

Workshop Highlights Summary

Workshop on Consumption Advisories for Mercury in Gulf Marine Fish

Gulf of Mexico Program

December 10 - 11, 2002
New Orleans, Louisiana



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The Gulf of Mexico Program (GMP) Project Team (Project Team) on Consumption Advisories for Mercury in Gulf Marine Fish met on December 10 - 11, 2002 in New Orleans, Louisiana. The workshop agenda and participants list are included in Attachments A and B, respectively. Highlights of the meeting are summarized below.

1. The Project Team on Consumption Advisories for Mercury in Gulf Marine Fish

Fred Kopfler, EPA Gulf of Mexico Program

The GMP Management Committee recommended that the Gulf of Mexico Program Office (GMPO) form a Project Team on Consumption Advisories for Mercury in Gulf Marine Fish. The purpose of this Project Team is to develop recommendations for consumption advisories, as needed, for mercury in marine fish from the Gulf of Mexico that are consistent in all five States bordering the Gulf. The Project Team is expected to evaluate all aspects of consumption advisories, identify areas of consistency and inconsistency, and develop consensus recommendations on appropriate ways to address inconsistencies. Furthermore, the Project Team is expected to develop a model consumption advisory based on the recommendations and propose a public outreach plan for appropriately communicating mercury risks in Gulf seafood to the public, including effective means for disseminating the advisories to the public. This work will serve to meet the GMP sub-objective 2(B)(2): "*Establish technical work group, composed of State and Federal agencies and in cooperation with nongovernment interests, to evaluate current Gulf State approaches to setting fish consumption advisories for methylmercury and to develop compatible fish consumption advisories for important commercial and recreational marine and estuarine species*". **The Project Team should strive to complete its work and present its final recommendations to the Management Committee within one year.**

The following agencies and organizations are represented on the Project Team. Additional experts may be invited to participate as needed to address key issues:

State Agencies

Gulf State Health Departments and additional agencies as appropriate to each State
Gulf States Marine Fisheries Commission

Federal Agencies

U.S. Environmental Protection Agency (Office of Water, Region 4, Region 6, and GMPO)
FDA (Office of Seafood)
Agency for Toxic Substances and Disease Registry
National Oceanic and Atmospheric Administration (National Marine Fisheries Service)
Gulf of Mexico Fishery Management Council

Nongovernment Organizations

Gulf Business Coalition
Coastal Conservation Association
Southeast Fisheries Association

GMP Citizens Advisory Committee representatives

The Workshop on Consumption Advisories for Mercury in Gulf Marine Fish (the workshop) had four goals:

- Evaluate all aspects of consumption advisories, identify areas of consistency and inconsistency
- Determine if a consistent advisory for king mackerel can be developed that can be also used as a template for other species
- Identify species that are pelagic and cross state lines that may be potential candidates for a Gulf-wide common advisory if high mercury levels are found in the future
- Establish a work plan for accomplishing any remaining Project Team activities

2. Ongoing Mercury Initiatives in the Gulf of Mexico Region

Fred Kopfler, EPA Gulf of Mexico Program

There are several ongoing activities having to do with mercury in the Gulf of Mexico being conducted by other groups. The workshop began with presentations on two of these activities so that the Project Team could understand how these activities were related to their goals. The first presentation was made by Ron Lukens on the Gulf States Marine Fisheries Commission's Resolution on Methylmercury, which was drafted with input from a team that included staff from the GMPO. The second presentation was made by Spencer Garrett on the Synoptic Survey of Total Mercury in Recreational Finfish in the Gulf of Mexico. The National Marine Fisheries Service (NMFS) is conducting this survey with financial support from the GMPO.

Gulf States Marine Fisheries Commission Resolution on Methylmercury

Ron Lukens, Gulf States Marine Fisheries Commission

Ron Lukens introduced the Resolution of the Gulf States Marine Fisheries Commission (GSMFC) Concerning the Investigation of Methylmercury in Fishes, signed by GSMFC Chairman Virginia Vail on November 1, 2002. This resolution states that the GSMFC will "*coordinate the development of a steering committee with the Gulf of Mexico Program and appropriate state and federal agencies*" and that "*the steering committee will provide recommendations on the need to develop a Gulf wide plan for the coordinated collection of data and public outreach needs concerning mercury*". The GSMFC is working on finalizing recommendations. Draft recommendations include the following activities:

- Conducting a Gulf-wide survey to collect fish tissue for mercury analysis from species commonly consumed by the public, from commercial sources and fish caught by recreational anglers
- Establishing consistent seafood consumption advisories and common advisory levels for mercury in fish
- Developing an education and outreach strategy to educate the general public about the risks associated with consumption of seafood that may be contaminated with mercury
- Conducting a fish consumption survey of recreational anglers
- Creating a centralized database on mercury in marine fish tissue
- Encouraging similar initiatives to address mercury in fishes for the Atlantic and Pacific coasts

