



**2022-2023 Royal Horticultural Society/Garden Club of America  
Interchange Fellowship  
Silas Zoeller  
Final Report**

At the start of my time as the RHS Interchange fellow I most frequently described my interest in the world of plants as lying at the intersection of conservation, collections, and public gardens. My understanding of what each of these includes, and can be has evolved and broadened radically as a result of my time spent in the UK working at some of the great gardens of the world. I was given the chance to work with plant collections of unparalleled diversity and interest, with gardeners with incredibly varied philosophies as well as skill sets, and in aid of so many incredible organizations working to connect people and plants the world over. Comparing what knowledge I had of horticulture in the US with these experiences I have formed deep and meaningful relations with those same concepts that I used to describe my interest going in to the fellowship and have both taken on the ideas of the people I worked amidst as well as forming new ideas I hope to pursue further as my career develops.

## **The Role of Horticulture in Conservation**

In the realm of conservation I was struck by both the many ways that plant species, cultivars, and genetics can be stewarded and also by the plethora of challenges and shortcomings that face many programs to save these valuable resources. One place that I was struck by this was at the Royal Botanic Garden Edinburgh's satellite at Benmore. The garden is a magnificent one set into the grand hills and fog of Western Scotland, and houses stellar collections of plants from various regions that are planted into areas that aim in some ways to recreate the ecosystems they came from. From broad swathes of Rhododendron species to a hillside dominated by Chilean plants many rare and threatened plants can be seen to thrive in the climate most defined by its high rainfall. To see these plants excel in an ex-situ location in some ways very different from their native habitat was really inspiring, *Nothofagus dombeyi* readily reseeding itself, and masses of *Rhododendrons* spreading tens of feet from their centers by layering clearly spoke to the promise of the garden as a backup for these species. Even within individual species the collections stored at Benmore make an effort at capturing the genetic diversity among different areas of a plant's native range, something lacking in much of the material collected long ago during the Victorian era of plant explorers. It was thrilling to see so much variation between the specimens of *Araucaria araucana*, varying shades of foliage and forms that I had not seen from the species before. Finding a location for these plants to thrive, collecting from a variety of locales, and not divorcing these incredible plant specimens from their identity as components of far-off floras are all things that make Benmore an astounding ex-situ collection. However, at the same time there is something inherently lost in the picture of these recreated biomes as the full breadth of the flora is not represented and one must question whether connections between these missing plants and those better represented are also lost in these types of collections. The climate too, while a boon to the growth of so many of these plants, also threatens its stability as a collection for conservation as the extreme rains allow for the spread of the fungal pathogen *Phytophthora*, which can quickly devastate some plants, in particular the Rhododendrons for which Benmore is so well known and valuable. As this and other conservation collections develop these are issues worth making an effort to alleviate, perhaps by spreading collections to more locations and continuing to bolster the range of plants collected from each region represented. I have no doubt that the team and administration will continue to innovate in this

realm, just as they have in collecting a broader range of genotypes, and that Benmore will long continue its role as an outstanding trove of botanical knowledge and stunning plant specimens.

In contrast to the preservation potential of the ex-situ collections at Benmore, the native plant conservation program at the main site of the Royal Botanic Garden Edinburgh is seeking to propagate native species on the brink in order to reintroduce them to the wild. These plants come with a host of challenges as they often reproduce poorly by seed or have very exacting demands for their habitat. The team at RBGE wears many hats in the process of saving these species, from habitat scouting through herbarium specimens and site visits, to innovating propagation protocols through grafting, tissue culture, and elaborate recreations of a plant's native habitat. The most striking example of this might be the program around *Saxifraga hirculus*, which is currently found at only 7 sites in Scotland and is threatened by habitat loss due to climate change. *S. hirculus* grows in highly oxygenated riparian areas and has been very difficult in cultivation. The intrepid team however worked to pull together all the scientific literature on the plant and its preferred circumstances and created a unique system of terraced aquatic trays through which water is continually stirred and oxygenated then passed over the baskets of saxifrage recreating the stream the plant generally calls home. Often the scientific work on conservation and the horticultural skills to grow these plants are divorced much to the detriment of species of concern, the bringing together of these two worlds as well as the ingenious solution it created was perhaps the most inspiring moment of my time in the UK. The work that the team does is extremely innovative and is producing some amazing results, however to save these species the team must also override the natural order of genetic flow. This means crossing genetics from disparate sites and even populations in different countries at times to introduce variation that could be crucial in stabilizing long-isolated and at-risk groups of these plants. The horticulturists I talked to admitted that this is indeed a fine line, as is the selection of suitable habitats, balancing the historical range of a plant and the ever-changing landscape of our climate change stricken world. The question of genetic integrity and human interference in speciation processes vs the chance of losing these plants entirely is one that the conservation community must reckon with constantly and is by no means over. Much the same as the debate over in-situ and ex-situ work, different programs have different approaches and in many cases an increase in collaboration and public communication may create backlash or expand the idea of conservation in a way that opens it up to the assistance of far more people. These takeaway questions are something I plan to continue asking conservationists and lovers of rare plants in the future as I form my own thoughts on the matter.



