Life Expectancies of Five Passerine Species in the DDT Era

*by Edwin C. Franks**

Has environmental DDT contamination shortened the lives of our songbirds?

DDT and its derivatives, along with many other modern pesticides, have spread throughout our environment (George and Frear, 1966; Wurster and Wingate, 1968). Some of these man-made chemicals have had serious effects on organisms that were not the intended targets. The abundant evidence that birds are among the innocent victims of continent-wide pesticide contamination has been reviewed by Henny (1972).

DDT was first used in the early 1940's, and came into widespread use in the middle of that decade. Hickey and Anderson (1968) found that egg shells of the Bald Eagle *(Haliaeetus leucocephalus)*, Peregrine Falcon *(Falco peregrinus)*, and Osprey *(Pandion haliaetus)* in museum collections became noticeably thinner beginning about 1947; they concluded that this thinning is caused by the presence of derivatives of DDT in the birds' diet. As far as wildlife is concerned, therefore, the DDT era began in the late 1940's.

Has the presence of DDT derivatives in the environment had a measurable effect on the life span of adult passerine birds? To determine this, bird band recapture records were used to compare the life expectancy of adults hatched before 1946 with the life expectancy of adults hatched after 1949.

METHODS

Bird band recapture records through August 1970 for five species in four passerine families were obtained from the Bird Banding Laboratory. Records used in the determination of the life expectancy for each species were of those birds that (1) were banded at a known age, (2) were banded no later than 1963 (to allow at least 7 years for the last group to have a chance to be recaptured), (3) were not treated experimentally at the time of banding, and (4) were dead when last found.

To calculate life expectancies, life tables were constructed according to the composite method of Hickey (1952). In this method, band recaptures at known ages for a large number of individuals of a species can be compiled to reveal the mortality rates and further life to be expected at any age.

In the analysis, each of the five species was divided into two groups: those hatched before 1946 (before the DDT era), and those hatched after 1949 (within the DDT era). To compare the two groups, I have used the number of years of further life to be expected on a birds' first January 1 of life. This date was selected so that the high or unsettled mortality rates of younger birds would not bias the results (Lack, 1946; Farner, 1949).

RESULTS

The life expectancies of birds in each of the five species is shown in Table 1. In each group, the sample size is the number of banded birds meeting the requirements listed above.

The available sample of Brewer's Blackbirds lived longer before the DDT era, Blue Jays and Golden-crowned Sparrows showed longer life within the DDT era, and Brown Thrashers and

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White-crowned Sparrows showed no change A t-test using paired samples (Freund, Livermore, and Miller, 1960) confirmed that the life expectancy of birds hatched before the DDT era was not significantly different from the life expectancy of birds hatched within the DDT era.

Table 1
Years of Further Life Expectancy at First January 1 of Life

Species	Hatched before 1946		Hatched after 1949	
	Further life expectancy	Sample size	Further life expectancy	Sample size
Blue Jay *(Cyanocitta cristata)*	1.9	(232)	2.1	(559)
Brown Thrasher *(Toxostoma rufum)*	1.8	(55)	1.8	(88)
Brewer's Blackbird *(Euphagus cyanocephalus)*	1.6	(44)	1.2	(38)
Golden-crowned Sparrow *(Zonotrichia atricapilla)*	1.2	(53)	1.9	(46)
White-throated Sparrow *(Zonotrichia albicollis)*	1.1	(59)	1.1	(72)
Mean and Total	1.5	(443)	1.6	(803)

DISCUSSION

It is comonly known that pesticides seriously affect certain bird populations, yet the results shown here indicate no effect. There are two explanations for this apparent discrepancy.

First, the life expectancies reported here were of birds that successfully reached their first January 1. There is no firm evidence that *adults* of any bird species are being killed by continent-wide pesticide contamination (Henny, 1972). Generally, pesticides are affecting certain bird populations by upsetting the reproductive physiology, not by killing the adults.

Second, in bird species where pesticides have been incriminated as the cause of population decline, the diet is often primarily of birds or fish (Peterson, 1969; Henny, 1972). These affected species, like the Osprey and the Brown Pelican *(Pelecanus occidentalis)* are high on the food chain. Being at the third or fourth consumer level, their foods may contain considerable quantities of certain pesticides. On the other hand, most passerine birds, like the five species studied here, are low on the food chain. Their diet of seeds, fruits, and herbivorous insects provides little room for concentrating pesticides in their diet. So even if there *were* adult bird mortality due to the build-up of pesticides in the food chain, we would find it first in the piscivorous and raptorial birds, not in the passerines.

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