Quarterly Progress Reports To iDigBio Submitted By Active Thematic Collections Networks (TCNs)

February 2021

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iDigBio is funded by a grant from the National Science Foundation's Advancing Digitization of Biodiversity Collections Program (Cooperative Agreement EF-1115210). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

CALIFORNIA PHENOLOGY TCN – QUARTERLY REPORT – FEBRUARY 2021

Assembled by Katie Pearson, 1 February 2021

PROGRESS IN DIGITIZATION EFFORTS:

Figure 1 shows our progress in imaging, transcribing, georeferencing, and phenologically scoring the target specimens for the original 22 CAP institutions, explained more in detail in the following sections.

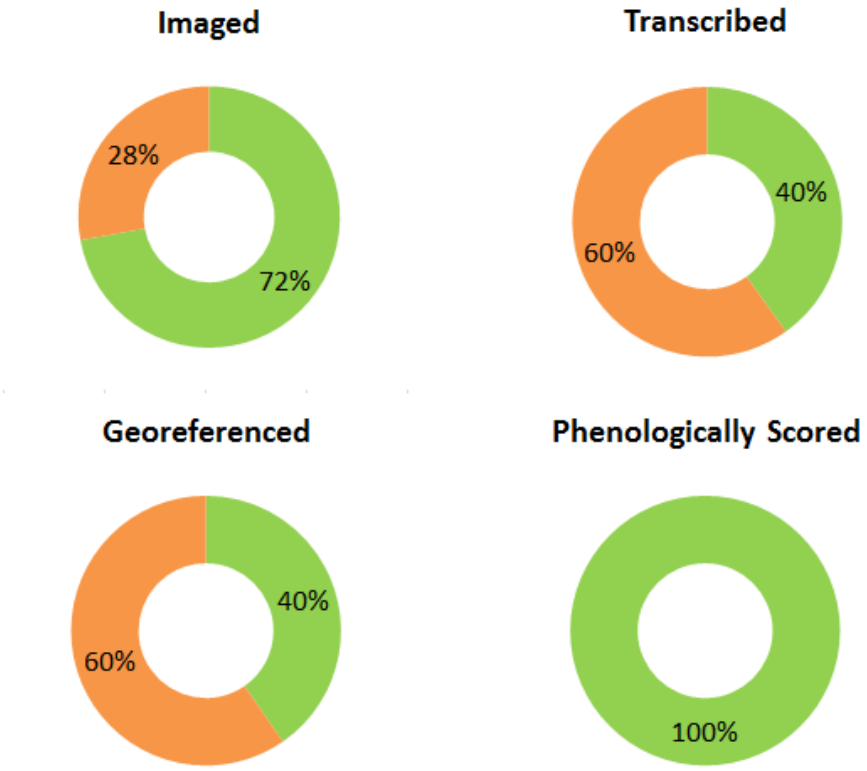

Figure 1. Progress in each of our four major digitization goals. Note that totals represent the original goals of the CAP grant: 902,400 specimens imaged and phenologically scored, 300,000 specimens transcribed, and 300,000 specimens georeferenced. Additional specimens to be digitized by the PEN grant are tabulated in the PEN section below.

TRANSCRIPTION

An estimated 120,000 specimen records have been transcribed across the CAP Network since the beginning of the project. This is approximately 40% of the goal number of transcriptions.

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Transcription has largely been accomplished by student volunteers working for credit (see Education and Outreach section) and through Notes from Nature expeditions. One NfN expedition was completed in November 2020, and we have launched two new expeditions in addition to the two existing expeditions.

GEOREFERENCING

We have georeferenced approximately 121,048 specimen records, which is 40% of our goal. Georeferencing is being conducted by trained staff and students at HSC, OBI, and SD, and by naturalist volunteers are part of the "100 Club." The CAP 100 Club currently has 26 active members who have collectively georeferenced over 6500 specimens since September 2020.

After switching to live management of their collection in the CCH2 portal, RSA was able to merge a file of previously-created georeferences into their specimen records, which added over 139,000 georeferences to the CCH2 portal.

IMAGING

Eleven of our 22 herbaria (50%) have completed their imaging goals (Figure 2). Of the remaining herbaria, four have been able to resume imaging since the COVID-19 shutdowns. The other herbaria have used this time offsite to process images, georeference specimens, and transcribe specimens. Figure 2 shows the current state of CAP imaging as of February 1, 2021.

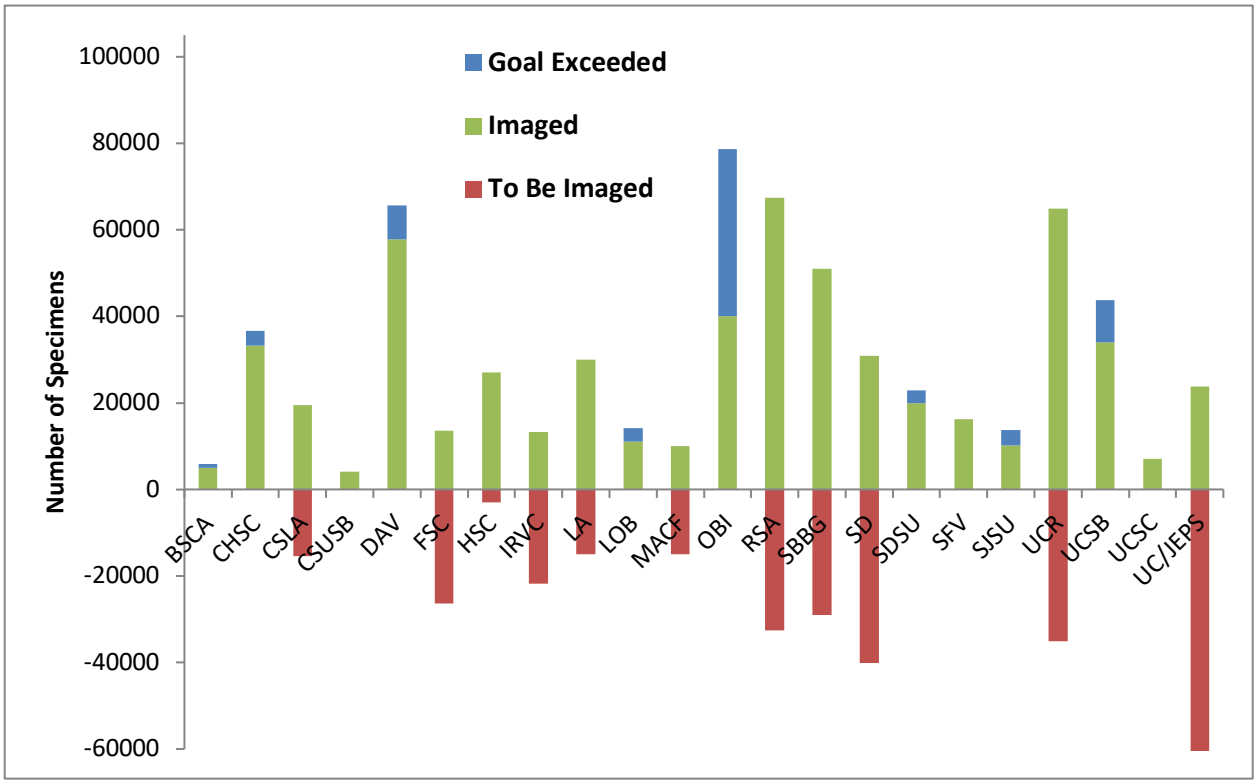

Figure 2. Herbarium specimen imaging progress. Green portions represent the number of specimens that have been imaged, while blue portions represent the number of specimens that have been imaged beyond the expected target specimens. Red bars below the zero line indicate the number of target specimens that have not yet been imaged.

PEN PROGRESS

Of the seven CAP institutions funded through the 2020 PEN grant, three (OSC, SD, UNLV) are currently imaging specimens. One (CDA) was delayed as we awaited approval to convert a subcontract to a sub-award. One (SFSU) has been delayed by COVID-19-related limitations. The remaining two will begin imaging later in 2021 (SHTC) and 2022 (PUA), as previously scheduled. Figure 3 shows the current imaging progress at PEN institutions.

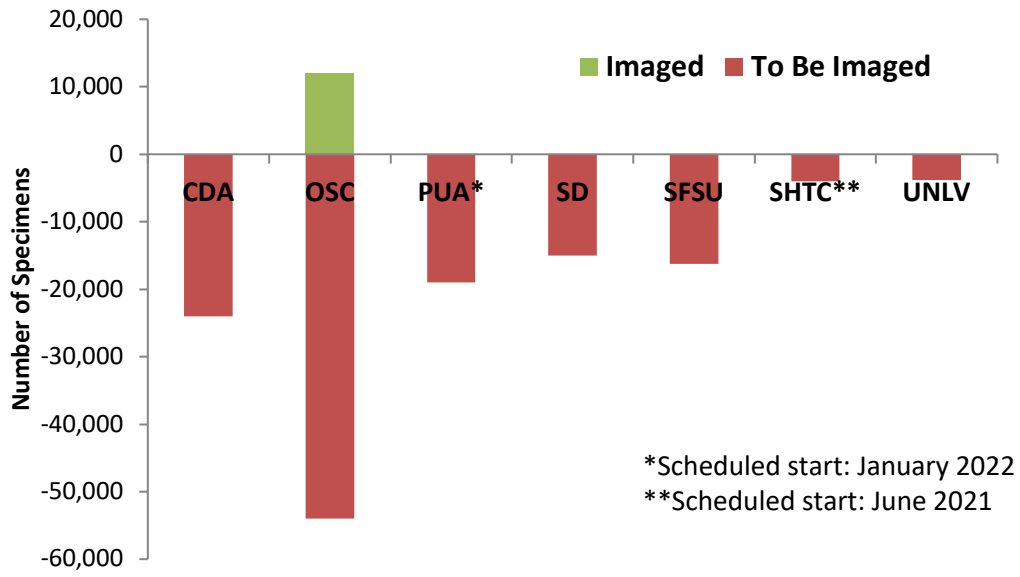

Figure 3. Herbarium specimen imaging progress for the seven PEN institutions. Green portions represent the number of specimens that have been imaged, while red bars below the zero line indicate the number of target specimens that have not yet been imaged.

The PM has continued to keep in close contact with the PEN institutions and ensure progress toward imaging goals. The PEN partners are included in all CAP-wide communications and meetings.

The data from all PEN institutions are now in CCH2 with the exception of PUA. The PM and PI at PUA are working to convert a previous RBase database into a file that can be imported into CCH2.

SHARE AND IDENTIFY BEST PRACTICES AND STANDARDS (INCLUDING LESSONS LEARNED)

Last quarter we reported the development of a tool that extracts georeferences for duplicate specimen records (https://doi.org/10.5281/zenodo.4300889). After adding the Oregon State University and Southern Oregon University collections to CCH2, we ran this script on all of the CCH2 specimens that were collected in Oregon. As a result, we identified over 2800 records that could be georeferenced from duplicate data. These georeferences were sent to the managers of their corresponding herbaria and uploaded into CCH2 when approved.

As described in the previous quarterly report, another strategy we employed to advance georeferencing is launching the “100 Club”. Members of the 100 Club are naturalists, botanists, and other professionals who volunteer time to georeference specimens in CCH2. We currently have 26 active members of the 100 Club, and they have georeferenced over 6500 specimens since September 2020. On February 1st, we held a group meeting

to build community and encourage the exchange of strategies for more efficient georeferencing. We are continuing to recruit members from the many naturalist networks across the state.

IDENTIFY GAPS IN DIGITIZATION AREAS AND TECHNOLOGY

We are continuing to develop the functionality of our CCH2 data portal. Currently, we lack a way to search by, download, and visualize specimens' phenological scorings, but we are working with Chris Tyrrell at the Milwaukee Public Museum to develop these tools, which are nearly complete.

SHARE AND IDENTIFY OPPORTUNITIES TO ENHANCE TRAINING EFFORTS

We have continued to recruit and train new members of the 100 Club to georeference in CCH2. We currently have 26 active members of the 100 Club, and they have georeferenced over 6500 specimens since September 2020.

During the fall quarter, Cal Poly led an online herbarium digitization course in which 65 students at 6 institutions learned how to georeference and transcribe specimens. Drawing on the lessons learned and the feedback received from students last quarter, we are leading a similar, yet smaller course for the winter 2021 quarter. This course meets synchronously, once per week for 2 hours and is composed of 32 students from 9 institutions. Five students are returning students from the fall 2020 course, which allows us to split into smaller breakout rooms during digitization tasks to facilitate more interaction and asking of questions. The 32 students are now trained in specimen transcription in Notes from Nature, and we will soon transition to data entry directly in CCH2. As part of the course, the students also give a short presentation on a scientific paper that reports using herbarium specimens in research.

PI-Liston at Oregon State University is leading a course of 12 OSU students in georeferencing Oregon specimens from CCH2. The PM has helped to facilitate the use of the GEOLocate Collaborating Georeferencing (CoGe) platform to this end, and the class is acting as somewhat of a beta test for future collaborative georeferencing efforts for the CAP Network. As part of this process, the PM also developed a user protocol for using CoGe for georeferencing, now posted on our website:
https://www.capturingcaliforniasflowers.org/uploads/1/6/3/7/16372936/georeferencingincoge.docx

SHARE AND IDENTIFY COLLABORATIONS WITH OTHER TCNS, INSTITUTIONS, AND ORGANIZATIONS

PM Pearson has been hired by Arizona State University as the portal manager for the GLOBAL TCN bryophyte and lichen portals. This will continue to increase Pearson's Symbiota skills and provide an easy pathway for any California institutions that have not yet added their bryophyte or lichen data to their respective portals. Pearson will continue to act as PM in the full capacity of the position for the remainder of the CAP TCN grant (through late July 2022). Pearson has also been able to advise the GLOBAL project manager and georeferencing manager on reporting, communication, and imaging- and georeferencing-related workflows.

Lead PI Yost and the PM presented at a UC Naturalists instructors' meeting on December 2nd, 2020. This presentation described the tools that are available to get UC Naturalists involved in digital specimen data, and

we disseminated a document that outlines the potential options. We are continuing to collaborate with the UC Naturalists team to engage more of their membership in digital specimen data.

Specimen data and images from the Oregon State University (OSC) and Southern Oregon University (SOC) herbaria were added to CCH2 as snapshots. OSC manages their data in a local instance of Symbiota (the Oregon Flora), while SOC manages their data in the Consortium of Pacific Northwest Herbaria portal.

With organization from CAP leadership, the Consortium of California Herbaria approved a new MOU with Calflora to facilitate ingestion of CCH2 data into Calflora. The CCH and Calflora have not historically had a highly collaborative relationship; thus, these efforts have been pivotal for both organizations. During this process, Calflora shared a list of records that had previously been excluded from CCH → Calflora imports due to potential errors, and we have used this list to correct these errors, where possible.

CAP leadership is in communication with members of the Endless Forms TCN in an effort to build a community understanding of data protection for sensitive species.

The PM also met with Tiana Rehman and Diego Barroso of the TORCH TCN to discuss using the GEOLocate Collaborative Georeference (CoGe) platform for their georeferencing goals. The PM shared the newly-developed CoGe protocol with Rehman and Barroso, who will provide feedback for the further improvement of the protocol.

The PM reached out to leadership at the California Geography Alliance and the California Geographical Society about establishing a partnership to engage their membership with specimen georeferencing.

SHARE AND IDENTIFY OPPORTUNITIES AND STRATEGIES FOR SUSTAINABILITY:

The PM is being trained to query and make edits to the CCH2 database through the MySQL Workbench to enable more functionality than is currently available through the front-end interface.

We are encouraging PIs to lead herbarium-focused independent research or internship courses at their own institutions, and the PI is supporting their efforts in doing so with planning and training. These 1-3 credit courses will be a sustainable way to keep students working in the herbaria and contributing to digitization and collection curation.

SHARE AND IDENTIFY EDUCATION AND OUTREACH (E&O) ACTIVITIES:

The PM shares updates on the project and phenology-related news via the network Twitter account (@CalPhenologyTCN).

We are now aggregating CAP-related educational resources on a new page of our website: https://www.capturingcaliforniasflowers.org/educational-materials.html

One blog post was written and published to the CAP website: https://www.capturingcaliforniasflowers.org/blog-recap.

Similarly to last quarter, Cal Poly is leading an undergraduate internship course involving students at multiple CAP institutions. The course began in early January and currently involves 32 students from 9 institutions (Cal Poly, CSU San Bernardino, San Francisco State, Pacific Union College, UC Irvine, UCLA, UC Riverside, UC Santa Barbara, and UC Santa Cruz). There the course meets synchronously on Tuesdays for two hours and works on transcription in Notes from Nature. Students are also expected to give a presentation on a research paper that uses herbarium specimens. The progress of the course, as well as a gallery of interesting specimens, is maintained on the course website: https://www.capturingcaliforniasflowers.org/herbarium-digitization-course.html

PI Yost is also leading a research course at Cal Poly similar to our spring 2020 course, assisted by the new CAP-funded postdoctoral student (Natalie Love), a graduate student at UCSB (Tadeo Ramirez Parada) and the PM. In this course, students conduct original research using newly digitized data. They score the phenological status of specimens of a focal taxon, use models in R to analyze the effects of climate on the timing of phenological events, and write and research paper and create a research poster to summarize and disseminate their results. PI Mazer (UCSB) is sitting in to the course and plans to run the course at UCSB during the spring 2021 quarter.

PI Waselkov (CSU Fresno) and PI Liston (Oregon State University) are separately leading independent research courses that involve digitization. Waselkov's group works on transcription and meets weekly to discuss their progress and research regarding herbarium specimens. Liston's group is co-led by the PM and is focused on georeferencing specimens from California herbaria that are located in Oregon. This course meets synchronously (optionally) and students work synchronously together in small groups on georeferencing specimens in assigned Oregon counties.

