

# Committee on Resources

---

## Witness Testimony

---

Testimony of

**Sally Yozell**

Deputy Assistant Secretary for Oceans and Atmosphere

National Oceanic and Atmospheric Administration

U.S. Department of Commerce

Before the Subcommittee on Fisheries,

Wildlife and Oceans

July 11, 1996

Good morning, Mr. Chairman and Members of the Subcommittee. My name is Sally Yozell, Deputy Assistant Secretary for Oceans and Atmosphere, National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce. I am also Co-Chair of the interagency Aquatic Nuisance Species Task Force (Task Force) established under the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (Act). I appreciate this opportunity to discuss the impacts of nonindigenous species on existing fish and wildlife communities. Recognizing that the Subcommittee will hear from other witnesses touching on freshwater and terrestrial introductions, I will emphasize in my testimony, the marine issues associated with nonindigenous species.

The problem of nonindigenous marine and estuarine organisms is of immediate and growing concern. Ballast water exchange and intentional introductions from aquaculture are two major pathways for new introductions. Every year ships discharge 11,507,000,000 gallons of ballast water into U.S. coastal waters. The impacts of zebra mussels in the Great Lakes ecosystem are now well documented, and damage to infrastructure and fisheries in the Lakes region alone may approach billions of dollars. As a result of species introductions, there have been ecological and associated economic consequences to marine species and ecosystems. For example, as the Subcommittee is aware, some populations of west coast salmon have been reduced to the point where they have had to be protected under the Endangered Species Act. Although many factors have contributed to their decline, research by Dr. John Chapman in the Pacific Northwest has identified predation on juvenile salmon by introduced fish species as a factor in the decline of salmon stocks. Another example, the European green crab, recently introduced and established in the San Francisco Bay, has now spread hundreds of miles north and poses a significant threat to the Pacific dungeness crab fishery, with an estimated annual value of \$49 million. Furthermore, researchers from the Smithsonian Environmental Research Center have found that the green crab poses a threat to the oyster culture industry in the State of California.

Direct predation on native species is only one type of impact that nonindigenous species may have. Researchers at the University of North Carolina have identified the recently introduced Indo-Pacific swimming crab as a direct competitor with the blue crab, one of the Atlantic coastal states' most important commercial fisheries. In New England, introduced species like the tunicate *Diplosoma* sp. have altered the habitat of coastal ecosystems in short time periods. The European green crab has also invaded the east coast, causing severe damage to commercially important steamer clam populations. The introduction of the Asian clam to north San Francisco Bay ten years ago has altered basic biological processes causing a fivefold reduction in annual primary production and almost complete disappearance of the summer phytoplankton bloom. It has also caused a substantial reduction in zooplankton. Many juvenile fish, including some that are listed as threatened or endangered, feed on the zooplankton.

Although there is a tendency to think of fish or mollusks as potentially the most devastating of species introductions, pathogens and parasites also qualify as nonindigenous aquatic nuisance species. As any waterman from Chesapeake Bay can tell you, the oyster fishery has been devastated by two diseases caused by protozoans--MSX and dermocystidium. Researchers now believe that MSX and dermocystidium are introduced species. The shrimp aquaculture industry has been plagued with a series of viral diseases that have moved around the world with shrimp imported for culture. These include IHNV (infectious

hypodermal and hematopoietic necrosis virus), MBV (Monodon-type baculovirus), HPV (hepatopancreatic parvo-like virus), BP (Baculovirus penai) and, most recently, taura syndrome virus. Because the introduction of shrimp viruses virtually destroyed its shrimp aquaculture industry in the early 1980s, the State of Hawaii now has one of the most stringent disease screening requirements for such viruses in the world. In addition to being a contributing problem in the shrimp aquaculture industry, such disease could create an economic catastrophe for our shrimp industry if they were to be introduced to wild populations. These are only a few of the cases illustrating that aquatic nuisance species have the potential to threaten commercial and recreational fisheries and the native species they depend on.

In response to the infestation of the Great Lakes by zebra mussels, the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 was passed. The Act was designed to mitigate the overall problem of aquatic nuisance species by establishing an interagency Task Force to develop policies that would prevent and mitigate the problems associated with introductions of nonindigenous species. The Task Force is co-chaired by NOAA and the U.S. Fish and Wildlife Service (FWS) and is composed of representatives from the Coast Guard, the Environmental Protection Agency (EPA), the Department of the Army (Civil Works), the Department of Agriculture, and the Department of State.

