Natural Resources Defense Council

STATEMENT OF
ERIK D. OLSON
DIRECTOR OF THE ADVOCACY CENTER
AND SENIOR ATTORNEY
NATURAL RESOUCES DEFENSE COUNCIL

BEFORE THE COMMITTEE ON GOVERNMENT REFORM
UNITED STATES HOUSE OF REPRESENTATIVES

HEARINGS ON
"OVA POLLUTION IN THE POTOMAC: EGG-BEARING MALE BASS AND IMPLICATIONS FOR HUMAN AND ECOLOGICAL HEALTH"

OCTOBER 4, 2006

TESTIMONY PREPARED WITH THE ASSISTANCE OF
DR. GINA SOLOMON, M.D., M.P.H., SENIOR SCIENTIST
DR. LINDA GREER, Ph.D., SENIOR SCIENTIST & DIRECTOR, ENVIRONMENT & HEALTH,
DR. SARAH JANSEN, M.D., Ph.D., M.P.H. SCIENCE FELLOW,
AND MICHAEL WALL, SENIOR ATTORNEY

Chairman Davis, Ranking Member Waxman, and members of the Committee, thank you for the opportunity to testify this afternoon on the important issue of endocrine disrupting chemicals in the Potomac River and other water sources. I am Erik D. Olson, Director of the Advocacy Center and a Senior Attorney at the Natural Resources Defense Council (NRDC), a national non-profit public interest organization dedicated to protecting public health and the environment. I have studied and fought to control the adverse effects of toxic chemicals on human health and the environment for more than 20 years, working for both the government and for non-profit organizations.

For more than a decade, NRDC has been concerned that certain synthetic (man-made) chemicals can have the effect of mimicking or otherwise interfering with hormones in the bodies of animals and humans, with potentially devastating effects on reproduction and health, including cancer. Recent reports that male fish in the Potomac River and in upstream tributaries are developing abnormally, and have both male and female characteristics, is just one of a wide array of indications that we are contaminating our environment with synthetic hormone-like chemicals. These endocrine disrupting (ED) contaminants harm fish, wildlife, and most likely ourselves, our families, and potentially future generations.

In my testimony, I will address some of the key questions raised by members of the Committee.

- **What are endocrine disruptors?**

Endocrine disruptors are substances which interfere with the endocrine system by mimicking, blocking or otherwise disrupting the function of natural hormones. Examples of endocrine disruptors include various pesticides, PCBs, dioxins, and a variety of chemicals in plastics such as phthalates and bisphenol A. These plastic additives are used in very high volume and so we worry about high concentrations flooding into the environment through sewage discharges and the like. Also of particular concern to NRDC are endocrine disrupting chemicals used in cosmetics, lotions, and creams (for their emollient properties). We're worried about these because people put them directly on their skin, where they are then absorbed.

By EPA's definition, endocrine disruptors "interfere with the synthesis, secretion, transport, binding, action, or elimination of natural hormones in the body that are responsible for the maintenance of homeostasis (normal cell metabolism), reproduction, development, and/or behavior." The endocrine system controls basic body functions such as metabolism and growth, as well as more specialized functions such as behavior, sexual differentiation during embryogenesis, sexual maturation during puberty, and reproduction in adulthood. There are many endocrine glands, such as the pituitary, thyroid, adrenal, ovaries, testes, and more.

- **What could cause male fish to bear eggs?**

Egg-bearing in male fish is a sure sign that those fish are exposed to chemicals that mimic estrogen. In fact, a laboratory test using male fish is an integral part of the EPA's proposed screening and testing program for endocrine disruptors – because this phenomenon is such a clear sign of exposures to estrogens. Male fish bearing eggs is an example of a phenomenon known as "intersex", where both male and female sexual characteristics appear in one animal. Male fish become intersex when they are exposed to estrogenic substances in the water or in the food they eat.

- **Why are synthetic EDs of greater concern potentially than naturally-occurring endocrine-affecting chemicals like phytoestrogens?**

Although there are both naturally-occurring and synthetic substances that affect hormones, the synthetic chemicals are of much greater concern for three reasons: First, most of the synthetic chemicals aren't broken down and excreted as easily in the environment and in our bodies, so they can cause persistent effects that may build up over time; in contrast the natural substances are efficiently excreted. Second, humans and animals have evolved with the naturally-occurring plant-based chemicals for millennia, whereas the synthetics are new and our bodies are not equipped to handle them. Third, we can actually do something to control the environmental release of synthetic endocrine disruptors, but can't do much about natural sources.

