

Gulf killifishes' biological responses to oil spills similar in field, laboratory studies

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Gulf killifish. Credit: Andrew Whitehead

Gulf killifish biological responses to the Deepwater Horizon oil spill detected by researchers in the field are similar to those in controlled laboratory studies, according to a study published September 10, 2014 in the open-access journal *PLOS ONE* by Whitney Pilcher from Louisiana State University and colleagues.

After the Deepwater Horizon oil spill, scientists monitored the impacts of oil on a local species of fish, the Gulf killifish. Changes in genome expression responses to oil exposure may provide insight into how the fish are affected by or adapt to environmental stressors. As it is difficult to control all the variables in the ocean and particularly, connect biological effects with specific causes, the authors compared killifish genome responses to oil exposure in the field with those in the lab at both low and high concentrations.

The authors found changes in genomic expression during each exposure. The high concentration response was characterized by activation of the molecular signaling pathway that facilitates oil metabolism in adults and induces developmental defects in embryos. The high dose exposure also caused DNA damage. The low concentration resulted in a genome expression response change that may support a compensatory response to oil exposure, including affecting genes associated with regulation of transcription, cell cycle progression, RNA processing, DNA damage, and apoptosis.

The authors conclude that the genome expression response detected in the field may be a useful indicator of exposure to the toxic components of contaminating oil. They suggest that [exposure](#) to relatively high concentrations, particularly during early life stages, can be especially damaging to fish.

Andrew Whitehead added: "This study represents a nice example of how laboratory studies can be integrated with field studies to offer greater insight into the effects of complicated environmental disasters such as marine [oil](#) spills."

More information: Pilcher W, Miles S, Tang S, Mayer G, Whitehead A (2014) Genomic and Genotoxic Responses to Controlled Weathered-Oil Exposures Confirm and Extend Field Studies on Impacts of the

Deepwater Horizon Oil Spill on Native Killifish. *PLoS ONE* 9(9): e106351. [DOI: 10.1371/journal.pone.0106351](https://doi.org/10.1371/journal.pone.0106351)

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