

The Deepwater Horizon disaster and wetlands

Statement from the Environmental Concerns Committee Society of Wetland Scientists

Dennis F. Whigham, Chair
Stephen W. Broome
Curtis J. Richardson
Robert L. Simpson
Loren M. Smith

May 18, 2010

Coastal wetlands are essential components of healthy and productive coastal fisheries, and nowhere within the lower 48 states has the critical linkage between wetlands and fisheries resources been more clearly demonstrated than in the Gulf Mexico (e.g., Chesney et al. 2000, Crain et al. 1979). Louisiana alone, for example, generates 30% of the nation's seafood production (Day et. al., 2005) and accounts for 40% of the total wetlands in the conterminous United States (Richardson and Pahl 2006). The ongoing loss of wetland resources in the Gulf of Mexico and the potential economic and environmental costs, especially in Louisiana and Florida, is an issue of international concern. The impacts of the current oil spill are unknown but the potential for direct and indirect environmental damage to coastal ecosystem services are extraordinary. Both the oil and the activities used in the cleanup have the potential to adversely affect wetland flora and fauna.

Thus far, most of the oil has remained offshore but reports of oil reaching the coast have been geographically extensive ranging from Florida to Louisiana. The potential geographic extent of the spill could result in the exposure of many types of coastal wetlands to oil, ranging from mangroves in Florida, Texas, Mexico and islands in the Caribbean basin to tidal freshwater wetlands along the Gulf Coast. Most wetlands that will potentially be exposed to oil are saline and brackish tidal wetlands, which are nursery grounds for economically important coastal fish and shellfish. Seagrass beds are also at risk.

Experimental and monitoring studies around the world have found that oil commonly has a negative impact on emergent wetlands and the biota that reside in them (e.g., Lin et al. 2002). However, the degrees of impacts are variable and complex (Pezeshki et al. 2000), depending on the species composition of the wetland vegetation (e.g., Lin and Mendelsohn 1996), the amount and characteristics of the oil, the extent of weathering, and the geographic location of the wetland. Tropical and subtropical mangroves seem especially vulnerable to oil spills (e.g., Garrity and Levings 1993, Proffitt et al. 1995), as was demonstrated along the Persian Gulf following the Gulf War and in Panama following a major spill in 1986. Coastal wetlands in the Gulf of Mexico are also sensitive to oil as are species-rich tidal freshwater wetlands, although long term impacts span the gamut from rapid recovery within a growing season to delayed recovery for several years (Hester and Mendelsohn 2000). In

addition to direct impacts on emergent plants, oil that reaches wetlands also impacts animals that utilize the wetlands, especially benthic organisms that reside in the substrate.

Studies of impacted wetlands have demonstrated that wetlands can recover from the impacts of oil spills but the recovery process varies from extremely slow in mangroves swamps (e.g., Burns et al. 1993, 1994) to relatively rapid in grass-dominated marshes (Pahl et al. 2003). The recovery of coastal wetlands from the current oil spill will be further complicated due to current stress on wetland plant productivity from the ongoing 1 cm yr^{-1} relative sea level rise (Stumpf and Haines 1998) and land subsidence due to natural and human-related factors within the Louisiana coastal zone (Richardson and Pahl 2006).

The current oil spill in the Gulf of Mexico has also focused discussion on where offshore drilling should be allowed. The disaster at the Deepwater Horizon platform demonstrates that the placement of oil wells in deep offshore waters has the potential to have far-reaching geographic impact. The disaster has also demonstrated that current technologies are not adequate to assure that an accident of this magnitude in deep ocean areas can be effectively managed without enormous economic and environmental costs. While the short- and long-term impacts of the current oil spill on ecosystem services unfold, the Society of Wetlands Scientists supports (1) the immediate inspection of all offshore oil facilities and remediation, if required, to ensure that an accident of this type does not happen again and (2) a moratorium on all new deep-water oil exploration and extraction until further technological advances are available and tested to assure that the impacts of accidents of this sort can be managed efficiently to assure minimal negative impacts to coastal resources.

