

## A Physiologically-based Model for Methylmercury Uptake and Accumulation in Female American Kestrels

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A physiologically-based model was developed to describe the uptake, distribution, and elimination of methylmercury in female American Kestrels (*Falco sparverius*). The model was adapted from established models for methylmercury in rodents. Features unique to the model include methylmercury deposition into eggs and five feather compartments (primaries, secondaries, coverts, retricies, and body feathers). Where possible, model parameters and the timing of key events (egg laying, molting of each feather type) were determined using observations from American Kestrels or other Kestrel species. Additional parameters were fitted to describe the observed kinetics of methylmercury in controlled exposures of American Kestrels. The model reproduces trends observed in studies with Kestrels and other avian species, including declining methylmercury concentrations in sequentially laid eggs and rapid depletion of whole-body methylmercury concentration with the onset of feather molt. Because the model explicitly accounts for methylmercury deposition into feathers, it can be used to predict similarities and differences in kinetics among species with different molting patterns.