The Great Lakes: Natural Beauty Devastated By Aquatic Invasive Species

Source: America2050.org

"The brawny mix of extraordinary sights-weather, politics, races, imagination, corruption and athletics. They clash and mingle here where the broad prairies that are the world's most fertile collection of farm fields meet the vast ***Great Lakes*** *that are the world's largest collection of fresh water." - Andrew H. Malcolm*

"A lake is the landscape's most beautiful and expressive feature. It is earth's eye; looking into which the beholder measures the depth of his own nature. The fluviatile trees next the shore are the slender eyelashes which fringe it,

Source: Mahan, John & Ann: Great Lakes Photography Exhibit -

http://sweetwatervisions.com/Pages/galleryGL.html

and the wooded hills and cliffs around are its overhanging brows." - Henry David Thoreau

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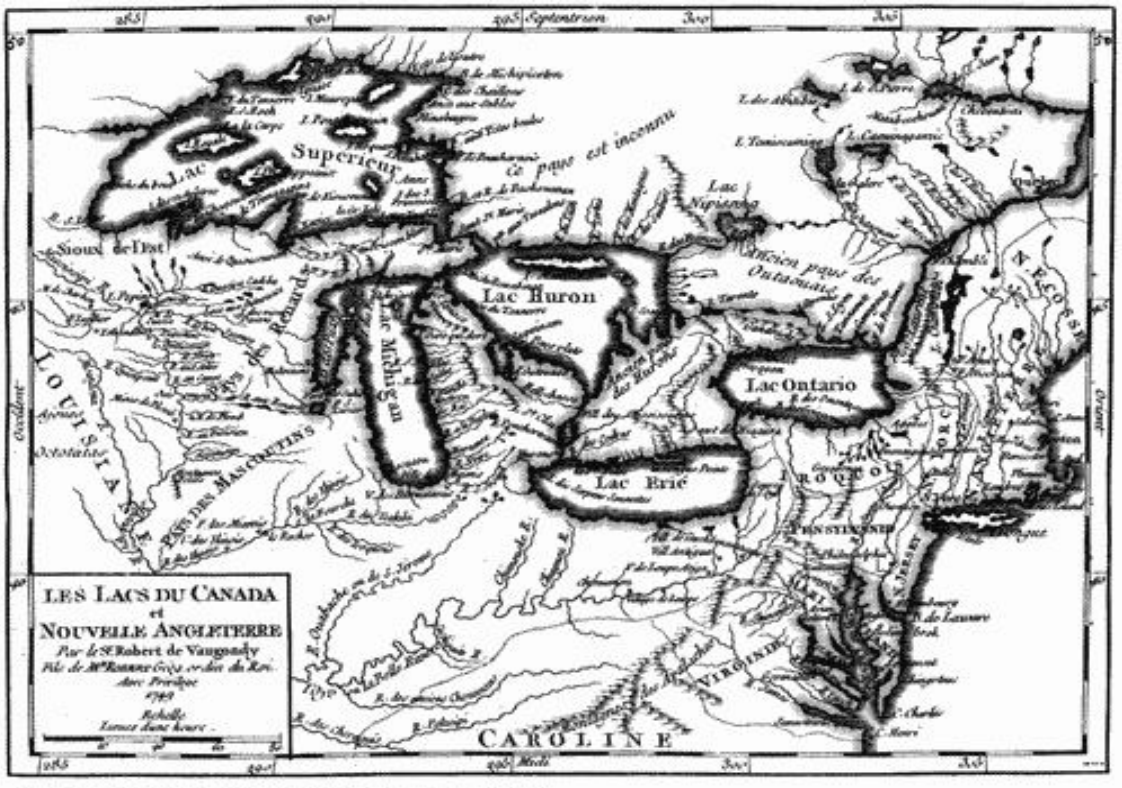
By definition, biodiversity is "the variety of all forms of life, from genes to species, through to the broad scale of ecosystems" ("Biodiversity", Stanford Encyclopedia of Philosophy), however, the perception of biodiversity can be applied to a greater degree. On every continent, in every country and in various cultures, biodiversity thrives. The human world and the animal world alike are wonderfully diverse in apperance, knowledge, tolerance, habits and lifestyles. In this way, biodiversity varies from region to region, for this is ultimately important for preservation. One area where biodiversity can be observed is within the Great Lakes, here in the United States and connected to Canada. However, due to man-made environmental impact, the habitats of the lakes along with the regions surrounding them have been decimated and afflicted, resulting in not only the endangerment of the aquatic habitats but also resulting in billions of dollars in damage to both the countries governments and businesses in the region alike. Therefore, measures have to be taken to preserve the wonder of the lakes, before the region becomes another unfortunate

