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NONTARGET HAZARDS ASSOCIATED WITH EGG BAITS USED TO CONTROL CORVID DEPREDATIONS ON ENDANGERED CALIFORNIA LEAST TERN EGGS AT CAMP PENDLETON, CALIFORNIA—1990 (Abstract only)

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ABSTRACT: Several small nesting colonies of the endangered California least tern (*Sterna antillarum browni*) remain along the California coast. The largest of these is located on Camp Pendleton Marine Base in southern California. Many forms of disturbance have apparently contributed to the decline of this tern species, including corvid, primarily raven (*Corvus corax*), predation on the eggs. Efforts to eliminate corvid predation have primarily focused on shooting offending birds; this method is selective, but it has inherent public safety problems. In 1988, biologists from the Denver Wildlife Research Center (DWRC) and the U.S. Navy, in cooperation with USDA Animal Damage Control personnel, conducted a pilot study at Camp Pendleton to determine if corvids could be selectively removed by consuming hard-boiled chicken eggs treated with the avicide DRC-1339. Thirty-six treated eggs, 6 per clutch, were exposed in dummy ground nests in raven nesting territories in the vicinity of one of the tern colonies. Egg baits were readily consumed by ravens, but several others were cached. After selectively removing only three to four ravens with this method, the least tern fledging rate for 1988 at Camp Pendleton was the highest in recent years.

The success of this pilot study led to a series of Navy-funded studies conducted by DWRC biologists from 1989 through 1992, including investigations of the activities of ravens in the vicinity of tern colonies and the development/evaluation of potential methods to reduce corvid predation on least tern eggs. This abstract describes research conducted at Camp Pendleton in 1990 to identify species of nontarget animals that might consume (1) egg baits that could be used to deliver a toxicant and (2) the carcasses of corvids that might be killed by consuming toxicant-treated eggs.

Eighty-seven untreated eggs and 13 untreated corvid carcasses were placed in various habitats and locations within 4 to 5 km of tern colonies during the tern breeding season. Some were placed in known raven nesting territories. One to two eggs were secured to each of 15 4-ft-high bait platforms and placed on the ground at 7 locations. Eggs were replenished as necessary during an observation period. A fresh carcass was secured to the ground at each of 13 locations. Each site was observed continuously for approximately 72 to 96 hours by infra-red, motion-sensing cameras to determine nontarget activity.

No nontarget animals consumed eggs from platforms during 1,112 hours of observations. During 433 hours of observations of eggs on the ground, only one species of nontarget animal, the striped skunk (*Mephitis mephitis*), was recorded feeding on eggs at one station during the night. Gulls (*Larus* sp.) were continually present in large numbers in the vicinity of exposed eggs, but did not feed on them.

Observations of untreated corvid carcasses, monitored for 1,030 hours, revealed only occasional scavenging by skunk, opossum (*Didelphis marsupialis*), turkey vulture (*Cathartes aura*), and raven.

The data suggest that eggs used in a toxicant baiting operation (e.g., DRC-1339) to control corvids, or carcasses of corvids dying as a result of such a baiting operation, pose minimal nontarget hazards. Although there are no data available on the primary and secondary toxicity of DRC-1339 to the nontarget species observed in this study, data from other species tested with this compound suggest none is likely to be killed by ingesting DRC-1339-treated eggs, nor by scavenging corvid carcasses.

Of the 87 eggs used in this study, ravens and crows, the target species, consumed 22 (46%) of the 48 eggs placed on platforms. Thirty-three of the 39 eggs placed on the ground were consumed—7 (21%) by skunk(s) at one station at night and 26 (79%) by ravens, exclusively within nesting territories. It appears that ground baiting during daylight hours is the most effective method of exposing treated eggs to target corvids, while minimizing nontarget consumption of eggs.

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