One Notes from Nature expedition was completed in November 2020, resulting in 1030 specimens from UC Irvine being fully transcribed. The data will be brought into CCH2 upon the return of the UC Irvine collections manager from temporary leave (March 2021). We launched expeditions for two new institutions—UCLA and Humboldt State University—in November 2020 and January 2021, respectively.

As part of the BIOME institute, the PM created a short video on the topic of "How and When to Cite Biodiversity Specimen Data," now posted to the CAP TCN YouTube channel: https://www.youtube.com/watch?v=z7E6VvtNvpY.

TCN QUARTERLY PROGRESS REPORT

Prior to each IAC meeting, TCNs are asked to complete a quarterly progress report in the areas outlined below. The TCN Lead PI or Project Manager collects information from all collaborators and compiles them into one overall progress report for the TCN. The TCN Lead PI or Project Manager then submits the quarterly reports via an email to Cat Chapman. An archive of previously submitted reports is available on the Internal Advisory Committee wiki page.

TCN Name

Cretaceous World

Person Completing the Report

Name and role of the person completing the report: Bruce S. Lieberman on behalf of new Lead PI Chris Beard

Share Progress in Digitization Efforts

Regarding the **University of Kansas** portion of the project, formerly led by PI Bruce S. Lieberman (BSL) and now led by new PI Chris Beard, and with major involvement from collections manager Natalia Lopez Carranza (NLC, who is Hispanic), we have databased 136,476 fossil specimens total. 110,742 of these specimen records are also georeferenced. In addition, we have georeferenced a total of ~ 9,989 localities associated with this project (the results presented here use the query associated with the web version of Specify due to COVID-19, and seem to be not quite as accurate as what we could report if we used the desktop version of Specify). This work has been performed by NLC. All KU digital data have been shared with iDigBio and GBIF.

One of the tasks that NLC has also been focusing on is producing new images of specimens that have already been databased. She is making these images in conjunction with graduate student Rene Martin (RM). A total of 536 specimens have been imaged, using Helicon stacking software, since the last reporting period and thus far NLC and RM in total have imaged 851 specimens. These images are being prepared for sharing on our Specify database and thus with iDigBio. Another task NLC and RM have been performing is adding new archival numbers to specimens, and thus far a total of 1,277 specimens have been numbered.

Regarding the **University of Colorado** portion of the project, led by PI Talia Karim:

They have databased 20,827 Cretaceous specimens total, with no new specimens databased since the last reporting period. 13,472 of these specimen records are also georeferenced. In addition, they have georeferenced 31 localities since the last reporting period and now georeferenced a total of 929 Cretaceous localities associated with this project. They generated no new images.

They have two new digitization assistants working on georeferencing remotely. They have already georeferenced about 200 localities during the reporting period. These are now in a verification queue and they will be added to Specify over the next month. One of the assistants has also been working on verbatim locality transcription from our digitized ledgers, which has reduced the bottleneck in creating new localities in Specify and georeferencing them. This work has led to the creation of 107 new localities during the reporting period. PI Karim has also been working with CU OIT staff to make upgrades to the server that hosts iDigPaleo (https://idigpaleo.org) and data from this project.

Regarding the **University of Texas** portion of the project, led by Lisa Boucher and Rowan Martindale with major participation from Liath Appleton and Matthew Brown

Digital record updates for iDigBio:

They have 24,530 Cretaceous cataloged records, representing ~80,000 specimens total, with 65 new records databased since the last report, Nov 2, 2020. Of the total number of specimen records, 24,194 have been georeferenced.

In addition, they have now georeferenced a total of 5,822 Cretaceous localities (out of 5,897 associated with this project, 18 localities georeferenced since our last report).

They generated 75 new images since their last report. The total number of Specify database images is 11,359.

Due to COVID-19, their imaging and georeferencing progress has slowed as the collection is only open to a limited extent. Students and volunteers have been contributing remotely, but their capacity to take new

images is limited. Some of the remaining Cretaceous localities to georeference are challenging and those that can be resolved require access to physical records.

Share Best Practices, Standards, and Lessons Learned

N/A

Share Identified Gaps in Digitization Areas and Technology

N/A

Share Opportunities to Enhance Training Efforts

Regarding the **University of Colorado** portion of the project, they have two new digitization assistants working on georeferencing remotely. One of the assistants has also been working on verbatim locality transcription from their digitized ledgers.

Share Collaborations with other TCNs, Institutions, and/or Organizations

N/A

Share Opportunities and Strategies for Sustainability

N/A

Share Education, Outreach, Diversity, & Inclusion (EODI) Activities

Regarding the **University of Kansas** portion of the project, one of our important areas of outreach has involved the updated second edition of the *Digital Atlas of Ancient Life app* available for iOS. It has received a total of more than 9,530 downloads, with the majority (~ 8,020) coming from the U.S. and Canada, though there were also more than 1,180 downloads from Europe.

Another key outreach development was creating a new version of the *Digital Atlas of Ancient Life app* available for Android; it has received a total of 1,211 downloads with the majority coming from the U.S. with the U.K., Canada, and Australia rounding out the top 4 spots.

Lastly, when it comes to the *Digital Atlas Identify app*, available for iOS, it has received a total of more than 2,570 downloads, with the majority (~ 2,090) coming from the U.S. and Canada, though there were also more than 385 downloads from Europe. In addition, it has also been receiving good and increasing usage, with an average of about 100 images of fossil specimens submitted for identification each week that BSL identifies. He then provide an identification to them via the app.

Please also see the next section on our *Digital Atlas of Ancient Life* website, which plays a key role in our education and outreach activities.

Share Information About Your Website and/or Portal Usage

Regarding the **University of Kansas** portion of the project, the *Digital Atlas of Ancient Life* website continues to receive major usage. Note that the development of this website and its continued maintenance, the addition of content, etc., has been led by Jonathan Hendricks at the Paleontological Research Institution. During the period October - December the site has a monthly average of more than 20,500 clicks and 2.2 million impressions, while the *Cretaceous Atlas* itself has a monthly average of more than 980 clicks and 46,000 impressions. In both cases the primary users were based in the U.S.A. The former also has high numbers of users based in India and the Philippines. The latter also has high numbers of users based in Canada and the UK.

Furthermore, in total the *Digital Atlas* website reached 246,253 users during 2020, by far its most successful year yet (up from 94,728 users in 2019). Visitors came from every country on Earth except North Korea, Chad, Central African Republic, Guinea, Guinea-Bissau, and Western Sahara. In total, *Digital Atlas* content made 17.9 million impressions on Google searches during 2020 (an impression means a *Digital Atlas* page appeared for a user on a Google search results page). Some of the terms that result in *Digital Atlas* content appearing on

Google front page search results include: geological time scale (#8), geologic time scale (#10), body fossils (#2), rugose coral (#2), brachiopods vs bivalves (#1), Ammonoidea (#2), and angiosperm life cycle (#5).

Finally, In January of 2021 the *Digital Atlas of Ancient Life* received 24.6K clicks and had 2.69 million impressions and the *Cretaceous Atlas* received 1.03K clicks and had 57.9K impressions.

Share Other Activities and/or Progress

Regarding the **University of Kansas** portion of the project, two papers describing results from research were published:

Strotz, L. C., and **B. S. Lieberman.** 2021. The names don't matter but the numbers do: searching for stability in Carboniferous brachiopod paleocommunities from the North American Midcontinent. *Paleobiology* 47, https://doi:10.1017/pab.2020.58 .

Casey, M. M., Saupe, E. E., and **B. S. Lieberman**. 2021. The effects of geographic range size and abundance on extinction during a time of 'sluggish' evolution. *Paleobiology* 47, https://doi:10.1017/pab.2020.52 .

Lastly, NLC, graduate student Martin, post-doc LaVine and BSL continue to work on research using digitized trilobite specimens to conduct morphometric analyses for the purposes of producing a phylo-morphospace. We are trying to develop this as a possible case study to show one type of research that can be done during a pandemic.

TCN Quarterly Progress Report

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TCN Name

Digitization TCN: Collaborative Research: Documenting Marine Biodiversity through Digitization of Invertebrate Collections (DigIn)

Person Completing the Report

Regina Wetzer (Lead PI)

Share Progress in Digitization Efforts

NOTE: Table of institutional abbreviations is at the end of this document.

SBNHM: 2863 lots cataloged 11/1/2020 through 1/19/2021.
SIO-BIC: Existing dataset ingested by iDigBio and now publicly available.
SIO-PIC: Collections Manager is cross referencing and combining previously digitized (non-georeferenced) information by taxa into one main file with synonymized fields in preparation for when more on-site sample digitization can commence.
MCZ: 720 lots cataloged this quarter from spreadsheet data; existing marine localities in database being cleaned/vetted for accuracy.
VIMS: 125 lots catalogued this quarter into an Excel spreadsheet. No data has been uploaded to Specify yet since the data is still going through QA/QC for accuracy.
UCM: Ordered imaging equipment (copy stand, camera etc.). Catalogued 225 lots into excel. Imaged 46 newly catalogued specimens.
CAS: Zooniverse, Notes from Nature Invertebrate Time Machine Project (NfN, ITM): Coll. staff scanned/parsed undigitized/renamed 30,299 catalog cards. CM built and launched NfN Project, built a team of 892 volunteer transcribers. CAS staff trained/engaged volunteers via >500 talk comments, refined tutorials & instructions based on initial expedition transcription results. Current progress: transcription of >11,000 catalog cards, each transcribed independently by 3 volunteers (>44,000 classifications including duplicates). Initiated preliminary QA/QC/reformatting of transcribed data to prep for ingestion. Collection staff scanned content for 94 CAS Station List Files. Current data/database:

preparations for CAS database migration and grant standardization including taxonomic and data field cleaning/standardization, geographic tree structure reorganization, etc.

AMNH: 120 card catalogs transcribed.

ANSP: (1) All analog catalogs of General Invertebrates collection have been digitized and indexed. (2) Work has commenced on digitizing crustacean types, including researching type status, assessing specimen condition and cataloging within the main Malacology database. So far 75 type lots have been dealt with. (3) The inventory of the fluid-housed collection has now located and registered 9,596 lots in Crustacea and Annelida. This includes rehousing individually lots that were previously in shared containers.

ALMNH: The ALMNH has uploaded data for 19,520 specimens to Arctos. There are roughly another 1,000 specimens that have been digitized but have issues that need to be manually addressed and corrected before the records can be uploaded to Arctos. In December 2020, Dr. Kocot co-led an Antarctic research expedition (NBP 20-10) that resulted in the collection of over 3,400 lots of marine invertebrates. Collection data have already been digitized and are ready for upload into Arctos along with image data. These should be publicly available in the first half of 2021.

FWRI: We have begun assessing the state of the field data for many of the projects that will be digitized in this project.

RSMAS: We have hired two interns that will start Feb 10th, 2021.

UF: 2914 lots cataloged this quarter. Selected and renamed 18,000 digital photographs and edited 3000 in preparation for upload.

NCSM-NMI & HBOM: Nothing to report.

NHMLA: Physical specimens digitization has not yet commenced. Museum facilities have not been accessible because of COVID restrictions.

BPBM: No submission.

AUMNH: No submission.

Share Best Practices, Standards, and Lessons Learned

SBNHM: Established workflow protocols. PI and collections manager assess identification, update taxonomy/classification, add non-obvious information (e.g. accession number). Curatorial assistants perform data entry. PI shelves specimens because in multi-phyla batches, CA's have difficulties filing specimens with only family name on label. With complicated lots, it is more efficient for PI to catalog specimens than to write it down and have CAs perform data entry.

SIO-BIC: Participated in Expedition Data working group.

SIO-PIC: Participated in Workflows Working Group. Shared SIO-PIC expedition data with Expeditions Working Group.

MCZ: Participation in working groups/committees: Steering, Expeditions, Georeferencing, Workflows.

VIMS: Still trying to get organized and implement a standard workflow protocol.

UCM: Participating in Georeferencing and Work flows working groups, bi weekly meetings to establish best practices and standards for both.

CAS: Notes from Nature: mounted a "guinea pig" marine catalog card transcription project: developed relationships and worked with NfN staff towards determining best practices for transcribing marine geography. Initiated generalized "Lessons Learned" documentation for ITM projects to apply towards potential future label transcription projects. Shared working draft of planned CAS workflows and ideas for label format sharing resource with Workflows WG. Shared CAS station file list for Expeditions WG. Provided input to Georeferencing WG and our partners re: habitat georeferencing using taxonomic parsing (for bycatch non-marine invert specimens). CM serves on DigIn Steering Committee to help plan grant activities/direction.

AMNH: Added a project attribution tab to give attribution of efforts to this NSF funded project. Created forms for volunteer digitizers to enter data in a standardized way. Old taxon names are being crossed-checked and updated using WoRMS.

ANSP: Physical workflow design is important, particularly preserving dedicated (non-shared) work spaces for rehousing and similar operations. Managing adjacencies with other departments is more important now than ever, due to limitations on proximity to other staff.

YPM: Georeferencing Working group is working to contribute to standards for marine georeferencing

ALMNH: We have embraced Arctos and are following its guidelines as we organize and digitize our data. We don’t love all aspects of how Arctos organizes data and I have been working with my Arctos mentor who will be instituting some changes (e.g., separating some specimen data that are currently combined into one field). Entering data directly into a spreadsheet during the NBP 20-10 cruise meant that data did not have to be transcribed later, which will make us able to upload data much more quickly. However, with several users entering data, a small but non-trivial number of mistakes were made. Better training and emphasis on careful data entry will be made in the future.

NHMLA: Working groups (1-Expedition Data, 2-Georeferencing, and 3-Workflow) have been set up, leads have been identified, and each working group has met 2-3 times. Meeting notes and recordings for working group meetings as well as all All-Hands Meetings are stored on a Google Drive and are available to all DigIn participants. Additional working groups have been identified (Nomenclature, Portal, Publicity-website, Outreach, and Tissue-sequence). Members have self-identified or have been selected, but these working groups are not necessarily active yet.

UF: Sharing best practices in Workflows, Expedition and Georeferencing working groups.

RSMAS, NCSM-NMI, HBOM, FWRI: No updates at this time.

Share Identified Gaps in Digitization Areas and Technology

SIO-PIC: Identifying best workflow for difficult to ascribe fields from labels/lids. Collection Manager working to develop key for recurring issues.

VIMS: Gaps include optimizing workflow and georeferencing protocols, as well as learning the Specify software.

UCM: Had planned to use university book scanners for ledgers, but they are no longer available (COVID). Still modifying and learning the back end options in Specify to prepare for move into it.

CAS: CAS has technology gaps related to: (1) application of barcodes to keep track of specimen label images; (2) specimen/label photography protocols and best practice.

AMNH: We are not onsite really yet, so we don't have a digital imaging station set up yet.

ANSP: Pending the upgrade to FileMaker Server 19, the databases created for various parts of the DigIn work can only talk to each other using FileMaker Sharing. This requires more coordination of users than FM Server. This will hopefully only be a temporary situation. Certain camera components are on multi-month back order due to very high demand for photographic equipment during 2020.

YPM: We need to improve georeferencing for Marine collections.

ALMNH: It is hard to find the mode of preservation in Arctos searches. I aim to work with my Arctos mentor to improve this so that researchers browsing our collection can easily determine the preservation status of our specimens.

HBOM: We will be setting up a camera set-up to take images of the relevant HBOM specimens for this project.

NHMLA: Significant energy is being spent in thoughtfully assessing our group-wide (total) assets and needs across all of our institutions. This work is taken seriously and ongoing and is being addressed in the Steering Committee, Working Groups, and All-hands DigIn Meetings.

RSMAS: Everything-we are starting from ground zero. Nothing is digitized or backed-up. We have ordered a scanner which can be used to scan all of the documents within the Voss collection.

Share Opportunities to Enhance Training Efforts

VIMS: Participation in georeferencing working group with plans to participate in the workflow working group.

UCM: There are numerous collections on this grant at different stages of optimizing Specify-Workflows group is aware of this, we should consider having working groups, or at least meetings for the collections management systems. Workflows will propose something along these lines after the survey is completed.

CAS: Opportunity for CAS to help advise potential users of NfN for DigIn activity if funding can be secured for DigIn to use NfN services following CAS's "pro bono" project.

YPM: We will conduct formal group georeferencing training prior to onset of georeferencing activities.

ALMNH: Arctos has a large number of training videos and other educational resources that will be used to train myself and my new undergraduate Collections Assistant to continue working towards our goal of digitizing our entire collection and managing our collection data. I also plan to record training videos to show students how to use our camera and microscope systems.

HBOM: I have a new OPS hire starting 2/1 who will need to be trained by the PI.

NHMLA: Working groups have been very effective in sharing knowledge across the project. We are exploring narrative training for DigIn participants that will make it possible for individuals to better communicate the importance of collections as a whole, their collections, and our collective work.

Share Collaborations with other TCNs, Institutions, and/or Organizations

SIO-BIC: Discussed possible areas of collaboration with the MBARI Video Lab for linking ROV imagery to digitized specimens.

MCZ: ADBC TCN Eastern Seaboard - sharing working groups.

CAS: ESB TCN; Zooniverse/Notes from Nature; WoRMS (taxonomic data downloads for standardizing/upgrading CAS taxon tree); GeoLocate; TDWG for marine georeferencing localities (see WG, Nicolas Bailly); NfN ITM Project stimulated volunteers/collaborations/blog & media posts by CDFW California Natural Diversity Database and Hopkins Marine Station Harold A. Miller Library staff.