NMFS Synoptic Survey of Total Mercury in Recreational Finfish in the Gulf of Mexico

Spencer Garrett, National Marine Fisheries Service, Southeast Fisheries Science Center, Mississippi Laboratories (Spencer Garrett spoke on behalf of Tony Lowery, who was unable to attend the workshop)

Subsistence, commercial, and marine recreational fishermen and their families may be at increased risk of exceeding the FDA methylmercury consumption guidelines, as they may be consuming seafood well in excess of 15 pounds per year, and they may be consuming non-commercially harvested seafood that exceeds the FDA's 1.0 ppm methylmercury monitoring and restrictions. Therefore, subsistence, commercial, and marine recreational fishermen and their families represent a new sub-population of the seafood consuming public that could likely require additional informational safeguards in order to protect them from excessive methylmercury ingestion via seafood.

The methylmercury levels in commonly available commercially harvested seafood species are fairly well documented. However, the methylmercury levels in seafood species not commonly available through commercial sources are less well known. Because the development of consumption advisories relative to subsistence, commercial, and marine recreational fishermen and their families should be based on sound science, data on the mercury levels in the seafood species this sub-population consumes will be collected. The NMFS National Seafood Inspection Laboratory and the GMP are conducting a synoptic survey analyzing 2,500 fish tissue samples in 2002-2003 to collect preliminary data on the mercury levels in selected popular marine recreational seafood finfish, and to provide data for later more extensive Gulf-wide mercury in seafood survey designs if needed.

The synoptic survey will be carried out in three parts:

1. **Estuarine Sampling and Modeling:** Selected estuarine finfish will be collected from estuaries with varying degrees of mercury contamination. Previously collected mercury data in oysters from these estuaries will be modeled against finfish mercury levels. If the modeling finds that the low oyster mercury levels can be used as a surrogate for finfish mercury levels, then finfish mercury levels in the 31 estuaries of the Gulf Coast could be modeled using NOAA Mussel Watch's previously collected oyster mercury data.
2. **Reef and Rig Sampling:** Selected reef finfish will be collected from oil and gas drilling rigs and non-oil and gas drilling rig reefs. The samples will be tested to determine if a statistical difference exists in the mercury level in the reef finfish caught near the drilling rigs versus those caught near the non-rig reefs. If no difference is observed, then a generic Gulf-wide modeling of the mercury levels in reef fish could be possible. Conversely, if the mercury levels in the reef finfish taken from the vicinity of the rigs are statistically higher than those taken at non-rig reefs, then additional surveys will be required.
3. **Migratory Species Sampling:** Selected highly migratory finfish species will be collected from off the Florida Gulf and Texas coasts. The samples will be tested to determine if a statistical difference exists between the fishes taken from these geographic regions of the Gulf. If no difference can be determined, then a generic Gulf-wide modeling of the mercury levels in these species could be possible. Conversely, if a difference is observed, then additional surveys would be required.

NMFS anticipates that the synoptic survey will, at a minimum, provide valuable data that will allow for an assessment of the scope of sampling required to adequately cover the marine recreational finfishes of the Gulf of Mexico. Such data is needed to support the development of consumption advisories for the general public, and especially for the subsistence, commercial, and marine recreational fishermen sub-population that is presently believed to be at the highest risk.

It should be understood that this NMFS Synoptic Survey deals, in a limited manner, with only one-half of the information needs that address the exposure component of a mercury risk assessment. The other necessary component of the exposure risk assessment is the need for consumption studies for the recreational fisheries and/or commercial fishers (who consume portions of their catch) relative to the species that may be identified as containing elevated mercury levels.

3. Consumption Advisory Process Used in EPA, FDA, and the Five Gulf States

Group Discussion

Jeff Bigler (EPA) and Philip Spiller (FDA) addressed workshop participants via speakerphone on consumption advisory processes used in the EPA and FDA. The group experienced difficulty in hearing these presentations due to poor sound quality of the calls. The EPA uses a risk-based approach to determining consumption advisories. The reader is referred to Section 5 of this workshop summary for more information about EPA's National Fish and Wildlife Contamination Program. The EPA's "Mercury Update: Impact of Fish Advisories" (June 2001) can be viewed at: <http://www.epa.gov/waterscience/fishadvice/mercupd.pdf>

The FDA's Consumer Advisory entitled "An Important Message for Pregnant Women and Women of Childbearing Age who May Become Pregnant about the Risks of Mercury in Fish" (March 2001) can be viewed at: <http://vm.cfsan.fda.gov/~dms/admehg.html>.

Consumption advisory processes were discussed for each state, and are summarized in Table 1. The lead and cooperating agencies and contacts responsible for issuing fish consumption advisories are summarized in Table 2. This activity laid the groundwork for the workshop discussion on developing a Gulf-wide king mackerel advisory (see Section 7 this workshop summary).

