

Abstract

The Physical Effects of Chemically and Physically Dispersed Oil on Wildlife

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The use of chemical dispersants are often discussed for larger spills (when appropriate and logistically feasible) due to the perceived advantage to the environment. Net environmental benefit analysis assumes that removing oil from the water surface and dispersing it into the water column will benefit marine wildlife by decreasing the risk of significant contamination to feathers or fur. The physical effect of chemical dispersants and dispersed oil, though, has been poorly investigated. The National Research Council (NRC) in 2005 described that limited available data suggested comparable toxicity of dispersed and untreated oil to seabirds and mammals, but found no conclusive information regarding the impacts of dispersed oil and dispersants in the waterproofing properties of fur and feathers. Evaluating the validity of these assumptions is critical because it is often a key factor in the decision on whether or not to use dispersants. Therefore, this project addresses the lack of scientific data on dispersant effects on wildlife by: 1) designing a system to exposure fur and feathers to dispersant and dispersed oil; 2) quantifying petroleum hydrocarbon (TPH) levels on individual feathers and hair; 3) assessing structural changes to feathers and hair associated with dispersant and/or oil exposure; and 4) evaluating dose-response relationships in these results with differing levels of dispersant and/or oil. Body feathers from common murre and hair trimmed from one Southern sea otter were exposed to Alaska North Slope crude and/or Corexit 9500 (Nalco-Exxon) in the following exposure groups: 1) mechanically dispersed oil, 2) oil mixed with dispersant, and 3) dispersant alone at three concentrations (low, medium and high). Resultant samples were digitally photographed both under a standard laboratory microscope and a transmission electron microscope, and a blinded observer scored observable damage to each sample. Samples were also analyzed for TPH levels at the Petroleum Chemistry Lab. The significant findings of this study will be presented.