outcome in a world where man-made pollution reigns. *Source: Wikipedia*

"If you stood on the moon, you could see the lakes and recognize the familiar wolf head shape of Lake Superior, or the mitten bounded by lakes Michigan, Huron and Erie," (Great Lakes Overview, The Great Lakes Information Network). The Great Lakes are noted fresh bodies of water located in the northeast of North America. Formed by a glacial process that began almost 100,000 years ago, the lakes hold 90% of North America's freshwater and supports more than 172 native fish species (Great Lakes Aquatic Invasions Booklet, pg. 4). These inland seas have provided many purposes for the inhabitants of the regions from transport and trade routes to resorts to fishing and recreation. These activities were able to be performed due to the opening of the Eerie Canal in 1825, thus allowing cargo ships and freights to bring in not only iron, grain and coal to the region but also allow immigrants to move into the region. "The immigration routes still have an effect today. Immigrants often formed their own communities and some areas have a pronounced ethnicity, such as Dutch, German, Polish, Finnish, and many others. Since many immigrants settled for a time in New England before moving westward, many areas on the U.S. side of the Great Lakes also have a New England feel, especially in home styles and accent" ("The Great Lakes", Wikipedia The Free Encyclopedia). The Great Lakes are home to major industrial centers and the region is known for its manufacturing, transportation and trade ("The Impact of



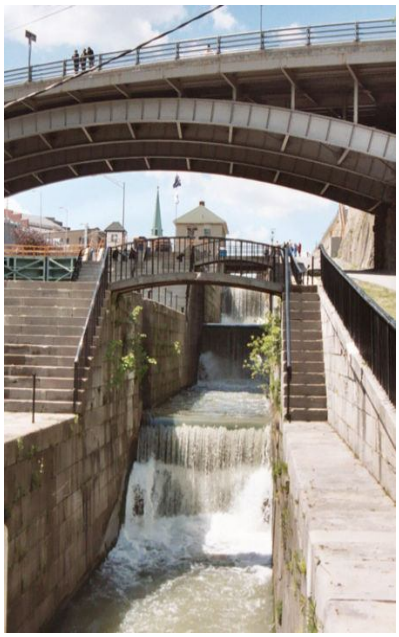
Created by Robert de Vaugondy, 1749

Aquatic Species on the Great Lakes, vii). *Source: Great Lakes Information Network*

