



NATIONAL TROPICAL BOTANICAL GARDEN

Chartered by Congress To Create A National Resource In Tropical Botany

Strategic Plan for the Herbarium (PTBG), National Tropical Botanical Garden 2020-2022

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Executive Summary

The herbarium of the National Tropical Botanical Garden (PTBG, formerly Pacific Tropical Botanical Garden) was founded in 1971 and currently houses a collection of approximately 89,000 specimens. These collections focus primarily on the plants of the Hawaiian Islands and areas of the tropical Pacific (primarily Polynesia, Micronesia and Melanesia) with ca. 86% of the collections from these areas. The collections include native, cultivated, and invasive vascular plants species as well as bryophytes, lichens, marine algae and fungi. The herbarium serves as a scientific resource for all of NTBG's five gardens as well as all governmental organizations and NGOs involved in conservation on the island of Kauai, Hawaii, and beyond. Herbarium PTBG is the second largest herbarium in Hawaii with a very active collection program, primarily based on Kauai as well as in relation to major flora projects across the Pacific (e.g. Marquesas Islands, Samoa and Micronesia). On average about 2,000 new specimens are added to the collection each year. The herbarium is well updated, and partly ($\approx 60\%$) digitized. A custom built public herbarium database available through the herbarium's webpages houses the herbarium's data. The herbarium database is currently being integrated with the living collections database requiring some level of coordination between the two systems and departments.

This strategic plan has been created to guide the future growth of PTBG, to direct and focus our collecting plans and increase the awareness of our collections as a valuable resource for researchers, conservation practitioners, educators, amateurs, artists, and students both locally and globally. The strategic plan is a living document that will evolve and grow along with herbarium PTBG, reflecting future needs and directions while maintaining the past excellence of the collections.

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National Tropical Botanical Garden
Kalaheo, Hawaii, USA, September 2020*

Mission Statement

The mission of Herbarium PTBG is the documentation and conservation of Pacific island floras, and the dissemination of knowledge about those floras

Vision Statement

To inspire through our actions the appreciation of the tropical Pacific's natural heritage and acknowledgement of its importance in our common future.

Strategy Statement

We achieve our goals through cooperation both amongst NTBG staff and our network of collaborative partners within the state of Hawaii, the Pacific and globally, increasing not only our own knowledge and appreciation of plant systematics, cultural uses, and conservation but also that of the citizens of the tropical Pacific region.

Our Goals

1. Increase the **recognition of the value** of our collections among the scientific and public communities
2. **Encourage use** of the collections in collaborative science and research projects
3. Become a leader in **developing collections and collections staff** in Pacific island nations
4. Develop programs to **ensure the long-term care and maintenance** of the botanical research collections

1. Visibility and Recognition

Increase the **recognition of the value** of our collections among the scientific and public communities

Objectives

- Upload herbarium data to all applicable portals
- Produce 1 identification booklet every two years
- Institute local (Hawaiian) plant identification services
- Develop outreach events that expand the community awareness of the value of PTBG
- Develop celebration program for specimen number 100,000
- Develop programs and displays allowing visitors to engage with the herbarium and NTBG's mission.
- Develop a plan for increased strategic communication including via NTBG's social media
- Update the PTBG herbarium homepage
- Update Index Herbariorum PTBG entry
- Encourage priority of the PTBG herbarium for depositing of specimens and duplicates
- Take advantage of membership of Society of Herbarium Curators, SPNHC, and other relevant organizations to exchange and collaborate on ideas and increase community support
- Publish research utilizing data obtained from our collections
- Make proto-DNA collections publicly available for researchers through the Global Genome Biodiversity Network

2. Collections use

Encourage use of the collections in collaborative science and research projects

Objectives

- Consolidate our Associated Researchers program through specific commitments
- Create a program for citizen scientist plant collections
- Seek opportunities for attachment of NTBG postdoc and graduate students
- Identify strengths of the collections and their associated data for research opportunities
- Emphasize the use of the collections as part of the scientific basis for the development of Pacific Flora projects
- Emphasize the importance of non-Pacific collections for research use, i.e., Neotropical Rubiaceae and Monimiaceae, and Monimiaceae of the Malagasy region
- Invite colleagues to collaborate on research projects utilizing data available in our collections
- Make proto-DNA collections publicly available for researchers through the Global Genome Biodiversity Network

3. Regional leadership

Become a leader in **developing collections and collections staff** in Pacific island nations

Objectives

- Partner with other official herbaria in the State of Hawaii to strengthen exchange and support
- Partner with various Pacific island nations to mentor staff/collaborate on collection projects
- Become the recognized leader in specimen-based learning courses in the Pacific
- Host student internships from the Pacific through UH Hilo and other programs
- Improve curatorial expertise through collaborations and exchange of loans/gifts with staff, postdocs, students, associated researchers and other external expertise.
- Initiate science staff led generic/family level identification blitzes of Hawaiian flora
- Identify list of experts willing to receive specimens for identification - loans/gifts
- Prioritize data-basing/digitization of collection holdings - especially through dedicated volunteer corps
- Host yearly classes in lichenology, bryology, basic entomology, general plant family characteristics - Identify teaching collaborators and funding options
- Define and improve best practice protocols for producing high quality collections
- Increase the quantity of staff collections including through external funding of expeditions
- Produce a collecting priorities list
 - Garden accessions
 - Under-represented groups of plants
 - Under-represented geographic areas
 - Continuous representation of the flora of Kauai
 - Support of NTBG programs and scientific collaborations
- Expand ancillary collections, especially wood, seed/carpological - ongoing
- Establish program with local plant nurseries to voucher new and uncollected horticultural species