Cultivation of *Saxifraga hirculus* at Royal Botanic Garden Edinburgh. The plants are grown in custom baskets in a constructed waterfall to provide for the flow of oxygenated water over the plants' roots



Success as a seedling of *S. hirculus* springs to life!



The Chilean hillside at RBGE Benmore

## **Collections Management and Maximizing Potential**

Having previously worked at a garden that dealt mainly with cultivated material, learning about the management of wild collected specimens and its importance was a huge takeaway from the botanical institutions I visited. At the National Botanic Garden of Wales, Kew, and RBGE I became familiar with collection numbers, styles of record keeping, and the way in which collections can be used to benefit a number of different organizations and shareholders. The horticulturists at these institutions painstakingly record the important events in the life of the plant specimens in their care, from repotting to propagation. The origin and life history of the plant are maintained through databasing and notation that can later be crucial to research, conservation, and education efforts. In this way botanical collections begin to function like museums, where the labeling and information attached to each accession becomes fully integral to the purpose of the plant itself. However while the management of these collections is relatively high level, and done quite studiously I had great conversations with colleagues at these institutions about the great amount that could still be improved upon universally. The standardization of how accessioning is handled, and particularly at what point accessions should be split due to propagation (and what methods this would apply to) and at what point a propagule can no longer truly be considered wild material. It would also be fantastic to see the importance of this kind of management and notation be spread further to smaller and private institutions, much could be gained from a standardized way of handling this key botanical information. Both in the UK and in the US botanical gardens could learn much from the curation of museums and museological concepts which would allow for better and more meaningful access to those who use gardens' collections.

Questions over the use of collections and how they can be made more available and more effective for research, conservation, education, etc. also became central to my experience in the UK. I had opportunities to meet with plant pathologists, conservation research teams, and to tour multiple herbaria. These experiences helped to illuminate the great potential held by international botanical collections, as well as some of the frustrations in maximizing this potential for everyone. Perhaps one of the most striking examples of this is the difficulty in sharing plant material or in locating specific plant material needed for any number of projects. Increasing legal difficulty relating to the movement of plants is a near universal gripe of horticulturists and collections managers in every country. I saw both sides of this issue during my time in the UK. When talking to plant pathologists at RHS Wisley I began to understand the great risk, and past disasters, that come with reckless transport of plant material. The potential for spread of unnoticed or unknown pathogens is certainly something that should be taken seriously, as was made evident by the public signs warning of the now invasive Oak Processionary Moth across the UK. At the same time a lot of value can be provided through reasonable movement of plants. Many gardens I visited had collections they were in the process of adopting either from private owners or from other gardens who did not have sufficient facilities to care for them. Other gardens I visited were working to place rare plants held in their collections in various other locations for conservation. An extremely important example being the UK overseas territories team at Kew. This team works to collect at-risk plants from the UK's overseas territories and develop propagation protocols for the plants and further specimens to return to the plants native range, strengthening populations and on the ground capacity for habitat renewal. Clearly there is an impetus for the plant community and international

governments to find a suitable balance or perhaps a universal policy for the transfer of plant material in the future.

Another way in which I appreciated the collection management of gardens in the UK was the way in which they took efforts to make their collections meaningful. By creating collections focused on particular regions, plant groups, or habitats the individual plants can become far more meaningful for the aforementioned goals of education, conservation, and research. The national collections program run by Plant Heritage in the UK was a recurring theme throughout my time in the country. The program incentivizes gardens to assemble as comprehensive as possible a collection of a particular group and publicizes that information. This includes both cultivated and wild-type material and many of the gardens I visited took great pride in housing various national collections. Other programs like RBGE's conifer conservation program also seek to form a comprehensive collection spread across the country, strengthening the longevity and availability of these important specimens. This is especially important in situations such as the renewal of glasshouses or other garden areas which can endanger long standing collections that are held only in one location. This spirit continued into the herbaria and historical collections at the gardens I visited as well, rotating displays in the welcome and science buildings often highlighted important preserved collections or put the collecting history of these great gardens in context. These collections are also being increasingly made available to both the public and broader scientific community through digitization efforts and volunteer involvement working on herbarium mounting and maintenance.

