Combating the Non-Native Species Invasion of the United States

by

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Originally published in DRAKE JOURNAL OF AGRICULTURAL LAW
2 DRAKE J. AGRIC. L. 259 (1997)

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I. INTRODUCTION

The City of Monroe, Michigan, spent $2 million to clean the city's water source intake pipe, which was clogged by zebra mussels.[1] Cholera, discovered in fish and shellfish in Alabama, was traced to in ballast water released by ships in Mobile Bay.[2] Such occurrences are becoming more prevalent in the United States today as non-native aquatic species[3] are infesting its waters. Non-native aquatic species introduced into the United States pose a serious threat to our nation's water ecosystem and water supply, and are very expensive to control.[4] A 1993 report concluded that 4,500 non-native species are in the United States, of which 675 or 15% have adverse economic effects.[5] Only ninety-seven of those species

1. *Zebra Mussel Poses Threat to Water Supplies*, CHI. TRIB., Nov. 7, 1989, at 3.

2. *Reauthorization of the 1990 Nonindigenous Aquatic Nuisance Prevention and Control Act: Hearings on H.R. 3217 Before the Subcomm. on Water Resources and Environment and the Subcomm. on Coast Guard and Maritime Transportation of the House Comm. on Transportation and Infrastructure*, 104th Cong., 2nd Sess., (1996) [hereinafter *H.R. 3217 July 17*] (testimony of Alfred M. Beeton, Acting Chief Scientist of the National Oceanic and Atmospheric Administration).

3. The term "non-native species" refers to animal, plant, and pathogen species living, growing, and established outside their native habitat. WEBSTER'S COLLEGIATE DICTIONARY 788 (9th ed. 1986). "Exotic species" and "nonindigenous species" are commonly interchanged with "non-native species" and have the same definition.

4. *See, e.g., Reauthorization of the 1990 Nonindigenous Aquatic Nuisance Prevention and Control Act: Hearings on H.R. 3217 Before the Subcomm. on Fisheries, Wildlife and Oceans of the House Comm. on Resources*, 104th Cong., 2nd Sess., (1996) [hereinafter *H.R. 3217 July 11*] (testimony of Russell A. Moll, Director, Michigan Sea Grant College Program).

have caused $97 billion in damages to natural resources and lost economic production.[6] The fifteen most recent non-native aquatic species to establish themselves will cost the United States an estimated $100 billion over the next fifty years.[7]

Environmental legislation, traditionally concerned only with human management of depleted native animals and resources, harmful substances, and land requirements, needs to vigorously combat the introduction of harmful non-native aquatic species to the United States.[8] Recent federal legislation enacted to directly address the damage caused by non-native species has been inadequate to counter the invasion.[9] Viable solutions to the inadequacies of current federal legislation lie with directing more national resources to combat the non-native aquatic species invasion, changing current trade practices that are conducive to transferring non-native aquatic species into U.S. waters, and the use of public nuisance tort law.

Part II of this note will give a brief history of non-native aquatic species in the United States. Particular attention is given to the destructive power of the zebra mussel, a prime example of the need to aggressively address the non-native aquatic species problem. Part III will outline the provisions of current federal legislation that indirectly addresses non-native aquatic species, but was not enacted to combat them directly. Part IV will outline the provisions of current federal legislation that was enacted to directly effect the spread and control of non-native aquatic species. Part V will outline proposed legislation to expand the coverage of current legislation. Part VI will discuss how nuisance law can provide a solution to the inadequacies of current federal legislation and will propose an overall scheme to combat the further introduction of non-native species and their damaging effect on the economy and ecology.

II. HISTORY OF NON-NATIVE AQUATIC SPECIES

More than 250 million years ago, all the land on earth was connected in a huge land mass called Pangaea.[10] On Pangaea "many species were widely found because they could move about and disperse relatively freely."[11] Eventually Pangaea began to separate and the continents that we now know began to drift toward their present locations.[12] As the drifting land masses became isolated, the

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5. *Reauthorization of the 1990 Nonindigenous Aquatic Nuisance Prevention and Control Act: Hearings on S. 1660 Before the Subcomm. on Drinking Water, Fisheries and Wildlife of the Senate Comm. on Environment*, 104th Cong., 2nd Sess., (1996) [hereinafter *S. 1660*] (testimony of Rowan W. Gould, Deputy Assistant director--Fisheries U.S. Fish and Wildlife Service, Department of Interior).

6. *See id.*

7. *See id.*

8. *See* Daniel P. Larsen, *Combating the Exotic Species Invasion: The Role of Tort Liability*, 5 DUKE ENVTL. L. & POL'Y F. 21 (1995).

9. *See, e.g.*, Nonindigenous Aquatic Nuisance Prevention and Control Act, 16 U.S.C. §§ 4701-4751 (1994); Alien Species Prevention and Enforcement Act, 39 U.S.C. § 3015 (1994).

10. David Yount, *The Eco-Invaders*, EPA J., Nov.-Dec. 1990, at 51.

11. *See id.*

12. *See id.*

animals that were once so widely dispersed became separated from one another.[13] Over millions of years, "these species evolved in diverse ways and produced varieties that might not have survived had they needed to compete with their close or distant relatives" on other continents.[14] As a result of continental drifting, the number of species on earth increased.[15]

The introduction of non-native animals in the United States is not a new phenomenon. Many of the species separated by the breakup of Pangaea have been reunited in the last 500 years through worldwide trade.[16] The invasion of non-native aquatic species has taken many routes including canals, purposeful introductions, unintentional escapes from ponds and aquaria, and ballast water.[17] The most prevalent way non-native aquatic species travel to the United States is by ships carrying them in their ballast water, anchor chains or other structural niches.[18] On average, more than 100 million gallons of ballast water is taken on board each ship at ports of origin and discharged at U.S. ports of call.[19] Every minute over 40,000 gallons of ballast water is deposited in U.S. coastal waters, totaling 21 billion gallons per year.[20]

