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<td>Scientific Name</td>
<td>Predominant Habitat</td>
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<tr>
<td>Rainbow trout</td>
<td>Oncorhynchus mykiss (formerly Salmo gairdneri)</td>
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<td><strong>Trout-perches - Family Percopsidae</strong></td>
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### TABLE 2-1
**HUDSON RIVER FISHES**

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<th>Common Name</th>
<th>Scientific Name</th>
<th>Predominant Habitat</th>
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<td>Trout-perch</td>
<td><em>Percopsis omiscomaycus</em></td>
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<td><strong>Wrasses - Family Labridae</strong></td>
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<td>Cunner</td>
<td><em>Tautogolabrus adspersus</em></td>
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<td>Tautog</td>
<td><em>Tautoga onitis</em></td>
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Notes: Fish are not found exclusively in predominant habitats.
TABLE 2-2
TYPICAL FISH AGGREGATIONS IN THE UPPER HUDSON RIVER

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<th>Shore area</th>
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<td>Gizzard shad</td>
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<table>
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<td>Largemouth bass</td>
<td>White catfish</td>
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<td>Rock bass</td>
<td>Largemouth bass</td>
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<tr>
<td>Redbreast sunfish</td>
<td>Walleye</td>
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<table>
<thead>
<tr>
<th>Vegetated backwater</th>
<th>Major tributaries</th>
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<tr>
<td>Brown bullhead</td>
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<tr>
<td>Yellow perch</td>
<td>Smallmouth bass</td>
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<tr>
<td>Goldfish</td>
<td>Redbreast sunfish</td>
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<tr>
<td>Golden shiner</td>
<td>Yellow perch</td>
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<td>Banded killifish</td>
<td>Largemouth bass</td>
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<td>Goldfish</td>
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<tr>
<td>White sucker</td>
<td>Rock bass</td>
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<tr>
<td>Gizzard shad</td>
<td>Bluegill</td>
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<tr>
<td>Northern pike</td>
<td>Black crappie</td>
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<tr>
<td>Emerald shiner</td>
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<td>Rock bass</td>
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<td>Redbreast sunfish</td>
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<tr>
<td>Bluegill</td>
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<tr>
<td>Smallmouth bass</td>
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<table>
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<tr>
<th>Offshore shoals and channel</th>
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<tr>
<td>Tessellated darter</td>
<td>Hogchoker</td>
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<td>White catfish</td>
<td>Shortnose sturgeon</td>
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<td>White sucker</td>
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Notes: Species are listed in order of abundance, excluding widespread species.
### AMPHIBIANS POTENTIALLY FOUND ALONG THE HUDSON RIVER

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
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<tbody>
<tr>
<td><strong>Order Caudata - Salamanders</strong></td>
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<tr>
<td>Allegheny Dusky Salamander</td>
<td>Desmognathus ochrophaeus</td>
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<tr>
<td>Blue-spotted Salamander</td>
<td>Ambystoma laterale</td>
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<tr>
<td>Common Mudpuppy</td>
<td>Necturus maculosus</td>
</tr>
<tr>
<td>Four-toed Salamander</td>
<td>Hemidactylium scutatum</td>
</tr>
<tr>
<td>Jefferson Salamander</td>
<td>Ambystoma jeffersonianum</td>
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<tr>
<td>Marbled Salamander</td>
<td>Ambystoma opacum</td>
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<tr>
<td>Northern Dusky Salamander</td>
<td>Desmognathus fuscus</td>
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<tr>
<td>Northern Spring Salamander</td>
<td>Gyrinophilus p. porphyriticus</td>
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<tr>
<td>Northern Redback Salamander</td>
<td>Plethodon c. cinereus</td>
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<td>Northern Slimy Salamander</td>
<td>Plethodon glutinosus</td>
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<td>Northern Two-lined Salamander</td>
<td>Eurycea bislineata</td>
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<tr>
<td>Northern Red Salamander</td>
<td>Pseudotriton r. ruber</td>
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<tr>
<td>Red-spotted or Eastern Newt</td>
<td>Notophthalmus v. viridescens</td>
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<tr>
<td>Spotted Salamander</td>
<td>Ambystoma maculatum</td>
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<tr>
<td><strong>Order Anura - Toads and Frogs</strong></td>
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<tr>
<td><strong>Toads</strong></td>
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<tr>
<td>Eastern American Toad</td>
<td>Bufo a. americanus</td>
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<tr>
<td>Eastern Spadefoot</td>
<td>Scaphiopus holbrookii</td>
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<tr>
<td>Fowler's Toad</td>
<td>Bufo fowleri</td>
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<tr>
<td><strong>Family Ranida- True Frogs</strong></td>
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</tr>
<tr>
<td>Bullfrog</td>
<td>Rana catesbeiana</td>
</tr>
<tr>
<td>Gray Treefrog</td>
<td>Hyla versicolor</td>
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<tr>
<td>Green Frog</td>
<td>Rana clamitans melanota</td>
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<tr>
<td>Northern Spring Peeper</td>
<td>Pseudacris c. crucifer</td>
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<tr>
<td>Northern Cricket Frog</td>
<td>Acris c. crepitans</td>
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<tr>
<td>Northern Leopard Frog</td>
<td>Rana pipiens</td>
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<tr>
<td>Pickerel Frog</td>
<td>Rana palustris</td>
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# Table 2-4

## Reptiles Potentially Found Along the Hudson River

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<thead>
<tr>
<th>Common Name</th>
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<tbody>
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<tr>
<td>Blanding's Turtle</td>
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<tr>
<td>Bog turtle</td>
<td><em>Clemmys muhlenbergi</em></td>
</tr>
<tr>
<td>Common snapping turtle</td>
<td><em>Chelydra serpentina</em></td>
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<tr>
<td>Diamondback terrapin</td>
<td><em>Malaclemys terrapin</em></td>
</tr>
<tr>
<td>Eastern box turtle</td>
<td><em>Terrapene carolina</em></td>
</tr>
<tr>
<td>Map turtle</td>
<td><em>Graptemys geographica</em></td>
</tr>
<tr>
<td>Northern water snake</td>
<td><em>Nerodia sipedon</em></td>
</tr>
<tr>
<td>Painted turtle</td>
<td><em>Chrysemys picta</em></td>
</tr>
<tr>
<td>Red-eared Slider</td>
<td><em>Trachemys scripta elegans</em></td>
</tr>
<tr>
<td>Spotted turtle</td>
<td><em>Clemmys guttata</em></td>
</tr>
<tr>
<td>Stinkpot/ common musk turtle</td>
<td><em>Sternotherus odoratus</em></td>
</tr>
<tr>
<td>Wood turtle</td>
<td><em>Clemmys insculpta</em></td>
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<tr>
<td><strong>Order Squamata - Lizards and Snakes</strong></td>
<td></td>
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<tr>
<td><strong>Suborder Lacertilia - Lizards</strong></td>
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<tr>
<td>Five-lined Skink</td>
<td><em>Eumeces fasciatus</em></td>
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<tr>
<td>Northern Coal Skink</td>
<td><em>Eumeces a. anthracinus</em></td>
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<tr>
<td>Northern Fence Lizard</td>
<td><em>Sceloporus undulatus hyacinthinus</em></td>
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<tr>
<td><strong>Suborder Serpente- Snakes</strong></td>
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</tr>
<tr>
<td>Northern Water Snake</td>
<td><em>Nerodia s. sipedon</em></td>
</tr>
<tr>
<td>Northern Redbelly Snake</td>
<td><em>Storeria o. occipitomaculata</em></td>
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<tr>
<td>Common Garter Snake</td>
<td><em>Thamnophis sirtalis</em></td>
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<tr>
<td>Eastern Ribbon Snake</td>
<td><em>Thamnophis sauritus</em></td>
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<tr>
<td>Eastern Hognose Snake</td>
<td><em>Heterodon platirhinos</em></td>
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<tr>
<td>Northern Ringneck Snake</td>
<td><em>Diadophis punctatus edwardsii</em></td>
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<tr>
<td>Eastern Worm Snake</td>
<td><em>Carphophis a. amoenus</em></td>
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<td>Northern Black Racer</td>
<td><em>Coluber c. constrictor</em></td>
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<tr>
<td>Smooth Green Snake</td>
<td><em>Liochlorophis vernalis</em></td>
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<tr>
<td>Black Rat Snake</td>
<td><em>Elaphe o. obsoleta</em></td>
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<tr>
<td>Eastern Milk Snake</td>
<td><em>Lampropeltis t. triangulum</em></td>
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<tr>
<td>Northern Copperhead</td>
<td><em>Agkistrodon contortrix mokasen</em></td>
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<tr>
<td>Timber Rattlesnake</td>
<td><em>Crotalus horridus</em></td>
</tr>
<tr>
<td>Northern Brown Snake</td>
<td><em>Storeria d. dekayi</em></td>
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<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
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<tr>
<td>Acadian Flycatcher</td>
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<td>Alder Flycatcher</td>
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<td>Botaurus lentiginosus</td>
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<td>American Robin</td>
<td>Turdus migratorius</td>
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<td>American Kestrel</td>
<td>Falco sparverius</td>
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<td>American Goldfinch</td>
<td>Carduelis tristis</td>
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<td>American Coot</td>
<td>Fulica americana*</td>
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<td>American Black Duck</td>
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<td>Setophaga ruticilla</td>
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<td>Parus atricapillus</td>
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<td>Black-crowned Night-Heron</td>
<td>Nycticorax nycticorax</td>
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<td>Dendroica caerulescens</td>
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<td>Dendroica virens</td>
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<td>Blackburnian Warbler</td>
<td>Dendroica fusca</td>
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<td>Blue Jay</td>
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<td>Anas discors</td>
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<td>Vermivora pinus</td>
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<td>Blue-winged &amp; Golden-winged Warbler Hybrids</td>
<td>Vermivora pinus &amp; Vermivora chrysoptera</td>
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<td>Bobolink</td>
<td>Dolichonyx oryzivorus</td>
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<tr>
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<td>Geothlypis trichas</td>
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<td>Common Name</td>
<td>Scientific Name</td>
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<tr>
<td>Common Merganser</td>
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<td>Sayornis phoebe</td>
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<td>Grasshopper Sparrow</td>
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<td>Indigo Bunting</td>
<td>Passerina cyanea</td>
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<td>Kentucky Warbler</td>
<td>Oporornis formosus</td>
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<td>Killdeer</td>
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<td>Laughing Gull</td>
<td>Larus atricilla*</td>
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<td>Lanius ludovicianus</td>
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<td>Asio otus</td>
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<tr>
<td>Louisiana Waterthrush</td>
<td>Seiurus motacilla</td>
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<tr>
<td>Magnolia Warbler</td>
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<tr>
<td>Mallard x American Black Duck</td>
<td>Anas platyrhynchos x rubripes</td>
</tr>
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<td>Mallard</td>
<td>Anas platyrhynchos</td>
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## TABLE 2-5

**BREEDING BIRDS OF THE HUDSON RIVER**

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<thead>
<tr>
<th>Common Name</th>
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<tbody>
<tr>
<td>Marsh Wren</td>
<td>Cistothorus palustris</td>
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<tr>
<td>Mourning Dove</td>
<td>Zenaidea macroura</td>
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<tr>
<td>Mute Swan</td>
<td>Cygnus olor</td>
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<tr>
<td>Nashville Warbler</td>
<td>Vermivora ruficapilla</td>
</tr>
<tr>
<td>Northern Bobwhite</td>
<td>Colinus virginianus</td>
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<td>Northern Rough-winged Swallow</td>
<td>Stelgidopteryx serripennis</td>
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<td>Icterus galbula</td>
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<td>Northern Pintail</td>
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<td>Northern Flicker</td>
<td>Colaptes auratus</td>
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<td>Northern Mockingbird</td>
<td>Mimus polyglottos</td>
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<tr>
<td>Northern Harrier</td>
<td>Circus cyaneus</td>
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<td>Northern Cardinal</td>
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<td>Icterus spurius</td>
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<td>Osprey</td>
<td>Pandion haliaetus</td>
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<td>Ovenbird</td>
<td>Seiurus aurocapillus</td>
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<td>Pied-billed Grebe</td>
<td>Podilymbus podiceps</td>
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<tr>
<td>Pileated Woodpecker</td>
<td>Dryocopus pileatus</td>
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<tr>
<td>Pine Warbler</td>
<td>Dendroica pinus</td>
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<td>Prairie Warbler</td>
<td>Dendroica discolor</td>
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<td>Purple Martin</td>
<td>Progne subis</td>
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<td>Purple Finch</td>
<td>Carpodacus purpureus</td>
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<td>Red-bellied Woodpecker</td>
<td>Melanerpes carolinus</td>
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<tr>
<td>Red-breasted Merganser</td>
<td>Mergus serrator</td>
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<tr>
<td>Red-breasted Nuthatch</td>
<td>Sitta canadensis</td>
</tr>
<tr>
<td>Red-eyed Vireo</td>
<td>Vireo olivaceus</td>
</tr>
<tr>
<td>Red-headed Woodpecker</td>
<td>Melanerpes erythrocephalus</td>
</tr>
<tr>
<td>Red-shouldered Hawk</td>
<td>Buteo lineatus</td>
</tr>
<tr>
<td>Red-tailed Hawk</td>
<td>Buteo jamaicensis</td>
</tr>
<tr>
<td>Red-winged Blackbird</td>
<td>Agelaius phoeniceus</td>
</tr>
<tr>
<td>Ring-necked Pheasant</td>
<td>Phasianus colchicus</td>
</tr>
<tr>
<td>Rock Dove</td>
<td>Columbia livia</td>
</tr>
<tr>
<td>Rose-breasted Grosbeak</td>
<td>Pheucticus ludovicianus</td>
</tr>
<tr>
<td>Ruby-throated Hummingbird</td>
<td>Archilochus colubris</td>
</tr>
<tr>
<td>Ruddy Duck</td>
<td>Oxyura jamaicensis</td>
</tr>
<tr>
<td>Ruffed Grouse</td>
<td>Bonasa umbellus</td>
</tr>
<tr>
<td>Rufous-sided Towhee</td>
<td>Pipilo erythrophthalmus</td>
</tr>
<tr>
<td>Savannah Sparrow</td>
<td>Passerculus sandwichensis</td>
</tr>
<tr>
<td>Scarlet Tanager</td>
<td>Piranga olivacea</td>
</tr>
<tr>
<td>Sharp-shinned Hawk</td>
<td>Accipiter striatus</td>
</tr>
<tr>
<td>Snowy Egret</td>
<td>Egretta thula*</td>
</tr>
<tr>
<td>Solitary Vireo</td>
<td>Vireo solitarius</td>
</tr>
<tr>
<td>Song Sparrow</td>
<td>Melospiza melodia</td>
</tr>
<tr>
<td>Sora</td>
<td>Porzana carolina</td>
</tr>
<tr>
<td>Spotted Sandpiper</td>
<td>Actitis macularia</td>
</tr>
<tr>
<td>Swamp Sparrow</td>
<td>Melospiza georgiana</td>
</tr>
<tr>
<td>Tree Swallow</td>
<td>Tachycineta bicolor</td>
</tr>
<tr>
<td>Tufted Titmouse</td>
<td>Parus bicolor</td>
</tr>
<tr>
<td>Turkey Vulture</td>
<td>Cathartes aura</td>
</tr>
</tbody>
</table>
## TABLE 2-5

### BREEDING BIRDS OF THE HUDSON RIVER

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upland Sandpiper</td>
<td><em>Bartramia longicauda</em></td>
</tr>
<tr>
<td>Veery</td>
<td><em>Catharus fuscescens</em></td>
</tr>
<tr>
<td>Vesper Sparrow</td>
<td><em>Poecetes gramineus</em></td>
</tr>
<tr>
<td>Virginia Rail</td>
<td><em>Rallus limicola</em></td>
</tr>
<tr>
<td>Warbling Vireo</td>
<td><em>Vireo gilvus</em></td>
</tr>
<tr>
<td>Western Meadowlark</td>
<td><em>Sturnella neglecta</em></td>
</tr>
<tr>
<td>Whip-poor-will</td>
<td><em>Caprimulgus vociferus</em></td>
</tr>
<tr>
<td>White-breasted Nuthatch</td>
<td><em>Sitta carolinensis</em></td>
</tr>
<tr>
<td>White-eyed Vireo</td>
<td><em>Vireo griseus</em></td>
</tr>
<tr>
<td>White-throated Sparrow</td>
<td><em>Zonotrichia albicollis</em></td>
</tr>
<tr>
<td>Wild Turkey</td>
<td><em>Meleagris gallopavo</em></td>
</tr>
<tr>
<td>Willow Flycatcher</td>
<td><em>Empidonax traillii</em></td>
</tr>
<tr>
<td>Winter Wren</td>
<td><em>Troglydes troglodytes</em></td>
</tr>
<tr>
<td>Wood Duck</td>
<td><em>Aix sponsa</em></td>
</tr>
<tr>
<td>Wood Thrush</td>
<td><em>Hylocichla mustelina</em></td>
</tr>
<tr>
<td>Worm-eating Warbler</td>
<td><em>Helmitheros vermivorus</em></td>
</tr>
<tr>
<td>Yellow Warbler</td>
<td><em>Dendroica petechia</em></td>
</tr>
<tr>
<td>Yellow-bellied Sapsucker</td>
<td><em>Sphyrapicus varius</em></td>
</tr>
<tr>
<td>Yellow-billed Cuckoo</td>
<td><em>Coccyzus americanus</em></td>
</tr>
<tr>
<td>Yellow-breasted Chat</td>
<td><em>Icteria virens</em></td>
</tr>
<tr>
<td>Yellow-crowned Night-Heron</td>
<td><em>Nycticorax violaceus</em></td>
</tr>
<tr>
<td>Yellow-rumped Warbler</td>
<td><em>Dendroica coronata</em></td>
</tr>
<tr>
<td>Yellow-throated Vireo</td>
<td><em>Vireo flavifrons</em></td>
</tr>
</tbody>
</table>

Notes: * coastal breeding birds

## Mammals Potentially Found Along the Hudson River

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Order Artiodactyla - Even-toed Ungulates</strong></td>
<td></td>
</tr>
<tr>
<td>Family Cervidae - Cervids</td>
<td></td>
</tr>
<tr>
<td>Whitetail deer</td>
<td><em>Odocoileus virginianus</em></td>
</tr>
<tr>
<td><strong>Order Carnivora</strong></td>
<td></td>
</tr>
<tr>
<td>Family Canidae - Canids</td>
<td></td>
</tr>
<tr>
<td>Coyote</td>
<td><em>Canis latrans</em></td>
</tr>
<tr>
<td>Gray fox</td>
<td><em>Urocyon cinereoargenteus</em></td>
</tr>
<tr>
<td>Red fox</td>
<td><em>Vulpes vulpes</em></td>
</tr>
<tr>
<td>Family Felidae - Cats</td>
<td></td>
</tr>
<tr>
<td>Bobcat</td>
<td><em>Lynx rufus</em></td>
</tr>
<tr>
<td><strong>Family Mustelidae - Weasels</strong></td>
<td></td>
</tr>
<tr>
<td>Common striped skunk</td>
<td><em>Mephitis mephitis</em></td>
</tr>
<tr>
<td>Ermine</td>
<td><em>Martes erminea</em></td>
</tr>
<tr>
<td>Fisher</td>
<td><em>Martes pennanti</em></td>
</tr>
<tr>
<td>Least weasel</td>
<td><em>Martes nivalis</em></td>
</tr>
<tr>
<td>Longtail weasel</td>
<td><em>Mustela frenata</em></td>
</tr>
<tr>
<td>Marten</td>
<td><em>Martes americana</em></td>
</tr>
<tr>
<td>Mink</td>
<td><em>Mustela vison</em></td>
</tr>
<tr>
<td>River otter</td>
<td><em>Lutra canadensis</em></td>
</tr>
<tr>
<td><strong>Family Procyonidae - Raccoons</strong></td>
<td></td>
</tr>
<tr>
<td>Raccoon</td>
<td><em>Procyon lotor</em></td>
</tr>
<tr>
<td><strong>Family Ursidae - Bears</strong></td>
<td></td>
</tr>
<tr>
<td>Black bear</td>
<td><em>Ursus americanus</em></td>
</tr>
<tr>
<td><strong>Order Chiroptera - Bats</strong></td>
<td></td>
</tr>
<tr>
<td>Family Vespertilionidae - Vespertilionid Bats</td>
<td></td>
</tr>
<tr>
<td>Big brown bat</td>
<td><em>Eptesicus fuscus</em></td>
</tr>
<tr>
<td>Eastern pipistrelle</td>
<td><em>Pipistrellus subflavus</em></td>
</tr>
<tr>
<td>Eastern small-footed myotis</td>
<td><em>Myotis leibii</em></td>
</tr>
<tr>
<td>Evening bat</td>
<td><em>Nycticeius humeralis</em></td>
</tr>
<tr>
<td>Hoary bat</td>
<td><em>Lasiurus cinereus</em></td>
</tr>
<tr>
<td>Indiana myotis</td>
<td><em>Myotis sodalis</em></td>
</tr>
<tr>
<td>Little brown bat</td>
<td><em>Myotis lucifugus</em></td>
</tr>
<tr>
<td>Keen’s myotis</td>
<td><em>Myotis keenii or M. septentrionalis</em></td>
</tr>
<tr>
<td>Red bat</td>
<td><em>Lasiurus borealis</em></td>
</tr>
<tr>
<td>Silver-haired bat</td>
<td><em>Lasionycteris noctivagans</em></td>
</tr>
<tr>
<td><strong>Order Insectivora - Insectivores</strong></td>
<td></td>
</tr>
<tr>
<td>Family Soricidae - Shrews</td>
<td></td>
</tr>
<tr>
<td>Least shrew</td>
<td><em>Cryptotis parva</em></td>
</tr>
<tr>
<td>Masked shrew</td>
<td><em>Sorex cinereus</em></td>
</tr>
<tr>
<td>Northern short-tailed shrew</td>
<td><em>Blarina brevicauda</em></td>
</tr>
<tr>
<td>Pygmy shrew</td>
<td><em>Sorex hoyi</em></td>
</tr>
<tr>
<td>Rock shrew</td>
<td><em>Sorex dispar</em></td>
</tr>
<tr>
<td>Smokey shrew</td>
<td><em>Sorex fumeus</em></td>
</tr>
<tr>
<td>Water shrew</td>
<td><em>Sorex palustris</em></td>
</tr>
<tr>
<td><strong>Family Talpidae - Moles</strong></td>
<td></td>
</tr>
<tr>
<td>Eastern mole</td>
<td><em>Scalopus aquaticus</em></td>
</tr>
<tr>
<td>Hairy-tailed mole</td>
<td><em>Parascalops breweri</em></td>
</tr>
<tr>
<td>Star-nosed mole</td>
<td><em>Condylura cristata</em></td>
</tr>
</tbody>
</table>
# TABLE 2-6

## MAMMALS POTENTIALLY FOUND ALONG THE HUDSON RIVER

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Order Lagomorpha</strong></td>
<td></td>
</tr>
<tr>
<td>Family Leporidae - Hares and Rabbits</td>
<td></td>
</tr>
<tr>
<td>Black-tailed jackrabbit</td>
<td><em>Lepus californicus</em></td>
</tr>
<tr>
<td>Cottontail</td>
<td><em>Sylvilagus floridanus</em></td>
</tr>
<tr>
<td>European rabbit</td>
<td><em>Oryctolagus cuniculus</em></td>
</tr>
<tr>
<td>New England cottontail</td>
<td><em>Sylvilagus transitionalis</em></td>
</tr>
<tr>
<td>Snowshoe hare</td>
<td><em>Lepus americanus</em></td>
</tr>
<tr>
<td><strong>Order Marsupialia - Marsupials</strong></td>
<td></td>
</tr>
<tr>
<td>Family Didelphidae - Oppossums</td>
<td></td>
</tr>
<tr>
<td>Virginia opposum</td>
<td><em>Didelphis virginiana</em></td>
</tr>
<tr>
<td><strong>Order Rodentia - Rodents</strong></td>
<td></td>
</tr>
<tr>
<td>Family Castoridae - Beavers</td>
<td></td>
</tr>
<tr>
<td>Beaver</td>
<td><em>Castor canadensis</em></td>
</tr>
<tr>
<td><strong>Family Cricetidae - Cricetids</strong></td>
<td></td>
</tr>
<tr>
<td>Deer mouse</td>
<td><em>Peromyscus maniculatus</em></td>
</tr>
<tr>
<td>Meadow vole</td>
<td><em>Microtus pennsylvanicus</em></td>
</tr>
<tr>
<td>Muskrat</td>
<td><em>Ondatra zibethicus</em></td>
</tr>
<tr>
<td>Pine vole</td>
<td><em>Microtus pientorum</em></td>
</tr>
<tr>
<td>Rock or yellow nose vole</td>
<td><em>Microtus chrotorrhinus</em></td>
</tr>
<tr>
<td>Southern bog lemming</td>
<td><em>Synaptomys cooperi</em></td>
</tr>
<tr>
<td>Southern red-backed vole</td>
<td><em>Clethrionomys gappeeri</em></td>
</tr>
<tr>
<td>White-footed mouse</td>
<td><em>Peromyscus leucopus</em></td>
</tr>
<tr>
<td><strong>Family Erethizontidae - New World Porcupine</strong></td>
<td></td>
</tr>
<tr>
<td>Porcupine</td>
<td><em>Erethizon dorsatum</em></td>
</tr>
<tr>
<td><strong>Family Muridae - Murids</strong></td>
<td></td>
</tr>
<tr>
<td>Norway rat</td>
<td><em>Rattus norvegicus</em></td>
</tr>
<tr>
<td>Black rat</td>
<td><em>Rattus rattus</em></td>
</tr>
<tr>
<td>House mouse</td>
<td><em>Mus musculus</em></td>
</tr>
<tr>
<td>Eastern woodrat</td>
<td><em>Neotoma magister</em></td>
</tr>
<tr>
<td><strong>Family Myocastoridae - Myocastorids</strong></td>
<td></td>
</tr>
<tr>
<td>Nutria</td>
<td><em>Myocastor coypus</em></td>
</tr>
<tr>
<td><strong>Family Sciuridae - Squirrels</strong></td>
<td></td>
</tr>
<tr>
<td>Chipmunk</td>
<td><em>Tamias striatus</em></td>
</tr>
<tr>
<td>Eastern gray squirrel</td>
<td><em>Sciurus carolinensis</em></td>
</tr>
<tr>
<td>Fox squirrel</td>
<td><em>Sciurus niger</em></td>
</tr>
<tr>
<td>Northern flying squirrel</td>
<td><em>Glaucomys sabrinus</em></td>
</tr>
<tr>
<td>Red squirrel</td>
<td><em>Tamiasciurus hudsonicus</em></td>
</tr>
<tr>
<td>Southern flying squirrel</td>
<td><em>Glaucomys volans</em></td>
</tr>
<tr>
<td>Woodchuck</td>
<td><em>Marmota monax</em></td>
</tr>
<tr>
<td><strong>Family Zapodidae - Jumping Mice</strong></td>
<td></td>
</tr>
<tr>
<td>Meadow jumping mouse</td>
<td><em>Zapus hudsonius</em></td>
</tr>
<tr>
<td>Woodland jumping mouse</td>
<td><em>Napaeozapus insignis</em></td>
</tr>
</tbody>
</table>