Strikingly though as with many gardens in the US the databasing of plant specimens is often incomplete, unavailable to the public, or split across multiple management systems. This is another area in which a universal standard could help immensely in aiding gardens that wish to fill gaps in their collection but don't know who holds specimens that could help or researchers doing surveys of groups that need to know where the full range is held. Great tools like BGCI Plantshare and the ages old Index seminum program are often underutilized and even direct communications between gardens with similar collections are rare or nonexistent. Better networking in these areas could certainly strengthen the power of the botanical community to produce meaningful work and results, as well as help protect against the loss or obfuscation of incredible collections developed over decades and centuries.



One of Kew's impressive collection of *Haworthia* note the IUCN status tag



Part of the Mathers Orchid Foundation collection used in breeding and made available for research



The national collection of Bromeliads at Walton Hall



View of the Conifer research house at RBGE housing part of the International Conifer Conservation Program

## **The Role of Public Gardens and Public Horticulture**

One of the largest and most evident differences between horticulture in the US and the UK is the notoriety and ubiquity of gardening. Plants and gardens are embedded deeply in British culture and during my time at UK gardens I sought to understand the role they play in society and in what ways this has led to the widespread love of plants. I found that far beyond just their role in conservation and collections, public gardens work to benefit all areas of life in the country.

An incredibly important trend that I noticed particularly at RHS gardens was the focus on communicating what gardens can do for people's health and wellbeing. The gardens themselves, the messaging, and many of the organization's programs work to create a personal connection with the people they reach, and therefore prove their essential nature in our lives. At RHS Wisley this took the form of research into the direct effects of green spaces on people, and gardens that invited people to engage their senses or to spend time meditating on their connection to nature. At other gardens, areas would be designated quiet zones allowing people to connect with a garden individually and without distraction. Both research and visitor feedback showed a great benefit to people who engaged more frequently and meaningfully with green space. In the US this type of messaging is rare and generally attributed to large parks, in an increasingly chaotic world this type of hopeful messaging could really change the way people see visiting public gardens or even gardening in their own yards.

Public gardens in the UK also make themselves essential to the community and often work to reflect aspects of the people using and visiting them. Fantastic examples of this can be found at the RHS's newest garden Bridgewater. Much of the garden's architectural features and layout reflect elements of the city of Manchester's industrial history, with one garden mapping the canals of the city punctuated by trellises designed to resemble smokestacks. Another garden that's development is underway aims to connect with the large Chinese population in Manchester blending the natural British landscape set into the garden slowly towards a more formal and traditional Chinese garden. Local visitors often expressed great pride in the garden and remarked at the way it and the city had taken ownership of each other. Much in the same way that Bridgewater has and will continue to become a point of pride and identity for Manchester, rural gardens can form a great heart for smaller communities. Great Dixter for example not only serves as a nationally recognized site of artistic beauty and history but actively spread its philosophy to its local community. Head gardener Fergus Garrett makes talks to the local garden club, its nurserymen attend the local plant fairs, and fellow nurseries gather for Dixter's own legendary plant fairs. The garden also hosts a slew of classes given intimately on site person-to-person to continue on the legacy of its style and innovation in garden design and mindful gardening for native wildlife.

As each public garden works to bolster its own connection to society-at-large plants gardens really become a part of the national consciousness in a way that's unheard of in the US. The experience of Chelsea Flower Show was an incredible eye-opener to just how high-profile gardening can be when outreach and personal connection are made central to the work of horticulturists. The event attracts tens of thousands of people including celebrities, and national television coverage. People eagerly seek out their favorite designers and nurseries to explore their displays and predict the medals they will earn.



The level of engagement and glamor is something I never believed could revolve solely around plants! Here too it's evident the power of making horticulture personal as the show gardens seek to raise awareness for important issues like homelessness, mental illness, food insecurity, and many more. In this way the event works to give back and raise the profile of several other charities as well as the profile of the RHS and horticulture broadly within the country.