References

- Burns, K.A., S.D. Garrity, and S.C. Levings. 1993. How many years until mangrove ecosystems recover from catastrophic oil spills? *Marine Pollution Bulletin* 26: 239-248.
- Burns, K.A., S.D. Garrity, D. Jorissen, J. MacPherson, M. Stoelting, J. Tierney, and L. Yelle-Simmons. 1994. The Galeta Oil Spill. II. Unexpected persistence of oil trapped in mangrove sediments. *Estuarine, Coastal and Shelf Science* 38: 349-364.
- Chesney, E.J., D.M. Baltz, and R. G. Thomas. 2000. Louisiana estuarine and coastal fisheries and habitats: perspectives from a fishse eye view. *Ecological Applications* 10: 350-366.
- Craig, N.J. R.E. Turner, and J.W. Day Jr. 1979. Land loss in coastal Louisiana (U.S.A.) *Environmental Management* 3: 133-144.
- Day, J.W., Jr., J. Barras, E. Clairain, J. Johnston, D. Justic, G.P. Kemp, J. Ko, R. Lane, W.J. Mitsch, G. Steyer, P. Templet, and A. Yañez-Arancibia. 2005. Implications of global climatic change and energy cost and availability for the restoration of the Mississippi delta. *Ecological Engineering* 24: 253-265.
- Garrity, S.D. and S.C. Levings. 1993. Effects of an oil spill on some organisms living on mangrove (*Rhizophora mangle* L.) roots in Caribbean Panama. *Marine Environmental Research* 35: 251-271.

Hester, M. W. and I. A. Mendelssohn. 2000. Long-term recovery of a Louisiana brackish marsh plant community from oil-spill impact: vegetation response and mitigating effects of marsh surface elevation. *Marine Environmental Research* 49:233-254.

Lin, Q. and I.A. Mendelssohn, 1996. A comparative investigation of the effects of South Louisiana crude oil on the vegetation of fresh, brackish, and salt marshes. *Marine Pollution Bulletin* 32: 202-209.

Lin, Q., I.A. Mendelssohn, M.T. Suidan, K. Lee, and A.D. Venosa. 2002. The dose-response relationship between No. 2 fuel oil and the growth of the salt marsh grass, *Spartina alterniflora*. *Marine Pollution Bulletin* 44. 897-902.

Pahl, J. W., I. A. Mendelssohn, C. B. Henry, and T. J. Hess. 2003. Recovery trajectories after in-situ burning of an oiled wetland in coastal Louisiana, USA. *Environmental Management* 31:236-251.

Pezeshki, S.R., M.W. Hester, Q. Lin, and J.A. Nyman. 2000. The effects of oil spill and clean-up on dominant US Gulf coast marsh macrophytes: a review. *Environmental Pollution* 108: 129-139.

Proffitt, C.E., D.J. Devlin, and M. Lindsey. 1995. Effects of oil on mangrove seedlings grown under different environmental conditions. *Marine Pollution Bulletin* 30: 788-793.

Richardson, C. J. and J. W. Pahl. 2006. Katrina consequences assessment and projection Report. Chapter 23, in FEMA Report on Impacts of Hurricane Katrina. February 2006. Washington, D. C.

Stumpf, R. P. and J. W. Haines. 1998. Variations in tidal level in the Gulf of Mexico and implications for tidal wetlands. *Estuarine, Coastal, and Shelf Science* 46:165–173.

Society of Wetland Scientists Mission

The mission of the Society of Wetland Scientists is to promote understanding, scientifically based management, and sustainable use of wetlands. The current oil spill in the Gulf of Mexico has the potential to impact coastal wetlands and cause enormous short- and long-term damage to ecosystem services they provide. The potential short- and long-term economic costs are therefore massive and unprecedented.