The rate of the non-native species invasion is rapidly increasing. As of 1992, the international fleet capable of trans-oceanic transport consisted of 39,896 vessels, and new trade routes with China and Eastern Europe allow more of these ships to enter U.S. waters.[21] In addition, ships are faster and larger today, so the stowaway organisms have a better chance of surviving the voyages.[22]

Non-native aquatic species are prevalent on both coasts of the United States.[23] Japanese seaweed threatens shellfish populations along the East Coast.[24] Cholera, traced to the ballast of vessels that had visited South American ports recently, has been found in Mobile and Chesapeake Bay.[25] In San Francisco Bay, scientists tested the ballast water of a Japanese vessel and found more than 350 living species of plankton.[26] Asiatic clams, Oriental shrimp and the yellow fin goby disrupt the natural ecology of San Francisco bay.[27] In the Chesapeake Bay,

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13. *See id.*
14. *See id.*
15. *See id.*
16. *See id.*
17. *See H.R. 3217 July 17, supra* note 4, (testimony of Russell A. Moll) (Aquaculture practices have also lead to the unintentional release of non-native aquatic species. The Florida Everglades has been hit especially hard by the unintentional release of non-native fish raised for the sale to pet stores. Margueritte Holloway, *Musseling In; Aquatic Organisms Invade New Ecosystems*, SCI. AM., Oct. 1992, at 22).
18. S. REP. No. 101-523 (1990).
19. *Id.*
20. *See S. 1660, supra* note 5, (testimony of Dr. James T. Carlton, Director of the Maritime Studies Program of Williams College and Mystic Seaport).
21. Margueritte Holloway, *Musseling In; Aquatic Organisms Invade New Ecosystems*, SCI. AM., Oct. 1992, at 22.
22. *See* John Ross, *An Aquatic Invader is Running Amok in U.S. Waterways; Zebra Mussels Choke Great Lakes and Other Waterways*, SMITHSONIAN, Feb. 1994, at 40.
23. *See* S. REP. No. 101-523 (1990).
24. *See id.*
25. *See H.R. 3217 July 17, supra* note 2, (testimony of Alfred M. Beeton).
26. *See* Holloway, *supra* note 21, at 21.
27. *See* S. REP. No. 101-523 (1990).

the oyster fishery has been reduced from an annual harvest of 40 million pounds to 1 million pounds because of two diseases caused by non-native species.[28]

Beginning in 1850, San Francisco Bay has experienced an average rate of invasion by non-native aquatic species at one per thirty-six weeks, one per twenty-four weeks since 1970, and one per twelve weeks since 1985.[29] The highest non-native aquatic species invasion rate in the last thirty years can be found in the Great Lakes Basin.[30] Since the settlement of the Great Lakes Basin began in the early nineteenth century, more than 139 non-native aquatic species have become established in the Great Lakes.[31] Russell Moll of the Michigan Sea Grant College Program at the University of Michigan clearly stated the impact non-native aquatic species have had on the Great Lakes:

> The degree of invasion can hardly be over-emphasized; almost the entire Great Lakes food web consists of nonindigenous species. Most of the organisms in the everyday lives of people who interact with the Great Lakes are invaders from another system. These include carp, alewife, rainbow smelt, coho salmon, chinook salmon, purple loosestrife, and water chestnut. The great benefits of a shrinking world, a more fluid global economy and a more mobile society have come at a cost to our ecosystem.[32]

Other non-native aquatic species present in the Great Lakes Basin include the sea lamprey and the European river ruffe.[33] Currently, the U.S. and Canadian governments together spend $10 million per year to control sea lamprey. Sea lamprey arrived in the United States in the early 1800's with the opening of the Welland Canal connecting Lake Ontario with Lake Erie, and feed on large commercially valuable fish.[34] The U.S. government spends over $1 million per year to control European river ruffe.[35] The ruffe is a small perch-like fish in Lake Superior that eats the eggs of other fish, including the commercially valuable yellow perch.[36]

The zebra mussel is the most famous of the non-native aquatic species invaders.[37] Zebra mussels attach themselves in great abundance to boat hulls and clog the water-intake pipes of power and water intake plants.[38] They also foul beaches with their razor sharp shells.[39]

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28. *See H.R. 3217 July 17, supra* note 2, (testimony of Alfred M. Beeton).
29. *See S. 1660, supra* note 5, (testimony of Dr. James T. Carlton).
30. *See H.R. 3217 July 11, supra* note 4, (testimony of Russell A. Moll).
31. *See id.*
32. *See id.*
33. *See* Holloway, *supra* note 21, at 22.
34. *See id.*
35. *See id.*
36. *See id.*
37. For a more complete description of the Zebra Mussel, its origins, spread and research pertaining to it, visit the Internet at: *Zebra Mussels in the Great Lakes* (last revised Jun. 4, 1996) <http:///www.great-lakes.net/envt/exotic/zebra.html> [hereinafter *Great Lakes*]. A bimonthly research periodical on zebra mussels from the New York Sea Grant can be accessed by calling 800-285-2285.
38. *See Zebra Mussels - the Bright Side. They May Help Restore Bottom-Dwelling Aquatic Plants in Great Lakes*, DISCOVER, Aug. 1996, at 18. [hereinafter DISCOVER].
39. *See id.*

The zebra mussel is a small freshwater filter-feeding mollusk about the size of a pistachio nut that attaches itself to hard surfaces.[40] In the mid 1980s the zebra mussel appeared in Lake St. Clair, a small lake connecting Lake Huron with Lake Erie through the Detroit River.[41] Most experts agree the zebra mussel's larvae, known as veligers, arrived in the ballast water taken on by a vessel from Eastern Europe and discharged in Lake St. Clair for stabilization.[42]

