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Before the House Committee on Transportation and Infrastructure's Subcommittee on Water Resources and Environment

Hearing on the Impact of Invasive Species on the Great Lakes

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Madame Chairwoman, Mr. Ranking Member, members of the Subcommittee, thank you for the opportunity to testify before you on a critically important issue: the impact of invasive species on one of our nation's greatest natural treasures - the Great Lakes. My name is Andy Buchsbaum and I am the director of the National Wildlife Federation's Great Lakes Office. NWF is America's oldest and largest conservation organization and has one million members and affiliated organizations in 47 states. I am also a co-chair of the broad-based Healing Our Waters–Great Lakes Coalition. The HOW Coalition is made up of over 90 national, regional, state and local organizations that are dedicated to the protection and restoration of the Great Lakes. These include Great Lakes state and regional conservation organizations such as the Alliance for the Great Lakes, Great Lakes United and the Ohio Environmental Council; national conservation organizations like Ducks Unlimited, the National Parks Conservation Association, Trout Unlimited, the Sierra Club, the Nature Conservancy and the Audubon Society; educational institutions such as Shedd Aquarium and Brookfield Zoo; and government representatives such as the County Executives of America. The Coalition's membership list accompanies this testimony as Appendix A.

As this subcommittee knows from hearings you have held, the Great Lakes are of national and worldwide importance. Yet, they have been severely damaged by numerous stresses, the most severe being invasive species. Unless actions are taken soon to protect the Great Lakes from new invaders and to respond to the damage that has already occurred, the Great Lakes face massive and irrevocable degradation.

My testimony today will focus on the impact invasive species are having on the Great Lakes. To help illustrate the threat to our region's way of life, I will first describe the importance

healthy Great Lakes are to the nation. I will then outline the accelerating deterioration the Great Lakes are currently experiencing, in large part due to invasive species, and the urgency of congressional action to protect the Great Lakes from this threat. The bottom line is this: any further delay in congressional action to address invasive species will result in irreversible damage and dramatic changes to this national and global treasure.

The Great Lakes: A National Priority

The Great Lakes define the landscape of our nation and a way of life for a region of more than 42 million people. They mean more to us than places to swim or fish; more than places to hike through some of the world's most beautiful dunes and national lakeshores; more than a source of drinking water; more than the lifeblood of commerce and industry. For those of us who live here, they are part of our way of life. They define who we are, our past and our future.

When I was growing up near Chicago, the high points of my childhood each summer were trips to Lake Michigan's North Avenue Beach in Chicago, the Indiana Dunes, and the Warren Dunes in Michigan. My friends and I would play in the water, race down the dunes and watch the incredible sunsets over waters so vast you could not see the other side. Now my own family is reprising those wonderful times. The best part of my sons' summers are when we go to roam the shoreline of Lake Superior, swim in the bone-biting cold of its waters and watch the sun set under the horizon. The lakes create the memories that bind my family to millions of others, and link my generation with my parents' and my children's. They are the defining features of our physical world, our continuing constant.

So it is no surprise that the Great Lakes are a top priority for those of us who live there. A 2003 Joyce Foundation poll asked Great Lakes residents if protecting and restoring the Great Lakes is important. Ninety six percent said yes! This response shows how closely we identify with our home.

The health of the Great Lakes is important not to just those that live there, however, but to every American as well. These Lakes define our nation's geography and history. They constitute 95 percent of the surface freshwater in the United States. They have a coastline of 10,000 miles – longer than the combined U.S. coastlines of the Atlantic and Pacific Oceans. They supply the drinking water, shipping, recreation and economic lifeblood to millions of people in eight states. They constitute a 1,000-mile border between the U.S. and Canada. They are continental features that attract migratory birds from the Canadian Arctic to South America. Millions of migratory waterfowl breed in the Great Lakes and then fly to the eastern and southern U.S. to supply hunters and birdwatchers from New Jersey to Louisiana.

