AMMAY, KRISTEN[1], CLARYMAR ORTIZ[2], DENNIS C. HANEY[1], AND JOHN WHEELER[1]. Furman University[1] and Universidad Metropolitano[2]-Evaluating the presence of estrogen in wastewater treatment plant effluent in the Broad River watershed, South Carolina.

Synthetic and natural estrogenic compounds derived from oral contraceptives, plasticizers, pesticides and household cleaning agents are discharged into wastewater systems. Wastewater treatment plants (WWTPs) in turn discharge these compounds into river systems. These chemicals can bind with the estrogen receptor in vertebrates and at high concentrations have been associated with reproductive failure and altered immune function in fish. The goal of this research was to design an effective procedure for detecting estrogenic activity and to quantify estrogen concentrations in the effluent of WWTPs in the Broad River watershed of South Carolina. Plants of varying sizes and levels of industrial and municipal influent were selected for study. Estrogenic compounds were first assessed by a yeast estrogen screen assay. This method measures human estrogen receptor-dependent activity by using β-galactosidase production to quantify the amount of estrogenic compounds. Results showed a weak but significant positive correlation between estrogen concentration and percent industrial influent to the WWTP, but no correlation with WWTP size. Plants with primary sedimentation and influent equalization basins contained significantly less estrogen in their effluent than plants without these features, suggesting that slower transit of wastewater through the plant reduces estrogen concentrations in the effluent. A liquid chromatograph mass spectrometry analysis was used to identify whether any of five common estrogenic compounds (estrone, estriol, 17α-ethynylestradiol, β-estradiol, and diethylstilbestrol) were present. Low concentrations of estrone and 17α-ethynylestradiol were detected only in a small percent of samples, suggesting that xenoestrogens may be the main source of estrogenic compounds detected in the yeast bioassay.