4. EPA's National Fish and Wildlife Contamination Program

Jeffrey Bigler, EPA Office of Science and Technology, National Fish and Wildlife Contamination Program

Jeff Bigler presented information on the EPA's National Fish and Wildlife Contamination Program via speakerphone, with a concurrent PowerPoint presentation at the workshop.

EPA's Fish Contamination Program

EPA's Fish Contamination Program provides technical assistance to state, federal and tribal agencies on matters related to health risks associated with exposure to chemical contaminants in fish and wildlife.

Program activities include:

- Publishing national guidance documents
- Maintaining national databases
- Conducting national conferences and workshops
- Providing grants for sampling and analysis
- Conducting special studies
- Issuing advisories

2001 National Listing of Fish and Wildlife Advisories

The 2001 National Listing of Fish and Wildlife Advisories (NLFWA) database lists 2,618 advisories in 48 states, the District of Columbia, and the US Territory of American Samoa. The number of waterbodies under advisory represents:

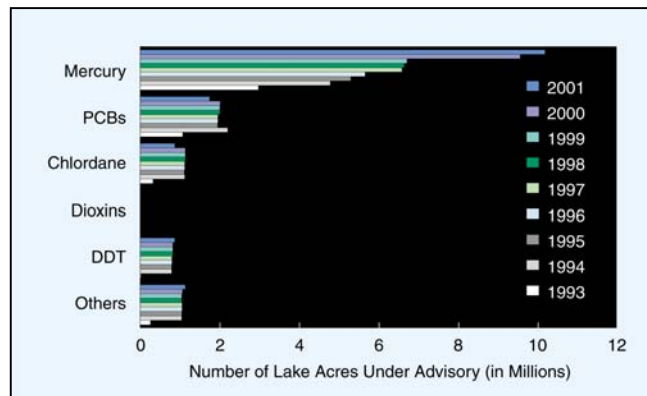
- 28% of the Nation's total lake acres or over 79,119 lakes
- 14% of the Nation's total river miles or over 485,205 river miles
- 71% of the Nation's contiguous coastal waters including 92% of the Atlantic coast and 100% of the Gulf coast
- 100% of the Great Lakes and their connecting waters

Bioaccumulative Pollutants

Although current advisories in the United States have been issued for 36 different pollutants, most advisories involve five primary bioaccumulative contaminants:

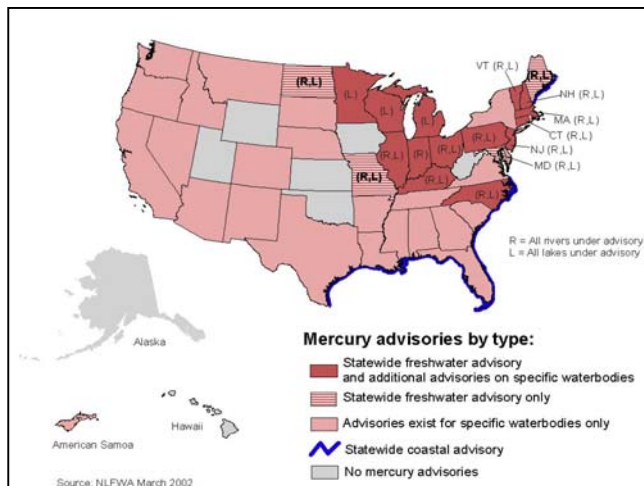
- Mercury = 1,933 advisories in 44 states active in 2001 (up 115% from 1993).
- PCBs = 764 advisories active in 2001 in 38 states (up 139% from 1993).
- Chlordane = 99 advisories active in 2001 (slight decrease from 2000).
- Dioxins = 75 advisories active in 2001 (slight decrease from 2000).
- DDT and metabolites = 48 advisories active in 2001 (up 4 from 2000).

The increase in advisories issued by the states generally reflects an increase in the number of assessments of contaminants in fish and wildlife tissues. The increasing trend in the number of lake acres under advisory for various pollutants, including mercury, is depicted in the following chart. This trend is likely due to increased monitoring, rather than increases in reference dose or mercury levels in fish.



Fish Advisories Due to Mercury

The following map depicts fish consumption advisories in effect in 2002 based on information provided to the EPA by the states. Because only selected waterbodies are monitored, this map may not reflect the geographic extent or magnitude of mercury contamination of fish tissue.