- **What chemicals might be in the Potomac that could be causing this problem?**

The U.S. Geological Survey (USGS) has stated that it cannot confirm what potential ED chemicals may be in the Potomac. While NRDC has not seen all of the testing of the Potomac River water conducted by all government agencies, we have reviewed very limited testing of raw and finished water by the Washington Aqueduct by the Army Corps of Engineers, showing that low levels of the EDs atrazine and simazine are occasionally found in the Potomac.

Endocrine disruptors that are potentially in the Potomac include a few major categories of chemicals: pesticide runoff from urban and agricultural areas; detergent additives and cosmetics discharging untreated from sewage treatment plants; and discarded pharmaceuticals or those eliminated in human waste, which are again untreated at sewage treatment plants. Elsewhere in the country, paper mill effluent is notorious for endocrine disrupting effects, but there are no paper mills in the Potomac River watershed to my knowledge. However, since most of the 80,000 or so chemicals in use today have never been tested for estrogenic effects, it is quite possible that the culprit in the Potomac may be a chemical that is not being tested for and is not yet recognized as estrogenic.

- **If we only find low levels of these ED chemicals or find none, doesn't that mean that they are not present at levels of concern, so the problem with intersex male fish must be some natural or other non-chemical phenomenon?**

Since most chemicals have never been tested to see if they are endocrine disruptors, we can put very little stock in testing for the handful of known estrogenic chemicals. The contamination may be coming from a chemical that is not yet a recognized endocrine disruptor. In addition, it is important to realize that hormones can have effects at infinitesimal doses – as low as the parts-per-billion (ppb) or even parts-per-trillion (ppt) range. This means that the laboratory methods may not be sophisticated enough to detect some of these chemicals at levels that may be relevant to health. For example, published studies show that the pesticide atrazine can cause adverse effects on frogs, including impacts on reproductive organs, at 0.1 part per billion (ppb)—a level lower than many laboratories are able to reliably detect.

- **What does it mean that "the timing makes the poison" for EDs?**

EDs are changing the way that scientists think about toxic chemicals. Since ancient times, scientists said that "the dose makes the poison." We now know that for many EDs, since only an extremely small dose is necessary to cause an adverse effect, often it is the "timing that makes the poison." For example, it has been demonstrated that exposure of a fetus to extremely low levels of certain ED chemicals at precise moments during fetal development called "critical windows" of vulnerability (in some cases on a single day) can trigger an adverse effect. ED effects triggered by exposure during fetal development can range from feminization of a male to birth defects or hormonally-related cancer much later in life.

This is why pregnant women are told to be very careful about exposures during the first trimester of their pregnancy. DES, for example, a drug used by pregnant women a generation ago to control morning sickness, caused malformation of the reproductive system and cancer in both

males and females only when taken during specific weeks of fetal development. Similarly thalidomide caused dramatic birth defects from a single exposure on a single day between weeks 7 and 9 of development. Recent work has shown that effects during fetal development are exquisitely sensitive to timing. For example, a single one-time dose of dibutyl phthalate (a chemical in many cosmetics) to rats to is sufficient to produce a range of reproductive tract malformations in male offspring in the absence of toxicity to the dam (mother). Even more amazing, these studies have shown different specific types of malformations of the male reproductive system can be triggered depending on the gestational day that the single dose is given. Doses at gestational day 16, for example, led to small testes and the development of female nipples in male rats. Doses at gestation day 17 led to hypospadias (a birth defect of the penis) and missing prostate lobes. Doses at gestational day 18 led to abnormalities of the bladder.

- **What are the potential public health issues here (both from eating the fish and from drinking the water)?**

The public health issues are hard to predict. However a few things are clear.

