Government Reform Committee
"Ova-Pollution in the Potomac: Egg-Bearing Male Bass and Implications for Human and Ecological Health"

Opening Statement of Chairman Tom Davis

October 4, 2006

Good afternoon, and welcome to this oversight hearing on egg-bearing male fish in the Potomac River. Recent *Washington Post* stories on this topic have spawned a great deal of interest, and justifiable concern, about the implications of this odd phenomenon for the environment, for the fish and for us. So today we will hear from those who watch over what goes into, and what comes out of, a vital regional waterway, the Potomac River.

First, let's understand just how far and wide the Potomac reaches. If you look at the green line on this map, you will see that the river runs from West Virginia to the Chesapeake Bay. Its uses are as varied as the communities through which it meanders. Humans use it for boating and recreational fishing. Fish and wildlife use it as their habitat. And local utilities use it to provide drinking water. In other words, what happens in the Potomac doesn't affect only one species of fish in Washington, D.C. It has repercussions for all the life that thrives on its flow.

So, what about these fish that scientists have found in our river? Do they have three heads? Three eyes? Are they growing legs? No. That's not the case at all. The findings by the US Geological Survey and the Fish and Wildlife Service are far subtler—but troubling nevertheless. What they and other researchers have found is egg yolk and immature ova being produced in male reproductive organs. That's what is ***known***. Still ***unknown*** are the exact causes, pathways and mechanisms of this unusual biological activity.

Some believe the fish could be reacting to organic chemical compounds such as human estrogen from processed sewage or animal estrogen from agricultural runoff. There is also the possibility the reaction is being triggered by manmade chemicals in pesticides and cosmetics. Or, it could be a combination of both. These questions are still under investigation, and we look forward to hearing from Department of Interior representatives about their research and findings.

So, what about the drinking water coming from the Potomac? How safe is it, and who is responsible for keeping it safe? This seemingly straightforward question has a complicated answer. In 1974, Congress passed the **Safe Drinking Water Act** requiring the Environmental Protection Agency to set standards and testing requirements for contaminants. Those requirements are then implemented

by the states. Because it runs through so many jurisdictions, the Potomac presents an interesting and challenging case. Testimony by our witnesses today will shed some light on the difficulties of navigating through the twisting rapids and rocky shoals of federal and state water quality regulations.

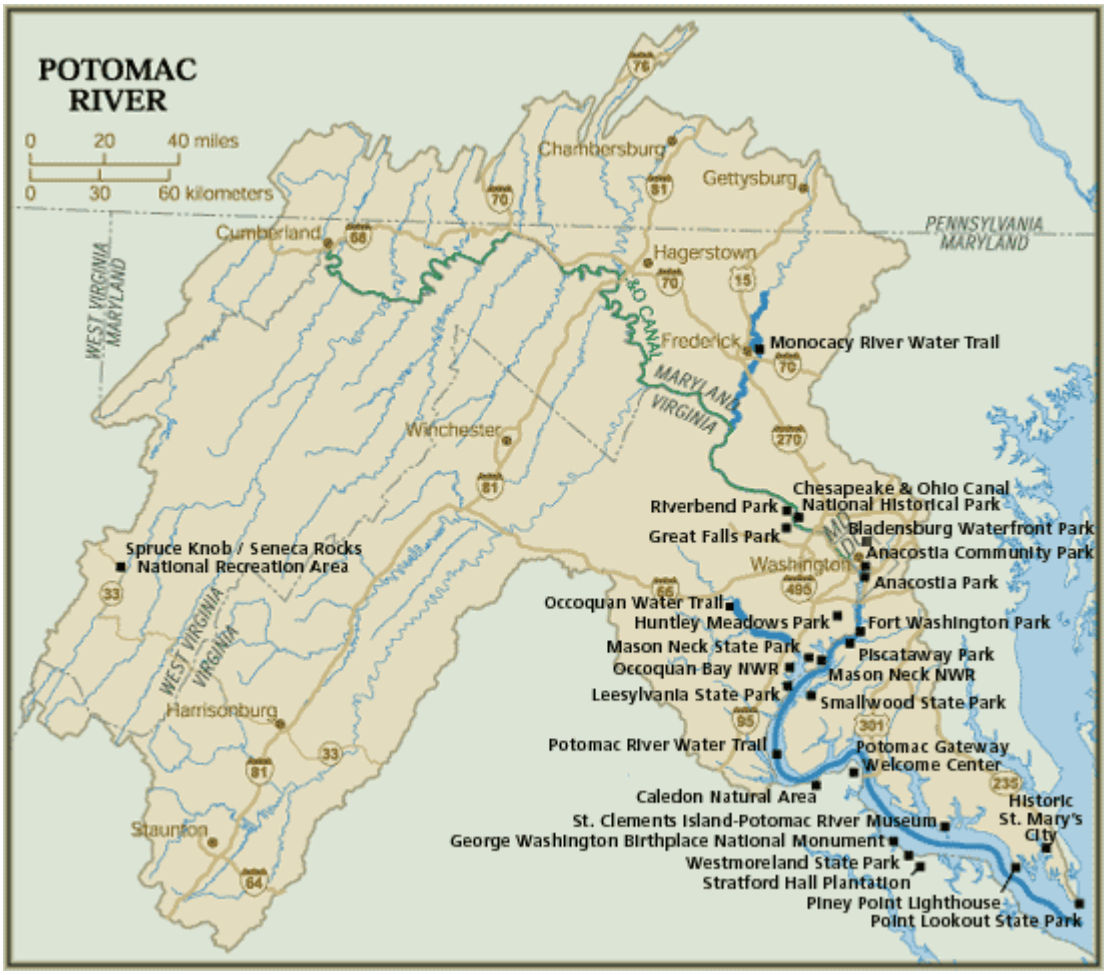
The good news is that many water utilities meet ***or exceed*** current EPA standards. But the menu of chemicals and contaminants finding their way into our waters is constantly changing. And the science of detecting and eliminating those contaminants, frankly, has to play catch-up. EPA, along with other federal agencies, has been studying chemicals and compounds thought to be causing the "intersex" fish phenomenon. We will hear from them, and from local water utilities, on how they advance the science and maintain vigilant testing regimes to keep harmful compounds out of our water.

At the end of the day, researchers have not yet determined what is scrambling the bass eggs. The preliminary conclusion as of now is that the fish "ova-pollution" probably has no impact on human health. Still, as the Chairman of the House Committee with jurisdiction over the District of Columbia, and as the co-chair of the Chesapeake Bay Watershed Task Force, I and many others want to know more. We need to be certain these sensitive biological markers are being

monitored and studied so we can detect and eliminate potentially harmful substances from the river ecosystem before they cause downstream environmental or human health effects.

I would like to thank our witnesses for being here today, and we look forward to hearing from each of you.

ATTACHMENT 1 – Potomac River



Mr. Ed Merrifield
Executive Director/Riverkeeper
Potomac Riverkeeper, Inc.

Testimony
Before the United States House of Representatives
Committee on Government Reform

Hearing on:
Ova-Pollution in the Potomac: Egg-Bearing Male Bass and Implications for Human and Ecological Health

October 4, 2006

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Testimony Before the House Committee on Government Reform

Ova-Pollution in the Potomac: Egg-Bearing Male Bass and Implications for Human and Ecological Health, October 4, 2006

Mr. Chairman and Members of the Committee:

On behalf of Potomac Riverkeeper, Inc., where I serve as Executive Director and Riverkeeper, thank you for the opportunity to present this statement to the Committee. Potomac Riverkeeper's mission is to protect and restore water quality in the Potomac River, from its headwaters in West Virginia to the Chesapeake Bay, through citizen action, education and enforcement. We serve the millions of citizens living in the Potomac watershed and surrounding Chesapeake Bay community who rely on the river for everything from drinking water to recreation.

Potomac Riverkeeper has been actively following the problem of fish intersex—the condition in which hermaphroditic qualities emerge—since it was first uncovered in our watershed by the US Geological Survey in 2003. At that time, scientists were trying to determine the cause of a fish kill 230 miles upstream from Washington, DC when they discovered ovaries in fish testes. Potomac Riverkeeper played an instrumental role in educating the public about the problem by providing information to the *Washington Post*'s front page story on intersex fish in October, 2004. Other stories followed, but because the problem was distant from the Washington, DC area, and because the focus was on fish health and not human health, public interest and EPA action lagged. Two years later, the intersex issue is front page news again—more so than when scientists first learned of the condition.

Intersex fish are now turning up in the Potomac waters of our metropolitan area, renewing the conversation about what is causing such mutations and giving rise to a new question: "How does this affect the millions of people living in the watershed?" Although water treatment facilities do a good job filtering the metropolitan area's tap water according to the EPA's standards, pollutants not tested for by water treatment plants do exist in the river.

According to the *Post*'s article, a 2002 test of the water in the Potomac yielded low levels of caffeine, an insecticide (DEET), and a chemical produced when the body breaks down nicotine, none of which is tested regularly by water treatment plants.

Over the last three years, endocrine disrupting chemicals (EDCs) have been linked with the intersex condition, though an exact EDC has not been named. EDCs attack the endocrine systems of fish, usually during the larval stage, and turn on hormonal processes that are not usually turned on for male fish. In the Potomac, male smallmouth and largemouth bass are growing ovaries on their testes. Studies show that EDCs affect sexual development and behavior, and reduce fertility.

While most scientists are unready to say which EDCs are responsible for intersex fish, the need to identify them is not new. The National Oceanic and Atmospheric Association (NOAA) concluded in a June 2002 report that "overt reproductive endocrine disruption in fish does not appear to be a ubiquitous environmental phenomenon. Rather, it appears to be associated with higher levels of contamination near pollution sources such as sewage treatment plants and industrial plants." In 1996, Congress created an EPA office dedicated to researching EDCs. The Endocrine Disruptor Research initiative was mostly a grant-based office, giving away about 2/3 of its $5 million budget. Ten years after its creation, the office has yet to release significant information about which EDCs are responsible for intersex—or what the risk is to metropolitan drinking water.

A variety of sources emit potential EDCs into the river. Antibiotics that are excreted or otherwise flushed down toilets do not get filtered before leaving treatment centers. Hormones from chicken waste make their way into water at poultry farms in Virginia and West Virginia. Stormwater runoff (which contains everything from pesticides and fertilizers to perfume and cosmetics) enters the water completely untreated, as does raw sewage from combined sewer overflows (CSOs). The issue at stake is the disposal of hazardous material and potentially hazardous material in a responsible fashion—we need to actualize the goals of the Clean Water Act and stop dumping waste, medications, and chemical runoff into the river. We are already over twenty years behind the Clean Water Act's stated goal.

Regarding human health, if scientists have not yet determined what pollutant is causing a reproductive health problem in fish in the Potomac, how can anyone say it is not in our drinking water? How can anyone say humans will not face a similar health problem? At best, all anyone can say is that they do not know if the EDC effect on fish would affect humans. One cannot deny that there is a potential threat to the millions of people who recreate, fish, and draw their tap water from the Potomac River. We know there are reproductive problems happening to the fish, and these affected fish are analogous to the canary in the coal mine. The fish are our warning.

Potomac Riverkeeper, Inc., on behalf of all citizens living in the watershed, is here today to ask that Congress, in cooperation with organizations like mine and the entire scientific community, proactively work to save Our Nation's River. With over five million people in the Potomac watershed, with Washington, DC being a destination for millions of tourists, and with members of Congress and their families living here much of the year, it makes sense to focus on the health

of this river. The banks of the Potomac, and its tributaries, are home to much less industry than most other major rivers in America. To believe we cannot stop these pollutants from entering our water and therefore eradicate the intersex problem is to sound the death knell of the Clean Water Act. By working together, we can make the Potomac a model river—paving the way for cities and states around the nation to clean up their water supply. With the full support and cooperation of the US Government and its agencies, we can have a fishable, swimmable Potomac, with plenty of clean, safe drinking water for all.

Thank you again for hearing my testimony today and I look forward to working with the committee in the future.

Ed Merrifield
Executive Director/Riverkeeper
Potomac Riverkeeper, Inc.

Congress of the United States
House of Representatives
Committee on Government Reform
Hearing on "Ova-Pollution in the Potomac: Egg-Bearing Male Bass and Implications for Human and Ecological Health"
1 p.m., October 4, 2006

Testimony of Charles M. Murray, General Manager, Fairfax Water

Mr. Chairman and Members of the Committee, thank you for the opportunity to present comments at this important hearing. My name is Charles M. Murray and I am the General Manager of Fairfax Water, Virginia's largest drinking-water utility. Fairfax Water is a non-profit, public water authority governed by a ten-member citizen board of directors who are appointed by the Fairfax County Board of Supervisors. Fairfax Water provides retail or wholesale service to nearly 1.5 million people in the Northern Virginia communities of Fairfax, Loudoun and Prince William Counties, the City of Alexandria, the Town of Herndon, Ft. Belvoir, and Dulles Airport. Fairfax Water operates state-of-the-art water treatment plants on both the Potomac and Occoquan Rivers.

As a large community drinking-water utility, we are regulated under the Safe Drinking Water Act through the Environmental Protection Agency. As with all community water utilities, Fairfax Water is dependent upon the United States Environmental Protection Agency (EPA) to set standards protective of public health, through the resources provided by Congress in the Safe Drinking Water Act. In Virginia, the Virginia Department of Health has been delegated regulatory authority for drinking-water utilities. I am proud to report to you that Fairfax Water meets all federal and state drinking-water regulations and has never had a violation of any maximum contaminant level. In fact, Fairfax Water takes pride in not only meeting these regulations, but in surpassing regulatory requirements for producing top-quality and esthetically pleasing water.

You have asked me to address today my awareness and concern regarding a recent USGS study and subsequent article in the *Washington Post* discussing egg-bearing male bass fish found in the Potomac River. Unfortunately, the USGS has not yet shared the report referred to in the *Post* article, so I cannot comment on it. What I can speak to are three things: my personal philosophy on the profession of drinking-water treatment, Fairfax Water's activities in the National Capital Region to protect the Potomac River Watershed, and Fairfax Water's participation in advancing the science associated with understanding endocrine disruptors.

