

Dioxin and Dioxin-like PCB Exposure and Risk Estimation of Common Cormorant in Japan

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Abstract

The concentrations of contaminants (PCDD/Fs: 33,000 pg/g fat, dioxin-like PCBs: 33,000 ng/g fat) in the liver of common cormorant are significantly higher than those in ten other species of birds that belongs to different ecology. 2378-substituted PCDD/Fs comprised 97% and 90%, respectively, to the total PCDD/Fs in the liver and egg. Particularly, 12378-PeCDD and 23478-PeCDF have shown the greatest contribution to TEQ because of the high load of these congeners in avian liver. The high bio-magnification factor (BMF) and the maximum TEF value of 1 for these congeners are also taken into further consideration. The half-lives of 2378-TCDD in common cormorant are conjectured by using an analysis value of fish and liver of cormorant for 43 days. The half-lives ranges from three days for 2378-TCDF to 122 days for 1234789-HpCDF. In addition, the half-lives of mono-*ortho* PCBs were found in the ranges from few hundred days to several years. Using tissue distribution data and half-lives, risk transition of the exposure of PCDD/Fs and dioxin-like PCBs and egg mortality of common cormorant in the past were predicted. Consequently, using only sediment data, we further estimated biota-sediment accumulation factors (BSAFs) and their transport to the cormorants that feed on fish in the same environment. Therefore, the risk transition was estimated to be two times higher in the 1970s because of elevated dioxin-like PCBs during that period compared to the current time. Eventually, risk transition seems to have declined after the 1970s due to emergence of regulatory policies.