Sources: NYSM, 1999; NYSDOS, 1990.
<table>
<thead>
<tr>
<th>Assessment Endpoint</th>
<th>Specific Ecological Receptor (“Endpoint Species”)</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benthic community structure as food source for local fish and wildlife.</td>
<td>· Benthic macroinvertebrate community</td>
<td>· Ecological community indices (diversity, evenness, dominance) · PCB levels in sediments and water column</td>
</tr>
<tr>
<td>Survival, growth, and reproduction of local forage fish populations.</td>
<td>· Spottail shiner · Pumpkinseed</td>
<td>· Measured PCB body burdens · Modeled PCB body burdens · PCB concentrations in sediments and water column</td>
</tr>
<tr>
<td>Survival, growth, and reproduction of local piscivorous/semi-piscivorous fish populations.</td>
<td>· Yellow perch · White perch · Largemouth bass · Striped bass</td>
<td>· Measured PCB body burdens · Modeled PCB body burdens · PCB concentrations in sediments and water column</td>
</tr>
<tr>
<td>Survival, growth, and reproduction of local omnivorous fish populations.</td>
<td>· Shortnose sturgeon · Brown bullhead</td>
<td>· Measured PCB body burdens · Modeled PCB body burdens · PCB concentrations in sediments and water column</td>
</tr>
<tr>
<td>Protection (i.e., survival and reproduction) of insectivorous birds and mammals.</td>
<td>· Tree swallow · Little brown bat</td>
<td>· Measured PCB concentrations in prey items (aquatic insects/benthic invertebrates) · Modeled PCB concentrations in prey items (aquatic insects) · PCB concentrations in the water column</td>
</tr>
<tr>
<td>Protection (i.e., survival and reproduction) of waterfowl.</td>
<td>· Mallard</td>
<td>· Measured PCB concentrations in prey (invertebrates, macrophytes) · Modeled PCB concentrations in prey (invertebrates, macrophytes) · PCB concentrations in the water column</td>
</tr>
<tr>
<td>Protection of piscivorous/semi-piscivorous birds and mammals.</td>
<td>· Belted kingfisher · Great blue heron · Mink · River Otter</td>
<td>· Measured PCB concentrations in prey (forage fish, invertebrates) · Modeled PCB concentrations in prey (forage fish, invertebrates) · PCB concentrations in sediments and water column</td>
</tr>
</tbody>
</table>
### TABLE 2-7
**ASSESSMENT AND MEASUREMENT ENDPOINTS**

<table>
<thead>
<tr>
<th>Assessment Endpoint</th>
<th>Specific Ecological Receptor (“Endpoint Species”)</th>
<th>Measures</th>
<th>Exposure</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection of omnivorous mammals.</td>
<td>· Raccoon</td>
<td>· Measured PCB concentrations in prey items (fish, invertebrates) · PCB concentrations in the water column</td>
<td>· Estimated exceedance of TRVs · Exceedance of AWQC for the protection of wildlife · Field observations</td>
<td></td>
</tr>
<tr>
<td>Protection of endangered and threatened species.</td>
<td>· Bald eagle · Shortnose sturgeon</td>
<td>· Modeled PCB body burdens (sturgeon) · Measured PCB concentrations in prey (fish) · Modeled PCB concentrations in prey (fish) · PCB concentrations in sediments and water column</td>
<td>· Estimated exceedance of TRVs · Exceedance of AWQC sediment guidelines for the protection of wildlife · Field observations</td>
<td></td>
</tr>
<tr>
<td>Protection of significant habitats.</td>
<td>· Hudson River NERR · Selected NYSDOS significant habitats</td>
<td>· PCB concentrations in sediments and water column</td>
<td>· Exceedance of federal and state AWQC and sediment guidelines</td>
<td></td>
</tr>
</tbody>
</table>

Notes: 1: Individual-level effects are considered to occur when the TQ is greater to or equal to one. Receptor species are surrogates, representative of a wide range of species likely to use the Hudson River as habitat or foraging source.
<table>
<thead>
<tr>
<th>Receptor Species</th>
<th>Habitat/Feeding Characteristics</th>
<th>Similar Feeding Groups (general comparison)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benthic Invertebrate Community</td>
<td>Benthic Macroinvertebrates-Planktivorous, Deposit-feeders, Omnivorous</td>
<td></td>
</tr>
<tr>
<td>Spottail Shiner Pumpkinseed</td>
<td>Nektonic Forage Fish - Planktivorous, Insectivorous, Omnivorous</td>
<td>Fish&lt;br&gt; Sunfishes&lt;br&gt; Minnows&lt;br&gt; Killfish&lt;br&gt; River Herring</td>
</tr>
<tr>
<td>Yellow Perch White Perch Largemouth Bass Striped Bass</td>
<td>Nektonic Fishes- Piscivorous</td>
<td>Basses&lt;br&gt; Bluefish&lt;br&gt; Weakfish</td>
</tr>
<tr>
<td>Brown Bullhead Shortnose Sturgeon</td>
<td>Aquatic Feeders - Omnivorous, Scavengers, Detritivores</td>
<td>Fish&lt;br&gt; Catfish&lt;br&gt; Sturgeon&lt;br&gt; Flatfishes&lt;br&gt; Eels</td>
</tr>
<tr>
<td>Tree Swallow</td>
<td>Perching Birds of Wetlands-Insectivorous</td>
<td>Thrushes&lt;br&gt; Wrens&lt;br&gt; Sparrows</td>
</tr>
<tr>
<td>Mallard</td>
<td>Swimming Birds - Aquatic Herbivorous/Insectivorous</td>
<td>Birds&lt;br&gt; Ducks&lt;br&gt; Geese&lt;br&gt; Swans&lt;br&gt; Coots</td>
</tr>
<tr>
<td>Great Blue Heron</td>
<td>Wading Birds - Piscivorous</td>
<td>Shorebirds&lt;br&gt; Herons, egrets, and bitterns&lt;br&gt; Cormorants&lt;br&gt; Mergansers&lt;br&gt; Rails</td>
</tr>
<tr>
<td>Belted Kingfisher</td>
<td>Wide-ranging River Birds - Piscivorous</td>
<td>Gulls&lt;br&gt; Kingfishers</td>
</tr>
<tr>
<td>Bald Eagle</td>
<td>Raptors (Birds of Prey) - Piscivorous/Carnivorous/Scavengers</td>
<td>Eagles&lt;br&gt; Hawks&lt;br&gt; Falcons&lt;br&gt; Osprey</td>
</tr>
<tr>
<td>Little Brown Bat</td>
<td>Flying Mammals -Insectivorous</td>
<td>Bats</td>
</tr>
<tr>
<td>Mink</td>
<td>Semi-piscivorous/Carnivorous Mammals</td>
<td>Other mustelids</td>
</tr>
<tr>
<td>River Otter</td>
<td>Piscivorous mammals</td>
<td>Harbor Seal</td>
</tr>
<tr>
<td>Raccoon</td>
<td>Facultative Wetland Mammals - Omnivorous</td>
<td>Foxes&lt;br&gt; Dogs&lt;br&gt; Cats</td>
</tr>
</tbody>
</table>

Notes: Habitat/feeding characteristics are generalized and may not apply to all individuals of a group or species.
# TABLE 2-9

## RECEPTOR TROPHIC LEVELS, EXPOSURE PATHWAYS, AND FOOD SOURCES

<table>
<thead>
<tr>
<th>Endpoint Species</th>
<th>Level</th>
<th>Exposure Pathways</th>
<th>General Food Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FISH</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benthic Invertebrates</td>
<td>1</td>
<td>A Direct contact with sediments</td>
<td>Species dependent; food sources include detritus, plants, other invertebrates, zooplankton and phytoplankton in interstitial water</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A Direct contact with interstitial water</td>
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<td></td>
<td></td>
<td>A Direct contact with water (epibenthic and filter feeders)</td>
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<tr>
<td>Pumpkinseed</td>
<td>2</td>
<td>A Direct contact with water (respiration, Dermal)</td>
<td>80% pelagic invertebrates</td>
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<td></td>
<td></td>
<td>A Food chain exposure (both water and Sediment-based)</td>
<td>20% benthic invertebrates</td>
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<tr>
<td></td>
<td></td>
<td>A Direct contact with sediments</td>
<td></td>
</tr>
<tr>
<td>Spottail Shiner</td>
<td>2</td>
<td>A Direct contact with water (respiration, Dermal)</td>
<td>50% benthic invertebrates</td>
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<td></td>
<td></td>
<td>A Food chain exposure (both water and Sediment-based)</td>
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<td>A Direct contact with sediments</td>
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</tr>
<tr>
<td>Brown Bullhead</td>
<td>2</td>
<td>A Direct contact with water (respiration, Dermal)</td>
<td>90% benthic invertebrates, &lt;10% pelagic invertebrates or forage fish</td>
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<tr>
<td></td>
<td></td>
<td>A Food chain exposure (primarily Sediment-based)</td>
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<td>A Direct contact with sediment</td>
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<tr>
<td>Yellow Perch</td>
<td>2-3</td>
<td>A Direct contact with water (respiration, Dermal)</td>
<td>&lt;10% forage fish</td>
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<td>A Food chain exposure (both water and Sediment-based)</td>
<td>20-30% benthic invertebrates</td>
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<td>A Direct contact with sediments</td>
<td>60-80% pelagic invertebrates</td>
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<td>White Perch</td>
<td>2-3</td>
<td>A Direct contact with water (respiration, Dermal)</td>
<td>10-20% forage fish</td>
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<td>A Food chain exposure (both water and Sediment-based)</td>
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<td>A Direct contact with sediments</td>
<td>50-60% pelagic invertebrates</td>
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<tr>
<td>Largemouth Bass</td>
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<td>90% forage fish</td>
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<td>A Food chain exposure (both water and Sediment-based)</td>
<td>10% benthic invertebrates</td>
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<td>A Direct contact with sediments</td>
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</tr>
<tr>
<td>Striped Bass</td>
<td>3</td>
<td>A Direct contact with water (respiration, Dermal)</td>
<td>Predominantly forage fish</td>
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<td>A Food chain exposure (both water and Sediment-based)</td>
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<td>Endpoint Species</td>
<td>Level</td>
<td>Exposure Pathways</td>
<td>General Food Sources</td>
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<tr>
<td>Shortnose Sturgeon</td>
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<td>A Direct contact with water (respiration, Dermal)</td>
<td>Predominantly forage fish</td>
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<td>A Food chain exposure (both water and Sediment-based)</td>
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<td>A Direct contact with sediments</td>
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<td>Birds</td>
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<tr>
<td>Tree Swallow</td>
<td>2</td>
<td>A Water ingestion</td>
<td>Emergent aquatic and terrestrial insects</td>
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<td>Mallard</td>
<td>2</td>
<td>A Water ingestion</td>
<td>Vegetation, benthic invertebrates</td>
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<td>A Food chain exposure</td>
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<td>Belted Kingfisher</td>
<td>3</td>
<td>A Water ingestion</td>
<td>Forage fish, aquatic invertebrates</td>
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<td>Great Blue Heron</td>
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<td>Forage fish, aquatic invertebrates</td>
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<td>A Food chain exposure</td>
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<td></td>
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<tr>
<td>Bald Eagle</td>
<td>4</td>
<td>A Ingestion of water</td>
<td>Forage fish, small mammals, carrion</td>
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<td>A Food chain exposures</td>
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<td>Mammals</td>
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<td>Little Brown Bat</td>
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<td>Emergent aquatic and terrestrial insects</td>
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<td>Forage fish, insects, invertebrates</td>
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<td>A Food chain exposure</td>
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<td>A Direct contact with sediments</td>
<td></td>
</tr>
<tr>
<td>Mink</td>
<td>4-5</td>
<td>A Ingestion of water</td>
<td>Forage fish, invertebrates, small mammals</td>
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<td></td>
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<td>A Direct contact with sediments</td>
<td></td>
</tr>
<tr>
<td>River Otter</td>
<td>4-5</td>
<td>A Ingestion of water</td>
<td>Forage and piscivorous fish, waterfowl, frogs, invertebrates</td>
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<td>A Food chain exposures</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>A Direct contact with sediments</td>
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### TABLE 2-10

NYS RARE AND LISTED SPECIES AND HABITATS OCCURRING IN THE VICINITY OF THE HUDSON RIVER

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>NYS Status</th>
<th>State Rank</th>
<th>Precision Value</th>
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<td>American waterwort</td>
<td>Elantine americana</td>
<td>Endangered</td>
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<td>S</td>
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<td>Bicknell’s sedge</td>
<td>Carex bicknelli</td>
<td>Rare</td>
<td>S2/S3</td>
<td>S</td>
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<tr>
<td>Carey’s smartweed</td>
<td>Polygonum careyi</td>
<td>Unprotected</td>
<td>S2</td>
<td>S</td>
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<tr>
<td>Clustered sedge</td>
<td>Carex cumulata</td>
<td>Rare</td>
<td>S2S3</td>
<td>S</td>
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<tr>
<td>Corn-salad</td>
<td>Valerianella umbilicata</td>
<td>Unprotected</td>
<td>SH</td>
<td>S</td>
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<tr>
<td>Davis’ sedge</td>
<td>Carex davisii</td>
<td>Rare</td>
<td>S1</td>
<td>S</td>
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<tr>
<td>Estuary beggar-ticks</td>
<td>Bidens bidentoides</td>
<td>Threatened</td>
<td>S3</td>
<td>S</td>
</tr>
<tr>
<td>False hop sedge</td>
<td>Carex lupiformes</td>
<td>Rare</td>
<td>S3</td>
<td>S</td>
</tr>
<tr>
<td>Fissidens (non-vascular)</td>
<td>Fissidens Fontanus</td>
<td>Unprotected</td>
<td>S3?</td>
<td>S</td>
</tr>
<tr>
<td>Frank sedge</td>
<td>Carex frankii</td>
<td>Unprotected</td>
<td>S1</td>
<td>S</td>
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<tr>
<td>Glaucous sedge</td>
<td>Carex Flaccosperma var. glaucodea</td>
<td>Rare</td>
<td>S1</td>
<td>S</td>
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<tr>
<td>Golden club</td>
<td>Orontium aquaticum</td>
<td>Unprotected</td>
<td>S2</td>
<td>S</td>
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<tr>
<td>Golden seal</td>
<td>Hydrastis canadensis</td>
<td>Threatened</td>
<td>S2</td>
<td>S</td>
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<tr>
<td>Gypsy-wort</td>
<td>Lycopus rubellus</td>
<td>Unprotected</td>
<td>S1</td>
<td>S</td>
</tr>
<tr>
<td>Heartleaf plantain</td>
<td>Plantago cordata</td>
<td>Threatened</td>
<td>S3</td>
<td>S</td>
</tr>
<tr>
<td>Illinois pinweed</td>
<td>Lechea racemulosa</td>
<td>Rare</td>
<td>S3</td>
<td>S</td>
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<tr>
<td>Liliaeopsis</td>
<td>Lilaeopsis chinensis</td>
<td>Unprotected</td>
<td>S2</td>
<td>S</td>
</tr>
<tr>
<td>Lined sedge</td>
<td>Carex striatula</td>
<td>Unprotected</td>
<td>S1</td>
<td>S</td>
</tr>
<tr>
<td>Long’s bittercress</td>
<td>Cardamine longii</td>
<td>Unprotected</td>
<td>S2</td>
<td>S</td>
</tr>
<tr>
<td>Marsh straw sedge</td>
<td>Carex hormathodes</td>
<td>Rare</td>
<td>S2/S3</td>
<td>S</td>
</tr>
<tr>
<td>Midland sedge</td>
<td>Carex mesocorea</td>
<td>Unprotected</td>
<td>S1</td>
<td>S</td>
</tr>
<tr>
<td>Mock-pennyroyal</td>
<td>Hedeoma hispidum</td>
<td>Rare</td>
<td>S2/S3</td>
<td>S</td>
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TABLE 2-10

NYS RARE AND LISTED SPECIES AND HABITATS OCCURRING IN THE VICINITY OF THE HUDSON RIVER

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>NYS Status</th>
<th>State Rank</th>
<th>Precision Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrow-leaved sedge</td>
<td><em>Carex amphibola var. amphibola</em></td>
<td>Unprotected</td>
<td>S1</td>
<td>S</td>
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<tr>
<td>Saltmarsh bulrush</td>
<td><em>Scirpus novae-anglia</em></td>
<td>Endangered</td>
<td>S1</td>
<td>S</td>
</tr>
<tr>
<td>Schweinitz’s flatsedge</td>
<td><em>Cyperus schweinitzii</em></td>
<td>Rare</td>
<td>S3</td>
<td>S</td>
</tr>
<tr>
<td>Slender crabgrass</td>
<td><em>Digitaria filiformis</em></td>
<td>Rare</td>
<td>S2</td>
<td>S</td>
</tr>
<tr>
<td>Small-flowered crowfoot</td>
<td><em>Ranunculus micranthus</em></td>
<td>Unprotected</td>
<td>S2</td>
<td>S</td>
</tr>
<tr>
<td>Smooth bur-marigold</td>
<td><em>Bidens laevis</em></td>
<td>Rare</td>
<td>S2</td>
<td>S</td>
</tr>
<tr>
<td>Southern yellow flax</td>
<td><em>Linum medium var. texanum</em></td>
<td>Threatened</td>
<td>S2</td>
<td>S</td>
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<tr>
<td>Southern dodder</td>
<td><em>Cuscuta obtusiflora car. glandulosa</em></td>
<td>Unprotected</td>
<td>S1</td>
<td>S</td>
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<tr>
<td>Spongy arrowhead</td>
<td><em>Sagittaria calycina var. spongiosa</em></td>
<td>Rare</td>
<td>S2</td>
<td>S</td>
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<tr>
<td>Starwort</td>
<td><em>Callitriche terrestris</em></td>
<td>Unprotected</td>
<td>S2S3</td>
<td>S</td>
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<tr>
<td>Swamp lousewort</td>
<td><em>Pedicularis lanceolata</em></td>
<td>Rare</td>
<td>S2</td>
<td>S</td>
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<tr>
<td>Swamp cottonwood</td>
<td><em>Populus heterophylla</em></td>
<td>Threatened</td>
<td>S2</td>
<td>S</td>
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<tr>
<td>Taxiphyllum (non-vascular)</td>
<td><em>Taxiphyllum taxiflora</em></td>
<td>Unprotected</td>
<td>S1</td>
<td>S</td>
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<tr>
<td>Violet wood-sorrel</td>
<td><em>Oxalis violacea</em></td>
<td>Unprotected</td>
<td>S1S2</td>
<td>S</td>
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<tr>
<td>Violet lespedeza</td>
<td><em>Lespedeza violacea</em></td>
<td>Rare</td>
<td>S3</td>
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<tr>
<td>Water pigmyweed</td>
<td><em>Crassula aquatica</em></td>
<td>Endangered</td>
<td>S1</td>
<td>S</td>
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<tr>
<td>Weak stellate sedge</td>
<td><em>Carex seorsa</em></td>
<td>Rare</td>
<td>S2</td>
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Invertebrates

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<th>Scientific Name</th>
<th>NYS Status</th>
<th>State Rank</th>
<th>Precision Value</th>
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<tbody>
<tr>
<td>American rubyspot dragonfly</td>
<td><em>Hetaerina americana</em></td>
<td>Unprotected</td>
<td>S2/S3</td>
<td>S</td>
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<tr>
<td>Arrowhead spiketail dragonfly</td>
<td><em>Cordulegaster obliqua</em></td>
<td>Unprotected</td>
<td>S2S3</td>
<td>S</td>
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<tr>
<td>Gray petaltail dragonfly</td>
<td><em>Tachopteryx thoreyi</em></td>
<td>Unprotected</td>
<td>S2</td>
<td>S</td>
</tr>
<tr>
<td>Common Name</td>
<td>Scientific Name</td>
<td>NYS Status</td>
<td>State Rank</td>
<td>Precision Value</td>
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<tr>
<td>Tawny emperor butterfly</td>
<td><em>Asterocampa clyton</em></td>
<td>Unprotected</td>
<td>S3</td>
<td>S</td>
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<tr>
<td>Riverine clubtail</td>
<td><em>Stylurus amnicola</em></td>
<td>Unprotected</td>
<td>SH</td>
<td>M</td>
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<tr>
<td><strong>Fish</strong></td>
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<tr>
<td>Shortnose sturgeon</td>
<td><em>Acipenser brevirostrum</em></td>
<td>Endangered</td>
<td>S1</td>
<td>S</td>
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<tr>
<td>Bluespotted sunfish</td>
<td><em>Enneacanthus gloriosus</em></td>
<td>Unprotected</td>
<td>S2</td>
<td>M</td>
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<td><strong>Reptiles</strong></td>
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<tr>
<td>Bog turtle</td>
<td><em>Clemmys muhlenbergii</em></td>
<td>Endangered</td>
<td>S2</td>
<td>M</td>
</tr>
<tr>
<td>Blanding’s turtle</td>
<td><em>Emydoidea blandingii</em></td>
<td>Threatened</td>
<td>S2</td>
<td>M</td>
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<tr>
<td>Fence lizard</td>
<td><em>Sceloporus undulatus</em></td>
<td>Unprotected</td>
<td>S1</td>
<td>S</td>
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<tr>
<td>Timber rattlesnake</td>
<td><em>Crotalus horridus</em></td>
<td>Threatened</td>
<td>S3</td>
<td>M</td>
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<td><strong>Birds</strong></td>
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<td>Peregrine falcon</td>
<td><em>Falco peregrinus</em></td>
<td>Endangered</td>
<td>S2</td>
<td>S</td>
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<tr>
<td>Bald eagle</td>
<td><em>Haliaeetus Leucocephalus</em></td>
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<td>S1B, S1N</td>
<td>S</td>
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<td>King rail</td>
<td><em>Rallus elegans</em></td>
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<td>S1</td>
<td>M</td>
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<tr>
<td>Barn Owl</td>
<td><em>Tyto alba</em></td>
<td>Protected- Special Concern</td>
<td>S3</td>
<td>M</td>
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<tr>
<td>Short-eared owl</td>
<td><em>Asio flammeus</em></td>
<td>Protected- Special Concern</td>
<td>S2</td>
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<td>Osprey</td>
<td><em>Pandion halietus</em></td>
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<tr>
<td>Eastern woodrat</td>
<td><em>Neotoma magister</em></td>
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<td><strong>Communities</strong></td>
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<tr>
<td>19 Freshwater Intertidal Mudflats Communities</td>
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<tr>
<td>25 Freshwater Tidal Marsh Communities</td>
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<tr>
<td>9 Freshwater Tidal Swamp Communities</td>
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<td>8 Freshwater Intertidal Shore Communities</td>
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<td>7 Brackish Intertidal Mudflats Communities</td>
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<tr>
<td>7 Brackish Tidal Marsh Communities</td>
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<td>1 Brackish Subtidal Aquatic Bed Community</td>
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<td>1 Calcareous Cliff Community</td>
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**Areas of Concern**

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<th>Scientific Name</th>
<th>NYS Status</th>
<th>State Rank</th>
<th>Precision Value</th>
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<td>12 Waterfowl Concentration Areas</td>
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<td>1 Warm Water Fish Concentration Area</td>
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Notes:
State Rank:
S1 = Typically 5 or fewer occurrences, very few remaining individuals, acres or miles of stream in NYS
S2 = Typically 6 to 20 occurrences, very few remaining individuals, acres or miles of stream in NYS
S3 = Typically 21 to 100 occurrences, limited acreage or miles of stream in NYS
S4 = Apparently secure in NYS
S5 = Demostrably secure in NYS

Precision Rank:
A precision value of “S” indicates that a species is known to be found along the Hudson River.
A precision value of “M” indicates that a species may occur along the Hudson River in an appropriate habitat.
### TABLE 2-11

**HUDSON RIVER SIGNIFICANT HABITATS**

<table>
<thead>
<tr>
<th>Freshwater Habitats</th>
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</thead>
<tbody>
<tr>
<td>Normans Kill</td>
</tr>
<tr>
<td>Papascanee Marsh and Creek</td>
</tr>
<tr>
<td>Shad and Schermerhorn Island</td>
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<tr>
<td>Schodack and Houghtaling Islands and Schodack Creek</td>
</tr>
<tr>
<td>Coeymans Creek</td>
</tr>
<tr>
<td>Hannacroix Creek</td>
</tr>
<tr>
<td>Mill Creek Wetlands</td>
</tr>
<tr>
<td>Stuyvesant Marshes*</td>
</tr>
<tr>
<td>Coxsackie Creek</td>
</tr>
<tr>
<td>Coxsackie Island Backwater</td>
</tr>
<tr>
<td>Stockport Creek and Flats</td>
</tr>
<tr>
<td>Vosburgh Swamp and Middle Ground Flats</td>
</tr>
<tr>
<td>Roger’s Island</td>
</tr>
<tr>
<td>Catskill Creek</td>
</tr>
<tr>
<td>Ramshorn Marsh</td>
</tr>
<tr>
<td>Inbocht Bay and Duck Cove</td>
</tr>
<tr>
<td>Roeliff-Jansen Kill</td>
</tr>
<tr>
<td>Smith’s Landing Cementon*</td>
</tr>
<tr>
<td>Germantown/Clermont Flats</td>
</tr>
<tr>
<td>Esopus Estuary</td>
</tr>
<tr>
<td>North and South Tivoli Bays</td>
</tr>
<tr>
<td>Mudder Kill*</td>
</tr>
<tr>
<td>The Flats</td>
</tr>
<tr>
<td>Roundout Creek</td>
</tr>
<tr>
<td>Kingston Deepwater Habitat</td>
</tr>
<tr>
<td>Vanderburgh Cove and Shallows</td>
</tr>
<tr>
<td>Esopus Meadows</td>
</tr>
<tr>
<td>Foughkeepsie Deepwater Habitat</td>
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<tr>
<td>Cruin Elbow Marsh*</td>
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<table>
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<th>Brackish Water Habitats</th>
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<tr>
<td>Fishkill Creek</td>
</tr>
<tr>
<td>Moodna Creek</td>
</tr>
<tr>
<td>Hudson River Miles 44-56</td>
</tr>
<tr>
<td>Constitution Marsh</td>
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<tr>
<td>Iona Island Marsh</td>
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<tr>
<td>Camp Smith Marsh and Annsville Creek*</td>
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<table>
<thead>
<tr>
<th>Salt Water Habitats</th>
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<tbody>
<tr>
<td>Haverstraw Bay</td>
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<tr>
<td>Croton River and Bay</td>
</tr>
<tr>
<td>Piermont Marsh</td>
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Notes: * Indicates an area that is recognized by the NYS Natural Heritage Program as containing rare/important species or communities, but is not a designated Significant Habitat.

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<th>BZ#105</th>
<th>BZ#114</th>
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<th>BZ#123</th>
<th>BZ#126</th>
<th>BZ#156</th>
<th>BZ#157</th>
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<td>0.11</td>
<td>0.00</td>
<td>0.52</td>
<td>0.01</td>
<td>0.00</td>
<td>0.00</td>
<td>0.01</td>
<td>0.01</td>
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<tr>
<td>Lower River Mean</td>
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<td>0.00</td>
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<td>0.04</td>
<td>0.01</td>
<td>0.07</td>
<td>0.03</td>
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<td>0.00</td>
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<td>0.13</td>
<td>0.04</td>
<td>0.01</td>
<td>0.08</td>
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<tr>
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<td>0.05</td>
<td>0.03</td>
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<td>0.05</td>
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Source: TAMS/Gradient Database Release 4.1b
Note: Dominant congeners are bold.
TABLE 3-2: FRACTION OF TRI+ CHLORINATED CONGENERS EXPRESSED AS TOXIC EQUIVALENCIES (TEQ)

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<td>1.22E-06</td>
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<td>1.78E-05</td>
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<td>2.36E-04</td>
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<td>1.20E-06</td>
<td>1.17E-04</td>
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<td>6.90E-03</td>
<td>2.60E-04</td>
<td>8.50E-03</td>
<td>4.30E-05</td>
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</table>

<table>
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<tr>
<td><strong>Benthic Invertebrate</strong></td>
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<td></td>
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<td>1.06E-07</td>
<td>2.97E-05</td>
<td>1.55E-06</td>
<td>5.33E-05</td>
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Factors obtained by multiplying media-specific TEF in Table 4-2 by individual congener concentrations for each sample, averaging across location and summing.

