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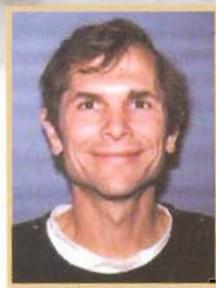


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Rachel Carson's Legacy

for Research and Monitoring at the USGS Patuxent Wildlife Research Center

by Dr. John R. Sauer



Rachel Carson spent a good part of her working life as a U.S. Fish and Wildlife Service (FWS) employee. As is true for many FWS employees, her job was a bully pulpit; it enhanced her understanding of the natural history and wildlife she described so gracefully, and positioned her on the stage she took so forcefully later in life. Working with the sacred places and trust animals overseen by the agency, put her in the bulls-eye of the environmental issues that she forcefully and effectively pursued.

Writing was her craft and her primary job in FWS. By interacting with FWS employees to write informational and educational pamphlets, she was able to experience a wide range of FWS activities and to see firsthand the issues confronting wildlife. However, she also edited materials produced by FWS researchers, and this part of her job, although perhaps less glamorous than the field experiences, gave her a front row view of the emerging crisis in pesticide use.

Her work opened a door to government research into contaminant and environmental influences on changes in wildlife populations.

FWS employees were concerned about the effects of DDT and other pesticides well before they became a topic of public debate. In the mid-to-late 1940s, researchers at the Patuxent Wildlife Research Center and elsewhere were producing reports on the direct and indirect mortality related to exposure to pesticides.

Critically reading all those reports and soaking in the consistent messages about the deleterious effects of pesticides must have helped to form Carson's perception of the emerging crisis. A great part of the allure of *Silent Spring* is its melding of science, advocacy, and description of the ways information is used and misused to form public views of complicated issues. Her professional experience imbedded in her the literature of the emerging science of pesticide effects; her talent for synthesis made the FWS research experience an intrinsic component of *Silent Spring*.

Another line of evidence that Carson used in her synthesis was observations of changes in animal numbers. In *Silent Spring*, Carson graphically describes the decline in juvenile Bald eagles seen at Hawk Mountain. FWS, the National Audubon Society, Hawk Mountain, and many other organizations had collected information that described changes in bird populations, but often these data were not effectively summarized or used.

For Carson, the often anecdotal wildlife monitoring data were of critical importance in focusing our attention on a changing world. By connecting the monitoring data to a management issue, she showed the value of the information and highlighted a problem that focused public interest and political pressure on addressing the crisis facing this emblematic species. She also highlighted the uncertainty about the cause of the changes, asking the critical question about why the eagles were apparently not reproducing.

As Carson was influenced by research results about pesticides and bird population data, her influence on the path of FWS research is equally striking. *Silent Spring* created a public interest, political impetus, and agency willingness that encouraged wildlife research in the FWS; administrators were open to starting research programs and other activities that would help to fill in the gaps in our knowledge about mechanisms and population-level effects of pesticides on wildlife.

At the Patuxent Wildlife Research Center, research initiated in the years after the publication of *Silent Spring* has become the core of the Center's research program; her influence was particularly profound for research into both pesticides and bird populations. Even though Carson never worked at the Center, their work became so closely identified with her work that many new employees simply assume that she had worked there. For many years, her presence was evoked by a large photograph prominently displayed in the Center Library.

Dr. Lucille Stickel, a distinguished researcher at Patuxent and Center Director from 1973 to 1982, built a large research program focused on laboratory studies to specify the effects of pesticide exposure on reproduction and mortality. As a government facility, pesticide research was not subject to the conflicts of interest associated with corporate funding that limits some academic research into the topic. Contaminant specialists hired in the 1960s and 1970s at Patuxent became authorities in their topics, and produced a wide range of innovative publications focused on understanding how pesticides modified animal physiology and limited survival or reproduction. The research had the credibility of impartiality and had a major influence, leading to the ban of organochloride pesticides in 1972.

In the following years, Lucille Stickel led the Center, providing a focus and intellectual rigor that maintained the quality of the research. Although that cohort of scientists is now on (or over) the cusp of retirement, and Lucille Stickel died in 2007, the value of their unique role is still acknowledged by the active government research into emerging pesticide threats to wildlife, both at Patuxent and at other government agencies such as the EPA.