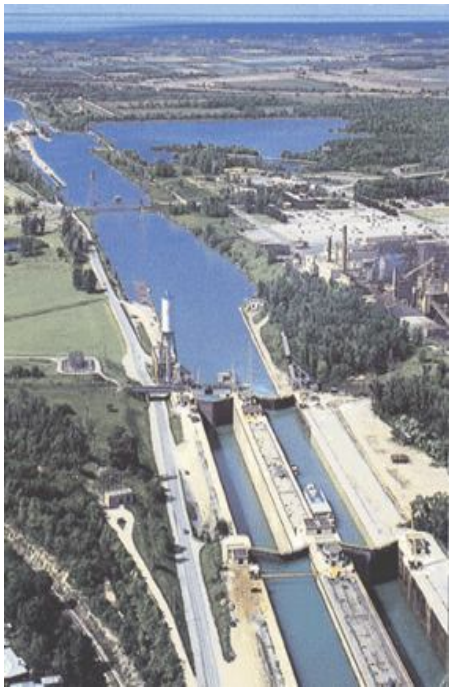
The Great Lakes have a colorful history and even the names of the Lakes themselves provide a historical basis. Lake Eerie, the smallest lake by volume and also the lake with the greatest biodiversity, was named after the Eerie Indians that inhabited the area, and with the discovery of the lake, the French entitled it "Lac du Chat" which corresponded to the Indians as they called themselves the "People of the Panther" ("What's In a Name", The Great Lakes Information Network). Lake Huron, the 3rd largest by volume and the lake characterized by its numerous sandy beaches and islands, was also named after the Huron Indians that resided there. The French had also given the lake a name, calling it "La Mer Douce", or the sweet fresh-water sea ("What's In a Name", The Great Lakes Information Network). Lake Michingan, the only Great Lake entirely in the United States, is best known for its freshwater sand dunes and beachy shorelines. The Lake has an interesting history as first Champlain entitled it the "Grand Lac", then later renamed after the people occupying the area as "Lake of the Puants", or more interestingly "Lake of the Stinking Water". It was finally renamed Lake Michigan after further analysis of the region by French explorers Joliette and Marquette, which probably were inspired by the local tribe that called the lake "michi gami" ("What's In a Name", The Great Lakes Information Network.) Lake Ontario is most famous for lying at the base of the Niagra Falls and for having the oldest lighthouse in the region. Named first by Champlain as Lake St. Louis, it was later renamed Lacus Ontarius, meaning "beautiful lake" ("What's In a Name", The Great Lakes Information Network). Last, but certainly not least, Lake Superior is, as the name hints, the largest of the Great Lakes by volume and has the largest surface area of any freshwater lake in the world. This lake was named "lac superieur" by early French explorers meaning "Upper lake" and not Great or Superior lake. However, the name was adopted from the translation of the Chippewa Indians, who called it "Kitchi gami", or "the Grand lake" ("What's In a Name", The Great Lakes Inforamtion Network).

Even of greater interest than the history of the Lakes is the ecology and aquatic environment. "Early European settlers were astounded by both the variety and quantity of fishes; there were 150 different species in the Great Lakes" ("The Great Lakes", Wikipedia: The Free Encyclopedia), which included whitefish, Atlantic salmon, lake trout and sturgeon. Due to the

discovery of such large quantities of these fish, over fishing became such a hazardous activity to the aquatic environment. However, the habitats were under attack from other sources as well.



Dam building limited the migration route of most fish and logging near the shore lines decimated the spawning grounds of many fish, including the whitefish, which was the most economically powerful catch of the lakes. Yet over fishing and the destruction of the natural environment was not enough to raise awareness for Canada and the United States to work together to save the lakes. After all, the environment was being destroyed, the economies of both countries were not relatively swayed as commerce through merchant ships still prospered, and with the opening of the Erie Canal (pictured above) and the St. Lawrence Seaway (pictured on the right), the progress of goods transport became even more accessible and desirable. Of course, these transport routes led to more significant environmental problems, most significant of all being the introduction of various invasive species that have created a destructive imprint on the ecology and the aquatic habitats of the Great Lakes.



The Great Lakes serve as not only an economic body of water that allows for trade within the Great Lakes region, but also as an area of recreation, an area of diverse habitat, once only native to the Great Lakes, and also an area of biodiversity. However, the aquatic invasive species have become traumatic to not only the region but also the activities of the people living in the region. A study done by Cornell University in 2000 estimated the resulting costs of the invasive species impact to $1 billion dollars annually from the invasive fish species (“The Impact of

Aquatic Invasive Species on the Great Lakes, x) and another $5.7 billion from other mollusks and plants life (Great Lakes Aquatic Booklet, 3). “Life history characteristics of aquatic invaders provided an opportunity for these species to dominate native populations, leading to permanent displacement of native species, and threatening biodiversity of native ecosystems” (Great Lakes Aquatic Invasion Booklet, 3). The invasive species have caused the degradation of beaches and swimming areas due to weed infestation and deposits of zebra muscle shells that litter beaches and shorelines (Great Lakes Aquatic Invasion Booklet, 3).