Mr. Chairman and Members of the Committee, as you are dedicated to serving the people of the United States in the best way possible, we at Fairfax Water are similarly committed to serving our customers. A statement that hangs on my office wall, written by a former executive director of the American Water Works Association, captures the importance of our work. I share this with you now.

We are, all of us, water beings on a water planet. Water is life. Without it, all living things die. Our dependence on water is absolute; our psyches know this and signal us in myriad ways of water's elemental importance and significance. That is why we love the water and remember experiences associated with it. Of the earth's vast resources of water, only a small fraction is fresh and drinkable. A few people among the globe's billions have been charged with the task of ensuring everyone else has a reliable supply of safe water. Supplying potable water is an essential human activity, a great responsibility, and a vocation of distinction.

J.B. Mannion

As you can see, with this philosophy in mind, it is with a sense of responsibility and commitment that I and the people of Fairfax Water perform our duties as the major Northern Virginia drinking-water provider. To that end, Fairfax Water is a founding member of the Potomac River Source Water Protection Partnership (Partnership). The Partnership is a voluntary organization of water utilities, state, interstate, and federal partners whose representatives are dedicated to source-water protection. The Partnership has identified endocrine-disrupting compounds (EDCs) as a priority issue. The Partnership is following the latest research into which specific chemicals may be causing the endocrine-disrupting effects on fish in the Potomac River. The short-term goals include defining and prioritizing EDCs based on a review of current knowledge and consultation with experts, assessing potential sources of EDCs in the Potomac River, and identifying appropriate best-management practices for their control. The long-term goal is to enhance local understanding of EDC identity, sources, distribution, possible human and ecological health effects, management practices to limit their presence in the environment, and methods of treatment and removal.

In addition to the Potomac Partnership, Fairfax Water, along with many water utilities across the nation, contributes to and participates in the activities of the American Water Works Association Research Foundation (AwwaRF). AwwaRF is a member-supported non-profit organization that sponsors research to enable water utilities, public health agencies, and other professionals to provide safe and affordable drinking water to consumers. AwwaRF is the research arm of the water-supply community. I serve on the Board of Trustees for the Foundation and my utility, Fairfax Water, is a longtime investor in AwwaRF, as are most of the water agencies in the greater DC area. AwwaRF operates a $30 million-a-year drinking-water research program. To date, AwwaRF has conducted 21 projects totaling about $5 million specifically to study the issue of endocrine disruptors. It is this research that ultimately will help lead us to understand the significance of endocrine disruptors in the aquatic environment.

Finally, Mr. Chairman, I would like to close by noting that AwwaRF is once again seeking funding from the United States Congress. AwwaRF is 80% funded by local drinking-water utilities and research partnerships and 20% through funding assistance from Congress. I want to express my strong support for the $5 million AwwaRF funding request in the EPA Science and Technology account of the FY'07 Interior Appropriations bill.

Thank you. I will be happy to answer your questions.

Testimony of
Andrew D. Brunhart, General Manager
Washington Suburban Sanitary Commission
House Committee on Government Reform
October 4, 2006

Introduction

Chairman Davis, Ranking Member Waxman and Members of the Committee, thank you for inviting me to appear today as we come together to discuss a shared problem worthy of attention. I am Andrew Brunhart, General Manager for the Washington Suburban Sanitary Commission and I am honored to represent our 1,424 employees dedicated to providing safe, clean water to our communities in an environmentally and fiscally responsible manner. That is not just a lofty statement that we bring out at our annual meetings. That is our mission and it drives the work we do day in and day out.

We are here today to talk about a very specific topic: Ova Pollution in the Potomac. But I believe this topic is part of a larger discussion that requires leadership from all levels of government and industry to resolve. What is the value of water in our society and what legacy are we leaving our children in our rivers, streams, bays, and oceans? Being in the business of providing clean, safe water and treating what our communities send down the drains, I think about this question daily. I think about the existing science and technology we currently use to provide a service many in this country take for granted. The 20th Century innovators ensured that most Americans can turn on a tap and receive clean water on demand. This is an achievement we should be proud of and the WSSC has been an integral part of that legacy.

WSSC was founded in 1918 by great pioneers and innovators in the water industry. One of the people who worked on the original surveys that led to the creation of the Commission was the world-renown engineer, Abel Wolman. Wolman is widely known as the father of modern sanitary engineering. Among his many contributions, perhaps most significant was his development of chlorination - which made possible the adoption of simple, effective methods to curb waterborne diseases (typhoid and cholera, most notably). Since that time, WSSC employees have set standards that many around the world aspire to. We are committed to providing the best product possible to our 1.6 million customers throughout Prince George's and Montgomery Counties in Maryland. Throughout our entire history, WSSC has never had a water quality violation. We consistently meet or exceed all drinking water standards and we are very proud of that achievement.

Yet we are not content with our past achievements. The WSSC, working with our peers around the nation and the world, looks toward continuous improvements in science,

technology, investments, research, and business practices to get better at what we do. One example is our commitment to the American Water Works Association Research Foundation (AwwaRF). The WSSC is a founding member of AwwaRF and continues to play a proactive role within this member-supported, international, nonprofit organization that sponsors research to enable water utilities, public health agencies, and other professionals to provide safe and affordable drinking water to consumers. In addition to proactive participation in the AwwaRF decision making and research review processes, the WSSC contributed over $1.5 million to AwwaRF since 1983 to further their research efforts and scientific explanations. (See Attachment A)

That is why, I believe, we are here today. As an industry leader in providing safe, clean water and treating wastewater for our communities, the WSSC is equally as concerned as this Committee and all of your panelists about the reports of male smallmouth bass in the Potomac watershed found to be bearing eggs. This is not a new concern for the WSSC or for me personally. It was about this time last year that the Chair of WSSC and I met with Congressman Van Hollen to discuss EDCs and the potential impact on human health. I would like to take this opportunity on the record to thank Congressman Van Hollen for his steadfast commitment to both the environment and his constituents.

The WSSC did not create this situation, but I assure you, we are as committed as this Committee and every panelist here today to working with all interested stakeholders to resolve it.

EDC Background

As this is not a new concern for the WSSC, I would like to provide some of the facts we have gathered over time. (See Attachment B for details) Emotive speculation makes great headlines, but I believe we must step back and allow the science to drive us forward. While this is a problem that must be recognized and agreed upon as a national priority, the problem definition and eventual solutions must be based in and driven by science.

Recent studies of fish health in several sub-watersheds of the upper Potomac River were initiated by the US Geological Survey (USGS) as a result of lesions, parasites and die-offs, unexpectedly identified reproductive abnormalities (e.g., feminization of male fish or “intersex” condition). USGS researchers concluded that the fish have been affected by some type of environmental contaminant that apparently disrupted or modified the fish endocrine system (i.e., glands and hormones that control growth and development) as well as potentially weakening their immune systems. Similar findings have been reported in other areas of the United States. In fact, USGS conducted similar studies in 139 streams in 30 states and found 80 percent of those streams faced similar problems to those we face in the Potomac Watershed. The potential effects of endocrine disruption are worldwide and the wildlife serves as the sentinels. (SOURCE: Dr. Vicki Blazer, USGS, presentation at DWSP Partnership sponsored Workshop, September 2005.)

State of the Science – Virtually concurrent with the fish studies, USGS released findings of a national reconnaissance of stream water quality, which identified almost ubiquitous presence at very low concentrations (i.e., sub-parts per billion or parts per trillion) of dozens of organic wastewater compounds, including pesticides, industrial and household products chemicals such as plasticizers and flame retardants, detergents, antimicrobials, non-prescription drugs, prescription pharmaceuticals, natural and synthetic hormones and fragrances. A sub-set of these chemicals is known to have endocrine disrupting effects on fish, based on controlled laboratory studies. (SOURCE: Kolpin *et al.* (2002) *Environmental Science & Technology*, vol. 36, no. 6, pp.1202-1211.)

Major advances have been made in analytical detection methods, which allowed the chemicals to be identified in the environment at ultra-low concentrations. This advancement is not in harmony with our scientific understanding of chemicals impacts on human health which causes confusion. Thus, there is a great need for scientific advancing. While occurrence of some chemicals in our streams and observed impacts on fish indicate that we face a significant environmental issue (for fish and wildlife), there is no reliable research that indicates occurrence of similar impacts in the human. Human exposures to chemicals are not similar to fish exposure which live in water for their entire life and are subject to bioaccumulation and bioaugmentation of toxic chemicals. The scientific focus of regulators has been on toxicity of pesticides (e.g., cancer and birth defects); whereas, a new effort is now being given to "sub-chronic" (i.e., low-dose) and non-fatal abnormal effects outcomes such as endocrine disruption. The practice of extrapolating laboratory observations of animal toxicity and adverse effects to human health effects is not yet adequately developed for endocrine disrupting chemicals (EDCs).

The USGS has extended its occurrence studies of micro-contaminants in ground water, sediments and drinking water (intake raw waters). (SOURCE: Dana Kolpin, USGS, presentation at DWSP Partnership sponsored Workshop, September 2005.) Both the Potomac and Patuxent water plant intakes were tested once each in 2002, and traces at the part-per-billion level of herbicides, household products constituents (flame retardant and detergent) and common drugs (e.g., caffeine and a nicotine byproduct) were found. Fewer than 1/3 of the substances detected are suspected fish EDCs. No regulated human health maximum contaminant levels (MCLs) were violated. (SOURCE: Ingrid Verstraeten, USGS in email to Plato Chen, WSSC.) Sources of micro-contaminants appear to include both point sources (e.g., wastewater treatment plant effluent, industrial effluents, and confined animal feeding operations) and non-point sources (e.g., storm water runoff from urban and agricultural land). Meanwhile, the drinking water industry has sponsored more than a dozen studies of EDCs, including their treatability under conventional water treatment processes and by advanced technology processes. (SOURCE: Kim Linton, AwwaRF, presentation at DWSP Partnership sponsored Workshop, September 2005.) Conventional processes such as sedimentation and chlorination (i.e., disinfection) have been proven to remove or degrade many of the trace substances, and advanced oxidation (e.g., ozone), absorption by activated carbon and nano-filtration/reverse-osmosis have been demonstrated to significantly reduce contaminant concentrations in finished drinking water. (SOURCE: Snyder *et al.* (2003) *Environmental Engineering Science*, vol. 20, no. 5, pp. 449-469.)

Challenge for Utilities – The ubiquitous occurrence of ultra-low concentration industrial and pharmaceutical contaminants in surface waters and drinking source waters is a national level concern that cannot be addressed adequately in a piecemeal manner by individual water utilities. In the case of surface water supplies drawn from a large watershed such as the Potomac River, an individual utility does not have jurisdiction over the multiple states and land uses in the headwaters. Accordingly, the research, funding and grants, guidelines and policy must be coordinated and sponsored at the national level. Government agencies can play a direct part in this (e.g., EPA, USGS, USDA, FDA) along with nationally influential independent or trade research agencies (e.g., NRC/NSF, AWWA-RF) and universities. Utilities can contribute limited funding and expertise to these efforts.

Despite the national nature of this challenge, water utilities including WSSC have been proactive. They support and fund advanced research via AwwaRF and are pursuing source water protection. WSSC also uses advanced wastewater treatment in all of its plants. Given the national nature of this concern and its complexity requires leadership and funding from the government and other key stakeholders. In the long run, implementation of pollution prevention and source control best management practices offers the fairest approach to reduce impacts to drinking water supplies. National level partnerships with the chemical, pharmaceutical and agricultural industries may be a starting point.

Realities in Water Utility Industry

Water utilities are often targets when situations like this arise. Although the water WSSC provides to our customers consistently meets or exceeds all standards set for clean drinking water, ours is not always a clean business. We must treat everything that literally goes down the drains. Whether flushing household cleaning products, expired prescription medications, garbage, oils, or a host of other items that common sense tells us should not be in our water, water utilities like the WSSC are expected to treat the wastewater collected by our systems.

While our record is exemplary, we realize we are not perfect. Any endeavor involving human beings will experience mistakes. Yet, we have taken every precaution possible to train our employees; invest in and upgrade our infrastructure; and contribute to ongoing science, research and development for continued improvement in every aspect of our business lines.

The water business is one of gravity. We are continually challenged by what comes down the drains and downstream. Contributing to the treatment challenges are those upstream that send their runoff our way.

Role Government Can Play

Government has and can continue to play a critical role in the legacy we leave our children through a consistent commitment for leadership, focus, and funding. Neither the WSSC nor any other utilities testifying today created this situation and none of us can

solve this problem alone. Congress should play a significant role in addressing the required scientific research, but you should be wary of simply creating additional regulation to patch the problem. I believe EPA possesses the necessary statutory authority and regulations to address this problem. What the EPA has been lacking is consistent funding commitments from Congress.

I would like to offer two suggestions I believe to be constructive and urge this Committee to consider them for possible action.

First, a Watershed Restoration Congressional Caucus should be created at the inception of the 110th Congress to serve as a real working group for all stakeholders. This group should include Members of Congress from across the nation, water utilities and associations, environmental groups, agricultural groups, corporations, developers, pharmaceuticals, EPA, Army Corps of Engineers, USGS, and state governments. Congressional leadership would provide the focus in briefings, legislation development, funding considerations, and education. The goal should be to push the science and research forward to keep us ahead of the curve. It would be a forum where solutions could be approached in a comprehensive, proactive way that would allow for input on Congressional authorizing and appropriating language, as well as regulations and grant programs.

Second, Congress should restore funding to both the EPA's State and Tribal Assistance Grant (STAG) program and previous AwwaRF appropriations. STAG grants have been declining for the past decade. Restored funding is critical to proactively address the science and research requirements to protect our water supply. In addition, AwwaRF has also seen a steady decline in federal commitments to its research efforts, placing heavier burdens on the approximately 900 drinking water utilities and other members that today provide more than 80% of the $30 million annual budget. Congress must reaffirm its commitment to this national research organization as it works to answer our national drinking water and environmental questions. (See Attachments C and D)

Summary

While this issue is of concern for water utilities, it is a major environmental issue worthy of serious national attention. We should ask ourselves the question again: What is the value of water in our society and what legacy are we leaving our children in our rivers, streams, bays, and oceans?

