

#### 7.5. Time Scale of Recovery and Resilience of Gulf Ecosystems

The time required for Gulf ecosystems to recover from a hydrocarbon blowout depends primarily on (i) the degree to which hydrocarbon contamination remains and (ii) biological processes regulating the reestablishment of populations. The reasons that certain components of the Prince William Sound ecosystem have recovered very slowly from the Exxon Valdez oil spill were either because of lingering, undegraded contamination where oil had seeped into poorly oxygenated sediments of the intertidal zone or because of inherent limitations in population recovery, such as with pods of killer whales.<sup>109</sup> Some parts of Gulf of Mexico ecosystems such as heavily silted marshes, the deep seabed around the Macondo well, and beaches with tar mats, remain contaminated four years after the blowout. It seems likely that some years more will be required before hydrocarbon contamination returns to background levels. The time required for recovery of affected populations also varies greatly. Plankton populations no doubt recovered within months if not sooner, reseeded by extensive surrounding reservoirs of unaffected plankton. However, if larvae of blue fin tuna were significantly diminished, the effects on the year-class structure of the whole Western Atlantic population would be affected, with multi-year consequences. Local populations of affected bottlenose dolphins or sea turtles, which are both broadly migratory and endangered, could be set back for years. We do not really know how long a 400-year old deepwater coral colony will take to recover. Moreover, where much pollution ended up, we do not know.

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Resilience in the ecosystems is partly compromised by human-induced stresses: the delta of the Mississippi Delta, agricultural pollution causing dead zones and more toxic algal blooms, seas that are warming, acidifying and rising, bottom trawling, overfishing, the vast steel oil and gas infrastructure, and introduced invasive species such as lionfish. Prudent stewardship can no longer rely on the resilience of ecosystems to clean up our mistakes.

#### INFORMATION REQUIRED BY THE FEDERAL RULES OF CIVIL PROCEDURE

1. This report contains my opinions, conclusions, and reasons therefor.
2. A general statement of my qualifications is contained in the Expert's Background section, page 4. A supplemental description of my qualifications is included in my attached CV, Appendix A.

<sup>109</sup> Peterson CJ, Rice SD, Short JW, Iker D, Bollen SL, Bellachey BS, Trono D (2003) Long-term ecosystem response to the Exxon Valdez oil spill. Science 301:1282-1289