

SCOMM

62:25

STATE OF ALASKA
1989 LEGISLATIVE SESSION

BILL VERSION: SJR 59
PUBLISH DATE: 4/22/90

FISCAL NOTE

REQUEST: _____

REVISION DATE: _____
TITLE: Prohibit Discharge of
Ballast Water
SPONSOR: Zharoff
REQUESTOR: _____

AGENCY: NONE
BRU: _____
COMPONENTS: _____

EXPENDITURES/REVENUES: (THOUSANDS OF DOLLARS)

	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94
OPERATING						
PERS. SERVICES						
TRAVEL						
CONTRACTUAL						
SUPPLIES						
EQUIPMENT						
LAND/BUILD.						
GRANTS/CLAIMS						
MISCELLANEOUS						
TOTAL	-0-	-0-	-0-	-0-	-0-	-0-
CAPITAL	-0-	-0-	-0-	-0-	-0-	-0-
REVENUE	-0-	-0-	-0-	-0-	-0-	-0-

FUNDING: (THOUSANDS OF DOLLARS)

GENERAL FUNDS						
FEDERAL FUNDS						
OTHER						
TOTAL	-0-	-0-	-0-	-0-	-0-	-0-

POSITIONS:

FULL-TIME						
PART-TIME						
TEMPORARY						

ANALYSIS:

PREPARED BY:  SENATE SPECIAL COMMITTEE ON OIL & GAS

DATE: 4/22/90

PHONE NO.: 465-4993



SENATOR FRED F. ZHAROFF
ALASKA STATE LEGISLATURE

P. O. BOX 405, KODIAK, ALASKA 99615 (907) 486-5259

DURING SESSION:

P. O. BOX V, JUNEAU, ALASKA 99811 • (907) 465-3473 • 465-3474

DISTRICT N

ALASKA PENINSULA • ALEUTIAN CHAIN • BRISTOL BAY • KODIAK ISLAND • LAKE CLARK/LAKE ILIAMNA • PRIBILOF ISLANDS • SHUMAGIN ISLANDS

MEMORANDUM

TO: Senator Drue Pearce
Chair - Senate Special Committee on Oil and Gas

FROM: Senator Fred F. Zharoff

DATE: April 20, 1990

RE: Senate Joint Resolution 59 - "Relating to the discharge of ballast water by vessels entering the waters of Alaska."

I respectfully request that SJR 59 be scheduled for a hearing before the Senate Special Committee on Oil and Gas at the earliest opportunity.

SJR 59 is aimed at a national problem - the introduction of exotic species through ballast water. The problem has had especially serious repercussions in California and the Great Lakes region. So far -- to the best of our knowledge -- Alaska has been spared this problem, in which native species are overwhelmed and wiped out by the new species. The new species also have a tendency to cause major ecological disruptions.

SJR 59 calls on the U.S. Coast Guard to adopt regulations that would protect Alaska's ecosystem from the introduction of exotic species via ballast water.

SJR 59 is based on a resolution that was adopted late last year by the Pacific Fisheries Legislative Task Force, made up of legislators from Alaska, California, Idaho, Oregon and Washington.

The following backup information is attached:

1. Letter and report regarding introduction of exotic species to the Sacramento-San Joaquin Estuary.
2. Summary of research paper on introduction of exotic species into the Great Lakes.
3. Information bulletin about zebra mussel problem in the Great Lakes.
4. Historical review of ballast water and the invasion of exotic species.

DEPARTMENT OF FISH AND GAME

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1-4-79

Mr. Charles Fullerton
Director
National Marine Fisheries
Service, Southwest Region
300 S. Ferry St.
Terminal Island, CA 90731

Dear Mr. Fullerton:

In the last ten years the Sacramento-San Joaquin Estuary has been invaded by a number of exotic aquatic organisms. These include four species of copepods, a clam and an amphipod. The copepods originated in China and Japan and were brought in by ballast water of freighters or tankers. The origins of the clam and amphipod have not been determined but ballast water is the assumed mode of introduction as a wide variety of invertebrates and fish have been found to survive for weeks in ballast tanks.

All of the introductions have become abundant in the Estuary and some of them may be having adverse impacts on a native species of copepod that is an important food for larval striped bass.