Zebra mussels evolved in the Black and Caspian Seas and arrived in Eastern Europe 200 years ago through newly opened canals and quickly raised havoc throughout Europe.[43] In 1880, water intake pipes in Rotterdam and Hamburg were blocked completely.[44] Europe is lucky to have natural predators to help control zebra mussel populations, but regular maintenance still must be performed on its intake pipes.[45] In the United States, few natural predators of zebra mussels exist.[46]

Worse yet, Zebra mussels reproduce at astounding rates. Each zebra mussel produces 20,000 to 30,000 eggs per year which quickly adhere to any solid surface they can find, including other animals.[47] Zebra mussel populations have reached astounding proportions in the Great Lakes Basin. In Lake St. Clair and the western basin of Lake Erie there are more than 600,000 zebra mussels per cubic yard.[48] Experts predict the estimated costs of controlling zebra mussels in the Great Lakes Basin will be $400 million per year.[49]

The most pronounced ecological side effect of zebra mussels is their capacity to filter a liter of water per day.[50] Zebra mussels easily filter all the water of Lake St. Clair several times a day[51] and filter the western basin of Lake Erie once a week.[52] Through filtration, zebra mussels eat and remove every microscopic aquatic plant and animal from the water thereby changing the structure of the food web.[53] In Lake Erie, the zebra mussel has reduced some forms of phytoplankton, the basis of the lake food web, by eighty percent.[54]

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40. *See* S. REP. No. 101-523 (1990).
41. *See* Ross, *supra* note 22, at 22.
42. *See id.*
43. *See id.*
44. *See id.*
45. *See id.*
46. *See id.*
47. Ryan Will, *Shell Shockers: Zebra Mussels are Changing the Fishing in Every Body of Water They Colonize*, OUTDOOR LIFE, Aug. 1996, at 8. The reproductive capacity of zebra mussels can be illustrated by the true story of a red Camaro that was pulled from the water of the northwestern shore of Lake Erie after being submerged for eight months and was covered by zebra mussels three inches thick. No area of the car was left uncovered, including rubber, metal, glass, or cloth. Ross, *supra* note 22, at 22. Also, zebra mussels have been known to congregate on navigational buoys in such numbers as to sink them under their weight. DISCOVER, *supra* note 38, at 18.
48. *See id.*
49. *See S. 1660*, *supra* note 5, (testimony of Rowan W. Gould).
50. *See Zebra Mussels and Other Nonindigenous Species* (visited Oct. 15, 1996) <http://www.great.lakes.net/evnt/exotic/zebra.html> [hereinafter *Zebra Mussels*].
51. *See* Yount, *supra* note 10, at 51.
52. *See Zebra Mussels*, *supra* note 50.
53. *See id.* For instance, zoo plankton feed on phytoplankton, larval and small fish feed on zoo plankton, and larger predatory fish prey upon the smaller fish. Therefore, with less phytoplankton, the ecosystem's chain links are removed and species [populations] collapse.

Zebra mussels, with all their destructive power, are spreading throughout the freshwaters of the United States. From its focus point of Lake St. Clair in 1986, the zebra mussel has spread throughout the Great Lakes, to all States east of the Mississippi River as far south as Louisiana and as far west as Oklahoma.[55] They even have been spotted on the California-Nevada border on recreational boats.[56] The zebra mussel's economic impact on western states could be catastrophic because most of the region's water is in canals.[57]

Stop-gap measures are being taken currently to control the zebra mussels effect on water intake pipes, although information about direct measures to control their effect on the environment could not be found. Flushing water intake pipes with chlorine is the most popular treatment of controlling zebra mussels, but "increased chlorination clearly contradicts the efforts of the Great Lakes community to reduce the amount of chlorine entering the ecosystem."[58] Preliminary research has shown that potassium, bromine, ozone, hot water, and ultraviolet light might be possible alternatives to chlorine.[59]

Although the zebra mussels are overwhelmingly a nuisance, their filtration has a beneficial side effect: water clarity. By filtering the water, thereby making it clearer, sun light can penetrate depths up to forty feet or more in the Great Lakes.[60] This has allowed long-vanished native water plants, such as tape grass, to reappear.[61]

III. INDIRECT FEDERAL LEGISLATION AFFECTING NON-NATIVE SPECIES

The federal government has never passed legislation to prevent directly the introduction or control of *all* non-native species. However, in the early twentieth century, the United States began to enact federal statutes that indirectly regulated the introduction of non-native species to protect agricultural and horticultural interests.

In 1900, Congress passed the Lacey Act, which prohibits the importation of "any foreign wild animal or bird," including the mongoose, fruit bat, English sparrow, starling, and any other animal that the Secretary of Agriculture deemed

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Larsen, *supra* note 8, at 24. Another, less proven bad side to zebra mussel filtration is that toxic chemicals, suspended in the water, are absorbed by the mussels. Peter Coy, *A Nice Side to Zebra Mussels?*, BUS. WK., Dec. 18, 1995, at 8. The few predators of zebra mussels in U.S. waters also absorb the toxins, thus allowing the toxins to enter the food chain. *See id.* Scientists also believe that zebra mussels are responsible for a huge bloom of toxic algae in Lake Erie. *See id.*

54. *See Great Lakes*, *supra* note 37.

55. *See H.R. 3217 July 11*, *supra* note 4, (testimony of Russell A. Moll).

56. *See id.*

57. *See* Will, *supra* note 47. The canals are made of concrete and have a current making them perfect homes for zebra mussels. *See id.*

58. *Great Lakes*, *supra* note 37.