Source: TAMS/Gradient Database Release 4.1b
<table>
<thead>
<tr>
<th>Location</th>
<th>Tri+ PCB Average Conc. in Water mg/L</th>
<th>95% UCL Conc. In Water mg/L</th>
<th>Avian Based TEF Average Conc. in Water mg/L</th>
<th>95% UCL Conc. In Water mg/L</th>
<th>Mammalian Based TEF Average Conc. in Water mg/L</th>
<th>95% UCL Conc. In Water mg/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper River</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thompson Island Pool (189)</td>
<td>7.36E-05</td>
<td>2.33E-04</td>
<td>6.01E-07</td>
<td>1.90E-06</td>
<td>4.66E-07</td>
<td>1.47E-06</td>
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<tr>
<td>Stillwater (168)</td>
<td>1.31E-04</td>
<td>4.15E-04</td>
<td>1.07E-06</td>
<td>3.39E-06</td>
<td>8.27E-07</td>
<td>2.62E-06</td>
</tr>
<tr>
<td>Federal Dam (154)</td>
<td>9.14E-05</td>
<td>1.96E-04</td>
<td>7.47E-07</td>
<td>1.60E-06</td>
<td>5.78E-07</td>
<td>1.24E-06</td>
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<td>5.03E-07</td>
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<td>113.8</td>
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</table>

Notes:
Source: TAMS/Gradient Database Release 4.1b
Water concentrations estimated from Phase 2 dataset -- data averaged across appropriate lower river water column sampling locations
### TABLE 3-4: DRY WEIGHT SEDIMENT CONCENTRATIONS BASED ON USEPA PHASE 2 DATASET

<table>
<thead>
<tr>
<th>Location</th>
<th>Tri+ PCB</th>
<th>Avian Based TEF</th>
<th>Mammalian Based TEF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
<td>95% UCL</td>
<td>Average</td>
</tr>
<tr>
<td></td>
<td>Sediment Conc.</td>
<td>mg/Kg</td>
<td>Sediment Conc.</td>
</tr>
<tr>
<td><strong>Upper River</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thompson Island Pool (189)</td>
<td>11.879</td>
<td>17.381</td>
<td>3.30E-02</td>
</tr>
<tr>
<td>Stillwater (168)</td>
<td>31.030</td>
<td>54.170</td>
<td>8.62E-02</td>
</tr>
<tr>
<td>Federal Dam (154)</td>
<td>2.793</td>
<td>4.684</td>
<td>7.76E-03</td>
</tr>
<tr>
<td><strong>Lower River</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>143.5</td>
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Source: TAMS/Gradient Database Release 4.1b
<table>
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<th>Mammalian Based TEF</th>
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<td>Average Benthic Invert Conc</td>
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<td>Average Benthic Invert Conc</td>
<td>95% UCL Benthic Conc</td>
<td>Average Benthic Invert Conc</td>
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Source: TAMS/Gradient Database Release 4.1b
### TABLE 3-6: FORAGE FISH CONCENTRATIONS BASED ON USEPA PHASE 2 DATASET

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<th>Tri+ PCB Average Conc mg/Kg</th>
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<th>Avian Based TEF Average Conc mg/Kg</th>
<th>Avian Based TEF 95% UCL Conc mg/Kg</th>
<th>Mammalian Based TEF Average Conc mg/Kg</th>
<th>Mammalian Based TEF 95% UCL Conc mg/Kg</th>
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Source: TAMS/Gradient Database Release 4.1b
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* Indicates that the calculated UCL exceeded the maximum due to small sample size.

Source: TAMS/Gradient Database Release 4.1b
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<th>Average Wet Weight (mg/Kg)</th>
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<th>95% UCL Average Lipid Normalized (mg PCB /Kg Lipid)</th>
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### TABLE 3-9: OBSERVED MAMMALIAN AND AVIAN PCB CONCENTRATIONS

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**TABLE 3-11: SUMMARY OF TRI+ SEDIMENT CONCENTRATIONS FROM THE HUDTOX MODEL AND TEQ-BASED PREDICTIONS FOR 1993 - 2018**

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TAMS/MCA
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<th>Conc Tri+ 95% UCL Results</th>
<th>Conc Benthic Average Avian TEF</th>
<th>95% Avian TEF</th>
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TABLE 3-12: SUMMARY OF TRI+ BENTHIC INVERTEBRATE CONCENTRATIONS FROM THE FISHRAND MODEL AND TEQ-BASED PREDICTIONS FOR 1993 - 2018

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<td>1.39</td>
</tr>
<tr>
<td>2008</td>
<td>1.12</td>
<td>3.88</td>
<td>12.01</td>
<td>0.55</td>
<td>1.50</td>
<td>4.23</td>
<td>0.17</td>
<td>0.46</td>
<td>1.26</td>
</tr>
<tr>
<td>2009</td>
<td>1.12</td>
<td>3.69</td>
<td>11.38</td>
<td>0.60</td>
<td>1.52</td>
<td>4.07</td>
<td>0.17</td>
<td>0.45</td>
<td>1.22</td>
</tr>
<tr>
<td>2010</td>
<td>0.99</td>
<td>3.37</td>
<td>10.61</td>
<td>0.52</td>
<td>1.39</td>
<td>3.86</td>
<td>0.17</td>
<td>0.45</td>
<td>1.18</td>
</tr>
<tr>
<td>2011</td>
<td>0.88</td>
<td>3.02</td>
<td>9.49</td>
<td>0.46</td>
<td>1.25</td>
<td>3.49</td>
<td>0.16</td>
<td>0.41</td>
<td>1.09</td>
</tr>
<tr>
<td>2012</td>
<td>0.84</td>
<td>2.83</td>
<td>8.70</td>
<td>0.52</td>
<td>1.25</td>
<td>3.39</td>
<td>0.18</td>
<td>0.41</td>
<td>1.04</td>
</tr>
<tr>
<td>2013</td>
<td>0.78</td>
<td>2.64</td>
<td>8.21</td>
<td>0.46</td>
<td>1.18</td>
<td>3.20</td>
<td>0.16</td>
<td>0.38</td>
<td>0.96</td>
</tr>
<tr>
<td>2014</td>
<td>0.73</td>
<td>2.45</td>
<td>7.57</td>
<td>0.44</td>
<td>1.10</td>
<td>2.98</td>
<td>0.14</td>
<td>0.34</td>
<td>0.89</td>
</tr>
<tr>
<td>2015</td>
<td>0.68</td>
<td>2.30</td>
<td>7.16</td>
<td>0.41</td>
<td>1.04</td>
<td>2.86</td>
<td>0.13</td>
<td>0.33</td>
<td>0.84</td>
</tr>
<tr>
<td>2016</td>
<td>0.65</td>
<td>2.19</td>
<td>6.74</td>
<td>0.43</td>
<td>1.05</td>
<td>2.78</td>
<td>0.15</td>
<td>0.34</td>
<td>0.82</td>
</tr>
<tr>
<td>2017</td>
<td>0.59</td>
<td>2.02</td>
<td>6.28</td>
<td>0.34</td>
<td>0.92</td>
<td>2.55</td>
<td>0.11</td>
<td>0.28</td>
<td>0.71</td>
</tr>
<tr>
<td>2018</td>
<td>0.58</td>
<td>1.98</td>
<td>6.08</td>
<td>0.33</td>
<td>0.88</td>
<td>2.45</td>
<td>0.10</td>
<td>0.25</td>
<td>0.66</td>
</tr>
<tr>
<td>Exposure Parameters</td>
<td>Common Name</td>
<td>Genus</td>
<td>Species</td>
<td>Sex (M/F)</td>
<td>Age (Adult/Juv.)</td>
<td>Male/Female Body Weight (kg)</td>
<td>Total Daily Dietary Ingestion (kg/day wet wt.)</td>
<td>Total Daily Dietary Ingestion (kg/day dry wt.)</td>
<td>General Dietary Characterization</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------------</td>
<td>-------</td>
<td>---------</td>
<td>-----------</td>
<td>-----------------</td>
<td>-----------------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Tree Swallow</td>
<td>Tachycineta</td>
<td>bicolor</td>
<td>Female</td>
<td>Adult, Breeding</td>
<td>0.0210</td>
<td>0.018</td>
<td>0.005</td>
<td>Insectivore</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Male</td>
<td></td>
<td>0.0206</td>
<td>0.018</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.0170 - 0.0255 (M and F)</td>
<td>0.016 - 0.020</td>
<td>No Contact with Sediments</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
1. Secord and McCarty (1997), Robertson et al. (1992);
2. Estimated from Nagy (1987) and USEPA (December, 1993);
3. No contact with sediments;
4. Secord and McCarty (1997), McCarty and Winkler (In Press);
5. Emergent forms of insects with partial aquatic life histories;
6. Calder and Braun (1983 In USE December 1993), Davis (1982);
7. Robertson et al. (1992);
8. McCarty and Winkler (In Press);
9. Robertson et al. (1992), see text for rationale;
**Table 3-18**
EXPOSURE PARAMETERS FOR THE MALLARD (*Anas platyrhynchos*)

<table>
<thead>
<tr>
<th>Exposure Parameters</th>
<th>Range Reported for Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Name</td>
<td>Male</td>
</tr>
<tr>
<td>Genus</td>
<td>Mallard</td>
</tr>
<tr>
<td>Species</td>
<td>1.06 - 1.11 F/M 1.21 - 1.27</td>
</tr>
<tr>
<td>Sex (M/F)</td>
<td>Female</td>
</tr>
<tr>
<td>Male/Female Body Weight (kg)</td>
<td>1.06 - 1.24 F/ 1.21 - M</td>
</tr>
<tr>
<td>Total Daily Dietary Ingestion (kg/day wet wt.)</td>
<td>0.292 - 0.322 F/ 0.317 - M</td>
</tr>
<tr>
<td>Total Daily Dietary Ingestion (kg/day dry wt.)</td>
<td>0.061 - 0.067 F/ 0.066 - M</td>
</tr>
<tr>
<td>General Dietary Characterization</td>
<td>Opportunistic Omnivore</td>
</tr>
<tr>
<td>Percent Diet Composition (% wet wt.)</td>
<td>0%</td>
</tr>
<tr>
<td>Fish (Total Component)</td>
<td>0%</td>
</tr>
<tr>
<td>Aquatic Invertebrates (Total Component)</td>
<td>50% - 100%</td>
</tr>
<tr>
<td>Aquatic Vegetation/Seeds</td>
<td>50% - 90%</td>
</tr>
<tr>
<td>Water Consumption Rate (L/day)</td>
<td>0.061 - 0.068 F/ 0.059 - M</td>
</tr>
<tr>
<td>Percent Incidental Sediment Ingestion in Diet</td>
<td>2.00%</td>
</tr>
<tr>
<td>Foraging Territory (km)</td>
<td>540.0 - 620.0</td>
</tr>
<tr>
<td>Behavioral Modification Factors in the Exposure Assessment</td>
<td>Resident</td>
</tr>
<tr>
<td>Temporal Migration Correction Factor (1-%Annual Temporal Displacement)</td>
<td>1</td>
</tr>
<tr>
<td>Temporal Hibernation/Asetivation Correction Factor (1-%Temporal Hib/Aset.)</td>
<td>1</td>
</tr>
<tr>
<td>Habitat Use Factor (Temporal use factor %)</td>
<td>1 Riparian habitats preferred</td>
</tr>
<tr>
<td>Temporal Reproductive Period (Mating/Gestation/Birth)</td>
<td>February - May</td>
</tr>
</tbody>
</table>

Notes:
<table>
<thead>
<tr>
<th>Exposure Parameters</th>
<th>Belts Kingfisher</th>
<th>Range Reported for Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Name</td>
<td>Belted Kingfisher</td>
<td>-</td>
</tr>
<tr>
<td>Genus</td>
<td>Ceryle</td>
<td>-</td>
</tr>
<tr>
<td>Species</td>
<td>alcyon</td>
<td>-</td>
</tr>
<tr>
<td>Sex (M/F)</td>
<td>Female Male</td>
<td>-</td>
</tr>
<tr>
<td>Age (Adult/Juv.)</td>
<td>Adult, Breeding</td>
<td>-</td>
</tr>
<tr>
<td>Male/Female Body Weight (kg)</td>
<td>0.147 0.147</td>
<td>0.136-0.158 M and F</td>
</tr>
<tr>
<td>Total Daily Dietary Ingestion (kg/day wet wt.)</td>
<td>0.058 0.058</td>
<td>0.055-0.060 M and F</td>
</tr>
<tr>
<td>Total Daily Dietary Ingestion (kg/day dry wt.)</td>
<td>0.017 0.017</td>
<td>-</td>
</tr>
<tr>
<td>General Dietary Characterization</td>
<td>Opportunistic Piscivore</td>
<td>-</td>
</tr>
<tr>
<td>Percent Diet Composition (% wet wt.)</td>
<td>78% 46% 100%</td>
<td>5% - 41%</td>
</tr>
<tr>
<td>Fish (Total Component)</td>
<td>78%</td>
<td>46% - 100%</td>
</tr>
<tr>
<td>Aquatic Invertebrates (Total Component)</td>
<td>22%</td>
<td>5% - 41%</td>
</tr>
<tr>
<td>Non-river Related Diet Sources</td>
<td>0%</td>
<td>4-3%</td>
</tr>
<tr>
<td>Water Consumption Rate (L/day)</td>
<td>0.016</td>
<td>0.015-0.017</td>
</tr>
<tr>
<td>Percent Incidental Sediment Ingestion in Diet</td>
<td>1.00%</td>
<td>nests in banks, grooming</td>
</tr>
<tr>
<td>Foraging Territory ( km)</td>
<td>0.70</td>
<td>0.389-1.03</td>
</tr>
<tr>
<td>Behavioral Modification Factors in the Exposure Assessment</td>
<td>1</td>
<td>Resident</td>
</tr>
<tr>
<td>Temporal Migration Correction Factor (1-%Annual Temporal Displacement)</td>
<td>1</td>
<td>Active Year Round</td>
</tr>
<tr>
<td>Temporal Hibernation/Asetivation Correction Factor (1-%Temporal Hib/Aset.)</td>
<td>1</td>
<td>Riparian habitats preferred</td>
</tr>
<tr>
<td>Habitat Use Factor (Temporal use factor %)</td>
<td>1</td>
<td>April - June</td>
</tr>
<tr>
<td>Temporal Reproductive Period (Mating/Gestation/Hatching)</td>
<td>9,10</td>
<td>April - June</td>
</tr>
</tbody>
</table>

Notes: 1 Brooks and Davis (1987), Poole (1932); 2 Estimated from Nagy (1987) and USEPA (December 1993); 3 Estimated from USEPA (1993b); 4 Gould unpublished data (in USEPA, December 1993), Davis (1982); 5 Calder and Braun (1983 in USEPA December 1993); 6 Best Professional Judgment based on Davis (1982), Andrle and Carroll (1988).
<table>
<thead>
<tr>
<th>Exposure Parameters</th>
<th>Range Reported for Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Name</td>
<td>Great Blue Heron</td>
</tr>
<tr>
<td>Genus</td>
<td>Ardea</td>
</tr>
<tr>
<td>Species</td>
<td>herodias</td>
</tr>
<tr>
<td>Sex (M/F)</td>
<td>Female, Male</td>
</tr>
<tr>
<td>Age (Adult/Juvenile)</td>
<td>Adult, Breeding</td>
</tr>
<tr>
<td>Male/Female Body Weight (kg)</td>
<td>2.20, 2.58</td>
</tr>
<tr>
<td>Total Daily Dietary Ingestion (kg/day wet wt.)</td>
<td>0.352, 0.390</td>
</tr>
<tr>
<td>Total Daily Dietary Ingestion (kg/day dry wt.)</td>
<td>0.097, 0.108</td>
</tr>
<tr>
<td>General Dietary Characterization</td>
<td>Opportunistic Piscivore</td>
</tr>
<tr>
<td>Percent Diet Composition (% wet wt.)</td>
<td>98%, 72-98%</td>
</tr>
<tr>
<td>Fish (Total Component)</td>
<td>1%</td>
</tr>
<tr>
<td>Aquatic Invertebrates (Total Component)</td>
<td>1%</td>
</tr>
<tr>
<td>Non-river Related Diet Sources</td>
<td>1%</td>
</tr>
<tr>
<td>Water Consumption Rate (L/day)</td>
<td>0.100, 0.111</td>
</tr>
<tr>
<td>Percent Incidental Sediment Ingestion in Diet</td>
<td>2.00%, -</td>
</tr>
<tr>
<td>Foraging Territory (km)</td>
<td>0.98</td>
</tr>
<tr>
<td>Behavioral Modification Factors in the Exposure Assessment</td>
<td>-</td>
</tr>
<tr>
<td>Temporal Migration Correction Factor (1-%Annual Temporal Displacement)</td>
<td>1</td>
</tr>
<tr>
<td>Temporal Hibernation/Asetration Correction Factor (1-%Temporal Hib/Aset.)</td>
<td>1</td>
</tr>
<tr>
<td>Habitat Use Factor (Temporal use factor %)</td>
<td>1</td>
</tr>
<tr>
<td>Temporal Reproductive Period (Mating/Gestation/Birth)</td>
<td>March - June</td>
</tr>
</tbody>
</table>

Notes: 1 Dunning (1993); 2 Estimated from Nagy (1987) and USEPA (December 1993); 3 Estimated from USEPA (1993b); 4 Alexander (1977 In USEPA, December 1993), Cotaam and Uhler (1945); 5 Calder and Braun (1983 In USEPA, December 1993); 6 Best Professional Judgement based on Eckert and Karalus (1988); 7 Peifer (1979 In USEPA, December, 1993); 8 USEPA (December, 1993); 9, 10 Bull (1998) and Andrle and Carroll (1988).
<table>
<thead>
<tr>
<th>Common Name</th>
<th>Bald Eagle</th>
<th>-</th>
</tr>
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<tbody>
<tr>
<td>Genus</td>
<td>Haliaeetus</td>
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</tr>
<tr>
<td>Species</td>
<td>leucocephalus</td>
<td>-</td>
</tr>
<tr>
<td>Sex (M/F)</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>Age (Adult/Juvenile)</td>
<td>Adult, Breeding</td>
<td>-</td>
</tr>
<tr>
<td>Male/Female Body Weight (kg)</td>
<td>5.10 3.20</td>
<td>4.5-5.6 F/M 3.0-3.4</td>
</tr>
<tr>
<td>Total Daily Dietary Ingestion (kg/day wet wt.)</td>
<td>0.65 0.46</td>
<td>0.60-0.69 F/0.46-0.49 M</td>
</tr>
<tr>
<td>Total Daily Dietary Ingestion (kg/day dry wt.)</td>
<td>- -</td>
<td>-</td>
</tr>
<tr>
<td>General Dietary Characterization</td>
<td>Opportunistic Piscivore</td>
<td>-</td>
</tr>
<tr>
<td>Percent Diet Composition (% wet wt.)</td>
<td>100%</td>
<td>70-100%</td>
</tr>
<tr>
<td>Fish (Total Component)</td>
<td>0%</td>
<td>0-18%</td>
</tr>
<tr>
<td>Aquatic Invertebrates (Total Component)</td>
<td>0%</td>
<td>0-4.3%</td>
</tr>
<tr>
<td>Water Consumption Rate (L/day)</td>
<td>0.175 0.129</td>
<td>0.162-0.187 F/0.123-0.134 M</td>
</tr>
<tr>
<td>Percent Incidental Sediment Ingestion in Diet</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Foraging Territory (km)</td>
<td>5.0</td>
<td>3.0-7.0 Km</td>
</tr>
<tr>
<td>Behavioral Modification Factors in the Exposure Assessment</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Temporal Migration Correction Factor (1-%Annual Temporal Displacement)</td>
<td>1</td>
<td>Resident</td>
</tr>
<tr>
<td>Temporal Hibernation/Asetivation Correction Factor (1-%Temporal Hib/Aset.)</td>
<td>1</td>
<td>Active Year Round</td>
</tr>
<tr>
<td>Habitat Use Factor (Temporal use factor %)</td>
<td>1</td>
<td>Riparian habitats preferred</td>
</tr>
<tr>
<td>Temporal Reproductive Period (Mating/Gestation/Birth)</td>
<td>February - May</td>
<td>February - May</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exposure Parameters</th>
<th>Proximal Range Reported for Species</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Common Name</strong></td>
<td>Little Brown Bat</td>
</tr>
<tr>
<td><strong>Genus</strong></td>
<td><em>Myotis</em></td>
</tr>
<tr>
<td><strong>Species</strong></td>
<td><em>lucifugus</em></td>
</tr>
<tr>
<td><strong>Sex (M/F)</strong></td>
<td>Female, Male</td>
</tr>
<tr>
<td><strong>Age (Adult/Juv.)</strong></td>
<td>Adult, Breeding</td>
</tr>
<tr>
<td><strong>Male/Female Body Weight (kg)</strong></td>
<td>0.0071, 0.0069</td>
</tr>
<tr>
<td><strong>Total Daily Dietary Ingestion (kg/day wet wt.)</strong></td>
<td>0.0025, 0.0025</td>
</tr>
<tr>
<td><strong>Total Daily Dietary Ingestion (kg/day dry wt.)</strong></td>
<td>- , -</td>
</tr>
<tr>
<td><strong>General Dietary Characterization</strong></td>
<td>Insectivore</td>
</tr>
<tr>
<td><strong>Percent Diet Composition (% wet wt.)</strong></td>
<td>0.0%</td>
</tr>
<tr>
<td><strong>Fish (Total Component)</strong></td>
<td>0.0%</td>
</tr>
<tr>
<td><strong>Aquatic Invertebrates (Total Component)</strong></td>
<td>100.0%</td>
</tr>
<tr>
<td><strong>Non-river Related Diet Sources</strong></td>
<td>0.0%</td>
</tr>
<tr>
<td><strong>Water Consumption Rate (L/day)</strong></td>
<td>0.0011, 0.0011</td>
</tr>
<tr>
<td><strong>Percent Incidental Sediment Ingestion in Diet</strong></td>
<td>0.00% , 0.00%</td>
</tr>
<tr>
<td><strong>Home Range (km)</strong></td>
<td>0.1, &gt;0.1</td>
</tr>
<tr>
<td><strong>Behavioral Modification Factors in the Exposure Assessment</strong></td>
<td><a href="#">Notes</a></td>
</tr>
<tr>
<td><strong>Temporal Migration Correction Factor (1-%Annual Temporal Displacement)</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Temporal Hibernation/Asetivation Correction Factor (1-%Temporal Hib/Aset.)</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Habitat Use Factor (Temporal use factor %)</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Temporal Reproductive Period (Mating/Gestation/Birth)</strong></td>
<td>April to July</td>
</tr>
</tbody>
</table>

---

1 [Bopp (1999)]
2 [Fenton and Barclay (1980)]
3 Dry weight basis of ingestion not required;
4 [Anthony and Kunz (1977), Belwood and Fenton (1976), Buchler (1976);
5 Farrell and Wood (1968c In USEPA, December 1993); 6 No contact
with sediments; 7 Bulcher (1976); 8 Davis and Hitchcock (1965); 9, 10 Belwood and Fenton (1976), Wimbatt (1945).
**TABLE 3-23**

**EXPOSURE PARAMETERS FOR RACCOON (Procyon lotor)**

<table>
<thead>
<tr>
<th>Exposure Parameters</th>
<th>Proximal Range Reported for Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Name</td>
<td>Racoon</td>
</tr>
<tr>
<td>Genus</td>
<td><em>Procyon</em></td>
</tr>
<tr>
<td>Species</td>
<td><em>lotor</em></td>
</tr>
<tr>
<td>Sex (M/F)</td>
<td>Female</td>
</tr>
<tr>
<td>Age (Adult/Juv.)</td>
<td>Adult, Breeding</td>
</tr>
<tr>
<td>Male/Female Body Weight (kg)</td>
<td>6.400</td>
</tr>
<tr>
<td>Total Daily Dietary Ingestion (kg/day wet wt.)</td>
<td>0.99</td>
</tr>
<tr>
<td>Total Daily Dietary Ingestion (kg/day dry wt.)</td>
<td>0.316</td>
</tr>
<tr>
<td>General Dietary Characterization</td>
<td>Opportunistic Omnivore</td>
</tr>
<tr>
<td>Percent Diet Composition (% wet wt.)</td>
<td>3.0%</td>
</tr>
<tr>
<td>Fish (Total Component)</td>
<td>37.0%</td>
</tr>
<tr>
<td>Aquatic Invertebrates (Total Component)</td>
<td>60.0%</td>
</tr>
<tr>
<td>Non-river Related Diet Sources</td>
<td>0.526</td>
</tr>
<tr>
<td>Water Consumption Rate (L/day)</td>
<td>9.4%</td>
</tr>
<tr>
<td>Percent Incidental Sediment Ingestion in Diet</td>
<td>48.0</td>
</tr>
<tr>
<td>Home Range (km)</td>
<td>18.2-814 M</td>
</tr>
<tr>
<td>Behavioral Modification Factors in the Exposure Assessment</td>
<td>1</td>
</tr>
<tr>
<td>Temporal Migration Correction Factor (1-%Annual Temporal Displacement)</td>
<td>1</td>
</tr>
<tr>
<td>Temporal Hibernation/Asertivation Correction Factor (1-%Temporal Hib/Aset.)</td>
<td>1</td>
</tr>
<tr>
<td>Habitat Use Factor (Temporal use factor %)</td>
<td>1</td>
</tr>
<tr>
<td>Temporal Reproductive Period (Mating/Gestation/Birth)</td>
<td>January to May</td>
</tr>
</tbody>
</table>

1 Bopp (1999), Sanderson (1984), USEPA (December 1993); 2, 3 Estimated from NFMR and ME in USEPA (December 1993) and Nagy (1987); 4 Tabatabai and Kennedy (1988), Newell et al. (1987), Llewellyn and Uhler (1952), Hamilton (1951); 5 Farrell and Wood (1968c In USEPA, 1993a); 6 Beyer et al. (1994); 7 Urban (1970), Stuewer (1943); 8 USEPA (December, 1993), Hamilton (1951); 9, 10 USEPA (December, 1993), Stuewer (1943).
### TABLE 3-24
EXPOSURE PARAMETERS FOR MINK (*Mustela vison*)

<table>
<thead>
<tr>
<th>Exposure Parameters</th>
<th>Proximal Range Reported for Species</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Common Name</strong></td>
<td>Mink</td>
</tr>
<tr>
<td><strong>Genus</strong></td>
<td><em>Mustela</em></td>
</tr>
<tr>
<td><strong>Species</strong></td>
<td><em>vision</em></td>
</tr>
<tr>
<td><strong>Sex (M/F)</strong></td>
<td>Female, Male</td>
</tr>
<tr>
<td><strong>Age (Adult/Juv.)</strong></td>
<td>Adult, Breeding</td>
</tr>
<tr>
<td><strong>Male/Female Body Weight (kg)</strong></td>
<td>0.83, 1.02</td>
</tr>
<tr>
<td><strong>Total Daily Dietary Ingestion (kg/day wet wt.)</strong></td>
<td>0.132, 0.132</td>
</tr>
<tr>
<td><strong>Total Daily Dietary Ingestion (kg/day dry wt.)</strong></td>
<td>0.059, 0.069</td>
</tr>
<tr>
<td><strong>General Dietary Characterization</strong></td>
<td>Opportunistic Piscivore/Carnivore</td>
</tr>
<tr>
<td><strong>Percent Diet Composition (% wet wt.)</strong></td>
<td>34.0%</td>
</tr>
<tr>
<td><strong>Fish (Total Component)</strong></td>
<td>16.5%</td>
</tr>
<tr>
<td><strong>Aquatic Invertebrates (Total Component)</strong></td>
<td>49.5%</td>
</tr>
<tr>
<td><strong>Non-river Related Diet Sources</strong></td>
<td>0.084, 0.101</td>
</tr>
<tr>
<td><strong>Water Consumption Rate (L/day)</strong></td>
<td>1.0%</td>
</tr>
<tr>
<td><strong>Home Range (km)</strong></td>
<td>1.9</td>
</tr>
</tbody>
</table>