I am fully confident that with continuous funding commitments from Congress and the EPA along with investments made by industry leaders like WSSC, we can push the science to understand this situation better. It is important that we create a forum like a Congressional Caucus where Members of Congress, their staff, and stakeholders can work through issues together as you consider various policy options that have direct and indirect effects on EDCs in our waterways.

At WSSC, we take the concerns of our customers very seriously and we respect their opinions on this issue. Our goal is to provide clean water to our families today while

ensuring our legacy of clean water for our children and their children. Most of us at WSSC are not just employees but customers as well. We drink WSSC water too and we want it to be just as safe for our families as those around us. We look forward to working with this Committee, your colleagues throughout Congress, the EPA, our peers, environmental groups, and other industry stakeholders to continue exceeding safe water standards for our communities and those across America.

Thank you Mr. Chairman and I look forward to answering any questions you or the Committee might have.

ATTACHMENT A

American Water Works Association Research Foundation (AwwaRF)

Background on AwwaRF

The Awwa Research Foundation (AwwaRF) is a member-supported, international, nonprofit organization that sponsors research to enable water utilities, public health agencies, and other professionals to provide safe and affordable drinking water to consumers. Its mission is advancing the science of water to improve the quality of life.

AwwaRF works to achieve the mission in three ways:

- By sponsoring research. AwwaRF sponsors an anticipatory and scientifically credible research program that is responsive to the needs of the water supply community.

- By developing knowledge. AwwaRF identifies the practical benefits of research findings and delivers this knowledge to stakeholders throughout the water supply community.

- By promoting collaboration. AwwaRF cultivates partnerships with organizations around the world to leverage funding and share expertise.

The Foundation was established in 1966 to provide a centralized, practical research program for the drinking water community. Its research program, which is highly respected as being one of the most scientifically credible and best-coordinated in the world, focuses on four main goal areas: high-quality water; efficient and customer-responsive organization; infrastructure reliability; and environmental leadership. Specific research projects focus on treatment, distribution, resources, monitoring and analysis, management, and health effects.

The Foundation is comprised of, and largely funded by, member organizations that voluntarily subscribe in order to support and benefit from the water-related research that the Foundation sponsors. Close to 900 water utilities worldwide currently subscribe to the Foundation. In addition, more than 50 water-related consulting firms and manufacturing companies are subscribers. The majority of our subscribers are in the United States. Others are located in Canada, Australia, and Europe. Our collaborating partners are situated all over the globe.

Since its inception, the Foundation has sponsored more than $370 million in research, represented by more than 600 completed research projects. Subscribers provide more than $10 million annually to fund research. This money is supplemented each year by several million dollars allocated by the U.S. government and is leveraged through collaborative partnerships with other research organizations.

In addition to monetary support, the high level of research activity sponsored by the Foundation would not be possible without the efforts of more than 700 subscriber

volunteers who serve on committees and councils, providing expertise in a variety of research topic areas.

Subscribers steer the Foundation in almost every respect. The Foundation is governed by an elected board of trustees, most of whom are water utility managers. The board also includes representatives appointed by the Association of Metropolitan Water Agencies, the National Association of Water Companies, and the American Water Works Association, as well as three members elected from the Foundation's subscriber base.

The research agenda is developed in consultation with subscribers, drinking water community experts, working professionals, and technical advisory groups. Hundreds of suggestions are examined to identify high-priority projects most crucial to the drinking water community. The final research agenda is then approved by the board of trustees.

Each approved project is assigned an advisory committee of volunteer experts in a specific area of study. The advisory committees evaluate proposals, select contractors, and monitor projects through to completion.

A full-time staff of more than 40 employees serves as the coordinating group for the various research functions. Staff includes professionals with expertise in biological sciences, chemistry, engineering, management, and communications.

Summary of On-going and Completed Research Sponsored by AwwaRF

Completed/Published Projects

1. Endocrine Disruptors and Pharmaceuticals in Drinking Water #2598
Examines potential implications of endocrine disruptors and pharmaceutically active compounds in drinking water and wastewater. Provides an overview of the health effects, occurrence, potential treatment options, and mainly the research agenda for future years. Research partners: WERF and WRF. Published in 2001.

2. Assessment of Waters for Estrogenic Activity #2642
Modifies, validates, and utilizes in vitro screening tests for the presence of estrogenic compounds in water samples. Also performs in vivo tests in combination with in vitro tests to determine the significance of the presence of estrogenic compounds in source waters, finished drinking waters, and effluent streams. Published in 2003.

3. Risk Communication for Emerging Contaminants #2776
Develops, tests, and evaluates proactive strategies and tools for utilities to identify and track emerging drinking water contaminants (e.g., endocrine disruptors, pharmaceuticals, MTBE [methyl tertiary-butyl ether], radon, etc.). Also provides strategies and tools for utilities to proactively and effectively communicate information to the public about the emerging contaminants. Published in 2004.

4. Occurrence Survey of Pharmaceutically Active Compounds #2617
Investigates the occurrence of a limited number of pharmaceutically active compounds in source and treated waters. Uses findings to further define and prioritize future research on

the occurrence, treatment, and potential public health impacts of pharmaceutically active compounds in water. Research partner: WRF. Published in 2005.

On-Going Research

1. Toxicological Relevance of Endocrine Disruptors and Pharmaceuticals in Drinking Water #3085
   Will conduct an extensive literature review on the known toxicity of EDCs and pharmaceuticals including naturally occurring EDCs and pharmaceutically active compounds. Will analyze various raw and finished drinking waters for a suite of EDCs and pharmaceuticals, and will screen various bottled waters, beverages, and food products. Will also use an in vitro bioassay to assess the estrogenicity of various waters, beverages, and foods. Will conduct risk assessments for chemicals of interest based on findings. Tailored Collaboration partner: Southern Nevada Water Authority.

2. Evaluation of Conventional and Advanced Treatment Processes to Remove Endocrine Disruptors and Pharmaceutically Active Compounds #2758
   Will determine removal efficiencies of conventional and advanced treatment processes for compounds classified as endocrine-disrupting chemicals (EDCs) and pharmaceutically active compounds (PhACs). Will ultimately predict contaminant removal a priori by a given treatment process or set of treatment processes.

3. Evaluation of Triclosan Reactivity in Chlorinated and Monochloraminated Waters #2902
   Will study the reaction of triclosan, a commonly used anti-microbial agent in personal care products, with free chlorine and monochloramine. Will characterize the kinetics, mechanism, and products of interactions, evaluate the influence of water quality on the reaction rates, and develop mechanistic models that describe the reactions occurring.

4. Toxicological Relevance of Endocrine Disruptors and Pharmaceuticals in Drinking Water #3085
   Will conduct an extensive literature review on the known toxicity of EDCs and pharmaceuticals including naturally occurring EDCs and pharmaceutically active compounds. Will analyze various raw and finished drinking waters for a suite of EDCs and pharmaceuticals, and will screen various bottled waters, beverages, and food products. Will also use an in vitro bioassay to assess the estrogenicity of various waters, beverages, and foods. Will conduct risk assessments for chemicals of interest based on findings. Tailored Collaboration partner: Southern Nevada Water Authority.

5. Removal and Fate of EDCs and Pharmaceuticals in Bank Filtration Systems #3136
   Project update not available. Partnership with Water Technology Center, funded in 2005, completion date TBD.

6. Pharmaceuticals, Personal Care Products and Endocrine Disruptors--Occurrence, Fate and Transport in the Great Lakes Water Supplies and the Effect of Advanced Treatment Processes on Their Removal #3071
   Will investigate the occurrence and fate of selected EDCs/PPCPs in surface water, and their removal by conventional ozonation and advanced oxidation treatment processes. Will examine the concentrations of target compounds before and after various treatment processes and as a function of pertinent parameters including ozone dose, hydrogen peroxide dose, pH, alkalinity, total organic carbon, turbidity, and temperature. Tailored Collaboration partner: Windsor Utilities Commission.

7. Impact of UV and UV - Advanced Oxidation Processes on Toxicity of Endocrine-Disrupting Compounds in Water #2897
   Will assess, through the use of bioassays and chemical analyses, the degradation, by-product formation, and subsequent toxicity of endocrine-disrupting compounds following UV and UV-oxidation treatment of water.

8. Comprehensive Utility Guide for Endocrine Disruptors and Pharmaceuticals In Drinking Water #3033
   Will synthesize existing knowledge on endocrine disrupting compounds (EDCs), pharmaceutically active compounds (PhACs), and personal care products (PCPs) in drinking water supplies. Will also include what is known about health effects, analysis, occurrence, and behavior in drinking water treatment processes for this broad range of compounds.

9. Pharmaceuticals, Personal Care Products and Endocrine Disruptors--Occurrence, Fate and Transport in the Great Lakes Water Supplies and the Effect of Advanced Treatment Processes on Their Removal #3071
   Will investigate the occurrence and fate of selected EDCs/PPCPs in surface water, and their removal by conventional ozonation and advanced oxidation treatment processes. Will examine the concentrations of target compounds before and after various treatment processes and as a function of pertinent parameters including ozone dose, hydrogen peroxide dose, pH, alkalinity, total organic carbon, turbidity, and temperature. Tailored Collaboration partner: Windsor Utilities Commission.

10. Toxicological Relevance of Endocrine Disruptors and Pharmaceuticals in Drinking Water #3085
    Will conduct an extensive literature review on the known toxicity of EDCs and pharmaceuticals including naturally occurring EDCs and pharmaceutically active compounds. Will analyze various raw and finished drinking waters for a suite of EDCs and pharmaceuticals, and will screen various bottled waters, beverages, and food products. Will also use an in vitro bioassay to assess the estrogenicity of various waters, beverages, and foods. Will conduct risk assessments for chemicals of interest based on findings. Tailored Collaboration partner: Southern Nevada Water Authority.

11. Evaluation of Triclosan Reactivity in Chlorinated and Monochloraminated Waters #2902

Will study the reaction of triclosan, a commonly used anti-microbial agent in personal care products, with free chlorine and monochloramine. Will characterize the kinetics, mechanism, and products of interactions, evaluate the influence of water quality on the reaction rates, and develop mechanistic models that describe the reactions occurring.

12. Evaluation of Conventional and Advanced Treatment Processes to Remove Endocrine Disruptors and Pharmaceutically Active Compounds #2758
Will determine removal efficiencies of conventional and advanced treatment processes for compounds classified as endocrine-disrupting chemicals (EDCs) and pharmaceutically active compounds (PhACs). Will ultimately predict contaminant removal a priori by a given treatment process or set of treatment processes.

ATTACHMENT B

Briefing on Endocrine Disrupting Chemicals (EDCs)
WSSC White Paper

Background and Challenges

1-Background

Development and body functions of many organisms are directed by a regulatory system called the endocrine system. The system includes a center in the brain (hypothalamus) and numerous glands. The glands produce compounds (hormones) at several locations in the body and distribute them via the blood stream as chemical messengers to regulate the actions of tissues located in other parts of the body. The hypothalamus constantly monitors the hormone levels in the blood. If levels of a hormone get too high or too low, the hypothalamus sends signals to the gland that produces this hormone to gear up, slow down, or shut off to keep the 50 trillion cells in our body fully coordinated. Endocrine Disrupting Chemicals (EDCs), mostly man-made, are those which could interfere with this regulatory function because they may either mimic or suppress the action of the body's natural hormones. Because these chemicals are increasingly present in the environment as a result of human activities and they only require tiny amounts to disrupt endocrine functions, EDCs may have major impacts on ecology and perhaps human health.

The U.S. EPA has defined EDCs as "Exogenous chemical substances or mixtures that alters the structure or function(s) of the endocrine system and causes adverse effects at the level of the organism, its progeny, population, or subpopulation of organisms, based on scientific principles, data, weight-of-evidence, and precautionary principle." Pharmaceutically Active Compounds (PhACs) (e.g., prescription drugs) and Personal Care Products (PCPs) (e.g., pain medication) may also impact the endocrine system and are generally considered as EDCs, although sometimes they are considered as separate groups.

The EDCs impact animals and humans mainly by interfering with the functions of this complex control system that operates at the cellular level. As an example, EDCs can damage the glands that produce hormones or may mimic the natural hormones produced by the gland and mislead the target organs to misperform. Some EDCs lodge in hormone receptor cells and block the activity of natural hormones. This can produce "Hormonal Chaos" in the body, with major impacts on an organism's functions.

Examples of EDCs include DDT and alachlor (pesticides/herbicides used in agriculture), metals such as cadmium and lead (used in commercial/industrial applications), plasticizers (used in toys and most plastic products), and polynuclear aromatic hydrocarbons (associated with oil spills and storm runoff). The number of known EDCs is quite limited; however, the potential number of EDCs may be very high as more than 87,000 untested man-made chemicals are currently on the market.

2- EDCs as Another Challenge to Human Health

Bacteria, viruses, mutagenic chemicals, and radiation are well known environmental agents with potential for causing human diseases. A good number of scientists have postulated that EDCs are a new class of environmental agent and could be a cause of major human disabilities and malfunctions. This phenomenon came to light when the intergenerational health effects of the synthetic estrogen diethylstilbestrol (DES), a hormone administered to women for treatment of menopause and prevention of spontaneous abortion, were observed. The use of DES was approved by the Food and Drug Administration in 1941. It was found to cause cancer in experimental animals in 1959. In 1971, an association was found between mothers who took DES and a rare form of vaginal cancer in their daughters. The FDA warned physicians against the use of DES in 1972, thirty-one years after its introduction in the market. As another example, in the 60s, it was learned that wildlife exposure to chlorinated pesticides caused major reduction in their reproductive capabilities. Sex organ changes in fish, such as those observed in the Potomac River, are more recent examples of the impact.

EDCs have two unique features, which distinguish them from other agents. First, they do not appear to exhibit conventional toxicological dose-response characteristics. In contrast to conventional contaminants, they may cause significant problems at very low levels. As an illustration of how low these levels may be the human lifetime exposure to an EDC at 100 parts per trillion via water supply, assuming 70 years of life and drinking two liters of water per day, amounts to only 0.005 gram (less than 1/6 of a drop of water). Second, EDCs are also very powerful during the early stage of life, but their impacts may have a long lag time, which may not be observable in the offspring until, after they reach adulthood.

