Oiled Wildlife Care Network
Wildlife Health Center

PROJECT ABSTRACT

State the objectives, specific aims and the significance of the project, and describe the methodology used to achieve these goals. Avoid summaries of past accomplishments. The abstract is meant to serve as a succinct and accurate description of the work when separated from other portions of the proposal. Do not exceed the space allowed; 10 pt. font and single-spacing is allowed for this section only. Do not use abbreviations in the title.

P.I. NAME and AFFILIATION: Ronald Tjeerdema, Department of Environmental Toxicology, UCD
FUNDING AMOUNT REQUESTED: $37,944 (year 2)
PROJECT TITLE: EFFECTS OF CRUDE OIL AND DISPERSED OIL ON SPAWNING TOPSMELT (ATHERINOPS AFFINIS)

This is a continuation of an OSPR-OWCN study designed to examine the effects of dispersed and undispersed oil on the survival and development of topsmelt. The hypotheses to be tested are: 1) chemically-dispersed oil is significantly more toxic to gravid adult topsmelt than physically dispersed oil; and 2) exposure to oil can adversely impact spawning ability and the embryonic stages of this species. This project will compare the toxic impacts of the water-accommodated fraction (WAF) and the chemically-enhanced WAF (CEWAF, using Corexit 9500) of weathered Prudhoe Bay Crude Oil (PBCO) on the adult and embryonic stages of topsmelt (A. affinis), their ability to spawn and the production of viable offspring. During year 1, gravid topsmelt will be collected from a wild population and exposed for 96 h to a series of sublethal concentrations of either WAF or CEWAF using standardized methods through CROSERF (Singer et al. 2000), with a declining exposure protocol developed by our laboratory (Singer et al. 1990, 1993). Total petroleum hydrocarbons (TPH) and PAHs will be characterized by gas chromatography – mass spectrometry (GC-MS) as outlined in our previous projects with salmon. Exposed and non-exposed adults will be induced to spawn by manipulating culture temperature and lighting and separate cohorts of embryos spawned from non-exposed adults will be exposed to WAF or CEWAF for 96 h. Selected cohorts of spawned embryos which were exposed in vivo or after spawning will be isolated and cultured through embryonic development and larval hatching; and developmental abnormalities and hatching success will be monitored following methods described in Anderson et al. (1991). Surviving larvae will be cultured to assess long-term growth rates of juvenile topsmelt (Anderson et al. 1995). Results of exposures and relative sensitivities on embryos spawned from non-exposed adults will be compared to the ova exposed in vivo. Metabolomic analyses will be conducted on tissues from adult and embryonic fish from each exposure, to provide potential sublethal indicators of metabolic stress (Viant et al. 2003, Pincetich et al. 2005). Metabolomic methods will follow those described in previous OWCN projects evaluating oil effects on salmon smolts and pre-smolts (e.g. Tjeerdema et al. 2007). This project addresses the concerns of resource agencies on the relative effects of using dispersants to treat a coastal or estuarine oil spill - when spawning populations of estuarine fish species are present. Information on the relative effects of treating coastal oil spills with dispersant is necessary for resource managers to make informed response decisions.