

Integrated Project Summary report YEAR TWO (July 2015 – May 2016)

Digitization TCN Collaborative Research:
DOCUMENTING THE OCCURRENCE THROUGH SPACE & TIME
OF AQUATIC NON-INDIGENOUS FISH, MOLLUSKS, ALGAE, & PLANTS
THREATENING NORTH AMERICA'S GREAT LAKES (= "Great Lakes Invasives TCN [GLI]")

PARTICIPANTS

Approximately 58 individuals from the 20 primary institutions funded by this effort have been engaged in the GLI-TCN during year two. These represent faculty, curators, permanent and temporary staff, graduate and undergraduate students. Additional participants will join the effort in year three as originally scheduled.

ACCOMPLISHMENTS

The overall goals of the Great Lakes Invasives TCN project are:

- (1) To digitize ca. 1.73 million specimens from 2,550 species in 101 genera, specifically:
 - 1a) >637,000 plant specimens +
 - 1b) >102,000 fish lots (containing >681,000 fish specimens) +
 - 1c) >44,000 mollusk lots (containing >408,000 mollusk specimens)
- (2) To harvest & organize significant data associated with collections using Symbiota portal software
- (3) To share specimen images and data with the greater scientific community using project-specific Symbiota portal(s) and the iDigBio National Resource
- (4) To promote cross-collection efforts in the study of aquatic/invasive species among at least 18 herbaria + 8 zoological museums from 7 states + Canada
- (5) To promote the use of collections data by educators and the public

Specimen Digitization Year One + Two Cumulative:

TARGETED PLANT SPECIMENS BY USA HERBARIA

Records Uploaded to iDigBio, the GLI Portal and/or to another Symbiota Portal = **448,703**
[of which 89,337 (20%) have been georeferenced; 340,366 (76%) imaged]

In addition . . .

Barcoded only = 15,232

Imaged only but image not yet uploaded to the portal: = 102,646

Databased only but not yet uploaded to a portal: = 147,848

Imaged and Databased but not yet uploaded to a portal: = 20,775

*Note that the new 'Consortium of Midwest Herbaria' Symbiota portal, which is directly related to this TCN, now has **1,154,500** occurrence records available from 21 herbaria. Only a subset of these records represent the target taxa for the GLI-TCN, but all of these will eventually be ingested by iDigBio. This portal is being administered by the same team overseeing the GLI TCN.

TARGETED PLANT SPECIMENS BY CANADA HERBARIA

Records Transferred to the GLI Portal from Canadensys = **122,816**
[of which 57,504 (47%) have been georeferenced; 14,278 (12%) imaged]

TARGETED FISH

Records Uploaded to iDigBio, the GLI Portal &/or another Symbiota Portal = **51,470**
[of which 11,883 (23%) have been georeferenced; 18,802 (37%) imaged]

In addition . . .

Imaged but not yet uploaded to the GLI portal: = 8,800

Databased only but not yet uploaded to a portal: = 204,709

TARGETED MOLLUSKS

Records Uploaded to iDigBio, the GLI Portal &/or another Symbiota Portal = **30,011**
[of which 5,979 (20%) have been georeferenced; 2,039 (7%) imaged]

In addition . . .

Barcoded Only = 200

Imaged only but image not yet uploaded to a portal: = 9,981

Databased only but not yet uploaded to a portal: = 16,308

Other Activities in Year Two:

- Plant digitization was completed in year two by several institutional partners. Others are nearing completion. Fish and mollusk digitization efforts have ramped up considerably in the past year, with many databased records and images added to the portal since year one.
- Data from the unfunded Canadian partners via Canadensys was contributed to the GLI portal in July, 2015 adding >100,000 plant specimens records.
- Additional partners were trained in year two. Specifically portable digitization workstations were loaned to UW-LaCrosse and to Butler University, where staff and student workers received training in plant digitization. Data collection is underway by both partners.
- At least 6 TCN representatives attended the iDigBio summit in Washington, DC in November, 2015. Co-PI Andrew Simons gave a 10 minute presentation on the project.
- PI Cameron (WIS) attended the iDigBio workshop on using specimen data to address issues of global change 2-3 December, St. Louis, MO.
- Two members of this TCN attended an iDigBio workshop on data management and digitization in September, 2015. This provided us with an opportunity to learn new skills as well as discuss issues and help other researchers working in other TCNs or other digitization projects.
- PI Cameron prepared four bi-monthly progress reports for iDigBio and participated with others in regularly scheduled bi-monthly TCN Administration Meetings.
- PI Cameron and several Co-PIs have participated in the monthly Symbiota Working Group meetings via Adobe Connect.
- A new PhD graduate student Project Assistant at UW-Madison began participation in the TCN as part of his training in plant systematics and museum studies. Sept 2016.
- The PI assisted the Milwaukee Public Museum with submission of a PEN grant proposal to NSF to join the GLI TCN, which was deemed meritorious, but not recommended for funding.