EPA Risk-Based Fish Consumption Limits – Fish Advisories

Limits are intended to protect human health by limiting exposure to chemical contaminants in fish tissue (freshwater/estuarine species), and to provide guidance on the maximum number of meals of fish from a defined area that can be eaten, over a specified time period, by defined groups of consumers. The Guidance for Assessing Chemical Contamination Data for Use in Fish Advisories (Third Edition) contains four volumes:

- Volume 1 - Fish Sampling and Analysis
- Volume 2 - Risk Assessment and Fish Consumption Limits
- Volume 3 - Overview of Risk Management
- Volume 4 - Risk Communication

Daily consumption limits for noncarcinogens are determined with the following equation:

$$CR_{lim} \text{ (kg/day)} = (RfD \times BW) / C_m$$

where,

- CR_{lim} = Maximum allowable daily fish consumption rate (kg/day)
- RfD = Reference dose (mg/kg-day)
- BW = Consumer body weight (kg)
- C_m = Measured concentration of chemical contaminant “m” in a given species of fish (mg/kg)

Meal consumption limits are determined with the following equation:

$$CR_{mm} \text{ (meals/month)} = CR_{lim} \times T_{ap} / MS$$

where,

- CR_{mm} = Maximum allowable fish consumption rate (meals/month)
- CR_{lim} = Maximum allowable daily fish consumption rate (kg/day)
- T_{ap} = Time averaging period (365.25 days/12 months = 30.44 days/month)
- MS = Meal size (kg fish/meal)

Recommended fish meals per month based on MeHg fish tissue levels are presented below. These recommendations assume and RfD of 0.1 g/kg/day, adult body weight of 70 kg, and a meal size of 8 ounces or 227 grams fish.

<u>MeHg (ppm in fish)</u>	<u>Meals per Month</u>
0.1	9.0
0.2	4.5
0.3	3.0
0.4	2.3
0.5	1.8
0.6	1.5
0.7	1.3
0.8	1.1
0.9	1.0

National freshwater fish advice developed in concert with Food and Drug Administration (FDA) was initially released in December 2000, and was revised March 2001. The advisory targets women who are pregnant, could become pregnant, nursing, and/or feeding a young child. The advisory recommends limiting consumption of freshwater fish caught by family and friends to one meal per week, where a meal size is defined as 6 ounces cooked (8 ounces uncooked) for an adult, and 2 ounces cooked (3 ounces uncooked) for a child. Consumers are advised to check with state or local health department for advice on waters where friends and family fish, and to follow FDA advice for ocean/commercial fish

EPA/ATSDR Fish Advisory Public Outreach

EPA/ATSDR fish advisory brochures, translated into seven languages, were distributed to over 200,000 health care professionals during 2001 - 2002. The EPA/ATSDR Fish Advisory Booth exhibited at five major medical conferences and several other national professional conferences and meetings.

5. Review of Neurological Development in Humans

Annette Ashizawa, Agency for Toxic Substances and Disease Registry, Division of Toxicology

One of the most sensitive subpopulations for the neurotoxic effects of methylmercury is fetuses and young children within whom the nervous system is still rapidly developing. Since one of the issues that must be agreed upon to harmonize the states' advisories for methylmercury in fish is the age at which "rapid development" of the nervous system is complete, Annette Ashizawa from the ASTDR agreed to present a review of the literature on the topic to provide a background for discussion.

Annette Ashizawa provided an overview of human developmental stages, and timelines of susceptibility of various organs to developmental (teratogenic) effects. Embryos are not usually susceptible to teratogens during the first two weeks of development. Major morphologic abnormalities occur with teratogen exposure during weeks three to seven. The central nervous system, heart, arms, legs, eyes, teeth, palate, external genitalia, and ears are all highly susceptible to teratogens during this period.

Physiological defects and minor morphologic abnormalities occur with teratogen exposure in the remainder of the term, and the fetus is generally less susceptible to teratogens during this period.

The neural tube, from which the brain and spinal cord develop, forms by the end of the 3rd week of development. Inhibition of neural development at this early stage can result in severe abnormalities of the brain and spinal cord. Mercury may circulate through the placenta from the maternal blood, and may cause toxicity to the neural tissues with pathological changes resulting within the brain. The nervous system, particularly the brain, is the target of mercury toxicity. The neurotoxic effect from mercury may appear years after cessation of exposure, due to compensatory mechanisms or a function not being exercised until later in life.

Most major nervous system development has occurred by age 3 ½, and 6 yrs is considered the end of the critically susceptible period of nervous system development. Fish consumption advisories currently consider this critical period (see Table 1). However, further developmental changes occur in the brains of adolescents. It is not known if this represents an additional period of susceptibility to mercury effects. Additional research is warranted to address the potential susceptibility of adolescent brain development to teratogens such as mercury. Fish consumption advisories may need to consider adolescents in addition to young children.

Annette Ashizawa will develop a reference list for the Project Team on developmental effects of mercury, and will distribute the list along with research papers on development in adolescents. This material will aid in a discussion of the theoretical vulnerability of adolescents to mercury in the Project Team's conference call, tentatively scheduled for early February 2003.

