



# Mississippi Seafood Safety



Newsletter of the Mississippi Department of Marine Resources

A Partnership between:

## Mississippi Department of Marine Resources



Shrimp sampling for seafood safety

## Mississippi Department of Environmental Quality



## Introduction

Commercial and recreational fishing are two vital components of life on the Mississippi Gulf Coast. Ensuring the safety of the seafood-consuming public and maintaining the integrity of Gulf Coast seafood in the marketplace are two important priorities for state and federal agencies working on the response to the Deepwater Horizon Oil Spill. Long before any oil reached Mississippi waters, the Mississippi Department of Marine Resources (MDMR), the Mississippi Department of Environmental Quality (MDEQ), the Mississippi State Department of Health (MSDH) and the Mississippi State Chemical Laboratory (MSCL) were working with federal agencies, including the U.S. Food and Drug Administration (FDA), the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) along with the other Gulf States, to achieve these goals.

Together these agencies developed a plan that would be applied consistently across the Gulf, in both state and federal waters. The plan called for precautionary closures when oil was present or sometimes projected to be present in an area. This helped to ensure that no oil-contaminated seafood reached the market or was brought in by fishermen. While no tissue testing was

required to close an area, a rigorous testing protocol was put in place for reopening an area.

Oil contamination presents two kinds of risks to the seafood-consuming public, and the reopening protocol was designed to address both. The first type of risk is the presence of petroleum-related taint or "off flavor," which renders seafood unfit for human consumption. Some petrochemicals create objectionable taste and odor at very low concentrations. The second risk is due to health risks caused by the presence of chemical contaminants, primarily polycyclic aromatic hydrocarbons (PAHs)

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(page 1 continued)

in the edible portions of seafood. The safety of commercial seafood is generally determined by comparison of tissue contaminant concentrations to FDA levels of concern. Toxicologists from federal and state agencies established criteria for PAHs in fish and shellfish, using standard FDA and EPA risk assessment methods, which are protective of human health and would be applied consistently in each of the states and in federal waters.

While the closure and reopening protocols were being developed, state and federal agencies were also out in the field actively collecting seafood samples for tissue analyses before, during and after the spill had reached our waters. There were at least four separate phases of this sampling, and the state of Mississippi was actively involved in the first three:

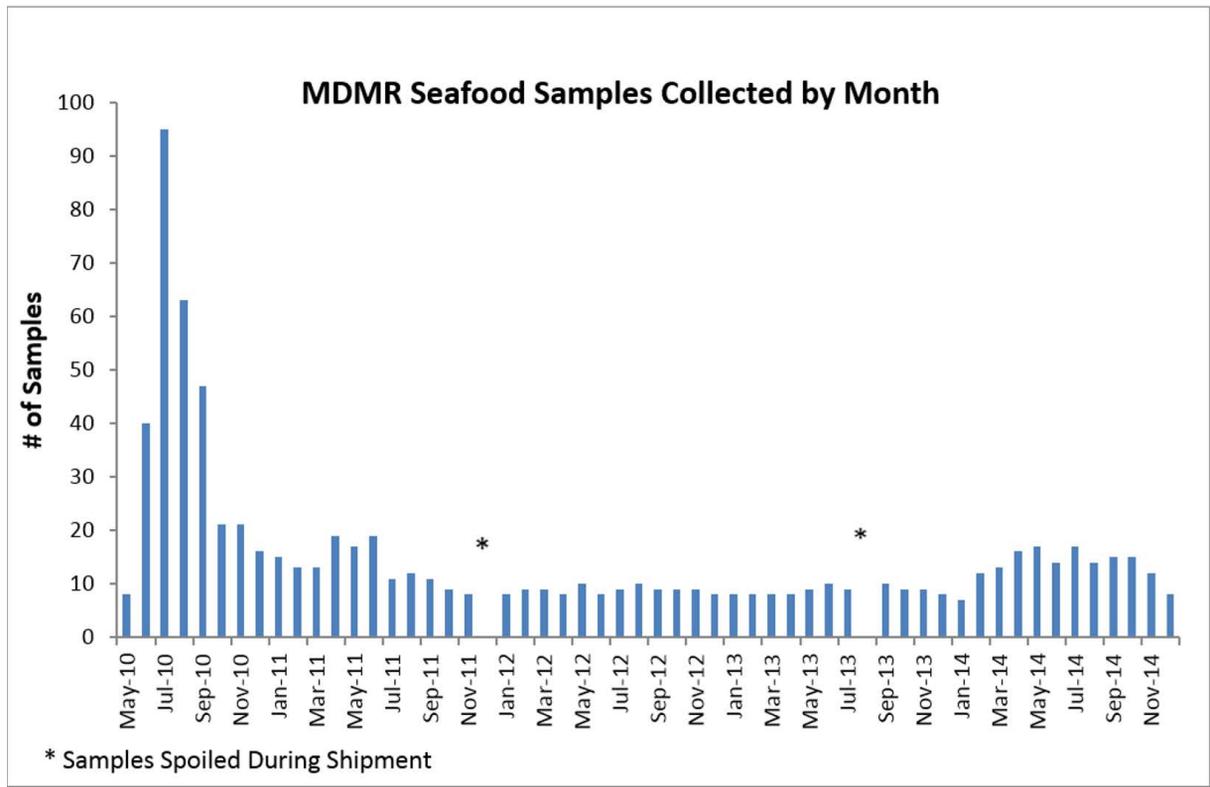
- Baseline sampling for the Natural Resource Damage Assessment (NRDA)
- Response Sampling
- Reopening Sampling
- Federal Sampling

