Aquatic Invasive Species

- plants, animals, and pathogens that are nonnative to this region AND cause harm
- harm- economic, ecological, or human health
- can produce self-sustaining populations

Eurasian Watermilfoil  Spiny Waterflea  Zebra Mussel
AQUATIC NON-NATIVE AND INVASIVE SPECIES IN LAKE CHAMPLAIN, 1883-2020

NOTE: Data reflects the year of first reported sighting of species.
DATA SOURCE: Ellen Fritzler, University of Vermont
Non-native threats to Lake Champlain Basin from connected waterways

The numbers show the total non-native and invasive species known to be present in each waterway as of January 2021.

NOTE: All the waterways contain some overlap of species.
Invasive Species Pathways

- Aquarium Dumping
- Home Gardening
- Canals & Waterways
- Illegal Stocking
- Overland Transport
Vectors of exotic species introductions

- **Canals**: 42% of species are introduced through canals. Regulations passed in 2002, followed by NY.
- **Escapes**: Reduced through education, permitting.
- **Stocked**: Reduced due to changes in management philosophy, regulations, and permits.
- **Unknown**: Represents the majority of species introductions.
- **Shipping**: A small number of species are introduced through shipping.
- **Bait**: A negligible number of species are introduced through bait.
INVADERS ALREADY IN THE CANAL SYSTEM

Round goby

Hydrilla

Fragile papershell

eDNA of Round goby

Asian clam

Quagga mussel
ECONOMIC IMPACTS ARE COSTLY

Invasive species cost the U.S. more than $120 billion in damages every year!

Water Chestnut Infestation, Lake Champlain
• Reduced water quality
• Reduced productivity of forestry, fisheries, agricultural and range lands

Milfoil Infestation, Upper Saranac Lake
• Impaired recreational activities; access, boating, birding, fishing, hunting
• Reduced property values
• Negative impact on tourism
ADK ECONOMIC IMPACTS

- $4.27 MILLION being spent on invasive species in the Adirondacks

- Estimated cost of 8 invasive species: 4 aquatic and 4 terrestrial

- Estimated annual loss of $48-53 million

- Total estimated property value loss of $420-840 million
Examples of AIS impacts to Lake Champlain

• Water chestnut management in Lake Champlain ~$600k annually
• Sea lamprey control program ~ $500-$800k annually
• Fish hatchery and public water supply intake expense for clearing pipes
• Injuries to citizens that cut their feet on the shells of zebra mussels while recreating
• Negative impacts to historic ship wrecks
• Imbalances in the foodweb (alewife displacing native smelt, spiny and fishhook waterflea disrupting the food chain, aquatic plant growth choking waterways for boats, swimmers and anglers
An Ounce of Prevention = 1 Pound of Cure
Lake Champlain Boat Launch Steward Program: 2007-2020
*Modeled after the Paul Smiths College Adirondack Watershed Institute Program

- 2007 steward program grew from 4 steward to 12 stewards in 2019
- Program Season: Memorial Day to Labor Day (8hr days up to 4 days/week)
- Location: high use VT Dept of Fish and Wildlife and NY State DEC boat launches on Lake Champlain, provincial QC sites

Risk Assessment – Greet boat launch users, conduct courtesy inspections, collect data on AIS spread prevention behavior, inform users/hand out educational materials

Key AIS spread prevention questions:

1) Last waterbody watercraft visited in the previous two weeks?

1) Do you take any measures to prevent the spread of AIS?

2) Where do you intend to launch your watercraft next?
JOINT TRAINING WITH AWI
**CLEAN BOATS CLEAN WATERS**

Watch out for unwanted aquatic hitchhikers when you move from one waterway to another!

Aquatic invasive species (AIS) are non-native plants and animals that threaten native plants, wildlife, and their habitat. They also affect humans by degrading boating and fishing areas and reducing lake shore property values and tourism. Once AIS are established, eradication is almost impossible.

**WATERCRAFT CHECK POINTS**

- Hitch
- Live Well
- Transom Well
- Rollers
- Axle 1
- Lower Unit/Propeller

**When you leave a waterway:**
- Check and remove any visible mud, plants, fish, or organisms from boats, trailers, equipment, clothing, dogs, etc.
- Clean and eliminate water from equipment.
- Dry anything that comes into contact with water.

