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SIZE MATTERS?: SMALL CITIES IN NEBRASKA, THE RELEASE OF ESTROGENIC COMPOUNDS AND THEIR BIOLOGICAL IMPACTS ON FISH

Alan Kolok*, Debbie Akerly, Molly M. Hartmann, Marlo K. Sellin, Daniel D. Snow

ABSTRACT: The primary objectives of this project were to determine if estrogenic compounds were being released from the wastewater treatment plants of three small cities in Eastern Nebraska, and to determine whether there were biological effects associated with these discharges. Data were collected to satisfy these objectives using two novel assessment tools, polar organic chemical integrative samplers (POCIS), and caged adult fathead minnows. During two field deployments, fish and POCIS were deployed for 7 days upstream and downstream from the Grand Island and Columbus wastewater treatment plants, and downstream from the Hastings wastewater treatment plant. Fish and POCIS were also deployed at three different reference sites for comparison. POCIS are currently being analyzed for a number of steroidogenic compounds including:17β estradiol, estrone, 17α ethinylestradiol, and testosterone,and these results will be presented at the conference. Adult male fathead minnow livers were analyzed for the relative gene expression of vitellogenin, an egg precursor protein that should only be present in female fish. Vitellogenin expression was very low in the males deployed at the three reference sites and upstream and downstream from the Grand Island and Columbus wastewater treatment plants. In contrast, vitellogenin levels in adult males deployed downstream from the Hastings treatment plant approached levels normally found in adult females, indicating that the males had been exposed to an estrogenic compound(s). Preliminary results suggest that estrogenic compounds are being released from the Hasting wastewater treatment plant, and that these compounds are present in concentrations that elicit estrogenic effects.

***** Professor, University of Nebraska - Omaha, 6001 Dodge Street, Department of Biology, 114 Allwine Hall, Omaha, NE 68182-0040, USA, Phone: 402-554-3545, Fax: 402-554-3532, Email: akolok@mail.unomaha.edu