

Prepared in cooperation with the
New York State Department of Environmental Conservation
New York City Department of Environmental Protection
New York State Department of Health
Wisconsin State Laboratory of Hygiene

Estrogenicity in Streams of New York State

Streams in New York may be affected by natural and synthetic hormones and the threat that these hormones pose to fish populations or human consumers remain largely unknown.

Problem

Almost 1900 public, private, and commercial waste-water treatment plants (WWTPs), many located upstream of drinking water intakes or within tributaries to water-supply reservoirs, are permitted to release effluents into surface- or ground-waters

across New York State. More than 150 facilities have New York State SPEDES permits to discharge waste waters in the New York City East of Hudson and West of Hudson Water Supply Watersheds (NYC Watersheds), which provide drinking water to more than nine million people in and around New York City. Some common waste water

treatment plant (WWTP) contaminants (e.g., polycyclic musks, alkylphenols, and estradiol) can cause estrogenic or androgenic changes in the reproductive systems of exposed fish and wildlife. These compounds are generally referred to as endocrine-disrupting contaminants or endocrine disruptors. Recent investigations from across the country indicate that some endocrine disruptors may pass through WWTPs in their original form or only partly altered, diluted, or strengthened. Changes in reproduction (endocrine) and histology (gonad) biomarkers of resident fish in streams receiving WWTP effluents have been

Municipal (blue), industrial (red), and private/commercial/institutional (green) WWTPs and drinking-water intakes (yellow) across New York State.



documented in receiving waters worldwide and indicate that endocrine disruptors are a ubiquitous problem. More importantly, changes in fish may forecast possible effects within humans because their endocrine systems integrate infrequent and/or long-term exposures to low-level steroid hormones in stream waters. The extent to which streams in New York may be affected by natural and synthetic hormones and the threat that these hormones pose to fish populations or human consumers remain largely unknown, however, because comprehensive estrogenicity surveys have not been done across any regions of the state.

Objectives

The United States Geological Survey (USGS) and the New York State Department of Environmental Conservation (NYS DEC) in collaboration with New York City Department of Environmental Protection (NYC DEP) and New York Department of Health (NY DOH) are conducting a pilot study mainly in southeastern NY to: (a) appraise the seasonal and spatial extent to which stream waters and fish in New York State (primarily within the NYC Watersheds), are affected by

natural and synthetic hormones from WWTPs, and (b) develop a plan to document potential endocrine-disruption issues in stream waters and fish from across all of New York State.

Approach

The United States Geological Survey (USGS), the New York State Department of Environmental Conservation (NYSDEC), and collaborators are addressing several water quality priorities identified in the New York City (NYC) Watershed Protection Management Plan by continuing the fourth phases of a pilot study being done mainly in the two NYC Water-Supply Watersheds. Study results are being used to better define the: (1) magnitude and variability in levels of natural hormones and estrogen and androgen mimics, other potentially estrogenic compounds, pharmaceuticals and personal-care products, acute or chronic toxicity, and relative estrogenicity (17 β -estradiol equivalents - EEQ) in effluents from a range of WWTPs, (2) concentrations of selected compounds and estrogenicity in a large portion of WWTP effluents, (3) potential effects of hormone-mimics on endocrine biomarkers (and reproductive systems) of one or more resident or surrogate fish species in a subset of effluents and receiving streams, (4) health

or condition of resident fish assemblages (and the entire community) in a subset of streams that receive WWTP effluents, and (5) inter-relations between known and potential hormone mimics in WWTPs and streams, relative estrogenicity levels, endocrine biomarkers and the reproductive systems in fish, and the health of fish populations in streams of the pilot study region and other selected sites across New York.

Reports

Baldigo, B.P., Sloan, R.J., Smith, S.B., Denslow, N.D., Blazer, V.S., and Gross, T.S., 2006, Polychlorinated biphenyls, mercury, and potential endocrine disruption in fish from the Hudson River, New York, USA: *Aquatic Sciences*, v. 68, p. 206-228, doi:10.1007/s00027-006-0831-8 http://ny.water.usgs.gov/projects/catskillgeopmorph/baldigo_hudson_2006_AS.pdf

Phillips, P.J., Stinson, B., Zaugg, S.D., Furlong, E.T., Kolpin, D.W., Esposito, K.M., Bodniewicz, B., Pape, R., and Anderson, J., 2005, A multi-disciplinary approach to the removal of emerging contaminants in municipal wastewater treatment plants in New York State, 2003-2004, in *Proceedings of WEFTEC.05, the 78th Annual Water Environment Federation Annual Technical Exhibition and Conference (CD-ROM)*, Washington, D.C., Oct. 29-Nov. 2, 2005. Water Environment Federation, Alexandria, Virginia, p. 5095-5124

Smith, S.B., Sloan, R.J., and Baldigo, B.P., 2000, Altered endocrine biomarkers in selected fish species in the Hudson River, New York.: U.S. Geological Survey FS-113-00, 2 p. [Fact Sheet].

Brown Trout (*Salmo Trutta*)



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For Additional Information

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