

Application Form:  
2010-11 TWRI Mills Scholarship Program

**Crystal Watkins**  
**Department of Wildlife and Fisheries Sciences**

**1. Applicant:**

Name: Crystal Watkins

**2. Advisor Information:**

Name: Dr. Kirk Winemiller,

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**3. Description of proposed research:**

Environmental pollution has contributed to population decline, reproductive anomalies, novel selection pressures, and fragmented habitats for aquatic biota (Kidd et al. 2007). Compounds such as pharmaceuticals and personal care products (PPCPs) associated with wastewater treatment plant (WWTP) effluents have been reported to directly impact aquatic habitats (Purdom et al. 1994). Previous studies have found an association between WWTP and abnormalities in fish. A study of fathead minnow found that chronic exposure to synthetic estrogen released from WWTP effluents caused feminization of males and led to near extinction of the species (Kidd et al. 2007). Others have reported reduced sexual behavioral patterns and abnormal testicular tissue, which could translate to lower reproductive success. Therefore, it seems that pharmaceuticals from WWTP discharge can negatively impact fish populations, and as a result, fish can serve as sensitive bioindicators for these compounds.

There is preliminary evidence that these compounds are making their way into Texas waterways, however research is still needed. Wastewater from treatment plants in large urban centers, such as in the Dallas/FW area, is presumed to contain significant concentrations of PPCPs (Brooks et al. 2005). Ramirez et al. (2009), whose study surveyed U.S. rivers, including one in Dallas, Texas, found that pharmaceuticals were present in detectable amounts in various fish tissues. However, little research has been done in the Houston area to evaluate the potential influence of effluents from wastewater treatment plants on aquatic biota.

The objective of the proposed study is to evaluate evidence of reproductive abnormalities of western mosquitofish in associations with WWTP effluents in tributaries of bayou systems in Harris County, Texas. My research objectives will focus on collecting mosquitofish near domestic wastewater discharges to 1) assess evidence of morphological or reproductive abnormalities in fish downstream from WWTP discharges and 2) characterize the reproductive status of mosquitofish populations in study areas to establish baseline indicators for future research and monitoring efforts. This information will be helpful for

effective wastewater management to balance human needs and environmental benefits that protect human health and welfare as well as biodiversity.

References:

Brooks, B. W., C. K. Chambliss, J. K. Stanley, A. Ramirez, K. E. Banks, R. D. Johnson, and R. J. Lewis. 2005. Determination of select antidepressants in fish from an effluent-dominated stream. *Environmental Toxicology and Chemistry* **24**:464-469.

Kidd, K. A., P. J. Blanchfield, K. H. Mills, V. P. Palace, R. E. Evans, J. M. Lazorchak, and R. W. Flick. 2007. Collapse of a fish population after exposure to a synthetic estrogen. *Proceedings of the National Academy of Sciences of the United States of America* **104**:8897-8901.

Purdom, C. E., P. A. Hardiman, V. V. J. Bye, N. C. Eno, C. R. Tyler, and J. P. Sumpter. 1994. Estrogenic effects of effluents from sewage treatment works. *Chemistry and Ecology* **8**:275 - 285.

Ramirez, A. J., R. A. Brain, S. Usenko, M. A. Mottaleb, J. G. O'Donnell, L. L. Stahl, J. B. Wathen, B. D. Snyder, J. L. Pitt, P. Perez-Hurtado, L. L. Dobbins, B. W. Brooks, and C. K. Chambliss. 2009. Occurrence of pharmaceuticals and personal care products in fish: Results of a national pilot study in the United States. *Environmental Toxicology and Chemistry* **28**:2587-2597.

**4. Academic qualifications of student:**

Courses Taken:	
Ichthyology	
Wetland Ecology	
Statistics in Research I	
Ecology and Society	

GRE Score:	
Undergraduate GPR:	
Graduate GPR:	
GRE Analytical Writing Score:	

**5. Proposed use of funds:**

With the funds from this scholarship, I would pay for travel expenses to and from my study sites in Houston as well as pay for laboratory supplies for analysis of reproductive abnormalities.

**6. Intended career path the student anticipates pursuing.**

After finishing my Masters degree, I intend to pursue my career in a government agency helping to form policies that address the growing concerns of anthropogenic influences on the environment. In the future, I hope to work with international organizations to create innovative environmental management policies that would benefit humans and wildlife.