59. *See id.*

60. *See* Coy, *supra* note 53, at 8. The zebra mussel has increased Lake Erie's water clarity by 600%. *Great Lakes*, *supra* note 37.

61. *See* DISCOVER, *supra* note 38. Increased water clarity has received mixed reviews on its impact on native fish populations. Largemouth bass, smallmouth bass, pike and catfish populations benefit from the clarity because of their reliance on ambushing their prey. Will, *supra* note 47; DISCOVER, *supra* note 38. On the other hand, perch and walleye fry are losing their source of food when zebra mussels eat zoo plankton. *See* Will, *supra* note 47.

contrary to the nation's agricultural interests.[62] As originally enacted, the Lacey Act clearly was not concerned with the environmental impacts non-native species would have on the native ecosystem.[63] Today, the Lacey Act is a much broader law meant to combat the illegal trade and transport of certain named species. In 1981, the Lacey Act was amended to make it "unlawful for any person-- (1) to import, export, transport, sell, receive, acquire, or purchase any fish or wildlife or plant taken, possessed, transported, or sold in violation of any law, treaty, or regulation of the United States or in violation of any Indian tribal law. . . . "[64]

The Lacey Act is inadequate to affect the continued introduction and proliferation of non-native species, perhaps because its original enactment was meant to protect our nation's agricultural interests. The regulations stemming from the Lacey Act work only to prohibit specifically named harmful species from importation into the United States.[65] Many commentators have determined the listing of named species is too burdensome on the Secretary of the Interior because of his duty to determine whether a species is injurious[66] before naming it to the prohibited list.[67] Most likely, once the Secretary of the Interior has determined the species is injurious, the species already has been introduced into the environment.

Instead of having the Secretary of the Interior provide a list of prohibited injurious species, a better and more efficient requirement would be for the Secretary of Interior to provide a list of non-injurious species that do not violate the Lacey Act.[68] This type of list scheme would place the burden on the proposed importer of any given species to prove to the Secretary of the Interior that the species is in fact non-injurious.[69] Although this proposed listing change would work well for importers who know they are importing non-native species, it would prove very burdensome on importers who do not know they are importing non-native species. For example, if a company is transporting grain to the United States by ship, the company must determine what non-native species to the United States are contained on board the ship [in the ballast water, in the grain, in the anchor chains, etc.]. Then the company must provide proof to the Secretary of the Interior that they are not injurious to the United States. If the Secretary of the

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62. 16 U.S.C. §§ 3371-3378 (1996) (hereinafter *Lacey Act*) (original version at ch. 553, 31 Stat. 187, 188 (1900)). The Lacey Act also prohibited the interstate transportation of any wild animals or birds killed in violation of state law and gave the Secretary of the Agriculture and later the Secretary of the Interior, the power to adopt measures necessary for the preservation, distribution, introduction, and restoration of game birds and other wild animals. Congress used its power to regulate commerce as authority to pass the Lacey Act and the use of such power was first upheld in The Abbey Dodge. *See* U.S. CONST. art I, § 8; Abbey Dodge v. United States, 223 U.S. 166 (1912).

63. *See* Larsen, *supra* note 8, at 27.

64. *Lacey Act*, *supra* note 62, § 3372 (a)(1).

65. *See* Larsen, *supra* note 8, at 27. The Lacey Act makes it unlawful to import or possess zebra mussels and the brown tree snake as well as other species deemed injurious by the Secretary of the Interior. *See* 18 U.S.C. § 42 (a)(1) (1996).

66. Section 42 of 18 U.S.C., subsection (a)(1) provides that animals that prove to be injurious to humans, agriculture, forestry or wildlife are prohibited.

67. *See* Larsen, *supra* note 8, at 27; Julianne Kurdila, *The Introduction of Exotic Species into the United States: There Goes the Neighborhood!*, 16 ENV. AFF. L. REV. 95, 104-105 (1988).

68. *See* Larsen, *supra* note 8, at 27.

69. *See* George Laycock, *The Importation of Animals*, SIERRA, Apr. 1978, at 20, 22.

Interior is satisfied that the species is non-injurious, then the species is placed on the list of species that do not violate the Lacey Act. This process would undoubtedly be very time-consuming and not cost productive for the importer.

Another failing of the Lacey Act is that it applies only to intentional introduction, "or introductions where the [importing] person did not exercise due care in knowing that prohibited species were being introduced."[70] The Lacey Act should be more active to encourage importers to be pro-active in preventing "non-negligent, unintentional introductions of exotic species."[71]

The Endangered Species Act is another example of a Congressional attempt to address indirectly the introduction of non-native species into the United States.[72] The purposes of the Act "are to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species".[73] Section 1538 (a)(1)(B) of the Act prohibits the taking of any listed endangered or threatened species within the United States[74]. The Act defines "take" to mean to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct."[75] To "harm" has been defined to mean to kill or injure or to significantly modify or degrade a listed species habitat which kills, injures or impairs essential behavioral patterns.[76] As previously discussed, non-native species modify, degrade, and even kill many native animals in the United States.

In *Palila v. Hawaii Dep't of Land & Nat. Resources*, the court used the Endangered Species Act to remove a non-native species that "harmed" a listed species.[77] In *Palila*, the Sierra Club sought to remove a non-native goat herd from an area where they were harming an endangered tree.[78] The court agreed with the Sierra Club that the Endangered Species Act could work to move a large and easy to capture non-native species. However, the Endangered Species Act has yet to be used to remove totally or prevent a non-native species from entering the United States. The major inadequacy of the Act in preventing and controlling non-native species is that it is limited to those non-native species that affect endangered or threatened species. If a non-native species harms a non-listed species, the Act has no power.

