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**Before the
United States Senate
Subcommittee on Water & Wildlife
Nutrient Pollution: An Overview of Nutrient Reduction Approaches
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Good Afternoon Chairman Cardin, Ranking Member Sessions and Members of the Subcommittee on Water & Wildlife. I am pleased to appear before you today to discuss a topic of great concern to the National Wildlife Federation (NWF) and our 4 million members and supporters nationwide—nutrient pollution. As you know, excessive amounts of nutrients, namely nitrogen and phosphorus, threaten the environmental and economic viability of our nation’s waters and the wildlife dependent upon them. Nutrient pollution is one of the most significant threats to waters all across the country. Excess nitrogen and phosphorus from sources such as sewage, animal manure, and fertilizer enter water bodies and have significant negative impacts on water quality. A 2009 report from a task group of senior state and EPA water quality and drinking water officials and managers found that half of U.S. streams have medium to high levels of nitrogen and phosphorus; 78 percent of assessed coastal waters exhibit eutrophication, nitrate drinking water violations have doubled in eight years; and algal blooms are steadily on the rise. Nutrient pollution also impacts almost all of our nation’s Great Waters, both coastal and riverine ecosystems including the Chesapeake Bay, Great Lakes, Long Island Sound, Mississippi River, Ohio River, Puget Sound and the Gulf of Mexico. I am pleased that this subcommittee has asked for our thoughts regarding approaches to nutrient reduction in America’s waters, but first, I’d like to take a moment to detail NWF’s interest and work on this issue.

The National Wildlife Federation is the largest private, nonprofit conservation education and advocacy organization with 47 state and territorial affiliated organizations. Our staff,

members, partners and supporters in communities across the country are working to [protect and restore wildlife habitat](#), confront global climate change and [connect kids with nature](#). Our members are sportsmen, outdoor enthusiasts, nature lovers, and others who share a passionate concern for wildlife. And many of our constituents are fisherman, birders, swimmers and boaters, who witness the destructive impact of nutrient pollution each summer as they watch growing dead zones, declining fish stocks, and rivers and streams that have been overrun by algae that can cause sickness and impede many recreational activities.

Our regional offices throughout the country work with local and state governments to protect and restore local rivers, lakes and streams. We co-chair the Healing Our Waters Great Lakes Coalition, the Choose Clean Water Chesapeake Coalition, and the Coastal Louisiana Restoration Coalition. NWF is also a founding member and co-chair of the America's Great Waters Coalition, an alliance of national, regional, state and local organizations joined together to protect, preserve, and restore our nation's Great Waters. Each of these entities works in some capacity to reduce nutrient pollution because it is one of the most common and widespread pollution problems threatening America's aquatic ecosystems.

EPA's most recent National Aquatic Resource Surveys of aquatic health found that 67% of our streams are in poor or fair biological condition, and that of the stressors assessed, nitrogen and phosphorus are the most pervasive in the nation's wadeable streams and lakes. Approximately 50% of streams and more than 40% of lake acres have medium or high levels of nutrients. States have identified more than 15,000 waters nationwide that have been degraded by excess levels of nutrients to the point that they do not meet state water quality standards. This trend threatens some of our nation's most treasured waters. Some of these systems have become so impaired that they are required by the Clean Water Act to implement pollution diets known as Total Maximum Daily Loads. The impact of these ecosystem declines is devastating to wildlife and to those who depend on them. I'd like to illustrate that point by using two of our nation's most important aquatic ecosystems as examples – the Chesapeake Bay and the Great Lakes.

The Chesapeake Bay: A Declining Ecosystem

In the Chesapeake Bay, nutrient pollution is so pervasive that each summer the mainstem of the Bay experiences a dead zone that covers as much as one third of the Bay. Despite efforts to rein it in, it continues to grow. This summer, the Bay experienced an unusually large dead zone, which the Washington Post noted might be the largest in history.¹ These dead zones take many victims from across the tropic scale. The nutrient-related decline of submerged aquatic vegetation has eliminated essential habitat for many fish, shellfish, and other aquatic life. When healthy, this submerged vegetation serves as rich nursery ground, providing food and habitat for juvenile fish. Molting crabs hide from predators in the grass beds. Larger fish such as sea trout, drum, perch, pickerel, and bluefish patrol the grass beds in search of food. Many small and interesting creatures including pipefish, seahorses, mud crabs, spider crabs, and several kinds of shrimp and minnows inhabit the underwater grass beds.

Loss of submerged aquatic vegetation (SAV) has contributed to a substantial reduction in the once massive flocks of waterfowl that darkened the skies of Chesapeake winters. Populations of redhead ducks have declined markedly with the loss of SAV. Other species, such as the Canada goose, American widgeon, and canvasback, have had to change their feeding habits to include other sources of food.