The biological plausibility of EDC impacts based on observations on wildlife and on test animals in research laboratories appear to be quite strong, but uncertainty exists regarding their health effects in humans. A 2002 study sponsored by the World Health Organization states: “Generally, studies examining EDC-induced effects in humans have yielded inconsistent and inconclusive results, which are responsible for the overall data being classified as “weak”. This classification is not meant to downplay the potential effects of EDCs; rather, it highlights the need for more rigorous studies.”

Another human health issue regarding EDCs is that the mainstream research has focused mainly on the impacts of the EDCs on reproductive functions. However, quite a number of scientists are concerned that the impacts can be much wider and many other bodily functions may be affected. As an example, more than 130 scientists, mostly European, gathered in Prague on May 10-12, 2005 and issued a 38-item declaration on EDCs. Item 6 of the declaration states that “Little or no information is currently available regarding the effects of endocrine disruptors on disease condition outside the reproductive system such as metabolic syndrome, neural development, childhood cancers, cognitive development, immune problems, psychological disorders, learning and memory development, and others. In many cases there are causal links between endocrine disruptors and these diseases and more scientific information is required.”

3- EDCs Challenges for Water Supply

EDCs have been found in both ground and surface waters. In a few cases, they also have been found in finished waters. However, no human heath impacts related to EDCs from water supply have been reported in the mainstream literature. Despite this, the customers perceive the issue as troubling, and their perceptions can become our reality. Furthermore, some scientists believe that conventional methods used for assessing the safe level of EDCs have major shortcomings. The conventional method uses animal testing and mainly assesses the impacts on their reproductive system. The critics believe that the impacts are often not seen in the offspring until after they reach adulthood and not necessarily in the exposed organism, that the impacts are not limited to the reproductive system, and that the method considers EDCs one at a time and, thus, ignores the impacts of a mixture of EDCs. As these issues are debated in the scientific community, the customers may become more concerned and the utilities must be prepared to address their concerns.

Conventional water treatment plants are designed to remove/control contaminants such as particulate matter, disease causing pathogens, and taste and odor generating compounds. Water utilities have done a great job in managing these groups of contaminants and are proud that their achievements have been recognized by the National Academy of Engineering as one of the top 20 engineering achievements of the 20th Century. However, conventional treatment is not very effective in removing chemicals that may have health impacts at very low levels in water (micro- pollutants).

Disinfection by-products (DBPs) are examples of micro-pollutants. They became an issue in the early 1970s when much better measuring methods became available; at the same time, we began to learn that they might cause cancer. Several hundreds of the DBPs have been identified. However, the EPA has been able to regulate only 9 of the DBPs in the past 35 years due to limited occurrence data and scientific knowledge of health effects. Even with the limited number of regulated DBPs, most water utilities will have to go beyond the conventional treatment provided by their plants to meet the upcoming new DBP requirements.

Compared to DBPs, EDCs, including PCPs and PhACs, are much more prevalent and may have health impacts at much lower levels. Regulating these potentially large numbers of micro-pollutants with the conventional approach would take much longer than 35 years and designing water treatment plants to remove them to extremely low levels will be major technical and financial challenges. Despite this, water utilities have to face these challenges and address their customers' concerns. AwwaRF has conducted several studies on the issue, and we can provide further information on them.

4- EDCs Challenges for Wastewater Services

Domestic wastewater also contains several groups of EDCs. Some are natural compounds produced by the human body or consumed with food, and then excreted into wastewater. Others are man-made such as those found in contraception drugs, detergents, and PCPs. Metals such as cadmium and certain polynuclear aromatic hydrocarbons (PAHs) are also

EDCs. Advanced wastewater treatment is quite effective in removing many of these EDCs. However, some will remain in the effluent. This could be primarily a general ecological issue, or it could become a human health issue if the plant effluent is discharged above a water supply intake. Also the removed portion of the EDCs is accumulated in biosolids and could make the land application of biosolids more controversial/problematic. Similar to AwwaRF, the WERF also has conducted several studies on the issue.

5- EDC Related Issues for our Metropolitan Area

As mentioned previously, specific human health effects of EDCs are generally unknown or not established at this time. Furthermore, there is very little monitoring data showing the occurrence (or non-occurrence) of EDCs due to limited capabilities and accepted standardized methods for lab detection at the low levels of potential concern. The primary source of monitoring data that is available at this time is a limited reconnaissance survey conducted by USGS for the metropolitan Washington region (performed in 2002). This survey effort took one sample from select water treatment plant intakes and wastewater treatment plant outfalls and analyzed the samples for a suite of suspected EDCs (including about 230 different hormones, pesticides, industrial chemicals, and PCP compounds). WSSC's Potomac and Patuxent WTPs were included in the survey. The Potomac WFP raw water only had detections of 17 compounds, 6 of which are known or suspected EDCs, and none of them are hormones. The Patuxent WFP raw water only had detections of 11 compounds, 4 of which are known or suspected EDCs, and none of them are hormones. None of these compounds was present in levels exceeding existing MCLs.

We also have data collected as part of the routine regulatory monitoring required under existing Safe Drinking Water Act (SDWA) rules. Of the >100 compounds monitored under the SDWA, only a small number (*i.e.*, those having a Maximum Contaminant Level, or MCL) are potential/suspected EDCs. For those potential/suspected EDCs that have an MCL, an analysis of the SDWA monitoring data since 2000 shows that only two have been detected at levels greater than the MCL in the raw water, and none have ever been detected at levels greater than the MCL in the finished water.

Although there is a paucity of directly relevant information, suspected EDC effects in fish have been reported in some Potomac River sub-watersheds upstream of the metropolitan area and WSSC's Potomac WFP intake. However, this is a national issue related to wide use of chemicals and, thus, is not limited to the Potomac River. The identity of the contaminant(s) that might be responsible for the observed EDC effects are being investigated, and possible sources for the contaminants are also being examined. However, the transport, fate and persistence of potential fish EDC contaminants to downstream Potomac River areas (including drinking water intakes in the metropolitan area) have not been identified or studied. In addition, no correlation has been established between observed wildlife (fish) EDC effects and potential human health effects, or what pharmaceutically active dose would be needed to produce any human health effect.

The suspected EDC effects on fish in the Potomac are based on the following information:

- Fish kills and widespread incidences of fish lesions in the South Branch Potomac River (Hardy County, West Virginia); follow-up studies discovered many reproductive anomalies among smallmouth bass, including egg production and egg-yolk precursor protein in male fish (*i.e.*, feminization).

- Earlier studies had found feminization of male common carp in the Shenandoah River near Millville (Jefferson County), West Virginia.

- Feminized male smallmouth bass were recently reported (December 2004) in the Potomac River near Sharpsburg (Washington County), Maryland, 170 miles downstream of Hardy County, WV. It is currently unknown if the suspected EDC effects are due to contaminants that have flowed downstream from West Virginia, or if a local Maryland source(s) of contamination may be responsible.

    - Recent sampling in the South Branch Potomac River and Cacapon River indicated presence of pesticide, flame retardant, and PCP residues in stream water; several of these compounds were also found in blood plasma collected from intersex fish. Some of the detected compounds are known or suspected as EDCs in fish.

Responses to EDC Challenges at the National Level
and by the WSSC and the Potomac DWSP Partnership

6- The EPA Approach

The EPA received programmatic mandates from Congress in 1996, under the Food Quality Protection Act (FQPA) and Safe Drinking Water Act (SDWA). Under the SDWA, EPA plans to screen down the universe of tens of thousands of potential contaminants to a proposed contaminant candidate list of about a thousand and then, using the expert judgment narrow it down further to about 100 substances. These 100 potential EDCs will be investigated in detail. However, the EPA is just beginning to grapple with the significant challenges of a very complex subject and no quick or simple answer will likely emerge soon. Nine years has gone by and EPA still has not standardized a testing protocol, mainly due to the complex nature of the problem.

7- The Basis of the WSSC Approach

The approach that the WSSC is pursuing is based on several considerations:

a- We believe that the EPA approach, which is based on risk assessment and animal testing, could be very cumbersome and slow. On the other hand, as more facts about EDCs become available, we believe the concerns of our customers will rise and we must respond to their concerns. So far we have received only two inquiries from our customers on how the WSSC is handling the EDCs issue, but this is likely to increase with greater media attention.

b- We recognize that there are uncertainties related to the significance of EDCs in terms of human health risks, especially via the drinking water exposure route. Nevertheless, we may not want to wait for EPA's final determination. This is based on our need to be responsive to our customers, as stated above, and to pursue a Precautionary Principle (PP) framework, which, stated simply, means it is better to be safe than sorry.

c- The PP framework is a well-recognized approach in the health and environmental fields. It was adopted unanimously by the 130 scientists who issued the Prague Declaration. Item 23 of the Declaration states "For the foreseeable future, regulation of endocrine disruptors will have to cope with the tension between the biological plausibility of serious, perhaps irreversible damage and delays in generating data suitable for comprehensive risk assessment. In view of the magnitude of the potential risks, we strongly believe that scientific uncertainty should not delay precautionary action for risk reduction."

d- We desire to pursue the PP framework in a manner that will not cause undue fear in our customers and to assure them that we will be ahead of the knowledge curve by pursuing the PP framework.

e- There is some potential for legal liability. Although, there is a move in Congress to create some liability protection for water utilities for non-regulated contaminants, the liability may remain. The proposed Bill (HR 1540) amends Section 1449 of the SDWA. Some of the amended language seems to be general in nature. The proposed Bill is quite protective for utilities in regard to regulated contaminants. However, its new Section (f) (2) allows suing utilities for unregulated contaminants, although under relatively strict conditions. Despite the strictness, it puts a major responsibility on utilities and makes them vulnerable even when they are in full compliance for all of the regulated contaminants. Passage of such a bill could become another driver to pursue the PP framework.

f- We realize that source control may be the most practical action at this time. The sources of EDCs are often scattered upstream of water intakes and are not controlled by utilities. Thus, we need to partner with others to gain influence and cost effectiveness for management practices. We were able to establish such a partnership, after several years of work, in September 2004 as described below.

8- Formation and Work of the Potomac River DWSP Partnership

About 7 years ago, the WSSC Environmental Group Leader accepted an invitation by the Maryland Department of the Environment (MDE) to serve on a Task Force to develop a Source Water Protection Program for Maryland as required by the EPA. This participation enhanced the trust of MDE in WSSC capabilities. Consequently, MDE gave WSSC a grant of $380,000 to conduct, on behalf of MDE, a Source Water Assessment **(**SWA) for all Maryland water plants that withdraw water from the Potomac River. One of the recommendations of the SWA was to create a regional partnership to protect the Potomac River for water supply needs. We pursued this recommendation and the Potomac River Drinking Water Source Protection (DWSP) Partnership was created in

September 2004. Since then, the Partnership has adopted a Strategy Plan, which includes two priority issues to be pursued, namely pathogens and emerging contaminants. EDCs are the first group of emerging contaminants on the Partnership priority list. Dr. Martin Chandler of the WSSC Environmental Group chairs the EDCs workgroup of the Partnership.

One of the significant efforts of the Partnership was to hold an expert workshop on EDCs to gain a better understanding of this complex issue and to develop a framework for potential actions that the Potomac DWSP Partnership can pursue. Dr. Chandler coordinated the planning for the workshop. We wanted to make the workshop not just a vehicle for knowledge sharing, but also a mechanism to integrate existing expertise in a framework. We issued a Task Order to our Water Research BOA consultant to prepare a draft framework for discussion by a panel of experts, mainly the scientists who gave presentations during the workshop. We guided the consultant with the key elements of the framework. The draft of the framework was discussed in the workshop. In brief, it included three steps: 1- raw water assessment for presence of EDCs and finding/prioritizing the sources of the observed EDCs; 2- identifying the BMPs for controlling their sources; and 3- keeping the customers and stakeholders informed about the findings. However, no consensus was reached on the first two steps.

Subsequently, the representatives of the three large metro DC utilities using the Potomac River followed up the workshop with more deliberation and have reached a preliminary consensus for a revised framework. The consensus includes developing a joint approach for communicating with our customers about EDCs, performing a survey of water utilities nationwide to identify how they are facing the EDC challenges, encouraging AwwaRF to support research for an EDC monitoring/management strategy for utilities, and pursuing legislation to protect utilities from liability for non-regulated contaminants.

There is one specific BMP that WSSC may want to consider because it is within our ability to implement. Given that EDCs major impacts seem to occur during pregnancy, use of highly purified bottled water for sensitive populations may be one of the BMPs. It may be beneficial to sensitive customers. It also could provide utilities with some degree of legal protection against liability related to non-regulated contaminants. However, it can be perceived that the water we supply to our general customers is not safe.

9- The Next Step

Our next step, after the adoption of the framework by the Partnership, is to obtain funding to pursue the framework. We will consider shared funding by the members of the Partnership as well as grant funding. We also will consider pursuing the framework via the Tailored Collaboration Program of AWWARF.

WSSC Acknowledgements: Environmental Group staff, including Dr. Martin Chandler, Plato Chen, Bob Buglass and Dr. Jin Shin, provided support for and reviewed this briefing. Their contributions are acknowledged and greatly appreciated. M. T. Habibian 10/13/05

ATTACHMENT C

WSSC Letter to Senator Mikulski for STAG and AwwaRF funding FY07

ATTACHMENT D

History of EPA and STAG funding from the Congressional Research Service

ATTACHMENT E

PowerPoint Presentation on “Intersex Fish and EDC Issues” by WSSC to the Montgomery County Council T&E Committee, September 2006.

Statement of Mark Myers

Director
U.S. Geological Survey
Department of the Interior

Before the

House Committee on Government Reform

Oversight Hearing on "Ova-Pollution in the Potomac: Egg-Bearing Male Bass and Implications for Human and Ecological Health"

October 4, 2006

Introduction

Thank you Mr. Chairman for the opportunity to present testimony on the Department of the Interior's (Department) science regarding intersexual characteristics of fish in the Potomac River. My name is Mark Myers, and I am the Director of the U.S. Geological Survey (USGS).