The problem is not limited to the Sacramento-San Joaquin Estuary; the Great Lakes have been invaded by a fish, a cladoceran, a crab and an alga, all brought in by ballast water. The problem is undoubtedly world-wide: Japanese copepods have been found in Chilean fjords and a Chinese copepod has appeared in San Diego Bay. The problem is severe enough in the Great Lakes for the Great Lakes Fishery Commission to appeal to the U. S. Coast Guard, the State Department and the International Maritime Organization of the U.N. The Commission is asking for a regulation that will require ocean-going vessels entering the Great Lakes to first exchange their ballast water in the open ocean. The reasoning being that oceanic organisms are unlikely to survive in the fresh water of the Great Lakes. Alternate means of eliminating ballast water organisms are filtering and disinfection. However, filtering is not practical due to the small size of some of these organisms and disinfection is likely to result in the release of toxic substances to the environment.

The U. S. Coast Guard has the authority to adopt and enforce a regulation requiring exchange of ballast water at sea but their representatives have indicated to the Great Lakes Fishery Commission that it will take political and agency pressure to get such a regulation adopted.

Mr. Charles Fullerton

-2-

The Department plans to pursue the issue through the Western and International Associations of Fish and Wildlife Agencies. I believe it would be most helpful if you would pursue the issue through federal channels.

If you want more detailed information on introductions into the Sacramento-San Joaquin Estuary, Pete Chadwick can see that it is provided. His telephone number is: 209-466-4421.

Sincerely,

Pete Bontadelli
Director

File: D, DRF, ExFile, Bay-Delta, Chron

Chadwick/see

The Problem of the Accidental Introduction of Exotic Aquatic Organisms to the Sacramento-San Joaquin Estuary

In 1978, a new species of planktonic copepod (a small relative of shrimp) appeared in the catches of the DFG's Bay-Delta Zooplankton Study. When sent to the Smithsonian Institution for identification, it turned out to be Sinocalanus doerrii, a species previously known only from Mainland China. In 1979, Sinocalanus became very abundant throughout the Delta and extended into Suisun Bay. In the same year another exotic copepod was discovered in the zooplankton catches. It also proved to be a Chinese species, Limnithona sinensis. A third copepod also appeared that year but turned out to be one that had been previously taken in 1964 by the DFG and not seen since. This copepod was later found to be numerous in South San Francisco Bay and was described as a new species, Oithona davisae. Japanese scientists later found it in Tokyo Bay and other locations in Japan where it had been known for some time but misidentified under another name.

The story continues. In 1987, specimens of Pseudodiaptomus, a copepod, were taken a few times by the DFG and were initially thought to be strays from San Francisco Bay. The next year, however, these animals became very abundant and a check of the literature showed that Pseudodiaptomus had never been caught in the Bay. The Smithsonian identified our specimens as P. forbesi, a species from the China coast.

In addition to copepods, in the last few years an amphipod, Lagunogammarus, and a clam, Potamocorbula, have entered the estuary from foreign parts, and in the last twenty to thirty years, a shrimp, Palaemon, and a fish, the yellowfin goby, have also come in and established populations.

The mode of introduction of the exotic species is ballast water of freighters and tankers. A variety of invertebrates and fish have been found to remain alive for weeks in such water while being transported across oceans. When discharged at a ship's destination the exotic organisms may find conditions unsuitable and die off or they may be dispersed by currents and never establish breeding populations. Sooner or later, however, conditions will be favorable and a new species will gain a foothold.

The impact of the new organisms on the plankton and fish of Suisun Bay and the Delta is difficult to ascertain but Sinocalanus may have been responsible for the precipitate decline of the native Diaptomus copepod in 1979, the year Sinocalanus became established. The native Eurytemora copepod, which is the most important food for larval striped bass, seems to have coexisted well with Sinocalanus, but in 1988, its abundance was as much as two orders of magnitude lower than in any previous year. This may be due to Pseudodiaptomus or to predation by an exotic clam, Potamocorbula, which consumed the early life stages of Eurytemora in a laboratory experiment and which became abundant for the first time in January 1988. Whether Pseudodiaptomus can replace Eurytemora as a food source for bass is still unknown.

Experiments have shown that copepods vary considerably in their vulnerability to larval bass predation.