The low oxygen conditions created by excess nutrients have severely impacted life in the Bay. Since 1960, there has been a substantial increase in the amount of Bay bottom with dangerously low levels of dissolved oxygen. Bottom-dwelling, or benthic organisms including worms, clams, oysters, crabs, and many smaller invertebrates are an essential link in the food web. With the decline of these benthic organisms, the entire Chesapeake ecosystem is altered. In fact, a recent study from the University of Maryland found that

¹ "Alarming Dead Zone Grows in the Chesapeake." [Darryl Fears](#). Washington Post. Published July 24, 2011.

the Chesapeake ecosystem had been drastically altered by nutrient pollution over the last 100 years.²

As a result, the famous Rockfish fishery has been limited, crabs and oysters are hard to find and beach closures are an annual occurrence. These are just some of the direct impacts of nutrient pollution on aquatic ecosystems, in the Chesapeake and throughout the country. Unless strong action is taken immediately to curb nutrient pollution, this story will continue to repeat itself throughout the country.

Complicating Factors in the Great Lakes

In the Great Lakes, excess nutrients are also causing massive ecological changes. Today, NWF is issuing a report, *Feast and Famine in the Great Lakes: How Nutrients and Invasive Species Interact to Overwhelm Coasts and Starve Offshore Waters*. The report documents the widespread ecosystem breakdowns and the policies and practices needed to address them. (See Exhibit 1). As indicated in the report, excessive nutrients in nearshore waters – in particular phosphorus from both agricultural and point sources – have brought the Great Lakes to a crisis point:

- This summer Lake Erie experienced the worst toxic algal bloom in its recorded history – even worse than the 1960s, when Lake Erie was declared dead.
- Miles of Lake Erie beaches have been closed and algae extends many miles out into the lake with thicknesses of up to 2 feet. Photos of these algal blooms and a satellite photo of their extent are included in this testimony (Exhibit 2).
- Toxic and green algal blooms are common this summer in nearshore areas and embayments throughout the Great Lakes, including Saginaw Bay, Green Bay and the coasts of Lake Michigan.
- Lake Erie is experiencing blooms of *microcystis*, a toxic algae, which has been measured at levels 1,000 times higher than WHO guidelines for drinking water; this algae can cause sickness or even death in humans and animals.

² "Eutrophication of Chesapeake Bay: Historical Trends and Ecological Interactions." W. M. Kemp¹ et al. Vol. 303: 1–29, 2005. Published November 21, 2005.

- We are seeing extensive blooms of the algae *Cladophora* along Lake Michigan's shores, which have interacted with invasive species to produce outbreaks of botulism poisoning that have killed fish and birds.
- Lake Erie has an anoxic zone where oxygen levels are too low for fish to live that seasonally extends thousands of square miles along the bottom of the lake.

This emerging nutrient crisis is already hurting people and wildlife and damaging the region's economy. NWF's Great Lakes office works closely with charter boat captains in the Great Lakes, particularly those in Lake Erie. Rick Unger, president of the Lake Erie Charter Boat Captains Association reports on terrible conditions on the lake. He says that the algae goes for miles along the beaches and extends miles into the open lake. In some places, the algae is two feet thick and looks like green mud. According to Captain Unger:

“The algae is toxic. There are posted warnings: Don't drink the water. Don't touch it. Don't swim in it. People are getting sick out on the water. Captains have respiratory problems. The Ohio Department of Public Health is investigating.”

In terms of Captain Unger's business, bookings are down; people don't want to go onto the water. Rebookings are nonexistent; once they've been out in the algae they don't want to go back. “When the algae moves in, the fish move out,” reports Captain Unger. He says, “The costs of doing business are skyrocketing.” He often has to go 10 miles further out to find fish, or 20 miles roundtrip. Gas costs \$4.50 a gallon, his boat gets 1 mile per gallon, so that's an extra \$90 (20 gallons) every trip.

Last year there were 800 charter boat captains in Lake Erie. This year, there are 700 – they lost 100 in a year. And by next year there will be a lot fewer. Captain Unger says there is no doubt that trend is because of the algae blooms. “There's miles and miles where the fish can't live,” he says. “It's turning back into the 1960s, when it was called a dead lake.”

