimately, these efforts could lead to shared Consortium messages and materials as members of the Consortium have suggested.

We consider other differences between the states' advisories lower priorities for attention. These include:

- Agreement on advisory goals and objectives is not complete, but is already quite high and unlikely to be improved substantially with additional attention.
- Although states differ in the timing of issuing their advisories, we think it would be difficult to increase coordination in this aspect because this timing is influenced by many factors and processes that are unique to each state.

The Consortium has a strong foundation from which to work towards additional coordination and consistency among the states' advisory programs, but it will face obstacles, too. Steps that could be taken to try to address these obstacles include the following:

- Maintain communication among Consortium members, including face-to-face meetings whenever possible. Try to find opportunities for more Consortium members to participate in these opportunities.
- Consider the opportunities for increased consistency and coordination we have identified, and prioritize those which members of the Consortium would like to address. Perspectives of Consortium members differ with regard to the importance of additional efforts to increase consistency, in general, and the importance of increasing consistency in particular areas.
- Once the Consortium has identified top priorities, determine which factors serve as barriers to increasing consistency in those areas. These may include disagreements among Consortium members about scientific findings, lack of information to support one approach over another, differences in regulations and procedures in each state, etc. The

particular barriers to increasing consistency in each case will influence the steps that need to be taken to address those barriers.

- Because working to coordinate programs across states costs both time and money, concentrate on those areas that maximize benefits to Consortium members once work is complete. For example, Consortium members mentioned data sharing and development of common advisory materials as opportunities that would ultimately benefit states that were constrained by resources.

ACKNOWLEDGMENTS

This study was funded by the U.S. Environmental Protection Agency (EPA) under a grant to the Minnesota Department of Health, as part of the Great Lakes Consortium Fish Consumption Advisory Enhancement project.

We thank Consortium members for providing background information, examples of advisory materials, and participating in telephone interviews. Without their help and cooperation this project would not be possible.

TABLE OF CONTENTS

Executive Summary	i
Acknowledgments.....	iv
Table of Contents.....	v
List of Tables	vi
List of Figures.....	vii
Introduction and Methods.....	1
Similarities and Differences in Fish Consumption Advisory Programs.....	3
Goals and Objectives of the Fish Consumption Advisory Programs	3
Decision-making Processes	6
Factors Influencing Consistency and Coordination between Advisory Programs	19
Relationships and Dialogue	20
Agreement.....	22
The Influences of Social Networks.....	26
Legitimization.....	28
Resources	30
Conclusions and Recommendations	33
Developing Protocols for Contaminants in Addition to PCBs, Mercury, and Chlordane	34
Increasing Cooperation on Data Collection and Sharing.....	34
Expanding Target Audiences.....	34
Increasing Consistency of Messages	34
Topics.....	34
Content.....	35
Terminology.....	35
Tone	35
Other Differences.....	36
Literature Cited.....	38
Appendix A.....	39
Appendix B.....	41
Appendix C.....	43
Appendix D.....	45
Appendix E.....	48

LIST OF TABLES

Table 1. Number of documents or websites reviewed by state.....	2
Table 2. Goals of the fish consumption health advisory programs.....	4
Table 3. State agencies involved in the fish consumption health advisory program by state.....	7
Table 4. Target audiences and languages found in document review by state.....	8
Table 5. Definition of women of childbearing age and children by state.....	9
Table 6. Message content and tone of fish consumption health advisory information by state. ..	11
Table 7. Chemicals and the amount of risk information discussed in documents by state.....	13
Table 8. Complexity of documents reviewed as measured by the number of words in the document, species and water bodies mentioned by state.....	15
Table 9. Means of communication of health advisory information by state.	16
Table 10. Size and composition of social networks contributing to fish consumption advisories in each of the Great Lakes states.....	27

LIST OF FIGURES

Figure 1. Social network map of Consortium members.. ..	21
---	----

INTRODUCTION AND METHODS

A consortium of the eight Great Lakes states' health, environmental, and natural resource agencies formed in the 1980s to develop shared science-based protocols for fish consumption advice in the Great Lakes (Anderson et al. 1993, McCann et al. 2007). This Consortium has worked together since then, as time and funding have allowed, on various communication tools, data sharing, and additions to the protocols. Most recently, the group submitted a proposal and was funded by the U.S. Environmental Protection Agency to work together to enhance state fish consumption advisory programs by determining how to communicate information to the public more effectively, thereby increasing public knowledge about the risks and benefits of fish consumption and reducing exposure of the public to toxic substances from consumption of contaminated fish. The Consortium is working with Cornell University's Human Dimensions Research Unit on several research projects to achieve their objective, including an assessment of current fish consumption advisory communication program activities taking place in the states. The purpose of the assessment, and the subject of this report, is to:

- Provide states in the Consortium information needed to develop a shared understanding of, and a consistent approach to, communicating and evaluating fish consumption advisories.
- Identify barriers to and opportunities for greater coordination on the communication programs associated with fish consumption advisories among states in the Consortium.

This report is organized into three sections. The first describes similarities and differences in the states' fish consumption advisory programs. The second identifies factors influencing coordination between the states, and the third provides recommendations for ways in which the states could improve coordination and consistency between their programs.

Information for this report was gathered in four ways. First, each of the states gave a presentation on their program at a meeting of the Consortium in November 2010. (A template for these presentations is provided in Appendix A.) The group also discussed the primary similarities and differences between the programs and potential opportunities for and barriers to increased coordination and consistency.

Second, all available documents and websites used by the states to communicate advisory information (Table 1 and Appendix B) were analyzed. For each document we coded information about the target audience, message content, and message tone. (Analysis procedures are described in Appendix C). The two lead authors divided the eight states into two groups and were each responsible for the analysis of four states' documents. To ensure coding reliability, each person initially coded four documents from the other person's states (8 total documents), compared codes, and, for items with substantial disagreement, refined the definitions of the codes and reanalyzed the document. For codes that were not applied consistently in this initial analysis, this process was repeated with a new set of documents until both researchers were applying the codes consistently. A total of 70 documents and websites¹ were reviewed.

¹ When websites were analyzed, we not only analyzed the main page, but also all pages maintained by the same agency on the same topic (fish consumption) to which links were provided from that page.

Table 1. Number of documents or websites reviewed by state.

States	Number of documents or websites reviewed
Illinois	5
Indiana	5
Michigan	23
Minnesota	6
New York	9
Ohio	5
Pennsylvania	3
Wisconsin	16

Third, semi-structured, open-ended, telephone interviews were conducted with key personnel involved in the fish consumption advisory program in each state. (The interview guide is provided in Appendix D.) The purpose of the interviews was to learn more about each state's fish consumption advisory program and identify opportunities for and barriers to greater coordination and consistency between states, focusing primarily, but not exclusively, on the communication aspects of these programs. All members of the Consortium were contacted for interviews. Additional people were selected for interviews based on the recommendation of Consortium members. We interviewed at least one person from each of the state agencies involved in the fish consumption advisory program (with the exception of Pennsylvania in which the state agriculture agency representative with fish consumption advisory responsibilities had recently left his position). The number of interviews conducted by state ranged from ten in New York to three each in Michigan and Illinois. A total of 38 people were interviewed.

When we received respondents' permission, we recorded and transcribed interviews. Content analysis of the interview transcripts was done using atlas.ti (Version 6.2.23). This qualitative data analysis program allowed us to mark/code segments of interviews that described similarities or differences between state programs, or factors that might influence coordination or consistency between programs. The two lead authors agreed on a set of codes and definitions of those codes for this analysis. The second author coded sections of the interviews that related to similarities or differences between state programs. The lead author coded sections related to factors influencing coordination or consistency between programs. Each researcher initially coded the relevant sections of two interview transcripts, and these coded sections were reviewed by the other researcher to identify possible areas of disagreement about how the documents were coded. No such areas of disagreement existed, and so the rest of the transcripts were analyzed following the same procedures. Interview segments with the same code were then grouped together, reviewed, and relevant quotes are used in subsequent sections of this report to illustrate similarities, differences, or factors influencing coordination.

Finally, we conducted social network analyses to (1) explore patterns of relationships among members of the Consortium; and (2) identify those individuals and organizations contributing to advisory programs in each state. We conducted a standardized social network survey to collect data about relationships among Consortium members. (The social network questionnaire is provided in Appendix E.) Each member of the Consortium was asked to complete a written questionnaire indicating how frequently they interacted with each other member of the Consortium on a scale of 1 (never) to 5 (very – at least once a week). All but 2 members of the Consortium completed this questionnaire.

From the data, we used Netdraw to produce a social network map depicting relationships between Consortium members. We used Ucinet 6 for Windows to calculate “degree centrality,” a measure of how central a role individuals play in the network. Degree centrality quantifies how many other members of the network an individual interacts with. Because degree centrality is dependent on the size of a network, it is typically normalized by dividing an actor’s degree centrality by the maximum possible degree centrality for that network. It is expressed as a percentage varying from 0 to 100.

In addition, we also considered relevant social contacts outside of the Consortium, based on the knowledge that individuals interact with many others who are not members of the Consortium in their work on fish advisories in their home states. We asked Consortium members to identify each individual or organization with whom they interacted at least several times a year in their work on advisories. We asked them to consider various categories of people (individuals working for their agency, individuals working for other agencies within their state, etc.) to encourage a more complete set of responses. A particular state’s social network was defined as the set of individuals and organizations identified by all of the Consortium members in that state. Once these individuals and organizations were identified, we calculated the total number of network members and the percent of network members falling into various categories (state fish and wildlife agency, state health department, etc.).

SIMILARITIES AND DIFFERENCES IN FISH CONSUMPTION ADVISORY PROGRAMS

In this section of the report we describe the similarities and differences between state programs. We have organized these similarities and differences into five areas: (1) goals and objectives of the advisory programs, (2) decision-making processes used to set the advisories, (3) target audiences, (4) message content, and (5) means of communication. We conclude with a description of those areas in which Consortium members believed it was important to increase coordination in the future. In addition to pointing out the similarities and differences, this section serves as a compilation of the various methods used by states to communicate health advisory information and could be used as a reference by states as they seek to update their methods.

Goals and Objectives of the Fish Consumption Advisory Programs

Based on the interview data and the information presented by each state at the November meeting a number of goals were articulated (Table 2). Some of these goals were presented as goals of the program, while some may have been personal goals of the respondents for the program.

Table 2. Variety of goals of Great Lakes states fish consumption advisory programs.

Goals of Fish Consumption Advisory Programs
Provide information about the risks due to consumption of chemically contaminated fish
Have people make informed choices when deciding about fish consumption
Provide information about the benefits of fish consumption
Encourage people to change their behavior and follow the advisory
Provide advice about the consumption of commercially-caught species
Encourage fishing
Monitor the environment for pollution

One goal that was common to all state programs was to inform those likely to consume sport-caught fish about the risks due to chemical contaminants and advise them about consumption. This common goal is reflected in statements about informing people, increasing awareness of the advisory, or (more broadly) protecting public health. For example:

To give the public fish consumption advice for sport-caught fish from public waters. (M-1)²

We'd really like all the people who eat sport fish to be aware or informed about our fish advisories. (M-2)

We want to protect public health. That's the bottom line, protect public health in all age groups, both genders. That's our mission because we work for the Department of Public Health so we really have no other mission. I mean we want people to eat fish. We know that that's the healthy thing. We want them to know how to choose fish that are low on contaminants and high in nutrients. And that's the message we're trying to get out and I think we've been pretty successful from what we've seen. (A-1)

The advisory programs give advice rather than stating rules or regulations. Therefore, another common goal mentioned by someone in almost every state was to help people make informed choices about fish consumption.

This is an advisory only. It's not set in stone, it's an advisory but it's recommended that the sensitive population be aware of it and make an informed decision. (M-3)

To give people information so that they can eat fish that are low in contaminants so they can include fish in their diet which is ...³ a good thing, has benefits. But that they all have the information to make choices about which fish to eat. (A-2)

² Letters and numbers in parentheses at the end of each excerpt are unique identifiers allowing the authors to identify the source of the excerpt.