We can expect more exotic organisms to enter the estuary as long as foreign-origin ballast water is emptied anywhere inside the Golden Gate. The effects of continued introductions is impossible to predict but the food chain leading to striped bass may already have been harmed irreparably by P. forbesi and Potamocorbula. To allow further introductions would be foolhardy.

The introduction problem is world-wide. Japanese copepods have been found in Chilean fjords. A Chinese copepod has appeared in San Diego Bay. The Great Lakes have been invaded by a fish, a crab, a cladoceran, and an alga.

The Great Lakes Fishery Commission (GLFC) has moved to end the dumping of foreign-origin ballast water in the Great Lakes. It has asked the U.S. and Canadian Coast Guards to require ships entering the Lakes to exchange their ballast water in the open ocean. Organisms from the high seas are unlikely to survive in the fresh water of the Great Lakes. The presiding officers of the Coast Guards of both nations are sympathetic to the idea and have the necessary power to enforce such a regulation but they have said that it will require political and agency pressure to move them. To apply the necessary pressure the GLFC will bring the matter up at a meeting in June 1989 of the United Nations International Maritime Organisation.

The GLFC has also explored alternatives to ballast exchange. These are filtration of ballast water, discharge of ballast water into holding tanks for treatment, and disinfection of ballast water in the ballast tanks of ships. These alternatives will be either ineffective as in the case of filtration, or more costly and likely to result in the discharge of toxic substances to the environment in the case of the other two alternatives.

2

THE INTRODUCTION OF EXOTIC ORGANISMS INTO THE GREAT LAKES
SINCE THE LATE 1800S

prepared by

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SUMMARY

North American scientists have been concerned for many decades about risks associated with introduced aquatic organisms. Such introductions to aquatic systems can have undesirable effects and pose a threat to the integrity of valued resources. The Laurentian Great Lakes have been subjected to introductions of non-native species since the time of settlement by Europeans. Recently, the Great Lakes have been invaded by three exotic species and these organisms pose a serious threat to the long-term integrity and value of the Great Lakes resource.

The first comprehensive inventory of flora and fauna introduced into the Great Lakes is currently being prepared. Establishment of such a database is presently funded by the Great Lakes Fishery Commission-Introductions Task Group. The goal of the Introductions Task Group is to increase our knowledge regarding Great Lakes exotic species, their introduction, their modes of entry, and prospects for prevention and control. To date, a total of 69 organisms ranging from disease pathogens to fish have been identified as non-native to the Great Lakes. Of this total, the bulk of organisms belong to three taxonomic groups, namely benthos, algae, and fish (Figure 1).

Exotic species have gained entry into the Great Lakes through a variety of vectors including waterfowl, birds, infected fish, stocking, canals, bait, and ballast water of ships. In the current survey of non-native species introductions, ballast water has been identified as the major vector through which exotic organisms have entered the Great Lakes. So far, 27 out of 69 exotic organisms have been identified as entering the Great Lakes via ballast water (Figure 2). Organisms associated with ballast water or ship hauls having the greatest impact on the Great Lakes resource include zebra mussel, sea lamprey, ruffe, and the spiny water flea. Canals also have been important vectors through which organisms have entered the Great Lakes. For example, the Erie-Barge Canal system has been an important historical route through which exotic organisms have

entered the Great Lakes. It is quite possible that the sea lamprey and the alewife entered the Great Lakes through the Erie-Barge Canal system. The white perch expanded its range into the Great Lakes from the Hudson River and the Erie-Barge Canal system. Further, the Welland Canal which connects Lakes Ontario and Erie was the primary route through which the sea lamprey expanded to the upper Great Lakes. The sea lamprey, alewife, and white perch have all had significant impacts on native Great Lakes species.

