

Congressional Testimony
House Subcommittee on Insular Affairs, Oceans and Wildlife
Oversight Hearing on Endocrine Disruptors in Fish and Wildlife

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I would like to thank Chairwoman Bordallo and the members of the committee for the opportunity to testify today. I am one of New Jersey's Commissioners to the Atlantic States Marine Fisheries Commission and am the Legislative Chairman for the Jersey Coast Anglers Association and the New Jersey State Federation of Sportsmen's Clubs. I am the longest serving member on the Policy Board of the Barnegat Bay Estuary Program, a board member of the New Jersey Environmental Federation, a member of the Government Affairs Committee of the American Sportfishing Association, and serve in various capacities in other environmental and trade organizations. I am an unpaid volunteer in all of these capacities.

I am here today to discuss an issue that I have been concerned about since I first became involved in fisheries management. As a disabled Vietnam veteran who was sprayed with Agent Orange and who has worked with Agent Orange Vets, I am particularly sensitive to the unintended negative impact chemicals can have on us. This is an issue Congressman Pallone and I have discussed endlessly. We began by working to stop the dumping of Agent Orange contaminated dredge spoils from Newark Bay in the Atlantic Ocean. Because of these experiences, I am always aware of other contaminants that affect the food chain, particularly in our water system. I recently wrote an article titled "The Consequences of Good Intentions." Most of the chemicals we deal with today were not deliberately placed in the system with a negative result intended. PCB's were designed so transformers would not overheat. Asbestos was used as insulation and as a fire preventative. Many of the cleaning fluids and drugs were intended to enhance our lives and our health. However, we are finding more and more that there are long term negative consequences to the inadvertent release of these chemicals into the environment. I knew the impact of Agent Orange on veterans, their children and the wildlife in Vietnam.

In the early '90's I attended a conference in Baltimore as the Chairman of the Habitat Committee for the Atlantic States Marine Fisheries Commission. At this conference, Dr. Judith Weiss from Rutgers University presented her research on killies (mummy chubs), a form of bait fish. She was comparing the behavior of killies from Newark Bay and Tuckerton. She was looking at eating, predatory and other behavior in these different chemical environments. She found that killies in Newark Bay where there are significant

chemical pollutants (PCBs, mercury, dioxin and estrogen) behaved differently. These killies did not catch prey as well, ate food that was not in their normal diet, and did not thrive. This was not true of the killies in Tuckerton where the chemical pollutants were far less significant. More recently Dr. Weiss presented four more papers from her Ph.D. graduate students on similar studies on grass shrimp, blue fish, fiddler crabs and blue claw crabs. In all studies they cited similar behavior patterns. When they transferred fish from cleaner areas (Tuckerton) to more polluted areas (Newark Bay), the fish soon developed the same inappropriate behaviors. The fish transferred to cleaner waters improved slightly but never returned to normal. The damage had been done. After Dr. Weiss' first presentation, I soon became aware of research on Native American Tribes who ate a significant amount of fish that were contaminated with PCBs. This study noted a statistically high number of female births and statistically high number of children with learning disabilities. Why PCBs? We know that PCB's are an estrogen mimicker. When I began seeing the studies on sewer plants and how endocrine disruptors were impacting on the sexual development of fish, the red flags went up! I began to search for the current research on this topic. There is an amazing amount of research available world wide. What is more amazing, with this abundance of research, is how little the public knows about this problem.

I am here today to talk specifically about the impact of endocrine disruptors on fish stocks and on the development of fisheries management plans. At the Atlantic States Marine Fisheries Commission I work with fisheries management plans. Some of those plans are jointly managed with the Mid-Atlantic Fisheries Management Council. One of the requirements of the Magnuson Stevens Act is to develop plans to rebuild fisheries stocks. In order to manage fisheries you need accurate stock assessment and projections. This is not like counting deer in a forest. Fish swim. They migrate throughout the ocean. So scientists take the available data and build stock assessments and develop projections using various models. These models are based on assumptions about fish stocks, their reproduction, natural mortality and fishing pressure. Models need to determine natural mortality and the fecundity of the fish. Natural mortality includes all the environmental conditions; prey predator relationships, available habitat, climate, and other variables. Whenever there are issues that are not included in the models, there is a disconnect between the data and the actual conditions in which fish live.