## Natural Resource Damage Assessment Sampling (NRDA)

Baseline or background samples were collected by MDMR and MDEQ in April and May of 2010 before the spill reached Mississippi waters as part of the NRDA. This will be a long-term effort to evaluate damages over time due to the oil spill, but in order to accurately evaluate damages, it is critical to establish baseline conditions to define pre-spill conditions. Samples include fish, shrimp, crabs and oysters.

## Response Sampling

After the NRDA baseline samples were collected, MDMR began response sampling in May 2010. This sampling included chemical analyses of both pre- and post-oil samples, data that was needed immediately to help make public health decisions. This monitoring was conducted in coordination with MDEQ and MSCL and included tissue sampling of: Blue crabs, finfish, shrimp and oysters. Bi-weekly tissue sampling of these species began May 23, 2010 as a precautionary measure and ended October 1, 2010. Since October 1, 2010, sampling has been conducted monthly.



## MDMR Seafood Samples Collected

For each of the four fishery categories, 0.5 pounds of edible tissue is needed for testing. The number of specimens needed to extract the required amount of tissue varies by species: 10 to 12 blue crabs, 1 pound whole shrimp, etc. Finfish species used for this type sampling include, but are not limited to, menhaden, mullet, cobia, croaker, white trout, spotted sea trout and red drum. Tissue samples are analyzed at the MSCL located at Mississippi State University. All Mississippi response samples collected to date have been significantly below levels of concern. The results for each of Mississippi's four major fisheries are summarized in Table 1 below. All of the target PAH Compounds detected were trace amounts, well below levels of concern, as shown in Table 2.

MDEQ also collected water samples in conjunction with the tissue collections, and the results are available online at: <http://www.deq.state.ms.us>.