This nutrient crisis in the Great Lakes is exacerbated by invasive mussels. Quagga and zebra mussels, now numbering in the trillions in Lake Michigan alone and widespread throughout the Great Lakes, have caused a major ecosystem shift: their efficient filtering

capabilities are sequestering much of the nutrients already in or entering lake waters and redirecting them to nearshore and deep bottom waters, reducing availability to other organisms. This phenomenon is encouraging explosive algal blooms in the nearshore while at the same time forming a nutrient desert in offshore waters, contributing to declines in fish populations. For example, Lake Huron has endured a 95% decline in fish biomass in offshore waters of Lake Huron in 15 years and we've seen an 80 percent decline in "primary production" – organisms in the water column that feed fish – in Lake Michigan in the last 25 years (since mid-1980s). In addition, the populations of the tiny freshwater shrimp, *Diporeia*, that is the base of the Great lakes food web, have declined in Lake Michigan by 94% in 10 years and in Lake Huron by 57% in 3 years. This is unprecedented: algal blooms caused by excess nutrients and fish population crashes caused by too few nutrients, all happening in the same ecosystem.

Today's *Feast and Famine* report from National Wildlife Federation makes a number of policy recommendations that are included in the policy section of this testimony. I would like to highlight three overarching principles here. First, management actions based on whole-lake objectives alone (or alternatively, focusing on one part of the ecosystem, such as offshore waters) are unlikely to be successful. Controls and management strategies need to take into account the different conditions of nearshore and offshore areas. As part of an overarching lake- or ecosystem-wide management approach, we need to refine management and policy at smaller levels (e.g., sub-basin or watershed) as appropriate. Second, while implementation of policies specific to nutrients and invasive species is critical, we need to explore policies that can address both stresses in an integrated way. For example, if research indicates that an invasive species may be limited in part by nutrients, reductions in nutrient loads could slow its growth and spread while reducing risks of harmful algae blooms. Finally, further nutrient reductions, particularly in targeted watersheds, are essential. Today in the Great Lakes, new nutrient loadings will in many cases continue to feed harmful algal blooms or invasive species, rather than contribute to the growth of desirable fish species.

The Great Lakes and Chesapeake are just two examples of the severity of the nation's nutrient pollution problems. As Captain Unger reports, those problems are causing economic as well as ecological damage. Spending a pleasurable day on the water usually involves at least some expense for travel, equipment and supplies. When multiplied by America's nearly 40 million anglers, their dollars employ millions of people in industries ranging from fishing tackle manufacturing to travel and hospitality to boat manufacturing. Since anglers are found in every state, their expenditures have a significant effect on state and local economies as well.

While many people recognize the recreational and economic benefits of fishing, its significant conservation benefits often go unnoticed. For each fishing-tackle purchase and each gallon of boating fuel consumed, a portion of the money is returned to state fish and wildlife agencies for conservation efforts. America's success in restoring many species of fish and wildlife and protecting natural habitat can largely be credited to the billions of dollars generated by sportsmen and women.

The American Sportfishing Association reports that 45 million anglers generate \$45 billion every year in retail sales.³ A portion of this money goes to licensing and other fees, which are the primary source for improving fish habitat, public access and environmental education.

Sportfishing, and the powerful economic effects it creates, would not be possible without fish. Those same fish would not exist without suitable habitat, which makes clean and healthy rivers, lakes and coastal waters essential to the bottom line. For this reason, NWF urges this committee to do all it can to reduce nutrient pollution in our nation's waters.

Looking Forward and Reducing Nutrient Pollution.

³ "Sport Fishing in America: An Economic Engine and Conservation Powerhouse." American Sportfishing Association. Revised Edition, January 2008.

Understanding the impact of nutrients on our nation's waters, NWF believes that the federal government has taken some key steps towards remedying this problem and that several others must be considered.

EPA acknowledged the national extent of the nutrient problem, when it issued its 1998 "National Strategy for the Development of Regional Nutrient Criteria." The report reflected an understanding that numeric nutrient criteria can be an effective way to prevent nutrient pollution and to help states comply with the Clean Water Act. EPA encouraged every state to develop numeric nutrient criteria to protect waters from this source of pollution and to help them meet water quality standards under the Clean Water Act. In 2008, an EPA status report found that 19 states have adopted numeric nutrient standards for some or all of their lakes and reservoirs, and 14 states have adopted numeric nutrient standards for some or all of their lakes and streams. We believe that numeric nutrient criteria is the most logical way to ensure ecosystem health in a site specific manner, and urge EPA and Congress to continue to work to ensure that every impaired stream segment, river and lake has a numeric nutrient goal to help restore the ecosystem.