4. Management and conservation

Develop programs to **ensure the long-term care and maintenance** of the botanical research collections

Objectives

- Develop (with planning partners) a Strategic plan for the Herbarium
- Complete CAP assessment – 2020 [depending on COVID 19 restrictions]
- Develop 2-3 year accompanying action plan to implement goals of strategic plan
- Solve or mitigate existing climate control and pest issues
- Identify funding needs and opportunities
- Update the loan policy to mitigate collection damage and loss
- Increase staffing of herbarium
- Expand long-term, regular volunteer capacity in the herbarium
- Explore opportunities for student workers through UH or KCC with some kind of credit opportunity
- Develop up-to-date emergency preparedness plan with standard operating procedures and training objectives

SWOT Analysis

Strengths	Weaknesses
<ul style="list-style-type: none"> • PTBG is the only natural history collection on the island of Kauai, HI • Collections contain the most complete set of recent (since 1990) collections from Kauai in the state • Our departmental staff are some of the most knowledgeable botanists in the state of Hawaii • Our database is robust and always evolving to optimize our collections • The physical structure of the herbarium including cabinets are only about 10 years old, and designed to be hurricane resistant with dedicated back-up generator • Proximity to extensive reference library • Continuous collaboration with botanical artists • Associated proto-DNA tissue collection • Strong use for conservation assessments • Institutional pride and strong leadership support • A new and energetic department head who fights for the department and its collections • Ambitious Flora projects • Ample storage capacity 	<ul style="list-style-type: none"> • PTBG is not a recognized natural history repository for the State of Hawaii • Not first priority herbarium for collections in Hawaii and Pacific • We are physically isolated and hard to access for non-local users • We have not prioritized our collecting goals – no strategic plan until now • Our climate control systems are suboptimal (mainly as a factor of cost of electricity) • Our most knowledgeable staff are aging • Small staff with many other responsibilities • Small base of volunteers • Too little external awareness • Limited exchange and increase in collections from external collectors • Multi-use building • Backlog becomes overwhelming without more help • Lack of awareness of the existence and function of a herbarium on Kauai
Opportunities	Threats
<ul style="list-style-type: none"> • New funding resources • Increased understanding of the importance/value of the collections • Student and postdoc involvement 	<ul style="list-style-type: none"> • Loss of institutional knowledge if senior staff are not replaced in good time • Climate control, especially humidity, is suboptimal, creating an environment

<ul style="list-style-type: none"> • Synergy with new research projects and funding • Increased outreach/communication • Further development of herbarium webpages • Increased messaging through new tour program • External assessment of storage and heritage management conditions • Strategic partnership with other herbaria, researchers, and institutions • Increased use of specimens and data for diverse research and conservation projects • Opportunity for contributing to meta-data analysis of changes in traits, distribution and composition • Increased number of scientific publications based on collections • Synergy with NTBG's journal Allertonia. • Citizen science programs • Dedicated teaching collection 	<p>favorable to pest infestations, especially booklice</p> <ul style="list-style-type: none"> • Unsustainably laborious freezing scheme to mitigate insect infestations • Hurricanes and other natural disasters • Reduction in curation time due to competing activities • Data standards lowered with potential changes to database entry requirements and/or collection protocols • Unsustainable and unclear economic baseline • Project funding used for basic management activities • Lack of security during opening hours • A lack of understanding by some agencies about the need for continued physical documentation of collections, including invasive species, CITES listed species, etc., either from within the State or for specimens collected outside of the country
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Sustainability

Maintaining Strengths

Herbarium PTBG's main strengths lie in the most complete modern collection of Kauai plant specimens in the State of Hawaii and globally and their well curated and high quality associated meta-data and ancillary collections. The collections will be maintained by continued strategic addition of material to the collections maintaining the unique time and distribution series from Kauai and across the State. The continued investment in Flora programs across the Pacific helps strengthen a broader Pacific profile.

New, enthusiastic leadership combined with the institutional knowledge of long-time highly dedicated staff responsible for collection and curation offer unparalleled opportunities for growth and expansion, especially in areas of conservation assessment and floristic documentation across the Pacific. Increased awareness of the value and use of the collections and their data in

conservation work will help ensure continued flow of high-quality collections and associated data as well as critical continued institutional support.