The issues and affected species change over time (nowadays, topics such as atrazine effects on amphibians and chemicals that disrupt endocrine activity are 'hot topics'), but Carson's advocacy enhanced the ability of government researchers to produce credible, reliable science on the effects of anthropogenic chemicals released to the environment. This research is still often the most credible science applied to the myriad chemicals our society pours into nature through drains or through pesticide applications.

Carson's concern about pesticide effects on wildlife also influenced FWS wildlife population studies, providing a motivation for development of monitoring programs. Were pesticides damaging populations of widespread and abundant species? Many of the species Carson identified as being at risk from pesticide applications were not within the traditional focus of FWS research, which had tended to emphasize harvested species. Now, a reason existed for FWS to track populations of songbirds. Chandler S. Robbins was able to use her work as a rationale for starting the North American Breeding Bird Survey (BBS), which is now the primary monitoring program for many of



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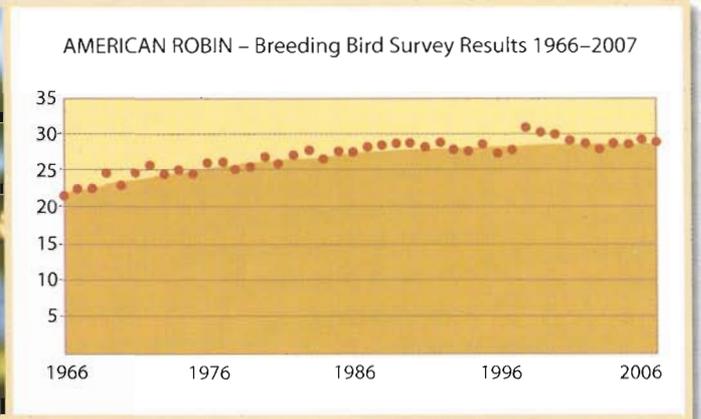


Figure 1. Graph of population change in American Robins (*Turdus migratorius*) from the North American Breeding Bird Survey. The Breeding Bird Survey collects information on over 420 species of birds, and was developed in response to the need for better monitoring data on birds thought to be declining in response to pesticide use.

the species that Carson highlighted in *Silent Spring* (Figure 1).

For bird conservation, the influence of Chan's survey and research innovations has been enormous. The BBS is now used as the information base to evaluate the consequences of all factors that might influence birds, including pesticide use, land use changes, and the introduction of West Nile Virus. BBS data are also used to develop predictive models to assess consequences of environmental change, most notably for predicting the effects of climate change on birds.

Of course, all these comments about the influence of Carson's career experience on her path to activism are speculative. It is striking, however, to read early pesticide research reports and see the effort devoted by the FWS to documenting the negative effects of indiscriminate use of pesticides.

While it may be presumptuous to sug-

gest too close a connection between Carson's work and the agency that employed her for part of her career, it is undeniable that her work opened a door to government research both into pesticide (and more generally, contaminant) research and into a much more general realm of investigation of environmental influences on changes in wildlife populations. The primary monitoring survey in bird conservation was rationalized with her work, and so to this day her vision still influences and encourages this research. ■



Dr. John Sauer is a Research Wildlife biologist at USGS Patuxent Wildlife Research Center. John has a PhD in Systematics and Ecology. For more information on the work conducted at the Laurel, Maryland facility visit <http://www.pwrc.usgs.gov>

On Global Warming

"The issue of climate change is one that we ignore at our own peril. There may still be disputes about exactly how much we're contributing to the warming of the earth's atmosphere and how much is naturally occurring, but what we can be scientifically certain of is that our continued use of fossil fuels is pushing us to a point of no return. And unless we free ourselves from a dependence on these fossil fuels and chart a new course on energy in this country, we are condemning future generations to global catastrophe." — SENATOR BARACK OBAMA

"Our nation has both an obligation and self-interest in facing head-on the serious environmental, economic, and national security threat posed by global warming."

— SENATOR JOHN MCCAIN