**Table 1. Mississippi Response Seafood Sampling Results**

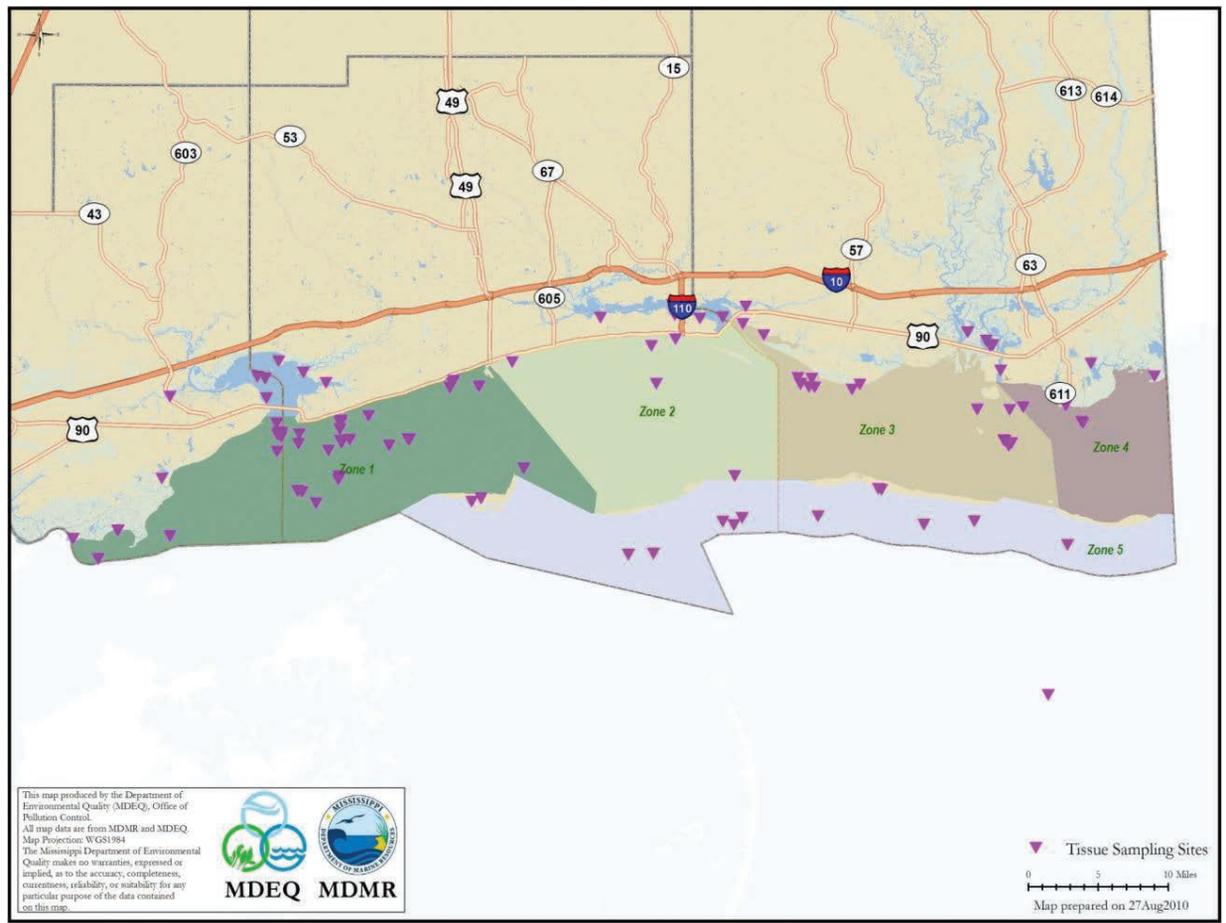
Sample Dates: 5/28/10- 12/31/14	Total	Above Levels of Concern	Lab Results Pending
Shrimp	164	0	0
Crab	151	0	0
Finfish	344	0	0
Oysters	161	0	0
All Seafood	820	0	0

**Table 2. Amounts of Detected and Levels of Concern in parts per million (ppm)**

	Shrimp		Fish		Crab		Oyster	
	Max Detected	Level of Concern						
Napthalene	0.0127	123	0.0121	32.7	0.0121	123	0.0196	133
Fluorene	0.0193	246	0.0199	65.3	0.0228	246	0.0198	267
Anthracene/Phenanthrene	0.0271	1846	0.0158	490	0.0305	1846	0.01595	2000
Pyrene	0.00366	185	0.006	49	0.077	185	0.0169	200
Fluoranthene	0.00477	246	0.006	65.3	0.0116	246	0.00294	267
Chrysene	ND	132	ND	35	0.000751	132	0.000547	143
Benzo(k)fluoranthene	ND	13.2	ND	3.5	ND	13.2	0.000703	14.3
Benzo(b)fluoranthene	ND	1.32	ND	0.35	0.000644	1.32	0.000727	1.43
Benzo(a)anthracene	ND	1.32	ND	0.35	ND	1.32	0.000628	1.43
Indeno(1,2,3-cd)pyrene	ND	1.32	ND	0.35	ND	1.32	0.00189	1.43
Dibenz(a,h)anthracene	0.000505	0.132	ND	0.035	ND	0.132	0.00209	0.143
Benzo(a)pyrene	ND	0.132	ND	0.035	ND	0.132	0.00291	0.143
DOSS	0.17	500	0.25	100	0.127	500	0.083	500