³ Ellipses indicate that material has been deleted to eliminate extraneous material and improve readability.

Some respondents mentioned as a goal wanting to inform people of the benefits of fish consumption. Even those states that didn't specifically mention it as a goal included statements about benefits in their advisory materials (discussed later in this report.)

Basically we want to increase awareness that there are health benefits of eating fish without ... scaring people. (M-4)

Most importantly is I want them to eat more fish as well. The duality is that while there are concerns ... with fish consumption from the chemical aspects of things, there are benefits and ... most people don't eat enough fish. So we want ... people to eat more fish. (A-3)

We always said ... fish are a good source of food and people like to fish and we don't want discourage people from fishing. We've always had that in our message but it's more prominent now. (A-4)

The statement above also refers to the importance of fishing as an activity. While encouraging fishing is not thought of as a primary goal of fish consumption advisory programs, several respondents in several different states mentioned it as important. It also was mentioned as a message in advisory documents we reviewed.

Plus we want to make sure their messages are consistent with pro-fishing messages because we don't want to discourage people from doing healthy lifestyle activities like fishing. (M-5)

Promotion of fishing and eating fish as ... a healthy food. (A-5)

Related to the goal of providing information so people can make an informed choice is getting people to actually follow the advice and reduce their exposure to contaminants. Some states went so far as to say an objective of their program was behavior change – getting people to reduce consumption of contaminated fish, change their methods of cooking the fish, etc. This assumes that some people were beginning with unhealthy behaviors.

Changed behavior which is your ultimate goal if you're trying to protect public health. (M-6)

Our basic goal is to increase the number of people who actually follow the advisory by making them aware and making sure they understand it (M-7)

Some respondents from Minnesota, Wisconsin, and Ohio, mentioned informing people about the consumption of commercially-caught species as a goal of their program, whereas in other states respondents didn't mention it as a goal or specifically state they are focusing only on sport-caught fish.

Give some thought to your consumption of store-bought fish as well. (M-8)

Versus:

We made a decision quite a while back that we would not include any primarily commercial species in our sport fish advice. (A-6)

Some states see the testing of fish that they do as a part of a broader goal of monitoring the environment for pollution, and subsequently informing people of safety issues.

That people are aware of where pollution problems exist, in what fish they need to avoid, where there are waters that they can safely eat any fish. (A-7)

Help identify sources of contaminants and evaluate effectiveness of source controls. (Illinois presentation)

The first three goals in Table 2 were articulated by someone in almost every state, so these are likely universal goals (providing information about risks and advice about consumption, helping people make informed choices, and providing information about the benefits of fish consumption). The other goals were not mentioned universally, but if asked specifically about them, all states might say they were at least tangential goals of their program, with the exception of informing people about the consumption of commercially-caught species. This topic is discussed in more detail later in this report.

Decision-making Processes

Fish consumption advisory programs involve several agencies in each state working together. The roles and responsibilities of each agency seem well defined as respondents had an easy time describing the roles and the process of decision-making regarding the advisories in their state. In each state there is a lead agency ultimately responsible for the production of the health advisory (Table 3). The lead agency is not always the state health department. Other agencies may be involved in deciding the advice for consumption of fish or only in collecting or testing the fish.

Well we have our memorandum of understanding between the 3 agencies that I mentioned before. We have our committee that meets several times a year and we get together ... as a committee and we discuss any updates or changes and then we get committee approval for that. (M-9)

Generally I would also consult with [the environmental agency] and [the natural resources agency] just more out of courtesy to let them know what we're thinking about changing and then at least give them an opportunity to comment on it. (A-8)

For some states, members of the consortium are typically the final decision-makers when deciding on changes to the advisory, whereas in other states changes involve many levels of approval.

So the technical workgroup reports to ... the policy workgroup. And parts that we're seeking their review and approval on would be the final advisories, the content of the

Table 3. State agencies¹ involved in the fish consumption advisory program by state.

States	Agencies Involved in Fish Consumption Advisory Program	
	Lead Agency	Other Agencies
Illinois	Health	Environmental, Natural Resources
Indiana	Health	Environmental, Natural Resources
Michigan	Health	Environmental, Natural Resources, Agriculture
Minnesota	Health	Environmental, Natural Resources
New York	Health	Natural Resources/Environmental
Ohio	Environmental	Health, Natural Resources
Pennsylvania	Environmental	Health, Natural Resources, Agriculture
Wisconsin	Natural Resources, Health	

message. We have a page or so before the actual listing of advisories that has introductory material in it about the importance of eating fish and the use of this ... list of advisories. So they'll review and approve that message in addition to any press releases that we'll publish throughout the year. But ... policy does not get involved too much in deciding on the actual technical protocols for the advisory decisions. (A-9)

There's a lot of bureaucracy that's involved in it... Within our bureau, we work with it, then it has to work its way through ... the entire upper management in order to get ... the sign off on the review. (M-10)

All states update their advisories every year, but the timing of when the new advisory information is released differs somewhat. Ohio, Illinois, and Pennsylvania issue their new advisory in the winter. The other states put out their updated advisories in the spring, generally timed for the beginning of the prime fishing season.

Target Audiences

All states produce printed material or have websites aimed at informing the general public about the fish consumption advisories in their state (Table 4). All also have material targeting anglers.

Our audience is the sport fish anglers. (M-11)

¹ Health Departments are typically concerned about human health issues. Natural Resources Departments are typically concerned with fish and wildlife management. Environmental Departments are typically concerned about pollution in the environment.

Table 4. Documents targeted at specific audiences and languages found in document review by state.

States	Documents Targeted at Specific Audiences						Languages other than English
	General Public	Anglers	Women of Childbearing Age	Urban Anglers	Youth Anglers	Older Adults	
Illinois	Yes	Yes	Yes	No	No	No	none
Indiana	Yes	Yes	Yes	No	No	No	Spanish
Michigan	Yes	Yes	No	Yes	Yes	No	Spanish
Minnesota	Yes	Yes	Yes	No	No	No	Spanish, Hmong, Vietnamese
New York	Yes	Yes	No	Yes	No	No	Spanish, Chinese
Ohio	Yes	Yes	Yes	No	No	No	Spanish, Korean, Chinese
Pennsylvania	Yes	Yes	No	No	No	No	none
Wisconsin	Yes	Yes	Yes	No	Yes	Yes	Spanish, Hmong

Interestingly, another respondent in the same state as the source of M-11, said the following:

I think still with the Great Lakes states the emphasis is ... on the general population with sensitive populations being a footnote. And I've become an advocate that the fish advisories should be primarily targeting the most at risk folks. And so that's the direction I feel we need to go for, certainly in [our state] that I would like to work toward. (M-12)

Ohio and Pennsylvania provide one set of advice for everyone. They indicate that this advice is conservative in that it is aimed at protecting women of childbearing age and children. They say that older women and men do not face as many health risks, so they could eat more fish, but they still recommend that they follow the advice in the state advisory. All of the other states follow a 2-tiered approach with one set of advice for older women and men, and a second set of generally more conservative advice for women of childbearing age and children.

The definition of women of childbearing age and children differs somewhat from state to state (Table 5). New York uses an age range for women, some states refer to childbearing years, whereas others refer to women who are pregnant or may become pregnant. All states, except Ohio, define children as being under 15 years old based on the degree to which they have

Table 5. Definition of women of childbearing age and children by state.

States	Women of Childbearing Age and Children Described As:
Illinois	Pregnant or nursing women, women of childbearing age, and children less than 15 years of age
Indiana	Women of childbearing years, nursing mothers, and all children under age 15
Michigan	Women ages 15 and older who are pregnant or may become pregnant in the future. Children under the age of 15 years old.
Minnesota	Pregnant women, women planning to become pregnant and children under age 15
New York	Children under the age of 15 and women under age 50
Ohio	Pregnant women, women of childbearing age, nursing women, infants, and children age 15 and younger*
Pennsylvania	Women of childbearing age and children*
Wisconsin	Women of childbearing years, nursing mothers and all children under 15

* Not used when providing specific advice because the advice is the same for everyone.

physically developed by age 15. Ohio includes 15 year olds in its definition of children, but since it offers the same advice for everyone, the difference between states is likely moot.

A number of states produce written material specifically targeting women of childbearing age (Table 4). They also engage in outreach activities aimed at this group through WIC (Women, Infants, and Children) clinics and health care providers. Some states are not feeling very successful in their efforts to reach this group. For example:

We would like to reach others. Our primary means of getting the message out is using the summary booklets that are given to all the licensed anglers when they purchase their annual license. We also post it on the website so we know that other people have access to it but it's not targeted to other specific audiences like we would like to. Women and children and the healthcare providers and things like that. We've been falling a little short on that. (A-10)

Michigan has developed materials targeting urban anglers in certain parts of their state (Table 4), such as those fishing the Detroit River. New York has recently taken a more regional approach to targeting audiences, some of which (e.g., New York City) turn out to be largely urban audiences. Other states have not focused specifically on urban anglers with printed materials.

Our view is when you have a contaminated water body, a large urban population and low income folks who fish the river that would be a priority. (M-13)

Michigan and Wisconsin have developed some materials specifically aimed at youth, such as tattoos and crossword puzzles. Indiana has a link on their website to an EPA site aimed at children. Recently Wisconsin has targeted some materials specifically at older adults:

And now our interest has been in what we call retiree group that we found that especially the males after 65 when they're retired they tend to go fishing more and they get, eat more fish and they hear from their doctors that oh you ought to increase your fish so that's just another excuse to go out and catch more. (A-11)

Most states produce materials targeting audiences who speak languages other than English, the most popular being Spanish, followed by various Asian languages. Some states are also working with Native American tribes.

We hope to use the community that designed ... the ideas that we come up with, work with them on increasing the awareness and keeping in mind that ... they have different tribal customs and beliefs that we need to incorporate in the advisory so we hope to be able to do that and then again transfer this information over to other Native American communities in [our state] or even outside [our state] if it works. (M-14)

Message Content

In our document analysis we reviewed each pamphlet, poster and website to see if it covered specific, pre-defined topics deemed likely to be of interest to many states based on the initial Consortium meeting in November, 2010 (e.g., the benefits of eating fish, cleaning and cooking guidelines). We then looked at all of the documents acquired for each state and determined if “some,” “most,” or “all” of these documents covered that topic⁴. We found that all states discuss the benefits of eating fish in at least some of their printed or web documents (Table 6), and most states discuss these benefits in most or all of their documents. States also encourage people to make informed choices, as illustrated below in document text from Minnesota:

“There is no need to stop eating fish. But if you wish to reduce your exposure to contaminants, you need to make wise choices about the kinds of fish you eat and how often you eat the fish.” (MN document)

Every state provided cleaning and cooking guidelines in at least some of their documents. The diagram of how to remove the fat when cleaning was very common, as was text such as:

“remove fat near the skin of the fish prior to cooking and broil, bake, or grill fish so the fat drips away.” (IN document).

The use of diagrams with text follows the recommendations of Connelly and Knuth (1998), who found that a majority of Great Lakes anglers thought the diagram/text example was clearer and easier to understand than a text only example.

⁴ Sometimes states with a large number of advisory materials tailored different materials for different purposes. For these states, even topics recognized as important might appear only in “some” materials.

Table 6. Message content and tone of fish consumption advisory information by state.