Figure 1. Number of Exotic Species Introduced Into the Great Lakes by Taxonomic Group

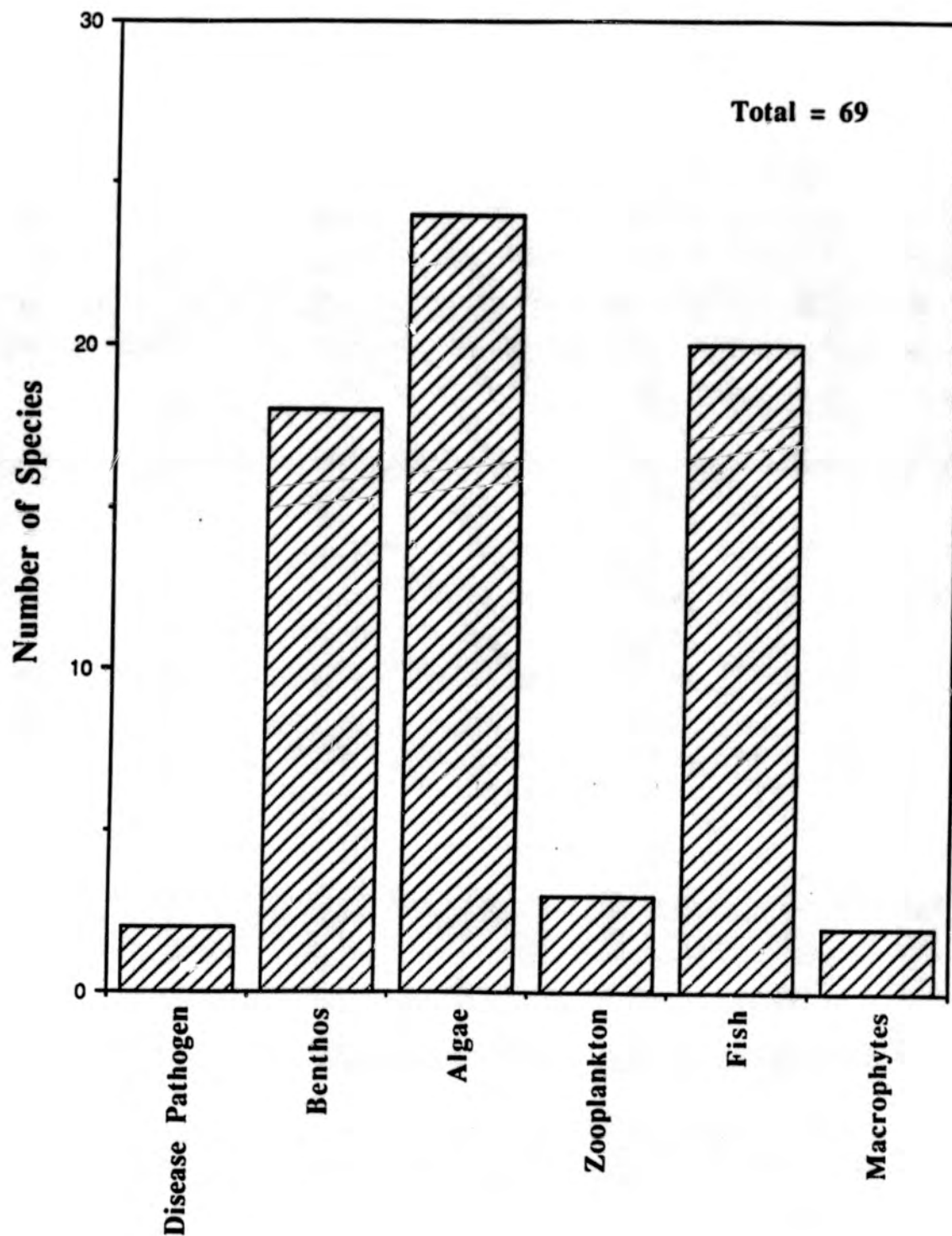
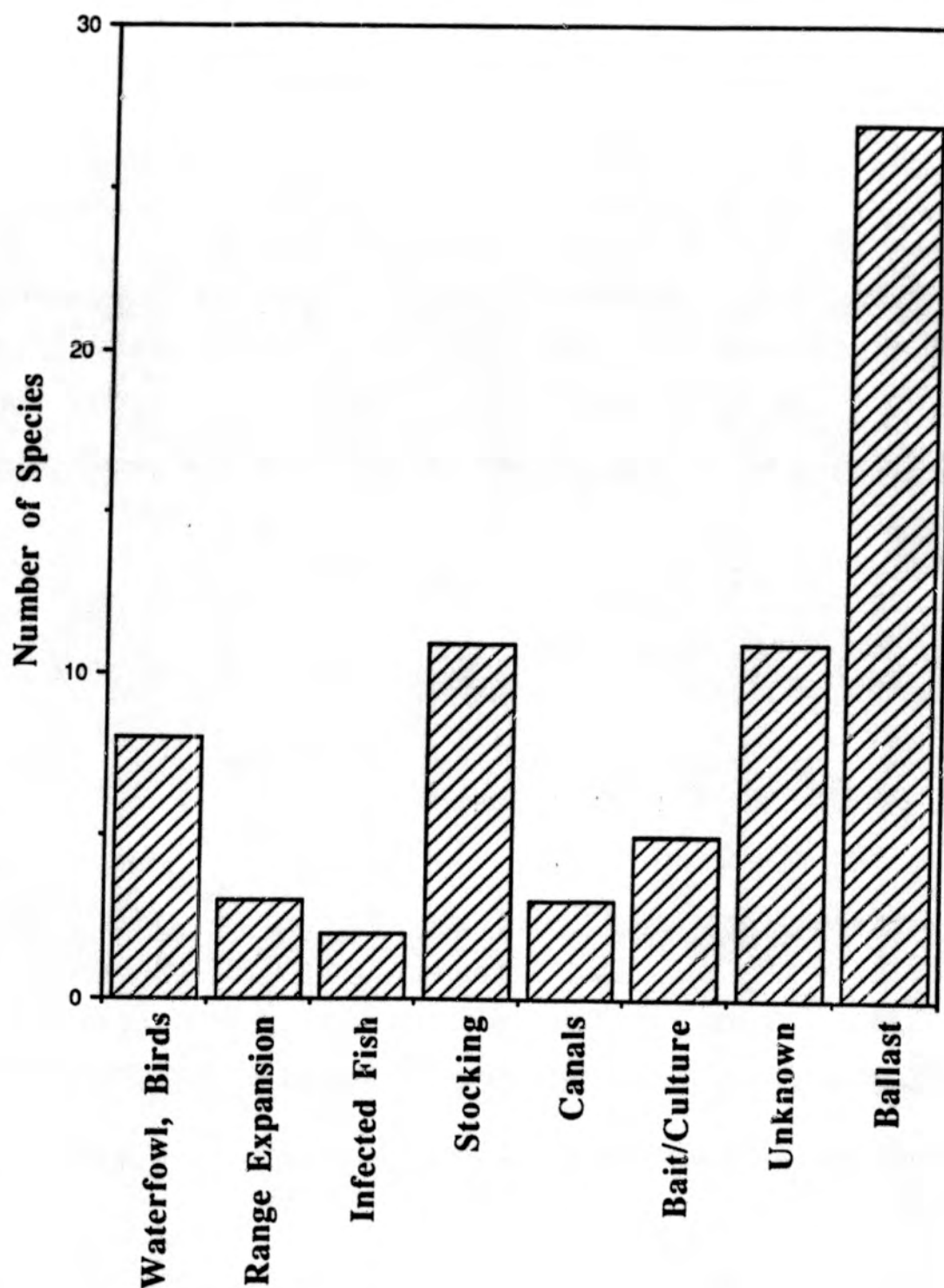