The Lacey and Endangered Species Acts are two examples of federal statutes that have an impact in preventing and controlling the harms caused by the current invasion of non-native species. However, both Acts were never directly intended to produce this result.

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70. Larsen, *supra* note 8, at 29.

71. *Id.*

72. *See* 16 U.S.C. §§ 1531-1544 (1994) [hereinafter *Endangered Species Act*].

73. *Endangered Species Act*, 16 U.S.C. § 1531(b) (1994).

74. *Endangered Species Act*, 16 U.S.C. § 1538(a)(1)(b) (1994).

75. *Endangered Species Act*, 16 U.S.C. § 1532(19) (1994).

76. 50 C.F.R. § 17.3(c) (1993).

77. Palila v. Hawaii Dep't of Land & Nat. Resources, 852 F.2d 1106 (9th Cir. 1988). Not all circuits in the U.S. have followed the Ninth Circuit's lead.

78. *See id.* at 1108.

IV. EXISTING LAW DIRECTLY TARGETING NON-NATIVE AQUATIC SPECIES

The zebra mussel brought the need for direct legislation to control and prevent further introductions of non-native species to the attention of the nation and Congress.[79] Since its unintentional introduction into the U.S., Congress enacted legislation specifically targeted toward controlling and preventing the further introduction of aquatic non-native species. [80]

The Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 was Congress' first and only attempt to control and prevent the further introduction of non-native aquatic species.[81] The purposes of the Act are the following:

> (1) to prevent unintentional introductions and dispersal of nonindigenous species into waters of the United States through ballast water management and other requirements;
> (2) to coordinate federally conducted, funded or authorized research, prevention control, information dissemination and other activities regarding the zebra mussel and other aquatic nuisance species;
> (3) to develop and carry out environmentally sound control methods to prevent, monitor and control unintentional introductions of nonindigenous species from pathways other than ballast water exchange;
> (4) to understand and minimize economic and ecological impacts of nonindigenous aquatic nuisance species that become established, including the zebra mussel; and
> (5) to establish a program of research and technology development and assistance to states in the management and removal of zebra mussels.[82]

When enacted, the Act required the creation of a voluntary ballast water exchange program in the Great Lakes Basin.[83] By 1992, this exchange program was to become mandatory.[84]

The ballast water exchange program called for vessels to do the following:

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79. *See S. 1660, supra* note 5, (testimony of Rowan W. Gould).

80. For example, the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, 16 U.S.C.S. §§ 4701-4751 (Law. Co-op. 1996). Congress has also enacted The Alien Species Prevention Enforcement Act of 1992. The purpose of this act was not to prevent the introduction of non-native aquatic species in the United States but was to prohibit the U.S. Postal Service from transporting any prohibited species of the Lacey Act to the State of Hawaii. *See* 39 U.S.C. § 3015 (1994).

81. The author will continue to use the term non-native species for the sake of consistency throughout this article, except when providing provisions of a statute. The Nonindigenous Aquatic Nuisance Prevention and Control Act defines "nonindigenous species" as "any species or other viable biological material that enters an ecosystem beyond its historic range, including any such organism transferred from one country to another . . . ." 16 U.S.C. § 4702(9) (1994).

82. 16 U.S.C. § 4701(b) (1994).

83. *See* 16 U.S.C. § 4711(a)(1) (1994).

84. *See* 16 U.S.C. § 4711(b)(1) (1994).

> carry out an exchange of ballast water beyond the exclusive economic zone prior to the entry into any port within the Great Lakes; carry out an exchange of ballast water in other waters where the exchange does not pose a threat of infestation or spread of acquatic nuisance species in the Great Lakes and other waters of the United States . . . or; to use environmentally sound alternative ballast water management methods approved by the Secretary [of Transportation].[85]

The penalties for not following the ballast water management requirements of the Act are (1) the required clearance of a vessel to enter U.S. waters may be revoked;[86] (2) a fine up to $25,000 for each day not in compliance with the Act;[87] and (3) the person responsible will be guilty of a class C felony.[88]

The Act also required the creation of a task force program to monitor and detect nonindigenous species in U.S. waters, develop control measures to minimize the risk of harm to the environment and public economic welfare, and provide research concerning the control and prevention of non-native aquatic species.[89] The Act also called for International cooperation[90] and authorized approximately $40 million each year to implement all the programs required under the Act.[91]

The Act unfortunately has been woefully inadequate to solve the non-native aquatic species problem. First, the Act requires a mandatory ballast exchange program only in the Great Lakes. It does not provide for a ballast exchange program throughout the nation. Second, the mandatory ballast exchange program in the Great Lakes is a delusion. At present, no proven viable "procedures or technology exists to manage residual ballast on board vessels entering U.S. ports fully laden with cargo except to retain the ballast on board."[92] Until such technologies become available, the only alternative is to "require the residual ballast vessels to exchange their ballast at alternative exchange sites within the Great Lakes after they unload cargo."[93] Currently, there are no identified alternative exchange sites in the Great Lakes.[94] Until such sites become available, the Coast Guard will not be able to enforce and regulate the ballast water exchanges of vessels until new technologies become available.[95] The Act's shipping study identified open water exchange, heating the water, and filtering the water as possible alternatives, but even these are not currently widely available.[96]

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85. 16 U.S.C.S. § 4711(b)(2)(B)(i)-(iii) (Law. Co-op. 1996).
86. *See* 16 U.S.C.S. § 4711(b)(2)(F) (Law. Co-op. 1996).
87. *See* 16 U.S.C.S. § 4711(c) (Law. Co-op. 1996).
88. *See* 16 U.S.C.S. § 4711(d) (Law. Co-op. 1996).
89. *See* 16 U.S.C.S. § 4722(d)-(f) (Law. Co-op. 1996).
90. *See* 16 U.S.C.S. § 4726 (Law. Co-op. 1996).
91. *See* 16 U.S.C.S. § 4741 (Law. Co-op. 1996).
92. *S. 1660, supra* note 5, (testimony of Richard M. Gaudiosi, Chief of Plans and Preparedness Division of the Coast Guard Marine Safety and Environmental Protection's Office of Response).
93. *Id.*
94. *See id.*
95. *See id.*
96. *See S. 1660, supra* note 5, (testimony of Dr. James T. Carlton).