States	Message Content Includes a Discussion of:			Message Tone:			
	Benefits of eating fish	Cleaning and cooking guidelines	Advice for purchased fish	Directive vs. Cajoling	Saying ‘what to do’ versus what ‘not to do’	How exposure to contaminants is described	How advisory recommendations are described
Illinois	Most documents	Some documents	No	Balanced	Mostly to do	Qualitatively	Both qualitatively and quantitatively
Indiana	Most documents	Some documents	Yes	Mostly directive	Mostly to do	Mostly Qualitatively	Both qualitatively and quantitatively
Michigan	Some documents	Most documents	Yes	Mostly directive	Mostly to do	Mostly Qualitatively	Both qualitatively and quantitatively
Minnesota	Most documents	Most documents	Yes	Balanced	Mostly to do	Qualitatively (but described infrequently)	Both qualitatively and quantitatively
New York	Most documents	Some documents	Yes, but not detailed	Mostly directive	Balanced	Qualitatively	Quantitatively
Ohio	All documents	Most documents	Yes	Mostly directive	Balanced	Qualitatively (but described infrequently)	Mostly quantitatively
Pennsylvania	All documents	All documents	Referenced FDA information only	Mostly cajoling	Mostly to do	Qualitatively (but described infrequently)	Mostly quantitatively
Wisconsin	Some documents	Some documents	Yes	Balanced	Balanced	Qualitatively	Both qualitatively and quantitatively

We assessed the level of detail states went into as they described the risks associated with chemical contaminants. We found that very few states presented information on how risks were calculated, or how the risks of consuming contaminated fish compared with other risks to which people were exposed (e.g., cigarette smoking). Most states did discuss the type of risks associated with consuming fish contaminated specifically with PCBs and mercury in some of their documents (Table 7). For example:

“in adults, prolonged expose to mercury can damage your kidney and nervous system.”
(MN document)

“studies of women and their children show a link between elevated levels of PCBs in their bodies and slight effects on their children’s birth weight, short-term memory and learning ability.” (NY document)

States also mentioned other chemicals of concern in at least some of their documents, including dioxins, chlordane, DDT, mirex, dieldrin, pesticides, PFCs/PFOS, lead, PAHs, cadmium, and other metals .

We also examined the documents to see how states described the level of exposure to contaminants associated with consuming fish and advisory recommendations about how much or what type of fish to consume. We categorized their statements as qualitative (e.g., using terms like “less,” “greater”) or quantitative (e.g., 1 meal per month), then considered all of the documents for a particular state and summarized the information provided in each as all qualitative, mostly qualitative, both qualitative and quantitative, mostly quantitative, all quantitative, or neither⁵ qualitative or quantitative. Three states provided very little advisory information on level of exposure to contaminants in their materials. Information provided by all states was generally qualitative in nature, such as “older or bigger fish have had more time to build up chemicals in their bodies” (IN document), rather than quantitative (Table 6). In contrast, consumption recommendations were described quantitatively most of the time (e.g., eat no more than one meal per week of predator fish [IL document]), and qualitatively some of the time (e.g., eat smaller, younger fish [WI document]).

We evaluated the tone of the messages provided in the documents and found a great deal of variety both within a state’s documents and between states. We considered whether messages were stated in a directive/commanding or cajoling manner. "Directive" refers to information which tells people what to do (e.g., choose freshwater sportfish from waterbodies for which there is no specific advice [NY document]). "Cajoling" refers to information that encourages or suggests what people should do (e.g., experts recommend eating two meals of fish per week [PA document]). These two tones were examined previously by us and results suggested that anglers preferred the cajoling tone (Connelly and Knuth 1998). We found some states, like Illinois, using both tones in almost equal amounts in their documents (Table 6). Other states, such as New York, were mostly directive in their message tone. Pennsylvania was the only state to use mostly cajoling language.

⁵ In situations in which no information was provided on the topic.

Table 7. Chemicals mentioned in documents by state and whether information is provided about types of risks posed by chemicals.

States	PCBs	Mercury	Other Contaminants
Illinois	Most documents provide info about types of risks	Most documents provide info about types of risks	Chlordane
Indiana	Some documents provide info about types of risks	Some documents provide info about types of risks	Pesticides, Other metals
Michigan	Some documents mention chemical, a few provide info about types of risks	Some documents mention chemical, a few provide info about types of risks	Dioxins, Chlordane, DDT, Other metals
Minnesota	Most documents provide info about types of risks	Most documents provide info about types of risks	Dioxins, PFCs/PFOS
New York	Some documents provide info about types of risks	Some documents provide info about types of risks	Dioxins, Chlordane, DDT, Mirex, Dieldrin, Pesticides, Lead, Cadmium, other metals
Ohio	Some documents provide info about types of risks	Some documents provide info about types of risks	DDT, Mirex, Pesticides, Lead, PAHs, Cadmium, Other metals
Pennsylvania	All documents provide info about types of risks	Most documents provide info about types of risks	Chlordane, Pesticides, Other metals
Wisconsin	Some documents mention chemical, a few provide info about types of risks	Some documents mention chemical, a few provide info about types of risks	Dioxins, PFCs/PFOS

Another way we characterized message tone was according to whether text (tables were excluded from this analysis) was worded as encouraging people to engage in particular behaviors (“to do”) versus encouraging them to avoid particular behaviors (“not to do”). There was variability within most states’ documents, but states generally focused on “to do” messages (Table 6). For example:

“Choose leaner fish.” (OH document)

“Eat fish from different places such as the grocery store, restaurants, rivers and lakes.” (MI document)

Respondents described their struggles with simplifying advisory messages. They would like to have a clear, concise, simple message, but the advisories are complicated.

I mean I think we’re always looking for ways to simplify it but the advisories themselves are incredibly complex. I think the only state whose advice is more onerous and complicated than ours is California. (M-15)

It was just not presented in a way that your average citizen could pick it up and get answers to that question: are the fish safe to eat? So we tried to say: “Well we’ll take this program on and we’ll try to make that messaging a lot clearer.” And I think we’ve done a little bit better job of that. (M-16)

We examined the complexity of documents and the advisory message itself in several ways. First, complexity can be measured by the number of words contained in a document. Some states had printed documents or websites with over 10,000 words (Table 8). These typically were the documents containing the full text of the health advisory, but in some states these same type of documents were under 5,000 words. These lengthy documents were offset by other much briefer documents, typically brochures or posted signs. The complexity of the advisory message itself was also measured in terms of the number of fish species and water bodies mentioned in one document. Again, the full text of the advisory, either in printed form or on the web, contained the longer list of species and water bodies. The detailed advisory information was typically presented in table format. In some states, such as New York, the fishing regulations guide contains the full list of water bodies and fish species covered in the advisory in table format. In other states, such as Ohio, only a brief general statement about fish consumption is made in the regulations guide, and anglers are provided with contact information to obtain the full advisory.

All of the states, except Illinois, *referenced* information on recommendations for consumption of purchased fish in some of their documents (Table 6). Six of the eight states gave specific, detailed information in at least some of their documents. One respondent suggested states in the Consortium might benefit from increasing their focus on purchased fish.

But I can tell you from an advisory messaging standpoint that we have been trying to make a case in the last year or so to people who have resisted that you can’t just be silent on commercial fish. (M-17)

Table 8. Complexity of documents reviewed as measured by the number of words in the document, species and water bodies mentioned by state.

States	Range in estimated # of words per document	Max. # species mentioned in 1 document	Max. # of water bodies mentioned in 1 document
Illinois	740-2,000	28	78
Indiana	225-10,700	46	178
Michigan	7-6,400	52	205
Minnesota	20-2,630	40	1,230
New York	22-11,400	30	138
Ohio	111-10,000	36	110
Pennsylvania	1,400-4,500	28	105
Wisconsin	96-3,700	22	135

But when some respondents were asked if the Consortium should try to work toward greater consistency on the issue of commercially-caught fish, the consensus among those asked was it was a worthwhile goal, but would be hard to achieve.

I think that there needs to be a clearer message when it comes to store bought vs. sport fish ... there's not enough consistency about addressing the commercial fish (A-12)

I don't know if it's something that we would agree upon (M-18)

Some states refuse to add commercial fish into the mix and you're not going to get them to change (M-19)

Means of Communication

All states have a website with health advisory information (Table 9). Most also have a separate printed booklet with a compilation of all the health advisories for the state. In addition, some portion of the health advisory is printed in the fishing regulations guide of most states. But one respondent brought up a concern about access to information in the fishing regulations guide:

Another thing that I'm concerned with is that we've gone to an online purchasing of license system like most states so ... you can go online and purchase your license, print your license right there in your house. When you do that you don't, I don't believe they send you a summary book so then you have to go to a website to either download the whole summary book or read it. (A-13)

Table 9. Means of communication of health advisory information by state.

States	Means of Communication								Refer to websites outside state
	Website	Health Advisory booklet	Fishing Regulations Guide	Brochure	Posted sign	Refrigerator Magnet	Poster or Flyer	Material for children	
Illinois	Yes	Yes	Yes	Yes	No	No	No	No	No
Indiana	Yes	Yes	Yes	Yes	No	No	No	No	Yes
Michigan	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Minnesota	Yes	No	Yes	Yes	No	Yes	No	No	Yes
New York	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Ohio	Yes	Yes	Yes	Yes	No	No	No	No	Yes
Pennsylvania	Yes	No	Yes	Yes	No	No	No	No	Yes
Wisconsin	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes

States also use brochures/pamphlets/wallet cards to reach various audiences. Few states use other types of printed material such as signs or posters. Several respondents indicated some limited presence on Facebook, and Indiana has developed an iPhone app to help people track commercial seafood consumption (aimed at women of childbearing age).

In most states' printed or web documents, readers were referred to a website outside of their state. Usually it was the FDA or EPA websites for information on mercury in fish and shellfish, including commercially-caught fish. However, we also noted references by some states to other websites such as the American Heart Association and Monterey Bay Aquarium.

During the interviews, respondents talked about where they distributed their printed materials and where they had opportunities for one-on-one communication with potential fish consumers. These distribution sites included places like WIC clinics, food pantries, and at public events such as state fairs or sportsmen's shows. Several states stressed the importance, in their view, of creating partnerships with other agencies and organizations to help spread the word about the advisories.

Increase our network of partners who can help us distribute things ... Over this time, we've had more connections in WIC clinics and other kinds of clinics, food pantries. (M-20)

So ... for example our [place name] brochure this year is including fishing access points ... a map that tactually shows landmarks where you can fish ... we're trying to really think of how to make our information ... more consistent ... with the kind of information that anglers really want and with the kind of information that distribution networks are going to feel more comfortable with helping us share. (M-21)

Activities/Topics Suggested by Consortium Members for Future Coordination

During our interviews we asked people where they thought the best opportunities for greater coordination lay. A number of interesting suggestions were made for the group to consider. Several respondents thought the Consortium would benefit from increased sharing of data on contaminant levels in fish samples, perhaps even building a single database. Doing so would be:

very useful because that would enable us to see what the other states have and ... how they base their advisories, what kind of data analysis they actually do, what kind of data review or what kind of health risk assessments they do. (M-22)

A number of respondents also mentioned looking at contaminants in addition to PCBs, mercury, and chlordane and discussing if new advisory protocols were needed.

We are all partners, so if there are emergent contaminants we can work together and try to find a common advisory ... like what we had for PCBs and mercury. (A-14)

Some respondents suggested the Consortium focus on identifying at-risk groups across states.

I've become an advocate that the fish advisories should be primarily targeting the most at risk folks. And so that's the direction I feel we need to go for certainly in [our state] that I would like to work toward.... And I'd like to see that ... advocated by the Consortium. (M-23)

I see ... a lot of different ethnic groups ... Asians and others and they just seem to be using the streams and keeping everything they catch and probably eating everything they catch. And nobody that I'm aware of in our state government ... that's not on their radar screens and it may not be an issue. It may, but I don't think we know. So I think maybe the multi-states approach could come up with some way of looking at ... stuff that's in the census data. Tease out where you have clusters of people with certain ethnic backgrounds who are prone to have a lot more fish in their diet and ... go from there. (M-24)

Several respondents suggested discussing portion size as a topic where it would be good to have consistency.

Uniform meal size protocol that would be a step in the right direction. (M-25)

Several respondents mentioned an idea that was discussed briefly at the Consortium meeting in November. The general idea was to have the group of states agree to several key messages and then put those messages into a brochure, which was sponsored / supported by the Consortium. Respondents referred to this idea in slightly different ways during the interviews, but it was one that seemed of interest to people from a variety of states.

