

AN ABSTRACT OF THE DISSERTATION OF

Robert Allan Grove for the degree of Doctor of Philosophy in Toxicology presented on May 25, 2006.

Title: Environmental Contaminants in Male River Otters Collected from Oregon and Washington, 1994-99, with Reproductive Organ Hypoplasia Observed in Otter Males.

Abstract approved: \_\_\_\_\_  
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A large number of river otter (*Lontra canadensis*) males were collected from areas of high and low contaminant concentrations throughout western Oregon and Washington during the fall and winter of 1994-99. Few significant non-reproductive organ morphometric differences were found in the large series of male otters collected, except for adrenal gland, lung, pancreas, thymus and thyroid gland mass in adult males. With respect to reproductive organ soft tissue mass, Oregon males were significantly heavier. Oregon yearling and adult male otters attain reproductive readiness approximately two weeks earlier than their Washington counterparts, explaining these size differences. Juvenile males from Oregon also appeared to be more developed than Washington juvenile males.

Male river otter hepatic contaminant concentrations exhibited significant regional differences, with males from heavily populated and industrialized regions of western Oregon and western Washington having higher concentrations of polychlorinated aromatic hydrocarbons. Also, otters collected from areas of intensive agriculture had significantly higher organochlorine insecticide and metabolite (OCs) concentrations. Mean liver concentrations of mercury were similar among regions for both juvenile and adult male otters, except the Lower Columbia River males which were significantly lower for both age classes. Although some mean mercury concentrations were elevated (3.6-13.8  $\mu\text{g g}^{-1}$ , dw), they were well below concentrations considered toxic.

Juvenile male river otters were prepubertal during their first year of life, as signified by the absence of testicular testosterone production and active

spermatogenesis. However, testosterone production occurred in yearling male otters when paired testes mass exceeded 11 g, with concurrent spermatogenesis demonstrated. Seminiferous tubule spermatozoa were observed in yearling testes as early as the first week of December.

No morphological reproductive tract abnormalities were noted during necropsy, except for a juvenile male lacking apparent external or internal testes. However, significant inverse relationships were found between hepatic contaminant concentrations (mainly *ortho*-substituted polychlorinated biphenyls [PCBs] and *p,p'*-dichlorodiphenyldichloroethylene [DDE]) and juvenile male gonad mass, testes mass, prostate mass and baculum length and mass, supporting findings from preliminary work. Furthermore, significant inverse relationships were also found between several OCs and PCBs and adult male otter baculum length and mass. The inverse relationships found with adult males implies that the reproductive organ hypoplasia observed in juvenile male otters continues into adulthood as a permanent effect.