I have been involved with some of these stocks for at least 20 years. In the last 30 years there are two species that have changed fisheries management and the Atlantic States Marine Fisheries Commission, striped bass and weakfish. For both of these species, management plans relied on restricting commercial and recreational fishing to increase the spawning stock and thereby allowing for an increased harvest as the stocks rebuilt. Using this type of management, we dramatically increased the stock of striped bass. In the mid 90's we saw the same positive impact on the weakfish stocks. Councils and Commissions only manage the human harvesters. We have no authority to regulate the environment or the consequences of human activity on the environment. This was evident when weakfish stocks stopped rebuilding and began to decline. The fishermen were reporting this dramatic decline

but it took some years before the stock assessment scientists recognized the same problems in their models. The models were not behaving the way they were planned to. The weakfish stock should be growing by leaps and bounds. Instead the stocks are decreasing dramatically. It was clear that fishing pressure was not the cause. The scientists began to use the phrase “hidden background natural mortality.” Where is this “hidden mortality” coming from?

Is this mortality caused by the impact of chemicals in the environment on reproduction? When we look carefully we find the greatest problem with “hidden mortality” is with estuarine dependent fish, fish that live and reproduce in the bays, estuaries and rivers. Something is impacting the stock growth and it is clearly not the human harvesters. For example, we have greatly restricted the catch of summer flounder since 1994. This is a fish that spawns in the ocean but spends the first year of life in the bays and estuaries. We have increased the spawning stock biomass and the current plan has allowed more summer flounder to have a greater age class distribution. We now have a huge amount of large female summer flounder that should be able to produce a massive amount of eggs but the recruitment (the number of new fish produced each year) is actually lower than it was in 1994. In 1994 we had 20% of the spawning stock biomass and few fish over 18 inches. Winter flounder is another example. They spawn in the bays, spend the first year there and then migrate to the ocean. The inshore stocks of winter flounder have collapsed. Usually when a stock collapses, we lose them at the fringe of their ideal habitat. New Jersey and New York are at the southern fringe of their habitat. We should be at the lowest levels of available harvest. Yet just the opposite is true. When you look at the recreational catch, New Jersey has the largest catch. Why is that true? The only difference I can see is that along the NJ coast we don't pump our treated sewage into rivers and bays. Treated sewage is piped directly to the ocean. Is it possible the impact of sewage that is untreated for endocrine disruptors and other chemicals is playing a major role in reproduction of winter flounder?

There are studies that confirm the impact of endocrine disruptors on fish. I am going to summarize information from many studies but will make the original documents available to you on disc. One study comes from the Boulder Creek in Colorado. This study looked at the impact on white suckers by sewer discharges. The study finds, “The fish sampling results on Boulder Creek were also disturbing. Just below the sewage plant outflow pipe, the team collected 101 females, 12 males and 10 intersex fish. Upstream of the sewage plant outflow, the team found 42 females, 37 males and zero intersex fish.” (Mutant Fish Prompt Concern - Study Focuses on Sewage Plants by Theo Stein and Miles Moffeit, Denver Post Staff Writers). The difference is dramatic. Above the sewer plant there is a normal male/female distribution. Below the plant, the male/female relationship is bizarre and you begin to see hermaphrodites.

If we look at the Potomac River, we find another disturbing study. In this study the subject was small mouth bass in the West Virginia area of the Potomac River ('Human

Activity' Blamed for Fish Ills, By David A. Fahrenthold, Washington Post Staff Writer, Friday, February 8, 2008). Again, what was found was a disturbing impact on the ratio of male/female fish and many males attempting to lay eggs. They had both male and female sex organs. In the 2003 study they studied the upper reaches of the Potomac River. In the more recent study, they find the same problems as far as the Chesapeake Bay.

New York Sea Grant has been studying winter flounder in Jamaica Bay, an area that received sewage from both Brooklyn and Queens, population more than 6,000,000. Again, what we are seeing is a disruption in the male/female relationship (13:1, 12:1, 11:1). This study was completed by Dr. Anne McElroy from Stony Brook University and Dr. Martin Schreiber from Brooklyn College – CUNY. They reported also that the males had female genes. Using sophisticated data gathering they reported high levels of “natural estrogens, estradiol and estrone” and “estrogenic detergent breakdown products, nonylphenol and its 1,2, and 3 ethoxylate metabolites (collectively termed NPEOs) were thousands to tens of thousand times higher, ranging from 100 to 600 parts per billion ($\mu\text{g/L}$).” They further concluded, “Young flounder throughout Jamaica Bay showed biochemical signs of exposure to estrogenic compounds in their environment. High levels of vitellogenin were observed and the young winter flounder also showed signs of female reproductive tissues within the testes of male fish. Altered sex ratios were observed in Jamaica Bay winter flounder with many more females caught than males as compared to the reference site, Shinnecock Bay, NY. Preliminary evidence also indicated that healthy winter flounder embryos exposed to sediment from Jamaica Bay showed delayed development and reduced hatching success. Winter flounder exposed to sediments dosed with nonylphenol showed some of the same responses seen in fish collected from Jamaica Bay, indicating that this estrogenic contaminant could be responsible for the effects observed.” (R/CTP-28 Endocrine Disruption in Jamaica Bay: Are Winter Flounder Being Affected? May 2007)