Introduction of the invasive species throughout many years have brought environmental hazard to the region. These species are not native to the Great Lakes and have been introduced through man-made means. “Aquatic Invasive Species (AIS) are non-native plants, animals and pathogens that cause or potentially cause economic loss, environmental damage, or harm to human health.” (Great Lakes Aquatic Invasion Booklet, Cover Page). In a hearing before the subcommittee on water resources and the environment of the committee on transportation and infrastructure house of representatives for the one hundred and fifth congress, the matter of the impact of these species were outlined for the congress and read as follows:

> “As a result of the increasing globalization of trade, speed of maritime travel, volume of cargo shipments, and tourism, the probability of accidental introduction of aquatic invasive species in the United States has increased in recent decades… These invasive incursions have already had profound environmental, economic and public health impacts…” (“The Impact of Aquatic Invasive Species on the Great Lakes, vi)

Maritime Commerce can be blamed for much of the introduction of the invasive species to the Great Lakes. “Ship ballast has been recognized as a leading vector of AIS introductions since the discovery of zebra muscles in Lake St. Clair in 1988” (Great Lakes Aquatic Invasion Booklet,

4). Ballast water, used to balance the hulls of cargo ships, has been acquired at different locations around the world, such as the Caspian Sea, and dumped within the Great Lakes when it came time to load on cargo. Even though some legislation came into effect to try and prevent this discharge, which introduced foreign species to their foreign waters, many ships continued to empty the ballast within the Great Lakes. This was the way the round goby and the zebra muscles was introduced.

THE ROUND GOBY *Neogobius melanostomus*

The round goby, native to eastern Europe, was discovered in the Lakes in 1990 and had been directly linked to "contaminated water ballast" ("The Impact of Aquatic Invasive Species on the Great Lakes, viii). An aggressive water predator, with virtually no predators above it in the now alternated food chain, the goby feeds upon unhatched eggs of such species as the native small-mouthed bass. They have adjusted to darkness, therefore making them even greater predators in the night and have also taken over habitat for spawning from less aggressive fish in the region thus depriving them of spawning points to reproduce their numbers. "Gobies are also capable of rapid population growth… a female can produce up to 5,000 eggs…" ("Round Goby", The University of Wisconsin Sea Grant Institute Publication).

Zebra muscles are a species native to the Caspian Sea. Being highly reproductive and having a habit of attaching to hard surfaces, the zebra muscle has not only depleted the food source for many native clams, shrimp and fish but also has cost millions of dollars in pollution (Great Lakes Aquatic Invasion Booklet, 5). The

zebra muscles have also been responsible for the destruction of waterway pipes and the pollution of beaches.

"On December 15, 1989, workers at the Monroe Water Department in southern Michigan realized that the water pressure at the plant was dropping. The emergency water shortage shut down schools, businesses and restaurants…Water department workers soon discovered that a combination of ice crystals and millions of zebra muscles had blocked the pipes and waterworks used to draw water from Lake Eerie…fifty-five thousand residents had to use bottled water." (Lesinski, 23)

"While zebra muscles are individually very small, densities over 1 million per square meter have been found in Lake Eerie" (The Impact of Aquatic Invasive Species on the Great Lakes, viii). These mollusks, a direct result of the water ballast, reproduce extremely fast and latch onto hydroelectric power pipes, water draining systems and boat hulls resulting in millions of dollars in damage. "Large water users on the Great lakes spend an annual average of $350,000 to $400,000 per user just to clear zebra mussels from their intake pipes. The U.S. Fish and Wildlife Service estimate the potential economic impact of zebra mussels over the next ten years at $5 billion to U.S. and Canadian water users within the Great Lakes region alone" (Invasive Species Fact Sheet, The Watershed Center Grand Traverse Bay).

"Since the St. Lawrence Seaway opened almost fifty years ago, ballast water discharge from ocean-going vessels is the No. 1 way in which aquatic invasive species enter the Great Lakes. To date, 185 invasive species have made a home in the Great Lakes costing us $5 billion a year. The zebra mussel alone costs regional

> industry $150 million a year – they have even been blamed for shutting down the Detroit Edison Plant. They came quietly, under the cover of darkness and they multiplied to biblical proportions." (Lubetkin, "Threat Level: Code Red)

Yet, ballast water is not the only means in which the invasive species have made way into the lakes.