AMNH: Eastern Seaboard Mollusks

YPM: ESB, GEOLocate/CoGe, DiGiLeap

ALMNH: I have active collaborations with a number of researchers both within the US and internationally. Last year, I hosted Dr. M. Carmen Cobo, a Fulbright postdoctoral researcher from Spain, for approximately four months. During that time, Dr. Cobo trained in genomics and bioinformatics and shared her expertise in the traditional taxonomy of marine molluscs. This work resulted in a publication describing several species new to science in Deep Sea Research Part I and another manuscript that was recently submitted to the Zoological Journal of the Linnean Society. Dr. Cobo just returned to my lab as a postdoctoral researcher. Other international efforts include his service as a member of the executive committees of Unitas Malacologica, the international molluscan research society, and the Global Invertebrate Genomics Alliance (GIGA) and my co-supervision of a Ph.D. student in Spain. Through involvement in these organizations, I have developed connections to researchers in Australia, Austria, Germany, and Norway, and the UK. Over the last year, he collaboratively published first-author papers with these researchers in Genome Biology and Evolution, Proceedings of the Royal Society B, Scientific Reports, and Mitochondrial Research Part B and co-authored a second paper in Proceedings of the Royal

Society B. I have established collaborations through taxonomy training workshops he has participated in, and co-authored a paper on nematode worm evolution with a colleague in Sweden in the journal BMC Evolutionary Biology and a paper on gastropod phylogeny, also in BMC Evolutionary Biology, with colleagues in Norway and Germany. International connections in the Kocot lab extend beyond the PI as Ph.D. candidate Rebecca Varney recently described a new species of 'mud dragon' with colleagues from Denmark and Kocot lab Ph.D. students Meghan Yap-Chiongco traveled to Russia twice for international workshops and both she and Ph.D. student Nick Roberts participated in a taxonomy training course in the Azores before the COVID-19 pandemic.

HBOM: We are also part of the ESB TCN.

FWRI: Collaboration with the ESB TCN has begun in part through the workflows working group.

NHMLA: We are collaborating with ESBN and share multiple working groups and Slack channels. We are working a bit with Pilsbry TCN and have already greatly benefited from the generosity of our colleagues at Parasite Tracker and California Phenology.

UF: DigIn and Eastern Seaboard are sharing working groups.

Share Opportunities and Strategies for Sustainability

UCM: Eastern Seaboard TCN has joined georeferencing and workflows working groups. UCM has a concurrent PEN to InvertEBase for terrestrial invertebrates. L. Elder is communicating with InvertEBase PIs for advice on best practices and lessons learned.

CAS: NfN ITM Project results in card label scans for future reference/online accessibility as specimen data QA resource. Scanned CAS station list files create the potential for historical marine data resource uploads.

AMNH: Card catalogs scanned by library & images will be attached to catalog records in the database to ensure longevity.

ALMNH: Reduction of in-person meetings in favor of Zoom or other online platforms is one of the most impactful ways we can reduce our carbon footprint. Better advertising of available specimens can reduce the need to collect material by others, thus reducing carbon footprint and decreasing impact on native populations of organisms.

HBOM: Right now, we are focused on remediating and reorganizing the collections. The former is a necessity and the latter will facilitate better execution of this project and others.

RSMAS: We have spoken with G. Paulay about different templates for inputting data and have decided that ultimately we will be using Specify, as UM has a subscription and technical support for this database. .

Share Education, Outreach, Diversity, & Inclusion (EODI) Activities

MCZ: "Ship to Shore" video released. Produced by Ocean Exploration Trust (E/V Nautilus) - highlights curatorial events that happen at the MCZ once specimens are received.

CAS: NfN ITM Project: posted blogs and social media on various CAS and external sites at project launch. Mobilized 896+ volunteer transcribers to crowdsource collections data. CAS staff answered hundreds of questions about label data that inspired transcribers' curiosity, provided content describing the value of historical marine collections data and engagement by describing captivating collections and collector "stories" in the collaborative Zooniverse Talk tool. ITM hosted a MN high school student for National Honor Society required (vetted) volunteer hours and discussed the potential with USF professor of transcriptions for undergraduate class credit (students would study taxa and data on ITM cards).

AMNH: Working remotely with a pool of AMNH volunteers who are helping to transcribe card catalogs. We plan to do remote collections tours and outreach.

NCSM-NMI: Signed up to attend narrative training and assisted with some social media strategy design.

ALMNH: We have been disseminating results of our research through virtual visits to schools through personal connections and Skype a Scientist. We plan to develop a museum exhibit on our research at the Alabama Museum of Natural History next year.

NHMLA: Brainstorming and planning for a WeDigBio event this Spring has begun. We have participated in 6 "Skype a Scientist" and "Meet a Scientist" virtual student engagement programs. We also hosted a 3-part series on the Extended Specimen for our Museum Fellows Program. Several of our invertebrate (mollusks, polychaetes, and marine invertebrate) collections contributed to the Nickelodeon Science of Slime project. *#DigInverts* is our DigIn hashtag, which we plan to activate shortly.

UF: Set up Twitter account Spineless Science @ UF (@UFInvertZoo) to share invertebrate photos and news and communicate lab activities. Posts are made at least once a week.

Share Information About Your Website and/or Portal Usage

[You can also embed graphics if desired, such as from Google Analytics.]

NHMLA: A logo for the project was adopted, and the core of the DigIn website has been constructed: https://digin-tcn.org

Share Other Activities and/or Progress

SBNHM: All SBMNH records have been uploaded to iDigBio. The taxonomic dictionary and geography updates were made through remote computer login as a result of the Covid related stay-at-home-order. Those cannot be quantified because the Specify database cannot search for them. All label materials have been ordered and received.

MCZ: PT Curatorial Assistant position has been advertised. Candidate screening is in the works.

AMNH: We've hired the two part-time people for the grant and have engaged three volunteers.

YPM: Ongoing work to incorporate bathymetric data and complex spatio-temporal locality representations into GEOLocate.

ALMNH: I have hired a bright and talented undergraduate museum collections assistant and just recruited a postdoctoral researcher for another project. These individuals will be a big help in reducing my direct workload and enabling me to focus on administration of the DigIn project.

NHMLA: Project Manager job qualifications have been identified. It is likely that we will split duties and tasks amongst more than one individual.

RSMAS: We have started the process of redoing our website and one of the interns that we hired will be in charge of completing this. We are currently buying new caps that can be used to better preserve the specimen that we have.

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Key to Abbreviations

NHMLA	Natural History Museum of Los Angeles County (lead), Los Angeles, CA (R.Wetzer)
ANSP	Academy of Natural Sciences, Philadelphia, PA (P. Callomon)
AMNH	American Museum of Natural History, New York, NY (C.Johnson)
AUMNH	Auburn University, Auburn, AL – no submission
ASU	Arizona State University, Tempe, AZ [subaward]
BPBM	Bishop Museum, Honolulu, HI – no submission
CAS	California Academy of Sciences, San Francisco, CA (C.Piotrowski)
VIMS	College of William & Mary—Virginia Institute of Marine Science, Gloucester Point, VA (J.Dreyer)
FMNH	Field Museum of Natural History, Chicago, IL [subward]
HBOM	Florida Atlantic University, Fort Pierce, FL (D. Hanisak)
FWRI	Fish and Wildlife Research Institute, St. Petersburg, FL (P.Larson)
MCZ	Harvard University, Cambridge, MA (A.Baldinger)
NCSM-NMI	North Carolina Museum of Natural Sciences, Raleigh, NC (M.McCuller)
Q-Quatics	Q-Quatics, Laguna, Philippines [subaward]
SBNHM	Santa Barbara Museum of Natural History, Santa Barbara, CA (D.Geiger)
SIO-BIC	Scripps Institution of Oceanography, University of California San Diego, CA (C.Seid)
SIO-PIC	Scripps Institution of Oceanography, University of California San Diego, CA (L.Sala)
ALMNH	University of Alabama Tuscaloosa, AL (K.Kocot)
UCM	University of Colorado, Boulder, CO (L.Elder)
UF	University of Florida, Gainesville, FL (J.Slapcinsky)
RSMAS	University of Miami, Rosenstiel School of Marine & Atmospheric Science, Miami, FL (N.Traylor-Knowles)
YPM	Yale University Peabody Museum of Natural History, Boston, MA [subaward] (N.Rios)

TCN Quarterly Progress Report

Prior to each IAC meeting, TCNs are asked to complete a quarterly progress report in the areas outlined below. The TCN Lead PI or Project Manager collects information from all collaborators and compiles them into one overall progress report for the TCN. The TCN Lead PI or Project Manager then submits the quarterly reports via an email to Cat Chapman. An archive of previously submitted reports is available on the Internal Advisory Committee wiki page.

TCN Name

Digitizing "endless forms": Facilitating Research on Imperiled Plants with Extreme Morphologies (EF)

Person Completing the Report

Matthew Pace (Lead PI)

Share Progress in Digitization Efforts

1,027,723 specimens barcoded (35,104+), 620,772 specimens imaged (52,512+), 830,003 specimens transcribed (78,781+), 314,897 specimens georeferenced (15,505+).

Share Best Practices, Standards, and Lessons Learned

Share information here. You can also embed graphics if desired.

Share Identified Gaps in Digitization Areas and Technology

Share information here. You can also embed graphics if desired.

Share Opportunities to Enhance Training Efforts

Share information here. You can also embed graphics if desired.

Share Collaborations with other TCNs, Institutions, and/or Organizations

Exploring transcription collaboration with Michael Denslow for EF & SERNEC.

Share Opportunities and Strategies for Sustainability

Share Education, Outreach, Diversity, & Inclusion (EODI) Activities

Selby Botanic Garden: Via Zoom we provided an outreach program to 35 of our remote data transcribers and georeferences to explain how the data and images are used by scientists to address real-world issues.

NYBG: held 5 on-line transcription projects focusing on EF taxa through Notes for Nature & Zooniverse.

California Botanic Garden: Oct 2020: Southern California Botanists Symposium: oral presentation by M. Nazaire on the Endless Forms project and RSA coming on as a PEN. 130 registered participants attended the talk. The Symposium was in a virtual format.

Share Information About Your Website and/or Portal Usage

Share information here. You can also embed graphics if desired, such as from Google Analytics.

Share Other Activities and/or Progress

Share information here for things that do not fit into the above categories. You can also embed graphics if desired.

TCN QUARTERLY PROGRESS REPORT

Prior to each IAC meeting, TCNs are asked to complete a quarterly progress report in the areas outlined below. The TCN Lead PI or Project Manager collects information from all collaborators and compiles them into one overall progress report for the TCN. The TCN Lead PI or Project Manager then submits the quarterly reports via an email to Cat Chapman. An archive of previously submitted reports is available on the Internal Advisory Committee wiki page.

TCN Name

ESB - Mobilizing Millions of Marine Mollusks of the Eastern Seaboard

Person Completing the Report

Rüdiger Bieler (Lead PI)

Share Progress in Digitization Efforts

COVID-19 restrictions impacting staff access to the collections and widespread hiring freezes for new staff caused unavoidable delays with our project startup (start date: 15 September 2020). However, where possible under the circumstances, work has begun. Members of the collaborative found creative ways to prepare for, and begin, digitization.

FMNH ESB**:** Designing EMu reports for complex station data to address project needs.

FMNH ESB subaward **HMNS:** Currently identifying lots of Gulf of Mexico specimens from the Wes Tunnel collection and digitization will begin soon. Texas specimens have also been identified in the recently acquired Gray-Major collection for inclusion in this ESB project.

FMNH ESB subaward **FWRI:** Begin identifying project specimens and state & availability of field data

FMNH ESB **s**ubaward **HBOM:** Nothing reported

ANSP ESB**:** Nothing to report

BMSM ESB**:** A total of 713 new ESB (Florida) records were digitized in the last three months, and 109 ESB (Florida) photographed.

CM ESB**:** found numerous lots of ESB quality backlog; in Q4 we digitized 35 lots from ESB.

DMNH ESB**:** We have identified all the family, genera, and species that we will digitize in this effort and have started doing data improvements in anticipation of uploading the first batch. No new records cataloged. We have also assessed how we will track the number of records improved or entered for the ESB project and will use the date/time stamp in the immediate future.

DMNH ESB subaward **RSMAS:** We have hired two interns and purchased a scanner.

DMNH ESB subaward **YPM:** Not applicable

MCZ ESB: 342 existing records in our database with New England localities were flagged for ESB inclusion. Coordinates for 333 of these records confirmed. Taxonomy, agents and data in other fields vetted as well. No new records were cataloged.

LACM ESB: Approximately 200 station records from Mississippi, Alabama, New Jersey, Maine, New York, Connecticut, and Rhode Island were digitized.

NCSM ESB: Nothing reported

UF ESB: Editing and standardizing station data for 10,000 records from the

McGinty Collection in preparation for georeferencing. Cataloged 424 new records. Georeferenced 1895 existing station records from Brevard, St. Lucie, Indian River, and Martin Counties in Florida and Suffolk and Nassau Counties in New York

UMMZ ESB: Specimens records from 136 lots (Polyplacophora & Gastropoda; 642 specimens) were newly entered since November 2020. In addition, 1125 gastropod lots were prescreened and are ready for data entry. Total: 238 lots, 1443 specimens; Polyplacophora: 67 lots, 235 specimens; Bivalvia: 35 lots, 236 specimens; Gastropoda: 136 lots, 972 specimens. Nova Scotia: 1 lot; New Brunswick: 2 lots; Maine: 26 lots; New Hampshire: 1 lots; Massachusetts: 10 lots; Connecticut: 1 lots; New York: 1 lots; New Jersey: 1 lots; Maryland: 1 lots; North Carolina: 1 lots; South Carolina: 4 lots; Georgia: 6 lots; Florida: 173 lots; Texas: 10 lots.

[USNM] ESB:

Share Best Practices, Standards, and Lessons Learned

Working groups have been established (e.g., workflow, georeferencing) and hold regular meetings. Several of these groups are joint efforts with the DigIn-TCN.

FMNH ESB: Nothing to report

FMNH ESB subaward **HMNS:** Nothing to report

FMNH ESB subaward **FWRI:** Nothing to report

FMNH ESB **s**ubaward **HBOM:** Nothing reported

ANSP ESB: Nothing reported

BMSM ESB: Participating in working group/committee: Social Media, Steering

CM ESB**:** Nothing to report

DMNH ESB: Participating in working groups and committees for live-dead and on slack channels for expeditions and georeferencing.

DMNH ESB subaward **RSMAS: S**poke with G. Paulay of UF and will be working with them to get spreadsheets going that can be easily uploaded into Specify.

DMNH ESB subaward **YPM:** Participation in georeferencing working groups in collaboration with DigIn

MCZ ESB**:** Participation in working groups/committees: Steering, Expeditions, Georeferencing, Workflows, Outreach

LACM ESB**:** Nothing to report

NCSM ESB**:** Nothing reported

UF ESB**:** Participating in working groups: Georeferencing, Expedition Data

UMMZ ESB**:** Nothing to report

[USNM] ESB**:**

Share Identified Gaps in Digitization Areas and Technology

There is much ongoing discussion by collaborative partners in this arena. Initial needs and concerns vary among members.

FMNH ESB**:** Designing EMu reports for complex station data to address project needs.

FMNH ESB subaward **HMNS:** Will be sitting down with our IT Department on plans to set up an IPT instance or best practices for exporting collections records out of EMu. Currently unsure how live/dead determinations can be integrated into EMu software.

FMNH ESB subaward **FWRI:** Nothing to report

FMNH ESB **s**ubaward **HBOM:**

ANSP ESB**:** Nothing reported

BMSM ESB**: Nothing to report**

CM ESB**:** began investigating how to get IPT instance. Awaiting results from live-dead committee before initiating incorporation of live-dead fields into EMu; started recording live-dead in comments for some cataloged records.

DMNH ESB**:** Internal discussions regarding how to manage live/dead determinations.

DMNH ESB subaward **RSMAS:** meetings to discuss plan of action and purchased a scanner for cards and notebooks to begin digitizing them.

DMNH ESB subaward **YPM:** Have begun developments to incorporate GEBCO bathymetry data. Discussions of complex spatio-temporal types and planning for incorporation of this modality into GEOLocate.

MCZ ESB**:** Nothing to report

LACM ESB**:** Nothing to report

NCSM ESB**:** Nothing reported

UF ESB**:** Nothing to report

UMMZ ESB**:** Nothing to report

[USNM] ESB**:**

Share Opportunities to Enhance Training Efforts

FMNH ESB**:** Nothing to report.

FMNH ESB subaward **HMNS:** Nothing to report

FMNH ESB subaward **FWRI:** Nothing to report

FMNH ESB **s**ubaward **HBOM:**

ANSP ESB**:** Nothing reported

BMSM ESB**:** Nothing to report

CM ESB**:** Nothing to report

DMNH ESB**:** Nothing to report

DMNH ESB subaward **RSMAS:** hired two interns

DMNH ESB subaward **YPM:** planning to hire 1-2 students to assist with GEOLocate developments

MCZ ESB**:** Nothing to report

LACM ESB**:** Nothing to report

NCSM ESB**:** Nothing reported

UF ESB**:** Nothing to report

UMMZ ESB**:** Nothing to report

[USNM] ESB**:**

Share Collaborations with other TCNs, Institutions, and/or Organizations

Much effort has been spent to facilitate exchanges and avoid duplication with other relevant TCNs. InvertEBase is the main partner for our Symbiota portal – with close coordination with DigIn-TCN, PILSBRY-TCN, and Smithsonian's Panama project (which is also in the process of joining the InvertEBase platform). Shared working groups (with members of multiple TCNs) have been established and are beginning to meet regularly. ESB and DigIn, in particular, share many upcoming needs in authority file development, georeferencing needs, and workflow development, and the two projects have a strong overlap in their steering committees to assure the best-possible flow of ideas and information.

FMNH ESB**:** Coordinating above efforts.

FMNH ESB subaward **HMNS:** Nothing to report

FMNH ESB subaward **FWRI:** Nothing to report

FMNH ESB **s**ubaward **HBOM:**

ANSP ESB**:** Nothing reported

BMSM ESB**:** Nothing to report

CM ESB**:** Nothing to report

DMNH ESB**:** Shared slack channel with DigIn expeditions and georeferencing working groups.