I sit on the Policy and Advisory committee of the Barnegat Bay Estuary Program. Since Ocean Country pumps its sewer water directly to the ocean we are not recharging the ground water and pumping the aquifer dry. Twelve years ago we thought we should be using that waste water for recharging and irrigation. Again our good intentions would have had a serious negative consequence. According to a study (Presence and Distribution of Wastewater-Derived Pharmaceuticals in Soil Irrigated With Reclaimed Water). “Three sites in the Front Range of Colorado, USA, were monitored from May through September 2003 to assess the presence and distribution of pharmaceuticals in soil irrigated with reclaimed water derived from urban wastewater...Nevertheless, the present study demonstrates that reclaimed-water irrigation results in soil pharmaceutical concentrations that vary through the irrigation season and that some compounds persist for months after irrigation.” There are many places using the reclaimed water and that is something that should be seriously reviewed. Every time it rains the golf courses that use reclaimed water are washing pharmaceuticals into the nearest rivers, bays and estuaries.

Changing the sex of fish has been used by the aquaculture industry for some time.

They add hormones at specific points in development to create the stock they want. On the disc I have included studies on oysters including a Canadian study on fathead minnows that found that you can manipulate the sex of fish by adding certain endocrine disruptors. A scientific paper (**Complete sex reversal of fish is accomplished routinely in aquaculture practices by exposing fish to exogenous sex steroids during gonadal differentiation**) states that “A variety of environmental chemicals are also active at sex steroid receptors and theoretically possess the potential to alter normal sexual differentiation in fish... These results clearly indicate that a weakly estrogenic pesticide, o,p'-DDT, when presented during the critical period of gonadal development, can profoundly alter sexual differentiation.” A study on oysters showed similar results (Nice, HE, D Morritt, M Crane and M Thorndyke. 2003. **Long-term and transgenerational effects of nonylphenol exposure at a key stage in the development of *Crassostrea gigas*. Possible endocrine disruption?** Marine Ecology Progress Series 256:293-300). “In experiments exposing larval oysters to a single dose of nonylphenol at levels commonly found in the environment, a team of English scientists finds that **nonylphenol can alter the sex ratio of oysters, cause some to become hermaphroditic, and dramatically impair survivorship of offspring...** They conclude that these effects are extremely deleterious to the survival of oysters and "may result in severe consequences, not only for natural populations but also for commercial hatcheries situated in areas where nonylphenol is present in the water.”

All you need to do is google endocrine disruptors in fish and you will find research papers and studies from around the world; Australia, European Union, Canada, and more. The truth is any country that is discharging endocrine disruptors into lakes and estuaries are finding the same problems. I had a scientist visiting from Germany who is familiar with Lake Geneva. Once I began to talk about endocrine disruptors, I realized we had many concerns in common.

The list can go on and on. The accompanying disc has many more studies. Since there are many others who will cover the human health issues, I want to focus on the impact on rebuilding fish stocks. When you add endocrine disruptors to the existing loss of habitat, fish kills by power plants, global warming and the increasing demand for water that is diverting water from our rivers and bays, you have the perfect storm. These are all complicated issues but we need to just begin. How can fisheries scientists predict a target rebuilding for stocks that are estuarine dependent? How can scientists get an accurate handle on the natural mortality? How do we account for this in the management process? We are destroying the recreational and commercial fishing industries. We are also having a terrible negative impact on the quality of life for recreational fishermen and keeping subsistence fishermen from harvesting for their families. We cannot rely on fisheries management to rebuild stocks until the environmental problems are solved. Fishermen were sold the idea that short term pain (not harvesting fish) would mean long term gain (healthy fish stocks). This has not proven true and has frustrated everyone. We need to stop pointing fingers and blaming one another for why stocks are not rebuilding and focus more clearly on the real problems, not the symptoms.

Based on the available research and my personal experience with fishing and environmental organizations, I would recommend the following:

1 Take a more precautionary approach.

We need to stop allowing new chemicals to enter the system without the most rigorous possible study. We need the European approach which is more precautionary. The European Union does not allow new chemicals to come to the market place on their way into the environment unless it is proven that there is no possible harm. The onus is on the chemical producers to prove they will cause no harm. Until they do, they cannot market the chemical. That is the opposite of our approach in the United States. The burden of proof is on the government and the people, not the manufacturers.