Never release plants, fish, or other animals into a waterway unless they came from that waterway.
Lake Champlain Steward Survey

<table>
<thead>
<tr>
<th>Boat Type</th>
<th>Group Size</th>
<th>State of Registration</th>
<th>Launch/Retrieve (circle one)</th>
<th>Time of Inspection (military)</th>
<th>Prior BLS contact? (circle one)</th>
<th>Does the Visitor Take Spread Prevention Steps? Write in Steps Taken!</th>
<th>Aquatic Organism(s) Found? (circle one)</th>
<th>Species Identification</th>
<th>Brochure or Sticker? (circle)</th>
<th>Last Waterbody Visited in Prior 2 Weeks? (name, town, state)</th>
<th>What Waterbody Will the Visitor Go To Next? (name, town, state)</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

Boat Type = M = motorboat; PWC = personal watercraft; S = sailboat; C = canoe; K = kayak; B/S = B for Brochure, S for Sticker (circle one, both or none)

Spread Prevention = I (inspected), WB (washed boat), DB (drained bilge water), BB (drained bait buckets), LW (drained or treated live well), Disp (dispose of bait properly)

DRY (dry boat and equipment); NONE (no steps taken); N/A (did not ask)
### 2019 FIELD SEASON DATA SUMMARY

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<th>2019</th>
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<tr>
<td>Stewards</td>
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<tr>
<td>Launches Attended</td>
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<tr>
<td>Wash Stations at Launches</td>
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<tr>
<td>Boats</td>
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<tr>
<td>Number of Visitors</td>
<td>22861</td>
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<tr>
<td>% Groups w/Intercepted Organisms</td>
<td>13.2</td>
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<tr>
<td>% Groups w/Intercepted Invasives</td>
<td>9.1</td>
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<tr>
<td>% Groups Taking AIS Preventative Measures</td>
<td>75.8</td>
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<tr>
<td># of Groups Surveyed</td>
<td>9883</td>
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<tr>
<td>Days</td>
<td>97</td>
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<td>Surveys per Day</td>
<td>102</td>
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<td>Average Group Size</td>
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**Figure 13** | Potential spread of aquatic invasive hitchhikers by trailered boats in the Northeast 2015-2017
2019 YEAR OF THE FISHHOOK WATERFLEA AND HYDRILLA SAVE
ASSIST WATER CHESTNUT AND EUROPEAN FROGBIT HARVEST EFFORTS
COVID-19 TIMES- 2020 FIELD SEASON

• VIRTUAL TRAINING MAY 18-20\textsuperscript{TH}
• PPE – MASKS, HAND SANITIZER, GLOVES
• UNKNOWN START DATE FOR THE FIELD WORK (EXPECT MEMORIAL DAY FOR NY; VT WAITING ON PERMIT, QC UNKNOWN)
• EXPECT TO HAVE DECON AT SHELBURNE, COLCHESTER, SOUTH HERO – SAME AS 2019
• WORKING ON ADDING DECON STATIONS (MALLETTS BAY HIGHEST RISK SITE)
PARTNERSHIP FORMED TO REDUCE THE SPREAD OF AQUATIC INVASIVE SPECIES THROUGH THE CHAMPLAIN CANAL
PARTNERSHIPS ARE KEY TO AIS SPREAD PREVENTION

• LCBP AND PARTNERS MET WITH NYSCC IN DECEMBER 2006 TO PROPOSE A PARTNERSHIP TO ADDRESS AIS IN THE CHAMPLAIN CANAL

• DEVELOPED SET OF COMMON PARTNERSHIP GOALS

• GROUP HAS MET SINCE 2006 TO DISCUSS AIS SPREAD PREVENTION EFFORTS IN THE CHAMPLAIN CANAL
SEC 5146. LAKE CHAMPLAIN CANAL, VERMONT AND NEW YORK

• (A) DISPERSAL BARRIER PROJECT – THE SECRETARY SHALL DETERMINE, AT FEDERAL EXPENSE, THE FEASIBILITY OF A DISPERSAL BARRIER PROJECT AT THE LAKE CHAMPLAIN CANAL, VERMONT AND NEW YORK, TO PREVENT THE SPREAD OF AQUATIC NUISANCE SPECIES

• (B) CONSTRUCTION, MAINTENANCE, AND OPERATION – IF THE SECRETARY DETERMINES THAT THE PROJECT DESCRIBED IN SUBSECTION (A) IS FEASIBLE, THE SECRETARY SHALL CONSTRUCT, MAINTAIN, AND OPERATE A DISPERSAL BARRIER AT THE LAKE CHAMPLAIN CANAL AT FEDERAL EXPENSE.
HISTORY OF INTEREST IN CHAMPLAIN CANAL AS AN AIS VECTOR

• 1989 (SMITH AND ROOT 1993); NYSDEC FISHERIES BIOLOGIST CONTACTS SMITH-ROOT TO EVALUATE ELECTRIC BARRIER ON THE CHAMPLAIN CANAL