DMNH ESB subaward **RSMAS:** Nothing new to report

DMNH ESB subaward **YPM:** DigIn georeferencing, expedition and workflow working groups.

MCZ ESB**:** ADBC TCN DigIn - sharing working groups

LACM ESB**:** Nothing to report

NCSM ESB**:** Nothing reported

UF ESB**:** ADBC TCN DigIn - sharing working groups

UMMZ ESB**:** Nothing to report

[USNM] ESB**:**

Share Opportunities and Strategies for Sustainability

FMNH ESB**:** Nothing to report

FMNH ESB subaward **HMNS:** Nothing to report

FMNH ESB subaward **FWRI:** Nothing to report

FMNH ESB **s**ubaward **HBOM:**

ANSP ESB**:** Nothing reported

BMSM ESB**:** Nothing to report

CM ESB**:** For cotton stoppers that have been replaced with polyester batting stoppers, we began composting the discarded cotton stoppers (instead of adding them to the landfill).

DMNH ESB**:** Nothing to report

DMNH ESB subaward **RSMAS:** Nothing new to report

DMNH ESB subaward **YPM:** Nothing to report

MCZ ESB**:** Nothing to report

LACM ESB**:** Nothing to report

NCSM ESB**:** Nothing reported

UF ESB**:** Nothing to report

UMMZ ESB**:** Nothing to report

[USNM] ESB**:**

Share Education, Outreach, Diversity, & Inclusion (EODI) Activities

Our Social Media Committee (spearheaded by BMSM, with FMNH, MCZ, and FWRI) defined parameters and spearheaded creation of media resources for the project. ESB now has media presence on: Facebook https://www.facebook.com/groups/easternseaboardmollusks; Instagram @eastern_seaboard_mollusks; Twitter @EMollusks; iNaturalist https://inaturalist.org/projects/eastern-seaboard-mollusks

FMNH ESB**:** as above

FMNH ESB subaward **HMNS:** Nothing to report

FMNH ESB subaward **FWRI:** Nothing to Report

FMNH ESB **s**ubaward **HBOM:** Nothing reported

ANSP ESB**:** as above

BMSM ESB**:** as above

CM ESB**:** involved a high school volunteer in pulling ESB quality backlog from among other backlog.

DMNH ESB**:** nothing to report.

DMNH ESB subaward **RSMAS:** Working on updating RSMAS collection website.

DMNH ESB subaward **YPM:** nothing to report

MCZ ESB**:** Established an iNaturalist page for the ESB project; Started a Twitter account for ESB; "Ship to Shore" video released. Produced by Ocean Exploration Trust (E/V Nautilus) - highlights curatorial events that happen at the MCZ once specimens are received.

LACM ESB**:** Nothing to report

NCSM ESB**:** Nothing reported

UF ESB**:** Set up Twitter account Spineless Science @ UF (@UFInvertZoo) to share mollusk and other invertebrate photos and news and communicate lab activities. Posts at least once a week.

UMMZ ESB**:** Nothing to report

[USNM] ESB**:**

Share Information About Your Website and/or Portal Usage

[Nothing to report -- will be added in next quarterly report]

Share Other Activities and/or Progress

Communication infrastructure and file storage has been organized via a dedicated Slack workspace and file storage on Google Drive. We also are sharing relevant Slack channels with the DigIn TCN. Cost-Reimbursement Subaward Agreements have been executed or are close to completion. The ESB Steering Committee now consists of Rüdiger Bieler* (FMNH), Petra Sierwald (FMNH), Gary Rosenberg* (ASNP), Elizabeth Shea (DMNH), Adam Baldinger* (MCZ), and Gustav Paulay* (UF); the four individuals marked by * also serve on the current DigIn TCN steering committee.

FMNH ESB**:** Coordination as described above.

FMNH ESB subaward **HMNS:** Nothing to report

FMNH ESB subaward **FWRI:** Nothing to report

FMNH ESB **s**ubaward **HBOM:** Nothing reported

ANSP ESB**:** Nothing reported

BMSM ESB**:** Previously digitized Eastern Seaboard specimens, harvested by iDigBio; submitted a manuscript listing types present in BMSM Collection including material from ESB (Leal, JH. Submitted to *Zootaxa*. Type specimens in the molluscan collection of the Bailey-Matthews National Shell Museum, Florida, USA. 88 ms pages, 82 figs.)

CM ESB**:** nothing to report

DMNH ESB**:** Nothing to report.

DMNH ESB subaward **RSMAS:**

DMNH ESB subaward **YPM:** Nothing to report.

MCZ ESB**:** PT Curatorial Assistant position has been approved by Harvard University Human Resources

LACM ESB**:** Previously digitized collections, including Eastern Seaboard specimens, harvested by iDigBio and now searchable.

NCSM ESB**:** Nothing reported

UF ESB**: N**othing to report

UMMZ ESB**:** Nothing to report

[USNM] ESB**:**

TCN Name

Building a global consortium of bryophytes and lichens: keystones of cryptobiotic communities (GLOBAL)[1]

Person Completing the Report

Miranda Zwingelberg (GLOBAL Project Manager)

Share Progress in Digitization Efforts

This report covers progress completed during the period of October 1 - December 31, 2020.

Digitization progress at our collaborating institutions continued to be significantly constrained by COVID restrictions during 2020-Q4. Access to collections spaces, specimens, and imaging equipment was in many cases severely limited and most teams were unable to onboard any of the student workers who will be responsible for the majority of the digitization work. In spite of this, GLOBAL collaborators made progress in a number of areas.

Imaging Equipment

Five institutions (ASU, COLO, DUKE, NY, TENN) purchased imaging equipment, software, and/or supplies, including barcodes. Six additional institutions (F, FLAS, MSC, NY, PH, YU) made progress modifying existing equipment and workstations for imaging the physical specimens inside bryophyte and lichen packets.

Workflow Development

Many institutions (ASU, BRY, CINC & MU, DUKE, F, LSU, MO, MSC, NY, PH, TENN, YU, WIS) spent time in 2020-Q4 drafting, updating, and refining their imaging workflows to include the physical specimen, a step not required in

[1] Throughout this report, herbaria are referred to by their Index Herbariorum acronyms, which correspond to institutional names as follows: ALA = University of Alaska, Fairbanks, ASU = Arizona State University, BRY = Brigham Young University, CINC & MU = University of Cincinnati & Miami University, COLO = University of Colorado, DUKE = Duke University, F = The Field Museum, FLAS = University of Florida, ILL & ILLS = University of Illinois at Urbana-Champaign & Illinois Natural History Survey, LSU = Louisiana State University, MICH = University of Michigan, MIN = University of Minnesota, MO = Missouri Botanical Garden, MSC = Michigan State University, NY = New York Botanical Garden, OSC = Oregon State University, PH = The Academy of Natural Sciences of Drexel University, TENN = University of Tennessee, Knoxville, UC = University of California, Berkeley, WIS = University of Wisconsin, YU = Yale University

the earlier Bryophyte and Lichen TCN in 2011. Pre-digitization activities also included preparing specimens, printing labels (BRY, CINC & MU, MSC), auditing existing data (F), and adding functionality to local databases (MO).

Personnel

The GLOBAL Georeferencing (WIS) and Project (TENN) Managers were hired and began work in October and December 2020. The Lead Digitizer at NY was selected and will start in January 2021. PH, BRY, and FLAS made progress toward recruiting and hiring undergraduate technicians.

Digitization

Eight institutions (COLO, DUKE, F, LSU, TENN, CINC & MU, FLAS, WIS) reported progress on digitization deliverables, with a total of 4,611 specimens barcoded (133 bryophytes and 4,478 lichens), 4,024 labels imaged (89 bryophytes and 3,935 lichens), 3,000 specimens imaged (32 bryophytes and 2,968 lichens), 309 specimen records uploaded to the portal (114 bryophytes and 195 lichens), 14,414 labels transcribed (10,359 bryophytes and 4,055 lichens), and 32,391 specimens georeferenced (3,383 bryophytes and 29,008 lichens).

Table 1: Digitization progress by GLOBAL collaborators in 2020-Q4, separated by Bryophyte (B) and Lichen (L) specimens.

	# Barcodes Added		# Labels Imaged		# Specimens Imaged		# Uploaded to Portal		# Labels Transcribed		# Georeferenced	
	B	**L**	**B**	**L**	**B**	**L**	**B**	**L**	**B**	**L**	**B**	**L**
ALA												
ASU												
BRY												
CINC & MU	114		70				114		3,230	459	2,192	1,221
COLO		1,500		769		186						
DUKE					13	2,782			11			
F		1,950		1,950					7,086	1,950		
FLAS				157				157		157		
ILL & ILLS												
LSU		38		69				38		1,489		3
MICH												
MIN												
MO												
MSC												
NY												
OSC												
PH												
TENN	19		19		19				32		34	
UC												
WIS		990		990							1,157	27,784
YU												
Totals	133	4,478	89	3,935	32	2,968	114	195	10,359	4,055	3,383	29,008
B+L Totals		**4,611**		**4,024**		**3,000**		**309**		**14,414**		**32,391**

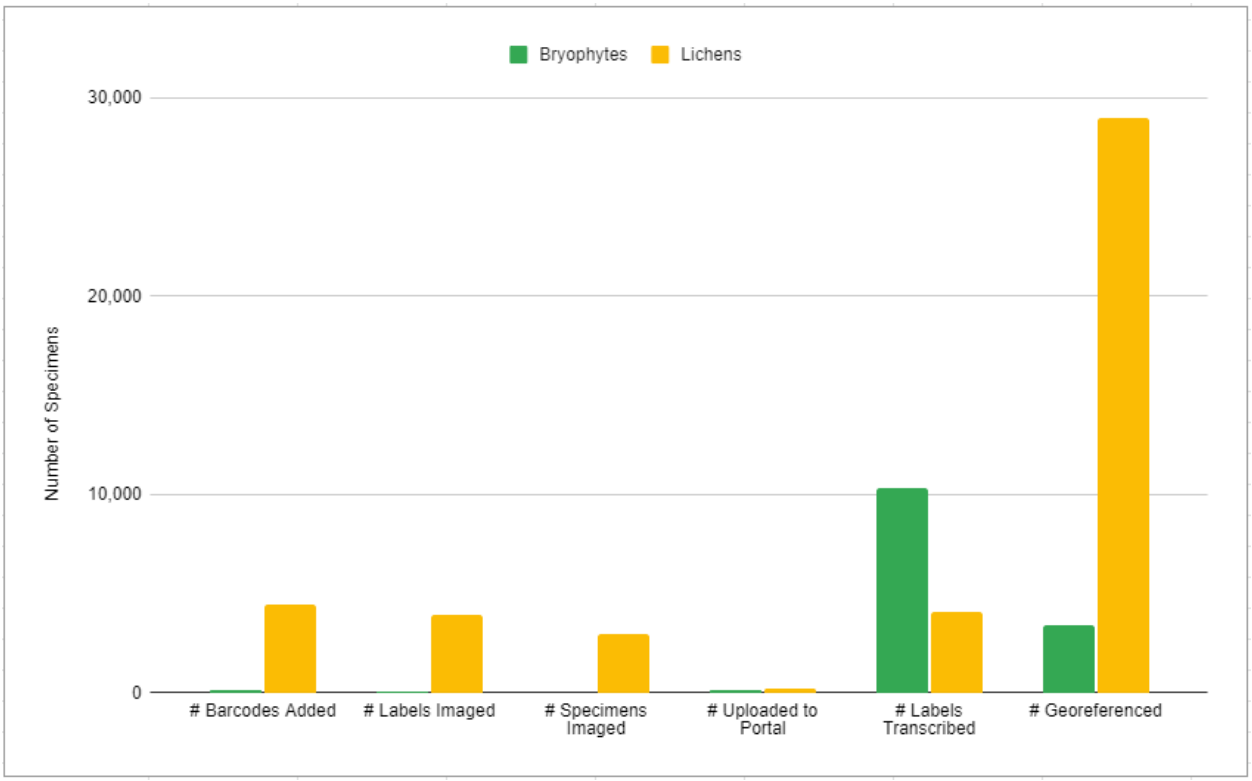


Figure 1: Digitization progress for GLOBAL collaboration in 2020-Q4, separated by Bryophyte and Lichen specimens.

Share Best Practices, Standards, and Lessons Learned

Flexible Workflows

COVID restrictions have forced many collaborators to adjust their timeline and workflow. Some institutions have been adapting imaging stations for at-home use (F, DUKE), while others are delaying imaging in favor of remote activities like transcribing existing label images (CINC & MU, LSU). To maximize the use of their limited time on-site, some collaborators are separating the process of imaging labels from imaging specimens (COLO). This will provide a steady source of label images for remote transcription, keeping students busy until they are approved to physically work in the collections. They will capture the specimen images later in the project, allowing additional time to improve workflows to increase specimen image quality. The majority of collaborators are using this time to test and optimize their setups and workflows, and will begin GLOBAL digitization work once they can fully access their collections in concert with decreased COVID restrictions.

Minimum Standards

With a wide range of specimen storage, equipment, workflows, and experience on the GLOBAL team, it has been important to establish clear minimum expectations for the group. Virtual meetings and online discussions

coordinated by the Lead PI (TENN) and Project Manager (TENN) were used to establish a living Google document of GLOBAL Project Standards. The document includes requirements and best practices for image content, image size and resolution, file naming standards, and skeletal data.

Collaboration

Basecamp, Zoom, and email were used to collaboratively problem-solve workflow challenges and share alternative methods and tools across institutions. The working group for Specimen Imaging held two Zoom meetings in 2020-Q4 where several participants demonstrated their workflows. The group asked questions, offered feedback, and discussed their own challenges. Recommendations for equipment, tools, and software, along with training documents and tracking tools, were shared and discussed in meetings and online (ASU, CINC & MU, COLO, DUKE, F, LSU, NY, OSC, TENN, WIS). Collaborators began posting test images of specimens on Basecamp for feedback on image content and quality (DUKE, F, LSU, NY, TENN). This practice leverages the wealth of technical knowledge on the GLOBAL team and helps ensure quality and efficient products.

Leveraging Institutional Expertise

The level of technical photographic experience varies widely in the GLOBAL group. LSU recommended that institutions reach out to their in-house photography department and seek guidance on optimizing their imaging equipment and set up. DUKE took advantage of a graduate student with established photographic experience to improve their lichen imaging. F coordinated internally with FMNH Photography, Archives & the Library who have inventoried photographic material, supplies, assets and equipment in order to re-evaluate purchasing of digital assets and creation of remote imaging stations.

Share Identified Gaps in Digitization Areas and Technology

Imaging Uploading

The most pressing technological challenge for the GLOBAL project during 2020-Q4 was the lack of batch image uploading capabilities to the Bryophyte and Lichen portals. Only two institutions were able to upload new images to the portals during this time (FLAS, LSU), and many have a backlog of images waiting to be uploaded (BRY, CINC & MU, TENN, WIS), which has delayed transcription efforts. The GLOBAL IT Team (ASU and ILL) met in December with the Lead PI (TENN), Project Manager (TENN), and the Bryophyte portal managers (F, DUKE) to plan and prioritize technology needs and deliverables. Batch image uploading was flagged as the highest priority. ILL and ASU began work on a dropbox-like image submission tool. The basic code was shared in 2020-Q4 but needs further development and integration into the portals that will be carried out during 2021-Q1.

Barcode Renaming

Another challenge identified was renaming image files with the specimen barcode. Automated renaming is problematic for images taken inside a specimen packet, in which the barcode may not be visible. Improvements were made to the “BarcodeRenamer” tool that offer a possible solution to this issue. Development also began

on a prototype program, “PhotoWatcher,” that will combine barcode renaming with additional skeletal data functionality (ASU).

Share Opportunities to Enhance Training Efforts

Symbiota

ASU held internal technical workgroup meetings to discuss how to develop “Symbiota Docs” as a completely revised and updated multi-language hub for documentation of the Symbiota biodiversity data management software. They also organized several technical training meetings on portal use.

Transcription

F began enhancing existing documentation for crowd-sourcing transcription in preparation for participation in the Spring WeDigBio event, public events, and programming. They also began developing onboarding materials for students, staff, interns, participants associated with the project.

Georeferencing

WIS researched webinars and training material for a shared resource page on georeferencing. They conversed with CINC to discuss successes with their georeferencing efforts and student training.

Share Collaborations with other TCNs, Institutions, and/or Organizations

The GLOBAL Project Manager (TENN) reached out to several other TCN’s (TPT, DigIn, CAP, MAM, MiCC) for example tracking and reporting documents and general advice from their TCN experiences.

F collaborated with Professor Emeritus Lars Soderstrom of the Norwegian University of Technology and Science, Trondheim on authoritative taxonomy files for liverworts and hornworts.

Share Opportunities and Strategies for Sustainability

Portal Management

ASU began setting up servers for portal hosting.

Taxonomy

Initial meetings of the GLOBAL Taxonomy and Nomenclature working group were held to discuss taxonomy updating routines. ILL & ILLS presented early efforts for taxonomy update routines to identify directions for

further development. MO continued to develop accepted names data for the bryophyte portal and java-based skeletal data entry application.

Share Education, Outreach, Diversity, & Inclusion (EODI) Activities

F began coordination for a special WeDigBio event scheduled for the spring of 2021 and initial planning of education and outreach initiatives.

ASU began discussions about developing new “Symbiota Docs” as part of outreach to the community.

Share Information About Your Website and/or Portal Usage

Development of the GLOBAL project website is projected for 2021-Q1 with the assistance of staff at TENN.

Share Other Activities and/or Progress

Imaging Tagging

ASU worked on setting up controlled vocabularies for an image tagging library and continued image analysis (online character matrix of identification keys currently being revised).