The USGS is a federal science agency within the Department that conducts research to understand the interrelationships among earth surface processes, ecological and biological systems, and human activities. The USGS does not conduct this science alone. We partner with other federal and state agencies, tribal governments, and non-governmental organizations, including human health agencies or academics, when a comprehensive human health assessment is required.

The USGS has collected data on endocrine disruption in fish and measured concentrations of endocrine disruptor chemicals in many rivers throughout the United States. For 12 years, the USGS has engaged in research activities concerning fish health assessments in the Potomac and Shenandoah Rivers. Fish that possess intersexual characteristics are not limited to the Chesapeake Bay Watershed. The USGS has found such fish in the Mississippi River, the Rio Grande and Colorado Rivers, the Columbia River, the Missouri River, the Las Vegas Wash and many other locations throughout the country.

My testimony today will cover the following:

- The fish health problem in the Chesapeake Bay and other rivers in the Nation;

- The role of USGS and our partners investigating the concerns;
- Current research into the potential causes of intersexual characteristics and endocrine disruption; and
- The role of our sister agency at the Department, the U.S. Fish and Wildlife Service, on this issue.

I will conclude my testimony with a brief discussion of the additional information that is needed to help managers develop solutions for this problem.

Identification of the Issue

In recent years, there have been a number of fish-health problems within the Chesapeake Bay and its watershed that are associated with changing water quality and habitat conditions. One of our major findings is the presence of intersexual characteristics in smallmouth and largemouth bass in the Potomac River.

The term "intersex" or intersexual characteristics describes a range of abnormalities in which both male and female characteristics are present within the same fish. Intersexual characteristics are most commonly described as the presence of female germ cells, which are the precursor to mature eggs, within a male reproductive organ and/or malformed reproductive ducts.

The occurrence of intersex fish has been related to chemicals, often termed endocrine disruptors, that affect the reproductive system. Endocrine disruptors are chemicals that interfere with the natural balance of hormones that regulate development, reproduction, metabolism, behavior, and the internal state of living organisms. Occasionally these abnormalities can be noted externally but most often the main reproductive organs must be examined under a microscope for diagnosis of intersexual characteristics. The presence of this abnormality or intersexual characteristic has been used as an indicator of exposure to estrogenic chemicals and has been documented in a variety of wild fish species in a number of rivers and estuaries around the Nation (*e.g.*, Florida, Colorado, California), as well as other countries, including the United Kingdom, the Seine-Maritime Bay (France), the Mediterranean Sea, and China.

Role of the U.S. Geological Survey

The USGS provides science to help understand the environment, including the factors affecting fish health. The information is used by the U.S. Fish and Wildlife Service (Service), whose role with regard to this issue is

discussed in more detail below; the U.S. Environmental Protection Agency (EPA); and other state and federal partners to better manage and restore fish, wildlife, and their habitats and to protect human health. The risk to humans from fish with intersexual characteristics is currently unknown.

The specific fish-health investigations in the Potomac Watershed that led to the discovery of intersexual characteristics in fish were conducted as part of the USGS efforts on the Chesapeake Bay Watershed. USGS programs and partners, including the Service, the Virginia Departments of Game and Inland Fisheries and Environmental Quality, the Maryland Department of Natural Resources, and the West Virginia Division of Natural Resources (WV DNR), have contributed to this work on fish health issues in the Chesapeake Bay drainage.

Recent Assessments of the Chesapeake Bay Watershed

In 2003 and 2004, in response to fish kills and increased observations of external sores and wounds on smallmouth bass and other species, WV DNR and USGS initiated fish-health assessments at selected sites in the South Branch of the Potomac River. Samples were collected, and pieces of all tissues, including reproductive organs, were removed for evaluation. During this time period, 16 out of 24 sampling events showed more than 25 percent of the male bass possessing intersexual characteristics. Sampling also indicated seasonal differences in the ratio of male bass possessing intersexual characters. Fish sampled in the spring months had a 25-40 percent higher occurrence of intersexual characteristics than those sampled during the summer months.

In 2005, through collaboration among USGS, the Service, the Virginia Departments of Game and Inland Fisheries and Environmental Quality, the Maryland Department of Natural Resources, and the WV DNR, sampling was expanded to additional sites in the Shenandoah and Potomac watersheds for determination of the extent of the intersex problem. During the late summer/early fall of 2005, samples were collected at sites farther downstream in the Potomac, specifically to look at areas associated with intersexual characteristics. These included wastewater treatment outflows; major fish kill sites; and other drainage sites for use as possible background sites. A map of sampling sites is shown in Figure 1.

These preliminary findings suggest that intersexual characteristics in fish are widespread throughout the Potomac and Shenandoah Rivers, but are at a much lower incidence in other sampled rivers in West Virginia.

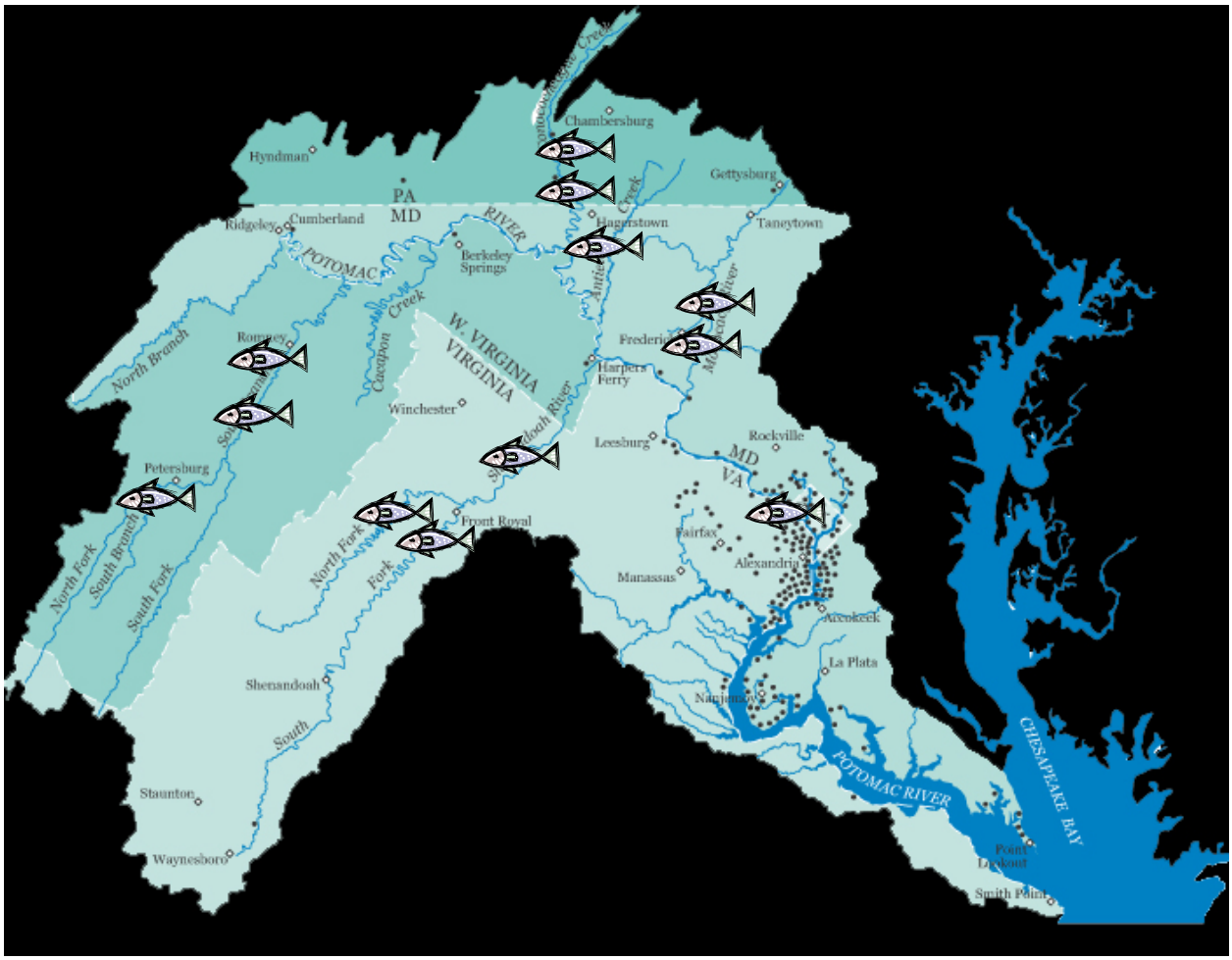

Figure 1. Map of sampling sites for largemouth and smallmouth bass within the Potomac River Watershed. Fish symbols indicate sites at were fish were collected for determination of intersexual characteristics.

Potential Causes

Potential causes of intersexual characteristics in fish include chemical contamination and changes in the temperature regime or habitat. Current research on intersexual characteristics has related numerous chemicals to reproductive effects in fish. These chemicals, often termed "endocrine disruptors," include previously banned chemicals, such as DDT and chlordane, natural and anthropogenic hormones, herbicides, fungicides, industrial chemicals, and an emerging group of chemicals including personal care products and pharmaceuticals that may act as endocrine disruptors in fish as well as other organisms. Potential sources of these endocrine disruptors include agricultural, as well as individual use of herbicides and pesticides, human waste (discharges from wastewater treatment facilities

and individual home septic systems), animal wastes that may reach the aquatic environment through runoff, leachates from landfills, and even atmospheric deposition.

Laboratory studies have indicated that the chronic effects of exposure to low levels of these chemicals can result in negative reproductive effects on zebrafish and fathead minnows. In addition, laboratory studies of fathead minnows, medaka, rainbow trout, common carp and zebrafish have shown other negative effects on reproductive activity by endocrine disruptors. Some results indicate that exposure to environmental contaminants may be affecting both growth and reproductive physiology of individual white sturgeon in the Columbia River. However, we have not been able to conclude from field studies, like the Potomac River study, that endocrine disrupting chemicals have impacts on wild fish populations. In addition, the interactive effects of multiple endocrine disruptors on aquatic organisms are unknown.

A limited amount of information is available on the distribution of these endocrine disruptors in the Chesapeake Bay and its major river basins. During 1992-1996, the USGS conducted extensive sampling of the Potomac and the Susquehanna River Basins. Chlordane, DDT, and PCBs were detected in streambed sediment and aquatic tissues in the Potomac Basin. Sediment from over one half of the sites contained concentrations of these chemicals that posed an intermediate probability of having adverse effects on aquatic life.

In 1999 and 2000, the USGS undertook a nationwide study to provide information on the occurrence of a larger group of chemicals and endocrine disruptors that may be entering the Nation's streams through wastewater. The USGS sampled streams at 139 sites across the Nation, including one site in the Potomac River basin. The samples were analyzed for 95 different emerging contaminants including human and veterinary drugs, hormones, detergents, disinfectants, insecticides, and fire retardants. At least one of these chemicals was found in 80 percent of the streams, with mixtures of the chemicals occurring at 75 percent of the sites. Most common groups detected were steroids, nonprescription drugs and insect repellent. Only 14 of these chemicals have human health advisory criteria and measured levels rarely exceeded any of the standards or criteria. However, little is known about the majority of the chemicals found in the samples or the effects of these chemicals when they are mixed together.

The USGS has also been active in developing methods to measure hormonally active or endocrine disrupting chemicals in water sediment and tissue, as well as in developing integrative samplers such as Semi-

Permeable Membrane Devices (SPMDs) and Polar Organic Chemical Integrative Samplers (POCIS). These new methods are used to assess the environmental occurrence of these chemicals. The USGS has published a significant number of journal articles on the environmental occurrence of endocrine disruptors that provide useful information to researchers in determining the concentrations and mixtures of these chemicals for laboratory studies.

Although the effects of endocrine disruptors can be replicated in the laboratory under controlled conditions using synthetic hormones or other chemicals, it has not been possible to demonstrate a cause of the intersexual characteristics in the field. Laboratory studies that discern the causative mechanisms for endocrine disruption are also underway at several USGS Science Centers. USGS is developing new molecular and other techniques to determine the causative agents of multiple stressor situations.

Research by other scientists around the world has shown that endocrine disrupting chemicals in aquatic environments affect various fauna, from mussels to fish to birds. Some of the aspects of this issue are being addressed by the European Commission and the U.S. Food and Drug Administration to determine the potential risks of human and veterinary drugs on the environment.

Additional Information is Needed

There is a need to further document the extent of intersexual characteristics within the Chesapeake Bay and other watersheds. Identifying the chemicals that are impacting the fish, and their sources, fate, and transport will help managers develop solutions for the problem. The USGS is currently conducting a study to address some aspects of the issue in the Shenandoah Valley of the Potomac River Basin. What is learned there may be applied and expanded to other areas and other watersheds.

To help coordinate federal research activities related to endocrine disruption in the environment, the USGS is leading the planning effort for an interagency workshop in February 2007 at the USGS Headquarters in Reston, Virginia. This workshop is being organized under the Office of Science and Technology Policy and the Council on the Environment and Natural Resources. Eight federal agencies will be participating in this workshop. The major goals are to review the current knowledge about endocrine disruption in the environment, what type of research and studies each agency is currently doing and planning in this area, and most importantly, to develop specific opportunities for collaboration between agencies. The workshop will involve a variety of federal scientists and

managers in every aspect of endocrine disruption, including developing methods to detect Endrocine Disrupting Chemicals (EDC) in the environment; basic research on how they affect fish and wildlife; developing methods for monitoring and identifying sources; and different ways the discharge of EDCs can be minimized or removed from the environment.

Given our current scientific understanding of intersex in fish, the areas in which USGS science can make a valuable contribution include determining:

- What effects these endocrine disruptors have on the ability of fish to reproduce, thrive and sustain populations in the wild;
- What aquatic organisms are being affected (e.g., are only benthic feeders or fish that lay eggs in the sediment affected or are other aquatic organisms at risk), and the implications for the aquatic ecosystem;
- What chemicals and other stressors are implicated in these effects;
- How to improve our ability to predict causes of endocrine disruption in the field;
- The consequences of these effects at the population and ecosystem levels; and
- Potential causes of intersexual characteristics in fish, including chemical contamination, and changes in the temperature regime or habitat.