The Great Lakes have also been connected to geographically disconnected waterways, such as the Mississippi river. The Chicago Sanitary and Ship Canal as well as the Welland Canal had no barriers present within the canal system to stop the invasion of non-native species to the Lakes. This caused species such as the Sea Lamprey to come into the Lakes. "Hitching rides on boat hulls, the lampreys quickly spread throughout the newly opened Welland Canal between Lake Ontario and Lake Eerie and then invaded the other Great Lakes." (Lesinksi, 8)

A sea lamprey is a long, cord-like leech that attaches itself to fish to feed off it's blood supply and tissue matter. "By the late 1940s sea lamprey had contributed to the decline of several fish species including lake trout, with catch decreasing from 15 million pounds in the upper Great Lakes to only 300,000 pounds by the 1960s" (Great Lakes Aquatic Invasion Booklet, 6). Since the Great Lakes have commercial and privately owned fishers operating, their financial gains are directly proportional to the stability of the fish they're catching. "Charter boat captain Larry Watts knows that sports fishing is uncertain risky business in the Great Lakes…as Watts and his client hoist the trout into the net, they find a hungry lamprey clinging to the fish's silvery side." (Lesinski, 7)

"A single adult sea lamprey can kill as much as 40 pounds of fish in a 12-20 month period…(the lamprey) has caused the extinction of three species of whitefish and the decline of several other major native fish species…" (The Impact of Aquatic Invasive Species on the Great Lakes, viii). With the sea lamprey literally eating away at their profits, the lamprey has caused nearly $4 billion in loss and damages to the commercial and recreational fisheries (Great Lakes Aquatic Invasion Booklet, 6). Some solutions to the problem have called for lampricides and hormone distribution within the waters to control the population, but as we can conclude from evidence of harmful agricultural pesticides, lampricides may have an effect on the other organisms in the area. "They tested more than six thousand chemicals before they discovered TFM in 1957...Yet too much TFM will kill some sports fish and aquatic insects." (Lesinksi, 13)

Since the Great Lakes also provided a lot of recreational fishing and boating, some invasive species were purposefully introduced to either combat the sea lamprey that was over killing the fish population or to adding an invasive species to take care of overpopulation of another. The hearing before Congress in May, 2007 also addressed this issue, bring light to the fact that the invasive species were more a direct man-made problem, instead of accidental or natural:

> "Moreover, in the absence of the lake trout as predator (killed off by the sea lamprey) another invasive species - the alewife- began to overpopulate. By the 1960's alewives were so populous that they

> outstripped their food sources and began dying in huge quantities…
>
> Billions of starved, dead alewives washed up on the shores of Lake Michigan…Lakeside municipalities had to expand tax resources to clean t he dead alewives… to control the alewife population, fishery managers introduced salmon to Lake Michigan… the salmon were so successful in containing the alewife population, that they too outstripped their food source, washing up on the shores" (The Impact of Aquatic Invasive Species on the Great Lakes, vii).

As the world modernizes and becomes more technologically advanced, the urban lifestyle and setting seems to grow like moss on a rock, covering the land with our skyscrapers and our pavements. Yet, even in cities like New York or Tokyo, considered some of the most prominent urban developments in the world today, cannot function without nature being present in the view of the mind. Tokyo, a cramped city, still cherishes its orchid gardens and cherry blossoms that grace the temples. In New York, Central park rests in the middle of the city that never sleeps, providing relief from the car horns and monstrous buildings that make a person feel so small and insignificant. It is this necessity of nature, a peace of mind that is given to us by the Earth, that makes the Great Lakes so essential for saving. The lakes are one of the few places where a soul can get back to nature, back to a state where looking at a tree, a lake, an ocean, feeling the wind hit their face makes them realize, even if for a second, that there is a great life bigger than they are, older than any being, wiser than time itself.

"Passing through huddled and ugly walls/ By doorways where women/ Looked from their hunger-deep eyes,/ Haunted with shadows of hunger-hands,/ Out from the huddled and ugly walls,/ I came sudden, at the city's edge,/ On a blue burst of lake,/ Long lake waves breaking under the sun/ On a spray-flung curve of shore;/ And a fluttering storm of gulls,/ Masses of great grey wings/ And flying white bellies/ Veering and wheeling free in the open."

