

*Science, Service, Stewardship*



# The Deepwater Horizon Oil Disaster: Seafood Safety Response

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**NOAA  
FISHERIES  
SERVICE**

**Contaminants, biotoxins, pathogens**

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graph TD; A[Contaminants, biotoxins, pathogens] --> B[Health & survival of organisms]; A --> C[Accumulation in fishery resources]; B --> D[Population effects]; C --> E[Impact on safety of seafood]; D --> F[Ecological and human health risk]; E --> F;
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The diagram is a flowchart set against a background of a satellite view of the Earth's ocean. It starts with a top box 'Contaminants, biotoxins, pathogens' in white text on a dark blue background. Two orange arrows point down to 'Health & survival of organisms' (left) and 'Accumulation in fishery resources' (right), both in yellow text on dark blue backgrounds. From 'Health & survival of organisms', an orange arrow points to 'Population effects' (left), also in white text on a dark blue background. From 'Accumulation in fishery resources', an orange arrow points to 'Impact on safety of seafood' (right), in yellow text on a dark blue background. Finally, orange arrows from both 'Population effects' and 'Impact on safety of seafood' point to a bottom box 'Ecological and human health risk' in white text on a dark blue background.

**Health & survival of organisms**

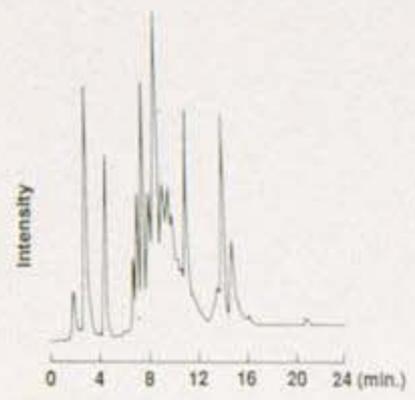
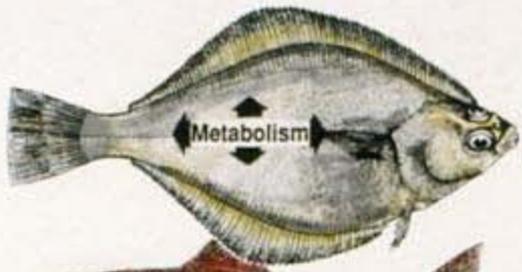
**Accumulation in fishery resources**

**Population effects**

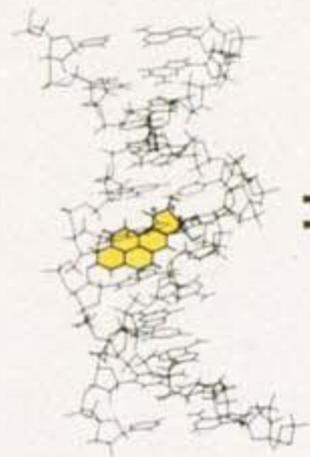
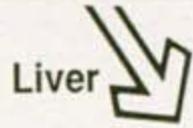
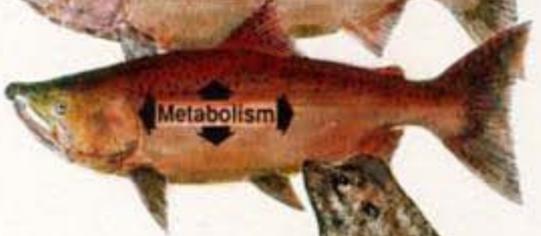
**Impact on safety of seafood**