Role of the U.S. Fish and Wildlife Service

At the request of the Committee, this testimony also provides information developed by the Service concerning the work it is carrying out regarding this issue.

The Service's Environmental Contaminants Program is responsible for protecting the nation's fish and wildlife from environmental contaminants through scientific study, mitigation, education and habitat cleanup. The Service has been involved with studying contaminant effects on fish and wildlife since its earliest days, but the Environmental Contaminants Program (Program) really began to take form in the 1950s, when increasing awareness of pollution problems spurred the American public to demand action.

The Service's Program includes contaminants specialists stationed at more than 75 locations around the country. Service contaminants specialists specialize in detecting toxic chemicals; addressing their effects; preventing harm to fish, wildlife and their habitats; and removing toxic chemicals and restoring habitat when prevention isn't possible. They are experts on oil and chemical spills, pesticides, water quality, hazardous materials disposal and other aspects of pollution biology. The Program's operations are integrated

into all other Service activities and the Service's contaminants specialists often work in partnership with other agencies and organizations which have come to rely on our expertise.

In 1991, the Program began investigating the potential reproductive effects of endocrine disrupting contaminants on wildlife with studies on the endangered Florida panther, polar bears and their prey. To date, the Program has funded and participated in more than 23 studies that specifically looked at the effects of endocrine disrupting contaminants on wildlife across the country. Many of these studies have been directly associated with endangered species recovery actions or threats to the recovery of listed species. These studies typically included management recommendations for the removal of threats from contaminants or other corrective actions to alleviate the impacts of endocrine disrupting contaminants on wildlife.

Some examples of the geographic and taxonomic extent of the studies include: river otters (Oregon); fish, alligators, and panthers (Florida); fish and barn swallows (lower Mississippi River –Louisiana); fish and reptiles (Arizona); fish and wildlife (Nevada); polar bears and eiders (Alaska); sturgeon (middle Mississippi River - Illinois, Missouri, Iowa); mussels and paddlefish (Ohio); common loons (Maine); terns and cormorants (New York); cormorants (Michigan); fish (Delaware, Maryland, Virginia); and amphibians (Texas). All of these investigations involved wildlife and habitat sampling to determine how the wildlife were being exposed to the disruptors and provided suggested management actions to alleviate impacts of endocrine disrupting contaminants on wildlife.

Recently, the Program initiated a campaign with the American Pharmacists Association (APhA) and a myriad of other partners including pharmaceutical manufacturers, the Food and Drug Administration, DEA, Environmental Protection Agency, American Veterinary Association, AMA, PhRMA, Water Environment Federation, U.S. Geological Survey, US Pharmacopeia, Pfizer, Walgreens, AstraZeneca, and the Association of Fish and Wildlife Agencies to develop recommendations and outreach strategies regarding the disposal of unused and unwanted pharmaceuticals. One of the objectives of this campaign is to raise public awareness about disposal options for prescription drugs as a means to minimize the introduction of chemicals into the environment.

Service Involvement on the Potomac River Intersex Study of Bass

As discussed above, the Service’s Chesapeake Bay Field Office Contaminants Program participated in a study to assess endocrine disruption in bass at five

locations in the Potomac River Watershed. In coordination with the states of Virginia and Maryland, and including the USGS, the Service selected two sites each on Conococheague Creek and the Monocacy River, Maryland and one on the Potomac River near the Blue Plains wastewater treatment plant, Washington, DC. In 2005, the Service collected data to determine if:

- Sewage treatment plants were releasing detectable concentrations of endocrine disrupting compounds into these water bodies;
- Male bass exposed to endocrine disrupting compounds had altered concentrations of vitellogenin, the protein precursor for egg production; and
- Male bass exposed to endocrine disrupting compounds are exhibiting intersex characteristics.

Today, the Service is working with the USGS to determine if intersex, altered vitellogenin concentrations, or altered hormone ratios can be induced in caged hatchery raised bass deployed in Monocacy River and Conococheague Creek compared to a control group of bass at the National Fish Health Research Laboratory in Kearneysville, West Virginia**.**

Final chemical analyses and field and laboratory data have not been completed. However, preliminary results indicate that between 80 to 100 percent of the male bass collected in the Mononcacy River and Conococheqgue Creek exhibited intersexual characteristics. More field collections were completed in mid-June 2006 and all samples are currently being analyzed at the laboratory. A final report is expected by Spring 2007.

In sum, Interior bureaus have been carrying out and will continue field collections in the Potomac River watershed. One of our major findings is the presence of intersexual characteristics in smallmouth and largemouth bass in the Potomac River. We do not know the full extent of this phenomenon throughout the entire watershed, as studies to date have been relatively small scale, have involved a single species, and were located near obvious potential sources of endocrine disrupting chemicals. In future years, comprehensive watershed evaluation may be necessary. There is more work to be done, but we are eager to continue our collaborative efforts with federal, state, and private partners to finds ways to better understand the impacts of endocrine disrupting chemicals on the Nation's fish and wildlife resources.

Thank you, Mr. Chairman, for the opportunity to present this testimony. I will be pleased to answer questions you and other Members of the Committee might have.

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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
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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.

INTERSTATE COMMISSION ON THE POTOMAC RIVER BASIN

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Testimony of the

Interstate Commission
on the
Potomac River Basin

Presented by
Joseph K. Hoffman
Executive Director

Hearing:
Ova-Pollution in the Potomac: Egg-Bearing Male Bass and Implications for Human and Ecological Health

October 4, 2006

House Committee on Government Reform

The Honorable Tom Davis
Chairman

The ICPRB is an interstate compact commission established by Congress in 1940. Its mission is the enhancement, protection, and conservation of the water resources of the Potomac River and its tributaries through regional and interstate cooperation. Represented by appointed commissioners, the ICPRB includes the District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia, and the federal government.

INTRODUCTION

Mr. Chairman, I appreciate the opportunity to testify before your Committee today as part of its investigation of recently reported abnormalities in fish in the Potomac watershed and its examination of the steps that governments are taking to ensure effective protection of human and ecological health.

I will focus my comments on four (4) areas:

1. The roles of the organization that I represent, the Interstate Commission on the Potomac River Basin (**ICPRB**), which is one of a number of river basin-focused organizations created by various states and Congress with water resources management functions;
2. The Potomac Drinking Water Source Protection Partnership;
3. A regional coordination role where agencies have banded together with a single coordinator to address the legacy of Polychlorinated Biphenyls (PCB's) in the Potomac River; and
4. A brief discussion of emerging contaminants and their impacts in the Basin.

ROLE OF ICPRB

The ICPRB is an interstate agency created, with the Potomac Valley Conservancy District, by an interstate compact ratified by Congress in 1940. Membership is comprised of five signatories (the commonwealths of Pennsylvania and Virginia, the states of Maryland and West Virginia, and the District of Columbia), with the federal government as a participant through the Presidential appointment of three (3) United States Commissioners. It was formed to address water resources issues in the 14,700-square-mile drainage area that forms the Potomac River watershed. It is a non-regulatory body that addresses water quality and water quantity issues from a watershed perspective. Its major functions are to provide the sound science needed by its member jurisdictions for water resources decision-making in the basin, to provide leadership for cooperative efforts of our member jurisdictions relating to the water resources of the basin, and to facilitate opportunities and forums to address significant water issues.

Our Commissioners, appointed by the member jurisdictions, represent a wide range of basin interests. Through the ICPRB, the Commissioners seek *"to enhance, protect, and conserve the water and associated land resources of the Potomac River and its tributaries through regional and interstate cooperation"* as their fundamental mission. The ICPRB has been doing this in a variety of ways through many collaborative efforts with our member jurisdictions and with other partners both in and outside the Potomac basin.

As examples of these efforts, three (3) activities are noteworthy. First, ICPRB's Section for Cooperative Water Supply Operations on the Potomac (CO-OP) manages the distribution of stored water during times of drought for the Washington Metropolitan Area under the authority of the Water Supply Coordination Agreement adopted by the regional water suppliers, the District of Columbia and the ICPRB. Many members of your Committee, and others throughout the region, may know about our role in effective management of water supply withdrawals while meeting environmental flow objectives, which I will be happy to detail for members outside of this presentation.

Second, ICPRB is directly acting to develop a coordinated action plan to reduce impairments from the residual impacts of PCBs in the Potomac River and in several tributary areas. I will briefly discuss the ICPRB role later.

Third, and most directly related to the issue before this Committee is the ICPRB role in coordinating and administering the organization known as the Potomac Drinking Water Source Protection (DWSP) Partnership. In examining these efforts, I will now focus on this Partnership.

POTOMAC DRINKING WATER SOURCE PROTECTION PARTNERSHIP

The DWSP Partnership, begun in 2004, is a voluntary organization of drinking water suppliers and government agencies working to protect drinking water sources, thereby safeguarding both public health and the environment. Through work groups and active discussion at partnership meetings, the DWSP Partnership is pursuing a strategy for enhancing source water protection as recommended by source water assessments that were prepared throughout the Potomac basin. Nineteen government agencies and drinking water utilities from throughout the Potomac basin have formally joined the growing DWSP Partnership. Added participants, including citizens and more local governments, are expected to become active in future months and years.

The Potomac River Basin is home to over 5.8-million people who rely on the basin's rivers and ground water for drinking water supply. Activities upstream of water supply intakes or in ground-water recharge areas can introduce contaminants to water sources for these inhabitants of the basin. The Partnership was formed, in part, so government agencies and water utilities could cooperatively address drinking water quality concerns arising in thesesource water areas. By relying not only on treatment plants, but also on multiple barriers to contamination created by watershed protection efforts, the Partnership seeks to enhance drinking source water quality and minimize risks to public health. The Partnership has identified several issues of importance and has formed separate workgroups to focus on:

- Emerging contaminants,
- Pathogens,
- Disinfectant byproduct precursors,
- Urban issues,
- Agricultural issues, and
- Development of an early warning and emergency response system.

Each of the workgroups has identified objectives, activities, and milestones for its focus topic.

The role of the Emerging Contaminants Workgroup is to support the DWSP Partnership by tracking and reporting on findings of research and monitoring of persistent and newly identified threats posed to the Potomac River drinking water supply. An initial focus of the workgroup is on endocrine disrupting chemicals (EDCs). The workgroup's short-term goals include defining and prioritizing EDCs based on a review of current knowledge and consultation with experts, assessing potential sources for the priority EDCs in the Potomac River, and identifying appropriate best management practices for their control. The workgroup's long-term goal is to enhance, through monitoring of ongoing research by others, the Partnership's and local stakeholders' understanding of EDCs identity, sources, distribution, possible human and

ecological health effects, treatability, and management practices to limit their proliferation in the environment. The DWSP Partnership conducted a workshop on Emerging Contaminants and Water Supply on September 19, 2005.

The Pathogens Workgroup was established to provide the Partnership with information on pathogens that may affect the raw water supplied by the Potomac River and its tributaries. The workgroup will seek to understand the sources of pathogens in the Potomac watershed and methods for controlling their introduction into the water supply. It also will try to create alliances with other stakeholders in developing a plan to reduce pathogen loads in the river. In addition, the DWSP Partnership organized a Pathogens Workshop on June 28, 2005, which focused primarily on Cryptosporidium, to learn more about pathogen sources and begin discussion on a strategy to reduce pathogen loads.

The Early Warning and Emergency Response Workgroup is intended to better prepare the Partnership's member utilities to respond in the event of a spill or other incident that affects their water supplies. ICPRB has had a spill model for parts of the basin for over a decade. This is being upgraded and exercised to make users more familiar with its capabilities. The workgroup will evaluate the need for further modifications and enhancements and help to coordinate the development of needed components of such a system. It will also assist in the development of an emergency response plan to improve communication among all affected utilities in the event of a water supply emergency.

The Disinfectant By-Product (DBP) workgroup was created to develop better information for Partnership utilities to address the disinfection by-product--chemicals and contaminants that result from current technology disinfection treatment techniques employed in the water supply industry. It will focus on prioritizing and conducting research to assess the relative contribution of different watershed sources of natural organic matter/DBP precursors to treated/distributed water DBP levels. The ultimate goal of this workgroup is to focus source water protection efforts on those sources most significant to DBP levels in treated/distributed water and to identify the most feasible and cost effective source water protection measures to address regional utility DBP issues.

The Urban Issues Workgroup will work to position the Partnership to better communicate drinking water needs in the Potomac River Basin to the agencies that oversee implementation of urban stormwater management programs. This workgroup is focused on urban stormwater including urban runoff, combined sewer overflows, and sanitary sewer overflows associated with storm activity. The goal of this workgroup is to promote implementation of better stormwater management to protect drinking water in the Potomac. The initial steps include gathering information on urban land use trends and on current stormwater management practices throughout the basin. After this process has been completed, priority communities will be identified and a dialogue started with those communities. This workgroup will develop a list of recommended urban stormwater practices to be used for advocacy throughout the watershed.

This discussion of the several work groups is provided to illustrate that a coordinated effort is seen as a viable method to address the current issues and conditions this Committee is considering today. The Partnership process, coordinated by ICPRB, allows a more thorough

understanding of potential contaminant sources, prioritizes protection areas, and plans watershed protection activities that are most likely to impact drinking water quality.

These watershed protection activities are in their initial phases of development and work will be implemented as funding becomes available. Funding the Partnership through a variety of arrangements is continuously being pursued and is essential to a basin-wide coordinated approach to:

- Identify the causes and the contaminants of concern,
- Prioritize needs based on impacts to human health and ecological considerations, and
- Implement change.