ND = Non Detected at minimum detection limit of 0.01 ppm prior to July 1, 2010 and after July 31, 2010 or 0.0005 ppm for July 1 thru July 31, 2010 and after Jan 1, 2012  
 TR = Trace - greater than minimum detection limit of 0.0005 ppm but less than reporting limit of 0.010 ppm

Fixed sampling locations were chosen to represent five distinct zones to aid in making fisheries reopening decisions. These areas are shown in Figure 1, and cover the three coastal counties out to the state territorial limit, three miles beyond the barrier islands



## Fishery Closures

Precautionary fishery closures were implemented in an area when significant visible oil was observed on the surface. These closure areas included the immediate vicinity of the observed oil as well as a designated buffer zone. Light sheen and tar balls were not considered significant oil according to the protocols due to the low risk of bioaccumulation from these weathered materials. No tissue or water analyses were required to close an area.

The first closure was issued on June 1, 2010, as winds pushed oil into the eastern part of the Mississippi Sound. Based on boat and plane surveillance, additional areas were closed as oil spread across Mississippi waters, and by July 1, 2010, most of Mississippi territorial waters, including the Mississippi Sound and the adjoining Gulf of Mexico waters out to the territorial limit were closed to commercial and recreational fishing.

2. There must be a low threat of oil moving back into the area. (These two conditions had to be met before samples were sent to the lab for testing).
3. Samples were first screened for tainting or off flavor using sensory (smell and taste) assessment of seafood by NOAA/FDA-trained experts.
4. If samples passed the sensory testing, they were submitted to an FDA Laboratory for chemical analysis. This analysis must have demonstrated that the levels of PAHs in the tissues were well below the levels of concern before an area could be reopened to fishing. Re-opened tissue samples were sensory tested by NOAA's Pascagoula, Mississippi, Laboratory and were chemically tested by an FDA Laboratory in Maryland. Table 3 shows the approximate number of organisms needed to complete the sensory and chemical testing for reopening. All of the Mississippi samples passed both the sensory and the chemical screening.

The FDA has a wealth of information about the oil spill and seafood safety, including the full reopening protocols, on its Web site at: <http://www.fda.gov/Food/FoodSafety/Product-SpecificInformation/Seafood/ucm210970.htm> Or contact the FDA at 1-888-INFO-FDA (1-888-463-6332).

## Reopening Sampling

Reopening criteria, which were agreed upon by the federal agencies (EPA, NOAA, FDA) and all the affected Gulf States, included the following steps:

1. There must be no significant oil detected in the area by visual observation, aerial reconnaissance or water testing for a minimum of three days.

**Table 3. Number of Organisms Needed for Each Location for Reopening.**

Number of Animals per Subsample	Sensory Testing		Chemical Testing <sup>2</sup> Individual Animals Needed per Sample Location	Total Field Collection <sup>1</sup> (Animals per Sample Location)
	# of Subsamples per Sample Location	Field Collection <sup>1</sup> (Animals per Sample Location)		
Crabs: 6 (~2 lbs)	6	Collect 36	10	Collect 46
Oysters: 10	3	Collect 30	15	Collect 45
Shrimp: 0.5 lbs	6	Collect 3 lbs	0.5 lbs	Collect 3.5 lbs
Fin Fish: 1 fish	6 <sup>3</sup>	Collect 6 fish	6 <sup>3</sup>	Collect 6 - 12
Sufficient material must be provided to be able to perform the necessary sensory analyses. Providing the amounts per sample indicated above will meet this need.				

<sup>1</sup>Field collections methods should be similar to commercial harvest methods.

<sup>2</sup>Animals from a sampling station will be combined into a composite sample for each station.

<sup>3</sup>Fish should be large enough or in sufficient quantity to provide at least 0.5 lb sample size for each sensory evaluation and chemistry testing. For large fish, fewer fish may be needed for both sensory and chemistry testing with one filet going to sensory and one filet to chemistry. (E.g. fish over 10 lbs, a sample unit is 6 lbs of filet with skin on.) For small fish lacking filet size of at least 200 g individually, collect (6) 0.5 lb sample units for sensory and (6) 0.5 lb sample units for chemistry. (E.g. for butterfish and menhaden collect (6) 0.5 lb sample units for sensory and (6) 0.5 lb sample units for chemistry.)