**Behavioral Modification Factors in the Exposure Assessment**
- **Temporal Migration Correction Factor (1-%Annual Temporal Displacement)**: 1, Resident
- **Temporal Hibernation/Asetivation Correction Factor (1-%Temporal Hib/Aset.)**: 1, Active Year Round
- **Habitat Use Factor (Temporal use factor %)**: 1, Riparian habitats preferred
- **Temporal Reproductive Period (Mating/Gestation/Birth)**: March to June

---

1 Mitchell (1961); J. Bopp (1999); 2 Bleavins and Aulerich (1981); 3 Estimated from Nagy (1987) and USEPA (December, 1993); 4 Hamilton (1951), Hamilton (1940), Hamilton (1936); 5 Farrell and Wood (1968c In USEPA, December 1993); 6 Best Professional Judgement - based upon observations in Hamilton (1940); 7 Gerell (1970), Mitchell (1961); 8 Allen (1986).
### TABLE 3-25
EXPOSURE PARAMETERS FOR RIVER OTTER (*Lutra canadensis*)

<table>
<thead>
<tr>
<th>Exposure Parameters</th>
<th>Proximal Range Reported for Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Name</td>
<td>River Otter</td>
</tr>
<tr>
<td>Genus</td>
<td><em>Lutra</em></td>
</tr>
<tr>
<td>Species</td>
<td><em>canadensis</em></td>
</tr>
<tr>
<td>Sex (M/F)</td>
<td>-</td>
</tr>
<tr>
<td>Age (Adult/Juv.)</td>
<td>-</td>
</tr>
<tr>
<td>Male/Female Body Weight (kg)</td>
<td>7.32  10.9</td>
</tr>
<tr>
<td>Total Daily Dietary Ingestion (kg/day wet wt.)</td>
<td>0.900  0.900</td>
</tr>
<tr>
<td>Total Daily Dietary Ingestion (kg/day dry wt.)</td>
<td>0.353  0.491</td>
</tr>
<tr>
<td>General Dietary Characterization</td>
<td>Opportunistic Piscivore</td>
</tr>
<tr>
<td>Percent Diet Composition (% wet wt.)</td>
<td>100%</td>
</tr>
<tr>
<td>Fish (Total Component)</td>
<td>100%</td>
</tr>
<tr>
<td>Aquatic Invertebrates (Total Component)</td>
<td>0.0%</td>
</tr>
<tr>
<td>Non-river Related Diet Sources</td>
<td>0.0%</td>
</tr>
<tr>
<td>Water Consumption Rate (L/day)</td>
<td>0.594  0.853</td>
</tr>
<tr>
<td>Percent Incidental Sediment Ingestion in Diet</td>
<td>1.0%</td>
</tr>
<tr>
<td>Home Range (km)</td>
<td>10.0</td>
</tr>
<tr>
<td>Behavioral Modification Factors in the Exposure Assessment</td>
<td>-</td>
</tr>
<tr>
<td>Temporal Migration Correction Factor (1-%Annual Temporal Displacement)</td>
<td>1</td>
</tr>
<tr>
<td>Temporal Hibernation/Awakening Correction Factor (1-%Temporal Hib/Asw.)</td>
<td>1</td>
</tr>
<tr>
<td>Habitat Use Factor (Temporal use factor %)</td>
<td>1</td>
</tr>
<tr>
<td>Temporal Reproductive Period (Mating/Gestation/Birth)</td>
<td>March to March 10</td>
</tr>
</tbody>
</table>

1 Spinola et al., (undated), Bopp (1999), USEPA (December 1993); 2, 3 Harris (1968 In USEPA, December 1993), Penrod (1999); 4 Spinola (1999), Newell et al. (1987), Hamilton (1961); 5 Farrell and Wood (1968c In USEPA, December 1993); 6 Best Professional Judgement - based upon Liers (1951) In USEPA, 1993; 7 Spinola et al. (undated); 8 USEPA (December 1993a); 9 Hamilton and Eadie (1964); 10 Period between mating and birth extends for one full year due to delayed implantation of zygote.
<table>
<thead>
<tr>
<th>Location</th>
<th>Drinking Water Expected</th>
<th>Benthic Invertebrate Expected</th>
<th>Total Average Daily Dose Expected (mg/Kg/day)</th>
<th>Total Average Predicted Egg Conc (mg/Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper River</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thompson Island Pool (189)</td>
<td>1.54E-05</td>
<td>1.09E+01</td>
<td>1.09E+01</td>
<td>2.54E+01</td>
</tr>
<tr>
<td>Stillwater (168)</td>
<td>2.74E-05</td>
<td>1.91E+01</td>
<td>1.91E+01</td>
<td>4.45E+01</td>
</tr>
<tr>
<td>Federal Dam (154)</td>
<td>1.92E-05</td>
<td>4.54E+00</td>
<td>4.54E+00</td>
<td>1.06E+01</td>
</tr>
<tr>
<td>Lower River</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>143.5</td>
<td>1.48E-05</td>
<td>6.33E-01</td>
<td>6.33E-01</td>
<td>1.48E+00</td>
</tr>
<tr>
<td>137.2</td>
<td>1.48E-05</td>
<td>1.25E+00</td>
<td>1.25E+00</td>
<td>2.91E+00</td>
</tr>
<tr>
<td>122.4</td>
<td>6.79E-06</td>
<td>6.89E-01</td>
<td>6.89E-01</td>
<td>1.61E+00</td>
</tr>
<tr>
<td>113.8</td>
<td>6.79E-06</td>
<td>7.09E-01</td>
<td>7.09E-01</td>
<td>1.65E+00</td>
</tr>
<tr>
<td>100</td>
<td>6.79E-06</td>
<td>3.26E-01</td>
<td>3.26E-01</td>
<td>7.60E-01</td>
</tr>
<tr>
<td>88.9</td>
<td>4.47E-06</td>
<td>1.63E-01</td>
<td>1.63E-01</td>
<td>3.81E-01</td>
</tr>
<tr>
<td>58.7</td>
<td>4.47E-06</td>
<td>5.03E-01</td>
<td>5.03E-01</td>
<td>1.17E+00</td>
</tr>
<tr>
<td>47.3</td>
<td>4.47E-06</td>
<td>5.71E-01</td>
<td>5.71E-01</td>
<td>1.33E+00</td>
</tr>
<tr>
<td>25.8</td>
<td>4.47E-06</td>
<td>1.69E-01</td>
<td>1.69E-01</td>
<td>3.95E-01</td>
</tr>
</tbody>
</table>
TABLE 3-27: SUMMARY OF ADD_{95\%UCL} AND EGG CONCENTRATIONS FOR FEMALE TREE SWALLOW BASED ON 1993 DATA USING SUM OF TRI+ CONGENERS

<table>
<thead>
<tr>
<th>Location</th>
<th>Drinking Water 95% UCL</th>
<th>Benthic Invertebrate 95% UCL</th>
<th>Total Average Daily Dose_{95%UCL} (mg/Kg/day)</th>
<th>Predicted 95% UCL Egg Conc (mg/Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Upper River</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thompson Island Pool (189)</td>
<td>4.88E-05</td>
<td>1.90E+01</td>
<td>1.90E+01</td>
<td>4.44E+01</td>
</tr>
<tr>
<td>Stillwater (168)</td>
<td>8.69E-05</td>
<td>8.93E+01</td>
<td>8.93E+01</td>
<td>2.08E+02</td>
</tr>
<tr>
<td>Federal Dam (154)</td>
<td>4.11E-05</td>
<td>7.72E+00</td>
<td>7.72E+00</td>
<td>1.80E+01</td>
</tr>
<tr>
<td><strong>Lower River</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>143.5</td>
<td>1.61E-04</td>
<td>1.55E+00</td>
<td>1.55E+00</td>
<td>3.62E+00</td>
</tr>
<tr>
<td>137.2</td>
<td>1.61E-04</td>
<td>5.06E+00</td>
<td>5.06E+00</td>
<td>1.18E+01</td>
</tr>
<tr>
<td>122.4</td>
<td>8.70E-05</td>
<td>1.73E+00</td>
<td>1.73E+00</td>
<td>4.04E+00</td>
</tr>
<tr>
<td>113.8</td>
<td>8.70E-05</td>
<td>2.75E+00</td>
<td>2.75E+00</td>
<td>6.41E+00</td>
</tr>
<tr>
<td>100</td>
<td>8.70E-05</td>
<td>2.23E+00</td>
<td>2.23E+00</td>
<td>5.20E+00</td>
</tr>
<tr>
<td>88.9</td>
<td>1.99E-05</td>
<td>2.90E-01</td>
<td>2.90E-01</td>
<td>6.77E-01</td>
</tr>
<tr>
<td>58.7</td>
<td>1.99E-05</td>
<td>4.60E+00</td>
<td>4.60E+00</td>
<td>1.07E+01</td>
</tr>
<tr>
<td>47.3</td>
<td>1.99E-05</td>
<td>4.19E+00</td>
<td>4.19E+00</td>
<td>9.78E+00</td>
</tr>
<tr>
<td>25.8</td>
<td>1.99E-05</td>
<td>2.87E-01</td>
<td>2.87E-01</td>
<td>6.69E-01</td>
</tr>
<tr>
<td>Year</td>
<td>Total Average Dietary Dose (mg/Kg/day)</td>
<td>Average Egg Concentration (mg/Kg)</td>
<td>TRI+ MCA</td>
<td>Other MCA</td>
</tr>
<tr>
<td>------</td>
<td>--------------------------------------</td>
<td>----------------------------------</td>
<td>----------</td>
<td>-----------</td>
</tr>
<tr>
<td>1993</td>
<td>1.27E+01 7.04E+00 3.09E+00 2.96E+01 1.64E+01 7.22E+00</td>
<td>1994 1.19E+01 6.70E+00 2.92E+00 2.78E+01 1.56E+01 6.81E+00</td>
<td>1995 1.11E+01 6.30E+00 2.68E+00 2.60E+01 1.47E+01 6.25E+00</td>
<td>1996 1.00E+01 5.62E+00 2.27E+00 2.34E+01 1.31E+01 5.29E+00</td>
</tr>
</tbody>
</table>
TABLE 3-29: SUMMARY OF ADD_{95% UCL} AND EGG CONCENTRATIONS FOR FEMALE TREE SWALLOW BASED ON TRI+ CONGENERS FOR PERIOD 1993 - 2018

<table>
<thead>
<tr>
<th>Year</th>
<th>Total 95% UCL Dietary Dose (mg/Kg/day)</th>
<th>95% UCL Egg Concentration (mg/Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>189</td>
<td>168</td>
</tr>
<tr>
<td>1993</td>
<td>1.86E+01</td>
<td>1.11E+01</td>
</tr>
<tr>
<td>1994</td>
<td>1.76E+01</td>
<td>1.06E+01</td>
</tr>
<tr>
<td>1995</td>
<td>1.61E+01</td>
<td>9.97E+00</td>
</tr>
<tr>
<td>1996</td>
<td>1.47E+01</td>
<td>8.88E+00</td>
</tr>
<tr>
<td>1997</td>
<td>1.35E+01</td>
<td>8.15E+00</td>
</tr>
<tr>
<td>1998</td>
<td>1.21E+01</td>
<td>7.33E+00</td>
</tr>
<tr>
<td>1999</td>
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<td>6.28E+00</td>
</tr>
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<td>2001</td>
<td>9.68E+00</td>
<td>6.15E+00</td>
</tr>
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<td>2002</td>
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<td>5.88E+00</td>
</tr>
<tr>
<td>2003</td>
<td>8.48E+00</td>
<td>5.55E+00</td>
</tr>
<tr>
<td>2004</td>
<td>7.78E+00</td>
<td>5.07E+00</td>
</tr>
<tr>
<td>2005</td>
<td>7.29E+00</td>
<td>4.71E+00</td>
</tr>
<tr>
<td>2006</td>
<td>6.96E+00</td>
<td>4.47E+00</td>
</tr>
<tr>
<td>2007</td>
<td>6.44E+00</td>
<td>4.18E+00</td>
</tr>
<tr>
<td>2008</td>
<td>6.07E+00</td>
<td>3.91E+00</td>
</tr>
<tr>
<td>2009</td>
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<td>2.76E+00</td>
</tr>
<tr>
<td>2015</td>
<td>3.67E+00</td>
<td>2.66E+00</td>
</tr>
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<td>2016</td>
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<td>2.52E+00</td>
</tr>
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<td>2017</td>
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</tr>
<tr>
<td>2018</td>
<td>3.20E+00</td>
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</tr>
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</table>
### TABLE 3-30: SUMMARY OF ADD\textsubscript{Expected} AND EGG CONCENTRATIONS FOR FEMALE MALLARD BASED ON 1993 DATA USING SUM OF TRI+ CONGENERS

<table>
<thead>
<tr>
<th>Location</th>
<th>Drinking Water Expected</th>
<th>Macrophyte Expected</th>
<th>Benthic Invertebrate Expected</th>
<th>Sediment Expected</th>
<th>Total Average Daily Dose\textsubscript{Expected} (mg/Kg/day)</th>
<th>Total Average Concentration in Eggs (mg/Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Upper River</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thompson Island Pool (189)</td>
<td>4.24E-06</td>
<td>1.43E-01</td>
<td>1.95E+00</td>
<td>1.37E-02</td>
<td>2.10E+00</td>
<td>4.24E+01</td>
</tr>
<tr>
<td>Stillwater (168)</td>
<td>7.53E-06</td>
<td>2.31E-01</td>
<td>3.63E+00</td>
<td>3.57E-02</td>
<td>3.90E+00</td>
<td>7.91E+01</td>
</tr>
<tr>
<td>Federal Dam (154)</td>
<td>5.26E-06</td>
<td>2.25E-01</td>
<td>8.66E-01</td>
<td>3.21E-03</td>
<td>1.09E+00</td>
<td>1.89E+01</td>
</tr>
<tr>
<td><strong>Lower River</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>143.5</td>
<td>4.07E-06</td>
<td>1.28E-01</td>
<td>1.21E-01</td>
<td>9.90E-04</td>
<td>2.50E-01</td>
<td>2.63E+00</td>
</tr>
<tr>
<td>137.2</td>
<td>4.07E-06</td>
<td>1.28E-01</td>
<td>2.38E-01</td>
<td>1.75E-03</td>
<td>3.67E-01</td>
<td>5.17E+00</td>
</tr>
<tr>
<td>122.4</td>
<td>1.86E-06</td>
<td>7.60E-02</td>
<td>1.11E-01</td>
<td>1.11E-03</td>
<td>1.88E-01</td>
<td>2.41E+00</td>
</tr>
<tr>
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<td>7.60E-02</td>
<td>9.52E-02</td>
<td>1.16E-03</td>
<td>1.72E-01</td>
<td>2.07E+00</td>
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<td>1.29E-01</td>
<td>1.14E+00</td>
</tr>
<tr>
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<td>1.23E-06</td>
<td>5.56E-02</td>
<td>2.63E-02</td>
<td>8.98E-04</td>
<td>8.28E-02</td>
<td>5.72E-01</td>
</tr>
<tr>
<td>58.7</td>
<td>1.23E-06</td>
<td>5.56E-02</td>
<td>6.76E-02</td>
<td>2.90E-04</td>
<td>1.23E-01</td>
<td>1.47E+00</td>
</tr>
<tr>
<td>47.3</td>
<td>1.23E-06</td>
<td>5.56E-02</td>
<td>9.18E-02</td>
<td>1.77E-03</td>
<td>1.49E-01</td>
<td>2.00E+00</td>
</tr>
<tr>
<td>25.8</td>
<td>1.23E-06</td>
<td>5.56E-02</td>
<td>2.72E-02</td>
<td>6.66E-04</td>
<td>8.35E-02</td>
<td>5.92E-01</td>
</tr>
<tr>
<td>Location</td>
<td>Drinking Water 95% UCL</td>
<td>Macrophyte 95% UCL</td>
<td>Benthic Invertebrate 95% UCL</td>
<td>Sediment 95% UCL</td>
<td>Total Upper Bound Daily Dose 95%UCL (mg/Kg/day)</td>
<td>Total Concentration in Eggs (95% UCL) (mg/Kg)</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----------------------</td>
<td>---------------------</td>
<td>-------------------------------</td>
<td>----------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td><strong>Upper River</strong></td>
<td></td>
<td></td>
<td></td>
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TABLE 3-34: SUMMARY OF ADD$_{Expected}$ AND EGG CONCENTRATIONS FOR FEMALE BELTED KINGFISHER BASED ON 1993 DATA USING SUM OF TRI+ CONGENERS
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<th>Sediment 95% UCL</th>
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**TABLE 3-35: SUMMARY OF ADD_{95\%UCL} AND EGG CONCENTRATIONS FOR FEMALE BELTED KINGFISHER BASED ON 1993 DATA USING SUM OF TRI+ CONGENERS**

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<th>Average Egg Concentration (mg/Kg)</th>
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## TABLE 3-37: SUMMARY OF ADD\textsubscript{95%UCL} AND EGG CONCENTRATIONS FOR FEMALE BELTED KINGFISHER BASED ON TRI+ CONGENERS FOR PERIOD 1993 - 2018

<table>
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<th>Year</th>
<th>95% UCL Dietary Dose (mg/Kg/day)</th>
<th>95% UCL Egg Concentration (mg/Kg)</th>
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TABLE 3-38: SUMMARY OF ADD$_{\text{Expected}}$ AND EGG CONCENTRATIONS FOR FEMALE GREAT BLUE HERON BASED ON 1993 DATA USING SUM OF TRI+ CONGENERS

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<th>Drinking Water Expected</th>
<th>Forage Fish Expected</th>
<th>Benthic Invertebrate Expected</th>
<th>Sediment Expected</th>
<th>Total Average Daily Dose$_{\text{Expected}}$ (mg/Kg/day)</th>
<th>Total Concentration in Eggs (mg/Kg)</th>
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## TABLE 3-40: SUMMARY OF ADD_{Expected} AND EGG CONCENTRATIONS FOR FEMALE GREAT BLUE HERON BASED ON TRI+ CONGENERS FOR PERIOD 1993 - 2018

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<th>Average Dietary Dose (mg/Kg/day)</th>
<th>Average Egg Concentration (mg/Kg)</th>
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TAMS/MCA
## TABLE 3-41: SUMMARY OF ADD95%UCL AND EGG CONCENTRATIONS FOR FEMALE GREAT BLUE HERON BASED ON TRI+ CONGENERS FOR PERIOD 1993 - 2018

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<th>95% UCL Egg Concentration (mg/Kg)</th>
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### TABLE 3-50: SUMMARY OF ADD\textsubscript{expected} AND EGG CONCENTRATIONS FOR FEMALE MALLARD BASED ON 1993 DATA ON A TEQ BASIS

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<tr>
<th>Location</th>
<th>Drinking Water Expected</th>
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<th>Benthic Invertebrate Expected</th>
<th>Sediment Expected</th>
<th>Total Average Daily Dose\textsubscript{expected} (mg/Kg/day)</th>
<th>Total Average Concentration in Eggs (mg/Kg)</th>
</tr>
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<th>Benthic Invertebrate 95% UCL</th>
<th>Sediment 95% UCL</th>
<th>Total Upper Bound Daily Dose_{95%UCL} (mg/Kg/day)</th>
<th>Total Concentration in Eggs (95% UCL) (mg/Kg)</th>
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**TABLE 3-51: SUMMARY OF ADD_{95%UCL} AND EGG CONCENTRATIONS FOR FEMALE MALLARD BASED ON 1993 DATA ON A TEQ BASIS**
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### TABLE 3-54: SUMMARY OF ADD$_{\text{Expected}}$ AND EGG CONCENTRATIONS FOR FEMALE BELTED KINGFISHER BASED ON 1993 DATA ON TEQ BASIS

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<th>Sediment Expected</th>
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### TABLE 3-55: SUMMARY OF ADD$_{95\%UCL}$ AND EGG CONCENTRATIONS FOR FEMALE BELTED KINGFISHER BASED ON 1993 DATA ON TEQ BASIS

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<th>Benthic Invertebrate 95% UCL</th>
<th>Benthic Invertebrate 95% UCL</th>
<th>Sediment 95% UCL</th>
<th>Sediment 95% UCL</th>
<th>Total Upper Bound Daily Dose$_{95%UCL}$</th>
<th>Eggs (95% UCL)</th>
<th>Total Concentration in (mg/Kg/day)</th>
<th>Total Concentration in (mg/Kg)</th>
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TABLE 3-56: SUMMARY OF ADD_{Expected} AND EGG CONCENTRATIONS FOR FEMALE BELTED KINGFISHER FOR THE PERIOD 1993 - 2018 ON TEQ BASIS

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<th>Average Egg Concentration (mg/Kg)</th>
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TABLE 3-57: SUMMARY OF ADD$_{95\%}$UCL AND EGG CONCENTRATIONS FOR FEMALE BELTED KINGFISHER FOR THE PERIOD 1993 - 2018 ON TEQ BASIS

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<th>95% UCL Egg Concentration (mg/Kg)</th>
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TABLE 3-58: SUMMARY OF ADD\textsubscript{Expected} AND EGG CONCENTRATIONS FOR FEMALE GREAT BLUE HERON BASED ON 1993 DATA ON TEQ BASIS

TAMS/MCA
### TABLE 3-59: SUMMARY OF ADD$_{95\%\text{UCL}}$ AND EGG CONCENTRATIONS FOR FEMALE GREAT BLUE HERON BASED ON 1993 DATA ON TEQ BASIS

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<th>Sediment $95% \text{UCL}$</th>
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### TABLE 3-60: SUMMARY OF ADD_{Expected} AND EGG CONCENTRATIONS FOR FEMALE GREAT BLUE HERON FOR THE PERIOD 1993 - 2018 ON TEQ BASIS

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TABLE 3-66: SUMMARY OF ADD$_{Expected}$ FOR FEMALE BAT USING 1993 DATA BASED ON TRI+ CONGENERS
# Table 3-67: Summary of ADD_{95\%UCL} For Female Bat Using 1993 Data Based on TRI+ Congeners

<table>
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<tr>
<th>Location</th>
<th>Drinking Water 95% UCL</th>
<th>Benthic Invertebrate 95% UCL</th>
<th>Total Upper Bound Daily Dose_{95%UCL} (mg/Kg/day)</th>
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<td>3.67E+01</td>
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TAMS/MCA
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### TABLE 3-69: SUMMARY OF ADD$_{95\%\text{UCL}}$ FOR FEMALE BAT
BASED ON TRI+ PREDICTIONS FOR THE PERIOD 1993 - 2018

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**TABLE 3-71: SUMMARY OF ADD$_{95\% UCL}$ FOR FEMALE RACCOON USING 1993 DATA BASED ON TRI+ CONGENERS**
TABLE 3-72: SUMMARY OF ADD$_{\text{Expected}}$ FOR FEMALE RACCOON BASED ON TRI+ PREDICTIONS FOR THE PERIOD 1993 - 2018

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**TABLE 3-75: SUMMARY OF ADD\textsubscript{95%UCL} FOR FEMALE MINK USING 1993 DATA BASED ON TRI+ CONGENERS**
TABLE 3-76: SUMMARY OF ADD<sub>Expected</sub> FOR FEMALE MINK
BASED ON TRI+ PREDICTIONS FOR THE PERIOD 1993 - 2018

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## TABLE 3-78: SUMMARY OF ADD$_{\text{Expected}}$ FOR FEMALE OTTER USING 1993 DATA BASED ON TRI+ CONGENERS

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TABLE 3-79: SUMMARY OF ADD_{95\% UCL} FOR FEMALE OTTER USING 1993 DATA BASED ON TRI+ CONGENERS
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### TABLE 3-85: SUMMARY OF ADD$_{95\%\text{UCL}}$ FOR FEMALE BAT
ON A TEQ BASIS FOR THE PERIOD 1993 - 2018

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### TABLE 3-87: SUMMARY OF ADD_{95%UCL} FOR FEMALE RACCOON USING 1993 DATA ON A TEQ BASIS

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<td>Piscivorous Fish 95% UCL</td>
<td>Sediment 95% UCL</td>
<td>Total Average Daily Dosage 95% UCL</td>
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**TABLE 3-95: SUMMARY OF ADD$_{95\%UCL}$ FOR FEMALE OTTER USING 1993 DATA ON A TEQ BASIS**
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TABLE 3-97: SUMMARY OF ADD$_{5\%\text{UCL}}$ FOR FEMALE OTTER ON A TEQ BASIS FOR THE PERIOD 1993 - 2018

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<td>1.58E-05</td>
</tr>
<tr>
<td>2018</td>
<td>1.40E-05</td>
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</table>
| **Hepatotoxicity**          | Hepatomegaly; bile duct hyperplasia, proliferation of smooth ER  
|                            | Focal necrosis; fatty degeneration  
|                            | Induction of microsomal enzymes; implications for hormone imbalances, pancreas and reproductive effects  
|                            | Depletion of fat soluble vitamins (predominantly vitamin A)  
|                            | Porphyria  
| **Immunotoxicity**         | Atrophy of lymphoid tissues  
|                            | Reduction in circulating leukocytes and lymphocytes  
|                            | Suppressed antibody responses  
|                            | Enhanced susceptibility to viruses  
|                            | Suppression of natural killer cells  
| **Neurotoxicity**          | Impaired behavioral responses  
|                            | Alterations in catecholamine levels  
|                            | Depressed spontaneous motor activity  
|                            | Developmental deficits  
|                            | Numbness in extremities  
| **Reproduction**           | Increased abortion; low birth weights  
|                            | Decreased survival and mating success  
|                            | Increased length of estrus  
|                            | Embryo and fetal mortality  
|                            | Gross teratogenic effects  
|                            | Biochemical, neurological, and functional changes following in utero exposure (mammals)  
|                            | Decreased libido, decreased sperm numbers and motility  
| **Gastrointestinal**       | Gastric hyperplasia  
|                            | Ulceration and necrosis  
| **Respiratory**            | Chronic bronchitis  
|                            | Decreased vital capacity  
| **Dermal Toxicity**        | Chloracne  
|                            | Hyperplasia and hyperkeratosis of epithelium  
|                            | Edema  
| **Mutagenic Effects**      | Commercial mixtures are weakly mutagenic  
| **Carcinogenic Effects**   | Preneoplastic changes  
|                            | Neoplastic changes  
|                            | Promotion considered main contribution  
|                            | Attenuation of other carcinogens under certain conditions  

### TABLE 4-2
WORLD-HEALTH ORGANIZATION FOR TOXIC EQUIVALENCY FACTORS (TEFs) FOR HUMANS, MAMMALS, FISH, AND BIRDS

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<th></th>
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<td>Fish</td>
<td>Birds</td>
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<td>0.0001</td>
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<td>&lt;0.000005</td>
<td>0.00001</td>
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</table>

**Notes:** CB = chlorinated biphenyls

**Reference:** van den Berg, et al. (1998). Toxic Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and Wildlife. Environmental Health Perspectives, 106:12, 775-791.
### Table 4-3
SELECTED SEDIMENT SCREENING GUIDELINES: PCBs