A Great Lakes wide communication plan that focuses on ... key messages for certain target audiences. (M-26)

It would be really nice if the consortium could come up with those simple messages and if they were the same consistent ... words. So that everyone could use... the same kind of things about benefits and just the general messages and then we could actually market that in a more ... successful way because ... you'd be hearing the same thing over and over in different ways and across this whole geographic area. (A-15)

A general brochure that everybody has the same sort of messages inside ... Here are the benefits, here are the general risks, here's where you go in your state for your specific water body information, here's where you go to the FDA for their information ... just, those sort of consistent messages about "choose wisely" or whatever ... I guess what I would suggest is coming up with an icon ... or an image that becomes recognized as the consortium and that could be on a brochure along with the state's ... department's logo (M-27)

But I really liked the idea that we had during the consortium of trying to come up with a set of materials that were published by all the states simultaneously. And so it would be the same exact material being distributed in all the Great Lakes states. I really thought that was a great idea and a way for those of us states that don't really have as much of a budget for that type of thing, it would actually reduce some of the financial burden in the sense

that if we all work together to design the materials, then the cost burden for that isn't on one state alone ... it's sort of spread out and it gets done in the context of this consortium which we're all attending anyway and then our state only has to do the costs of printing the material and distributing it. (A-16)

During some of the interviews we posed the following question to some interviewees: “Should/Could the Consortium come up with an agreed upon definition of women of childbearing age?” The general consensus of the people asked was to have the Consortium work on this task.

I don't know if we would agree on what we would come up with but I think it would be really nice to have consortium approved language because then should we issue any documents that are by the Great Lakes Consortium, at least it's all language that we are all ... standing by. I think then it would also help us within our state to maybe move towards using, adopting that language. (M-28)

I would encourage you to look at the literature on this because I think a lot has been done. And maybe a lit review on this topic would be worthwhile and enough to come out with a recommendation. ... I also know that many, many different organizations have done a lot of research on this. There is a lot, there's a lot to mine to decide on whatever term ... we're going to use. I think that they all have benefits and drawbacks and I think that the best thing that we can do is pick one and ... familiarize people with it. So yeah I do think ... that's definitely a good focus area for the consortium. (M-29)

FACTORS INFLUENCING CONSISTENCY AND COORDINATION BETWEEN ADVISORY PROGRAMS

Previous research shows that a variety of factors can influence the ability of groups to collaborate, reach common decisions, and cooperate on shared actions. We used this past research as a basis for identifying the factors that influenced the ability of the Great Lakes states to achieve greater consistency and coordination between their advisory programs. We based our conclusions about the importance of these factors on either: (a) interview respondents' testimony to their importance; or (b) interview respondents' testimony to the presence of factors that *theory* suggests are important. These factors include:

- Relationships and dialogue among Consortium members, which serves as the foundation for shared decision-making about the advisories;
- The level of agreement among Consortium members about what they would like to accomplish through the advisories;
- Whether Consortium members are able to achieve the necessary legitimization of their preferred approaches to their advisory programs given the political pressures and approval processes in their states.
- The availability of resources, such as funding, staff, and information, to enable efforts to increase consistency in the advisories.

Our interviews of members of the Consortium provided evidence of how each of these factors influenced their work. We discuss each of these factors in turn incorporating excerpts from the interviews to illustrate their effects.

Relationships and Dialogue

Past research has demonstrated the critical roles that interpersonal relationships and forums for dialogue play in collaborative work. The work of the Consortium is no exception. Several members of the Consortium noted the importance of the quality of their relationships to their work.

They have been successful in maintaining a good working relationship. (A-17)

I think that the ability to ... maintain a good working relationship even when there's disagreement ... about some issues, really to work ... together and ... keep listening to each other. I think that is the really important part of it. (M-30)

The effort to provide opportunities for people to meet in person periodically is one of the reasons relationships have remained strong.

I think getting everyone together physically has been very helpful. People are more willing to work together if they know each other more, and I think they're more open to dialogue when they have face-to-face meetings vs. teleconference calls. (A-18)

Meetings also directly contributed to tangible gains in increasing the consistency of the advisories.

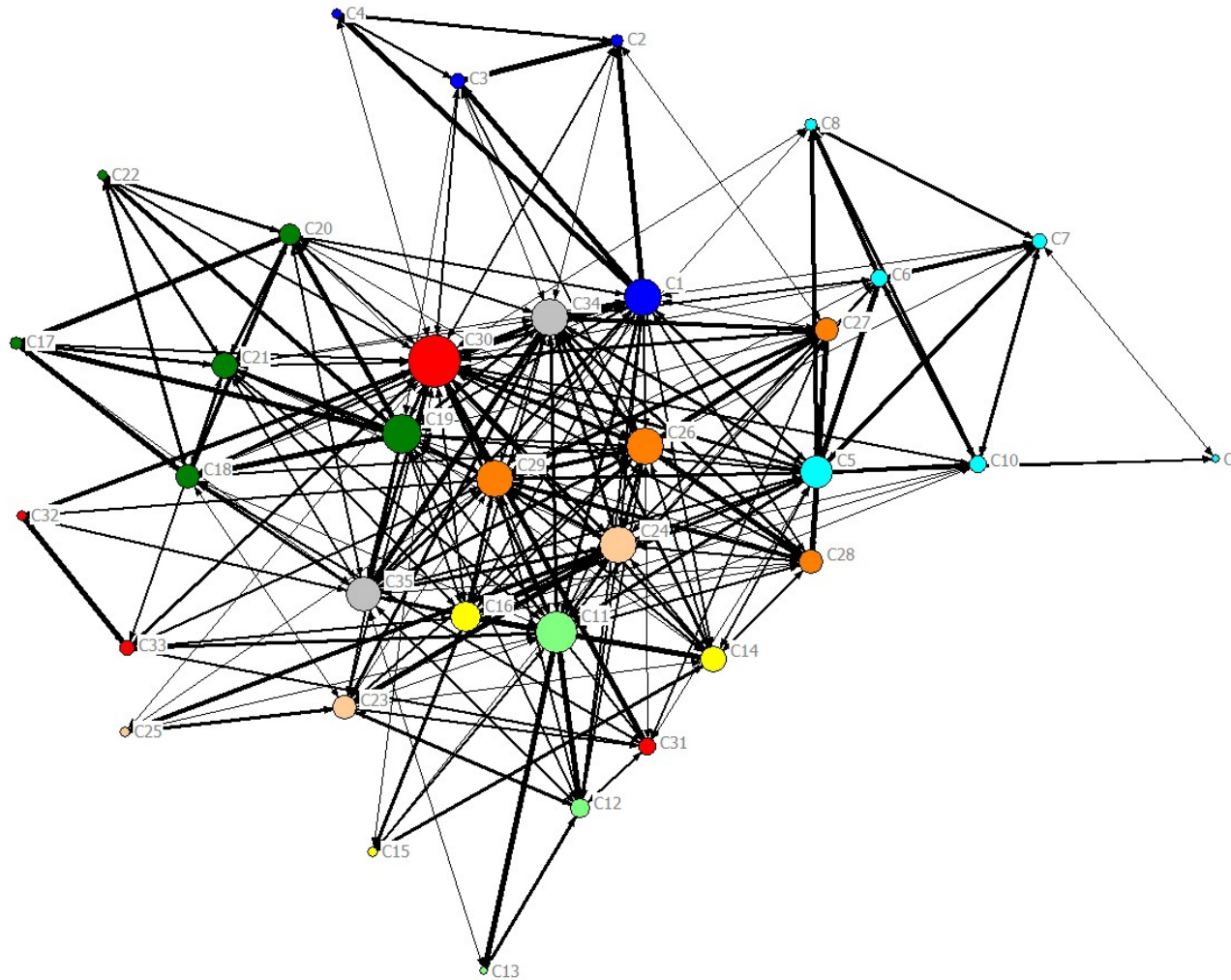
When I first ... became DNR's representative ... they were working on the mercury protocol ... for the Great Lakes states. And we met in Madison as I recall ... to ... iron all that out and get some consistency with respect to the mercury interpretation and advice. And that seemed to be a fairly ... long, drawn out process. But it seems like it was worth the effort because ... I think everybody for the most part is in agreement with the mercury advice at this point in time in the Great Lakes states. (A-19)

Although relationships between Consortium members were noted as an asset, not all members of the Consortium worked with their counterparts in other states.

Once in a while I may have a communication with maybe somebody from Wisconsin or Michigan, and that would be about it. But ... it's not on a regular basis. (A-20)

These differences were reflected in our social network analysis of Consortium members (Figure 1). Several insights emerge from this map. For each state, some individuals are more central within the Consortium than others, indicating that some individuals are more likely to interact with individuals in other states. Most states have at least one individual who plays a central role in the Consortium, although in a few states, none of the individuals have a particularly central role in the Consortium.

Figure 1. Social network map of Consortium members. Circles represent individuals. Colors represent affiliation with state or EPA (Dark Blue – NY. Light Blue – PA. Light Green – OH. Dark Green – MI. Yellow – IN. Light Orange – IL. Dark Orange – WI. Red – MN. Gray – EPA). A line connecting two circles indicates a linkage between the actors based on the frequency of interactions between them in their work on advisories. Size of symbols represent degree of connectedness with other members of the Consortium.



These differences in how frequently Consortium members interact with their counterparts in other states are not necessarily a problem; a coordination process in which all members of the Consortium were actively and equally engaged with other states would likely be cumbersome. However, some members of the Consortium who had not worked much with other states in the past found it very helpful to take part in the meeting of the Consortium that took place in November 2010.

That discussion I thought was helpful and healthy. And having that kind of a mechanism for more than ... the chairs to get together. And again that's not being critical of [our chair]. [Our chair] represents us well. But for more than just [our chair] ... to be able to come to a multistate meeting like that I think was very helpful. I mean just very thought provoking. (A-21)

Although interactions between the states were generally characterized in positive terms, several respondents pointed out ways in which dialogue between the states could be improved.

And I think that ... consistency in sharing data, consistency in telling each other what we're doing ... sharing ideas about ... new contaminants in fish... Just keeping up the communication could be much better. And hopefully that's improving. (A-22)

Interviewer: *How satisfied are you with the opportunities that you collectively have to interact with the different players in fish advisory programs?*

Respondent: *... It probably could be improved.... We used to as part of the Consortium ... we ... had an education work group. So the public health educators that were interested in the fish advisories got together to really work on ... different brochures and how to get the message out... And then ... the fisheries people got together to talk about fish sampling. But the outreach people really don't know anything about collecting fish samples ... so they don't necessarily need to be on those calls... More getting [together] the people who are actually ... boots on the ground. (A-23)*

Getting back to talking with the other Great Lakes states... we really haven't done enough of that... We've participated in the Great Lakes Fish Advisory Task Force meetings either at my level or at a higher level, and certainly the Health Department has been actively involved in that effort. But to discuss and assess the contaminants both in the fish and sharing the results, that has not been something that has been done adequately. (M-31)

Agreement

Relationships and dialogue can provide the foundation for states to reach agreement on what they would like to accomplish through their advisory programs, but that agreement does not necessarily follow. Consistency in advisory programs is easier to achieve if states agree on goals. During our interviews, members of the Consortium spoke about similarities and differences in states' goals for advisory programs, several of which were also evident from our review of available documents. Nevertheless, most respondents believed that the Great Lakes

states largely had very similar overall goals for their programs, a belief also reflected in our other analyses.

We're probably not different than any of the other states... The goal is to ... protect public health ... to reduce people's exposures to environmental contaminants. But more specifically with respect to fish to help people make informed choices about the fish that they eat ... to make them aware of the contaminants that are in fish that they might consume and ways they can reduce their exposure to those contaminants. I think another goal ... is to encourage people to eat fish. To fish and eat fish. (M-32)

You know it's getting a balanced message out so that people are eating ... the appropriate amount of fish, and are eating fish that are low in contaminants. I would think all of the states ... would have that basic goal (A-24)

I think all states are very concerned to reach their angler populations and in particular to reach vulnerable people within the angler population. And I think the area of limited English speakers is a concern that all states have. I think pretty much all states probably have that concern. (A-25)

When differences were perceived in goals for advisory programs, they did not tend to follow state lines. Instead, differences in goals were more often mentioned in relation to differences between state fish and wildlife agencies and state health agencies within particular states.