2 Invest in waste water treatment plants and industrial systems that discharge into the environment.

Some of these chemicals are part of the drugs that are essential for people's lives. We are not going to stop manufacturing or using these drugs. There are other chemicals that are not so essential in personal care products, detergents and household cleaners that are in every day use. It may take years before we can convince the public to stop using these products. There are also large amounts of illegal drugs that are entering the system as well. That means that we need to develop new treatment options for both our sewage plants and our industries that discharge into our water ways. These options must remove chemicals from waste before they enter the environment. This is not only an issue for water that supports our fish populations but for the water drinking public. Although the short term investment will be great, but will be more cost effective than cleaning up later and dealing with all the health problems for humans and wildlife that these chemicals will cause.

3 Develop a more efficient delivery system for our current medications.

Many of the drugs we take for health problems are prescribed in large doses because our bodies don't absorb them well. This means that our bodies are discharging significant percentages of the drugs we take, some as high as 90%. We are one of the chief polluters. The pharmaceutical companies need to research more efficient and effective delivery systems for these medications. The medical profession must stop over-prescribing and do a better job of explaining how drugs are best used to their patients. More is not necessarily better for your health and is certainly not better for the environment.

4 Educate the public about their responsibilities.

Most of the public has not real awareness of this problem. We need a massive educational program to make people more aware, to help them shop environmentally and to use and dispose of drugs appropriately. I know Lisa Jackson, the EPA's new Administrator, is well aware of this problem and will take a leadership role. We need Congress to provide appropriate legislation and funding so the EPA can take the necessary steps. We need to tell the

- public which chemicals to avoid in their household cleaners and other products. We need to publish a list of things to buy. We need a system to return or dispose of unused prescription and non-prescription medications.
- 5 Demand that our elected officials take action.
At the Federal, State and local level, there is much to be done. Leadership by our elected officials is crucial. Gone are the days when we could wait for the public to figure out the problem and solve it. The investment in time, money and education is far too big for individuals to subsidize.
 - 6 Fund the fisheries science.

Since I emphasized the impact this has on fisheries management, it is appropriate that I end with a plea. Good management is not possible without good science. Good science costs money. Unless the Federal government takes funding good science seriously, the problems of fisheries management will never be solved. We need to get a handle on the biology of the fish and the impacts of environmental contamination. We need that science to build useful models for projecting stocks and managing fisheries. We need to increase the funding for stock assessment by \$60,000,000. Then we need additional funds for the biological research for the necessary data. The National Marine Fisheries Service is the appropriate vehicle. They just need adequate funding.

The great strides in civilizations often grew around the availability of healthy drinking water and a means for disposing of our waste. The Romans invested heavily in aqueducts to bring plentiful water to their towns. The monks in early European times developed beer as an alternative to the polluted water. Our early settlements in this country were built around the availability of water for human and animal consumption and growing crops. When the cities were heavily populated, many diseases were passed through the water system. When we added chlorine to our urban water systems, the potential for harm was diminished. The last big change in water infrastructure and waste disposal occurred in the 1970s with the passage of the Clean Water Act. We cleaned up the water enough that oxygen returned. At the time, striped bass did not exist in the Delaware River due to oxygen depletion in the Camden/Philadelphia area. The return of striped bass to the Delaware is directly attributed to the upgrading of the sewer systems after the passage of the Clean Water Act. Today, we seem most concerned about a terrorist attack on our drinking water when the fact is we are contributing potentially lethal chemicals to our water systems every day. Since the effects are not immediately apparent, they are easier to ignore.

The chemicals that we are putting in our water have the potential to make some species of both fish and wildlife extinct. If you don't reproduce, extinction is the next step. It is just a matter of time. Right now, New Jersey and other states are concerned about the Red Knot. We can sit on the beach and count the decreasing number of these birds. It is much more difficult to count the fish in the ocean, bays and estuaries but the results are the same.

In my experience, scientists have a tremendously important role to play in shaping our

decisions and our actions. However, it is also possible to study a problem to death and never do anything. Scientists studied asbestos, tobacco and Agent Orange for years before they had enough studies to point the finger. We needed to act much earlier and save lives in the process. Right now, we have sufficient studies to get started identifying and solving the problems. More studies can be done, but we can't wait to begin cleaning our water.

In conclusion, at certain times in history we have tremendous challenges and opportunities. The problems created by endocrine disruptors and other chemicals going into our water systems have produced one of those historic moments. This is a world wide problem and is increasingly recognized by governments throughout the world. We cannot solve this problem by relying on local governments to take piecemeal action. Rebuilding the sewer system throughout our country is a perfect job creating opportunity and a perfect start in solving this problem. This is truly money spent for the next generation. It is an opportunity to offer our children and their children the same quality of life we have enjoyed. We owe them nothing less.