First, chemicals that are estrogenic in fish are likely also estrogenic in humans, since our hormone systems are very similar. In other words, hormones work the same in humans as they do in fish. In particular, the estrogen receptor has been conserved throughout evolution, and the mechanisms of action are very similar from fish to chickens to rats to humans. Second, chemicals that feminize male fish have the potential to have a feminizing effect in humans, especially in the fetus. Third, there is something estrogenic and unnatural either in the Potomac water or in the food chain in the river. There are still lots of research questions, but the bottom line is that there is a problem that needs to be addressed before we start seeing problems in more than just fish. These fish are the canaries in the coal mine – we ignore them at our peril.

Regarding potential health effects, although these effects are being seen in male fish, it is women drinking the water and eating the fish—and their fetuses—who are likely at greatest risk. Women of child-bearing age are at risk because male fetuses are particularly vulnerable to estrogen exposures during development. We know from animal studies that males exposed to estrogen-mimicking chemicals such as bisphenol A are prone to developing enlarged prostate glands with precancerous lesions as adults. There is also concern that interference with natural hormone action during development of the reproductive tract results in abnormalities in the development of genitalia (hypospadias and cryptorchidism – undescended testicles) as well as infertility later in life. In addition, exposure to estrogenic chemicals could promote the development of hormonal cancers in women, for example breast cancer

- **Is it true that since fish live in the water, they are probably dosed way more than people are, so there is no public health concern?**

Although we are much larger than fish, our bodies do not require larger doses of hormones to have effects. Hormones work in the parts per billion to parts per trillion range of concentrations - in all species. These amounts are incredibly small; an analogy for a concentration of one part per trillion is one grain of salt in an Olympic sized swimming pool. Synthetic endocrine

disruptors often require slightly higher concentrations to have the same effect as physiological hormones, however, the concentrations that cause these effects are not expected to differ greatly between species.

Fish are the canaries in the coal mine – we ignore them at our peril. They may be more exposed to certain contaminants in the water than humans are, although people who regularly drink the water or eat fish from the river are likely to be significantly exposed to the same ED chemicals. Some ED chemicals "bioconcentrate" as they move up the food chain; small fish exposed to contaminated food or water have moderate levels, but the larger fish that eat them, and big predator fish that eat those medium-sized fish, have increasingly high levels of the chemicals in their tissues. If there are effects in the fish, it tells us that there's something seriously wrong in the river. If my wife of a family member were pregnant, I would certainly have concerns about her drinking that water or eating those fish.

- **What do the Food Quality Protection Act of 1996 (FQPA) and the Safe Drinking Water Act Amendments of 1996 (SDWA) require EPA to do about endocrine disruptors?**

In 1996, Congress began to get serious about endocrine disruptors, and in the FQPA ordered EPA to establish an endocrine disruptor screening and testing program for pesticides and certain other chemicals. The FQPA required EPA to develop this ED screening program by August 1998, and to "implement" the program by August 1999. (Federal Food Drug and Cosmetic Act (FFDCA) §408(p), 21 U.S.C. §346a(p), as amended by the FQPA). The program was supposed to require testing of all pesticides, and of any other chemicals that may have a an effect that is cumulative with a pesticide, for endocrine disrupting impacts. A separate provision in the law required that EPA review the safety of all pesticide "tolerances" (the maximum allowable level of pesticides in foods) in three batches, all to be completed by August of 2006.

When EPA failed to adopt and implement the endocrine disruptor screening and testing program by 1999 as required by the FQPA, NRDC sued the agency for missing the deadline. NRDC and EPA settled that litigation in 2001, in an agreement initially reached with the Clinton Administration, but later explicitly ratified and supported by the George W. Bush Administration. In the settlement, EPA agreed to take numerous steps to expedite the adoption and implementation of the endocrine disruptor testing and screening program and to meet a series of deadlines for further action.

In addition, the SDWA Amendments of 1996 authorize EPA to provide for testing of any other chemical that may be found in drinking water sources and to which a substantial number of persons may be exposed, for potential endocrine disrupting effects.

- **Ten years later, how many chemicals have been tested, or restricted or banned due to endocrine disrupting effects under the Endocrine Disruption Screening Program?**

More than 10 years after the law was enacted, and more than seven years after Congress required EPA to "implement" the endocrine disruptor screening program, not a single chemical has been tested under EDSP, much less restricted or banned as a result of testing under the EDSP. EPA

recently claimed to have completed the FQPA-mandated safety review of all pesticide tolerances, yet it did its reviews with the benefit of a single EDSP-required test of a pesticide. While EPA has taken modest action to restrict a few uses of a few pesticides citing in part effects of the chemical on development, this has been rare and has not been an outgrowth of the EDSP or any routine or standardized ED testing. EPA's extensive delay in carrying out the endocrine disruptor program in violation of clear Congressional directives is causing continued public and environmental contamination with these dangerous chemicals.