PCB REGIONAL INITIATIVE

In another area, ICPRB technical and coordinating capabilities are being used for a regional initiative. The District of Columbia, Maryland, and Virginia have placed portions of the tidal Potomac on their 303(d) impaired waters lists for PCB contamination and all three jurisdictions are required by the Clean Water Act to determine a TMDL (Total Maximum Daily Load) that will remove the impairment. Because it would be confusing to the public if separate TMDLs with potentially conflicting findings and recommendations were produced for this shared water body, the jurisdictions agreed that all would benefit if data collection and model development were coordinated and a single TMDL analysis done. The Interstate Commission on the Potomac River Basin was asked to take on that role. We have responsibility for determining where the PCBs are coming from and, in 2007, will be conducting the TMDL analysis. We carry out this responsibility in consultation with a Steering Committee, which includes participants from the involved jurisdictions and the U. S. Environmental Protection Agency, through which we share information and decision making at each step in the process so that each jurisdiction and the EPA is comfortable with and can take "ownership" of the final product: ***One TMDL for an interstate water body.***

EMERGING CONTAMINANTS ISSUES IN THE POTOMAC BASIN

Emerging contaminants include endocrine disrupting chemicals contained in pharmaceuticals, agricultural and industrial chemicals, personal care products, pesticides, and fire retardants that have been discovered in surface and/or ground water. Reportedly more than 10,000 compounds are potentially of concern.

The potential sources of Emerging Contaminants (not definitively determined to date) include:

* Pharmaceuticals
    - Pass through into wastewater plants, may not be fully removed
    - Rapidly growing use of many pharmaceuticals by humans and in animals
* Agriculture operations
    - Growth hormones in various poultry and livestock
    - Pesticides and herbicides (no-till operations)
* Various personal care products (e.g., anti-bacterial soaps)
* Reliance on pesticides
* Fire retardants and other industrial chemicals

There are several important impact issues in the Potomac River Basin relating to these contaminants:

* Drinking Water Supply - Anecdotal information suggests that contaminants exist at some small level; however, these contaminants are not routinely monitored. The contaminants are not on the list for which Maximum Contaminant Levels (MCLs) are established. To date, these contaminants have not become regulated under the federal drinking water program. The Potomac River basin includes multiple users of the water as it is withdrawn at the many drinking water intakes, used through domestic systems, and then returned to the river or a tributary after treatment.

Groundwater sources need to be considered in future actions, as about 1.2 million people in the Potomac Basin depend on over 110 million gallons per day of groundwater as their source of supply either through individual domestic wells or through public systems. Both methods normally use lesser treatment technology than do surface-supplied utilities.

As an aside, ICPRB is grateful to Congress for providing funds for the Commission to work with the U. S. Geological Survey on a basin-wide groundwater assessment. This partnership has resulted in the installation of real-time monitoring wells to aid in drought monitoring and has allowed the development of tools to assist local governments in assessing the impacts of growth on local groundwater supplies.

Expanded monitoring is essential to understanding and determining the impact of these contaminants on the drinking water supply and its human consumers.

* Fish Resources - The intersex fish issue has emerged as a public concern and fish showing evidence of this problem have been seen in several areas of the basin. Testing and evaluation continues, primarily through the U. S. Geological Survey. At the state level, Virginia's departments of Environmental Quality and Game and Inland Fisheries, and West Virginia's Division of Natural Resources and Department of Environmental Protection are actively investigating with some coordination between the groups as resources allow. Although not directly attributed to this problem as a cause or an effect, there have been fish kills and fish with lesions in several areas of Potomac River Basin, including the South Branch of the Potomac, the Shenandoah River, and even the tidal estuary south of Washington (and in drainage areas outside the Potomac basin). There are many potential stress factors that could contribute to the intersex problem, and it is likely that more than one factor is involved. Further research and funding are essential to understand the role of emerging contaminants in this process. Collectively, the fish with intersex characteristics have not yet been seen as a reason for a fish consumption advisory to be issued (advisories do exist in the Potomac for mercury and PCBs).

* Wastewater - The broad category of emerging contaminants is not regulated through effluent criteria prescribed for wastewater plant discharges. Methods of testing and detection limits for emerging contaminants are not standard nor routinely sampled. The level of emerging contaminant removal is not well-documented, and thus it is likely that some contaminants remain after treatment. The advanced wastewater treatment used in many facilities in the basin focuses on bacteria, disinfection, and nutrient removal. The Blue Plains wastewater plant that handles over 300 million gallons of wastewater per day has no drinking water withdrawals below its

discharge.

* Bio-amplification - We do not have information that tells us if or how these substances accumulate in human or fish tissue. There is uncertainty and many unknowns about the movement of these contaminants in food chain, retention factors, etc. More answers are needed.

Agencies, entities, and organizations addressing the issues surrounding emerging contaminants:

* U. S. Geological Survey - Especially fish intersex, kills, lesions, and related issues; some water supply topics are addressed with ongoing programs.

* U. S. Environmental Protection Agency - Principally in drinking water program (source water protection); active in Potomac.

* ICPRB - Potomac Drinking Water Source Protection Partnership (DWSP). Includes EPA, USGS, states, water utilities, county governments, regional agencies (Metropolitan Washington Council of Governments, etc.)

* American Water Works Association Research Foundation - Approximately $5 million in about 20 projects. (Funding limitations constrain the timing and amount of work that can be accomplished).

* States - Water supply agencies, environmental agencies, fisheries agencies. At this time all levels of government have various fiscal restrains, so resource availability for funding and coordinating programs is not clear.

* Water suppliers - Multiple barrier approach to protecting/using water sources. Limited availability/implementation of newer treatment methods (i.e., granular activated carbon filtration) are used in few facilities in the Basin. Until we obtain a more complete knowledge of the needs and levels of concerns, more research is necessary. Potomac DWSP Partnership is one available action group.

ICPRB can play a vital role in addressing the issues involved in emerging contaminants, including:

* Regional coordination of efforts of interstate, interagency, and stakeholders (including federal partners)
* Data/technology development and exchange
* Potentially hosting a regional conference
* ICPRB Leadership can:
    - Coordinate the development of a unified science plan - the who, what, where, when and how. This could be done via the discussed workshop.

    - Build Consensus in the critical early-steps research components, without which we could end up with expensive answers to the wrong questions.

    - Plan potential unified management steps for the time when information content reaches appropriate juncture.

- Devise a regional plan for management and communications.

All of these steps and actions involve both state and federal agencies and stakeholders. In addition to the USGS, we need to have the EPA, USDA, and FDA involved from the start. Unfortunately, while we recognize the importance of emerging contaminants in the context of water resources, ICPRB has not been able to allocate more than a nominal amount of its budget to address this issue. While we recognize that this is not an appropriations hearing, as an agency, ICPRB had, until 1995, a direct federal appropriation that would have allowed us to commence action much more rapidly under circumstances such as this. Today, while we have a proficient and able staff, they are funded largely by specific grants or projects secured from a variety of sources, with limited flexibility for diversion to this work.

CONCLUSION

As I conclude, let me present a summary of lessons learned in the Potomac River Basin with respect to water resources management that may prove valuable to coordinate solutions to the issues being discussed today:

- We have found through the Potomac Basin CO-OP water supply program that significant financial resources were saved by governmental jurisdictions and a wide range of interests operating as a ***regional system***. Interstate agencies such as the ICPRB can play a significant role in the coordination necessary to such a system and the management of its resources. Innovative, regional, cooperative planning, rather than completely independent operations, has proven beneficial and effective over the last 66 years since ICPRB was formed.

- The Interstate Commission on the Potomac River Basin is recognized regionally and internationally as a good model for managing water resources on a watershed basis because of its ability to manage across political boundaries, achieve economy by acting as a clearinghouse for data exchange, and address conflicting objectives water quality, quantity, and resources.

- Cooperation, coordination, and communication among impacted agencies and organizations is essential to effectively address the health and maintenance of the Potomac River Basin's ecological balance.

- Local and regional action is essential, but we all know that water is not governed by state and municipal boundaries. The DWSP Partnership, under the ICPRB umbrella, is an excellent example of a structure that allows multiple jurisdictions and partners to work together. Congress and our signatories understood in 1940 what they do now: Interstate action is required to eliminate the political impediments that may impact the health and welfare of the Potomac River Basin.

- Federal agencies and the Congress have both a major leading and a supporting role to play, especially in research and in funding national efforts to protect our drinking water sources.

- The Potomac models are successful because:
    * The cooperating utilities need an interstate cooperative approach in order to be successful,
    * The states and federal agencies fund the programs to achieve a high degree of scientific excellence and cooperation, and
    * Parties have all given, and continue to give, their cooperation for the common good.

As Executive Director of the Interstate Commission on the Potomac River Basin, I appreciate the opportunity to have participated today in helping you to understand the active role we take in addressing the health and welfare of the Potomac watershed. Thank you, Mr. Chairman.

TESTIMONY OF
BENJAMIN H. GRUMBLES
ASSISTANT ADMINISTRATOR FOR WATER
ENVIRONMENTAL PROTECTION AGENCY
BEFORE THE
COMMITTEE ON GOVERNMENT REFORM
UNITED STATES HOUSE OF REPRESENTATIVES

October 4, 2006

Good afternoon and thank you for this opportunity to appear before this Committee. I am Benjamin H. Grumbles, Assistant Administrator for Water at the United States Environmental Protection Agency (EPA). I welcome the opportunity to describe EPA's actions to protect our Nation's watersheds and drinking water supplies against chemicals in our waterways, especially those that may affect the endocrine (or hormone) system. This issue was raised recently in connection with the Potomac River and needs to be considered in the context of our mission of protecting water quality, human and aquatic health, and assuring safe drinking water.

We work within a national framework of protecting human health and the environment, and aquatic research, using technology and implementing regulations on a watershed basis -- all driven by a strong emphasis on sound science, transparency, public information, and partnerships. This framework reflects requirements established by Congress under the Clean Water Act (CWA), the Safe Drinking Water Act (SDWA), the Food Quality Protection Act (FQPA), the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), and the Toxic Substances Control Act (TSCA).

Our mission is to better understand the physiological effects of exposure to water-related contaminants in terms of metabolic pathways, modes of action, and dose response relationships. How do these contaminants work in the body, and what concentrations may cause an effect? For example, the function of the endocrine system and its operation with regard to the production, release, transport, or elimination of natural hormones in the body is essential research – particularly with regard to the maintenance of normal cell metabolism, reproduction, development, and/or behavior.

When we look at contaminants in water, including chemicals that may affect the endocrine system, we begin by relating what is identified at different locations, concentrations, frequency, time and duration, and then pose the question what human or aquatic life "critical endpoint" may be affected. Critical endpoints that we routinely evaluate include general toxicity (illness and mortality), neurological impacts, immunological effects, as well as reproductive and developmental impacts.

My testimony focuses on three areas – (1) the statutory framework for regulatory and stewardship action; (2) research to increase our understanding of the scope of the problem; and, (3) identify needed solutions.

STATUTORY AND REGULATORY FRAMEWORK

Clean Water Act: Section 304(a)(1) of CWA requires EPA to develop water quality criteria reflecting the latest scientific knowledge related to the kind and extent of effects on human health and aquatic life from the presence of pollutants in our nation's waters. To date, EPA has developed 120 recommended human health criteria and 45 recommended aquatic life criteria for specific chemicals or classes of chemicals. These national recommended water quality criteria (i.e., numeric pollutant concentrations or narrative guidance), serve as the basis for States and Tribes to adopt water quality standards. These standards are used to assess water quality, provide a baseline for non-point source control strategies, and develop discharge limits in CWA permits for industrial and municipal dischargers and municipal wastewater treatment facilities nationally. EPA recently issued two of these chemical criteria that are directly linked to reproductive and developmental impacts – nonylphenols and tributyltins.

When we develop recommended human health and aquatic life criteria, we focus on the most sensitive endpoint, which may be reproductive and developmental effects or others such as immune effects or cancer. It is important to note that if a contaminant has several critical endpoints, protecting for the most sensitive endpoint (which may be something

other than reproductive effects) will also be protective for reproductive and developmental impacts.

Technologies installed to address one class or group of contaminants may also be effective at removing or controlling other contaminants. For example, public water systems that use powdered carbon, ozone, UV, or chlorine to address other treatment needs, may also be removing some level of contaminants with reproductive or developmental effects. The level of removal depends on the technology and the specific contaminant in question. This is an area that EPA continues to examine and research.

Human Health Criteria

In determining human health criteria, EPA evaluates contaminants based on pollutant concentration, potential exposure, and associated human health effects, such as reproductive and developmental endpoints and the relationship among these factors. In addition, EPA evaluates potential exposure routes such as direct ingestion of drinking water and fish/shellfish consumption. To identify chemicals for which EPA will develop recommended human health criteria, EPA works with a broad range of stakeholders to select chemicals with potential health effects that also may occur in water at high concentrations and frequencies, and set priorities for developing national criteria. As new science and data become available, EPA also periodically reviews existing recommended water quality criteria to determine whether any revisions are needed.

Aquatic Life Criteria

In developing recommended aquatic life criteria, EPA uses toxicity data on growth, reproduction, and mortality endpoints found in the literature as well as solicited from the public. The Agency's 1985 Aquatic Life Criteria Guidelines call for a minimum data set comprised of eight different species from eight different families to represent the diversity of organisms, community structures, and populations found in U.S. waters. We consider acute and chronic toxicity data for the most sensitive life stage (e.g., egg, larval, adult), as well as bioconcentration and bioaccumulation studies. The methodology helps assure that the recommended criteria concentration will be protective of aquatic life and

that a scientifically sound process is in place for adjusting the criteria should there be concerns the criteria are over- or under-protective. The method ensures that chemicals causing adverse reproductive effects – regardless of the cause -- have criteria protective of these endpoints.

To better inform our criteria development efforts, we are working nationally to improve understanding of the prevalence in our waters of pharmaceuticals, which include endocrine disrupting chemicals as a subset. We are conducting a pilot study to investigate the occurrence and concentrations of about 40 pharmaceuticals and personal care product in fish tissue. EPA anticipates completing fish sampling and tissue analysis by mid-2007 and producing a report by the end of 2007. This effort is being supplemented by EPA's Great Lakes National Program Office, in partnership with a number of other Federal and local agencies. They are studying the North Shore Channel of the Chicago River to determine if there is reproductive impairment to resident fish and to estimate effluent and stream concentrations of certain chemicals that could cause such impairment.