The Great Lakes are truly a national treasure. Tom Kiernan, President of the National Parks Conservation Association and co-chair of the Healing Our Waters Coalition, puts it this way: "The Great Lakes are national icons, a beautiful natural treasure you can see from space. Like the majestic Grand Canyon and Everglades, these inland oceans help define the soul of a region and the landscape of a nation." Their national importance has prompted 11 national organizations to actively participate in the Healing Our Waters Coalition to protect and restore them. Leaders from around the country – including those from the Chesapeake Bay, Restore

America's Estuaries, Everglades and Coastal Louisiana, each of which also have pressing needs for restoration – understand the national importance of the Great Lakes and their need for protection and restoration:

> "Like the Chesapeake Bay, the Great Lakes are resources of national significance. They have helped shape our history as a nation and they have provided immeasurable recreational, economic, and cultural opportunities for our citizens. Unfortunately, they share a history of insufficient investment in their protection and restoration. National attention, national funding, and national commitment to the restoration of natural resources like the Chesapeake Bay and the Great Lakes is critical for us, as a nation, to ensure a legacy of clean water, abundant fisheries, and economic development for future generations." Roy A. Hoagland, Esq., Vice President, Environmental Protection and Restoration, Chesapeake Bay Foundation

> "The Great Lakes are extraordinary resources of national importance, and they require national attention and funding to get back to health. Like the Great Lakes, many of our nation's Great Waters - such as Puget Sound, the Louisiana Coast, the Everglades or Chesapeake Bay -- are in grave condition. Investments in the restoration of these critical ecosystems will repay us many fold, and will benefit the nation as a whole." Mark Wolf-Armstrong, CEO of Restore America's Estuaries.

> "The Great Lakes are of national importance. If we can't save Coastal Louisiana, we can't save the Great Lakes and vice versa. It can't be that we have to choose one place over another, or we'll be set up to fail everywhere. The consequences to the nation of inaction or delay are enormous. We cannot afford to wait, either here in Coastal Louisiana or in the Great Lakes." Mark Davis, Director, Coalition to Restore Coastal Louisiana

> "As America's Everglades is a unique national treasure, so too are the Great Lakes. The people of the Great Lakes region support restoring the Everglades, and we support restoring the Great Lakes." – Everglades Coalition

Our Coalition appreciates their support and we support their efforts to protect these national resources as well.

The Great Lakes' economic importance to the Midwest and the nation is immense. The Great Lakes annually generate billions of dollars of economic revenue directly:

- Tourism in Ohio is a $7 billion industry sustaining over a quarter of a million jobs.
- In Michigan, tourism generates $16 billion annually, and in Wisconsin, $11.8 billion.
- Hunting, fishing and wildlife watching account for more than $18 billion annually in the Great Lakes states.

But the economic impact of the Great Lakes is far greater than this. Twenty-five million people rely on the Great Lakes for their drinking water. Industries such as auto, power, agriculture and steel depend on them to supply their industrial processes. Consumers and

businesses throughout the region and the nation rely on them for the shipment of goods such as grain, steel and manufactured goods. The Great Lakes define not just the recreational and ecological footprint of the region; they drive the economic opportunities in the Midwest.

The economy of this region is vitally important to the nation. The Great Lakes region produces one-third of the nation's economic gross state product. The Great Lakes are the natural infrastructure that supports this productivity; their health is critical to economy of the Midwest and the nation.

The Healing Our Waters Coalition will be better able to demonstrate what we already know: investing in Great Lakes restoration and protection is good for our nation's economy as it is for our families and environment. We are partnering with the Council of Great Lakes Industries, the Great Lakes Cities Initiative and the Brookings Institution to produce an independent study of the ways in which investing in Great Lakes ecosystem restoration will support the economy of the region. We will be happy to share it with the Subcommittee when our work is complete later this year.

A Resource in Peril: "Ecosystem Breakdown"

Despite their vast size, the Great Lakes are fragile and need our nation's help. In recent years, the Great Lakes have been increasingly plagued by beach closings due to untreated sewage; invasions by harmful exotic species (on average, one new invasive species enters the Great Lakes every eight months); contamination of sport and commercial fisheries; and loss of habitat for wildlife. Each of these and other problems has been viewed as a separate challenge to be researched and addressed independently; few have tried to assess the condition of the Great Lakes as an ecosystem and design solutions on that basis.