- **Is EPA right to say that it is so complicated to screen and test for EDs that it is perfectly understandable that the agency has taken 10 years since the FQPA and the SDWA '96 passed, and that not a single chemical has been tested under EDSP?**

It is inexcusable that the EPA has not yet gotten this basic screening program into place ten years after it was mandated by Congress. The EPA federal advisory committee on endocrine disruptors (EDSTAC – Endocrine Disruptor Screening and Testing Advisory Committee), in which NRDC, independent scientists, industry, and others participated, unanimously recommended a limited set of rapid screens and follow-up tests to detect effects on male and female hormones, as well as on the thyroid. These screens and tests have been bogged down at EPA since 1998.

EPA's Endocrine Disruptor Screening Program (EDSP) has suffered seriously from inattention and neglect. No doubt there have been some unexpected events that slowed EPA's development and implementation of the program, but nothing extraordinary that could not have been dealt with had EPA treated the program as a priority and nothing that should have required the extended, unlawful delay that has occurred. In fact, EPA has not yet even identified the list of chemicals it intends to test, a step it could have taken without waiting for screens to be validated. We have recently formally informed EPA that we believe it is in violation of essentially all of the deadlines in the EDSP settlement agreement.

EPA has validated just one test of endocrine effects, the existing two-generation mammalian assay, which the Agency considers "valid for identification and characterization of reproductive and developmental effects, including those due to endocrine disruption." EPA could begin requiring use of that test to implement an endocrine disruptor testing program now, but EPA does not want to, preferring (it says for efficiency reasons) to wait until all assays come on line. Extremely slow progress is being made on some of those assays, and although EPA claims that it will begin to require testing by close of 2007, NRDC won't believe it until we see the testing requirements promulgated in the Federal Register. Meanwhile tens of thousands of chemicals are in widespread use with no idea whether or not they may be interfering with our hormones.

- **Does typical drinking water treatment technology get rid of ED chemicals?**

Standard treatment technology used by most water suppliers using the Potomac River (and indeed standard treatment technology used by over 90 percent of U.S. water supplies) does not get rid of most synthetic organic chemicals. For example, the Army Corps of Engineers-operated Washington Aqueduct (which supplies water to Washington D.C., Arlington, the Pentagon, National Airport, Falls Church, and some areas in Fairfax County), uses old-fashioned treatment techniques that have been around for about 100 years—coagulation, sedimentation, filtration

with sand and crushed anthracite, and chlorination/chloramination. While this treatment can remove many contaminants such as bacteria and dirt, it is not very effective at removing most synthetic chemicals, toxic heavy metals, or many radioactive contaminants. The treatment system used by the new plant at Fairfax County Water Authority (which serves a portion of that county), uses ozone and granular activated carbon; if properly designed, operated, and optimized, this treatment is capable of reducing most synthetic organic chemicals to extremely low levels. However, according to an NRDC survey of big city water systems in the United States several years ago, very few city water supplies (less than 10 percent) have invested in such modern water treatment technologies.

- **What needs to be done?**

Here's what needs to be done: (1) USGS in cooperation other agencies should be fully funded to complete a comprehensive chemical analysis of the water in the Potomac and other important water bodies to look for a wide array of synthetic chemicals including all currently known and suspected endocrine disrupting chemicals. (2) USGS and EPA should place caged fish at locations along the Potomac river to try to pinpoint where the contamination is entering the watershed. (3) EPA should complete an expedited evaluation and work with state and local authorities to require expedited use of improved sewage treatment systems, improved concentrated animal feeding operation (CAFO) treatment technologies, and modernized drinking water treatment technologies to better address contaminants including endocrine disruptors. (4) EPA's drinking water and other programs must be changed to test ED chemicals more frequently and to regulate them at lower levels; (5) full funding and rapid implementation of the EPA Endocrine Disruptor Screening Program.