Oftentimes ... the tourism industry is ... impacted by fish consumption. So if the advisories are perceived by the [state fish and wildlife agency] as a deterrent from consuming fish then you know they will have an influence over how the advice is ... written... You have inconsistencies because perhaps ... other state agencies don't want you to deter people from consuming fish. (A-26)

One fish and wildlife agency representative even spoke of feeling marginalized in discussions about fish advisories.

What factors have been most important in preventing states from achieving greater coordination and consistency ... up to this point?... If this question refers to health agencies and conservation agencies, then a more open, respectful dialogue needs to be established. (M-33)

For the most part, however, members of the Consortium believed that health departments and fish and wildlife agencies were largely in agreement about advisory programs and major differences between them was a thing of the past.

Well there's always been a certain amount of tension between public health concerns, which were mainly, originally in our program, and concerns about adverse impacts ... on promoting the sport fishery in the state, which was primarily [the state fish and wildlife agency's] thrust... I would suggest that there's probably still a certain amount of that kind of tension, but I think within the last couple of years ... we've got a program that

everybody's comfortable with ... We all have the public health concerns foremost in all of the things that we do. (M-34)

I'd say that the amount of disagreements ... between the agencies has really been pretty minimal over the years... If you want to go back ... many years ago ... when the mercury first became an issue back in the 70s, there was I think a lot of resistance from the [state fish and wildlife agency] to be talking about tainted fish. You know they didn't want to talk about it back in those days, but I think obviously things have changed much from that time. (A-27)

I can't even remember a major disagreement. Early on in the program the [state fish and wildlife agency] grumbled a little bit because they thought it was hurting fishing license sales. But that's long gone. They understand that this is a program that has to be and they're happy to do their part. (A-28)

Similar goals for advisory programs can facilitate the process of increasing consistency and coordination among the programs. However, this process still requires effort. The willingness of people to make this effort depends in part on how important they believe it is to increase consistency. Members of the Consortium had varied opinions on this topic. To many, increasing consistency was very important, and they believed most others in the Consortium agreed with them.

Most people that ... do a lot of work on fish advisories recognize that consistency is best for ... the public to understand and think that there's some basis to our advice... I think that that's definitely the way that people want to go. (A-29)

It became very obvious many years ago that when there is a perceived difference in advisory information ... on the surface it seems like we're issuing different information. And in the public's eye or even some legislators' eyes, that can give the appearance of conflict and loss of credibility. And so having agreed upon common information lends to our credibility. It helps remove confusion on the part of the fisher and fish consumer. And it just, it just is better for the program. (M-35)

I think consistency is always good. The more we can communicate all the same way and develop a glossary of terms that people can say "Oh yes, that's familiar. I know what that means." I think that that's a great objective. (M-36)

Not everyone agreed, however. Some Consortium members did not think it was worth putting energy into increasing consistency and coordination because differences between the advisory programs were minimal.

I don't think they're big enough to make a big deal out of. (A-30)

One respondent argued that not only were the benefits of increased consistency negligible, but they came at the cost of abandoning an approach her state believed was most appropriate.

We're not very willing to change that just so that we would be consistent with another state. Because ... we view our mission as protecting public health. And if another state has a different interpretation of that... we've already chosen not to dilute our advice based on someone else... I'm not sure what the benefit would be except if somebody moves from [state to state] they will be familiar with the same advice... It's not my job to protect people in [other states] or to decide ... what information should be given to them... I guess you feel more comfortable if you're doing something everybody around you is doing. It's easier to justify. It's icing on the cake, but the bottom line for us is that we feel like we're doing what we need to do to protect people in [our state]. (A-31)

Differences in the perceived importance of increased consistency may not be widely recognized among Consortium members. When asked about this topic, one respondent maintained that everyone in the Consortium thought it was important to increase consistency.

There's no kind of negativity in it. And no "I don't see a need," or "I'm not interested in hearing what anybody else is doing, I'm just going to do my own thing" kind of stuff. (A-32)

The other factor that tempered beliefs about the importance of increased consistency was the perceived feasibility of it.

You know there is a limit to the amount of consistency that there's ever going to be. I think we're a heterogeneous country. Even Great Lakes states have different priorities and needs and so I think it's good for us to just understand when there are differences, what they are, and why they are and just go from there and use what we can with each other. You know a lot of these things there's no right way and wrong way to do them. (A-33)

If a goal would be to try to strive for a thoroughly consistent advisory approach, I don't know that that's a worthwhile goal. I think it's worthwhile to be consistent in certain elements of the advisories – to ... make sure everyone is considering sensitive subpopulations. To ... consider them in exactly the same way, I don't think it is necessary. They're going to be differences... Different state agencies in other states have their own institutional ways of doing things and influences on how things are done... We can't overcome them real easily. (M-37)

As these excerpts suggest, one influence on the feasibility of consistency is the contextual differences between the states. These contextual differences are both ecological and social.

Well, certainly there are differences. I mean some states have different contaminants that we don't see as much in [our state]. It's different bodies of water, different species of fish and so when you have that or if you have Hmong population, for example they eat fish that most of our other anglers maybe wouldn't eat, and so you have to have an advisory ... for that. I mean there are differences in advisories based on what's going on in your state and what the contaminants are. You may have a place that has a chemical that we

don't see in [our state] and so you need an advisory for that. So ... there's no way to get around that (A-34)

Not only are there differences in the nature of the problems each state is trying to address, but there are differences in the receptivity of target audiences to health advisory information and in the types of strategies that will be effective at reaching these audiences.

I think in some ways the states are really different. The populations are really different... I would talk to the people in Minnesota and they would put out a survey and they would get like ... a 90% response or something... We couldn't even get 40. I would say "How do you do that? How do you get 90% of your people to complete your surveys?" And she said "Because we're Minnesotans and that's what we do." ... So I guess the question is ... how different are the cultures or the populations in each state? ... Or how much would it have to be customized to be relevant for each state? (M-38)

We as states ... grapple with ... how to target a group and how to be really effective in promoting your information to that group. And I think that's one of the things that will be difficult because different states have different activity levels with recreation... So you're talking about a state for instance like Minnesota that has 10,000 lakes and big promotion as a coastal state... [Our state], we do fishing here, but I think the emphasis and the motivation is not as great as it would be in another state that's very, very sports conscious ... And so how we could be coordinated ... in that matter I think will be a big challenge. (M-39)

The Influences of Social Networks

One particular facet of context that may influence the Consortium's ability to achieve greater consistency and coordination is the characteristics of social networks contributing to the advisories in each state. These networks provide the social foundation for advisory work, and the interests represented in them will shape advisory program goals. Therefore, differences in network composition may make it harder to reach agreement on advisory programs.

We asked Consortium members to identify all of the individuals and organizations they interacted with during the course of their work on fish consumption advisories and used this information to determine the compositions of the social networks that contributed to advisories in each state. These data reflect the different types of actors that may influence the advisories, but do not capture the relative importance of these actors in the actual formulation of advisories. Both the size and the composition of these networks varied markedly from state to state (Table 10).

Wisconsin (70 network members) and New York (54) had particularly large networks contributing to advisories. Indiana (18), Illinois (25), and Ohio (28) had the smallest networks. Illinois drew over one-quarter of its network members from the state fish and wildlife agency, whereas all but one of the other states had fewer than 12% of its network members from the state fish and wildlife agency. Ohio had the lowest percentage of its network from the state health department, while in New York one in three network members came from the health department.

Table 10. Size and composition of social networks contributing to fish consumption advisories in each of the Great Lakes states.

% of Network Members by Organization Types										
State	Number in Network	State Fish and Wildlife Agency	State Health Department	State EPA	State Agric. Agency	Other States	Federal Agencies	Other Gov't.	Universities or Extension	Other
NY	54	11	33	0	0	20	6	7	11	11
PA	46	9	13	17	4	28	11	0	9	9
OH	28	7	7	18	0	50	7	0	0	11
IN	18	6	11	11	0	39	17	0	11	6
MI	46	11	17	9	2	2	11	26	11	11
IL	25	28	12	20	0	28	12	0	0	0
WI	70	17	16	0	0	19	11	4	14	19
MN	44	5	23	11	2	27	9	14	2	7

Consortium members in Michigan were by far the least likely to interact with individuals from other states in their work. Minnesota, Illinois, and Ohio had relatively little involvement with individuals from academia. The percentage of network members from “other government” (with members often coming from local government and local health departments) was highest in Michigan and Minnesota. Half of the states, however, drew no network members from “other government.”

Conceivably, any of these network types could formulate advisories effectively. However, they provide different social contexts for formulating and distributing advisories, and the involvement of different types of organizations varies from state to state. In addition, the involvement of individuals from other states (particularly, but not exclusively, other Great Lakes states) also varies. Either of these differences could make it more difficult for achieving consistency among the states.

A specific concern related to these social networks was the relationship between different states and the EPA. One respondent argued that EPA’s administrative structure tended to leave New York out of the loop in comparison to the other Great Lakes states.

There’s two [EPA] regions involved. Region 2 for New York and then Region 5 for everybody else. And as a consequence and the Great Lakes National Program Office is in Region 5, so there is a strong tie between the states and EPA there. And I just get the feeling that New York is the poor boy down the block that doesn’t get the attention from GLNPO that it should get. You know it’s a feeling, it’s nothing that I can quantify but you know it’s there. It’s improved in the last few years somewhat and I’m hoping that GLRI will really help... But it’s that old feeling that ... New York has big bucks, big pockets. Let them handle the lower lakes and the other states will work with EPA and handle the upper. (M-40)

Legitimization

Regardless of how members of the Consortium would like to run their state advisory programs, they may be constrained in the activities they can undertake by either state laws and regulations, which place stipulations on how programs are run, or political pressures. The ability of Consortium members to achieve legitimacy for the types of activities they would like to carry out may influence their ability to achieve greater consistency with other states.

I think ... many states may be constrained by either political or administrative differences in the way they do things that make us unable to be just totally cohesive as a group from time to time on certain issues. (M-41)

Some of the states did not consider state laws and regulations a major constraint on their activities because their programs were only advisory and not regulatory.

The fish advisory program ... is not a regulatory program. It's really a program that exists so that we can give advice to individual people really about their health and nutrition... It's advice. And it's nothing more than that. (A-35)

The advisory nature of their programs gives some Consortium members' flexibility to carry out their work as they see fit.

I would say we have infinite flexibility. (A-36)

Some, however, spoke of state laws and regulations governing the manner in which advisory programs were implemented, which placed constraints on how programs were run.

And New York has always had a separate statute... They just derived their numbers in a different manner... They had legislation that they have a generic advisory that ... "You shouldn't eat sport fish more than ... once a week," or something like that. So that's ... the base threshold... Then they would look at: "Well ... do we need something more restrictive than that?" ... They had a separate law that established all that. (A-37)

I think bureaucracy is another big thing... I'm really not sure what the answer to that is because ... bureaucracy is a hard thing to overcome. And by that I mean the different states and the different regulations and how they have to work, how the different programs have to work within the confines of their own state regulations. (M-42)

We have certain restrictions... I mentioned the policy workgroup. We're really not supposed to release information unless they approve it... They are supposed to approve everything we release, and we do have certain legislative mandates to do the analysis and create the consumption advisories based on those analyses. (A-38)

One specific concern that was raised was related to whether states had the legal authority to offer advice on consumption of store-bought fish because offering that advice might be viewed as falling under the federal government's authority over interstate commerce.