**Ecological and human health risk**

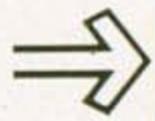
Contaminants



Fluorescent contaminants in bile



Contaminants bound to DNA



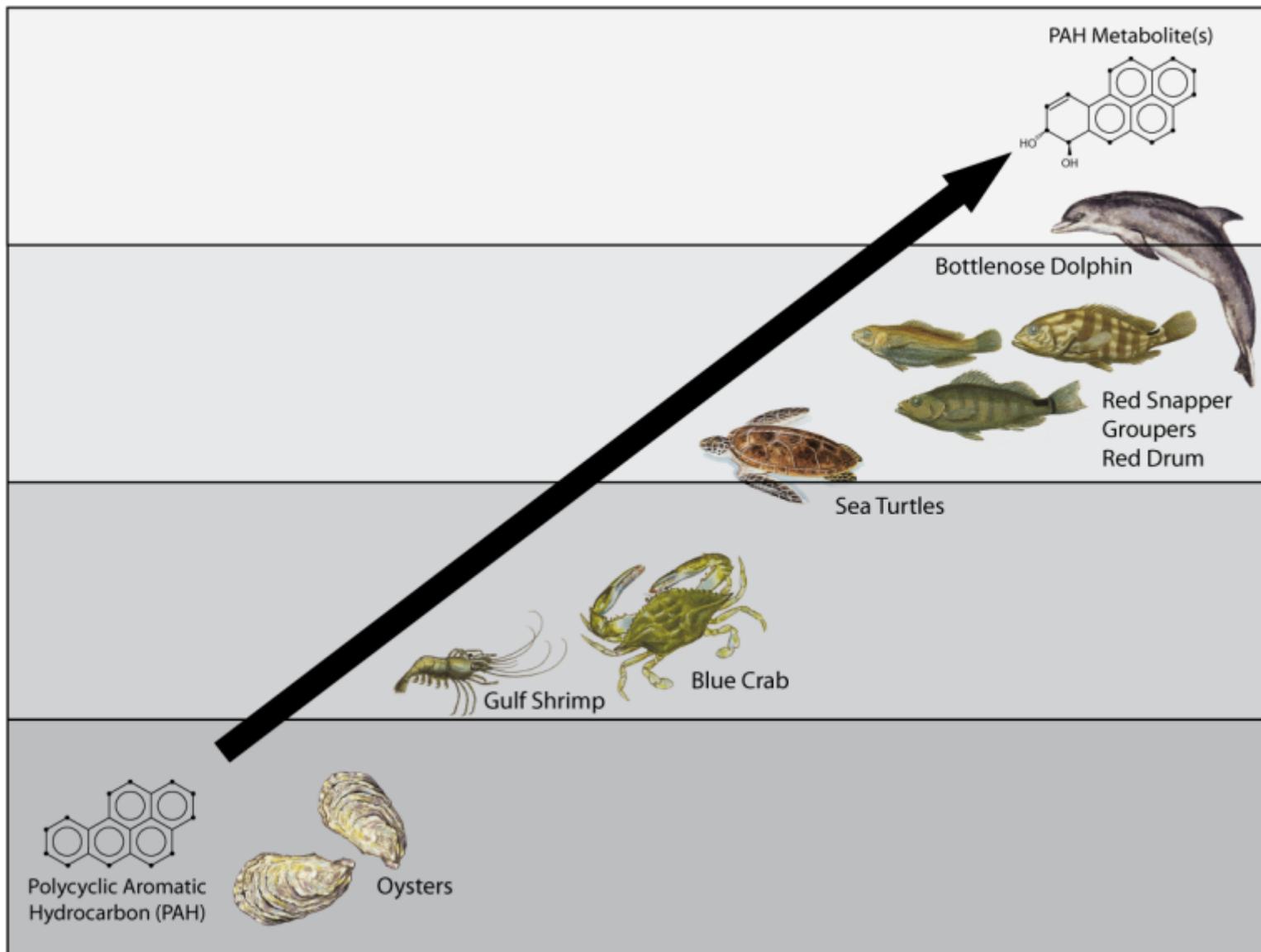
Adduct profile

# Extent of Metabolism of PAHs

EXCRETION



RETENTION



Depiction by Su Kim based on "Metabolism of PAHs in the Aquatic Environment, ISBN# 0-8493-6844-8, Editor U. Varanasi and "Evaluating and Communicating Subsistence Seafood Safety in a Cross-Cultural Context: Lessons Learned from the Exxon Valdez Oil Spill, ISBN# 1-880611-29-5, Editors L.J. Field, J.A. Fall, T.S. Nighswander, N. Peacock, and U. Varanasi

# Oil Spill Response – Key Questions

- **Chemical composition of the source**
- **Fate and toxicity of the source**
- **Resources at risk**
- **Type of investigation to be conducted**
- **Sampling design**
- **Analytical approaches**



