Current Event in Fish Ecology **FiW 4614** **by: Mark Foster**

Sewage effluents impact fish reproduction

MINNEAPOLIS, Jan. 16 (UPI) -- U.S. scientists say sewage plant effluents not only affect individual aquatic organisms, but also entire aquatic populations, reducing long-term viability.

It's known sewage treatment plants release estrogens that can cause changes in the gender of an individual fish or invertebrate, but the long-term consequences to populations were unclear. The new University of Minnesota study confirms such estrogens can have population-level impacts.

The researchers found effluent exposure reduced male fish aggressiveness and ability to successfully compete with unexposed males for a nest. The exposed fish were less able to attract a female and successfully reproduce.

But while estrogens had a negative impact on fathead minnow reproduction, the researchers found exposure to a male hormone showed opposite results. Exposed fish were more aggressive than unexposed fish, and they competed better for nests, thus producing a greater number of eggs.

The study is published in the current issue of Environmental Toxicology and Chemistry.

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References:

Hogan D. 2007. Sewage effluents impact fish reproduction. ScienceDaily LLC. Available: http://www.sciencedaily.com/upi/index.php?feed=Science&article=UPI-1-20070116-08190400-bc-us-sewagefish.xml (January 18, 2007).

Martinovic D., W. T. Hogarth, R. E. Jones, and P. W. Sorensen. 2007. Environmental estrogens suppress hormones, behavior, and reproductive fitness in male fathead minnows. Environmental Toxicology and Chemistry 26(2):271-278.

Answers to Questions:

1. In past studies, high levels of estrogen hormones were found to cause gender changes in individual fish. This study established that long-term viability within the population was negatively impacted. Exposure to sewage effluents reduced male fish aggressiveness interfering with their ability to compete with unexposed males. This lack of aggressiveness caused them to be less attractive to females directly impacting their ability to reproduce.

2. Since ecology is the study of the relationships of organisms among themselves and their environment, unexpected or sudden changes can disrupt the life cycle of individual organisms eventually jeopardizing the survival of an entire population. A point source such as sewage effluents is a good example of unexpected or sudden caused by human influences.

3. The human players consist of thousands of people who contribute to the problem by sending their waste to the sewage plant for processing. The nonhuman player is the fathead minnow, specifically, but includes many other organisms directly influenced by the discharge from the sewage plant.

4. Socioeconomic issues include the problem of what to do with all the human waste. It must be sanitized and disposed of properly or it poses a health risk to humans. The problem is how to do this as inexpensively as possible without harming the environment and the organisms that live within it.

5. The writer synthesized the information within the highly technical scientific journal article into several easily understood paragraphs and reported the information accurately and without bias. I feel the information was overly simplified and left out pertinent details such as the species involved in the study and that it is a widely used in ecotoxicological models.

6. It would help to have previous data on the fathead minnow within the stream reach affected. Studying other species and their interactions with the fathead minnow would provide additional information on how sewage effluents affect the population in the long-term.

7. Fish ecologists should negotiate with authorities in the local municipality to neutralize estrogen levels in the sewage effluents. They can utilize local media sources to broadcast their findings in order to help educate the public about the problem. More studies are needed to monitor the condition of the stream reach and other species that are affected. The scientific journal article concluded with the need to investigate multiple competitors, varying exposure times and concentrations, and multiple generations.