CANADA GEESE INCUBATE EGGS LAID IN PREVIOUS YEARS

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In 1978 we initiated a study of the effects of heptachlor-treated cereal grains on wildlife, particularly the Canada Goose *(Branta canadensis)*, in the Columbia Basin (Blus et al. *in* Jarvis and Bartonek, Management and Biology of Pacific Flyway Geese, OSU Book Stores, Corvallis, OR, 1979: 105-116). To assess the impact of heptachlor and other pollutants on reproductive success of Great Basin Canada Geese *(B. c. moffitti)*, we collected a sample egg for pesticide analysis from each of 41 marked nests on the Umatilla National Wildlife Refuge in Oregon and Washington, and another series about 65 km upstream from Umatilla on the McNary Recreation Area, Washington. Geese in these two arid areas nest on islands in the Columbia River. Sample eggs collected from three active nests in mid-March were addled and the contents were gray. We judged that the three eggs were laid during a previous year because geese in this area initiate laying in early March, and two of the three nests contained unincubated, incomplete clutches that were ultimately completed and incubated.

Previous years' nests containing only old eggs were present on both study areas during our initial visits in mid-March; incomplete counts included 13 such nests at Umatilla and 4 at McNary that contained from one to six eggs. Examination of unhatched eggs at the end of the 1978 reproductive season revealed a number of other eggs that appeared old; however, we were unable to discern their age with certainty. A broken egg, apparently old, was found in each of five active goose nests that were all eventually abandoned.

To demonstrate that goose eggs in the Columbia Basin can persist overwinter, we located three clutches of abandoned eggs after the 1979 nesting season at Umatilla. We marked the 17 eggs in August and replaced them in marked nests such that one clutch of five was left intact and the other two clutches were divided with one egg placed in each of 12 nests. In the spring of 1980, we relocated 10 of the 13 nests; four eggs remained from the clutch of five and a single marked egg remained in each of three nests.

The incubation of old eggs was apparently related to two factors: (1) a number of nests contained abandoned eggs at the end of the breeding season; and (2) a number of these eggs persisted into the following reproductive season, due to the absence of scavengers and predators, and because the eggs' durability was such that they withstood extreme environmental conditions without breaking. Incubation of old eggs by geese is not unexpected in view of previously recorded incubation behavior. They are known to incubate such objects as pine cones and rocks (Knight and Erickson, West. Birds 8:108, 1977); they have been induced to nest in new nesting platforms by placing artificial eggs in the nest (Gibson and Buss, Northwest Sci. 46:318, 1972); they will nest in the same nest cup in successive years (McCabe, M.S. thesis, Oregon State Univ., Corvallis, 1976); and they usually accept and incubate eggs laid in their nests by other birds (Cooper, Wildl. Monogr. No. 61, 1978).

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