TCN Name

InvertEBase

This TCN is almost at its end. Most participating collections have ended the project and submitted the final report. However, they are continuing to update their data and add specimen records.

Person Completing the Report

Petra Sierwald, FMNH, lead PI

Share Progress in Digitization Efforts

Results of the TCN's digitization to date:

		InvertEBase	SCANBug
Collection name		**status: Jan 8-21**	Insects/ENT
Arizona State University Mollusk Collection	(ASU-ASUMOC)	842	
Auburn University Museum of Natural History	AUMNH	to be added	97,931
California Academy of Sciences	(CAS-INVERT)	164,923	259,860
Carnegie Museum of Natural History - Mollusks	(CM-Mollusks)	157,608	
Chicago Academy of Sciences	(CHAS-MAL)	15,529	26,175
Colecciones Biológicas de la Universidad del Valle de Guatemala - Colección de Moluscos	(UVG-UVGMOL)	178	
Colorado Plateau Biodiversity Center-Mollusk Collection	(NAU-NAUF3A)	10	
Delaware Museum of Natural History – Mollusks	(DMNH-Mollusk)	79,751	
Denver Museum of Nature & Science	(DMNS-INVERT)	30,425	40,614

Denver Museum of Nature & Science	DMNHS-ENT		119,374
Dugway Proving Ground Natural History Collection	(DUGWAY-DUG-INVERT)	45	2,771
Eastern Kentucky University Mollusk Collection	(EKU-Mollusks)	5,867	0
Field Museum of Natural History Invertebrates	(FMNH-Invertebrate Zoology)	257,400	455,181
Florida Museum of Natural History	(UF)	665,800	
Harvard University Museum of Comparative Zoology	(Harvard-MCZ)	442,762	518,683
Illinois Natural History Survey - Mollusk Collection	(INHS-MOLLUSK)	91,096	657,555
INHS	crustaceans		15,536
Invertebrates Collection at the Natural History Museum of Utah	(UMNH-Invertebrates)	12,777	73,069
Museum of Northern Arizona	MNA-BioMNA-Invertebrates	3,661	
Naturalis Biodiversity Center (NL) - Mollusca	(Naturalis-Mollusca)	729,950	
North Carolina Museum of Natural Sciences - Mollusk Collection	(NCSM-UNIO)	35,938	0
Sam Noble Oklahoma Museum of Natural History	(SNM-INVERT)	9,407	158,143
Texas A&M University Biodiversity Research and Teaching Collections	(TCWC-Marine Invertebrates)	22,803	548,589
University of Alaska Museum	(UAM-INVERT)	20,306	
University of Michigan Museum of Zoology	(UMMZ-Mollusk Collection)	190,557	343,897
Yale University Peabody Museum	(IZ-YPM)	141,814	358,639
current total specimen records		***3,079,449***	
Frost			132,685
Cleveland			126,703

	3,935,405

Currently, InvertEBase serves 3,079,449 invertebrate specimen records online. The SCANBug portal serves 3,935,405 specimen records from collections associated with the InvertEBase TCN.

Lepidoptera of North America Network &
Symbiota Collections of Arthropods Network (SCAN)
Quarterly Report

February 3, 2021
Neil Cobb

Progress in Digitization Efforts:

This is a joint report for the two Thematic Collections Networks (TCNs) SCAN and LepNet. Many museums are involved in both SCAN and LepNet, including collections that have received funding from both TCNs, collections that are unfunded for one TCN and funded by the other, and some collections that are providing data to both and are unfunded by the ADBC program. Both TCNs share the same database https://scan-bugs.org/portal/, which depending on the context we refer to as the SCAN-LepNet database or the LepNet-SCAN database. We will also serve arthropod data for InverteBase and will serve Terrestrial Parasite Tracker TCN data when it becomes available (See TPT TCN report for details). Summary statistics presented here were compiled from data accessed on the SCAN portal, February 1, 2021. **Table 1** shows the key statistics of Lepidoptera (LepNet) and non-Lepidoptera (SCAN) records to date. These consist of all records and images, including records and images from data providers who have allowed us to post their data on the SCAN/LepNet portal. Providing data from these additional providers increases our ability to georeference, add to taxonomic tables, and more accurately assess the total digitization effort for any given taxon. We provide data specific to institutions that received direct funding from the NSF-ADBC program in the annual reports to NSF.

Table 1. Records in SCAN/LepNet database, "all data" reflects all arthropod taxa, "Non-Lep" includes all non-Lepidoptera arthropod data, and Lepidoptera includes only Lepidoptera taxa.

	All data	Non-Lep (SCAN)	Lepidoptera (LepNet)
Specimen Records	22,676,043	18,419,006	4,257,037
# Georeferenced	19,086,256	15,362,486	3,723,770
# Imaged	3,903,414	2,461,799	1,441,615
# Identified to species	13,640,873	9,554,232	4,086,641

The SCAN network started in 2012 and the TCN funding has ended, but SCAN continues to support PEN projects. The LepNet grant was initiated on July 1, 2016 and there are currently 27 ADBC funded museums and one non-funded museum (Oklahoma State University). The museums comprising the NSF-ADBC LepNet are all serving records and images on the LepNet Portal and are serving data directly to iDigBio via IPT or through DwC archives on the LepNet-SCAN portal. Twenty museums are serving DwC archives to iDigBio and six museums are serving data snapshots with the LepNet portal. We have set up the SCAN Portal to serve all arthropod data from North America as well as all data from North American arthropod collections where specimens were collected outside of North America.

LepNet - The LepNet ADBC-funded museums are still on target to meet goals for records and images. An additional 59 collaborators (non-ADBC funded museums that use our data portal to serve their data) have also provided additional records for Lepidoptera. There are 47 collections (referred to as added-

value) that have allowed us to harvest their data via IPT to serve lepidopteran records. Although most of the Lepidoptera imaged are from INaturalist, 170,854 are specimen images **Table 2** shows the top 10 families of Lepidoptera in terms of total occurrences digitized.

What is most encouraging about the lepidopteran records is that 87% of the records are identified to species, which is higher than any of the other major orders. Thus, the primary factor limiting the production of "research-ready" data is due to georeferencing. For Lepidoptera 74% of the records are research-ready (i.e., identified to species and georeferenced) and by georeferencing existing records we should increase that percentage to 90% over the next three years. We realize that many records represent misidentified specimens and we also need to seek additional non-ADBC funding to review as many specimen identifications as possible. We are sponsoring the first LepNet Partners to Existing Networks (PEN) grant with the San Diego Museum of Natural History. This PEN project will focus on the Lepidoptera of Baja California, including a large number of historical records. They have already contributed over 13,000 records.

Table 2. The number of occurrence records for the top 10 families of Lepidoptera that have been digitized.

Taxa	# Specimen Records	# Georeferenced	# Specimen Identified to species	# Georeferenced & Ided to species
Nymphalidae	866,504	794,766	853,030	785,577
Noctuidae	551,907	497,764	532,520	484,671
Erebidae	409,709	364,190	391,397	350,357
Geometridae	354,158	311,771	338,290	298,221
Hesperiidae	343,517	290,141	335,880	283,861
Pieridae	341,709	285,533	337,471	282,400
Lycaenidae	271,896	242,957	267,095	239,354
Papilionidae	170,456	142,609	168,960	141,616
Crambidae	157,158	133,565	151,543	129,497
Tortricidae	134,876	107,454	125,529	100,934

Symbiota Collections of Arthropods Network (SCAN) - We have surpassed our overall TCN/PEN goals for the network and have been very successful in supporting data mobilization for unfunded museums and cooperation by larger collections that have allowed there data to be used to help mobilize data from other museums. We are sponsoring one SCAN PEN proposal, one through the American Museum of Natural History, focusing on several ground-dwelling families. **Table 3** shows data for the five major taxa we targeted in SCAN. All five groups have enough data to produce scores of papers.

Share and Identify Opportunities to Enhance Training Efforts: We are developing resources on the WordPress site http://www.scan-all-bugs.org/ .

Share and Identify Best Practices and Standards (including Lessons Learned):

Table 3 Number of records for the five focal SCAN taxa groups.

Taxa	# Specimen Records	# Georeferenced	# Specimen Identified to species	# Georeferenced & Ided to species
Formicidae	1,191,047	1,074,097	690,977	615,852
Carabidae	622,726	507,590	391,047	323,411
Araneae	252,097	198,201	208,854	169,032
Acrididae	431,679	218,036	368,783	203,830
Tenebrionidae	192,506	167,147	113,304	99,095

We share best practices on the SCAN/LepNet project website https://scan-all-bugs.org/ .

Images for Research - We developed a new and efficient process for uploading images to the database https://scan-bugs.org/portal/profile/index.php?refurl=/portal/imagelib/imagebatch.php? .We are participating in a TDWG-sponsored working group to develop standards for specimen images, including definition of morphological traits.

Identify Gaps in Digitization Areas and Technology: We are supporting the "LightingBug" project https://lightningbug.tech/, which will exponentially increase transcription rate of labels and produce specimen images comprising 360-degree image suites. The production of images will be transformational in terms of extending our capabilities to provide automated identifications and examine morphological traits.
We continue to seek out occurrence data to better understand the biogeography of the focal SCAN taxa and Lepidoptera. For most groups there is not enough data to talk about gaps. We are meeting this need by incorporating additional collections into the SCAN-LepNet database, and harvesting observational records from iNaturalist, Pollardbase, Buguide, LepSoc inventories, and smaller observation sets provided by individual lepidopterists.

Share and Identify Collaborations with other TCNs, Institutions, and Organizations:
We are primarily working with other Symbiota TCNs and other Symbiota portals. We are also generally collaborating with a variety of individuals, projects and organizations to extend the ability to mobilize biodiversity data and promote the use of data in research. We are serving data from 217 collections, we continue to add one collection per month.

Share and Identify Opportunities and Strategies for Sustainability: Nothing to report

Other Progress (that doesn't fit into the above categories):

Focus on North American Arthropods We continue to provide North American data obtained from any credible sources to increase the quantity of data available to SCAN and LepNet users. We have added three new collections since the last update.

GBIF Registration - There are 47 Live collections on SCAN that are now registered with GBIF and 87 other entomology collection datasets from the North America being served on GBIF for a total of 181 datasets. This leaves approximately 30 collections in North America that still need to register on GBIF.

Publications - We have published an overview of the LepNet project (Seltmann et al 2017), and several LepNet participants collaborated on a publication below (Belitz et al., 2018). Our review of North American entomology collections has been published in PeerJ. We are now developing a follow up review on North American arthropod data.

Belitz, M.W., Hendrick, L.K., Monfils, M.J., Cuthrell, D.L., Marshall, C.J., Kawahara, A.Y., Cobb, N.S., Zaspel, J.M., Horton, A.M., Huber, S.L. and Warren, A.D., 2018. Aggregated occurrence records of the federally endangered Poweshiek skipperling (*Oarisma poweshiek*). *Biodiversity data journal*, (6).

Cobb, N.S., L. Gall, J.M. Zaspel, L.M. McCabe, N.J. Dowdy. and A.Y. Kawahara. 2019 Assessment of North American Entomology Collections: Prospects and Challenges for Addressing Biodiversity Research. PeerJ, 7, p.e8086.

Google Analytics: Our Google Analytics data are dynamically shown https://datastudio.google.com/u/0/reporting/1VvEU4pM2LGqQXY0hVCTf98VvGmM7T_bu/page/cLZN for the SCAN portal, http://scan-bugs.org/portal/index.php .

TCN Quarterly Progress Report

Prior to each IAC meeting, TCNs are asked to complete a quarterly progress report in the areas outlined below. The TCN Lead PI or Project Manager collects information from all collaborators and compiles them into one overall progress report for the TCN. The TCN Lead PI or Project Manager then submits the quarterly reports via an email to Cat Chapman. An archive of previously submitted reports is available on the Internal Advisory Committee wiki page.

TCN Name

The Microfungi Collections Consortium: A Networked Approach to Digitizing Small Fungi with Large Impacts on the Function and Health of Ecosystems (MiCC)

Person Completing the Report

Andrew Miller (Lead PI)

Share Progress in Digitization Efforts

- BPI uploaded ~25,000 myxomycetes to the MyCoPortal and we will soon link 39,375 images to these records. They also transcribed 27,329 records and georeferenced 27,136 records.
- PH transcribed 136 records and georeferenced 12,732 records.
- CLEM completed their georeferencing of 2841 records. Their entire collection of 4833 records is fully transcribed and georeferenced.
- CUP transcribed 1048 records and georeferenced 43518 records.
- EIU is fully transcribed and georeferenced for their 13,870 records.
- MU georeferenced 656 records.
- OSU transcribed 6262 records.
- CHRB transcribed 1143 records.
- UC transcribed 1603 records and georeferenced 273 records.
- ILLS added 2601 complete records.
- MISS added 510 images.
- The MyCoPortal now contains 7,382,175 records from 114 collections! The number of records with georeference data is 4,409,107 (60%) and 31% contain images.

Share Best Practices, Standards, and Lessons Learned

- Nothing new to report.

Share Identified Gaps in Digitization Areas and Technology

- Nothing new to report.

Share Opportunities to Enhance Training Efforts

- Hired a recently-graduated student (minority female) and she has been trained via Zoom to transcribe and georeference fungal records.

Share Collaborations with other TCNs, Institutions, and/or Organizations

- FunGuild, which serves fungal ecological metadata, has been moved to the INHS as part of the MyCoPortal suite, which includes FDex – a simplified names database, primarily for projecting taxonomic hierarchy for fungal taxa.
- The MyCoPortal is changing from Symbiota-standard code base to Symbiota-light and working with Ed Gilbert and the GLOBAL TCN to update our taxonomic thesaurus.

Share Opportunities and Strategies for Sustainability

- A new mirrored backup storage system, which holds 80TB of data, has been purchased and will be used to store, backup and serve data and images to the MyCoPortal.

Share Education, Outreach, Diversity, & Inclusion (EODI) Activities

- Nothing new to report.

Share Information About Your Website and/or Portal Usage

Please see attached report from Google Analytics.

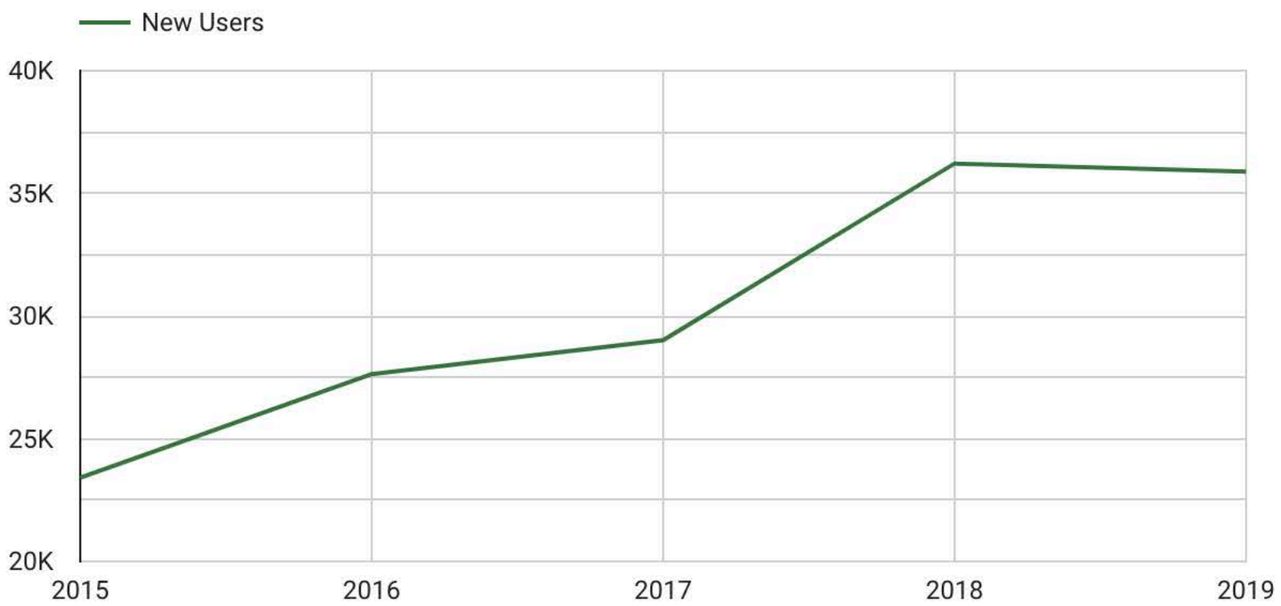
Share Other Activities and/or Progress

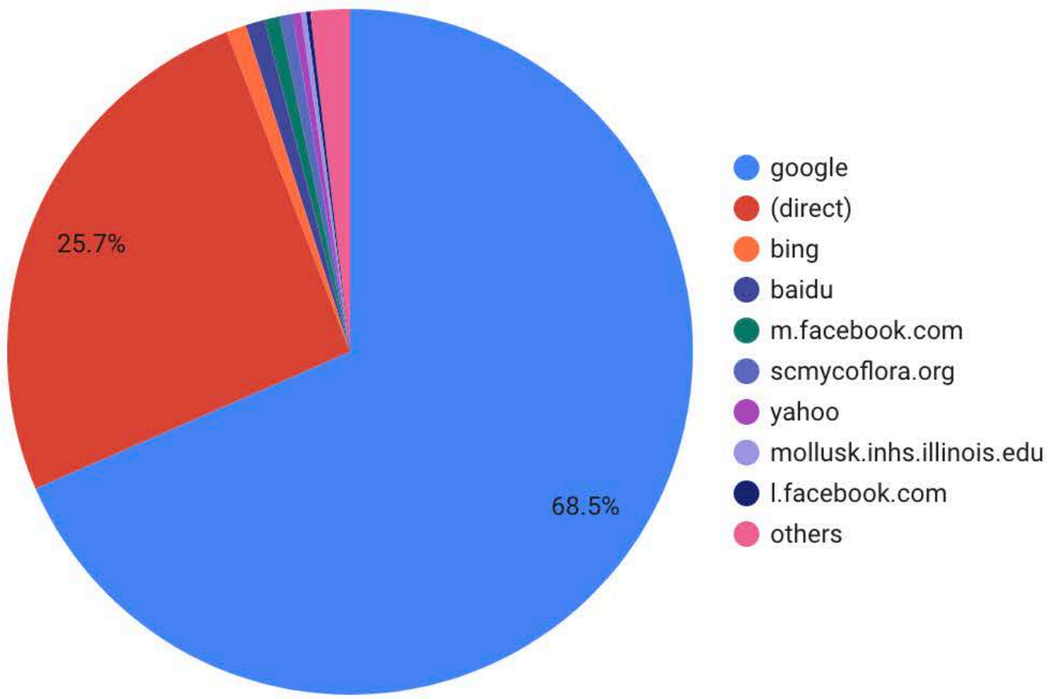
- MyCoPortal has been cited 88 times - 30 times in 2020 and 1 time in 2021, in peer-reviewed journal publications.