In December 2005, over sixty of the leading scientists in the Great Lakes region issued an alarming report. In a paper titled "Prescription for Great Lakes Ecosystem Protection and Restoration"[1], the scientists concluded that the Great Lakes are experiencing an historic crisis (attached as Appendix B). Deterioration of large sections of their ecosystem is accelerating dramatically, and if not addressed now, the damage is likely to be irreversible. In their own words:

> "There is widespread agreement that the Great Lakes presently are exhibiting symptoms of extreme stress from a combination of sources that include toxic contaminants, invasive species, nutrient loading, shoreline and upland land use changes, and hydrologic modifications . . .. In large areas of the lakes, historical sources of stress have combined with new ones to reach a *tipping point*, the point at which ecosystem-level changes occur rapidly and unexpectedly, confounding the traditional relationships between sources of stress and the expected ecosystem response. *There is compelling evidence that in many parts of the Great Lakes we are beyond this tipping point. Certain areas of the Great Lakes are increasingly experiencing ecosystem breakdown*, where intensifying levels of

[1] http://restorethelakes.org/PrescriptionforGreatLakes.pdf

stress from a combination of sources have overwhelmed the natural processes that normally stabilize and buffer the system from permanent change."[2] (Emphasis added)

Over 200 scientists from around the country, including from California, Hawaii and Tennessee, have endorsed the report.

The scientists' report was a surprise to the public because to many, the Great Lakes and their tributaries seem to be improving. Due to fundamental policy shifts like the Clean Water Act, massive government investment in better sewers and responsible private initiatives, rivers no longer catch fire, Lake Erie has come back from the dead, the water often looks clearer and many pollutant indicators have improved. But such observations only scratch the surface and the scientists looked much deeper to find an ecosystem in crisis. They have documented:

- The destruction of the foundation of the Great Lakes food web in many of the Great Lakes. Populations of the basic food group for most fish, a freshwater shrimp called *Diporeia,* have declined from over 10,000 per square meter of lake bottom to virtually zero over vast stretches of Lake Michigan and the other Great Lakes. The scientists cannot be sure, but they believe the decline is linked to the infestation of the Great Lakes by an invasive species, the zebra mussel, which colonizes the lakebeds in thick mats of shells that extend for acres and leaves the surrounding lakebeds barren of life. The National Wildlife Federation produced a report describing the devastating impact that invasive species have had on the Great Lakes in a report titled *Ecosystem Shock* (attached as Appendix C).

- Lake Erie's so-called "dead zone," an area deprived of oxygen, has reappeared in central Lake Erie. Accompanying this anoxic zone is the return elsewhere in the lake of blue-green (toxic) algae blooms and episodic die-offs of fish and fish-eating birds from avian botulism. Scientists are seeing similar eutrophication problems in Lake Huron's Saginaw Bay and Lake Michigan's Green Bay.

- Many fish populations are showing signs of stress and decline in the Great Lakes. Scientists have found widespread decline in growth, condition and numbers of yellow perch, lake whitefish and other valuable fish species in Lake Michigan and portions of Lake Huron.

The scientists concluded that these and other large-scale ecosystem changes result from the loss of the Great Lakes' capacity to buffer themselves against sources of stress – essentially, damage to the Great Lakes immune system. Much of the buffering capacity for the Great Lakes comes from healthy near-shore communities and tributaries. As these areas are damaged by pollution, hydrologic modifications, invasive species and shoreline development, they lose their capacity to buffer the Great Lakes. Without that buffering capacity, each new stress – whether it is an invasive species or additional pollution – can set off a cascade of damage to the ecosystem that occurs rapidly and unexpectedly. In the scientists' words:

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[2] http://restorethelakes.org/PrescriptionforGreatLakes.pdf, P.1

"In the Great Lakes, nonlinear changes are no longer a future threat–these types of changes are taking place now. While in some areas some indicators of ecosystem health have continued to improve over the past decade, other large areas of the lakes are undergoing rapid changes where combinations of effects of old and new stresses are interacting synergistically to trigger *a chain reaction process of ecosystem degradation. The rapidness of this chain-reaction process, seen over the past five to fifteen years and involving sudden and unpredictable changes, is unique in Great Lakes recorded history.*"[3] (Emphasis added)

Invasive Species Role in the Breakdown of the Great Lake Ecosystem

Although it is hard to determine which problem is the largest cause of the ecosystem breakdowns now plaguing the Great Lakes, many scientists believe that it is invasive species. It is easy to see why:

