

PCB Poisoning in a Red-Tailed Hawk (*Buteo jamaicensis*) near a Site of Terrestrial Contamination in New York State

W. B. Stone, J. C. Okoniewski

Wildlife Pathology Unit, New York State Department of Environmental Conservation,
108 Game Farm Road, Delmar, NY 12054, USA

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Documented effects of polychlorinated biphenyls (PCBs) on wild birds have mostly been related to their likely involvement in the reproductive impairment of fish-eating species via embryotoxicity and aberrant parental behavior, particularly on some of the North American Great Lakes in the 1960's and 70's (see Gilbertson et al. 1991 for a review). Documented incidents of outright lethal intoxication of fully grown adult birds are rare. The most well-known of these concerned the die-off of ring-billed gulls (*Larus delawarensis*) on Lake Ontario in the early 1970's (Sileo et al. 1977). Otherwise, the only other case in the literature where the level of PCBs in the brain exceeded diagnostic minimums suggested by experimentation (reviewed in Hoffman et al. 1996) involved a great horned owl (*Bubo virginianus*) found moribund along the Hudson River in New York State in 1981 (Stone and Okoniewski 1983). Other published cases where PCB poisoning appears to be a possibility include those which involved eagle owls (*Bubo bubo*) from the Baltic coast in Sweden (Odsjo 1973), a bald eagle from Michigan in 1972 (Cromartie et al. 1975), a great blue heron (*Ardea herodias*) found dead along the Sheboygan River in Wisconsin in 1976 (Heinz et al. 1984) and, perhaps, a goshawk (*Accipiter gentilis*) from Western Norway in 1978 with 1260 ppm PCB in its liver (Froslie et al. 1986). The following is a report of PCB intoxication, perhaps one of the most unequivocal to date, in a banded red-tailed hawk (*Buteo jamaicensis*) found debilitated near a site of known PCB contamination in western New York State (Erie County, Town of Cheektowaga) on 29 April 1996.

MATERIALS AND METHODS

The bird was submitted to the Erie County ASPCA animal shelter where it was administered fluids and atropine on suspicion of poisoning. The hawk died overnight and the carcass was frozen and later shipped to our laboratory on 10 February 1997. A necropsy was performed on 11

February and tissues for toxicological analysis were placed in glass jars and frozen. One-half of the brain was shipped to an analytical laboratory (En Chem, Inc., Madison, WI) for quantification of organochlorine pesticides and PCBs by gas chromatography following EPA method 8081 (USEPA 1996) with modifications. Recovery of pesticides in a spiked sample in the run mostly ranged between 88% and 120% (outliers were endosulfan sulfate (160%), beta BHC (70%), and endrin aldehyde (15%)). Recovery of decachlorobiphenyl (surrogate spike) in the samples run with the red-tailed hawk brain ranged from 69-125% with two exceptions: a waterfowl fat sample, and the hawk brain. In the fat sample, recovery was 217% due most likely to coelution with interferences present in the sample. Because of the enormous PCB level in the brain, the decachlorobiphenyl was not detectable after necessary dilutions were done.

RESULTS AND DISCUSSION

Seizures were observed by animal shelter personnel while the bird was in captivity. At necropsy this adult female red-tail was found to be in fair flesh, lacking notable grossly visible fat deposits, and was without any significant gross pathologic lesions. There was little in the alimentary canal. These are typical findings for organochlorine pesticide poisonings (Okoniewski and Novesky 1993). Analyses revealed 760 ppm (wet basis) PCBs (characterized as Aroclor 1260) in brain tissue. Also present were DDE (2.1 ppm), dieldrin (1.1 ppm), heptachlor epoxide (0.28 ppm), oxychlordan (0.32 ppm) and trans-nonachlor (0.063 ppm). The PCB level in the brain of the red-tail was at or beyond the high end of the range observed in experimental dosage/feeding studies for a number of species (reviewed in Hoffman et al. 1996). Of the pesticides detected, only dieldrin was at a level of any possible toxicological significance (Heinz and Johnson 1982).

U.S. Fish and Wildlife Service banding records and subsequent inquiries revealed that this bird had suffered an episode of debilitation two years previously. On 16 January 1994 it was found in a weakened state at a shopping mall less than 2 km from where it was recovered in 1996. It reportedly responded well to heat and food and was released about a month later. No central nervous system signs were observed during that episode.

The source of the PCBs was almost certainly the contamination around an electrical transformer manufacturing facility (TMF) less than 0.5 km from where the hawk was found on 29 April. Red-tailed hawks had nested in a wooded area on the west side of an industrial park within a few hundred meters SSW of the TMF for at

least six years prior to the death of this bird (T. O'Day, personal communication). The contaminated TMF is also bordered by an open undeveloped parcel to the east and a series of three cemeteries to the West. The land immediately north of the TMF is occupied primarily by light industries.

Prior to remediation activities begun later that year, PCBs in surface soils between the main TMF building and the cemetery ranged from 10,000 to 280,000 ppm, dry weight (NYSDEC 1993). Levels in excess of 500 ppm were found in the sediment of a ditch draining stormwater from the property. This ditch discharged into a culvert under a railroad bed and subsequently into an open ditch which ran through the industrial park where the hawk nests were located. PCB levels in the sediments of this latter ditch ranged up to 32 ppm, although most samples contained <10 ppm. Levels in soils bordering the ditches ranged from 1 to 160 ppm near the cemetery and were between 2.8 and 11.8 ppm along the ditch below the culvert. This degree of soil contamination is roughly similar to a site in eastern New York State we investigated in the early 1980's (Watson et al. 1985) where we found substantial PCB levels in the skinned carcasses (alimentary canal removed) of some small mammals: up to 3.0 ppm in *Peromyscus leucopus*, 4.1 ppm in *Microtus pennsylvanicus*, 5.7 ppm in *Cryptotis parva* and 166 ppm in *Blarina brevicauda*. It is likely that analysis of small mammals in the vicinity of the TMF site prior to remediation would have yielded similar levels. Given the tendency for PCBs to reach high levels at the top of food chains (Jensen et al. 1969, Winter and Streit 1992), it is not surprising that lethal intoxication of the red-tail occurred. Impacts on fitness and reproduction in other species in the local animal community probably occurred as well. This case is an excellent example of the degree of threat posed by terrestrial PCB contamination to resident fauna.

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