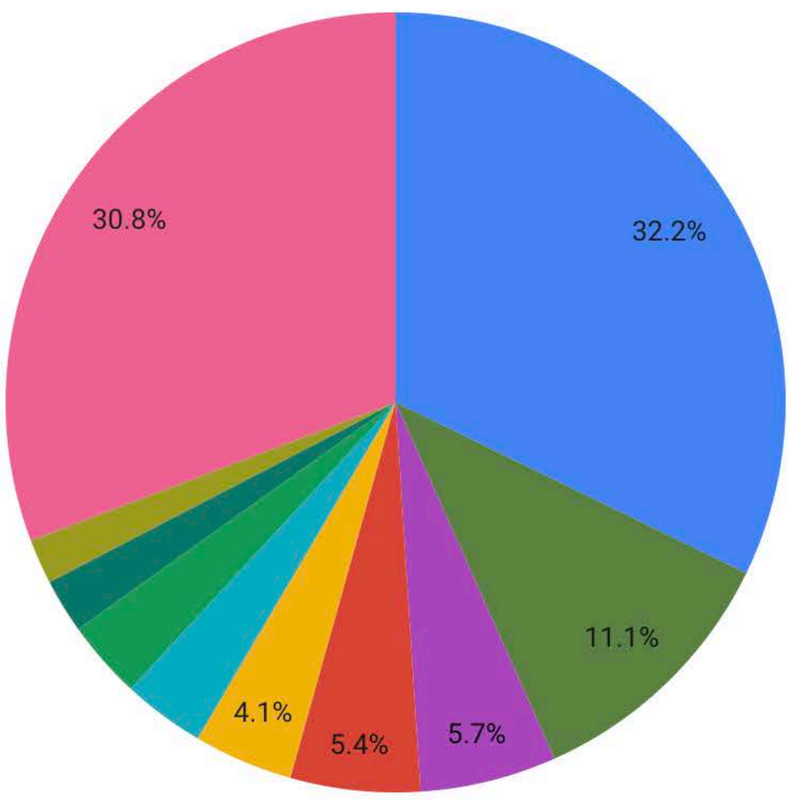
MyCoPortal Data Portal Statistics

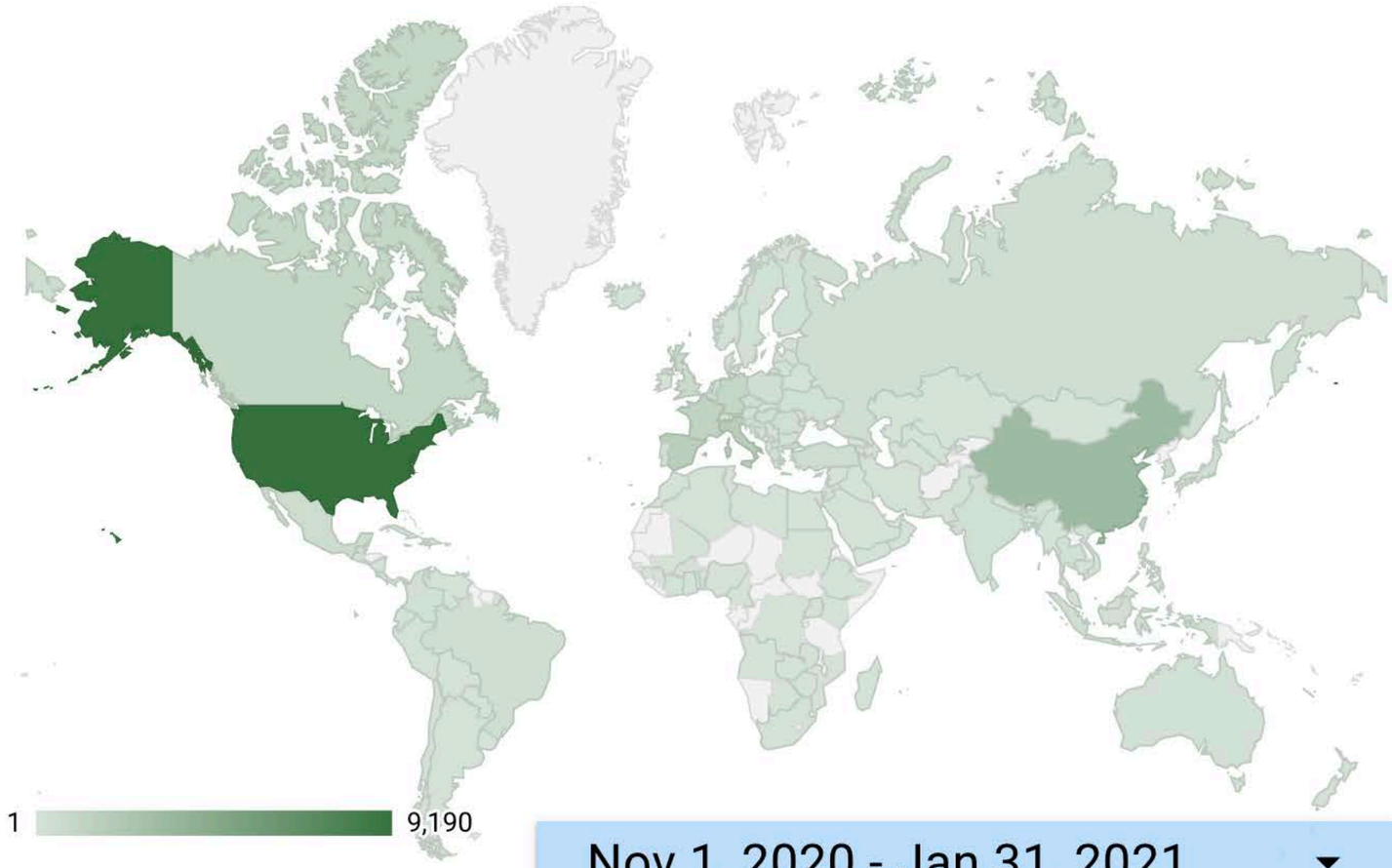
www.mycoportal.org **Data from Google Analytics**

Users	New Users	Sessions	Number of Sessions per User	Pageviews	Pages / Session	Avg. Session Duration	Bounce Rate
16,815	15,736	28,527	1.7	74,360	2.61	00:02:45	65.65%









Nov 1, 2020 - Jan 31, 2021

TCN QUARTERLY PROGRESS REPORT

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TCN Name

The Pteridological Collections Consortium: An integrative Approach to Pteridophyte Diversity Over the Last 420 Million Years (PCC)

Person Completing the Report

Amy Kasameyer (Project Manager)

Share Progress in Digitization Efforts

For extant specimen progress during this reporting period, Pteridophyte Collections Consortium members created skeletal records for **7,752** specimens, fully transcribed **33,795** specimens, imaged **8,392** specimens, and geo-referenced **9,656** specimen records. The total pteridophyte extant specimen progress including work done prior to the start of the grant is **595,345 (36% of goal)** skeletal records created, **1,086,276 (66% of goal)** extant specimens imaged, **1,038,229 (63% of goal)** extant specimens fully transcribed, and **266,793 (16% of goal)** extant specimens geo-referenced.

In the Pteridoportal (http://pteridoportal.org/), we currently have **1,545,665** extant specimen records, **1,232,975** (80%) of which are imaged and **386,311** (25%) of which are georeferenced.

For fossil specimen progress during this reporting period, Pteridophyte Collections Consortium members databased **1,567** specimens, imaged **822** specimens, and geo-referenced **4,481** specimen records. The total pteridophyte fossil specimen progress including work done prior to the start of the grant is **31,318** (36% of goal) specimens databased, **31,318** (36% of goal) specimens imaged, and **15,663** (18% of goal) specimen records geo-referenced.

In the Pteridoportal (http://pteridoportal.org/), we currently have **11,089** fossil specimen records, **8,459** (76%) of which are imaged and **5,275** (48%) of which are georeferenced.

Portal Manager Joyce Gross worked with Garth Holman and Robyn Burnham at the University of Michigan to add their fossil data to the Pteridoportal.

Collections continue to be impacted by COVID. Onsite activities at most institutions are limited, safety procedures are requiring work to be done at a slower rate, and in most institutions volunteers are not yet able to volunteer in person.

Share Best Practices, Standards, and Lessons Learned

Share Identified Gaps in Digitization Areas and Technology

Share Opportunities to Enhance Training Efforts

NYBG: During Regina Vitiello's tenure as Lead Digitizer for the PCC project, she pursued and obtained in Sep 2020, a Master of Library Sciences degree, and she intends to pursue a permanent position at a museum or library that will allow her to continue working with collections.

FIELD: During December and January the Field Museum trained staff in other sectors of the Museum (i.e., Guest Services), to transcribe. They are front line staff but the Museum was shut down for a portion of that time to the public. This provided the staff with an opportunity to work with scientists, help make progress with transcribing, and deepen their connection to the significance of collections.

UCMP: Despite Covid restrictions UCMP was able to bring onboard UC Berkeley freshman James Pinto during the 2020 Fall semester as an undergraduate research apprentice (URAP). He is continuing his URAP appointment this Spring semester and was hired on as a work-study student to further assist with our digitization efforts. In addition, Jaemin Lee is contributing to the fern digitization project this semester as a GSR (graduate student researcher) through his work digitizing the Jurassic floras from the Monte de Oro Formation of California and Riddle Formation of Oregon.

Share Collaborations with other TCNs, Institutions, and/or Organizations

Partners have ongoing collaborations with the Endless Forms, MAM, andCretaceous World TCNs.

Share Opportunities and Strategies for Sustainability

SAM NOBLE: We continue utilizing the opportunities presented by this project to grow in-house technical and collection knowledge and abilities to help work towards more maintainable technological needs of the Collection and data portals. This efforts enables collection staff, volunteers and our museum's IT department to work together, with a common vocabulary, to establish in-house processes to appropriately add additional data fields (especially those necessary/useful/required for sharing TCN-related data) to datasets being shared via museum's IPT server, ensure data quality and handle necessary updates.

Share Education, Outreach, Diversity, & Inclusion (EODI) Activities

BRIT: Alejandro Vasco at BRIT gave an adult education class: The wild world of ferns.

FIELD: In January the Field Museum had our quarterly Collections Club spanning two days with over 70 volunteers working on a variety of projects including transcribing ferns using the crowdsource module.

NYBG: NYBG's partial closure due to the pandemic has motivated our Science and Humanities departments to begin hosting free weekly science seminars online. PCC and other TCN project staff are encouraged to attend these lectures focused on research being conducted at NYBG and by invited guest speakers.

MSU: Project updates are posted regularly on their Twitter feed with the #fernfriday hashtag.

TEX: George Yatskievych presented one program via Zoom to a local garden club on herbaria and the TEX-LL herbaria's digitization efforts, including the PCC project.

UCMP: Created a project wide Instagram account and has been posting project updates: https://www.instagram.com/pteridophyte_tcn/

Share Information About Your Website and/or Portal Usage

Share Other Activities and/or Progress

TCN QUARTERLY PROGRESS REPORT

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TCN Name

TCN Name and short code, such as: Digitizing collections to trace parasite-host associations and predict the spread of vector-borne disease (TPT)

Enhancing Access to Taxonomic and Biogeographical Data to Stem the Tide of Extinction of the Highly Imperiled Pacific Island Land Snails (PILSBRy)

Person Completing the Report

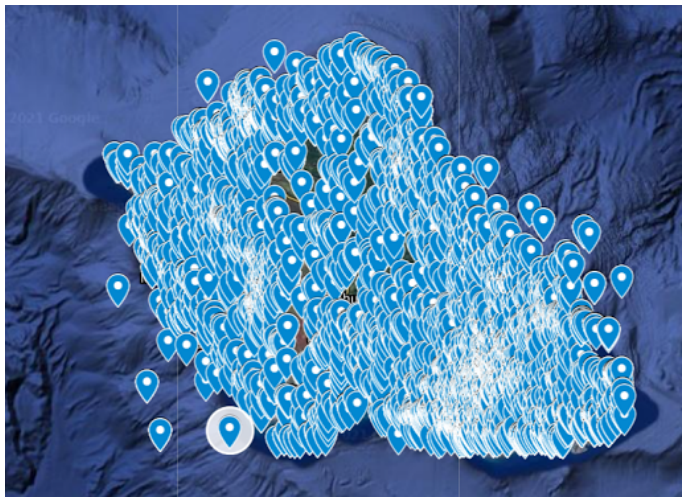
Name and role of the person completing the report, such as: Jennifer Zaspel (Lead PI)

Norine Yeung (Lead PI)

Share Progress in Digitization Efforts

Share information here. You can also embed graphics if desired.

- 5 of the 6 collections have uploaded their Pacific Island land snail specimen records onto the PILSBRy symbiota portal for taxonomy clean up and addition of georeferenced data.
    - 365354 lots, 3616337 specimens, 101218 georeferenced records.
- The taxonomic authority file is slated to be completed by April 2021.
- About 20,000 unique Hawaiian archipelago localities will be in GEOLocate (see outreach video here: https://twitter.com/PacificSnail/status/1355016837654695938)
- Here is a screen shot of all georeferenced specimen records from 4 of the 6 collections just on the island of Oahu, Hawaii.



Share Best Practices, Standards, and Lessons Learned

Share information here. You can also embed graphics if desired.

Paul Callomon, coPI from ANSP, published a guide for shell imaging: https://www.researchgate.net/publication/347950720_A_simple_system_for_holding_mollusk_shells_and_other_small_objects_for_photography

We also created workflow protocols for taxonomic cleanup and will finalize the protocols for the georeferencing cleanup and export of data by March 2021.

Share Identified Gaps in Digitization Areas and Technology

Share information here. You can also embed graphics if desired.

COVID19 continues to impact access to collections and recruitment of staff and volunteers.

Share Opportunities to Enhance Training Efforts

Share information here. You can also embed graphics if desired.

COVID19 continues to impact physical training within the collection. However, we have created ppt presentations, protocol documents, videos, and organized virtual sessions to facilitate training within the project.

Share Collaborations with other TCNs, Institutions, and/or Organizations

Share information here. You can also embed graphics if desired.

We've contacted local conservation agencies in Hawaii to help verify gps information of localities within the Hawaiian Archipelago, clean up typos in geographic names, and provide GPS data for localities. We will be reaching out to other local agencies and organizations on other Pacific Islands to aid in with georeferencing.

Share Opportunities and Strategies for Sustainability

Share information here. You can also embed graphics if desired.

Share Education, Outreach, Diversity, & Inclusion (EODI) Activities

Share information here. You can also embed graphics if desired.

Most of the collections are still constrained by the COVID19 pandemic. But any recruitment of staff or volunteers/interns are cognizant in providing opportunities to minorities and reaching out to local residents.

Share Information About Your Website and/or Portal Usage

Share information here. You can also embed graphics if desired, such as from Google Analytics.

Share Other Activities and/or Progress

Share information here for things that do not fit into the above categories. You can also embed graphics if desired.

TCN Quarterly Progress Report

TCN Name

American Crossroads: Digitizing the Vascular Flora of the South-Central United States (TORCH)

Reporting Period: November 1st, 2020 - January 31st, 2020

Assembled by BRIT on February 2nd, 2021, for Feb. 3rd IAC meeting

Person Completing the Report

Diego Barroso, TORCH TCN Project Manager <dbarroso@brit.org>

Reporting Institutions

BRIT – Botanical Research Institute of Texas
BAYLU – Baylor University
HUH – Harvard University
KANU – University of Kansas
MO – Missouri Botanical Garden
NOSU – Northeastern State University
NY – New York Botanical Garden
OKL – University of Oklahoma
OKLA – Oklahoma State University
SHST – Sam Houston State University
TAES – Texas A&M University-College Station
TAMUCC – Texas A&M University-Corpus Christi
TEX/LL – University of Texas at Austin [and subaward institutions]
TTC – Texas Tech University
UTEP – University of Texas at El Paso

Share Progress in Digitization Efforts

- Number of skeletal records created:

  BRIT = 705

  BAYLU = 0

  HUH = 0

  KANU = 0

MO = 0
NOSU = 0

NY = 300 (project total: 28,480)

OKL = 0

OKLA = 0

SHST = 0

TAES = 0

TAMUCC = ~10,000 skeletal records are present (exact number not available)

TEX/LL = 0

TTC = 139

UTEP = 0

Total skeletal records created this quarter: 11,144

- Number of fully-transcribed records created:

  BRIT = 20,736 (14,736 staff & volunteer transcriptions + 6000 community science NfN supplied transcriptions).*****

  BAYLU = 0

  HUH = 0

  KANU = 832 (total number of fully transcribed records from OK and TX = 26,963)

  MO = 232

  NOSU = 0

  NY = 466 (project total: 52,951)

OKL = 97

OKLA = 2,000 (in Notes from Nature by students, via course assignment)*

SHST = 914

TAES = 0

TAMUCC = 0

TEX/LL = 608
HPC = 5
JFC = 0 [=Lady Bird Johnson Wildflower Center]
PAUH= 0 [no report received]
SAT = 275
SRSC= 2,037
TLU = 547

TTC = 0

UTEP = 0

* Notes from Nature transcriptions: From November 1st through January 22nd, 8 expeditions with 13,000 subjects were created, of which 9,700 have been completely transcribed (mostly BRIT and OKLA specimens already included in tallies above).