The Act assigns a weighty responsibility to the Task Force and I am pleased to represent NOAA as the co-chair. Because of fiscal constraints, the majority of funds originally authorized under the Act have not been appropriated. Notwithstanding, the Task Force has moved forward to fulfil the mandates of the Act in an approach that has proven to be both fiscally responsible, and creative. We are proud of our achievements to date, and I will briefly describe a few of the Task Force's activities related to marine species and ballast water.

As part of the National Ballast Water Control Program, the Task Force is mandated to conduct ballast exchange and biological studies. Through joint cooperation, the Task Force initiated the ballast exchange study in July of 1994, to assess the environmental effects of ballast water exchange on the diversity and abundance of native species in U.S. waters and to identify areas, if any, where exchange does not pose a threat. The project was initiated with joint support from NOAA's National Sea Grant College Program and EPA's Office of Research and Development and was conducted and administered through NOAA's Great Lakes Environmental Research Laboratory (GLERL). The study was recently completed and is being prepared for distribution.

The biological study was prepared to determine whether aquatic nuisance species threaten the ecological characteristics and economic uses of U.S. waters other than the Great Lakes. The study was initiated with Fish and Wildlife Service funds and was conducted on a case study basis. One study on the fresh, brackish, and marine waters of the San Francisco Bay and Delta was recently completed. The study identified that the San Francisco Estuary contains over 212 introduced species, and that many of these species have caused extreme changes in the Bay's ecosystem. Dr. Jim Carlton of Williams College, and Dr. Andrew Cohen of the University of California at Berkeley were co-principal investigators. Other studies on the Chesapeake Bay and Florida are underway and should be completed soon.

A shipping study was conducted by the Coast Guard (with a grant through NOAA's National Sea Grant College Program) to determine the degree to which shipping is a vector of aquatic nuisance species, and identify alternatives for controlling introductions through shipping, and the feasibility of implementing regional versus national control measures. The study is under the purview of the Secretary of Transportation and will not be addressed in this testimony.

In addition to co-chairing the Task Force, NOAA has been involved with a number of other nonindigenous species activities. In response to the growing problem of marine invasions, in April of 1993, NOAA sponsored an international workshop on nonindigenous estuarine and marine organisms. More recently, NOAA moved to address the growing threat of new introductions via ballast water. In November 1995, the President signed Public Law 104-58 which authorized, for the first time, the export of Alaskan North slope crude oil. The statute required the President to consider the results of an environmental review prior to making a determination on whether lifting the export ban was in the national interest. NOAA provided the lead on the environmental review and identified that lifting the ban would in fact increase tanker traffic to and from the cold water ports of north east Asia which would increase the chance that new water borne

aquatic nuisance species could be introduced to Prince William Sound and the Port of Valdez. Fish pathogens such as the salmonid herpesvirus type II, which impact salmon, could be transported from Japanese ports via ballast water. The potential economic impact from such pathogen introductions to Alaskan aquaculture facilities would be significant. To reduce the possibility that new aquatic nuisance species would be introduced through ballast water, NOAA recommended that deep water ballast exchange be a mandatory condition for Alaskan north slope crude oil export permits. NOAA further recommended that log books be required for all ships involved with the oil exports to accurately record ballast exchange and to help track when and where any alien introductions may occur. These recommendations were agreed upon by the President and were incorporated as permit conditions in the President's national interest determination. These measures were fully supported by the State of Alaska.

NOAA's Line Offices have long been involved with a number of nonindigenous species activities dating back to the early 1970s when the agency was first created. At that time, the National Marine Fisheries Service (NMFS) established a shellfish disease research program. The Oxford, Maryland, Cooperative Laboratory is among the leading institutions in the world for detection of molluscan diseases and has been in the forefront in finding a solution to diseases such as MSX and dermocystidium. NMFS has also provided Saltonstall-Kennedy grants to deal with the problems caused by specific nonindigenous species. For example, in 1995 grants were made to improve the detection of the taura syndrome virus in shrimp, to control the spread of the introduced plant, *Spartina alterniflora*, in the State of Washington, and to develop methods for controlling the green crab on the west coast. Given the importance of the nonindigenous species problem, NMFS has proposed additional efforts in the current fiscal year to specifically begin addressing threats and impacts to fisheries and other living marine resources from introductions of aquatic nuisance species. Working with the National Fish and Wildlife Foundation, NMFS is providing federal funds to attract private sector matching funds for challenge grants. These grants will forge new partnerships between the public and private sector to identify the threats, impacts and management priorities of nonindigenous species introductions to marine fisheries and coastal ecosystems. These partnerships will accomplish three important things: (1) sponsor a scientific workshop to review the current state of marine introductions and make recommendations to the Task Force on candidates for listing as marine aquatic nuisance species under the Act; (2) produce a research strategy and leverage a small amount of research funds for NOAA and partners on marine aquatic nuisance species; and (3) provide graduate fellowships for training to develop the tools and expertise to quickly identify and control marine nonindigenous species. The lack of marine expertise is one of the critical weaknesses in NOAA's ability to document, identify, and mitigate introductions of marine nonindigenous species.