- Scientists have found 183 aquatic invasive species in the Great Lakes thus far, making it one of the most invaded ecosystems in the world. They include:

    - Eel-like sea lamprey that attack lake trout and suck the blood out of them;
    - Zebra and quagga mussels that form thick mats of shells over vast stretches of the lake floors and beaches and disrupt the food chain;
    - A fish-killing virus called viral hemorrhagic septicemia that has spread to Lakes Ontario, Erie and Huron and caused multiple fish kills; and
    - Most recently, bug-eyed shrimp that feed on tiny zooplankton and phytoplankton that directly or indirectly sustain the Great Lakes native fish species was found in Lake Michigan.

- Since 1950, on average one new invasive species has entered the Great Lakes every seven months. Under such an onslaught it is impossible to conceive of how the Great Lakes ecosystem could possibly reach any sort of equilibrium, how aquatic life could recover or how scientists and managers could make decisions to help restore the lakes' buffering capacity.

- Invasive species are affecting every level of the Great Lakes ecosystem: the lake bottoms, the water column, the surface, the shorelines, the near shore and the open water, the zooplantkton, the forage fish and the fish at the top of the food web (like trout and walleye).

- The breadth, depth and frequency of these invasions are facilitating what some scientists call "invasional meltdown." Some invaders alter their new environment in ways that make it easier for subsequent invaders to thrive, making it even more difficult for native species to survive.

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[3] http://restorethelakes.org/PrescriptionforGreatLakes.pdf, P.8

- The aquatic invaders are only one part of the invasives problem. Terrestrial invaders also are having devastating impacts on the Great Lakes ecosystem, making restoration more difficult and raising the costs. All along the coastlines and tributaries, the wetlands so important for the Great Lakes immune system are being taken over by phragmites and purple loosestrife. Lake Ontario is losing its native wetlands, which are based on sedge grasses. As we propose to spend billions of dollars on restoring coastal wetlands, we need to protect the wetlands we have from these terrestrial invaders.

Virtually every ecosystem breakdown in the Great Lakes identified by the scientists – the Lake Erie anoxic zone, the declines and stresses in fish populations, and widespread food web disruption – are caused in large part by invasive species. The massive damage to the Great Lakes food web over the past 15 years is perhaps the most illustrative example of why invasive species are so devastating. Fully 99 percent of the foundation of the food web – the food available to fish in the sediments of the Great Lakes – is made up of four species: tiny shrimp-like creatures called *Diporeia*; fingernail clams; certain worms, and opossum shrimp. Of these, *Diporeia*, the tiny shrimp, dominate making up 80 percent of the available food.

Since about 1990, however, the *Diporeia* and fingernail clam populations have crashed over vast stretches of Lake Michigan, Lake Huron and other lakes. Attached to this testimony in Appendix C are two charts that illustrate the decline in *Diporeia* in Lakes Michigan and Huron. Dr. Tom Nalepa of NOAA's Great Lakes Environmental Research Laboratory, based on his research of the past two decades, produced these figures. They graphically show a 94 percent decline in *Diporeia* organisms in Lake Michigan over 10 years and a 57 percent decline of those organisms in Lake Huron in only 3 years. *Diporeia* populations have gone from 10,000 organisms per square meter to virtually zero in many areas. Scientists have also seen a parallel crash in the populations of fingernail clams, and are now concerned about the viability of the other major food source, the opossum shrimp.

Scientists believe that the cause of this collapse is zebra mussels. Zebra mussels colonize the lakebeds in thick mats of shells that extend for acres and leave the surrounding lakebeds barren of life. They are not completely sure, though, and are still searching for the mechanism that causes the disappearance of the *Diporeia*.

Ironically, zebra mussel populations are now declining in the Great Lakes. The invasive quagga mussel is crowding them out. The quagga mussel threatens to further depress the *Diporeia* populations in the Great Lakes, and even worse, decimate the remaining food sources in the lake sediments – particularly the opossum shrimp. Dr. Nalepa's studies have produced two other charts on the growth of the quagga mussel population, attached as Appendix D.