To that end, we applaud the specific EPA actions in Florida and the Chesapeake Bay to promulgate and implement numeric nutrient criteria and we recognize the national significance of these initiatives. A recent article in the Environmental Law Reporter summed this up best, stating, "The CWA, with multiple paths to its destination, is reinventing itself once more. Enacted in modern form in 1972, the next quarter century saw EPA focused on the development of technology standards for industrial and municipal point sources. In the mid-1990s, prodded forward by a stream of citizen suits, the Agency started to address nonpoint sources of pollution through water quality standards and the TMDL program. This movement stalled from 2000-2009 and the current revival raises the question of whether EPA can finally make nonpoint and ambient-based controls effective. The answers are being tested in two venues where the problems are among the most acute and their solutions the most resisted: the Chesapeake

Bay and Florida. *As go the Chesapeake and the Sunshine State, so will go the future of clean water for years to come.*⁴”

The success of EPA’s initiative to work with the state of Florida to reduce nutrient pollution may foretell the fate of future generations. If this initiative is further delayed, it could stymie similar efforts throughout the country and ensure the permanent decline of our nation’s aquatic ecosystems. If EPA cannot effectively limit nutrients in Florida, a state dependent on recreation and tourism, where the algal blooms are so pervasive that they can be seen from the shores of most rivers and lakes, what chance do other ecosystems have?

In the interest of the Everglades, water quality throughout the state of Florida and all of the waters impaired by nutrients throughout the country, we urge the committee to recognize the importance and necessity of the promulgation of numeric nutrient criteria, in Florida and wherever else nutrient pollution threatens rivers, lakes and streams. We urge you to support the EPA as it works to ensure that all Americans enjoy healthy and pollution free waters.

In addition, NWF recommends that:

- Restoration funding such as the Great Lakes Restoration Initiative, EPA's Chesapeake Bay Program, the Long Island Sound Study and other restoration and pollution reduction programs must be increased and used to intensively target these damaged eutrophic areas with targeted funding to help farmers improve conservation practices and identify the precise vectors and mechanisms that are causing the algal blooms. EPA and other agencies should support an integrated suite of activities, not isolated actions.
- Funding to stop combined sewer overflows and raw sewage overflows is essential. Although not the primary source of nutrient pollution overall, in many

⁴ Houck, Oliver A. "The Clean Water Act Returns (Again): Part I, TMDLs and the Chesapeake Bay." Environmental Law Reporter. March, 2011.

- places these large wastewater treatment plants have huge and lasting effects, impacts that will get worse as storms continue to worsen. For this reason we urge reauthorization and maximum funding for the Clean Water State Revolving Fund.
- EPA must do a better job of developing and approving nutrient standards that match the conditions of different waterways and different segments of waterways. A one-size-fits all approach will only cause further damage. A single state-wide nutrient standard will not work; and in many cases, neither will a lakewide nutrient standard. We urge Congress to do all it can to assist states and EPA in promulgating and implementing site specific nutrient reduction targets.
 - Farm Bill programs are essential. Most producers will not take their land out of production for essential buffer strips or wetlands if it substantially hurts their bottom line. We need financial incentives to at least cushion the blow. Funding for the conservation title of the Farm Bill is essential. We urge Congress to expand conservation funding in the next Farm Bill and to ensure that these mandatory funds are not capped annually by the Appropriations Committee.
 - There needs to be more research. Many of the practices that once reduced nutrient loadings are not working any more, or at least are not working in the same way. For example, no till farming has had strong benefits in reducing sediment transport and runoff. However, in places such as the Lake Erie watershed, we are now seeing less uptake of fertilizers in the soil and higher amounts of soluble reactive phosphorus, a much more damaging form, which might result from those no till practices.
 - We need to address drainage and tileage. Extensive tiling means that substantial runoff is never captured by buffer strips, and may bypass wetlands. We need to encourage 2-stage ditches.
 - We must address the hypoxic zone in the Gulf of Mexico, our nations' largest deadzone by providing adequate conservation planning and financial assistance to farmers along the Mississippi River and its tributaries.
 - Finally, for nutrient standards to be successful in cleaning up America's waters, they must be enforced in the 60% of the nation's waterways that flow intermittently and the wetlands associated with them. These small streams and

associated wetlands do the lion's share of the work in filtering nutrient run-off and storing sediment and floodwaters, yet they are losing Clean Water Act protections and are at increased risk of pollution and destruction in the wake of controversial Supreme Court decisions in 2001 and 2006. We urge the Committee to support efforts to restore Clean Water Act protections to these streams and wetlands.

While these recommendations are not exhaustive, I believe that if enacted, these would make a significant contribution to the reduction of nutrient pollution in our nation's waters and allow the health of their ecosystems to slowly recover. I thank you for the opportunity to discuss this most important issue with you and look forward to answering your questions.