6. Developing Common Language for King Mackerel Advisories

Group Discussion

With the goal of harmonizing king mackerel consumption advisories among all of the Gulf states, workshop participants collectively reviewed each state's king mackerel consumption advisory to identify similarities and differences. The group agreed that developing a common advisory is an achievable goal, but that both the definitions and the values of the advisory parameters must be harmonized for any common Gulf-wide fish consumption advisory, including a king mackerel advisory. Existing king mackerel advisories for the five Gulf states are summarized in Table 3. Meal sizes and frequencies were standardized for the purpose of comparison among states, and are summarized in Table 4.

Consensus was reached on the following king mackerel advisory parameters:

- King mackerel lengths:
 - Fork length should be used in measuring the fish. Louisiana is comfortable with using fork rather than total length. Texas was not represented at the workshop, but the group suggested that Texas add fork length measurements to its advisory while still retaining the total length measurements that may include required regulatory wording.
 - "No consumption" advisory level: >39" fork length. Louisiana is comfortable with changing its advisory from >39' total length to >39" fork length.
 - "Restricted consumption" advisory level: 33" - 39" fork length
 - The group discussed the possibility of a two-level advisory system for king mackerel. Don Axelrad (FL DEP) will review Florida's data on mercury in king mackerel greater than 36" fork length vs. 36" fork length and under.
 - It is possible that the Gulf of Mexico Mercury Database could be used to obtain length and weight data for Alabama and Texas fish.

- Adult weight: 70kg
- Meal size (fish in general): 8oz/raw, 6oz cooked
- Definition of "susceptible women": women of childbearing age

Consensus was not reached on these king mackerel advisory parameters:

- Age of children: The group agreed that this age should be at least seven, but age definition will be revisited following review of research on development changes and potential susceptibility to mercury in adolescents.
- King mackerel lengths: The lowest advisory level (<33" fork length) will be revisited following review of new research on potential cardiological effects of mercury. Citations and abstracts for two recent studies (Guallar *et al.* 2002; Yoshizawa *et al.* 2002) are included in Attachment C of this workshop summary.
- Reference dose (RfD): Some states are currently reviewing their RfDs and action levels and advisory methodology. It was agreed that the group could not at this time define a common RfD, but would continue to revisit the issue.
- Meal frequency: The group recognized that because meal frequency is calculated from the RfD, a common definition of meal frequency will need to follow a determination of a common RfD.

There was some discussion on the value of conducting a consumption survey. One opinion was that this would not be necessary as long as the dose is defined. It may be more important to know the mercury levels that are present in fish. A consumption survey may help to identify at-risk populations. This knowledge could help guide outreach efforts.

7. Candidate Species for Consistent Advisories

Group Discussion

Other species, in addition to king mackerel, may be candidates for common Gulf-wide advisories, due to their life history characteristics and migratory patterns. Highly migratory pelagic species whose range includes all five states are initial candidates. This group may be refined by focusing specifically on species that are commonly consumed. Those species that are not highly migratory but for which similar mercury levels exist in multiple states may also be candidates. Cobia, wahoo, tuna, swordfish, and dolphin may be candidate species. The group agreed that sharing research and advisory development at the state level will help in identifying potential candidates for common advisories. It will also be important to identify mercury pathways for species posing health risks and ultimate sources of mercury contamination.

8. Public Outreach Plan Discussion

Group Discussion

Workshop participants brainstormed several important considerations regarding the development of a public outreach plan for a Gulf-wide king mackerel advisory. These considerations are summarized below:

- The outreach plan could be developed as a single Gulf-wide effort, or individually by each state. Alternatively, the Project Team could develop an outreach "toolkit" that would include content and ideas, and each state would be responsible for distribution of its own outreach material.

- The Gulf of Mexico Program Office is not in a position to issue a Gulf-wide king mackerel advisory, but could develop an "issue document" that could be referred to in individual state advisories.
- Look to other public outreach plans to see what has and has not been successful. Good examples may be obtained from state and national Sea Grant programs. Also, the Great Lakes public outreach plan for mercury in fish consumption advisories will provide valuable reference information. Henry Anderson is the lead on that outreach effort.
- Provide outreach material in the languages of the target population.
- Consider using various media in delivering outreach message: flyers, brochures, newspapers, radio, television, fishing licenses, magnets, etc.
- Consider using various organizations, such as chambers of commerce, visitors bureaus, and seafood industry associations, to aid in distribution of advisories.
- Consider how the recipients of the advisories will use the advisories.
- Consider who will be the most effective messengers, e.g., physicians, preachers.
- Consider developing different messages for different target groups (e.g. recreational fishermen vs. public health officials); however, "simpler is better" applies to all groups.

The group agreed that it is essential to define the target population of the advisory in order to define the target population and goals of the outreach program. The group defined the target population of the king mackerel advisory as "recreational king mackerel fishermen, their families, and friends". The public outreach discussion concluded with consensus that it is too early to identify an outreach plan for a Gulf-wide king mackerel advisory, but that it will be beneficial for the Project Team to begin to study other fish advisory outreach material.