Figure 2. Entry Vectors of Exotic Species Introduced Into the Great Lakes Since the Late 1800s.





3

Monthly News Letter #45

February 1989

Water Resources Assessment Unit,
Southwestern Region, Ministry of the Environment

INTRODUCTION OF ZEBRA MUSSELS INTO THE GREAT LAKES: TRUTH AND CONSEQUENCES.

Over the past two years, the predacious zooplankter "B.C." (*Bythotrephes cederstroemi*), the perch-like ruffe (*Gymnocephalus cernuus*) and the zebra mussel (*Dreissena polymorpha*) have all been sighted in the Great Lakes' ecosystem. These recent immigrants join the long list of exotic species that have entered the Great Lakes probably as a result of discharges of freshwater ballast from ocean-crossing ships; a practice allowed because of the lack of Federal regulations.

While each of these recently introduced species will disturb the ecological relationships among native biota, the zebra mussel (Figure 1) will probably be the first exotic species to impart a severe cost on the users of the lakes. Using its byssal apparatus to secrete horny threads, the zebra mussel can climb and firmly attach itself to any solid surface (e.g. rocks, piers, breakwalls, pipes, boats, fishing nets, mussel shells). As a consequence, they have already restricted the inflow of water to electrical generating and water treatment facilities by reducing the diameter of intake pipes. They are expected to reduce the catch of fish by fouling impounding gear, affect sailing activities by colonizing the hulls of boats, restrict swimming activities by forming large "mussel mats" in littoral areas, interfere with beach activities because of large numbers of shells washing up along shorelines, and reduce the aesthetics of water-front areas by encrusting anything in contact with the water.

Based on the size of the shells collected (maximum length of 30mm), the zebra mussel has probably been in the Great Lakes for 2-2.5 years. The occurrence of zebra mussel shells along beaches (arrows in Figure 2) and their reported occurrence in water treatment plants (solid circles in Figure 2) indicates that they currently are found in the central and western basins of Lake Erie, the Detroit River and Lake St. Clair. Their rapid dispersal has been facilitated by their high reproductive capacity, free-swimming larval (veliger) stage, and the ability of yearlings to disperse by drifting. By 1990, the zebra mussel will probably expand its range into the eastern basin of Lake Erie and the Niagara River. However, it is not confined to Great Lakes' habitats, and will probably begin to appear in inland reservoirs, lakes and rivers in the near future, transported by waterfowl and wildlife.

Ronald W. Griffiths



Figure 1: Zebra Mussel

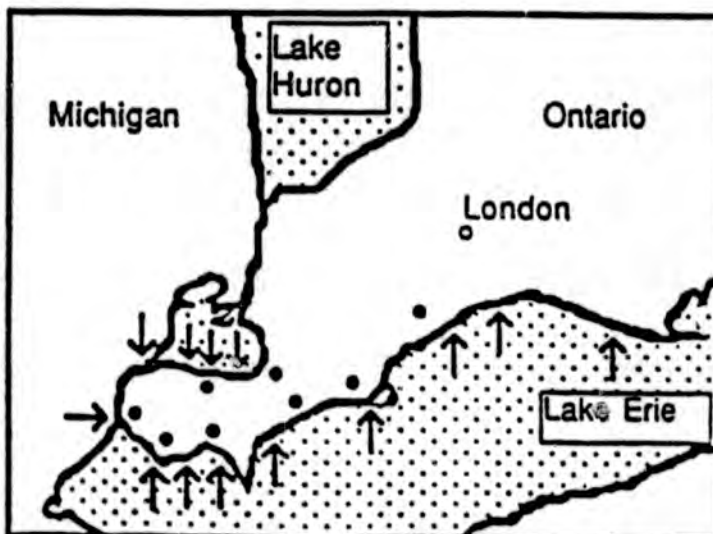


Figure 2: Occurrence of Zebra Mussels along the shoreline and in Water Treatment Plants.

BALLAST WATER AND THE INVASION OF EXOTIC SPECIES
A Brief Historical Review: 1868 - 1990

James T. Carlton
Maritime Studies Program, Williams College - Mystic Seaport Museum
Mystic, Connecticut 06355

**A Chronological Summary of the Some of the Events and Concerns
Relative to Ballast Water:**

- 1868 Grantham (1868) describes the design of double-bottom tank systems for water ballast in iron ships
- 1880 Lloyd's Register begins in 1880 (but not before) noting types and capacities of water ballast tanks
- 1896 "Probably most cargo steamers in these days are fitted with some means of carrying water as ballast..." (Walton, 1896)
- 1900 Fulton and Grant (1900) suggest that the European shore crab Carcinus maenas was introduced to Australia by ballast water
- 1908 Ostenfeld (1908) suggests that the Asian diatom Odontella (Biddulphia) sinensis may have been introduced to the North Sea in 1903 by ballast water
- 1933 Peters describes the introduction of the mitten crab Eriocheir sinensis, sometime before 1912, from Korea or China to Germany
- 1968-
1978 Extensive literature discussions on the role of ballast water in exchanging marine organisms through the Panama Canal (reviewed by Carlton, 1985, p. 319)
- 1973 Medcof and Scribner (1975) provide first detailed report of living organisms in ballast water, based upon samples of a ship arriving from Japan to New South Wales, Australia
- 1973 "Resolution 18": "Research into the Effect of Discharge of Ballast Water Containing Bacteria of Epidemic Diseases" passed by the International Conference on Marine Pollution (including the International Convention for the Prevention of Pollution from Ships)
- 1976-
1977 CSIRO (Australia) biologists sample bulk cargo carriers coming from Japan to Western Australia (see Williams et al., 1988)
- 1980 Environment Canada commissions ballast water study at Montreal, to sample 55 merchant vessels in the summer and fall; published as Bio-Environmental Services (1981)