Also, the requirements of ballast exchange are waived if the vessel's structural loading or weather conditions pose a safety concern to the vessel or its crew.[97]

Third, the Act's task force program has not been appropriately funded.[98] To be effective, "Sea Grant's[99] efforts to address the aquatic nuisance species problem require a stable base of funding that will enable [it] to continue a coordinated, national effort through research, public education and outreach."[100] Currently, the U.S. spends approximately $100 million per year to prevent the invasion of new agricultural pests.[101] In contrast, "approximately 1 million [dollars] is devoted to preventing the introduction of nonindigenous aquatic organisms."[102]

Fourth, the enforcement provisions and penalties are under the control of executive agencies. The Act does not allow a private citizen or entity to apply for recourse to protect their ecosystems or receive remedies for ecological destruction. This issue will be discussed and more fully developed in Part V of this article.

Even with all its faults, the Act is a good faith first step by Congress to first, recognize there is a monumental problem with the invasion of non-native aquatic species; and, second, provide adequate funding for Sea Grant programs to develop mechanisms to prevent and control non-native aquatic species in U.S. waters.

V. PROPOSED LEGISLATION DIRECTLY TARGETING NON-NATIVE AQUATIC SPECIES

Currently, Congress is considering H.R. 3217[103] and S. 1660,[104] which will expand and re-authorize the Nonindigenous Nuisance Prevention and Control Act of 1990. These two bills have only minor differences, and if enacted, the legislation will be titled the National Invasive Species Act of 1996.[105]

The proposed legislation would continue to require a mandatory ballast water management program in the Great Lakes and would expand it to the Hudson River Valley north of the George Washington Bridge in New York City.[106] It also would create national voluntary ballast water management

97. *See H.R. 3217 July 17, supra* note 2, (testimony of Alfred M. Beeton).

98. *See S. 1660, supra* note 5 (testimony of Sally Yozell, Deputy Assistant Secretary for Oceans and Atmosphere National Oceanic and Atmospheric Administration).

99. Sea Grants are federal and collegiate programs provided with federal funding to perform research concerning aquaria. *See id.* Sea Grant research programs are developing research pertaining to the Nonindigenous Aquatic Nuisance Prevention and Control Act in the following categories: biology and life history; effects on ecosystems; socio-economic analysis; costs and benefits; control and mitigation; preventing new introductions; and reducing the spread of established population of non-native species. *See H.R. 3217 July 11, supra* note 4, (testimony of Russell A. Moll).

100. *See H.R. 3217 July 11, supra* note 4, (testimony of Russell A. Moll).

101. *See S. 1660, supra* note 5, (testimony of Steven Hall, Executive Director of the Association of California Water Agencies).

102. *Id.*

103. H.R. 3217, 104th Cong. (1996).

104. S. 1660, 104th Cong. (1996).

105. H.R. 3217(a), 104th Cong. (1996).

106. H.R. 3217(b)(3), 104th Cong. (1996).

guidelines,[107] and maintain the research and reporting programs and penalties established in the Nonindigenous Nuisance Aquatic Prevention and Control Act of 1990.[108]

As stated earlier, the mandatory ballast water management program is unworkable. There are still no viable procedures or technology to manage ballast on board vessels entering U.S. ports.[109] Also, there are no alternative ballast exchange sites in the Great Lakes or Hudson River Valley.[110] Although the proposed legislation expands the ballast management program nation-wide, it is voluntary and thus, not enforceable nor subject to penalties.[111]

The proposed legislation would further weaken the mandatory ballast water management program, even if it became viable by providing a liberal exception. The exception is that "[t]he master of a vessel is not required to conduct a ballast water exchange if the master decides that the exchange would threaten the safety or stability of the vessel, its crew, or its passengers because of adverse weather, vessel architectural design, equipment failure, or any other extraordinary conditions."[112] Even if alternative ballast exchange sites are located within the Great Lakes or the Hudson River Valley, a ship captain may dump his ballast if he, in good faith, believed it was necessary and he complies with the reporting requirements of the proposed legislation. The "good faith" standard encompasses only an honest belief on the part of the captain of the vessel that it is necessary to dump his ballast water.[113] Most likely, this subjective standard would be too burdensome for a prosecuting government agency to prove that the captain did not act with an honest belief in dumping ballast water within the exceptions of the Act.

The proposed legislation would decrease authorized funding from approximately $40 million to $36 million.[114] This would be counter-productive in combating the invasion of non-native aquatic species in U.S. waters considering that the proposed legislation expands the scope of the 1990 Act, thus requiring more personnel and research. Moreover, the current level of funding has been insufficient to produce a viable ballast water management program.[115] The U.S. Coast Guard commented that it would need, to fulfill its obligations under the proposed legislation, $1 million more than its entire budget request for fiscal year 1997. [116] Clearly, with this proposed legislation, Congress is paying only lip

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107. H.R. 3217(c), 104th Cong. (1996).

108. H.R. 3217(b)(4), (e)(2), (g)(1)-(3), 104 Cong. (1996).

109. *See S. 1660, supra* note 5, (testimony of Richard M. Gaudiosi).