It's been a hurdle because we don't necessarily have regulatory authority over things like commercial transactions. And even though issuing advice isn't telling people they are not legally allowed to consume something ... some of the member states were concerned that if we overstep our boundary in terms of advice on commercial fish, that we may be treading in interstate commercial transaction-type of waters and that our administrators would not want to go there... I think we would need some kind of assurance that it's not going to become a legal issue for us. (M-43)

While not as concrete as laws and regulations, political pressures are also a possible constraint on fish consumption advisories and, therefore, could make it more difficult to achieve consistency in advisories across states. Many respondents spoke of feeling little political pressure in their work.

We are not being pressured to do anything differently... There [is] no pressure ... to change or modify things. (A-39)

I haven't had any experience where somebody calls up a state senator and something comes down from the state senator... I haven't had anything like that... I've never heard of anything like that happening. I mean we seem to be able to do this based on the merits ... and available resources. (M-44)

Other individuals, however, indicated political pressures did indeed exist.

But that on occasion does become a stumbling block ... the perception that we're issuing advisories and therefore it could ... interfere with recreation and tourism. (A-40)

Environmental groups sometimes want us to be more conservative in our advice versus industry wanting us to be less conservative in our advice. So there's definitely pressure from environmental groups and criticism about the way we do things sometimes. (A-41)

What we'll get sometimes is when a body of water is particularly important to a particular community and all of a sudden we're issuing a fish advisory for that body of water... "Why didn't you tell us before you issued this advisory?" ... All of a sudden [the lake] has a fish advisory on it. People who live around it now start to see the lake differently. You know maybe they think it's dirty ... It's an image thing. (A-42)

One individual argued that state programs always had to cope with the fact that a change in governor or state agency director could almost overnight change the dynamic of the Consortium and lead to numerous problems maintaining consistency among the states.

Most frequently, however, it was the administrative processes of approvals that were mentioned as a barrier to consistency and coordination between the states.

It's tough with fish advisories because every state has their own administration... It's probably hard for each state to work together... We have our own roadblocks here... If we change one piece of our fish advisory, we have to get approval right through the Commissioner of Health. So I think that hinders us a little bit in working with other states... How do you overcome that? I don't know if it's possible... If you want [our state] to put their stamp of approval on it... I don't know how possible that's going to be. (M-45)

Resources

The final set of factors that can influence the capacity of states to increase the consistency and coordination of their advisory programs is the availability of resources, such as funding, staffing, and information. Numerous respondents pointed out that both funding and staff were limited and working to increase the consistency of advisories required both.

State resources are very limited so all these things take time (A-44)

I think to work on the Great Lakes Consortium ... it takes away from your normal job that you have... I think we're all kind of limited on time. If we had more staffing that would help the Great Lakes Consortium be more functional ... It's not dysfunctional but ... we'd be able to do more. (A-45)

In Michigan, the fish advisory program funding for the state health department was eliminated in 1998 and that caused a loss of staff and that loss of staff hurt the connection of the Michigan advisory program with the programs in the other Great Lakes states. Michigan has continued to issue annual fish advisories based on new fish contaminant data, but has had to restrict their efforts to core function activities.

Well, the Michigan program, there was a big gap in when they had any staff at all working on fish advisories and so the historical knowledge and connection to the Consortium I think was lost for a while (A-46)

Limited funding interferes with the ability of individuals to travel to meet with other members of the Consortium.

Travel ... the last few years has been very problematic. States aren't allowed to travel out of state so getting people together ... has been a challenge (A-47)

Funding can also influence the types of topics that get addressed in advisories. One individual argued that advisories on commercial fish were less likely because resources to support that work might not be available.

I don't know if the states that do not issue advice on commercial fish would have the resources to put towards trying to have advice for their state for commercial fish (M-46)

A Consortium member concluded that greater collaboration between the states was unlikely without funding to support it.

The states focus on getting state information out in the state... You can say we want to have a collective, but unless it specifically benefits the state or makes our workload less, I think it's just more work... That's a barrier for us to invest a lot of time in something that's greater than us without an adequate incentive. (M-47)

For that reason, collaboration between the states is influenced in part by the availability of grants to support the work. The GLRI funding currently available made such work more possible than at other times.

The Great Lakes Restoration Initiative funding really does enhance resources for the fish advisory in a very significant way. (A-48)

Well ... right now, with the GLRI grant, it's good. Prior to that we really had no specific funding for the Fish Advisory Program... We basically have no dedicated funding for the

advisory from the state. Now we have the GLRI grant, so that helps a lot... But then when GLRI is done ... I'm not sure what will happen (A-49)

Although a lack of funding and staff can constrain collaboration, it can also provide an incentive for collaboration.

I've become more aware of the other states programs and materials that they use... And they're freely offering them up as long as you recognize where they were developed. You can adapt for your use in your state, which has been very helpful. We don't have the resources to reinvent and redevelop all the materials. If something's working, it's nice that they're able to share it. (A-50)

I think this would be important for the Consortium ... to look at making the most out of the resources that are at hand. I think that we spent an awful lot of our staff hours working on this project or this program... I think ... we could help to streamline that and maybe look at the resources that are spent ... maybe more of a regional approach would ... be helpful. (M-48)

Funding and staff are one type of resource supporting advisories, and information is another. Developing consistency among advisories depends in part on having a common base of information as a foundation for the advisories. While members of the Consortium rely on many of the same sources of information when developing their advisories, disagreement still exists about some scientific findings relevant to formulating advisories.

Most of the meetings that I attended were mostly science based issues rather than two different states having intractable ... policy issues. (A-51)

Some scientists just don't agree with or ... they don't believe the studies that have been done. They don't believe the science is maybe strong enough yet... And they have a right to that opinion. But we just have a different point of view. (A-52)

Respondents frequently mentioned that key unanswered questions existed about the types of messages and communication strategies that were best for reaching people. They argued that filling this information gap would remove a barrier to greater consistency among the state programs.

I think that if there's evaluation and research that's done to support the use of different terms, then I think that people would be more likely to agree to a standard.... And so that, that's one thing that the GLRI is hopefully going to help us to have that research because you know prior to this we've all just ... done some focus groups, things like that. But there's never been a really good evaluation of how people interpret our messages. (A-53)

I'd be fine with changing that terminology... We've talked on many of our calls about how it's awkward. It means different things to different people. But I guess the way to do that would be we would need some kind of information from ... focus group work or

survey work to tell us what better terminology ... is. We could all update our materials through that. (M-49)

Another type of information shaping the advisory is the data on which the advisories are based. Respondents believed basing advisories on the same data helped to increase consistency. Many individuals stated that procedures for sharing data were generally strong.

We still share data. So I think data sharing is good (A-54)

However, some mentioned that not all states were aware of procedures for data sharing until recently.

[They] didn't really realize ... that states were all sharing the Great Lakes fish data, and then trying to come up with consistent advice... So there's work to be done as far as just making sure that the state programs know ... what's going on. (A-55)

Furthermore, some respondents discussed needs for conducting shared data collection or developing more consistent procedures for analysis.

So particularly for more of the newer contaminants ... we want to make sure that when each of those labs produces ... data, that we can compare those data. To do that those ... labs will hopefully be sharing their methods and then analyzing the same sample of fish ... and then they'll look at ... any differences that they get from that analysis. (A-56)

I think ... on interstate waters or inter-jurisdictional waters, more coordinated interstate planning or data collection. Maybe off of common samples... With the Consortium that's not really happening other than ... I'm openly feeding ... our data to ... Wisconsin. (M-50)

CONCLUSIONS AND RECOMMENDATIONS

As reflected by our analyses, the Consortium has many characteristics that mark it as a very successful collaborative partnership. The organizations that belong to the Consortium and some of the individuals that belong to the organizations have strong, long-standing relationships. It has served as a forum for constructive dialogue about fish consumption advisories with the periodic face-to-face meetings having proven to be particularly valuable. Considerable agreement about program advisory goals and approaches exist. The group has been able to secure grant support for its activities. There is a record of tangible accomplishments.

Based on our analysis of similarities and differences in existing advisory materials and our synthesis of Consortium members' insights, we identified additional opportunities for the states to increase the consistency and coordination of their advisory programs. These include:

- Developing protocols for contaminants in addition to PCBs, mercury, and chlordane;
- Increasing efforts at sharing data and cooperating on data collection;

- Expanding the target audiences addressed through outreach; and
- Increasing the consistency of messages communicated.

The Consortium must decide which of these opportunities it wishes to prioritize, but we outline the possibilities here.

Developing Protocols for Contaminants in Addition to PCBs, Mercury, and Chlordane

One of the areas in which the Consortium has considerable experience is in developing common protocols for contaminants. Determining whether common protocols are needed for additional contaminants could be worthwhile now or in the future.

Increasing Cooperation on Data Collection and Sharing

Sharing contaminant data and cooperating on data collection could allow Consortium members to obtain the data they need more cost-effectively and aid in developing protocols for new contaminants. Differences in data collection and analysis procedures, however, would undoubtedly lead to start-up costs initially.

Expanding Target Audiences

A number of states are beginning to reach out to new target audiences, but they are not all reaching out in the same direction. These audiences include youth, urban anglers, ethnic minorities, elderly anglers, and Native Americans. Regional differences necessitate that different states will target different audiences under some circumstances. However, it may be worth exploring whether certain at-risk audiences are common to many Great Lakes states and could benefit from a coordinated approach by fish consumption advisories in these states.

Increasing Consistency of Messages

We see the greatest number of opportunities for increased consistency in relation to advisory messages. A number of examples exist of states adopting different approaches in message topics, content, terminology, and tone, and many Consortium members thought that aiming for more consistent messages, and possibly a common Consortium brochure, was an important goal.

Topics

Considerable differences existed in the topics covered by advisory materials. Many of these differences are to be expected. Most states produce materials with varying degrees of depth to meet the needs of individuals with different levels of interest in advisories. These materials, therefore, necessarily include different types of content. For example, all states produce advisory materials that provide fish cleaning and cooking guidelines, but most states do not provide this information in ALL of their materials.

Other differences in topics may be worth addressing, however:

- In at least some of their materials, five states provided information about differences in exposure to contaminants depending on the types of fish consumed. (For example, larger, older fish have more contaminants.) Three states did not provide this type of information in any of the materials we analyzed. Research could determine whether this type of information is helpful to target audiences or likely to influence their behaviors and provide a basis for more consistent advisories.
- States differ in the emphasis they place on commercially-caught fish in their advisories. Several members of the Consortium believed it was unlikely that states could reach agreement on a common approach to commercially-caught fish, and so did not believe it was worth trying. However, more common ground for a consistent approach to commercially-caught fish may exist than these individuals believed. Seven out of eight states include consumption advice for commercially-caught fish in at least some of their materials already.

Content

A number of members of the Consortium expressed a strong interest in the development of clear, concise, simple advisory messages. The development of common messages would both encourage efficient use of resources by avoiding duplication of efforts among the states and help reinforce particular messages among target audiences, increasing advisory effectiveness. A variety of types of common messages could be developed, and the Consortium would need to prioritize among these. Possible topics of common messages include:

- Types of fish to consume
- Amount of fish to consume
- Preparation methods
- Risks of fish consumption
- Benefits of fish consumption

Terminology

The states could also work towards greater consistency in specific terms used in advisories. The most prominent example of different terminology discussed during the interviews was the difference in how the target audience of women of childbearing age was described. (Other examples are commercial/purchased fish and sport-caught/recreational fish.) This audience was variously described as women of childbearing age, women of childbearing years, women who are pregnant or may become pregnant in the future, women planning to become pregnant, and women under age 50. These terms may be interpreted differently by different women in both expected and unexpected ways. Research could help to determine whether a particular term is most likely to elicit the desired perception among women.

Tone

Two areas of difference were noted in message tone. Considerable differences existed in whether advisory materials adopted a cajoling (encouraging people to behave in a certain way)

vs. a directive (telling people to behave in a certain way) tone in their advice and whether they offered advice about what to do vs. advice about what not to do.