• INTERSTATE HIGHWAYS AND RAILWAYS TRANSITION CANAL TO RECREATIONAL USE, PLATTSBURGH AIR FORCE BASE CLOSES 1995

• 1998 USFWS HOLDS WORKSHOP ON CHAMPLAIN CANAL AS VECTOR

• WRDA 2000 IDENTIFIES THE CHAMPLAIN CANAL AQUATIC NUISANCE SPECIES BARRIER FEASIBILITY STUDY

• 2001 – NSGO AWARD: MULTIDISCIPLINARY ANALYSIS OF THE FEASIBILITY OF CHAMPLAIN CANAL BARRIER OPTIONS

• 2002 LCSG STAKEHOLDER SUMMIT, CHICAGO SANITARY SHIP CANAL EXPERTS, OUTCOME = PUBLIC DOES NOT BELIEVE CANAL IS SIGNIFICANT PATHWAY FOR NONNATIVE SPECIES COMPARED TO OTHERS

• 2004 VESSEL TRAFFIC TOTALED 24,976 (22,315 RECREATIONAL, 495 CARGO, 715 TOUR, 129 HIRE, 1,322 STATE)
FEASIBILITY OF CHAMPLAIN CANAL AQUATIC NUISANCE SPECIES BARRIER OPTIONS

2005 LAKE CHAMPLAIN SEA GRANT AND NOAA STUDY (MARSDEN, MALCHOFF, AND HAUSER)

ATTRIBUTES OF AN IDEAL BARRIER =

• FEASIBLE
• AFFORDABLE
• DOES NOT IMPEDE BOAT TRAFFIC
• MINIMAL NON-TARGET EFFECTS
• EFFECTIVE AGAINST A RANGE OF TAXA (FISH, INVERTEBRATES, PLANTS, PLANKTON)
CANAL AIS MANAGEMENT OPTIONS

• **ALTERNATIVE ONE:** DO NOTHING (I.E. NO CHANGE IN CANAL ENGINEERING OR OPERATIONS)

• **ALTERNATIVE TWO:** CLOSE THE CHAMPLAIN CANAL

• **ALTERNATIVE THREE:** PHYSICAL/MECHANICAL MODIFICATION OF CANAL AND OR LOCKS

• **ALTERNATIVE FOUR:** BEHAVIORAL BARRIER (ELEC., BUBBLE)

• **ALTERNATIVE FIVE:** CHEMICAL/WATER QUALITY BARRIER

• **ALTERNATIVE SIX:** BIOLOGICAL BARRIER
SAVE THE DATE – NOVEMBER 6TH, 2008

CHAMPLAIN CANAL AQUATIC INVASIVE SPECIES INFORMATIONAL MEETING

ORGANIZATIONS, BUSINESSES, MUNICIPALITIES, THE PUBLIC, AND OTHERS WITH AN INTEREST IN THE CHAMPLAIN CANAL ARE INVITED TO THE CHAMPLAIN CANAL AQUATIC INVASIVE SPECIES INFORMATIONAL MEETING. THE MEETING IS SPONSORED BY THE LAKE CHAMPLAIN BASIN PROGRAM (LCBP) AND THE NEW YORK STATE CANAL CORPORATION (NYSCC) IN PARTNERSHIP WITH THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION OFFICE OF INVASIVE SPECIES COORDINATION (NYSDEC-OISC).

WHEN: THURSDAY NOVEMBER 6TH, 2008 FROM 1PM-5PM
WHERE: WASHINGTON COUNTY MUNICIPAL CENTER, 383 BROADWAY, FORT EDWARD, NY
RSVP: THIS MEETING IS FREE AND OPEN TO THE PUBLIC. PLEASE RSVP TO LCBP AT 1-800-468-5227 OR KJARVIS@LCBP.ORG TO ENABLE US TO MAKE ADEQUATE SPACE AVAILABLE.

COME LEARN ABOUT AQUATIC INVASIVE SPECIES IMPACTS AND THE CHAMPLAIN CANAL. THE MEETING WILL INCLUDE PRESENTATIONS BY LCBP, NYSCC, NYSDEC-OISC, US ARMY CORPS OF ENGINEERS, INVASIVE SPECIES EXPERTS, AND WILL INCLUDE A PUBLIC COMMENT PERIOD.
OUTCOME OF THE MEETING

• NYSCC WROTE A LETTER TO THE USACE SUPPORTING A FEASIBILITY STUDY FOR A BARRIER ON THE CHAMPLAIN CANAL.

