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Annual and seasonal evaluation of reproductive status in hornyhead turbot at municipal wastewater outfalls in the Southern California Bight

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ABSTRACT

Over a billion gallons of treated wastewater effluent is discharged into the coastal waters of the Southern California Bight (SCB) daily, containing chemicals that target the endocrine system of aquatic organisms. Further, many areas within the SCB are contaminated with historical discharges of DDT and PCBs that can also cause endocrine effects in aquatic organisms. This study investigated changes in indicators of reproduction and environmental estrogen exposure in flatfish near wastewater outfalls. Hornyhead turbot (*Pleuronichthys verticalis*) were collected from four discharge areas, two farfield stations, and a reference location in the SCB during May-June 2006 to examine spatial patterns. Quarterly samples were also collected between May-June 2006 and February 2007 to investigate temporal patterns in reproductive indicators. Fish from the Orange County outfall farfield site were often younger and less sexually mature than fish from other sites. Sex ratio was significantly male or female skewed in some hornyhead turbot samples from the outfall sites, as well as from the Dana Point reference site. However, no consistent pattern in sex ratio was present over time. Low-level induction of the egg yolk protein vitellogenin (vtg) in males was frequently observed in male hornyhead turbot from all sites, suggesting widespread ongoing exposure to estrogenic compounds. The source of this exposure could not be determined from the data since there was no pattern related to outfall proximity, effluent type, or time of year. Male vtg concentrations did not appear to be impacting reproductive function, as there was no incidence of related gonad abnormalities (ova-testis). Analysis of historical hornyhead turbot trawl catch data indicated that populations are either increasing or stable in the SCB, thus environmental estrogen exposure was not adversely impacting fish abundance. Additional research is needed to determine the cause of the estrogenic response in hornyhead turbot, and whether the source of the estrogenic compounds is a consequence of historical contamination of the SCB, ongoing sources, or representative of an uncommon species-specific natural condition.

Full Text

http://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2011AnnualReport/ar11_375_388.pdf