

# **GOM-SCHEMA: The impact of the Deepwater Horizon spill on historic shipwreck microbiomes in the northern Gulf of Mexico**

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There are more than 2,000 historic shipwrecks in the Gulf of Mexico spanning 500 years of human history. Shipwrecks serve as artificial reefs and hotspots of biodiversity by providing hard substrate for organismal settlement. The *Deepwater Horizon* (DWH) spill released crude oil into the deep Gulf. Because of physical, biological, and chemical interactions, DWH oil was deposited on the seafloor in areas where historic shipwrecks are present. The spill created potential for contact of oil with shipwreck remains and the microbiological biological communities around them. The interaction of oil and dispersants used in the spill mitigation effort with shipwreck microbiomes may have synergistic effects that accelerate degradation of the structures they inhabit. Accordingly, this study examined the DWH spill's lasting effects on sedimentary microbiomes surrounding 7 historic shipwrecks. The study included steel-hulled World War II-era shipwrecks and wooden-hulled 19<sup>th</sup> century shipwrecks discovered prior to the DWH spill. Through comparative analysis of 16S rRNA sequence libraries for sediment microbiomes from wrecks located within and external to the DWH seafloor footprint, this study documented that the German U-boat *U-166* and the wooden-hulled sailing vessel known as the Mardi Gras Wreck were exposed to deposited oil. Impacts to shipwreck microbiomes included a significant increase in sequences related to *Piscirickettsiaceae* in surface sediments, and reduced biodiversity relative to sites outside of the spill. The work provides the first evidence of DWH spill residues interacting with historic shipwrecks on the seafloor.