Outreach Activities in Year Two:

- The Field and Morton are working in tandem with the N.W. Harris Learning Collection at the Field Museum to develop an “Experience Box.” This learning tool will be on loan available to area teachers. The Experience Box will contain lesson plans and tangible specimens for students to learn from hands on experience. The included specimens will represent native and non-indigenous species and provide valuable resources for students to generate real, meaningful data. As of September 15, 2015, we have had an initial meeting with the Field Museum educational staff and are planning regular meetings arranged to facilitate further collaboration. At the initial meeting we were introduced to examples of existing Experience Boxes and the loan system already in place at the Field Museum. Scientific content of the Experience Box was reviewed by Dan Larkin at the University of Minnesota. We are on track to have the Experience Box in classrooms mid to late 2016.
- The Education and Outreach Coordinator attended the Michigan Consortium of Botanists meeting on October 24, 2015. At this meeting she presented our TCN’s outreach strategies and networked with botanists interested in sharing the Experience Box’s educational materials. Half of the day’s presentations were focused on invasive species research, reporting, and control strategies. Of particular interest was learning more about MISIN (Midwest Invasive Species Information Network). MISIN has an online invasive species records database and specializes in optimizing occurrence reporting. We will be contributing our data records to MISIN.
- The Outreach Coordinator (MOR) is writing tutorials for databases receiving records from the TCN. These will be used in teacher training and professional user workshops.
- Native and invasive look-alikes identification materials’ first draft is almost complete. The guide includes line drawings, herbarium specimen images, and in-situ photos. The ID guide will be included in the Experience Boxes and will be available online.
- The Outreach Coordinator began sharing data with MISIN, GLANSIS, and GISD. We shared select images with GLANSIS and Bugwood depending on which species they wanted. More images will be uploaded to Bugwood in the future.
- The Outreach Coordinator is attending iDigBio Education and Outreach working group webinars and is collaborating with other members of the working group to submit proposals for the 2017 National Science Teachers Association Conference and the 2016 meeting of the National Association of Environmental Educators.
- A news story out of the Univ of Michigan, “Digitizing the U-M Herbarium collections: Great Lakes invasive species update”, was published Sept 11, 2015.

Highlights of IT Activities

- AZ State Univ (representing Symbiota) has employed two programmers and one data jockey contributing to the maintenance, development, and overall support of the infrastructure supporting the TCN data portals, including the Aquatic Invasive and Midwest consortium projects.
- Roughly 60-80% of the ASU effort spent on the TCN related tasks involve server and database maintenance, data migration, data cleaning, and other non-development (programming) tasks. The remaining tasks tend to involve programming, software development and maintenance of the portal software (e.g. updates, repairing buggy code) . One can access full details of the programming tasks via the code repository submission history links listed below. Over the 2015 period, the ASU Symbiota team submitted 470 code submissions, which is probably more than any other year since the original Symbiota grant.

PUBLICATIONS AND PRODUCTS

- Three primary websites have been developed specifically for this project:
<http://herbarium.wisc.edu/GreatLakes.htm> &
<http://greatlakesinvasives.org> &
<http://midwestherbaria.org>
- An undergraduate Biology major completed 3 hours of Directed Study at UW-Madison on the topic of “Spatial and temporal spread of non-indigenous species of the Great Lakes using herbarium data at a regional scale” which resulted in an unpublished student thesis.
- At least three abstracts have been submitted by Co-PIs who will be presenting papers and posters about the TCN at national meetings in summer-fall 2016.
- Partners at Univ of Michigan & Central Michigan Univ produced an outstanding online video showcasing the project . . . “*Aquatic Invasive Plants: Following the Data*” Science LIVE. <https://vimeo.com/156926248>