John L. Buono
Chairman
Michael R. Pfisterer
Executive Director

March 3, 2009

Eugene Brickman
US Army Corp of Engineers
26 Federal Plaza
New York, NY 10278

Subject: Champlain Canal Dispersal Barrier Feasibility Project

Dear Mr. Brickman:

The New York State Canal Corporation (Corporation) formally requests that the US Army Corp of Engineers initiate the Champlain Canal dispersal barrier feasibility study to determine how to best prevent the spread of aquatic invasive species. This study is referenced in the Water Resources Development Act of 2007, Section 3146, which is excerpted as follows:

(a) Dispersal Barrier Project – The Secretary shall determine, at Federal expense, the feasibility of a dispersal barrier project at the Lake Champlain Canal, Vermont and New York, to prevent the spread of aquatic nuisance species.

The Corporation has formed a good working relationship with the Lake Champlain Basin Program and the New York State Department of Environmental Conservation to address aquatic invasive species spread prevention in the Champlain Canal. Our partnership held a Champlain Canal Aquatic Invasive Species Stakeholder Meeting in November, 2006, at which more than 70 stakeholders from municipalities, state agencies, non-profit organizations, legislators’ offices, watershed organizations, and businesses shared their thoughts and support for reducing the spread of aquatic invasive species via the Champlain Canal. The Corporation believes that the feasibility study is an important next step in managing aquatic invasive species threats to the Lake Champlain ecosystem.

The Corporation looks forward to working with the US Army Corp of Engineers on this endeavor. Please do not hesitate to contact me if you should have any questions.

Sincerely,

Carmella R. Mantello
Director
PARTNERSHIP WORKS TO ADDRESS NEW AIS IN THE CHAMPLAIN CANAL

• ASIAN CLAM – 1ST FOUND IN THE CHAMPLAIN CANAL IN FORT EDWARD, NY IN SPRING, 2008

• SPINY WATERFLEA – CONFIRMED IN GREAT SACANDAGA LAKE IN OCTOBER 2008 (CONNECTED TO THE CHAMPLAIN CANAL THROUGH THE GLENS FALLS FEEDER CANAL)

• 2009 CONGRESSIONAL TOUR OF THE CHAMPLAIN CANAL (NY AND VT)

• MARSDEN CHAMPLAIN CANAL SPECIES RESEARCH IN THE CHAMPLAIN CANAL

• STEWARDSHIP PROGRAMS IN 2013 AND 2014 TRAINED BY LCBP
Spiny Water Flea
Glens Falls Feeder Canal
June 12, 2012
CONGRESSIONAL TOUR OF CHAMPLAIN CANAL
Photos of sampling

All taxa: collections in drained locks (locks 4, 8, and 9)
Results

Canal habitat and conditions

Secchi depth 0.4 - 1.3 m (median 0.6 m)
DO (surface) 8.2 - 11 mg/L
DO (bottom) 6.8 - 1.4
Surface temp. max. 28° C
Bottom temp. averaged 1.2° C lower than surface
Conclusions of Canal Research

Champlain Canal contains a diverse community with reproducing fish communities

Habitat is largely warm, shallow, lentic, with mud-sand substrates

Canal is accessible to cold- and cool-water fishes

Invasion is occurring by range extension, not just rapid migration

= few obstacles to future invasions
USACE SCOPE OF STUDIES FOR CHAMPLAIN CANAL BARRIER FEASIBILITY STUDY

• NYSCC, NYSDEC, USFWS, AND LCBP PARTNERS AGREE ON LANGUAGE FOR THE CHAMPLAIN CANAL BARRIER FEASIBILITY STUDY FOR HYDROLOGIC SEPARATION

• NOT A RAPID PROCESS BUT WOULD ADDRESS ALL SPECIES MOVEMENT

• 2017 AFTER MANY ATTEMPTS (YEARS) SECURING A LOCAL SPONSOR, NEIWPC/LCBP SERVE AS LOCAL SPONSOR AND SECURE SECTION 542 USACE ASSISTANCE TO INITIATE THE CHAMPLAIN CANAL BARRIER FEASIBILITY STUDY ~$550K
TARGET AREA OF THE CANAL

Mouth of GF Feeder Canal – looking upstream
• The team conducted a site visit on October 30, 2018 at the Lake Champlain Canal, focusing on the study area of locks C8, C9, and the feeder canal from the Hudson River at Glens Falls, NY. Additional sites were visited in the vicinity of lock C7 as it became apparent that the canal between lock C8 and C7 might become part of the solution set.
**USACE/HDR STAKEHOLDER PROJECT TEAM**