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<th>Source / Authority</th>
<th>Concentration Type</th>
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<th>Aroclor 1248</th>
<th>Aroclor 1016</th>
<th>Aroclor 1260</th>
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<tr>
<td>Hudson River Sediment Effect Concentrations (mg/kg, ppm)</td>
<td>(MacDonald Env. Sci., 1999) (Estuarine, freshwater, and saltwater)</td>
<td>Threshold Effect Concentration</td>
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<td>Mid-range Effect Concentration</td>
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<td>Extreme Effect Concentration</td>
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<tr>
<td>NYSDEC (1998) (Freshwater) (mg/kg organic carbon)</td>
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<td>Wildlife Bioaccumulation</td>
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<td>Wildlife Bioaccumulation</td>
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<tr>
<td>Ontario Ministry of the Environment Sediment Guidelines (Freshwater) (Persaud et al., 1993)</td>
<td>No Effect Level (mg/kg)</td>
<td>0.01</td>
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<tr>
<td></td>
<td>Lowest Effect Level (mg/kg)</td>
<td>0.07</td>
<td>0.06</td>
<td>0.03</td>
<td>0.007</td>
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<tr>
<td></td>
<td>Severe Effect Level (mg/kg organic carbon)</td>
<td>530</td>
<td>54</td>
<td>150</td>
<td>53</td>
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<tr>
<td></td>
<td>Effects-Range-Median</td>
<td>180</td>
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<tr>
<td>Ingersoll et al. (1996) Sediment Guidelines (ug/kg, or ppb) (Freshwater)</td>
<td>(Derived from 28-day Hyalella azteca data)</td>
<td>Effects-Range-Low</td>
<td>50</td>
<td></td>
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<tr>
<td></td>
<td>Effects-Range-Median</td>
<td>730</td>
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<td></td>
<td>Threshold Effect Level</td>
<td>32</td>
<td></td>
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<td>Probable Effect Level</td>
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<tr>
<td></td>
<td>No Effect Concentration</td>
<td>190</td>
<td></td>
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<tr>
<td>Washington State Dept of Ecology 1997 Sediment Guidelines (Freshwater) (ug/kg, or ppb)</td>
<td>Apparent Effects Threshold (Microtox)</td>
<td>21</td>
<td>7.3</td>
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<td></td>
<td>Apparent Effects Threshold (Hyalella azteca)</td>
<td>820</td>
<td>350</td>
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<td>100</td>
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<td>Probable Apparent Effects Threshold (Microtox)</td>
<td>21</td>
<td>7.3</td>
<td>21</td>
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<td></td>
<td>Probable Apparent Effects Threshold (Hyalella azteca)</td>
<td>450</td>
<td>240</td>
<td></td>
<td>100</td>
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<td></td>
<td>Lowest Apparent Effects Threshold</td>
<td>21</td>
<td>7.3</td>
<td>21</td>
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<tr>
<td></td>
<td>(between Microtox and H. azteca)</td>
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<tr>
<td>Florida Department of Environmental Protection (ug/kg, or ppb) (Marine and Estuarine)</td>
<td>Threshold Effect Level</td>
<td>21.6</td>
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<td></td>
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<td></td>
<td>Probable Effect Level</td>
<td>189</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jones et al. (1997) (ug/kg, or ppb)</td>
<td>EqP-derived; recommended TOC adjustment</td>
<td>Secondary Chronic Value</td>
<td>810</td>
<td>1000</td>
<td>450000</td>
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<td>Smith et al. (1996) (ug/kg, or ppb)</td>
<td>Threshold Effect Level</td>
<td>34.1</td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>Probable Effect Level</td>
<td>277</td>
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Note: All values are dry weight unless noted. Some values also available in mg/kg organic carbon.
<table>
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<tr>
<th>SPECIES</th>
<th>EXPOSURE MEDIA</th>
<th>PCB TYPE</th>
<th>EXPOSURE DURATION</th>
<th>EFFECT LEVEL</th>
<th>EFFECT CONC, WHOLE BODY CONC. (mg/kg wet wt)</th>
<th>EFFECT ENDPOINT</th>
<th>REFERENCE</th>
</tr>
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<tbody>
<tr>
<td>Amphipod (Gammarus pseudolimnaeus)</td>
<td>Water</td>
<td>Aroclor 1248</td>
<td>2 months</td>
<td>LD₅₀</td>
<td>552</td>
<td>Mortality</td>
<td>Nebeker and Puglisi (1974)</td>
</tr>
<tr>
<td>Amphipod (Hyalella azteca)</td>
<td>Water</td>
<td>PCB 52</td>
<td>&gt; or = 10 weeks</td>
<td>LD₃₀</td>
<td>180</td>
<td>Mortality</td>
<td>Borgmann et al. (1990)</td>
</tr>
<tr>
<td>Amphipod (Hyalella azteca)</td>
<td>Water</td>
<td>Aroclor 1242</td>
<td>&gt; or = 10 weeks</td>
<td>LD₃₀</td>
<td>100</td>
<td>Mortality</td>
<td>Borgmann et al. (1990)</td>
</tr>
<tr>
<td>Amphipod (Gammarus pseudolimnaeus)</td>
<td>Water</td>
<td>Aroclor 1242</td>
<td>2 months</td>
<td>LD₃₀</td>
<td>316</td>
<td>Mortality</td>
<td>Nebeker and Puglisi (1974)</td>
</tr>
<tr>
<td>C. Cladoceran (Daphnia magna)</td>
<td>Model ecosystem</td>
<td>2,3,7,8-TCDD</td>
<td>33 days</td>
<td>EL (no effect)</td>
<td>1570</td>
<td>Reproduction reduced by at least 50%</td>
<td>Isensee and Jones (1975)</td>
</tr>
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<td>Amphipod (Gammarus pseudolimnaeus)</td>
<td>Water</td>
<td>Aroclor 1248</td>
<td>2 months</td>
<td>LOAEL</td>
<td>552</td>
<td>Mortality</td>
<td>Nebeker and Puglisi (1974)</td>
</tr>
<tr>
<td>Snail (Physa spp.)</td>
<td>Water</td>
<td>2,3,7,8-TCDD</td>
<td>33 days</td>
<td>EL (no effect)</td>
<td>502</td>
<td>Mortality</td>
<td>Isensee and Jones (1975)</td>
</tr>
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<td>Water</td>
<td>Aroclor 1242</td>
<td>2 months</td>
<td>EL (effect)</td>
<td>316</td>
<td>No reproduction</td>
<td>Nebeker and Puglisi (1974)</td>
</tr>
<tr>
<td>Oligochaete (Lumbricillus variegatus)</td>
<td>Algae (Food)</td>
<td>PCB 153</td>
<td>35 days</td>
<td>LOAEL</td>
<td>126</td>
<td>Mortality</td>
<td>Fisher et al. (1998)</td>
</tr>
<tr>
<td>Oligochaete (Lumbricillus variegatus)</td>
<td>Algae (Food)</td>
<td>PCB 153</td>
<td>35 days</td>
<td>LOAEL</td>
<td>126</td>
<td>Weight loss</td>
<td>Fisher et al. (1998)</td>
</tr>
<tr>
<td>Oligochaete (Lumbricillus variegatus)</td>
<td>Algae (Food)</td>
<td>PCB 15</td>
<td>35 days</td>
<td>LOAEL</td>
<td>119</td>
<td>Mortality</td>
<td>Fisher et al. (1998)</td>
</tr>
<tr>
<td>Oligochaete (Lumbricillus variegatus)</td>
<td>Algae (Food)</td>
<td>PCB 47</td>
<td>35 days</td>
<td>LOAEL</td>
<td>113</td>
<td>Mortality</td>
<td>Fisher et al. (1998)</td>
</tr>
<tr>
<td>Grass shrimp (Palaemonetes rugo)</td>
<td>Water</td>
<td>Aroclor 1254</td>
<td>7 days</td>
<td>LOAEL</td>
<td>65</td>
<td>Mortality (60%)</td>
<td>Nimmo et al. (1974)</td>
</tr>
<tr>
<td>Oligochaete (Lumbricillus variegatus)</td>
<td>Algae (Food)</td>
<td>PCB 1</td>
<td>35 days</td>
<td>LOAEL</td>
<td>64</td>
<td>Mortality</td>
<td>Fisher et al. (1998)</td>
</tr>
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<td>Oligochaete (Lumbricillus variegatus)</td>
<td>Algae (Food)</td>
<td>PCB 1</td>
<td>35 days</td>
<td>LOAEL</td>
<td>64</td>
<td>Weight loss</td>
<td>Fisher et al. (1998)</td>
</tr>
<tr>
<td>Grass shrimp (Palaemonetes rugo)</td>
<td>Water</td>
<td>Aroclor 1254</td>
<td>16 days</td>
<td>LOAEL</td>
<td>27</td>
<td>Mortality (45%)</td>
<td>Nimmo et al. (1974)</td>
</tr>
<tr>
<td>Amphipod (Gammarus pseudolimnaeus)</td>
<td>Water</td>
<td>Aroclor 1242</td>
<td>2 months</td>
<td>NOAEL</td>
<td>76</td>
<td>Reproduction</td>
<td>Nebeker and Puglisi (1974)</td>
</tr>
<tr>
<td>Oligochaete (Lumbricillus variegatus)</td>
<td>Algae (Food)</td>
<td>PCB 153</td>
<td>35 days</td>
<td>NOAEL</td>
<td>65</td>
<td>Mortality</td>
<td>Fisher et al. (1998)</td>
</tr>
<tr>
<td>Oligochaete (Lumbricillus variegatus)</td>
<td>Algae (Food)</td>
<td>PCB 153</td>
<td>35 days</td>
<td>NOAEL</td>
<td>65</td>
<td>Weight loss</td>
<td>Fisher et al. (1998)</td>
</tr>
<tr>
<td>Oligochaete (Lumbricillus variegatus)</td>
<td>Algae (Food)</td>
<td>PCB 15</td>
<td>35 days</td>
<td>NOAEL</td>
<td>63.1</td>
<td>Mortality</td>
<td>Fisher et al. (1998)</td>
</tr>
<tr>
<td>Oligochaete (Lumbricillus variegatus)</td>
<td>Algae (Food)</td>
<td>PCB 15</td>
<td>35 days</td>
<td>NOAEL</td>
<td>63.1</td>
<td>Weight loss</td>
<td>Fisher et al. (1998)</td>
</tr>
<tr>
<td>Amphipod (Hyalella azteca)</td>
<td>Water</td>
<td>PCB 52</td>
<td>&gt; or = 10 weeks</td>
<td>NOAEL</td>
<td>54</td>
<td>Mortality</td>
<td>Borgmann et al. (1990)</td>
</tr>
<tr>
<td>Oligochaete (Lumbricillus variegatus)</td>
<td>Algae (Food)</td>
<td>PCB 47</td>
<td>35 days</td>
<td>NOAEL</td>
<td>49.3</td>
<td>Mortality</td>
<td>Fisher et al. (1998)</td>
</tr>
<tr>
<td>Oligochaete (Lumbricillus variegatus)</td>
<td>Algae (Food)</td>
<td>PCB 47</td>
<td>35 days</td>
<td>NOAEL</td>
<td>49.3</td>
<td>Weight loss</td>
<td>Fisher et al. (1998)</td>
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<td>Oligochaete (Lumbricillus variegatus)</td>
<td>Algae (Food)</td>
<td>PCB 1</td>
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<td>NOAEL</td>
<td>33.2</td>
<td>Mortality</td>
<td>Fisher et al. (1998)</td>
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<td>Algae (Food)</td>
<td>PCB 1</td>
<td>35 days</td>
<td>NOAEL</td>
<td>33.2</td>
<td>Weight loss</td>
<td>Fisher et al. (1998)</td>
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TABLE 4-4
TOXICITY ENDPOINTS FOR BENTHIC INVERTEBRATES
EFFECTIVE CONCENTRATIONS OF TOTAL PCBs, AROCLORS, AND DIOXIN TOXIC EQUIVALENTS (TEQs)

<table>
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<tr>
<th>SPECIES (species)</th>
<th>EXPOSURE MEDIA</th>
<th>PCB TYPE</th>
<th>EXPOSURE DURATION</th>
<th>EFFECT LEVEL</th>
<th>EFFECT CONC, WHOLE BODY CONC. (mg/kg wet wt)</th>
<th>EFFECT ENDPOINT</th>
<th>REFERENCE</th>
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<tbody>
<tr>
<td>Amphipod (Hyalella azteca)</td>
<td>Water</td>
<td>Aroclor 1242</td>
<td>&gt; or = 10 weeks</td>
<td>NOAEL</td>
<td>30</td>
<td>Mortality</td>
<td>Bergmann et al. (1990)</td>
</tr>
<tr>
<td>Grass shrimp (Palaemonetes pugio)</td>
<td>Water</td>
<td>Aroclor 1254</td>
<td>16 days</td>
<td>NOAEL</td>
<td>18</td>
<td>Mortality</td>
<td>Nimmo et al. (1974)</td>
</tr>
<tr>
<td>Grass shrimp (Palaemonetes pugio)</td>
<td>Water</td>
<td>Aroclor 1255</td>
<td>7 days</td>
<td>NOAEL</td>
<td>5.4</td>
<td>Mortality</td>
<td>Nimmo et al. (1974)</td>
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<tr>
<td>SPECIES</td>
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<td>PCB TYPE</td>
<td>EXPOSURE DURATION</td>
<td>EFFECT LEVEL</td>
<td>EFFECT CONCENTRATION WHOLE BODY CONCENTRATION mg/kg wet wt.</td>
<td>EFFECT ENDPOINT</td>
<td>REFERENCE</td>
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<tr>
<td>Lake trout</td>
<td>Water</td>
<td>PCB-153</td>
<td>15 days</td>
<td>LD100</td>
<td>7.6</td>
<td>Fry mortality</td>
<td>Broyles and Noveck, 1979</td>
</tr>
<tr>
<td>Chinook salmon</td>
<td>Water</td>
<td>PCB-153</td>
<td>15 days</td>
<td>LD100</td>
<td>3.6</td>
<td>Fry mortality</td>
<td>Broyles and Noveck, 1979</td>
</tr>
<tr>
<td>Adult Fathead Minnow</td>
<td>Water</td>
<td>Aroclor 1254</td>
<td>9 months</td>
<td>LOAEL</td>
<td>999</td>
<td>Adult mortality</td>
<td>Nebeker et al., 1974</td>
</tr>
<tr>
<td>Adult Fathead Minnow</td>
<td>Water</td>
<td>Aroclor 1254</td>
<td>9 months</td>
<td>LOAEL</td>
<td>429</td>
<td>Spawning</td>
<td>Nebeker et al., 1974</td>
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<tr>
<td>Adult Minnow</td>
<td>Diet</td>
<td>Clophen A50</td>
<td>40 days, studied</td>
<td>LOAEL</td>
<td>170</td>
<td>Egg hatchability</td>
<td>Nebeker et al., 1974</td>
</tr>
<tr>
<td>Brook trout fry</td>
<td>Water</td>
<td>Aroclor 1254</td>
<td>118 days</td>
<td>LOAEL</td>
<td>125</td>
<td>Fry mortality</td>
<td>Manck et al., 1978</td>
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<tr>
<td>Salmonidae (Salvelinus namaycush)</td>
<td>Water</td>
<td>PCB-153</td>
<td>15 days</td>
<td>LD100</td>
<td>7.6</td>
<td>Fry mortality</td>
<td>Broyles and Noveck, 1979</td>
</tr>
<tr>
<td>Chinook salmon</td>
<td>Water</td>
<td>PCB-153</td>
<td>15 days</td>
<td>LD100</td>
<td>3.6</td>
<td>Fry mortality</td>
<td>Broyles and Noveck, 1979</td>
</tr>
<tr>
<td>Adult Fathead Minnow</td>
<td>Water</td>
<td>Aroclor 1254</td>
<td>9 months</td>
<td>NOAEL</td>
<td>436</td>
<td>Adult mortality</td>
<td>Nebeker et al., 1974</td>
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<tr>
<td>Adult Fathead Minnow</td>
<td>Water</td>
<td>Aroclor 1254</td>
<td>9 months</td>
<td>NOAEL</td>
<td>429</td>
<td>Egg hatchability</td>
<td>Nebeker et al., 1974</td>
</tr>
<tr>
<td>Adult Minnow</td>
<td>Diet</td>
<td>Clophen A50</td>
<td>40 days, studied</td>
<td>LOAEL</td>
<td>170</td>
<td>Egg hatchability</td>
<td>Nebeker et al., 1974</td>
</tr>
<tr>
<td>Brook trout fry</td>
<td>Water</td>
<td>Aroclor 1254</td>
<td>118 days</td>
<td>NOAEL</td>
<td>71</td>
<td>Fry mortality</td>
<td>Manck et al., 1978</td>
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<tr>
<td>Juvenile Spot</td>
<td>Water</td>
<td>Aroclor 1254</td>
<td>1 Lab Stu</td>
<td>NOAEL</td>
<td>27</td>
<td>Adult mortality</td>
<td>Hansen et al., 1971</td>
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<tr>
<td>Adult Minnow</td>
<td>Diet</td>
<td>Clophen A50</td>
<td>40 days, studied</td>
<td>NOAEL</td>
<td>15</td>
<td>Egg hatchability</td>
<td>Bengtsson, B., 1980</td>
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<tr>
<td>Killfish</td>
<td>Single injection into adults</td>
<td>PCB mixture</td>
<td>Single injection, 40 days of observation</td>
<td>NOAEL</td>
<td>3.8 (nominal dose)</td>
<td>Egg production and food consumption</td>
<td>Black et al., 1998a</td>
</tr>
<tr>
<td>Killfish</td>
<td>Single injection into adults</td>
<td>PCB mixture</td>
<td>Single injection, 40 days of observation</td>
<td>NOAEL</td>
<td>0.76 (nominal dose)</td>
<td>Egg production and food consumption</td>
<td>Black et al., 1998a</td>
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<tr>
<td>SPECIES</td>
<td>FIELD COMPONENT</td>
<td>CONTAMINANT TYPE</td>
<td>EFFECT LEVEL</td>
<td>EFFECT CONCENTRATION (mg/kg wet wt or as noted below)</td>
<td>EFFECT ENDPOINT</td>
<td>REFERENCE</td>
<td></td>
</tr>
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<td>-------------------------------</td>
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<td>--------------</td>
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<td>------------------------------------------------------</td>
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<tr>
<td>Arctic char (Salvelinus alpinus)</td>
<td>Adult fish and eggs collected from Lake Geneva</td>
<td>PCBs</td>
<td>EL-effect</td>
<td>10 to 75 mg/kg lipid</td>
<td>Embryomortality</td>
<td>Monod, 1985</td>
<td></td>
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<tr>
<td>Winter ronconet (Pseudopleuronectes americanus)</td>
<td>Adult and eggs collected from New Bedford Harbor</td>
<td>PCBs</td>
<td>EL-effect</td>
<td>36.0 mg/kg dry wt in eggs</td>
<td>Growth rate of larvae</td>
<td>Black et al., 1988b</td>
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<tr>
<td>Katfish (Fundulus heteroclitus)</td>
<td>Fish collected from New Bedford Harbor</td>
<td>PCBs</td>
<td>LOAEL</td>
<td>20.5 mg/kg dry wt in liver</td>
<td>Embryo and larval survival</td>
<td>Black et al., 1998b</td>
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<tr>
<td>Kamrin (Fundulus heteroclitus)</td>
<td>Fish collected from New Bedford Harbor</td>
<td>PCBs</td>
<td>EL-effect</td>
<td>5.7 mg/kg dry wt in liver</td>
<td>Embryo and larval survival</td>
<td>Black et al., 1998b</td>
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<tr>
<td>English sole (Parophrys vetulus)</td>
<td>Fish collected from Puget Sound</td>
<td>PCBs, PAHs</td>
<td>EL-effect</td>
<td>0.461 mg/kg dry wt in liver</td>
<td>Larval mortality</td>
<td>Westin et al., 1983</td>
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<tr>
<td>Stripped bass (Morone saxatilis)</td>
<td>Eggs from hatcheries. Larvae fed naturally contaminated</td>
<td>PCBs, HCl, pesticides</td>
<td>EL-effect</td>
<td>0.1 to 10 in eggs</td>
<td>Larval mortality</td>
<td>Westin et al., 1983</td>
<td></td>
</tr>
<tr>
<td>Chinook salmon (Oncorhynchus tshawytscha)</td>
<td>Adult fish and eggs collected from Lake Michigan</td>
<td>PCBs, pesticides</td>
<td>EL-effect</td>
<td>0.5 to 9.9 mg/kg in eggs</td>
<td>Hatching success</td>
<td>Giesy et al., 1986</td>
<td></td>
</tr>
<tr>
<td>Chinook salmon (Oncorhynchus tshawytscha)</td>
<td>Adult fish and eggs collected from Lake Michigan</td>
<td>PCBs</td>
<td>EL-effect</td>
<td>2.75 to 5.75 in eggs</td>
<td>Hatching success</td>
<td>Ankley et al., 1981</td>
<td></td>
</tr>
<tr>
<td>Elan thought (Salmo gairdneri)</td>
<td>Juvenile fish and eggs from hatchery</td>
<td>PCBs, DDT</td>
<td>EL-effect</td>
<td>2.7 in eggs</td>
<td>Embryomortality</td>
<td>Hogan and Braun, 1975</td>
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<td>English sole (Parophrys vetulus)</td>
<td>Adult and eggs collected from Puget Sound</td>
<td>PCBs</td>
<td>LOAEL</td>
<td>2.56 in liver</td>
<td>Production of normal larvae</td>
<td>Casillas et al., 1991</td>
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<tr>
<td>Lake trout (Salvelinus nannycz)</td>
<td>Adult fish and eggs collected from Great Lakes</td>
<td>PCBs</td>
<td>EL-effect</td>
<td>0.25 to 1.77 in eggs</td>
<td>Egg mortality and percent of normal fry hatching</td>
<td>Mac et al., 1993</td>
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<tr>
<td>Chinook salmon (Oncorhynchus tshawytscha)</td>
<td>Adult fish and eggs collected from Lake Michigan</td>
<td>PCBs, pesticides</td>
<td>EL-effect</td>
<td>0.22 ± 0.8 in eggs</td>
<td>Hatching success</td>
<td>Giesy et al., 1986</td>
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<tr>
<td>Starry flounder (Platichthys stellatus)</td>
<td>Adult fish and eggs from area of San Francisco Bay</td>
<td>PCBs, HCl, Phthalates</td>
<td>EL-effect</td>
<td>about 50 to 200 in eggs</td>
<td>Hatching success</td>
<td>Spies and Rice, 1988</td>
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<td>Redbreast sunfish (Lepomis auritus)</td>
<td>Adult fish collected from East Tennessee stream</td>
<td>PCBs, PAHs, metals, chlorine</td>
<td>EL-effect</td>
<td>0.95</td>
<td>Fecundity, clutch size, growth</td>
<td>Adams et al., 1989, 1990, 1992</td>
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<td>Baltic shiner (Stizostedion mormon)</td>
<td>Adult fish and eggs collected from Baltic Sea</td>
<td>PCBs</td>
<td>EL-effect</td>
<td>≥ 0.120</td>
<td>Hatching success</td>
<td>Hansen et al., 1985</td>
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<td>Baltic flounder (Platichthys fluvius)</td>
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<td>PCBs, pesticides, metals</td>
<td>EL-effect</td>
<td>≥ 0.120</td>
<td>Hatching success</td>
<td>von Winternhagen et al., 1981</td>
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<tr>
<td>Katfish (Fundulus heteroclitus)</td>
<td>Fish collected from New Bedford Harbor</td>
<td>PCBs</td>
<td>NOAEL</td>
<td>9.5 mg/kg dry wt in liver</td>
<td>Embryo and larval mortality</td>
<td>Black et al., 1998b</td>
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<td>Stripped bass (Morone saxatilis)</td>
<td>Larvae fed naturally contaminated food</td>
<td>PCBs</td>
<td>EL-no effect</td>
<td>3.1 in post yolk sac larvae</td>
<td>Larval mortality</td>
<td>Westin et al., 1983</td>
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<td>Winter ronconet (Pseudopleuronectes americanus)</td>
<td>Adult and eggs collected from New Bedford Harbor</td>
<td>PCBs</td>
<td>EL-no effect</td>
<td>1.08 mg/kg dry wt in eggs</td>
<td>Growth rate of larvae</td>
<td>Black et al., 1988b</td>
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<td>Adult and eggs collected from Puget Sound</td>
<td>PCBs</td>
<td>NOAEL</td>
<td>0.09 in liver</td>
<td>Production of normal larvae</td>
<td>Casillas et al., 1991</td>
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<td>Fish from an East Tennessee stream</td>
<td>PCBs, PAHs, metals, chlorine</td>
<td>EL-no effect</td>
<td>0.5</td>
<td>Fecundity, clutch size, growth</td>
<td>Adams et al., 1989, 1990, 1992</td>
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<td>Fish collected from New Bedford Harbor</td>
<td>PCBs</td>
<td>NOAEL</td>
<td>0.461 mg/kg dry wt in liver</td>
<td>Adult female mortality</td>
<td>Black et al., 1998b</td>
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<td>Norwegian (Gobius niger)</td>
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<td>PCBs</td>
<td>EL-effect</td>
<td>≥ 1.05 in ovaries</td>
<td>Hatching success</td>
<td>Hansen et al., 1985</td>
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<td>Arctic char (Salvelinus alpinus)</td>
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<td>DDT</td>
<td>EL-no effect</td>
<td>≥ 1.05 in ovaries</td>
<td>Hatching success</td>
<td>Monod, 1985</td>
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<td>EFFECT LEVEL</td>
<td>TISSUE</td>
<td>CONTAMINANT TYPE</td>
<td>EFFECT CONC. (ug/kg ww)</td>
<td>LIPID CONTENT OF EGG (g lipid/gww egg)</td>
<td>TEF</td>
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<tr>
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<td>Water</td>
<td>LD50</td>
<td>Embryo</td>
<td>2,3,7,8-TCDD</td>
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<td>Zebrafish (Danio danio)</td>
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<td>Egg</td>
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<td>White sucker (Catosomus commersoni)</td>
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<td>LD50</td>
<td>Egg</td>
<td>2,3,7,8-TCDD</td>
<td>2.5</td>
<td>0.017</td>
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<tr>
<td>Northern Pike (Esox lucius)</td>
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<td>LD50</td>
<td>Egg</td>
<td>2,3,7,8-TCDD</td>
<td>1.89</td>
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<td>Medaka (Oryzias latipes)</td>
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<td>Egg</td>
<td>2,3,7,8-TCDD</td>
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<td>Water</td>
<td>LD50</td>
<td>Egg</td>
<td>2,3,7,8-TCDD</td>
<td>0.539</td>
<td>0.024</td>
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<td>Lake herring (Coregonus artedi)</td>
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<td>Egg</td>
<td>2,3,7,8-TCDD</td>
<td>0.902</td>
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<td>Dalmatian eel (Ichthys punctatus)</td>
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<td>Egg</td>
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<td>Egg</td>
<td>2,3,7,8-TCDD</td>
<td>0.439</td>
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<td>Egg</td>
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<td>Egg</td>
<td>2,3,7,8-TCDD</td>
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<td>0.087</td>
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<td>Rainbow Trout</td>
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<td>Egg</td>
<td>2,3,7,8-TCDD</td>
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<td>Brook Trout (Salvelinus fontinalis)</td>
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<td>Egg</td>
<td>PCB 126</td>
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<td>Rainbow Trout</td>
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<td>LD50</td>
<td>Egg</td>
<td>2,3,7,8-TCDD</td>
<td>0.200</td>
<td>0.068</td>
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<td>LD50</td>
<td>Egg</td>
<td>2,3,7,8-TCDD</td>
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<td>LD50</td>
<td>Egg</td>
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<td>Egg</td>
<td>2,3,7,8-TCDD</td>
<td>0.085</td>
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<td>LD50</td>
<td>Egg</td>
<td>2,3,7,8-TCDD</td>
<td>0.065</td>
<td>0.08</td>
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<td>Lake trout (Salvelinus namaycush)</td>
<td>Injection</td>
<td>LD50</td>
<td>Egg</td>
<td>2,3,7,8-TCDD</td>
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<td>Fathead minnow</td>
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<td>LD100</td>
<td>Larvae</td>
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<td>Water</td>
<td>LD50</td>
<td>Larvae</td>
<td>2,3,7,8-TCDD</td>
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<td>SPECIES</td>
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<td>TISSUE</td>
<td>CONTAMINANT TYPE</td>
<td>EFFECT CONC. (ug/kg ww)</td>
<td>LIPID CONTENT OF EGG (g lipid/gww egg)</td>
<td>TEF</td>
</tr>
<tr>
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<tr>
<td>Zebrafish (Danio rerio)</td>
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<td>Egg</td>
<td>2,3,7,8-TCDD</td>
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<tr>
<td>Fathead minnow (Pimephales promelas)</td>
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<td>LOAEL</td>
<td>Egg</td>
<td>2,3,7,8-TCDD</td>
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<td>White sucker (Catostomus commersoni)</td>
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<td>LOAEL</td>
<td>Egg</td>
<td>2,3,7,8-TCDD</td>
<td>1.22</td>
<td>0.025</td>
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<td>Northern Pike (Esox lucius)</td>
<td>Water</td>
<td>LOAEL</td>
<td>Egg</td>
<td>2,3,7,8-TCDD</td>
<td>1.8</td>
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<td>Metaka (Oryzias latipes)</td>
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<td>LOAEL</td>
<td>Egg</td>
<td>2,3,7,8-TCDD</td>
<td>0.949</td>
<td>0.029</td>
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<tr>
<td>Fathead minnow (Pimephales promelas)</td>
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<td>LOAEL</td>
<td>Egg</td>
<td>2,3,7,8-TCDD</td>
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<td>Channel catfish (Ictalurus punctatus)</td>
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<td>Egg</td>
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<td>Lake trout (Coregonus artedii)</td>
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<td>LOAEL</td>
<td>Egg</td>
<td>2,3,7,8-TCDD</td>
<td>0.27</td>
<td>0.066</td>
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<tr>
<td>Rainbow Trout (Salmo gairdneri)</td>
<td>Injection</td>
<td>LOAEL</td>
<td>Egg</td>
<td>2,3,7,8-TCDD</td>
<td>0.291</td>
<td>0.087</td>
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<tr>
<td>Rainbow Trout (Salmo gairdneri)</td>
<td>Water</td>
<td>LOAEL</td>
<td>Egg</td>
<td>2,3,7,8-TCDD</td>
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<td>LOAEL</td>
<td>Egg</td>
<td>2,3,7,8-TCDD</td>
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<td>Egg</td>
<td>2,3,7,8-TCDD</td>
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<td>Lake trout (Salvelinus namaycush)</td>
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<td>LOAEL</td>
<td>Egg</td>
<td>2,3,7,8-TCDD</td>
<td>0.055</td>
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<td>Lake trout (Salvelinus namaycush)</td>
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<td>LOAEL</td>
<td>Egg</td>
<td>2,3,7,8-TCDD</td>
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<td>Lake trout (Salvelinus namaycush)</td>
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<td>Egg</td>
<td>2,3,7,8-TCDD</td>
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<td>Fathead minnow (Pimephales promelas)</td>
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<td>Larvae</td>
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<td>White sucker (Catostomus commersoni)</td>
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<td>Egg</td>
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<td>Egg</td>
<td>2,3,7,8-TCDD</td>
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<td>Egg</td>
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<td>Egg</td>
<td>2,3,7,8-TCDD</td>
<td>0.455</td>
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<td>Egg</td>
<td>2,3,7,8-TCDD</td>
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<td>Egg</td>
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<td>Embryo</td>
<td>2,3,7,8-TCDD</td>
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<td>Egg</td>
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<td>Egg</td>
<td>2,3,7,8-TCDD</td>
<td>0.291</td>
<td>0.087</td>
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<tr>
<td>Brook Trout (Salvenius fontinalis)</td>
<td>Water</td>
<td>NOAEL</td>
<td>Egg</td>
<td>2,3,7,8-TCDD</td>
<td>0.135</td>
<td>0.068</td>
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TABLE 4-7 TOXICITY ENDPOINTS FOR FISH - LABORATORY STUDIES EFFECTIVE CONCENTRATIONS OF DIOXIN TOXIC EQUIVALENTS (TEQs)
<table>
<thead>
<tr>
<th>SPECIES</th>
<th>EXPOSURE MEDIA</th>
<th>EFFECT LEVEL</th>
<th>TISSUE</th>
<th>CONTAMINANT TYPE</th>
<th>EFFECT CONC. (ug/kg ww)</th>
<th>LIPID CONTENT OF EGG (g lipid/gww egg)</th>
<th>TEF</th>
<th>EFFECT CONC. DIOXIN EQUIVALENTS (ug TEQ/kg lipid)</th>
<th>EFFECT ENDPOINT</th>
<th>REFERENCE</th>
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<td>Injection</td>
<td>NOAEL</td>
<td>Egg</td>
<td>2,3,7,8-TCDD</td>
<td>0.044</td>
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<td>0.55</td>
<td>Early life stage mortality</td>
<td>Walker et al., 1992</td>
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<td>Injection</td>
<td>NOAEL</td>
<td>Egg</td>
<td>2,3,7,8-TCDD</td>
<td>0.044</td>
<td>0.08</td>
<td>1</td>
<td>0.55</td>
<td>Early life stage mortality</td>
<td>Walker et al., 1994</td>
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<tr>
<td>Lake trout</td>
<td>Water</td>
<td>NOAEL</td>
<td>Egg</td>
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<td>2,3,7,8-TCDD</td>
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Notes:
* No relevant field studies were found.
* Fathead minnow embryo is assumed to have same lipid content as reported for eggs.
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<th>TISSUE</th>
<th>CONTAMINANT TYPE</th>
<th>EFFECT CONC. (ug/kg ww, unless noted differently)</th>
<th>LIPID CONTENT OF EGG (g lipid/gww egg)</th>
<th>EFFECT CONC. DIOXIN EQUIVALENTS (ug TEQ/kg lipid)</th>
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<td>Diet</td>
<td>9 weeks</td>
<td>NOAEL</td>
<td>Aroclor 1254</td>
<td>0.1</td>
<td>2</td>
<td>Hatching success</td>
<td>Scott, 1977</td>
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<td>SPECIES</td>
<td>FIELD COMPONENT</td>
<td>EFFECT LEVEL</td>
<td>CONTAMINANT TYPE</td>
<td>EFFECTIVE DOSE (mg/kg/day)</td>
<td>EFFECTIVE FOOD CONC.</td>
<td>EFFECT ENDPOINT</td>
<td>REFERENCE</td>
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<tr>
<td>Tree Swallow (Tachycineta bicolor)</td>
<td>Populations in Fox River and Green Bay, Lake Michigan, studied</td>
<td>NOAEL</td>
<td>PCBs, DDE</td>
<td>0.55</td>
<td>up to 0.61</td>
<td>Clutch and egg success</td>
<td>Custer et al., 1998</td>
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<tr>
<td>Tree Swallow (Tachycineta bicolor)</td>
<td>Populations along Hudson River studied</td>
<td>NOAEL</td>
<td>PCBs</td>
<td>16.1</td>
<td>up to 17.9</td>
<td>Growth, mortality, reproduction</td>
<td>US EPA Phase 2 Database (1998)</td>
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## Table 4-11
### Toxicity Endpoints for Avians - Laboratory Studies
#### Effective Dietary Doses of Dioxin Toxic Equivalents (TEQs)