110. *Id.*

111. H.R. 3217(c), 104th Cong. (1996).

112. H.R. 3217(K)(1), (g)(4)(a), 104th Cong. (1996).

113. BLACK'S LAW DICTIONARY 477 (6th ed. 1991). "Good faith is an intangible and abstract quality with no technical meaning or statutory definition, and it encompasses . . . an honest belief, the absence of malice. . . and an individual's personal good faith is concept of his own mind. . . ." *Id.*

114. *See* H.R. 3217(F), 104th Cong. (1996); *State of Michigan Department of Environmental Quality, Office of the Great Lakes* (visited Oct. 15, 1996) <http:///www.deq.state.mi.us>.

115. *See S. 1660, supra* note 5, (testimony of Rowan W. Gould)."Implementing existing and additional nonindigenous species authorities is, to a large extent, a question of resources to carry out these important responsibilities in a timely and optimal fashion." *Id.*

116. *See id.* (testimony of Richard M. Gaudiosi).

service to a national disaster waiting to happen.[117] This is unfortunate because it would be more cost effective and environmentally sound to prevent the introduction of non-native species than to spend billions in the future on control programs that have a mixed record of success.[118]

VI. FILLING IN THE HOLES WITH NUISANCE LAW

The federal statutory approach used in the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 and the proposed National Invasive Species Act of 1996 are full of gaping holes, which allow non-native aquatic species to continue to invade U.S. waters and damage our environment and economy. The Act and proposed Act's main focus is to prohibit and enjoin the activities of vessels unintentionally bringing in non-native aquatic species in their ballast water. They do not address intentional introductions or unintentional introductions by individuals. Imposing the costs of non-native aquatic species introductions on those responsible may be more effective than commanding a specific statutory course of action. Nuisance law may not be the "cure all" in the fight to prevent and control all non-native species, but it is much more flexible in its possible application to varying circumstance. In fact, Congress has codified some of the principals of nuisance law in the past.[119]

The common law tort system could provide incentives for parties prone to introduce non-native aquatic species to take more protective measures to prevent themselves from becoming the passage of transport, or prevent the escape of non-native aquatic species.[120] A nuisance tort liability scheme would be flexible enough to allow a business to change its methods conducive to the introduction of non-native aquatic species.[121] Statutes are rigid and demand a certain, narrow type of conduct that cannot be changed until the law or its regulations are changed. The regulations required for the implementation of statutes are slow to change. As shown by previous discussion of the inadequacy of the ballast water management program, regulations keep inadequate measures in place instead of encouraging the development of more effective control mechanisms.[122] Further, new designs and measures to prevent more introductions and controlling the

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117. *See H.R. 3217 July 17*, *supra* note 2, (testimony of Alfred M. Beeton). For example, the disease that arrived in Chesapeake Bay with the introduction of a non-native fish could potentially wipe out all oyster fishing on the East Coast and the Gulf of Mexico. *Id.* Or the zebra mussel may become established in California's water canal systems and deplete the water supply to Southern California and require the chlorination of the canals which would require more water treatment to remove the chlorine at its destination. *See* Will, *supra* note 47.

118. *See H.R. 3217 July 11*, *supra* note 4, (testimony of Russell A. Moll).

119. *See, e.g.*, The Federal Water Pollution Control Act, Pub. L. No. 80-845, 2(d)(1), 62 Stat. 1155, 1156 (1948) (declaring pollution of interstate waters to be a public nuisance and subject to abatement); *See* Larsen, *supra* note 8, at 39. The Endangered Species Act also has a citizen suit provision allowing any person to commence a civil suit on his own behalf to enjoin any person or entity who is in violation of the Act's provision. 16 U.S.C.S. § 1540(g) (Law. Co-op. 1996).

120. *See* Larsen, *supra* note 8, at 37.

121. *See id.*

122. *See* Adam Babich, *Understanding the New Era in Environmental Law*, 41 S.C. L. REV. 733, 761-62 (1990). For instance, how can Congress or executive agencies keep up with the spread of the zebra mussel and provide preventative measures, (for example, in California's water canal systems) if they cannot even keep up with the risks involved in new industry developments? *See id.*

species already established will be discovered through the nuisance law scheme's flexibility.[123] "[T]he effect of . . . liability-based statutes is to assign much of the responsibility for planning for a dangerous and uncertain environmental future to that segment of society most capable of finding innovative solutions: the private sector."[124] The government is not the model when it comes to innovation, development, or productivity.[125] The added burden on industry and businesses to find solutions to stop further introductions by non-native aquatic species and control their effects is acceptable because the private sector is largely responsible for transporting them into U.S. waters, and it "enables us to discover how exotics are transported, their effect within ecosystems, and the inventory of native species in different ecosystems."[126]

Nuisance law provides the necessary court enforcement by first, finding the public nuisance, and second, fashioning an equitable remedy such as fines, abatement or an injunction.[127] Instead of a governmental agency levying a fine, limited in amount by statute, a court can fine the liable party in an amount that would compensate for the harm, repair the harm, and if necessary, provide punitive damages as further punishment.[128]

A public nuisance is "an unreasonable interference with a right common to the general public."[129] An unreasonable infringement of a public right can be "conduct of a continuing nature [that] has produced a permanent or long-lasting effect, and, as the actor knows or has reason to know, has a significant effect upon the public right."[130] The result of the activity of the alleged wrongful party, not the conduct, is the focus under the public nuisance doctrine. An individual can recover damages for a public nuisance if he has "suffered harm of a kind different from that suffered by other members of the public exercising the right common to the general public that was the subject of interference."[131] Without

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123. *See* Larsen, *supra* note 8, at 37.

124. Babich, *supra* note 122, at 758.

125. In the past ten years or so, this has become readily apparent with foreign governments selling off state-owned corporations. The U.S. government does not even try to develop its own weapons or its own space program. The government just explains to the private sector what its goal is and pays for its procurement.