- 1980-
1982 Ballast water investigations commence at the Woods Hole Oceanographic Institution, Woods Hole, based upon experimental studies using oceanographic research vessels, and upon bulk bulk cargo traffic arriving at US ports (J. T. Carlton and colleagues)
- 1985 Publication of review monograph by Carlton (1985)
- 1986 Ballast water investigations commence in Coos Bay, Oregon, at the University of Oregon Institute of Marine Biology, based upon bulk cargo vessel traffic from Japan to Pacific Northwest (J. T. Carlton and colleagues)
[Sea Grant funded, 1987-1988, 1989-1991]
- 1987 Publication of monograph on introductions of non-indigenous marine organisms by ballast water and other vectors into Australia, by Hutchings, van der Velde, and Keable (1987)
- 1987 CSIRO (Australia) scientists re-commence sampling of bulk cargo vessels inbound from Japan (Dr. G. Hallegraeff, of CSIRO Division of Fisheries, Hobart)
- 1987 Revision of Water Quality Agreement between Canada and the United States assigns responsibility (under Annex 6) for studying the ballast water issue and possible solutions to the US and Canadian Coast Guards
- 1988 Publication of paper on ballast water as a mechanism of introduction of exotic species in Australia by Williams et al. (1988).
- 1988 Great Lakes Fishery Commission meeting in Toledo, Ohio, (May) considers issue and questions of ballast water release in the Great Lakes
- 1988 "Recommendation No. 1" of the International Council for the (June) Exploration of the Sea's "Working Group on Introductions and Transfers of Marine Organisms" formulated and sent to ICES for consideration at Plenary Session in October 1988
- 1988 Canada and U.S. raise the issue of Great Lakes introductions (Sept) via ballast water at the London meeting of the Marine Environment Protection Committee of the UN's International Maritime Organization (IMO).
- 1989
March Congressmen Davis and Hertel introduce a House of Representatives bill "to direct the Secretary of Transportation to report on methods available to control the influx of exotic species into the Great Lakes"

1989 [continued]

- May Canadian Coast Guard Voluntary Guidelines on ballast water exchange go into effect in Great Lakes (compliance begins in April)
- Aug Mandatory guidelines on ballast water exchange go into effect in Australia; suspended soon thereafter
- Aug "Resolution 89-10" passed by Pacific Fisheries Legislative Task Force, "Introduced Organisms from Ballast Water", urging US Coast Guard to prohibit non-exchanged ballast water release
- Sept American Fisheries Society's Introduced Fishes Section passes Resolution at Annual Meeting (Alaska) on control of ballast water discharges
- Oct New York Congressman Nowak introduces House of Representatives Bill 3403 "to require that vessels exchange their ballast water entering the Great Lakes" [legislation pending, February 1990]
- Oct Ballast Water Monitoring Workshop, sponsored by the Great Lakes Fishery Commission, at St. Catharines, Ontario
- Dec House of Representatives bill 2459 passes, calling for US Coast Guard to produce report on ballast water management strategies by June 1990 (Bill authored by Michigan Congressmen Robert Davis and Dennis Hertel)

1990

- Jan Senator F.F.Zharoff submits "Senate Joint Resolution No.59" to State of Alaska legislature "Relating to the discharge of ballast water by vessels entering the waters of Alaska" (and the organisms therein)
- Feb Voluntary guidelines on ballast water exchange go into effect in Australia (February 1)
- Feb Ballast Water Monitoring Workshop II, sponsored by the Great Lakes Fishery Commission, at Toronto, Ontario (8-9 February)
- Feb Exotic Species and the Shipping Industry Workshop, sponsored by the International Joint Commission and the Great Lakes Fishery Commission, at Toronto, Ontario (28 Feb, 1-2 March)