9. Summary

Group discussion

Workshop participants agreed that significant progress was made in collectively understanding the consumption advisory processes used in each Gulf state. In addition, the group was able to harmonize several elements of the Gulf states' king mackerel consumption advisories, and identify those elements that still need to be harmonized. The group also identified several important questions to be addressed in developing an effective public outreach plan for a Gulf-wide king mackerel advisory.

The next activity of the Project Team will be to conduct a conference call, tentatively schedule for early February 2003. Workshop participants agreed to discuss the following items in the conference call:

- Review literature on developmental susceptibility of adolescents to define "age of children" for advisories
- Review literature on potential cardiovascular effects of mercury (see citations and abstracts of two recent studies in Attachment C of this workshops summary)
- Redefine lowest king mackerel advisory level (<33" fork length), considering recent literature on cardiovascular effects of mercury
- Review data from Florida on mercury in king mackerel greater than 36" fork length vs. 36" fork length and under, for consideration of two-level advisory
- Review state progress on RfD revisions and discuss if the Project Team can help facilitate the process
- Consider scheduling another Project Team workshop

Table 1. Gulf State approaches to establishing an advisory for mercury in fish

State	Mercury Toxicity Value (e.g. RfD)	Action Level (if used)	Fish Tissue Level	Meal Size (raw/cooked)	Meal Frequency	Assumptions for General Population (e.g. 150 lbs)	Sensitive Subpopulation ¹	Age of Children
Alabama	0.4 µg/kg/day	FDA 1 ppm	1 ppm	3 oz cooked	per month	70kg	includes all definitions ¹	15
Florida	0.4 µg/kg/day	<ul style="list-style-type: none"> • >1.5 ppm: no consumption • 0.5 - 1.5 ppm: 1 meal/mo for sensitive subpopulation or 1 meal/wk for general population • <0.5 ppm: no restrictions (may be revised to state "see EPA advisory" of 1/week sense subpopulation and general population) 		8 oz raw	per month/sensitive subpopulation, or per week/general population	70kg	<ul style="list-style-type: none"> • women of childbearing age • children under 10 	10
Louisiana		guidance level 0.5 ppm		8 oz cooked	per month	<ul style="list-style-type: none"> • 70 kg, 10 kg child • assumes the average LA resident consumes no more than 4 fish meals per month • assumes the body absorbs 100% of contamination present 	<ul style="list-style-type: none"> • women of childbearing age • pregnant women • breast feeding women • children under seven 	7
Mississippi	0.3 µg/kg/day	<ul style="list-style-type: none"> • 1.0 ppm • >1.5 ppm: no consumption 		8 oz raw	<ul style="list-style-type: none"> • @ 1ppm no more than 2 meals/ month/ general pop • 1 meal/2 months 	70 kg	<ul style="list-style-type: none"> • women of childbearing age • children under 7 	under 7
Texas	0.3 µg/kg/day	• 0.7 guidance level		TBD	TBD	TBD	TBD	TBD

¹Sensitive subpopulation may include the following definitions: *women of childbearing age, females of childbearing age, pregnant women, women who plan on becoming pregnant, pregnant/breast-feeding women, and women planning to be pregnant*

Table 2. Lead and cooperating Gulf state agencies and contacts responsible for issuing fish consumption advisories.

State	Responsible Agencies and Contacts	Cooperating Agencies and Contacts
AL	Dept. of Public Health: Neil Sass	AL Dept. of Environmental Management: Fred Leslie
FL	Dept. of Health: Joe Sekerke	Dept. of Environmental Protection: Don Axelrad Florida Fish and Wildlife Conservation Commission: Ted Lange (freshwater) and George Henderson (marine)
LA	Dept. of Health and Hospitals: Dianne Dugas Dept. of Environmental Quality: Chris Roberie Dept. of Wildlife and Fisheries: Randy Pausina	Pesticide advisories are issued by the Dept. of Agriculture and Forestry: Bobby Simoneaux
MS	Dept. of Health: Bruce Brackin Dept. of Environmental Quality: Henry Folmer	Dept. of Marine Resources: Tom van Devender Dept. of Wildlife, Fisheries, and Parks: Tom Holman Dept. of Agriculture: Jim Lipe
TX	TX Dept. of Health: Kirk Wiles	TX Council on Environmental Quality: Steve Twidwell Agency for Toxic Substances and Disease Registry: George Pettigrew