Source: Mahan, John & Ann: Great Lakes Photography

The above poem by Carl Sandburg entitled “The Harbor” is a poetic interpretation of how soothing and relaxing the lakes can be. How even though you might be struck with hunger, you might be quartered in “huddled and ugly walls”, however the encounter with the lake can ease the mind with the beauty and peacefulness of nature. Nature is a spiritual journey, and the Great Lakes are a magnificent example. To further research this phenomena, I interviewed a man named Michael Herald, a native of Canada, who does not have to venture far for a “blue burst of lake”, as in his backyard sits Lake Ontario.

Source: Mahan John & Ann: Great Lakes Photograph

At first I was reluctant to speak about nature to a man who writes programs for a living, however being stuck in a car for eight hours while driving to Quebec inspired me to break the ice and strike a conversation. Before asking about the lake at all, I learned that Mike was an environmentalist at heart. He owned a hybrid car, but seldom used it as he still walked the 3 miles it took to get to the company’s main office. He mentioned he was tossing the idea around of getting solar panels installed around his house someday, but his main concern about the environment, he said, was “keeping the balance of nature and the urban sprawl”. I began asking him about the little lake in his backyard. As I questioned him, I wondered if I would understand the concept at all. Living in New York City, in a small 1 bedroom apartment, surrounded by apartment complexes, the closest thing to a natural experience would be the hour walk to the beach. No, the nature within my closest surrounding was limited to inbred squirrels, bare tress with half of the branches sawed off to make room for wires, rugged weeds poking through the pavement where cracks had formed and the marvelous sight of pigeons flying about in

all their glory.

Source: Mahan John & Ann - Great Lakes Photography

Yet, with an open mind, I prepared for an answer which left me feeling nostalgic. Michael told me that nature is something he craved, especially after a stressful day of customers, computers and the office clutter he had to deal with for a living. He told me that as a child climbing trees and playing in the grass were activities he was so fond of and he did not understand why as people grow up and become working adults they lose touch with that same love for the natural environment. I asked him if the lake impacted his daily life to which he responded saying that waking up in the morning and stepping outside to breathe fresh air and gaze upon the lake made him feel grounded. “No matter the problems at work or even inside my own house, the lake kind of soothes the troubles, even if for a few brief moments,” he said. Even in all the ugliness in the world, you can still look at something in nature and it perks you up, it makes you realize that beauty still exists and that the necessity of this beauty cannot dwindle or be harmed, but be protected for the spirituality of human kind.

The Great Lakes are in use constantly for many recreational purposes. As mentioned before, people boat, fish and enjoy the beaches of the lakes every year. Niagara Falls, for example, is a large tourist attraction. This is why the preservation of the lakes is so important.

Source: Mahan John & Ann - Great Lakes Photography

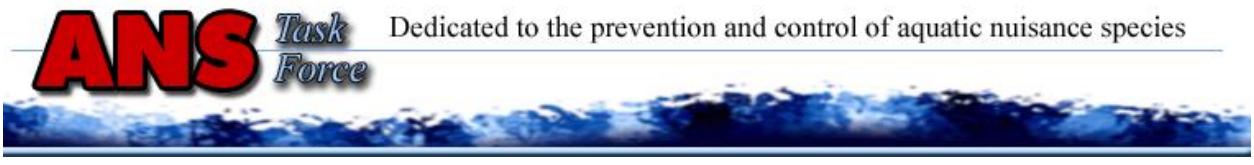
> "Restoring and preserving the richness of species--the biodiversity--of the lands and waters of the region is an important activity because biodiversity in the Great Lakes is strongly tied to the economy, health, and quality of life of the surrounding human population through its positive effects on tourism, recreation, agriculture, drinking-water quality, and fish consumption." (United States Geological Survey, Science Daily)

The Earth has held a balance in nature on her own. In an untouched habitat, the food chain is controlled so that there is never overpopulation and the ratio of prey to predator is from a large scale to a much smaller scale. With the introduction of humans to these environments, small changes took place. As fishing began, the population shift also had begun to occur. Yet, the humans who first fished in the lakes controlled their methods to sustain themselves and never over fished for profit. With the creation of trade routes, cargo ships, ports, fisheries and man-made canals, Earth no longer had control over the habitat of the Great Lakes, and as humans saw the great potential of the lakes as a profitable region, the balance of human impact and nature had spiraled downward and out of control.