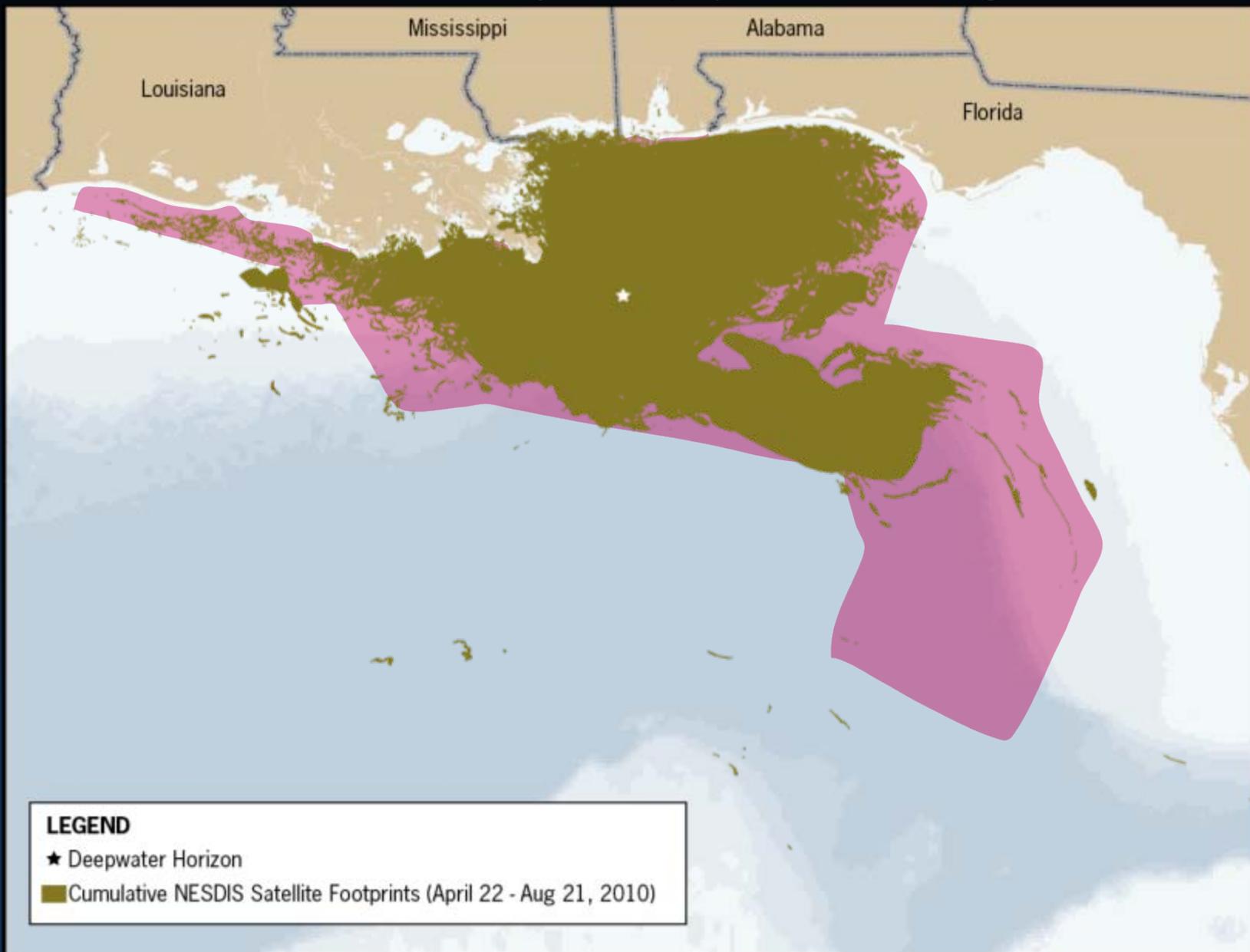
# Deepwater Horizon Incident

Is the seafood safe to eat?

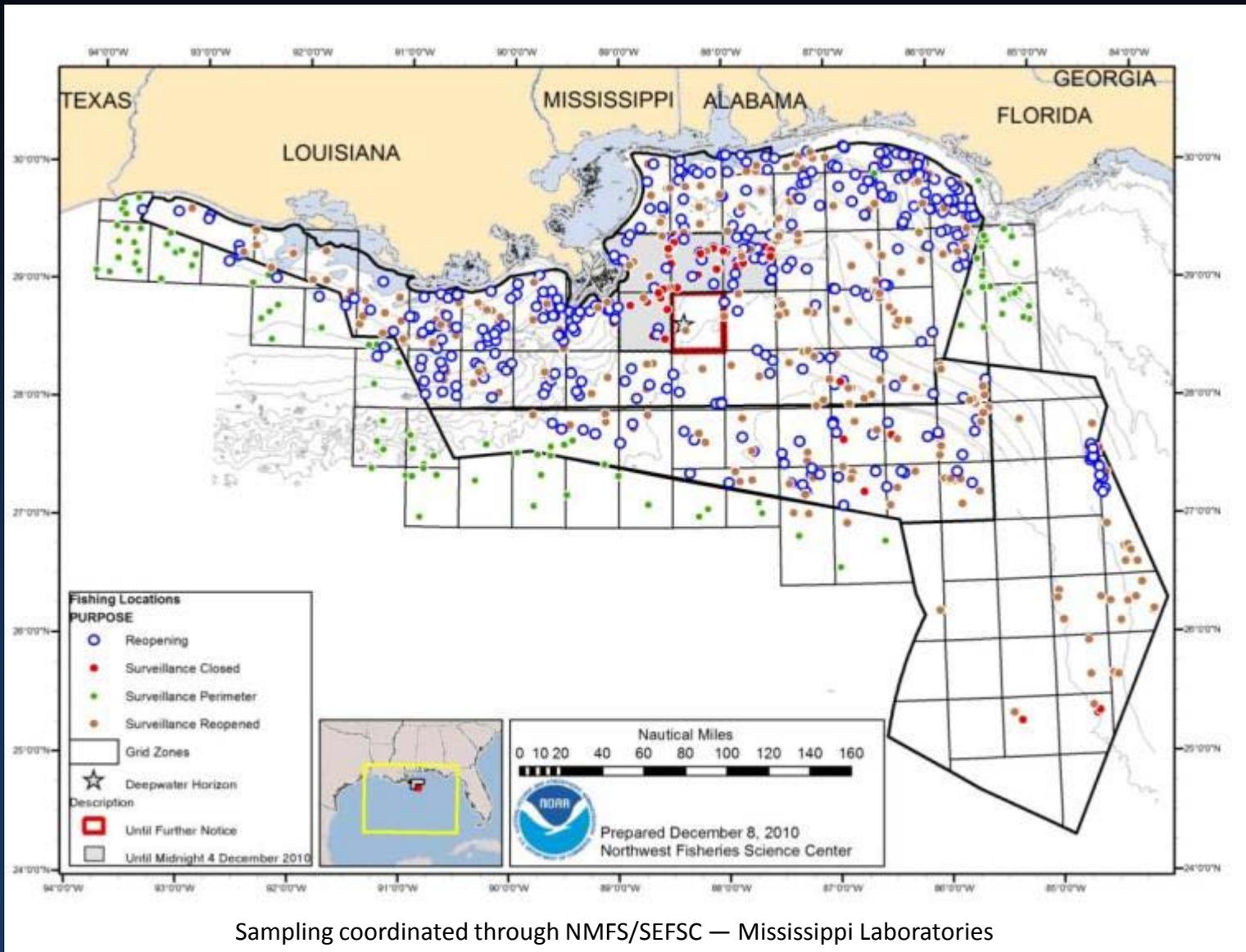
And how do we know?