States were more likely to offer directive advice rather than cajoling advice, but considerable variability existed among individual materials, even within particular states. Considering all materials analyzed, 32% of materials included only directive language, 26% included mostly directive language, 28% included a mix of directive and cajoling language, and 15% included mostly or all cajoling language. Past research suggests that cajoling language is preferred to directive language by target audiences. Determining why states adopt different tones in different materials and whether a more consistent cajoling tone would be more effective may be worthwhile.

States were more likely to offer advice about what to do rather than what not to do, but again considerable variability existed. Considering all materials analyzed, 27% of materials included only advice about what to do, 33% included mostly advice about what to do, and 34% included a mixture of advice about what to do and what not to do. Research could help to determine which type of advice is more likely to elicit desired behaviors and determine whether greater consistency would be worthwhile.

One of the key barriers to more similar messages is a lack of information about how target populations are likely to respond to different types of messages and delivery mechanisms; this barrier is one that can be addressed. Some of this information can be found already in the literature and some is being generated through focus groups and surveys conducted as part of this project. Ultimately, these efforts could lead to shared Consortium messages and materials as members of the Consortium have suggested.

Other Differences

We consider other differences between the states' advisories lower priorities for attention. These include:

- Agreement on advisory goals and objectives is not complete, but is already quite high and unlikely to be improved substantially with additional attention.
- Although states differ in the timing of issuing their advisories, we think it would be difficult to increase coordination in this aspect because this timing is influenced by many factors and processes that are unique to each state.

Reducing Barriers

The Consortium has a strong foundation from which to work towards additional coordination and consistency among the states' advisory programs, but it will face obstacles, too. Steps that could be taken to try to address these obstacles include the following:

- Maintain communication among Consortium members, including face-to-face meetings whenever possible. Try to find opportunities for more Consortium members to participate in these opportunities.
- Consider the opportunities for increased consistency and coordination we have identified in this report, and prioritize those which members of the Consortium would like to address. Perspectives of Consortium members differ with regard to the importance of additional efforts to increase consistency, in general, and the importance of increasing consistency in particular areas.
- Once the Consortium has identified top priorities, determine which factors serve as barriers to increasing consistency in those areas. These may include disagreements among Consortium members about scientific findings, lack of information to support one approach over another, differences in regulations and procedures in each state, etc. The particular barriers to increasing consistency in each case will influence the steps that need to be taken to address those barriers.
- Because working to coordinate programs across states costs both time and money, concentrate on those areas that maximize benefits to Consortium members once work is complete. For example, Consortium members mentioned data sharing and development of common advisory materials as opportunities that would ultimately benefit states that were constrained by resources.

LITERATURE CITED

- Anderson, H. A., J. F. Amrhein, P. Shubat, and J. Hesse. 1993. Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory. Great Lakes Sport Fish Advisory Task Force.
- Connelly, N.A., and B.A. Knuth. 1998. Evaluating Risk Communication: Examining Target Audience Perceptions about Four Presentation Formats for Fish Consumption Health Advisory Information. *Risk Analysis* 18(5):649-659.
- McCann, P. J., H. A. Anderson, and Great Lakes Sport Fish Consortium. 2007. A Protocol for Mercury-based Fish Consumption Advice: An addendum to the 1993 "Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory." Great Lakes Sport Fish Advisory Task Force.

APPENDIX A

State Presentation Template

During the meeting, a representative of each state in the Consortium will make a presentation providing basic information about the state's fish consumption advisory program. The purposes of the presentations are to: (a) provide a foundation for later discussions of similarities and differences in program assumptions, objectives, and activities; and (b) begin to assess how much is known about the impacts of these programs. The presentations should each be BRIEF – **no more than 15-20 minutes**. Because we have a very full agenda, we will have to keep strictly to this time limit, and presenters should briefly address each of the listed topics rather than discussing them in depth.

Each presenter also should bring **25 copies of a written summary** of the information they will present to the meeting to distribute to other attendees.

Each presentation should contain the following sections:

(1) Fish Consumption Advisory Program Objectives

- List formal objectives for the health advisory program in your state – any program objectives you may have documented through reports, plans, memos, etc.
- List informal objectives – those which you believe key individuals involved with the program generally share, but which may not be articulated as part of formal objectives.

(2) Target Audiences

- List target audiences of activities currently conducted under your state's program.
- List additional target audiences that you believe are important to reach, but which might not yet be being reached

(3) Key Messages

- Describe the messages your program attempts to communicate to target audiences.

(4) Means of Communication

- Identify the various means your program uses to communicate key messages to target audiences.

(5) Logistical Considerations

- Describe the timing of the release of your advisory updates.
- Describe the timing of your receiving of new fish contaminant data.

(6) Collaborations

- Describe your current and past connections to the Consortium, including any shared data, use of Protocol, coordination of advice on shared waters or statewide advice, coordination of commercial fish consumption advice, etc.
- Describe any other *key* partnerships or shared undertakings related to your advisory program.

(7) Constraints

- To the degree that they are relevant and you are able to share this information, describe any constraints to how you approach your advisory work because of:
 - Your institutional context and political pressures.
 - The legal mandates for health advisory work in your state.
 - Funding availability, sources, and pressures.
 - Staff availability.

(8) Evaluation Activities

- Briefly describe any evaluation activities (both formal and informal) you may have conducted to try to assess the effects of your health advisory program. Include past surveys and any other evaluation activities.
- Describe metrics or measures on which you have relied in these evaluation activities whether they are quantitative (e.g., results of standardized surveys, behavior observations, etc.) or qualitative (e.g., anecdotal observations, unsolicited feedback, etc.).

(9) Future Plans

- Describe any activities you plan to conduct with GLRI funding, in addition to your work with the Consortium.
- Discuss any approaches or messages you would like to test and why.

APPENDIX B

Advisory Documents and Websites Analyzed

State/ID #	Document Description
IL1	Illinois fishing information
IL2	Fish Advisories in Illinois Website (http://www.idph.state.il.us/envhealth/factsheets/fishadv.htm)
IL3	An expectant mother's guide to eating Illinois fish
IL4	Illinois Fish Advisory (2011 PCB and Chlordane Fish Advisory)
IL5	Illinois Fish and Your Health Website (http://www.idph.state.il.us/envhealth/factsheets/fishpam.htm)
IN1	Fish for your health
IN2	Woman's Guide to Eating Indiana Fish
IN3	Fish Consumption Advisory
IN4	Fishing Regulations Guide
IN5	Safe Eating Guidelines for Selected Sport Fish
MI1	Eat Safe Fish from the Rouge River
MI2	Refrigerator magnet
MI3	Eat Safe Fish tattoo
MI4	Eat Safe Fish brochure
MI5	Eat Safe Fish in Detroit brochure
MI6	Saginaw Bay Fish brochure
MI7	Fishing for Words Crossword Puzzle
MI8	Michigan Fish Advisory
MI9	Statewide Mercury Advisory
MI10	Eat Safe Fish from Torch Lake brochure
MI11	Eat Safe Fish from Torch Lake poster
MI12	Eating fish from the Rouge River Sign
MI13	Eating fish from the Detroit River sign
MI14	Eating River Fish sign
MI15	Five steps to catch Saginaw River Walleye flyer
MI16	Guidelines for Eating Michigan Fish and Wild Game Website (http://michigan.gov/mdch/0,1607,7-132-54783_54784_54785---,00.html)
MI17	Manistique River sign
MI18	Manistique's Family Guide to Eating Fish
MI19	Guide to Eating Fish from Saginaw Bay Watershed
MI20	Trimming and Cooking Away the Fat sign
MI21	Fish Smart Eat Smart poster
MI22	Hooked on Fish cookbook
MI23	Video
MN1	Fish Consumption Advice Website (http://www.health.state.mn.us/divs/eh/fish/index.html)

Advisory Documents and Websites Analyzed (continued)

State/ID #	Document Description
MN2	Eat fish often?
MN3	Eat smaller fish magnet
MN4	A Family Guide to Eating Fish
MN5	2011 Fishing Regulations (http://files.dnr.state.mn.us/rlp/regulations/fishing/fishing2011.pdf#view=fit&pagemode=bookmarks)
MN6	LakeFinder (http://www.dnr.state.mn.us/lakefind/index.html)
NY1	Adirondack Region: Health Advice on Eating Fish You Catch
NY2	Freshwater Fishing Regulations Guide
NY3	Catskill Region: Health Advice on Eating Fish You Catch
NY4	New York City Area: Health Advice on Eating Fish You Catch
NY5	Health Advisories on Eating Sportfish - NYC area, Rockland, Westchester, Long Island
NY6	Hudson River: Health Advice on Eating Sportfish
NY7	Chemicals in Sportfish and Game Health Advisory (same info makes up text of website)
NY8	NYC Posted Sign
NY9	Hudson River Posted Sign
OH1	2010 Ohio Sport Fish Consumption Advisory
OH2	Fish for Your Health brochure
OH3	Fish is good for you brochure
OH4	Ohio Sport Fish Health Advisory Website (http://epa.ohio.gov/dsw/fishadvisory/index.aspx)
OH5	Fishing regulations guide
PA1	Commonwealth of Pennsylvania Public Health Advisory: 2010 Fish Consumption
PA2	PA DEP Fish Consumption Advisories Fact Sheet
PA4	PCB Information (http://www.fish.state.pa.us/qpcb2001.htm)
WI 1	What women of childbearing age should know about eating fish
WI 2	A guide to eating fish for older adults
WI 3	A health guide for eating fish in WI
WI4	Guide to Wisconsin Hook and Line Fishing Regulations 2010-2011
WI5	A Family Guide to Eating Fish
WI6	Junior Angler
WI7	Enjoy your catch (WI Fishing Report)
WI8	Just Fishing
WI9	Eating Safe Fish Website (http://www.dhs.wisconsin.gov/eh/fish/)
WI10	Fish Consumption Advisories Website (http://dnr.wi.gov/fish/consumption/)
WI11	Little Lake Butte de Morte to De Pere Dam Sign
WI12	De Pere Dam to Mouth of Fox River Sign
WI13	Green Bay Sign
WI14	Cedar Creek Sign
WI15	Sheboygan River Sign
WI16	South Branch Manitowoc River

APPENDIX C

Document Analysis Protocol

Purposes

This component of the research involves an analysis of fish consumption advisory materials that Great Lakes states distribute or make available to target audiences. The analysis will categorize messages, means of communication, and target audiences – identifying similarities and differences between the states.

Procedures

- Each state has provided Cornell with a set of written advisory materials and some states have also referred Cornell to websites where additional materials are available.
- Two researchers will complete the analysis. Each will analyze the advisory materials from 4 states. In deciding how to divide the states between them, they will consider: (a) the volume of materials from each state (so that each is analyzing approximately the same amount of material); (b) which states they are most likely to be working with during other phases of the project; and (c) ensuring that both are exposed to a range of materials.
- Each material from each state will be analyzed. For each material, we will develop a category system allowing us to characterize messages, means of communication, and target audiences. This category system will be emergent. The two researchers will independently review a purposefully selected sample of materials initially and develop a suggested list of categories. They will meet to resolve differences in their category systems and agree on a common system. They will each then independently code an additional purposefully selected sample of materials and review and resolve any differences in their coding. They will then independently code separate groups of the remaining materials. Additional analysis may require further modifications to the system.
- We expect the category systems to be relatively straightforward for means of communication (e.g., brochures, web sites, refrigerator magnets) and target audiences (e.g., general, anglers, women of child-bearing age, limited English populations). The category system for messages will be most complex because many different aspects of the messages could be characterized. During the November 2010 consortium meeting, a number of characteristics of messages were identified as potentially important and will be included in the analysis. These characteristics are:
 - Focus on purchased fish, sport-caught fish, or both.
 - Positive vs. negative messages (what to do vs. what not to do).
 - Directive/commanding vs. cajoling.
 - Use text and pictures vs. text only.
 - Messages framed in least restrictive terms (with more restrictive exceptions for particular audiences) vs. messages framed in most restrictive terms (with less restrictive exceptions for particular audiences).
 - Simple vs. complex messages.
 - Quantitative vs. qualitative messages.