The damage to these foundation species is sending waves throughout the Great Lakes food web. We are seeing impacts on native perch, walleye and trout. Combined with the other invasive species that have invaded our region, the Great Lakes ecosystem is experiencing breakdown. As invasive species like zebra and quagga mussels overwhelm the Great Lakes, large stretches of the lakes that used to be teeming with life are now barren.

These rapid and dramatic changes to the Great Lakes food web are unprecedented in the recorded history of the lakes. And unless we take action now, the attacks on the lakes will only worsen. The damage to the food web done by zebra mussels, quagga mussels and other aquatic invaders will be very difficult to repair.

Unless we stop new invaders from entering the Great Lakes, however, restoring them will be impossible. The Great Lakes cannot even begin to recover when every seven months another invasive species enters the lakes and begins to wreak its own particular kind of havoc on the ecosystem. Scientists say they are falling farther and farther behind in even understanding the lakes because the system changes so dramatically due to these fresh invasions.

Potentially the worst aquatic invaders to the Great Lakes thankfully have not yet arrived. They are Asian and silver carp, large fish with voracious appetites that are only 50 miles from Lake Michigan. These fish can grow as large as 100 pounds and six feet in length and eat everything in their path. They were intentionally introduced to clean out catfish farms on the Mississippi, but escaped and migrated up the Mississippi River to the Chicago Sanitary and Ship Canal. In some areas of the Mississippi River, Asian carp have multiplied so rapidly that in less than a decade they make up 90 percent or more of the fish life. Scientists at the Illinois Department of Natural Resources have shown that native fish are suffering. The average weight of a 25-inch buffalo fish, a native and popular fish with locals in the Illinois River, has dropped from over 12 pounds to less than 9 pounds over five years.

The only thing standing between these monster fish and Lake Michigan is a temporary underwater electric barrier installed by the U.S. Army Corps of Engineers. Unfortunately, a permanent barrier has design problems and cannot be brought on-line without further investment and time, and the temporary barrier is not failsafe. Until the permanent barriers are operational and effective, the Great Lakes are at extreme risk. As a U. S. Fish and Wildlife officer explained to a newspaper, "If the Asian carp get into Lake Michigan, they will turn the Great Lakes into giant carp ponds."

Actions Needed To Stop Invasive Species From Entering The Great Lakes

The National Wildlife Federation's *Ecosystem Shock* report described the damage to the Great Lakes food web. It also provided the best summary of information (known at that time) of which invasive species were causing the most damage, where they had been introduced and when, where they originated and what should be done to stop them.

As the report showed, invasive species enter the Great Lakes from a number of sources. There is no single "silver bullet" that can protect the lakes, which is why our nation needs a comprehensive approach. We can start by addressing the biggest vector for invasive species to the Great Lakes: the ballast water of foreign ships. Ships from outside the Great Lakes system take on ballast water in their homeports and travel to the Great Lakes. When they put off and take on cargo in Great Lakes ports, they uptake and discharge that ballast water. Often the ballast tanks of these ships contain organisms not native to our region. Many of these organisms thrive in cold fresh water, reproducing and becoming yet another on a growing list of invasive species in the Great Lakes.

But ballast water is not the only source of invasive species in the Great Lakes. Other vectors include ship hulls, accidental and intentional releases and ship or barge canals. One of the worst invaders, the eel-like sea lamprey, which decimated the lake trout population throughout the lakes, migrated through the Lake Erie Canal and reached Lake Superior by 1938.

These multiple vectors for entry demand a comprehensive strategy to combat them – one that is integrated and national. Such legislation must have strong provisions that require effective standards that are defined, set and enforced for how ships manage their ballast water; supports information and education outreach programs to reduce the potential for aquatic invasive species introductions; creates a rapid response process for the containment, control, and eradication of initial invasions; screens live aquatic species for invasiveness before import; and authorizes additional research to ensure that proper methods are developed and used to prevent, control and eradicate aquatic invasive species.

Steps to combat the invasive species problem in a comprehensive manner have already begun in the Senate. The Healing Our Waters Coalition supports the bi-partisan, national approach taken by Senators Carl Levin and Susan Collins. They introduced S. 725, the National Aquatic Invasive Species Act (NAISA), on March 1. This legislation lays the foundation to control the invasion of aquatic species in the Great Lakes. Our Coalition looks forward to working with the bill sponsors to further enhance the enforcement and screening provisions of this legislation, which we hope is considered by Congress this year.

