

Harwell, Mark A. and John H. Gentile. 2006. Ecological significance of residual exposures and effects from the *Exxon Valdez* oil spill. *Integrated Environmental Assessment & Management* 2(3): 204-246.

ABSTRACT

An ecological significance framework is used to assess the ecological condition of Prince William Sound (PWS), Alaska, in order to address the current management question: Seventeen years following the *Exxon Valdez* oil spill (EVOS), are there any remaining and continuing ecologically significant exposures or effects on the PWS ecosystem caused by EVOS? We examined the extensive scientific literature funded by the Exxon Valdez Trustees or by ExxonMobil to assess exposures and effects from EVOS. Criteria to assess ecological significance include whether a change in a valued ecosystem component (VEC) is sufficient to affect the structure, function, and/or health of the system and whether such a change exceeds natural variability. EVOS occurred on 24 March 1989, releasing over 250,000 barrels of crude oil into PWS. Because PWS is highly dynamic, the residual oil was largely eliminated in the first few years, and now only widely dispersed, highly weathered or isolated small pockets of residual sources remain. Many other sources of PAHs exist in PWS from past or present human activities or natural oil seeps. Multiple-lines-of-evidence analyses indicate residual PAHs from EVOS no longer represent an ecologically significant exposure risk to PWS. To assess the ecological significance of any residual effects from EVOS, we examined the literature on more than 20 VECs, including primary producers, filter feeders, fish and bird primary consumers, fish and bird top predators, a bird scavenger, mammalian primary consumers and top predators, biotic communities, ecosystem-level properties of trophodynamics and biogeochemical processes, and landscape-level properties of habitat mosaic and wilderness quality. None of these has any ecologically significant effects that are detectable at present, with the exception of one pod of orcas and possibly one subpopulation of sea otters; however, in both those cases, PWS-wide populations appear to have fully recovered. Many other stressors continue to affect PWS adversely, including climate and oceanographic variability, increased tourism and shipping, invasive species, the 1964 earthquake, and over-exploitation of marine resources, with associated

cascading effects on populations of PWS fish and predators, but we conclude that the PWS ecosystem has now effectively recovered from EVOS.