Table 3. Comparison of Gulf States' consumption advisories for king mackerel

State	No Consumption¹	Unlimited Consumption	Adults	Women of Childbearing Age³	Children
AL	Advice for everyone: Do not consume king mackerel over 39 inches	Not Addressed	Limit their consumption of the king mackerel less than 39 inches to one meal per month	Avoid eating king mackerel from these areas	Children less than 15 years old should avoid eating king mackerel from these areas
FL	No consumption - king mackerel > 39" fork length	The advisory does not restrict consumption of king mackerel under 33 inches fork length	Adults should limit consumption of king mackerel (33" - 39") to one eight-ounce meal per week	Should limit consumption to one eight-ounce meal per month.	Children less than 11 years old should consume no more than one 8-ounce meal per month
LA	Advice for all individuals: NO consumption of king mackerel greater than 39 inches in total length	Not Addressed	Limit consumption of all king mackerel 39 inches or less in total length to 4 meals per month. (Includes children 7years of age and older)	Should limit consumption of all king mackerel 39 inches or less in total length to 1 meal per month	Children less than 7 years of age should limit consumption of all king mackerel 39 inches or less in total length to 1 meal per month
MS	Do not eat king mackerel greater than 39".	Not Addressed ²	Should eat no more than one meal of 33"-39" king mackerel every two weeks.	Should eat no more than one meal of these fish every two months	Children under 7 should eat no more than one meal of these fish every two months
TX	The advisory recommends not eating king mackerel longer than 43 inches in total length.	For king mackerel less than 37 inches total length. Safe for unrestricted consumption.	Limit consumption of king mackerel measuring from 37 to 43 inches in total length to one eight- ounce serving per week	Limit consumption of king mackerel measuring from 37 to 43 inches in total length to one 8-ounce serving per month.	(no age) limit consumption of king mackerel measuring from 37 to 43 inches in total length to one 8-ounce serving per month.

1. The methods of measuring are not consistent. The original Florida Dept. of Health press release states that fork length is used. Personal communication between Fred Kopfler and Henry Folmar, MS DEQ, states that Alabama and Mississippi use fork length, but this is not stated explicitly in the advisories. Louisiana's advisory states that the length measurement used is total length. A personal communication with Kirk Wiles, TX Dept. of Health, indicated that total length is used in Texas' advisory.

2. Personal Communication between Fred Kopfler and Henry Folmar: While not stated in the advisory, MS does not restrict consumption of king mackerel less than 33 inches.

3. The Louisiana advisory uses pregnant women, breast-feeding women, and women planning to be pregnant, rather than women of childbearing age.

Table 4. Standardized meal sizes and frequencies from Gulf States' king mackerel consumption advisories.

State	Meal Size	Adults	Women of Childbearing Age	Children
FL	8 oz raw	8 oz/week raw	8 oz/month raw	8 oz/month raw
AL	4 oz raw	1 oz/week raw	no consumption	no consumption
MS	8 oz raw	4 oz/week raw	4 oz/month raw	4 oz/month raw
LA	10.6 oz raw	10.6 oz/week raw	10.6 oz/month raw	10.6 oz/month raw
TX (confirm)	8 oz raw	8 oz/week raw	8 oz/month raw	8 oz/month raw

ATTACHMENT A
Agenda
Workshop on Consumption
Advisories for Mercury in Gulf Marine Fish
December 10 - 11, 2002
New Orleans, Louisiana

Tuesday, December 10, 2002

1:00 - 1:15 Welcome and Introductions

1:15 - 1:30 Fred Kopfler - Background on the Issue

1:30 - 2:00 Ron Lukens - Gulf States Marine Fisheries Resolution on Methylmercury

2:00 - 2:30 Tony Lowry - NMFS Synoptic Mercury in the Gulf of Mexico

2:30 - Consumption Advisory Process used in EPA, FDA and the five Gulf States

Discussion started with a remote presentation by Jeff Bigler, EPA, Washington, DC

Philip Spiller, Office of Seafood, FDA, Washington, DC, will also participate in the discussion via speaker phone

State representatives provide consumption advisory parameters used in each state

Round Table Discussion by States

5:00 Adjourn

Wednesday, December 11, 2002

8:00 - 8:30 Annette Ashizawa - review of literature on neurological development in humans

8:30 - 9:00 Definition of "Child" for purposes of Hg advisories - open discussion

9:00 - 10:00 States work on common language for King Mackerel Advisories

10:00 - 10:15 Break

10:15 - 11:30 Continue development of common language for King Mackerel Advisories

11:30 - 12:00 Discussion of other fish that may be candidates for consistent advisories based on life histories

12:00 - 1:00 Lunch

1:00 - 2:00 Public Outreach Plan Discussion

2:00 - 3:00 Next steps, hanging items, Adjourn

ATTACHMENT B
Participants List
Workshop on Consumption
Advisories for Mercury in Gulf Marine Fish
December 10 - 11, 2002
New Orleans, Louisiana