<table>
<thead>
<tr>
<th>Species</th>
<th>Exposure Media</th>
<th>Exposure Duration</th>
<th>Effect Level</th>
<th>Contaminant Type</th>
<th>Effective Dose Dioxin Equivalents (ug/kg/day)</th>
<th>Effect Endpoint</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ringed turtle dove (Streptopelia risoria)</td>
<td>Oral</td>
<td>Single dose</td>
<td>LD$_{50}$</td>
<td>2,3,7,8-TCDD</td>
<td>&gt; 810</td>
<td>Mortality</td>
<td>Hudson et al., 1984</td>
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<tr>
<td>Mallard (Anas platyrhynchos)</td>
<td>Oral</td>
<td>Single dose</td>
<td></td>
<td>2,3,7,8-TCDD</td>
<td>&gt; 108</td>
<td>Mortality</td>
<td>Hudson et al., 1984</td>
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<td>Oral</td>
<td>21 days</td>
<td>LD$_{50}$</td>
<td>2,3,7,8-TCDD</td>
<td>25 - 50</td>
<td>Mortality</td>
<td>Greig et al., 1973</td>
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<tr>
<td>Ring-necked pheasant (Phasianus colchicus)</td>
<td>Intraperitoneal</td>
<td>Single dose</td>
<td>LD$_{50}$</td>
<td>2,3,7,8-TCDD</td>
<td>25</td>
<td>Mortality</td>
<td>Nosek et al., 1992</td>
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<tr>
<td>Northern bobwhite quail (Colinus virginianus)</td>
<td>Oral</td>
<td>Single dose</td>
<td>LD$_{50}$</td>
<td>2,3,7,8-TCDD</td>
<td>15</td>
<td>Mortality</td>
<td>Hudson et al., 1984</td>
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<td>Oral</td>
<td>21 days</td>
<td>LOAE</td>
<td>2,3,7,8-TCDD</td>
<td>1.0</td>
<td>Mortality</td>
<td>Schwetz et al., 1973</td>
</tr>
<tr>
<td>Ring-necked pheasant (Phasianus colchicus)</td>
<td>Intraperitoneal</td>
<td>10 weeks</td>
<td>LOAE</td>
<td>2,3,7,8-TCDD</td>
<td>0.14</td>
<td>Fertility, embryo mortality</td>
<td>Nosek et al., 1992</td>
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<td>Oral</td>
<td>21 days</td>
<td>NOAE</td>
<td>2,3,7,8-TCDD</td>
<td>0.1</td>
<td>Mortality</td>
<td>Schwetz et al., 1973</td>
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<tr>
<td>Ring-necked pheasant (Phasianus colchicus)</td>
<td>Intraperitoneal</td>
<td>10 weeks</td>
<td>NOAE</td>
<td>2,3,7,8-TCDD</td>
<td>0.014</td>
<td>Fertility, embryo mortality</td>
<td>Nosek et al., 1992</td>
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**Notes:**
- * No relevant field studies were found.
- Note units of ug/kg/day.
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<tr>
<th>SPECIES</th>
<th>FIELD COMPONENT</th>
<th>EFFECT LEVEL</th>
<th>CONTAMINANT TYPE</th>
<th>EFFECTIVE DOSE DIOXIN EQUIVALENTS (ug/kg/day)</th>
<th>EFFECTIVE FOOD CONC. (ug/kg)</th>
<th>EFFECT ENDPOINT</th>
<th>REFERENCE</th>
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<tr>
<td>Tree Swallow (<em>Tachycineta bicolor</em>)</td>
<td>Populations along Hudson River studied</td>
<td>EL-no effect</td>
<td>TEQs</td>
<td>4.9</td>
<td>up to 5.41</td>
<td>Growth, mortality, reproduction</td>
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<td>Populations in Fox River and Green Bay, Lake Michigan, studied</td>
<td>EL-no effect</td>
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<td>0.08</td>
<td>up to 0.091</td>
<td>Clutch and egg success</td>
<td>Custer et al., 1998</td>
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<td>SPECIES</td>
<td>EXPOSURE MEDIA</td>
<td>EXPOSURE DURATION</td>
<td>EFFECT LEVEL</td>
<td>PCB TYPE</td>
<td>EFFECTIVE EGG CONC. (mg/kg egg)</td>
<td>EFFECT ENDPOINT</td>
<td>REFERENCE</td>
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<tr>
<td>Chicken (Gallus domesticus)</td>
<td>Drinking water</td>
<td>6 weeks</td>
<td>EL-effect</td>
<td>Aroclor 1254</td>
<td>0.01-0.15 ppm in yolk</td>
<td>Deformities</td>
<td>Tumasonis et al., 1973</td>
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<tr>
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<td>Egg injection</td>
<td>LOAEL</td>
<td>10</td>
<td>Aroclor 1260</td>
<td>6.7</td>
<td>Growth rate of chicks</td>
<td>Carlson and Duby, 1973</td>
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<tr>
<td>Chicken (Gallus domesticus)</td>
<td>Egg injection</td>
<td>LOAEL</td>
<td>5</td>
<td>Aroclor 1242</td>
<td>5.0</td>
<td>Growth and mortality of embryos</td>
<td>Gould et al., 1997</td>
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<td>Egg injection</td>
<td>LOAEL</td>
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<td>Aroclor 1254</td>
<td>5.0</td>
<td>Hatching success</td>
<td>Carlson and Duby, 1973</td>
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<td>Egg injection</td>
<td>LOAEL</td>
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<td>Aroclor 1242</td>
<td>5.0</td>
<td>Hatching success</td>
<td>Carlson and Duby, 1973</td>
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<td>Chicken (Gallus domesticus)</td>
<td>Egg injection</td>
<td>LOAEL</td>
<td>3.7</td>
<td>Aroclor 1248</td>
<td>2.21</td>
<td>Hatching success</td>
<td>Britton and Huston, 1973</td>
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<td>NOAEL</td>
<td>10</td>
<td>Aroclor 1260</td>
<td>10.0</td>
<td>Hatching success</td>
<td>Carlson and Duby, 1973</td>
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<tr>
<td>Screech owl (Otus asio)</td>
<td>Diet of hens</td>
<td>&gt; 8 weeks</td>
<td>NOAEL</td>
<td>Aroclor 1248</td>
<td>7.1</td>
<td>Egg production, hatching success, and fledging success</td>
<td>McLane and Hughes, 1980</td>
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<td>Chicken (Gallus domesticus)</td>
<td>Egg injection</td>
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<td>Growth rate of chicks</td>
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<td>Aroclor 1254</td>
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<td>Scott, 1977</td>
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<td>CONTAMINANT TYPE</td>
<td>EFFECTIVE EGG CONC. (mg/kg egg)</td>
<td>EFFECT ENDPOINT</td>
<td>REFERENCE</td>
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<td>Bald eagle (Haliaeetus leucocephalus)</td>
<td>EL-Effect level</td>
<td>PCBs, Pesticides</td>
<td>20-54</td>
<td>Reproductive success</td>
<td>Clark et al., 1988</td>
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<td>Double-crested cormorant (Phalacrocorax auritus)</td>
<td>EL-Effect level</td>
<td>PCBs, Pesticides, Hg</td>
<td>23.8</td>
<td>Hatching success and fledging success</td>
<td>Weseloh et al., 1983</td>
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<td>Caspian tern (Hydroprogne caspia)</td>
<td>EL-Effect level</td>
<td>PCBs, Pesticides</td>
<td>4.2 - 18</td>
<td>Increased rate of embryo deformities</td>
<td>Yamashita et al., 1993</td>
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<td>Forster’s tern (Sterna forsteri)</td>
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<td>PCBs, Pesticides, Dioxins, Furans</td>
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<td>Hatching success</td>
<td>Kubiak et al., 1989</td>
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<td>Common tern (Sterna hirundo)</td>
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<td>PCBs, Pesticides, Hg</td>
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<td>Hatching success</td>
<td>Becker et al., 1993</td>
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<td>PCBs, Pesticides, Hg</td>
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<td>Hoffman et al., 1993</td>
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<td>PCBs, Pesticides, Hg</td>
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<td>10% reduction in reproductive success</td>
<td>Wiemeyer et al., 1984, 1993</td>
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<td>PCBs</td>
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<td>Reproductive output</td>
<td>U.S. EPA Phase 2 Database Release 4.1b, McCarty and Secord, 1999, Hoffman et al., 1993</td>
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<td>PCBs, Pesticides, Hg</td>
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<td>Hatching success</td>
<td>Hoffman et al., 1993</td>
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<td>PCBs, Pesticides, Dioxins, Furans</td>
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<td>Hatching success</td>
<td>Kubiak et al., 1989</td>
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<td>Tree swallow (Tachycineta bicolor)</td>
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<td>PCBs, DDE</td>
<td>3.24 in eggs and pippers</td>
<td>Hatch success, egg success</td>
<td>Custer et al., 1998</td>
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<td>PCBs, Pesticides, Hg</td>
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<td>Reproductive success</td>
<td>Wiemeyer et al., 1984, 1993</td>
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<td>exposure MEDIA</td>
<td>exposure duration</td>
<td>effect level</td>
<td>contaminant TYPE</td>
<td>effective EGG Conc. (ug/kg egg)</td>
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<td>American kestrel (Falco sparverius)</td>
<td>Egg injection</td>
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<td>LD50</td>
<td>PCB 77</td>
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<td>cormorant (Phalacrocorax carbo)</td>
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<td>21 days</td>
<td>PCB 126</td>
<td>158</td>
<td>0.1</td>
<td>16</td>
<td>Embryo mortality</td>
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<td>common tern (Sterna hirundo)</td>
<td>Egg injection</td>
<td>18 days</td>
<td>PCB 126</td>
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<td>LD50</td>
<td>PCB 126</td>
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<td>18 days</td>
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<td>LD50</td>
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<td>24 days</td>
<td>PCB 105</td>
<td>2.3</td>
<td>0.1</td>
<td>0.2</td>
<td>Embryo mortality</td>
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<td>chicken (Gallus domesticus)</td>
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<td>24 days</td>
<td>PCB 126</td>
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<td>1</td>
<td>0.2</td>
<td>Embryo mortality</td>
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<tr>
<td>chicken (Gallus domesticus)</td>
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<td>20 days</td>
<td>LD50</td>
<td>PCB 77</td>
<td>2.6</td>
<td>0.05</td>
<td>0.1</td>
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<td>Egg injection</td>
<td>18 days</td>
<td>LD50</td>
<td>0.4</td>
<td>0.1</td>
<td>0.1</td>
<td>Embryo mortality</td>
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<tr>
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<td>LOAEL</td>
<td>PCB 126</td>
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<td>LOAEL</td>
<td>PCB 126</td>
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<td>PCB 77</td>
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<td>LOAEL</td>
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<td>Double-crested cormorant</td>
<td>Egg injection</td>
<td>21 days</td>
<td>LOAEL</td>
<td>2,3,7,8-TCDD</td>
<td>4</td>
<td>1</td>
<td>4</td>
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<td>ring-necked pheasant (Phasianus colchicus)</td>
<td>Egg injection</td>
<td>21 days</td>
<td>LOAEL</td>
<td>2,3,7,8-TCDD</td>
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<td>1.0</td>
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<tr>
<td>chick (Gallus domesticus)</td>
<td>Egg injection</td>
<td>18 days</td>
<td>LOAEL</td>
<td>PCB 105</td>
<td>1000</td>
<td>0.0001</td>
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<td>Egg injection</td>
<td>18 days</td>
<td>LOAEL</td>
<td>PCB 77</td>
<td>9</td>
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<td>Egg injection</td>
<td>18 days</td>
<td>LOAEL</td>
<td>PCB 77</td>
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<td>24 days</td>
<td>LOAEL</td>
<td>2,3,7,8-TCDD</td>
<td>0.16</td>
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<td>EL-No effect</td>
<td>2,3,7,8-TCDD</td>
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<td>Egg injection</td>
<td>18 days</td>
<td>LOAEL</td>
<td>PCB 126</td>
<td>0.9</td>
<td>0.1</td>
<td>0.09</td>
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<td>pigeon (Columba livia)</td>
<td>Egg injection</td>
<td>18 days</td>
<td>LOAEL</td>
<td>PCB 126</td>
<td>0.5</td>
<td>0.1</td>
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<td>Oral-gavage</td>
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<td>FOOD INGESTION RATE (kg/kg/day)</td>
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<td>LOAEL</td>
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<td>0.04</td>
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<td>Barsotti and Van Miller, 1984 (Golub)</td>
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<td>Swine</td>
<td>Diet</td>
<td>Throughout gestation</td>
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<td>Decreased litter size</td>
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<td>Growth rate of juveniles</td>
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<td>Observed after 14 days</td>
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<td>Osborne-Mendel Rat</td>
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Notes:
- No relevant field studies were found.
- Dose to rhesus monkey calculated using food ingestion rate of 0.2 kg/day and body weight of 5 kg (Sample et al., 1996)
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<th>EFFECT LEVEL</th>
<th>CONTAMINANT TYPE</th>
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Note: All values are from Toxicological Benchmarks for Wildlife:1996 Revision (USEPA, 1996) unless otherwise noted.
TABLE 4-25
TOXICITY REFERENCE VALUES FOR FISH
DIETARY DOSES AND EGG CONCENTRATIONS OF TOTAL PCBs AND DIOXIN TOXIC EQUIVALENTS (TEQs)

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<td>17</td>
<td>17</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>NOAEL</td>
<td>1.5</td>
<td>15</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
</tbody>
</table>

White perch and striped bass: Westin et al. (1983)

Notes:

- LOAEL: Lowest Observable Adverse Effect Level
- NOAEL: No Observable Adverse Effect Level
- NA: Not available

**Note:**
- Pumpkinseed (Lepomis gibbosus) and spottail shiner (Notropis hudsonius)
- Units vary for PCBs and TEQ
- Selected TRVs are **bolded** and *italicized*.
TABLE 4-26
TOXICITY REFERENCE VALUES FOR BIRDS
DIETARY DOSES AND EGG CONCENTRATIONS OF TOTAL PCBs AND DIOXIN TOXIC EQUIVALENTS (TEQs)

<table>
<thead>
<tr>
<th>TRVs</th>
<th>Tree Swallow (Tachycineta bicolor)</th>
<th>Mallard Duck (Anas platyrhynchos)</th>
<th>Belted Kingfisher (Ceryle alcyon)</th>
<th>Great Blue Heron (Ardea herodias)</th>
<th>Bald Eagle (Haliaeetus leucocephalus)</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dietary Dose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lab-based TRVs for PCBs (mg/kg/day)</td>
<td>LOAEL</td>
<td>0.07</td>
<td>2.6</td>
<td>0.07</td>
<td>0.07</td>
<td>Mallard: Custer and Heinz (1980) All others: Scott (1977)</td>
</tr>
<tr>
<td></td>
<td>NOAEL</td>
<td>0.01</td>
<td>0.26</td>
<td>0.01</td>
<td>0.01</td>
<td>Tree Swallow: US EPA Phase 2 Database (1998)</td>
</tr>
<tr>
<td>Field-based TRVs for PCBs (mg/kg/day)</td>
<td>LOAEL</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NOAEL</td>
<td>16.1</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Lab-based TRVs for TEQs (ug/kg/day)</td>
<td>LOAEL</td>
<td>0.014</td>
<td>0.014</td>
<td>0.014</td>
<td>0.014</td>
<td>Nosek et al. (1992)</td>
</tr>
<tr>
<td></td>
<td>NOAEL</td>
<td>0.0014</td>
<td>0.0014</td>
<td>0.0014</td>
<td>0.0014</td>
<td></td>
</tr>
<tr>
<td>Field-based TRVs for TEQs (ug/kg/day)</td>
<td>LOAEL</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>US EPA Phase 2 Database (1998)</td>
</tr>
<tr>
<td></td>
<td>NOAEL</td>
<td>4.9</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Egg Concentration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lab-based TRVs for PCBs (mg/kg egg)</td>
<td>LOAEL</td>
<td>2.21</td>
<td>2.21</td>
<td>2.21</td>
<td>2.21</td>
<td>Scott (1977)</td>
</tr>
<tr>
<td></td>
<td>NOAEL</td>
<td>0.33</td>
<td>0.33</td>
<td>0.33</td>
<td>0.33</td>
<td>Bald Eagle: Wiemeyer (1984, 1993) Tree Swallow: US EPA Phase 2 Database (1998)</td>
</tr>
<tr>
<td>Field-based TRVs for PCBs (mg/kg egg)</td>
<td>LOAEL</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NOAEL</td>
<td>26.7</td>
<td>NA</td>
<td>NA</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Lab-based TRVs for TEQs (ug/kg egg)</td>
<td>LOAEL</td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
<td>NA</td>
<td>Great Blue Heron: Janz and Bellward (1996) Others: Powell et al. (1996a)</td>
</tr>
<tr>
<td></td>
<td>NOAEL</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>2</td>
<td>Mallard: White and Seguiak (1994); White and Hoffman (1995) Great Blue Heron: Sanderson et al. (1994)</td>
</tr>
<tr>
<td>Field-based TRVs for TEQs (ug/kg egg)</td>
<td>LOAEL</td>
<td>NA</td>
<td>0.02</td>
<td>NA</td>
<td>0.5</td>
<td>Tree Swallow: US EPA Phase 2 Database (1998)</td>
</tr>
<tr>
<td></td>
<td>NOAEL</td>
<td>13</td>
<td>NA</td>
<td>0.005</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

Note: Units vary for PCBs and TEQ.
NA = Not Available
Selected TRVs are bolded and italicized.
# TABLE 4-27

**TOXICITY REFERENCE VALUES FOR MAMMALS**

**DIETARY DOSES OF TOTAL PCBs AND DIOXIN TOXIC EQUIVALENTS (TEQs)**

<table>
<thead>
<tr>
<th>TRVs</th>
<th>Little Brown Bat (Myotis lucifugus)</th>
<th>Raccoon (Procyon lotor)</th>
<th>Mink (Mustela vison)</th>
<th>Otter (Lutra canadensis)</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab-based TRVs for PCBs (mg/kg/day)</td>
<td>LOAEL 0.15 0.15</td>
<td>0.07</td>
<td>0.07</td>
<td>Mink and otter: Aulerich and Ringer (1977)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NOAEL 0.032 0.032</td>
<td>0.01</td>
<td>0.01</td>
<td>Raccoon and bat: Linder et al. (1984)</td>
<td></td>
</tr>
<tr>
<td>Field-based TRVs for PCBs (mg/kg/day)</td>
<td>LOAEL NA NA</td>
<td>0.13</td>
<td>0.13</td>
<td>Heaton et al. (1995)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NOAEL NA NA</td>
<td>0.004</td>
<td>0.004</td>
<td>Mink and otter: Aulerich and Ringer (1977)</td>
<td></td>
</tr>
<tr>
<td>Lab-based TRVs for TEQs (ug/kg/day)</td>
<td>LOAEL 0.001 0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>Murray et al. (1979)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NOAEL 0.0001 0.0001</td>
<td>0.0001</td>
<td>0.0001</td>
<td>Heaton et al. (1995)</td>
<td></td>
</tr>
<tr>
<td>Field-based TRVs for TEQs (ug/kg/day)</td>
<td>LOAEL NA NA</td>
<td>0.00224</td>
<td>0.00224</td>
<td>Tillitt et al. (1996)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NOAEL NA NA</td>
<td>0.00008</td>
<td>0.00008</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Units vary for PCBs and TEQ.

**Note:** TRVs for raccoon and bat are based on multi-generational studies to which interspecies uncertainty factors are applied.

