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New Research Illuminates the Effects of UV Light and Oil on Larval Grass Shrimp

Understanding how UV light increases oil toxicity may enable better oil spill clean-up

Could oil spills be causing even more harm than expected? New research suggests that UV rays may significantly increase the toxicity of oil in *Palaemonetes pugio*, or grass shrimp. Grass shrimp are an important prey species for fish and crabs and contribute to the breakdown of nutrients smaller organisms need to thrive; thus, factors that influence them are likely to have wide-ranging habitat impacts.

Previous work done with open ocean fish such as mahi-mahi has shown that UV light can increase the toxicity of oil by over 1000 times, decrease hatching success of fish eggs, and cause developmental problems such as cardiac defects.

However, oil affects different organisms in different ways, depending on the organism, its age, and how it's exposed, so it's important to evaluate a variety of organisms and routes of exposure to get a more complete understanding of the harm oil spills can cause.

Research conducted by Deanna Hausman looked at the immediate and long-term toxic effects of oil exposure with and without UV light on larval grass shrimp. Previous research indicated that that is the stage when they're most sensitive. The study also looked at the toxic effects of thin sheens of oil, given that previous research has not really studied this in estuarine species, and estuarine species are likely to be exposed to them due to their proximity to the coast.

According to project lead Dr. Marie Delorenzo: "This research will help inform the Office of Response and Restoration's clean-up decisions and will likely provide a more complete picture of the harm oil causes both to grass shrimp and estuaries at large." This will give oil spill response teams the tools they'll need to prioritize clean-up decisions and ultimately work to reduce the devastation oil spills can cause.

This research found a variety of interesting things. Firstly, it found that UV light increases the toxicity of oil mixed with water by over 4 times. It also found that shrimp exposed to UV light experienced a lot of latent mortality, even after they were moved to clean seawater. It also found oil caused a lot of developmental defects. Oil reduced the concentration of a hormone shrimp need to grow and develop, basically meaning that oil may keep shrimp from developing properly. It also indicated that oil may cause shrimp to grow abnormally large. This all indicates that oil spills may continue to cause damage to marine ecosystems long after they occur, and even after they've been cleaned up.

This study didn't conclusively show whether oil spills are significantly toxic to shrimp, or whether UV light increased their toxicity. However, the study did find more mortality in the shrimp exposed to oil, and the most mortality occurred in the shrimp exposed to the oil sheen under UV light.

Whenever an oil spill occurs, the most important thing in any response is understanding the damage that oil spill will cause. Understanding what species will be most affected helps responders to know where to target their efforts, in order to decrease the harmful effects of the spill as much as possible. Much is still not understood about oil toxicity and how it effects different species, but this research works to fill in some of the gaps.

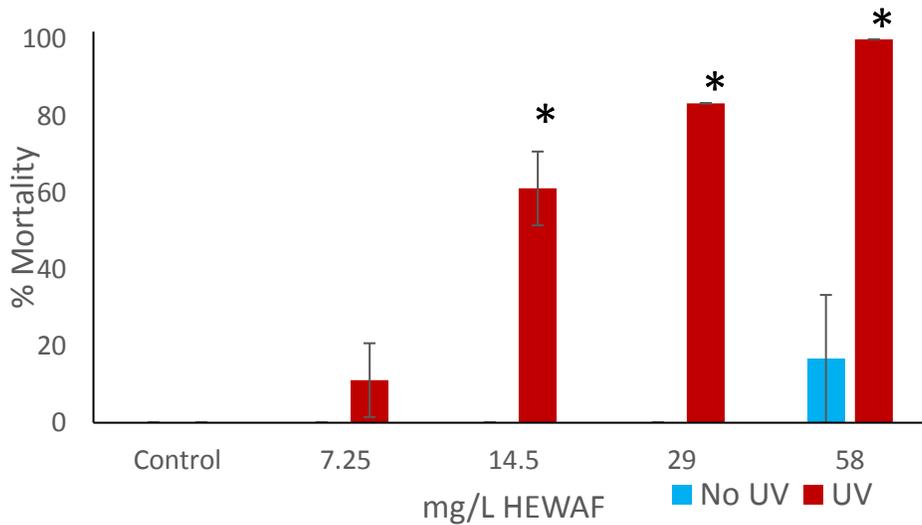


Figure 1: Graph showing initial mortality caused by oil exposure



Figure 2: Test species- *Palaemonetes pugio*. Image taken from: <http://www.floridawildlifemagazine.com/grass-shrimp.html>

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