Shortly after the zebra mussel invasion of the Great Lakes, NOAA's Great Lakes Environmental Research Laboratory, Office of Oceanic and Atmospheric Research, recognized that impacts of zebra mussels on ecosystems could not be predicted because no ecosystem level studies had ever been conducted in North America or Europe. GLERL conducted intense monitoring and experimental work on Saginaw Bay before and after the zebra mussel invasion. Saginaw Bay, a semi-enclosed, shallow bay of Lake Huron was small enough to allow scientists to sample nutrients, contaminants, and everything up and down the food chain. The program started in 1990 and was expanded in 1991. In late 1991, Saginaw Bay became infested with zebra mussels, and during 1992 and 1993, the water became clearer because of the mussel filtering activities, and aquatic weeds became more abundant because of the increased water clarity. GLERL, taking the lead, also enlisted the aid of the EPA, the Michigan Department of Natural Resources, and Sea Grant universities to ensure all major components of the ecosystem were covered. In addition, work at GLERL carefully documented the devastating effects of zebra mussels on native mussels in Lake St. Clair and Lake Erie.

GLERL believes that the Saginaw Bay ecosystem, Lake Erie and nearshore environments of most Great Lakes have been destabilized by the zebra mussel. Further research is required to understand these effects so that appropriate management strategies for nutrient control and fisheries impacts can be developed for coping with the zebra mussel and other invaders already in or anticipated to invade the Great Lakes and other waters. As you are well aware, NOAA's National Sea Grant College Program has been carrying out a substantial program of research, outreach, and public education on zebra mussels for the past five years. The Sea Grant program of research and outreach into nonindigenous species issues includes not just zebra mussels but other Great Lakes species, oyster diseases, and various marine invaders, and represents the largest effort of its kind in the Federal government. Over 90 research projects have been supported dealing

with zebra mussels, and while the majority of that work has been accomplished with funds appropriated to Sea Grant through the Aquatic Nuisance Prevention and Control Act, about one-fourth of the projects have been made possible with funds from the core appropriation for Sea Grant. There have been numerous accomplishments of this program, including achieving a clear understanding of the changes zebra mussels have caused in freshwater ecosystems, developing various chemical and mechanical control methods in concert with the private sector, and establishing basic cost/benefit analyses with which to evaluate proposed control strategies. A major thrust of Sea Grant's efforts has been to educate the public in how they can prevent the spread of zebra mussels. Over one million identification cards have been distributed throughout the Great Lakes region telling boaters what to look out for and how they can clean their own boats of zebra mussels. Sea Grant advisory agents have continually transferred the latest information to industrial and municipal water users. Recently, Sea Grant and the United States Department of Agriculture's Cooperative Extension Service have established a joint effort to transfer the results of Sea Grant's research and outreach experience with zebra mussels to inland and western states who will eventually have to address the problem.

Focusing on Sea Grant's additional work in marine nonindigenous species, let me highlight some achievements. Sea Grant researchers are carrying out a major program of research into the oyster diseases that are causing severe problems for the Chesapeake Bay oyster industry. Research is aimed at understanding the course of the diseases and at developing resistant strains that may allow the industry to recover. Also in Chesapeake Bay, Sea Grant is evaluating the impact of the substantial shipping traffic on ballast water introductions. On the Gulf Coast, researchers are studying another invading mussel, the brown mussel, which has been found fouling water intakes in Texas. Scientists are looking at the physiological limits of the species with an eye toward designing non-chemical control strategies. There has been a long-term and continuing interest in Sea Grant in various diseases that impact the aquaculture industry. Current research is focused on detection and prevention of viral disease in shrimp aquaculture in the Gulf Coast. On the west coast, California researchers are concerned with a small marine worm, probably introduced from South Africa, that is harming abalone culture operations, and threatening abalone enhancement projects that involve planting the abalone in the wild. The worm also is capable of infesting other native molluscs and the researchers are working with industry to develop plans to eradicate the worms.