In addition to the actions proposed in S. 725, we also need to address the canals that connect the Great Lakes to other watersheds. The top priority must be the Chicago Sanitary and Ship Canal because of the close proximity of the Asian carp. The clear consensus of the Healing Our Waters Coalition members and our partners among the cities, states and business communities is that the top priority must be funding and completing the electric barrier that is currently keeping the Asia Carp from reaching Lake Michigan. For a relatively small investment – about $9.0 million – the permanent barrier can be brought on line in the next few months, thereby saving the Great Lakes and the nation from spending billions of dollars in response costs and lost jobs.

Stopping the entrance of new aquatic invaders must be the top priority, but it is not the only priority. The Great Lakes have sustained extensive damage such as food web disruptions from zebra mussels, quagga mussels, sea lamprey and 180 others. Restoration, not just protection, is required.

Scientists, policy-makers and the citizens of the region came together to make a single set of recommendations to restore the Great Lakes. They joined in a process called the Great Lakes Regional Collaboration, which involved all levels of government (federal, state, tribal, local), scientists, multiple stakeholders and citizens from the region in a 12-month planning effort. The result of that effort is a precedent-setting Great Lakes protection and restoration plan called the Great Lakes Regional Collaboration "Strategy to Restore and Protect the Great Lakes." The Strategy recommends a $20 billion in federal, state, local and private investment in the Great

Lakes to restore wetlands, clean up toxic sediments, stop non-point pollution, and most importantly, to stop invasive species introduction by passing a new law like NAISA.

All of these investments are important to address the harm that invasive species have already caused the Great Lakes. As the scientists stated in their "Prescription" paper, the Great Lakes can recover their health and stabilize if their buffering capacity – their immune system – can be restored. Restoring the health of lake sediments and shorelines can help restore the Great Lakes immune system, providing the lakes with the buffering capacity they need to heal themselves and repel new insults. So actions like cleaning up toxic sediments, softening shorelines, instituting buffer strips and restoring wetlands will help repair the damage that zebra and quagga mussels have caused.

For that reason, it must be a priority not only to pass laws that stop new invaders from entering the lakes, but also to invest the resources necessary to allow the lakes to heal themselves from existing invaders. The Great Lakes Collaboration Implementation Act was introduced last year to ensure that Congress addresses all of priorities at once and in an integrated way. This legislation addressed the key issues raised by the Great Lakes Regional Collaboration. Our Coalition urges this Subcommittee to consider the elements of that legislation when the bill is reintroduced this year. The longer we wait to clean up toxic harbors, protect wetlands or upgrade sewer systems, the more expensive and harder it becomes.

Conclusion

Although invasive species have plagued the Great Lakes for over a century, we are now at a tipping point. Because rapid action is so important for the health of both the Great Lakes and the region's economy, we are now seeing states begin to take matters into their own hands. Michigan, for example, passed a law in 2005 requiring ocean-going vessels that discharge ballast to install ballast-water treatment by the beginning of this year. Other states are considering similar laws. Even though no single state can solve this problem alone, they hope that by taking the initiative they can spark congressional action.

The Great Lakes are under attack. If we are going to be truly successful in stopping foreign invasions of species from far away places, Congress needs to pass a comprehensive law this year that ends the dumping of untreated ballast water, closes the door on the Asian carp and provides mechanisms to screen species being imported in our country and educate the public on the impact invasive species has on our environment and economy. The economic and ecological wellbeing of our region and a way of life are at stake.

We hope that this hearing is the beginning of that congressional action. Thank you again for the opportunity to testify before you today.

Appendix A: Members of the Healing Our Waters-Great Lakes Coalition

Appendix B: Bails, et.al. "Prescription for Great Lakes Ecosystem Protection and Restoration: Avoiding the Tipping Point of Irreversible Change" December 2005

Appendix C: National Wildlife Federation. "Ecosystem Shock: The Devastating Impacts of Invasive Species on the Great Lakes Food Web" October 2004

Appendix D: Diporeia declines in the Great Lakes

Appendix E: Quagga Mussels in the Great Lakes