# Cumulative Satellite Footprint (April 22 – August 21, 2010)



# Fish sampling sites



Sampling coordinated through NMFS/SEFSC — Mississippi Laboratories

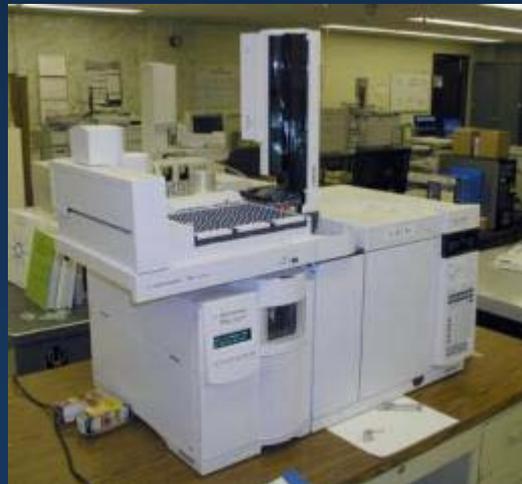
# NMFS Seafood Safety Program

- Ensure that tainted or contaminated seafood does not reach the marketplace

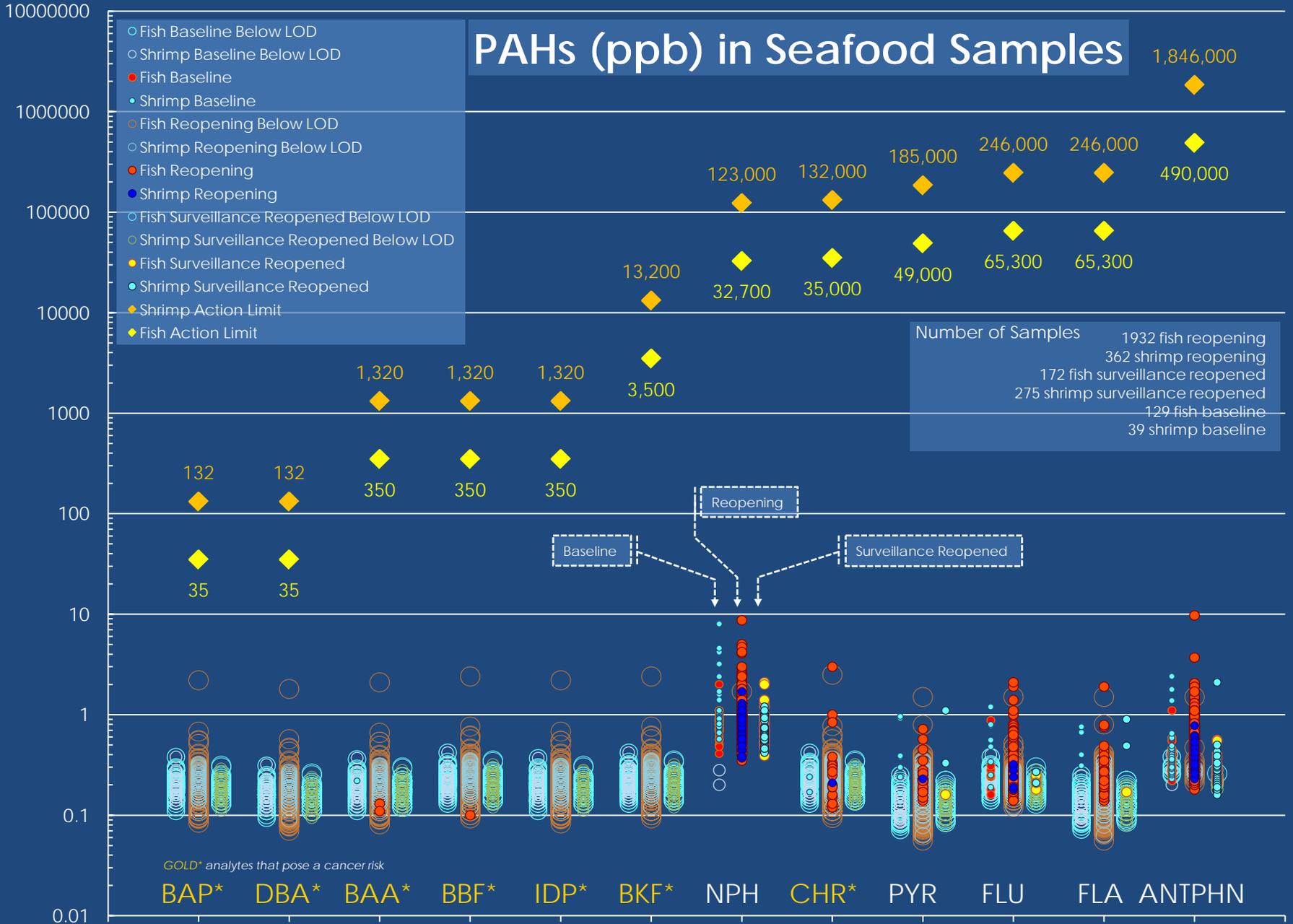
Sensory  
analysis



Analytical  
analysis



# PAHs (ppb) in Seafood Samples



# What about dispersants?

*There is concern over the amounts and widespread use of dispersants in the aftermath of the Deepwater Horizon incident.*