Safe Drinking Water Act: Using Clean Water Act tools such as water quality criteria and effluent guidelines, EPA and its partners significantly reduce the levels of chemicals entering drinking water plants. Where surface water is used as a public water supply, an additional multi-barrier system of public health protection measures apply to assure that our cities, towns, and communities have clean and safe water to drink. Under the Safe Drinking Water Act and EPA's national drinking water program, the Agency has issued over 200 Public Health Advisories (13 associated with reproductive and developmental endpoints) and established over 85 Maximum Contaminant Level Goals (MCLGs) to date (11 associated with reproductive and developmental endpoints). MCLGs are used in conjunction with information on validated analytical methods, available treatment technologies, and associated costs and benefits to develop enforceable Maximum Contaminant Levels (MCL) or "standards" that apply to approximately 54,000 community water systems that serve over 270 million people across the nation.

In determining whether a contaminant should be regulated, the SDWA directs the Administrator to consider 1) whether a contaminant may have an adverse effect on human health, 2) whether it occurs, or there is a substantial likelihood that it will occur, in public water systems at frequencies and levels of public health concern, and 3) whether regulation of the contaminant presents a meaningful opportunity for health risk reduction for people served by public water systems. To help answer each of these questions, EPA's Office of Research and Development has major national programs devoted to human health effects research, better understanding of exposure issues, analytical methods development, and treatment effectiveness research. EPA's Office of Water has a program to collect monitoring data on unregulated contaminants from a subset of water systems throughout the country.

Applying this research and data to support EPA's ongoing public health protection rulemaking process is important. But equally important is to assure that existing drinking water standards are updated to reflect new science, and that we are looking ahead to identify new contaminants of concern. There are two mechanisms EPA relies upon to keep existing standards up to date, and to identify future contaminants that may warrant more in depth research and possible drinking water regulation.

The first mechanism is the Six Year Review process. Section 1412(b)(9) of SDWA requires that the Agency review existing national primary drinking water regulations every six years and, where appropriate, revise them to reflect new research and information. As a result of EPA's first review of 69 drinking water standards in 2003, we nominated several presently regulated compounds for new health risk assessments due, in part, to new information on reproductive/developmental impacts. We continue to review more recent science and research to identify any new information on reproductive and developmental impacts that may inform our next six year review and regulatory update process.

Looking to the future, EPA also conducts a Contaminant Candidate Listing (CCL) process on a five year cycle to evaluate unregulated drinking water contaminants.

Section 1412(b)(1) of SDWA requires EPA to publish a list of unregulated contaminants that are known or anticipated to occur in public water systems and may require control through national primary drinking water regulation. We have published two CCLs to date and are implementing recommendations made by the National Academy of Sciences and the National Drinking Water Advisory Council to develop a third CCL list. EPA will be sure to include in this evaluation contaminants associated with reproductive and developmental effects.

FIFRA/TSCA: In addition to programs that manage/regulate releases and uses of existing chemicals (chemicals that are being produced today and have been produced and used for many years), EPA also has a robust review process for new chemicals under both the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) and the Toxic Substances Control Act (TSCA). EPA reviews new chemicals and pesticides before they are put on the market and takes appropriate regulatory action to reduce risks or prevent releases in those cases where these new chemicals or pesticides are found to pose unacceptable risks. These review processes are designed to identify problem chemicals and pesticides before widespread production and use and to prevent their introduction into the environment in those cases where risks cannot be effectively mitigated through use restrictions. In both of these programs, EPA's review process includes an evaluation of the likelihood of these new compounds causing reproductive impacts to humans and to fish and wildlife. In this way, EPA is actively working to ensure that new chemicals and new pesticides will not present unacceptable reproductive risks to people or fish and wildlife.

FIFRA/FQPA: The Food Quality Protection Act directed the Agency to develop a screening program, using appropriate validated test systems and other scientifically relevant information, to determine whether pesticides and other chemical substances may have an effect on humans that is similar to an effect produced by naturally occurring estrogen or such other endocrine effect as determined by the Administrator. This was a very tall order, especially considering that when FQPA passed there were no validated test systems available – that is, tests that the scientific community considers reliable and

reproducible for screening endocrine disruptors. To help in this major efort, EPA convened independent panels of experts and other stakeholders, including the Endocrine Disruptor Screening and Testing Advisory Committee (EDSTAC), to examine available tests to determine which ones could be used to set up a reliable screening program. Based on this input, the Agency developed a program that includes a two-tiered system. The first tier will include relatively inexpensive short-term assays designed to identify substances that potentially interact with estrogen, androgen, and/or thyroid systems, followed, if appropriate, by second tier confirmatory testing to determine the effects caused and at what dose level they occur. EPA is working to ensure that the *in vitro* and *in vivo* protocols that comprise the two tiers are optimized and validated so that the information they provide will allow identification of problem substances, and that the assays provide the same results when different laboratories perform them.

A major challenge we are addressing is the apparent need for several different assays to screen for endocrine disrupting effects, as no single assay would cover all hormonal effects of concern. Females and males, for example, have different hormone systems and one assay would not cover both. In addition, a substance could cause hormonal effects by several different mechanisms. No single test is comprehensive enough to provide definitive results in all cases. Therefore, it takes several tests to demonstrate that a substance is not likely to cause harm. We are confident the preparatory work underway at EPA will result in an endocrine disruptor screening program based on sound science and will be reliable and defensible.

EPA continues to use its best efforts to complete validation of these endocrine assays as expeditiously as possible without sacrificing essential scientific quality and integrity. EPA is working closely with the Interagency Coordinating Committee on the Validation of Alternative Methods and the Organization for Economic Cooperation and Development to optimize and validate various endocrine effects test methods to promote international acceptance of these methods.

In the meantime, the Agency is working through existing programs to reduce the risk of exposure to pesticide chemicals that could pose reproductive or developmental risks. Office of Pesticide Programs routinely requires pesticide companies to test food use pesticides to determine if they can cause adverse developmental and reproductive effects. They also evaluate pesticides for a range of potential effects on aquatic life. Tests routinely required include full life cycle studies for fish, early life cycle studies for invertebrates, and developmental and reproductive and developmental toxicity studies for a variety of aquatic organisms. In addition, environmental fate data are required to help determine the likelihood of pesticides moving offsite. All of these data are considered in developing pesticide labels that limit the use of pesticides to reduce their introduction into waterways. In addition, the Agency is required by statute to periodically re-examine its previous safety findings to reflect new data.

RESEARCH

We need the best science available to inform our policies and regulations at the federal and state levels. Research supported by EPA's Office of Research and Development (ORD) is improving our ability to test for endocrine disruptors and increasing our understanding of possible exposure routes and effects these chemicals may have on humans and wildlife. ORD is pursing a research strategy with three goals: to support the Agency's screening and testing program; to continue providing the underlying science on the effects, exposure, and risk management of endocrine disruptors; and to determine the impact of endocrine disruptors on humans, wildlife and the environment.

To support the Agency's screening and testing needs, ORD is developing screening and testing protocols that OPPTS is having validated to use in implementing the Endocrine Disruptor Screening Program mandated by the Food Quality Protection Act.

ORD is also focusing research on improving our understanding of the underlying science for developing methods, models and measures to help OPPTS, OW and other parts of the Agency integrate data on endocrine disruptors into their risk assessments. This research has focused on:

- identifying chemicals and classes of chemicals that are endocrine disruptors and their modes of action;
- developing methods to evaluate the effects of mixtures of chemicals that interfere with the endocrine system by common and different mechanisms of toxic effects;
- characterizing the shape of the dose-response curves; and
- developing approaches to extrapolate results across species.

Equally important for determining the impact of endocrine disruptors is applying the methods and models ORD and others are developing to assess real-world scenarios. This work includes identifying potential sources of endocrine disruptors in the environment with a focus on wastewater treatment plants, concentrated animal feeding operations, drinking water plants, and biosolids

To ensure we have the best current science on endocrine disruptors, ORD is coordinating research both domestically and internationally. Domestically, EPA is working with other federal agencies through an interagency working group on endocrine disruptors, including jointly sponsoring research with the National Institute of Environmental Health Sciences, the National Cancer Institute, and the National Institute for Occupational Safety and Health to support epidemiological studies investigating reproductive and developmental effects of endocrine disruptors. Internationally, ORD led the working group that prepared the 2002 World Health Organization report on 'Global Assessment of the State of the Science of Endocrine Disruptors; co-sponsors workshops with the European Union and Japan; and serves with other countries on committees under the auspices of the Organization for Economic Cooperation and Development to harmonize testing protocol development.

ACTIONS IN THE POTOMAC WATERSHED

In response to recent fish kills and reports of intersex fish, EPA Region III is working to better understand the source of the problem. For example, the region has arranged for ORD to examine the possible stressors in the Potomac watersheds and whether there is any link to intersex characteristics in fish, with initial findings available in January 2007.

Additionally, EPA's Wheeling, West Virginia Field Office took water samples from the South Branch Potomac watershed to determine potential contaminants using whole effluent toxicity tests. More broadly, EPA III, in partnership with the Maryland Department of the Environment, the Virginia Departments of Health and Environmental Quality, the West Virginia Department of Health and Human Resources, and water utility partners in the Potomac Basin created the Potomac River Source Water Protection Partnership (Potomac River Basin Drinking Water Source Partnership). The Partnership's goal is to use the results of source water assessments to guide the development of strategies to prevent pollution from entering the Potomac River which could threaten drinking water quality. Endocrine disruptors and pharmaceuticals are a priority area for the partnership. The partnership is working together to share data as it is developed on these recent discoveries. But the causes are still unknown.

CONCLUSION

In conclusion, Mr. Chairman, EPA has a strong and responsive statutory and regulatory framework to understand, manage and reduce hazards – including reproductive and developmental effects -- posed by chemicals in our waters. We have a targeted research program to develop new assays to test for and improve our understanding of hazards posed by chemicals. And we are responding to emerging contaminants and hazards, such as those that prompted this hearing, within this framework. However, these issues are not easy ones and often require considerably more information than is available, as well as additional analysis as the reports from the Potomac highlight.

Our goal and commitment is to bring good science, transparency, and strong partnerships to bear to find needed answers and solutions to ensure we continue to meet EPA's central goal of protecting water quality, human and aquatic health, and assuring safe drinking water. I will be happy to answer any questions.

TESTIMONY OF
THOMAS P. JACOBUS
GENERAL MANAGER
WASHINGTON AQUEDUCT
BEFORE THE
COMMITTEE ON GOVERNMENT REFORM
UNITED STATES HOUSE OF REPRESENTATIVES

October 4, 2006

Congressman Davis and members of the Committee, thank you for the opportunity to be here today.

I am Tom Jacobus, General Manager of Washington Aqueduct. Washington Aqueduct operates two water treatment plants and other facilities that provide water to its wholesale customers. These customers are the District of Columbia, Arlington County, and the City of Falls Church. Falls Church further serves an area of Fairfax County and the Town of Vienna. Washington Aqueduct is owned and operated by the US Army Corps of Engineers.

This federal ownership and operation of the water treatment facilities stems from the beginning of the water system for the District of Columbia in 1852. The US Army Corps of Engineers built and operated the system, and in the intervening years has continued to expand and modernize the treatment plants to meet increasing demand and to improve the quality of the drinking water.

Washington Aqueduct receives no direct federal funding. All funds for operations, maintenance, and capital improvements come from its wholesale customers.

All of the water treated at the Dalecarlia and McMillan plants is withdrawn from the Potomac River either at Great Falls or at Little Falls. The treatment processes are regulated by Region 3 of the US Environmental Protection Agency (EPA). The water production operations at Washington Aqueduct are in compliance with all environmental requirements, including those of the Safe Drinking Water Act.

Throughout the production process, samples are collected and analyzed for bacteria and organic and inorganic substances. Once delivered to the distribution system, the water undergoes additional sampling and analysis. Each year, Washington Aqueduct's EPA-certified water quality laboratory analyzes more than 65,000 samples of the source water and the finished water to determine its quality. All of this is done to ensure the safety of the water provided to our customers.

Washington Aqueduct's principal focus is on producing safe drinking water. To ensure that we will continue to provide drinking water that meets future regulations, we participate in EPA's ongoing evaluation of unregulated drinking water contaminants. Also, we are an active participant with both regional and national groups whose purpose is to advance the science of water. We contribute to the work of the American Water Works Association Research Foundation by direct funding and by participating in

research projects. Our engineers and scientists prepare technical papers and attend conferences to ensure we are current with industry technology and regulatory developments. Additionally we have contractual relationships with nationally renowned consultants in the field of water treatment. We use those consultants to help us evaluate options for future treatment.

We are certainly aware of the reports of fishermen and scientists in the Potomac River basin finding sexually abnormal male smallmouth bass. We are also aware that this phenomenon is observed not only in the Potomac River, but also elsewhere both nationally and internationally.

Our engineers and scientists have been keeping abreast of the research into endocrine disrupting chemicals. We believe that our participation with research and water industry groups and our collaboration with EPA in support of their Contaminant Candidate Listing are very effective ways to be involved with this issue.

We will continue our involvement in research of emerging contaminants and will be prepared to take necessary steps to modify the treatment process to comply with any regulations that come from the results of the ongoing scientific investigations.

I'd like to comment on one other activity in which we are involved. Chemicals can get into the source water, in our case the Potomac River, in a number of ways. If

we can prevent the chemicals from entering the river, then they pose no risk to the drinking water production process.

In April 2004, in conjunction with other water utilities in Maryland, Virginia and with EPA Region 3 and the US Geological Survey along with agencies from Pennsylvania, Maryland, Virginia, West Virginia and the District of Columbia, we formed a Potomac River Basin Drinking Water Source Protection Partnership. Two of the goals of the Partnership are to maintain a coordinated dialogue between water suppliers and government agencies involved with source water protection and to coordinate approaches to water supply protection measures in the Potomac River basin.

In September 2005, the Partnership held a workshop to educate water suppliers and government agencies on emerging contaminants in the Potomac River basin. Included on the agenda were endocrine disrupting chemicals. The Partnership is currently working with the American Water Works Association Research Foundation to address more research on endocrine disrupting chemicals in the Potomac River.

Thank you for the opportunity to be here today to offer these remarks. I am looking forward to answering any questions the Committee may have.