Total fully-transcribed records created this quarter: 28,749

- Number of specimens imaged:

BRIT = 17,600

BAYLU = 7,203

HUH = 0 (imaging is ongoing, but without transcription we cannot report numbers)

KANU = 915 (total imaged specimens from OK and TX = 6,122)

MO = 58

NOSU = 0

NY = 18,376 (project total: 24,515)

OKL = 2,000

OKLA = 27,343

SHST = 0

TAES = 0

TAMUCC = 100

TEX/LL = 2,723

HPC = 100
JFC = 3,272 [=Lady Bird Johnson Wildflower Center]
PAUH= 0 [no report received]
SAT = 275
SRSC= 2,037
TLU = 0

TTC = 337

UTEP = ~ 8,500

Total number of specimens imaged this quarter: 90,839

- Number of specimens georeferenced:

BRIT = 0
BAYLU = 0
HUH = 868
KANU = 856 (total georeferenced specimens from OK and TX = 26,729)

MO = 188

NOSU = 0

NY = 7,293 (project total: 52,353)

OKL = 6,500

OKLA = 0

SHST = 0

TAES = 25,000

TAMUCC = 100 (digitized)

TEX/LL = 177

HPC = 0
JFC = 0 [=Lady Bird Johnson Wildflower Center]
PAUH= 0 [no report received]
SAT = 0
SRSC= 0
TLU = 0

TTC = 2,506

UTEP = ~ 3,500

Total number of specimens georeferenced this quarter: 46,988

- Other digitization or pre-digitization efforts:

BRIT:
Continued locating and segregating TORCH TCN Project specimens in the BRIT collection, for processing (Oklahoma specimens in BRIT/SMU North America folders).

Expanded project beyond single high school intern to virtual volunteer team (mid-November 2020) to skeletally transcribe images from image sets containing a mix of project and non-project specimens (Texas and Oklahoma in VDB North America folders) in the VDB collection at BRIT in order to prioritize TORCH complete transcriptions. Utilizing the crowd sourcing module in Symbiota, providing training (outside of business hours) and ongoing support (via email, Zoom, and Google Docs) has resulted in 17,983 skeletal transcriptions (scientific name, country, state, county) in 2.5 months. These skeletal transcriptions have provided us with details to prioritize complete transcription of TORCH specimens.

Moved Digitization Technician Ashley Bordelon to full-time status as Digitization Coordinator for our virtual volunteer effort.

Completed the imaging of the ACU herbarium, on loan to BRIT, and began transcription of its specimens.

Institutional Representative Tiana Rehman met with the Dean of the college, Andrea Jensen, and HSU curator Rick Hammer to discuss the logistics of the loan of HSU

specimens to BRIT for the purposes of Digitization under the TORCH grant. Delivered empty boxes and tentatively planned for specimen retrieval to BRIT (and subsequent freezing protocol) in February/March 2021.

With the help of Ed Gilbert, activated the Collaborative Georeferencing module (interface with GeoLocate) in the Symbiota Processing toolbox on the TORCH portal.

BAYLU: Nothing new to report.

HUH: We are imaging at near-normal rates, which will be used for transcription/data entry once system upgrades are complete.

KANU: In a related side project, the PI identified and labeled 179 unmounted specimens from Coleman, Mason, and Uvalde counties, TX. Those specimens have been moved into the mounting room and prioritized for processing so they eventually will be available for the TORCH project. The PI is checking several other accessions in the KANU backlog to locate other OK and TX specimens that can be prioritized for processing. The identification, labeling, mounting, sewing, and barcoding of these specimens is funded independent of the TORCH grant.

MO: Nothing new to report.

NOSU: Nothing new to report.

NY: OCR has been performed on all specimen labels to aid in transcription.

OKL: Data Manager Clay Barrett at OKLA continues to work on cleaning the OKL data imported to the Symbiota portal from OBIS.

OKLA: Genus folders made for Texas specimens (64 cabinets, not using TORCH funds)
Specimens repaired as needed (not using TORCH funds)

SHST: Nothing new to report.

TAES: Nothing new to report.

TAMUCC: Since the start of the TORCH digitization project, we have upgraded nearly all our specimen cabinets from old, wooden cabinets to new, rubber-sealed metal cabinets. We have also installed a -20 degree C freezer for quarantining specimens that newly arrive to the herbarium or are being moved from the old cabinets to the new. We have added these pre-digitization steps to ensure that we obtain the best quality images possible, as well as prevent any further pest damage to our records. We also use this time as an opportunity to omit unsatisfactory specimen sheets from our collection.

TEX/LL: None. We have not yet started working with Our Lady of the Lake or UTRGV Brownsville, and Fort Worth Nature Center is complete (except for uploading to iDigBio and TORCH portals).

TTC: Nothing new to report.

UTEP: Nothing new to report.

- Comments about the digitization process:

BRIT: Nothing new to report.

BAYLU: Nothing new to report.

HUH: We have resumed georeferencing activities starting in the new year after coordinating with the GEOLocate team to resolve a bug in the GEOLocate Collaborative interface. System enhancements are planned to allow us to ingest the coordinate data from GEOLocate back into the local Specify database (the data will be subsequently disseminated via our existing IPT feed). Project-related transcription is currently on-hold due to ongoing enhancements to our storage system. COVID-related obstacles have also increased timelines for system enhancements. We expect to resume project-related transcription (i.e. new record creation) early in 2021.

KANU: We completed the transcription all specimens from OK and TX that we found in the cases and have completed georeferencing of all specimens that can be georeferenced (99.1% of all OK and TX specimens). Specimens that have not been georeferenced have 1) ambiguous locality data that cannot be rectified or 2) geographically vague collection data (e.g., specimens with only state-level collection data). Focus now has shifted to imaging of specimens that have not already been imaged. Because COVID safety protocols allow only one person in the imaging room at a time, imaging will proceed much more slowly than when we work with two-person teams. Nevertheless, we expect to make reasonable progress imaging specimens this semester.

The University of Kansas was completely shut down from December 27, 2020 until January 3, 2021. Staff and students were prohibited from working on-site and off-site during the shutdown.

MO: As of this reporting access to our collections remains restricted to our science staff, who are authorized to be on-site only one or two days per week. Presently, there is no provision for access to our facilities by students, volunteers and visitors. This has severely impacted our ability to do recruit, train and add new people to the project.

NOSU: Nothing new to report.

NY: Due to state and city restrictions, we are limited to only a small number of onsite staff each day, and each staff member can only work two days per week.

OKL: Graduate student Leann Monaghan stopped imaging Texas specimens in mid-December, because she switched to a TA position for spring semester.

OKLA: All going well.

SHST: Nothing new to report.

TAES: Nothing new to report.

TAMUCC: Although we have faced many obstacles, we have learned so much along the way! One of the best resources we have been able to utilize during this process is our colleagues who have so graciously pointed us in the right direction for purchasing specimen labels, scanners, color cards, and more. Being able to meet virtually with other herbarium technicians and PIs who have also experienced similar obstacles has helped us tremendously to move forward with our digitization efforts, especially regarding Lightroom Classic export presets, and TACC uploading. Now that we have created a workflow, gotten familiar with our equipment, and improved our efficiency, we are excited to continue with this project. We have received approval for our TACC username and account status and plan to work through our first upload with Project Manager Diego Barroso once we have a nice batch of images ready.

TEX/LL: Our digitization efforts slowed after Thanksgiving, as our university asked students not to return to campus for the remaining weeks of the semester and moved all instruction to remote-learning. For spring semester, students were asked not to return to school until 1 February.

TTC: We have made made significant progress on fixing our georeferencing in Texas and will be looking to submit to iDigBio during the next quarter.

UTEP: We still have a limited ability to have students work in the herbarium due to Covid-19. We have been able to make some progress on the imaging thanks to efforts by our collections manager.

- Number of records available in iDigBio portal (cumulative):

BRIT = For BRIT-SMU-VDB-NLU: 170,801 (All TX and OK records)
For TAC: 7,065
For NTSC: 0
For ACU: 0

BAYLU = 0

HUH = 36,838

KANU = We upload a new instance of our database to GBIF and iDigBio at the beginning of each month. This continues to be done for all transcribed records. We plan to process new images periodically, uploading batches of 2000-3000 images at a time. Uploading of new images has not yet started. [For this count, assumed 26,963 as entered above]

MO = Nothing new to report.

NOSU = 0

NY = 86,805 (also includes bryophytes and fungi)

OKL = 0 (as far as I can determine)

OKLA = 0

SHST = 27,000

TAES = 0

TAMUCC = 0

TEX/LL = 0
FWNC = 0
HPC = 0
JFC = 0 [=Lady Bird Johnson Wildflower Center]
PAUH= 0
SAT = 0
SRSC= 2,037
TLU = 6,673

TTC = 0

UTEP = 82,652

Total number of records available in iDigBio portal (cumulative): 446,834

- Number of records available in TORCH Symbiota portal (cumulative):

BRIT = For BRIT-SMU-VDB-NLU: 168,500 (All Texas and Oklahoma records)

For TAC: 7,064 (All Texas and Oklahoma records)
For NTSC: 4,944 (All Texas and Oklahoma records)
For ACU: 2,680

BAYLU = approximately 10,000 (non-transcribed)

HUH = 41,556

KANU = All KANU records uploaded to GBIF and iDigBio should be accessible via the TORCH portal. [For this count, assumed 26,963 as entered above]

MO = Nothing new to report.

NOSU = 0

NY = 79,791 specimen records

OKL = 134,481

OKLA = 54,833

SHST = 0

TAES = 234,741

TAMUCC = 0

TEX/LL = 229,019
FWNC = 0
HPC = 22,897
JFC = 0 [=Lady Bird Johnson Wildflower Center]
PAUH= 6,418
SAT = 38,699
SRSC= 2,037
TLU = 6,751

TTC = 21,615

UTEP = 84,024

Total number of records in TORCH Symbiota portal (cumulative): 1,177,013

Share Best Practices, Standards, and Lessons Learned

Best Practices and Standards (Lessons Learned):

BRIT: Nothing new to report.

BAYLU: Nothing new to report.

HUH: Nothing new to report.

KANU: Nothing new to report.

MO: Nothing new to report.

NOSU: Nothing new to report.

NY: Nothing new to report.

OKL: Nothing new to report.

OKLA: Guides (documentation) for renaming files by reading barcode and post-processing image correction drafted.

SHST: Nothing new to report.

TAES: Nothing new to report.

TAMUCC:

Always clean workspace after specimens have been removed from/placed in cabinets or after a digitization session to prevent any opportunity for pests to invade and to maintain cleanliness of the herbarium.

Affix the black felt to the bottom of the Ortery light box and affix both the color card and the ruler to the black felt near the top so that getting images in and out of the light box is more efficient. The images tend to look more uniform this way as well because we do not need to place the color card and ruler onto the specimen sheet itself each time.

Lightroom Classic has a feature where if you select an export preset, it does not autofill the export information boxes (leading me to believe my export presets were set wrong) even though your export should still follow the preset guidelines once exported. We have included this bit of information in our protocol so that future digitizers will save time being aware of this and not have to manually do each batch export.

Check that the images have properly been saved in their respective folder in the correct format for raw images, DNG files, and JPEG files after each digitization session. We also keep a log where we can confirm the number of images that were taken that session, who completed the session, who conducted the quality check of images (WB correctly, exports are correct), and the date of TACC upload.

TEX/LL: Nothing new to report.

TTC: Nothing new to report.

UTEP: Nothing new to report.

Share Identified Gaps in Digitization Areas and Technology

Identify Gaps in Digitization Areas and Technology (issues preventing progress):
BRIT: We have not yet begun the georeferencing effort, and are developing materials and methods to instruct staff, students, and possibly volunteers. We have had discussions with other TCNs to learn from their expertise.

BAYLU: Current technician has left position as of 12/31/20, in need of replacement.

HUH: We are currently working on an upgrade to our storage network. Working restrictions due to COVID and recent staff retirements have caused these upgrades to take longer. Specimen imaging continues at near-normal levels, but the ingest and of those images and transcription/new record creation is on hold until storage upgrades are finished.

KANU: Nothing new to report.

MO: Nothing new to report.

NOSU: Nothing new to report.

NY: During our lockdown, we ran out of previously-imaged specimens to transcribe, so we shifted the focus to georeferencing. The Lead Digitizer, McKenna Coyle, was cleared for return to onsite work two days per week in September, but due to illness and quarantine, she was only able to work for two weeks (four days) that month. Since October 1, she had been maintaining the schedule of two days onsite per week, creating skeletal records and imaging specimens. During the remaining work time, she and Intern Alex Patrascu are doing transcription and georeferencing.

OKL: When we have a second digitization station, we will be able to start working with subawardee Northeastern State University and digitizing provider collections.

OKLA: Need segmentation/OCR of accession stamp to link existing database records to images as they are obtained.

SHST: We have identified 2175 datacaptured herbarium sheets that do not have accession numbers, and there are an additional 2000 specimens that have duplicate accession numbers. We are in the process of cleaning up these errors so that all of our specimens have a unique accession number.

TAES: Nothing new to report.

TAMUCC:
Occasionally, when there is a lot of white space on the specimen sheet, the mounted camera has difficulty focusing on the specimen and is unable to capture a photo. This occurrence would mean that I would have to switch the camera from auto to manual and manually focus the lens. This would make it very hard to obtain images in a timely manner. A trick that Kyle Simpson passed along to me was to add very faint pencil marking to the sheet (which often is not distracting from image by any means) in order for the camera to auto-focus. This trick has seemed to help thus far for us, but I still wonder if there are other ways to avoid this problem.

Being a new user of Lightroom Classic and advanced cameras, we encountered many roadblocks when trying to get the settings right for our tethered capture. It took a lot of digging and learning about both Lightroom Classic and our camera type (which significantly slowed our progress for a while) before arriving at a place where we could even capture an image. Our methods of changing the tethered capture settings on our specific camera type (Nikon D800) are now in our protocol so that any future digitizers may not encounter these same obstacles.

TEX/LL: We were unable to receive a report from UTRGV – Edinburg. The retirement of Andy McDonald appears to have created an information gap. I am still working to identify the pertinent individual who will be taking responsibility for the herbarium.

TTC: Nothing new to report.

UTEP: As per above, imaging has been delayed due to Covid-19.

Share Opportunities to Enhance Training Efforts

Opportunities to Enhance Training Efforts; Training and Professional Development Opportunities you offered and/or participated in (e.g., webinars, student digitizer training, etc.):

BRIT: Continuing to host weekly Zoom sessions as part of the Armchair Botanist program, to engage Notes from Nature volunteers transcribing project specimens. The Armchair Botanist sessions were shifted from Thursdays to Wednesdays. Offered three additional and advanced training events (via Zoom) for BRIT volunteers interested in transcribing directly into Symbiota (including those previously not contributing to online Notes from Nature transcriptions).

BAYLU: Nothing new to report.

HUH: Nothing new to report.

KANU: One hourly student (Megan Wetherington) was trained in use of the imaging station. She is now doing most of the imaging. Other students currently are assisting with other aspects of the project, such as retrieving and refiling specimens, and performing quality control on Specify database records.

MO: Nothing new to report.

NOSU: Nothing new to report.

NY: Digitization staff have taken advantage of a wide range of webinars and online conferences sponsored by New York Botaical Garden, iDigBio, Royal Botanic Gardens, Kew, etc.

OKL: Nothing new to report.

OKLA: Guides (documentation) for renaming files by reading barcode and post-processing image correction drafted.

SHST: Nothing new to report.

TAES: Nothing new to report.

TAMUCC:
We have started to create and compile an 'herbarium technician binder' (online and a physical copy) in which we have included organized information covering the digitization process—from equipment manuals to becoming an authorized TACC user—in addition

to information and resources pertaining to collecting and pressing specimens, mounting specimens, data sharing, herbarium maintenance and cleanliness, education and outreach efforts, and other how-tos and extras. We believe this available resource will make our trainings for future herbarium volunteers and workers much more streamlined.

TEX/LL: Nothing new to report.

TTC: Nothing new to report.

UTEP: Georeferencing training has been offered to several student volunteers. One student will be following up with georeferencing by creating a plant list for a Texas state park as a UTEP research project.

Share Collaborations with other TCNs, Institutions, and/or Organizations

Collaboration with other TCNs, Institutions, and Organizations:
The TORCH TCN Project held two virtual Executive Committee meetings (with all 5 lead PI's in attendance), on December 10th, 2020, and January 15th, 2021. We have decided to hold these meetings on a regular, fixed schedule that will suit all members.

BRIT:

Opened discussions with stakeholders (Chuck Sexton and Deborah Holle) in the Balcones Canyonlands National Wildlife Refuge Herbarium in Marble Falls, Texas, for the purpose assisting them with the digitization of their collection (not currently included on the TORCH grant).

Met with Pteridoportal team to discuss Georeferencing through GeoLocate Co-Ge via Symbiota Processing toolbox.

Met with Katelin Pearson (California Phenology TCN; CNABH Portal Manager) to discuss georeferencing protocols and processes.

With Texas Master Naturalists group:
Participants in #transcriptionthursdays with the Armchair Botanist program with BRIT (Indian Trail Master Naturalists, Cross Timbers Chapter, North Texas Chapter, Highland Lakes Chapter, South Texas Chapter, etc).