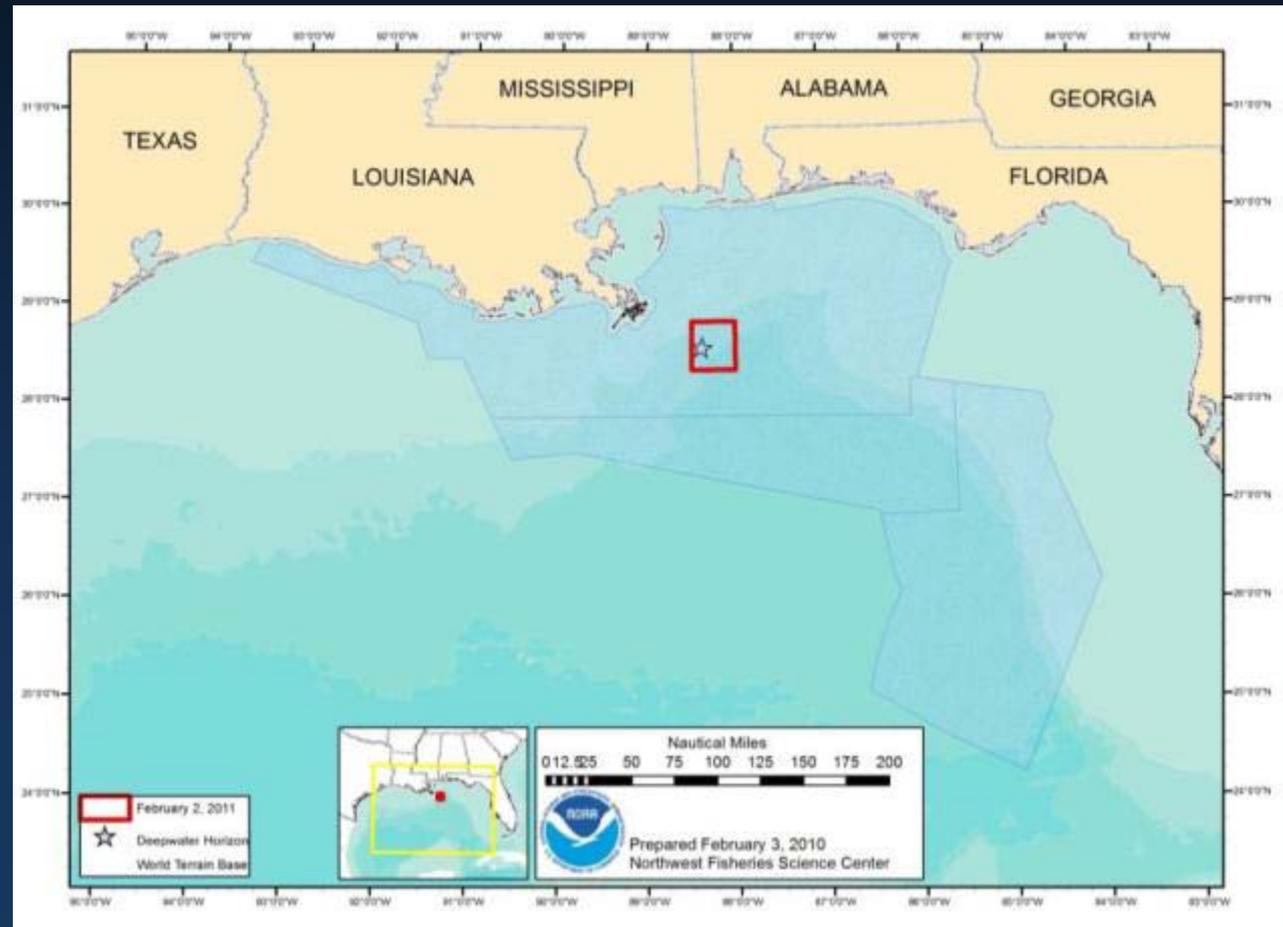




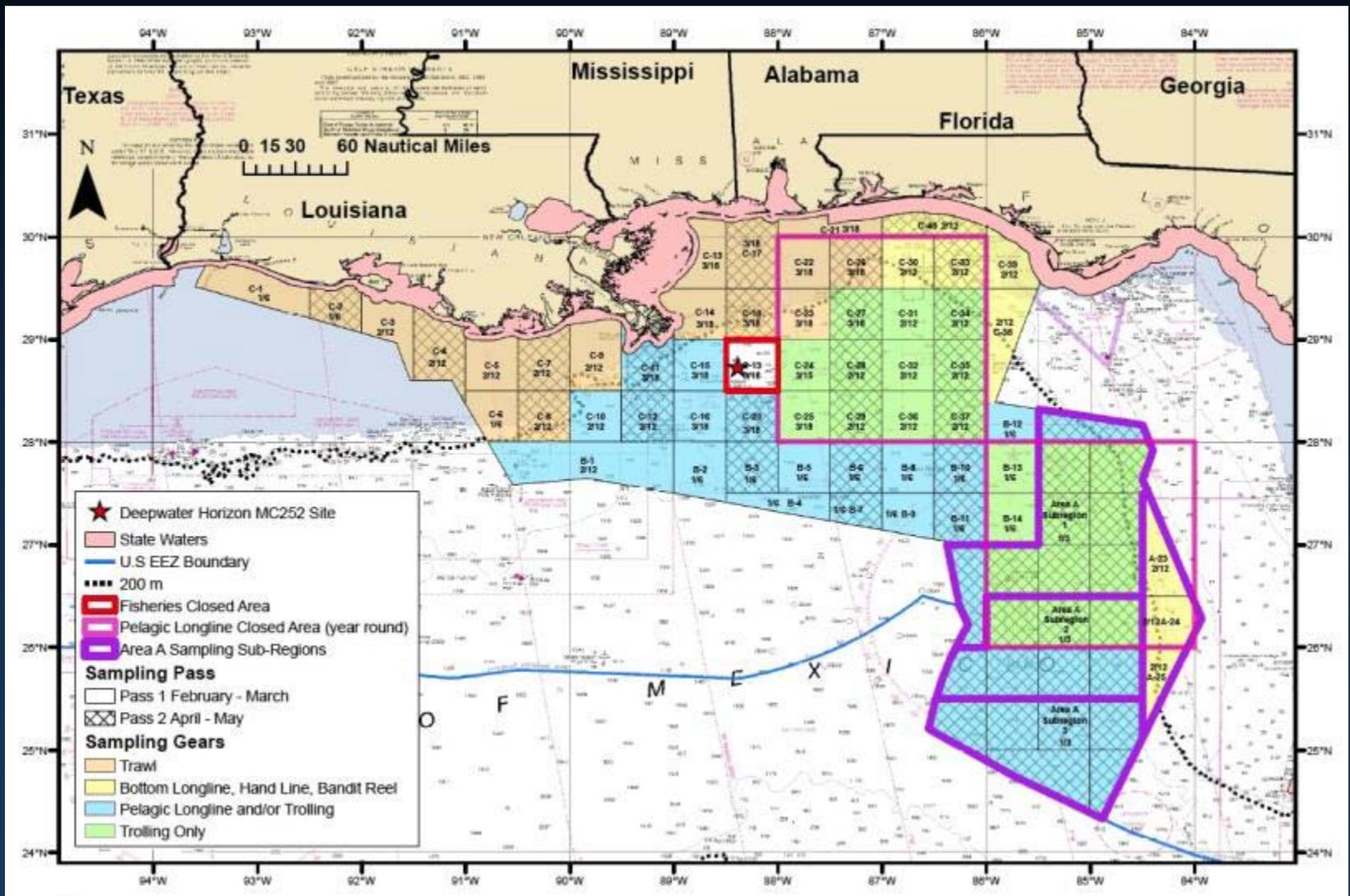
**Gulf seafood is safe to eat –  
and is supported by extensive data....but  
“you can’t truth your way out of it...”**