126. Larsen, *supra* note 8, at 38.

127. *See id.*

128. *See id.* Under the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 and the proposed National Invasive Species Act of 1996, $25,000 per day is the maximum fine imposed. 16 U.S.C.S. § 4711(c) (Law. Co-op. 1996); H.R. 3217(g)(1)-(3) 104th Cong. (1996). Under the Lacey Act, the maximum penalty is a fine of $10,000 for failure to exercise due care and criminal penalties up to $20,000 and five years in prison for knowing violations. 16 U.S.C.S. §§ 3373 (a)(1), (d)(1) (Law. Co-op. 1996). The Endangered Species Act provides for a maximum civil penalty of $25,000 for knowing violations or criminal penalties up to $50,000 and one year in prison for knowing violations. 16 U.S.C.S. §§ 1538(a)(1)(B), 1540 (Law. Co-op. 1996). The Endangered Species Act also has a citizen suit provision allowing any person to commence a civil suit on his own behalf to enjoin any person or entity who is in violation of the Act's provision. 16 U.S.C.S. § 1540(g) (Law. Co-op.1996).

129. Restatement (Second) of Torts § 821B (1979).

130. *Id.*

131. *Id.*; *aee* Leo v. General Elec. Co., 538 N.Y.S.2d 844, 846 (1989); Larsen, *supra* note 8, at 41.

showing a "different harm" from the rest of the public, the individual cannot recover damages, only a public institution can.[132]

Most likely, a public right would entail the right of a city to pump water from a public lake for the use of its citizens as drinking water and in industry. An unreasonable interference may be named in a statute[133] or a balancing test will be used comparing "the gravity of the harm to the public interest against the value of the conduct sought to be prohibited."[134] The gravity of harm caused by non-native aquatic species is clearly evident.[135]

Clearly, the introduction of non-native aquatic species can act as a nuisance, just as oil spills, hazardous waste, and noise pollution can cause damage to our environment and economy.[136] The effects of non-native species on our environment and economy may become more hazardous than pollution because of their capacity to reproduce, disperse, and the potential cost of controlling or eradicating them. Just as other polluters are responsible for the costs of cleaning up what they caused, parties responsible for the introduction and spread of non-native aquatic species also should pay.

Proving that a party caused the unreasonable public nuisance can be a daunting problem for a prospective plaintiff. Causation proves to be a "scientific burden [because there is a] lag of time between exposure of the [non-native aquatic species] . . . and the manifestation of the [economic or] environmental problem."[137] The use of science already has proven to be a valuable tool in finding the source of some non-native aquatic species in the United States. [138] Through increased scientific investigation, researchers will gain knowledge quickly as to exotic introduction identification and methods.[139] This is an area in which federal statutes also can help. For example, if the statute demands that all ships entering U.S. ports have their ballast water tested, then causation can be traced more easily.[140]

The common law requirement that for an individual to have a public nuisance claim, he must have a "different harm" than the rest of the public is another high obstacle for the plaintiff to overcome. "[I]ndividuals seldom suffer distinct recognizable injuries that can be distinguished from public suffering."[141] A modification is needed in this area of public nuisance law for private citizens to

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132. Larsen, *supra* note 8, at 41. Arguably, if a state, county or village can sue on the claim of Public Nuisance, the private sector may respond by developing new techniques in controlling and preventing the non-native aquatic species from entering U.S. waters.

133. *See id.* at 54. For example, the Endangered Species Act prohibits the "taking" of any listed animal or plant. 16 U.S.C.S. § 1538(a)(1)(B) (Law. Co-op. 1996); see discussion *infra* pertaining to note 74.

134. Larsen, *supra* note 8, at 54.

135. *See, e.g* , *supra* notes 1, 2, 38.

136. *See* Larsen, *supra* note 8, at 51.

137. *Id.* at 58; *see* Yount, *supra* note 10.

138. *See* discussion *infra* pertaining to note 25.

139. *See* Larsen, *supra* note 8, at 58.

140. This would prove to be expensive to the federal or state government, but the cost should be borne by the vessel owners. Again, because the private sector is most responsible for transporting them into U.S. waters, they should pay for its control. Also, this statutory framework could work with accidental introductions by aquaria through a reporting and licensing system with the cost of the license paying for the reporting system.

141. Larsen, *supra* note 8, at 56.

maintain a suit under public nuisance law. Again, statutory construction can help in this regard by providing for a citizen suit provision allowing injunctions and damages against violators of the statute regardless of a "different harm."[142]

VII. CONCLUSION

As discussed, current legislation is inadequate to combat the further introduction and control of non-native aquatic species. Applying new ideas and threats to old legislation is very cumbersome and probably unworkable. As shown, the Nonindigenous Aquatic Nuisance Prevention and Control Act and its proposed expanding legislation are too narrowly focused and provide too few resources to combat the non-native aquatic species invasion. However, the Act has brought non-native aquatic species to the forefront of environmental law and has given the public something from which to spring its counter attack.

Because non-native aquatic species interfere with public rights, public nuisance laws would help bolster the effect of current legislation if legislation was expanded to add a cause of action under it. Nuisance law is more flexible in addressing the ever changing problems associated with the degradation of our environment. It would also promote solutions that would more efficiently suit their operations as scientific knowledge increases. However, the current requirement under public nuisance law for a private citizen to have a "different harm" than the rest of the public would have to be changed. This too could be done through legislation.

As discussed, non-native aquatic species in U.S. waters pose a serious threat economically and environmentally. Future legislation must be pro-active so that Congress is not in a position where a committee is holding a hearing on the non-native aquatic species that has destroyed the oyster fishery along the East Coast or destroyed the recreational fishery in the Great Lakes Basin or shut down the water supply to Southern California.

142. *See id.* at 56.