Abstract:

Impacts of oil spills may be especially important when interacting with other environmental changes that have jeopardized a population. As late as the 1980s, Cassin’s Auklets (CAAU) were the second most abundant seabird breeding in California. However, from 1985 to 1994, the breeding population on the central California coast declined by 87% from 62,000 to 8,000 birds. They have not recovered since, and reached a 35-year low with nearly total breeding failure in 2005 and 2006. This decline has apparently resulted from effects of ocean conditions on foraging energetics, by altering prey abundance and the distance of feeding areas from colonies. About 20% of this population now nests in the Channel Islands, where they feed in a limited area mostly in and near a shipping lane for oil tankers. An oil spill in this key foraging area would potentially have three effects: (1) many CAAU would become oiled and need rehabilitation, (2) reduced access to their main feeding area during the oil spill and cleanup might impact their provisioning of chicks, and (3) if alternative feeding areas are inadequate, the birds might refuse to feed elsewhere and continue exposing themselves to oil. If the latter two effects are likely, then high priority should be given to cleaning oil from key feeding areas. To ensure prompt and effective responses, good protocols are needed to care for rehabilitated CAAU, and a firm ecological basis for cleanup priorities should be established before a spill occurs. This project addresses both these needs.

During the first year of this study (2004–2005), CAAU chicks were collected in British Columbia and transported to the University of Wyoming for rearing. While delaying research for a year until the birds reached adult age, we developed the document Cassin’s Auklet: Protocol for Collection, Transport, and Captive Husbandry which was submitted to OWCN. In the second year of funding (2006–2007), we have begun studies of dive costs in auklets needed to model impacts of oil spills on auklet populations. The auklets are being trained to dive in a swim channel for measurements of oxygen consumption. Also in the second year, we have done field work and analyses to characterize the diel vertical migration and dispersion of krill prey in upwelling ecosystems, information needed for modeling. In the third and final year, we will complete studies of dive costs, as well as quantify effects on dive costs of electronic recording devices which can be used for field measurements of changes in behavior due to oil spills. The auklets will then be transported to the Marine Wildlife Veterinary Care and Research Center (MWVCRC) in Santa Cruz, where rehabilitation is likely if an oil spill occurred. Protocols for captive care of CAAU will be adapted to conditions at the MWVCRC, including consultation with the OWCN facility in Fairfield. In modeling work supplemented by other funding, we will integrate dive cost measurements funded here with results from other studies of auklet movements and dive patterns in the Santa Barbara Channel (SBC), and of the patch structure of krill prey. Computer simulations will assess impacts on the auklets’ energy balance of foraging at different distances from the colony; these sites will include the main areas used in the SBC, and alternative areas if the main sites were unavailable during an oil spill and cleanup operations. These analyses will also indicate how the severity of oil-spill impacts on CAAU populations is affected by natural variations in prey availability.