**The continuing  
challenge....**

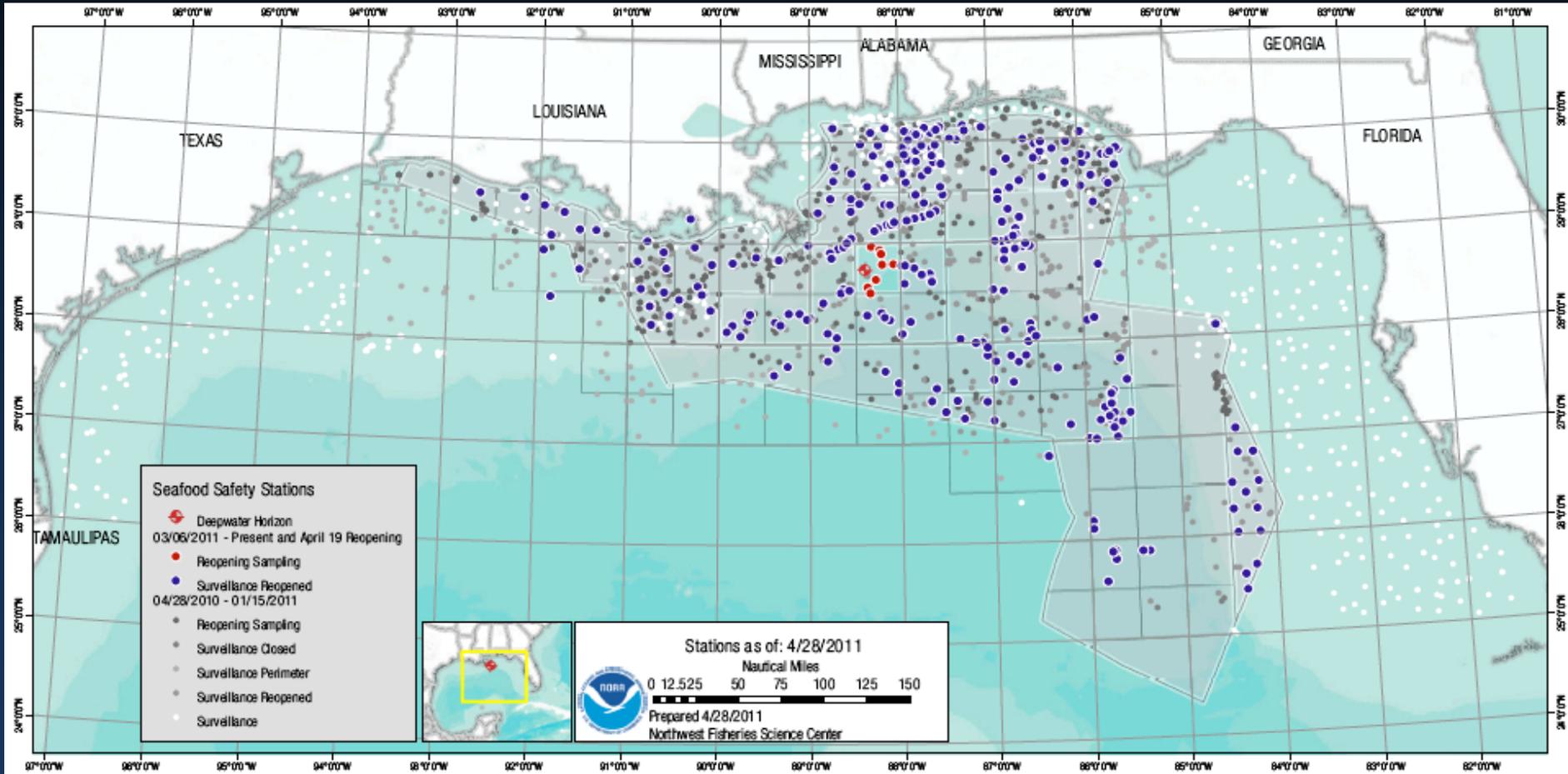
**Moving public  
perception?**



# Continued Surveillance of Reopened Areas



## Surveillance



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graph TD; A[Contaminants, biotoxins, pathogens] --> B[Health & survival of organisms]; A --> C[Accumulation in fishery resources]; B --> D[Population effects]; C --> E[Impact on safety of seafood]; D --> F[Ecological and human health risk]; E --> F;
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**Contaminants, biotoxins, pathogens**