A solution to the invasive species of the Great Lakes must take place. As with much of man-made problems, such as global warming, people need to take steps and react to this matter, before the biodiversity of the lakes is beyond repair and more invasive species are introduced, thus threatening the environmental and economic standings of the region further. As the hearing on aquatic invasive species to Congress was presented in 2007, the following statement was issued by Jerry F. Costello, a member of the Subcommittee on Water Resources and the Environment:

> "The impact of invading species to U.S. waters has grown beyond simply reducing native fishing harvest to threatening the natural function of entire ecosystems and posing significant threats to human health. Aquatic invasive species spread through ballast water and threaten local water supplies in many Great Lake communities. Now is not the time to throw up our hands to the issue of controlling invasive species. Congress needs to establish a strict stationary of controlling the spread of aquatic invasive species to prevent the next wave" (The Impact of Aquatic Invasive Species on the Great Lakes, 41).

Few pieces of legislation and federal programs do exist today. The Aquatic Nuisance Species Task Force. This task force includes "10 federal agencies and 12 ex-officio members. It is co-chaired by representative of the U.S. Fish and Wildlife Services and the National Oceanic and Atmospheric Administration" (Great Lakes Aquatic Invasion Booklet, 4). Their main goal is to implement and enforce the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA) of 1990. On their website, the task force lists 5 goals as crucial to their existence, goal 1 being the development of strategies to identify and reduce the risk of Aquatic Species, goal 2 focuses on the minimization of the impact of invasive species already in the water, goal 3 focuses on developing research to study the species, goal 4 demonstrates the importance of teaching the public about the species and what can be done to prevent them from spreading and goal 5 focuses on the maximization of the organization of the government (ANSTF Strategic Plan, Table of Contents).



The Aquatic Nuisance Species Task Force does identify a key point in their goals with goal 4, the education of the public and the region about these species and the prevention of them. One such program designed to relay the message of the importance of the invasive species is

called Habitattitude. “Habitattitude provides consumers and retailers with clear, consistent AIS prevention messages combined with beneficial guidelines…”. The methods that are carried out by the program include such items as brochures, ads, banners, tip cards, posters and public service announcements (Great Lakes Aquatic Species Booklet, 7). Another method of education is the Invading Species Awareness Program, which is a direct program dealing with Aquatic invasive species in the Great Lakes through prevention, monitoring and control of activities. “Key AIS vectors addressed are live bait industry, recreational watercraft, aquarium and water garden trades and unauthorized fish introductions” (Great Lakes Aquatic Booklet, 9). The Awareness Program provides material regarding their mission to boating stores and shows, outreach programs and, most importantly, schools.

Most importantly the control of ballast water must be maintained. One option introduced in the hearing to Congress regarding the Aquatic Invasive species, Adolph Ojard, Executive Director of the Duluth Seaway Port Authority, advised that the Coast Guard should have much more control and authority to enforce the dumping of any ballast water incoming into the Great Lakes outside of the entry points. Further, he said the following:

> “Water-borne transportation is widely regarded as the safest, cleanest and least costly mode of commercial transportation. Ships emit one-tenth of the greenhouses gases of trucks and half that of trains. One maritime accident is recorded for every 14 rail accidents
> and 75 truck accidents. Unfortunately, the emergency of aquatic invasive species has become our industries’ Achilles heel” (The Impact of Aquatic Invasive Species on the Great Lakes, 30)

“Eerie, and Ontario, and Huron, and Superior, and Michigan - possess an ocean-like expansiveness, with many of the ocean’s noblest traits… they are swept by Borean and dismasting blasts as direful as any that lash the salted wave; they know what shipwrecks are, for out of sight

of land, however inland, they have drowned full many a midnight ship with all its shrieking crew." (Moby Dick, Herman Melville) It seems that the post-industrial world has had a conflict of man against nature, where nature once had a fighting chance, as in the Melville quote, but humanity has learned to overcome and overcompensate, to outlive natural disasters, to explore and trample mountains, rivers, oceans and lakes like they have never tried before. Yet, instead of careful treading, humans have scarred the land and the waters, leaving a permanent mark of pollution and invasive species in their wake. Now with new awareness and imminent money spending to solve the man-made problems of the Great Lakes, measures must be taken to not only prevent future infiltration of the exotic species into the lakes, but also control and minimize the effect of the species already infiltrating the area.