- Information on emerging contaminants (or not).
- Comparative risk information (or not)—and types of comparisons (between fish, to other foods, to other types of health or mortality risks).
- The group to which risks are described – angler, fish eater, future generations, etc.
- To which Theory of Planned Behavior constructs messages relate (outcomes, norms, or constraints).
- Once the category systems are developed, we will characterize each material from each state for each category we have identified. For some categories, in addition to classifying the material, we anticipate it may be helpful to include excerpts from the materials in our results (e.g., messages reflecting a range of complexity).
- We will make a series of comparisons between states, types of materials, materials aimed at particular audiences, etc. based on our results.

APPENDIX D

Interview Protocol

Purpose of interview: To learn more about each state's fish consumption advisory program, and discuss opportunities for and barriers to greater coordination and consistency between states.

Method: Conduct telephone interviews with key individuals engaged in fish consumption advisory efforts in each of the states. These individuals will include representatives of state health departments, state fish and wildlife agencies, Sea Grants, and others. We anticipate five to ten individuals will need to be interviewed in each state. We will start with interviews of members of the Great Lakes fish consumption advisory consortium, and then expand to other individuals named most frequently as collaborators by consortium members or those from organizations we deem important to have represented.

We will set-up the interviews by telephone and email and send copies of the general questions and the informed consent script to interviewees in advance to increase their comfort with the interview.

We will conduct the interviews over the telephone using the questions below. Because the questions are open-ended, we will not necessarily cover the questions in the exact order listed nor will we necessarily read the questions verbatim. These questions describe the content we will cover during the interview. (Possible probing, follow-up questions are marked with a P, and will not be included in the list of questions we send to interviewees in advance.) It is possible that interviewee responses will lead us to follow up with additional questions not listed in the initial script.

The interview will be audiorecorded and transcribed after obtaining permission from the interviewee.

Interview Questions

Consent? Agree to be interviewed? Agree to have the interview recorded?

Questions? Are there any questions before we get started?

1. What is your role in the fish consumption health advisory program in your state?
2. What do you hope that your state's advisory program will accomplish? (What are the objectives of your state's advisory program?)
3. What messages do you try to communicate? What audiences do you prioritize in your work? What means of communication do you use? (P) For people we have not previously gotten materials from, or if it is not material we already have or have analyzed on-line: Could we obtain a copy of that material or could you direct us to the on-line link?
4. How frequently do you update your advisories? How does your state go about making decisions about changes to its advisory program? Who is involved? What roles do they play? On what sources of information do you rely? When do you receive that information?

5. In your work on advisories, how much do you work with other agencies or organizations in your state? In other states? How satisfactory are the opportunities for communication and dialogue between your agency and other agencies and organizations?
6. What influences or pressures do you face which constrain the approach you take to your state's advisory program?
 - a. (P) Institutional pressures with your agency or organization? Political pressure from other agencies? From elected officials? From stakeholder groups?
 - b. (P) What legal restrictions or constraints, if any, do you face on the approach you take in your health advisory work?
 - c. (P) How sufficient is your funding for your advisory work? What are the sources of that funding? What pressures, if any, do you face because of where your funding comes from?
 - d. (P) How sufficient is your staff (both in terms of number and areas of expertise) for carrying out health advisory work?
7. One of the goals of the consortium we are doing this research for is greater consistency and coordination between the Great Lakes states' advisory programs. Have you worked with other states or consulted other states' materials in your own work? If so, can you recall which states and the general type of consultation?
8. In what areas do you think the Great Lakes states have been most successful in coordinating aspects (or increasing consistency) of advisory work? (P) WHY or HOW has coordination/consistency has been increased?
 - a. (P) goals and objectives,
 - b. (P) decision-making processes,
 - c. (P) message content,
 - d. (P) timing,
 - e. (P) communication methods or channels/media.
9. What factors have been most important in contributing to the states' ability to achieve these successes? (P) What has allowed or supported greater coordination/consistency?
10. What are the greatest differences between the states' advisory programs that have caused problems or led to undesirable outcomes?
 - a. (P) goals and objectives,
 - b. (P) decision-making processes,
 - c. (P) message content,
 - d. (P) timing,
 - e. (P) communication methods or channels/media.
11. What factors have been most important in preventing the states from achieving greater coordination/consistency in these areas up to this point?
12. Where do you think there are the best opportunities for greater coordination in the future? What do you think it will take to achieve this?
13. (P) [Ask only if topics have not been discussed previously] From our research so far, we noticed some differences between states in: How did your state make its decision about x? Is this an area where consistency/coordination could be improved? What do you think it would take to do that?
 - a. Scope of advisory - Whether advice is provided for commercially-caught fish or only for sport-caught fish.
 - b. Whether there is discussion about the benefits of consuming fish or not

- c. Reference to the at-risk group of women who may become pregnant (e.g., women of child-bearing age, women aged 16-50)
14. (P) I am planning to speak with x, y, and z in your state. Are there other key individuals that you think I should interview? Get contact information.

APPENDIX E

Social Network Survey Questionnaire

Great Lakes Research Initiative Fish Consumption Health Advisory Consortium

Initial Survey on Collaboration and Information Sources
Fall 2010

One of the goals of the Consortium is to identify “opportunities for (and barriers to) greater coordination between state advisory programs.” One way to identify these opportunities and barriers is to document collaborative working relationships that exist between members of the Consortium (and others) and to explore whether and how these relationships change over time. In this questionnaire, we will ask you about the people with whom you work on fish health consumption advisories – including members of the Consortium and other people. Your participation in this survey is voluntary, but we strongly encourage you to respond. A high response rate is needed for the results to adequately characterize the working relationships we are documenting. The questionnaire should take about 20 minutes to complete. Although information about your interactions with others will be presented in our results, that information will be based on data collected both from you and from others. In any reports arising from this work, we will keep your name confidential and will not associate your individual responses with your name. Procedures for conducting this research have been approved by the University Committee on Human Subjects at Cornell University, which requires that all responses are kept anonymous.

1. How frequently have you interacted with each of these other members of the Consortium (and other individuals involved with related GLRI grants) in your work on fish consumption health advisories? (*Skip the question about yourself.*)

- 1=Never interacted
 2=Rarely interacted (no more than once a year)
 3=Sometimes interacted (several times a year)
 4=Frequently interacted (at least once a month)
 5=Very frequently interacted (at least once a week)

		Have you interacted with this individual...				
		Never?			Very frequently?	
a.	Tony Forti, NYS Department of Health	1	2	3	4	5
b.	Agnes Mukasa, NYS Department of Health	1	2	3	4	5
c.	Faith Schottenfeld, NYS Department of Health	1	2	3	4	5
d.	Wayne Richter, NYS Department of Environmental Conservation	1	2	3	4	5
e.	Tom Barron, PA Department of Environmental Protection	1	2	3	4	5
f.	Michael "Josh" Lookenbill, PA Department of Environmental Protection	1	2	3	4	5
g.	Kandiah "Siva" Sivarajah, PA Department of Health	1	2	3	4	5
h.	Dave Spotts, PA Fish & Boat Commission	1	2	3	4	5
i.	William "Bill" Chirdon, PA Department of Agriculture	1	2	3	4	5
j.	June Black, PA Department of Environmental Protection	1	2	3	4	5
k.	Mylynda Shaskus, OH Environmental Protection Agency	1	2	3	4	5
l.	Bob Frey, OH Department of Health	1	2	3	4	5
m.	Scott Hale, OH Department of Natural Resources	1	2	3	4	5
n.	LaNetta Alexander, IN Department of Health	1	2	3	4	5
o.	Wayne Faatz, IN Department of Natural Resources	1	2	3	4	5
p.	Jim Stahl, IN Department of Environmental Management	1	2	3	4	5
q.	Michelle Bruneau, MI Department of Community Health	1	2	3	4	5

(continued on next page)

(continued from previous page)

Have you interacted with this individual...

Never?

Very frequently?

r.	Linda Dykema, MI Department of Community Health	1	2	3	4	5
s.	Kory Groetsch, MI Department of Community Health	1	2	3	4	5
t.	Jennifer Gray, MI Department of Community Health	1	2	3	4	5
u.	Joe Bohr, MI Department of Environmental Quality	1	2	3	4	5
v.	Bonnie Taffe, MI Department of Community Health	1	2	3	4	5
w.	Donna Kashian, Wayne State University	1	2	3	4	5
x.	James Cherney, Wayne State University	1	2	3	4	5
y.	Matthew Seeger, Wayne State University	1	2	3	4	5
z.	Pradeep Sopory, Wayne State University	1	2	3	4	5
aa.	Ken Runkle, IL Department of Health	1	2	3	4	5
bb.	Tom Hornshaw, IL Environmental Protection Agency	1	2	3	4	5
cc.	Joe Ferencak, IL Department of Natural Resources	1	2	3	4	5
dd.	Henry Anderson, WI Department of Health Services	1	2	3	4	5
ee.	Linda Knobeloch, WI Department of Health Services	1	2	3	4	5
ff.	Pamela Imm, WI Department of Health Services	1	2	3	4	5
gg.	Candy Schrank, WI Department of Natural Resources	1	2	3	4	5
hh.	Pat McCann, MN Department of Health	1	2	3	4	5
ii.	Rita Messing, MN Department of Health	1	2	3	4	5
jj.	Mark Briggs, MN Department of Natural Resources	1	2	3	4	5
kk.	Bruce Monson, MN Pollution Control Agency	1	2	3	4	5
ll.	Jackie Fisher, EPA Great Lakes National Program Office	1	2	3	4	5
mm.	Beth Murphy, EPA Great Lakes National Program Office	1	2	3	4	5

2. We're also interested in organizations and people *outside* of the Consortium with whom you may interact in the course of your work on fish consumption health advisories. For each of the following categories, please list all of the organizations (and specific individuals, if you can identify them by name) with whom you interact **at least several times** a year in your work on fish consumption health advisories.

a. Other individuals working for your agency (Name of your agency: _____)

b. Other state agencies within your state. (*Please list agencies – and specific individuals if you can identify them.*)

c.

d. State agencies in other states. (*Please list agencies – and specific individuals if you can identify them.*)

- e. State legislatures, governor's offices, or other state offices not listed above. *(Please list offices – and specific individuals if you can identify them.)*

- f. Federal agencies. *(Please list agencies – and specific individuals if you can identify them.)*

- g. Nongovernmental organizations (e.g., Sea Grants). *(Please list organizations – and specific individuals if you can identify them.)*

h. Other stakeholder groups. *(Please list groups – and specific individuals if you can identify them.)*

i. Other organizations or individuals not listed above. *(Please list organizations – and specific individuals if you can identify them.)*

3. Consider the organizations and individuals listed above in questions 1 and 2a-h as well as other individuals with whom you may have contact. Please list the 5 contacts who have the greatest impact on your ability to carry out your fish advisory responsibilities successfully.

4. Opportunities for collaboration between state advisory programs can also be influenced by similarities and differences in the information sources on which individuals developing the advisories rely most heavily. Please indicate how often you have looked for information about fish consumption and health using each of the following strategies in the past 6 months. (*Check one number for each item.*)

1=Not at all 3=At least monthly
 2=At least once 4=At least weekly

	<u>Not at all</u>			<u>At least weekly</u>
a. Accessing journals over the internet.	1	2	3	4
b. Accessing journals through libraries.	1	2	3	4
c. General searches of the Internet.	1	2	3	4
d. Attending meetings with other professionals.	1	2	3	4
e. Using other electronic literature searchable databases.	1	2	3	4
f. Participating in listservs.	1	2	3	4
g. Reading books.	1	2	3	4
h. Reading government documents and unpublished reports.	1	2	3	4
i. Taking continuing education courses.	1	2	3	4
j. Attending conferences and symposia.	1	2	3	4
k. Newspapers and magazines.	1	2	3	4
l. Other	1	2	3	4

Please list: _____