NA = Not Available

Final selected TRVs are bolded and italicized.
TABLE 4-28: WILDLIFE SURVEY RESULTS Amphibians

Hudson River
New York

<table>
<thead>
<tr>
<th>Information Source</th>
<th>Date</th>
<th>Contact</th>
<th>Response</th>
<th>Contact Information</th>
<th>Data Available</th>
<th>Information/Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amphibian Expert</td>
<td>1-Jun-99</td>
<td>Email</td>
<td>Yes</td>
<td>Thomas Palmer, frog consultant for Wellesley Project; <a href="mailto:Ophis@world.std.com">Ophis@world.std.com</a></td>
<td>He doesn't know anything about PCB effects on frogs; posted message on amphibian web page</td>
<td>Recommended the following website: <a href="http://cciw.ca/green-lane/herptox/">http://cciw.ca/green-lane/herptox/</a></td>
</tr>
<tr>
<td>NYSDEC - Amphibian and Reptile Atlas Project</td>
<td>3-Jun-99</td>
<td>Email</td>
<td>No</td>
<td><a href="mailto:herps@gw.dec.state.ny.us">herps@gw.dec.state.ny.us</a>; <a href="http://www.dec.state.ny.us/website/dfwrmr/wildlife/herp/index.html">http://www.dec.state.ny.us/website/dfwrmr/wildlife/herp/index.html</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ndakinna Wilderness Project</td>
<td>6/3/1999</td>
<td>Email</td>
<td>No</td>
<td>Jim Brushek (518) 583-9980x3, 23 Middle Grove Road, Greenfield Center, NY 12833; Received address from Saratoga County Information - Annamaria Dalton (<a href="mailto:annamaria@spa.net">annamaria@spa.net</a>)</td>
<td>Professional Tracker</td>
<td>Common amphibians present in strong numbers. Box, snapper, and painted turtles. Some snakes which he could not identify.</td>
</tr>
</tbody>
</table>
**TABLE 5-1**  
**BENTHIC INVERTEBRATES COLLECTED AT TI POOL STATIONS**

<table>
<thead>
<tr>
<th>Taxa in Rank Order</th>
<th>Common Name</th>
<th>Mean % of Total Ind. Collected</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Caecidotea racovitzai</em></td>
<td>Isopod (sowbug)</td>
<td>34.6</td>
</tr>
<tr>
<td>Chironomidae</td>
<td>Midge</td>
<td>~30.2</td>
</tr>
<tr>
<td>Oligochaeta</td>
<td>Aquatic worms</td>
<td>14.3</td>
</tr>
<tr>
<td><em>Gammarus fasciatus</em></td>
<td>Amphipod</td>
<td>10.3</td>
</tr>
<tr>
<td><em>Pisidium</em> sp.</td>
<td>Pill Clam</td>
<td>5.0</td>
</tr>
<tr>
<td><em>Canthocamptes</em> sp.</td>
<td>Harpacticoid copepod</td>
<td>1.5</td>
</tr>
<tr>
<td>Nematoda</td>
<td>Nematods (worms)</td>
<td>1.1</td>
</tr>
<tr>
<td><em>Phylocentropus</em> sp.</td>
<td>Caddis fly larvae</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Dubiraphia</em> sp.</td>
<td>Beetle larvae</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Menetus</em> sp.</td>
<td>Caddis fly larvae</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Valvata</em> sp.</td>
<td>Snail</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Sialis</em> sp.</td>
<td>Alderfly larvae</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Oecetis</em> sp.</td>
<td>Caddisfly larvae</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Probezzia</em> sp.</td>
<td>Biting midges</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Enallagma</em> sp.</td>
<td>Damselfly nymph</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Chydoridae</td>
<td>Water fleas (Cladoceran)</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Acariformes</td>
<td>Mites</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Ammicola</em> sp.</td>
<td>Snail</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Mystacides</em> sp.</td>
<td>Caddisfly larvae</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Diaphanosoma</em> sp.</td>
<td>Water fleas (Cladoceran)</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Ceratopogonidae</td>
<td>Biting midges</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Helobdella fusca</em></td>
<td>Leech</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Arthropoda</td>
<td>Arthropods</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Eukiefferiella</em> sp.</td>
<td>Biting Midge</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Taxa in Rank Order</td>
<td>Common Name</td>
<td>Mean % of Total Ind. Collected</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>Turbellaria</td>
<td>Flatworms</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Dugesia tigrina</em></td>
<td>Flatworm</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Bithynia tentaculata</em></td>
<td></td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Trichoptera</td>
<td>Caddisfly larvae</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Chydorus sp.</em></td>
<td>Water fleas (Cladoceran)</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Caenis sp.</em></td>
<td>Mayfly nymph</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Physa sp.</em></td>
<td>Snail</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Helobdella sp.</em></td>
<td>Leech</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Mesocyclops sp.</em></td>
<td>Cyclopoid copepods</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Orthotrichia sp.</em></td>
<td>Caddisfly larvae</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Aeschnidae</td>
<td>Dragonfly nymph</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Hexagenia sp.</em></td>
<td>Mayfly nymph</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Hirudinea</td>
<td>Leeches</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Neureclipsis sp.</em></td>
<td>Caddisfly larvae</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Culicoides sp.</em></td>
<td>Mosquito larvae</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Corixidae</td>
<td>Water boatman</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Neoperla sp.</em></td>
<td>Stonefly nymph</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Caenidae</td>
<td>Mayfly nymph</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Donacia sp.</em></td>
<td>Beetle</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Hemiptera</td>
<td>True bugs</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Molanna sp.</em></td>
<td>Caddisfly larvae</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Copepoda</td>
<td>Copepods</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Insecta</td>
<td>Insects</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Baetidae</td>
<td>Mayfly nymph</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Macronychus sp.</em></td>
<td>Riffle beetle</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Tipulidae</td>
<td>Crunefly larvae</td>
<td>&lt;1.0</td>
</tr>
</tbody>
</table>
### TABLE 5-1
**BENTHIC INVERTEBRATES COLLECTED AT TI POOL STATIONS**

<table>
<thead>
<tr>
<th>Taxa in Rank Order</th>
<th>Common Name</th>
<th>Mean % of Total Ind. Collected</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Cymatia</em> sp.</td>
<td>Water boatman</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Notonecta</em> sp.</td>
<td>Water boatman</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Talitridae</td>
<td>Amphipod</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Baetis</em> sp.</td>
<td>Mayfly nymph</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Dromogomphus</em> sp.</td>
<td>Dragonfly nymph</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Oxyethira</em> sp.</td>
<td>Caddis fly larvae</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Diptera</td>
<td>Flies and midges</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Atherix</em> sp.</td>
<td>Snipe fly</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Tabanidae</td>
<td>Horsefly larvae</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td><em>Elliptio</em> sp.</td>
<td>Eastern elliptio mussel</td>
<td>&lt;1.0</td>
</tr>
</tbody>
</table>

Notes: Taxa are listed in order of absolute abundance. Mean Percent of individuals is based on the mean of Stations 3 to 7. 

1 Chironomidae were primarily composed of Chironominae, *Proclaudius* sp., *Tanytarsus* sp., *Dicrotendipes* sp., *Polypedilum* sp., *Clinotanypus* sp., *Tribelos jucundus*, and Tanypodinae.
## TABLE 5-2
### RELATIVE ABUNDANCE OF FIVE DOMINANT TAXANOMIC GROUPS AT TI POOL STATIONS

<table>
<thead>
<tr>
<th>Group/Taxa</th>
<th>Station 3 Abundance</th>
<th>Station 4 Abundance</th>
<th>Station 5 Abundance</th>
<th>Station 6 Abundance</th>
<th>Station 7 Abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ind/m²</td>
<td>Percent</td>
<td>ind/m²</td>
<td>Percent</td>
<td>ind/m²</td>
</tr>
<tr>
<td>Total Dominant Isopoda</td>
<td>653</td>
<td>5.6%</td>
<td>3245</td>
<td>24.6%</td>
<td>14256</td>
</tr>
<tr>
<td><em>Caecidotea racovitzai</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Dominant Chironomids</td>
<td>3775</td>
<td>32.3%</td>
<td>3959</td>
<td>30.1%</td>
<td>7619</td>
</tr>
<tr>
<td>Unidentified Chironomidae</td>
<td>1398</td>
<td>12.0%</td>
<td>122</td>
<td>0.9%</td>
<td>2232</td>
</tr>
<tr>
<td>Unidentified Chironominae</td>
<td>510</td>
<td>4.4%</td>
<td>1490</td>
<td>11.3%</td>
<td>374</td>
</tr>
<tr>
<td><em>Procladius</em> sp.</td>
<td>479</td>
<td>4.1%</td>
<td>204</td>
<td>1.5%</td>
<td>1474</td>
</tr>
<tr>
<td><em>Tanytarsus</em> sp.</td>
<td>255</td>
<td>2.2%</td>
<td>0</td>
<td>0.0%</td>
<td>1409</td>
</tr>
<tr>
<td><em>Dicrotendipes</em> sp.</td>
<td>479</td>
<td>4.1%</td>
<td>337</td>
<td>2.6%</td>
<td>560</td>
</tr>
<tr>
<td><em>Polypedilum</em> sp.</td>
<td>82</td>
<td>0.7%</td>
<td>102</td>
<td>0.8%</td>
<td>396</td>
</tr>
<tr>
<td><em>Clinotanypus</em> sp.</td>
<td>51</td>
<td>0.4%</td>
<td>133</td>
<td>1.0%</td>
<td>200</td>
</tr>
<tr>
<td><em>Tribelos jucundus</em></td>
<td>112</td>
<td>1.0%</td>
<td>571</td>
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<td>0.4%</td>
<td>194</td>
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<tr>
<td><em>Chironomus</em> sp.</td>
<td>41</td>
<td>0.3%</td>
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<td>0.3%</td>
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<td><em>Cricotopus trifascia</em></td>
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<td>41</td>
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<td>0</td>
<td>0.0%</td>
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<tr>
<td>Total Dominant Oligochaeta</td>
<td>2918</td>
<td>25.0%</td>
<td>2245</td>
<td>17.0%</td>
<td>2681</td>
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<td>Unidentified Oligochaeta</td>
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<tr>
<td>Total Dominant Amphipoda</td>
<td>1030</td>
<td>8.8%</td>
<td>1102</td>
<td>8.4%</td>
<td>682</td>
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<tr>
<td><em>Gammarus fasciatus</em></td>
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<tr>
<td>Total Dominant Pelecypoda</td>
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<td>10.6%</td>
<td>1581</td>
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<td><em>Pisidium</em> sp.</td>
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<td>Subtotals</td>
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<td>82.3%</td>
<td>12132</td>
<td>92.1%</td>
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<td>Total Abundance (all taxa)</td>
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<td>27983</td>
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<td>Simpson Dominance $I$</td>
<td>Eveness Distribution</td>
<td>Species Richness</td>
<td>Abundance No. Ind./Sq M</td>
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<td>Total Benthos</td>
<td>Infauna</td>
<td>Total Benthos</td>
<td>Infauna</td>
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<td>3</td>
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<td>0.87</td>
<td>0.16</td>
<td>0.13</td>
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<td>4</td>
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<td>0.57</td>
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<td>0.76</td>
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Notes: Total benthos equals the sum of infaunal and epibenthic macroinvertebrates
## TABLE 5-4
RELATIVE PERCENT ABUNDANCE OF MACROINVERTEBRATES -- LOWER HUDSON RIVER

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<tr>
<th>Species/Group</th>
<th>%</th>
<th>Station 14</th>
<th>Species/Group</th>
<th>%</th>
<th>Station 15</th>
<th>Species/Group</th>
<th>%</th>
<th>Station 17</th>
<th>Species/Group</th>
<th>%</th>
<th>Station 18</th>
<th>Species/Group</th>
<th>%</th>
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<td>Oligochaeta</td>
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<tr>
<td>Chironominae Indet.</td>
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<td>Procladius sp.</td>
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<td>Polyplepidium sp.</td>
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<td>Acariformes</td>
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<tr>
<td>Tribelos sp.</td>
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<td>Pisidium sp.</td>
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<td>Dicrotendipes sp.</td>
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<tr>
<td>Cryptotendipes sp.</td>
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<td>2.3</td>
<td>Cladotanytarsus sp.</td>
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<td>Amnicola sp.</td>
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<td>Hydroptilidae</td>
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<td>Hydroptila sp.</td>
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<td>Hydroptila sp.</td>
<td>0.4</td>
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<td>Proberlia sp.</td>
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<tr>
<td>Cryptochironomus sp.</td>
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<td>Tribelos sp.</td>
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<td>Visonuctolida</td>
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<td>Djalnabatista sp.</td>
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<td>Visonuctolida</td>
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<td>Labrundinia sp.</td>
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<td>Coelotanytarsus sp.</td>
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<td>Visonuctolida</td>
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<td>Synorthocladius sp.</td>
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<td>Visonuctolida</td>
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<td>Cryptotendipes sp.</td>
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<td>Visonuctolida</td>
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## TABLE 5-5
SUMMARY OF DIVERSITY INDICES AND ABUNDANCE DATA – LOWER HUDSON RIVER

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<tr>
<th>Station</th>
<th>$D_s$</th>
<th>I</th>
<th>$D_{max}$</th>
<th>$E_s$</th>
<th>Species Richness</th>
<th>Abundance ind/m²</th>
<th>Biomass mg/m²</th>
</tr>
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<tbody>
<tr>
<td>Station 12 Stockport Flats</td>
<td>0.70</td>
<td>0.30</td>
<td>0.92</td>
<td>0.76</td>
<td>14</td>
<td>5,289</td>
<td>63</td>
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<tr>
<td>Station 14 Tivoli Bays</td>
<td>0.82</td>
<td>0.18</td>
<td>0.95</td>
<td>0.86</td>
<td>16</td>
<td>4,524</td>
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<td>Station 15 Esopus Meadows</td>
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<td>0.14</td>
<td>0.93</td>
<td>0.93</td>
<td>11</td>
<td>2,551</td>
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<td>Station 17 Iona Island</td>
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<td>0.29</td>
<td>0.90</td>
<td>0.79</td>
<td>9</td>
<td>5,136</td>
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<td>Station 18 Piermont Pier</td>
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<td>0.16</td>
<td>0.90</td>
<td>0.93</td>
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<td>6,480</td>
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<td>Grand Mean</td>
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<td>0.85</td>
<td>12</td>
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### Table 5-6
**Selected Sediment Screening Guidelines: PCBs**

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<th>Total PCBs</th>
<th>Aroclor 1254</th>
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<th>Aroclor 1242</th>
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<td>Hudson River Sediment Effect Concentrations</td>
<td>(NOAA, 1999) - mg/kg (ppm)</td>
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<td>Mid-range Effect Concentration</td>
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<td>Extreme Effect Concentration</td>
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<td>NYSDEC (1998) Freshwater (µg/g OC)</td>
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<td>Benthic Aquatic Life Acute Toxicity</td>
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<td>Benthic Aquatic Life Chronic Toxicity</td>
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<td>Wildlife Bioaccumulation</td>
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<td>Ontario Ministry of the Environment</td>
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<td>Freshwater Guidelines (Persaud et al., 1993)</td>
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<td>No Effect Level (µg/g)</td>
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<tr>
<td>Lowest Effect Level (µg/g)</td>
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<td>Severe Effect Level (µg/g OC)</td>
<td>530 34 150 53 24</td>
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<td>Long et al. (1995) Marine &amp; Estuaries- ppb</td>
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<td>Effects-Range-Low</td>
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<td>Ingersoll et al. (1996) Freshwater Guidelines based on <em>Hyalella azteca</em> - ppb</td>
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**Notes:** All values are provided in dry weight unless noted

Mean PCB conc. Upper Hudson benthic stations: 9.292 - 29.320 ppm
Mean PCB conc. Lower Hudson benthic stations: 0.367 - 1.313 ppm
TABLE 5-7: FEDERAL AND STATE PCB WATER QUALITY CRITERIA

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### TABLE 5-8: RATIO OF OBSERVED SEDIMENT CONCENTRATIONS TO GUIDELINES

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Average PCB Results

Tri+ 95% UCL Results
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**TABLE 5-13: RATIO OF PREDICTED PUMPKINSEED CONCENTRATIONS TO FIELD-BASED NOAEL FOR TRI+ PCBS**
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**TABLE 5-20: RATIO OF PREDICTED BROWN BULLHEAD CONCENTRATIONS TO LABORATORY-DERIVED NOAEL FOR TRI+ PCBS**
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TABLE 5-21: RATIO OF PREDICTED BROWN BULLHEAD CONCENTRATIONS TO LABORATORY-DERIVED LOAEL FOR TRI+ PCBS
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TABLE 5-24: RATIO OF OBSERVED LARGEMOUTH BASS AND BROWN BULLHEAD CONCENTRATIONS TO TOXICITY BENCHMARKS USING NYSDEC DATASET
### TABLE 5-25: RATIO OF OBSERVED WHITE PERCH AND YELLOW PERCH CONCENTRATIONS TO TOXICITY BENCHMARKS USING NYSDEC DATASET

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**TABLE 5-30: RATIO OF PREDICTED WHITE PERCH CONCENTRATIONS TO LABORATORY-DERIVED LOAEL ON A TEQ BASIS**
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TABLE 5-31: RATIO OF PREDICTED YELLOW PERCH CONCENTRATIONS TO LABORATORY-DERIVED NOAEL ON A TEQ BASIS
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## TABLE 5-33: RATIO OF PREDICTED LARGEMOUTH BASS CONCENTRATIONS TO FIELD-BASED NOAEL FOR TRI+ PCBs

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TABLE 5-34: RATIO OF PREDICTED LARGEMOUTH BASS CONCENTRATIONS TO LABORATORY-DERIVED NOAEL ON A TEQ BASIS
### TABLE 5-35: RATIO OF PREDICTED LARGEMOUTH BASS CONCENTRATIONS TO LABORATORY-DERIVED LOAEL ON A TEQ BASIS

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Bold values indicate exceedances.
### TABLE 5-37: RATIO OF MODELED DIETARY DOSE AND EGG CONCENTRATIONS TO BENCHMARKS
BASED ON 1993 DATA FOR FEMALE TREE SWALLOW FOR TRI+ CONGENERS

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Bold value indicates exceedances
TABLE 5-39: RATIO OF MODELED EGG CONCENTRATIONS TO BENCHMARKS FOR FEMALE TREE SWALLOWS BASED ON THE SUM OF TRI+ CONGENERS FOR THE PERIOD 1993 - 2018

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Bold value indicates exceedances
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BASED ON 1993 DATA FOR FEMALE TREE SWALLOW ON TEQ BASIS

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BASED ON 1993 DATA FOR FEMALE MALLARD FOR TRI+ CONGENERS

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| 137.2                        | 0.1         | 0.3         |
| 122.4                        | 0.1         | 0.6         |
| 113.8                        | 0.1         | 0.5         |
| 100                          | 0.0         | 0.6         |
| 88.9                         | 0.0         | 0.4         |
| 58.7                         | 0.0         | 0.5         |
| 47.3                         | 0.1         | 0.7         |
| 25.8                         | 0.0         | 0.4         |

Bold values indicate exceedances
### TABLE 5-44: RATIO OF MODELED DIETARY DOSE TO BENCHMARKS FOR FEMALE MALLARD BASED ON FISHRAND RESULTS FOR THE TRI+ CONGENERS

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Bold values indicate exceedances.
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Bold values indicate exceedances
TABLE 5-49: RATIO OF MODELED DIETARY DOSE AND EGG CONCENTRATIONS TO BENCKMARKS BASED ON 1993 DATA FOR FEMALE BELTED KINGFISHER FOR TRI+ CONGENERS

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### TABLE 5-50: RATIO OF MODELED DIETARY DOSE AND EGG CONCENTRATIONS TO BENCHMARKS BASED ON 1993 DATA FOR FEMALE GREAT BLUE HERON FOR TRI+ CONGENERS

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Bold values indicate exceedances
### TABLE 5-52: RATIO OF MODELED DIETARY DOSE TO BENCHMARKS BASED ON FISHRAND FOR FEMALE BELTED KINGFISHER BASED ON THE SUM OF TRI+ CONGENERS FOR THE PERIOD 1993 - 2018

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Bold values indicate exceedances
### TABLE 5-53: RATIO OF MODELED DIETARY DOSE TO BENCHMARKS BASED ON FISHRAND FOR FEMALE BLUE HERON

BASED ON THE SUM OF TRI+ CONGENERS FOR THE PERIOD 1993 - 2018

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Bold values indicate exceedances

TAMS/MCA
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|------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1993 | 95      | 120     | 668     | 838     | 72      | 88      | 504     | 615     | 35      | 44      | 248     | 309     |
| 1994 | 58      | 78      | 406     | 547     | 50      | 60      | 347     | 417     | 25      | 31      | 176     | 216     |
| 1995 | 64      | 86      | 448     | 599     | 55      | 66      | 385     | 462     | 27      | 33      | 190     | 231     |
| 1996 | 58      | 84      | 408     | 589     | 44      | 54      | 309     | 377     | 24      | 30      | 167     | 210     |
| 1997 | 45      | 65      | 318     | 458     | 39      | 47      | 271     | 326     | 21      | 26      | 144     | 180     |
| 1998 | 38      | 54      | 265     | 378     | 35      | 42      | 244     | 296     | 17      | 21      | 121     | 148     |
| 1999 | 33      | 49      | 231     | 342     | 28      | 35      | 199     | 246     | 13      | 17      | 92      | 116     |
| 2000 | 31      | 46      | 216     | 321     | 27      | 33      | 188     | 229     | 13      | 15      | 88      | 108     |
| 2001 | 29      | 43      | 201     | 298     | 26      | 32      | 181     | 222     | 12      | 15      | 84      | 105     |
| 2002 | 28      | 42      | 199     | 293     | 28      | 34      | 193     | 236     | 13      | 16      | 90      | 112     |
| 2003 | 25      | 37      | 174     | 259     | 23      | 29      | 162     | 200     | 11      | 14      | 76      | 96      |
| 2004 | 23      | 34      | 163     | 239     | 23      | 28      | 158     | 193     | 11      | 14      | 79      | 99      |
| 2005 | 21      | 31      | 144     | 217     | 17      | 21      | 120     | 147     | 8.5     | 11      | 59      | 74      |
| 2006 | 20      | 30      | 142     | 210     | 19      | 23      | 131     | 161     | 9.0     | 11      | 63      | 77      |
| 2007 | 19      | 28      | 131     | 197     | 16      | 19      | 110     | 133     | 6.9     | 8.5     | 49      | 60      |
| 2008 | 18      | 27      | 124     | 188     | 14      | 17      | 99      | 122     | 6.7     | 8.5     | 47      | 60      |
| 2009 | 18      | 26      | 125     | 183     | 15      | 19      | 107     | 131     | 7.2     | 9.1     | 51      | 64      |
| 2010 | 16      | 23      | 110     | 160     | 14      | 17      | 97      | 120     | 6.0     | 7.5     | 42      | 52      |
| 2011 | 14      | 21      | 96      | 146     | 12      | 15      | 83      | 102     | 5.9     | 7.5     | 41      | 52      |
| 2012 | 14      | 20      | 96      | 141     | 12      | 15      | 84      | 104     | 5.7     | 7.2     | 40      | 50      |
| 2013 | 13      | 19      | 92      | 136     | 13      | 15      | 88      | 108     | 5.5     | 7.0     | 39      | 49      |
| 2014 | 12      | 17      | 83      | 121     | 12      | 15      | 83      | 102     | 5.0     | 6.2     | 35      | 44      |
| 2015 | 11      | 16      | 76      | 112     | 10      | 13      | 73      | 89      | 4.6     | 5.9     | 33      | 41      |
| 2016 | 11      | 16      | 78      | 113     | 12      | 14      | 82      | 100     | 5.0     | 6.2     | 35      | 43      |
| 2017 | 10      | 15      | 67      | 102     | 8.9     | 11      | 62      | 76      | 4.1     | 5.4     | 29      | 38      |
| 2018 | 9.3     | 14      | 65      | 97      | 8.5     | 11      | 60      | 74      | 3.7     | 4.8     | 26      | 33      |

Bold values indicate exceedances

TABLE 5-54: RATIO OF MODELED DIETARY DOSE TO BENCHMARKS BASED ON FISHRAND FOR FEMALE BALD EAGLE BASED ON THE SUM OF TRI+ CONGENERS FOR THE PERIOD 1993 - 2018

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Bold values indicate exceedances
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BASED ON THE SUM OF TRI+ CONGENERS FOR THE PERIOD 1993 - 2018

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Bold values indicate exceedances
TABLE 5-59: RATIO OF MODELED DIETARY DOSE AND EGG CONCENTRATIONS TO BENCHMARKS 
BASED ON 1993 DATA FOR FEMALE GREAT BLUE HERON ON TEQ BASIS

| Location                  | Hazard Quotient | Hazard Quotient | Hazard Quotient | Hazard Quotient | Hazard Quotient | Hazard Quotient | Hazard Quotient | Hazard Quotient | Hazard Quotient | Hazard Quotient | Hazard Quotient | Hazard Quotient | Hazard Quotient | Hazard Quotient | Hazard Quotient | Hazard Quotient | Hazard Quotient | Hazard Quotient | Hazard Quotient | Hazard Quotient | Hazard Quotient | Hazard Quotient | Hazard Quotient |
|---------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Upper River               |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |
| Thompson Island Pool (189)| 62              | 125             | 616             | 1245            | 204             | 417             | 340             | 694             |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |
| Stillwater (168)          | 26              | 39              | 256             | 388             | 69              | 98              | 115             | 164             |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |
| Federal Dam (154)         | 5.2             | 7.7             | 52              | 77              | 16              | 23              | 27              | 39              |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |
| Lower River               |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |
| 143.5                     | 5.6             | 6.8             | 56              | 68              | 19              | 23              | 31              | 38              |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |
| 137.2                     | 11              | 25              | 114             | 246             | 38              | 82              | 63              | 137             |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |
| 122.4                     | 4.4             | 7.0             | 44              | 70              | 15              | 23              | 24              | 39              |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |
| 113.8                     | 4.6             | 4.9             | 46              | 49              | 15              | 16              | 25              | 26              |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |
| 100                       | 2.0             | 4.9             | 20              | 49              | 7               | 11              | 11              | 19              |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |
| 88.9                      | 4.0             | 5.6             | 40              | 56              | 13              | 18              | 22              | 30              |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |
| 58.7                      | 4.2             | 5.2             | 42              | 52              | 14              | 16              | 24              | 27              |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |
| 47.3                      | 4.0             | 6.0             | 40              | 60              | 13              | 17              | 21              | 28              |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |
| 25.8                      | 2.9             | 3.6             | 29              | 36              | 10              | 11              | 16              | 19              |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |

Bold values indicate exceedances
TABLE 5-60: RATIO OF MODELED DIETARY DOSE AND EGG CONCENTRATIONS TO BENCHMARKS
BASED ON 1993 DATA FOR FEMALE BALD EAGLE ON TEQ BASIS

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### TABLE 5-63: RATIO OF MODELED DIETARY DOSE TO BENCHMARKS BASED ON FISHRAND FOR FEMALE BALD EAGLE USING TEQ FOR THE PERIOD 1993 - 2018

| Year | Average LOAEL | 95% UCL LOAEL | Average NOAEL | 95% UCL NOAEL | Average LOAEL | 95% UCL LOAEL | Average NOAEL | 95% UCL NOAEL | Average LOAEL | 95% UCL LOAEL | Average NOAEL | 95% UCL NOAEL | Average LOAEL | 95% UCL LOAEL | Average NOAEL | 95% UCL NOAEL | Average LOAEL | 95% UCL LOAEL | Average NOAEL | 95% UCL NOAEL |
|------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| 1993 | 122           | 154           | 1225          | 1536          | 92            | 113           | 924           | 1128          | 45            | 57            | 455           | 567           | 1994          | 74            | 100           | 745           | 1002          | 64            | 77            | 635           | 765           | 32            | 40            | 322           | 397           |
| 1997 | 58            | 84            | 583           | 840           | 50            | 60            | 496           | 598           | 26            | 33            | 263           | 330           | 1998          | 49            | 69            | 487           | 692           | 45            | 54            | 447           | 543           | 22            | 27            | 221           | 272           |
| 1999 | 42            | 63            | 423           | 628           | 36            | 45            | 364           | 451           | 17            | 21            | 169           | 213           | 2000          | 40            | 59            | 395           | 588           | 34            | 42            | 344           | 421           | 16            | 20            | 161           | 199           |
| 2001 | 37            | 55            | 369           | 546           | 33            | 41            | 331           | 407           | 15            | 19            | 154           | 192           | 2002          | 36            | 54            | 364           | 536           | 35            | 43            | 353           | 432           | 16            | 21            | 164           | 206           |
| 2007 | 24            | 36            | 240           | 362           | 20            | 24            | 201           | 244           | 9             | 11            | 89            | 109           | 2008          | 23            | 35            | 227           | 345           | 18            | 22            | 181           | 223           | 9             | 11            | 86            | 109           |
| 2009 | 23            | 34            | 229           | 335           | 20            | 24            | 196           | 240           | 9             | 12            | 93            | 117           | 2010          | 20            | 29            | 201           | 294           | 18            | 22            | 179           | 219           | 8             | 10            | 78            | 96            |
| 2011 | 18            | 27            | 176           | 268           | 15            | 19            | 152           | 187           | 8             | 10            | 75            | 96            | 2012          | 18            | 26            | 175           | 259           | 15            | 19            | 154           | 190           | 7             | 9             | 73            | 92            |
| 2013 | 17            | 25            | 168           | 249           | 16            | 20            | 160           | 198           | 7             | 9             | 71            | 90            | 2014          | 15            | 22            | 153           | 222           | 15            | 19            | 153           | 187           | 6             | 8             | 65            | 80            |
| 2015 | 14            | 21            | 140           | 206           | 13            | 16            | 134           | 163           | 6             | 8             | 60            | 75            | 2016          | 14            | 21            | 143           | 207           | 15            | 18            | 150           | 184           | 6             | 8             | 64            | 79            |