Under the direction of Alan Nelson and Tiana Rehman, recruited a Tarleton State University (TSU) M.S. student in 1-hour independent study seminar through TSU to

assist with the georeferencing of TORCH material; hours will begin in earnest in February.

BAYLU: Nothing new to report.

HUH: Nothing new to report.

KANU: Nothing new to report.

MO: Nothing new to report.

NOSU: Nothing new to report.

NY: Nothing new to report.

OKL: Nothing new to report.

OKLA: Nothing new to report.

SHST: Nothing new to report.

TAES: Nothing new to report.

TAMUCC: Nothing new to report.

TEX/LL: Nothing new to report.

TTC: Nothing new to report.

UTEP: Nothing new to report.

Share Opportunities and Strategies for Sustainability

Opportunities and Strategies for Sustainability:
BRIT: Nothing new to report.

BAYLU: Nothing new to report.

HUH: Nothing new to report.

KANU: Nothing new to report.

MO: Nothing new to report.

NOSU: Nothing new to report.

NY: Nothing new to report.

OKL: Nothing new to report.

OKLA: New, higher capacity NAS emplaced for long term backup and transfer to TACC image server.

SHST: Nothing new to report.

TAES: Nothing new to report.

TAMUCC: We are constantly looking for ways to be more sustainable in our digitization efforts and herbarium maintenance techniques. Along these lines, we have only used a freezer-quarantine method for our specimens, and we do not administer any of the previously used fumigates (Carbon disulfide and Paradichlorobenzene) for pest control. Additionally, we use hefty reusable Ziploc bags for holding the specimens while in the freezer. Near the beginning, we used one-time-only plastic covers, but have since realized that the plastic waste generated by that method could be avoided.

TEX/LL: Nothing new to report.

TTC: Nothing new to report.

UTEP: Nothing new to report.

Share Education, Outreach, Diversity, & Inclusion (EODI) Activities

Methods of disseminating results to communities of interest (presentations, lectures, etc.):

BRIT:
Proposal submitted and accepted to present the Armchair Botanist program for digitizing TORCH specimens through Notes from Nature to the 2021 Texas Master Naturalist in February 2021.

BAYLU: Nothing new to report.

HUH: Nothing new to report.

KANU: Nothing new to report.

MO: Nothing new to report.

NOSU: Nothing new to report.

NY: Nothing new to report.

OKL: Nothing new to report.

OKLA: Nothing new to report.

SHST: Nothing new to report.

TAES: Nothing new to report.

TAMUCC:
We have worked to provide information about the Ruth O'Brien Herbarium to our campus community by inviting student reporters to cover our project and progress in our campus newspaper.

We conduct lectures for plant ecology and plant taxonomy, where the importance of herbarium specimens is thoroughly explained. Often the students who complete these course have a much better understanding of herbariums and their contributions to science, as well as our results here at the ROH.

TEX/LL: PI George Yatskievych gave a program in January 2021 to the Hill Country Garden Club in Austin on herbaria and the TORCH digitization efforts. It was attended by ca. 15 individuals.

TTC: Nothing new to report.

UTEP: The collection manager (Vicky Zhuang) on the project is organizing an art project with Art Faculty member to create an exihibit for the UTEP Centennial Museum involving Herbarium Specimens from the Chihuahuan Desert.

<u>Other Education and Outreach activities</u>:
BRIT: Tiana Rehman gave a presentation for the Amon Carter Museum of American Art about herbaria and a piece of art in the museum holdings. One slide of the presentation was dedicated to the TORCH TCN Project. "The Art of Nature" was a great success,

with a total of 117 people in attendance. The presentation was recorded and is to be made available on YouTube in the future.

BAYLU: Nothing new to report.

HUH: Nothing new to report.

KANU: Nothing new to report.

MO: Nothing new to report.

NOSU: Nothing new to report.

NY: Participated in WeDigBio by contributing records for transcription.

OKL: Nothing new to report.

OKLA: Notes from Nature transcription class project assigned in Fishbein's Field Botany course.

SHST: Nothing new to report.

TAES: Nothing new to report.

TAMUCC: We invite small groups of students to visit the herbarium and learn more about our specimens and their importance.

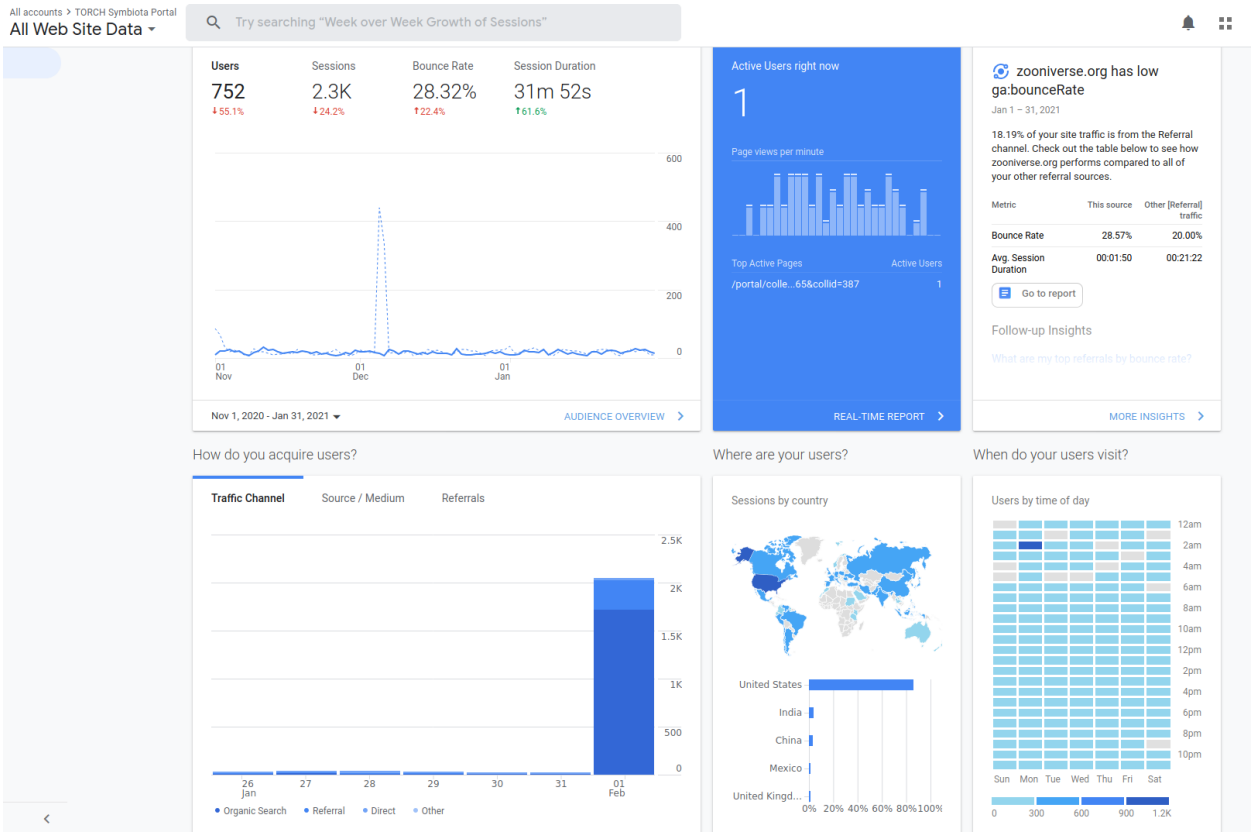
TEX/LL: Nothing new to report.

TTC: Nothing new to report.

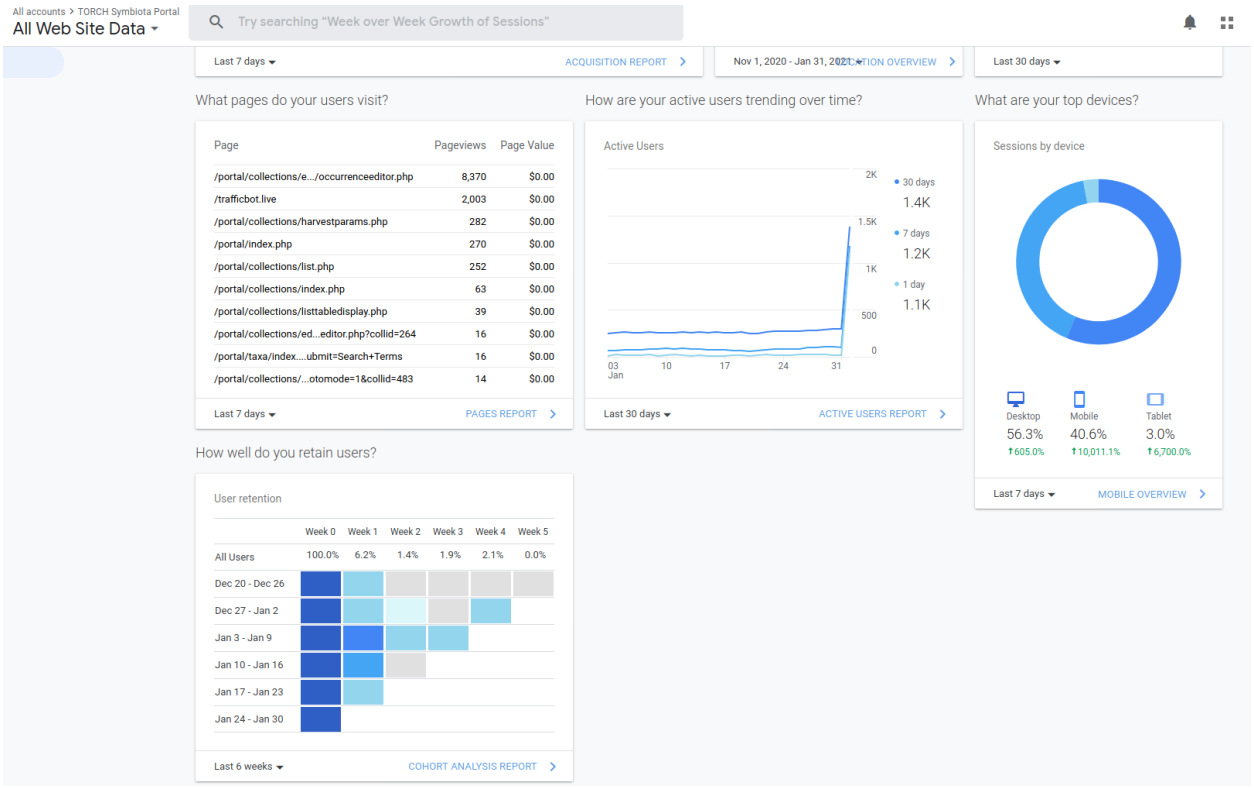
UTEP: Nothing new to report.

Share Information About Your Website and/or Portal Usage

Share information here. You can also embed graphics if desired, such as from Google Analytics.

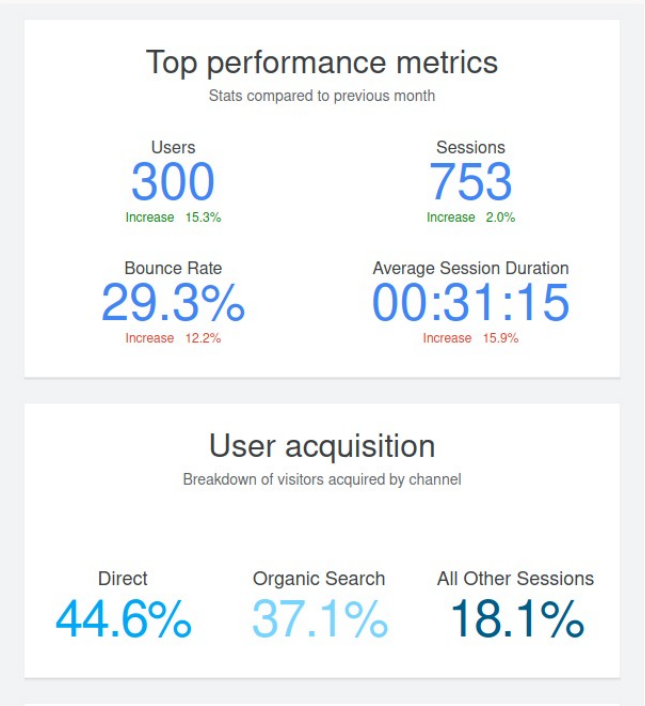


iDigBio
Integrated Digitized Biocollections



UF UNIVERSITY of FLORIDA
FLORIDA STATE UNIVERSITY 1851
FM FLORIDA MUSEUM
NSF

In January, you had 300 users visit your website (Google Analytics)



Share Other Activities and/or Progress

Products generated (publications, conference presentations, technologies/techniques, websites, etc.):

BRIT: Technological Innovator Jason Best and Data Manager Clay Barrett (at OSU) continue to work on improving the TORCH Digitization workflow and tools for automation of the process. These software tools are freely available on GitHub.

BAYLU: Nothing new to report.

HUH: Nothing new to report.

KANU: Nothing new to report.

MO: Nothing new to report.

NOSU: Nothing new to report.

NY: Nothing new to report.

OKL: Nothing new to report.

OKLA: Nothing new to report.

SHST: Nothing new to report.

TAES: Nothing new to report.

TAMUCC: Ruth O'Brien Herbarium-specific digitization protocol.

TEX/LL: Nothing new to report.

TTC:
New preprint featuring specimens from Guadalupe Mountains National Park, georeferenced as part of the TORCH TCN project.

Study led by an undergraduate, submitted for peer review at Applications in Plant Sciences:
Slimp, Madeline, Lindsay D. Williams, Haley Hale, and Matthew G. Johnson. "On the potential of Angiosperms353 for population genomics." bioRxiv (2020). Doi: 10.1101/2020.10.11.335174

UTEP: Nothing new to report.

Participants (especially those who have newly joined the project):
BRIT:

Ashley Bordelon, Digitization Coordinator (virtual engagement); abordelon@brit.org
Joe Lippert, Digitization Coordinator (imaging and image processing); jlippert@brit.org
Diego Barroso, TORCH TCN Project Manager; dbarroso@brit.org
Tiana Rehman, Collections Manager/Institutional Rep; trehman@brit.org
Jason Best, Dir. Biodiv. Informatics/Technovator; jbest@brit.org
Peter Fritsch, VP of Research/PI; pfritsch@brit.org
Jessica Lane, BRIT Herbarium Assistant; jlane@brit.org
Tessa Boucher, Digitization Technician, tboucher@brit.org
Rachel Carmickle, Herbarium Technician, rcarmickle@brit.org

BAYLU: Nothing new to report.

HUH: Nothing new to report.

KANU: No new participants. Zoe Chan, an hourly student who was unable to return to the university at the start of the fall semester, did not work for the us during this reporting period.

MO: Nothing new to report.

NOSU: Nothing new to report.

NY: McKenna Coyle, Lead Digitizer
Alexandra Patrascu, Intern

OKL: Nothing new to report.

OKLA: Four undergraduate workers continued imaging.

SHST: We have submitted the paperwork to hire two undergraduate students to the project:
Laura Bianchi
Jesus Castillo

TAES: Nothing new to report.

TAMUCC: Barnabas H. Daru
Jordan Rodriguez (newly joined)

TEX/LL: Nothing new to report.

TTC: Yanni Chen (Herbarium graduate assistant). Undergraduate assistants: Dawson Westurn, Chase Bergeron, Jared Salzman, Jennifer Mendez

UTEP: UTEP undergraduates:
Ianellie Munguia (new Fall 2020)
Justin Gaenzle (continuing)
Carlos Vargas (continuing)
Muriel Norman (continuing)
Alexis Vallejo (continuing)
Aparna Mangadu (continuing)

All students georeferenced, being trained and supervised by our collections manager Mingna “Vicky” Zhuang.

Other Progress not listed above (anything else to share):
BRIT: Nothing new to report.

BAYLU: Nothing new to report.

HUH: Nothing new to report.

KANU: We continue to carry out strategic curatorial and collection management work on specimens, especially those from OK and TX. This work is handled by the Collection Manager and/or a student employee not working on the TORCH grant. It has resulted in significant collateral collection improvements, such as replacing several thousand worn genus folders, refoldering specimens to reduce compaction, repairing damaged specimens, annotating specimens, and updating the Specify taxonomy tree.

MO: Nothing new to report.

NOSU: Nothing new to report.

NY: Remaining work to do in year 2:
Skeletal records: 28,520 (out of a promised 57,000)
Specimens imaged: 32,698 (out of a promised 57,000)
Full transcriptions: 24,049 (out of a promised 77,000)
Georeferences: 15,914 (out of a promised 68,267)

OKL: Nothing new to report.

OKLA: Nothing new to report.

SHST: The biggest challenge to the grant is that Justin Williams was made the PI of the project on October 30th, 2020. With this change in management, he will now be the point of contact at SHSU, and not Will Godwin. This change has yet to be officially made at the SHSU level.

TAES: Nothing new to report.

TAMUCC: We plan to start making YouTube videos of certain aspects of our efforts in an attempt to not only reach more people but also to have available resources for any future herbarium volunteers/workers.

TEX/LL: Nothing new to report.

TTC: Nothing new to report.

UTEP: Nothing new to report.

Questions/comments:

BAYLU: The Baylor Department of Biology has decided to move the Herbarium in May 2021. This may create some disruption of progress. We have attempted to stall this move, however to no avail.

MO: I have tried to devote some of my time to databasing and imaging specimens, but I can only do it at odd times and for relatively short periods. It is endlessly frustrating.

OKL: In the summer, assuming the Covid-19 situation has improved, we plan to train an undergraduate student to work with Leann, which should increase the progress of digitization considerably.

SHST: We are exploring the possibility of being one of the TORCH institutions that can borrow a roving imaging station to digitize our herbarium sheets. We would also like to see if we can transfer the funds currently available for equipment into salary.