Yet it isn't even solely within gardens and shows that the importance of plants and horticulture makes itself known within the UK. At many of the museums I visited whole sections would be devoted to fossil plants and discussion of plant evolution. Art galleries as well very often featured works or exhibits focusing on botanical themes. Even public parks often have high quality garden displays created by local garden clubs or city councils, sometimes with the support of major organizations like the Royal Botanic Garden Edinburgh. Clearly there is a lot still to be done in the US by public garden when it comes to reaching greater audiences, proving the essential nature of plants in our lives, and unlocking the power of growing within and with local communities in ways that will improve people's lives, the environment, and the profile of horticulture within the country.

Education within public gardens and public horticulture was also something I took great notice of in the UK. While education outreach to the public bears a lot of similarity to that in the US, with fantastic trials gardens and educational programming for all ages, the internal education was strikingly different. Nearly every garden I went to had a group of students learning horticulture through hands-on work placement, formal teaching, and examination whether through national schemes or unique certifications. This sort of experiential learning in concert with academic teaching is rare in the US, while some gardens have internship or student programs they often lack a tangible qualification or significant classroom learning. University programs offer the latter two but often miss out on the hands-on skills based learning that actual time in a garden or nursery provides. The breadth and availability of programs in the UK and the ability for them to be delivered by experienced garden staff is incredible and produces an amazing quality of preparedness in their students while also giving them the formal certifications required to find high-level work. Not only this but the learning is delivered collaboratively, both from a teacher and student perspective. Teachers from these courses often come from a wide variety of backgrounds and usually include skilled individuals from other organizations, and the students by working amidst a cohort of their peers form important industry connections and nurture their own learning and passion within a community. Getting to join the Wisley student community for a time was an incredibly exciting opportunity and I gained so much more by trading ideas and knowledge with them than I would in another setting. Students and even employed horticulturists frequently do placements and work experiences at other gardens as well, allowing for the trade of information and techniques between organizations while also giving a broader base to horticulturists across the country. In a time where so many bemoan the lack of qualified young horticulturists in the US, clearly there is an incredible amount to be learned from these types of programs and to be gained by investing in them here in the states.



The Chinese Streamside Garden at RHS Bridgewater



Rock garden at Saughton Park, created and maintained by Edinburgh city council and the Caley Horticulture Society



Samaritan's Listening Garden at Chelsea Flower Show

## **Takeaways and Acknowledgements**

One of the concepts I had been toying with prior to starting the fellowship was the value of bringing together the skills and knowledge of researchers and scientific botanists with those of the horticulturists who grow, preserve, and manage the great plant collections that form the foundation of that knowledge. Perhaps the most quintessential takeaway from my time in the UK was a strengthening of this idea and a desire to work to bridge those two worlds. Many of the most inspiring horticulturists I met during my time in the UK worked very closely with researchers, aiding in publications, using scientific literature to inform their horticultural decisions, and learning the complex inner workings of the plants they specialized in. This sort of interdisciplinary work ethic is very important to me and I strongly believe it holds a great deal of value for all the realms that I am so passionate about. The way we conserve plants, the way we collect and manage important groups of plants, and the way in which we communicate our learning and passion to the public all stand to benefit greatly from a closer and more collaborative relationship between the science and art of horticulture.

The other core takeaway is of course the drive, wisdom, and eternally giving nature of the horticulture community. My time in the UK would absolutely not have been the same without all of the impassioned discussions with students, moments of wonder at the work of great plantspeople, and the time given to including me on so many incredible experiences. To that end I want to thank all of the gardens who hosted me, those who let me lend my inexperienced hands to their work, those that provided transport to see and experience things that would otherwise have been out of my grasp, and everyone who indulged my effusive amazement at the gardens and plants of the United Kingdom. A particular and most important thank you to Rowena Wilson who helped me negotiate all of the moving parts that went into making this experience possible with the greatest tact and guidance, and pushed me to make the absolute most of my time. And of course to the wonderful folks at the RHS and Garden Club of America for believing in the importance of this experience and the value of the young people who benefit from it year after year, it has been a truly life-changing year and I still cannot believe all that I have done and seen thanks to your generosity.



Watching for owls with the RHS Wisley Students in our off hours



Botanizing for native orchids with the Wisley Students



The fantastic work placement students during my time at Tresco Abbey