**Health & survival of organisms**

**Accumulation in fishery resources**

**Population effects**

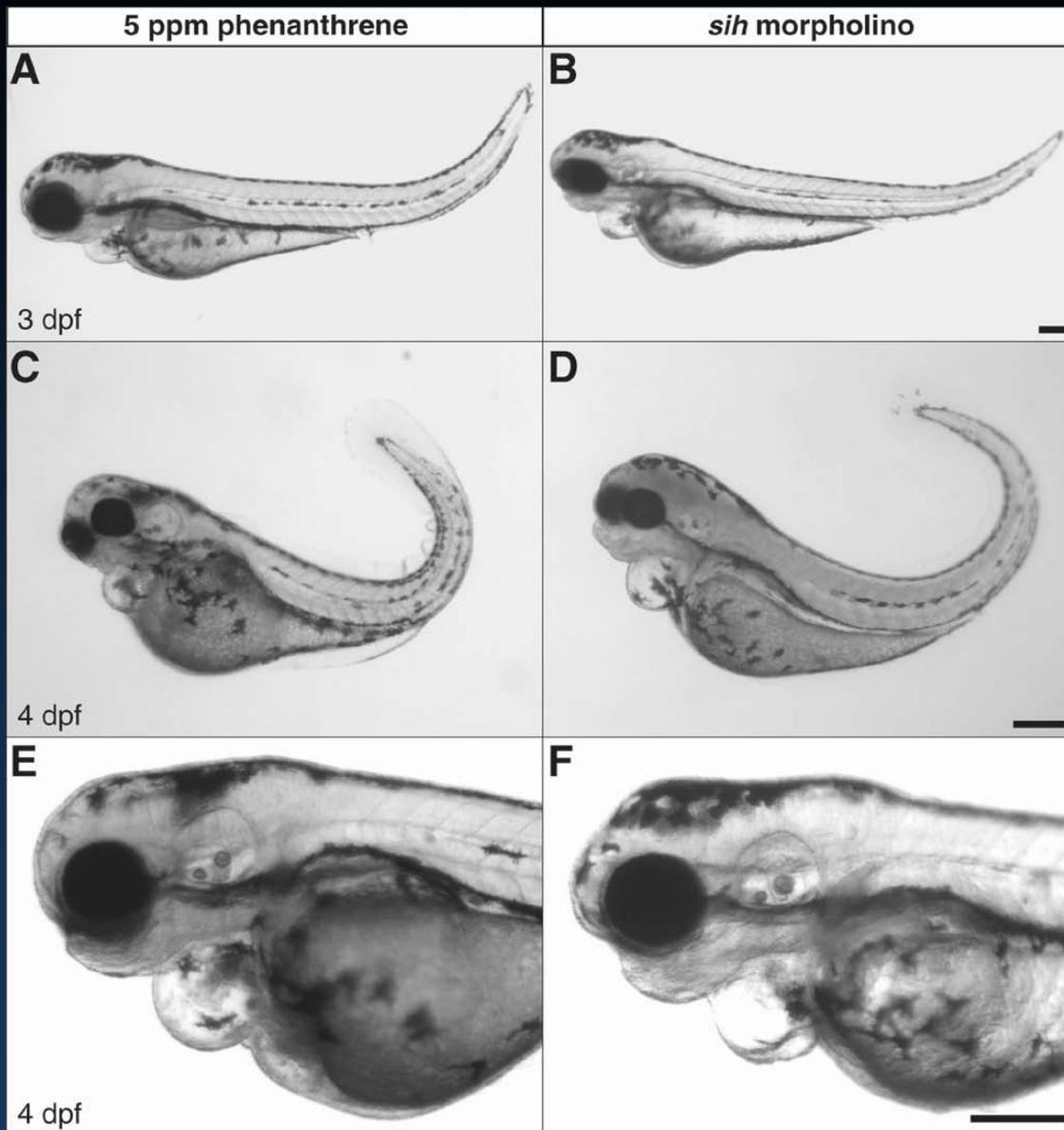
**Impact on safety of seafood**

**Ecological and human health risk**

# Effects of Lower Molecular Weight PAHs

- Malformations are secondary to loss of circulation
- Genetic “knock-down” of cardiac function produces same malformations

The vertebrate heart is a primary target for PAH toxicity



From: Incardona, et al., *Toxicol. Appl. Pharmacol.* (2004)

# Lesions in Fish – Status

- SEFSC survey underway
- FDA/Dauphin Island Sea Lab survey
- Cooperative research survey
- Determine prevalence of lesions and geographic distribution
- Use findings to guide any additional sampling



# Long Term Monitoring

- **SEFSC surveys**
- **NRDA investigations**
- **BP funded investigations by academia**



# Questions

# Need for Seafood Assessment Program

- Sustained monitoring effort to systematically collect seafood samples from coastal waters
- Improved analytical capacity for pathogens, biotoxins, and current and emerging contaminants of concern; as well as for nutritionally beneficial components of fish and shellfish, especially omega-3 fatty acids

*While remaining attentive to:*

- Biological attributes (e.g., life history) of species being collected and analyzed
- Use of standard procedures (e.g., a sampling and analysis plan that is well documented)
- Effective, and objective, communication of results