In addition to its work with invading animals and disease organisms, Sea Grant has dealt with several invading plant species in the marine environment. For example, the common reed *Phragmites* had invaded one-third of Delaware's wetlands in the 50 years since it was introduced. Since the common reed is an undesirable species for water fowl habitat, Delaware had a program of spraying with a herbicide. Sea Grant funded researchers, provided detailed knowledge of the growth cycle of the plant, and worked with state agencies to reduce significantly the amount of herbicide necessary for control purposes, thus saving money while reducing the impact on the environment. Salt marsh cordgrass is invading west coast mudflats, damaging the most productive oyster beds in the Nation in Washington's Willapa Bay, and threatening shorebirds and migratory waterfowl by altering their habitat. Ironically, this is the same species of marsh grass we plant on the east coast to restore or create salt marshes, but as we have often seen, when a species is taken out of its environment and introduced into another, it can become a serious problem. Washington Sea Grant held a workshop in 1990 that successfully focused public attention on the problem and now Sea Grant researchers are investigating the impact of the grass in altering the feeding patterns of fish and birds that rely on the animals present in the previously bare mudflats for their food, and in changing the patterns of water movement in the Bay. Other researchers are evaluating the threat that the invading cordgrass may genetically cross with the native species in California marshes and hinder efforts to restore California's decimated wetlands. NOAA strongly supports H.R. 3217 the "National Invasive Species Act of 1996." Nonindigenous species invasions are increasing both in frequency and in extent of damage they cause to the Nation's environment and economy. Once invasions have occurred, the costs to control them are high, and we believe the most cost-effective means to deal with nonindigenous species invasions is to prevent them from ever occurring. NOAA views this legislation as necessary in order to ensure that the problem of nonindigenous species invasions continues to be addressed in a coordinated and cost-effective manner that maximizes the protection of the aquatic environment while minimizing the burdens on the international shipping industry. H.R. 3217 has the right emphasis, to establish a nationwide ballast water management program based on the successful Great Lakes ballast water management program developed as a result of the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990. In particular, NOAA endorses the approach taken in H.R. 3217 that would establish voluntary ballast water management

guidelines, and only takes a regulatory approach as a last resort if the voluntary measures are not successful. While H.R. 3217 as written will help prevent the further introduction of nonindigenous species into U.S. waters, NOAA remains concerned that there is inadequate attention brought to the problem of spread of nonindigenous species between U.S. waters. For example, intra-basin transports have proven to be a problem in the Great Lakes with such species as the Eurasian ruffe jumping from Duluth Harbor, Lake Superior to Thunder Bay, Lake Huron. Ruffe now compete with the important yellow perch fishery in Northern Lake Huron, and are a large step closer to the economically important fisheries of Saginaw Bay and Western Lake Erie. Transport of nonindigenous species within the U.S. exclusive economic zone may not be preventable by ballast water exchange and most likely will require an emphasis on more innovative ballast water treatment and management techniques. The impacts of aquatic nuisance species are now well established in marine waters as well as the Great Lakes, and we support the removal of the earmark for Great Lakes funding from the authorization for NOAA's National Sea Grant College Program. However, Sea Grant intends to continue to give Great Lakes issues the attention they deserve, and offer support to inland states when appropriate, giving those states the advantage of Sea Grant's expertise and experience in coastal waters.

The marine and coastal waters of the United States are a resource of immeasurable economic, environmental and aesthetic value. Fisheries in the U.S. remain extremely valuable to the Nation's economy, contributing over \$25 billion annually. Although we believe it is not possible to prevent all alien species introductions, and indeed there have been some beneficial introductions to marine industries such as aquaculture, we do believe that with further research and management strategies we will be able to greatly reduce the risk of introduced species and therefore the negative impacts on our environment. A lesson we have learned from the Great Lakes experience is that it is very difficult to control and almost impossible to eradicate a species once it is introduced.

Mr Chairman, thank you for the opportunity to testify on this important issue. I will be pleased to answer any questions that you may have.

# # #