## Federal Sampling

In addition to the tissue sampling conducted by the states, FDA and NOAA conducted extensive sampling in both closed and open areas of the Gulf, in both federal and state waters. By August 28, 2010, the NOAA Seafood Inspection Lab at Pascagoula had processed 4,018 samples from federal waters and 731 samples from state waters.

## Fishery Reopenings

On July 30, 2010, based on the results of the reopening samples, which showed no impairment due to taste and odor or chemical contamination, Mississippi officials, with the concurrence of NOAA and FDA, opened the waters north of the barrier islands to commercial and recreational shrimping and fishing. MDMR continued to systematically sample using the reopening protocols, and on August 6, 2010 all Mississippi territorial waters were opened for shrimp and finfish. By August 21, 2010, all Mississippi waters were opened for blue crab fishing, and on August 25, 2010, FDA granted concurrence for the opening of oyster harvest. MDMR typically opens oyster season in late September or October.

The reopening results mirror the results from the other state and federal monitoring efforts, showing very little or no presence of PAHs in seafood tissues. This sampling includes hundreds of samples from state waters and thousands of samples from federal waters.

## Seafood Safety and Dispersants

Sampling in Mississippi state waters continues to show no significant levels of dispersants. Scientific data indicate that the dispersants used to combat the oil spill break down rapidly and become highly dispersed in Gulf waters. For more information:

<http://www.fda.gov/downloads/Food/FoodSafety/Product-SpecificInformation/Seafood/UCM221659.pdf>



*Safe seafood workshop*



*Safe seafood workshop*

## Safe Seafood Assurance Workshop

Members of the Mississippi seafood industry learned firsthand the different sensory characteristics of seafood, crude, diesel and oxidized oil in varying concentrations. More than 70 participants, a mixture of state certified seafood dealers and processors, MSDH personnel, Mississippi State University (MSU) researchers and MDMR seafood officers and educators attended the free training session on August 26, 2010, at the MSU Coastal Research and Extension Center. The workshop provided dealers and processors with additional evidence to help improve buyer confidence in the safety of Mississippi seafood and public welfare.

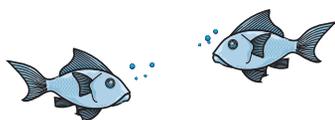
Another program introduced was the “HOW method = Harvest from Open Waters”. This program was spearheaded by Dr. Steve Otwell of Florida State University and developed by a team of experts from the five Gulf states. It was hosted by the Mississippi-Alabama Sea Grant Consortium and MSU-CREC team of David Burrage, Dr. Benedict Posadas, Susan Deblanc, Amanda Seymour, Randy Coker and Mary Dikes.

## Dockside Visits

MDMR’s Seafood Technology Bureau reached out to Mississippi fishermen by including dockside visits in its regular monitoring of Mississippi seafood products. Visits included visually checking shrimp caught during the open season and interviews with fishermen. Interviews provided MDMR with valuable feedback from fishermen about their observations during their fishing trips in the Mississippi Sound including observations of marine animals and oil sightings. MDMR seafood inspectors and officers continue to encourage open dialogue with the state’s fishermen and to obtain valuable data from their at-sea activities.

## Monitoring and Inspections Of Seafood Facilities and Operations

As a response to the Deepwater Horizon oil spill, an increase in the frequency of monitoring and inspections of seafood processing facilities and courtesy inspections of seafood markets in the three coastal counties was immediately implemented. From May to July 2010, seafood officers conducted 99 courtesy visits and provided technical assistance in 20 counties throughout the state. Continued regulatory quarterly inspections, courtesy visits and organoleptic (taste, color, odor and texture) inspections have been conducted by the MDMR Seafood Technology Bureau as well as certification of new seafood dealers.



*Dockside seafood safety inspection*



*Dockside seafood safety inspection*



*Seafood plant inspection*



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*Processing crabs for analysis at MSCL*