Addressing Weaknesses

The main weaknesses are the lack of State recognition and priority status and limited awareness of the herbarium and the value of the collections to a broader and international audience. Increased communication and collaborations will help increase awareness and recognition. Opportunities for obtaining formal priority State repository status should be explored. Currently, the most direct and time-consuming weakness involves a constant battle against booklice infestations compounded by sub-optimally high humidity levels. Completion of a CAP grant collection assessment in 2020 will help us identify and address weaknesses in our climate control systems. Completion of a strategic plan in 2020 will guide us in the prioritization of collection goals and help focus our efforts on the continuous development of the collections and the wider awareness of their value and use. Reducing the backlog of non-intercalated and unmounted specimens as well as non-digitized specimens, will increase the material available for research and other uses as well as for exchange and gift programs, can be addressed through increased support from new volunteers, student and intern helpers, and additional temporary staff secured through external funding. Increased knowledge of our collections will also allow us to focus our recruitment efforts to align volunteers with needed herbarium priorities as well as highlight and advertise the unique collection housed in PTBG.

Capitalizing on Opportunities

The main new opportunities are increased external awareness and potential for research and conservation planning. An increased understanding of the importance and value of our collections, disseminated through a dedicated and inspiring webpage and new outreach programs and platforms including NTBG's social media, will improve our visibility in the conservation arena, lead to new opportunities for collaborations, and open the collections to novel uses and research avenues. Combining curatorial objectives with research, education and outreach activities will help activate the collections, raise new funding, and effectively communicate the existence and qualities of the collections to a wide audience. Increased networking with other herbaria and professional organizations can inspire new activities in all aspects of the PTBG strategic goals.

Mitigating Threats

Our most significant threat is climate control and the associated pest problems. Completion of the strategic planning process and CAP assessment will position us to address and mitigate the

underlying issues that are at the root of these problems as well as raise the necessary funding to ensure long-term climate and pest control solutions. Increased and targeted messaging about our mission and the high quality and curation standards of our collections will help establish the PTBG herbarium as a priority herbarium in the Pacific region, introduce us to potential new partners and funding opportunities, as well as ensure supportive collaboration with regulatory and permitting agencies. Finding opportunities for training of new collectors and curatorial staff will address the threat of aging staff and competing activities.

Organization

Herbarium PTBG is part of the National Tropical Botanical Garden. The herbarium of the National Tropical Botanical Garden (NTBG) was established as a scientific reference collection in 1971 together with the garden, which was originally named the Pacific Tropical Botanical Garden and the herbarium therefore has the official acronym PTBG.

The herbarium is a core facility of NTBG's Science and Conservation Department based on Kauai, Hawaii, and encourages use of specimens and data for research, education, art and communication, and welcomes enquiries and collaborations.

The herbarium is a scientific reference collection of permanently preserved plant specimens and include nearly 90,000 herbarium specimens focused primarily on the plants of the Hawaiian Islands and areas of the tropical Pacific (primarily Polynesia, Micronesia and Melanesia) with ca. 86% of the collections from these areas. The oldest collections date back to 1837. The collections include native, cultivated, and invasive vascular plants species as well as bryophytes, lichens, marine algae and fungi.

The herbarium is well updated, and about 60% of the collections are digitized and can be searched from the herbarium database and new specimens are added weekly. The currently 315 type specimens can also be found through JSTOR Plants database. A further backlog of about 11,000 specimens are pending mounting and intercalation.

The herbarium is an integrated part of NTBGs Science and Conservation Department and is both supported and used by NTBGs scientific staff. One full time curator oversees the management and development of the collections. A handful of dedicated volunteers and occasionally students and interns help with mounting of specimens.

Audience for the Strategic Plan

Planning partners; NTBG Garden Directors; NTBG Department Heads; NTBG Board of Trustees; NTBG Research Associates and collaborators, especially plant collectors; Herbarium users in general; Collaborating herbaria, primarily in Hawaii and the Pacific, existing and potential donors and funds.

Key Stakeholders

Internal

NTBG Board of Trustees; CEO/Director of NTBG; Department of Science/Conservation staff; Volunteer coordinator/Volunteers; NTBG Garden Directors (Southshore, Limahuli, Kahanu, the Kampong); NTBG Education Department; Living Collections Department; Horticulture Department; the Breadfruit Institute.

External

State of Hawaii Department of Land and Natural Resources (Permitting – State Botanist, Island Botanist); United States Fish and Wildlife Service; Conservation and Natural Resource management organizations on Kauai (Kauai Invasive Species Committee; Kokee Resource Conservation Program; The Nature Conservancy-Hawaii; Plant Extinction Prevention Program); public and private colleges and universities; Local K-12 schools; Amateurs; World-wide science community; State and Federal Legislators, Funding Agencies.

Strategic Planning Partners

The NTBG strategic planning team is composed of:

- Tim Flynn – Curator of the Herbarium,
- Nina Rønsted – Director of Science and Conservation,
- David H. Lorence – Senior Research Botanist (former PTBG Curator),
- Kenneth R. Wood – Research Biologist,
- Seana K. Walsh – Conservation Biologist,
- Dustin Wolkis – Seed Bank and Laboratory Manager,
- Tobias Koehler – Director of South Shore Gardens,
- Janet Mayfield – CEO and Director of National Tropical Botanical Garden.

Evaluation

Benchmarks and milestones for outputs and outcomes of activities targeting our stated goals are to be detailed in a separate document.

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