The management of the aquatic invasive species has to start at an awareness level. Public education, such as signs, pamphlets and outreach methods to boaters and fishers ought to be enforced. Signs around lakes and ports have to include warning signs to recreational boaters to clean their boating equipment properly before putting the boat in the water. Also, after removing the boat, measures have to be taken by boaters to make sure that no aquatic species have latched on to the hull or the motor. Prevention messages could be given on site at the lakes by agency inspectors and volunteers. "Stop Aquatic Hitchhikers!" is a national campaign in Canada that is designed to educate recreational water resource users on the aquatic issues and provide targeted advice on voluntary guidelines for prevention and control. According to their website, www.protectyourwaters.net, there are simple procedures that boaters and recreational lake users can take to minimize their active involvement in the spread of aquatic invasive species. The procedures include removing visible mud, plants, fish or animals from the boats, as well as draining all water before transporting the equipment, as well as drying all materials that have been in contact with the water. The most important procedure outlined on the front page of the cite urges boaters to never release plants, animals or fish into a body of water unless they have originally come from the same body of water.

Then, a more aggressive assessment and study of the current species has to take place.

Constant monitoring and risk assessment would allow researches to determine the aggressive nature of the species currently in the lakes and estimate their impact on the local industries, ecosystems and possible the regional health of both the animals and humans. Identification of new invaders is also necessary to correctly identify the aquatic invasive species and their effects on the environment. An awareness program called the "Invading Species Awareness Program" has been in operation since 1992 and is a cooperative venture of the Ontario Ministry of Natural Resources. The mission of the program is to raise public awareness on the aquatic species and encourage public participation in prevention and monitoring. They have even set up the Invading Species Hotline, which allows volunteers and agency members to report aquatic species introduction. Other volunteer monitoring programs such as displays at boating shows, industry workshops, outreach material and school curricula. (GLAI Bklt, 9).

Perhaps all of this can be possible if, instead of relying on federal support from either the United States side or the Canadian side, a massive non-profit organization was created to control all of the volunteer and small organizational work that is already being put into the protection of the Great Lakes region. In an "Utopian" setting, this organization would be called the Preservation of the Great Lakes Region Society. Lobbying for grants from both sides of the border, the organization would take away the conflict of involving to different governing bodies from deciding which should spend more on the Great Lakes. The society will use its full-time staff to print and provide the outreach material; design and post clear well-printed signs around the Great Lakes which would include information about the clearance of water craft and all accompanying fines; employ water craft inspectors and entry points of ports into the Great Lakes to survey every single ship to make sure the water ballast has been emptied before entrance to the lakes; to employ full-time marine biologists to fully study and understand the involvement of the invasive species on the lakes and try to find a solution to minimize the invasive species problem.

The evidence of not only the economic cost the invasive species, such as the zebra muscle, but also the huge environmental impact is very significant. Billions of dollars are being wasted as a result of these man-made hazards that were introduced to the beautiful Great Lakes as an act of carelessness or a direct neglective power-trip that man tends to have of being able to take a

species from another habitat, without completely understanding their niches, and putting them in a new environment, usually to fix a previously man-made problem, resulting in utter chaos. In my opinion, further investigation and public education needs to take place. I would have not know of this myself, unless a friend who recently moved near Lake Ontario would not have notified me of this problem. For the people living in the Great Lakes region the evidence is clear. When millions of zebra muscle shells are polluting their beaches, when the sea lamprey has eaten away at the commercial and local fisheries profits, when dead alewives float on the water making it impossible to swim or recreate, that's when the realization comes that yes, we have a problem, we caused it and we have to fix it.

Source: Mahan John & Ann - Great Lakes Photography

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