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<td>WATERFOWL/MALLARD: Steve Brown - Delmar NYSDEC</td>
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<td>KINGFISHER: Breeding bird atlas - DEC now computerized on web page; Bob Anderle/Janet Carroll - NYSDEC</td>
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<td>NYS Department of Environmental Conservation - Endangered Species Unit</td>
<td>3-Jun-99</td>
<td>Call</td>
<td>No</td>
<td>Peter Nye (518) 439-7635x9 (Eagle Specialist); <a href="http://www.dec.state.ny.us">www.dec.state.ny.us</a></td>
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<tr>
<td>Manomet Center for Conservation Sciences</td>
<td>2-Jun-99</td>
<td>Email</td>
<td>No</td>
<td>John M. Hagen, Division Director (Conservation Forestry Staff); <a href="mailto:jmhagan@ime.net">jmhagan@ime.net</a>; <a href="http://www.manomet.org">www.manomet.org</a>;</td>
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<td>Saratoga National Historic Park, Stillwater, NY</td>
<td>4-Jun-99</td>
<td>Call</td>
<td>No</td>
<td>Chris (wildlife manager) (518) 664-9821x5; also can contact Richard Beresford</td>
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<td>Federation of New York State Bird Clubs</td>
<td>3-Jun-99</td>
<td>Email</td>
<td>No</td>
<td>Valeria Freer, President (<a href="mailto:vfreer@sullivan.suny.edu">vfreer@sullivan.suny.edu</a>); <a href="http://www.birds.cornell.edu/fnysec">http://www.birds.cornell.edu/fnysec</a></td>
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<td>Union College Professor Emeritus</td>
<td>2-Jun-99 7-Jun-99</td>
<td>Call/Call</td>
<td>No  Yes</td>
<td>Carl George (518) 388-6330; Bird Expert; (John Waldman - Hudson River Foundation Recommended I call)</td>
<td>He did not have any specific data, but recommended a number of different sources</td>
<td>He recommended that I contact: Bob Daniels (mammals) - NY State Museum; Walter Sabin (Hudson-Mohawk Bird Club, they do an intensive waterbird survey and publish results in the <em>Kingbird Journal</em> (518) 439-7344; Also Union College has survey information for a lake in Scotia near the Hudson for Collins Lake in Scotia (across river from Schenectady) - <a href="http://tardis.union.edu/~birds">http://tardis.union.edu/~birds</a>, presents 10 years of bird information - 15 air miles from Hudson; also recommended contacting Robert Yunick for regional baseline information from Audubon Christmas count and the mid-May Big Day</td>
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<td>Manomet Center for Conservation Sciences</td>
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<td>Dr. Treavor Lloyd-Evans (<a href="mailto:tlloyd-evans@manomet.org">tlloyd-evans@manomet.org</a>) - avian expert</td>
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<td><a href="http://www.americanbirding.org">www.americanbirding.org</a></td>
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<td>Walter Sabin Home: (518) 439-7344</td>
<td>Intensive waterbird survey every year - publish results in Kingbird Journal</td>
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<td>Ornithologist</td>
<td>7-Jun-99</td>
<td>Need</td>
<td>Number</td>
<td>Robert Yunick</td>
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<td>No</td>
<td><a href="http://www.dec.state.ny.us/website/dfwmr/wildlife/endspec/enspbird.html">www.dec.state.ny.us/website/dfwmr/wildlife/endspec/enspbird.html</a></td>
<td>Brief summaries, listed by species, for NY State.</td>
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<td><strong>Ixobrychus exilis</strong> (Least Bittern): Populations along Hudson River Valley, uncommon and rare breeder, declines due to loss of marsh habitat due to drainage, vegetational changes, pollution, insecticides. <strong>Rallus elegans</strong> (King Rail): Nesting was reported in northern Hudson Valley, however there are no confirmed nests in NY state currently, decline due to degradation of wetlands. <strong>Bartramia longicauda</strong> (Upland Sand Piper): once common around NY state including Hudson, less than 250 breeding sites to date in NY, decline due to loss of grassland habitat. All considered threatened species.</td>
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<tr>
<td>Regional trend analysis by species - region=NY State, some additional details may be available</td>
<td>Tachycineta bicolor (Tree Swallow): Common breeder throughout entire state. <strong>Ceryle alcyon</strong> (Belted Kingfisher): Common summer resident throughout entire state. <strong>Ardea herodias</strong> (Great Blue Heron): Observed in Northern Hudson Valley, possibility of breeding there. <strong>Anas platyrhynchos</strong> (Mallard): Common breeder in wetlands. In the 1900's, rarely if ever seen as a breeder; creation/improvement of wetlands in mid-1900's and release of captive-bred adults and ducklings in the 1950's caused populations to increase. <strong>Birds not found in Northern Hudson Valley</strong>: Eagles and Osprey.</td>
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<td>NYSDEC</td>
<td>16-Jun-99</td>
<td>Call</td>
<td>Yes</td>
<td>Mark Brown (518) 623-3671</td>
<td>Familiar with the area regarding mammals, birds, and herps. Good source. See General Info page.</td>
<td>This area is rich in birds including water fowl. Bald Eagle is only a winter resident, migrates in the summer. Lots of Canada geese and mallard. Has not seen any Osprey nests. They only feed here and spend most of their time around the near-by lakes. Has also seen tree swallow, kingfisher, and great blue heron. Most of the water fowl and larger birds use the area for feeding but do not breed here. He hasn't seen many nests except those built by species which live in the more wooded areas. Here's a list of the other species he has seen in the area: Common Mergenser (Diving Duck), red tailed hawk, sparrow hawk, rough grouse, wild turkey, killdeer, wood cock, morning dove, barn owl, bard owl, sawat owl (occupying nest boxes built for ducks), swallows, ravens, crows, wrens, eastern blue bird, starlings.</td>
</tr>
<tr>
<td>Ndakinna Wilderness Project</td>
<td>6/3/1999</td>
<td>Email</td>
<td>No</td>
<td>Jim Brushek (518) 583-9980x3, 23 Middle Grove Road, Greenfield Center, NY 12833; Received address from Saratoga County Information - Annamaria Dalton (<a href="mailto:annamaria@spa.net">annamaria@spa.net</a>)</td>
<td>Professional Tracker</td>
<td>Saw some bald eagles 3 or 4 weeks ago. Hasn't seen any osprey. Great Blue Heron and kingfisher in large numbers. Hasn't seen any tree swallow. Lots of mallards and Canada geese. Could not recall seeing any nests.</td>
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<tr>
<td></td>
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**TABLE 5-67: WILDLIFE SURVEY RESULTS - Birds**

**Hudson River**

**New York**
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<th>LOAEL vs. Average ADD Hazard Quotient</th>
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<th>NOAEL vs. Average ADD Hazard Quotient</th>
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<td><strong>Upper River</strong></td>
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<td>Thompson Island Pool (189)</td>
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<td>245</td>
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<td>Federal Dam (154)</td>
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Bold values indicate exceedances
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Bold values indicate exceedances
### TABLE 5-70: RATIO OF MODELED DIETARY DOSES TO BENCHMARKS FOR FEMALE BAT BASED ON 1993 DATA ON A TEQ BASIS

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<th>Location</th>
<th>LOAEL vs. Average ADD Hazard Quotient</th>
<th>LOAEL vs. 95% UCL ADD Hazard Quotient</th>
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TABLE 5-71: RATIO OF MODELED DIETARY DOSES TO TOXICITY BENCHMARKS
FOR FEMALE BAT ON A TEQ BASIS FOR THE PERIOD 1993 - 2018

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Bold values indicate exceedances
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Bold values indicate exceedances.
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FOR FEMALE RACCOON BASED ON 1993 DATA ON A TEQ BASIS

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Bold values indicate exceedances
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Bold values indicate exceedances.
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Bold values indicate exceedances.
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FOR FEMALE MINK BASED ON 1993 DATA ON A TEQ BASIS

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</table>

Bold values indicate exceedances

TABLE 5-84: RATIO OF MODELED DIETARY DOSES TO TOXICITY BENCHMARKS FOR FEMALE OTTER ON A TEQ BASIS FOR THE PERIOD 1993 - 2018
<table>
<thead>
<tr>
<th>Information Source</th>
<th>Date</th>
<th>Contact</th>
<th>Response</th>
<th>Contact Information</th>
<th>Data Available</th>
<th>Information/Findings</th>
</tr>
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<tbody>
<tr>
<td>Hudsonia</td>
<td>2-Jun-99</td>
<td>Call/Fax</td>
<td>YES; spoke with on 6/2/999</td>
<td>Eric Kiviat, Executive Director; (914) 758-7273 (7274) OR (914) 758-7053; FAX: (914) 758-7033; EMAIL: <a href="mailto:kiviat@bard.edu">kiviat@bard.edu</a>; inside.bard.edu/specialprog/arch/hudsonia.html</td>
<td>He has no direct knowledge of the upper Hudson but provided names</td>
<td>RIVER OTTER: very rare; he has only seen one on the Hudson in 30 years</td>
</tr>
<tr>
<td>NYS Department of Environmental Conservation - Endangered Species Unit</td>
<td>3-Jun-99</td>
<td>Call</td>
<td>Yes</td>
<td>Al Hicks (Mammal Biologist) (518) 478-3056; <a href="http://www.dec.state.ny.us">www.dec.state.ny.us</a></td>
<td>Left Message - Will call back</td>
<td>RACCOON: Fur bearer unit - NYSDEC; trapper prices currently very low so may not have information</td>
</tr>
<tr>
<td>The New York River Otter Project</td>
<td>2-Jun-99</td>
<td>Email</td>
<td>No</td>
<td>Dennis Money, <a href="mailto:Dennis_Money@rge.com">Dennis_Money@rge.com</a>; <a href="http://www.nyotter.org">www.nyotter.org</a></td>
<td>Left Message - Will call back</td>
<td>LITTLE BROWN BAT: Endangered species Unit - Allen Hicks (Delmar NYSDEC Endangered Species)</td>
</tr>
<tr>
<td>Professional Trapper</td>
<td>4-Jun-99</td>
<td>Call</td>
<td>No</td>
<td>Jim Comstock</td>
<td>Left Message - Will call back</td>
<td></td>
</tr>
<tr>
<td>New York State Trappers Association</td>
<td>4-Jun-99</td>
<td>Email</td>
<td>Yes</td>
<td>Jerry Leggieir (<a href="mailto:montcalm@earthlink.net">montcalm@earthlink.net</a>)</td>
<td>Asked me to give him a call at night; also suggested that I call Everett Nack (518) 851-2901 - a commercial fisherman on the river</td>
<td></td>
</tr>
<tr>
<td>Professional Fisherman on the Hudson</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Recommended by Jerry Leggieir</td>
<td></td>
</tr>
<tr>
<td>NYSDEC</td>
<td>16-Jun-99</td>
<td>Call</td>
<td>Yes</td>
<td>Mark Brown (518) 623-3671</td>
<td>Familiar with the area regarding mammals, birds, and herps. Good source. See General Info page.</td>
<td>Otter, Mink, Musk Rat present. PCB contamination reduced their numbers severly but in the past 10 years, they have rebounded after clean-up work. Has also seen raccoon, short and long tail weasels, big and little brown bat, skunk, oppossum. The red fox, grey fox, and coyote especially common in the northern Hudson, and plenty of white tail deer suggesting no bears.</td>
</tr>
<tr>
<td>Ndakinna Wilderness Project</td>
<td>6/3/1999</td>
<td>Email</td>
<td>No</td>
<td>Jim Brushek (518) 583-9980x3; 23 Middle Grove Road, Greenfield Center, NY 12833; Received address from Saratoga County Information - Annamaria Dalton (<a href="mailto:annamaria@spa.net">annamaria@spa.net</a>)</td>
<td>Professional Tracker</td>
<td>Quite a few otter. Mink numbers are large and increasing. Tons of raccoons (&quot;road-kill count is staggering&quot;). Some musk rat. Lots of beavers. Very recent reports of moose in the center of Saratoga, about 5 miles from Hudson. He expects moose to inhabit the Hudson very soon but he thinks they are already there. Sees fisher cats cruising the water occasionaly. Frequently sees red fox, grey fox, and deer visiting the water. The coyote population is very large. Coyotes and foxes will feed on the smaller aquatic mammals. Sees the occassional black bear.</td>
</tr>
</tbody>
</table>
Figure 1-2
Eight-Step Ecological Risk Assessment Process for Superfund
Hudson River PCB Reassessment
Ecological Risk Assessment

STEP 1: SCREENING-LEVEL:
- Site Visit
- Problem Formulation
- Toxicity Evaluation

STEP 2: SCREENING-LEVEL:
- Exposure Estimate
- Risk Calculation

STEP 3: PROBLEM FORMULATION
- Toxicity Evaluation
  - Assessment Endpoints
  - Conceptual Model Exposure Pathways
  - Questions/Hypotheses

STEP 4: STUDY AND DESIGN DQO PROCESS
- Lines of Evidence
- Measurement Endpoints
  - Work Plan and Sampling and Analysis Plan

STEP 5: VERIFICATION OF FIELD SAMPLING DESIGN

STEP 6: SITE INVESTIGATION AND DATA ANALYSIS

STEP 7: RISK CHARACTERIZATION

STEP 8: RISK MANAGEMENT

Risk Assessor and Risk Manager Agreement
Compile Existing Information
Data Collection
SMDP
ECOLOGICAL DATA SOURCES

OTHER

WATER COLUMN (USGS)
AVIAN (USFWS)
FISH (NOAA, NYSDEC)
FISH STOMACH CONTENTS (GE)
MACROINVERTEBRATES (NYSDOH)
SEDIMENTS (NYSDEC, NYSDOH)

PHASE2 (USEPA)

WATER COLUMN
SEDIMENT (High Resolution Coring)
ECOLOGICAL (Fish, Sediment & Macroinvertebrates)

Figure 1-3
Hudson River ERA Data Sources
Figure 2-1
Baseline Ecological Risk Assessment
Upper Hudson River Sampling Stations

LEGEND

190  RIVER MILE

ECOLOGICAL SAMPLING LOCATION
Figure 2-2
Baseline Ecological Risk Assessment
Lower Hudson River Sampling Stations

Legend

190 RIVER MILE

ECOLOGICAL SAMPLING LOCATION

SOURCE: Reassessment Database
TAMS / MCA
LEGEND:
- ECOLOGICAL SAMPLING STATION

SOURCE:
SHORELINES AND RM DESIGNATIONS ARE APPROXIMATE.
2. HOT SPOTS 5 THROUGH 8 WERE DIGITIZED FROM NYSDEN'S "PCB RECLAMATION PROJECT" DRAWINGS (DECEMBER 1985) AT A SCALE OF 1" = 200'.
3. HOT SPOTS 1 THROUGH 4 (AROUND ROGERS ISLAND) ARE NOT SHOWN SINCE THEIR CONTINUED EXISTENCE IS UNCERTAIN DUE TO CHANNEL MAINTENANCE DREDGING SUBSEQUENT TO NYSDEN'S 1977/78 SAMPLING.

PHASE 2 ECOCLOGICAL SAMPLING LOCATIONS—UPPER HUDSON RIVER

MATCH LINE "A"
SEE FIGURE 2-3B

BAKERS FALLS DAM
(RM 197.8)
FENIMORE BRIDGE
GE HUDSON FALLS SOURCE AREAS
ECO-STATION 20 (RM 196.9)
REMNANT DEPOSIT 1
GE FORT EDWARD
REMNANT DEPOSIT 2
REMNANT DEPOSIT 3
REMNANT DEPOSIT 4
REMNANT DEPOSIT 5
FORT EDWARD
RT. 197 BRIDGE
ECO-STATION 2 (RM 194.1)
LOCK 7
HOT SPOT 5
HOT SPOT 6
HOT SPOT 7
2000 1000 0 2000 FT.
MATCH LINE "B" — SEE FIGURE 2-3B

FORT MILLER DAM (RM 186.2)

LOCK 6

HOT SPOT 29

HOT SPOT 31

HOT SPOT 32

HOT SPOT 33

HOT SPOT 35

NORTHUMBERLAND DAM
(RM 183.4)

LOCK 6

MATCH LINE "C"
SEE FIGURE 2-3D

LEGEND:

ECCOLOGICAL SAMPLING STATION

SOURCES:

SHOULINES AND RM DESIGNATIONS ARE APPROXIMATE.
1. HOT SPOTS 28 THROUGH 35 WERE DIGITIZED FROM NUS CORPORATION'S "UPPER HUDSON RIVER AREA" DRAWINGS (APRIL 1984) AT A SCALE OF 1" = 1 MILE.
MATCH LINE "C" – SEE FIGURE 2–3C

MATCH LINE "D" – SEE FIGURE 1–3E

LEGEND:
- 180 RIVER MILE (RM) UPSTREAM OF THE BATTERY

SOURCES:
SHORELINES AND RM DESIGNATIONS ARE APPROXIMATE.
MATCH LINE "D" – SEE FIGURE 2-3D

MATCH LINE "E"
SEE FIGURE 2-3F

LEGEND:
- 175 RIVER MILE (RM) UPSTREAM OF THE BATTERY

SOURCES:
SHORELINES AND RM DESIGNATIONS ARE APPROXIMATE.
Figure 2-4
Hudson River PCB Reassessment
Conceptual Model Diagram Including Floodplain Soils

Notes:
1. All receptors may be directly exposed to river water and sediments.
2. Trophic levels are provided as a general guide to bioaccumulation potential, but vary according to species and food availability.
FIGURE 3-1: AVERAGE WET WEIGHT PCB CONCENTRATIONS IN SELECTED FISH SPECIES BASED ON NYSDEC DATA
FIGURE 3-2: AVERAGE LIPID-NORMALED PCB CONCENTRATIONS IN SELECTED FISH SPECIES BASED ON NYSDEC DATA

Average Lipid-Normalized PCB Concentrations at River Mile 189

Year | Lipid-Norm PCB (mg/kg) | Brown Bullhead | Largemouth Bass | Yellow Perch | Pumpkinseed
--- | --- | --- | --- | --- | ---
1982 | 0 | 0 | 0 | 0 | 0
1984 | 500 | 500 | 500 | 500 | 500
1986 | 1000 | 1000 | 1000 | 1000 | 1000
1988 | 1500 | 1500 | 1500 | 1500 | 1500
1992 | 2500 | 2500 | 2500 | 2500 | 2500
1994 | 3000 | 3000 | 3000 | 3000 | 3000
1996 | 3500 | 3500 | 3500 | 3500 | 3500

Average Lipid-Normalized Concentrations at River Mile 168

Year | Lipid-Norm PCB (mg/kg) | Brown Bullhead | Largemouth Bass | Yellow Perch | Pumpkinseed
--- | --- | --- | --- | --- | ---
1980 | 0 | 0 | 0 | 0 | 0
1982 | 500 | 500 | 500 | 500 | 500
1984 | 1000 | 1000 | 1000 | 1000 | 1000
1986 | 1500 | 1500 | 1500 | 1500 | 1500
1990 | 2500 | 2500 | 2500 | 2500 | 2500
1992 | 3000 | 3000 | 3000 | 3000 | 3000
1994 | 3500 | 3500 | 3500 | 3500 | 3500
1996 | 4000 | 4000 | 4000 | 4000 | 4000

Average Lipid-Normalized PCB Concentrations at River Mile 157

Year | Lipid-Norm PCB (mg/kg) | Brown Bullhead | Largemouth Bass | Yellow Perch | White Perch
--- | --- | --- | --- | --- | ---
1986 | 0 | 0 | 0 | 0 | 0
1987 | 100 | 100 | 100 | 100 | 100
1988 | 200 | 200 | 200 | 200 | 200
1989 | 300 | 300 | 300 | 300 | 300
1990 | 400 | 400 | 400 | 400 | 400
1991 | 500 | 500 | 500 | 500 | 500
1992 | 600 | 600 | 600 | 600 | 600
1993 | 700 | 700 | 700 | 700 | 700

Average Lipid-Normalized PCB Concentrations at River Mile 152

Year | Lipid-Norm PCB (mg/kg) | Brown Bullhead | Largemouth Bass | Yellow Perch | White Perch
--- | --- | --- | --- | --- | ---
1980 | 0 | 0 | 0 | 0 | 0
1982 | 200 | 200 | 200 | 200 | 200
1984 | 400 | 400 | 400 | 400 | 400
1986 | 600 | 600 | 600 | 600 | 600
1988 | 800 | 800 | 800 | 800 | 800
1990 | 1000 | 1000 | 1000 | 1000 | 1000
1992 | 1200 | 1200 | 1200 | 1200 | 1200
1994 | 1400 | 1400 | 1400 | 1400 | 1400
1996 | 1600 | 1600 | 1600 | 1600 | 1600
1998 | 1800 | 1800 | 1800 | 1800 | 1800
Figure 4-1: Shape of Biphenyl and Substitution Sites
Figure 4-2
Selected Fish Aroclor and Total PCB Toxicity Endpoints

- 46: Juvenile Spot, LOAEL, 20 days, adult mortality
- 36: Fathead Minnow, 16 weeks, LOAEL, spawning and fecundity
- 27: Juvenile Spot, NOAEL, 56 days, adult mortality
- 11.6: Fathead Minnow, NOAEL, 16 weeks, spawning and fecundity
- 3.8 (nominal dose): Killifish, LOAEL, 40 days observation, egg production and food consumption
- 0.76 (nominal dose): Killifish, NOAEL, 40 days of observation, egg production and food consumption
Figure 4-3
Selected Fish Egg Dioxin Equivalent Toxicity Endpoints

Endpoint: Early Life Stage Mortality

- 100: White sucker, LOAEL
- 34: White sucker, NOAEL
- 18: Channel catfish, LOAEL
- 8.0: Channel catfish, NOAEL
- 0.7: Lake trout, LOAEL
- 0.43: Lake trout, NOAEL
Figure 4-4
Selected Bird Diet Aroclor and Total PCB Toxicity Endpoints

- 16.1: Tree Swallow, NOAEL, field study, reproductive output
- 2.6: Mallard Duck, EL (no effect), approx. 1 month, reproductive success
- 1.1: Ringed Turtle Dove, EL (effect), hatching success
- 0.7: Domestic Chicken, LOAEL, hatching success
- 0.4: Screech Owl, EL (no effect), > 8 weeks, egg production, hatching success, and fledging success
- 0.1: Domestic Chicken, NOAEL, hatching success

Effective Dose (mg PCB/kg wet body wt./day)
Figure 4-5
Selected Bird Diet Dioxin Equivalent Toxicity Endpoints

Effective Dose Dioxin Equivalents (ug TEQ/kg wet body wt./day)

- 25: Ring-necked Pheasant, LD$_{50}$, single dose
- 15: Northern Bobwhite Quail, LD$_{50}$, single dose
- 4.9: Tree Swallow, NOAEL, field study, reproductive output
- 1.0: Domestic Chicken, LOAEL, 21 days, mortality
- 0.14: Ring-necked Pheasant, LOAEL, 10 weeks, fertility and embryo mortality
- 0.1: Domestic Chicken, NOAEL, 21 days, mortality
- 0.014: Ring-necked Pheasant, NOAEL, 10 weeks, fertility and embryo mortality
Figure 4-6
Selected Bird Egg Aroclor and Total PCB Toxicity Endpoints

26.7: Tree swallow, NOAEL, reproductive output
7.1: Screech owl, NOAEL, egg production, hatching success, and fledging success
5: Domestic chicken, LOAEL, hatching success
3.0: Bald eagle, NOAEL, reproductive success
2.5: Domestic chicken, NOAEL, hatching success
1.7: Domestic chicken, LOAEL, hatching success
0.33: Domestic chicken, NOAEL, hatching success

Effective Egg Concentration (mg PCB/kg egg)
Figure 4-7
Selected Bird Egg Dioxin Equivalent Toxicity Endpoints

Endpoint: Embryo Mortality

- 80: Cormorant, LOAEL
- 40: Cormorant, NOAEL
- 23: American Kestrel, LOAEL
- 13: Tree Swallow, NOAEL
- 5: American Kestrel, LOAEL
- 4: Common Tern, LOAEL
- 4: Cormorant, LOAEL
- 2.3: American Kestrel, NOAEL
- 1: Cormorant, NOAEL
- 0.5: Great Blue Heron, LOAEL
- 0.3: Great Blue Heron, NOAEL
- 0.1: Ring-necked Pheasant, NOAEL
- 0.02: Wood Duck, LOAEL
- 0.01: Domestic Chicken, NOAEL
- 0.005: Wood Duck, LOAEL

Effective Dose Dioxin Equivalents (ug TEQ/kg egg)

TAMS/MCA
Figure 4-8
Selected Mink Aroclor and Total PCB Toxicity Endpoints

- 11.5: LD$_{50}$, 4 weeks, adult mortality
- 10.8: LD$_{50}$, 4 weeks, adult mortality
- 6.4: LD$_{50}$, 4 weeks, adult mortality
- 6.4: LD$_{50}$, 4 weeks, adult mortality (weathered PCBs)
- 1.4: LOAEL, 4 weeks, reduced weight gain in juveniles
- 0.91: LC$_{50}$, 9 months, mortality
- 0.69: NOAEL, 4 months, decreased number of kits born live
- 0.49: LOAEL, 105 days, adult mortality
- 0.34: EL, 4 months, decreased number of kits born live
- 0.14: NOAEL, 4 months, decreased number of kits born live
- 0.14: EL, 6 months, reduced growth rates of kits
- 0.09: LOAEL, 160 days, reduced number of kits born alive
Figure 4-9
Selected Mammal Aroclor and Total PCB Toxicity Endpoints

- 50: Raccoon, EL (effect), 8 days, decreased weight gain
- 32: Female Rat, LOAEL, day 1, 3, 5, 7, and 9 of lactation, reduced growth rate of offspring
- 12.5: Mouse, LOAEL, 108 days, decreased conception
- 1.5: Sherman Rat, LOAEL, 129 days, decreased litter size
- 0.1: Rhesus Monkey, LOAEL, 18 months, infant mortality
Figure 4-10
Selected Mammal Dioxin Equivalent Toxicity Endpoints

- 0.25: Rat, LOAEL, gestation days 6-15, litter size and pup weight
- 0.125: Rat, NOAEL, gestation days 6-15, litter size and pup weight
- 0.1: Rat, LOAEL, 2 years, female mortality
- 0.01: Rat, LOAEL, 3 generations, reproductive capacity
- 0.0021: Rhesus Monkey, LOAEL, 7 months, number of births
- 0.001: Rat, NOAEL, 3 generations, reproductive capacity
- 0.00059: Rhesus Monkey, LOAEL, 7-48 months (maternal), reproductive
- 0.00012: Rhesus Monkey, NOAEL, 7-48 months (maternal), reproductive

Effective Dose Dioxin Equivalents (µg TEQ/kg wet body wt/day)
Note: The dendrogram is based on Morisita’s index (Sₕ) of community similarity and the computed fusion value of each junction is given.

Figure 5-1
Complete Linkage Clustering - TI Pool
Figure 5-2
Relative Percent Grain Size Classes - TI Pool

Note: Error bars represent one standard deviation.
Figure 5-3
Mean Sediment TOC - TI Pool

Note: Error bars represent one standard deviation.
Figure 5-4
Mean Total PCB Concentration in Sediment - TI Pool

Note: Error bars represent one standard deviation.
Figure 5-5
Biomass of Benthic Invertebrates - TI Pool

Note: Error bars represent one standard deviation.
Figure 5-6
Relative Percent Grain Size Classes - Lower Hudson River
Figure 5-7
Mean Sediment TOC - Lower Hudson River
Figure 5-8
Mean Total PCB Concentration in Sediment - Lower Hudson River

Note: Error bars represent one standard deviation.