Name	Organization	Phone Number
Lisa Arcand-Hay	Blasland, Bouck & Lee, Inc.	315-446-9120
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Flinda Hill	MPC/ Gulf of Mexico Program Business Council	228-865-5152
W. D. Holland	EPA/Gulf of Mexico Program Office	228-688-3912
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R. M. Lyons	LA Mid-Continent Oils and Gas Association	225-387-3205
Angela Machen	Tulane University	504-988-1270
Barbara Montwill	Food and Drug Administration	301-436-1426
Chris M. Piehler	LA Department of Environmental Quality	225-765-0592
Terry Romaine	LA Department of Wildlife and Fisheries	225-765-2394
Neil Sass	AL Department of Public Health	334-206-5973
Joseph Sejud	LA Department of Health Hospitals, Office of Public Health	TBD
Joe Sekerke	FL Department of Health	850-245-4248
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Steva Stephens	Tulane University	504-669-4624
Jerry Stober	EPA, Region 4	706-355-8705
Larinda Tervelt	EPA/Gulf of Mexico Program Office	228-688-1033
Tom Van Devender	MS Division of Marine Resources	228-378-5000
Lee Yokel	Mobile Bay National Estuary Program	251-431-6409

ATTACHMENT C
New Research: Citations and Abstracts
Workshop on Consumption
Advisories for Mercury in Gulf Marine Fish
December 10 - 11, 2002
New Orleans, Louisiana

Guallar, E., Sanz-Gallardo, M. I., Veer, P. v.'t, Bode, P., Aro, A., Gomez-Aracena, J., Kark, J. D., Riemersma, R. A., Martin-Moreno, J. M., Kok, F. J., the Heavy Metals and Myocardial Infarction Study G, (2002). Mercury, Fish Oils, and the Risk of Myocardial Infarction. *N Engl J Med* 347: 1747-1754

Abstract: It has been suggested that mercury, a highly reactive heavy metal with no known physiologic activity, increases the risk of cardiovascular disease. Because fish intake is a major source of exposure to mercury, the mercury content of fish may counteract the beneficial effects of its n-3 fatty acids. In a case-control study conducted in eight European countries and Israel, we evaluated the joint association of mercury levels in toenail clippings and docosahexaenoic acid (C22:6n-3, or DHA) levels in adipose tissue with the risk of a first myocardial infarction among men. The patients were 684 men with a first diagnosis of myocardial infarction. The controls were 724 men selected to be representative of the same populations. The average toenail mercury level in controls was 0.25 µg per gram. After adjustment for the DHA level and coronary risk factors, the mercury levels in the patients were 15 percent higher than those in controls (95 percent confidence interval, 5 to 25 percent). The risk-factor-adjusted odds ratio for myocardial infarction associated with the highest as compared with the lowest quintile of mercury was 2.16 (95 percent confidence interval, 1.09 to 4.29; P for trend=0.006). After adjustment for the mercury level, the DHA level was inversely associated with the risk of myocardial infarction (odds ratio for the highest vs. the lowest quintile, 0.59; 95 percent confidence interval, 0.30 to 1.19; P for trend=0.02). The toenail mercury level was directly associated with the risk of myocardial infarction, and the adipose-tissue DHA level was inversely associated with the risk. High mercury content may diminish the cardioprotective effect of fish intake.

Yoshizawa, K., Rimm, E. B., Morris, J. S., Spate, V. L., Hsieh, C.-c., Spiegelman, D., Stampfer, M. J., Willett, W. C. (2002). Mercury and the Risk of Coronary Heart Disease in Men. *N Engl J Med* 347: 1755-1760

Abstract: A high dietary intake of mercury from consumption of fish has been hypothesized to increase the risk of coronary heart disease. Using a nested case-control design, we investigated the association between mercury levels in toenails and the risk of coronary heart disease among male health professionals with no previous history of cardiovascular disease or cancer who were 40 to 75 years of age in 1986. Toenail clippings were collected in 1987 from 33,737 cohort members, and during five years of follow-up, we documented 470 cases of coronary heart disease (coronary-artery surgery, nonfatal myocardial infarction, and fatal coronary heart disease). Each patient was matched according to age and smoking status with a randomly selected control subject. The mercury level was significantly correlated with fish consumption (Spearman $r=0.42$, $P<0.001$), and the mean mercury level was higher in dentists than in nondentists (mean, 0.91 and 0.45 µg per gram, respectively; $P<0.001$). After age, smoking, and other risk factors for coronary heart disease had been controlled for, the mercury level was not significantly associated with the risk of coronary heart disease. When the highest and lowest quintiles of mercury level were compared, the relative risk of coronary heart disease was 0.97 in the highest level (95 percent confidence interval, 0.63 to 1.50; P value for trend=0.78). Adjustment for intake of n-3 fatty acids from fish did not appreciably change these results. Our findings do not support an association between total mercury exposure and the risk of coronary heart disease, but a weak relation cannot be ruled out.