- Identify measures to form 6 alternatives
- Down select to 3 alternatives
- Evaluating value functions for cost/benefit analysis of 3 alternatives

### Summary of Control Measures used in Alternatives

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<tr>
<th>Control Measure</th>
<th>Alt. 1</th>
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<th>Alt. 4</th>
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<tr>
<td>1) Reverse Flow Cell to Cell, Raise Weir</td>
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<td>2) Back Pump</td>
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<td>3) Alternate Makeup Water</td>
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<td>6) Wedge Wire Intake Screen</td>
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<td>7) Modified Lock Passage Scheduling and Operations</td>
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<td>8) Water Filtration / Storage Tank Feed</td>
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<td>10) Chlorination Treatment Chamber</td>
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ALTERNATIVES INCLUDE CONSTRUCTING BERM AND LIFTING BOATS SOUTH OF LOCK 9 AND PROVIDING BOAT LIFTS AT LOCK 9

• REVERSE FLOW AT LOCK C9, BACK PUMP, BUILD BURM, RAISE WEIR, BOAT LIFT WITH CLEANING STATION, REPAIR LOCK SEALS

• STUDY IS UNDERWAY
THANK YOU!

Meg Modley Gilbertson
NEIWPCC Environmental Analyst
Lake Champlain Basin Program Aquatic Invasive Species Management Coordinator
54 West Shore Rd., Grand Isle, VT 05458
802-372-0215 mmodley@lcbp.org
lcbp.org | neiwpcc.org
Great Lakes and Lake Champlain Invasive Species Program (GLLISP) Update

NYCAC March 2021
Meg Modley
AIS Management Coordinator
Lake Champlain Basin Program
2018 G LLC ISP Authorization Required Report to Congress

- Description of activities
- Multidisciplinary efforts
- Recommendations to more fully achieve G LLC ISP Purposes
- Recommendations to achieve efficiency
GLCC ISP Report to Congress

Recommendations

- Establish a more robust Lake Champlain AIS Program
- Enhance ballast water research and development of technologies
- Increase state and tribal AIS program support
- Increase research to support surveillance and early detection approaches
2018 GLLC ISP Authorization Identifies Eight Purposes of Program

- to monitor for the introduction and spread of ANS species...
- to detect newly introduced ANS prior to the establishment ...
- to inform, and assist with, management and response actions...
- to establish a watch list of candidate ANS...
- to monitor vectors...
- ... to develop criteria for prioritizing and distributing monitoring effort
- to develop, achieve type approval for, and pilot shipboard or land-based ballast water management system... for use by commercial vessels operating solely within the Great Lakes and Lake Champlain
- to facilitate meaningful Federal and State implementation of the [ballast water] regulatory framework
## Format of GLLC ISP Report to Congress

- **By Purpose (8) and associated Key Activities (20)**
- **Comparison and contrast between Great Lakes and Lake Champlain**

### Purpose 2: Programs that “detect newly introduced aquatic nuisance species prior to the establishment”

<table>
<thead>
<tr>
<th>Key Activity</th>
<th>Great Lakes</th>
<th>Lake Champlain</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. “Hotspot” early detection activities</td>
<td>Basin-wide program in place to monitor “hotspot” locations along with supplementary activities by partners</td>
<td>No established early detection monitoring efforts present at boat launches and marinas and other opportunistic areas</td>
</tr>
<tr>
<td>4. Species-specific activities or collaboratives (i.e., focus efforts on critical species)</td>
<td>Collaboratives exist for Asian carp, crayfish, Hydrilla, invasive mussels, Phragmites, New Zealand mud snail</td>
<td>Collaboratives exist for water chestnut and Asian clam, but directed efforts for other high concern species are lacking</td>
</tr>
<tr>
<td>5. Innovative technology development and deployment</td>
<td>Monitoring and intercepting vectors of bighead and silver carp using eDNA tools while building genomic libraries and techniques for additional species</td>
<td>Piloted development of genomic tools for early detection of quagga mussel, Asian clam, and Zebra mussel</td>
</tr>
</tbody>
</table>
Possible Next Steps for Great Lakes and Lake Champlain*

- Sharing lessons learned, technology transfer, and making more connections
- Development of AIS data delivery system for Lake Champlain
- Considering initial steps for developing a Lake Champlain AIS early detection program

* Does not consider next steps for ballast water research and development and regulatory framework. Also does not consider if federal appropriations for GLLCISP are made.
Thank you to GLLC ISP Report to Congress Contributors!

Federal Agencies, States, Tribes, and Regional Entities

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